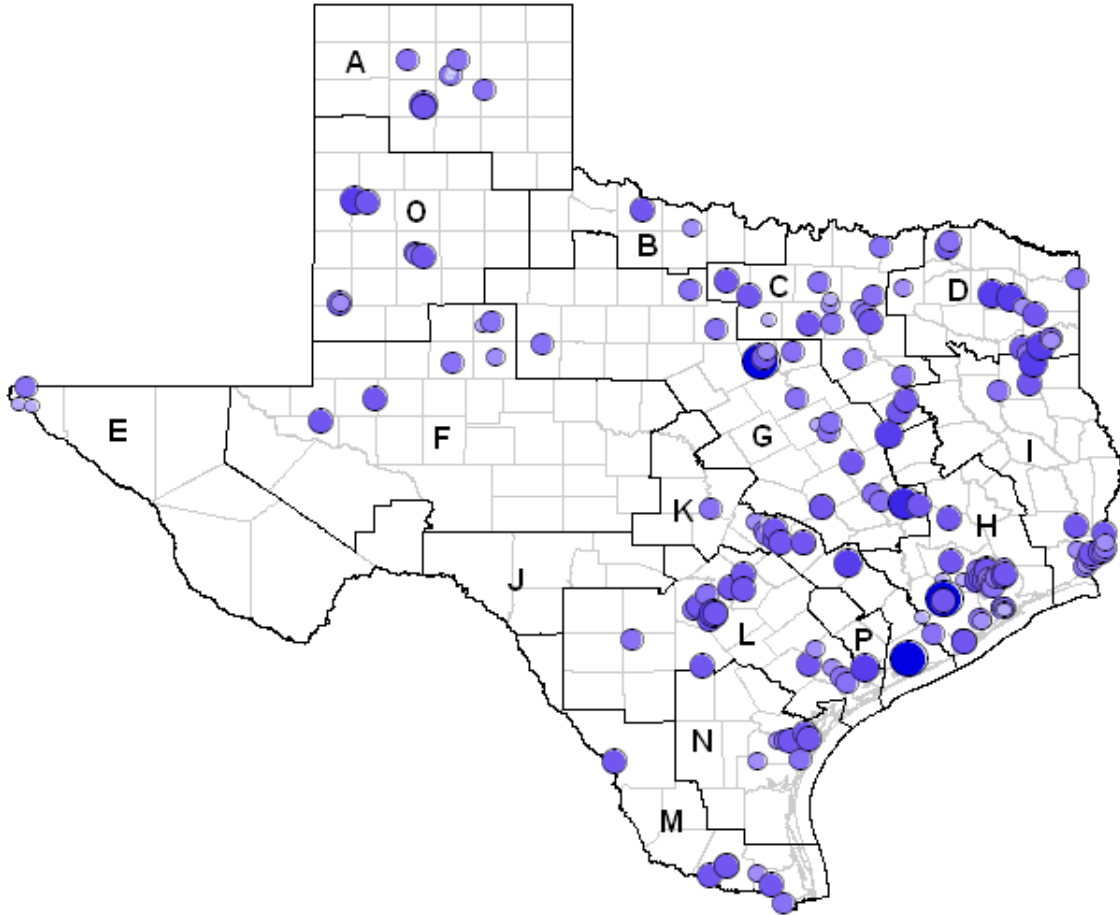


Water Demand Projections for Power Generation in Texas



Prepared for
Texas Water Development Board

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Executive Summary

The generation of electricity usually requires available water for diversion, withdrawal, and consumption. Up to 1 gallon of freshwater may be consumed for every kilowatt hour (kWh) generated in the case of some coal and natural gas plants. Other electricity generation sources, such as wind power require a negligible amount of water. We estimate that for Texas in 2006, the electric power sector water demand was approximately 482,000 acre-feet during the year resulting in an average water consumption rate of 0.39 gal/kWh. All of this water is consumed in thermoelectric, or steam-electric, generation (coal, natural gas, and nuclear), with a majority required as cooling water for condensing process steam.

The typical water consumption rate in gallons per kWh (gal/kWh) for the Texas power generation fleet is 0.2-0.7 for coal and natural gas using steam turbines, 0.6 for nuclear, 0.23 for natural gas combined cycle units using cooling towers, and 0.0 for wind turbines. The water consumption rates are a factor of both the type of power generation unit and the cooling system employed. Open loop (or once-through) cooling systems are widely used in Texas using both fresh and salt water. These open loop systems have relatively large water withdrawal rates but smaller direct consumption rates because very little water is evaporated within the power plant. Approximately half of the cooling process is performed by discharged warm water evaporating from adjacent cooling ponds and lakes, an estimated 125,000-250,000 ac-ft/yr, or one-fourth to one-half of thermoelectric water consumption in Texas. Power plants using closed loop cooling systems with cooling towers are designed to withdraw roughly the same amount of water that is consumed through evaporation within the power plant. Power plants with cooling towers require much lower withdrawal than open loop systems, but tend to consume nearly twice as much at the power plant. Air-cooling systems have negligible cooling water demand but result in a decrease in the energy efficiency of the plant. This efficiency loss can be larger than 5% when ambient outside air temperatures exceed 95 F. Currently two natural gas power plants in Texas use dry cooling.

Texas' future water demand for the electric generation sector depends on: (1) the rate of economic growth and resultant future demand for electric power; (2) the future mix of generation capacity (natural gas combined cycle, pulverized coal, advanced coal, nuclear etc.); (3) whether or not a price is put on carbon dioxide emissions (for mitigation of global warming) such that some power plants have incentive to employ carbon capture and storage technologies; and (4) the extent and success of future efficiency programs. Projecting future energy demand and resource utilization on a time scale of decades is very difficult. This difficulty is particularly true for the current business climate given the uncertainties outlined above. Nonetheless, this report attempts to project electric power demand and associated water needs in Texas over the next fifty years.

To project future water usage for power production in Texas it is necessary to project the type of power plants that will produce power in the future. One of the important drivers for power plant construction and dispatching decisions is the future cost of natural gas. Unfortunately, natural gas prices are very difficult to predict. Natural gas prices are defined as "high" if they are high enough to prevent natural gas combined cycle (NGCC) plants from being dispatched as baseload facilities. Under these circumstances it is assumed that NGCC plants would only operate as peaking plants. Again for the purposes of our projections, "low" natural gas prices are those that are sufficiently low such that NGCC plants would form part of the base load generation. A

second important driver of the future fuel mix is whether or not Texas power plants will be incentivized to capture carbon dioxide by future federal legislation. Carbon capture increases water usage directly and also decreases the energy efficiency of fossil fuel power plants.

Because natural gas price and carbon capture requirements act as critical drivers of the future Texas electricity fuel mix, four bounding scenarios are proposed: (1) high natural gas prices with no incentive for carbon capture; (2) high natural gas prices with incentive for carbon capture; (3) low natural gas prices with no incentive for carbon capture; and (4) low natural gas prices with incentive for carbon capture (see Table ES-1). To encompass the range of possibilities for electric generation, we performed water consumption projections for these four scenarios, each with two electricity demand targets: a “business-as-usual” (BAU) case and a “low energy usage” (L) case (See Figure ES-1). The BAU case assumes an annual electricity growth rate of 1.8% as indicated in the Electric Reliability Council of Texas (ERCOT) 2008 Planning Long-Term Hourly Demand Energy Forecast [ERCOT, 2008]. This latest edition of ERCOT’s forecast only projects electricity in the ERCOT territory until 2018, but we extend the growth rate for the entire state of Texas until 2060. The “low energy usage” case assumes that measures and programs are put in place to reduce electricity consumption by 50 million megawatt hours (MWh) by 2023 and another 42 million MWh from 2023 through 2060 [ACEEE, 2007].

Table ES-1. Characterization of simulated scenarios for projected electricity generation in Texas.

Scenario	Annual Electric Sales Growth	Natural Gas Prices	Carbon Price causes Carbon Capture to be implemented
1L	Low	High	No
1BAU	BAU	High	No
2L	Low	High	Yes
2BAU	BAU	High	Yes
3L	Low	Low	No
3BAU	BAU	Low	No
4L	Low	Low	Yes
4BAU	BAU	Low	Yes

Thus, we provide a possible lower and upper bound for Texas electricity generation in the year 2060: 892 and 983 million megawatt hours (MWh) compared to 400 million MWh generated in 2006. The resulting 2060 electricity-related water demand varies regionally depending upon the influence of the fuels projected, and the overall Texas projections also vary considerably from a low of 850,000 ac-ft (Scenario 3L representing the low energy case with low natural gas prices and no carbon dioxide emissions constraint) to 1,600,000 ac-ft (Scenario 2BAU representing the BAU case with high natural gas prices and a carbon dioxide emissions constraint) (see Figure ES-1).

We can draw a few conclusions from the results. The major difference that can be seen in Figure ES-1 is that the 2006 estimate for water demand for power generation in this report (482,000 ac-ft) is significantly lower than that from the current State Water Plan (678,000 ac-ft). This difference of 196,000 ac-ft is primarily due to an overestimate of the year 2000 average water consumption rate (0.6 gal/kWh) compared to our 2006 average rate (0.39 gal/kWh). This

discrepancy alone accounts for 241,000 ac-ft using 2000 Texas electricity generation of 378 million MWh. Although, the previous analysis upon which the Texas Water Development Board relied upon recognized that a majority of Texas steam turbine power plants used “once-through” cooling systems with a typical consumption rate of 0.35 gal/kWh versus fossil-fueled steam turbines cooled using cooling towers resulting in approximately 0.6 gal/kWh; the authors used the 0.6 gal/kWh value instead of the weighted average of power plant consumption rates thus causing an overestimate of water consumption for power generation.

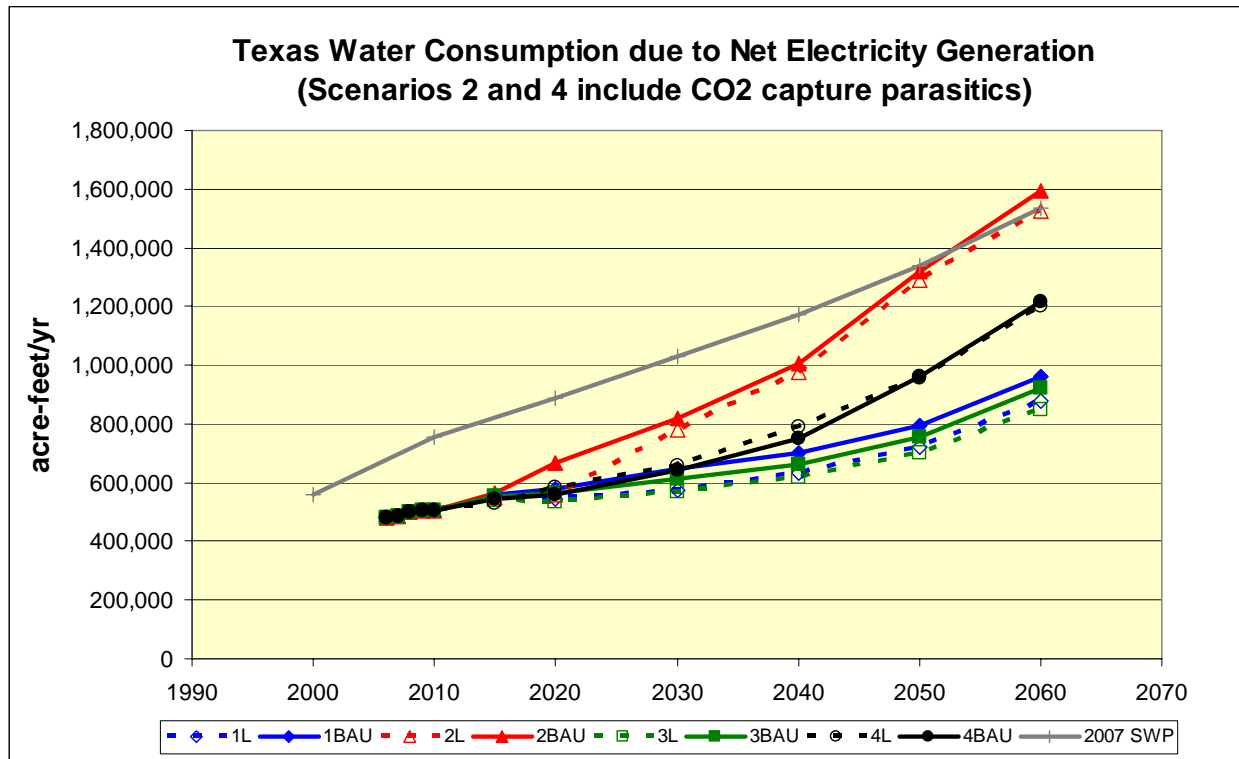


Figure ES-1. The estimates for near term (2006-2015) water consumption for power generation are significantly below the current 2007 State Water Plan (2007 SWP). The water projection for Scenario 2 (involves high natural gas prices and carbon capture systems) results in significantly more water consumption than the other three scenarios.

Six of the eight water demand projections in this report remain significantly lower than the projections in the Texas State Water Plan through the year 2060. As already discussed, this result is primarily due to the State Water Plan using an overly high estimate as a baseline number. However, some difference between the long-term water projections of the 2007 State Water Plan and this report is in part a result of ERCOT lowering its estimated annual electricity demand growth rate to 1.8%. Consequently, water demand projections are 150,000 ac-ft/yr lower for the year 2060 than would have been predicted a few years ago using a 2.0% [Sledge, et al., 2003] annual growth rate for electricity.

In looking at the future trends for water demand for power generation in Texas, carbon legislation that drives carbon dioxide capture on coal and natural gas plants can significantly increase water demand. Scenarios 2 and 4 impose an aggressive carbon dioxide emissions constraint, and the projected water consumption is significantly higher due to the extra energy required to operate the capture equipment at coal and natural gas plants. Scenarios 1 and 3

project significantly lower water consumption required when carbon dioxide capture equipment is not employed.

Energy and water are linked in many ways, and for electricity generation, the link is mainly as cooling water for the thermoelectric generation processes that account for over 95% of Texas' electricity. Any reduction in electricity demand will decrease the demand for water.

Additionally, the use of water-conserving technologies at power generation facilities can lower water consumption, but for steam-based processes doing so often causes a concomitant drop in plant power efficiency. The growing use of wind power (2% of electricity in 2007), which practically consumes no water during operation, also plays an increasing role in decreasing Texas' water demand for electricity.

CHAPTER 1: Current State of Water for Electricity

1.1 Introduction

Electric power generation requires a reliable and predictable source of water. Currently each kilowatt hour (kWh) generated in Texas from steam-electric generation requires up to 30 gallons of available water to withdraw while consuming only 0.3-0.6 gallons of that water. The population of Texas is projected to double by the middle of this century, and Texas will experience a continuing growth in demand for water. As the Texas economy grows the demand for electricity will grow. The demand for water for power production competes with other sectors of the economy and it is critical to assure adequate supply during droughts. To support economic well being, quality of life, and ecosystem preservation it is critical that surface and groundwater resources do not become overcommitted.

It is important when considering water and thermoelectric generation to clearly distinguish between a number of different terms:

- *Consumption:* water that is not returned from the water source from which it was originally diverted, usually due to evaporation.
- *Demand:* same as consumption.
- *Discharge:* water that is expelled from the power plant and/or cooling system infrastructure but is kept within the entire power plant system boundary such as in a cooling reservoir.
- *Diversion:* water that is taken into the power plant system boundary from a water body (e.g. river, lake, reservoir, aquifer) that exists outside of the power plant system boundary such that this water is not available for another user.
- *Forced evaporation:* evaporation that occurs from a water body due to the added heat contained within power plant discharge or boiler water.
- *Natural evaporation:* evaporation that occurs from a water body due to the natural environmental forcing of the atmosphere.
- *Return flow:* water that is removed from the power plant system boundary and sent into a water body (e.g. river, lake, reservoir, aquifer) such that is available for another user.
- *Withdrawal:* water that is taken from a water body and returned to the water body within the power plant system boundary but that is not diverted or returned to a water body outside of the power plant system boundary. In the electric power industry this water is often termed once-through cooling water.

Of these terms, it is particularly important in reading this report to distinguish between diversion, withdrawal and consumption of water. For some power plants in Texas most of the water diverted from surface water bodies is later put back as return flow. It might be argued that consumption is the only relevant metric for water usage. However, in times of drought, if the necessary water for withdrawal and/or diversion is not available then the plant would be forced to shut down.

In Texas essentially all the water used in electric power generation currently comes from surface water. The majority of this water is used in open loop cooling utilizing reservoirs. Existing water rights in Texas account for most of the surface water usage. The Texas electric power market is arguably the most deregulated in the country. Increasing efficiency of electric power plants over the next fifty years could have a major effect on lowering average water consumption per kWh. For example, pulverized coal power plants have an energy efficiency of 35% with the rest of the energy being dissipated by cooling water. New coal power plant technologies such as ultra supercritical coal and integrated gasification combined cycle (IGCC) should lower water consumption by 30 to 60%, as a result of both higher efficiency and technological innovation. Other evolving trends in electric power generation in Texas include: a new period of building nuclear power plants; construction of fewer natural gas fueled electric power plants as gas prices continue to trend high; and the development of distributed power projects and cogeneration plants that achieve higher energy efficiency through using steam for heating and air conditioning in residential, hospitals, industrial and commercial facilities clustered around the power plant.

The recent drought in the Southeastern U.S. during 2007 has drawn attention to the vulnerability of electric power production to low stream flows. In the Fall of 2007, the governor of Alabama wrote a letter to President Bush regarding a proposed Georgia water conservation strategy that threatened to shut down the Farley Nuclear Plant in Alabama due to a limited supply of cooling water [Riley, 2007]. As water consumption in other sectors increases over the next 50 years, the power sector, Central and West Texas in particular, will become increasingly vulnerable to drought. Drought can threaten the ability to cool a steam-electric power plant if insufficient water is available for diversion and/or withdrawal.

It is a particularly opportune time for Texas to re-evaluate the possible impact of future development of new electric generation capacity on water usage. This report reviews the current usages of water resources in the production of electric power in Texas. It then attempts to project future water use for electric power generation in Texas over the next five decades. The results of past attempts to project water use makes it clear that predicting future energy or water use trends is a significant challenge. For example, from 1960 to 1990 the average per capita water withdrawal in the U.S. increased on a steady, linear trend by 30%. However, from 1990 to the present the per capita withdrawal has remained more or less. Despite the inherent uncertainties in predicting the future, such predictions can provide insights into the range of possible outcomes.

Uncertainties in any projections for general water usage are related to:

- Uncertainty in projections for economic growth and increase in the population of Texas.
- Uncertainty in the possible effects of global warming on energy needs and water availability in Texas.

Uncertainties in projections for thermoelectric water usage are related to the above factors and in addition:

- Uncertainty in whether or when CO₂ sequestration will be required.
- Uncertainty in the rate of implementation of new technologies such as supercritical coal plants, IGCC plants and dry cooling.

This report provides background knowledge and information necessary to understand the methodology used in this report to project electricity-related water usage.

1.1.1 Background: Thermoelectric Generation

Electric power generated from coal, nuclear, oil, and natural gas fall into the general class of “thermoelectric power generation”. These plants represent the vast majority of electric power generation in Texas. Water is essential for thermoelectric power generation as the excess heat that cannot be converted into electricity has to be safely dissipated without negative effects on the surrounding environment. Thermoelectric plants also use water for other purposes such as flue gas desulfurization (FGD), boiler water treatment, ash sluice water, and wash water. On average, a kilowatt-hour (kWh) of electricity from such plants requires the withdrawal of 20-30 gallons of water for cooling [Freeley et al, 2007] while consuming less than 1 gallon per kilowatt hour (gal/kWh). Water is also required for desulfurization of flue gases (FGD), ash handling, and wash water. Putting this in a more readily understandable context, Freeley et al (2005) note that a 500 MW pulverized coal power plant uses over 12 million gallons of water per hour for cooling and other processes while burning 250 tons of coal.

The majority of the electricity generated in Texas (~ 57% in 2006) comes from steam turbines [EIA, 2006]. Condensation of exhaust steam from the final, low-pressure turbine is a key part of this power generation system. Steam when condensed, causes a rapid drop in volume (from the vapor-to-liquid transition) leading to a vacuum at the turbine outlet known as the turbine backpressure. To ensure efficient operation through maintenance of the backpressure requires an efficient cooling system that consistently removes the heat of condensation. Thus, the cooling system is an integral part of power generation and plays a key role in both the efficiency and the availability of the power plant.

Most, but not all, of the cooling power comes from the evaporation of water. Heat removed during condensation of the steam in the end is transferred to the environment. Water is the transfer medium of choice due to its high heat capacity, ready availability, low relative cost, and to some extent its reusability. In wet cooling, heat is absorbed via indirect contact between cooling water and low-pressure steam in a condenser. Heated water discharges into surface water (river, lake, or bay) in open loop cooling, or passes through a cooling tower or pond (closed loop) where it is cooled prior to returning to the condenser. In both open and closed loop cooling, heat from the condenser passes to the environment through evaporation and sensible heat. This creates the nexus between electric energy and water consumption.

1.1.2 Background: Thermoelectric Generation Water Impact

Energy infrastructure in Texas, particularly electric power plants, already has a significant impact on the state's water resources. Possible effects from climate change in Texas may include lower summer flows in Texas rivers, longer and more severe and droughts, rises in sea level, and deterioration of wetlands. However, uncertainty in climate change simulation models makes it very difficult to make confident projections of climate impacts.

Increasing efficiency of electric power plants over the next fifty years could have a major effect on the lowering the average water consumption per kWh of generation. For example, pulverized coal power plants in Texas have an energy efficiency of 32% [EIA, 2006] with the rest of the energy dissipated as heat to the environment, mostly via cooling water. New power plant technologies such as IGCC and ultra supercritical coal can lower water consumption by 30 to 60% due to higher energy efficiency and technological innovation. The development of distributed power projects at the Robert Mueller Airport Project and the Domain in Austin achieve high-energy efficiency of 70 to 80%. These projects use waste steam for heating and air conditioning in residential, hospitals, industrial and commercial facilities clustered around the power plant. Decreases in water consumption of more than 60% are possible in such distributed cogeneration type power plants. Such distributed power generation is unlikely to replace more than a small fraction of the baseload over the next 50 years.

Essentially all (> 99%) water used in electric power generation in Texas comes from surface water. Most of this water is used in open loop cooling utilizing reservoirs and bays. Existing surface water rights in Texas account for most of the surface water. Additionally, cooling technology can be influenced by environmental regulations, such as Section 316(b) Phase I of the Clean Water Act that focuses on lower cooling water intake velocity at greenfield facilities – thus favoring building of cooling towers (closed loop cooling) in preference to once through (open loop) cooling. Federal regulation of water intakes in existing power plants (316(b) Phase II of the Clean Water Act), is currently suspended as a result of legal challenges. Closed loop cooling towers withdraw much less water; however, the consumptive water use is double relative to open loop cooling in reservoirs. The implementation of air-cooled systems could result in very large reductions in both water usage and consumption at power plants.

In Central and Western Texas, it is likely that an increasing portion of future thermoelectric power plants will get part or all of their water requirements from groundwater. At the same time, all but a few of the major cities in Texas either are initiating desalinization projects, which create a high demand for electricity, or have such projects under serious consideration [TWDB, 2007].

One option that could be considered in some parts of Texas is dry cooling of power plants. This technology has the greatest potential for lowering water withdrawals and consumption (up to 90%) by the electric sector. However, dry cooling is not as efficient as water based cooling systems especially during hot weather. With 110° F temperatures, dry cooled plants suffer from an energy loss of as much as five percent. It is unfortunate that this power loss occurs at the exact time that power demand peaks. Two ways to address this issue could be to implement hybrid wet/dry cooling systems and use dry cooling in cogeneration and natural gas combined cycle generation systems as done at two locations in Texas. Hybrid wet/dry systems use wet cooling when the ambient temperatures are greater than 85-90° F. Such systems avoid the hot weather power loss for dry cooling at the expense of higher capital costs. Implementation of hybrid or dry cooling would also have the advantage of drought proofing the power plant.

1.2 Factors Affecting Texas Water usage for Electricity

The electric power generating industry in Texas is entering a period of change. New ways of doing business are rapidly emerging, driven in large part by: high and uncertain natural gas prices; potential federal legislation that could economically drive CO₂ capture and sequestration from fossil fuel fired power plants; and public concern about environmental issues. Specific factors that need to be accounted for in understanding the future interaction between the increasing demand for both electric power and water in Texas include:

- Texas' projected future population and economic output.
- Texas' deregulated wholesale and retail power markets. The deregulated market has significant advantages, but it also means that the Texas Public Utility Commission (PUCT) has no ability to impact siting of power plants based on the state's view of regional projections of water availability. As a consequence, understanding the factors that will drive the site selection decisions of Texas' investor owned utilities (IOUs) and independent power producers is critical to understand the regional patterns of future water demands for power generation.
- High and volatile natural gas prices may drive increases in the percentage of baseload power generation based on coal and uranium fuels. It is unclear whether unconventional gas resources, such as the Barnett Shale, and LNG imports to the Gulf Coast will drive natural gas prices low such that natural gas fueled power plants may provide significant amounts of baseload in the future.

- There may be a necessity in the future to develop post combustion CO₂ capture on existing coal fired power plants. If post combustion capture has to be retrofitted to existing coal fired power plants, the efficiencies of such plants could decrease by up to 35%. The resultant increase in water consumption per net electricity output at the retrofitted plants with CO₂ capture can be more than 80% over the plant with no CO₂ capture. These and other potential impacts of water usage of carbon capture technologies must be factored into future water demand projections for Texas.

1.3 Existing State of Water for Electricity

The majority of water use for electricity generation is for the cooling of thermoelectric power plants. In these plants, water is used as a coolant to condense steam, created by the burning of fossil fuels and splitting of fissile material, used in thermoelectric power generation processes. How a thermoelectric power plant uses water for cooling is determined by the particulars of a plant's design. In the following Figures 1.1-1.5, we provide diagrams that can be used to distinguish between different cooling methods. The cooling systems at most power plants in Texas can be described by Figures 1.1-1.5.

Note that in Figures 1.1-1.5, precipitation is considered to cross the power plant system boundary and add to the water supply for the power plant in some circumstances. For example, during any particular year there might be sufficient rainfall within the catchment area of a power plant cooling reservoir to avoid diversion of water from an adjacent river. While the power plant may not need to divert water, assuming all other factors equal (e.g. electricity generation, temperature, etc.), its operation still necessitates the consumption of the same amount of water than had there been no rain. Furthermore, Figures 1.1-1.5 show natural and forced evaporation. We consider that only forced evaporation can contribute to power plant consumption.

Type A: Once-through with Reservoir

(Reservoir can serve many purposes: recreation, municipal supply, wildlife habitat, etc.)

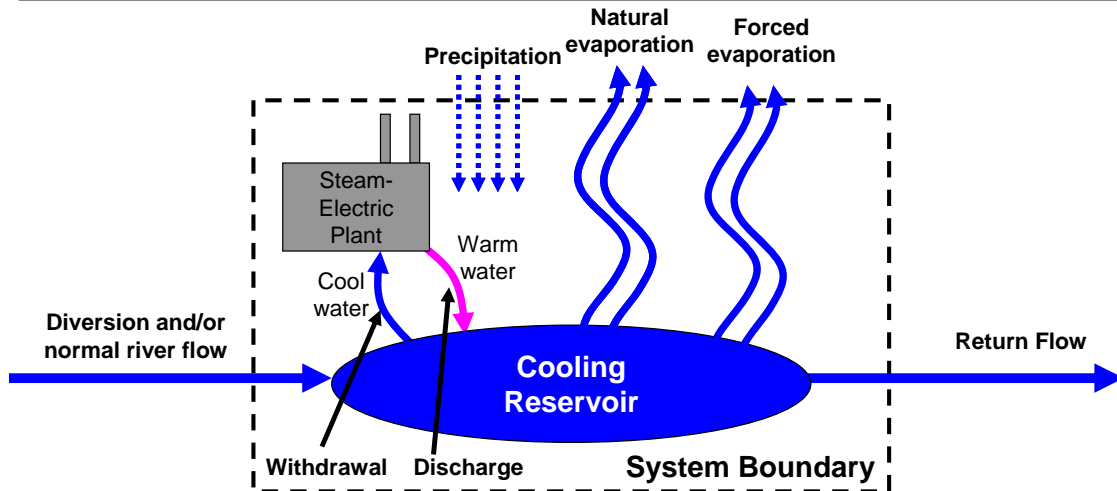


Figure 1.1. A ‘once-through with reservoir’ cooling system typically withdraws 1-2 orders of magnitude more water than is consumed and uses the reservoir as a heat sink such that most consumption results from the forced evaporation from the reservoir that is caused by discharging warm water from the power plant.

Type B: Once-through with Freshwater River

(River has many purposes: recreation, municipal supply, etc.)

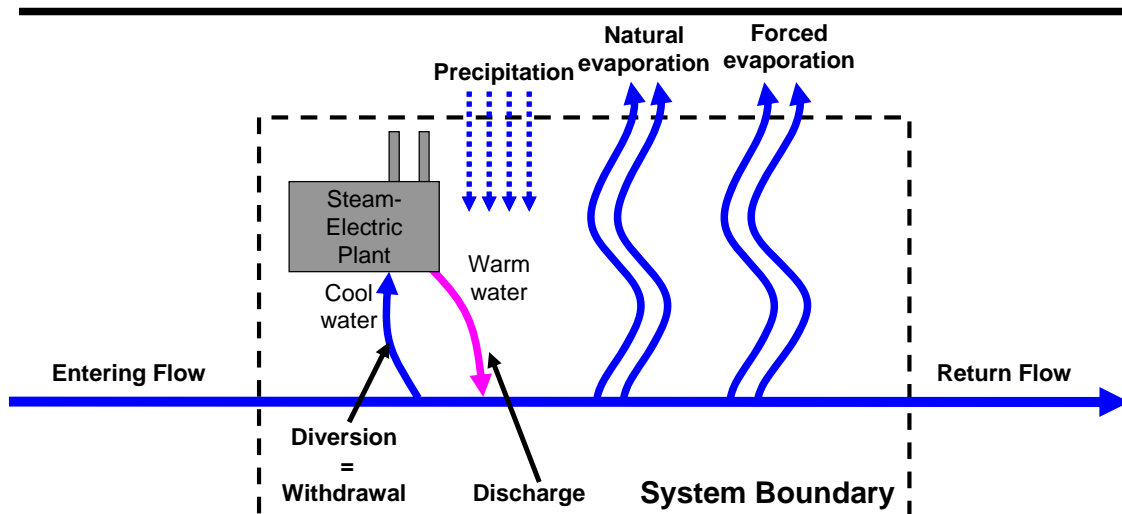


Figure 1.2. In a ‘once-through with freshwater river’ cooling system the diverted water equals the withdrawn water and the power plant water consumption mainly results from the forced evaporation of the heated cooling water that is discharged to the river.

Type C: Once-through with Saline Bay or Canal

(Saline source has many purposes: recreation, shipping, etc., and extends outside of the plant system boundary)

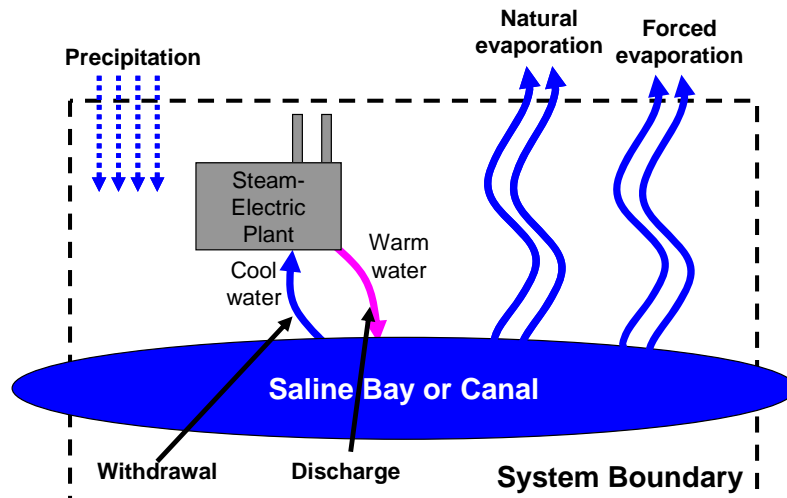
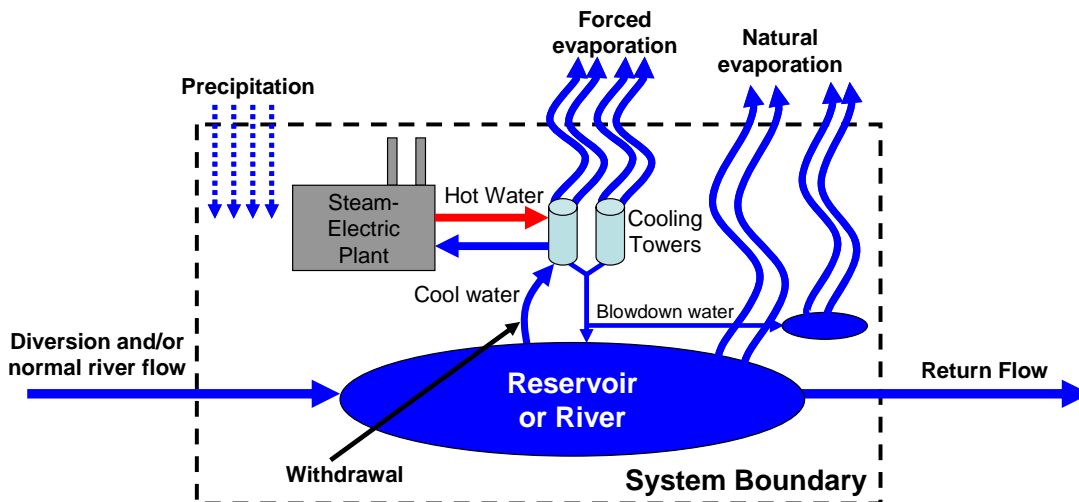


Figure 1.3. In a ‘once-through with saline bay or canal’ cooling system the cooling water source is saline instead of fresh water, withdrawal = diversion, and discharge = return flow. When used, this type of cooling systems is usually employed in coastal areas.

Type D: Cooling Tower with surface water

(Surface water can serve many purposes: recreation, municipal supply, wildlife habitat, etc.)

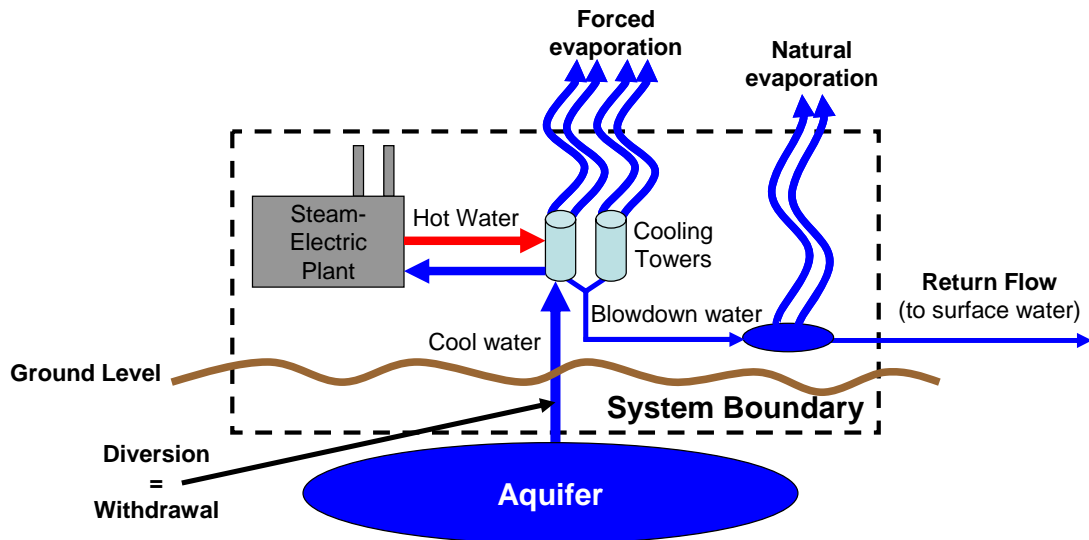


Consumption = forced evaporation

Withdrawal ~ Consumption

Figure 1.4. In a cooling system using cooling towers and surface water, the vast majority of water that is diverted and withdrawn is evaporated in the cooling towers. Some water remains within the cooling tower subsystem, and when it becomes sufficiently high in concentration of dissolved solids, this ‘blowdown water’ is discharged into the reservoir or a separate evaporation pond.

Type E: Cooling Tower with groundwater



Consumption = forced evaporation
 Withdrawal = Diversion ~ Consumption

Figure 1.5. In a cooling system that uses cooling towers and groundwater as the water source, diversion = withdrawal, and there may or may not exist any return flow that goes to surface water supplies.

Using Figures 1.1-1.5 we can gain a context for the available water usage information that exists from state and federal agencies. Because different agencies collect different data using different methodologies, comparing the data from each source is not straightforward. We have attempted to report the data in a manner consistent with the definitions defined in this report. The term “water use” is ambiguous, and understanding how water is cycled through power plants and their associated subsystems requires careful use of terms.

Figures 1.6 and 1.7 demonstrate a real-world example by showing the 2006 water balance and cooling reservoir surface level, respectively, of the South Texas Project (STP) nuclear power generation facility in Matagorda County. The STP cooling system can be described as of the type A system of Figure 1.1 as well as a recirculating closed system with cooling pond (see Table 1.1). Notice how both diversions (50,012 ac-ft) and rainfall (25,142 ac-ft) play major roles in maintaining the volume of water stored in the reservoir. The decreasing slopes of Figure 1.7 are approximately 0.23-0.27 ft/day. If we multiply these slopes by the 7000 acre surface area of the lake to get a volumetric decrease rate, and divide by the electricity generated during the associated dates, we obtain a total water consumption rate of approximately 0.84 gal/kWh. Of this total water consumption rate,

0.58 gal/kWh is due to forced evaporation while the remaining 0.26 gal/kWh is due to natural evaporation.¹

In studies of water usage by electric power production forced evaporation is seldom counted. Natural evaporation is never directly counted as part of water usage. However, it should be noted that in the above example water is diverted to replace both natural and forced evaporation in times of low rainfall. Thus, for power plants with reservoirs with small catchment areas both types of evaporative loss will get captured in water usage reports particularly in years with low rainfall. As a result of this and other complications, the recorded water usage in Texas, even when normalized to kWh of electric power production, will vary from year to year.

To estimate the total water force evaporation from cooling lakes and ponds, we look at all open loop, or once-through, systems that utilize fresh water lakes or ponds for source and sink. The amount of forced evaporation associated with hot water discharged from a power plant going into a lake can vary considerably, but a range of 30%-60% of the added heat going to evaporated water is reasonable [Harbeck, 1964]. Combining the power production in 2006 for all power plants using open loop with cooling ponds or lakes amounts to approximately 165 million MWh, or 41% of Texas electricity. Assuming the average Texas plant efficiency of 32% we calculate a range of 112-224 Mgal/d (125,500 – 250,900 ac-ft/yr) for evaporated water from cooling lakes due to added heat. This represents an equivalent 0.25-0.50 gal/kWh of added consumption. Thus, having this water available in lakes is crucial in making sure that the power plant can operate at full capacity and that water temperatures do not increase above environmental limits.

¹ Forced evaporation = (37,912 ac-ft)(325851.4 gal/ac-ft)/(21,368,269,000 kWh generated in 2006) = 0.58 gal/kWh

Simplified Water Balance of the South Texas Project Main Cooling Reservoir for 2006

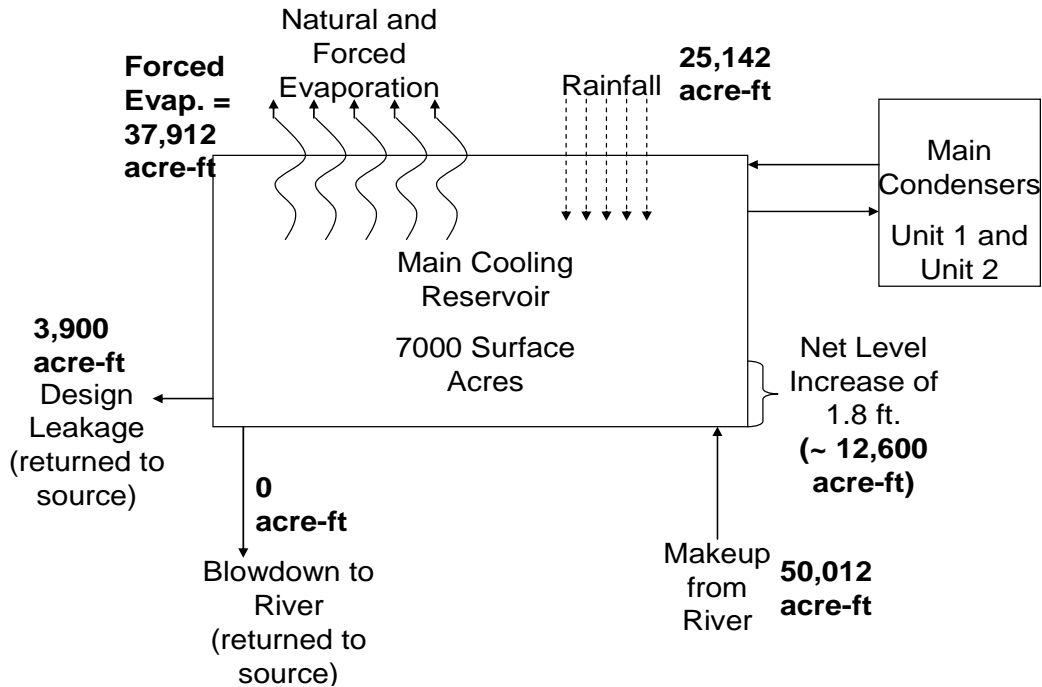


Figure 1.6. The 2006 water balance of the South Texas Project cooling reservoir shows rainfall, evaporation (forced and natural), designed leakage, and makeup water all contributed to maintaining the cooling reservoir level.

South Texas Project Main Cooling Reservoir Level - 2006

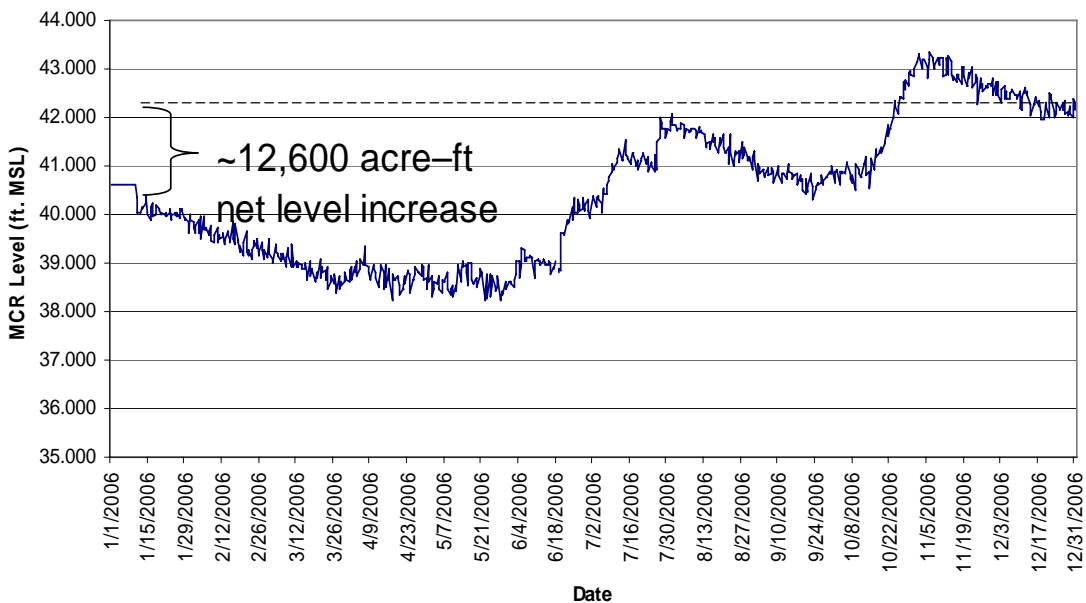


Figure 1.7. The level of the cooling reservoir at the South Texas Project nuclear generation facility shows how the rainfall and diversion increase the volume of the reservoir at various times during the year.

One difficulty in estimating water consumption for electricity production involves the multiple yet often conflicting sources of information on water usage. Table 1.2 gives a summary of the data that are available at the power plant level from three sources from which the authors obtained steam-electric water usage information. At the federal level, the Energy Information Administration (EIA) requires all organic-fueled (i.e. neglects nuclear) steam-electric power generators with units greater than 10 MW to submit cooling system information via forms 860 and 923 (formerly form 767). At the state level, the Texas Commission on Environmental Quality (TCEQ) and the Texas Water Development Board (TWDB) each has a form to track surface water with the TWDB also tracking groundwater. Additionally, the characterization of the cooling system types referenced by the EIA do not capture the details of cooling systems as depicted in our descriptions in Figures 1.1-1.5 [EIA, 2005]. Table 1.1 describes our best attempt at comparison in terms of relating cooling type descriptions from the EIA form 767 to those provided in this report.

Table 1.1. Comparison labeling of cooling types by this report and the Energy Information Administration (EIA) [EIA, 2005]. OS = Once through, saline water. OF and OC = Once through with cooling pond(s) or canal(s). RI = Recirculating with induced draft cooling tower(s). RF = Recirculating with forced draft cooling tower(s). RC = Recirculating with cooling pond(s) or canal(s).

Cooling System Type	
This report	EIA
A: once-through with reservoir	OC, OF, RC
B: once-through with river	OC, OF
C: once-through with saline water	OS
D: cooling tower with surface water	RI, RF
E: cooling tower with groundwater	RI, RF

Table 1.2. Comparing different data sources that provide water use data (X = data available) at the power plant level shows that three major sources of information for power plants in Texas cover different types of information. SW = surface water. GW = groundwater.

	Withdrawal		Consumption		Diversions		Return		Discharge	
	SW	GW	SW	GW	SW	GW	SW	GW	SW	GW
EIA	X	X	X ^a	X ^a					X	X
TCEQ			X ^b		X		X			
TWDB					X ^c	X ^c				

^a = consumption data from the EIA-767 are defined as = withdrawal – discharge, and thus do not take into account any forced evaporation from cooling reservoirs.

^b = water use forms for TCEQ data do not specify details about the cooling system, and consumption is intended to be the quantity defined by “diversion – return” even though often the form is completed incorrectly.

^c = the TWDB form asks water users to specify “intake” of water, which we assume here to mean diversion.

1.3.1 Past and Current Thermoelectric Fossil fuel and Nuclear Water Withdrawal – EIA and USGS Data

The United States Geological Survey (USGS) provides 1995 and 2000 water usage data for fossil fuel and nuclear thermoelectric power in Texas and the United States. The Energy Information Administration (EIA) data reports on thermoelectric cooling water, withdrawal and consumption, used for power generation. The EIA data from Form 767 provides very different results for water withdrawal than the USGS data. Data provided in the 2005 EIA-767 data set only exist for approximately 50% of the total amount of electricity generated in Texas. This percentage accounts for electrical generation primarily from facilities with code 22 of the North American Industry Classification System (NAICS) defined as “electric, gas, and sanitary services,” but EIA-767 data after 2000 no longer include nuclear plants.

The EIA data set, that presents data at the individual power plant level, contains a disturbing number of aberrant data that are clearly either too high or too low. Dziegielewski and Bik (2006) have critiqued the EIA’s methodology and have attempted (with mixed success) to gather more reliable data. Table 1.3 compares thermoelectric water withdrawal data from two sources: the USGS from 1995 data [USGS, 1998] and 2000 data [USGS, 2004] as well as the EIA from 2005 data on form 767 [EIA, 2005]. While interested parties disagree as to the usefulness of withdrawal data when discussing power plant water usage, we simply present the results of available data for completeness of discussion.

Table 1.3. Comparison of water *withdrawals* of groundwater and surface water for thermoelectric power. (Some data from reference [USGS, 2004] has summing errors due to rounding). OL = open loop and “once-through” cooling with or without cooling reservoirs. CL = closed loop cooling with cooling towers. Values in parentheses indicate breakdowns between OL and CL systems.

Thermoelectric Power - Water Withdrawals				
	Groundwater (Mgal/d)	Surface water (Mgal/d)		All Water (Mgal/d)
	Fresh (OL/CL)	Fresh (OL/CL)	Saline (OL/CL)	Total (OL/CL)
Texas (1995)^a	59	9,530	3,870	13,400
Texas (2000)^b	60.2 (0/60.2)	9,760 (6,990/2,770)	3,440 (3,440/0)	13,260 (10,400/2,830)
Texas (2006)^c	339 (0/339)	20,560 ^{c,d} (15,700/5,240)	9,178 (9,200/3)	30,100 ^{c,d} (24,900/5,600)
United States (1995)^a	565	131,000	57,900	189,000
United States (2000)^b	409 (0/409)	135,000 (119,000/16,300)	59,500 (58,000/1,530)	195,000 (177,000/18,300)
	Groundwater (acre-feet/yr)	Surface water (acre-feet/yr)		All Water (acre-feet/yr)
	Fresh (OL/CL)	Fresh (OL/CL)	Saline (OL/CL)	Total (OL/CL)
Texas (1995)^a	66,100	10,675,000	4,335,000	15,010,000
Texas (2000)^b	67,400 (0/67,400)	10,900,000 (7,800,000/3,100,000)	3,900,000 (3,900,000/0)	14,900,000 (11,600,000/3,170,000)
Texas (2006)^c	380,000 (0/380,000)	23,000,000 ^{c,d} (17,600,000/5,900,000)	10,300,000 (10,305,000/3,400)	33,700,000 ^{c,d} (27,900,000/6,273,000)
United States (1995)^a	633,000	146,700,000	64,900,000	211,700,000
United States (2000)^b	460,000 (0/460,000)	151,200,000 (133,300,000/18,300)	66,600,000 (65,000,000/1,700,000)	218,400,000 (198,300,000/20,500,000)

^a [USGS, 1998]

^b [USGS, 2004]

^c Data from EIA form 767 [EIA,2005] for ~ 50% of electrical generation (200 million MWh) in Texas in 2005 (2005 electrical generation was 397 million MWh) and 67% of installed nameplate capacity while also neglecting Texas’ two nuclear plants.

^d The EIA-767 data from 2005 neglect water usage for nuclear facilities and some open loop cooling systems that have been included here. Specifically included here are data from Southern Illinois University [Dziegielewski and Bik, 2006] that estimate water withdrawal at Texas’ two nuclear plants with two reactors each as an additional 3,800-4,000 Mgal/d (4,300,000-4,500,000 acre-ft/yr) at rates of 55 (Comanche Peak) and 39 gal/kWh (South Texas Project).

The USGS reports (see Figure 1.8) that the two sectors responsible for the majority of water withdrawal in Texas are thermoelectric (steam-electric) power (13,260 Mgal/d or 14,900,000 ac-ft/yr - 45% of Texas total in 2000) and irrigation (8,630 Mgal/d or 9,700,000 ac-ft/yr - 21% of Texas total in 2000). Fortunately, at the present time these

two consumer groups primarily take water from different sources. In 2000, about 75% of ground-water withdrawals in Texas were for irrigation [USGS, 2004]. Of all water withdrawn by the Texas thermoelectric power industry, over 98% is from surface water, both fresh and saline (See Table 1.3) [USGS, 2004].

It is important to keep in mind that over 90% of withdrawn water for thermoelectric power is returned to the source, but during irrigation the vast majority of water withdrawals are not returned. In this section we provide information regarding withdrawal for completeness, but the rest of the report focuses upon water consumption.

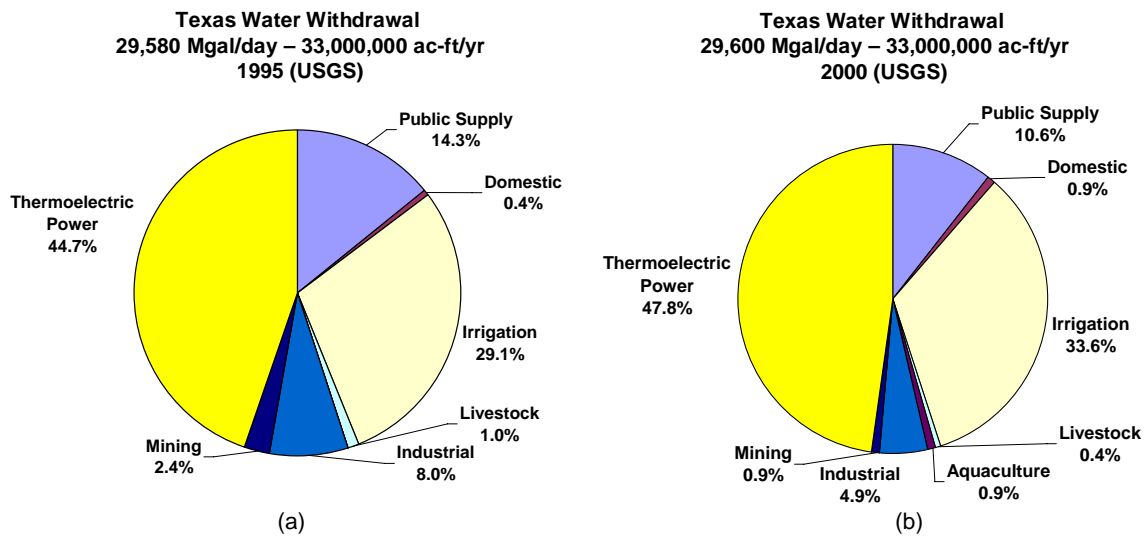


Figure 1.8. Texas (a) and United States (b) water withdrawals in 2000 by sector as reported by the USGS [USGS, 2004].

There is reason to believe the USGS’s numbers for total water withdrawals for generating thermoelectric power in Texas are underestimated. For example, withdrawal data gathered independently by the Energy Information Administration (EIA), shows that water withdrawals were much higher, almost twice as high, than in the USGS data sets (EIA-767). Again it should be stated that the EIA data for Texas are incomplete as they do not include the withdrawals associated with cogeneration facilities and power plants that supply power exclusively to particular refineries and other large industrial plants. Using EIA data, along with nuclear facility withdrawals from Dziegielewski and Bik (2006), and extrapolating information in Sledge. et al. (2003), we estimate a total thermoelectric water withdrawal for 100% of Texas generation at 30,100 Mgal/d (33,700,000 ac-ft/yr), or well over two times the water withdrawal reported by the USGS. Equation 1 shows the calculation for obtaining the fresh water withdrawal values, while the salt water withdrawal is directly from the EIA-767 data set. A scale factor is applied to the open loop cooling water usage to account for the 8% of the open loop-cooled generation that is unaccounted for in available data. Note that for the nuclear facilities, Comanche Peak uses OL cooling with a cooling reservoir and the South Texas Project uses CL cooling with a recirculating reservoir.

$$\begin{aligned}
\text{Total fresh water withdrawal} &= (\text{OL}) (\text{scale to 100\% OL-cooled generation}) + (\text{CL}) \\
&= [(\text{EIA OL data} + \text{Nuclear})(\text{scale factor}) + (\text{EIA CL Data} + \text{Nuclear})] \\
&= [(11,643 + 2,800)(1/92\%) + (4,138 + 1,100)] \text{ Mgal/d} \quad (1) \\
&= (15,700 + 5,240) \text{ Mgal/d} \\
&= 20,900 \text{ Mgal/d} = 23,400,000 \text{ ac-ft/yr}
\end{aligned}$$

From the data in Table 1.3 and Figure 1.8, we estimate that thermoelectric water withdrawal accounts for nearly 65% of all water withdrawal in Texas (See Equation 2), not 45% as reported.

$$\begin{aligned}
\% \text{ Texas withdrawal for thermoelectric} &= 1 - \frac{\text{non - thermoelectric withdrawal}}{\text{total withdrawal}} \\
&= 1 - \frac{(0.553) \left(29,600 \text{ Mgal/d} \right)}{(0.553) \left(29,600 \text{ Mgal/d} \right) + 30,100 \text{ Mgal/d}} \quad (2) \\
&= 65\%
\end{aligned}$$

Of course, the calculations of Equations 1 and 2 assume that the other water withdrawal tallies for the other sectors are accurate.

Although there are large discrepancies in published water usage data for Texas, we believe that we have been able to make a reasonably accurate estimate for the 2006 thermoelectric withdrawal shown in Table 1.3. The lakes associated with the power plants have a volume near 2.7-3.5 million acre-feet. It is unclear why the thermoelectric withdrawal data from the USGS is less than one-half of the value estimated using the EIA data.

Figure 1.9 plots the water withdrawal rate (gal/kWh) for OL and CL designs as reported to the EIA for 2005 [EIA, 2005]. Data in Figure 1.9 are only inclusive of approximately 50% of Texas electricity generation, so many thermoelectric units associated with over 48% of the electric power production are not included. OL designs typically withdraw much more water than CL designs. Although, some CL designs, 8 of 73 reporting (11%), withdraw water at high rates over 100 gal/kWh. The vast majority, 56 out of 73 reporting (77%), of the CL cooling units withdraw less than 10 gal/kWh. All but 1 of the 39 reported OL cooling units withdraw more than 20 gal/kWh, with 26, or 67%, of the OL units withdrawing greater than 100 gal/kWh. Figure 1.10 shows the water withdrawal for OL and CL cooling units as categorized by more specific OL and CL types defined by the EIA [EIA, 2005].

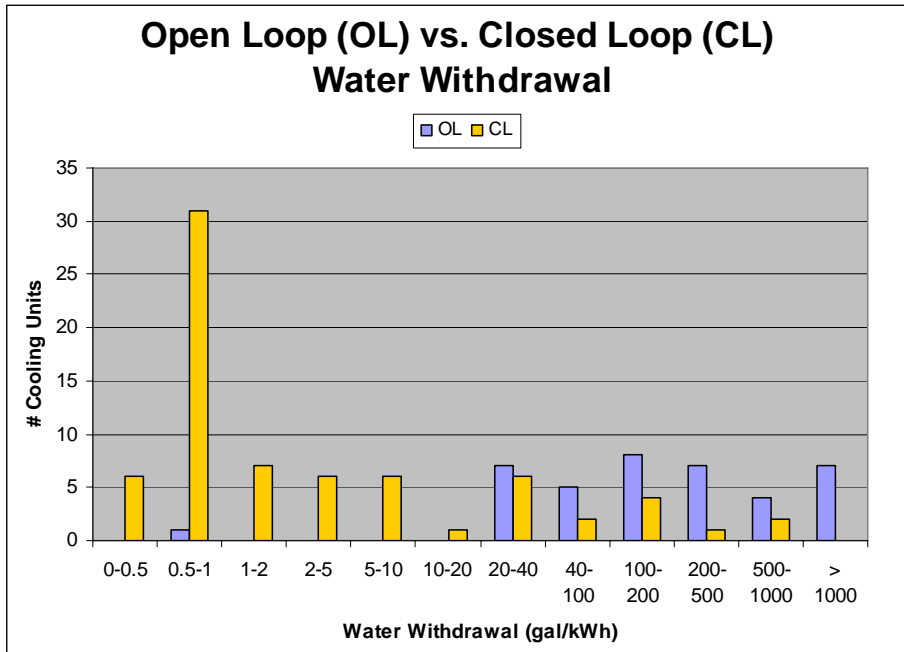


Figure 1.9. Number of cooling units (data only exists for 50% of Texas electric generation) at Texas thermoelectric power plants that *withdraw* a given amount of water in gallons per net kilowatt-hour generated [EIA, 2005].

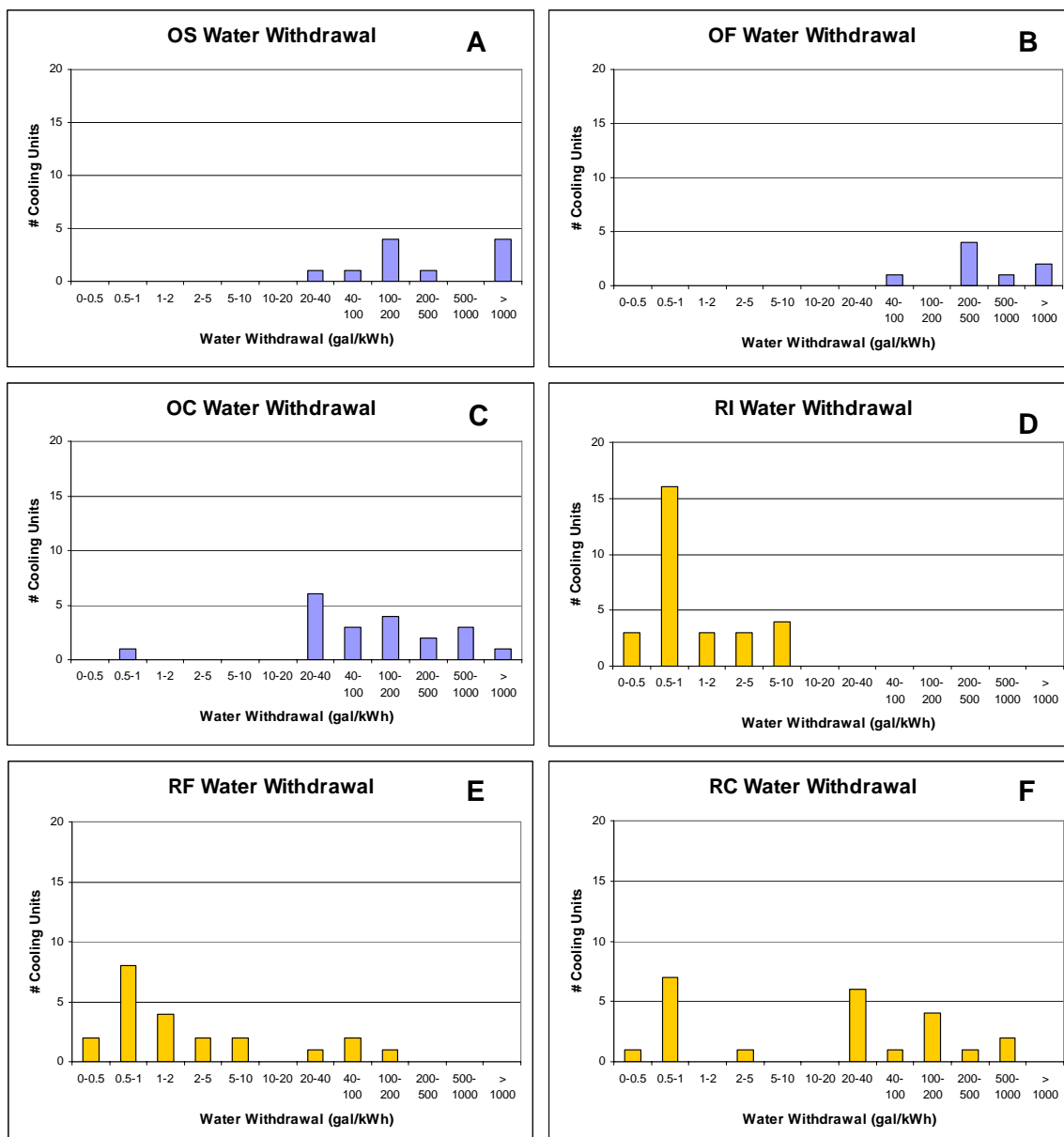


Figure 1.10. Number of cooling units, by EIA category, at Texas steam-electric power plants that *withdraw* a given amount of water in gallons per net kilowatt-hour generated [EIA, 2005]. (A) OS = Once through, saline water. (B) OF and (C) OC = Once through with cooling pond(s) or canal(s). (D) RI = Recirculating with induced draft cooling tower(s). (E) RF = Recirculating with forced draft cooling tower(s). (F) RC = Recirculating with cooling pond(s) or canal(s).

1.3.2 Past and Current Thermoelectric Fossil fuel and Nuclear Water Consumption – EIA and USGS Data

Table 1.4 compares thermoelectric consumption data from three sources: the USGS from 1995 data [USGS, 1998], the Texas Water Development Board (TWDB) from the 2007 *State Water Plan* [TWDB, 2007], and the EIA from 2005 data on form 767 [EIA, 2005]. The USGS describes 1995 data for fossil fuel and nuclear thermoelectric power in Texas and the United States. The TWDB report describes water demand, or consumption, for steam-electric plants. The EIA data report on thermoelectric cooling water, withdrawal and consumption, used for power generation. As stated earlier, EIA form 767 data after 2000 neglect nuclear facilities.

Table 1.4. Water *consumption* for thermoelectric power.

Thermoelectric Power - Water Consumption				
	Groundwater (Mgal/d)	Surface water (Mgal/d)		All Water (Mgal/d)
	Fresh	Fresh	Saline	Total
Texas (1995)^a	--	297	12	309
Texas (2000)^b	--	--	--	501-555
United States (1995)^a	--	3,130	369	3,680
	Groundwater (acre-feet/yr)	Surface water (acre-feet/yr)		All Water (acre-feet/yr)
	Fresh	Fresh	Saline	Total
Texas (1995)^a	--	332,000	13,000	346,000
Texas (2000)^b	--	--	--	561,394 – 622,000
United States (1995)^a	--	3,500,000	413,000	4,122,000

^a [USGS, 1998]

^b Table 4.2 (501 Mgal/d; 561,394 ac-ft/yr) [TWDB, 2007]; Appendix A3 (555 Mgal/d, 622,000 ac-ft/yr) [Sledge et al., 2003]

^c Using data from EIA form 767 [EIA,2005] and data from the TWDB [TWDB, 2007; Sledge et al., 2003]

According to the USGS, in Texas during 1995 thermoelectric generation was responsible for 2.7% (309 Mgal/d, 346,000 ac-ft/yr) of freshwater consumption, mostly due to evaporation [DOE, 2006]. There are no consumptive-use estimates in 2000 from the USGS as these were omitted in the 2000 survey and the USGS no longer collects consumption data [USGS, 2004]. However, the Texas Water Development Board (TWDB) tracks water consumption, termed demand by the TWDB, and puts Texas' thermoelectric water consumption at 3.3% of the 2000 Texas total water consumption, or 501 Mgal/d (561,394 ac-ft/yr) [TWDB, 2007]. Figure 1.11 shows the 1995 USGS estimate for Texas freshwater consumption and the 2000 TWDB estimate for Texas water demand.

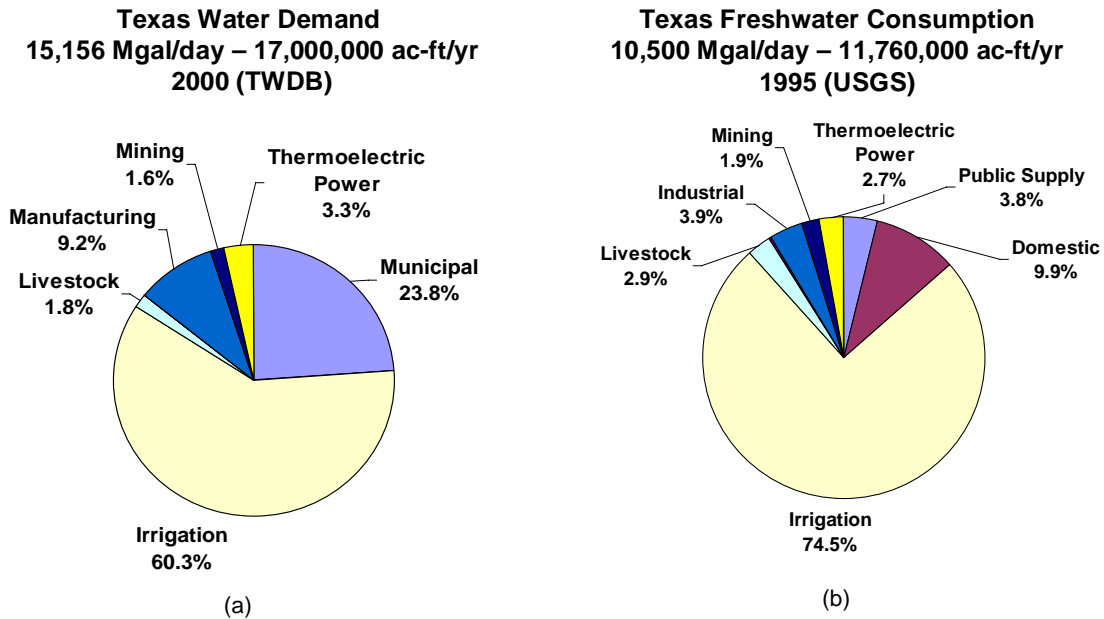


Figure 1.11. (a) Texas water demand in 2000 from the TWDB [TWDB, 2007], and (b) Texas freshwater consumption in 1995 from the USGS [USGS, 1998].

Figure 1.12 compares water consumption for power generators using open loop (OL) and closed loop (CL), or recirculating, cooling designs. One sees that CL cooling methods, on average, consume more water per net electrical generation than do open loop methods. This difference in consumption is largely due to the definition of the system considered and where water consumption is measured. For CL systems, the evaporated water must be replaced in the system, such that aside from blowdown and process water, the quantity of water withdrawn is similar to the water consumed. For OL systems, the consumption is measured as the difference between what is withdrawn from the environment and what is discharged into the environment. The heated water that is discharged continues to dissipate heat from the power plant. As noted previously this water loss through forced evaporation is not accounted for in the EIA data that tally power plant water use. Thus, the OL systems data as reported in EIA for 767, and shown in Figure 1.12, underestimate their impact on water consumption [EIA, 2005]. Figure 1.13 shows the water consumption for OL and CL cooling units as categorized and reported by the EIA [EIA, 2005].

It is important to note that the data presented in Figures 1.12 and 1.13 are from EIA form 767 and do not account for diverted or make-up water that may be needed to keep a cooling reservoir at a necessary level. This is a limitation of the reporting method, and we present these data for purposes of completeness.

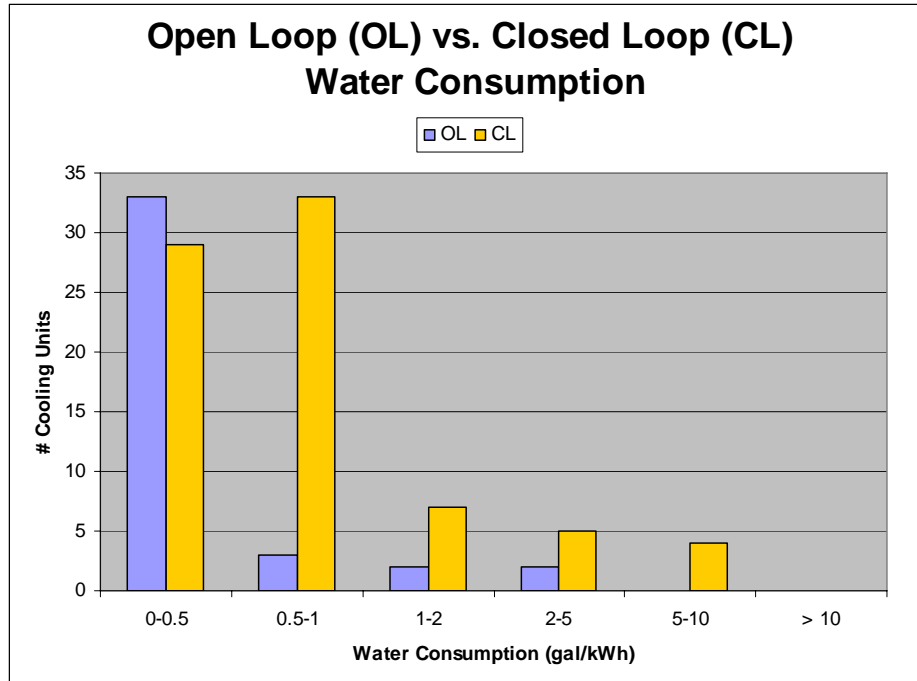


Figure 1.12. Number of cooling units at Texas steam-electric power plants that *consume* a given amount of water in gallons per net kilowatt-hour generated [EIA, 2005].

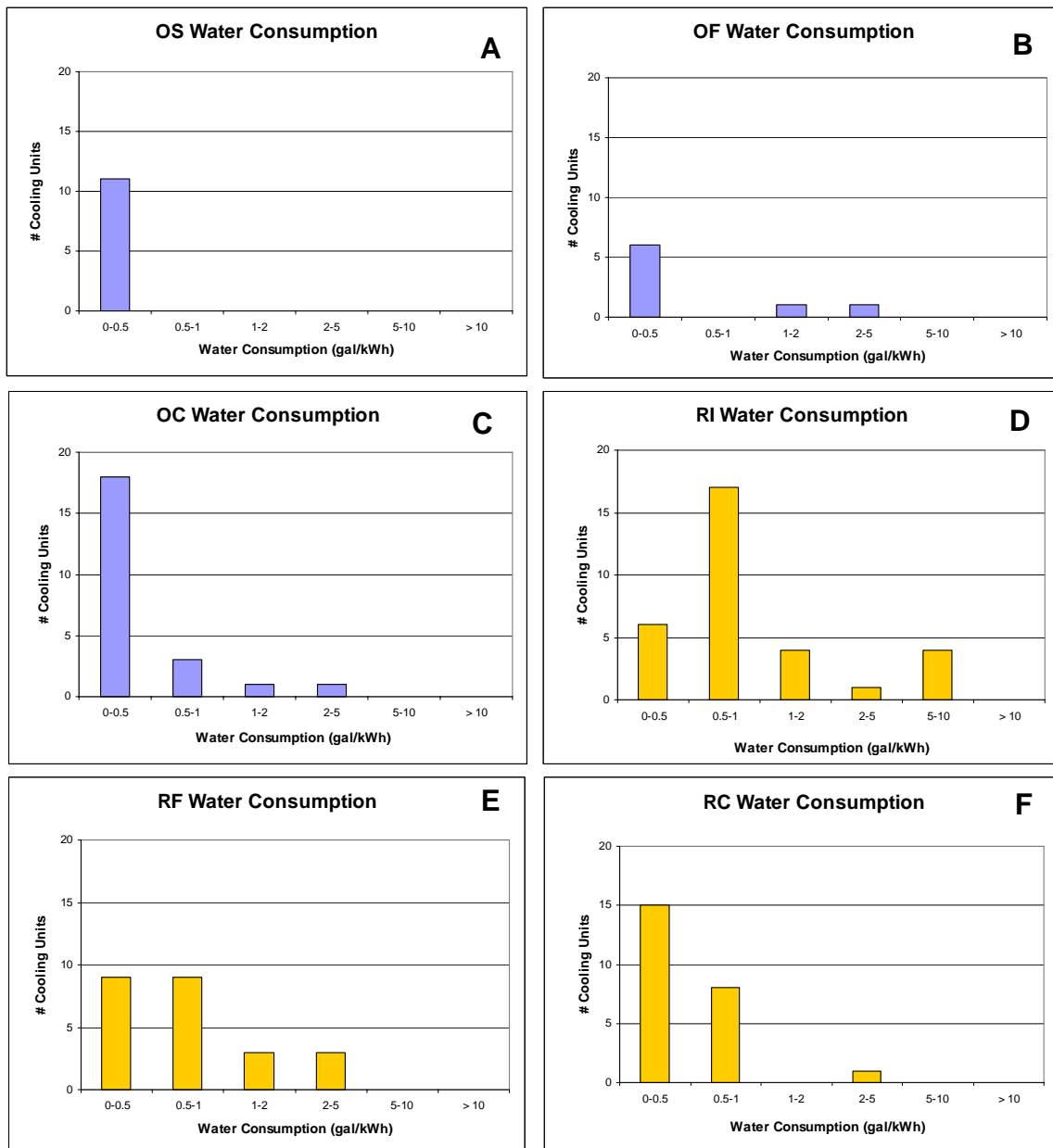


Figure 1.13. Number of cooling units, by EIA category, at Texas steam-electric power plants that *consume* given amount of water in gallons per net kilowatt-hour generated [EIA, 2005]. (A) OS = Once through, saline water. (B) OF and (C) OC = Once through with cooling pond(s) or canal(s). (D) RI = Recirculating with induced draft cooling tower(s). (E) RF = Recirculating with forced draft cooling tower(s). (F) RC = Recirculating with cooling pond(s) or canal(s).

1.3.3 Summary of EIA information

Figure 1.14 shows average values for water consumption and withdrawal rates for facilities listed in EIA-767 for 2005. In producing Figure 1.14, the average is calculated by dividing total water usage by total electricity generated (gallons per year/electricity) for each type of fuel and generator unit. This is not the same as averaging the individual plant “gal/kWh” values for each individual fuel and generation unit type.

Natural gas combined cycle plants (CT and CA) consume water at much higher rates, but withdraw much smaller quantities of water due to the heavy use of cooling towers (refer to Figures 1.10D, 1.10E, 1.13D, and 1.13E). In other words, NGCC plants consume almost all of the water they withdraw, whereas the other types of plants, typically more than 15 years older, withdraw 1-2 orders of magnitude more water than they consume. Figure 1.15 demonstrates the average values for water consumption and withdrawal for various types of cooling systems. Note that for induced draft cooling towers (RI) the withdrawal is less than 1 gal/kWh and thus does not show due to the right hand scale of the graph. Two NGCC power plants in Texas use air cooling, which consume and withdraw negligible amounts of water.

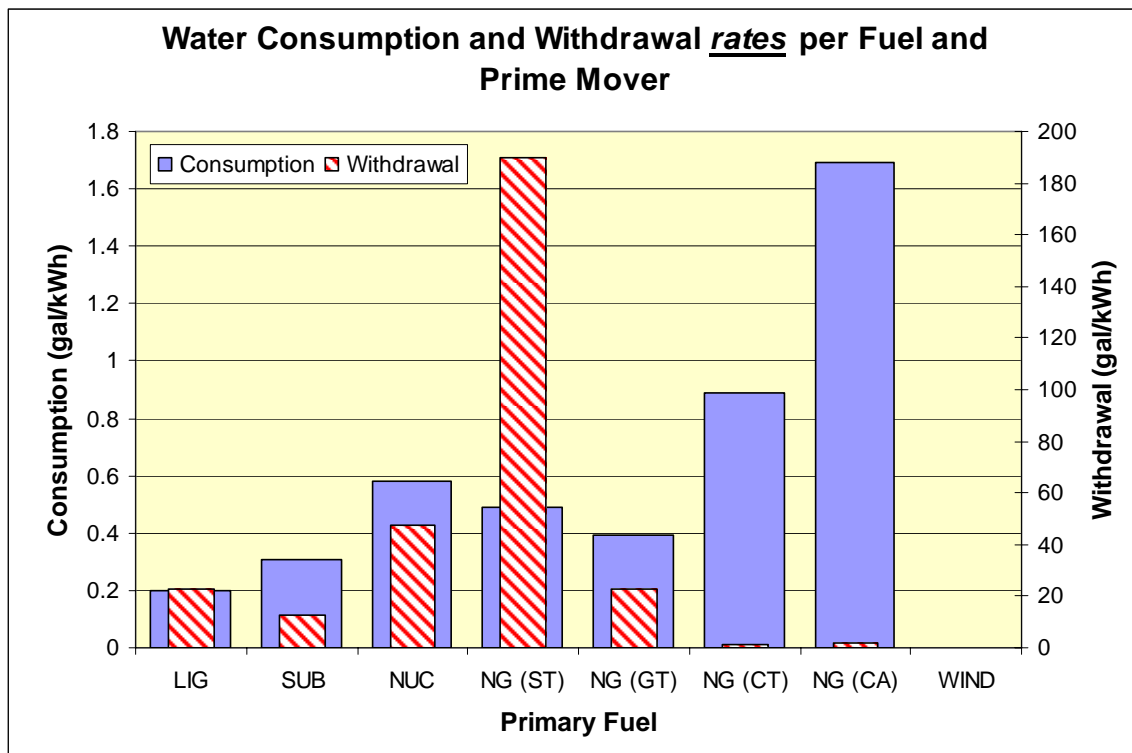


Figure 1.14. Trends of water consumption and withdrawal rates by fuel source for various fuel sources used in Texas [EIA, 2005]. ST = steam turbine, GT = gas turbine not in combined cycle, CT = combustion turbine of combined cycle, CA = steam section of combined cycle.

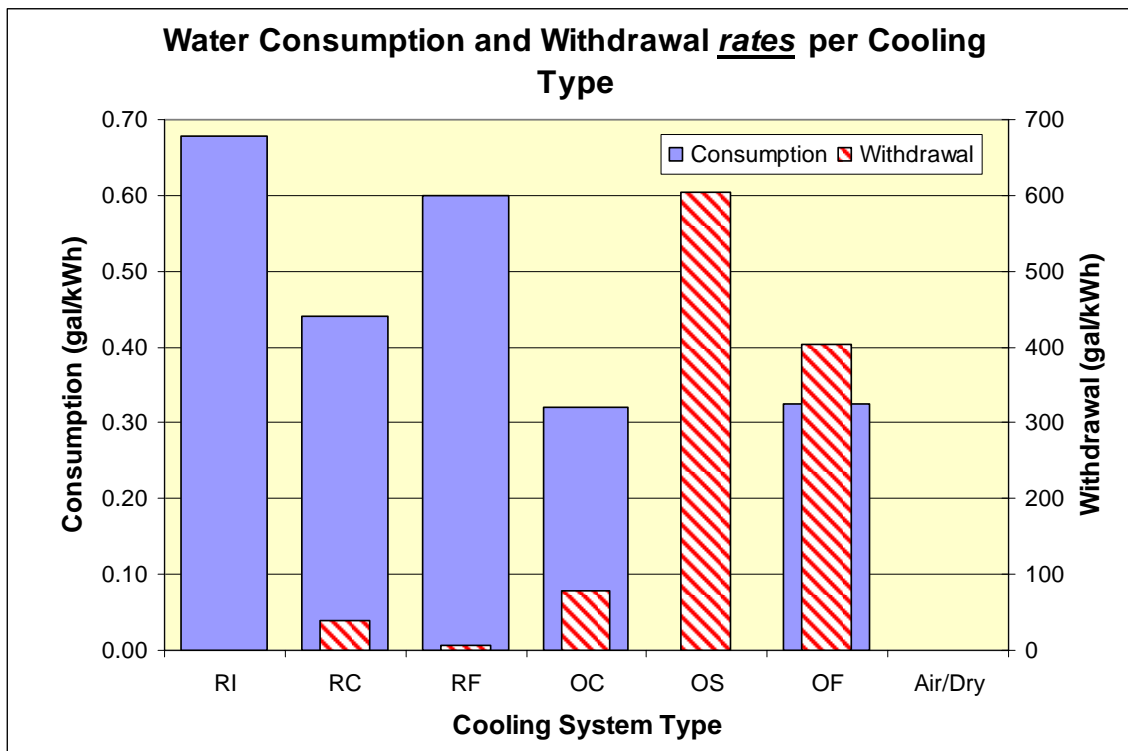


Figure 1.15. Trends of water consumption and withdrawal rates, by cooling system type. Note that for RI, the withdrawal rate is 0.76 gal/kWh and does not display in the graph due to scale [EIA, 2005]. OS = Once through, saline water. OF and OC = Once through with cooling pond(s) or canal(s). RI = Recirculating with induced draft cooling tower(s). RF = Recirculating with forced draft cooling tower(s). RC = Recirculating with cooling pond(s) or canal(s).

1.3.4 Current Steam-electric Fossil fuel and Nuclear Water Consumption – TCEQ and TWDB Data

Because of a limitations in EIA data, the authors along with industry representatives and the TWDB decided to base the water consumption for power generation upon data from state-level sources from the TCEQ and TWDB. This section describes these data and Appendix C shows results for each power plant facility. The final result for estimating water consumption for power generation in Texas for 2006 is listed in Table 1.6 along with estimates from other reports listed in Table 1.4.

The authors obtained steam-electric water consumption data from both the Texas Commission on Environmental Quality (2001-2006) and the Texas Water Development Board (2001-2005) concerning water intake, diversion, and return of surface and groundwater.

The goal was to use only 2006 TCEQ data because they are the latest available, and 2006 was considered a dry year and thus a good baseline or ‘bad case’ scenario for estimating water diversions for power plants. Because not all power plants had available data for the latest single year (e.g. 2006 for TCEQ and 2005 for TWDB), we were considered data from more years than just the latest available. For example, out of 400 terawatt hours (TWh)² generated in Texas in 2006 from all electric generation units, the 2006 TCEQ database contains information on plants that account for 210 TWh. When considering only non-industrial generation, TCEQ water data exist for 200 TWh out of 360 TWh that are non-industrial.

Therefore, in addition to tabulating water consumption and electric generation for the single year of 2006, we calculated average values for years 2001 through 2006 (TCEQ) and 2001 through 2005 (TWDB). These aggregated water diversion and consumption values were divided by the associated electricity generated at those facilities within the years of interest. This additional step provided slightly more raw data for power plant water diversion and consumption, but still left many facilities with no available data.

For power plants with no TCEQ data, we used the default water use rates in Table 1.5. Appendix C describes and lists the data (e.g. “gal/kWh” factors and ac-ft consumed) used to estimate this report’s official 2006 water consumption for electricity generation in Texas.

Table 1.5. Default water consumption rates when no TCEQ data were available for any given facility.

Fuel	Prime Mover	Once-through or Cooling Tower?	Water consumption rate (gal/kWh)
NG	CC	cooling tower	0.23
NG	GT	cooling tower	0.05
NG	ST	cooling tower	0.70
NG	CC	Once-through or recirculating	0.23
NG	GT	Once-through or recirculating	0.05
NG	ST	Once-through or recirculating	0.35
Coal (any)	ST	cooling tower	0.60
Coal (any)	ST	Once-through or recirculating	0.35
Nuclear	ST	Any	0.60

² 1 TWh = 1 terawatt hour = 1 million megawatt hours (MWh) = 1 x 10¹² watt hours

Table 1.6. Water *consumption* for thermoelectric power with the estimate from this report listed for 2006.

Thermoelectric Power - Water Consumption				
	Groundwater (Mgal/d)	Surface water (Mgal/d)		All Water (Mgal/d)
	Fresh	Fresh	Saline	Total
Texas (1995) ^a	--	297	12	309
Texas (2000) ^b	--	--	--	501-555
Texas (2006)^c	40	381	9	430
United States (1995) ^a	--	3,130	369	3,680
	Groundwater (acre-feet/yr)	Surface water (acre-feet/yr)		All Water (acre-feet/yr)
	Fresh	Fresh	Saline	Total
Texas (1995) ^a	--	332,000	13,000	346,000
Texas (2000) ^b	--	--	--	561,394 – 622,000
Texas (2006)^c	45,000	427,100	10,000	482,100
United States (1995) ^a	--	3,500,000	413,000	4,122,000

^a [USGS, 1998]

^b Table 4.2 (501 Mgal/d; 561,394 ac-ft/yr) [TWDB, 2007]; Appendix A3 (555 Mgal/d, 622,000 ac-ft/yr) [Sledge et al., 2003]

^c Final 2006 steam-electric water consumption estimate for this report. Using data from TCEQ, TWDB, stakeholder input, and general “gal/kWh” consumption factors. See Appendix C.

1.3.5 Water usage from non-fossil/nuclear Thermoelectric Generation: Wind, Solar PV, Solar CSP

Wind, PV solar, and other non-water using renewables can contribute to electricity generation without direct water usage. The amount of installed wind power has increased tremendously in Texas over the last 5 years. In 2006, approximately 3,000 MW of installed wind capacity generated approximately 6.7 million MWh, or 1.7% of Texas electricity. As of the end of 2007, approximately 4,500 MW of wind turbines were installed, and during 2007, 8.1 million MWh, or 2%, of Texas electricity was generated by wind turbines [EIA, 2007b].

Because wind power requires virtually no water usage during electricity generation, we assume its consumption and withdrawal rates are approximately 0 gal/kWh, although some water may be used for washing wind turbine blades. Additionally, to date all wind electricity has been generated in West Texas where water supplies are generally scarce, thus providing a nice geographic and resource synergy. Using typical Texas values for water consumption and withdrawal rates, in 2007 wind power offset the need for approximately 7,500-15,000 ac-ft (at 0.3-0.6 gal/kWh) of consumption and 500,000 ac-ft (at 20 gal/kWh) of withdrawal. In the Chapter 3 of this report, we account for future additional wind electricity in displacing the need for some water.

Today, there are no concentrating solar power (CSP) facilities in Texas; however, utilities such as Austin Energy are considering implementing this technology. CSP plants use mirrors to concentrate the solar radiation onto smaller areas in order to heat a fluid or molten salt. Water is then turned to steam by running it through a heat exchanger with this heated fluid, and that steam is in turn used to generate electricity in a cycle similar to that for fossil and nuclear steam plants. Thus, CSP systems need cooling systems like

other thermoelectric power plants. For cooling towers connected to CSP systems, the estimated water consumption is 0.72-0.90 gal/kWh [DOE, 2006]. Water concerns are a big factor for CSP systems since they are most feasible in the desert areas of the US, and thus the far Western regions of Texas, where water is least available. Air cooled systems can be used at CSP plants, but their larger infrastructure costs only adds to the already more expensive CSP plant itself.

1.4 Summary of All Texas Electricity Generation and Water Usage

Figure 1.16 shows the annual electricity generated in Texas by major fuel categories. Nuclear has held steady at near 40 million MWh since 1995 when the last reactor came online. Natural gas generation has steadily increased from just under 140 million MWh in 1990 to almost 200 million MWh in 2002, where it was stayed until 2006. Coal generation has increased more slowly than natural gas, from 120 million MWh in 1990 to approximately 145 million MWh in 2006. Hydroelectric generation is hardly measureable on the scale of what is consumed in Texas resting at 0.5-2.6 million MWh since 1990. Other renewables, which is almost entirely wind power, is steadily increasing with significant increases starting in 2000 from 1.8 million MWh to 7.8 million MWh in 2006.

In looking at the trends in Figure 1.16, one cannot directly deduce if they indicate that more or less water has been consumed in the past as compared to today. The details are in the types of generation and cooling units that are using the fuels. Generally, the more that non-steam-based generation (e.g. wind, solar PV) and more energy efficient technologies are incorporated as a percentage of electricity generated, they will move toward decreasing Texas' overall electricity water consumption rate, or gal/kWh value. The discussion of water-conserving technologies is the subject of Chapter 2.

Figures 1.17 and 1.18 show the geographical distribution of electricity generation and water consumption, respectively, for electricity generation in Texas

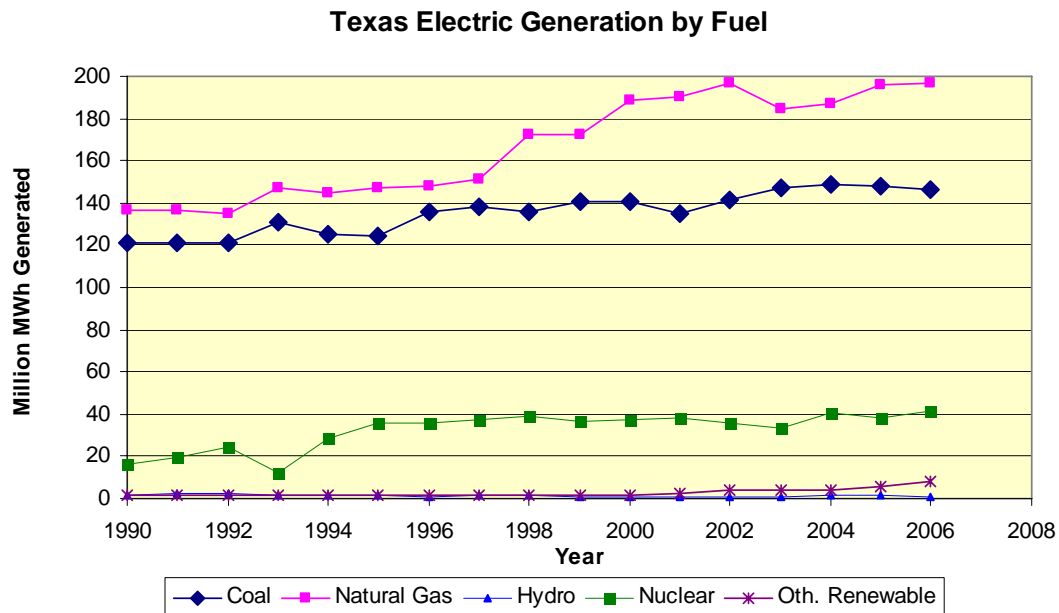


Figure 1.16. Trends of Texas electricity generation by fuel source [EIA, 2007].

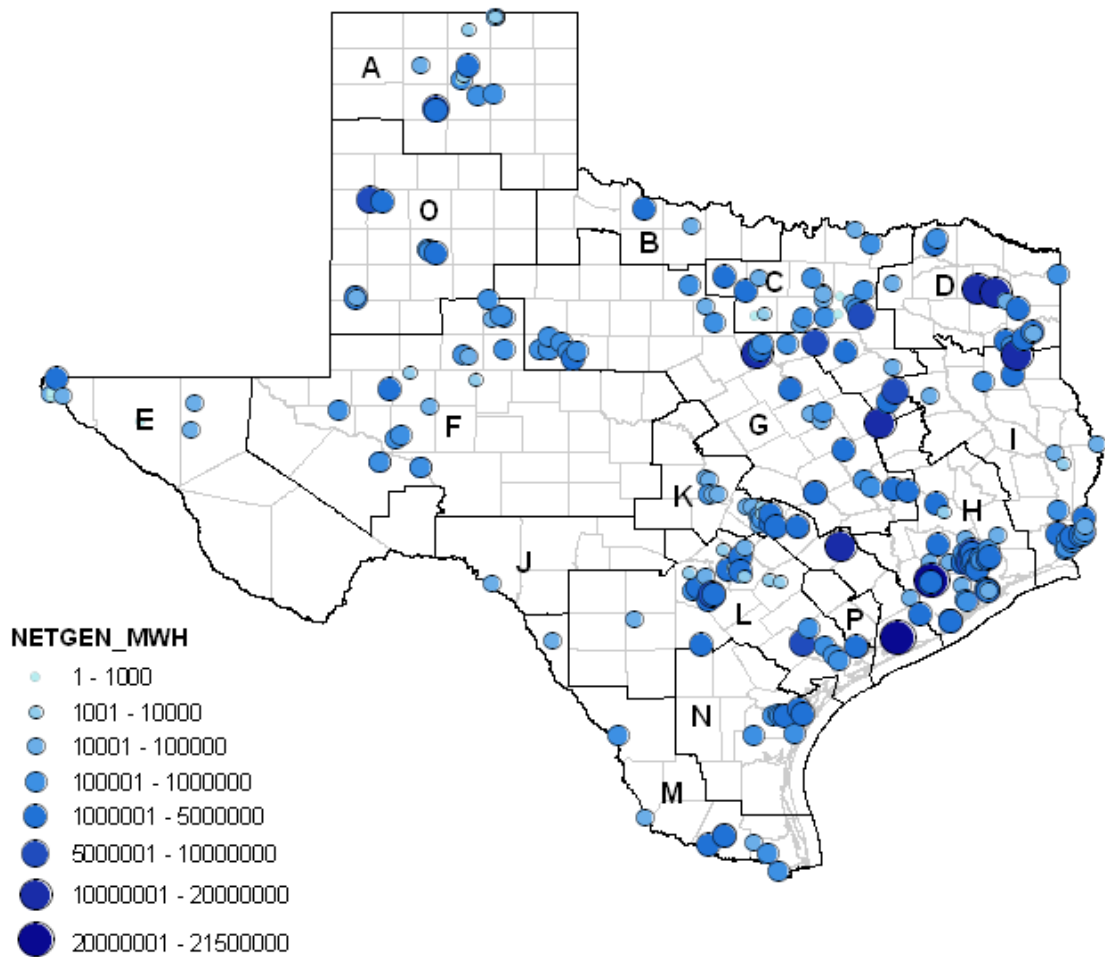


Figure 1.17. Map of the distribution of *electricity generation* (MWh) in 2006 via power plant facility.

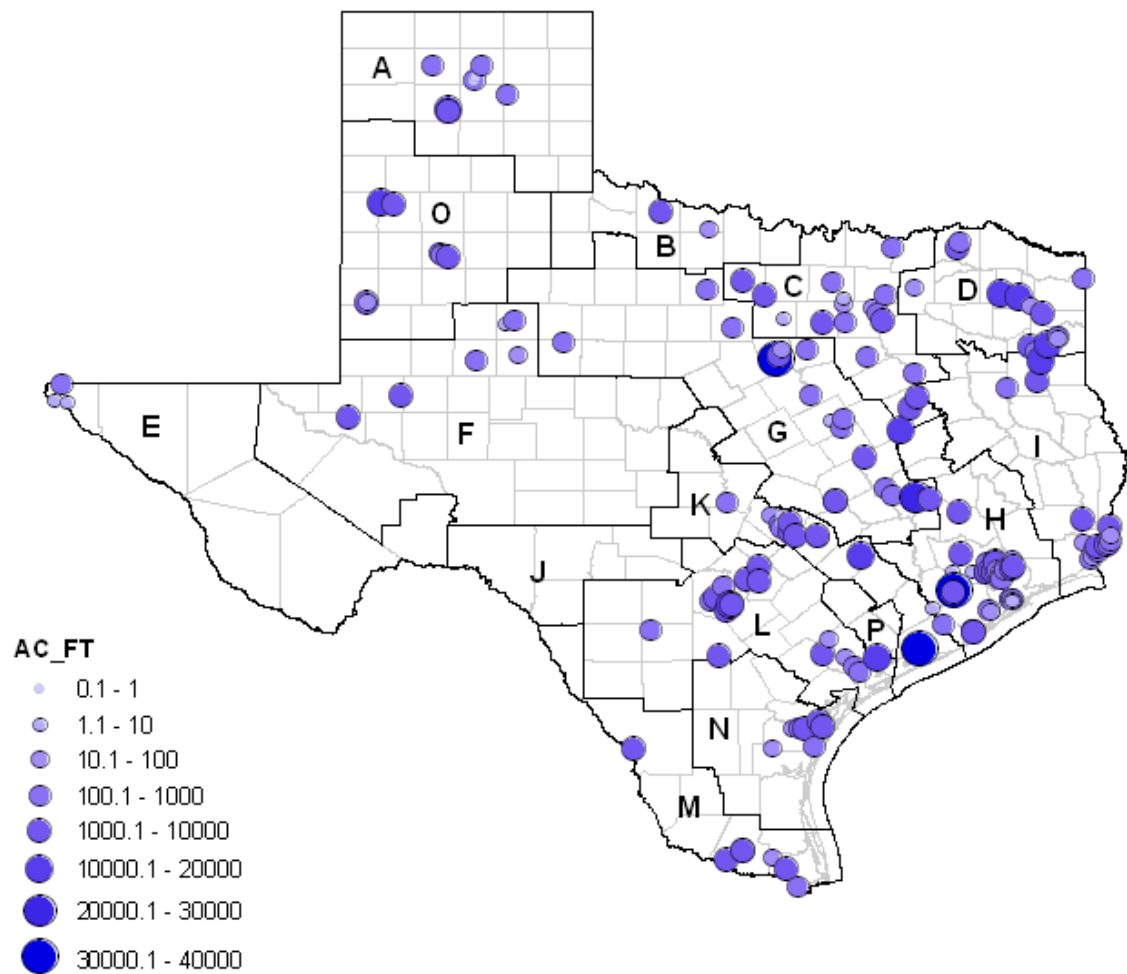


Figure 1.18. Map of the distribution of *thermoelectric water consumption* (ac-ft) in 2006 via power plant facility.

CHAPTER 2: Cooling and Water Conserving Technologies

2.1 Cooling systems for Thermoelectric Power plants

The main types of cooling systems for thermoelectric power plants utilize wet cooling (open loop wet cooling or once-through cooling, and closed loop wet cooling or cooling towers), dry cooling and hybrid wet/dry cooling. Figures 1.1-1.5 show the overall power plant system overview, and the following subsections describe specific cooling system technologies.

2.1.1 Wet Cooling Systems

Historical trends for open loop (once-through with and without cooling reservoirs) and closed loop wet cooling systems using cooling towers or recirculating reservoirs for Texas electricity generators were discussed extensively in Chapter 1 of this report. Data presented in Chapter 1 show how the distribution of cooling rates (gal/kWh) is not normal, but we summarize averages here for quick reference.

In summary, Texas thermoelectric open loop cooling systems average a withdrawal rate of 105 gal/kWh [EIA, 2005] when considering both fresh and salt water, and 63 gal/kWh [EIA, 2005] when considering only freshwater systems. The average direct consumption rate for once-through cooling from the EIA is 0.08 gal/kWh [EIA, 2005] and 0.51 gal/kWh as estimated in this report. Much of the large difference between the EIA and our value stems from accounting for enhanced evaporation from power plant cooling lakes, rivers, and ponds. For open loop cooling systems, the enhanced evaporation due to added heat from power plants into lakes is the cause for the majority of water consumption with those systems, and in Texas can account for 0.25-0.50 gal/kWh. This lake evaporation quantity is simply not considered in the EIA form 767 data and explains the low average obtained from that data.

The EIA data suggest thermoelectric closed loop cooling systems average 12.4 gal/kWh [EIA, 2005] for withdrawal and 0.51 gal/kWh for consumption. The data used in this report (see Appendix C.1) show consumption rate of 0.34 gal/kWh for power plants with cooling towers. This smaller consumption rate for cooling towers versus once-through systems is largely a result of a common association of cooling towers with NGCC plants that are typically more thermally efficient than coal, nuclear, or natural gas plants using only steam turbines.

2.1.2 Air/Dry Cooling Systems

As the categorization implies, dry cooling systems use no external water for condensing process steam after it passes through the steam turbine. The water or cooling fluid used in dry cooling systems is self-contained within a closed loop much like a car radiator. Thus, dry cooling systems have 0.0 gal/kWh water withdrawal and consumption rates, but plants that use dry cooling do consume and withdraw water for other purposes. For

example, a study of dry cooling natural gas combined cycle plants in California estimated that dry-cooled NGCC plants would use approximately 5% of the water as a wet cooled plant [Maulbetsch and DiFilippo, 2006].

Although some sources cite as many as 600 power plants using dry cooling systems worldwide, in the U.S. most dry cooling systems are at units that have generating capacities of less than 100 MW. By 1994, there were 36 dry-cooled plants in the U.S. with 3,200 MW of installed capacity, and 42% of the plants cited the lack of water as the reason for the use of dry cooling [Bartz, 1994; Dziegielewski et al., 1999]. During the ten-year period between 1990-1999, dry cooling was used at ten new U.S. power plants with a capacity greater than 50 MW; only one of these plants had a generating capacity greater than 200 MW [Micheletti and Burns, 2002].

In Texas two power plants that use dry cooling are fueled by natural gas combined cycle plants using a single shaft (CS) [EPRI, 2002]. These two plants, Midlothian Energy Facility (Ellis County) and Hays Energy Project (Hays County), owned by International Power PLC, both had very high energy efficiencies in 2006 at 45.7% and 46.8%, respectively. The dry cooling systems were engineered by BDT Engineering, Balke-Dürr, Inc. [EPRI, 2002]. The Hays Energy Project facility has half of its generators cooled by wet cooling towers that reuse municipal wastewater and the other half cooled by air-cooled towers.

Figure 2.1 shows a diagram of a dry cooling system, often characterized as having an air-cooled condenser (ACC). The hot condenser liquid, which operates in a closed pipe system, passes through a liquid-to-air heat exchanger instead of being discharged into the environment (as in open-loop cooling systems) or evaporated (as in closed loop cooling systems). The heat exchanger has many fins on the pipes to increase surface area, and thus heat removal.

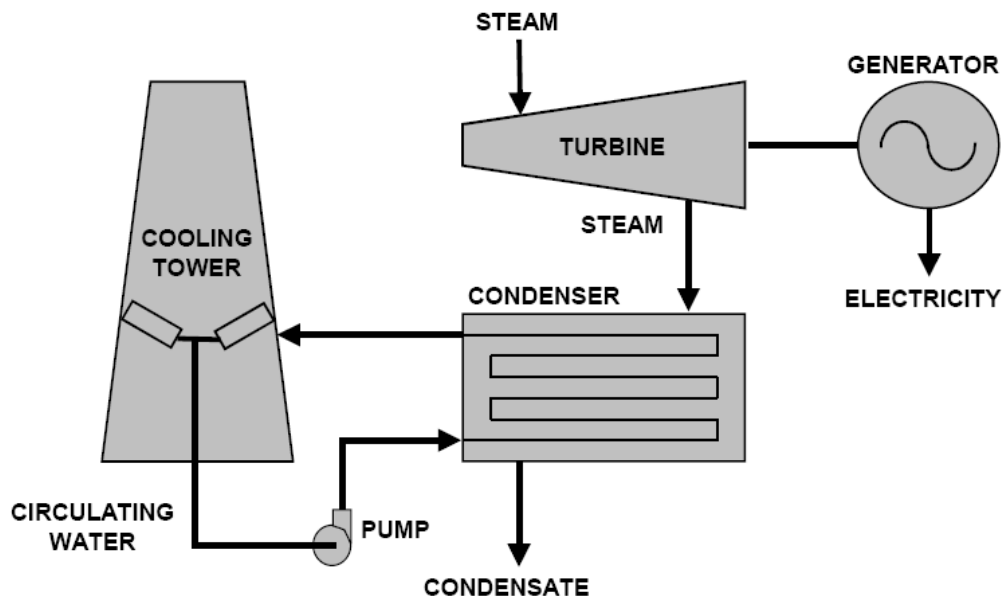


Figure 2.1. Diagram of an air or dry-cooling system [Torcellini, 2003].

There are two basic types of air cooling systems based upon how the steam is condensed:

1. *Direct* – turbine exhaust steam is delivered directly to an air-cooled condenser (See Figure 2.2). The cooling air contacts the finned pipes that contain the turbine steam.
2. *Indirect* – steam is condensed in a condenser that is separate from the air cooling tower (See Figure 2.3). The steam is condensed by a spray of cooling water onto the steam-containing pipes, and this water is then circulated to an air cooling tower.

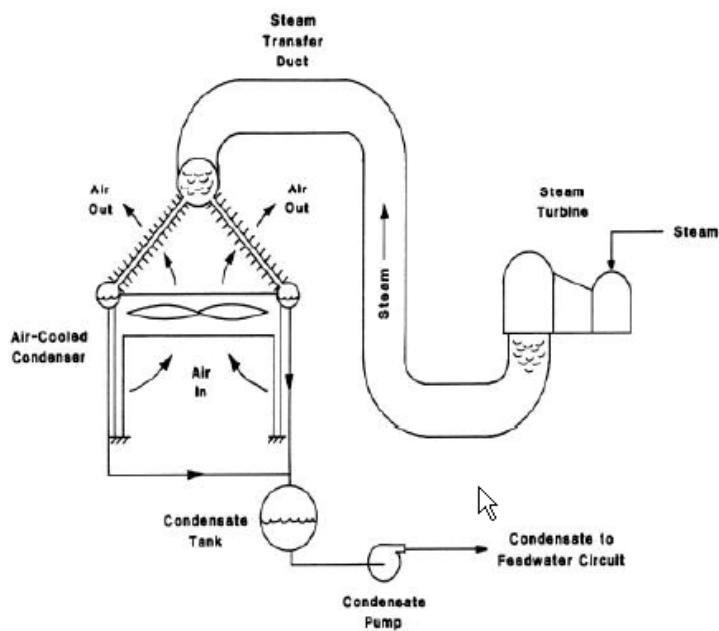


Figure 2.2. Direct dry/air cooled cooling system [EPRI, 2002].

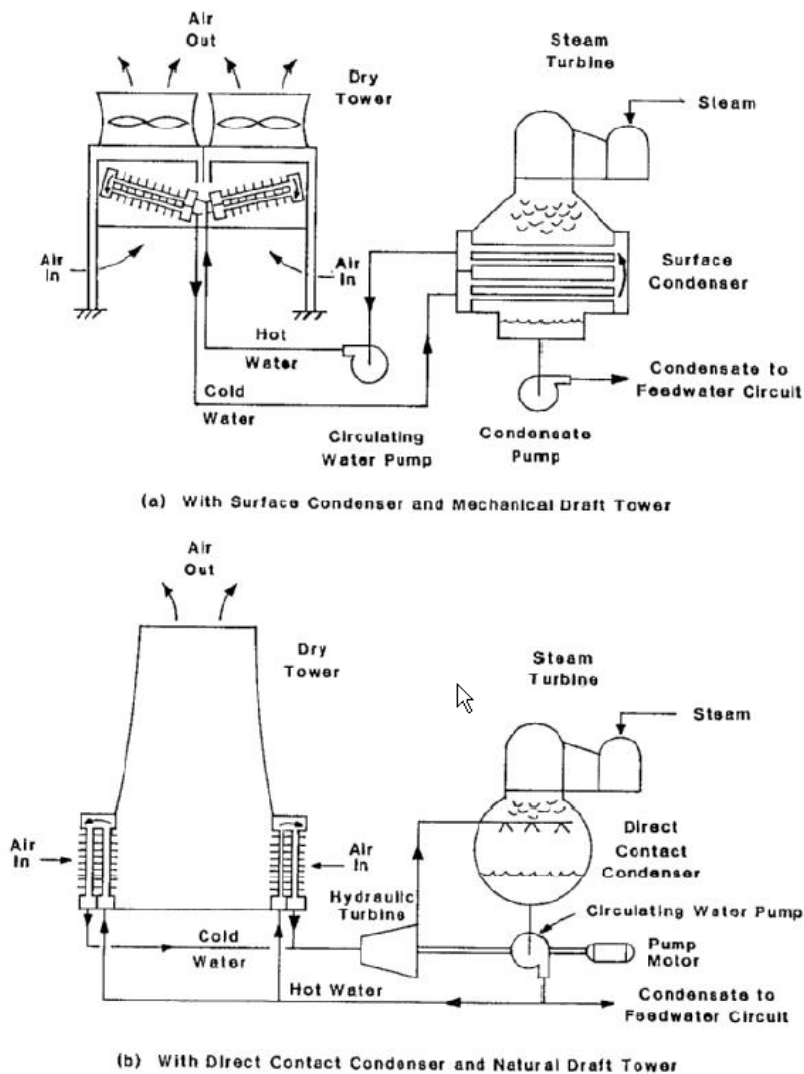


Figure 2.3. Indirect dry/air cooled cooling systems [EPRI, 2002].

The effectiveness of dry cooling depends heavily upon air temperature, more specifically the dry bulb temperature, and relative humidity. These environmental factors of temperature and humidity are more influential upon the performance of dry systems versus wet cooling systems. Generally cooler and drier air increases the effectiveness of dry cooling. For the two dry-cooled power plants in Texas, the drop in summer capacity rating is from 0.99 GW to 0.88 GW and from 1.73 GW to 1.29 GW for the Hays and Midlothian facilities, respectively [EIA, 2006]. These summer capacity drops represent maximum power rating decreases of 11% and 25%.

In a study for California nominal 500 MW NGCC plants optimized for lifetime cost, the net capacity of wet-cooled systems over dry-cooled systems was 12.3, -0.2, -4.5, and -3.7 MW for four different climates [Maulbetsch and DiFilippo, 2006]. Thus, because you

still have to consider the size of a cooling system with its cost, the power efficiency of dry-cooled plants can vary. The cost of dry cooling was seen to add 5% to 13% more to the capital cost of a wet cooled plant.

Generally, dry cooling systems are significantly more expensive to construct and operate. For two climactic conditions similar to those in Houston (Jacksonville, FL) to El Paso, capital and annual costs can be 3-4.5 times larger for dry versus wet closed loop cooling towers [Maulbetsch and Zammit, 2005]. However, the attraction of dry cooling systems is their lack of need for water, and thus the economic tradeoff depends upon the cost of water. In comparing dry and wet cooling in the same climate zones, Maulbetsch and Zammit conclude that if water costs are above \$3-\$4 per 1000 gallons (kgal), then dry cooling can possibly be the more economical choice. Usually, this cost of water is still well above the going price. A recent debate about water usage at 2 new power plants near Corsicana, Texas stem around the cost of water near \$1.00/kgal for delivered water (pipeline from lake) and \$0.56/kgal for water at the lake without a pipeline [Jacobs, 2008]. The proposed power plant diversions are 10-16 Mgal/d (11,200-17,900 ac-ft/yr) while returning 20-25% of the water to the lake.

2.1.3 Hybrid wet/dry Cooling Systems

Hybrid wet/dry cooling systems refer to those that have cooling from both a wet cooling system and a dry cooling system. Each dry and wet cooling unit can be sized smaller than if they were standalone cooling systems. The major driver for hybrid cooling systems is to avoid the capacity loss during hot summer months, when extra capacity is most needed. Thus, during the hot months, the wet cooled system can be employed to maintain a higher power capacity rating.

Hybrid cooling systems usually exist in a parallel configuration where some fraction of steam is condensed in the wet section and the rest in the air-cooled section. The fraction of steam condensed in each system depends upon the engineering design and climatic conditions during operation.

The cost effectiveness and water usage issues of hybrid cooling are similar as for dry cooling. Hybrid cooling systems simply attempt to reduce the amount of water consumption for a smaller increase in capital cost and maintenance. In the future as electricity generators become more familiar with dry and hybrid cooling designs, the costs could come down. Also, as more pressure is put upon water resources from thermoelectric and other demands, dry and hybrid cooling may become more feasible even without significant design improvements.

There are not many examples of hybrid cooling being used in Texas; however, one chemical facility, the Formosa Plastics plant in Point Comfort, uses a parallel path plume abatement type of hybrid cooling system constructed in 1999 [EPRI, 2002].

2.2 Power Plant Efficiency and Water Usage

The power efficiency of a power plant can be defined as net electricity output divided by the total fuel energy content input. For fossil fuel plants, the energy input is dictated by the amount of fuel, in volume or mass, multiplied by its energy density. Table 2.1 shows the fuel efficiency characteristics of power plants in Texas.

Table 2.1. Fuel efficiency of electricity generation power plant types in Texas during 2006 [EIA, 2006].

Fuel Type	Prime Mover*	Power Efficiency [#]
Coal - Lignite	ST	31.1 %
Coal - Subbituminous	ST	32.3 %
Natural Gas	ST	28.4 %
Natural Gas	GT	26.2 %
Natural Gas Combined Cycle	CT-CA	38.6 %
Natural Gas Combined Cycle ⁺	CS	46.1%
DFO (diesel)	GT	17.9 %
Nuclear	ST	32.7 %
Total (not wind or hydroelectric)	ALL	32.6 %

* GT = combustion turbine, ST = steam turbine, CT = combustion turbine of combined cycle, CA = steam part of combined cycle, and CS = single shaft combined cycle.

[#] Efficiency here only accounts for electricity production, and not heat energy provided by cogeneration or combined heat and power for various useful purposes.

⁺ There are only two listed sites, both operated by International Power plc and operating using dry cooling: Hays Energy Project and Midlothian Energy Facility. The Hays Energy Project has both dry and wet cooling but not operating in a hybrid fashion (personal communication with Ron Reynolds).

As can be seen from Table 2.1, 67% of the energy content of fuels used to generate electricity is dissipated as heat. This heat is currently dissipated using water as a coolant. In general the higher the energy efficiency of the steam-electric power production technology the lower the water usage on a per kWh basis. As the average efficiency of Texas power plants increases in the future, the water usage per kWh will likely decline (in the absence of other factors). For instance, if a new coal power plant is 40% energy efficient instead of 32%, then we should expect the cooling water demand to reduce by approximately 5%-10% because more of the fuel energy content ends up as electricity (i.e., usable energy) versus heat (i.e., wasted energy).

Because so much energy is usually wasted as heat, increasingly development organizations and planning agencies are implementing what is termed combined heat and power (CHP). Essentially, CHP attempts to make use of the normally wasted heat from a thermoelectric generation process. The major ways to make use of the heat are:

- delivered steam for industrial processes,
- delivered steam or heated air for building heating,
- delivered steam or heated air for air-conditioning via absorption chillers, and
- delivered steam or heated air for chilled water via absorption chillers.

Because a single energy system can supply electricity, heated air/steam, and chilled air/water, the systems are sometime referred to as tri-generation or CCHP for combined

cooling, heating, and power generation. Austin Energy, through its Domain and Robert Mueller projects, has taken advantage of this on-site generation, or cogeneration, concept to create systems that achieve energy efficiencies of 60%-80%. In order to create this efficiency, a large amount of planning must occur to co-locate all of the necessary infrastructure (buildings and pipelines) and customers for the power, heat, and cooling services.

2.2.1 Natural Gas Technologies – Combined Cycle

From Table 2.1, one can notice that natural gas combined cycle (NGCC) units have a 10%-12% higher efficiency than natural gas generation from gas or steam turbines. These higher efficiency NGCC plants are the types that have been constructed more often in the recent past, and this trend is expected to continue for future natural gas plants. Individual Texas NGCC power plant efficiencies approach annual electric power efficiencies of over 45% depending upon operational characteristics, and this still does not account for cogeneration units using steam for other processes [EIA, 2006]. NGCC plants at optimally operating conditions have higher efficiencies than single cycle thermoelectric plants operating at optimal conditions.

Natural gas and compressed air are burned in combustion turbines (stationary jet engines) connected to a generator. The exhaust hot gases from the combustion process is routed to a heat recovery steam generator (HRSG) or boiler where water is converted to steam. The steam leaving the HRSG is routed to a steam turbine for additional electrical generation. Some units require supplemental firing of the HRSG to maintain proper steam temperatures and pressures. In cogeneration facilities, the HRSGs may supply steam to a separate process rather than a steam turbine or steam may be extracted from the turbine at various pressures and temperatures to feed another process.

Figure 2.4 shows the cumulative installed capacity of current natural gas units in Texas that were installed over the last 60 years. Starting in 1982, natural gas combined cycle units became the dominant installation. This pattern is represented in the figure both as CS and by CA and CT increasing together at a roughly 2:1 ratio. In NGCC installations, the steam part (CA) is usually approximately 1/3 of the capacity of the total plant, and combustion turbines (CT) account for the other 2/3 capacity.

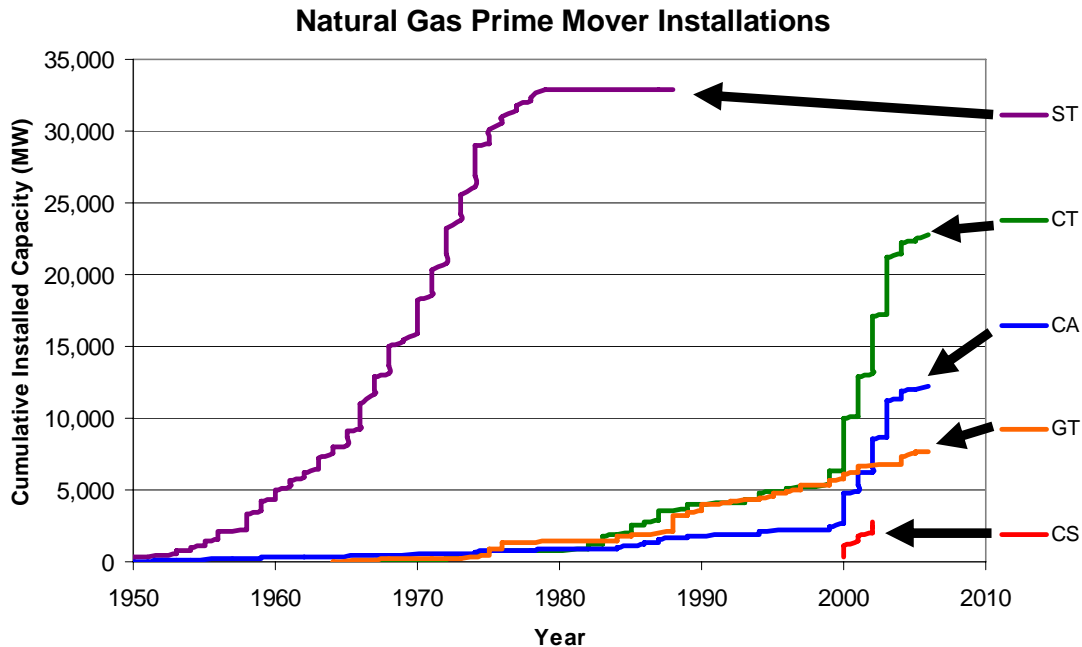


Figure 2.4. The cumulative installed capacity of natural gas combined cycle plants increased significantly starting in 2000. CT = combustion turbine of combined cycle, CA = steam section of combined cycle, GT = gas combustion turbine not in combined cycle, and CS = combined cycle single shaft (same generator).

Not only does the higher efficiency of NGCC plants lower water consumption and withdrawal for cooling, but the combustion turbine part of the cycle is air cooled. The combustion turbines are the major reason why NGCC plants have low cooling water usage rates. The natural gas plants with the highest water use rates (gal/kWh) tend to be the oldest and comprised of natural gas boilers running steam turbines (ST). Figure 2.4 indicates that since 1980 there have been no new major natural gas power plant installations using only steam turbines. These plants also tend to be the least efficient and thus the last chosen to generate electricity. From EIA-767 2005 data, 47% (60 of 129) of the listed natural gas generation units were installed before 1970 and generated 31% of the electricity from natural gas.

2.2.2 Refrigerated air for combustion turbines

One method to increase fuel efficiency of NGCC plants is to pre-cool the inlet air to the combustion turbines [Stewart, 1999; Punwani et al., 2001]. The turbines are usually rated at an International Organization for Standardization (ISO) standard of sea level conditions at 59°F. As the inlet air temperature decreases, the turbine power rating goes up almost linearly, and vice versa as the temperature increases. The heat rate, or input fuel per power output, decreases with temperature, but at a slower rate than the turbine power rating. As an example, Stewart notes that for a 7EA turbine operating at 40°F versus 100°F the increase in capacity is from 73 MW to 90 MW, or 23%, and the decrease in heat rate is approximately 4% [Stewart, 1999]. Nonetheless, the benefits of

turbine inlet air cooling are twofold: increased ability to meet peak power demand and increased overall fuel efficiency. The extra peak power helps prevent the need for more electric generation plants, and the increase in fuel efficiency helps minimize environmental effects including water consumption.

Figure 2.5 shows how the heat rate and power output for a combustion turbine changes with inlet air temperature. The major reason for the increase in performance is because the turbines operate at near constant air velocity and cooler air is denser – thus, more momentum is transferred through the turbine due to cooler input air.

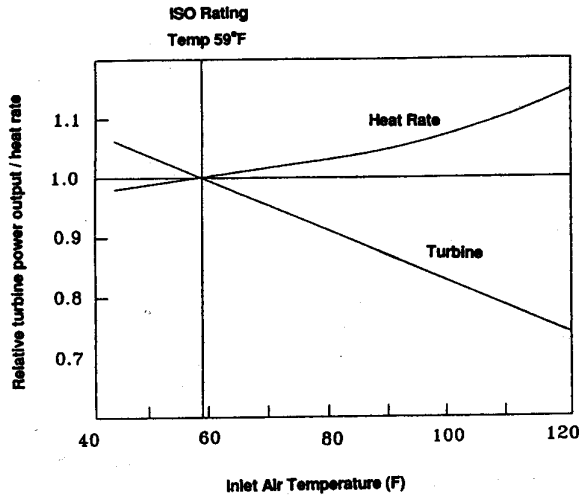


Figure 2.5. Relative turbine power output and heat rate versus inlet air temperature [reproduced from Stewart, 1999].

There are a few common technologies used to cool turbine inlet air, and the use of them individually or as hybrid combinations depends upon the specific plant site characteristics. These characteristics include climate, airflow rate per kW of increased generation, value of increased generation capacity and decreased heat rate, load profile and hours of operation, cost of equipment and installation, cost of refrigerant, turbine degradation from input pressure loss of cooling system, and maintenance and cost of operation that can include purchase of water, refrigerant, pumps, and other equipment [Stewart, 1999]. Different types of inlet air cooling technologies include evaporative coolers (the least expensive), electric centrifugal chillers, direct refrigerant coolers, and absorption chillers. In addition, off-peak thermal storage (chilled water or ice) can create a method to store energy when electricity is cheaper.

A study of a cogeneration power plant in Pasadena, TX showed that the annual rate of return on investment for a turbine inlet air cooling system was in the range of 12-22% for the most promising technologies considered [Punwani et al., 2001]. This Pasadena plant used three combustion turbines at a total 316.8 MW power rating while selling steam as a coproduct to a neighboring chemical plant such that increased steam production also produces income on top of increased electricity sales. The authors note that the economic factors considered at the time (e.g. price of gas \$2.5/MMBtu) were ‘typical’ at the time, and as the economics change, so can the desirability of the investment.

2.2.3 New Coal Technologies – Integrated Gasification Combined Cycle, Supercritical, and Ultra Supercritical Pulverized Coal

New coal power methods, such as integrated gasification combined cycle (IGCC), can also potentially lower water consumption due to differences in design which translate to over 30% less water needed per MW generated. For instance, Figure 2.6 shows calculated data for water loss, or consumption, in various coal plants that use recirculating closed loop cooling systems [DOE/NETL, 2007b]. In the cases analyzed, the water consumption rate is nearly 40%-50% less for IGCC plants versus pulverized coal (PC) designs, which are the only coal plants currently operating in Texas. Even though the calculations for Figure 2.6 are based upon bituminous coal, which is not used in Texas, the general trend follows for the lignite and subbituminous coals used in Texas.

Supercritical PC plants will also slightly reduce water consumption, mostly due to higher power efficiency over subcritical PC plants. Figure 2.6 shows a 12% reduction for supercritical PC over subcritical PC. Ultra supercritical PC plants can increase efficiency even further. The increase in efficiency from supercritical and ultra supercritical steam cycles results from the fact that the higher temperature and pressures create a more thermodynamically-efficient situation given that the environment (e.g. air and water) stays at the same temperature and pressure.

2.3 Effect of Environmental Controls and Policies upon Water Usage

2.3.1 Flue Gas Desulfurization systems

Flue gas desulfurization (FGD) systems are designed to precipitate sulfur out of the exhaust gas in coal plants. When sulfur molecular compounds, most commonly in the form of sulfur dioxide (commonly sulfur emissions are noted as SO_x or SO_x where the 'x' denotes the oxygen content of the sulfur and oxygen molecule), are emitted into the atmosphere they promote the formation of smog and acid rain.

The acid rain problem in the Northeastern and Midwestern United States had become troublesome by the 1980s. In 1995, the Environmental Protection Agency (EPA) implemented a cap-and-trade system governing SO_2 emissions from some of the large coal facilities [EPA, 2007]. In 2000, Phase II of the program targeted additional coal, oil, and natural gas facilities. The U.S. EPA estimates that SO_2 emissions are now 40 percent below 1995 levels.

The primary way that the SO_2 emissions reductions occurred was by the use of FGD systems and use of coal with less sulfur content (e.g. Powder River Basin coal instead of bituminous coal). In 2005, 14 Texas generation plants operated FGD systems [EIA, 2005]. These FGD systems consumed a quantity of electricity less than one-thousandth of

a percent of the 102 million MWh (25% of Texas total) of net electricity generated from their associated power plants. Thus, we conclude the effect of FGD units on plant efficiency is negligible in terms of calculating a water usage impact.

However, unlike the efficiency impact, the water usage for FGD unit operation is measureable. In power plants equipped with recirculating cooling water systems and wet FGD systems, 90 percent of the evaporative water loss occurs in the cooling towers and 10 percent in the wet FGD system [DOE, 2006c]. Wet FGD units consume approximately 0.05-0.07 gal/kWh generated from the plant with dry FGD systems consuming approximately half that amount of water [CMU via Dziegielewski and Bik, 2006]. Current research funded by the Department of Energy seeks to reduce the amount of evaporated water in wet FGD units by 50 percent.

Assuming the 9:1 ratio of water consumption at power plants with FGD systems, we can estimate the water usage for FGD systems. Approximately 73,000 ac-ft (65 Mgal/d) of water was used for thermoelectric generation from the 14 power plants with FGD systems [EIA, 2005]. Thus, the 2005 water consumption due to FGD systems was approximately 7,300 ac-ft/yr (7 Mgal/d). While this amount is not large compared to the total thermoelectric water consumption of 482,000 ac-ft/yr (430 Mgal/d), it is a significant increase in water usage for each individual plant and requisite water source, and it is only associated with one-quarter of Texas electricity.

We calculate a *lower and upper limit* on future water consumption from FGD systems by assuming they are installed on all coal plants and that coal plants generate 30%-50% of electricity in any given year. Note that coal currently generates approximately 35%-40% of electricity in Texas. Assuming 1.0% (low) and 2.5% (high) future growth rates for Texas electricity consumption, water consumption associated with FGD systems would be 12,300-25,800 ac-ft/yr (11-23 Mgal/d), 14,600-42,600 ac-ft/yr (13-38 Mgal/d), and 16,800-62,700 ac-ft/yr (15-56 Mgal/d) in 2026, 2046, and 2060, respectively.

2.3.2 Carbon Capture and Storage (CCS)

The future holds uncertainty as to whether or not a price will be put on carbon such that electricity generators would be forced to internalize what is now an economic externality. Nonetheless, popular sentiment appears to be switching to the concept, and even large energy companies that operate in Texas, including Luminant and NRG, are advocating, preparing, and/or researching for ways to operate their businesses while considering a carbon price or carbon emissions constraint. Several proposed bills in the US Congress seek to put a price on carbon (e.g. Lieberman-Warner: America's Climate Security Act), and some believe a bill will be signed during the administration of the next U.S. President. Additionally, investment banks that finance power plants are also very concerned about the future profits in coal plants because they will economically be the hardest hit by a carbon price.

Two strategies, aside from general energy efficiency measures, in Texas for dealing with a carbon price and increases in electricity demand may be to (1) build power facilities

(nuclear, wind, coal, solar, geothermal) that emit no carbon dioxide and (2) implement carbon capture and storage (CCS) technologies and systems that capture carbon dioxide (CO₂) from the pre or post-combustion gases of coal and natural gas power plants.

Coal plants are relatively well suited for CCS because (1) they run as baseload facilities at over 85% capacity factor and generate approximately 37% of Texas' electricity, and (2) coal has a relatively high carbon/energy content ratio such that coal generation accounted for 58% of Texas 258 million metric tons³ (tonnes) of CO₂ emissions in 2006 [EIA, 2007]. Coal power in Texas has a CO₂ emissions rate of 1.03 tonne CO₂/MWh. This rate is high compared to Texas natural gas CO₂ emissions rate of 0.58 tonne CO₂/MWh and, 0.0 tonne CO₂/MWh for nuclear and wind power. The overall year 2006 CO₂ emissions rate from Texas electricity generation was 0.643 tonne CO₂/MWh.

CCS may be enacted for natural gas plants, but the already high power conversion efficiency (over 50% running full time) of combined cycle systems and the lower carbon/energy content ratio of natural gas make CCS less likely than for coal, but still possible depending upon possible future carbon prices.

In power plants with CCS, water usage rates in gallons per *net* kWh generated will go up for three major reasons:

- losses in overall plant energy efficiency (i.e. more *gross* plant power required for auxiliary equipment and pumps),
- water use to cool the CO₂-absorbing solvents as the solvent is thermally cycled to absorb and release the CO₂, and
- increased electricity required for pumping CO₂ to and into sequestration sites.

2.3.2.1 Water Usage for CCS

CCS technologies added onto pulverized coal (PC) or integrated gasification combined cycle (IGCC) plants are expected to lower plant energy efficiency considerably. Estimates for energy penalties (e.g. decreases from normal power output assuming same amount of fuel input) for capturing 90% of plant CO₂ are 22%-29% for supercritical PC, 12%-20% for IGCC, and 14%-16% for NGCC [Rubin et al., 2004]. In other words, a bituminous coal plant running 75% of the time with a CO₂ capture system could decrease efficiency (η) from 39% to 30% for PC and 38% to 32% for IGCC. An NGCC plant with the same operating profile and CO₂ capture would decrease efficiency from 50% to 42% [Rubin et al., 2004].

The reason that efficiency decreases is due to the running of auxiliary equipment (pumps, fans, compressors, etc.) needed specifically for the CO₂ capture processes and the diversion of heat from the steam-electric cycle into the CO₂ solvent cycle. For each carbon capture system, there is more fuel input into the power plant for the same net

³ 1 metric ton, or tonne = 1000 kg = 1.102311 short tons = 2,204.6 lb

output. For example, for the coal plant post combustion capture designs discussed by the DOE [DOE/NETL, 2007b], additional produced steam bypasses the turbines used for generating electricity in order to drive the thermal cycling of an amine solvent that absorbs CO₂ from the flue gas. Thus, instead of approximately 30%-40% of all steam energy being converted into electricity, only 30%-40% of *half* of the steam energy is converted. In all it amounts to 80%-100% more heat that needs to be dissipated (see Tables 2.2 and 2.3). This extra heat in the diverted steam and the processes it heats must still be cooled just as if it were run through the steam turbines, and the use of additional cooling tower capacity will cause an increase in the water usage rate (gal/kWh) of the entire plant. It is important to note that air cooling towers could also be used to offset the increased water usage from CO₂ capture systems onto power plants.

While we have briefly described an example of using an amine solvent in a post combustion capture process for a pulverized coal power plant, there are different processes of separating CO₂ from gas flows in fossil fuel power plants. In IGCC power plants, the major gasification reaction converts carbon and steam into a syngas composed of carbon monoxide and hydrogen: $C + H_2O \rightarrow CO + H_2$. This syngas can be combusted in a gas turbine. When incorporating carbon capture, it is additionally desirable to strip the carbon from the carbon monoxide in the syngas to create a cleaner burning fuel of nearly pure hydrogen. An additional reaction, called the shift reaction, consumes additional water to produce more hydrogen that originates from the water: $CO + H_2O \rightarrow CO_2 + H_2$. Now the *pre-combustion* gas stream is composed of CO₂ to be captured in a scrubbing process before combusting the nearly pure H₂ in the turbines.

Natural gas combined cycle plants could be designed for CO₂ capture from the flue gas, like for pulverized coal plants, or by using chemical reactions to separate the hydrogen and carbon from the base gas much like in IGCC plants. Our analysis assumes that NGCC plants employ post-combustion CO₂ capture to produce an upper bound for water consumption.

2.3.2.2 Water Usage: CCS pipeline

After capturing and compressing CO₂ into its supercritical liquid phase, this CO₂ must be transported to a sequestration site that may or may not exist at the plant site. The most likely transport method for a CCS system is a pipeline network that connects CO₂ sources (power plants, concrete plants, etc.) with sinks (abandoned oil and gas wells, deep brine formations, etc.). Electricity is required to power the pumps that move the CO₂, perhaps hundreds of miles.

To estimate the electricity required to run the pumps for a CO₂ pipeline network, we use data from work being performed at the Bureau of Economic Geology (BEG). The BEG heads the Gulf Coast Carbon Center (GCCC), a consortium of businesses and environmental groups with interests in CO₂ infrastructure. As part of the GCCC work, the BEG is analyzing a pipeline network along the Texas coastal area to connect the many coal and natural gas plants to likely sequestration sites that include oil fields in decline, where enhanced oil recovery using the CO₂ can extract more oil, and brine reservoirs.

Preliminary calculations show that for 40-56 MtCO₂/yr (million metric tons of CO₂) and approximately 1000 miles of pipeline in South Texas, approximately two booster pumps are needed to move the CO₂. These two booster pumps are rated at about 8,200 hp (6.1 MW) each. Therefore, if these are both electrical booster pumps (they could be natural gas powered) operating at 85% capacity factor just as the coal power plants, they would consume approximately 90,000 MWh/yr, or 1.5-2.5 kWh/tCO₂. Using this rate of electricity per tonne of CO₂ and assuming the capture of CO₂ from all Texas coal plants equates to 225,000-375,000 MWh/yr for pumping. The water consumption from this additional electricity is approximately 270-450 ac-ft/yr (0.2-0.4 Mgal/d). Thus, we conclude that the increased *water consumption from pumping CO₂ is negligible* on the scale of water usage for power generation.

2.3.2.3 Water Usage: CCS Overall

Figure 2.6 shows the results from a DOE study indicating the water usage for coal and natural gas combined cycle plants when using a cooling tower and carbon dioxide capture systems [DOE/NETL, 2007b]. Table 2.2 shows how the extra water is needed for carbon capture systems that are cooled with closed loop wet cooling towers.

For the systems studied without CO₂ capture, the water consumption rates are approximately 0.37, 0.6-0.7, and 0.27 gal/kWh for IGCC, PC, and NGCC power plants, respectively. These consumption rates increase to approximately 0.51, 1.1-1.3, and 0.49 gal/kWh when considering carbon capture systems. Thus, there is a significant increase in water consumption required for capturing CO₂. For projecting increases in water usage in Texas for CCS on power plants using closed loop cooling towers, we use the middle of the ranges for percent increase as presented in Table 2.2.

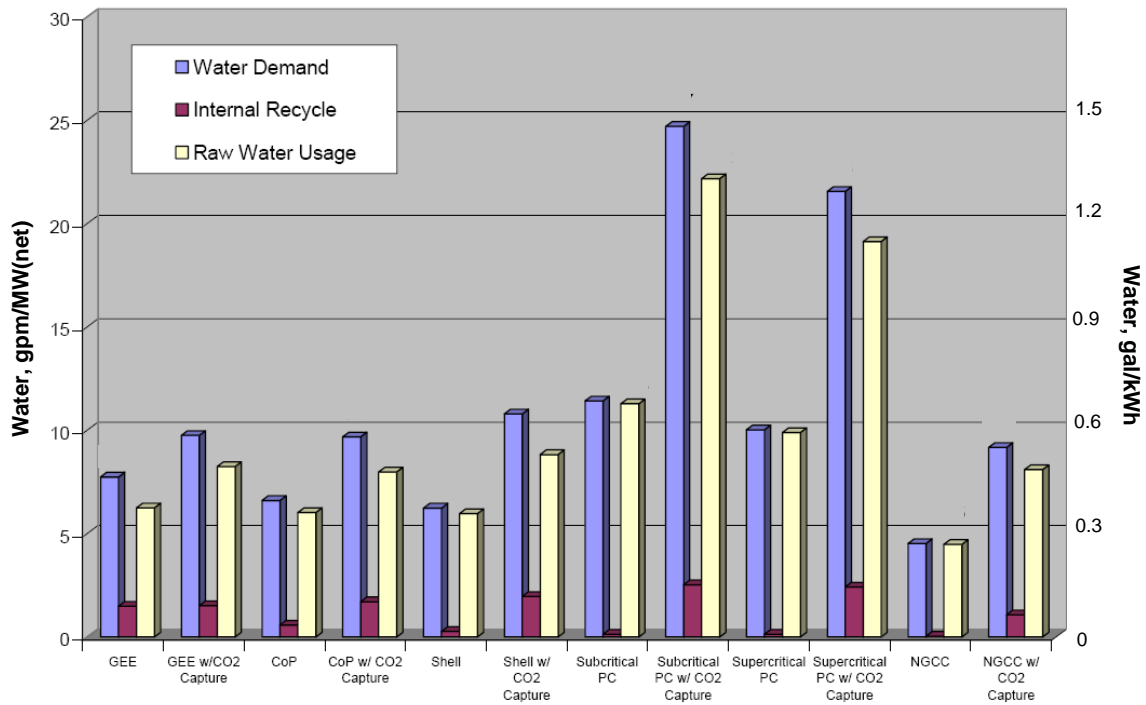


Figure 2.6. For coal plants, the predicted water usage is much higher for PC plants where the consumption rates with capture *without CO₂ capture* are larger than the consumption rates for IGCC coal plants *with CO₂ capture* (assuming a closed loop cooling system with recirculating with cooling tower) [DOE/NETL, 2007b]. Here “Raw Water Usage” is equal to consumption and kWh represent net electricity generation.

Table 2.2. Changes in **water consumption** for CCS of coal and natural gas generation plants with wet recirculating cooling towers.

Plant Type	% increase in consumption due to <i>efficiency loss</i> ^{*,=}	% increase in consumption due to <i>CCS process cooling</i>	% increase in consumption due to <i>CO₂ pipeline</i>	Total % increase in water consumption ⁺
Coal – PC	30% - 50%	45% - 60%	~ 0%	90% – 100%
Coal – IGCC	15% - 30%	15% - 25%	~ 0%	30% - 50%
Natural Gas – NGCC	13% - 17%	60%	~ 0%	70% - 80%

* Calculated as “ $(\eta_{no\ CCS} / \eta_{with\ CCS}) - 1$ ” per Rubin et al., 2004.

+ Figure ES-4 of DOE/NETL, 2007b.

= Some data from NETL, 2007.

2.3.3 Carbon Dioxide avoidance

2.3.3.1 New Nuclear Generation

Using data from the two existing nuclear facilities in Texas, one can make a good estimate of the water withdrawal and consumption rates for new nuclear units. Expanded nuclear generation in Texas is a very realistic scenario to occur by 2020, as both NRG and Luminant have either submitted permit applications or letters to the Nuclear Regulatory Commission regarding the intention to expand nuclear generation at their existing locations [PUCT, 2007]. Other companies, such as Exelon and Amarillo Power, have expressed interest in building nuclear facilities at new locations within Texas. Doubling Texas' nuclear generation in 10 years is quite realistic and beyond then additional nuclear power is a definite possibility.

Recall from Chapter 1 that the two nuclear sites in Texas consume water at a rate of approximately 0.6 gal/kWh. The withdrawal for each nuclear facility is different since one uses open loop cooling (Comanche Peak) with a cooling pond withdrawing 55 gal/kWh and the other uses closed loop cooling (South Texas Project) with a recirculating cooling pond withdrawing 39 gal/kWh.

2.3.3.2 Renewable Energy Generation

The installation of more renewable energy generation that does not directly consume and withdraw water are other ways to reduce the overall Texas demand for water in the electricity sector. Wind farms in West Texas and in the Texas Panhandle are able to generate electricity without using water in areas where water is scarce and aquifers are being used at unsustainable rates. In 2006, approximately 3,000 MW of installed wind capacity generated just over 6.7 million MWh, or 1.7% of Texas electricity [EIA, 2006]. As of the end of 2007, over 4,500 MW of wind turbines were installed, and during 2007, 8.1 million MWh, or 2%, of Texas electricity was generated by wind turbines [EIA, 2007b].

Because wind power requires no water usage during electricity generation, its consumption and withdrawal rates are approximately 0.0 gal/kWh with some water used for washing wind turbine blades. Additionally, to date all wind electricity has been generated in West Texas where water supplies are generally scarce, thus providing a nice geographic and resource synergy. Using typical Texas values for water consumption and withdrawal rates, in 2007 wind power offset the need for approximately 7,500-15,000 ac-ft (at 0.3-0.6 gal/kWh) of consumption and 500,000 ac-ft (at 20 gal/kWh) of withdrawal. In the Water Projections chapter of this report, we account for future additional wind electricity in displacing the need for some water.

2.3.3.3 Distributed Generation and Combined Heat and Power

Distributed power projects, achieving higher energy efficiency by co-production of electricity and steam for use in industrial or commercial application could play a similar role to conversion to more efficient generation technologies. Every cogeneration system

that uses its heat either (1) directly for industrial processes or building/home heating, or (2) indirectly for absorption chiller systems for building/home cooling decreases the need for electricity, and thus the associated water.

2.4 Projections of Cooling Technology Trends

2.4.1 National Trends

Figure 2.7 shows the United States' trend in cumulative electricity generation capacity in terms of the type of cooling system used at the power plant. Few new open loop or once-through cooling systems are likely to be built. The U.S. EPA has attempted to stop installation of open loop cooling under a Phase I ruling of Section 316(b) of the Clean Water Act that heavily favors the use of cooling towers due to restrictions on cooling water intake velocities [EPA]. The Phase II of the U.S. EPA 316(b) ruling, regarding whether or not to grandfather existing facilities, is currently suspended [EPA, 2007b]. Therefore, it is unclear if existing sites that use once-through cooling may be required to retrofit to systems with lower intake velocity.

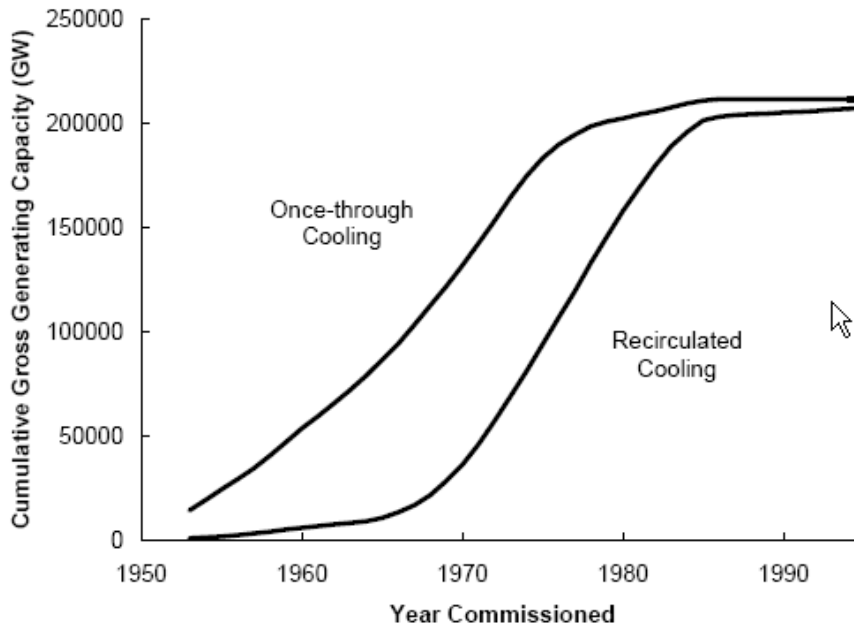


Figure 2.7. Growth of once-through and recirculated cooling in the United States [Micheletti and Burns, 2002] from: COOLADD: A Database of Power Plant Cooling Water Systems and Generic Chemical Additives Usage, Electric Power Research Institute, Palo Alto, CA, December 1998.

2.4.2 Texas Trends

The driving factors for what cooling technologies get used in new Texas power plants will largely depend upon three main factors that vary geographically throughout Texas. These factors are the:

- (1) cost of water (what does cooling cost at a particular site),
- (2) cost of transmission congestion (what is cost of power transmission from a particular site), and
- (3) power plant regulatory environment (what are environmental costs and planning costs associated with a particular plant site).

Many of Texas' existing power generation sites exist at locations that have existing water rights, including water rights held for future use, with access to cooling lakes and ponds. From a water demand standpoint, these locations could be considered likely to expand generation capacity in the future to the allowable limits based upon environmental (i.e., water temperature) and legal (i.e., water rights) factors. In 2006, electric power plants cooled by open loop, or once-through, systems using lakes and recirculated systems using cooling reservoirs accounted for approximately 38% of Texas electricity - mostly baseload coal and nuclear plants. Because of current environmental regulations and water rights, it is reasonable to expect that these sites will continue to use their existing cooling systems indefinitely into the future. This includes the possibility of adding new generation capacity at these existing sites or replacing existing generation units with newer units of similar size.

Greenfield power generation sites will likely use closed loop wet systems or dry cooling systems. The determination of cooling strategy will depend upon the total estimated power generation cost for a power plant. Water cost is one factor as is water availability and the cost of building pipelines and cooling ponds that provide both water access and/or water reserves. New power plant sites may also have to consider using groundwater resources for water cooling, and this could put substantial strain on regional and local water resources, especially in smaller cities that rely on groundwater for municipal and domestic household purposes.

CHAPTER 3: Thermoelectric Water Demand Projections

3.1 Electricity Projection Methodology

In projecting future water use by thermoelectric power plants in Texas and given the inherent uncertainty in generating forecasts over such a long planning horizon, the authors of this report generated several different *electricity projection* scenarios. Reference cases for “business as usual” (BAU) and “low” energy growth scenarios for power generation are based upon data from the ERCOT 2008 Planning Long-Term Hourly Peak Demand and Energy Forecast [ERCOT, 2008]. In the planning forecast, ERCOT assumes a reference base case, or BAU, annual electricity growth rate of 1.8%. We assume this growth rate for all of Texas, not only ERCOT, through the year 2060. For the BAU growth case, no increased energy efficiency is assumed. However, for the “low” energy growth case an energy efficiency target is used from an American Council for an Energy-Efficient Economy (ACEEE) report on Texas [ACEEE, 2007]. The ACEEE authors suggest that by 2023, 101 million MWh of electricity demand could be offset due to various efficiency programs (50 million MWh), renewable sources (23 million MWh), or combined heat and power (CHP) and cogeneration facilities (28 million MWh). In our forecasts, the offset quantity for efficiency (50 million MWh) is subtracted from total electricity sales in 2023 and projected forward through 2060 by maintaining the year 2023 ratio of cumulative efficiency over electricity generation. In other words, by 2023, 50 million MWh of efficiency is assumed for a demand of 477.6 million MWh for Scenario 1L (scenarios are described later in this report) and the ratio of cumulative efficiency over generation is equal to $50/477.6$ or 10.5%. This 10.5% efficiency ratio is assumed to be maintained such that projected electricity demand for the “low” scenarios is 10.5% less than the BAU scenarios for each subsequent year from 2024 to 2060.

In our electricity projections we use electricity *sales* as the projected quantity, and then calculate total *net generation* from power generation facilities required to meet these sales to consumers. This distinction is necessary because water demand at power generation facilities is dictated by the quantity of electricity generated, which is greater than the quantity of electricity purchased and consumed by the end user. We define *sales* as electricity that is purchased by the end user. We define *generation* as the net electricity that leaves the power plant (e.g. steam-electric facility, wind turbine, etc.) before it is sent over transmission lines to the customer or is either on-site industrial or commercial generation. On-site industrial/commercial generation is generation listed with an industrial or commercial North American Industrial Classification System (NAICS) code by the EIA [EIA, 2005].

Additionally, for carbon capture scenarios more electricity is generated for auxiliary, or parasitic, power within the power plants with capture equipment. This increase in electricity and cooling demand is factored for water projections. Other auxiliary power generation is already generated within power plants to run pumps and other equipment, but this historical auxiliary power is already accounted for in the TCEQ and TWDB water usage data that form the basis of our calculations.

Therefore, projected electricity generation in this report is as follows:

$$\text{Electricity generation} = \text{electricity sales} + \text{transmission and distribution losses} + \text{auxiliary power for carbon capture}$$

Transmission and distribution losses force net electric generation to be larger than consumer demand. An electricity grid transmission and distribution (T&D) loss of 6.3% was assumed to remain constant throughout the study period. The T&D loss factor is based upon the Distribution Loss Factor (DLF) and Transmission Loss Factor (TLF) as reported by ERCOT [ERCOTb]. The TLF is the percentage loss in transmission lines rated at over 60 kV, and the DLF accounts for the remaining percentage power loss down to the consumer meter. The total T&D grid loss is the TLF plus the DLF. The ERCOT average TLFs were 1.92, 1.73, and 1.81 percent for 2005, 2006, and 2007, respectively. The ERCOT average DLFs were 4.45, 4.25, and 4.77 percent for 2005, 2006, and 2007, respectively. The average of these values results in 6.3% for T&D loss of the ERCOT grid, which we assume is equivalent for the overall Texas electric grid.

Figure 3.1 plots historical and our future projected per capita electricity generation (MWh/person) for the BAU and “low” electricity growth scenarios. Here, electricity per capita is a calculated quantity resulting from electricity sales and population projections; it is not a projected quantity in itself. Note that per capita electricity generation peaked in 2000, and even the low electricity growth scenario stays below current levels for another 30 years. Population projections for creating Figure 3.1 were taken from the TWDB 2007 *State Water Plan*.

As an insight to the historical data in Figure 3.1, the 2000 peak in electricity per capita is largely a result of changes in end use sector electricity sales. Starting around 1998-2000, industrial electricity sales started to decline and residential sector sales leveled off [EIA, 2007c]. Commercial sector sales have kept increasing, but not a rate to maintain a continually increasing electricity per capita value [EIA, 2007c]. Additionally, Texas’ industrial sector is relatively large in terms of the Texas population because many industrial products produced and refined in Texas go to the rest of the U.S. to be consumed by residents of other states. Thus, there is insight to be gained from Figure 3.1, but few conclusions should be drawn from such a simplistic measure.

Texas Electricity Generation per capita
(neglects parasitic loads for CO₂ capture)

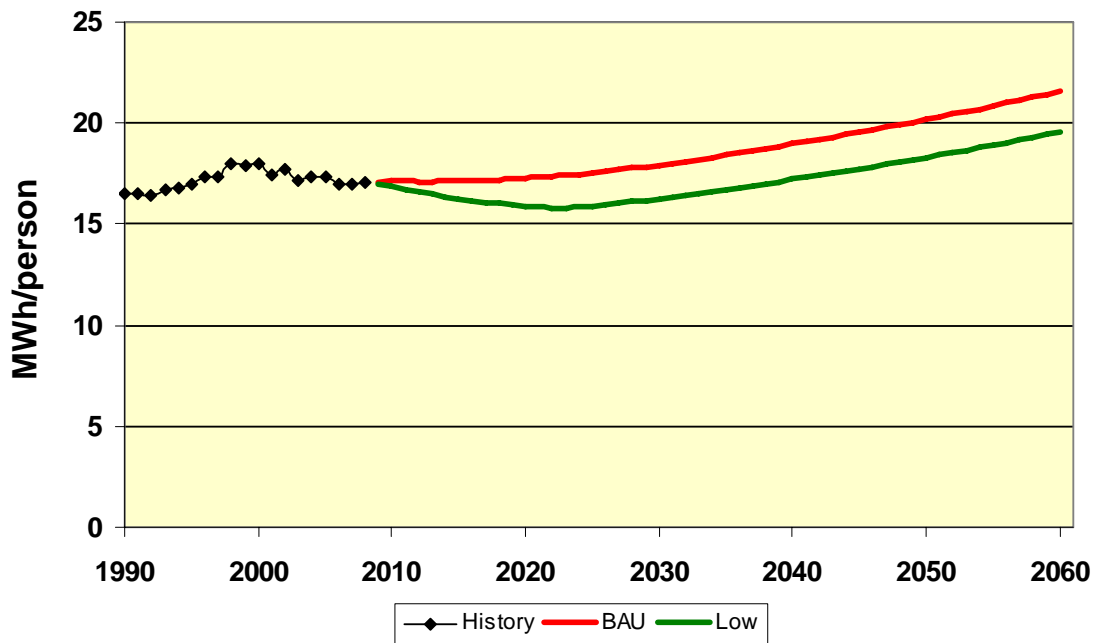


Figure 3.1. The Texas electricity *generation* per capita peaked at just over 18 MWh/person in 2000. For the next 30 years generation per capita is projected to stay below current levels in the low growth case while rising above historic highs by the early 2030s in the BAU growth case.

Two fundamental unknowns plague attempts to project the future evolution of electric power production, and hence associated water usage in Texas. The first unknown is the future cost of natural gas. For the purpose of these projections natural gas prices are defined as “high” if they are high enough to prevent natural gas combined cycle (NGCC) plants dispatching as base load facilities. Under these circumstances it is assumed that NGCC plants would only operate as peaking facilities generating approximately 20% of annual electricity sales outside of on-site industrial generation. Again for the purposes of these projections, low natural gas prices would be sufficiently low that NGCC plants would form part of the base load generation as they do today at 40% of electricity sales outside of on-site industrial generation. Some experts have suggested natural gas prices in the future will be driven down by a plentiful supply from Liquefied Natural Gas (LNG). Other experts, and the current futures market, predict continuing high gas prices. Thus, these disagreements led the authors to pursue a bounding approach that considers both high and low natural gas prices.

The second unknown is whether or not Texas power plants will be economically driven by future federal legislation to implement carbon capture and storage (CCS). Either “cap and trade” or a carbon tax would effectively establish a “carbon price.” The higher the carbon price the more likely that CCS will be implemented by utilities and other power companies. CCS increases water usage directly for post-combustion capture from existing plants and also decreases the energy efficiency of these plants. NGCC plants are also assumed capable of having post combustion CCS systems as needed to meet CO₂ emissions targets. Because carbon dioxide capture requires more heat and auxiliary

power to run capture equipment, a scenario that assumes carbon capture onto coal and/or natural gas plants will increase the water consumption rate (gal/kWh) of the power plant. Additionally, power plants will have to generate more gross electricity to serve the same customer demand, and this increase in electricity is depicted in the two scenarios (2 and 4) that include the effects of a price for carbon.

In an attempt to put upper and lower bounds on future water usage, this study used four different bounding scenarios. These four bounding scenarios are (1) high natural gas prices and no carbon capture; (2) high natural gas prices and carbon capture; (3) low natural gas prices and no carbon capture; and (4) low natural gas prices and carbon capture. These four cases combined with either the “business as usual” or “low” electricity usage projections (as explained at the beginning of this section) result in the eight different projections shown in Table 3.1 below.

Table 3.1. Characterization of simulated scenarios for projected electricity generation in Texas.

Scenario	Annual Electric Sales Growth	Natural Gas Prices	Carbon Price causes Carbon Capture to be implemented
1L	Low	High	No
1BAU	BAU	High	No
2L	Low	High	Yes
2BAU	BAU	High	Yes
3L	Low	Low	No
3BAU	BAU	Low	No
4L	Low	Low	Yes
4BAU	BAU	Low	Yes

Both the BAU and low scenarios include projected increases in renewable energy. Projections for renewable energy generation assume that wind power will encompass 20% of total electrical consumption, or demand, by 2060 as this percentage is seen as a feasible target even without widespread use of large-scale storage systems to mitigate wind intermittency [DOE, 2008]. Additionally, we assume that by 2060 the renewable category is composed of generation via the following breakdown: wind (65%), photovoltaic (PV) solar (17.5%), and concentrated solar power (CSP) (17.5%) with wet closed loop cooling towers consuming water at a rate of 0.8 gal/kWh [DOE, 2006]. Thus, for all scenarios by 2060, renewables as a category are assumed to provide approximately 30% of Texas electric generation:

$$\begin{aligned} \text{2060 Renewable Elec. \%} &\sim (\% \text{ total electric that is wind}) / (\% \text{ of renewables that is wind}) \\ \text{2060 Renewable Elec. \%} &\sim (20\%) / (65\%) \sim 30\% \end{aligned}$$

Today, over 90% of Texas’ renewable electricity is from wind power and this will remain the case for the near future. We assume a constant 1 million MWh per year are generated from hydroelectric power as that resource has little practical room to grow [VERA,

1995]. For simplicity in the electricity projections, this constant quantity of hydroelectric generation is encompassed within the “wind and hydro” category of the projections data presented in Appendix A. We factor in a slight ‘jump’ in electricity generation from wind power in 2015 by assuming that the transmission lines as part of the Competitive Renewable Energy Zones are installed as planned. This jump is assumed for all cases but has little influence on long-term projections.

For Scenarios 2 and 4 with a carbon price, we have targeted a carbon dioxide (CO₂) emissions level that follows that of the Lieberman-Warner Climate Security Act of 2007 (S. 2191) [GovTrack]. This bill suggests a linearly decreasing target for greenhouse gas emissions, termed emissions allowances, where 1 emissions allowance is equivalent to 1 ton of CO₂ equivalent. The target is to decrease from approximately 97% of 2005 US emissions in the year 2012 to 29% of 2005 U.S. emissions in 2050. For this analysis, we assume the emissions target for 2050-2060 is constant at the 2050 level. This chosen carbon trajectory is a very aggressive scenario that provides close to a “worst case” trajectory for CO₂ reductions, and thus provides us with a good estimate of the upper extreme for electricity generation that might need CCS infrastructure.

In Texas in 2006, the EIA reports that Texas emitted 150,589,000 and 104,094,000 metric tons CO₂ (tCO₂) from coal and natural gas based electricity, respectively [EIA, 2006b]. These total emissions of 255,000,000 tCO₂ were associated with 146.4 (pulverized coal) and 196.5 (natural gas) million MWh of electricity. Thus, for a 71% emissions reduction by 2050, Texas must achieve annual electricity CO₂ emissions of approximately 74,000,000 tCO₂, or 74 MtCO₂ (million metric tons of CO₂).

From the EIA-provided emissions for Texas we calculate current rates of emissions as 1.03 tCO₂/MWh for PC coal and 0.53 tCO₂/MWh for natural gas. For emissions projections in Scenarios 2 and 4, we use the emissions rates for generic coal and natural gas plants are given in Table 3.2. For fossil power plants with carbon capture systems, we assume they capture 85% of the annual CO₂ emissions.

Table 3.2. Carbon dioxide emissions rates (metric tons of CO₂ per megawatt-hour of net generation) used for water projections. We assume 85% of CO₂ is captured at any given power plant. PC = pulverized coal. IGCC = coal-based integrated gasification combined cycle. NGCC = natural gas combined cycle. NG-CHP = natural gas fueled combined heat and power.

Plant Type	Carbon capture?	Emission Rate (t CO₂/MWh)
PC	No	1.0
PC	Yes	0.15
IGCC	No	0.9
IGCC	Yes	0.14
NGCC	No	0.53
NGCC	Yes	0.08
NG-Cogen	No	0.50

3.2 Future Water Demand Projection Methodology

The scenarios discussed in the previous section are not meant to be our best estimates of future electric power usage but rather they represent cases that will likely bound the future demand for power generation. It is difficult to infer future electric power production and associated water usage at a county level within Texas. Because the types of power plants and cooling systems used could vary tremendously from county to county, the county-level results from our methodology can vary significantly among the scenarios even when the overall Texas total water demand might remain relatively unchanged. Nonetheless, the short term projections are based upon existing power plants and therefore should prove more accurate for short time frames (< 10 yrs) than longer time frames (> 20 yrs).

Based on our projection of electric power demand between now and 2060, we have generated estimates for water usage associated with power production over this time period. Figure 3.2 describes the basic methodology used for projecting water demands through 2060. We employ an approach that considers three basic time frames:

- **Today** – calculate a current county-level water demand for the year 2006.
- **Near Term** – use power plants that have been announced to project county-level water demand from 2008-2015. Note that all projection scenarios have the exact same results for 2006-2010.
- **Long Term** – use the geographical dispersion of water demand characteristics from 2015 (Scenario 1BAU) to project county-wide and regional water demand from a Texas-wide electricity projection.

First we calculate the water demand for “today”, which is an estimate for water demand relative to electricity generated in 2006. For the “Near Term” projection, we include power plants that are in the construction phase or announced to the Public Utility Commission of Texas (PUCT) or ERCOT, as well as any additional power plants indicated as undergoing or having recently undergone the permitting process at the Texas Commission on Environmental Quality. The staff at the Texas Water Development Board requested that the report follow this protocol of including all announced power plants as well as a few more specific plants of concern. Appendix C.2 lists the power plants assumed to be added in the “Near Term” projection methodology.

These announced and permitted plants allow a relatively detailed “Near Term” projection through 2015 as they are described by geographical location at the county level. Thus, we can project regional water demands from their operation. It is important to note that there is no guarantee that all of these power plants will be constructed as each power plant owner can continually adjust market strategy as time passes. If all of these announced power plants are constructed, the average power plant may need to operate at lower capacity factor or an equal amount of existing power plant capacity (minus electricity load growth) would need to be retired to enable equal or higher capacity factors. These aspects must be kept in mind when interpreting the water projection results.

To project “Long Term” water demand for power generation, we apportion the total Texas thermoelectric water demand according to the ratio of each fuel and generation technology that is used in each county in 2015. For example, if approximately 10% of natural gas generation in 2015 occurred in Harris County, then we assume that 10% of future natural gas generation will occur in Harris County. Obviously this may well not be the case. However we have no basis for making any other judgments. It may be that different scenarios for growth will be more applicable for different counties in the future. For example, water usage in counties with one or more coal fired power plants are most susceptible to water usage related to CCS.

For “Near Term” water demand projections up to 2015, we estimate a water consumption factor for each existing or proposed power plant: *gallons of water consumed per kWh of net generation* (gal/kWh). These factors are obtained using data from TCEQ, industry representatives, and the TWDB. For “Long Term” projections after the year 2015, these gal/kWh factors are assumed constant from the year 2015. A gal/kWh factor is obtained per fuel category and per county. In this manner, the ‘per county’ projected electricity generation per fuel can be multiplied by the ‘gal/kWh’ factor for each fuel in each county to obtain the amount of water demand in each county.

For electric generation technologies that do not currently operate in Texas, but which are assumed in some of the projection scenarios, we assume water consumption factors. These consumption factors assumed for the additional technologies are:

- concentrated solar power with wet cooling towers
 - 0.8 gal/kWh [DOE, 2006]
- pulverized coal with carbon dioxide capture systems
 - 1.14 gal/kWh, a 90% increase over a typical rate of 0.6 gal/kWh for coal plant with cooling tower (see Section 2.3.2)
- integrated gasification combined cycle using cooling towers *without* carbon capture
 - 0.35 gal/kWh (see Section 2.3.2 and [DOE/NETL, 2007b])
- integrated gasification combined cycle using cooling towers *with* carbon capture
 - 0.49 gal/kWh a 40% increase over the non-capture rate of 0.35 gal/kWh (see Section 2.3.2 and [DOE/NETL, 2007b])
- natural gas combined cycle using cooling towers *with* carbon capture
 - 0.40 gal/kWh: ~ 75% larger than new NGCC using cooling towers (0.23 gal/kWh typical assumed value) without carbon capture (see Section 2.3.2 and [DOE/NETL, 2007b])

Water Consumption for Steam-electric: Projection Methodology

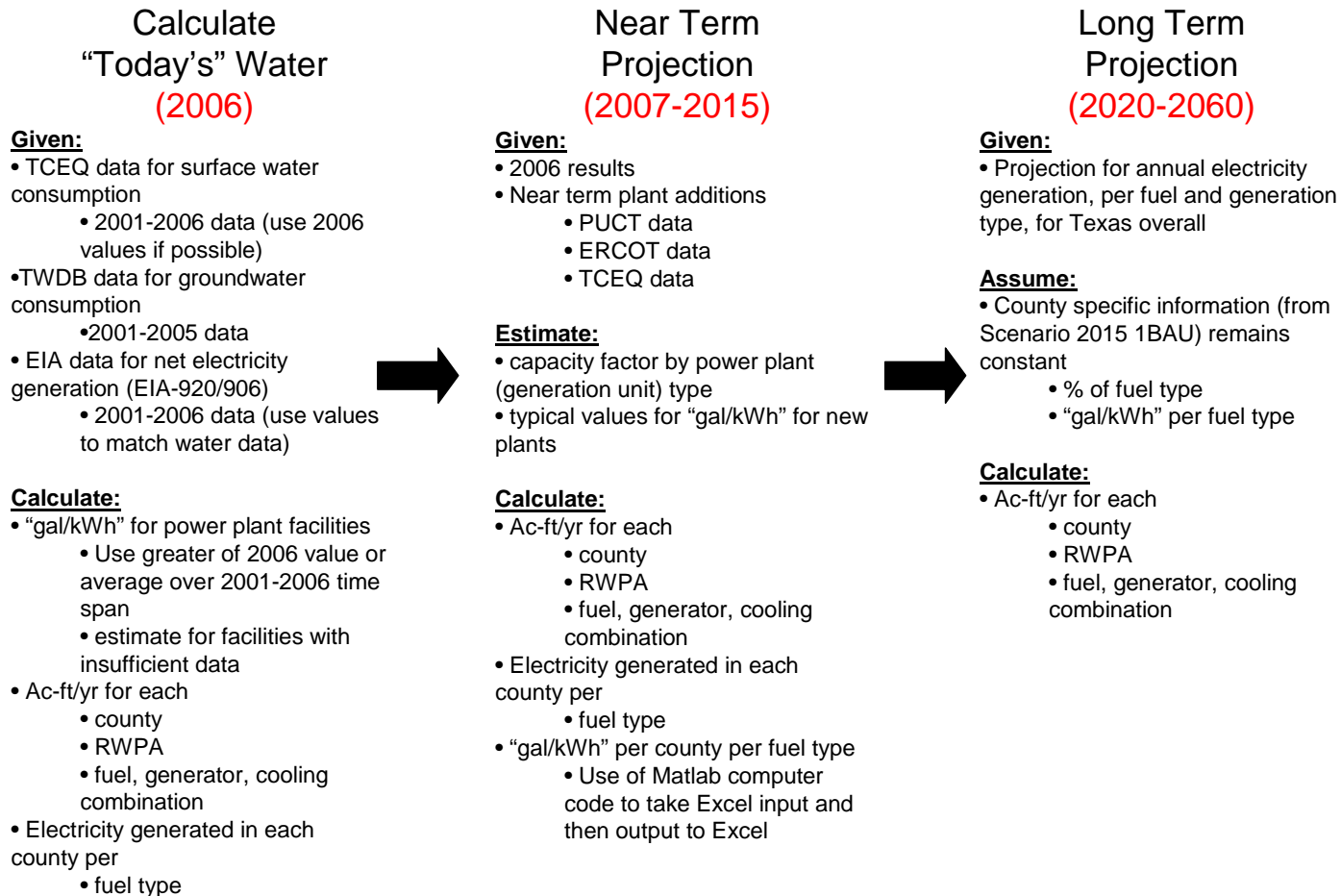


Figure 3.2. The method for projecting future water demand for electricity generation starts with 2006 calculations ("today"), moves to a near term projection (through 2015), and then uses the distribution of water demand from 2015 to project into the long term future through 2060.

3.3 Projections for Future Water Demand due to Electricity Generation - Texas Total Generation

3.3.1 Texas Water Demand Projections for Electricity Generation

This section presents the overall Texas projections for electricity generation and subsequent water demand to meet that electricity projection. General conclusions are discussed later in Section 3.5. Figure 3.3 plots the projected net electricity generation that also includes gross electricity generation that is specifically for running carbon dioxide capture auxiliary equipment for Scenarios 2 and 4 that include a carbon dioxide emission constraint. The net electricity projections for Scenarios 1 and 3 are identical, but those of Scenarios 2 and 4 are higher due to carbon dioxide capture equipment assumed on some coal and natural gas power plants.

Figure 3.4 plots the water demand projection for meeting the electricity projections of Figure 3.3. Also plotted is the water demand of the steam-electric sector as taken from the TWDB 2007 State Water Plan. The 2007 State Water Plan water demand projections by Regional Water Planning Area are also shown in Table 3.3 for comparison to the projections of this report (see Appendix D for regional and county-level breakdowns). Tables 3.5 and 3.4 report the data points that are plotted in Figures 3.3 and 3.4, respectively.

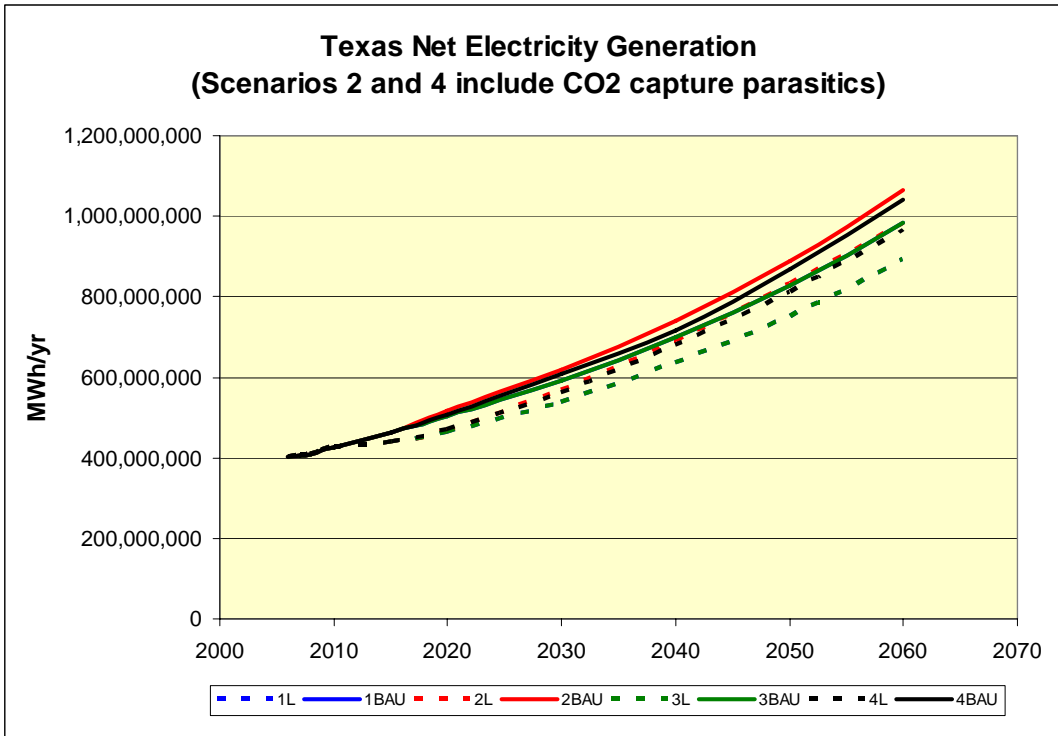


Figure 3.3. The electricity projection (MWh) for Texas. Scenarios 1 and 3 are identical since there is no increase in parasitic gross electric generation for carbon capture.

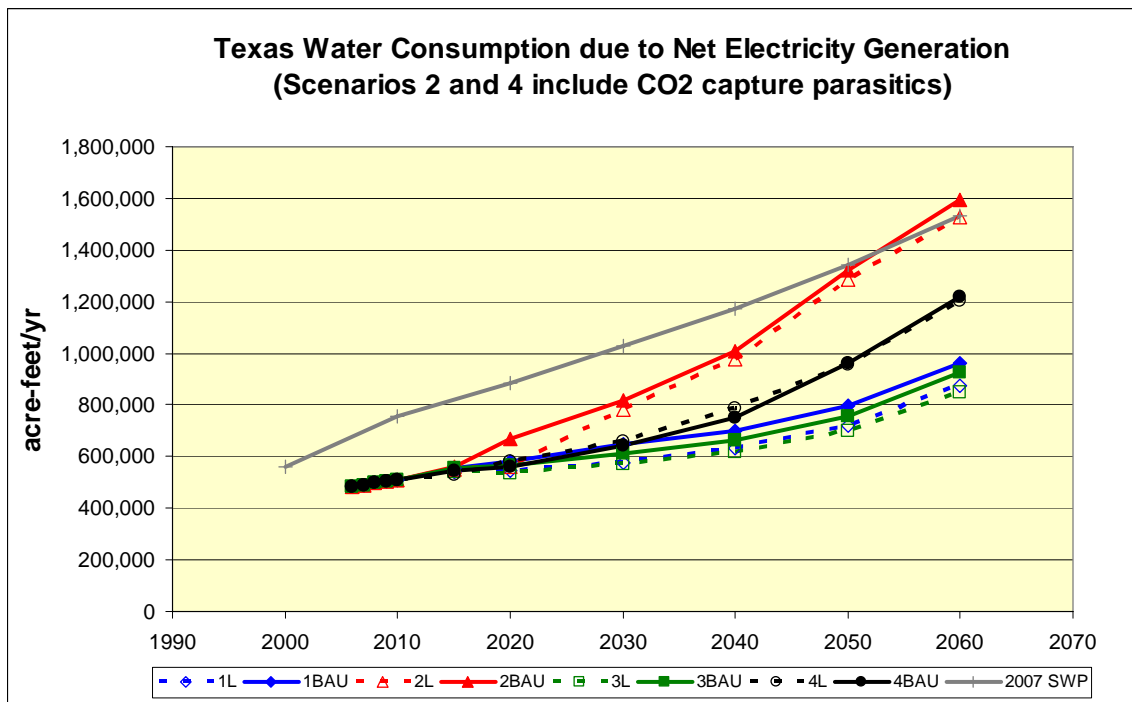


Figure 3.4. The water demand projection (ac-ft) for electricity generation in Texas. The projection from the 2007 State Water Plan (“2007 SWP”) is shown for reference.

Table 3.3. Official projections for the steam electric sector from 2006 Texas Water Development Board Regional Water Plan [TWDB, 2006].

2006 Regional Water Plan								
Regional Total Water Demand Projections for 2000-2060 (in acft ¹)								
Region	Category	2000	2010	2020	2030	2040	2050	2060
A	Steam Electric	18,255	22,632	25,587	27,004	28,608	30,211	34,328
B	Steam Electric	9,841	13,360	17,360	21,360	21,360	21,360	21,360
C	Steam Electric	43,071	71,471	95,640	110,542	128,709	150,855	177,848
D	Steam Electric	73,477	89,038	96,492	112,809	132,703	156,951	186,509
E	Steam Electric	2,962	3,131	6,937	8,111	9,541	11,284	13,410
F	Steam Electric	17,749	22,215	22,769	26,620	31,312	37,033	44,008
G	Steam Electric	103,330	147,734	158,789	171,489	191,968	219,340	242,344
H	Steam Electric	83,262	91,231	112,334	131,332	154,491	182,720	217,132
I	Steam Electric	28,996	43,985	79,989	93,515	110,006	130,108	154,611
J	Steam Electric	0	0	0	0	0	0	0
K	Steam Electric	103,875	153,522	156,894	194,396	208,982	214,783	222,058
L	Steam Electric	35,379	50,427	56,792	66,397	78,104	92,378	109,776
M	Steam Electric	6,780	13,463	16,864	19,716	23,192	27,430	32,598
N	Steam Electric	8,799	7,316	14,312	16,733	19,683	23,280	27,664
O	Steam Electric	25,618	25,645	25,821	30,188	35,511	42,000	49,910
P	Steam Electric	0	0	0	0	0	0	0
Texas Total		561,394	755,170	886,580	1,030,212	1,174,170	1,339,733	1,533,556

¹⁾ An acft is an amount of water to cover one acre with one foot of water and equals 325,851 gallons.

Table 3.4. Texas projected water consumption (ac-ft/yr) for total net electricity generation while including gross parasitic generation required for carbon dioxide capture when applicable.

Scenario	2006	2010	2015	2020	2030	2040	2050	2060
1L	482,112	506,788	542,459	543,462	575,312	632,108	722,342	876,669
1BAU	482,112	506,788	556,814	580,434	649,452	701,478	796,864	963,407
2L	482,112	506,788	547,885	560,568	781,071	977,563	1,287,477	1,525,453
2BAU	482,112	506,788	562,796	666,562	819,740	1,006,387	1,319,347	1,595,273
3L	482,112	506,788	539,403	532,725	570,703	616,471	699,931	849,532
3BAU	482,112	506,788	554,234	563,452	610,664	662,173	757,357	923,698
4L	482,112	506,788	530,457	581,837	659,092	787,659	958,655	1,202,620
4BAU	482,112	506,788	545,289	558,912	643,861	750,640	961,251	1,216,885

Table 3.5. Texas projected net electricity generation (MWh/yr) while including gross parasitic generation required for carbon dioxide capture when applicable.

Scenario	2006	2010	2015	2020	2030	2040	2050	2060
1L	401,227,140	426,196,025	437,888,621	463,182,734	537,141,157	634,974,356	751,914,609	891,693,572
1BAU	401,227,140	426,196,025	462,438,631	502,182,733	592,448,117	700,342,542	829,309,004	983,462,922
2L	401,227,140	426,196,025	439,359,845	467,307,734	568,841,157	688,934,356	832,644,610	977,043,572
2BAU	401,227,140	426,196,025	462,798,377	518,642,733	618,958,117	739,552,542	889,959,004	1,063,402,922
3L	401,227,140	426,196,025	439,012,458	462,182,734	537,141,157	634,974,356	751,914,610	891,693,572
3BAU	401,227,140	426,196,025	462,201,891	502,182,733	592,448,117	700,342,542	829,309,004	983,462,922
4L	401,227,140	426,196,025	439,151,882	469,767,734	560,621,157	678,554,356	810,314,610	965,093,572
4BAU	401,227,140	426,196,025	462,341,315	506,682,733	607,448,117	716,842,542	868,459,004	1,041,962,922

In comparing the results of Tables 3.3 and 3.4 and graphed in Figure 3.4, the water demand increase changes by similar amounts over time but there is a large discrepancy in the quantities for our starting year of 2006. The analysis in this report calculates approximately 196,000 ac-ft less water consumption for power generation in 2006 than the existing TWDB State Water Plan. Assuming a linear projection from the year 2000 to 2010, the State Water Plan indicates 678,000 ac-ft for the steam-electric demand in the year 2006. This report calculates a water consumption of 482,000 ac-ft for all power generation in Texas.

There is one major factor that describes why the previous steam-electric demand is much higher than the estimate in Table 3.4. This discrepancy is based upon using too large of an average water consumption rate for existing steam-electric power plants.

The steam-electric projection in Table 3.3 is based upon a previous report authored by representatives of Texas' investor owned utilities [Sledge et al, 2003]. In that report, the Sledge et al. acknowledge that "most of the current generation in the State uses once-through cooling from reservoirs for large central station generation." Sledge et al. also mention that an average "once-through" cooling system for a steam-based power plant consumes water at a rate of 0.35 gal/kWh while similar power plants using cooling towers have average water consumption rates of 0.6 gal/kWh. However, when calculating the base water consumption for Texas steam-electric power for the year 2000, Sledge et al. use the 0.6 gal/kWh factor instead of figuring the proportion of power plants, that according to those authors is greater than 50%, have average consumption rates of 0.35 gal/kWh. Additionally, Sledge et al. did not account for any natural gas combined cycle power plants which they estimated to consume water at a rate of 0.23 gal/kWh (also refer back to Table 1.5).

The discrepancy between the water demand in the 2007 State Water Plan (Table 3.3) and this current report (Table 3.4) can be explained by the overestimate by Sledge et al. We estimate that 31% of the fossil-fueled power generation in Texas uses either once-through cooling or recirculating cooling using a cooling reservoir (See Appendix C.1). This estimate excludes the nuclear facilities. Due to this statistic alone, Equation 2 below shows that it is likely that the investor-owned utility report [Sledge et al., 2003] caused the TWDB to overestimate the 2006 consumption for power generation by approximately 95,000 ac-ft.

$$\begin{aligned}
 &= [(2006 \text{ generation})(\% \text{ at } 0.35 \text{ gal/kWh})(0.6 \text{ gal/kWh} - 0.35 \text{ gal/kWh})]/(325851.4 \text{ ac-ft/gal}) \\
 &= [(400 \times 10^9 \text{ kWh})(31\%)(0.25 \text{ gal/kWh})]/(325851.4 \text{ ac-ft/gal}) \\
 &= \mathbf{95,000 \text{ ac-ft}}
 \end{aligned}
 \tag{2}$$

Additionally, 33% of Texas' 2006 electricity generation came from natural gas combined cycle units using cooling towers. Equation 3 shows the calculation that indicates Sledge et al. may have caused an overestimate of an additional 150,000 ac-ft.

$$\begin{aligned}
 &= [(2006 \text{ generation})(\% \text{ NGCC at } 0.23 \text{ gal/kWh})(0.6 \text{ gal/kWh} - 0.23 \text{ gal/kWh})]/(325851.4 \text{ ac-ft/gal}) \\
 &= [(400 \times 10^9 \text{ kWh})(33\%)(0.37 \text{ gal/kWh})]/(325851.4 \text{ ac-ft/gal}) \\
 &= \mathbf{150,000 \text{ ac-ft}}
 \end{aligned}
 \tag{3}$$

By subtracting 95,000 ac-ft and 150,000 ac-ft from the 2006 estimate of 2007 State Water Plan, we obtain 433,000 ac-ft which is below the 482,000 ac-ft value calculated in this report. Additionally, if we account for the 6.7 TWh of wind power in 2006 (at 0.0 gal/kWh), we could subtract an additional 12,000 ac-ft, which lowers the State Water Plan projection to 421,000 ac-ft.

We use Equation 4 to illustrate a simple modified approach to the “top-down” Sledge et al. method for estimating Texas’ 2006 water consumption for power generation. Using the data in Appendix C.1, we assume that 33% of power was generated from NGCC using cooling towers (0.23 gal/kWh), 31% was coal or natural gas using once-through or recirculating systems with cooling reservoirs (0.35 gal/kWh), 10% was from nuclear at 0.6 gal/kWh, 1.7% was from wind at 0 gal/kWh, and the remaining 24.3% was fossil-fueled using cooling towers consuming water at 0.6 gal/kWh.

$$\begin{aligned}
 &= [(2006 \text{ generation})(33\% \text{ NGCC and cooling towers at } 0.23 \text{ gal/kWh} + 33\% \text{ once-through at } \\
 &\quad 0.35 \text{ gal/kWh} + 10\% \text{ nuclear at } 0.6 \text{ gal/kWh} + 1.7\% \text{ wind at } 0.0 \text{ gal/kWh} + 24.3\% \text{ fossil} \\
 &\quad \text{with cooling towers at } 0.6 \text{ gal/kWh})(0.6 \text{ gal/kWh} - 0.35 \text{ gal/kWh})]/(325851.4 \text{ ac-ft/gal}) \\
 &= [(400 \times 10^9 \text{ kWh})(0.39 \text{ gal/kWh})]/(325851.4 \text{ ac-ft/gal}) \\
 &= \mathbf{479,000 \text{ ac-ft}} \qquad \qquad \qquad \mathbf{(4)}
 \end{aligned}$$

The simple “top-down” estimate of Equation 4 (479,000 ac-ft) compares very well with our plant-by-plant “bottom-up” result in Table 3.4 (482,000 ac-ft). This correlation is to be expected since the two methods are not entirely based upon independent data. However, the data set in Appendix C.1 contains many water consumption values that differ from the typical values from Table 1.5 and used in Equation 4.

3.3.2 Projection 1: High Natural Gas Prices no CCS

3.3.2.1 Scenario 1 Description

Scenario 1 projects Texas water from electricity based upon natural gas prices being relatively high with no price on carbon emissions. Here we assume that the high natural gas prices that will put pressure on new natural gas combined cycle (NGCC) plants to become peaking-only plants as traditional pulverized coal (PC) nuclear power will remain the cheapest technologies for electricity production. Thus, Scenario 1 projects increasing share of nuclear and coal power with most new plants using closed loop cooling systems with cooling towers. We assume the ratio of electricity generated from natural gas will decrease to around 20%.

The results of Scenario 1 show Texas 2060 thermoelectric water consumption to be 877,000 and 963,000 ac-ft for Scenarios 1L and 1BAU, respectively. Figures 3.5 and 3.6 show the electricity projections, via fuel category, for the Scenarios 1L and 1BAU, respectively. The electricity in the industrial category is assumed to be generated on-site

via natural gas combined heat and power systems. Tables 3.6 and 3.7 show the thermoelectric water demand projections per Regional Water Planning Area for Scenarios 1L and 1BAU. Figure 3.7 plots the carbon dioxide emissions due to Texas electricity generation for comparison to Scenario 2 where a carbon emissions restriction is imposed.

3.3.2.2 Scenario 1 Results

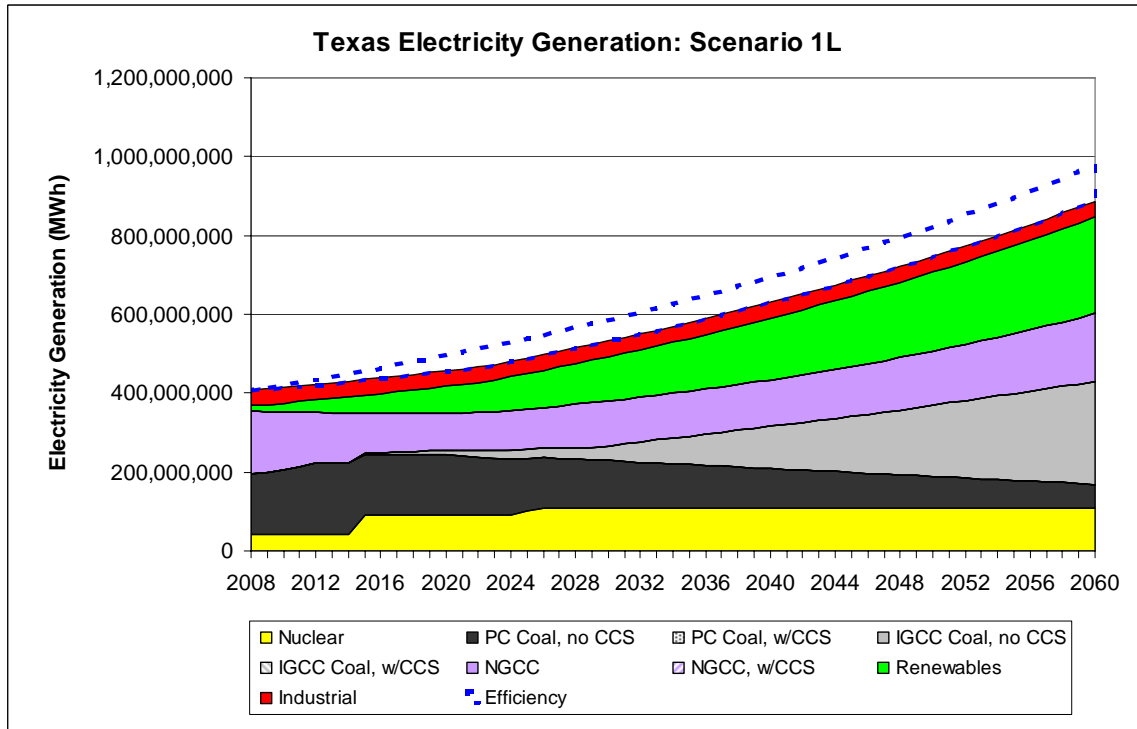


Figure 3.5. Electricity generation projection for Texas, by fuel category, for Scenario 1L.

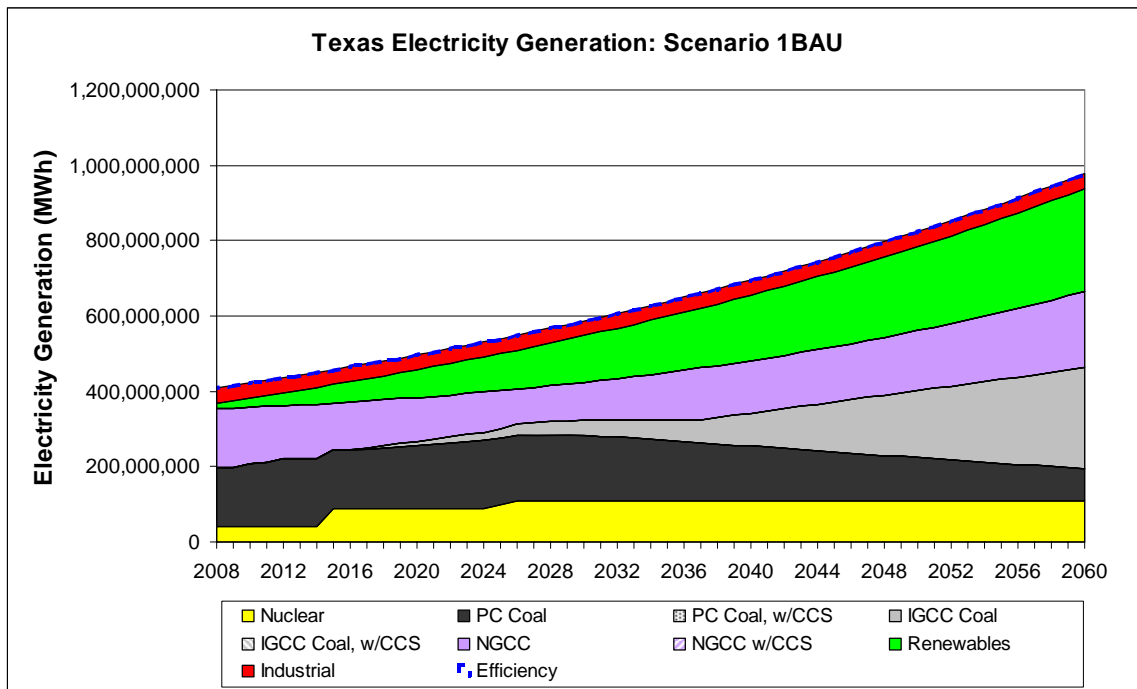


Figure 3.6. Electricity generation projection for Texas, by fuel category, for Scenario 1BAU.

Table 3.6. Electricity sector water consumption (ac-ft/yr) projection for Scenario 1L indicated by Regional Water Planning Group (RWPG).

Scenario 1L

RWPG	2010	2015	2020	2030	2040	2050	2060
A	17,786	14,508	14,161	43,579	41,967	40,505	39,190
B	5,274	4,298	4,242	3,329	2,800	2,286	1,786
C	26,617	23,179	21,483	22,527	22,212	23,794	27,243
D	51,264	40,523	39,734	33,749	29,877	26,954	24,962
E	938	720	2,589	5,985	14,980	39,511	106,180
F	9,168	11,325	14,895	23,855	48,336	74,686	104,309
G	120,032	170,776	168,227	151,142	167,067	185,360	207,460
H	85,739	69,838	71,783	78,045	99,485	125,914	158,686
I	28,833	21,993	21,209	19,157	17,580	16,845	16,940
J	0	0	0	0	0	0	0
K	63,824	98,904	101,385	79,657	78,624	78,442	79,095
L	67,973	61,058	58,871	89,880	85,728	84,129	85,039
M	6,608	5,047	4,656	5,328	5,446	6,117	7,332
N	6,449	6,576	7,080	7,641	7,740	8,301	9,316
O	16,283	13,713	13,148	11,438	10,265	9,499	9,130
P	0	0	0	0	0	0	0
TX Total	506,788	542,459	543,462	575,312	632,108	722,342	876,669

Table 3.7. Electricity sector water consumption (ac-ft/yr) projection for Scenario 1BAU indicated by Regional Water Planning Group (RWPG).

Scenario 1BAU

RWPG	2010	2015	2020	2030	2040	2050	2060
A	17,786	14,346	15,346	47,953	45,869	43,581	41,527
B	5,274	4,273	4,580	4,777	4,016	3,236	2,478
C	26,617	24,919	24,446	22,665	26,424	27,599	31,742
D	51,264	41,611	43,456	44,065	40,373	35,384	31,879
E	938	818	2,731	6,123	16,013	43,066	118,322
F	9,168	12,105	15,916	25,873	43,832	75,936	109,300
G	120,032	170,980	175,506	178,622	184,164	203,678	225,182
H	85,739	74,783	79,191	87,228	107,584	137,835	174,227
I	28,833	22,905	23,388	23,172	22,686	21,051	20,736
J	0	0	0	0	0	0	0
K	63,824	99,807	103,247	82,169	82,515	81,705	82,223
L	67,973	63,396	65,093	100,316	99,779	95,768	95,747
M	6,608	5,719	5,394	4,790	6,201	6,858	8,381
N	6,449	7,337	7,697	7,193	8,371	8,921	10,193
O	16,283	13,817	14,444	14,505	13,650	12,244	11,471
P	0	0	0	0	0	0	0
TX Total	506,788	556,814	580,434	649,452	701,478	796,864	963,407

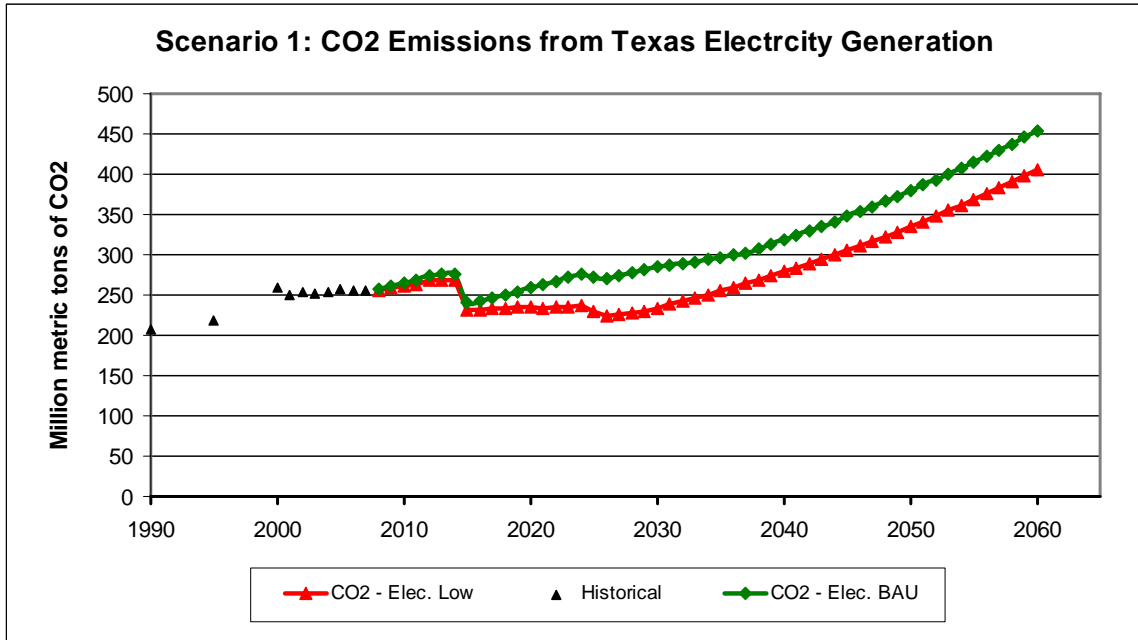


Figure 3.7. Carbon dioxide (CO₂) emissions from Texas electricity generation for Scenario 1L (CO₂ – Elec. Low) and Scenario 1BAU (CO₂ – Elec. BAU).

3.3.3 Projection 2: High Natural Gas Prices with CCS

3.3.3.1 Scenario 2 Description

Scenario 2 projects Texas water from electricity based upon appreciably high natural gas prices with a price on carbon enacted within 5 years that will change the economics of producing electricity from coal such that carbon capture and storage (CCS) systems will begin to be employed on new and/or existing coal plants and possibly natural gas plants. We assume these new coal plants will be a combination of pulverized coal (PC) and integrated gasification combined cycle (IGCC) using closed loop cooling systems with cooling towers. The incentive for carbon-free emissions will also eventually promote new nuclear generation despite the concerns about nuclear proliferation. The higher assumed natural gas prices will put pressure on new natural gas combined cycle (NGCC) plants to become peaking plants and for generation to back up intermittent renewable generation such as wind power. The electricity projections result in annual CO₂ emissions that follow the target trajectory of Senate Bill 2191.

The results of Scenario 2 show Texas' 2060 thermoelectric water consumption to be between 1,530,000 and 1,560,000 ac-ft for Scenarios 2L and 2BAU, respectively. Figures 3.8 and 3.9 show the electricity projections, via fuel category, for the Scenarios 2L and 2BAU, respectively. The electricity in the industrial category is assumed to be generated on-site via natural gas combined heat and power systems. Tables 3.8 and 3.9 show the thermoelectric water demand projections per Regional Water Planning Area for Scenarios 2L and 2BAU. Figure 3.10 plots the carbon dioxide emissions from Texas electricity generation for Scenario 2.

3.3.3.2 Scenario 2 Results

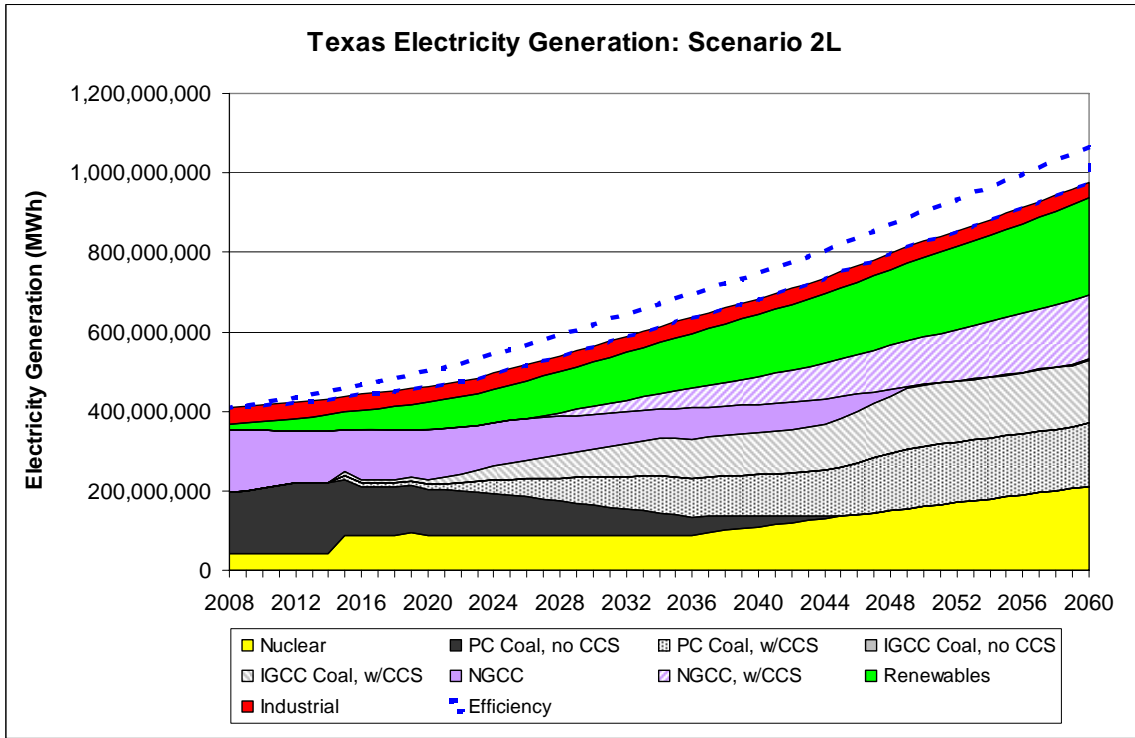


Figure 3.8. Electricity generation projection for Texas, by fuel category, for Scenario 2L.

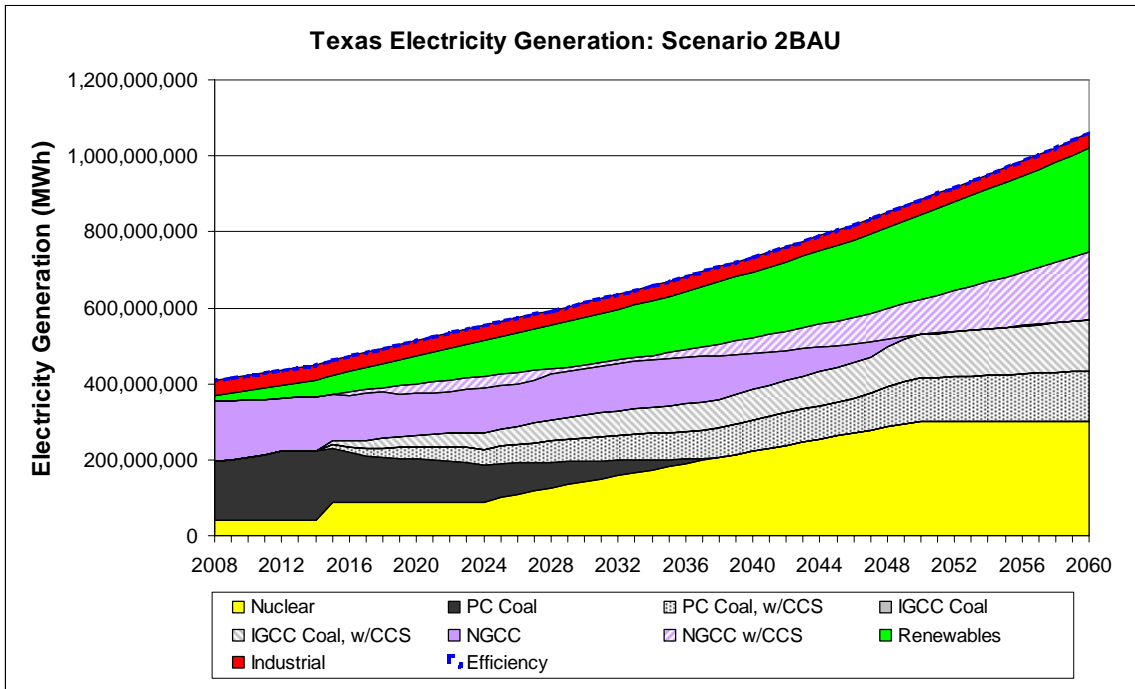


Figure 3.9. Electricity generation projection for Texas, by fuel category, for Scenario 2BAU.

Table 3.8. Electricity sector water consumption (ac-ft/yr) projection for Scenario 2L indicated by Regional Water Planning Group (RWPG).

Scenario 2L

RWPG	2010	2015	2020	2030	2040	2050	2060
A	17,786	14,862	12,983	44,057	51,516	70,689	86,641
B	5,274	4,376	4,259	8,034	9,798	13,106	13,754
C	26,617	22,931	25,473	31,492	42,250	49,287	57,418
D	51,264	40,922	39,799	60,763	72,788	92,455	99,665
E	938	701	2,744	6,056	15,451	40,040	106,916
F	9,168	11,239	18,126	48,441	69,581	94,832	101,149
G	120,032	172,098	165,568	209,934	256,234	345,129	389,576
H	85,739	70,545	78,847	124,100	161,870	202,827	222,671
I	28,833	22,484	22,802	35,100	44,302	56,020	61,346
J	0	0	0	0	0	0	0
K	63,824	98,891	103,071	79,169	98,663	136,171	169,966
L	67,973	61,845	60,124	102,977	118,073	145,378	169,446
M	6,608	4,925	5,725	5,343	7,047	6,951	8,651
N	6,449	8,201	7,973	7,888	9,893	10,395	12,282
O	16,283	13,865	13,074	17,716	20,099	24,198	25,972
P	0	0	0	0	0	0	0
TX Total	506,788	547,885	560,568	781,071	977,563	1,287,477	1,525,453

Table 3.9. Electricity sector water consumption (ac-ft/yr) projection for Scenario 2BAU indicated by Regional Water Planning Group (RWPG).

Scenario 2BAU

RWPG	2010	2015	2020	2030	2040	2050	2060
A	17,786	14,856	15,484	56,892	78,882	106,227	109,498
B	5,274	4,400	5,776	6,733	7,005	9,860	11,595
C	26,617	24,511	31,023	31,589	35,203	38,274	57,424
D	51,264	42,218	50,304	52,923	53,544	70,144	88,224
E	938	786	2,957	6,341	16,202	43,189	119,098
F	9,168	11,962	29,238	43,971	54,421	71,803	88,018
G	120,032	173,126	193,800	219,607	272,668	369,015	406,230
H	85,739	75,158	101,484	115,757	128,191	155,501	204,220
I	28,833	23,405	29,204	31,642	33,831	42,781	55,836
J	0	0	0	0	0	0	0
K	63,824	99,782	107,776	108,358	157,212	208,808	219,392
L	67,973	64,253	68,748	115,681	138,357	170,793	189,946
M	6,608	5,511	6,369	6,057	6,569	5,590	9,551
N	6,449	8,763	8,803	8,368	9,145	8,909	13,244
O	16,283	14,064	15,596	15,822	15,155	18,453	22,997
P	0	0	0	0	0	0	0
TX Total	506,788	562,796	666,562	819,740	1,006,387	1,319,347	1,595,273

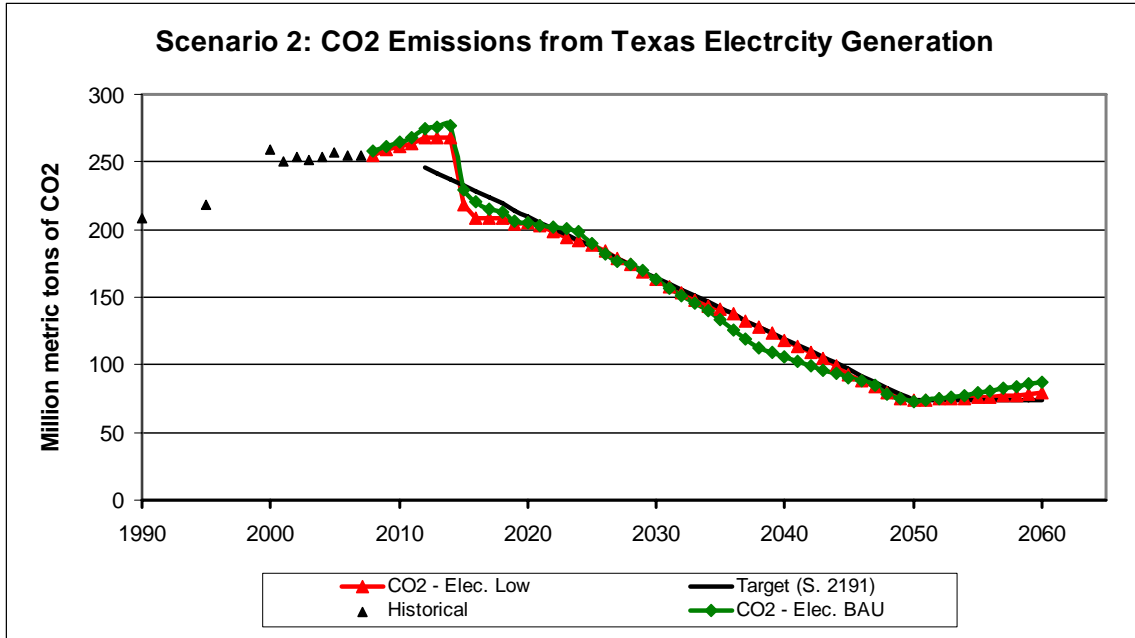


Figure 3.10. Carbon dioxide (CO₂) emissions from Texas electricity generation for Scenario 2L (CO₂ – Elec. Low) and Scenario 2BAU (CO₂ – Elec. BAU). The target of the Lieberman-Warner Climate Security Act of 2007, Senate bill 2191 [GovTrack] is plotted as the black line in the background.

3.3.4 Projection 3: Low Natural Gas Prices no CCS

3.3.4.1 Scenario 3 Description

Scenario 3 projects Texas water from electricity based upon natural gas prices becoming relatively cheap with no carbon price enacted. Because there is no carbon price, no carbon capture systems will be employed and little new nuclear generation will be built over the currently proposed facilities. The low natural gas prices will expand the construction of new natural gas combined cycle (NGCC) plants to become both baseload generators as well as for peaking units and backing up intermittent renewable generation such as wind power. Natural gas generation is targeted to generate 40% of grid electricity.

The results of Scenario 3 show Texas 2060 thermoelectric water consumption to be between 850,000 and 924,000 ac-ft. Figures 3.11 and 3.12 show the electricity projections, via fuel category, for the Scenarios 3L and 3BAU, respectively. The electricity in the industrial category is assumed to be generated on-site via natural gas combined heat and power systems. Tables 3.10 and 3.11 show the thermoelectric water demand projections per Regional Water Planning Area for Scenarios 3L and 3BAU. Figure 3.13 plots the carbon dioxide emissions from Texas electricity generation for Scenario 3 for comparison to Scenario 4 that imposes a carbon restriction.

3.3.4.2 Scenario 3 Results

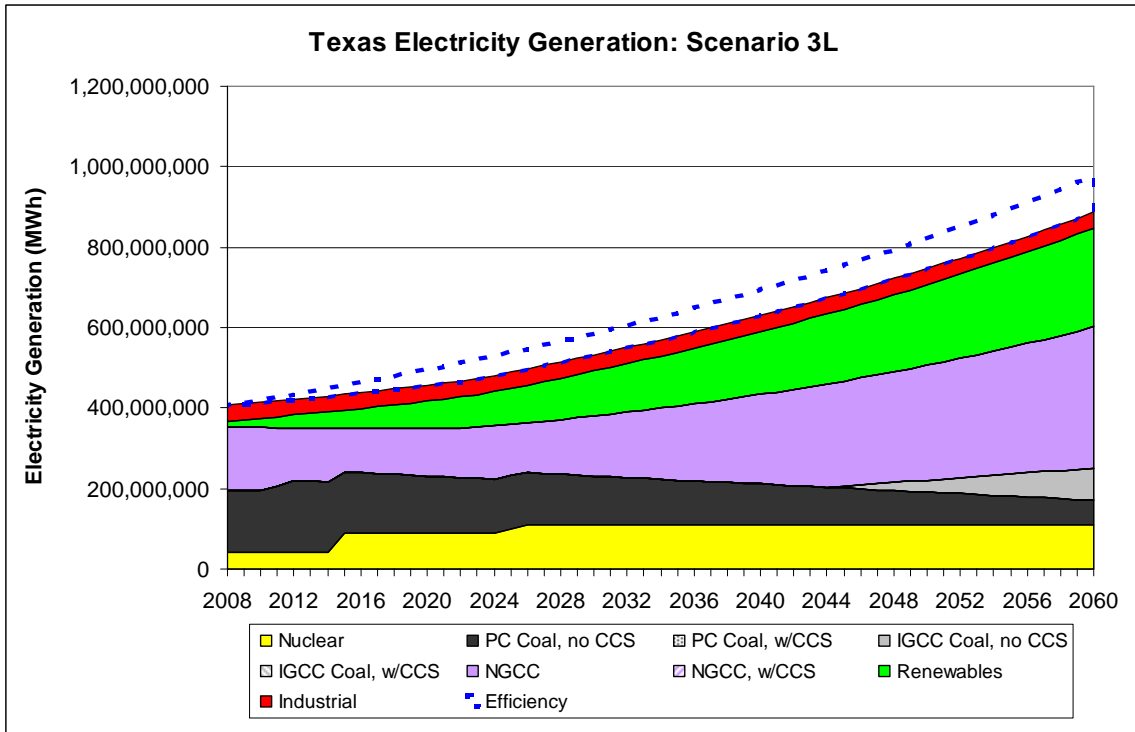


Figure 3.11. Electricity generation projection for Texas, by fuel category, for Scenario 3L.

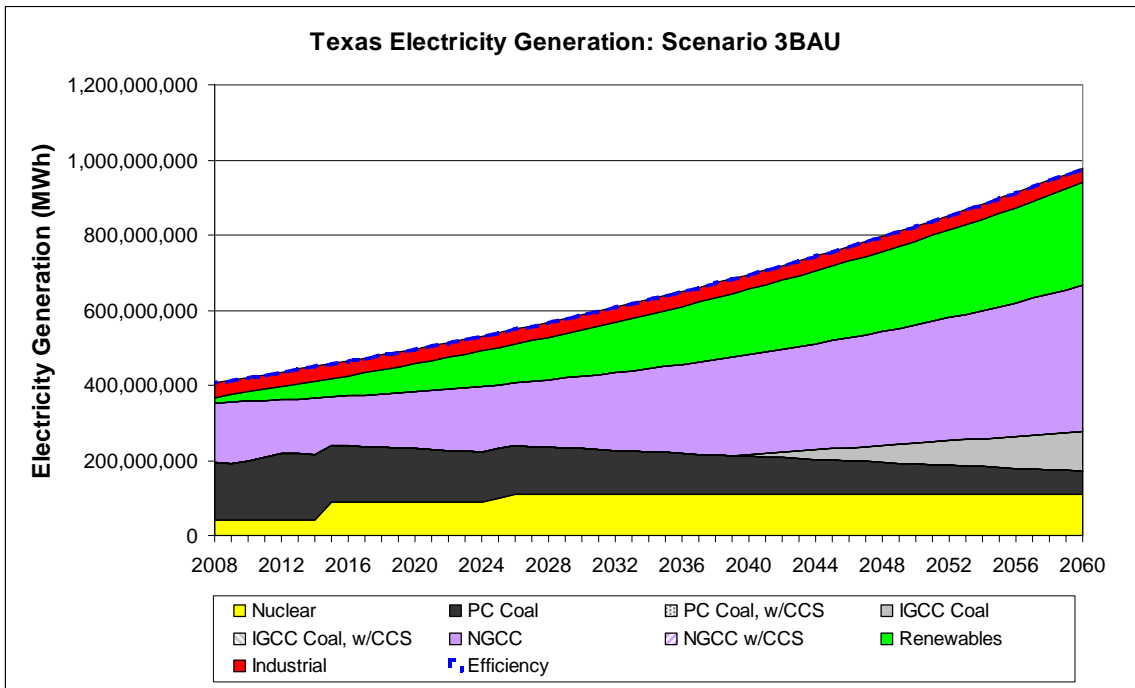


Figure 3.12. Electricity generation projection for Texas, by fuel category, for Scenario 3BAU.

Table 3.10. Electricity sector water consumption (ac-ft/yr) projection for Scenario 3L indicated by Regional Water Planning Group (RWPG).

Scenario 3L

RWPG	2010	2015	2020	2030	2040	2050	2060
A	17,786	14,094	13,315	44,068	43,106	42,042	41,005
B	5,274	4,173	3,918	3,413	2,947	2,471	1,998
C	26,617	23,493	23,842	26,723	34,657	41,306	48,290
D	51,264	39,910	38,496	36,226	36,488	36,105	35,885
E	938	747	2,708	6,160	15,503	40,248	107,067
F	9,168	11,426	11,515	12,540	15,710	28,968	49,457
G	120,032	168,630	159,299	141,386	137,276	143,262	156,776
H	85,739	70,200	70,643	73,883	87,574	109,243	138,694
I	28,833	21,832	21,323	21,165	23,253	24,769	26,435
J	0	0	0	0	0	0	0
K	63,824	98,881	101,863	81,624	84,285	86,371	88,607
L	67,973	60,624	59,621	95,895	102,835	108,049	113,713
M	6,608	5,230	5,480	6,530	9,052	11,200	13,446
N	6,449	6,702	7,769	8,646	10,753	12,548	14,425
O	16,283	13,462	12,934	12,444	13,033	13,348	13,734
P	0	0	0	0	0	0	0
TX Total	506,788	539,403	532,725	570,703	616,471	699,931	849,532

Table 3.11. Electricity sector water consumption (ac-ft/yr) projection for Scenario 3BAU indicated by Regional Water Planning Group (RWPG).

Scenario 3BAU

RWPG	2010	2015	2020	2030	2040	2050	2060
A	17,786	14,094	13,626	44,470	43,504	42,317	41,363
B	5,274	4,196	3,948	3,452	2,986	2,498	2,033
C	26,617	25,040	27,788	31,833	39,723	44,793	52,831
D	51,264	41,182	40,475	38,790	39,031	37,858	38,167
E	938	831	2,910	6,591	16,641	43,844	119,249
F	9,168	12,134	13,189	14,708	19,632	39,309	60,245
G	120,032	169,636	161,944	144,811	142,498	154,729	168,949
H	85,739	74,779	78,805	84,452	99,826	125,317	156,948
I	28,833	22,758	23,076	23,436	25,503	26,318	28,452
J	0	0	0	0	0	0	0
K	63,824	99,754	103,629	83,912	86,553	87,932	90,640
L	67,973	63,017	64,927	102,765	109,647	112,738	119,819
M	6,608	5,804	6,630	8,019	10,529	12,216	14,769
N	6,449	7,352	8,730	9,890	11,987	13,397	15,530
O	16,283	13,657	13,776	13,535	14,114	14,092	14,703
P	0	0	0	0	0	0	0
TX Total	506,788	554,234	563,452	610,664	662,173	757,357	923,698

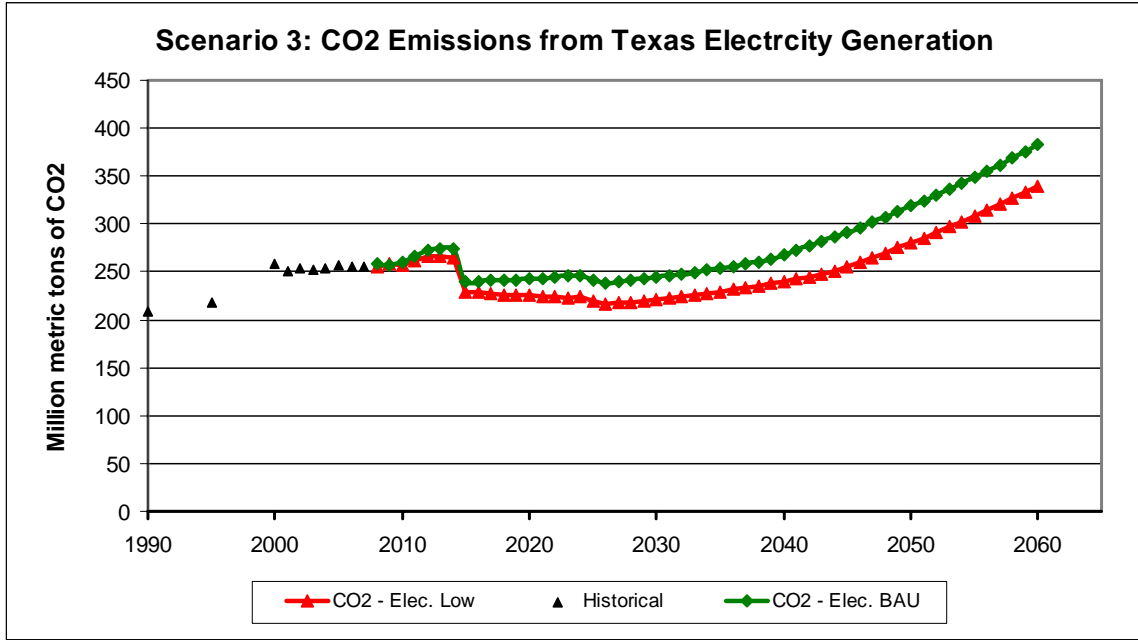


Figure 3.13. Carbon dioxide (CO₂) emissions from Texas electricity generation for Scenario 3L (CO₂ – Elec. Low) and Scenario 3BAU (CO₂ – Elec. BAU).

3.3.5 Projection 4: Low Natural Gas Prices with CCS

3.3.5.1 Scenario 4 Description

Scenario 4 projects Texas water from electricity based upon natural gas prices becoming relatively cheap with a price on carbon enacted. Because there is a carbon price, carbon capture systems may be employed on coal and natural gas plants as necessary, but natural gas generation will dominate. Additionally, new nuclear generation is assumed to be built as needed to meet the carbon dioxide limiting trajectory. The low natural gas prices will expand the construction of new natural gas combined cycle (NGCC) plants to become both baseload generators as well as for peaking units and backing up intermittent renewable generation such as wind power. Natural gas generation is targeted to generate 40% of grid electricity.

The results of Scenario 4 show Texas 2060 thermoelectric water consumption to be between 1,200,000 and 1,220,00 ac-ft. Figures 3.14 and 3.15 show the electricity projections, via fuel category, for the Scenarios 4L and 4BAU, respectively. The electricity in the industrial category is assumed to be generated on-site via natural gas combined heat and power systems. Tables 3.12 and 3.13 show the thermoelectric water demand projections per Regional Water Planning Area for Scenarios 4L and 4BAU. Figure 3.16 plots the carbon dioxide emissions from Texas electricity generation as compared to the target trajectory.

3.3.5.2 Scenario 4 Results

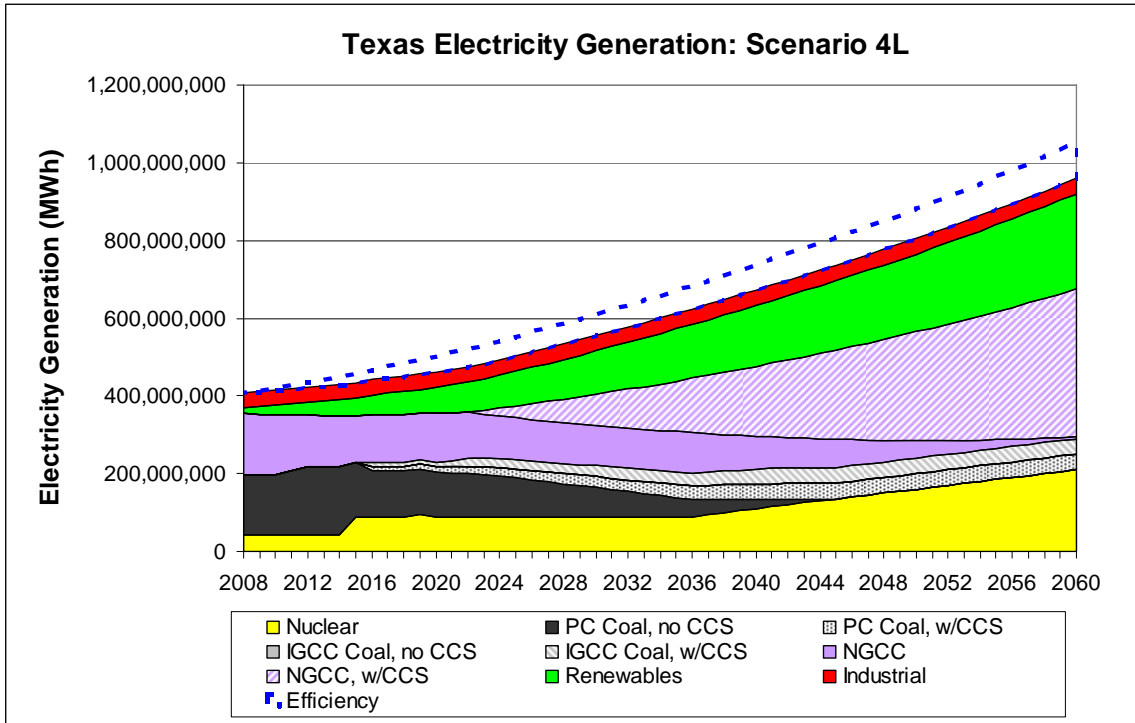


Figure 3.14. Electricity generation projection for Texas, by fuel category, for Scenario 4L.

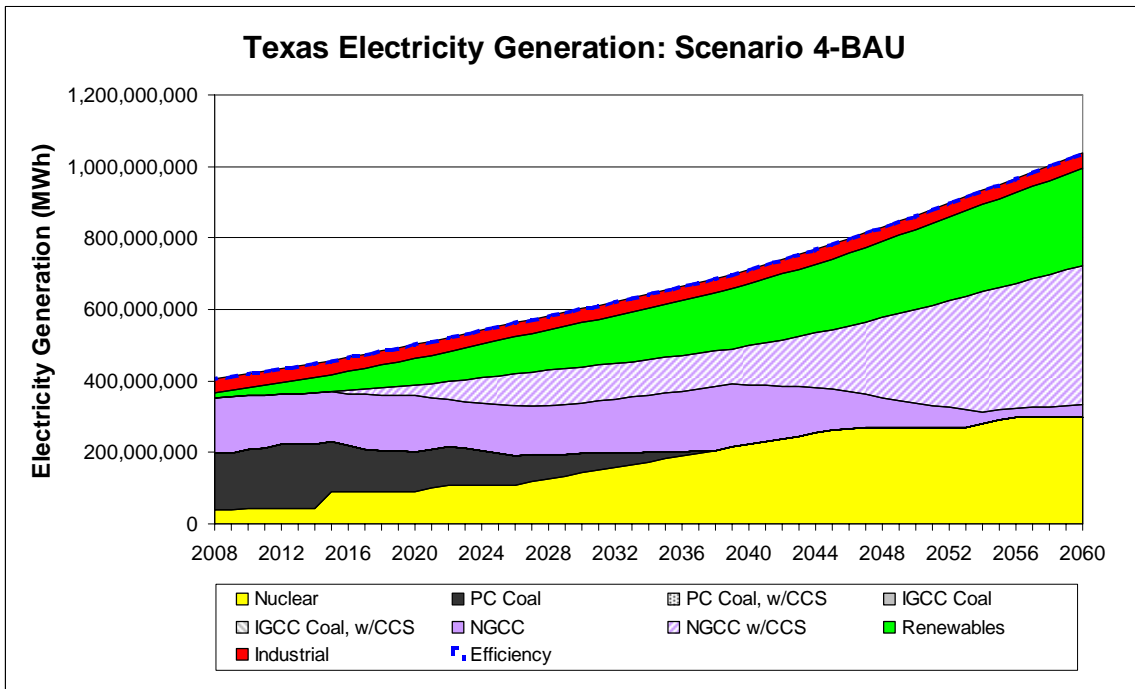


Figure 3.15. Electricity generation projection for Texas, by fuel category, for Scenario 4BAU.

Table 3.12. Electricity sector water consumption (ac-ft/yr) projection for Scenario 4L indicated by

Scenario 4L

RWPG	2010	2015	2020	2030	2040	2050	2060
A	17,786	13,125	13,768	38,447	42,704	55,599	70,561
B	5,274	3,873	4,756	4,605	4,257	3,879	4,000
C	26,617	24,013	25,196	38,844	55,312	68,938	83,303
D	51,264	38,277	42,307	45,985	49,457	52,629	59,940
E	938	798	2,696	6,739	16,632	41,870	109,173
F	9,168	11,562	20,978	29,882	39,834	44,868	49,471
G	120,032	163,401	173,975	152,777	164,662	191,310	227,977
H	85,739	70,514	82,354	108,139	137,868	159,679	185,056
I	28,833	21,361	23,972	29,618	36,008	41,208	48,101
J	0	0	0	0	0	0	0
K	63,824	98,698	103,753	76,442	95,276	128,785	164,059
L	67,973	59,316	61,355	93,675	103,197	120,367	142,987
M	6,608	5,581	5,397	8,642	12,603	15,803	19,037
N	6,449	7,099	7,699	11,343	15,817	19,655	23,523
O	16,283	12,839	13,631	13,951	14,032	14,065	15,431
P	0	0	0	0	0	0	0
TX Total	506,788	530,457	581,837	659,092	787,659	958,655	1,202,620

Regional Water Planning Group (RWPG).

Table 3.13. Electricity sector water consumption (ac-ft/yr) projection for Scenario 4BAU indicated by Regional Water Planning Group (RWPG).

Scenario 4BAU

RWPG	2010	2015	2020	2030	2040	2050	2060
A	17,786	13,125	11,418	48,740	68,150	82,294	91,578
B	5,274	3,897	3,214	1,755	356	504	673
C	26,617	25,560	32,907	42,524	45,260	62,545	82,935
D	51,264	39,550	37,579	31,592	22,928	31,763	42,127
E	938	882	3,232	7,349	17,253	45,248	121,406
F	9,168	12,270	14,623	17,084	17,563	22,645	29,373
G	120,032	164,407	150,503	136,674	161,146	196,918	224,587
H	85,739	75,093	84,080	92,984	90,865	120,071	156,655
I	28,833	22,287	23,383	23,810	21,195	29,647	39,366
J	0	0	0	0	0	0	0
K	63,824	99,571	104,421	104,495	150,390	185,477	211,485
L	67,973	61,708	62,331	102,138	120,941	140,057	160,303
M	6,608	6,155	8,146	10,897	12,166	15,765	20,480
N	6,449	7,748	10,346	13,459	14,636	19,403	24,845
O	16,283	13,034	12,729	10,360	7,791	8,914	11,073
P	0	0	0	0	0	0	0
TX Total	506,788	545,289	558,912	643,861	750,640	961,251	1,216,885

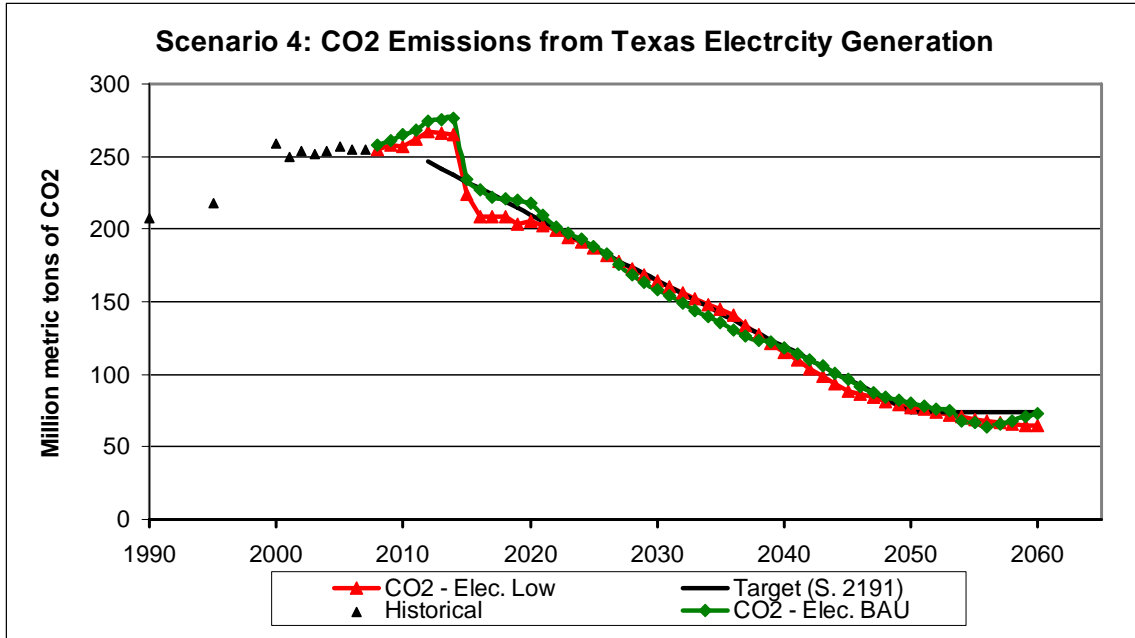


Figure 3.16. Carbon dioxide (CO₂) emissions from Texas electricity generation for Scenario 4L (CO₂ – Elec. Low) and Scenario 4BAU (CO₂ – Elec. BAU). The target of the Lieberman-Warner Climate Security Act of 2007, Senate bill 2191 [GovTrack] is plotted as the black line in the background.

3.4 Projections for Future Water Demand due to Electricity Generation - Texas Non-Industrial Generation

Because the Texas Water Development Board categorizes water demand from the steam-electric sector separately from the industrial sector, this section provides water consumption estimates for all Texas electric generation except for that generated on-site at industrial or commercial facilities. The industrial and commercial generation is assumed at 40 million MWh throughout the study period as industrial on-site generation is not projected to grow substantially in the future. As a reference, the EIA Annual Energy Outlook for 2008 assumes national industrial sales to increase at only 0.3%/yr. Therefore, if we assumed this 0.3% annual growth rate (which is not exactly analogous) then on-site industrial generation would result in an additional 7 million MWh of additional generation by 2060. Since this quantity is small compared to the total state generation projection, we assume it will have a negligible overall effect.

3.4.1 Texas Water Demand Projections for Electricity Generation excluding on-site Industrial and Commercial Generation

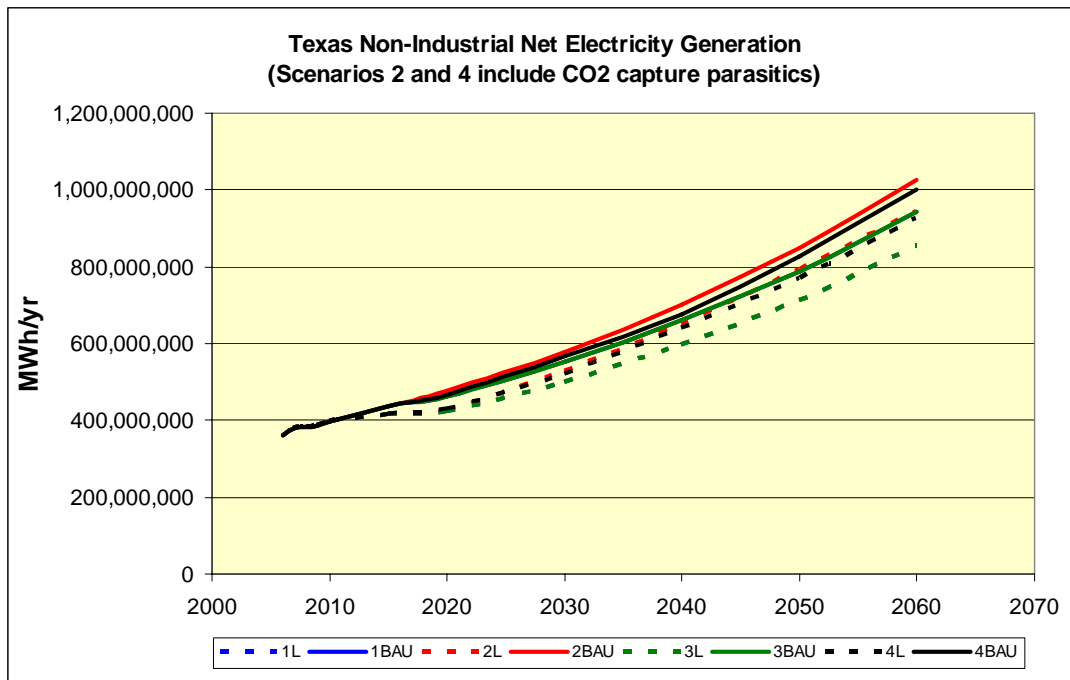


Figure 3.17. The non-industrial electricity projection (MWh) for Texas. Scenarios 1 and 3 are identical since there is no increase in parasitic gross electric generation for carbon capture.

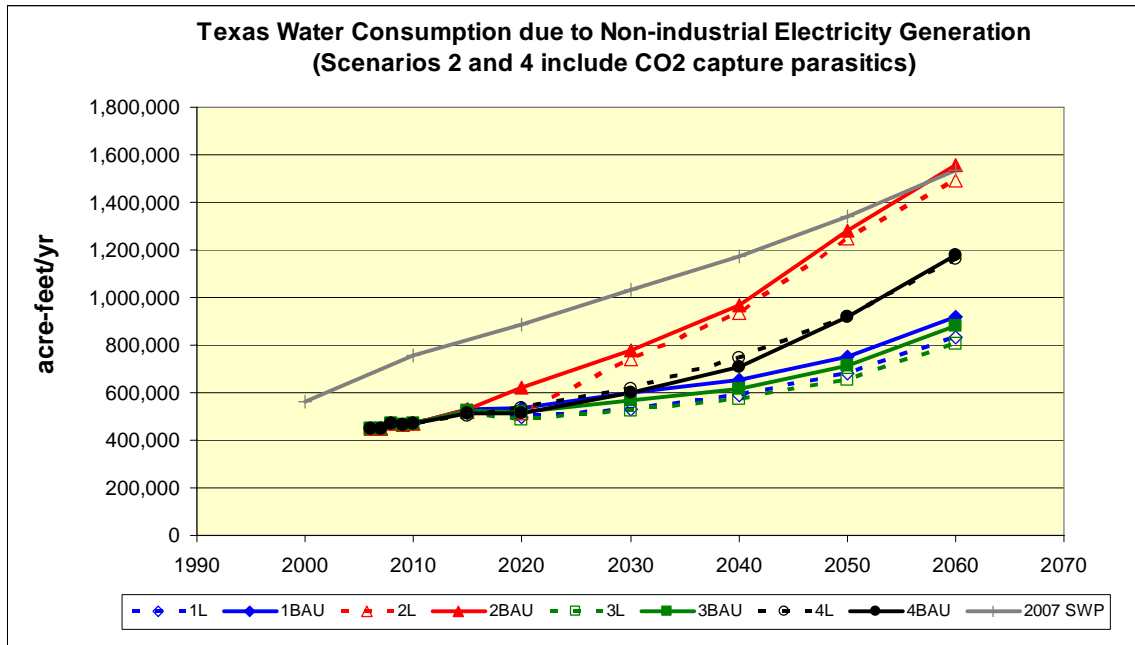


Figure 3.18. The water demand projection (ac-ft) for non-industrial electricity generation in Texas.

Table 3.14. Texas projected water consumption (ac-ft/yr) for total net electricity generation while including gross parasitic generation required for carbon dioxide capture when applicable.

Scenario	2006	2010	2015	2020	2030	2040	2050	2060
1L	446,225	471,762	515,272	497,070	530,298	587,919	678,893	833,877
1BAU	446,225	471,762	527,389	533,411	602,171	655,243	751,796	919,374
2L	446,225	471,762	518,457	515,714	738,123	936,835	1,248,190	1,492,322
2BAU	446,225	471,762	531,426	621,895	777,500	966,580	1,280,053	1,558,441
3L	446,225	471,762	512,061	486,758	525,412	571,623	655,588	805,682
3BAU	446,225	471,762	524,850	517,300	565,134	617,087	712,847	879,632
4L	446,225	471,762	502,774	537,036	616,058	746,852	919,129	1,163,306
4BAU	446,225	471,762	515,564	513,998	601,509	710,454	921,588	1,177,410

Table 3.15. Texas projected net electricity generation (MWh/yr) while including gross parasitic generation required for carbon dioxide capture when applicable.

Scenario	2006	2010	2015	2020	2030	2040	2050	2060
1L	360,944,118	396,572,867	415,385,965	423,182,734	497,141,157	594,974,356	711,914,609	851,693,572
1BAU	360,944,118	396,572,867	437,238,473	462,182,733	552,448,117	660,342,542	789,309,004	943,462,922
2L	360,944,118	396,572,867	415,769,736	427,307,734	528,841,157	648,934,356	792,644,610	942,043,572
2BAU	360,944,118	396,572,867	436,888,345	478,642,733	578,958,117	699,552,542	849,959,004	1,025,402,922
3L	360,944,118	396,572,867	415,985,423	422,182,734	497,141,157	594,974,356	711,914,610	851,693,572
3BAU	360,944,118	396,572,867	436,816,606	462,182,733	552,448,117	660,342,542	789,309,004	943,462,922
4L	360,944,118	396,572,867	415,057,722	429,767,734	520,621,157	638,554,356	770,314,610	925,093,572
4BAU	360,944,118	396,572,867	435,888,906	466,682,733	567,448,117	676,842,542	828,459,004	1,001,962,922

3.4.2 Projection 1: High Natural Gas Prices no CCS

3.4.2.1 Scenario 1 Description

See Section 3.3.2.1 for full description of the heuristics governing this scenario projection.

The results of Scenario 1 show Texas 2060 non-industrial electric sector water consumption to be 837,000 and 923,000 ac-ft for Scenarios 1L and 1BAU, respectively. The electricity projections, via fuel category, are the same as shown in Section 3.3.2.2 except for neglecting the “industrial” portion. Tables 3.16 and 3.17 show the non-industrial electric water demand projections per Regional Water Planning Area for Scenarios 1L and 1BAU.

3.4.2.2 Scenario 1 Results

Table 3.16. Electricity sector water consumption (ac-ft/yr) projection for Scenario 1L indicated by Regional Water Planning Group (RWPG).

Scenario 1L

RWPG	2010	2015	2020	2030	2040	2050	2060
A	17,689	14,488	13,730	43,161	41,552	40,103	38,812
B	5,274	4,298	4,223	3,313	2,784	2,272	1,777
C	26,612	23,173	18,627	19,920	19,649	21,480	25,379
D	50,878	40,434	38,340	32,490	28,631	25,845	24,115
E	935	717	2,466	5,873	14,870	39,410	106,099
F	8,883	11,138	13,535	22,571	47,065	73,492	103,253
G	105,354	158,732	159,628	144,199	161,008	180,314	203,556
H	78,824	64,213	59,705	65,668	87,055	113,185	145,415
I	26,107	20,865	19,064	17,053	15,483	14,790	14,960
J	0	0	0	0	0	0	0
K	63,432	98,642	99,957	78,310	77,292	77,192	77,993
L	60,428	56,633	50,613	81,305	77,099	75,184	75,523
M	6,523	5,030	3,848	4,601	4,734	5,486	6,849
N	4,542	3,201	2,552	3,052	3,139	3,639	4,542
O	16,280	13,709	12,493	10,827	9,663	8,940	8,652
P	0	0	0	0	0	0	0
TX Total	471,762	515,272	498,781	532,343	590,023	681,332	836,922

Table 3.17. Electricity sector water consumption (ac-ft/yr) projection for Scenario 1BAU indicated by Regional Water Planning Group (RWPG).

Scenario 1BAU

RWPG	2010	2015	2020	2030	2040	2050	2060
A	17,689	14,326	14,930	47,525	45,468	43,194	41,169
B	5,274	4,273	4,564	4,759	4,003	3,225	2,472
C	26,612	24,913	21,864	19,860	24,141	25,559	30,265
D	50,878	41,522	42,225	42,690	39,294	34,437	31,259
E	935	815	2,620	6,003	15,914	42,978	118,257
F	8,883	11,876	14,640	24,528	42,647	74,826	108,362
G	105,354	159,086	166,565	169,197	176,355	197,307	220,452
H	78,824	68,034	66,784	75,090	94,817	124,775	160,488
I	26,107	21,687	21,288	21,035	20,636	19,042	18,820
J	0	0	0	0	0	0	0
K	63,432	99,489	101,908	80,757	81,275	80,545	81,248
L	60,428	58,071	56,488	91,994	90,794	86,474	85,738
M	6,523	5,702	4,675	3,999	5,581	6,318	8,025
N	4,542	3,781	3,101	2,652	3,701	4,190	5,322
O	16,280	13,814	13,838	13,860	13,098	11,735	11,062
P	0	0	0	0	0	0	0
TX Total	471,762	527,389	535,489	603,949	657,724	754,604	922,941

3.4.3 Projection 2: High Natural Gas Prices with CCS

3.4.3.1 Scenario 2 Description

See Section 3.3.3.1 for full description of the heuristics governing this scenario projection.

The results of Scenario 2 show Texas 2060 non-industrial electric sector water consumption to be between 1,490,000 ac-ft and 1,560,000 ac-ft for Scenarios 2L and 2BAU, respectively. The electricity projections, via fuel category, are the same as shown in Section 3.3.3.2 except for neglecting the “industrial” portion. Tables 3.18 and 3.19 show the non-industrial electric water demand projections per Regional Water Planning Area for Scenarios 2L and 2BAU.

3.4.3.2 Scenario 2 Results

Table 3.18. Electricity sector water consumption (ac-ft/yr) projection for Scenario 2L indicated by Regional Water Planning Group (RWPG).

Scenario 2L

RWPG	2010	2015	2020	2030	2040	2050	2060
A	17,689	14,828	12,573	43,630	51,099	70,247	86,246
B	5,274	4,376	4,244	8,019	9,792	13,102	13,767
C	26,612	22,925	23,014	29,005	40,675	47,959	58,010
D	50,878	40,778	38,636	59,551	72,058	91,815	100,039
E	935	698	2,638	5,948	15,379	39,977	106,942
F	8,883	11,059	16,887	47,157	68,486	93,721	100,583
G	105,354	159,813	158,931	204,925	253,771	343,722	389,104
H	78,824	65,139	66,293	111,061	146,435	185,798	205,060
I	26,107	20,943	20,722	32,883	41,907	53,335	58,973
J	0	0	0	0	0	0	0
K	63,432	98,639	101,773	77,845	97,598	135,146	169,618
L	60,428	57,417	51,363	94,726	109,847	138,023	162,543
M	6,523	4,895	5,047	4,626	6,552	6,461	8,640
N	4,542	3,085	3,347	3,249	4,979	5,371	7,224
O	16,280	13,862	12,490	17,094	19,558	23,619	25,611
P	0	0	0	0	0	0	0
TX Total	471,762	518,457	517,958	739,718	938,134	1,248,296	1,492,359

Table 3.19. Electricity sector water consumption (ac-ft/yr) projection for Scenario 2BAU indicated by Regional Water Planning Group (RWPG).

Scenario 2BAU

RWPG	2010	2015	2020	2030	2040	2050	2060
A	17,689	14,823	15,075	56,484	78,470	105,772	109,093
B	5,274	4,400	5,765	6,720	6,995	9,850	11,606
C	26,612	24,505	28,943	29,309	33,282	36,273	57,812
D	50,878	42,078	49,343	51,838	52,628	69,126	88,507
E	935	783	2,866	6,242	16,117	43,099	119,108
F	8,883	11,747	28,070	42,769	53,275	70,540	87,339
G	105,354	160,841	187,425	215,663	271,160	367,285	405,652
H	78,824	68,771	87,824	102,727	113,951	140,061	184,727
I	26,107	21,810	27,022	29,526	31,577	40,183	53,155
J	0	0	0	0	0	0	0
K	63,432	99,482	106,583	107,111	156,058	207,587	218,916
L	60,428	59,050	60,097	106,929	129,860	163,583	182,564
M	6,523	5,482	5,778	5,423	6,007	4,925	9,500
N	4,542	3,591	4,058	3,687	4,346	4,081	7,930
O	16,280	14,061	15,039	15,254	14,602	17,804	22,605
P	0	0	0	0	0	0	0
TX Total	471,762	531,426	623,887	779,680	968,328	1,280,167	1,558,515

3.4.4 Projection 3: Low Natural Gas Prices no CCS

3.4.4.1 Scenario 3 Description

See Section 3.3.4.1 for full description of the heuristics governing this scenario projection.

The results of Scenario 3 show Texas 2060 non-industrial electric sector water consumption to be 812,000 and 886,000 ac-ft for Scenarios 3L and 3BAU, respectively. The electricity projections, via fuel category, are the same as shown in Section 3.3.4.2 except for neglecting the “industrial” portion. Tables 3.20 and 3.21 show the non-industrial electric water demand projections per Regional Water Planning Area for Scenarios 3L and 3BAU.

3.4.4.2 Scenario 3 Results

Table 3.20. Electricity sector water consumption (ac-ft/yr) projection for Scenario 3L indicated by Regional Water Planning Group (RWPG).

Scenario 3L

RWPG	2010	2015	2020	2030	2040	2050	2060
A	17,689	14,075	12,900	43,674	42,761	41,739	40,746
B	5,274	4,173	3,902	3,401	2,944	2,476	2,011
C	26,612	23,488	21,292	24,562	33,428	40,873	48,689
D	50,878	39,823	37,282	35,231	36,036	36,116	36,384
E	935	744	2,599	6,066	15,448	40,225	107,079
F	8,883	11,228	10,248	11,393	14,849	28,351	49,096
G	105,354	156,967	151,449	134,638	131,975	139,321	154,217
H	78,824	64,269	58,197	60,969	73,535	94,247	122,696
I	26,107	20,699	19,229	19,136	21,378	23,028	24,832
J	0	0	0	0	0	0	0
K	63,432	98,603	100,535	80,424	83,393	85,740	88,250
L	60,428	55,963	50,976	86,756	92,510	96,714	101,323
M	6,523	5,213	4,772	5,949	8,778	11,187	13,705
N	4,542	3,359	3,165	3,945	5,821	7,419	9,089
O	16,280	13,458	12,333	11,913	12,668	13,124	13,658
P	0	0	0	0	0	0	0
TX Total	471,762	512,061	488,879	528,057	575,525	660,560	811,773

Table 3.21. Electricity sector water consumption (ac-ft/yr) projection for Scenario 3BAU indicated by Regional Water Planning Group (RWPG).

Scenario 3BAU

RWPG	2010	2015	2020	2030	2040	2050	2060
A	17,689	14,075	13,233	44,105	43,188	42,033	41,129
B	5,274	4,196	3,936	3,446	2,988	2,507	2,050
C	26,612	25,035	25,663	30,222	39,041	44,736	53,719
D	50,878	41,096	39,513	38,120	38,901	38,087	38,952
E	935	828	2,818	6,520	16,608	43,837	119,281
F	8,883	11,901	12,053	13,730	18,938	38,807	60,034
G	105,354	157,974	154,363	138,412	137,543	151,026	166,700
H	78,824	67,888	65,846	70,875	85,129	109,868	140,360
I	26,107	21,548	21,052	21,498	23,720	24,640	26,931
J	0	0	0	0	0	0	0
K	63,432	99,429	102,441	82,893	85,841	87,425	90,444
L	60,428	57,586	55,741	92,926	98,628	100,925	106,806
M	6,523	5,787	6,062	7,619	10,433	12,326	15,189
N	4,542	3,855	4,020	5,053	6,919	8,174	10,073
O	16,280	13,653	13,251	13,102	13,846	13,935	14,715
P	0	0	0	0	0	0	0
TX Total	471,762	524,850	519,994	568,521	621,724	718,326	886,383

3.4.5 Projection 4: Low Natural Gas Prices with CCS

3.4.5.1 Scenario 4 Description

See Section 3.3.5.1 for full description of the heuristics governing this scenario projection.

The results of Scenario 4 show Texas 2060 non-industrial electric sector water consumption to be between 1,160,000 ac-ft and 1,180,000 ac-ft for Scenarios 4L and 4BAU, respectively. The electricity projections, via fuel category, are the same as shown in Section 3.3.5.2 except for neglecting the “industrial” portion. Tables 3.22 and 3.23 show the non-industrial electric water demand projections per Regional Water Planning Area for Scenarios 4L and 4BAU.

3.4.5.2 Scenario 4 Results

Table 3.22. Electricity sector water consumption (ac-ft/yr) projection for Scenario 4L indicated by Regional Water Planning Group (RWPG).

Scenario 4L

RWPG	2010	2015	2020	2030	2040	2050	2060
A	17,689	13,106	13,351	38,057	42,345	55,256	70,235
B	5,274	3,873	4,739	4,605	4,276	3,915	4,052
C	26,612	24,008	22,615	37,916	56,415	71,790	87,917
D	50,878	38,192	41,072	45,646	50,219	54,330	62,594
E	935	795	2,585	6,693	16,667	41,973	109,346
F	8,883	11,342	19,701	28,968	39,361	44,749	49,711
G	105,354	152,643	167,262	148,548	163,516	191,997	229,436
H	78,824	63,996	69,946	91,665	116,355	133,466	154,128
I	26,107	20,181	21,873	27,265	33,331	38,161	44,686
J	0	0	0	0	0	0	0
K	63,432	98,392	102,415	75,583	95,003	129,005	164,777
L	60,428	54,185	52,748	84,865	94,176	111,495	134,246
M	6,523	5,564	4,679	8,345	12,819	16,440	20,100
N	4,542	3,662	3,103	6,258	10,131	13,438	16,770
O	16,280	12,835	13,026	13,509	13,787	13,968	15,485
P	0	0	0	0	0	0	0
TX Total	471,762	502,774	539,116	617,923	748,401	919,983	1,163,482

Table 3.23. Electricity sector water consumption (ac-ft/yr) projection for Scenario 4BAU indicated by Regional Water Planning Group (RWPG).

Scenario 4BAU

RWPG	2010	2015	2020	2030	2040	2050	2060
A	17,689	13,106	11,042	48,385	67,815	81,959	91,275
B	5,274	3,897	3,209	1,764	370	538	731
C	26,612	25,555	31,512	42,544	45,805	65,275	88,139
D	50,878	39,464	37,021	31,793	23,416	33,405	45,118
E	935	879	3,169	7,342	17,267	45,347	121,603
F	8,883	12,015	13,656	16,423	17,046	22,524	29,776
G	105,354	153,650	144,545	133,875	160,958	197,594	226,385
H	78,824	67,616	69,464	74,850	71,838	94,496	124,756
I	26,107	21,031	21,283	21,482	18,888	26,705	35,983
J	0	0	0	0	0	0	0
K	63,432	99,217	103,449	103,931	149,991	185,673	212,389
L	60,428	55,808	52,928	92,598	110,969	130,888	151,049
M	6,523	6,138	7,772	10,879	12,305	16,392	21,721
N	4,542	4,158	5,426	8,120	9,157	13,234	17,936
O	16,280	13,030	12,285	10,054	7,562	8,827	11,216
P	0	0	0	0	0	0	0
TX Total	471,762	515,564	516,761	604,040	713,389	922,858	1,178,075

3.5 Summary of Projections

The steam-electric water demand projection for 2060 from the TWDB *2007 State Water Plan* [TWDB, 2007] is 1,554,000 ac-ft, and the only scenarios that approach that high of a projection are 2L and 2BAU. We previously discussed in Section 3.3.1 why our water demand projections are significantly lower than that in the *2007 State Water Plan* for the year 2006. The water projection for steam-electric power in current State Water Plan, which is in part based on the analysis of Sledge et al. [Sledge et al., 2003] projects water usage of 1,627,000 ac-ft for 2060.

In this report, we use an updated and slightly lower annual growth rate for electricity demand: 1.8% [ERCOT, 2008] versus 2.0% [Sledge et al., 2003]. Economic growth conditions are slightly lower in 2008 than during 2006 when the regional water plans were finalized for inclusion into the *2007 State Water Plan*, and this 0.2% reduction itself can account for a water demand reduction in the range of 100,000-150,000 ac-ft by 2060 and an electricity generation reduction of 100 million MWh by 2060. All of this shows the effects of uncertainty in making projections for economic growth or energy consumption in the future.

The four scenarios studied in this report envision significantly different futures in terms of the use of coal, natural gas, and nuclear power. Thus, the results for any given county can vary considerably among the four scenarios by having increasing water demand in one scenario and decreasing demand in another. These scenarios are meant to provide bounds on the possibilities for water demand due to electricity generation. It is advisable for each county and/or region to consider the range of results from each scenario.

We discuss three specific concepts used in the projections that can greatly affect regional water demand. These concepts can cause any particular county or region to follow water demand trends that are significantly above or below the state-wide trend for any of the scenarios studied in this report:

- Carbon dioxide capture
- Discrete nature of power plant locations and water transport
- Drivers for steam-electric power in dry regions

3.5.1 Carbon Capture on fossil power plants

Scenarios 2 and 4 that include a carbon dioxide emission restriction project higher water demand than their respective scenarios without carbon restrictions. The major reasons are the increased use of nuclear power as well as carbon dioxide (CO₂) capture from coal and natural gas plants where more cooling water is required to cool the solvents that absorb carbon dioxide from the flue gases (pulverized coal and natural gas) or syngases (for IGCC coal plants) of the fossil plants. These CO₂-absorbing solvents absorb CO₂ when near ambient temperature. They release the CO₂ when heated with steam, and therefore must be cooled to reabsorb CO₂. This extra cooling need may or may not prove to be viably met by dry or hybrid wet-dry cooling systems.

3.5.2 Discrete nature of power plant locations and water transport

The projection of this report inherently assumes that all power plants consume water within and from the same county in which they are located. It is certainly possible that in the future water may be transferred between counties or water basins. Additionally, the water and electricity demand projections assume each type of power plant produces electricity with the same capacity factor, thus distributing the electric generation proportional to installed capacity. This uniform capacity factor assumption is a simplification as many power plants of the same variety operate with different economic drivers depending upon the strategy of the owners and whether or not they are in regulated or deregulated electric areas. Again, regional insight from the regional water planning areas can augment the projections of this report.

3.5.2 Drivers for steam-electric power in dry regions

3.5.2.1 Concentrated Solar Power

It is important to note that we do not include significantly different projections for the amount of electricity that is generated by renewable energy systems as the renewable energy projection is at a constant ratio constant for all scenarios. This is obviously a gross simplification. However with possible renewable energy projects being announced in many different part of the state it may well be a reasonable assumption for the future. Certainly the amount of renewable electricity, steam-electric or not, may be different to our assumed growth, and the result will have implications for water demand.

An example of how the renewable energy projection largely affects regional water usage is the consideration of concentrated solar power systems that are assumed to be installed at appreciable capacities in Region E during the latter part of the projection period. These CSP systems are assumed to use closed loop cooling systems with wet cooling towers and account for practically all of the water consumption projection for Region E. Therefore, if less of these systems are installed, there will be much lower water demand; and if CSP systems are installed in other regions, with Region F being the other that is likely, then those regions could increase their water demand substantially. Water demand for CSP systems is one of the major concerns about their implementation as the high quality solar resource that is needed for their efficiency usually occurs in areas with little water.

3.5.2.2 Carbon Dioxide Capture at fossil plants for Enhanced Oil Recovery

Included in the projected future power plants are two integrated gasification combined cycle (IGCC) coal power plants that are to be located in the West Texas region where average rainfall is less than the Eastern and Central regions of Texas where most fossil fuel power plants exist. One of these proposed plants is considering installation of CO₂ capture equipment. One of the major drivers for locating coal plants to West Texas is to serve the need for CO₂ for enhanced oil recovery (EOR) in oil reservoirs in decline within the Permian Basin. It could be important for regional planners to consider viable locations for new coal power plants, both IGCC and pulverized coal types, in regions that

are near or include Permian Basin oil fields or other areas with potential for EOR using CO₂.

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Appendix A: Description of Electricity/Water Projection Worksheets

Here we describe the worksheets used to perform the electricity and subsequent water demand projections for the State of Texas. Sections 3.1 and 3.2 describe the basic methodology, and here we describe how to use the worksheets for calculations of projections.

A.1 Electricity Projection Scenarios

There are 4 Excel files, one for each Scenario 1-4 used to project electricity and water demand for electricity generation. Each file uses the same format with three worksheets and is described here.

A.1.1. Worksheet - “Overall Total Chart”:

Presents summary data for electricity and resulting water demand for Texas overall.

INPUTS:

There are no inputs on this worksheet.

OUTPUTS:

The low generation case results lie in columns A-C, and those of the “business-as-usual” generation case lie in columns D:F.

Columns A:F are labeled as follows:

	Low		BAU		
Year	Elec. Gen (million MWh)	CO2 (Mt CO2/yr)	Elec. Gen (million MWh)	CO2 (Mt CO2/yr)	TX CO2 Target (S. 2191)

“Year” = the year of the projection

“Elec. Gen (million MWh)” = the electricity generation projected that is net power plant generation plus parasitic generation for carbon capture (if applicable)

“CO2 (Mt CO2/yr)” = carbon dioxide emissions from electricity generation in units of millions of metric tonnes

“TX CO2 Target (S. 2191)” = the estimated target carbon dioxide emissions as suggested by the Lieberman-Warner Climate Security Act of 2007, Senate Bill 2191

A.1.2. Worksheet - “Low Case, Scen N”

Here “N” represents the scenario number, 1-4.

This worksheet describes the amount of electricity generated for the “low” generation Scenario with assumed efficiency improvements.

INPUTS:

a. Cells A5:A16

These describe various annual growth factors for different types of generation and other parameters that govern the projections. Some factors do not continue to multiply through the entire study period (2060) as they would completely dominate the electricity generation mixture over time, yet likely will grow relatively quickly in the near term.

For this “Low case” with low total traditional electric generation, we have taken the amount of electricity (MWh) assumed offset due to efficiency from the ACEEE reference mentioned in Section 3.2 of the main report; 50 million MWh. This amount is extrapolated after 2023 (when the ACEEE projection stops) as if the percentage of efficiency with respect to the total electricity consumption (without parasitic loads due to carbon dioxide capture) remains constant into the future. Thus, efficiency grows after 2023, but at a slower rate than before 2023.

Cell by cell description:

- A5:** “Elec. Sales growth” – this is the annual growth in electricity consumption that does not include the transmission and distribution losses
- A6:** “Transmission and Distribution losses (% of sales)” – the average extra generation that is required at power plants in order to meet the electricity load at the consumer after crossing transmission lines and distribution facilities (as a percentage of sales/load)
- A7:** “millions of MWh from renewables in 2008” – an estimated 2008 quantity of renewable electricity generation in Texas
- A8:** “millions of MWh from industrial On-site in 2008” – the estimated 2008 quantity of electricity that is generated at industrial facilities and not flowing on the electric grid
- A9:** “Assumed solar PV annual growth rate” – annual growth rate for solar photovoltaics (PV)
- A10:** “Assumed solar CSP annual growth rate” – annual growth rate for solar concentrating power (CSP) generation
- A11:** “Assumed efficiency reduction, in MWh, in 2023 (ACEEE)” – the annual quantity of electricity consumption by 2023 that is displaced due to efficiency programs as per the Texas-based study by the American Council for an Energy Efficiency Economy
- A12:** “Assumed growth rate of industrial on-site MWh” – annual growth rate of industrial on-site generation
- A13:** “% of total electricity consumption as wind in 2060” – the target percentage of electricity consumption in 2060 that is from wind generation.
- A14:** “% of generation from PC w/CCS that is parasitic load for carbon capture” – this is the percentage of gross generation from pulverized coal power plants with a carbon capture system that is attributed to carbon dioxide capture and compression for sequestration
- A15:** “% of generation from IGCC w/CCS that is parasitic load for carbon capture” - this is the percentage of gross generation from integrated gasification combined

cycle coal power plants with a carbon capture system that is attributed to carbon dioxide capture and compression for sequestration

A16: “% of generation from NGCC w/CCS that is parasitic load for carbon capture” - this is the percentage of gross generation from natural gas combined cycle power plants with a carbon capture system that is attributed to carbon dioxide capture and compression for sequestration

INPUTS/OUTPUTS:

b. Columns A-H for projections years 2008-2060 in rows 18-70

Column A, “Year” –

Year of the projection

Column B, “TX Electrical Sales (MWh), neglects losses in T&D” –

The projected quantity of Texas electrical sales (starting with 351 million MWh in 2008) where neither transmission and distribution losses nor industrial on-site generation is included. This is the quantity that is projected to increase at the 1.8% annual growth rate.

EQUATION (years $N = 2009$ thru 2060): Cell $BN = \text{Cell } B^{N-1} * (1+\$A\$5)$

Column C, “TX Elec. Gen - w/o Industrial On-site (MWh)” –

The projected electricity generation for Texas that includes transmission and distribution losses but not on-site industrial generation

EQUATION: Column C = Column B * (1 + Cell $\$A\6)

Column D, “Texas total Net Generation w/o CCS parasitics (MWh)” –

This is the total *net electricity generation* projected for Texas.

EQUATION: Column D = Column C + Column F – Column E

Column E, “TX Total MWh from efficiency” –

This is the projected amount of net electricity generation that is assumed (when applicable) to not be needed due to energy efficiency enhancements in any and all sectors. For the BAU cases, this column is always zero. For the “low” cases, this quantity linearly increases from 0 MWh in 2008 to the 50 million MWh target quantity in 2023, and then maintains that ratio of “efficiency/generation” through the rest of the projection

EQUATION (years $N = 2009$ thru 2022): Cell $EN = (AN-A\$18)/(A\$33-A\$18)*(E\$33-E\$18)+E\18

EQUATION (years $N = 2023$): Cell $E33 = \text{Cell } A11$

EQUATION (years $N = 2024$ thru 2060): Cell $EN = D^{N-1} * \$E\$33/\$D\33

Column F, “TX Total MWh from Industrial On-site” –

The quantity of electricity (MWh) generated on-site at industrial and commercial facilities.

EQUATION (year 2008): Cell F18 = Cell A8*1,000,000

EQUATION (years N = 2009 thru 2060): Cell FN = Cell F'N-1' * (1+\$A\$12)

Column G, "TX Total MWh from renewables" –

The amount of electricity generated from renewable energy technologies that includes wind, photovoltaic solar, concentrated solar power, and hydroelectric power. The target quantity of renewable

EQUATION (year 2008): Cell G18 = Cell A7

EQUATION (years N = 2009 thru 2059): Cell GN = (AN-\$A\$18)/(\$A\$70-\$A\$18)*(\$G\$70-\$G\$18)+\$G\$18

EQUATION (year 2060): Cell G70 = (B70-E70)*\$A\$13/0.65

Recall that wind power is assumed to be 20% of total electricity generation (cell A13) and 65% of all renewable generation.

Column H, "TX Total MWh Parasitics due to CCS" –

This is *extra gross electricity generation* at a coal or natural gas combined cycle plants that is specifically due to loads caused to run carbon dioxide capture auxiliary equipment at the power plants. Note that there is other gross generation for equipment that is not associated with carbon dioxide capture that is not quantified here.

EQUATION: Column H = Column AD*\$A\$14 + Column AE*\$A\$15 + Column AF*\$A\$16

c. Columns I-T and/or Columns V-AG

For every column I-T (describing the % of the electricity generated by a particular fuel and technology), there is a corresponding column V-AG (describing the absolute value of MWh generated by a particular fuel and technology). One can either (1) input the percentage of the fuel mix that is represented by a particular fuel into Columns I-T and then output the bulk value in MWh into the respective Column V-AG, or (2) input the bulk value, in MWh, into Columns V-AG and output the percentage of the electricity mix represented by that fuel in Columns I-T.

As a check, the sum of percentages must equal 100% every year (Column U), and the sum of all MWh must equal the total desired generation (Column AH must equal Column AI, and Column AJ must be equal to zero). The total net electricity generated plus parasitic gross generation for carbon capture systems is calculated in column AI = column D + column H. This is compared to column AH that is equal to the sum of generation from all possible categories in columns V-AG.

There is any number of ways to calculate numbers in this spreadsheet, and the authors have used their knowledge to put in representative values into each of the scenarios.

For example, assume you would like 20% of Texas electricity to be natural gas combined cycle (NGCC) in the year 2060, no matter what. You could input 20% into cell K70 (which is NGCC % for the year 2060), and therefore the output of cell X70 (MWh for NGCC in 2060) should be = “K70*(D70+H70)” = “% NGCC*(Net generation + carbon capture parasitic generation).”

Description of Column Headings:

“PC Coal, no CCS” = pulverized coal power plant with no carbon capture and storage

“IGCC Coal, no CCS” = integrated gasification combined cycle coal power plant with no carbon capture and storage

“NGCC Coal, no CCS” = natural gas combined cycle power plant with no carbon capture and storage

“Industrial On-site” = all on-site generation is assumed from natural gas combined cycle systems with some use of excess heat (as steam or not) for industrial purposes that process industrial heating

“Wind and hydro” = renewable energy generation that comes from wind power and hydropower, which are both assumed to consume water at a rate of 0 gal/kWh.

“Nuclear” = electricity generation from nuclear power

“Solar CSP” = renewable energy generation from concentrated solar power (CSP) systems

“Solar PV” = renewable energy generation from photovoltaic (PV) solar panels

“PC Coal, w/CCS” = pulverized coal power plant with carbon capture and storage

“IGCC Coal, w/CCS” = integrated gasification combined cycle coal power plant with carbon capture and storage

“NGCC, w/CCS” = natural gas combined cycle power plant with carbon capture and storage

“Other” = any generation other than those listed

% MWh PC Coal, no CCS	% MWh IGCC Coal, no CCS	% MWh NGCC, no CCS	% MWh NG Industrial On-site	% MWh wind and hydro	% MWh Nuclear	% MWh Solar CSP	% MWh Solar PV	% MWh PC Coal, w/CCS	% MWh IGCC Coal, w/CCS	% MWh NGCC, w/CCS	% MWh other
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Columns I:T are labeled as follows:

Columns V:AG are labeled as follows:

MWh PC Coal, no CCS	MWh IGCC Coal, no CCS	MWh NGCC, no CCS	MWh NG Industrial On-Site	MWh wind and hydro	MWh Nuclear	MWh Solar CSP	MWh Solar PV	MWh PC Coal, w/CCS	MWh IGCC Coal, w/CCS	MWh NGCC, w/CCS	MWh other
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d. Columns AH-AL

Column AH, “Total MWh from Table” – Total MWh generated that is net electrical generation plus parasitic gross generation from carbon dioxide capture auxiliary equipment

EQUATION: Column AH = SUM(V18:AG18)

Column AI, “MWh Target (check)” – Total MWh generated that is net electrical generation plus parasitic gross generation from carbon dioxide capture auxiliary equipment

EQUATION: Column AI = Column D + Column H

Column AJ, “Difference from MWh Target” –

EQUATION: Column AI = Column AH - Column AI

Column AK, “Annual CO₂ Emissions (MtCO₂)” – Carbon dioxide emissions estimate from electricity generation in units of millions of metric tons of CO₂ (MtCO₂).

EQUATION: Column AI = [(\$G\$7*Column V) + (\$G\$8*Column AD) + (\$G\$9*Column W) + (\$G\$10*Column AE) + (\$G\$11*Column X) + (\$G\$12*Column AF) + (\$G\$13*Column Y)]/1000000

Column AL, “Target CO₂ Emissions (MtCO₂)” – The target trajectory for carbon dioxide emissions as modeled after the Lieberman-Warner Senate Bill 2191 in 2007.

EQUATION: Column AI = Column F from worksheet “OverallTotalChart”

A.1.3. Worksheet - “BAU Case, Scen *N*”

Here “*N*” represents the scenario number, 1-4.

This worksheet describes the amount of electricity generated for the “business-as-usual” generation Scenario with no extra efficiency.

The inputs and outputs are equivalent in description to the “Low Case, Scen *N*” described in Section A.1.2.

A.2 Water Consumption Projection results

The Excel worksheets described in this section reside in the following two filenames and are identical except for what is described below:

TWDBFutureProjectionFinalData_total.xls: This file has results for *all* Texas net electrical generation plus parasitic gross generation required for carbon capture systems (when applicable).

TWDBFutureProjectionFinalData_Nonindus.xls: This file has results for Texas net electrical generation plus parasitic gross generation required for carbon capture systems (when applicable) *except* for industrial on-site generation. In other words, this provides water consumption projection estimates for facilities that send electricity onto the electric grid. The data in this file still incorporate many cogeneration, or combined heat and power, units that are not specifically owned and on the premises of industrial facilities.

A.2.1. Worksheet - “TX Summary”

This worksheet displays data in charts that tabulate water consumption totals (ac-ft/yr) and electricity generation totals (MWh/yr) for the entire state, for each scenario, and for the years 2006-2010, 2015, 2020, 2030, 2040, 2050, and 2060. Additionally, totals of water consumption (ac-ft/yr) and electricity generation (MWh/yr) are subdivided by Regional Water Planning Group for each scenario studied for the same set of years.

Graphs plotting the statewide results are also presented.

A.2.2. Worksheet - “RWPG Ac-ft”

This worksheet tabulates water consumption for electricity generation by county, for each scenario, and for the years 2006-2010, 2015, 2020, 2030, 2040, 2050, and 2060. Totals are also shown for each Regional Water Planning Group and Texas. This worksheet is the driver for presenting results in the “TX Summary” worksheet.

A.2.3. Worksheet - “RWPG MWh”

This worksheet has the same layout as worksheet “RWPG Ac-ft” except that the tabulated information is for net electricity generation plus parasitic loads for carbon dioxide capture, in MWh.

A.2.4. Worksheets - “2006”- “2010”:

Each of these worksheets displays information regarding projections for electricity generation and associated water consumption per county and per electricity generation type for the year corresponding to the worksheet label.

Description of Columns A-F:

County	RWPA	Ac-ft/yr Consumption (2006)	% Water Consumption (2006)	MWh Generation (2006)	% MWh Generation (2006)
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“County”: The county for which the data in each other column correspond

“RWPA”: The Texas Water Development Board regional water planning area (group) designated for the county. Sometimes two RWPAs are listed when a particular county has parts that lie in more than one RWPA but no double-counting of data is done. By circumstance, it occurs that for each county that is governed by two RWPAs and existing electric generation units, those units only lie in one of the RWPAs. Some counties governed by two RWPAs have no electric generation.

“Ac-ft/yr Consumption”: the total water consumption (ac-ft/yr) for electricity generation in Texas that is consumed in each county

“% Water consumption”: the percent of total water consumption for electricity generation in Texas that is consumed in each county

“MWh Generation”: the total electricity generation in Texas that is generated in each county

“% MWh Generation”: the percent of total electricity generation in Texas that is generated in each county

Description of Columns H-Q:

These columns tabulate the water consumed (ac-ft/yr) for electricity generation as a percentage of water consumed *per power generation type*. There are nine generation types, plus an “other” category that includes fuels such as waste wood, petroleum products, and other combustible materials and gases.

Percentage of Ac-ft/yr per county									
Nuclear	Coal, PC, no CCS	Coal, IGCC, no CCS	Coal, PC, w/CCS	Coal, IGCC, w/CCS	NGCC, no CCS	NGCC, w/CCS	Solar - CSP	Non-CSP Renewabl es	Other

“Nuclear”: Nuclear power generation

“Coal, PC, no CCS”: pulverized coal power generation with no carbon dioxide capture

“Coal, IGCC, no CCS”: integrated gasification combined cycle coal power generation with no carbon dioxide capture

“Coal, PC, w/CCS”: pulverized coal power generation with carbon dioxide capture

“Coal, IGCC, w/CCS”: integrated gasification combined cycle coal power generation with carbon dioxide capture

“NGCC, no CCS”: natural gas combined cycle power generation with no carbon dioxide capture

“NGCC, w/CCS”: natural gas combined cycle power generation with carbon dioxide capture

“Solar-CSP”: concentrating solar power electricity generation

“Non-CSP renewables”: wind, photovoltaic solar, and hydroelectric power generation

“Other”: any electric generation from fuels and technologies other than those listed above

Description of Columns S-AB:

These columns tabulate the water consumed (ac-ft/yr) for electricity generation *per power generation type*. There are nine generation types, plus an “other” category that includes fuels such as waste wood, petroleum products, and other combustible materials and gases.

Ac-ft/yr Water Consumption per fuel type (2006)									
Nuclear	Coal, PC, no CCS	Coal, IGCC, no CCS	Coal, PC, w/CCS	Coal, IGCC, w/CCS	NGCC, no CCS	NGCC, w/CCS	Solar - CSP	Non-CSP Renewables	Other

Description of Columns AD-AM:

These columns tabulate the electricity generated (MWh) as a percentage of electricity generated *per power generation type*. There are nine generation types, plus an “other” category that includes fuels such as waste wood, petroleum products, and other combustible materials and gases.

% Generation per fuel type (2006)									
Nuclear	Coal, PC, no CCS	Coal, IGCC, no CCS	Coal, PC, w/CCS	Coal, IGCC, w/CCS	NGCC, no CCS	NGCC, w/CCS	Solar - CSP	Non-CSP Renewables	Other

Description of Columns AO-AX:

These columns tabulate the electricity generated (MWh) *per power generation type*. There are nine generation types, plus an “other” category that includes fuels such as waste wood, petroleum products, and other combustible materials and gases.

MWh Generation per fuel type (2006)									
Nuclear	Coal, PC, no CCS	Coal, IGCC, no CCS	Coal, PC, w/CCS	Coal, IGCC, w/CCS	NG (All), no CCS	NGCC, w/CCS	Solar - CSP	Non-CSP Renewables	Other

Description of Columns AZ-BI:

These columns tabulate the water consumption factor (gallons of water consumed per kWh generated) for each county *per power generation type*. There are nine generation types, plus an “other” category that includes fuels such as waste wood, petroleum products, and other combustible materials and gases. For the years 2006-2010 these water consumption factors are calculated for reference only.

gal/kWh (per county per fuel) (2006)									
Nuclear	Coal, PC, no CCS	Coal, IGCC, no CCS	Coal, PC, w/CCS	Coal, IGCC, w/CCS	NG (All), no CCS	NGCC, w/CCS	Solar - CSP	Non-CSP Renewables	Other

A.2.5. Worksheets - “2015-1L” – “2015-4H”:

These worksheets display the same information in the same format as worksheets “2006”-“2010” except all correspond to the year 2015. Each of the eight analyzed scenarios have a unique year 2015 projection where “2015-1L” shows the year 2015 results for Scenario 1L and “2015-1H” shows the year 2015 results for Scenario 1BAU. The same description pattern holds for Scenarios 2-4.

For the water consumption factors that are calculated in columns AZ:BI, these will be used and remain constant for all future year projections 2020, 2030, 2040, 2050, and 2060.

A.2.6. Worksheets – “2020” – “2060”:

Columns A-J as on worksheet:

County	RWPA	Scenario 1L				Scenario 1H			
		Ac-ft/yr Consumption (2020)	% Water Consumption (2020)	MWh Generation (2020)	% Generation (2020)	Ac-ft/yr Consumption (2020)	% Water Consumption (2020)	MWh Generation (2020)	% Generation (2020)

Columns A and B:

“County”: County for which the data have been calculated

“RWPA”: the TWDB Regional Water Planning Area within which the county resides

Columns C-F: results for Scenario 1L

“Ac-ft/yr Consumption (20XX)”: The total projected water consumption, in ac-ft, for each county. Here, XX represents the year label of the worksheet.

“% Water consumption (20XX)”: The percentage of Texas total water consumption for electricity generation that is projected for each county.

“MWh Generation (20XX)”: The total projected electricity generation, in MWh, for each county. Here, XX represents the year label of the worksheet.

“% Generation (20XX)”: The percentage of Texas total electricity generation that is projected for each county.

Columns G-J: results for Scenario 1BAU

Same descriptions as noted for columns C-F.

Columns K-N: results for Scenario 2L

Same descriptions as noted for columns C-F.

Columns O-R: results for Scenario 2BAU

Same descriptions as noted for columns C-F.

Columns S-V: results for Scenario 3L

Same descriptions as noted for columns C-F.

Columns W-Z: results for Scenario 3BAU

Same descriptions as noted for columns C-F.

Columns AA-AD: results for Scenario 4L

Same descriptions as noted for columns C-F.

Columns AE-AH: results for Scenario 4BAU

Same descriptions as noted for columns C-F.

Columns AI-AS: Electricity Generation per fuel type for each scenario

	MWh/yr Generation per fuel type (2030)									
	Nuclear	Coal, PC, no CCS	Coal, IGCC, no CCS	Coal, PC, w/CCS	Coal, IGCC, w/CCS	NG (All), no CCS	NGCC, w/CCS	Solar - CSP	Non-CSP Renewables	Other
1L	109,000,000	120,000,000	37,000,000	0	0	154,471,821	0	2,124,257	109,545,079	5,000,000
1BAU	109,000,000	175,000,000	41,000,000	0	0	138,832,474	0	2,212,066	121,403,577	5,000,000
2L	89,000,000	75,000,000	0	70,000,000	70,000,000	128,171,821	20,000,000	2,124,257	109,545,079	5,000,000
2BAU	142,000,000	54,000,000	0	61,000,000	61,000,000	162,342,474	10,000,000	2,212,066	121,403,577	5,000,000
3L	109,000,000	122,000,000	0	0	0	189,471,821	0	2,124,257	109,545,079	5,000,000
3BAU	109,000,000	122,000,000	0	0	0	232,832,474	0	2,212,066	121,403,577	5,000,000
4L	89,000,000	75,000,000	0	28,000,000	28,000,000	143,951,821	80,000,000	2,124,257	109,545,079	5,000,000
4BAU	142,000,000	54,000,000	0	0	0	182,832,474	100,000,000	2,212,066	121,403,577	5,000,000

Column AI: in rows 3:10 indicates the electricity projection scenario (e.g. 1L, 1BAU, etc.) for which the electricity generation per fuel is provided in columns AJ:AS.

Column AJ, “Nuclear”: Nuclear power generation

Column AK, “Coal, PC, no CCS”: pulverized coal power generation with no carbon dioxide capture

Column AL, “Coal, IGCC, no CCS”: integrated gasification combined cycle coal power generation with no carbon dioxide capture

Column AM, “Coal, PC, w/CCS”: pulverized coal power generation with carbon dioxide capture

Column AN, “Coal, IGCC, w/CCS”: integrated gasification combined cycle coal power generation with carbon dioxide capture

Column AO, “NGCC, no CCS”: natural gas combined cycle power generation with no carbon dioxide capture

Column AP, “NGCC, w/CCS”: natural gas combined cycle power generation with carbon dioxide capture

Column AQ, “Solar-CSP”: concentrating solar power electricity generation

Column AR, “Non-CSP renewables”: wind, photovoltaic solar, and hydroelectric power generation

Column AS, “Other”: any electric generation from fuels and technologies other than those listed above

Columns AU-BD: gal/kWh factors per fuel type

gal/kWh Water Consumption per fuel type (2030)									
Nuclear	Coal, PC, no CCS	Coal, IGCC, no CCS	Coal, PC, w/CCS	Coal, IGCC, w/CCS	NG (All), no CCS	NGCC, w/CCS	Solar - CSP	Non-CSP Renewables	Other

Same fuel descriptions as for columns AI-AS.

Columns BF-BO: % electricity generation per fuel type per county

% Generation per fuel type (fixed from 2015)									
Nuclear	Coal, PC, no CCS	Coal, IGCC, no CCS	Coal, PC, w/CCS	Coal, IGCC, w/CCS	NG (All), no CCS	NGCC, w/CCS	Solar - CSP	Non-CSP Renewables	Other

Same fuel descriptions as for columns AI-AS. Recall these factors are fixed from the year 2015 for years 2020-2060. Exceptions are for (1) the nuclear category since some scenarios show large increases in nuclear generation that is assumed to occur within two additional counties (Victoria and Potter) than the existing two counties (Matagorda and Somervell) and (2) the Solar CSP category since no generation exists in this category so it must be assumed to occur in several West Texas counties which have been chosen randomly but with feasible location.

Low Generation Case, Scenario 1: High NG price with no Carbon Price

1.80%	Elec. Sales growth	CO2	
6.30%	Transmission and Distribution Losses (% of sales)	M/MSWh	
14.0	millions of MWh from renewables in 2008	PC	1.00
40.0	millions of MWh from Industrial On-site in 2008	PC w/CCS	0.15
16.9%	Assumed solar PV annual growth rate	IGCC	0.90
10.5%	Assumed solar CSP annual growth rate	IGCC w/CCS	0.14
50.0	Assumed efficiency reduction, in MWh, in 2023 (ACEEE)	NGCC	0.53
0.00%	Assumed growth rate of industrial on-site MWh	NGCC w/CCS	0.08
20.00%	% of total electricity consumption as wind in 2060	CHP (Ind.)	0.5
25.00%	% of generation from PC w/CCS that is parasitic load for carbon capture		
16.00%	% of generation from IGCC w/CCS that is parasitic load for carbon capture		
15.00%	% of generation from NGCC w/CCS that is parasitic load for carbon capture		

PERCENTAGES OF TOTAL GENERATION FROM EACH POWER PLANT TYPE																				
Year	TX Electrical Sales (MWh), neglects losses in T&D	TX Elec. Gen w/o Industrial On-site (MWh)	Texas total Net Generation w/o CCS parasitics (MWh)	TX Total MWh from efficiency	TX Total MWh from Industrial On-site	TX Total MWh Generated from renewables	TX Total MWh Parasitics due to CCS	% MWh PC Coal, no CCS	% MWh IGCC Coal, no CCS	% MWh NGCC, no CCS	% MWh Industrial On-site	% MWh wind and hydro	% MWh Nuclear	% MWh Solar CSP	% MWh Solar PV	% MWh PC w/CCS	% MWh IGCC Coal, w/CCS	% MWh NGCC, w/CCS	% MWh other	Total % MWh
2008	351,000,000	373,113,000	413,113,000	0	40,000,000	14,000,000	0	37.5%	0.0%	38.2%	9.7%	3.4%	10.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
2009	357,318,000	379,829,034	416,495,701	3,333,333	40,000,000	18,439,515	0	37.9%	0.0%	36.9%	9.6%	4.4%	9.9%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
2010	363,749,724	386,665,957	419,999,290	6,666,667	40,000,000	22,879,031	0	39.3%	0.0%	34.6%	9.5%	5.4%	10.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
2011	370,297,219	393,625,944	423,625,944	10,000,000	40,000,000	27,319,546	0	40.1%	0.0%	32.9%	9.4%	6.4%	9.9%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
2012	376,962,569	400,711,211	427,377,877	13,333,333	40,000,000	31,758,061	0	42.1%	0.0%	30.1%	9.4%	7.3%	9.8%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
2013	383,747,895	407,924,013	431,257,346	16,666,667	40,000,000	36,197,576	0	41.7%	0.0%	29.7%	9.3%	8.3%	9.7%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
2014	390,655,357	415,266,645	435,266,645	20,000,000	40,000,000	40,637,092	0	41.4%	0.0%	29.3%	9.2%	9.2%	9.6%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
2015	397,687,154	422,741,444	439,408,111	23,333,333	40,000,000	45,076,607	0	35.3%	0.5%	23.5%	9.1%	10.1%	20.3%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
2016	404,845,523	430,350,790	443,684,124	26,666,667	40,000,000	49,516,122	0	34.9%	0.9%	22.8%	9.0%	11.0%	20.1%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
2017	412,132,742	438,097,105	448,097,105	30,000,000	40,000,000	53,955,638	0	34.6%	1.3%	22.1%	8.9%	11.9%	19.9%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
2018	419,551,131	445,982,853	452,649,519	33,333,333	40,000,000	58,395,163	0	34.2%	1.8%	21.5%	8.8%	12.7%	19.7%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
2019	427,103,052	454,010,544	457,343,877	36,666,667	40,000,000	62,834,668	0	33.9%	2.2%	20.9%	8.7%	13.6%	19.5%	0.2%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
2020	434,790,907	462,182,734	462,182,734	40,000,000	40,000,000	67,274,183	0	33.5%	2.6%	20.3%	8.7%	14.4%	19.3%	0.2%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
2021	442,617,143	470,502,023	467,168,690	43,333,333	40,000,000	71,713,699	0	32.1%	3.0%	20.9%	8.6%	15.1%	19.1%	0.2%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
2022	450,584,251	478,971,059	472,304,393	46,666,667	40,000,000	76,153,214	0	31.3%	3.4%	20.8%	8.5%	15.9%	18.8%	0.2%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
2023	458,694,768	487,592,538	477,592,538	50,000,000	40,000,000	80,592,729	0	30.6%	3.8%	20.7%	8.4%	16.6%	18.6%	0.2%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
2024	466,951,274	496,369,204	486,369,204	50,000,000	40,000,000	85,032,245	0	29.6%	4.1%	21.2%	8.2%	17.2%	18.3%	0.2%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
2025	475,356,397	505,303,850	494,385,005	50,918,845	40,000,000	89,471,760	0	27.3%	4.4%	20.8%	8.1%	17.8%	20.2%	0.3%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
2026	483,912,812	514,399,319	502,641,286	51,758,033	40,000,000	93,911,275	0	25.5%	4.8%	20.4%	8.0%	18.4%	21.7%	0.3%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
2027	492,623,243	523,658,507	511,036,109	52,622,397	40,000,000	98,350,791	0	24.7%	5.1%	20.9%	7.8%	18.9%	21.3%	0.3%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
2028	501,490,461	533,084,360	519,583,094	53,501,266	40,000,000	102,790,306	0	23.9%	5.4%	21.3%	7.7%	19.4%	21.0%	0.3%	0.1%	0.0%	0.0%	0.0%	0.0%	100.0%
2029	510,517,289	542,679,878	528,283,814	54,396,065	40,000,000	107,229,821	0	23.1%	5.7%	21.8%	7.6%	19.9%	20.6%	0.4%	0.1%	0.0%	0.0%	0.0%	0.0%	100.0%
2030	519,706,600	552,448,116	537,141,158	55,306,958	40,000,000	111,669,336	0	22.3%	6.9%	21.3%	7.4%	20.3%	20.3%	0.4%	0.1%	0.0%	0.0%	0.0%	0.0%	100.0%
2031	529,061,319	562,392,182	546,157,933	56,234,249	40,000,000	116,108,852	0	21.6%	8.1%	20.9%	7.3%	20.7%	20.0%	0.4%	0.1%	0.0%	0.0%	0.0%	0.0%	100.0%
2032	538,584,423	572,515,242	555,337,010	57,178,231	40,000,000	120,548,367	0	20.9%	9.2%	20.5%	7.2%	21.1%	19.6%	0.5%	0.1%	0.0%	0.0%	0.0%	0.0%	100.0%
2033	548,278,943	582,820,516	564,681,311	58,139,205	40,000,000	124,987,882	0	20.2%	10.3%	20.1%	7.1%	21.5%	19.3%	0.5%	0.1%	0.0%	0.0%	0.0%	0.0%	100.0%
2034	558,147,964	593,311,285	574,193,809	59,117,476	40,000,000	129,427,398	0	19.5%	11.3%	19.8%	7.0%	21.9%	19.0%	0.6%	0.1%	0.0%	0.0%	0.0%	0.0%	100.0%
2035	568,194,627	603,990,888	583,877,532	60,113,356	40,000,000	133,866,913	0	18.8%	12.3%	19.5%	6.9%	22.2%	18.7%	0.6%	0.1%	0.0%	0.0%	0.0%	0.0%	100.0%
2036	578,422,130	614,862,724	593,735,562	61,127,162	40,000,000	138,306,428	0	18.2%	13.3%	19.3%	6.7%	22.5%	18.4%	0.7%	0.2%	0.0%	0.0%	0.0%	0.0%	100.0%
2037	588,833,728	625,930,253	603,771,037	62,159,217	40,000,000	142,745,943	0	17.6%	14.2%	19.1%	6.6%	22.7%	18.1%	0.7%	0.2%	0.0%	0.0%	0.0%	0.0%	100.0%
2038	599,432,736	637,196,998	613,987,150	63,209,848	40,000,000	147,185,459	0	16.9%	15.1%	18.9%	6.5%	23.0%	17.8%	0.8%	0.2%	0.0%	0.0%	0.0%	0.0%	100.0%
2039	610,222,525	648,666,544	624,387,153	64,279,391	40,000,000	151,624,974	0	16.3%	16.0%	18.7%	6.4%	23.2%	17.5%	0.8%	0.3%	0.0%	0.0%	0.0%	0.0%	100.0%
2040	621,206,530	660,342,542	634,974,356	65,368,186	40,000,000	156,064,489	0	15.7%	16.9%	18.6%	6.3%	23.4%	17.2%	0.9%	0.3%	0.0%	0.0%	0.0%	0.0%	100.0%
2041	632,388,248	672,228,707	645,752,129	66,476,578	40,000,000	160,504,005	0	15.2%	17.7%	18.5%	6.2%	23.5%	16.9%	1.0%	0.3%	0.0%	0.0%	0.0%	0.0%	100.0%
2042	643,771,236	684,328,824	656,723,902	67,604,922	40,000,000	164,943,520	0	14.6%	18.4%	18.4%	6.1%	23.6%	16.6%	1.1%	0.4%	0.0%	0.0%	0.0%	0.0%	100.0%
2043	655,359,119	696,646,743	667,893,167	68,753,576	40,000,000	169,383,035	0	14.1%	19.2%	18.3%	6.0%	23.7%	16.3%	1.2%	0.5%	0.0%	0.0%	0.0%	0.0%	100.0%
2044	667,155,583	709,186,384	679,263,478	69,922,906	40,000,000	173,822,550	0	13.5%	19.9%	18.3%	5.9%	23.8%	16.0%	1.3%	0.5%	0.0%	0.0%	0.0%	0.0%	100.0%
2045	679,164,383	721,951,739	690,838,455	71,113,284	40,000,000	178,262,066	0	13.0%	20.8%	18.3%	5.8%	23.8%	15.8%	1.4%	0.6%	0.0%	0.0%	0.0%	0.0%	100.0%
2046	691,389,342	734,946,871	702,621,782	72,325,089	40,000,000	182,701,581	0	12.5%	21.2%	18.3%	5.7%	23.8%	15.5%	1.5%	0.7%	0.0%	0.0%	0.0%	0.0%	100.0%
2047	703,834,350	748,175,914	714,617,208	73,558,706	40,000,000	187,141,096	0	12.0%	21.8%	18.4%	5.6%	23.8%	15.3%	1.6%	0.8%	0.0%	0.0%	0.0%	0.0%	100.0%
2048	716,503,369	761,643,081	728,828,553	74,814,528	40,000,000	191,580,612	0	11.6%	22.6%	18.3%	5.5%	23.7%	15.0%	1.8%	0.9%	0.0%	0.0%	0.0%	0.0%	100.0%
2049	729,400,429	775,352,656	739,259,701	76,092,955	40,000,000	196,020,127	0	11.1%	23.3%	18.3%	5.4%	23.5%	14.7%	1.9%	1.0%	0.0%	0.0%	0.0%	0.0%	100.0%
2050	742,529,637	789,309,004	751,914,610	77,394,394	40,000,000	200,459,642	0	10.6%	23.9%	18.3%	5.3%	23.4%	14.5%	2.1%	1.2%	0.0%	0.0%	0.0%	0.0%	100.0%
2051	755,895,170	803,516,566	764,797,308	78,719,259	40,000,000	204,899,158	0	10.2%	24.6%	18.3%	5.2%	23.1%	14.3%	2.3%	1.4%	0.0%	0.0%	0.0%	0.0%	100.0%
2052	769,501,283	817,979,864	777,911,894	80,067,971	40,000,000	209,338,673	0	9.8%	25.2%	18.3%	5.1%	22.9%	14.0%	2.5%	1.6%	0.0%	0.0%	0.0%	0.0%	100.0%
2053	783,352,307	832,703,502	791,262,542	81,440,960	40,000,000	213,778,188	0	9.4%	25.8%	18.4%	5.1%	22.5%	13.8%	2.7%	1.8%	0.0%	0.0%	0.0%	0.0%	100.0%
2054	797,452,648	847,692,165	804,853,502	82,838,663	40,000,000	218,217,703	0	8.9%	26.3%	18.5%	5.0%	22.1%	13.5%	2.9%	2.1%	0.0%	0.0%	0.0%	0.0%	100.0%
2055	811,806,796	862,950,624	818,689,100	84,261,524	40,000,000	222,657,219	0	8.6%	26.9%	18.6%	4.9%	21.6%	13.3%	3.2%	2.4%	0.0%	0.0%	0.0%	0.0%	100.0%
2056	826,419,318	878,483,735	832,773,738	85,709,997	40,000,000	227,096,734	0	8.2%	27.4%	18.7%	4.8%	21.1%	13.1%	3.4%	2.8%	0.0%	0.0%	0.0%	0.0%	100.0%
2057	841,294,866	894,296,442	847,111,900	87,184,542	40,000,000	231,536,249	0	7.8%	27.9%	18.8%	4.7%	20.4%	12.9%	3.7%	3.2%	0.0%	0.0%	0.0%	0.0%	100.0%
2058	856,438,173	910,393,778	861,70																	

Low Generation Case, Scenario 1: Hi

- 1.80% Elec. Sales growth
- 6.30% Transmission and Distribution Losses (% of sales)
- 14.0 millions of MWh from renewables in 2008
- 40.0 millions of MWh from Industrial On-site in 2008
- 16.9% Assumed solar PV annual growth rate
- 10.5% Assumed solar CSP annual growth rate
- 50.0 Assumed efficiency reduction, in MWh, in 2023 (AC
- 0.00% Assumed growth rate of industrial on-site MWh
- 20.00% % of total electricity consumption as wind in 2060
- 25.00% % of generation from PC w/CCS that is parasitic loa
- 16.00% % of generation from IGCC w/CCS that is parasitic
- 15.00% % of generation from NGCC w/CCS that is parasitic

TOTAL MWH OF GENERATION FROM EACH POWER PLANT TYPE - INCLUDING PARASITICS DUE TO CARBON CAPTURE

Year	TX Electrical Sales (MWh), neglects losses in T&D	TX Elec. Gen w/o Industrial On-site (MWH)	Texas total Net Generation w/o CCS parasitics (MWH)	MWh PC Coal, no CCS	MWh IGCC Coal, no CCS	MWh NGCC, no CCS	MWh NG Industrial On-Site	MWh wind and hydro	MWh Nuclear	MWh Solar CSP	MWh Solar PV	MWh PC Coal, w/CCS	MWh IGCC Coal, w/CCS	MWh NGCC, w/CCS	MWh other	Total MWh from Table	MWh Target (check)	Difference from MWh Target	Annual CO2 Emissions (MtCO2)	Target CO2 Emissions (MtCO2)
2008	351,000,000	373,113,000	413,113,000	154,917,375	0	157,968,269	40,000,000	13,987,000	41,270,000	0	13,000,000	0	0	0	4,957,356	413,113,000	413,113,000	0	259	
2009	357,318,000	379,829,034	416,495,701	158,000,000	0	153,786,185	40,000,000	18,424,323	41,270,000	0	15,192,000	0	0	0	5,000,000	416,495,701	416,495,701	0	260	
2010	363,749,724	386,665,957	419,999,290	165,000,000	0	145,120,259	40,000,000	22,861,277	42,000,000	0	17,753,000	0	0	0	5,000,000	419,999,290	419,999,290	0	262	
2011	370,297,219	393,625,944	423,625,944	170,000,000	0	139,307,398	40,000,000	27,297,800	42,000,000	0	20,746,000	0	0	0	5,000,000	423,625,944	423,625,944	0	264	
2012	376,962,569	400,711,211	427,377,877	180,000,000	0	128,619,816	40,000,000	31,383,417	42,000,000	350,400	24,244,000	0	0	0	5,000,000	427,377,877	427,377,877	0	268	246
2013	383,747,895	407,924,013	431,257,346	180,000,000	0	128,059,769	40,000,000	35,781,948	42,000,000	387,297	28,332,000	0	0	0	5,000,000	431,257,346	431,257,346	0	268	242
2014	390,655,357	415,266,645	435,266,645	180,000,000	0	127,629,553	40,000,000	40,175,904	42,000,000	428,080	33,108,000	0	0	0	5,000,000	435,266,645	435,266,645	0	268	237
2015	397,687,154	422,741,444	439,408,111	155,000,000	2,000,000	103,331,504	40,000,000	44,564,760	89,000,000	473,156	38,691,000	0	0	0	5,000,000	439,408,111	439,408,111	0	232	233
2016	404,845,523	430,350,790	443,684,124	155,000,000	4,000,000	101,168,001	40,000,000	48,947,929	89,000,000	522,980	45,214,000	0	0	0	5,000,000	443,684,124	443,684,124	0	232	228
2017	412,132,742	438,097,105	448,097,105	155,000,000	6,000,000	99,141,467	40,000,000	53,324,751	89,000,000	578,049	52,837,000	0	0	0	5,000,000	448,097,105	448,097,105	0	233	223
2018	419,551,131	445,982,853	452,649,519	155,000,000	8,000,000	97,254,366	40,000,000	57,694,490	89,000,000	638,918	61,745,000	0	0	0	5,000,000	452,649,519	452,649,519	0	234	219
2019	427,103,052	454,010,544	457,343,877	155,000,000	10,000,000	95,509,209	40,000,000	62,056,317	89,000,000	706,196	72,155,000	0	0	0	5,000,000	457,343,877	457,343,877	0	235	214
2020	434,790,907	462,182,734	462,182,734	155,000,000	12,000,000	93,908,550	40,000,000	66,409,304	89,000,000	780,559	84,321,000	0	0	0	5,000,000	462,182,734	462,182,734	0	236	210
2021	442,617,143	470,502,023	467,168,690	155,000,000	14,000,000	97,454,991	40,000,000	70,752,410	89,000,000	862,751	98,537,000	0	0	0	5,000,000	467,168,690	467,168,690	0	234	205
2022	450,584,251	478,971,059	472,304,393	148,000,000	16,000,000	98,151,179	40,000,000	75,084,465	89,000,000	953,599	115,150,000	0	0	0	5,000,000	472,304,393	472,304,393	0	234	201
2023	458,694,768	487,592,538	477,592,538	146,000,000	18,000,000	98,999,809	40,000,000	79,404,152	89,000,000	1,054,013	134,565,000	0	0	0	5,000,000	477,592,538	477,592,538	0	235	196
2024	466,951,274	496,369,204	486,369,204	144,000,000	20,000,000	103,336,959	40,000,000	83,709,992	89,000,000	1,165,001	157,252,000	0	0	0	5,000,000	486,369,204	486,369,204	0	237	192
2025	475,356,397	505,303,850	494,385,005	135,000,000	22,000,000	102,913,245	40,000,000	88,000,320	100,000,000	1,287,675	183,765,000	0	0	0	5,000,000	494,385,005	494,385,005	0	229	187
2026	483,912,812	514,399,319	502,641,286	128,000,000	24,000,000	102,730,011	40,000,000	92,273,260	109,000,000	1,423,267	214,748,000	0	0	0	5,000,000	502,641,286	502,641,286	0	224	183
2027	492,623,243	523,658,507	511,036,109	126,000,000	26,000,000	106,685,319	40,000,000	96,526,699	109,000,000	1,573,137	250,955,000	0	0	0	5,000,000	511,036,109	511,036,109	0	226	178
2028	501,490,461	533,084,360	519,583,094	124,000,000	28,000,000	110,792,788	40,000,000	100,758,252	109,000,000	1,738,789	293,266,000	0	0	0	5,000,000	519,583,094	519,583,094	0	228	174
2029	510,517,289	542,679,878	528,883,814	122,000,000	30,000,000	115,053,992	40,000,000	104,965,228	109,000,000	1,921,883	342,710,000	0	0	0	5,000,000	528,883,814	528,883,814	0	230	169
2030	519,706,600	552,448,116	537,141,158	120,000,000	37,000,000	114,471,821	40,000,000	109,144,588	109,000,000	2,124,257	400,491,000	0	0	0	5,000,000	537,141,158	537,141,158	0	234	165
2031	529,061,319	562,392,182	546,157,933	118,000,000	44,000,000	114,049,081	40,000,000	113,292,896	109,000,000	2,347,942	468,014,000	0	0	0	5,000,000	546,157,933	546,157,933	0	238	160
2032	538,584,423	572,515,242	555,337,010	116,000,000	51,000,000	113,788,643	40,000,000	117,406,266	109,000,000	2,595,180	546,921,000	0	0	0	5,000,000	555,337,010	555,337,010	0	242	155
2033	548,276,943	582,820,516	564,681,311	114,000,000	58,000,000	113,693,429	40,000,000	121,480,298	109,000,000	2,868,453	639,132,000	0	0	0	5,000,000	564,681,311	564,681,311	0	246	151
2034	558,147,964	593,311,285	574,193,809	112,000,000	65,000,000	113,766,411	40,000,000	125,510,008	109,000,000	3,170,501	746,889,000	0	0	0	5,000,000	574,193,809	574,193,809	0	251	146
2035	568,194,627	603,990,888	583,877,532	110,000,000	72,000,000	114,010,619	40,000,000	129,489,744	109,000,000	3,504,354	872,815,000	0	0	0	5,000,000	583,877,532	583,877,532	0	255	142
2036	578,422,130	614,862,724	593,735,562	108,000,000	79,000,000	114,429,134	40,000,000	133,413,094	109,000,000	3,873,363	1,019,972,000	0	0	0	5,000,000	593,735,562	593,735,562	0	260	137
2037	588,833,728	625,930,253	603,771,037	106,000,000	86,000,000	115,025,093	40,000,000	137,272,777	109,000,000	4,281,228	1,191,939,000	0	0	0	5,000,000	603,771,037	603,771,037	0	264	133
2038	599,432,736	637,196,998	613,987,150	104,000,000	93,000,000	115,801,691	40,000,000	141,060,518	109,000,000	4,732,041	1,392,900,000	0	0	0	5,000,000	613,987,150	613,987,150	0	269	128
2039	610,222,525	648,666,544	624,387,153	102,000,000	100,000,000	116,762,179	40,000,000	144,766,906	109,000,000	5,230,325	1,627,742,000	0	0	0	5,000,000	624,387,153	624,387,153	0	274	124
2040	621,206,530	660,342,542	634,974,356	100,000,000	107,000,000	117,909,867	40,000,000	148,381,231	109,000,000	5,781,078	1,902,180,000	0	0	0	5,000,000	634,974,356	634,974,356	0	279	119
2041	632,388,248	672,228,707	645,752,129	98,000,000	114,000,000	119,248,124	40,000,000	151,891,291	109,000,000	6,389,826	2,222,887,000	0	0	0	5,000,000	645,752,129	645,752,129	0	284	115
2042	643,771,236	684,328,824	656,723,902	96,000,000	121,000,000	120,780,382	40,000,000	155,283,179	109,000,000	7,062,675	2,597,666,000	0	0	0	5,000,000	656,723,902	656,723,902	0	289	110
2043	655,359,119	696,646,743	667,893,167	94,000,000	128,000,000	122,510,131	40,000,000	158,541,028	109,000,000	7,806,374	3,035,633,000	0	0	0	5,000,000	667,893,167	667,893,167	0	294	106
2044	667,156,583	709,186,384	679,263,478	92,000,000	135,000,000	124,440,928	40,000,000	161,846,725	109,000,000	8,628,385	3,547,440,000	0	0	0	5,000,000	679,263,478	679,263,478	0	299	101
2045	679,164,383	721,951,739	690,838,455	90,000,000	142,000,000	126,576,389	40,000,000	164,579,573	109,000,000	9,536,954	4,145,539,000	0	0	0	5,000,000	690,838,455	690,838,455	0	305	97
2046	691,389,342	734,946,871	702,621,782	88,000,000	149,000,000	128,920,201	40,000,000	167,315,909	109,000,000	10,541,196	4,844,477,000	0	0	0	5,000,000	702,621,782	702,621,782	0	310	92
2047	703,834,350	748,175,914	714,617,208	86,000,000	156,000,000	131,476,112	40,000,000	169,828,657	109,000,000	11,651,184	5,661,255,000	0	0	0	5,000,000	714,617,208	714,617,208	0	316	87
2048	716,503,369	761,643,081	726,828,553	84,000,000	164,000,000	133,247,941	40,000,000	172,086,815	109,000,000	12,878,053	6,615,743,000	0	0	0	5,000,000	726,828,553	726,828,553	0	322	83
2049	729,400,429	775,352,656	739,259,701	82,000,000	172,000,000	135,239,574	40,000,000	174,054,857	109,000,000	14,234,112	7,731,157,000	0	0	0	5,000,000	739,259,701	739,259,701	0	328	78
2050	742,529,637	789,309,004	751,914,610	80,000,000	180,000,000	137,454,968	40,000,000	175,692,047	109,000,000	15,732,964	9,034,630,000	0	0	0	5,000,000	751,914,610	751,914,610	0	335	74
2051																				

Business as Usual Generation Case, Scenario 1: High NG price with no Carbon Price

1.80%	Elec. Sales growth	CO2
6.30%	Transmission and Distribution Losses (% of sales)	Mt/MWh
14.0	millions of MWh from renewables in 2008	PC
40.0	millions of MWh from Industrial On-site in 2008	PC w/CCS
17.1%	Assumed solar PV annual growth rate	IGCC
10.8%	Assumed solar CSP annual growth rate	IGCC w/CCS
0.0	Assumed efficiency reduction, in MWh, in 2023 (ACEEE)	NGCC
0.00%	Assumed growth rate of industrial on-site MWh	NGCC w/CCS
20.00%	% of total electricity consumption as wind in 2060	CHP (Ind.)
25.00%	% of PC w/CCS that is parasitic load for carbon capture	
16.00%	% of IGCC w/CCS that is parasitic load for carbon capture	
15.00%	% of NGCC w/CCS that is parasitic load for carbon capture	

Year	TX Electrical Sales (MWh), neglects losses in T&D	TX Elec. Gen - w/o Industrial On-site (MWh)	Texas total Net Generation w/o CCS parasitics (MWh)	TX Total MWh from efficiency	TX Total MWh from Industrial On-site	TX Total MWh from renewables	TX Total MWh Parasitics due to CCS	PERCENTAGES OF TOTAL GENERATION FROM EACH POWER PLANT TYPE													Total % MWh	MWh PC Coal, no CCS
								% MWh PC Coal, no CCS	% MWh IGCC Coal, no CCS	% MWh NGCC, no CCS	% MWh NG Industrial On-site	% MWh Wind and Hydro	% Nuclear	% MWh Solar CSP	% MWh Solar PV	% MWh Coal, w/CCS	% MWh IGCC Coal, w/CCS	% MWh NGCC, w/CCS	% MWh other			
2008	351,000,000	373,113,000	413,113,000	0	40,000,000	14,000,000	0	37.5%	0.0%	38.1%	9.7%	3.4%	10.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.4%	100.0%	154,917,375	
2009	357,318,000	379,829,034	419,829,034	0	40,000,000	18,982,529	0	37.6%	0.0%	37.3%	9.5%	4.5%	9.8%	0.0%	0.0%	0.0%	0.0%	0.0%	1.2%	100.0%	158,000,000	
2010	363,749,724	386,665,957	426,665,957	0	40,000,000	23,965,058	0	38.7%	0.0%	35.3%	9.4%	5.6%	9.8%	0.0%	0.0%	0.0%	0.0%	0.0%	1.2%	100.0%	165,000,000	
2011	370,297,219	393,625,944	433,625,944	0	40,000,000	28,947,588	0	39.2%	0.0%	34.1%	9.2%	6.7%	9.7%	0.0%	0.0%	0.0%	0.0%	0.0%	1.2%	100.0%	170,000,000	
2012	376,962,569	400,711,211	440,711,211	0	40,000,000	33,930,117	0	40.8%	0.0%	31.7%	9.1%	7.6%	9.5%	0.1%	0.0%	0.0%	0.0%	0.0%	1.1%	100.0%	180,000,000	
2013	383,747,895	407,924,013	447,924,013	0	40,000,000	38,912,646	0	40.2%	0.0%	31.7%	8.9%	8.6%	9.4%	0.1%	0.0%	0.0%	0.0%	0.0%	1.1%	100.0%	180,000,000	
2014	390,655,357	415,266,645	455,266,645	0	40,000,000	43,895,175	0	39.5%	0.0%	31.7%	8.8%	9.5%	9.2%	0.1%	0.0%	0.0%	0.0%	0.0%	1.1%	100.0%	180,000,000	
2015	397,687,154	422,741,444	462,741,444	0	40,000,000	48,877,704	0	33.5%	0.0%	27.0%	8.6%	10.5%	19.2%	0.1%	0.0%	0.0%	0.0%	0.0%	1.1%	100.0%	155,000,000	
2016	404,845,523	430,350,790	470,350,790	0	40,000,000	53,860,234	0	33.0%	0.0%	27.1%	8.5%	11.3%	18.9%	0.1%	0.0%	0.0%	0.0%	0.0%	1.1%	100.0%	155,000,000	
2017	412,132,742	438,097,105	478,097,105	0	40,000,000	58,842,763	0	33.0%	0.4%	26.2%	8.4%	12.2%	18.6%	0.1%	0.0%	0.0%	0.0%	0.0%	1.0%	100.0%	158,000,000	
2018	419,551,131	445,982,853	485,982,853	0	40,000,000	63,825,292	0	33.1%	1.0%	25.1%	8.2%	13.0%	18.3%	0.1%	0.0%	0.0%	0.0%	0.0%	1.0%	100.0%	161,000,000	
2019	427,103,052	454,010,544	494,010,544	0	40,000,000	68,807,821	0	33.2%	1.6%	24.1%	8.1%	13.8%	18.0%	0.1%	0.0%	0.0%	0.0%	0.0%	1.0%	100.0%	164,000,000	
2020	434,790,907	462,182,734	502,182,734	0	40,000,000	73,790,350	0	33.3%	2.2%	23.2%	8.0%	14.5%	17.7%	0.2%	0.0%	0.0%	0.0%	0.0%	1.0%	100.0%	167,000,000	
2021	442,617,143	470,502,023	510,502,023	0	40,000,000	78,772,880	0	33.3%	2.7%	22.3%	7.8%	15.2%	17.4%	0.2%	0.0%	0.0%	0.0%	0.0%	1.0%	100.0%	170,000,000	
2022	450,584,251	478,971,059	518,971,059	0	40,000,000	83,755,409	0	33.3%	3.3%	21.4%	7.7%	15.9%	17.1%	0.2%	0.0%	0.0%	0.0%	0.0%	1.0%	100.0%	173,000,000	
2023	458,694,768	487,592,538	527,592,538	0	40,000,000	88,737,938	0	33.4%	3.8%	20.6%	7.6%	16.6%	16.9%	0.2%	0.0%	0.0%	0.0%	0.0%	0.9%	100.0%	176,000,000	
2024	466,951,274	496,369,204	536,369,204	0	40,000,000	93,720,467	0	33.4%	4.3%	19.9%	7.5%	17.2%	16.6%	0.2%	0.0%	0.0%	0.0%	0.0%	0.9%	100.0%	179,000,000	
2025	475,356,397	505,303,850	545,303,850	0	40,000,000	98,702,996	0	32.1%	4.8%	18.4%	7.3%	17.8%	16.3%	0.2%	0.0%	0.0%	0.0%	0.0%	0.9%	100.0%	175,000,000	
2026	483,912,812	514,399,319	554,399,319	0	40,000,000	103,685,525	0	31.6%	5.2%	16.7%	7.2%	18.4%	19.7%	0.3%	0.0%	0.0%	0.0%	0.0%	0.9%	100.0%	175,000,000	
2027	492,623,243	523,658,507	563,658,507	0	40,000,000	108,668,055	0	31.0%	5.7%	16.7%	7.1%	18.9%	19.3%	0.3%	0.0%	0.0%	0.0%	0.0%	0.9%	100.0%	175,000,000	
2028	501,490,461	533,084,360	573,084,360	0	40,000,000	113,650,584	0	30.5%	6.1%	16.7%	7.0%	19.5%	19.0%	0.3%	0.1%	0.0%	0.0%	0.0%	0.9%	100.0%	175,000,000	
2029	510,517,289	542,679,878	582,679,878	0	40,000,000	118,633,113	0	30.0%	6.5%	16.7%	6.9%	20.0%	18.7%	0.3%	0.1%	0.0%	0.0%	0.0%	0.9%	100.0%	175,000,000	
2030	519,706,600	552,448,116	592,448,116	0	40,000,000	123,615,642	0	29.5%	6.9%	16.7%	6.8%	20.4%	18.4%	0.4%	0.1%	0.0%	0.0%	0.0%	0.8%	100.0%	175,000,000	
2031	529,061,319	562,392,182	602,392,182	0	40,000,000	128,598,171	0	28.6%	7.3%	17.2%	6.6%	20.9%	18.1%	0.4%	0.1%	0.0%	0.0%	0.0%	0.8%	100.0%	172,000,000	
2032	538,584,423	572,515,242	612,515,242	0	40,000,000	133,580,701	0	27.6%	7.7%	17.8%	6.5%	21.3%	17.8%	0.4%	0.1%	0.0%	0.0%	0.0%	0.8%	100.0%	169,000,000	
2033	548,278,943	582,820,516	622,820,516	0	40,000,000	138,563,230	0	26.7%	8.0%	18.3%	6.4%	21.7%	17.5%	0.5%	0.1%	0.0%	0.0%	0.0%	0.8%	100.0%	166,000,000	
2034	558,147,964	593,311,285	633,311,285	0	40,000,000	143,545,759	0	25.7%	8.4%	18.9%	6.3%	22.0%	17.2%	0.5%	0.1%	0.0%	0.0%	0.0%	0.8%	100.0%	163,000,000	
2035	568,194,627	603,990,888	643,990,888	0	40,000,000	148,528,288	0	24.8%	8.7%	19.5%	6.2%	22.3%	16.9%	0.6%	0.1%	0.0%	0.0%	0.0%	0.8%	100.0%	160,000,000	
2036	578,422,130	614,862,724	654,862,724	0	40,000,000	153,510,817	0	24.0%	9.0%	20.1%	6.1%	22.7%	16.6%	0.6%	0.2%	0.0%	0.0%	0.0%	0.8%	100.0%	157,000,000	
2037	588,833,728	625,930,253	665,930,253	0	40,000,000	158,493,347	0	23.1%	9.3%	20.6%	6.0%	22.9%	16.4%	0.7%	0.2%	0.0%	0.0%	0.0%	0.8%	100.0%	154,000,000	
2038	599,432,736	637,196,998	677,196,998	0	40,000,000	163,475,876	0	22.3%	10.3%	20.5%	5.9%	23.2%	16.1%	0.7%	0.2%	0.0%	0.0%	0.0%	0.7%	100.0%	151,000,000	
2039	610,222,525	648,666,544	688,666,544	0	40,000,000	168,458,405	0	21.5%	11.5%	20.2%	5.8%	23.4%	15.8%	0.8%	0.3%	0.0%	0.0%	0.0%	0.7%	100.0%	148,000,000	
2040	621,206,530	660,342,542	700,342,542	0	40,000,000	173,440,934	0	20.7%	12.6%	20.0%	5.7%	23.6%	15.6%	0.9%	0.3%	0.0%	0.0%	0.0%	0.7%	100.0%	145,000,000	
2041	632,388,248	672,228,707	712,228,707	0	40,000,000	178,423,463	0	19.9%	13.6%	19.8%	5.6%	23.8%	15.3%	1.0%	0.3%	0.0%	0.0%	0.0%	0.7%	100.0%	142,000,000	
2042	643,771,236	684,328,824	724,328,824	0	40,000,000	183,405,993	0	19.2%	14.6%	19.6%	5.5%	23.9%	15.0%	1.0%	0.4%	0.0%	0.0%	0.0%	0.7%	100.0%	139,000,000	
2043	655,359,119	696,646,743	736,646,743	0	40,000,000	188,388,522	0	18.5%	15.6%	19.4%	5.4%	24.0%	14.8%	1.1%	0.4%	0.0%	0.0%	0.0%	0.7%	100.0%	136,000,000	
2044	667,155,583	709,186,384	749,186,384	0	40,000,000	193,371,051	0	17.8%	16.6%	19.3%	5.3%	24.1%	14.5%	1.2%	0.5%	0.0%	0.0%	0.0%	0.7%	100.0%	133,000,000	
2045	679,164,383	721,951,739	761,951,739	0	40,000,000	198,353,580	0	17.1%	17.5%	19.2%	5.2%	24.1%	14.3%	1.3%	0.6%	0.0%	0.0%	0.0%	0.7%	100.0%	130,000,000	
2046	691,389,342	734,946,871	774,946,871	0	40,000,000	203,336,109	0	16.4%	18.3%	19.2%	5.2%	24.1%	14.1%	1.5%	0.7%	0.0%	0.0%	0.0%	0.6%	100.0%	127,000,000	
2047	703,834,350	748,175,914	788,175,914	0	40,000,000	208,318,639	0	15.7%	19.2%	19.1%	5.1%	24.1%	13.8%	1.6%	0.8%	0.0%	0.0%	0.0%	0.6%	100.0%	124,000,000	
2048	716,503,369	761,643,081	801,643,081	0	40,000,000	213,301,168	0	15.0%	20.0%	19.1%	5.0%	24.0%	13.6%	1.7%	0.9%	0.0%	0.0%	0.0%	0.6%	100.0%	121,000,000	
2049	729,400,429	775,352,656	815,352,656	0	40,000,000	218,283,697	0	14.5%	20.7%	19.1%	4.9%	23.8%	13.4%	1.9%	1.0%	0.0%	0.0%	0.0%	0.6%	100.0%	118,000,000	
2050	742,529,637	789,309,004	829,309,004	0	40,000,000	223,266,226	0	13.9%	21.5%	19.2%	4.8%	23.7%	13.1%	2.1%	1.2%	0.0%	0.0%	0.0%	0.6%	100.0%	115,000,000	
2051	755,895,170	803,516,566	843,516,566	0	40,000,000	228,248,755	0	13.3%	22.2%	19.2%	4.7%	23.4%	12.9%	2.3%	1.4%	0.0%	0.0%	0.0%	0.6%	100.0%	112,000,000	
2052	769,501,283	817,979,864	857,979,864	0	40,000,000	233,231,284	0	12.7%	22.8%	19.3%	4.7%	23.2%	12.7%	2.5%	1.6%	0.0%	0.0%	0.0%	0.6%	100.0%	109,000,000	
2053	783,352,307	832,703,502	872,703,502	0	40,000,000	238,213,814	0	12.1%	23.5%	19.4%	4.6%	22.8%	12.5%	2.7%	1.8%	0.0%	0.0%	0.0%	0.6%	100.0%	106,000,000	
2054	797,452,648	847,692,165	887,692,165	0	40,000,000	243,196,343	0	11.6%	24.1%	19.5%	4.5%	22.4%	12.3%	2.9%	2.1%	0.0%	0.0%	0.0%	0.6%	100.0%	103,000,000	
2055	811,806,796	862,950,624	902,950,624	0	40,000,000	248,178,872	0	11.1%	24.7%	19.7%	4.4%	21.9%	12.1%	3.2%	2.4%	0.0%	0.0%	0.0%	0.6%	100.0%	100,000,000	
2056	826,419,318	878,483,735	918,483,735	0	40,000,000	253,161,401	0	10.6%	25.3%	19.9%	4.4%	21.4%	11.9%	3.4%	2.8%	0.0%	0.0%	0.0%	0.5%	1		

Business as Usual Generation Case, S

- 1.80% Elec. Sales growth
- 6.30% Transmission and Distribution Losses (% of sales)
- 14.0 millions of MWh from renewables in 2008
- 40.0 millions of MWh from Industrial On-site in 2008
- 17.1% Assumed solar PV annual growth rate
- 10.8% Assumed solar CSP annual growth rate
- 0.0 Assumed efficiency reduction, in MWh, in 2023 (ACEE)
- 0.00% Assumed growth rate of industrial on-site MWh
- 20.00% % of total electricity consumption as wind in 2060
- 25.00% % of PC w/CCS that is parasitic load for carbon captur
- 16.00% % of IGCC w/CCS that is parasitic load for carbon cap
- 15.00% % of NGCC w/CCS that is parasitic load for carbon cap

Year	TOTAL MWH OF GENERATION FROM EACH POWER PLANT TYPE - INCLUDING PARASITICS DUE TO CARBON CAPTURE															Total MWh from Table	MWh Target (check)	Difference from MWh Target	Annual CO2 Emissions (MtCO2)	Target CO2 Emissions (MtCO2)	Total TWh w/o parasitics
	TX Electrical Sales (MWh), neglects losses in T&D	TX Elec. Gen - w/o Industrial On-site (MWh)	Texas total Net Generation w/o CCS parasitics (MWh)	MWh IGCC Coal, no CCS	MWh NGCC, no CCS	MWh NG Industrial On-Site	MWh Wind and Hydro	MWh Nuclear	MWh Solar CSP	MWh Solar PV	MWh PC Coal, w/CCS	MWh IGCC Coal, w/CCS	MWh NGCC, w/CCS	MWh other							
2008	351,000,000	373,113,000	413,113,000	0	157,224,666	40,000,000	13,987,000	41,270,000	0	13,000	0	0	5,148,959	412,561,000	413,113,000	-552,000	258	413			
2009	357,318,000	379,829,034	419,829,034	0	156,576,505	40,000,000	18,967,306	41,270,000	0	15,223	0	0	5,000,000	419,829,034	419,829,034	0	261	420			
2010	363,749,724	386,665,957	426,665,957	0	150,700,898	40,000,000	23,947,232	42,000,000	0	17,826	0	0	5,000,000	426,665,957	426,665,957	0	265	427			
2011	370,297,219	393,625,944	433,625,944	0	147,678,566	40,000,000	28,926,713	42,000,000	0	20,874	0	0	5,000,000	433,625,944	433,625,944	0	268	434			
2012	376,962,569	400,711,211	440,711,211	0	139,781,094	40,000,000	33,555,273	42,000,000	350,400	24,444	0	0	5,000,000	440,711,211	440,711,211	0	274	441			
2013	383,747,895	407,924,013	447,924,013	0	142,011,367	40,000,000	38,495,853	42,000,000	388,170	28,624	0	0	5,000,000	447,924,013	447,924,013	0	275	448			
2014	390,655,357	415,266,645	455,266,645	0	144,371,470	40,000,000	43,431,646	42,000,000	430,010	33,519	0	0	5,000,000	455,266,645	455,266,645	0	277	455			
2015	397,687,154	422,741,444	462,741,444	0	124,863,740	40,000,000	48,362,093	89,000,000	476,361	39,250	0	0	5,000,000	462,741,444	462,741,444	0	241	463			
2016	404,845,523	430,350,790	470,350,790	0	127,490,557	40,000,000	53,286,563	89,000,000	527,708	45,962	0	0	5,000,000	470,350,790	470,350,790	0	243	470			
2017	412,132,742	438,097,105	478,097,105	2,000,000	125,254,342	40,000,000	58,204,351	89,000,000	584,590	53,821	0	0	5,000,000	478,097,105	478,097,105	0	246	478			
2018	419,551,131	445,982,853	485,982,853	5,000,000	122,157,561	40,000,000	63,114,664	89,000,000	647,603	63,025	0	0	5,000,000	485,982,853	485,982,853	0	250	486			
2019	427,103,052	454,010,544	494,010,544	8,000,000	119,202,723	40,000,000	68,016,611	89,000,000	717,408	73,802	0	0	5,000,000	494,010,544	494,010,544	0	254	494			
2020	434,790,907	462,182,734	502,182,734	11,000,000	116,392,383	40,000,000	72,909,191	89,000,000	794,737	86,422	0	0	5,000,000	502,182,734	502,182,734	0	259	502			
2021	442,617,143	470,502,023	510,502,023	14,000,000	113,729,143	40,000,000	77,791,277	89,000,000	880,402	101,201	0	0	5,000,000	510,502,023	510,502,023	0	263	511			
2022	450,584,251	478,971,059	518,971,059	17,000,000	111,215,651	40,000,000	82,661,602	89,000,000	975,301	118,506	0	0	5,000,000	518,971,059	518,971,059	0	267	519			
2023	458,694,768	487,592,538	527,592,538	20,000,000	108,854,600	40,000,000	87,518,739	89,000,000	1,080,428	138,770	0	0	5,000,000	527,592,538	527,592,538	0	272	528			
2024	466,951,274	496,369,204	536,369,204	23,000,000	106,648,737	40,000,000	92,361,079	89,000,000	1,196,888	162,500	0	0	5,000,000	536,369,204	536,369,204	0	276	536			
2025	475,356,397	505,303,850	545,303,850	26,000,000	100,600,853	40,000,000	97,186,808	100,000,000	1,325,900	190,288	0	0	5,000,000	545,303,850	545,303,850	0	272	545			
2026	483,912,812	514,399,319	554,399,319	29,000,000	92,713,794	40,000,000	101,993,880	109,000,000	1,468,819	222,827	0	0	5,000,000	554,399,319	554,399,319	0	270	554			
2027	492,623,243	523,658,507	563,658,507	32,000,000	93,990,452	40,000,000	106,779,982	109,000,000	1,627,143	260,930	0	0	5,000,000	563,658,507	563,658,507	0	274	564			
2028	501,490,461	533,084,360	573,084,360	35,000,000	95,433,776	40,000,000	111,542,502	109,000,000	1,802,533	305,549	0	0	5,000,000	573,084,360	573,084,360	0	277	573			
2029	510,517,289	542,679,878	582,679,878	38,000,000	97,046,765	40,000,000	116,278,487	109,000,000	1,996,828	357,798	0	0	5,000,000	582,679,878	582,679,878	0	281	583			
2030	519,706,600	552,448,116	592,448,116	41,000,000	98,832,474	40,000,000	120,984,595	109,000,000	2,212,066	419,982	0	0	5,000,000	592,448,116	592,448,116	0	284	592			
2031	529,061,319	562,392,182	602,392,182	44,000,000	103,794,011	40,000,000	125,657,400	109,000,000	2,450,504	498,628	0	0	5,000,000	602,392,182	602,392,182	0	287	600			
2032	538,584,423	572,515,242	612,515,242	47,000,000	108,934,541	40,000,000	130,291,532	109,000,000	2,714,644	574,525	0	0	5,000,000	612,515,242	612,515,242	0	289	613			
2033	548,278,943	582,820,516	622,820,516	50,000,000	114,257,286	40,000,000	134,883,206	109,000,000	3,007,256	672,769	0	0	5,000,000	622,820,516	622,820,516	0	292	623			
2034	558,147,964	593,311,285	633,311,285	53,000,000	119,765,526	40,000,000	139,426,539	109,000,000	3,331,408	787,512	0	0	5,000,000	633,311,285	633,311,285	0	294	633			
2035	568,194,627	603,990,888	643,990,888	56,000,000	125,462,600	40,000,000	143,915,260	109,000,000	3,690,500	922,828	0	0	5,000,000	643,990,888	643,990,888	0	297	644			
2036	578,422,130	614,862,724	654,862,724	59,000,000	131,351,907	40,000,000	148,342,238	109,000,000	4,088,299	1,080,280	0	0	5,000,000	654,862,724	654,862,724	0	300	655			
2037	588,833,728	625,930,253	665,930,253	62,000,000	137,436,907	40,000,000	152,699,362	109,000,000	4,528,977	1,265,008	0	0	5,000,000	665,930,253	665,930,253	0	303	666			
2038	599,432,736	637,196,998	677,196,998	70,000,000	138,721,122	40,000,000	156,977,396	109,000,000	5,017,155	1,481,324	0	0	5,000,000	677,196,998	677,196,998	0	308	677			
2039	610,222,525	648,866,544	688,866,544	79,000,000	139,208,139	40,000,000	161,165,819	109,000,000	5,557,955	1,734,631	0	0	5,000,000	688,866,544	688,866,544	0	313	689			
2040	621,206,530	660,342,542	700,342,542	88,000,000	139,901,608	40,000,000	165,252,635	109,000,000	6,157,046	2,031,253	0	0	5,000,000	700,342,542	700,342,542	0	318	700			
2041	632,388,248	672,228,707	712,228,707	97,000,000	140,805,244	40,000,000	169,224,152	109,000,000	6,820,714	2,378,597	0	0	5,000,000	712,228,707	712,228,707	0	324	712			
2042	643,771,236	684,328,824	724,328,824	106,000,000	141,922,832	40,000,000	173,064,736	109,000,000	7,555,919	2,785,337	0	0	5,000,000	724,328,824	724,328,824	0	330	724			
2043	655,359,119	696,646,743	736,646,743	115,000,000	143,258,212	40,000,000	176,756,520	109,000,000	8,370,372	3,261,630	0	0	5,000,000	736,646,743	736,646,743	0	335	737			
2044	667,155,583	709,186,384	749,186,384	124,000,000	144,815,333	40,000,000	180,279,068	109,000,000	9,272,614	3,819,369	0	0	5,000,000	749,186,384	749,186,384	0	341	749			
2045	679,164,383	721,951,739	761,951,739	133,000,000	146,598,159	40,000,000	183,608,990	109,000,000	10,272,109	4,472,481	0	0	5,000,000	761,951,739	761,951,739	0	347	762			
2046	691,389,342	734,946,871	774,946,871	142,000,000	148,610,761	40,000,000	186,719,494	109,000,000	11,379,340	5,237,275	0	0	5,000,000	774,946,871	774,946,871	0	354	775			
2047	703,834,350	748,175,914	788,175,914	151,000,000	150,857,276	40,000,000	189,579,871	109,000,000	12,605,919	6,132,849	0	0	5,000,000	788,175,914	788,175,914	0	360	787			
2048	716,503,369	761,643,081	801,643,081	160,000,000	153,341,913	40,000,000	192,154,891	109,000,000	13,964,711	7,181,566	0	0	5,000,000	801,643,081	801,643,081	0	366	808			
2049	729,400,429	775,352,656	815,352,656	169,000,000	156,068,959	40,000,000	194,404,116	109,000,000	15,469,967	8,409,614	0	0	5,000,000	815,352,656	815,352,656	0	373	819			
2050	742,529,637	789,309,004	829,309,004	178,000,000	159,042,778	40,000,000	196,281,093	109,000,000	17,137,475	9,847,658	0	0	5,000,000	829,309,004	829,309,004	0	379	825			
2051	755,895,170	803,516,566	843,516,566	187,000,000	162,267,811	40,000,000	197,732,425	109,000,000	18,984,723	11,531,607	0	0	5,000,000	843,516,566	843,516,566	0	386	844			
2052	769,501,283	817,979,864	857,979,864	196,000,000	165,748,500	40,000,000	198,696,686	109,000,000	21,031,087	13,503,512	0	0	5,000,000	857,979,864	857,979,864	0	393	848			
2053	783,352,307	832,703,502	872,703,502	205,000,000	169,489,688	40,000,000	199,103,173	109,000,000	23,298,028	15,812,613	0	0	5,000,000	872,703,502	872,703,502	0	400	873			
2054	797,452,648	847,692,165	887,692,165	214,000,000	173,495,822	40,000,000	198,870,451	109,000,000	25,809,322	18,516,569	0	0	5,000,000	887,692,165	887,692,165	0	408	888			
2055	811,806,796	862,950,624	902,950,624	223,000,000	177,771,752	40,000,00															

Low Generation Case, Scenario 2: High NG price with Carbon Price

1.80%	Elec. Sales growth	CO2
6.30%	Transmission and Distribution Losses (% of sales)	Mt/MWh
14.0	millions of MWh from renewables in 2008	PC
40.0	millions of MWh from Industrial On-site in 2008	PC w/CCS
16.9%	Assumed solar PV annual growth rate	IGCC
10.5%	Assumed solar CSP annual growth rate	IGCC w/CCS
50.0	Assumed efficiency reduction, in MWh, in 2023 (ACEEE)	NGCC
0.00%	Assumed growth rate of industrial on-site MWh	NGCC w/CCS
20.00%	% of total electricity consumption as wind in 2060	CHP (Ind.)
25.00%	% of PC w/CCS that is parasitic load for carbon capture	
16.00%	% of IGCC w/CCS that is parasitic load for carbon capture	
15.00%	% of NGCC w/CCS that is parasitic load for carbon capture	

PERCENTAGES OF TOTAL GENERATION FROM EACH POWER PLANT TYPE

Year	TX Electrical Sales (MWh), neglects losses in T&D	TX Elec. Gen w/o Industrial On-site (MWh)	Texas total Consumption w/o CCS parasitics (MWh)	TX Total MWh from efficiency	TX Total MWh from Industrial On-site	TX Total MWh Generated from renewables	TX Total MWh Parasitics due to CCS	% MWh PC Coal, no CCS	% MWh IGCC Coal, no CCS	% MWh NGCC, no CCS	% MWh Industrial On-site	% MWh wind and hydro	% MWh Nuclear	% MWh Solar CSP	% MWh Solar PV	% MWh PC Coal, w/CCS	% MWh IGCC Coal, w/CCS	% MWh NGCC, w/CCS	% MWh other	Total % MWh
2008	351,000,000	373,113,000	413,113,000	0	40,000,000	14,000,000	0	37.5%	0.0%	38.2%	9.7%	3.4%	10.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.2%	100.0%
2009	357,318,000	379,829,034	416,495,701	3,333,333	40,000,000	18,439,515	0	37.9%	0.0%	36.9%	9.6%	4.4%	9.9%	0.0%	0.0%	0.0%	0.0%	0.0%	1.2%	100.0%
2010	363,749,724	386,665,957	419,999,290	6,666,667	40,000,000	22,879,031	0	39.3%	0.0%	34.6%	9.5%	5.4%	10.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.2%	100.0%
2011	370,297,219	393,625,944	423,625,944	10,000,000	40,000,000	27,318,546	0	40.1%	0.0%	32.9%	9.4%	6.4%	9.9%	0.0%	0.0%	0.0%	0.0%	0.0%	1.2%	100.0%
2012	376,962,569	400,711,211	427,377,877	13,333,333	40,000,000	31,758,061	0	42.1%	0.0%	30.1%	9.4%	7.3%	9.8%	0.1%	0.0%	0.0%	0.0%	0.0%	1.2%	100.0%
2013	383,747,895	407,924,013	431,257,346	16,666,667	40,000,000	36,197,576	0	41.7%	0.0%	29.7%	9.3%	8.3%	9.7%	0.1%	0.0%	0.0%	0.0%	0.0%	1.2%	100.0%
2014	390,655,357	415,266,645	435,266,645	20,000,000	40,000,000	40,637,092	0	41.4%	0.0%	29.3%	9.2%	9.2%	9.6%	0.1%	0.0%	0.0%	0.0%	0.0%	1.1%	100.0%
2015	397,687,154	422,741,444	439,408,111	23,333,333	40,000,000	45,076,607	4,100,000	31.6%	0.0%	23.5%	9.0%	10.0%	20.1%	0.1%	0.0%	2.3%	2.3%	0.0%	1.1%	100.0%
2016	404,845,523	430,350,790	443,684,124	26,666,667	40,000,000	49,516,122	4,100,000	26.8%	0.0%	27.8%	8.9%	10.9%	19.9%	0.1%	0.0%	2.2%	2.2%	0.0%	1.1%	100.0%
2017	412,132,742	438,097,105	448,097,105	30,000,000	40,000,000	53,955,638	4,100,000	26.5%	0.0%	27.5%	8.8%	11.8%	19.7%	0.1%	0.0%	2.2%	2.2%	0.0%	1.1%	100.0%
2018	419,551,131	445,982,853	452,649,519	33,333,333	40,000,000	58,395,153	4,100,000	26.3%	0.0%	27.2%	8.8%	12.6%	19.5%	0.1%	0.0%	2.2%	2.2%	0.0%	1.1%	100.0%
2019	427,103,052	454,010,544	457,343,877	36,666,667	40,000,000	62,834,668	4,612,500	25.4%	0.0%	25.8%	8.7%	13.4%	20.6%	0.2%	0.0%	2.4%	2.4%	0.0%	1.1%	100.0%
2020	434,790,907	462,182,734	462,182,734	40,000,000	40,000,000	67,274,183	5,125,000	24.6%	0.0%	27.0%	8.6%	14.2%	19.0%	0.2%	0.0%	2.7%	2.7%	0.0%	1.1%	100.0%
2021	442,617,143	470,502,023	467,168,690	43,333,333	40,000,000	71,713,699	6,560,000	23.7%	0.0%	26.1%	8.4%	14.9%	18.8%	0.2%	0.0%	3.4%	3.4%	0.0%	1.1%	100.0%
2022	450,584,251	478,971,059	472,304,393	46,666,667	40,000,000	76,153,214	9,020,000	22.9%	0.0%	24.3%	8.3%	15.6%	18.5%	0.2%	0.0%	4.6%	4.6%	0.0%	1.0%	100.0%
2023	458,694,768	487,592,538	477,592,538	50,000,000	40,000,000	80,592,729	11,480,000	22.0%	0.0%	22.7%	8.2%	16.2%	18.2%	0.2%	0.0%	5.7%	5.7%	0.0%	1.0%	100.0%
2024	466,951,274	496,369,204	486,369,204	50,000,000	40,000,000	85,032,245	13,940,000	21.0%	0.0%	21.6%	8.0%	16.7%	17.8%	0.2%	0.0%	6.8%	6.8%	0.0%	1.0%	100.0%
2025	475,356,397	505,303,850	494,385,005	50,918,845	40,000,000	89,471,760	16,400,000	19.6%	0.0%	21.0%	7.8%	17.2%	17.4%	0.3%	0.0%	7.8%	7.8%	0.0%	1.0%	100.0%
2026	483,912,812	514,399,319	502,641,286	51,758,033	40,000,000	93,911,275	18,860,000	18.2%	0.0%	20.4%	7.7%	17.7%	17.1%	0.3%	0.0%	8.8%	8.8%	0.0%	1.0%	100.0%
2027	492,623,243	523,658,507	511,036,109	52,622,397	40,000,000	98,350,791	22,070,000	16.9%	0.0%	19.1%	7.5%	18.1%	16.7%	0.3%	0.0%	9.8%	9.8%	0.9%	0.9%	100.0%
2028	501,490,461	533,084,360	519,583,094	53,501,266	40,000,000	102,790,306	25,280,000	15.6%	0.0%	17.8%	7.3%	18.5%	16.3%	0.3%	0.1%	10.6%	10.6%	1.8%	0.9%	100.0%
2029	510,517,289	542,679,878	528,283,814	54,396,065	40,000,000	107,229,821	28,490,000	14.4%	0.0%	16.6%	7.2%	18.9%	16.0%	0.3%	0.1%	11.5%	11.5%	2.7%	0.9%	100.0%
2030	519,706,600	552,448,116	537,141,158	55,306,958	40,000,000	111,669,336	31,700,000	13.2%	0.0%	15.5%	7.0%	19.2%	15.6%	0.4%	0.1%	12.3%	12.3%	3.5%	0.9%	100.0%
2031	529,061,319	562,392,182	546,157,933	56,234,249	40,000,000	116,108,852	34,910,000	12.0%	0.0%	14.4%	6.9%	19.5%	15.3%	0.4%	0.1%	13.1%	13.1%	4.3%	0.9%	100.0%
2032	538,584,423	572,515,242	555,337,010	57,178,231	40,000,000	120,548,367	38,120,000	11.0%	0.0%	13.5%	6.7%	19.8%	15.0%	0.4%	0.1%	13.8%	13.8%	5.1%	0.8%	100.0%
2033	548,278,943	582,820,516	564,681,311	58,139,205	40,000,000	124,987,882	41,330,000	9.9%	0.0%	12.5%	6.6%	20.0%	14.7%	0.5%	0.1%	14.5%	14.5%	5.8%	0.8%	100.0%
2034	558,147,964	593,311,285	574,193,809	59,117,476	40,000,000	129,427,398	44,540,000	8.9%	0.0%	11.7%	6.5%	20.3%	14.4%	0.5%	0.1%	15.2%	15.2%	6.5%	0.8%	100.0%
2035	568,194,627	603,990,886	583,877,532	60,113,356	40,000,000	133,866,913	46,110,000	7.9%	0.0%	11.9%	6.3%	20.6%	14.1%	0.6%	0.1%	15.2%	15.2%	7.1%	0.8%	100.0%
2036	578,422,130	614,862,724	593,735,562	61,127,162	40,000,000	138,306,428	47,680,000	7.0%	0.0%	12.2%	6.2%	20.8%	13.9%	0.6%	0.2%	15.3%	15.3%	7.8%	0.8%	100.0%
2037	588,833,728	625,930,253	603,771,037	62,159,217	40,000,000	142,745,943	49,250,000	6.1%	0.0%	12.5%	6.1%	21.0%	14.5%	0.7%	0.2%	15.3%	15.3%	8.4%	0.8%	100.0%
2038	599,432,736	637,196,998	613,987,150	63,209,848	40,000,000	147,185,459	50,820,000	5.3%	0.0%	11.1%	6.0%	21.2%	15.0%	0.7%	0.2%	15.3%	15.3%	9.0%	0.8%	100.0%
2039	610,222,525	648,666,544	624,387,153	64,279,391	40,000,000	151,624,974	52,390,000	4.4%	0.0%	10.7%	5.9%	21.4%	15.5%	0.8%	0.2%	15.4%	15.4%	9.6%	0.7%	100.0%
2040	621,206,530	660,342,542	634,974,356	65,368,186	40,000,000	156,064,489	53,960,000	3.6%	0.0%	10.3%	5.8%	21.5%	16.0%	0.8%	0.3%	15.4%	15.4%	10.2%	0.7%	100.0%
2041	632,388,248	672,228,707	645,752,129	66,476,578	40,000,000	160,504,005	55,530,000	2.9%	0.0%	10.0%	5.7%	21.7%	16.4%	0.9%	0.3%	15.4%	15.4%	10.7%	0.7%	100.0%
2042	643,771,236	684,328,824	656,723,902	67,604,922	40,000,000	164,943,520	57,100,000	2.1%	0.0%	9.6%	5.6%	21.8%	16.8%	1.0%	0.4%	15.4%	15.4%	11.2%	0.7%	100.0%
2043	655,359,119	696,646,743	667,893,167	68,753,576	40,000,000	169,383,035	58,670,000	1.4%	0.0%	9.4%	5.5%	21.8%	17.2%	1.1%	0.4%	15.4%	15.4%	11.7%	0.7%	100.0%
2044	667,155,583	709,186,384	679,263,478	69,922,906	40,000,000	173,822,550	61,060,000	0.7%	0.0%	8.7%	5.4%	21.8%	17.6%	1.2%	0.5%	15.7%	15.7%	12.2%	0.7%	100.0%
2045	679,164,383	721,951,739	690,838,455	71,113,284	40,000,000	178,262,066	64,680,000	0.0%	0.0%	7.4%	5.3%	21.8%	17.9%	1.3%	0.5%	16.3%	16.3%	12.6%	0.7%	100.0%
2046	691,389,342	734,946,871	702,621,782	72,325,089	40,000,000	182,701,581	68,300,000	0.0%	0.0%	5.6%	5.2%	21.7%	18.2%	1.4%	0.6%	16.9%	16.9%	13.0%	0.6%	100.0%
2047	703,834,350	748,175,914	714,617,208	73,558,706	40,000,000	187,141,096	71,920,000	0.0%	0.0%	3.9%	5.1%	21.6%	18.4%	1.5%	0.7%	17.4%	17.4%	13.3%	0.6%	100.0%
2048	716,503,369	761,643,081	726,828,553	74,814,528	40,000,000	191,580,612	75,540,000	0.0%	0.0%	2.2%	5.0%	21.4%	18.7%	1.6%	0.8%	17.9%	17.9%	13.7%	0.6%	100.0%
2049	729,400,429	775,352,656	739,259,701	76,092,955	40,000,000	196,020,127	79,160,000	0.0%	0.0%	0.7%	4.9%	21.3%	18.9%	1.7%	0.9%	18.5%	18.5%	14.1%	0.6%	100.0%
2050	742,529,637	789,309,004	751,914,610	77,394,394	40,000,000	200,459,642	80,730,000	0.0%	0.0%	0.1%	4.8%	21.1%	19.2%	1.9%	1.1%	18.4%	18.4%	14.4%	0.6%	100.0%
2051	755,895,170	803,516,566	764,797,308	78,719,259	40,000,000	204,899,158	81,330,000	0.0%	0.0%	0.1%	4.7%	20.9%	19.5%	2.1%	1.2%	18.1%	18.1%	14.7%	0.6%	100.0%
2052	769,501,283	817,979,864	777,911,894	80,067,971	40,000,000	209,338,673	81,930,000	0.0%	0.0%	0.2%	4.7%	20.7%	19.8%	2.2%	1.4%	17.8%	17.8%	14.9%	0.6%	100.0%
2053	783,352,307	832,703,502	791,262,542	81,440,960	40,000,000	213,778,183	82,680,000	0.0%	0.0%	0.1%	4.6%	20.4%	20.0%	2.4%	1.6%	17.5%	17.5%	15.2%	0.6%	100.0%
2054	797,452,648	847,692,165	804,853,502	82,838,663	40,000,000	218,217,703	83,430,000	0.0%	0.0%	0.1%	4.5%	20.0%	20.3%	2.6%	1.9%	17.2%	17.2%	15.5%	0.6%	100.0%
2055	811,806,796	862,950,824	818,689,100	84,261,524	40,000,000	222,657,219	84,180,000	0.0%	0.0%	0.1%	4.4%	19.6%	20.5%	2.9%	2.2%	16.9%	16.9%	15.8%	0.6%	100.0%
2056	826,419,318	878,483,735	832,773,738	85,709,997	40,000,000	227,096,734	84,930,000	0.0%	0.0%	0.2%	4.4%	19.1%	20.7%	3.1%	2.5%	16.7%	16.7%			

Low Generation Case, Scenario 2: H

- 1.80% Elec. Sales growth
- 6.30% Transmission and Distribution Losses (% of sales)
- 14.0 millions of MWh from renewables in 2008
- 40.0 millions of MWh from Industrial On-site in 2008
- 16.9% Assumed solar PV annual growth rate
- 10.5% Assumed solar CSP annual growth rate
- 50.0 Assumed efficiency reduction, in MWh, in 2023 (A)
- 0.00% Assumed growth rate of industrial on-site MWh
- 20.00% % of total electricity consumption as wind in 2060
- 25.00% % of PC w/CCS that is parasitic load for carbon ca
- 16.00% % of IGCC w/CCS that is parasitic load for carbon
- 15.00% % of NGCC w/CCS that is parasitic load for carbon

TOTAL MWH OF GENERATION FROM EACH POWER PLANT TYPE - INCLUDING PARASITICS DUE TO CARBON CAPTURE																Total MWh from Table	MWh Target (check)	Difference from MWh Target	Annual CO2 Emissions (MtCO2)	Target CO2 Emissions (MtCO2)	Total TWh w/o parasitics
Year	TX Electrical Sales (MWh), neglects losses in T&D	TX Elec. Gen w/o Industrial On-site (MWh)	Texas total Consumption w/o CCS parasitics (MWh)	MWh PC Coal, no CCS	MWh IGCC Coal, no CCS	MWh NGCC, no CCS	MWh NG Industrial On-Site	MWh wind and hydro	MWh Nuclear	MWh Solar CSP	MWh Solar PV	MWh PC Coal, w/CCS	MWh IGCC Coal, w/CCS	MWh NGCC, w/CCS	MWh other						
2008	351,000,000	373,113,000	413,113,000	154,917,375	0	157,968,269	40,000,000	13,987,000	41,270,000	0	13,000	0	0	0	4,957,356	413,113,000	413,113,000	0	259	413	
2009	357,318,000	379,829,034	416,495,701	158,000,000	0	153,786,185	40,000,000	18,424,323	41,270,000	0	15,192	0	0	0	5,000,000	416,495,701	416,495,701	0	260	416	
2010	363,749,724	386,665,957	419,999,290	165,000,000	0	145,120,259	40,000,000	22,861,277	42,000,000	0	17,753	0	0	0	5,000,000	419,999,290	419,999,290	0	262	420	
2011	370,297,219	393,625,944	423,625,944	170,000,000	0	139,307,398	40,000,000	27,297,800	42,000,000	0	20,746	0	0	0	5,000,000	423,625,944	423,625,944	0	264	424	
2012	376,962,569	400,711,211	427,377,877	180,000,000	0	128,619,816	40,000,000	31,383,417	42,000,000	350,400	24,244	0	0	0	5,000,000	427,377,877	427,377,877	0	268	427	
2013	383,747,895	407,924,013	431,257,346	180,000,000	0	128,059,769	40,000,000	35,781,948	42,000,000	387,297	28,332	0	0	0	5,000,000	431,257,346	431,257,346	0	268	431	
2014	390,655,357	415,266,645	435,266,645	180,000,000	0	127,629,553	40,000,000	40,175,904	42,000,000	428,080	33,108	0	0	0	5,000,000	435,266,645	435,266,645	0	268	435	
2015	397,687,154	422,741,444	439,408,111	140,000,000	0	104,431,504	40,000,000	44,564,760	89,000,000	473,156	38,691	10,000,000	10,000,000	0	5,000,000	443,508,111	443,508,111	0	218	439	
2016	404,845,523	430,350,790	443,684,124	120,000,000	0	124,268,001	40,000,000	48,947,929	89,000,000	522,980	45,214	10,000,000	10,000,000	0	5,000,000	447,784,124	447,784,124	0	209	444	
2017	412,132,742	438,097,105	448,097,105	120,000,000	0	124,241,467	40,000,000	53,324,751	89,000,000	578,049	52,837	10,000,000	10,000,000	0	5,000,000	452,197,105	452,197,105	0	209	448	
2018	419,551,131	445,982,853	452,649,519	120,000,000	0	124,354,366	40,000,000	57,694,490	89,000,000	638,918	61,745	10,000,000	10,000,000	0	5,000,000	456,749,519	456,749,519	0	209	453	
2019	427,103,052	454,010,544	457,343,877	117,500,000	0	119,121,709	40,000,000	62,056,317	95,000,000	706,196	72,155	11,250,000	11,250,000	0	5,000,000	461,956,377	461,956,377	0	204	457	
2020	434,790,907	462,182,734	462,182,734	115,000,000	0	126,033,550	40,000,000	66,409,304	89,000,000	780,559	84,321	12,500,000	12,500,000	0	5,000,000	467,307,734	467,307,734	0	205	462	
2021	442,617,143	470,502,023	467,168,690	112,500,000	0	123,514,991	40,000,000	70,752,410	89,000,000	862,751	98,537	16,000,000	16,000,000	0	5,000,000	473,728,690	473,728,690	0	203	467	
2022	450,584,251	478,971,059	472,304,393	110,000,000	0	117,171,179	40,000,000	75,084,465	89,000,000	953,599	115,150	22,000,000	22,000,000	0	5,000,000	481,324,393	481,324,393	0	198	201	
2023	458,694,768	487,592,538	477,592,538	107,500,000	0	110,979,809	40,000,000	79,404,152	89,000,000	1,054,013	134,565	28,000,000	28,000,000	0	5,000,000	489,072,538	489,072,538	0	194	196	
2024	466,951,274	496,369,204	486,369,204	105,000,000	0	108,276,959	40,000,000	83,709,992	89,000,000	1,165,001	157,252	34,000,000	34,000,000	0	5,000,000	500,309,204	500,309,204	0	192	192	
2025	475,356,397	505,303,850	494,385,005	100,000,000	0	107,313,245	40,000,000	88,000,320	89,000,000	1,287,675	183,765	40,000,000	40,000,000	0	5,000,000	510,785,005	510,785,005	0	188	187	
2026	483,912,812	514,399,319	502,641,286	95,000,000	0	106,960,011	40,000,000	92,273,260	89,000,000	1,423,267	214,748	46,000,000	46,000,000	0	5,000,000	521,501,286	521,501,286	0	185	183	
2027	492,623,243	523,658,507	511,036,109	90,000,000	0	101,755,319	40,000,000	96,526,699	89,000,000	1,573,137	250,955	52,000,000	52,000,000	5,000,000	5,000,000	533,106,109	533,106,109	0	179	178	
2028	501,490,461	533,084,360	519,583,094	85,000,000	0	97,072,788	40,000,000	100,758,252	89,000,000	1,738,789	293,266	58,000,000	58,000,000	10,000,000	5,000,000	544,863,094	544,863,094	0	174	174	
2029	510,517,289	542,679,878	528,283,814	80,000,000	0	92,543,992	40,000,000	104,965,228	89,000,000	1,921,883	342,710	64,000,000	64,000,000	15,000,000	5,000,000	556,773,814	556,773,814	0	168	169	
2030	519,706,600	552,448,116	537,141,158	75,000,000	0	88,171,821	40,000,000	109,144,588	89,000,000	2,124,257	400,491	70,000,000	70,000,000	20,000,000	5,000,000	568,841,158	568,841,158	0	163	165	
2031	529,061,319	562,392,182	546,157,933	70,000,000	0	83,959,081	40,000,000	113,292,896	89,000,000	2,347,942	468,014	76,000,000	76,000,000	25,000,000	5,000,000	581,067,933	581,067,933	0	158	160	
2032	538,584,423	572,515,242	555,337,010	65,000,000	0	79,908,643	40,000,000	117,406,266	89,000,000	2,595,180	546,921	82,000,000	82,000,000	30,000,000	5,000,000	593,457,010	593,457,010	0	153	155	
2033	548,278,943	582,820,516	564,681,311	60,000,000	0	76,023,429	40,000,000	121,480,298	89,000,000	2,868,453	639,132	88,000,000	88,000,000	35,000,000	5,000,000	606,011,311	606,011,311	0	148	151	
2034	558,147,964	593,311,285	574,193,809	55,000,000	0	72,306,411	40,000,000	125,510,008	89,000,000	3,170,501	746,889	94,000,000	94,000,000	40,000,000	5,000,000	618,733,809	618,733,809	0	143	146	
2035	568,194,627	603,990,886	583,877,532	50,000,000	0	75,120,619	40,000,000	129,489,744	89,000,000	3,504,354	872,815	96,000,000	96,000,000	45,000,000	5,000,000	629,987,532	629,987,532	0	141	142	
2036	578,422,130	614,862,724	593,735,562	45,000,000	0	78,109,134	40,000,000	133,413,094	89,000,000	3,873,363	1,019,972	98,000,000	98,000,000	50,000,000	5,000,000	641,415,562	641,415,562	0	138	137	
2037	588,833,728	625,930,253	603,771,037	40,000,000	0	75,275,093	40,000,000	137,272,777	95,000,000	4,281,228	1,191,939	100,000,000	100,000,000	55,000,000	5,000,000	653,021,037	653,021,037	0	133	133	
2038	599,432,736	637,196,998	613,987,150	35,000,000	0	73,621,691	40,000,000	141,060,518	100,000,000	4,732,041	1,392,900	102,000,000	102,000,000	60,000,000	5,000,000	664,807,150	664,807,150	0	128	128	
2039	610,222,525	648,666,544	624,387,153	30,000,000	0	72,152,179	40,000,000	144,766,906	105,000,000	5,230,325	1,627,742	104,000,000	104,000,000	65,000,000	5,000,000	676,777,153	676,777,153	0	123	124	
2040	621,206,530	660,342,542	634,974,356	25,000,000	0	70,869,867	40,000,000	148,381,231	110,000,000	5,781,078	1,902,180	106,000,000	106,000,000	70,000,000	5,000,000	688,934,356	688,934,356	0	118	119	
2041	632,388,248	672,228,707	645,752,129	20,000,000	0	69,778,124	40,000,000	151,891,291	115,000,000	6,389,826	2,222,887	108,000,000	108,000,000	75,000,000	5,000,000	701,282,129	701,282,129	0	114	115	
2042	643,771,236	684,328,824	656,723,902	15,000,000	0	68,880,382	40,000,000	155,283,179	120,000,000	7,062,675	2,597,666	110,000,000	110,000,000	80,000,000	5,000,000	713,823,902	713,823,902	0	109	110	
2043	655,359,119	696,646,743	667,893,167	10,000,000	0	68,180,131	40,000,000	158,541,028	125,000,000	7,806,374	3,035,633	112,000,000	112,000,000	85,000,000	5,000,000	726,563,167	726,563,167	0	105	106	
2044	667,155,583	709,186,384	679,263,478	5,000,000	0	64,500,928	40,000,000	161,646,725	130,000,000	8,628,385	3,547,440	116,000,000	116,000,000	90,000,000	5,000,000	740,323,478	740,323,478	0	99	101	
2045	679,164,383	721,951,739	690,838,455	0	0	56,256,389	40,000,000	164,579,573	135,000,000	9,536,954	4,145,539	123,000,000	123,000,000	95,000,000	5,000,000	755,518,455	755,518,455	0	92	97	
2046	691,389,342	734,946,871	702,621,782	0	0	43,220,201	40,000,000	167,315,909	140,000,000	10,541,196	4,844,477	130,000,000	130,000,000	100,000,000	5,000,000	770,921,782	770,921,782	0	88	92	
2047	703,834,350	748,175,914	714,617,208	0	0	30,396,112	40,000,000	169,828,657	145,000,000	11,651,184	5,661,255	137,000,000	137,000,000	105,000,000	5,000,000	786,537,208	786,537,208	0	84	87	
2048	716,503,369	761,643,081	726,828,553	0	0	17,787,941	40,000,000	172,086,815	150,000,000	12,878,053	6,615,743	144,000,000	144,000,000	110,000,000	5,000,000	802,368,553	802,368,553	0	79	83	
2049	729,400,429	775,352,656	739,259,701	0	0	5,399,574	40,000,000	174,054,857	155,000,000	14,234,112	7,731,157	151,000,000	151,000,000	115,000,000	5,000,000	818,419,701	818,419,701	0	75</		

Business as Usual Generation Case, Scenario 2: High NG price with Carbon Price

1.80%	Elec. Sales growth	CO2
6.30%	Transmission and Distribution Losses (% of sales)	M/MWh
14.0	millions of MWh from renewables in 2008	PC
40.0	millions of MWh from Industrial On-site in 2008	PC w/CCS
17.1%	Assumed solar PV annual growth rate	IGCC
10.8%	Assumed solar CSP annual growth rate	IGCC w/CCS
0.0	Assumed efficiency reduction, in MWh, in 2023 (ACEEE)	NGCC
0.00%	Assumed growth rate of industrial on-site MWh	NGCC w/CCS
20.00%	% of total electricity consumption as wind in 2060	CHP (Ind.)
25.00%	% of PC w/CCS that is parasitic load for carbon capture	
16.00%	% of IGCC w/CCS that is parasitic load for carbon capture	
15.00%	% of NGCC w/CCS that is parasitic load for carbon capture	

Year	TX Electrical Sales (MWh), neglects losses in T&D	TX Elec. Gen - w/o Industrial On-site (MWh)	Texas total Consumption w/o CCS parasitics (MWh)	TX Total MWh from efficiency	TX Total MWh from Industrial On-site	TX Total MWh from renewables	TX Total MWh Parasitics due to CCS	PERCENTAGES OF TOTAL GENERATION FROM EACH POWER PLANT TYPE														
								% MWh PC Coal, no CCS	% MWh IGCC Coal, no CCS	% MWh NGCC, no CCS	% MWh NG Industrial On-site	% MWh Wind and Hydro	% Nuclear	% MWh Solar CSP	% MWh Solar PV	% MWh PC Coal, w/CCS	% MWh IGCC Coal, w/CCS	% MWh NGCC, w/CCS	% MWh other	Total % MWh		
2008	351,000,000	373,113,000	413,113,000	0	40,000,000	14,000,000	0	37.5%	0.0%	38.1%	9.7%	3.4%	10.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.4%	100.0%
2009	357,318,000	379,829,034	419,829,034	0	40,000,000	18,982,529	0	37.6%	0.0%	37.3%	9.5%	4.5%	9.8%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.2%	100.0%
2010	363,749,724	386,665,957	426,665,957	0	40,000,000	23,965,058	0	38.7%	0.0%	35.3%	9.4%	5.6%	9.8%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.2%	100.0%
2011	370,297,219	393,625,944	433,625,944	0	40,000,000	28,947,588	0	39.2%	0.0%	34.1%	9.2%	6.7%	9.7%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.2%	100.0%
2012	376,962,569	400,711,211	440,711,211	0	40,000,000	33,930,117	0	40.8%	0.0%	31.7%	9.1%	7.6%	9.5%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.1%	100.0%
2013	383,747,895	407,924,013	447,924,013	0	40,000,000	38,912,646	0	40.2%	0.0%	31.7%	8.9%	8.6%	9.4%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.1%	100.0%
2014	390,655,357	415,266,645	455,266,645	0	40,000,000	43,895,175	0	39.5%	0.0%	31.7%	8.8%	9.5%	9.2%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.1%	100.0%
2015	397,687,154	422,741,444	462,741,444	0	40,000,000	48,877,704	4,100,000	30.0%	0.0%	26.6%	8.6%	10.4%	19.1%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.1%	100.0%
2016	404,845,523	430,350,790	470,350,790	0	40,000,000	53,860,234	7,650,000	27.2%	0.0%	25.1%	8.4%	11.1%	18.6%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.0%	100.0%
2017	412,132,742	438,097,105	478,097,105	0	40,000,000	58,842,763	9,700,000	24.6%	0.0%	25.6%	8.2%	11.9%	18.2%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.0%	100.0%
2018	419,551,131	445,982,853	485,982,853	0	40,000,000	63,825,292	11,750,000	23.6%	0.0%	24.6%	8.0%	12.7%	17.9%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.0%	100.0%
2019	427,103,052	454,010,544	494,010,544	0	40,000,000	68,807,821	15,230,000	22.6%	0.0%	21.7%	7.9%	13.4%	17.5%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.0%	100.0%
2020	434,790,907	462,182,734	502,182,734	0	40,000,000	73,790,350	16,460,000	21.7%	0.0%	21.5%	7.7%	14.1%	17.2%	0.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.0%	100.0%
2021	442,617,143	470,502,023	510,502,023	0	40,000,000	78,772,880	18,440,000	20.8%	0.0%	20.5%	7.6%	14.7%	16.8%	0.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.9%	100.0%
2022	450,584,251	478,971,059	518,971,059	0	40,000,000	83,755,409	19,670,000	20.0%	0.0%	20.3%	7.4%	15.3%	16.5%	0.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.9%	100.0%
2023	458,694,768	487,592,538	527,592,538	0	40,000,000	88,737,938	20,900,000	18.8%	0.0%	20.6%	7.3%	16.2%	16.2%	0.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.9%	100.0%
2024	466,951,274	496,369,204	536,369,204	0	40,000,000	93,720,467	22,130,000	17.2%	0.0%	21.3%	7.2%	16.5%	15.9%	0.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.9%	100.0%
2025	475,356,397	505,303,850	545,303,850	0	40,000,000	98,702,996	23,360,000	15.7%	0.0%	20.0%	7.0%	17.1%	17.6%	0.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.9%	100.0%
2026	483,912,812	514,399,319	554,399,319	0	40,000,000	103,685,525	24,590,000	14.2%	0.0%	19.2%	6.9%	17.6%	18.8%	0.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.9%	100.0%
2027	492,623,243	523,658,507	563,658,507	0	40,000,000	108,668,055	25,070,000	12.7%	0.0%	19.2%	6.8%	18.1%	20.0%	0.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.8%	100.0%
2028	501,490,461	533,084,360	573,084,360	0	40,000,000	113,650,584	24,800,000	11.4%	0.0%	20.1%	6.7%	18.7%	21.1%	0.3%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.8%	100.0%
2029	510,517,289	542,679,878	582,679,878	0	40,000,000	118,633,113	25,280,000	10.9%	0.0%	20.3%	6.6%	19.1%	22.0%	0.3%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.8%	100.0%
2030	519,706,600	552,448,116	592,448,116	0	40,000,000	123,615,642	26,510,000	8.7%	0.0%	19.8%	6.5%	19.5%	22.9%	0.4%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.8%	100.0%
2031	529,061,319	562,392,182	602,392,182	0	40,000,000	128,598,171	27,330,000	7.5%	0.0%	19.6%	6.4%	20.0%	23.8%	0.5%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.8%	100.0%
2032	538,584,423	572,515,242	612,515,242	0	40,000,000	133,580,701	28,150,000	6.2%	0.0%	19.4%	6.2%	20.3%	24.7%	0.4%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.8%	100.0%
2033	548,278,943	582,820,516	622,820,516	0	40,000,000	138,563,230	28,970,000	5.1%	0.0%	19.2%	6.1%	20.7%	25.5%	0.5%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.8%	100.0%
2034	558,147,964	593,311,285	633,311,285	0	40,000,000	143,545,759	29,790,000	3.9%	0.0%	19.1%	6.0%	21.0%	26.2%	0.5%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.8%	100.0%
2035	568,194,627	603,990,888	643,990,888	0	40,000,000	148,528,288	31,360,000	2.8%	0.0%	18.3%	5.9%	21.3%	26.9%	0.5%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.7%	100.0%
2036	578,422,130	614,862,724	654,862,724	0	40,000,000	153,510,817	32,930,000	1.7%	0.0%	17.6%	5.8%	21.6%	27.6%	0.6%	0.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.7%	100.0%
2037	588,833,728	625,930,253	665,930,253	0	40,000,000	158,493,347	34,500,000	0.7%	0.0%	17.0%	5.7%	21.8%	28.3%	0.6%	0.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.7%	100.0%
2038	599,432,736	637,196,998	677,196,998	0	40,000,000	163,475,876	36,070,000	0.0%	0.0%	16.1%	5.6%	22.0%	28.9%	0.7%	0.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.7%	100.0%
2039	610,222,525	648,666,544	688,666,544	0	40,000,000	168,458,405	37,640,000	0.0%	0.0%	14.6%	5.5%	22.2%	29.5%	0.8%	0.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.7%	100.0%
2040	621,206,530	660,342,542	700,342,542	0	40,000,000	173,440,934	39,210,000	0.0%	0.0%	13.1%	5.4%	22.3%	30.0%	0.8%	0.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.7%	100.0%
2041	632,388,248	672,228,707	712,228,707	0	40,000,000	178,423,463	40,780,000	0.0%	0.0%	11.8%	5.3%	22.5%	30.5%	0.9%	0.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.7%	100.0%
2042	643,771,236	684,328,824	724,328,824	0	40,000,000	183,405,993	42,350,000	0.0%	0.0%	10.5%	5.2%	22.6%	31.0%	1.0%	0.4%	0.0%	0.0%	0.0%	0.0%	0.0%	0.7%	100.0%
2043	655,359,119	696,646,743	736,646,743	0	40,000,000	188,388,522	43,920,000	0.0%	0.0%	9.2%	5.1%	22.6%	31.5%	1.1%	0.4%	0.0%	0.0%	0.0%	0.0%	0.0%	0.6%	100.0%
2044	667,155,583	709,186,384	749,186,384	0	40,000,000	193,371,051	45,490,000	0.0%	0.0%	8.1%	5.0%	22.7%	32.0%	1.2%	0.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.6%	100.0%
2045	679,164,383	721,951,739	761,951,739	0	40,000,000	198,353,580	47,060,000	0.0%	0.0%	7.0%	4.9%	22.7%	32.4%	1.3%	0.6%	0.0%	0.0%	0.0%	0.0%	0.0%	0.6%	100.0%
2046	691,389,342	734,946,871	774,946,871	0	40,000,000	203,336,109	48,630,000	0.0%	0.0%	6.0%	4.9%	22.7%	32.8%	1.4%	0.6%	0.0%	0.0%	0.0%	0.0%	0.0%	0.6%	100.0%
2047	703,834,350	748,175,914	788,175,914	0	40,000,000	208,318,639	50,610,000	0.0%	0.0%	4.8%	4.8%	22.6%	33.1%	1.5%	0.7%	0.0%	0.0%	0.0%	0.0%	0.0%	0.6%	100.0%
2048	716,503,369	761,643,081	801,643,081	0	40,000,000	213,301,168	55,460,000	0.0%	0.0%	2.4%	4.7%	22.4%	33.4%	1.6%	0.8%	0.0%	0.0%	0.0%	0.0%	0.0%	0.6%	100.0%
2049	729,400,429	775,352,656	815,352,656	0	40,000,000	218,283,697	58,260,000	0.0%	0.0%	1.1%	4.6%	22.3%	33.7%	1.8%	1.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.6%	100.0%
2050	742,529,637	789,309,004	829,309,004	0	40,000,000	223,266,226	60,650,000	0.0%	0.0%	0.2%	4.5%	22.1%	33.7%	1.9%	1.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.6%	100.0%
2051	755,895,170	803,516,566	843,516,566	0	40,000,000	228,248,755	62,560,000	0.0%	0.0%	0.1%	4.4%	21.8%	33.1%	2.1%	1.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.6%	100.0%
2052	769,501,283	817,979,864	857,979,864	0	40,000,000	233,231,284	64,580,000	0.0%	0.0%	0.0%	4.3%	21.5%	32.5%	2.3%	1.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.5%	100.0%
2053	783,352,307	832,703,502	872,703,502	0	40,000,000	238,213,814	66,600,000	0.0%	0.0%	0.0%	4.2%	21.2%	31.9%	2.5%	1.7%	0.0%	0.0%	0.0%	0.0%	0.0%	0.5%	100.0%
2054	797,452,648	847,692,165	887,692,165	0	40,000,000	243,196,343	68,620,000	0.0%	0.0%	0.0%	4.2%	20.8%	31.4%	2.7%	1.9%	0.0%	0.0%	0.0%	0.0%	0.0%	0.5%	100.0%
2055	811,806,796	862,950,624	902,950,624	0	40,000,000	248,178,872	70,640,000	0.0%	0.0%	0.0%	4.1%	20.3%	30.8%									

Business as Usual Generation Case, Sc

- 1.80% Elec. Sales growth
- 6.30% Transmission and Distribution Losses (% of sales)
- 14.0 millions of MWh from renewables in 2008
- 40.0 millions of MWh from Industrial On-site in 2008
- 17.1% Assumed solar PV annual growth rate
- 10.8% Assumed solar CSP annual growth rate
- 0.0 Assumed efficiency reduction, in MWh, in 2023 (ACEEE)
- 0.00% Assumed growth rate of industrial on-site MWh
- 20.00% % of total electricity consumption as wind in 2060
- 25.00% % of PC w/CCS that is parasitic load for carbon capture
- 16.00% % of IGCC w/CCS that is parasitic load for carbon captu
- 15.00% % of NGCC w/CCS that is parasitic load for carbon capt

Year	TX Electrical Sales (MWh), neglects losses in T&D	TX Elec. Gen - w/o Industrial On-site (MWh)	Texas total Consumption w/o CCS parasitics (MWh)	TOTAL MWH OF GENERATION FROM EACH POWER PLANT TYPE - INCLUDING PARASITICS DUE TO CARBON CAPTURE													Total MWh from Table	MWh Target (check)	Difference from MWh Target	Annual CO2 Emissions (MtCO2)	Target CO2 Emissions (MtCO2)	Total TWh w/o parasitics
				MWh PC Coal, no CCS	MWh IGCC Coal, no CCS	MWh NGCC, no CCS	MWh NG Industrial On-Site	MWh Wind and Hydro	MWh Nuclear	MWh Solar CSP	MWh Solar PV	MWh PC Coal, w/CCS	MWh IGCC Coal, w/CCS	MWh NGCC, w/CCS	MWh other							
2008	351,000,000	373,113,000	413,113,000	154,917,375	0	157,224,666	40,000,000	13,987,000	41,270,000	0	13,000	0	0	0	5,148,959	412,561,000	413,113,000	-552,000	258	413	413	
2009	357,318,000	379,829,034	419,829,034	158,000,000	0	156,576,505	40,000,000	18,967,306	41,270,000	0	15,223	0	0	0	5,000,000	419,829,034	419,829,034	0	261	420	420	
2010	363,749,724	386,665,957	426,665,957	165,000,000	0	150,700,898	40,000,000	23,947,232	42,000,000	0	17,826	0	0	0	5,000,000	426,665,957	426,665,957	0	265	427	427	
2011	370,297,219	393,625,944	433,625,944	170,000,000	0	147,678,356	40,000,000	28,926,713	42,000,000	0	20,874	0	0	0	5,000,000	433,625,944	433,625,944	0	268	434	434	
2012	376,962,569	400,711,211	440,711,211	180,000,000	0	139,781,094	40,000,000	33,555,273	42,000,000	350,400	24,444	0	0	0	5,000,000	440,711,211	440,711,211	0	274	441	441	
2013	383,747,895	407,924,013	447,924,013	180,000,000	0	142,011,367	40,000,000	38,495,853	42,000,000	388,170	28,624	0	0	0	5,000,000	447,924,013	447,924,013	0	275	442	448	
2014	390,655,357	415,266,645	455,266,645	180,000,000	0	144,371,470	40,000,000	43,431,646	42,000,000	430,010	33,519	0	0	0	5,000,000	455,266,645	455,266,645	0	277	455	455	
2015	397,687,154	422,741,444	462,741,444	140,000,000	0	123,963,740	40,000,000	48,362,093	89,000,000	476,361	39,250	10,000,000	10,000,000	0	5,000,000	466,841,444	466,841,444	0	230	463	463	
2016	404,845,523	430,350,790	470,350,790	130,000,000	0	120,140,557	40,000,000	53,286,563	89,000,000	527,708	45,962	15,000,000	15,000,000	10,000,000	5,000,000	478,000,790	478,000,790	0	220	470	470	
2017	412,132,742	438,097,105	478,097,105	120,000,000	0	124,954,342	40,000,000	58,204,351	89,000,000	584,590	53,821	20,000,000	20,000,000	10,000,000	5,000,000	487,797,105	487,797,105	0	215	478	478	
2018	419,551,131	445,982,853	485,982,853	117,500,000	0	122,407,561	40,000,000	63,114,664	89,000,000	647,603	63,025	25,000,000	25,000,000	10,000,000	5,000,000	497,732,853	497,732,853	0	213	496	496	
2019	427,103,052	454,010,544	494,010,544	115,000,000	0	110,432,723	40,000,000	68,016,611	89,000,000	717,408	73,802	28,000,000	28,000,000	25,000,000	5,000,000	509,240,544	509,240,544	0	206	494	494	
2020	434,790,907	462,182,734	502,182,734	112,500,000	0	111,352,383	40,000,000	72,909,191	89,000,000	794,737	86,422	31,000,000	31,000,000	25,000,000	5,000,000	518,642,734	518,642,734	0	206	510	510	
2021	442,617,143	470,502,023	510,502,023	110,000,000	0	108,169,143	40,000,000	77,791,277	89,000,000	880,402	101,201	34,000,000	34,000,000	30,000,000	5,000,000	528,942,023	528,942,023	0	203	502	502	
2022	450,584,251	478,971,059	518,971,059	107,500,000	0	109,385,651	40,000,000	82,661,602	89,000,000	975,301	118,506	37,000,000	37,000,000	30,000,000	5,000,000	538,641,059	538,641,059	0	202	519	519	
2023	458,694,768	487,592,538	527,592,538	103,000,000	0	112,754,600	40,000,000	87,518,739	89,000,000	1,080,428	138,770	40,000,000	40,000,000	30,000,000	5,000,000	548,492,538	548,492,538	0	201	528	528	
2024	466,951,274	496,369,204	536,369,204	96,000,000	0	118,778,737	40,000,000	92,361,079	89,000,000	1,196,888	162,500	43,000,000	43,000,000	30,000,000	5,000,000	558,499,204	558,499,204	0	198	536	536	
2025	475,356,397	505,303,850	545,303,850	89,000,000	0	113,960,853	40,000,000	97,186,808	100,000,000	1,325,900	190,288	46,000,000	46,000,000	30,000,000	5,000,000	568,663,850	568,663,850	0	190	545	545	
2026	483,912,812	514,399,319	554,399,319	82,000,000	0	111,303,794	40,000,000	101,993,880	109,000,000	1,468,819	222,827	49,000,000	49,000,000	30,000,000	5,000,000	578,989,319	578,989,319	0	182	554	554	
2027	492,623,243	523,658,507	563,658,507	75,000,000	0	113,060,452	40,000,000	106,779,982	118,000,000	1,627,143	260,930	52,000,000	52,000,000	25,000,000	5,000,000	588,728,507	588,728,507	0	177	564	564	
2028	501,490,461	533,084,360	573,084,360	68,000,000	0	120,233,776	40,000,000	111,542,502	126,000,000	1,802,533	305,549	55,000,000	55,000,000	15,000,000	5,000,000	597,884,360	597,884,360	0	174	573	573	
2029	510,517,289	542,679,878	582,679,878	61,000,000	0	123,326,765	40,000,000	116,278,487	134,000,000	1,996,828	357,798	58,000,000	58,000,000	10,000,000	5,000,000	607,959,878	607,959,878	0	169	583	583	
2030	519,706,600	552,448,116	592,448,116	54,000,000	0	122,342,474	40,000,000	120,984,595	142,000,000	2,212,066	418,982	61,000,000	61,000,000	10,000,000	5,000,000	618,958,116	618,958,116	0	163	592	592	
2031	529,061,319	562,392,182	602,392,182	47,000,000	0	123,124,011	40,000,000	125,657,040	150,000,000	2,450,504	490,628	63,000,000	63,000,000	10,000,000	5,000,000	629,722,182	629,722,182	0	157	602	602	
2032	538,584,423	572,515,242	612,515,242	40,000,000	0	124,084,541	40,000,000	130,291,532	158,000,000	2,714,644	574,525	65,000,000	65,000,000	10,000,000	5,000,000	640,665,242	640,665,242	0	151	613	613	
2033	548,278,943	582,820,516	622,820,516	33,000,000	0	125,227,286	40,000,000	134,883,206	166,000,000	3,007,256	672,769	67,000,000	67,000,000	10,000,000	5,000,000	651,790,516	651,790,516	0	146	621	621	
2034	558,147,964	593,311,285	633,311,285	26,000,000	0	126,555,526	40,000,000	139,426,539	174,000,000	3,331,408	787,812	69,000,000	69,000,000	10,000,000	5,000,000	663,101,285	663,101,285	0	140	633	633	
2035	568,194,627	603,990,888	643,990,888	19,000,000	0	123,822,600	40,000,000	143,915,260	182,000,000	3,690,500	922,528	71,000,000	71,000,000	15,000,000	5,000,000	675,350,888	675,350,888	0	133	644	644	
2036	578,422,130	614,862,724	654,862,724	12,000,000	0	121,281,907	40,000,000	148,342,238	190,000,000	4,088,299	1,080,280	73,000,000	73,000,000	20,000,000	5,000,000	687,792,724	687,792,724	0	126	655	655	
2037	588,833,728	625,930,253	665,930,253	5,000,000	0	118,936,907	40,000,000	152,699,362	198,000,000	4,528,977	1,265,008	75,000,000	75,000,000	25,000,000	5,000,000	700,430,253	700,430,253	0	119	666	666	
2038	599,432,736	637,196,998	677,196,998	0	0	114,791,122	40,000,000	156,977,396	206,000,000	5,017,155	1,481,324	77,000,000	77,000,000	30,000,000	5,000,000	713,266,998	713,266,998	0	113	677	677	
2039	610,222,525	648,666,544	688,666,544	0	0	105,848,139	40,000,000	161,165,819	214,000,000	5,557,955	1,734,631	79,000,000	79,000,000	35,000,000	5,000,000	726,306,544	726,306,544	0	109	689	689	
2040	621,206,530	660,342,542	700,342,542	0	0	97,111,608	40,000,000	165,252,635	222,000,000	6,157,046	2,031,253	81,000,000	81,000,000	40,000,000	5,000,000	739,552,542	739,552,542	0	106	719	719	
2041	632,388,248	672,228,707	712,228,707	0	0	88,585,244	40,000,000	169,224,152	230,000,000	6,820,714	2,378,597	83,000,000	83,000,000	45,000,000	5,000,000	753,008,707	753,008,707	0	103	712	712	
2042	643,771,236	684,328,824	724,328,824	0	0	80,272,832	40,000,000	173,064,736	238,000,000	7,555,919	2,785,337	85,000,000	85,000,000	50,000,000	5,000,000	766,678,824	766,678,824	0	99	710	724	
2043	655,359,119	696,646,743	736,646,743	0	0	72,178,221	40,000,000	176,756,520	246,000,000	8,370,372	3,261,630	87,000,000	87,000,000	55,000,000	5,000,000	780,566,743	780,566,743	0	96	737	737	
2044	667,155,583	709,186,384	749,186,384	0	0	64,305,333	40,000,000	180,279,068	254,000,000	9,272,614	3,819,369	89,000,000	89,000,000	60,000,000	5,000,000	794,676,384	794,676,384	0	93	749	749	
2045	679,164,383	721,951,739	761,951,739	0	0	56,658,159	40,000,000	183,608,990	262,000,000	10,272,109	4,472,481	91,000,000	91,000,000	65,000,000	5,000,000	809,011,739	809,011,739	0	90	762	762	
2046	691,389,342	734,946,871	774,946,871	0	0	49,240,761	40,000,000	186,719,494	270,000,000	11,379,340	5,237,275	93,000,000	93,000,000	70,000,000	5,000,000	823,576,871	823,576,871	0	88	775	775	
2047	703,834,350	748,175,914	788,175,914	0	0	40,467,276	40,000,000	189,579,871	278,000,000	12,605,919	6,132,849	96,000,000	96,000,000	75,000,000	5,000,000	838,785,914	838,785,914	0	85	787	787	
2048	716,503,369	761,643,081	801,643,081	0	0	20,801,913	40,000,000	192,154,891	286,000,000	13,964,711	7,181,											

Low Generation Case, Scenario 3: Low NG price with no Carbon Price

1.80%	Elec. Consumption growth	CO2	
6.30%	Transmission and Distribution Losses (% of sales/consumption)	Mt/MWh	
14.0	millions of MWh from renewables in 2008	PC	1.00
40.0	millions of MWh from Industrial On-site in 2008	PC w/CCS	0.15
16.9%	Assumed solar PV annual growth rate	IGCC	0.90
10.5%	Assumed solar CSP annual growth rate	IGCC w/CCS	0.14
50.0	Assumed efficiency reduction, in MWh, in 2023 (ACEEE)	NGCC	0.53
0.00%	Assumed growth rate of industrial on-site MWh	NGCC w/CCS	0.08
20.00%	% of total electricity consumption as wind in 2060	CHP (Ind.)	0.5
25.00%	% of PC w/CCS that is parasitic load for carbon capture		
16.00%	% of IGCC w/CCS that is parasitic load for carbon capture		
15.00%	% of NGCC w/CCS that is parasitic load for carbon capture		

PERCENTAGES OF TOTAL GENERATION FROM EACH POWER PLANT TYPE

Year	TX Electrical Sales (MWh), neglects losses in T&D	TX Elec. Gen - w/o Industrial On-site (MWh)	Texas total Consumption w/ CCS parasitics (MWh)	TX Total MWh from efficiency	TX Total MWh from Industrial On-site	TX Total MWh Generated from renewables	TX Total MWh Parasitics due to CCS	% MWh PC Coal, no CCS	% MWh IGCC Coal, no CCS	% MWh NGCC, no CCS	% MWh Industrial On-site	% MWh wind and hydro	% MWh Nuclear	% MWh Solar CSP	% MWh Solar PV	% MWh PC Coal, w/CCS	% MWh IGCC Coal, w/CCS	% MWh NGCC, w/CCS	% MWh other	Total % MWh
2008	351,000,000	373,113,000	413,113,000	0	40,000,000	14,000,000	0	37.5%	0.0%	38.2%	9.7%	3.4%	10.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.2%	100.0%
2009	357,318,000	379,829,034	416,495,701	3,333,333	40,000,000	18,439,515	0	37.2%	0.0%	37.6%	9.6%	4.4%	9.9%	0.0%	0.0%	0.0%	0.0%	0.0%	1.2%	100.0%
2010	363,749,724	386,665,957	419,999,290	6,666,667	40,000,000	22,879,031	0	36.9%	0.0%	36.9%	9.5%	5.4%	10.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.2%	100.0%
2011	370,297,219	393,625,944	423,625,944	10,000,000	40,000,000	27,318,546	0	38.9%	0.0%	34.1%	9.4%	6.4%	9.9%	0.0%	0.0%	0.0%	0.0%	0.0%	1.2%	100.0%
2012	376,962,569	400,711,211	427,377,877	13,333,333	40,000,000	31,758,061	0	41.4%	0.0%	30.8%	9.4%	7.3%	9.8%	0.1%	0.0%	0.0%	0.0%	0.0%	1.2%	100.0%
2013	383,747,895	407,924,013	431,257,346	16,666,667	40,000,000	36,197,576	0	41.0%	0.0%	30.4%	9.3%	8.3%	9.7%	0.1%	0.0%	0.0%	0.0%	0.0%	1.2%	100.0%
2014	390,655,357	415,266,645	435,266,645	20,000,000	40,000,000	40,637,092	0	40.2%	0.0%	30.5%	9.2%	9.2%	9.6%	0.1%	0.0%	0.0%	0.0%	0.0%	1.1%	100.0%
2015	397,687,154	422,741,444	439,408,111	23,333,333	40,000,000	45,076,807	0	34.6%	0.0%	24.7%	9.1%	10.1%	20.3%	0.1%	0.0%	0.0%	0.0%	0.0%	1.1%	100.0%
2016	404,845,523	430,350,790	443,684,124	26,666,667	40,000,000	49,516,122	0	33.8%	0.0%	24.8%	9.0%	11.0%	20.1%	0.1%	0.0%	0.0%	0.0%	0.0%	1.1%	100.0%
2017	412,132,742	438,097,105	448,097,105	30,000,000	40,000,000	53,955,638	0	33.0%	0.0%	25.0%	8.9%	11.9%	19.9%	0.1%	0.0%	0.0%	0.0%	0.0%	1.1%	100.0%
2018	419,551,131	445,982,853	452,649,519	33,333,333	40,000,000	58,395,153	0	32.3%	0.0%	25.2%	8.8%	12.7%	19.7%	0.1%	0.0%	0.0%	0.0%	0.0%	1.1%	100.0%
2019	427,103,052	454,010,544	457,343,877	36,666,667	40,000,000	62,834,668	0	31.5%	0.0%	25.5%	8.7%	13.6%	19.5%	0.2%	0.0%	0.0%	0.0%	0.0%	1.1%	100.0%
2020	434,790,907	462,182,734	462,182,734	40,000,000	40,000,000	67,274,183	0	30.7%	0.0%	25.7%	8.7%	14.4%	19.3%	0.2%	0.0%	0.0%	0.0%	0.0%	1.1%	100.0%
2021	442,617,143	470,502,023	467,168,690	43,333,333	40,000,000	71,713,699	0	30.0%	0.0%	26.0%	8.6%	15.1%	19.1%	0.2%	0.0%	0.0%	0.0%	0.0%	1.1%	100.0%
2022	450,584,251	478,971,059	472,304,393	46,666,667	40,000,000	76,153,214	0	29.2%	0.0%	26.3%	8.5%	15.9%	18.8%	0.2%	0.0%	0.0%	0.0%	0.0%	1.1%	100.0%
2023	458,694,768	487,592,538	477,592,538	50,000,000	40,000,000	80,592,729	0	28.5%	0.0%	26.6%	8.4%	16.6%	18.6%	0.2%	0.0%	0.0%	0.0%	0.0%	1.0%	100.0%
2024	466,951,274	496,369,204	486,369,204	50,000,000	40,000,000	85,032,245	0	27.6%	0.0%	27.4%	8.2%	17.2%	18.3%	0.2%	0.0%	0.0%	0.0%	0.0%	1.0%	100.0%
2025	475,356,397	505,303,850	494,385,005	50,918,845	40,000,000	89,471,760	0	26.7%	0.0%	25.9%	8.1%	17.8%	20.2%	0.3%	0.0%	0.0%	0.0%	0.0%	1.0%	100.0%
2026	483,912,812	514,399,319	502,641,286	51,758,033	40,000,000	93,911,275	0	25.9%	0.0%	24.8%	8.0%	18.4%	21.7%	0.3%	0.0%	0.0%	0.0%	0.0%	1.0%	100.0%
2027	492,623,243	523,658,507	511,036,109	52,622,397	40,000,000	98,350,791	0	25.0%	0.0%	25.6%	7.8%	18.9%	21.3%	0.3%	0.0%	0.0%	0.0%	0.0%	1.0%	100.0%
2028	501,490,461	533,084,360	519,583,094	53,501,266	40,000,000	102,790,306	0	24.3%	0.0%	26.3%	7.7%	19.4%	21.0%	0.3%	0.1%	0.0%	0.0%	0.0%	1.0%	100.0%
2029	510,517,289	542,679,878	528,283,814	54,396,065	40,000,000	107,229,821	0	23.5%	0.0%	27.1%	7.6%	19.9%	20.6%	0.4%	0.1%	0.0%	0.0%	0.0%	0.9%	100.0%
2030	519,706,600	552,448,116	537,141,158	55,306,958	40,000,000	111,669,336	0	22.7%	0.0%	27.8%	7.4%	20.3%	20.3%	0.4%	0.1%	0.0%	0.0%	0.0%	0.9%	100.0%
2031	529,061,319	562,392,162	546,157,933	56,234,249	40,000,000	116,108,852	0	22.0%	0.0%	28.6%	7.3%	20.7%	20.0%	0.4%	0.1%	0.0%	0.0%	0.0%	0.9%	100.0%
2032	538,584,423	572,515,242	555,337,010	57,178,321	40,000,000	120,548,367	0	21.2%	0.0%	29.3%	7.2%	21.1%	19.6%	0.5%	0.1%	0.0%	0.0%	0.0%	0.9%	100.0%
2033	548,278,943	582,820,516	564,681,311	58,139,205	40,000,000	124,987,882	0	20.5%	0.0%	30.1%	7.1%	21.5%	19.3%	0.5%	0.1%	0.0%	0.0%	0.0%	0.9%	100.0%
2034	558,147,964	593,311,285	574,193,809	59,117,476	40,000,000	129,427,398	0	19.9%	0.0%	30.8%	7.0%	21.9%	19.0%	0.6%	0.1%	0.0%	0.0%	0.0%	0.9%	100.0%
2035	568,194,627	603,990,888	583,877,532	60,113,356	40,000,000	133,866,913	0	19.2%	0.0%	31.5%	6.9%	22.2%	18.7%	0.6%	0.1%	0.0%	0.0%	0.0%	0.9%	100.0%
2036	578,422,130	614,862,724	593,735,562	61,127,162	40,000,000	138,306,428	0	18.5%	0.0%	32.2%	6.7%	22.5%	18.4%	0.7%	0.2%	0.0%	0.0%	0.0%	0.8%	100.0%
2037	588,833,728	625,930,253	603,771,037	62,159,217	40,000,000	142,745,943	0	17.9%	0.0%	33.0%	6.6%	22.7%	18.1%	0.7%	0.2%	0.0%	0.0%	0.0%	0.8%	100.0%
2038	599,432,736	637,196,998	613,987,150	63,209,848	40,000,000	147,185,459	0	17.3%	0.0%	33.7%	6.5%	23.0%	17.8%	0.8%	0.2%	0.0%	0.0%	0.0%	0.8%	100.0%
2039	610,222,525	648,666,544	624,387,153	64,279,391	40,000,000	151,624,974	0	16.7%	0.0%	34.4%	6.4%	23.2%	17.5%	0.8%	0.3%	0.0%	0.0%	0.0%	0.8%	100.0%
2040	621,206,530	660,342,542	634,974,356	65,368,186	40,000,000	156,064,489	0	16.1%	0.0%	35.1%	6.3%	23.4%	17.2%	0.9%	0.3%	0.0%	0.0%	0.0%	0.8%	100.0%
2041	632,388,248	672,228,707	645,752,129	66,476,578	40,000,000	160,504,005	0	15.5%	0.0%	35.8%	6.2%	23.5%	16.9%	1.0%	0.3%	0.0%	0.0%	0.0%	0.8%	100.0%
2042	643,771,236	684,328,824	656,723,902	67,604,922	40,000,000	164,943,520	0	14.9%	0.0%	36.5%	6.1%	23.6%	16.6%	1.1%	0.4%	0.0%	0.0%	0.0%	0.8%	100.0%
2043	655,359,119	696,646,743	667,893,167	68,753,576	40,000,000	169,383,035	0	14.4%	0.0%	37.2%	6.0%	23.7%	16.3%	1.2%	0.5%	0.0%	0.0%	0.0%	0.7%	100.0%
2044	667,155,583	709,186,384	679,263,478	69,922,906	40,000,000	173,822,550	0	13.8%	0.0%	37.9%	5.9%	23.8%	16.0%	1.3%	0.5%	0.0%	0.0%	0.0%	0.7%	100.0%
2045	679,164,383	721,951,739	690,838,455	71,113,284	40,000,000	178,262,066	0	13.3%	0.7%	37.9%	5.8%	23.8%	15.8%	1.4%	0.6%	0.0%	0.0%	0.0%	0.7%	100.0%
2046	691,389,342	734,946,871	702,621,782	72,325,089	40,000,000	182,701,581	0	12.8%	1.4%	37.8%	5.7%	23.8%	15.5%	1.5%	0.7%	0.0%	0.0%	0.0%	0.7%	100.0%
2047	703,834,350	748,175,914	714,617,208	73,558,706	40,000,000	187,141,096	0	12.3%	2.1%	37.8%	5.6%	23.8%	15.3%	1.6%	0.8%	0.0%	0.0%	0.0%	0.7%	100.0%
2048	716,503,369	761,643,081	726,828,553	74,814,528	40,000,000	191,580,612	0	11.8%	2.8%	37.9%	5.5%	23.7%	15.0%	1.8%	0.9%	0.0%	0.0%	0.0%	0.7%	100.0%
2049	729,400,429	775,352,656	739,259,701	76,092,955	40,000,000	196,020,127	0	11.4%	3.4%	37.9%	5.4%	23.5%	14.7%	1.9%	1.0%	0.0%	0.0%	0.0%	0.7%	100.0%
2050	742,529,637	789,309,004	751,914,610	77,394,394	40,000,000	200,459,642	0	10.9%	4.0%	38.0%	5.3%	23.4%	14.5%	2.1%	1.2%	0.0%	0.0%	0.0%	0.7%	100.0%
2051	755,895,170	803,516,566	764,797,308	78,719,259	40,000,000	204,899,158	0	10.5%	4.6%	38.0%	5.2%	23.1%	14.3%	2.3%	1.4%	0.0%	0.0%	0.0%	0.7%	100.0%
2052	769,501,283	817,979,864	777,911,894	80,067,971	40,000,000	209,338,673	0	10.0%	5.1%	38.1%	5.1%	22.9%	14.0%	2.5%	1.6%	0.0%	0.0%	0.0%	0.6%	100.0%
2053	783,352,307	832,703,502	791,262,542	81,440,960	40,000,000	213,778,188	0	9.6%	5.7%	38.2%	5.1%	22.5%	13.8%	2.7%	1.8%	0.0%	0.0%	0.0%	0.6%	100.0%
2054	797,452,648	847,692,165	804,853,502	82,838,663	40,000,000	218,217,703	0	9.2%	6.2%	38.3%	5.1%	22.1%	13.5%	2.9%	2.1%	0.0%	0.0%	0.0%	0.6%	100.0%
2055	811,806,796	862,950,624	818,689,100	84,261,524	40,000,000	222,657,219	0	8.8%	6.7%	38.5%	4.9%	21.6%	13.3%	3.2%	2.4%	0.0%	0.0%	0.0%	0.6%	100.0%
2056	826,419,318	878,483,735	832,773,738	85,709,997	40,000,000	227,096,734	0	8.4%	7.2%	38.6%	4.8%	21.1%	13.1%	3.4%	2.8%	0.0%	0.0%	0.0%	0.6%	100.0%
2057	841,294,866	894,296,442	847,111,900	87,184,542	40,000,000	231,536,249	0	8.0%	7.7%	38.8%	4.7%	20.4%	12.9%	3.7%	3.2%	0.0%	0.0%	0.0%	0.6%	100.0%
2058	856,438,173	910,393,778	861,708,149																	

Low Generation Case, Scenario 3: L

- 1.80% Elec. Consumption growth
- 6.30% Transmission and Distribution Losses (% of sales/
- 14.0 millions of MWh from renewables in 2008
- 40.0 millions of MWh from Industrial On-site in 2008
- 16.9% Assumed solar PV annual growth rate
- 10.5% Assumed solar CSP annual growth rate
- 50.0 Assumed efficiency reduction, in MWh, in 2023 (A)
- 0.00% Assumed growth rate of industrial on-site MWh
- 20.00% % of total electricity consumption as wind in 2060
- 25.00% % of PC w/CCS that is parasitic load for carbon ca
- 16.00% % of IGCC w/CCS that is parasitic load for carbon
- 15.00% % of NGCC w/CCS that is parasitic load for carbon

TOTAL MWH OF GENERATION FROM EACH POWER PLANT TYPE - INCLUDING PARASITICS DUE TO CARBON CAPTURE																Total MWh from Table	MWh Target (check)	Difference from MWh Target	Annual CO2 Emissions (MtCO2)	Target CO2 Emissions (MtCO2)	Total TWh w/o parasitics
Year	TX Electrical Sales (MWh), neglects losses in T&D	TX Elec. Gen - w/o Industrial On-site (MWh)	Texas total Consumption w/o CCS parasitics (MWh)	MWh PC Coal, no CCS	MWh IGCC Coal, no CCS	MWh NGCC, no CCS	MWh NG Industrial On-Site	MWh wind and hydro	MWh Nuclear	MWh Solar CSP	MWh Solar PV	MWh PC Coal, w/CCS	MWh IGCC Coal, w/CCS	MWh NGCC, w/CCS	MWh other						
2008	351,000,000	373,113,000	413,113,000	154,917,375	0	157,968,269	40,000,000	13,987,000	41,270,000	0	13,000	0	0	0	4,957,356	413,113,000	413,113,000	0	259	413	
2009	357,318,000	379,829,034	416,495,701	155,000,000	0	156,786,185	40,000,000	18,424,323	41,270,000	0	15,192	0	0	0	5,000,000	416,495,701	416,495,701	0	258	416	
2010	363,749,724	386,665,957	419,999,290	155,000,000	0	155,120,259	40,000,000	22,861,277	42,000,000	0	17,753	0	0	0	5,000,000	419,999,290	419,999,290	0	257	420	
2011	370,297,219	393,625,944	423,625,944	165,000,000	0	144,307,398	40,000,000	27,297,800	42,000,000	0	20,746	0	0	0	5,000,000	423,625,944	423,625,944	0	261	424	
2012	376,962,569	400,711,211	427,377,877	177,000,000	0	131,619,816	40,000,000	31,383,417	42,000,000	350,400	24,244	0	0	0	5,000,000	427,377,877	427,377,877	0	267	426	
2013	383,747,895	407,924,013	431,257,346	177,000,000	0	131,059,769	40,000,000	35,781,948	42,000,000	387,297	28,332	0	0	0	5,000,000	431,257,346	431,257,346	0	266	431	
2014	390,655,357	415,266,645	435,266,645	175,000,000	0	132,629,553	40,000,000	40,175,904	42,000,000	428,080	33,108	0	0	0	5,000,000	435,266,645	435,266,645	0	265	435	
2015	397,687,154	422,741,444	439,408,111	152,000,000	0	108,331,504	40,000,000	44,564,760	89,000,000	473,156	38,691	0	0	0	5,000,000	439,408,111	439,408,111	0	229	439	
2016	404,845,523	430,350,790	443,684,124	150,000,000	0	110,168,001	40,000,000	48,947,929	89,000,000	522,980	45,214	0	0	0	5,000,000	443,684,124	443,684,124	0	228	444	
2017	412,132,742	438,097,105	448,097,105	148,000,000	0	112,141,467	40,000,000	53,324,751	89,000,000	578,049	52,837	0	0	0	5,000,000	448,097,105	448,097,105	0	227	443	
2018	419,551,131	445,982,853	452,649,519	146,000,000	0	114,254,366	40,000,000	57,694,490	89,000,000	638,918	61,745	0	0	0	5,000,000	452,649,519	452,649,519	0	227	458	
2019	427,103,052	454,010,544	457,343,877	144,000,000	0	116,509,209	40,000,000	62,056,317	89,000,000	706,196	72,155	0	0	0	5,000,000	457,343,877	457,343,877	0	226	462	
2020	434,790,907	462,182,734	462,182,734	142,000,000	0	118,908,550	40,000,000	66,409,304	89,000,000	780,559	84,321	0	0	0	5,000,000	462,182,734	462,182,734	0	225	210	
2021	442,617,143	470,502,023	467,168,690	140,000,000	0	121,454,991	40,000,000	70,752,410	89,000,000	862,751	98,537	0	0	0	5,000,000	467,168,690	467,168,690	0	224	205	
2022	450,584,251	478,971,059	472,304,393	138,000,000	0	124,151,179	40,000,000	75,084,465	89,000,000	953,599	115,150	0	0	0	5,000,000	472,304,393	472,304,393	0	224	202	
2023	458,694,768	487,592,538	477,592,538	136,000,000	0	126,999,809	40,000,000	79,404,152	89,000,000	1,054,013	134,565	0	0	0	5,000,000	477,592,538	477,592,538	0	223	196	
2024	466,951,274	496,369,204	486,369,204	134,000,000	0	133,336,959	40,000,000	83,709,992	89,000,000	1,165,001	157,252	0	0	0	5,000,000	486,369,204	486,369,204	0	225	192	
2025	475,356,397	505,303,850	494,385,005	132,000,000	0	127,913,245	40,000,000	88,000,320	100,000,000	1,287,675	183,765	0	0	0	5,000,000	494,385,005	494,385,005	0	220	187	
2026	483,912,812	514,399,319	502,641,286	130,000,000	0	124,730,011	40,000,000	92,273,260	109,000,000	1,423,267	214,748	0	0	0	5,000,000	502,641,286	502,641,286	0	216	183	
2027	492,623,243	523,658,507	511,036,109	128,000,000	0	130,685,319	40,000,000	96,526,699	109,000,000	1,573,137	250,955	0	0	0	5,000,000	511,036,109	511,036,109	0	217	178	
2028	501,490,461	533,084,360	519,583,094	126,000,000	0	136,792,788	40,000,000	100,758,252	109,000,000	1,738,789	293,266	0	0	0	5,000,000	519,583,094	519,583,094	0	219	174	
2029	510,517,289	542,679,878	528,283,814	124,000,000	0	143,053,992	40,000,000	104,965,228	109,000,000	1,921,883	342,710	0	0	0	5,000,000	528,283,814	528,283,814	0	220	169	
2030	519,706,600	552,448,116	537,141,158	122,000,000	0	149,471,821	40,000,000	109,144,588	109,000,000	2,124,257	400,491	0	0	0	5,000,000	537,141,158	537,141,158	0	221	165	
2031	529,061,319	562,392,182	546,157,933	120,000,000	0	156,049,081	40,000,000	113,292,896	109,000,000	2,347,942	468,014	0	0	0	5,000,000	546,157,933	546,157,933	0	223	160	
2032	538,584,423	572,515,242	555,337,010	118,000,000	0	162,788,643	40,000,000	117,406,266	109,000,000	2,595,180	546,921	0	0	0	5,000,000	555,337,010	555,337,010	0	224	155	
2033	548,278,943	582,820,516	564,681,311	116,000,000	0	169,693,429	40,000,000	121,480,298	109,000,000	2,868,453	639,132	0	0	0	5,000,000	564,681,311	564,681,311	0	226	151	
2034	558,147,964	593,311,285	574,193,809	114,000,000	0	176,766,411	40,000,000	125,510,008	109,000,000	3,170,501	746,889	0	0	0	5,000,000	574,193,809	574,193,809	0	228	146	
2035	568,194,627	603,990,888	583,877,532	112,000,000	0	184,010,619	40,000,000	129,489,744	109,000,000	3,504,354	872,815	0	0	0	5,000,000	583,877,532	583,877,532	0	230	142	
2036	578,422,130	614,862,724	593,735,562	110,000,000	0	191,429,134	40,000,000	133,413,094	109,000,000	3,873,363	1,019,972	0	0	0	5,000,000	593,735,562	593,735,562	0	231	137	
2037	588,833,728	625,930,253	603,771,037	108,000,000	0	199,025,093	40,000,000	137,272,777	109,000,000	4,281,228	1,191,939	0	0	0	5,000,000	603,771,037	603,771,037	0	233	133	
2038	599,432,736	637,196,998	613,987,150	106,000,000	0	206,801,691	40,000,000	141,060,518	109,000,000	4,732,041	1,392,900	0	0	0	5,000,000	613,987,150	613,987,150	0	236	128	
2039	610,222,525	648,666,544	624,387,153	104,000,000	0	214,762,179	40,000,000	144,766,906	109,000,000	5,230,325	1,627,742	0	0	0	5,000,000	624,387,153	624,387,153	0	238	124	
2040	621,206,530	660,342,542	634,974,356	102,000,000	0	222,909,867	40,000,000	148,381,231	109,000,000	5,781,078	1,902,180	0	0	0	5,000,000	634,974,356	634,974,356	0	240	119	
2041	632,388,248	672,228,707	645,752,129	100,000,000	0	231,248,124	40,000,000	151,891,291	109,000,000	6,389,826	2,222,887	0	0	0	5,000,000	645,752,129	645,752,129	0	243	115	
2042	643,771,236	684,328,824	656,723,902	98,000,000	0	239,780,382	40,000,000	155,283,179	109,000,000	7,062,675	2,597,666	0	0	0	5,000,000	656,723,902	656,723,902	0	245	110	
2043	655,359,119	696,646,743	667,893,167	96,000,000	0	248,510,131	40,000,000	158,541,028	109,000,000	7,806,374	3,035,633	0	0	0	5,000,000	667,893,167	667,893,167	0	248	106	
2044	667,155,583	709,186,384	679,263,478	94,000,000	0	257,440,928	40,000,000	161,646,725	109,000,000	8,628,385	3,547,440	0	0	0	5,000,000	679,263,478	679,263,478	0	250	101	
2045	679,164,383	721,951,739	690,838,455	92,000,000	5,000,000	261,576,389	40,000,000	164,579,573	109,000,000	9,536,954	4,145,539	0	0	0	5,000,000	690,838,455	690,838,455	0	255	97	
2046	691,389,342	734,946,871	702,621,782	90,000,000	10,000,000	265,920,201	40,000,000	167,315,909	109,000,000	10,541,196	4,844,477	0	0	0	5,000,000	702,621,782	702,621,782	0	260	92	
2047	703,834,350	748,175,914	714,617,208	88,000,000	15,000,000	270,476,112	40,000,000	169,828,657	109,000,000	11,651,184	5,661,255	0	0	0	5,000,000	714,617,208	714,617,208	0	265	87	
2048	716,503,369	761,643,081	726,828,553	86,000,000	20,000,000	275,247,941	40,000,000	172,086,815	109,000,000	12,878,053	6,615,743	0	0	0	5,000,000	726,828,553	726,828,553	0	270	83	
2049	729,400,429	775,352,656	739,259,701	84,000,000	25,000,000	280,239,574	40,000,000	174,054,857	109,000,000	14,234,112	7,731,157	0	0	0	5,000,000	739,259,701	739,259,701	0	275	78	
2050	742,529,637	789,309,004	751,914,610	82,000,000	30,000,000	285,454,968	40,000,000	175,692,047	109,000,000	15,732,984	9,034,630	0	0	0	5,000,000	751,914,610	751,914,610	0	280	74	
2051	755,895,170	803,516,566	764,797,308	80,000,000	35,000,000	290,898,150	40,000,000	176,951,643	109,000,000	17,389,645	10,557,869	0	0	0	5,000,000	764,797,308	764,797,308	0	286	74	
2052	769,501,283	817,979,864	777,911,894	78,000,000	40,000,000	296,573,221	40,000,000	177,779,972	109												

BAU Generation Case, Scenario 3: Low NG price with no Carbon Price

- 1.80% Elec. Consumption growth
- 6.30% Transmission and Distribution Losses (% of sales/consumption)
- 14.0 millions of MWh from renewables in 2008
- 40.0 millions of MWh from Industrial On-site in 2008
- 17.1% Assumed solar PV annual growth rate
- 10.8% Assumed solar CSP annual growth rate
- 0.0 Assumed efficiency reduction, in MWh, in 2023 (ACEEE)
- 0.00% Assumed growth rate of industrial on-site MWh
- 20.00% % of total electricity consumption as wind in 2060
- 25.00% % of PC w/CCS that is parasitic load for carbon capture
- 16.00% % of IGCC w/CCS that is parasitic load for carbon capture
- 15.00% % of NGCC w/CCS that is parasitic load for carbon capture

	CO2	
	M/MWh	
	PC	1.00
	PC w/CCS	0.20
	IGCC	0.90
	IGCC w/CCS	0.18
	NGCC	0.53
	NGCC w/CCS	0.09
	CHP (Ind.)	0.5

PERCENTAGES OF TOTAL GENERATION FROM EACH POWER PLANT TYPE

Year	TX Electrical Sales (MWh), neglects losses in T&D	TX Elec. Gen - w/o Industrial On-site (MWh)	Texas total Consumption w/o CCS parasitics (MWh)	TX Total MWh from efficiency	TX Total MWh from Industrial On-site	TX Total MWh from renewables	TX Total MWh Parasitics due to CCS	% MWh PC Coal, no CCS	% MWh IGCC Coal, no CCS	% MWh NGCC, no CCS	% MWh Industrial On-site	% MWh Wind and Hydro	% Nuclear	% MWh Solar CSP	% MWh Solar PV	% MWh PC Coal, w/CCS	% MWh IGCC Coal, w/CCS	% MWh NGCC, w/CCS	% MWh other	Total % MWh
2008	351,000,000	373,113,000	413,113,000	0	40,000,000	14,000,000	0	37.5%	0.0%	38.1%	9.7%	3.4%	10.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.4%	100.0%
2009	357,318,000	379,829,034	419,829,034	0	40,000,000	15,982,529	0	35.7%	0.0%	39.2%	9.5%	4.5%	9.8%	0.0%	0.0%	0.0%	0.0%	0.0%	1.2%	100.0%
2010	363,749,724	386,665,957	426,665,957	0	40,000,000	23,965,058	0	36.3%	0.0%	37.7%	9.4%	5.6%	9.8%	0.0%	0.0%	0.0%	0.0%	0.0%	1.2%	100.0%
2011	370,297,219	393,625,944	433,625,944	0	40,000,000	28,947,588	0	38.1%	0.0%	35.2%	9.2%	6.7%	9.7%	0.0%	0.0%	0.0%	0.0%	0.0%	1.2%	100.0%
2012	376,962,569	400,711,211	440,711,211	0	40,000,000	33,930,117	0	40.2%	0.0%	32.4%	9.1%	7.6%	9.5%	0.1%	0.0%	0.0%	0.0%	0.0%	1.1%	100.0%
2013	383,747,895	407,924,013	447,924,013	0	40,000,000	38,912,646	0	39.5%	0.0%	32.4%	8.9%	8.6%	9.4%	0.1%	0.0%	0.0%	0.0%	0.0%	1.1%	100.0%
2014	390,655,357	415,266,645	455,266,645	0	40,000,000	43,895,175	0	38.4%	0.0%	32.8%	8.8%	9.5%	9.2%	0.1%	0.0%	0.0%	0.0%	0.0%	1.1%	100.0%
2015	397,687,154	422,741,444	462,741,444	0	40,000,000	48,877,704	0	32.8%	0.0%	27.6%	8.6%	10.5%	19.2%	0.1%	0.0%	0.0%	0.0%	0.0%	1.1%	100.0%
2016	404,845,523	430,350,790	470,350,790	0	40,000,000	53,860,234	0	31.9%	0.0%	28.2%	8.5%	11.3%	18.9%	0.1%	0.0%	0.0%	0.0%	0.0%	1.1%	100.0%
2017	412,132,742	438,097,105	478,097,105	0	40,000,000	58,842,763	0	31.0%	0.0%	28.7%	8.4%	12.2%	18.6%	0.1%	0.0%	0.0%	0.0%	0.0%	1.0%	100.0%
2018	419,551,131	445,982,853	485,982,853	0	40,000,000	63,825,292	0	30.0%	0.0%	29.3%	8.2%	13.0%	18.3%	0.1%	0.0%	0.0%	0.0%	0.0%	1.0%	100.0%
2019	427,103,052	454,010,544	494,010,544	0	40,000,000	68,807,821	0	29.1%	0.0%	29.8%	8.1%	13.8%	18.0%	0.1%	0.0%	0.0%	0.0%	0.0%	1.0%	100.0%
2020	434,790,907	462,182,734	502,182,734	0	40,000,000	73,790,350	0	28.3%	0.0%	30.3%	8.0%	14.5%	17.7%	0.2%	0.0%	0.0%	0.0%	0.0%	1.0%	100.0%
2021	442,617,143	470,502,023	510,502,023	0	40,000,000	78,772,880	0	27.4%	0.0%	30.9%	7.8%	15.2%	17.4%	0.2%	0.0%	0.0%	0.0%	0.0%	1.0%	100.0%
2022	450,584,251	478,971,059	518,971,059	0	40,000,000	83,755,409	0	26.6%	0.0%	31.4%	7.7%	15.9%	17.1%	0.2%	0.0%	0.0%	0.0%	0.0%	1.0%	100.0%
2023	458,694,768	487,592,538	527,592,538	0	40,000,000	88,737,938	0	25.8%	0.0%	32.0%	7.6%	16.6%	16.9%	0.2%	0.0%	0.0%	0.0%	0.0%	0.9%	100.0%
2024	466,951,274	496,369,204	536,369,204	0	40,000,000	93,720,467	0	25.0%	0.0%	32.6%	7.5%	17.2%	16.6%	0.2%	0.0%	0.0%	0.0%	0.0%	0.9%	100.0%
2025	475,356,397	505,303,850	545,303,850	0	40,000,000	98,702,996	0	24.2%	0.0%	31.1%	7.3%	17.8%	18.3%	0.2%	0.0%	0.0%	0.0%	0.0%	0.9%	100.0%
2026	483,912,812	514,399,319	554,399,319	0	40,000,000	103,685,525	0	23.4%	0.0%	30.1%	7.2%	18.4%	19.7%	0.3%	0.0%	0.0%	0.0%	0.0%	0.9%	100.0%
2027	492,623,243	523,658,507	563,658,507	0	40,000,000	108,668,055	0	22.7%	0.0%	30.7%	7.1%	18.9%	19.3%	0.3%	0.0%	0.0%	0.0%	0.0%	0.9%	100.0%
2028	501,490,461	533,084,360	573,084,360	0	40,000,000	113,650,584	0	22.0%	0.0%	31.3%	7.0%	19.5%	19.0%	0.3%	0.1%	0.0%	0.0%	0.0%	0.9%	100.0%
2029	510,517,289	542,679,878	582,679,878	0	40,000,000	118,633,113	0	21.3%	0.0%	31.9%	6.9%	20.0%	18.7%	0.3%	0.1%	0.0%	0.0%	0.0%	0.9%	100.0%
2030	519,706,600	552,448,116	592,448,116	0	40,000,000	123,615,642	0	20.6%	0.0%	32.5%	6.8%	20.4%	18.4%	0.4%	0.1%	0.0%	0.0%	0.0%	0.8%	100.0%
2031	529,061,319	562,392,182	602,392,182	0	40,000,000	128,598,171	0	19.9%	0.0%	33.2%	6.8%	20.9%	18.1%	0.4%	0.1%	0.0%	0.0%	0.0%	0.8%	100.0%
2032	538,584,423	572,515,242	612,515,242	0	40,000,000	133,580,701	0	19.3%	0.0%	33.8%	6.5%	21.3%	17.8%	0.4%	0.1%	0.0%	0.0%	0.0%	0.8%	100.0%
2033	548,278,943	582,820,516	622,820,516	0	40,000,000	138,563,230	0	18.6%	0.0%	34.4%	6.4%	21.7%	17.5%	0.5%	0.1%	0.0%	0.0%	0.0%	0.8%	100.0%
2034	558,147,964	593,311,285	633,311,285	0	40,000,000	143,545,759	0	18.0%	0.0%	35.0%	6.3%	22.0%	17.2%	0.5%	0.1%	0.0%	0.0%	0.0%	0.8%	100.0%
2035	568,194,627	603,990,888	643,990,888	0	40,000,000	148,528,288	0	17.4%	0.0%	35.6%	6.2%	22.3%	16.9%	0.6%	0.1%	0.0%	0.0%	0.0%	0.8%	100.0%
2036	578,422,130	614,862,724	654,862,724	0	40,000,000	153,510,817	0	16.8%	0.0%	36.2%	6.1%	22.7%	16.6%	0.6%	0.2%	0.0%	0.0%	0.0%	0.8%	100.0%
2037	588,833,728	625,930,253	665,930,253	0	40,000,000	158,493,347	0	16.2%	0.0%	36.9%	6.0%	22.9%	16.4%	0.7%	0.2%	0.0%	0.0%	0.0%	0.8%	100.0%
2038	599,432,736	637,196,998	677,196,998	0	40,000,000	163,475,876	0	15.7%	0.0%	37.5%	5.9%	23.2%	16.1%	0.7%	0.2%	0.0%	0.0%	0.0%	0.7%	100.0%
2039	610,222,525	648,666,544	688,666,544	0	40,000,000	168,458,405	0	15.1%	0.0%	38.1%	5.8%	23.4%	15.8%	0.8%	0.3%	0.0%	0.0%	0.0%	0.7%	100.0%
2040	621,206,530	660,342,542	700,342,542	0	40,000,000	173,440,934	0	14.6%	0.7%	38.0%	5.7%	23.6%	15.6%	0.9%	0.3%	0.0%	0.0%	0.0%	0.7%	100.0%
2041	632,388,248	672,228,707	712,228,707	0	40,000,000	178,423,463	0	14.0%	1.4%	37.9%	5.6%	23.8%	15.3%	1.0%	0.3%	0.0%	0.0%	0.0%	0.7%	100.0%
2042	643,771,236	684,328,824	724,328,824	0	40,000,000	183,405,993	0	13.5%	2.1%	37.8%	5.5%	23.9%	15.0%	1.0%	0.4%	0.0%	0.0%	0.0%	0.7%	100.0%
2043	655,359,119	696,646,743	736,646,743	0	40,000,000	188,388,522	0	13.0%	2.7%	37.8%	5.4%	24.0%	14.8%	1.1%	0.4%	0.0%	0.0%	0.0%	0.7%	100.0%
2044	667,155,583	709,186,384	749,186,384	0	40,000,000	193,371,051	0	12.5%	3.3%	37.7%	5.3%	24.1%	14.5%	1.2%	0.5%	0.0%	0.0%	0.0%	0.7%	100.0%
2045	679,164,383	721,951,739	761,951,739	0	40,000,000	198,353,580	0	12.1%	3.9%	37.7%	5.2%	24.1%	14.3%	1.3%	0.6%	0.0%	0.0%	0.0%	0.7%	100.0%
2046	691,389,342	734,946,871	774,946,871	0	40,000,000	203,336,109	0	11.6%	4.5%	37.8%	5.2%	24.1%	14.1%	1.5%	0.7%	0.0%	0.0%	0.0%	0.6%	100.0%
2047	703,834,350	748,175,914	788,175,914	0	40,000,000	208,318,639	0	11.2%	5.1%	37.8%	5.1%	24.1%	13.8%	1.6%	0.8%	0.0%	0.0%	0.0%	0.6%	100.0%
2048	716,503,369	761,643,081	801,643,081	0	40,000,000	213,301,168	0	10.7%	5.6%	37.8%	5.0%	24.0%	13.6%	1.7%	0.9%	0.0%	0.0%	0.0%	0.6%	100.0%
2049	729,400,429	775,352,656	815,352,656	0	40,000,000	218,283,697	0	10.3%	6.1%	37.9%	4.9%	23.8%	13.4%	1.9%	1.0%	0.0%	0.0%	0.0%	0.6%	100.0%
2050	742,529,637	789,309,004	829,309,004	0	40,000,000	223,266,226	0	9.9%	6.6%	38.0%	4.8%	23.7%	13.1%	2.1%	1.2%	0.0%	0.0%	0.0%	0.6%	100.0%
2051	755,895,170	803,516,566	843,516,566	0	40,000,000	228,248,755	0	9.5%	7.1%	38.1%	4.7%	23.4%	12.9%	2.3%	1.4%	0.0%	0.0%	0.0%	0.6%	100.0%
2052	769,501,283	817,979,864	857,979,864	0	40,000,000	233,231,284	0	9.1%	7.6%	38.2%	4.7%	23.2%	12.7%	2.5%	1.6%	0.0%	0.0%	0.0%	0.6%	100.0%
2053	783,352,307	832,703,502	872,703,502	0	40,000,000	238,213,814	0	8.7%	8.0%	38.3%	4.6%	22.8%	12.5%	2.7%	1.8%	0.0%	0.0%	0.0%	0.6%	100.0%
2054	797,452,648	847,692,165	887,692,165	0	40,000,000	243,196,343	0	8.3%	8.4%	38.5%	4.5%	22.4%	12.3%	2.9%	2.1%	0.0%	0.0%	0.0%	0.6%	100.0%
2055	811,806,796	862,950,624	902,950,624	0	40,000,000	248,178,872	0	8.0%	8.9%	38.6%	4.4%	21.9%	12.1%	3.2%	2.4%	0.0%	0.0%	0.0%	0.6%	100.0%
2056	826,419,318	878,483,735	918,483,735	0	40,000,000	253,161,401	0	7.6%	9.3%	38.8%	4.4%	21.4%	11.9%	3.4%	2.8%	0.0%	0.0%	0.0%	0.5%	100.0%
2057	841,294,866	894,296,442	934,296,442	0	40,000,000	258,143,930	0	7.3%	9.6%	39.0%	4.3%	20.7%	11.7%	3.8%	3.2%	0.0%	0.0%	0.0%	0.5%	100.0%
2058	856,438,173	910,393,778	950,393,778	0	40,000,000	263,126,460	0	6.9%	10.0%	39.2%	4.2%	19.9%	11.5%	4.1%	3.7%	0.0%	0.0%	0.0%	0.5%	100.0%
2059	871,854,060	926,780,866	966,780,866	0	40,000,000	268,108,989	0	6.6%	10.3%	39.4%	4.1%	19.1%	11.3%	4.5%	4.2%	0.0%	0.0%	0.0%	0.5%	100.0%
2060	887,547,434	943,462,922	983,																	

BAU Generation Case, Scenario 3: Low

- 1.80% Elec. Consumption growth
- 6.30% Transmission and Distribution Losses (% of sales/consumption)
- 14.0 millions of MWh from renewables in 2008
- 40.0 millions of MWh from Industrial On-site in 2008
- 17.1% Assumed solar PV annual growth rate
- 10.8% Assumed solar CSP annual growth rate
- 0.0 Assumed efficiency reduction, in MWh, in 2023 (ACEE)
- 0.00% Assumed growth rate of industrial on-site MWh
- 20.00% % of total electricity consumption as wind in 2060
- 25.00% % of PC w/CCS that is parasitic load for carbon capture
- 16.00% % of IGCC w/CCS that is parasitic load for carbon capture
- 15.00% % of NGCC w/CCS that is parasitic load for carbon capture

TOTAL MWH OF GENERATION FROM EACH POWER PLANT TYPE - INCLUDING PARASITICS DUE TO CARBON CAPTURE

Year	TX Electrical Sales (MWh), neglects losses in T&D	TX Elec. Gen - w/o Industrial On-site (MWh)	Texas total Consumption w/o CCS parasitics (MWh)	MWh PC Coal, no CCS	MWh IGCC Coal, no CCS	MWh NGCC, no CCS	MWh NG Industrial On-Site	MWh Wind and Hydro	MWh Nuclear	MWh Solar CSP	MWh Solar PV	MWh PC Coal, w/CCS	MWh IGCC Coal, w/CCS	MWh NGCC, w/CCS	MWh other	Total MWh from Table	MWh Target (check)	Difference from MWh Target	Annual CO2 Emissions (MTCO2)	Target CO2 Emissions (MTCO2)	Total MWh w/o parasitics
2008	351,000,000	373,113,000	413,113,000	154,917,375	0	157,224,666	40,000,000	13,987,000	41,270,000	0	13,000,000	0	0	0	5,148,959	412,561,000	413,113,000	-552,000	258	413	413
2009	357,318,000	379,829,034	419,829,034	150,000,000	0	164,576,505	40,000,000	18,967,306	41,270,000	0	15,223,000	0	0	0	5,000,000	419,829,034	419,829,034	0	257	420	420
2010	363,749,724	386,665,957	426,665,957	155,000,000	0	160,700,898	40,000,000	23,947,232	42,000,000	0	17,826,000	0	0	0	5,000,000	426,665,957	426,665,957	0	260	427	427
2011	370,297,219	393,625,944	433,625,944	165,000,000	0	152,678,356	40,000,000	28,926,713	42,000,000	0	20,874,000	0	0	0	5,000,000	433,625,944	433,625,944	0	266	434	434
2012	376,962,569	400,711,211	440,711,211	177,000,000	0	142,781,094	40,000,000	33,555,273	42,000,000	350,400	24,444,000	0	0	0	5,000,000	440,711,211	440,711,211	0	273	441	441
2013	383,747,895	407,924,013	447,924,013	177,000,000	0	145,011,367	40,000,000	38,495,853	42,000,000	388,170	28,424,000	0	0	0	5,000,000	447,924,013	447,924,013	0	274	448	448
2014	390,655,357	415,266,645	455,266,645	175,000,000	0	149,371,470	40,000,000	43,431,646	42,000,000	430,010	33,519,000	0	0	0	5,000,000	455,266,645	455,266,645	0	274	455	455
2015	397,687,154	422,741,444	462,741,444	152,000,000	0	127,863,740	40,000,000	48,362,093	89,000,000	476,361	39,250,000	0	0	0	5,000,000	462,741,444	462,741,444	0	240	233	463
2016	404,845,523	430,350,790	470,350,790	150,000,000	0	132,490,557	40,000,000	53,286,563	89,000,000	527,708	45,962,000	0	0	0	5,000,000	470,350,790	470,350,790	0	240	228	470
2017	412,132,742	438,097,105	478,097,105	148,000,000	0	137,254,342	40,000,000	58,204,351	89,000,000	584,590	53,821,000	0	0	0	5,000,000	478,097,105	478,097,105	0	241	223	478
2018	419,551,131	445,982,853	485,982,853	146,000,000	0	142,157,561	40,000,000	63,114,664	89,000,000	647,603	63,025,000	0	0	0	5,000,000	485,982,853	485,982,853	0	241	219	486
2019	427,103,052	454,010,544	494,010,544	144,000,000	0	147,202,723	40,000,000	68,016,611	89,000,000	717,408	73,824,000	0	0	0	5,000,000	494,010,544	494,010,544	0	242	214	494
2020	434,790,907	462,182,734	502,182,734	142,000,000	0	152,392,383	40,000,000	72,909,191	89,000,000	794,737	86,422,000	0	0	0	5,000,000	502,182,734	502,182,734	0	243	210	502
2021	442,617,143	470,502,023	510,502,023	140,000,000	0	157,429,143	40,000,000	77,791,277	89,000,000	880,402	101,201,000	0	0	0	5,000,000	510,502,023	510,502,023	0	244	205	510
2022	450,584,251	478,971,059	518,971,059	138,000,000	0	163,215,651	40,000,000	82,661,602	89,000,000	975,301	118,506,000	0	0	0	5,000,000	518,971,059	518,971,059	0	245	201	519
2023	458,694,768	487,592,538	527,592,538	136,000,000	0	168,854,600	40,000,000	87,816,739	89,000,000	1,080,428	138,770,000	0	0	0	5,000,000	527,592,538	527,592,538	0	245	196	528
2024	466,951,274	496,369,204	536,369,204	134,000,000	0	174,648,737	40,000,000	92,361,079	89,000,000	1,196,888	162,500,000	0	0	0	5,000,000	536,369,204	536,369,204	0	247	192	536
2025	475,356,397	505,303,850	545,303,850	132,000,000	0	189,600,853	40,000,000	97,186,808	100,000,000	1,325,900	190,288,000	0	0	0	5,000,000	545,303,850	545,303,850	0	242	187	545
2026	483,912,812	514,399,319	554,399,319	130,000,000	0	196,713,794	40,000,000	101,993,880	109,000,000	1,468,819	222,827,000	0	0	0	5,000,000	554,399,319	554,399,319	0	238	183	554
2027	492,623,243	523,658,507	563,658,507	128,000,000	0	172,990,452	40,000,000	106,779,982	109,000,000	1,627,143	260,930,000	0	0	0	5,000,000	563,658,507	563,658,507	0	240	178	564
2028	501,490,461	533,084,360	573,084,360	126,000,000	0	179,433,776	40,000,000	111,542,502	109,000,000	1,802,533	305,549,000	0	0	0	5,000,000	573,084,360	573,084,360	0	241	174	573
2029	510,517,289	542,679,878	582,679,878	124,000,000	0	186,046,765	40,000,000	116,278,487	109,000,000	1,996,828	357,798,000	0	0	0	5,000,000	582,679,878	582,679,878	0	243	169	583
2030	519,706,600	552,448,116	592,448,116	122,000,000	0	192,832,474	40,000,000	120,984,595	109,000,000	2,212,066	418,982,000	0	0	0	5,000,000	592,448,116	592,448,116	0	244	165	592
2031	529,061,319	562,392,182	602,392,182	120,000,000	0	199,794,011	40,000,000	125,657,040	109,000,000	2,450,504	490,628,000	0	0	0	5,000,000	602,392,182	602,392,182	0	246	160	602
2032	538,584,423	572,515,242	612,515,242	118,000,000	0	206,934,541	40,000,000	130,291,532	109,000,000	2,714,644	574,525,000	0	0	0	5,000,000	612,515,242	612,515,242	0	248	155	613
2033	548,278,943	582,820,516	622,820,516	116,000,000	0	214,257,286	40,000,000	134,883,206	109,000,000	3,007,256	672,769,000	0	0	0	5,000,000	622,820,516	622,820,516	0	250	151	623
2034	558,147,964	593,311,285	633,311,285	114,000,000	0	221,765,526	40,000,000	139,426,539	109,000,000	3,331,408	787,812,000	0	0	0	5,000,000	633,311,285	633,311,285	0	252	146	633
2035	568,194,627	603,990,888	643,990,888	112,000,000	0	229,462,600	40,000,000	143,915,260	109,000,000	3,690,500	922,528,000	0	0	0	5,000,000	643,990,888	643,990,888	0	254	142	644
2036	578,422,130	614,862,724	654,862,724	110,000,000	0	237,351,907	40,000,000	148,342,238	109,000,000	4,088,299	1,080,280,000	0	0	0	5,000,000	654,862,724	654,862,724	0	256	137	655
2037	588,833,728	625,930,253	665,930,253	108,000,000	0	245,436,907	40,000,000	152,699,362	109,000,000	4,528,977	1,265,008,000	0	0	0	5,000,000	665,930,253	665,930,253	0	258	133	666
2038	599,432,736	637,196,998	677,196,998	106,000,000	0	253,721,122	40,000,000	156,977,396	109,000,000	5,017,155	1,481,324,000	0	0	0	5,000,000	677,196,998	677,196,998	0	260	128	677
2039	610,222,525	648,666,544	688,666,544	104,000,000	0	262,208,139	40,000,000	161,165,819	109,000,000	5,557,955	1,734,631,000	0	0	0	5,000,000	688,666,544	688,666,544	0	263	124	689
2040	621,206,530	660,342,542	700,342,542	102,000,000	5,000,000	265,901,608	40,000,000	165,252,635	109,000,000	6,157,046	2,031,253,000	0	0	0	5,000,000	700,342,542	700,342,542	0	267	119	700
2041	632,388,248	672,228,707	712,228,707	100,000,000	10,000,000	269,805,244	40,000,000	169,224,152	109,000,000	6,820,714	2,378,597,000	0	0	0	5,000,000	712,228,707	712,228,707	0	272	115	712
2042	643,771,236	684,328,824	724,328,824	98,000,000	15,000,000	273,922,832	40,000,000	173,064,736	109,000,000	7,555,919	2,785,337,000	0	0	0	5,000,000	724,328,824	724,328,824	0	277	110	724
2043	655,359,119	696,646,743	736,646,743	96,000,000	20,000,000	278,258,221	40,000,000	176,756,520	109,000,000	8,370,372	3,261,630,000	0	0	0	5,000,000	736,646,743	736,646,743	0	281	106	737
2044	667,155,583	709,186,384	749,186,384	94,000,000	25,000,000	282,815,333	40,000,000	180,279,068	109,000,000	9,272,614	3,819,369,000	0	0	0	5,000,000	749,186,384	749,186,384	0	286	101	749
2045	679,164,383	721,951,739	749,951,739	92,000,000	30,000,000	287,598,159	40,000,000	183,608,990	109,000,000	10,272,109	4,472,481,000	0	0	0	5,000,000	761,951,739	761,951,739	0	291	97	762
2046	691,389,342	734,946,871	774,946,871	90,000,000	35,000,000	292,610,761	40,000,000	186,719,494	109,000,000	11,379,340	5,237,275,000	0	0	0	5,000,000	774,946,871	774,946,871	0	297	92	775
2047	703,834,350	748,175,914	788,175,914	88,000,000	40,000,000	297,857,276	40,000,000	189,579,871	109,000,000	12,605,919	6,132,849,000	0	0	0	5,000,000	788,175,914	788,175,914	0	302	87	788
2048	716,503,369	761,643,081	801,643,081	86,000,000	45,000,000	303,341,913	40,000,000	192,154,891	109,000,000	13,964,711	7,181,566,000	0	0	0	5,000,000	801,643,081	801,643,081	0	307	83	802
2049	729,400,429	775,352,656	815,352,656	84,000,000	50,000,000	309,068,959	40,000,000	194,404,116	109,000,000	15,469,967	8,409,614,000	0	0	0	5,000,000	815,352,656	815,352,656	0	313	78	815
2050	742,529,637	789,309,004	829,309,004	82,000,000	55,000,000	315,042,778	40,000,000	196,281,093	109,000,000	17,13											

Low Generation Case, Scenario 4: Low NG price with Carbon Price

1.80%	Elec. Consumption growth	CO2
6.30%	Transmission and Distribution Losses (% of sales/consumption)	M/MWh
14.0	millions of MWh from renewables in 2008	PC
40.0	millions of MWh from Industrial On-site in 2008	PC w/CCS
16.9%	Assumed solar PV annual growth rate	IGCC
10.5%	Assumed solar CSP annual growth rate	IGCC w/CCS
50.0	Assumed efficiency reduction, in MWh, in 2023 (ACEEE)	NGCC
0.00%	Assumed growth rate of industrial on-site MWh	NGCC w/CCS
20.00%	% of total electricity consumption as wind in 2060	CHP (Ind.)
25.00%	% of PC w/CCS that is parasitic load for carbon capture	
16.00%	% of IGCC w/CCS that is parasitic load for carbon capture	
15.00%	% of NGCC w/CCS that is parasitic load for carbon capture	

PERCENTAGES OF TOTAL GENERATION FROM EACH POWER PLANT TYPE																					
Year	TX Electrical Sales (MWh), neglects losses in T&D	TX Elec. Gen w/o Industrial On-site (MWh)	Texas total Consumption w/o CCS parasitics (MWh)	TX Total MWh from efficiency	TX Total MWh from Industrial On-site	TX Total MWh Generated from renewables	TX Total MWh Parasitics due to CCS	% MWh PC Coal, no CCS	% MWh IGCC Coal, no CCS	% MWh NGCC, no CCS	% MWh NG Industrial On-site	% MWh wind and hydro	% MWh Nuclear	% MWh Solar CSP	% MWh Solar PV	% MWh Coal, w/CCS	% MWh IGCC Coal, w/CCS	% MWh NGCC, w/CCS	% MWh other	Total % MWh	
2008	351,000,000	373,113,000	413,113,000	0	40,000,000	14,000,000	0	37.5%	0.0%	38.2%	9.7%	3.4%	10.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.2%	100.0%
2009	357,318,000	379,829,034	416,495,701	3,333,333	40,000,000	18,439,515	0	37.2%	0.0%	37.6%	9.6%	4.4%	9.9%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.2%	100.0%
2010	363,749,724	386,665,957	419,959,290	6,666,667	40,000,000	22,879,031	0	36.9%	0.0%	36.9%	9.5%	5.4%	10.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.2%	100.0%
2011	370,297,219	393,625,944	423,625,944	10,000,000	40,000,000	27,318,546	0	38.9%	0.0%	34.1%	9.4%	6.4%	9.9%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.2%	100.0%
2012	376,962,569	400,711,211	427,377,877	13,333,333	40,000,000	31,758,061	0	41.4%	0.0%	30.8%	9.4%	7.3%	9.8%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	1.2%	100.0%
2013	383,747,895	407,924,013	431,257,346	16,666,667	40,000,000	36,197,576	0	41.0%	0.0%	30.4%	9.3%	8.3%	9.7%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	1.2%	100.0%
2014	390,655,357	415,266,645	435,266,645	20,000,000	40,000,000	40,637,092	0	40.2%	0.0%	30.5%	9.2%	9.2%	9.6%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	1.1%	100.0%
2015	397,687,154	422,741,444	439,408,111	23,333,333	40,000,000	45,076,607	0	31.9%	0.0%	27.4%	9.1%	10.1%	20.3%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	1.1%	100.0%
2016	404,845,523	430,350,790	443,684,124	26,666,667	40,000,000	49,516,122	4,100,000	26.8%	0.0%	27.8%	8.9%	10.9%	19.9%	0.1%	0.0%	2.2%	2.2%	0.0%	0.0%	1.1%	100.0%
2017	412,132,742	438,097,105	448,097,105	30,000,000	40,000,000	53,955,638	4,100,000	26.5%	0.0%	27.5%	8.8%	11.8%	19.7%	0.1%	0.0%	2.2%	2.2%	0.0%	0.0%	1.1%	100.0%
2018	419,551,131	445,982,853	452,649,519	33,333,333	40,000,000	58,395,153	4,100,000	26.3%	0.0%	27.2%	8.8%	12.6%	19.5%	0.1%	0.0%	2.2%	2.2%	0.0%	0.0%	1.1%	100.0%
2019	427,103,052	454,010,544	457,343,877	36,666,667	40,000,000	62,834,668	4,612,500	25.4%	0.0%	25.8%	8.7%	13.4%	20.6%	0.2%	0.0%	2.4%	2.4%	0.0%	0.0%	1.1%	100.0%
2020	434,790,907	462,182,734	462,182,734	40,000,000	40,000,000	67,274,183	5,125,000	24.6%	0.0%	27.0%	8.6%	14.2%	19.0%	0.2%	0.0%	2.7%	2.7%	0.0%	0.0%	1.1%	100.0%
2021	442,617,143	470,502,234	467,168,690	43,333,333	40,000,000	71,713,699	6,560,000	23.7%	0.0%	26.1%	8.4%	14.9%	18.8%	0.2%	0.0%	3.4%	3.4%	0.0%	0.0%	1.1%	100.0%
2022	450,584,251	478,971,059	472,304,393	46,666,667	40,000,000	76,153,214	8,200,000	22.9%	0.0%	25.0%	8.3%	15.6%	18.5%	0.2%	0.0%	4.2%	4.2%	0.0%	0.0%	1.0%	100.0%
2023	458,694,768	487,592,538	477,592,538	50,000,000	40,000,000	80,592,729	10,110,000	22.0%	0.0%	23.3%	8.2%	16.3%	18.2%	0.2%	0.0%	4.3%	4.3%	2.1%	1.0%	1.0%	100.0%
2024	466,951,274	496,369,204	486,369,204	50,000,000	40,000,000	85,032,245	12,020,000	21.1%	0.0%	22.1%	8.0%	16.8%	17.9%	0.2%	0.0%	4.4%	4.4%	4.0%	1.0%	1.0%	100.0%
2025	475,356,397	505,303,850	494,385,005	50,918,845	40,000,000	89,471,760	13,930,000	19.7%	0.0%	21.4%	7.9%	17.3%	17.5%	0.3%	0.0%	4.5%	4.5%	5.9%	1.0%	1.0%	100.0%
2026	483,912,812	514,399,319	502,641,286	51,758,033	40,000,000	93,911,275	15,840,000	18.3%	0.0%	20.7%	7.7%	17.8%	17.2%	0.3%	0.0%	4.6%	4.6%	7.7%	1.0%	1.0%	100.0%
2027	492,623,243	523,658,507	511,036,109	52,622,397	40,000,000	98,350,791	17,750,000	17.0%	0.0%	20.1%	7.6%	18.3%	16.8%	0.3%	0.0%	4.7%	4.7%	9.5%	0.9%	1.0%	100.0%
2028	501,490,461	533,084,360	519,583,094	53,501,266	40,000,000	102,790,306	19,660,000	15.8%	0.0%	19.6%	7.4%	18.7%	16.5%	0.3%	0.1%	4.8%	4.8%	11.1%	0.9%	1.0%	100.0%
2029	510,517,289	542,679,878	528,283,814	54,396,065	40,000,000	107,229,821	21,570,000	14.5%	0.0%	19.0%	7.3%	19.1%	16.2%	0.3%	0.1%	4.9%	4.9%	12.7%	0.9%	1.0%	100.0%
2030	519,706,600	552,448,116	537,141,158	55,306,958	40,000,000	111,669,336	23,480,000	13.4%	0.0%	18.5%	7.1%	19.5%	15.9%	0.4%	0.1%	5.0%	5.0%	14.3%	0.9%	1.0%	100.0%
2031	529,061,319	562,392,182	546,157,933	56,234,249	40,000,000	116,108,852	25,990,000	12.2%	0.0%	18.1%	7.0%	19.8%	15.6%	0.4%	0.1%	5.1%	5.1%	15.7%	0.9%	1.0%	100.0%
2032	538,584,423	572,515,242	555,337,010	57,178,231	40,000,000	120,548,367	27,300,000	11.2%	0.0%	17.7%	6.9%	20.2%	15.3%	0.4%	0.1%	5.1%	5.1%	17.2%	0.9%	1.0%	100.0%
2033	548,278,943	582,820,516	564,681,311	58,139,205	40,000,000	124,987,882	29,210,000	10.1%	0.0%	17.3%	6.7%	20.5%	15.0%	0.5%	0.1%	5.2%	5.2%	18.5%	0.8%	1.0%	100.0%
2034	558,147,964	593,311,285	574,193,809	59,117,476	40,000,000	129,427,398	31,120,000	9.1%	0.0%	17.0%	6.6%	20.7%	14.7%	0.5%	0.1%	5.3%	5.3%	19.8%	0.8%	1.0%	100.0%
2035	568,194,627	603,990,888	583,877,532	60,113,356	40,000,000	133,868,913	33,030,000	8.1%	0.0%	16.7%	6.5%	21.0%	14.4%	0.6%	0.1%	5.3%	5.3%	21.1%	0.8%	1.0%	100.0%
2036	578,422,130	614,862,724	593,735,562	61,127,162	40,000,000	138,306,428	34,940,000	7.2%	0.0%	16.4%	6.4%	21.2%	14.2%	0.6%	0.2%	5.4%	5.4%	22.3%	0.8%	1.0%	100.0%
2037	588,833,728	625,930,253	603,771,037	62,159,217	40,000,000	142,745,943	36,850,000	6.2%	0.0%	15.3%	6.2%	21.4%	14.8%	0.7%	0.2%	5.5%	5.5%	23.4%	0.8%	1.0%	100.0%
2038	599,432,736	637,196,998	613,987,150	63,209,848	40,000,000	147,185,459	38,760,000	5.4%	0.0%	14.3%	6.1%	21.6%	15.3%	0.7%	0.2%	5.5%	5.5%	24.5%	0.8%	1.0%	100.0%
2039	610,222,525	648,666,544	624,387,153	64,279,391	40,000,000	151,624,974	40,670,000	4.5%	0.0%	13.4%	6.0%	21.8%	15.8%	0.8%	0.2%	5.6%	5.6%	25.6%	0.8%	1.0%	100.0%
2040	621,206,530	660,342,542	634,974,356	65,368,186	40,000,000	156,064,489	42,580,000	3.7%	0.0%	12.6%	5.9%	21.9%	16.2%	0.9%	0.3%	5.6%	5.6%	26.6%	0.7%	1.0%	100.0%
2041	632,388,248	672,228,707	645,752,129	66,476,578	40,000,000	160,504,005	44,490,000	2.9%	0.0%	11.8%	5.8%	22.0%	16.7%	0.9%	0.3%	5.7%	5.7%	27.5%	0.7%	1.0%	100.0%
2042	643,717,236	684,328,824	656,723,902	67,604,922	40,000,000	164,943,520	46,400,000	2.1%	0.0%	11.1%	5.7%	22.1%	17.1%	1.0%	0.4%	5.7%	5.7%	28.4%	0.7%	1.0%	100.0%
2043	655,359,119	696,646,743	667,893,167	68,753,576	40,000,000	169,383,035	47,900,000	1.4%	0.0%	10.7%	5.6%	22.1%	17.5%	1.1%	0.4%	5.6%	5.6%	29.3%	0.7%	1.0%	100.0%
2044	667,115,583	709,186,384	679,263,478	69,922,506	40,000,000	173,822,550	49,400,000	0.7%	0.0%	10.3%	5.5%	22.2%	17.8%	1.2%	0.5%	5.5%	5.5%	30.2%	0.7%	1.0%	100.0%
2045	679,164,383	721,951,739	690,838,455	71,113,284	40,000,000	178,262,066	50,900,000	0.0%	0.0%	9.9%	5.4%	22.2%	18.2%	1.3%	0.6%	5.4%	5.4%	31.0%	0.7%	1.0%	100.0%
2046	691,389,342	734,946,871	702,621,782	72,325,089	40,000,000	182,701,581	52,400,000	0.0%	0.0%	9.5%	5.3%	22.2%	18.5%	1.4%	0.6%	5.3%	5.3%	31.8%	0.7%	1.0%	100.0%
2047	703,834,350	748,175,914	714,617,208	73,558,706	40,000,000	187,141,096	53,900,000	0.0%	0.0%	9.0%	5.2%	22.1%	18.9%	1.5%	0.7%	5.2%	5.2%	32.5%	0.7%	1.0%	100.0%
2048	716,503,369	761,643,081	726,828,553	74,814,528	40,000,000	191,580,612	55,400,000	0.0%	0.0%	8.7%	5.1%	22.0%	19.2%	1.6%	0.8%	5.1%	5.1%	33.2%	0.6%	1.0%	100.0%
2049	729,400,429	775,352,656	739,259,701	76,092,955	40,000,000	196,020,127	56,900,000	0.0%	0.0%	8.3%	5.0%	21.9%	19.5%	1.8%	1.0%	5.0%	5.0%	33.9%	0.6%	1.0%	100.0%
2050	742,529,637	789,309,004	751,914,610	77,394,394	40,000,000	200,459,642	58,400,000	0.0%	0.0%	7.9%	4.9%	21.7%	19.7%	1.9%	1.1%	4.9%	4.9%	34.6%	0.6%	1.0%	100.0%
2051	755,895,170	803,516,566	764,797,308	78,719,259	40,000,000	204,899,158	59,900,000	0.0%	0.0%	7.4%	4.9%	21.5%	20.0%	2.1%	1.3%	4.9%	4.9%	35.2%	0.6%	1.0%	100.0%
2052	769,501,283	817,979,864	777,911,894	80,067,971	40,000,000	209,338,673	61,400,000	0.0%	0.0%	6.8%	4.8%	21.2%	20.3%	2.3%	1.5%	4.8%	4.8%	35.7%	0.6%	1.0%	100.0%
2053	783,352,307	832,703,502	791,262,542	81,440,960	40,000,000	213,778,188	62,900,000	0.0%	0.0%	6.3%	4.7%	20.9%	20.5%	2.5%	1.7%	4.7%	4.7%	36.3%	0.6%	1.0%	100.0%
2054	797,452,648	847,692,165	804,853,502	82,838,663	40,000,000	218,217,703	64,400,000	0.0%	0.0%	5.7%	4.6%	20.5%	20.7%	2.7%	1.9%	4.6%	4.6%	36.8%	0.6%	1.0%	100.0%
2055	811,806,796	862,950,624	818,689,100	84,261,524	40,000,000																

Low Generation Case, Scenario 4: Lr

- 1.80% Elec. Consumption growth
- 6.30% Transmission and Distribution Losses (% of sales/c
- 14.0 millions of MWh from renewables in 2008
- 40.0 millions of MWh from Industrial On-site in 2008
- 16.9% Assumed solar PV annual growth rate
- 10.5% Assumed solar CSP annual growth rate
- 50.0 Assumed efficiency reduction, in MWh, in 2023 (AC
- 0.00% Assumed growth rate of industrial on-site MWh
- 20.00% % of total electricity consumption as wind in 2060
- 25.00% % of PC w/CCS that is parasitic load for carbon cap
- 16.00% % of IGCC w/CCS that is parasitic load for carbon c
- 15.00% % of NGCC w/CCS that is parasitic load for carbon

Year	TX Electrical Sales (MWh), neglects losses in T&D	TX Elec. Gen w/o Industrial On-site (MWh)	Texas total Consumption w/o CCS parasitics (MWh)	TOTAL MWH OF GENERATION FROM EACH POWER PLANT TYPE - INCLUDING PARASITICS DUE TO CARBON CAPTURE													Total MWh from Table	MWh Target (check)	Difference from MWh Target	Annual CO2 Emissions (MtCO2)	Target CO2 Emissions (MtCO2)	Total MWh w/o parasitics
				MWh PC Coal, no CCS	MWh IGCC Coal, no CCS	MWh NGCC, no CCS	MWh NG Industrial On-Site	MWh wind and hydro	MWh Nuclear	MWh Solar CSP	MWh Solar PV	MWh Coal, w/CCS	MWh IGCC Coal, w/CCS	MWh NGCC, w/CCS	MWh other							
2008	351,000,000	373,113,000	413,113,000	154,917,375	0	157,968,269	40,000,000	13,987,000	41,270,000	0	13,000	0	0	0	4,957,356	413,113,000	413,113,000	0	259	413		
2009	357,318,000	379,829,034	416,495,701	155,000,000	0	156,786,185	40,000,000	18,424,323	41,270,000	0	15,192	0	0	0	5,000,000	416,495,701	416,495,701	0	258	416		
2010	363,749,724	386,665,957	419,999,290	155,000,000	0	155,120,259	40,000,000	22,861,277	42,000,000	0	17,753	0	0	0	5,000,000	419,999,290	419,999,290	0	257	420		
2011	370,297,219	393,625,944	423,625,944	165,000,000	0	144,307,388	40,000,000	27,297,800	42,000,000	0	20,746	0	0	0	5,000,000	423,625,944	423,625,944	0	261	424		
2012	376,962,569	400,711,211	427,377,877	177,000,000	0	131,619,816	40,000,000	31,383,417	42,000,000	350,400	24,244	0	0	0	5,000,000	427,377,877	427,377,877	0	267	427		
2013	383,747,895	407,924,013	431,257,346	177,000,000	0	131,059,769	40,000,000	35,781,948	42,000,000	387,297	28,332	0	0	0	5,000,000	431,257,346	431,257,346	0	266	431		
2014	390,655,357	415,266,645	435,266,645	175,000,000	0	132,629,553	40,000,000	40,175,904	42,000,000	428,080	33,108	0	0	0	5,000,000	435,266,645	435,266,645	0	265	435		
2015	397,687,154	422,741,444	439,408,111	140,000,000	0	120,331,504	40,000,000	44,564,760	89,000,000	473,156	38,691	0	0	0	5,000,000	439,408,111	439,408,111	0	224	439		
2016	404,845,523	430,350,790	443,684,124	120,000,000	0	124,268,001	40,000,000	48,947,929	89,000,000	522,980	45,214	10,000,000	10,000,000	0	5,000,000	447,784,124	447,784,124	0	209	444		
2017	412,132,742	438,097,105	448,097,105	120,000,000	0	124,241,467	40,000,000	53,324,751	89,000,000	578,049	52,837	10,000,000	10,000,000	0	5,000,000	452,197,105	452,197,105	0	209	448		
2018	419,551,131	445,982,853	452,649,519	120,000,000	0	124,354,366	40,000,000	57,694,490	89,000,000	638,918	61,745	10,000,000	10,000,000	0	5,000,000	456,749,519	456,749,519	0	209	453		
2019	427,103,052	454,010,544	457,343,877	117,500,000	0	119,121,709	40,000,000	62,056,317	95,000,000	706,196	72,155	11,250,000	11,250,000	0	5,000,000	461,956,377	461,956,377	0	204	457		
2020	434,790,907	462,182,734	462,182,734	115,000,000	0	126,033,550	40,000,000	66,409,304	89,000,000	780,559	84,321	12,500,000	12,500,000	0	5,000,000	467,307,734	467,307,734	0	205	462		
2021	442,617,143	470,502,023	467,168,690	112,500,000	0	123,514,991	40,000,000	70,752,410	89,000,000	862,751	98,537	16,000,000	16,000,000	0	5,000,000	473,728,690	473,728,690	0	203	467		
2022	450,584,251	478,971,059	472,304,393	110,000,000	0	120,351,179	40,000,000	75,084,465	89,000,000	953,599	115,150	20,000,000	20,000,000	0	5,000,000	480,504,393	480,504,393	0	199	472		
2023	458,694,768	487,592,538	477,592,538	107,500,000	0	113,609,809	40,000,000	79,404,152	89,000,000	1,054,013	134,565	21,000,000	21,000,000	10,000,000	5,000,000	487,702,538	487,702,538	0	194	478		
2024	466,951,274	496,369,204	486,369,204	105,000,000	0	110,356,959	40,000,000	83,709,992	89,000,000	1,165,001	157,252	22,000,000	22,000,000	20,000,000	5,000,000	498,389,204	498,389,204	0	191	486		
2025	475,356,397	505,303,850	494,385,005	100,000,000	0	108,843,245	40,000,000	88,000,320	89,000,000	1,287,675	183,765	23,000,000	23,000,000	30,000,000	5,000,000	508,315,005	508,315,005	0	187	494		
2026	483,912,812	514,399,319	502,641,286	95,000,000	0	107,570,011	40,000,000	92,273,260	89,000,000	1,423,267	214,748	24,000,000	24,000,000	40,000,000	5,000,000	518,481,286	518,481,286	0	182	503		
2027	492,623,243	523,658,507	511,036,109	90,000,000	0	106,435,319	40,000,000	96,526,699	89,000,000	1,573,137	250,955	25,000,000	25,000,000	50,000,000	5,000,000	528,786,109	528,786,109	0	178	511		
2028	501,490,461	533,084,360	519,583,094	85,000,000	0	105,452,788	40,000,000	100,758,252	89,000,000	1,738,789	293,266	26,000,000	26,000,000	60,000,000	5,000,000	539,243,094	539,243,094	0	173	520		
2029	510,517,289	542,679,878	528,283,814	80,000,000	0	104,623,992	40,000,000	104,965,228	89,000,000	1,921,883	342,710	27,000,000	27,000,000	70,000,000	5,000,000	549,853,814	549,853,814	0	169	528		
2030	519,706,600	552,448,116	537,141,158	75,000,000	0	103,951,821	40,000,000	109,144,588	89,000,000	2,124,257	400,491	28,000,000	28,000,000	80,000,000	5,000,000	560,621,158	560,621,158	0	164	536		
2031	529,061,319	562,392,182	546,157,933	70,000,000	0	103,439,081	40,000,000	113,292,896	89,000,000	2,347,942	468,014	29,000,000	29,000,000	90,000,000	5,000,000	571,547,933	571,547,933	0	160	547		
2032	538,584,423	572,515,242	555,337,010	65,000,000	0	103,088,643	40,000,000	117,406,266	89,000,000	2,595,180	546,921	30,000,000	30,000,000	100,000,000	5,000,000	582,637,010	582,637,010	0	156	555		
2033	548,278,943	582,820,516	564,681,311	60,000,000	0	102,903,429	40,000,000	121,480,298	89,000,000	2,868,453	639,132	31,000,000	31,000,000	110,000,000	5,000,000	593,891,311	593,891,311	0	152	561		
2034	558,147,964	593,311,285	574,193,809	55,000,000	0	102,886,411	40,000,000	125,510,008	89,000,000	3,170,501	746,889	32,000,000	32,000,000	120,000,000	5,000,000	605,313,809	605,313,809	0	148	574		
2035	568,194,627	603,990,888	593,877,532	50,000,000	0	103,040,619	40,000,000	129,489,744	89,000,000	3,504,354	872,815	33,000,000	33,000,000	130,000,000	5,000,000	616,907,532	616,907,532	0	144	584		
2036	578,422,130	614,862,724	593,735,562	45,000,000	0	103,369,134	40,000,000	133,413,094	89,000,000	3,873,363	1,019,972	34,000,000	34,000,000	140,000,000	5,000,000	628,675,562	628,675,562	0	141	594		
2037	588,833,728	625,930,253	603,771,037	40,000,000	0	97,875,093	40,000,000	137,272,777	95,000,000	4,281,228	1,191,939	35,000,000	35,000,000	150,000,000	5,000,000	640,621,037	640,621,037	0	134	604		
2038	599,432,736	637,196,998	613,987,150	35,000,000	0	93,561,691	40,000,000	141,060,518	100,000,000	4,732,041	1,392,900	36,000,000	36,000,000	160,000,000	5,000,000	652,747,150	652,747,150	0	128	614		
2039	610,222,525	648,666,544	624,387,153	30,000,000	0	89,432,179	40,000,000	144,766,906	105,000,000	5,230,325	1,627,742	37,000,000	37,000,000	170,000,000	5,000,000	665,057,153	665,057,153	0	121	624		
2040	621,206,530	660,342,542	634,974,356	25,000,000	0	85,489,867	40,000,000	148,381,231	110,000,000	5,781,078	1,902,180	38,000,000	38,000,000	180,000,000	5,000,000	677,554,356	677,554,356	0	115	635		
2041	632,388,248	672,228,707	645,752,129	20,000,000	0	81,738,124	40,000,000	151,891,291	115,000,000	6,389,826	2,222,887	39,000,000	39,000,000	190,000,000	5,000,000	690,242,129	690,242,129	0	110	646		
2042	643,771,236	684,328,824	656,723,902	15,000,000	0	78,180,382	40,000,000	155,283,179	120,000,000	7,062,675	2,597,666	40,000,000	40,000,000	200,000,000	5,000,000	703,123,902	703,123,902	0	104	657		
2043	655,359,119	696,646,743	667,893,167	10,000,000	0	76,410,131	40,000,000	158,541,028	125,000,000	7,806,374	3,035,633	40,000,000	40,000,000	210,000,000	5,000,000	715,793,167	715,793,167	0	99	668		
2044	667,155,583	709,186,384	679,263,478	5,000,000	0	74,840,928	40,000,000	161,646,725	130,000,000	8,628,385	3,547,440	40,000,000	40,000,000	220,000,000	5,000,000	728,663,478	728,663,478	0	94	679		
2045	679,164,383	721,951,739	690,838,455	0	0	73,476,389	40,000,000	164,579,573	135,000,000	9,536,954	4,145,539	40,000,000	40,000,000	230,000,000	5,000,000	741,738,455	741,738,455	0	89	691		
2046	691,389,342	734,946,871	702,621,782	0	0	67,320,201	40,000,000	167,315,909	140,000,000	10,541,196	4,844,477	40,000,000	40,000,000	240,000,000	5,000,000	755,021,782	755,021,782	0	86	703		
2047	703,834,350	748,175,914	714,617,208	0	0	61,376,112	40,000,000	169,828,657	145,000,000	11,651,184	5,661,255	40,000,000	40,000,000	250,000,000	5,000,000	768,517,208	768,517,208	0	84	715		
2048	716,503,369	761,643,081	726,828,553	0	0	55,647,941	40,000,000	172,086,815	150,000,000	12,878,053	6,615,743	40,000,000	40,000,000	260,000,000	5,000,000	782,228,553	782,228,553	0	82	727		
2049	729,400,429	775,352,656	739,259,701	0	0	50,139,574	40,000,000	174,054,857	155,000,000	14,234,112	7,731,157	40,000,000	40,000,000	270,000,000	5,000,000	796,1						

BAU Generation Case, Scenario 4: Low NG price with Carbon Price

- 1.80% Elec. Consumption growth
- 6.30% Transmission and Distribution Losses (% of sales/consumption)
- 14.0 millions of MWh from renewables in 2008
- 40.0 millions of MWh from Industrial On-site in 2008
- 17.1% Assumed solar PV annual growth rate
- 10.8% Assumed solar CSP annual growth rate
- 0.0 Assumed efficiency reduction, in MWh, in 2023 (ACEEE)
- 0.00% Assumed growth rate of industrial on-site MWh
- 20.00% % of total electricity consumption as wind in 2060
- 25.00% % of PC w/CCS that is parasitic load for carbon capture
- 16.00% % of IGCC w/CCS that is parasitic load for carbon capture
- 15.00% % of NGCC w/CCS that is parasitic load for carbon capture

CO2	1.00
M/MWh	0.20
PC	0.90
PC w/CCS	0.18
IGCC	0.53
IGCC w/CCS	0.09
NGCC	0.53
NGCC w/CCS	0.09
CHP (Ind.)	0.5

PERCENTAGES OF TOTAL GENERATION FROM EACH POWER PLANT TYPE																					
Year	TX Electrical Sales (MWh), neglects losses in T&D	TX Elec. Gen - w/o Industrial On-site (MWh)	Texas total Consumption w/ CCS parasitics (MWh)	TX Total MWh from efficiency	TX Total MWh from Industrial On-site	TX Total MWh from renewables	TX Total MWh Parasitics due to CCS	% MWh PC Coal, no CCS	% MWh IGCC Coal, no CCS	% MWh NGCC, no CCS	% MWh Industrial On-site	% MWh Wind and Hydro	% Nuclear	% MWh Solar CSP	% MWh Solar PV	% MWh PC Coal, w/CCS	% MWh IGCC Coal, w/CCS	% MWh NGCC, w/CCS	% MWh other	Total % MWh	
2008	351,000,000	373,113,000	413,113,000	0	40,000,000	14,000,000	0	37.5%	0.0%	38.1%	9.7%	3.4%	10.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.4%	100.0%	
2009	357,318,000	379,829,034	419,829,034	0	40,000,000	18,982,529	0	37.6%	0.0%	37.3%	9.5%	4.5%	9.8%	0.0%	0.0%	0.0%	0.0%	0.0%	1.2%	100.0%	
2010	363,749,724	386,665,957	426,665,957	0	40,000,000	23,965,058	0	38.7%	0.0%	35.3%	9.4%	5.6%	9.8%	0.0%	0.0%	0.0%	0.0%	0.0%	1.2%	100.0%	
2011	370,297,219	393,625,944	433,625,944	0	40,000,000	28,947,588	0	39.2%	0.0%	34.1%	9.2%	6.7%	9.7%	0.0%	0.0%	0.0%	0.0%	0.0%	1.2%	100.0%	
2012	376,962,569	400,711,211	440,711,211	0	40,000,000	33,930,117	0	40.8%	0.0%	31.7%	9.1%	7.6%	9.5%	0.1%	0.0%	0.0%	0.0%	0.0%	1.1%	100.0%	
2013	383,747,895	407,924,013	447,924,013	0	40,000,000	38,912,646	0	40.2%	0.0%	31.7%	8.9%	8.6%	9.4%	0.1%	0.0%	0.0%	0.0%	0.0%	1.1%	100.0%	
2014	390,655,357	415,266,645	455,266,645	0	40,000,000	43,895,175	0	39.5%	0.0%	31.7%	8.8%	9.5%	9.2%	0.1%	0.0%	0.0%	0.0%	0.0%	1.1%	100.0%	
2015	397,687,154	422,741,444	462,741,444	0	40,000,000	48,877,704	0	30.3%	0.0%	30.2%	8.6%	10.5%	19.2%	0.1%	0.0%	0.0%	0.0%	0.0%	1.1%	100.0%	
2016	404,845,523	430,350,790	470,350,790	0	40,000,000	53,860,234	1,500,000	27.6%	0.0%	30.5%	8.5%	11.3%	18.9%	0.1%	0.0%	0.0%	0.0%	2.1%	1.1%	100.0%	
2017	412,132,742	438,097,105	478,097,105	0	40,000,000	58,842,763	2,250,000	25.0%	0.0%	31.7%	8.3%	12.1%	18.5%	0.1%	0.0%	0.0%	0.0%	3.1%	1.0%	100.0%	
2018	419,551,131	445,982,853	485,982,853	0	40,000,000	63,825,292	3,000,000	24.0%	0.0%	31.4%	8.2%	12.9%	18.2%	0.1%	0.0%	0.0%	0.0%	4.1%	1.0%	100.0%	
2019	427,103,052	454,010,544	494,010,544	0	40,000,000	68,807,821	3,750,000	23.1%	0.0%	31.1%	8.0%	13.7%	17.9%	0.1%	0.0%	0.0%	0.0%	5.0%	1.0%	100.0%	
2020	434,790,907	462,182,734	502,182,734	0	40,000,000	73,790,350	4,500,000	22.2%	0.0%	30.9%	7.9%	14.4%	17.6%	0.2%	0.0%	0.0%	0.0%	5.9%	1.0%	100.0%	
2021	442,617,143	470,502,023	510,502,023	0	40,000,000	78,772,880	6,000,000	21.3%	0.0%	27.6%	7.7%	15.1%	19.4%	0.2%	0.0%	0.0%	0.0%	7.7%	1.0%	100.0%	
2022	450,584,251	478,971,059	518,971,059	0	40,000,000	83,755,409	7,500,000	20.4%	0.0%	24.9%	7.6%	15.7%	20.7%	0.2%	0.0%	0.0%	0.0%	9.5%	0.9%	100.0%	
2023	458,694,768	487,592,538	527,592,538	0	40,000,000	88,737,938	9,000,000	19.2%	0.0%	24.4%	7.5%	16.3%	20.3%	0.2%	0.0%	0.0%	0.0%	11.2%	0.9%	100.0%	
2024	466,951,274	496,369,204	536,369,204	0	40,000,000	93,720,467	10,500,000	17.6%	0.0%	24.3%	7.3%	16.9%	19.9%	0.2%	0.0%	0.0%	0.0%	12.8%	0.9%	100.0%	
2025	475,356,397	505,303,850	545,303,850	0	40,000,000	98,702,996	12,000,000	16.0%	0.0%	24.3%	7.2%	17.4%	19.6%	0.2%	0.0%	0.0%	0.0%	14.4%	0.9%	100.0%	
2026	483,912,812	514,399,319	554,399,319	0	40,000,000	103,685,525	13,500,000	14.4%	0.0%	24.3%	7.0%	18.0%	19.2%	0.3%	0.0%	0.0%	0.0%	15.8%	0.9%	100.0%	
2027	492,623,243	523,658,507	563,658,507	0	40,000,000	108,668,055	14,250,000	13.0%	0.0%	23.6%	6.9%	18.5%	20.4%	0.3%	0.0%	0.0%	0.0%	16.4%	0.9%	100.0%	
2028	501,490,461	533,084,360	573,084,360	0	40,000,000	113,650,584	15,000,000	11.6%	0.0%	23.0%	6.8%	19.0%	21.4%	0.3%	0.1%	0.0%	0.0%	17.0%	0.9%	100.0%	
2029	510,517,289	542,679,878	582,679,878	0	40,000,000	118,633,113	15,000,000	10.2%	0.0%	23.3%	6.7%	19.5%	22.4%	0.3%	0.1%	0.0%	0.0%	16.7%	0.8%	100.0%	
2030	519,706,600	552,448,116	592,448,116	0	40,000,000	123,615,642	15,000,000	8.9%	0.0%	23.5%	6.6%	19.9%	23.4%	0.4%	0.1%	0.0%	0.0%	16.5%	0.8%	100.0%	
2031	529,061,319	562,392,182	602,392,182	0	40,000,000	128,598,171	15,000,000	7.6%	0.0%	23.8%	6.5%	20.4%	24.3%	0.4%	0.1%	0.0%	0.0%	16.2%	0.8%	100.0%	
2032	538,584,423	572,515,242	612,515,242	0	40,000,000	133,580,701	15,000,000	6.4%	0.0%	24.1%	6.4%	20.8%	25.2%	0.4%	0.1%	0.0%	0.0%	15.9%	0.8%	100.0%	
2033	548,278,943	582,820,516	622,820,516	0	40,000,000	138,563,230	15,000,000	5.2%	0.0%	24.3%	6.3%	21.1%	26.0%	0.5%	0.1%	0.0%	0.0%	15.7%	0.8%	100.0%	
2034	558,147,964	593,311,285	633,311,285	0	40,000,000	143,545,759	15,000,000	4.0%	0.0%	24.6%	6.2%	21.5%	26.8%	0.5%	0.1%	0.0%	0.0%	15.4%	0.8%	100.0%	
2035	568,194,627	603,990,888	643,990,888	0	40,000,000	148,528,288	15,000,000	2.9%	0.0%	25.0%	6.1%	21.8%	27.6%	0.6%	0.1%	0.0%	0.0%	15.2%	0.8%	100.0%	
2036	578,422,130	614,862,724	654,862,724	0	40,000,000	153,510,817	15,000,000	1.8%	0.0%	25.3%	6.0%	22.1%	28.4%	0.6%	0.2%	0.0%	0.0%	14.9%	0.7%	100.0%	
2037	588,833,728	625,930,253	665,930,253	0	40,000,000	158,493,347	15,000,000	0.7%	0.0%	25.6%	5.9%	22.4%	29.1%	0.7%	0.2%	0.0%	0.0%	14.7%	0.7%	100.0%	
2038	599,432,736	637,196,998	677,196,998	0	40,000,000	163,475,876	15,000,000	0.0%	0.0%	25.7%	5.8%	22.7%	29.8%	0.7%	0.2%	0.0%	0.0%	14.4%	0.7%	100.0%	
2039	610,222,525	648,666,544	688,666,544	0	40,000,000	168,458,405	15,000,000	0.0%	0.0%	25.0%	5.7%	22.9%	30.4%	0.8%	0.2%	0.0%	0.0%	14.2%	0.7%	100.0%	
2040	621,206,530	660,342,542	700,342,542	0	40,000,000	173,440,934	16,500,000	0.0%	0.0%	23.2%	5.6%	23.1%	31.0%	0.9%	0.3%	0.0%	0.0%	15.3%	0.7%	100.0%	
2041	632,388,248	672,228,707	712,228,707	0	40,000,000	178,423,463	18,000,000	0.0%	0.0%	21.5%	5.5%	23.2%	31.5%	0.9%	0.3%	0.0%	0.0%	16.4%	0.7%	100.0%	
2042	643,771,236	684,328,824	724,328,824	0	40,000,000	183,405,993	19,500,000	0.0%	0.0%	19.8%	5.4%	23.3%	32.0%	1.0%	0.4%	0.0%	0.0%	17.5%	0.7%	100.0%	
2043	655,359,119	696,646,743	736,646,743	0	40,000,000	188,388,522	21,150,000	0.0%	0.0%	18.1%	5.3%	23.3%	32.5%	1.1%	0.4%	0.0%	0.0%	18.6%	0.7%	100.0%	
2044	667,155,583	709,186,384	749,186,384	0	40,000,000	193,371,051	22,950,000	0.0%	0.0%	16.4%	5.2%	23.3%	32.9%	1.2%	0.5%	0.0%	0.0%	19.8%	0.6%	100.0%	
2045	679,164,383	721,951,739	761,951,739	0	40,000,000	198,353,580	24,900,000	0.0%	0.0%	14.7%	5.1%	23.3%	33.3%	1.3%	0.6%	0.0%	0.0%	21.1%	0.6%	100.0%	
2046	691,389,342	734,946,871	774,946,871	0	40,000,000	203,336,109	27,750,000	0.0%	0.0%	12.9%	5.0%	23.3%	33.1%	1.4%	0.7%	0.0%	0.0%	23.0%	0.6%	100.0%	
2047	703,834,350	748,175,914	788,175,914	0	40,000,000	208,318,639	30,600,000	0.0%	0.0%	11.2%	4.9%	23.2%	33.0%	1.5%	0.7%	0.0%	0.0%	24.9%	0.6%	100.0%	
2048	716,503,369	761,643,081	801,643,081	0	40,000,000	213,301,168	33,450,000	0.0%	0.0%	10.0%	4.8%	23.0%	32.3%	1.7%	0.9%	0.0%	0.0%	26.7%	0.6%	100.0%	
2049	729,400,429	775,352,656	815,352,656	0	40,000,000	218,283,697	36,300,000	0.0%	0.0%	9.0%	4.7%	22.8%	31.7%	1.8%	1.0%	0.0%	0.0%	28.4%	0.6%	100.0%	
2050	742,529,637	789,309,004	829,309,004	0	40,000,000	223,266,226	39,150,000	0.0%	0.0%	8.0%	4.6%	22.6%	31.1%	2.0%	1.1%	0.0%	0.0%	30.1%	0.6%	100.0%	
2051	755,895,170	803,516,566	843,516,566	0	40,000,000	228,248,755	42,000,000	0.0%	0.0%	7.0%	4.5%	22.3%	30.5%	2.1%	1.3%	0.0%	0.0%	31.6%	0.6%	100.0%	
2052	769,501,283	817,979,864	857,979,864	0	40,000,000	233,231,284	44,850,000	0.0%	0.0%	6.2%	4.4%	22.0%	29.9%	2.3%	1.5%	0.0%	0.0%	33.1%	0.6%	100.0%	
2053	783,352,307	832,703,502	872,703,502	0	40,000,000	238,213,814	47,700,000	0.0%	0.0%	5.3%	4.3%	21.6%	29.3%	2.5%	1.7%	0.0%	0.0%	34.6%	0.5%	100.0%	
2054	797,452,648	847,692,165	887,692,165	0	40,000,000	243,196,343	50,550,000	0.0%	0.0%	4.5%	4.3%	21.2%	29.8%	2.8%	2.0%	0.0%	0.0%	35.9%	0.5%	100.0%	
2055	811,806,796	862,950,624	902,950,624	0	40,000,000	248,178,872	53,400,000	0.0%	0.0%	3.2%	4.2%	20.7%	30.4%	3.0%	2.3%	0.0%	0.0%	35.6%	0.5%	100.0%	
2056	826,419,318	878,483,735	918,483,735	0	40,000,000	253,161,401	56,250,000	0.0%	0.0%	2.4%	4.1%	20.2%	30.9%	3.3%	2.6%	0.0%	0.0%	36.0%	0.5%	100.0%	
2057	841,294,866	894,296,442	934,296,442	0	40,000,000	258,143,930	59,100,000	0.0%	0.0%	2.5%	4.0%	19.6%	30.4%	3.6%	3.0%	0.0%	0.0%	36.4%	0.5%	100.0%	
2058	856,438,173	910,393,778	950,393,778	0	40,000,000	263,126,460	62,000,000	0.0%	0.0%	2.8%	4.0%	18.8%	29.8%	3.9%	3.5%	0.0%	0.0%	36.8			

BAU Generation Case, Scenario 4: Lo

- 1.80% Elec. Consumption growth
- 6.30% Transmission and Distribution Losses (% of sales/co
- 14.0 millions of MWh from renewables in 2008
- 40.0 millions of MWh from Industrial On-site in 2008
- 17.1% Assumed solar PV annual growth rate
- 10.8% Assumed solar CSP annual growth rate
- 0.0 Assumed efficiency reduction, in MWh, in 2023 (AC
- 0.00% Assumed growth rate of industrial on-site MWh
- 20.00% % of total electricity consumption as wind in 2060
- 25.00% % of PC w/CCS that is parasitic load for carbon capt
- 16.00% % of IGCC w/CCS that is parasitic load for carbon c
- 15.00% % of NGCC w/CCS that is parasitic load for carbon

TOTAL MWH OF GENERATION FROM EACH POWER PLANT TYPE - INCLUDING PARASITICS DUE TO CARBON CAPTURE

Year	TX Electrical Sales (MWh), neglects losses in T&D	TX Elec. Gen - w/o Industrial On-site (MWh)	Texas total Consumption w/ CCS parasitics (MWh)	MWh PC Coal, no CCS	MWh IGCC Coal, no CCS	MWh NGCC, no CCS	MWh NG Industrial On-Site	MWh Wind and Hydro	MWh Nuclear	MWh Solar CSP	MWh Solar PV	MWh PC Coal, w/CCS	MWh IGCC Coal, w/CCS	MWh NGCC, w/CCS	MWh other	Total MWh from Table	MWh Target (check)	Difference from MWh Target	Annual CO2 Emissions (MtCO2)	Target CO2 Emissions (MtCO2)	Total TWh w/o parasitics
2008	351,000,000	373,113,000	413,113,000	154,917,375	0	157,224,666	40,000,000	13,987,000	41,270,000	0	13,000	0	0	0	5,148,959	412,561,000	413,113,000	-552,000	258	413	413
2009	357,318,000	379,829,034	419,829,034	158,000,000	0	156,576,505	40,000,000	18,967,306	41,270,000	0	15,223	0	0	0	5,000,000	419,829,034	419,829,034	0	261	420	420
2010	363,749,724	386,665,957	426,665,957	165,000,000	0	150,700,898	40,000,000	23,947,232	42,000,000	0	17,826	0	0	0	5,000,000	426,665,957	426,665,957	0	265	427	427
2011	370,297,219	393,625,944	433,625,944	170,000,000	0	147,678,356	40,000,000	28,926,713	42,000,000	0	20,874	0	0	0	5,000,000	433,625,944	433,625,944	0	268	434	434
2012	376,962,569	400,711,211	440,711,211	180,000,000	0	139,781,094	40,000,000	33,555,273	42,000,000	350,400	24,444	0	0	0	5,000,000	440,711,211	440,711,211	0	274	441	441
2013	383,747,896	407,924,013	447,924,013	180,000,000	0	142,011,367	40,000,000	38,495,853	42,000,000	388,170	28,624	0	0	0	5,000,000	447,924,013	447,924,013	0	275	442	448
2014	390,655,357	415,266,645	455,266,645	180,000,000	0	144,371,470	40,000,000	43,431,646	42,000,000	430,010	33,519	0	0	0	5,000,000	455,266,645	455,266,645	0	277	455	455
2015	397,687,154	422,741,444	462,741,444	140,000,000	0	139,863,740	40,000,000	48,362,093	89,000,000	476,361	39,250	0	0	0	5,000,000	462,741,444	462,741,444	0	234	463	463
2016	404,845,523	430,350,790	470,350,790	130,000,000	0	143,990,557	40,000,000	53,286,563	89,000,000	527,708	45,962	0	0	10,000,000	5,000,000	471,850,790	471,850,790	0	227	470	470
2017	412,132,742	438,097,105	478,097,105	120,000,000	0	152,504,342	40,000,000	58,204,351	89,000,000	584,590	53,821	0	0	15,000,000	5,000,000	480,347,105	480,347,105	0	222	478	478
2018	419,551,131	445,982,853	485,982,853	115,000,000	0	153,657,561	40,000,000	63,114,664	89,000,000	647,603	63,025	0	0	20,000,000	5,000,000	488,982,853	488,982,853	0	221	479	486
2019	427,103,052	454,010,544	494,010,544	115,000,000	0	154,952,723	40,000,000	68,016,611	89,000,000	717,408	73,802	0	0	25,000,000	5,000,000	497,760,544	497,760,544	0	219	494	494
2020	434,790,907	462,182,734	502,182,734	112,500,000	0	156,392,383	40,000,000	72,909,191	89,000,000	794,737	86,422	0	0	30,000,000	5,000,000	506,682,734	506,682,734	0	218	502	502
2021	442,617,143	470,502,023	510,502,023	110,000,000	0	142,729,143	40,000,000	77,791,277	100,000,000	880,402	101,201	0	0	40,000,000	5,000,000	516,502,023	516,502,023	0	209	505	511
2022	450,584,251	478,971,059	518,971,059	107,500,000	0	131,215,651	40,000,000	82,661,602	109,000,000	975,301	118,506	0	0	50,000,000	5,000,000	526,471,059	526,471,059	0	202	501	519
2023	458,694,768	487,592,538	527,592,538	103,000,000	0	130,854,600	40,000,000	87,518,739	109,000,000	1,080,428	138,770	0	0	60,000,000	5,000,000	536,592,538	536,592,538	0	198	528	528
2024	466,951,274	496,369,204	536,369,204	96,000,000	0	133,148,737	40,000,000	92,361,079	109,000,000	1,196,888	162,500	0	0	70,000,000	5,000,000	546,869,204	546,869,204	0	193	536	536
2025	475,356,397	505,303,850	545,303,850	89,000,000	0	135,600,853	40,000,000	97,186,808	109,000,000	1,325,900	190,288	0	0	80,000,000	5,000,000	557,303,850	557,303,850	0	188	545	545
2026	483,912,812	514,399,319	554,399,319	82,000,000	0	138,213,794	40,000,000	101,993,880	109,000,000	1,468,819	222,827	0	0	90,000,000	5,000,000	567,899,319	567,899,319	0	183	554	554
2027	492,623,243	523,658,507	563,658,507	75,000,000	0	136,240,452	40,000,000	106,779,982	118,000,000	1,627,143	260,930	0	0	95,000,000	5,000,000	577,908,507	577,908,507	0	176	578	564
2028	501,490,461	533,084,360	573,084,360	68,000,000	0	135,433,776	40,000,000	111,542,502	126,000,000	1,802,533	305,549	0	0	100,000,000	5,000,000	588,084,360	588,084,360	0	169	573	573
2029	510,517,289	542,679,878	582,679,878	61,000,000	0	139,046,765	40,000,000	116,278,487	134,000,000	1,996,828	357,798	0	0	100,000,000	5,000,000	597,679,878	597,679,878	0	164	583	583
2030	519,706,600	552,448,116	592,448,116	54,000,000	0	142,832,474	40,000,000	120,984,595	142,000,000	2,212,066	418,982	0	0	100,000,000	5,000,000	607,448,116	607,448,116	0	159	582	592
2031	529,061,319	562,392,182	602,392,182	47,000,000	0	146,794,011	40,000,000	125,657,040	150,000,000	2,450,504	490,628	0	0	100,000,000	5,000,000	617,392,182	617,392,182	0	154	602	602
2032	538,584,423	572,515,242	612,515,242	40,000,000	0	150,934,541	40,000,000	130,291,532	158,000,000	2,714,644	574,525	0	0	100,000,000	5,000,000	627,515,242	627,515,242	0	149	613	613
2033	548,278,943	582,820,516	622,820,516	33,000,000	0	155,257,286	40,000,000	134,883,206	166,000,000	3,007,256	672,769	0	0	100,000,000	5,000,000	637,820,516	637,820,516	0	144	623	623
2034	558,147,964	593,311,285	633,311,285	26,000,000	0	159,765,526	40,000,000	139,426,539	174,000,000	3,331,408	787,812	0	0	100,000,000	5,000,000	648,311,285	648,311,285	0	140	641	633
2035	568,194,627	603,990,888	643,990,888	19,000,000	0	164,462,600	40,000,000	143,915,260	182,000,000	3,690,500	922,528	0	0	100,000,000	5,000,000	658,990,888	658,990,888	0	135	644	644
2036	578,422,130	614,862,724	654,862,724	12,000,000	0	169,351,907	40,000,000	148,342,238	190,000,000	4,088,299	1,080,280	0	0	100,000,000	5,000,000	669,862,724	669,862,724	0	131	655	655
2037	588,833,728	625,930,253	665,930,253	5,000,000	0	174,436,907	40,000,000	152,699,362	198,000,000	4,528,977	1,265,008	0	0	100,000,000	5,000,000	680,930,253	680,930,253	0	126	666	666
2038	599,432,736	637,196,998	677,196,998	0	0	177,721,122	40,000,000	166,977,396	206,000,000	5,017,155	1,481,324	0	0	100,000,000	5,000,000	692,196,998	692,196,998	0	123	677	677
2039	610,222,525	648,666,544	688,666,544	0	0	176,208,139	40,000,000	161,165,819	214,000,000	5,557,955	1,734,631	0	0	100,000,000	5,000,000	703,666,544	703,666,544	0	122	689	689
2040	621,206,530	660,342,542	700,342,542	0	0	166,401,608	40,000,000	165,252,635	222,000,000	6,157,046	2,031,253	0	0	110,000,000	5,000,000	716,842,542	716,842,542	0	118	719	700
2041	632,388,248	672,228,707	712,228,707	0	0	156,805,244	40,000,000	169,224,152	230,000,000	6,820,714	2,378,597	0	0	120,000,000	5,000,000	730,228,707	730,228,707	0	114	712	712
2042	643,771,236	684,328,824	724,328,824	0	0	147,422,832	40,000,000	173,064,736	238,000,000	7,555,919	2,785,337	0	0	130,000,000	5,000,000	743,828,824	743,828,824	0	110	724	724
2043	655,359,119	696,646,743	736,646,743	0	0	137,408,221	40,000,000	176,756,520	246,000,000	8,370,372	3,261,630	0	0	141,000,000	5,000,000	757,796,743	757,796,743	0	106	737	737
2044	667,155,583	709,186,384	749,186,384	0	0	126,765,333	40,000,000	180,279,068	254,000,000	9,272,614	3,819,369	0	0	153,000,000	5,000,000	772,136,384	772,136,384	0	101	749	749
2045	679,164,383	721,951,739	771,951,739	0	0	115,498,159	40,000,000	183,608,990	262,000,000	10,272,109	4,472,481	0	0	166,000,000	5,000,000	786,851,739	786,851,739	0	96	762	762
2046	691,389,342	734,946,871	774,946,871	0	0	103,360,761	40,000,000	186,719,494	266,000,000	11,379,340	5,237,275	0	0	185,000,000	5,000,000	802,696,871	802,696,871	0	91	775	775
2047	703,834,350	748,175,914	788,175,914	0	0	91,457,276	40,000,000	189,579,871	270,000,000	12,605,919	6,132,849	0	0	204,000,000	5,000,000	818,775,914	818,775,914	0	87	787	787
2048	716,503,369	761,643,081	801,643,081	0	0	83,791,913	40,000,000	192,154,891	270,000,000	13,964,711	7,181,566	0	0	223,000,000	5,000,000	835,093,081	835,093,081	0	84	802	802
2049	729,400,429	775,352,656	815,352,656	0	0	76,368,959	40,000,000	194,404,116	270,000,000	15,469,967	8,409,614	0	0	242,000,000	5,000,000	851,652,656	851,652,656	0	82	815	815
2050	742,529,637	789,309,004	829,309,004	0	0	69,192,778	40,000,000	196,281,093	270,000,000	17,137,475	9,847,658	0	0	261,000,000	5,0						

Appendix B: Texas Electricity And Population Projection

Year	Texas Population (millions) (TWDB 2007 State Water Plan)	1.8% growth		1.8% with efficiency		
		Elec. Consumption "BAU" (million MWh)	Elec. Consumption "Low" (million MWh)	Elec/capita, History (MWh/per)	Elec/capita, "BAU" Projection (MWh/per)	Elec/capita, "Low" Projection (MWh/per)
1990	17,044,714	282	282	16.519	--	--
1991	17,339,904	286	286	16.513	--	--
1992	17,650,479	290	290	16.447	--	--
1993	17,996,764	300	300	16.652	--	--
1994	18,338,319	307	307	16.751	--	--
1995	18,679,706	318	318	17.004	--	--
1996	19,006,240	329	329	17.307	--	--
1997	19,355,427	336	336	17.376	--	--
1998	19,712,389	355	355	18.025	--	--
1999	20,044,141	359	359	17.908	--	--
2000	20,949,316	378	378	18.031	--	--
2001	21,334,855	373	373	17.463	--	--
2002	21,723,220	386	386	17.752	--	--
2003	22,103,374	379	379	17.156	--	--
2004	22,490,022	390	390	17.354	--	--
2005	22,928,508	397	397	17.300	--	--
2006	23,507,783	399	399	16.991	--	--
2007	23,852,172	405	405	16.980	--	--
2008	24,201,606	413	413	17.070	--	--
2009	24,556,160	420	416	--	17.097	16.961
2010	24,915,388	427	420	--	17.125	16.857
2011	25,335,603	434	424	--	17.115	16.721
2012	25,755,818	441	427	--	17.111	16.593
2013	26,176,033	448	431	--	17.112	16.475
2014	26,596,248	455	435	--	17.118	16.366
2015	27,016,463	463	439	--	17.128	16.264
2016	27,436,677	470	444	--	17.143	16.171
2017	27,856,892	478	448	--	17.163	16.086
2018	28,277,107	486	453	--	17.186	16.008
2019	28,697,322	494	457	--	17.215	15.937
2020	29,117,537	502	462	--	17.247	15.873
2021	29,511,034	511	467	--	17.299	15.830
2022	29,904,531	519	472	--	17.354	15.794
2023	30,298,028	528	478	--	17.413	15.763
2024	30,691,525	536	486	--	17.476	15.847
2025	31,085,022	545	494	--	17.542	15.904
2026	31,478,518	554	503	--	17.612	15.968
2027	31,872,015	564	511	--	17.685	16.034
2028	32,265,512	573	520	--	17.762	16.103
2029	32,659,009	583	528	--	17.841	16.176
2030	33,052,506	592	537	--	17.924	16.251
2031	33,436,582	602	546	--	18.016	16.334
2032	33,820,658	613	555	--	18.111	16.420
2033	34,204,734	623	565	--	18.209	16.509
2034	34,588,810	633	574	--	18.310	16.601
2035	34,972,887	644	584	--	18.414	16.695
2036	35,356,963	655	594	--	18.521	16.793
2037	35,741,039	666	604	--	18.632	16.893
2038	36,125,115	677	614	--	18.746	16.996
2039	36,509,191	689	624	--	18.863	17.102
2040	36,893,267	700	635	--	18.983	17.211
2041	37,311,081	712	646	--	19.089	17.307
2042	37,728,895	724	657	--	19.198	17.406
2043	38,146,710	737	668	--	19.311	17.509
2044	38,564,524	749	679	--	19.427	17.614
2045	38,982,338	762	691	--	19.546	17.722
2046	39,400,152	775	703	--	19.669	17.833
2047	39,817,966	788	715	--	19.794	17.947
2048	40,235,781	802	727	--	19.924	18.064
2049	40,653,595	815	739	--	20.056	18.184
2050	41,071,409	829	752	--	20.192	18.307
2051	41,520,096	844	765	--	20.316	18.420
2052	41,968,784	858	778	--	20.443	18.535
2053	42,417,471	873	791	--	20.574	18.654
2054	42,866,158	888	805	--	20.708	18.776
2055	43,314,846	903	819	--	20.846	18.901
2056	43,763,533	918	833	--	20.987	19.029
2057	44,212,220	934	847	--	21.132	19.160
2058	44,660,907	950	862	--	21.280	19.294
2059	45,109,595	967	877	--	21.432	19.432
2060	45,558,282	983	892	--	21.587	19.573

Appendix C: List of Electricity Generation Facilities and Water Consumption Per Facility

This appendix describes the water demand, or consumption, factors used in the analysis for obtaining the total electric demand estimate for Texas electricity generation. The final data are water consumption rates, in gallons per kilowatt hour (gal/kWh), for each power plant facility that currently exists and that is included in a list of planned power plant facilities.

C.1 Existing Power Plants

This section describes the Excel worksheet “*ElecGenAndWaterUse-2006-FINAL*” of Excel file *TWDBData_Calculations_FINAL.xls* that contains the final values used to estimate 2006 water consumption for electric power generation in Texas.

Table C1. Columns of Excel file listed in order from Column A to Column Z:

Column	Title	Description	Source
A	Facility ID	The EIA-listed facility ID number for the power plant facility	EIA for 906/920 (2006). http://www.eia.doe.gov/cneaf/electricity/page/eia906_920.html
B	Reg. Water Planning Area	The Texas Water Development Board Regional Water Planning Area in which the power facility resides	
C	County	The Texas county in which the power facility resides	
D	Longitude	The longitudinal coordinates of the power plant facility (sometimes general value for city or county)	
E	Latitude	The latitudinal coordinates of the power plant facility (sometimes general value for	

		city or county)	
F	Company	Name of the company that owns the power plant facility	EIA 906/920 (2006) and stakeholder input
G	Plant Name	Name of the power plant facility	EIA 906/920 (2006) and stakeholder input
H	Nameplate Capacity (kW)	The rated power capacity of the power plant facility for all generating units	EIA-860 (2006). http://www.eia.doe.gov/cneaf/electricity/page/eia860.html
I	2006 Generation (MWh)	The electricity generated, in megawatt-hours, by each power plant facility	EIA-906/920 (2006)
J	Cooling Type	Type of cooling system used at power facility	EIA-767 (2005) http://www.eia.doe.gov/cneaf/electricity/page/eia767.html as well as stakeholder input and reference Sledge et al. (2003)
K	Water Source 1	The main water source type for cooling water	EIA-767 (2005), stakeholder input, and Sledge et al. (2003)
L	Water Source 2	An alternate or secondary water source type for cooling water	EIA-767 (2005), stakeholder input, and Sledge et al. (2003)
M	CHP (Y or N)	Y = the facility is a combined heat and power facility N = the facility only sells electricity	EIA-906/920 (2006)
N	Industrial On-Site (Y or N), C = Commercial	Y = facility is listed with an industrial NAICS code N = facility is listed with an NAICS code of 22 C = facility is listed with a commercial NAICS code	EIA-906/920 (2006)
O	Prime Mover	The major type of prime mover	EIA-906/920 (2006) and EIA-860 (2006)

		(by MWh) used at the power plant	
P	Prime Mover 2	Secondary prime mover type	EIA-906/920 (2006) and EIA-860 (2006)
Q	Energy Source 1	The primary fuel source for the power plant facility	EIA-906/920 (2006) and EIA-860 (2006)
R	Energy Source 2	The secondary fuel source for the power plant facility	EIA-906/920 (2006) and EIA-860 (2006)
S	Consumption (gal/kWh) TWDB, Educated Guesses, and Industry input	“gal/kWh” consumption factors used when no viable data is available for power plant facility	These factors are general factors that represent an average power facility of a given fuel type, prime mover, and cooling type. These are based upon input from the TWDB and industry stakeholder input.
T	2006 Total Consumption reported to TCEQ (ac-ft)	The 2006 consumption reported by all power plant facilities to the TCEQ	Texas Commission on Environmental Quality (TCEQ) provided a database to the authors
U	2006 Non-Industrial Consumption reported to TCEQ (ac-ft)	The 2006 consumption reported by power plant facilities to the TCEQ. Only non-industrial facilities are tallied.	Texas Commission on Environmental Quality (TCEQ) provided a database to the authors
V	gal/kWh: from 2006 TCEQ Consumption Only	The water consumption rate, gal/kWh, if using the TCEQ 2006 data only	Calculated as: = (Column T)*325851.4/((Column I)*1000)
W	gal/kWh from 2001-2006 cumulative data (TCEQ Consumption/ EIA Generation)	The water consumption rate over the years 2001-2006 for facilities that had both (1) submitted consumption data to TCEQ and (2) listed generation with the EIA for all years	Calculated as: = (sum of ac-ft consumed per TCEQ for 2001-2006)*325851.4/((sum of generation for 2001-2006 in MWh)*1000)

X	gal/kWh, 2001-2005 avg. TWDB groundwater data and EIA MWh	The water intake rate, gal/kWh, while considering only groundwater data submitted to the TWDB	TWDB supplied database with groundwater intake (intake is assumed equal to consumption) EIA 906/920 data for electric generation Calculated as: (sum of gallons of intake per TWDB for 2001-2005)/((sum of generation for 2001-2005 in MWh)*1000)
Y	gal/kWh consumption	Final consumption factors used for current and projected water consumption for each power plant facility	Calculated values from columns V, W, and X were used as appropriate, and values from column S were used otherwise
Z	Ac-Ft consumed	Estimated water consumption (ac-ft) per facility for the year 2006	Calculated as: (Column I)*1000*(Column Y)/325851.4

Notes:

Cooling System: type of cooling system (Cooling Tower, Once-through, Air, or N/A for hydropower)

Prime mover: prime mover that produced the most electricity in 2006; NGCC = natural gas combined cycle, ST = steam turbine (could be part of NGCC when with natural gas), GT = gas turbine (could be part of NGCC), HY = hydroelectric turbine, WT = wind turbine, IC = internal combustion, CT = combustion turbine,

Energy source: fuel that is use the most at the facility; NG = natural gas, LIG = lignite coal, SUB = subbituminous coal, WAT = water, WND = wind, NUC = nuclear (uranium), PUR = purchased steam, WDS = wood waste solids, DFO = distillate fuel oil, AB = agricultural byproducts, BLQ = black liquor (renewable), WH = waste heat, OTH = other

Wind, hydroelectric, and internal combustion (IC) generators were all assumed to have a water demand rate of 0 gal/kWh.

EIA-906/920 (2006)					EIA-906/920 (2006)	EIA-906/920 (2006)	EIA-860 (2006)	EIA-906/920 (2006)	EIA-767 (2005), Sledge et al. 2003, Stakeholders	EIA-767, Stakeholders	EIA-767, Stakeholders	EIA-906/920 (2006)	EIA-906/920 (2006)	EIA-906/920 & EIA-860 (2006)
Facility ID	Reg. Water Planning Area	County	Longitude	Latitude	Company	Plant Name	Nameplate Capacity (kW)	2006 Generation (MWh)	Cooling type	Water Source 1	Water Source 2	CHP (Y or N)	Industrial On-Site (Y or N), C = Commercial	Prime Mover
55052	I	Anderson	-95.6400	31.7700	WTG Jameson, L.P.	Jameson Gas Processing Plant	1,100	10,057	None	None		N	Y	IC
55747	I	Anderson	-101.9495	30.8850	NWP Indian Mesa Wind Farm LP	NWP Indian Mesa Wind Farm	82,500	235,582	Air	None		N	N	WT
54948	F	Andrews	-102.5500	32.3200	Duke Energy Field Services	Fullerton	3,000	0	Air	None		N	Y	IC
50249	I	Angelina	-94.6776	31.3572	Abitibi Consolidated-Lufkin	Abitibi Consolidated Lufkin	84,800	0	Cooling Tower	Unknown		Y	Y	ST
6183	L	Atascosa	-98.4723	28.7092	San Miguel Electric Coop Inc	San Miguel	410,000	2,937,194	Cooling Tower	Groundwater		N	N	ST
55168	K	Bastrop	-97.5500	30.1458	Bastrop Energy Partners, LP	Bastrop Energy Center	727,800	1,972,648	Cooling Tower	Municipal		N	N	NGCC
55154	K	Bastrop	-97.2706	30.1465	Lower Colorado River Authority	Lost Pines 1 Power Project	595,000	3,452,313	Once Through	Lake		N	N	NGCC
3601	K	Bastrop	-97.2750	30.1419	Lower Colorado River Authority	Sim Gideon	639,000	763,299	Once Through	Lake		N	N	ST
7512	L	Bexar	-98.5000	29.4000	San Antonio Public Service Bd	Arthur Von Rosenberg	550,000	1,380,225	Once Through	Lake	River/Municipal	N	N	NGCC
7097	L	Bexar	-98.3203	29.3066	San Antonio Public Service Bd	J K Spruce	566,000	4,040,787	Once Through	Reuse		N	N	ST
6181	L	Bexar	-98.3228	29.3075	San Antonio Public Service Bd	J T Deely	932,000	5,502,734	Once Through	Reuse		N	N	ST
3609	L	Bexar	-98.5758	29.3512	San Antonio Public Service Bd	Leon Creek	418,300	127,181	Cooling Tower	Groundwater		N	N	ST
3611	L	Bexar	-98.3245	29.3080	San Antonio Public Service Bd	O W Sommers	892,000	1,305,476	Once Through	Reuse		N	N	ST
54606	L	Bexar	98.6220	29.5830	Wim-Sam Inc	University of Texas at San Antonio	3,400	4,723	Air	None		Y	C	IC
3612	L	Bexar	-98.3814	29.2564	San Antonio Public Service Bd	V H Braunig	894,000	1,093,110	Once Through	River	Municipal/Reuse	N	N	ST
3613	L	Bexar	-98.4178	29.5305	San Antonio Public Service Bd	W B Tuttle	493,900	25,596	Cooling Tower	Groundwater		N	N	ST
56457	F	Borden	-101.3847	33.1910	FPL Energy Red Canyon LLC	Post Wind Farm LP	84,000	202,601	Air	None		N	N	WT
55172	G	Bosque	-97.3588	31.8590	Mirant Corp	Bosque County Peaking	557,000	1,354,027	Cooling Tower	River		N	N	NGCC
6414	G	Bosque	-97.3718	31.8652	USCE-Fort Worth District	Whitney	30,000	14,616	N/A	Lake		N	N	HY
55311	H	Brazoria	-95.4000	29.0000	BASF Corporation	BASF Freeport Works	92,700	623,726	Cooling Tower	Unknown		Y	Y	NGCC
10418	H	Brazoria	-95.2062	29.2434	Solutia Inc-Chocolate	Chocolate Bayou Plant	0	260,140	Cooling Tower	River		Y	Y	ST
10154	H	Brazoria	-95.1945	29.2323	INEOS USA LLC	Chocolate Bayou Works	41,000	264,725	Cooling Tower	Unknown		Y	Y	GT
52120	H	Brazoria	-95.3800	28.9860	Dow Chemical Co	Dow Chemical Texas Operation	1,378,600	4,204,762	Cooling Tower	River		Y	Y	NGCC
54676	H	Brazoria	-95.3800	28.9860	Dow Chemical Company-Oyster Creek VIII	Oyster Creek Unit VIII	497,900	2,841,702	Cooling Tower	Unknown		Y	N	NGCC
55015	H	Brazoria	-95.7459	29.0749	Sweeny Cogeneration LP	Sweeny Cogen Facility	572,000	3,333,407	Cooling Tower	Unknown		Y	N	GT
3561	G	Brazos	-96.3725	30.6444	Bryan City of	Bryan	138,000	124,862	Cooling Tower	Groundwater		N	N	ST
6243	G	Brazos	-96.4611	30.7219	Bryan City of	Dansby	154,100	356,121	Unknown	Unknown		N	N	ST
3595	K	Burnet	-98.4179	30.7514	Lower Colorado River Authority	Buchanan	47,800	28,088	N/A	Lake		N	N	HY
3597	K	Burnet	-98.3382	30.5561	Lower Colorado River Authority	Granite Shoals	60,000	27,118	N/A	Lake		N	N	HY
3598	K	Burnet	-98.3853	30.7312	Lower Colorado River Authority	Inks	15,000	14,458	N/A	Lake		N	N	HY
3599	K	Burnet	-98.2571	30.5558	Lower Colorado River Authority	Marble Falls	30,000	16,665	N/A	Lake		N	N	HY
50404	L	Calhoun	-96.8341	28.5715	INEOS Nitriles Greenlake	BP Chemicals Green Lake Plant	0	226,068	Cooling Tower	Unknown		Y	Y	ST
10554	L	Calhoun	-96.5446	28.6846	Formosa Plastics Corp	Formosa Utility Venture Ltd	689,400	4,045,361	Cooling Tower	Lake	Municipal	Y	Y	NGCC
52069	L	Calhoun	-96.5523	28.6611	Alcoa World Alumina LLC	Point Comfort Operations	63,100	329,026	Cooling Tower	Unknown		Y	Y	ST
10167	L	Calhoun	-96.7950	28.5130	Seadrift Coke L P	Seadrift Coke LP	7,600	44,988	Cooling Tower	Unknown		Y	Y	ST
50150	L	Calhoun	-96.7720	28.5108	Union Carbide Corp-Seadrift	Union Carbide Seadrift Cogen	168,000	743,713	Cooling Tower	Unknown		Y	Y	NGCC
3442	M	Cameron	-97.6389	26.1334	NuCoastal Power LLC	La Palma	258,300	627,148	Cooling Tower	Surface		N	N	ST
54338	M	Cameron	-97.8300	26.2600	Rio Grande Valley Sugar Growers, Inc.	Rio Grande Valley Sugar Growers	7,500	18,200	Cooling Tower	Unknown		Y	Y	ST
3559	M	Cameron	-97.5216	25.9136	Brownsville Public Utis Board	Silas Ray	181,400	214,706	Cooling Tower	Surface		N	N	ST
55579	A	Carson	-101.2335	35.4673	Shell Wind Energy Inc.	Llano Estacado Wind Ranch	80,000	256,633	Air	None		N	N	WT
54097	D	Cass	-94.0693	33.2562	International Paper Co	International Paper Texarkana Mill	65,000	353,096	Cooling Tower	River		Y	Y	ST
3460	H	Chambers	-94.9255	29.7502	NRG Energy	Cedar Bayou	2,295,000	2,793,442	Once Through	Salt	Groundwater	N	N	ST
10261	H	Chambers	-94.9113	29.8618	Enterprise Products Optg LP	Enterprise Products Operating	25,700	186,639	Cooling Tower	Unknown		Y	Y	GT
3504	I	Cherokee	-94.9883	31.9382	Luminant Generation Company LLC	Stryker Creek	713,400	617,962	Once Through	Lake		N	N	ST
3500	C	Collin	-96.8138	33.1997	Luminant Generation Company LLC	Collin	156,200	0	Cooling Tower	Groundwater		N	N	ST
3576	C	Collin	-96.4528	33.0682	Garland City of	Ray Olinger	427,700	494,119	Once Through	Lake		N	N	ST
791	L	Comal	-98.1955	29.8700	Guadalupe Blanco River Auth	Canyon	6,000	5,421	N/A	Lake		N	N	HY
55399	E	Culberson	-104.7437	31.6780	Delaware Mountain LP	Delaware Mountain Windfarm	30,000	67,376	Air	None		N	N	WT
54966	E	Culberson	-104.7764	31.3388	WindPower Partners, 1994, L.P.	West Texas Windplant	33,600	57,744	Air	None		N	N	WT
3574	C	Dallas	-96.6243	32.9127	Garland City of	C E Newman	96,400	12,382	Cooling Tower	Surface		N	N	ST
3452	C	Dallas	-96.5461	32.8362	Luminant Generation Company LLC	Lake Hubbard	927,500	513,932	Once Through	Lake		N	N	ST
3453	C	Dallas	-96.9361	32.7235	Exelon Generation Co LLC	Mountain Creek	958,300	530,147	Once Through	Lake		N	N	ST
3454	C	Dallas	-96.9750	32.9507	Luminant Generation Company LLC	North Lake	708,500	74,754	Once Through	Lake		N	N	ST
54248	C	Dallas	-96.8076	32.7432	Rock-Tenn	Rock Tenn Dallas Mill	6,200	0	Cooling Tower	Unknown		Y	Y	ST
55390	C	Dallas	-96.7730	32.7730	State Farm Mutual Auto Ins Co	State Farm Insur Support Center Central	10,800	65	Air	None		N	C	IC
54607	C	Dallas	-96.7500	32.9880	University of Texas at Dallas	University of Texas at Dallas	3,500	23	Air	None		Y	C	IC
50569	C	Denton	-96.9583	33.0197	WM Renewable Energy LLC	DFW Gas Recovery	6,000	28,504	Cooling Tower	Unknown		N	N	GT
794	C	Denton	-96.9643	33.0685	Garland City of	Lewisville	2,800	5,737	N/A	Lake		N	N	HY
796	C	Denton	-97.0488	33.3529	Denton City of	Ray Roberts	1,200	0	N/A	Lake		N	N	HY
4266	C	Denton	-97.1028	33.2043	Garland City of	Spencer	173,700	181,910	Cooling Tower	Reuse		N	N	ST
55000	L	DeWitt	-97.3112	29.1297	Small Hydro of Texas Inc	Small Hydro of Texas	1,500	0	N/A	River		N	N	HY
55215	F	Ector	-102.3261	31.8389	Odessa-Ector Power Partners LP	Odessa-Ector Generating Station	1,135,200	4,977,708	Cooling Tower	Groundwater		N	N	NGCC
9	E	El Paso	-106.5232	31.7812	El Paso Electric Co	Copper	0	16,420	Cooling Tower	Groundwater		N	N	GT
55536	E	El Paso	-106.5000	31.8000	Hoover Company	Hoover Company	7,200	112	Air	None		N	Y	IC
55578	E	El Paso	-105.3904	31.4595	El Paso Electric Co	Hueco Mountain Wind Ranch	1,300	393	Air	None		N	N	WT
55637	E	El Paso	-106.5783	31.8978	Leviton Manufacturing Inc	Leviton Manufacturing	1,800	0	Air	None		Y	Y	IC
3456	E	El Paso	-106.4322	31.9843	El Paso Electric Co	Newman	575,000	1,661,990	Cooling Tower	Groundwater	Reuse	N	N	ST
54628	E	El Paso	-106.3800	31.7600	Phelps Dodge Refining Corp	Phelps Dodge Refining	19,600	40,981	Cooling Tower	Unknown		Y	Y	GT
50241	E	El Paso	-106.5020	31.7692	Tenet Hospital Ltd	Providence Memorial Hospital	4,200	24	Air	Unknown		N	C	IC
55223	C	Ellis	-96.6753	32.3199	Ennis Tractebel Power Co LP	Ennis Tractebel Power LP	418,000	1,381,153	Cooling Tower	Municipal		N	N	NGCC

EIA-906/920 (2006)					EIA-906/920 (2006)	EIA-906/920 (2006)	EIA-860 (2006)	EIA-906/920 (2006)	EIA-767 (2005), Sledge et al. 2003, Stakeholders	EIA-767, Stakeholders	EIA-767, Stakeholders	EIA-906/920 (2006)	EIA-906/920 (2006)	EIA-906/920 & EIA-860 (2006)
Facility ID	Reg. Water Planning Area	County	Longitude	Latitude	Company	Plant Name	Nameplate Capacity (kW)	2006 Generation (MWh)	Cooling type	Water Source 1	Water Source 2	CHP (Y or N)	Industrial On-Site (Y or N), C = Commercial	Prime Mover
55091	C	Ellis	-97.0541	32.4295	ANP Operations Co	Midlothian Energy Facility	1,734,000	7,057,168	Air	None		N	N	CS
3508	C	Fannin	-96.3650	33.6437	Valley NG Power Company LLC (Luminant)	Valley	1,175,400	278,892	Once Through	Lake		N	N	ST
6179	K	Fayette	-96.7506	29.9175	Lower Colorado River Authority	Fayette Power Project	1,690,000	10,000,368	Once Through	Lake		N	N	ST
55357	H	Fort Bend	-95.6244	29.4731	Calpine - Brazos Valley	Brazos Valley Generating Facility	950,600	1,981,846	Cooling Tower	River		N	N	NGCC
3470	H	Fort Bend	-95.6331	29.4836	NRG Energy	W A Parish	3,969,000	20,178,794	Cooling Tower	Lake	Groundwater	N	N	ST
3497	C	Freestone	-96.0547	31.8207	Big Brown Power Company LLC (Luminant)	Big Brown	1,186,800	8,911,676	Once Through	Lake	Groundwater	N	N	ST
55226	C	Freestone	-96.1491	31.7049	Calpine - Freestone Power Generation LP	Freestone Power Generation LP	1,036,000	3,169,555	Cooling Tower	Unknown		N	N	NGCC
3630	L	Frio	-99.3026	29.0195	South Texas Electric Coop Inc	Pearsall	66,000	39,783	Unknown	Unknown		N	N	ST
55470	H	Galveston	-94.9181	29.3711	South Houston Green Power LP	Green Power 2	611,000	2,246,864	None	River		Y	Y	NGCC
3466	H	Galveston	-94.9797	29.4872	NRG Energy	P H Robinson	2,314,500	0	Once Through	Salt	Groundwater	N	N	ST
52132	H	Galveston	-94.9237	29.3791	South Houston Green Power LP	Power Station 4	191,100	502,553	Cooling Tower	Unknown		Y	Y	NGCC
54253	H	Galveston	-94.9200	29.3700	S&L Cogeneration Co	S&L Cogeneration Co	55,000	284,943	Cooling Tower	Unknown		Y	Y	GT
50153	H	Galveston	-94.9437	29.3767	Union Carbide Corp-Texas City	Texas City Plant Union Carbide	96,000	187,356	Cooling Tower	Unknown		Y	Y	GT
52088	H	Galveston	-94.9439	29.3784	Calpine Corp-Texas City	Texas City Power Plant	450,000	1,259,801	Cooling Tower	Municipal		Y	N	NGCC
52013	H	Galveston	-94.9171	29.3702	Valero Refining Co-Texas City	Valero Refining Texas City	16,200	19,592	Cooling Tower	Unknown		Y	Y	GT
56394	F	Glasscock	-101.2650	31.9700	Airtricity Inc	Forest Creek Wind Farm LLC	124,200	5,001	Air	None		N	N	WT
6178	L	Goliad	-97.2142	28.7131	American Natl. Power (was Topaz Power Group)	Coletto Creek	600,400	5,240,154	Once Through	Lake		N	N	ST
7394	L	Gonzales	-97.4552	29.4972	Gonzales City of	Gonzales Hydro Plant	1,500	0	N/A	Lake		N	N	HY
7678	A	Gray	-101.0485	35.4813	Southwestern Public Service Co	Celanese	50,000	343,968	Cooling Tower	Groundwater		N	N	ST
6416	C	Grayson	-96.5697	33.8180	USCE-Tulsa District	Denison	70,000	71,607	N/A	Lake		N	N	HY
3625	C	Grayson	-96.9100	33.6600	Whitesboro City of	Whitesboro	3,800	0	Air	None		N	N	IC
3476	D	Gregg	-94.6427	32.3746	Southwestern Electric Power Co	Knox Lee	501,000	533,649	Once Through	Lake	Groundwater	N	N	ST
6136	G	Grimes	-96.0778	30.6169	Texas Municipal Power Agency	Gibbons Creek	453,500	3,611,068	Once Through	Lake		N	N	ST
55062	G	Grimes	-95.9180	30.5929	Tenaska Frontier Partners Ltd	Tenaska Frontier Generation Station	939,700	4,143,008	Cooling Tower	Unknown		N	N	NGCC
3581	L	Guadalupe	-98.0406	29.5944	Guadalupe Blanco River Auth	Abbott TP 3	2,800	6,050	N/A	Lake		N	N	HY
3582	L	Guadalupe	-98.0664	29.6539	Guadalupe Blanco River Auth	Dunlap TP 1	3,600	8,703	N/A	Lake		N	N	HY
55153	L	Guadalupe	-98.1396	29.6232	Guadalupe Power Partners LP	Guadalupe Generating Station	1,142,200	4,436,855	Cooling Tower	Lake		N	N	NGCC
3583	L	Guadalupe	-97.6246	29.4956	Guadalupe Blanco River Auth	H 4	2,400	5,361	N/A	Lake		N	N	HY
3584	L	Guadalupe	-97.4920	29.4682	Guadalupe Blanco River Auth	H 5	2,400	5,345	N/A	Lake		N	N	HY
3585	L	Guadalupe	-97.9394	29.5288	Guadalupe Blanco River Auth	Nolte	2,400	4,690	N/A	Lake		N	N	HY
55137	L	Guadalupe	-97.9733	29.5931	Rio Nogales Power Project LP	Rio Nogales Power Project	898,200	3,902,576	Cooling Tower	Municipal		N	N	NGCC
3586	L	Guadalupe	-97.9996	29.5485	Guadalupe Blanco River Auth	TP 4	2,400	5,671	N/A	Lake		N	N	HY
56225	A	Hansford	-101.3500	36.2800	Aelous Wind, LLC	Acolus Wind Facility	3,000	6,924	Air	None		N	N	WT
50253	H	Harris	-95.1080	29.8815	Abitibi Consolidated-Sheldon	Abitibi Consolidated Sheldon	97,200	0	Cooling Tower	Unknown		Y	Y	ST
10670	H	Harris	-95.2269	29.7173	AES Deepwater Inc	AES Deepwater	184,000	1,209,482	Cooling Tower	Municipal		Y	N	ST
55528	H	Harris	-95.2000	29.9900	Viridis Energy	Atascosita	6,500	67,710	Air	None		N	N	IC
10298	H	Harris	-95.0442	29.6176	Air Liquide Large Industries U S LP	Bayou Cogen Plant	300,000	1,982,597	Cooling Tower	Unknown		Y	Y	GT
55551	H	Harris	-94.9700	29.7300	Viridis Energy	Baytown	5,200	18,832	Air	None		N	N	IC
55327	H	Harris	-94.9019	29.7731	Calpine Central LP	Baytown Energy Center	914,600	4,082,048	Cooling Tower	Municipal		Y	N	NGCC
55552	H	Harris	-95.2000	29.8000	Viridis Energy	Bluebonnet	4,000	9,540	Air	None		N	N	IC
55299	H	Harris	-95.2269	29.7117	Calpine - Channel Energy	Channel Energy Center	715,000	2,840,247	Cooling Tower	Reuse		Y	N	NGCC
55187	H	Harris	-95.1216	29.8369	Reliant Energy Channelview LP	Channelview Cogeneration Plant	918,300	5,229,167	Cooling Tower	Unknown		Y	N	NGCC
10741	H	Harris	-95.0631	29.6245	Calpine - Clear Lake	Clear Lake Cogeneration	465,200	241,683	Cooling Tower	Unknown		Y	N	NGCC
55554	H	Harris	-95.2400	29.4200	Viridis Energy	Coastal Plains	5,200	26,046	Air	None		N	N	IC
50815	H	Harris	-95.1083	29.8166	Cogen Lyondell	CoGen Lyondell	643,600	2,765,563	Cooling Tower	Unknown		Y	N	NGCC
3461	H	Harris	-95.2266	29.7233	AES Western Power LLC	Deepwater	187,800	0	Once Through	Salt		N	N	ST
55464	H	Harris	-95.1361	29.7153	Calpine - Deer Park	Deer Park Energy Center	996,000	5,464,269	Cooling Tower	Municipal		Y	N	NGCC
55365	H	Harris	-95.0718	29.7031	Exelon Generation Co LLC	Exelon LaPorte Generating Station	236,000	81,355	Cooling Tower	Unknown		N	N	GT
10436	H	Harris	-95.0091	29.7411	Exxon Mobil Refining and Supply Co.	ExxonMobil Baytown Refinery	199,900	944,968	Cooling Tower	Unknown		Y	Y	GT
10692	H	Harris	-95.0125	29.7557	Exxon Mobil Refining and Supply Co.	ExxonMobil Baytown Turbine	376,900	2,503,825	Cooling Tower	River		Y	Y	GT
3464	H	Harris	-95.2186	29.8216	NRG Energy	Greens Bayou	878,400	299,168	Cooling Tower	Surface	Groundwater	N	N	ST
50043	H	Harris	-95.1052	29.7273	Oxy Vinyls LP	Houston Chemical Complex Battleground	281,000	1,053,112	Cooling Tower	Unknown		Y	Y	NGCC
10638	H	Harris	-95.1910	29.7160	Air Products LP	Pasadena	6,500	2,767	Cooling Tower	Unknown		Y	Y	GT
55047	H	Harris	-95.1792	29.7300	Calpine - Pasadena Cogeneration LP	Pasadena Cogeneration	815,000	2,541,752	Cooling Tower	Unknown		Y	N	NGCC
52065	H	Harris	-95.2712	29.7198	Rhodia Inc	Rhodia Houston Plant	7,500	54,973	Cooling Tower	Unknown		Y	Y	ST
50054	H	Harris	-95.3999	29.7212	Rice University	Rice University	6,900	28,157	Cooling Tower	Unknown		Y	C	GT
3468	H	Harris	-95.1719	29.7300	NRG Energy	Sam Bartron	875,100	552,802	Once Through	Salt	Groundwater	N	N	ST
7325	H	Harris	-95.0498	29.6578	Texas Genco II, LP	San Jacinto Steam Electric Station	176,400	1,189,135	None	Unknown		N	N	GT
50304	H	Harris	-95.1222	29.7162	Shell Oil Co-Deer Park	Shell Deer Park	257,000	1,364,364	Cooling Tower	Unknown		Y	Y	GT
3469	H	Harris	-95.5317	29.9416	NRG Energy	T H Wharton	1,421,500	1,918,505	Cooling Tower	Groundwater		N	N	NGCC
50229	H	Harris	-95.2552	29.6992	Texas Petrochemicals Corp	Texas Petrochemicals	35,000	253,086	Cooling Tower	Unknown		Y	Y	ST
52012	H	Harris	-95.2554	29.7203	Valero Refining Co - TX	Valero Refining Texas Houston	17,100	12,554	Cooling Tower	Unknown		Y	Y	GT
3471	H	Harris	-95.1036	29.5300	NRG Energy	Webster	426,300	0	Once Through	Salt		N	N	GT
54330	H	Harris	-95.6469	29.7213	Shell Chemical LP	Westhollow Technology Center	3,700	33,712	Cooling Tower	Unknown		Y	C	GT
55176	D	Harrison	-94.6917	32.4472	Eastman Cogeneration LP	Eastman Cogeneration Facility	467,700	2,113,552	Cooling Tower	Lake		Y	N	NGCC
55664	D	Harrison	-94.3713	32.5482	Entergy Power Ventures LP	Harrison County Power Project	570,000	1,099,375	Cooling Tower	Reuse		N	N	NGCC
54972	D	Harrison	-94.3700	32.5400	Norit Americas Inc	Norit Americas Marshall Plant	2,000	15,110	Cooling Tower	Unknown		N	Y	ST
7902	D	Harrison	-94.4850	32.4607	Southwestern Electric Power Co	Pirkey	721,000	4,501,460	Once Through	Lake		N	N	ST
50141	D	Harrison	-94.3763	32.5754	Snider Industries Inc	Snider Industries	5,000	28,283	Cooling Tower	Unknown		Y	Y	ST
55144	L	Hays	-97.9896	29.7811	ANP Operations Co - Hays	Hays Energy Project	989,000	4,300,004	Air & Wet Cooling Tower	Municipal Reuse		N	N	NGCC

EIA-906/920 (2006)					EIA-906/920 (2006)	EIA-906/920 (2006)	EIA-860 (2006)	EIA-906/920 (2006)	EIA-767 (2005), Sledge et al. 2003, Stakeholders	EIA-767, Stakeholders	EIA-767, Stakeholders	EIA-906/920 (2006)	EIA-906/920 (2006)	EIA-906/920 & EIA-860 (2006)
Facility ID	Reg. Water Planning Area	County	Longitude	Latitude	Company	Plant Name	Nameplate Capacity (kW)	2006 Generation (MWh)	Cooling type	Water Source 1	Water Source 2	CHP (Y or N)	Industrial On-Site (Y or N), C = Commercial	Prime Mover
50263	L	Hays	-97.9437	29.8888	Texas State University - San Marcos	Southwest Texas State University	6,000	32,578	Air	Municipal		Y	C	IC
3507	C	Henderson	-96.1016	32.1245	Luminant Generation Company LLC	Trinidad	243,300	56,903	Once Through	Lake		N	N	ST
55098	M	Hidalgo	-98.3800	26.2300	Frontera Generation Limited Partnership	Frontera Energy Center	529,000	2,036,942	Cooling Tower	Surface	Groundwater	N	N	NGCC
55545	M	Hidalgo	-98.1751	26.3417	Calpine Corp-Hidalgo	Hidalgo Energy Center	647,000	1,878,610	Cooling Tower	Surface		N	N	NGCC
3438	M	Hidalgo	-98.4084	26.2170	NuCoastal Power LLC	J L Bates	188,700	0	Cooling Tower	Surface	Groundwater	N	N	ST
55123	M	Hidalgo	-98.1751	26.3417	Calpine Corp-Magic Valley	Magic Valley Generating Station	801,000	1,615,741	Cooling Tower	Municipal		N	N	NGCC
8063	G	Hood	-97.7187	32.4018	DeCordova Power Company LLC (Luminant)	DeCordova Steam Electric Station	1,156,800	114,479	Once Through	Lake		N	N	ST
55139	G	Hood	-97.7316	32.3337	Wolf Hollow I LP	Wolf Hollow I LP	809,600	3,830,804	Cooling Tower	Unknown		N	N	NGCC
10569	F	Howard	-101.4195	32.2897	Alon USA LP	Big Spring Texas Refinery	1,500	0	Cooling Tower	Unknown		N	Y	ST
54979	F	Howard	-101.3589	32.2375	Caithness Operating Co LLC	Big Spring Wind Power Facility	34,300	89,015	Air	None		N	N	WT
52176	F	Howard	-101.4216	32.2684	Power Resources Ltd	C R Wing Cogen Plant	230,000	609,065	Cooling Tower	Unknown		Y	N	NGCC
56402	F	Howard	-101.3600	32.2400	West Texas Renewables	West Texas Renewables LLC	84,000	9,164	Air	None		N	N	WT
4195	D	Hunt	-96.1106	33.1442	Greenville Electric Util Sys	Powerlane Plant	84,700	34,526	Once Through	Lake		N	N	ST
55064	A	Hutchinson	-101.3547	35.8400	Borger Energy Associates LP	Black Hawk Station	253,800	1,570,491	Cooling Tower	Unknown		Y	N	GT
50067	A	Hutchinson	-101.4350	35.6659	Sid Richardson Carbon Ltd	Borger Plant	0	122,394	Cooling Tower	Groundwater		Y	Y	ST
10072	A	Hutchinson	-101.4350	35.6659	Engineered Carbons Inc	Engineered Carbons Borger Cogen	20,000	992	Cooling Tower	Unknown		N	Y	ST
3487	A	Hutchinson	-101.4100	35.7100	Southwestern Public Service Co	Riverview	25,000	3,884	Cooling Tower	Groundwater		N	N	GT
55230	C	Jack	-98.1700	33.2300	Brazos Electric Power Coop Inc	Jack Energy Facility	640,000	3,063,108	Cooling Tower	Unknown		N	N	NGCC
50101	I	Jasper	-94.0657	30.3419	MeadWestvaco Corp	MeadWestvaco Evadale	57,700	456,838	Cooling Tower	Unknown		Y	Y	ST
7200	I	Jasper	-94.0000	30.9200	USCE-Fort Worth District	Robert D Willis	8,000	9,998	N/A	Lake		N	N	HY
6413	I	Jasper	-94.1062	31.0608	USCE-Fort Worth District	Sam Rayburn	52,000	42,980	N/A	Lake		N	N	HY
55309	I	Jefferson	-93.9300	29.9000	Air Products LP	Air Products Port Arthur	40,600	0	Cooling Tower	Unknown		Y	N	NGCC
50625	I	Jefferson	-94.0690	30.0664	ExxonMobil Corp	ExxonMobil Beaumont Refinery	595,600	4,039,672	Once Through	River		Y	Y	GT
54321	I	Jefferson	-94.0700	30.0700	Goodyear Tire & Rubber Co	Goodyear Beaumont Chemical Plant	34,800	267,573	Cooling Tower	Unknown		Y	Y	GT
54637	I	Jefferson	-93.9485	29.9789	Huntsman Corp	JCO Oxides Olefins Plant	77,200	461,167	Cooling Tower	Unknown		Y	Y	GT
55122	I	Jefferson	-93.9397	29.8846	BASF Corp	NAFTA Region Olefins Complex Cogen Fac	83,200	494,483	Cooling Tower	Unknown		Y	Y	GT
50973	I	Jefferson	-93.9691	29.8601	Motiva Enterprises LLC	Port Arthur Refinery	78,100	598,711	Cooling Tower	Unknown		Y	Y	NGCC
52108	I	Jefferson	-93.8856	29.9543	Valero Energy Corporation	Port Arthur Refinery	84,600	270,308	Cooling Tower	Unknown		Y	Y	NGCC
10568	I	Jefferson	-93.8922	29.9650	Total Petrochemicals USA Inc	Port Arthur Texas Refinery	38,400	263,132	Cooling Tower	River		Y	Y	GT
54748	I	Jefferson	-93.9517	29.9785	Air Liquide America-Pt Neches	Port Neches Plant	38,000	257,517	Cooling Tower	Unknown		Y	Y	GT
54817	G	Johnson	-97.4082	32.3988	Brazos Electric Power Coop Inc	Johnson County	178,200	461,095	Cooling Tower	Municipal		N	N	NGCC
4938	G	Jones	-99.6826	32.5826	AEP Texas North Company	Fort Phantom	363,000	0	Once Through	Lake		N	N	ST
55480	C	Kaufman	-96.4737	32.7587	FPLE Fomey LP	Fomey Energy Center	1,783,800	8,237,423	Cooling Tower	Reuse		N	N	NGCC
55097	D	Lamar	-95.5896	33.6315	Lamar Power Partners LP	Lamar Power Project	1,090,800	4,508,439	Cooling Tower	Municipal		N	N	NGCC
50109	D	Lamar	-95.5575	33.6967	Tenaska III Texas Partners	Tenaska Paris Generating Station	500,000	501,086	Cooling Tower	Unknown		N	N	NGCC
3485	O	Lamb	-102.4113	34.1662	Southwestern Public Service Co	Plant X	434,400	1,267,450	Cooling Tower	Groundwater		N	N	ST
6194	O	Lamb	-102.5688	34.1848	Southwestern Public Service Co	Tolk	1,136,000	7,342,494	Cooling Tower	Groundwater		N	N	ST
55556	H	Liberty	-94.8000	30.0500	Viridis Energy	Security	3,900	23,312	Air	None		N	N	IC
298	G	Limestone	-96.2525	31.4224	NRG Energy	Limestone	1,706,400	12,709,534	Cooling Tower	Surface	Groundwater	N	N	ST
4937	K	Llano	-98.3695	30.5566	Lower Colorado River Authority	Thomas C Ferguson	446,000	860,765	Once Through	Lake		N	N	ST
7131	O	Lubbock	-101.8500	33.5800	Lubbock City of	Brandon Station	21,000	61,959	Unknown	Unknown		N	N	GT
3604	O	Lubbock	-101.8550	33.5777	Lubbock City of	J Robert Massengale	107,000	341,656	Cooling Tower	Groundwater		N	N	ST
3482	O	Lubbock	-101.7399	33.5240	Southwestern Public Service Co	Jones	496,000	2,357,769	Cooling Tower	Reuse		N	N	ST
3602	O	Lubbock	-101.8296	33.5549	Lubbock City of	Ty Cooke	150,600	125,461	Cooling Tower	Groundwater		N	N	ST
3478	D	Marion	-94.5469	32.8487	Southwestern Electric Power Co	Wilkes	882,000	1,522,180	Once Through	Lake		N	N	ST
6251	K	Matagorda	-96.0489	28.7952	STP Nuclear Operating Co	South Texas Project	2,708,600	21,368,269	Once Through	Lake		N	N	ST
3437	M	Maverick	-100.3152	28.7413	Maverick Cnty Wtr Control & Imp Dst No 1	Eagle Pass	12,000	50,480	N/A	Irrigation Canal		N	N	HY
10317	G	McLennan	-97.1171	31.5480	Baylor University	Baylor University Cogen	3,400	19,128	Cooling Tower	Unknown		Y	C	GT
3502	G	McLennan	-96.9867	31.4635	Luminant Generation Company LLC	Lake Creek	321,600	99,921	Once Through	Lake	Groundwater	N	N	ST
3506	G	McLennan	-96.9645	31.5730	Tradinghouse Power Company LLC (Luminant)	Tradinghouse	1,379,700	521,452	Once Through	Lake		N	N	ST
54458	F	Midland	-102.0850	32.0370	Western Gas Resources Inc	Benedum Plant	2,000	4,359	Air	None		N	Y	IC
6648	G	Milam	-97.0639	30.5644	Luminant Generation Company LLC	Sandow No 4	590,600	3,878,580	Once Through	Lake		N	N	ST
52071	G	Milam	-97.0652	30.5665	Alcoa Inc	Sandow Station	363,000	2,489,887	Once Through	Lake		N	Y	ST
3492	F	Mitchell	-100.9157	32.3363	Luminant Generation Company LLC	Morgan Creek	1,363,700	114,583	Once Through	Lake		N	N	ST
55555	H	Montgomery	-95.4600	30.3200	Viridis Energy	Conroe	3,000	7,135	Air	None		N	N	IC
3457	H	Montgomery	-95.5478	30.4369	Entergy Gulf States Inc	Lewis Creek	542,800	1,721,739	Once Through	Lake	Groundwater	N	N	ST
3483	A	Moore	-101.9400	35.8400	Southwestern Public Service Co	Moore County	49,000	45,243	Cooling Tower	Groundwater		N	N	ST
3477	D	Morris	-94.6994	32.9205	Southwestern Electric Power Co	Lone Star	40,000	21,014	Once Through	Lake		N	N	ST
55358	I	Newton	-93.7364	30.2583	Cottonwood Energy Co LP	Cottonwood Energy Project	1,336,000	2,416,715	Cooling Tower	River		N	N	NGCC
6595	I	Newton	-93.5660	31.1737	Entergy Gulf States Inc	Toledo Bend	81,000	61,126	N/A	Lake		N	N	HY
56211	G	Nolan	-100.4795	32.3347	Babcock & Brown Power Op Partners LLC	Brazos Wind Farm	37,500	126,278	Air	None		N	N	WT
56212	G	Nolan	-100.3667	32.3289	Babcock & Brown Power Op Partners LLC	Sweetwater Wind 2 LLC	91,500	313,075	Air	None		N	N	WT
56311	G	Nolan	-100.3667	32.3289	Babcock & Brown Power Op Partners LLC	Sweetwater Wind 3 LLC	135,000	436,492	Air	None		N	N	WT
55968	G	Nolan	-100.1988	32.4253	Trent Wind Farm LP	Trent Wind Farm, L.P.	150,000	508,556	Air	None		N	N	WT
50615	G	Nolan	-100.3653	32.4925	Luminant	TXU Sweetwater Generating Plant	344,000	289,642	Cooling Tower	Unknown		Y	N	NGCC
4939	N	Nueces	-97.3117	27.6067	Topaz Power Group LLC	Barney M Davis	703,000	527,265	Once Through	Salt		N	N	ST
10243	N	Nueces	-97.8253	27.5670	Celanese Engineering Resin Inc	Celanese Engineering Resin	44,200	242,459	Cooling Tower	Unknown		Y	Y	GT
50475	N	Nueces	-97.5936	27.8111	Equistar Chemicals LP	Corpus Christi	41,000	281,284	Cooling Tower	Unknown		Y	Y	GT
55206	N	Nueces	-97.4284	27.8144	Calpine - Corpus Christi Cogeneration LP	Corpus Christi Energy Center	575,500	1,856,494	Cooling Tower	Salt		N	N	NGCC
50026	N	Nueces	-97.5267	27.8321	Flint Hills Resources LP	Corpus Refinery	55,000	270,223	Cooling Tower	Unknown		Y	Y	GT

EIA-906/920 (2006)					EIA-906/920 (2006)	EIA-906/920 (2006)	EIA-860 (2006)	EIA-906/920 (2006)	EIA-767 (2005), Sledge et al. 2003, Stakeholders	EIA-767, Stakeholders	EIA-767, Stakeholders	EIA-906/920 (2006)	EIA-906/920 (2006)	EIA-906/920 & EIA-860 (2006)
Facility ID	Reg. Water Planning Area	County	Longitude	Latitude	Company	Plant Name	Nameplate Capacity (kW)	2006 Generation (MWh)	Cooling type	Water Source 1	Water Source 2	CHP (Y or N)	Industrial On-Site (Y or N), C = Commercial	Prime Mover
3440	N	Nueces	-97.6167	27.8503	NuCoastal Power LLC	Lon C Hill	0	0	Cooling Tower	Surface		N	N	ST
3441	N	Nueces	-97.4192	27.8192	Topaz Power Group LLC	Nueces Bay	0	0	Once Through	Salt		N	N	ST
10203	N	Nueces	-97.4464	27.8124	Valero Refining Co	Valero Refinery Corpus Christi East	40,000	199,197	Cooling Tower	Unknown		Y	Y	GT
50121	N	Nueces	-97.4852	27.8170	Valero Refining Co	Valero Refinery Corpus Christi West	76,700	321,182	Cooling Tower	Unknown		Y	Y	OT
56557	A	Ochiltree	-101.0100	36.4200	John Deere Wind 1 LLC	JD Wind 1 LLC	10,000	25,042	Air	None		N	N	WT
56558	A	Ochiltree	-101.0100	36.4200	John Deere Wind 2 LLC	JD Wind 2 LLC	10,000	25,627	Air	None		N	N	WT
56559	A	Ochiltree	-101.0100	36.4200	John Deere Wind 3 LLC	JD Wind 3 LLC	10,000	25,882	Air	None		N	N	WT
56561	A	Ochiltree	-101.0100	36.4200	John Deere Wind 5 LLC	JD Wind 5 LLC	10,000	3,799	Air	None		N	N	WT
56562	A	Ochiltree	-101.0100	36.4200	John Deere Wind 6 LLC	JD Wind 6 LLC	10,000	0	Air	None		N	N	WT
10187	I	Orange	-93.7208	30.1518	Engineered Carbons Inc	Engineered Carbons Echo Cogeneration	10,000	47,205	Cooling Tower	Unknown		N	Y	ST
10425	I	Orange	-93.7400	30.0900	Temple-Inland	Inland Paperboard and Packaging	48,000	277,098	Cooling Tower	Unknown		N	Y	ST
3459	I	Orange	-93.8752	30.0208	Entergy Gulf States Inc	Sabine	2,051,200	4,385,581	Once Through	Salt	Groundwater	N	N	ST
55104	I	Orange	-93.7718	30.0497	Sabine Cogen LP	Sabine Cogen	101,400	611,048	Cooling Tower	Unknown		Y	N	NGCC
10789	I	Orange	-93.7543	30.0540	E I DuPont De Nemours & Co	Sabine River Works	102,300	654,327	Cooling Tower	Unknown		Y	Y	NGCC
55120	I	Orange	-93.7718	30.0497	SRW Cogeneration LP	SRW Cogen LP	505,000	1,950,346	Cooling Tower	Unknown		Y	N	NGCC
3557	G	Palo Pinto	-98.4265	32.8701	Brazos River Authority	Morris Sheppard	25,000	10,783	N/A	Lake		N	N	HY
3628	G	Palo Pinto	-98.3103	32.6582	Brazos Electric Power Coop Inc	R W Miller	603,600	760,686	Once Through	Lake		N	N	ST
3627	C	Parker	-97.6946	32.7784	Brazos Electric Power Coop Inc	North Texas	71,000	8,232	Once Through	Lake		N	N	ST
3624	C	Parker	-97.8000	32.7500	Weatherford Mun Utility System	Weatherford	5,700	25	Air	None		N	N	IC
55992	F	Pecos	-101.9495	30.8850	Desert Sky Wind Farm LP	Desert Sky	160,500	488,474	Air	None		N	N	WT
55796	F	Pecos	-102.4398	30.9523	Pecos Wind I LP	Woodward Mountain I	82,000	182,813	Air	None		N	N	WT
55795	F	Pecos	-102.4398	30.9523	Pecos Wind II LP	Woodward Mountain II	78,000	175,895	Air	None		N	N	WT
6193	A	Potter	-101.7476	35.2989	Southwestern Public Service Co	Harrington	1,080,000	7,623,174	Cooling Tower	Reuse		N	N	ST
3484	A	Potter	-101.7460	35.2831	Southwestern Public Service Co	Nichols	476,000	1,221,340	Cooling Tower	Reuse	Groundwater	N	N	ST
7030	G	Robertson	-96.6934	31.0930	Altura Power	Twin Oaks Power One	349,200	2,351,664	Cooling Tower	Groundwater		N	N	ST
6146	I	Rusk	-94.5708	32.2607	Luminant Generation Company LLC	Martin Lake	2,379,600	17,821,177	Once Through	Lake		N	N	ST
55132	I	Rusk	-94.6201	32.0178	Tenaska Gateway Partners Ltd	Tenaska Gateway Generating Station	939,600	4,139,359	Cooling Tower	Lake		N	N	NGCC
55086	N	San Patricio	-97.2500	27.9000	DPS Gregory LLC	Gregory Power Facility	432,000	2,706,019	Cooling Tower	Reuse		Y	N	NGCC
55313	N	San Patricio	-97.2000	27.8500	Ingleside Cogeneration LP	Ingleside Cogeneration	528,000	2,643,043	Cooling Tower	Unknown		Y	Y	NGCC
54291	N	San Patricio	-97.2586	27.8890	Sherwin Alumina Company	Sherwin Alumina	24,000	188,188	Cooling Tower	Unknown		Y	Y	ST
56111	F	Scurry	-101.1172	32.9503	Shell Wind Energy Inc.	Brazos Wind Farm	160,000	510,658	Air	None		N	N	WT
56233	F	Scurry	-100.9588	32.7496	Kinder Morgan Production Company LP	EG178 Facility	120,600	853,218	Cooling Tower	Unknown		N	Y	NGCC
55025	F	Scurry	-101.0700	32.7000	Kinder Morgan Yates Operation	Yates Gas Plant	5,600	26,950	Cooling Tower	Unknown		Y	Y	GT
6145	G	Somervell	-97.7858	32.2983	Luminant Generation Company LLC	Comanche Peak	2,430,000	19,896,009	Once Through	Lake		N	N	ST
6410	M	Starr	-99.1640	26.5574	International Bound & Wtr Comm	Falcon Dam & Power	31,500	62,230	N/A	Lake		N	N	HY
56479	F	Sterling	-101.0500	31.8400	Airtricity Inc	Sand Bluff Wind Farm	90,000	0	Air	None		N	N	WT
3489	C	Tarrant	-97.4795	32.9060	Luminant Generation Company LLC	Eagle Mountain	706,100	0	Once Through	Lake		N	N	ST
3491	C	Tarrant	-97.2192	32.7287	Exelon Generation Co LLC	Handley	1,433,300	714,854	Once Through	Lake		N	N	ST
54520	C	Tarrant	-97.2450	32.6500	Ft Worth City of	Village Creek Wastewater Treatment Plant	12,400	35,603	Air	None		N	C	IC
56240	G	Taylor	-100.1100	32.3100	Buffalo Gap Wind Farm	AES SeaWest Inc	120,600	284,020	Air	None		N	N	WT
56270	G	Taylor	-100.0155	32.3118	FPL Energy Callahan Wind, LLC	Callahan Divide Wind Energy Center	114,000	409,513	Air	None		N	N	WT
56291	G	Taylor	-100.0453	32.2220	FPL Energy Horse Hollow LLC	Horse Hollow Wind Energy Center I	732,500	1,323,204	Air	None		N	N	WT
3558	O	Terry	-102.2700	33.1800	Brownfield City of	Brownfield	17,900	0	Unknown	Unknown		N	N	GT
6147	D	Titus	-95.0416	33.0918	Luminant Generation Company LLC	Monticello	1,980,000	14,961,282	Once Through	Lake		N	N	ST
6139	D	Titus	-94.8372	33.0404	Southwestern Electric Power Co	Welsh	1,674,000	10,035,850	Once Through	Lake		N	N	ST
3527	F	Tom Green	-100.4923	31.3935	AEP Texas North Company	San Angelo/Concho (retired)	128,000	0	Once Through	Lake		N	N	NGCC
3594	K	Travis	-97.7850	30.2938	Lower Colorado River Authority	Austin	16,000	26,025	N/A	Lake		N	N	HY
10184	K	Travis	-97.8425	30.3974	Minnesota Mining & Mfg Co	Central Utility Plant	14,300	25,196	Cooling Tower	Unknown		Y	C	ST
3548	K	Travis	-97.6128	30.3038	Austin Energy	Decker Creek	932,000	1,403,302	Once Through	Lake		N	N	ST
56373	K	Travis	-97.7252	30.3975	Austin Energy	Domain Plant	5,000	2,359	Cooling Tower	Municipal		Y	N	GT
50118	K	Travis	-97.7351	30.2867	University of Texas at Austin	Hal C Weaver Power Plant	128,400	341,939	Cooling Tower	Municipal		Y	C	NGCC
3549	K	Travis	-97.7221	30.2513	Austin Energy	Holly Street (retired in 2008)	558,000	472,580	Once Through	Lake		N	N	ST
3600	K	Travis	-97.9072	30.3910	Lower Colorado River Authority	Marshall Ford	102,500	88,770	N/A	Lake		N	N	HY
56374	K	Travis	-97.7091	30.3060	Austin Energy	Robert Mueller Energy Center	6,100	1,309	Cooling Tower	Municipal		Y	N	GT
7900	K	Travis	-97.6138	30.2087	Austin Energy	Sand Hill	593,600	1,613,191	Cooling Tower	Reuse		N	N	NGCC
55588	K	Travis	-97.7600	30.1700	Gas Recovery Systems Inc	Sunset Farms	4,000	19,994	Air	None		N	N	IC
55581	F	Upton	-102.2444	31.2357	FPL Energy Upton Wind LP	King Mountain Wind Ranch 1	278,000	690,563	Air	None		N	N	WT
54459	F	Upton	-101.8400	31.6300	Western Gas Resources Inc	Midkiff Plant	3,600	12,222	Air	None		N	Y	IC
55367	F	Upton	-102.1915	31.2793	West Texas Wind Egy Ptnrs LLC	West Texas Wind Energy LLC	75,000	210,191	Air	None		N	N	WT
6128	J	Val Verde	-101.0557	29.4496	International Bound & Wtr Comm	Amistad Dam & Power	66,000	90,049	N/A	Lake		N	N	HY
54976	D	Van Zandt	-95.7100	32.6700	Morton International Inc	Morton Salt Grand Saline	1,500	0	Cooling Tower	Unknown		Y	Y	ST
3631	L	Victoria	-97.1347	28.8950	South Texas Electric Coop Inc	Sam Rayburn	240,200	498,081	Once Through	River		N	N	GT
3443	L	Victoria	-97.0103	28.7897	Topaz Power Group LLC	Victoria	516,000	0	Cooling Tower	Groundwater		N	N	ST
10790	L	Victoria	-96.9552	28.6737	Invista	Victoria Texas Plant	102,400	585,555	Cooling Tower	Unknown		Y	N	GT
3494	F	Ward	-102.9638	31.5841	Luminant Generation Company LLC	Permian Basin	1,097,400	959,847	Cooling Tower	Groundwater	Groundwater	N	N	ST
3439	M	Webb	-99.5090	27.5670	Topaz Power Group LLC	Laredo	187,200	875,278	Cooling Tower	Surface		N	N	ST
50137	K	Wharton	-95.8989	29.2638	Wharton County Power Partners	Newgulf Cogen	78,700	17,384	Cooling Tower	Unknown		N	N	GT
50127	B	Wichita	-98.5895	33.8627	Mirant Wichita Falls LP	Mirant Wichita Falls LP	80,000	76,437	Cooling Tower	Unknown		N	N	NGCC
54364	B	Wichita	-98.5530	34.0030	PPG Industries Inc Works 4	PPG Industries Works 4	6,000	0	Air	None		N	Y	IC
127	B	Wilbarger	-99.1754	34.0826	Public Service Co of Oklahoma	Oklauion	720,000	3,964,478	Cooling Tower	Surface		N	N	ST

EIA-906/920 (2006)					EIA-906/920 (2006)	EIA-906/920 (2006)	EIA-860 (2006)	EIA-906/920 (2006)	EIA-767 (2005), Sledge et al. 2003, Stakeholders	EIA-767, Stakeholders	EIA-767, Stakeholders	EIA-906/920 (2006)	EIA-906/920 (2006)	EIA-906/920 & EIA-860 (2006)
Facility ID	Reg. Water Planning Area	County	Longitude	Latitude	Company	Plant Name	Nameplate Capacity (kW)	2006 Generation (MWh)	Cooling type	Water Source 1	Water Source 2	CHP (Y or N)	Industrial On-Site (Y or N), C = Commercial	Prime Mover
55053	C	Wise	-97.7500	33.2100	Devon Gas Services	Bridgeport Gas Processing Plant	7,000	39,500	None	None		N	Y	IC
55320	C	Wise	-97.9103	33.0583	Wise County Power Co., LP	Wise County Power LP	746,000	3,123,527	Cooling Tower	Unknown		N	N	NGCC
54962	D	Wood	-95.2000	32.5900	Exxon Mobil Production Co	ExxonMobil Hawkins Gas Plant	10,500	0	Air	None		N	Y	IC
55065	O	Yoakum	-102.7418	32.9728	Denver City Energy Assoc LP	Mustang Station	521,000	2,410,483	Cooling Tower	Groundwater		N	N	NGCC
56326	O	Yoakum	-102.7418	32.9728	Yoakum Electric Generating Cooperative	Mustang Station 4	170,000	88,382	Cooling Tower	Groundwater		N	N	GT
52122	O	Yoakum	-102.7545	33.0099	Occidental Permian Ltd	Wasson CO2 Removal Plant	23,400	53,454	Cooling Tower	Unknown		Y	Y	GT
3490	G	Young	-98.6120	33.1348	Luminant Generation Company LLC	Graham	634,700	517,312	Once Through	Lake		N	N	ST

EIA-906/920 (2006)					EIA-906/920 (2006)	EIA-906/920 (2006)	EIA-906/920 & EIA-860 (2006)	EIA-906/920 & EIA-860 (2006)	EIA-906/920 & EIA-860 (2006)	Stakeholders, General factors	TCEQ	TCEQ	Calculated	Calculated	TWDB, Calculated	
Facility ID	Reg. Water Planning Area	County	Longitude	Latitude	Company	Plant Name	Prime Mover 2	Energy Source 1	Energy Source 2	Consumption (gal/kWh) TWDB, Educated Guesses, and Industry input	2006 Total Consumption reported to TCEQ (ac-ft)	2006 Non-Industrial Consumption reported to TCEQ (ac-ft)	gal/kWh: from 2006 TCEQ Consumption Only	gal/kWh from 2001-2006 cumulative data (TCEQ Consumption/ EIA Generation)	gal/kWh, 2001-2005 avg, TWDB groundwater data and EIA MWh	
											305,688	249,398		<- Totals ->		
55052	I	Anderson	-95.6400	31.7700	WTG Jameson, L.P.	Jameson Gas Processing Plant		NG		0			--	0.00	0.00	
55747	I	Anderson	-101.9495	30.8850	NWP Indian Mesa Wind Farm LP	NWP Indian Mesa Wind Farm		WND		0			--	0.00	0.00	
54948	F	Andrews	-102.5500	32.3200	Duke Energy Field Services	Fullerton		NG		0			--	0.00	0.00	
50249	I	Angelina	-94.6776	31.3572	Abitibi Consolidated-Lufkin	Abitibi Consolidated Lufkin	GT	NG	WDL	0.3			--	0.00	0.00	
6183	L	Atascosa	-98.4723	28.7092	San Miguel Electric Coop Inc	San Miguel		LIG		0.6	0	0	--	0.00	0.87	
55168	K	Bastrop	-97.5500	30.1458	Bastrop Energy Partners, LP	Bastrop Energy Center		CT-CA	NG	0.23			--	0.00	0.00	
55154	K	Bastrop	-97.2706	30.1465	Lower Colorado River Authority	Lost Pines 1 Power Project		CT-CA	NG	0.23			--	0.00	0.00	
3601	K	Bastrop	-97.2750	30.1419	Lower Colorado River Authority	Sim Gideon		NG	DFO	0.35			0.00	0.34	0.00	
7512	L	Bexar	-98.5000	29.4000	San Antonio Public Service Bd	Arthur Von Rosenberg		CT-CA	NG	0.15			--	1.10	0.00	
7097	L	Bexar	-98.3203	29.3066	San Antonio Public Service Bd	J K Spruce		SUB		0.35			--	0.70	0.01	
6181	L	Bexar	-98.3228	29.3075	San Antonio Public Service Bd	J T Deely		SUB		0.35			--	0.70	0.01	
3609	L	Bexar	-98.5758	29.3512	San Antonio Public Service Bd	Leon Creek	GT	NG		0.75			--	0.00	0.62	
3611	L	Bexar	-98.3245	29.3080	San Antonio Public Service Bd	O W Sommers		NG	DFO	0.35			--	0.70	0.01	
54606	L	Bexar	98.6220	29.5830	Wim-Sam Inc	University of Texas at San Antonio		NG	DFO	0			--	0.00	0.00	
3612	L	Bexar	-98.3814	29.2564	San Antonio Public Service Bd	V H Braunig		NG	DFO	0.3			--	1.10	0.10	
3613	L	Bexar	-98.4178	29.5305	San Antonio Public Service Bd	W B Tuttle		NG		0.7			--	0.00	2.27	
56457	F	Borden	-101.3847	33.1910	FPL Energy Red Canyon LLC	Post Wind Farm LP		WND		0			--	0.00	0.00	
55172	G	Bosque	-97.3588	31.8590	Mirant Corp	Bosque County Peaking	GT	NG		0.23			--	0.00	0.00	
6414	G	Bosque	-97.3718	31.8652	USCE-Fort Worth District	Whitney		WAT		0			--	0.00	0.00	
55311	H	Brazoria	-95.4000	29.0000	BASF Corporation	BASF Freeport Works		CT-CA	NG	0.23			--	0.00	0.00	
10418	H	Brazoria	-95.2062	29.2434	Solutia Inc-Chocolate	Chocolate Bayou Plant		WH	NG	0.3			0.00	0.00	0.00	
10154	H	Brazoria	-95.1945	29.2323	INEOS USA LLC	Chocolate Bayou Works		NG		0.05	0	0	--	0.00	0.00	
52120	H	Brazoria	-95.3800	28.9860	Dow Chemical Co	Dow Chemical Texas Operation		CT-CA	NG	OTH	0.23		--	0.00	0.00	
54676	H	Brazoria	-95.3800	28.9860	Dow Chemical Company-Oyster Creek VIII	Oyster Creek Unit VIII		CT-CA	NG	OG	0.23		--	0.00	0.00	
55015	H	Brazoria	-95.7459	29.0749	Sweeny Cogeneration LP	Sweeny Cogen Facility		NG	OG	0.05	23.720	23.720	2.32	2.04	0.00	
3561	G	Brazos	-96.3725	30.6444	Bryan City of	Bryan City of	GT	NG	DFO	0.7			--	0.00	0.96	
6243	G	Brazos	-96.4611	30.7219	Bryan City of	Dansby	GT	NG	DFO	0.35			0.00	0.00	0.00	
3595	K	Burnet	-98.4179	30.7514	Lower Colorado River Authority	Buchanan		WAT		0			--	0.00	0.00	
3597	K	Burnet	-98.3382	30.5561	Lower Colorado River Authority	Granite Shoals		WAT		0			--	0.00	0.00	
3598	K	Burnet	-98.3853	30.7312	Lower Colorado River Authority	Inks		WAT		0			--	0.00	0.00	
3599	K	Burnet	-98.2571	30.5558	Lower Colorado River Authority	Marble Falls		WAT		0			--	0.00	0.00	
50404	L	Calhoun	-96.8341	28.5715	INEOS Nitriles Greenlake	BP Chemicals Green Lake Plant		WH	NG	0.3			--	0.00	0.00	
10554	L	Calhoun	-96.5446	28.6846	Formosa Plastics Corp	Formosa Utility Venture Ltd		CT-CA	NG	OG	0.827		--	0.00	0.00	
52069	L	Calhoun	-96.5523	28.6611	Alcoa World Alumina LLC	Point Comfort Operations		NG		0.3			0.00	0.00	0.00	
10167	L	Calhoun	-96.7950	28.5130	Seadrift Coke L P	Seadrift Coke LP		WH	OG	0.23			--	0.00	0.00	
50150	L	Calhoun	-96.7720	28.5108	Union Carbide Corp-Seadrift	Union Carbide Seadrift Cogen		CT-CA	NG	0.23			--	0.00	0.00	
3442	M	Cameron	-97.6389	26.1334	NuCoastal Power LLC	La Palma		NG		0.7			--	0.00	0.00	
54338	M	Cameron	-97.8300	26.2600	Rio Grande Valley Sugar Growers, Inc.	Rio Grande Valley Sugar Growers		AB	NG	0.7	0	0	--	0.00	0.00	
3559	M	Cameron	-97.5216	25.9136	Brownsville Public Utils Board	Silas Ray		NGCC	NG	DFO	0.7		--	0.00	0.00	
55579	A	Carson	-101.2335	35.4673	Shell Wind Energy Inc.	Llano Estacado Wind Ranch		WND		0			--	0.00	0.00	
54097	D	Cass	-94.0693	33.2562	International Paper Co	International Paper Texarkana Mill		BLQ	WDS	0.3	3,280	0	3.03	0.00	0.00	
3460	H	Chambers	-94.9255	29.7502	NRG Energy	Cedar Bayou		NG		0.27	3,253	3,253	0.38	0.39	0.01	
10261	H	Chambers	-94.9113	29.8618	Enterprise Products Optg LP	Enterprise Products Operating		NG		0.05			--	0.00	0.00	
3504	I	Cherokee	-94.9883	31.9382	Luminant Generation Company LLC	Stryker Creek		IC	NG	DFO	0.35	606	606	0.32	0.25	0.04
3500	C	Collin	-96.8138	33.1997	Luminant Generation Company LLC	Collin		NG	RFO	0.7			--	0.00	0.79	
3576	C	Collin	-96.4528	33.0682	Garland City of	Ray Olinger		GT	NG	DFO	0.35		0.00	0.01	0.00	
791	L	Comal	-98.1955	29.8700	Guadalupe Blanco River Auth	Canyon		WAT		0			--	0.00	0.00	
55399	E	Culberson	-104.7437	31.6780	Delaware Mountain LP	Delaware Mountain Windfarm		WND		0			--	0.00	0.00	
54966	E	Culberson	-104.7764	31.3388	WindPower Partners, 1994, L.P.	West Texas Windplant		WND		0			--	0.00	0.00	
3574	C	Dallas	-96.6243	32.9127	Garland City of	C E Newman		NG	DFO	0.7			--	0.00	0.00	
3452	C	Dallas	-96.5461	32.8362	Luminant Generation Company LLC	Lake Hubbard		NG	DFO	0.35	705	705	0.45	18.82	0.00	
3453	C	Dallas	-96.9361	32.7235	Exelon Generation Co LLC	Mountain Creek		NG	RFO	0.35	696	696	0.43	0.48	0.00	
3454	C	Dallas	-96.9750	32.9507	Luminant Generation Company LLC	North Lake		NG	DFO	0.35	247	247	1.08	0.00	0.00	
54248	C	Dallas	-96.8076	32.7432	Rock-Tenn	Rock Tenn Dallas Mill		NG	DFO	0.3			--	0.00	0.00	
55390	C	Dallas	-96.7730	32.7730	State Farm Mutual Auto Ins Co	State Farm Insur Support Center Central		DFO		0	0	0	--	0.00	0.00	
54607	C	Dallas	-96.7500	32.9880	University of Texas at Dallas	University of Texas at Dallas		NG	DFO	0			--	0.00	0.00	
50569	C	Denton	-96.9583	33.0197	WM Renewable Energy LLC	DFW Gas Recovery		LFG		0.05	0	0	--	0.00	0.00	
794	C	Denton	-96.9643	33.0685	Garland City of	Lewisville		WAT		0			--	0.00	0.00	
796	C	Denton	-97.0488	33.3529	Denton City of	Ray Roberts		WAT		0			--	0.00	0.00	
4266	C	Denton	-97.1028	33.2043	Garland City of	Spencer		NG	DFO	0.7			--	0.00	0.00	
55000	L	DeWitt	-97.3112	29.1297	Small Hydro of Texas Inc	Small Hydro of Texas		WAT		0			--	0.00	0.00	
55215	F	Ector	-102.3261	31.8389	Odessa-Ector Power Partners LP	Odessa Ector Generating Station		CT-CA	NG	0.23			--	0.00	0.00	
9	E	El Paso	-106.5232	31.7812	El Paso Electric Co	Copper		NG	DFO	0.05	0	0	--	0.00	0.14	
55536	E	El Paso	-106.5000	31.8000	Hoover Company	Maytag Corp		DFO		0	0	0	--	0.00	0.00	
55578	E	El Paso	-105.3904	31.4595	El Paso Electric Co	Hueco Mountain Wind Ranch		WND		0			--	0.00	0.00	
55637	E	El Paso	-106.5783	31.8978	Leviton Manufacturing Inc	Leviton Manufacturing		DFO		0	0	0	--	0.00	0.00	
3456	E	El Paso	-106.4322	31.9843	El Paso Electric Co	Newman		NGCC	NG	DFO	0.7		--	0.00	0.16	
54628	E	El Paso	-106.3800	31.7600	Phelps Dodge Refining Corp	Phelps Dodge Refining		NG		0.05			--	0.00	0.00	
50241	E	El Paso	-106.5020	31.7692	Tenet Hospital Ltd	Providence Memorial Hospital		NG	DFO	0			--	0.00	0.00	
55223	C	Ellis	-96.6753	32.3199	Ennis Tractebel Power Co LP	Ennis Tractebel Power LP		CT-CA	NG	0.23			--	0.00	0.00	

EIA-906/920 (2006)					EIA-906/920 (2006)	EIA-906/920 (2006)	EIA-906/920 & EIA-860 (2006)	EIA-906/920 & EIA-860 (2006)	EIA-906/920 & EIA-860 (2006)	Stakeholders, General factors	TCEQ	TCEQ	Calculated	Calculated	TWDB, Calculated
Facility ID	Reg. Water Planning Area	County	Longitude	Latitude	Company	Plant Name	Prime Mover 2	Energy Source 1	Energy Source 2	Consumption (gal/kWh) TWDB, Educated Guesses, and Industry input	2006 Total Consumption reported to TCEQ (ac-ft)	2006 Non-Industrial Consumption reported to TCEQ (ac-ft)	gal/kWh: from 2006 TCEQ Consumption Only	gal/kWh from 2001-2006 cumulative data (TCEQ Consumption/ EIA Generation)	gal/kWh, 2001-2005 avg, TWDB groundwater data and EIA MWH
											305,688	249,398	--	--	0.00
55091	C	Ellis	-97.0541	32.4295	ANP Operations Co	Midlothian Energy Facility		NG		0	0			0.00	0.00
3508	C	Fannin	-96.3650	33.6437	Valley NG Power Company LLC (Luminant)	Valley		NG	DFO	0.35	281	281	0.33	0.29	0.09
6179	K	Fayette	-96.7506	29.9175	Lower Colorado River Authority	Fayette Power Project		SUB	LIG	0.35	97	97	0.00	0.08	0.00
55357	H	Fort Bend	-95.6244	29.4731	Calpine - Brazos Valley	Brazos Valley Generating Facility	CT-CA	NG		0.23			--	0.00	0.00
3470	H	Fort Bend	-95.6331	29.4836	NRG Energy	W A Parish	GT	SUB	NG	0.7	41,721	41,721	0.67	0.47	0.04
3497	C	Freestone	-96.0547	31.8207	Big Brown Power Company LLC (Luminant)	Big Brown		LIG	SUB	0.35	9,936	9,936	0.36	0.29	0.00
55226	C	Freestone	-96.1491	31.7049	Calpine - Freestone Power Generation LP	Freestone Power Generation LP	CT-CA	NG		0.23			--	0.00	0.00
3630	L	Frio	-99.3026	29.0195	South Texas Electric Coop Inc	Pearsall		NG	DFO	0.7			--	0.00	1.55
55470	H	Galveston	-94.9181	29.3711	South Houston Green Power LP	Green Power 2	CT-CA	NG	OG	0			--	0.00	0.00
3466	H	Galveston	-94.9797	29.4872	NRG Energy	P H Robinson		NG		0.27			0.00	0.48	0.00
52132	H	Galveston	-94.9237	29.3791	South Houston Green Power LP	Power Station 4	CT-CA	NG	OG	0.23			--	0.00	0.00
54253	H	Galveston	-94.9200	29.3700	S&L Cogeneration Co	S&L Cogeneration		NG		0.05			--	0.00	0.00
50153	H	Galveston	-94.9437	29.3767	Union Carbide Corp-Texas City	Texas City Plant Union Carbide	ST	NG	PUR	0.23			--	0.00	0.00
52088	H	Galveston	-94.9439	29.3784	Calpine Corp-Texas City	Calpine Corp-Texas City	CT-CA	NG	OG	0.23			--	0.00	0.00
52013	H	Galveston	-94.9171	29.3702	Valero Refining Co-Texas City	Valero Refining Texas City		NG	OG	0.05			--	0.00	0.00
56394	F	Glasscock	-101.2650	31.9700	Airtricity Inc	Forest Creek Wind Farm LLC		WND		0			--	0.00	0.00
6178	L	Goliad	-97.2142	28.7131	American Natl. Power (was Topaz Power Group)	Coletto Creek		SUB		0.35			--	0.00	0.01
7394	L	Gonzales	-97.4552	29.4972	Gonzales City of	Gonzales Hydro Plant		WAT		0			--	0.00	0.00
7678	A	Gray	-101.0485	35.4813	Southwestern Public Service Co	Celanese		PUR		0.7			--	0.00	0.00
6416	C	Grayson	-96.5697	33.8180	USCE-Tulsa District	Denison		WAT		0			--	0.00	0.00
3625	C	Grayson	-96.9100	33.6600	Whitesboro City of	Whitesboro		NG	DFO	0			--	0.00	0.00
3476	D	Gregg	-94.6427	32.3746	Southwestern Electric Power Co	Knox Lee		NG	RFO	0.35			--	0.00	0.12
6136	G	Grimes	-96.0778	30.6169	Texas Municipal Power Agency	Gibbons Creek		SUB	NG	0.35	10,859	10,859	0.98	2.67	0.00
55062	G	Grimes	-95.9180	30.5929	Tenaska Frontier Partners Ltd	Tenaska Frontier Generation Station	CT-CA	NG	DFO	0.23			--	0.00	0.00
3581	L	Guadalupe	-98.0466	29.5944	Guadalupe Blanco River Auth	Abbott TP 3		WAT		0			--	0.00	0.00
3582	L	Guadalupe	-98.0664	29.6539	Guadalupe Blanco River Auth	Dunlap TP 1		WAT		0			--	0.00	0.00
55153	L	Guadalupe	-98.1396	29.6232	Guadalupe Power Partners LP	Guadalupe Generating Station	CT-CA	NG		0.23			--	0.00	0.00
3583	L	Guadalupe	-97.6246	29.4956	Guadalupe Blanco River Auth	H 4		WAT		0			--	0.00	0.00
3584	L	Guadalupe	-97.4920	29.4682	Guadalupe Blanco River Auth	H 5		WAT		0			--	0.00	0.00
3585	L	Guadalupe	-97.9394	29.5288	Guadalupe Blanco River Auth	Nolte		WAT		0			--	0.00	0.00
55137	L	Guadalupe	-97.9733	29.5931	Rio Nogales Power Project LP	Rio Nogales Power Project	CT-CA	NG		0.23			--	0.00	0.00
3586	L	Guadalupe	-97.9996	29.5485	Guadalupe Blanco River Auth	TP 4		WAT		0			--	0.00	0.00
56225	A	Hansford	-101.3500	36.2800	Aelous Wind, LLC	Acolus Wind Facility		WND		0			--	0.00	0.00
50253	H	Harris	-95.1080	29.8815	Abitibi Consolidated-Sheldon	Abitibi Consolidated Sheldon	GT	NG	TDF	0.3			--	0.00	0.00
10670	H	Harris	-95.2269	29.7173	AES Deepwater Inc	AES Deepwater		PC	NG	0.3			0.00	0.00	0.00
55526	H	Harris	-95.2000	29.9900	Viridis Energy	Atascosita		LFG		0	0	0	--	0.00	0.00
10298	H	Harris	-95.0442	29.6176	Air Liquide Large Industries U S LP	Bayou Cogen Plant		NG	OG	0.05			--	0.00	0.00
55551	H	Harris	-94.9700	29.7300	Viridis Energy	Baytown		LFG		0	0	0	--	0.00	0.00
55327	H	Harris	-94.9019	29.7731	Calpine Central LP	Baytown Energy Center	CT-CA	NG		0.23			--	0.00	0.00
55552	H	Harris	-95.2000	29.8000	Viridis Energy	Bluebonnet		LFG		0	0	0	--	0.00	0.00
55299	H	Harris	-95.2269	29.7117	Calpine - Channel Energy	Channel Energy Center	CT-CA	NG	OG	0.23			--	0.00	0.00
55187	H	Harris	-95.1216	29.8369	Reliant Energy Channelview LP	Channelview Cogeneration Plant	CT-CA	NG		0.23			--	0.00	0.00
10741	H	Harris	-95.0631	29.6245	Calpine - Clear Lake	Clear Lake Cogeneration	CT-CA	NG		0.3			--	0.00	0.00
55554	H	Harris	-95.2400	29.4200	Viridis Energy	Coastal Plains		LFG		0	0	0	--	0.00	0.00
50815	H	Harris	-95.1083	29.8166	Cogen Lyondell	CoGen Lyondell	CT-CA	NG		0.23			--	0.00	0.00
3461	H	Harris	-95.2266	29.7233	AES Western Power LLC	Deepwater		NG		0.27			--	0.00	0.00
55464	H	Harris	-95.1361	29.7153	Calpine - Deer Park	Deer Park Energy Center	CT-CA	NG		0.23			--	0.00	0.00
55365	H	Harris	-95.0718	29.7031	Exelon Generation Co LLC	Exelon LaPorte Generating Station		NG		0.05			--	0.00	0.00
10436	H	Harris	-95.0091	29.7411	Exxon Mobil Refining and Supply Co.	ExxonMobil Baytown Refinery	ST	NG		0.05			--	0.00	0.00
10692	H	Harris	-95.0125	29.7557	Exxon Mobil Refining and Supply Co.	ExxonMobil Baytown Turbine		NG		0.05			--	0.00	0.00
3464	H	Harris	-95.2186	29.8216	NRG Energy	Greens Bayou	GT	NG	DFO	0.7			--	0.00	0.11
50043	H	Harris	-95.1052	29.7273	Oxy Vinyls LP	Houston Chemical Complex Battleground	CT-CA	NG	OTH	0.3			0.00	0.00	0.00
10638	H	Harris	-95.1910	29.7160	Air Products LP	Pasadena		NG		0.05			--	0.00	0.00
55047	H	Harris	-95.1792	29.7300	Calpine - Pasadena Cogeneration LP	Pasadena Cogeneration	CT-CA	NG		0.23			--	0.00	0.00
52065	H	Harris	-95.2712	29.7198	Rhodia Inc	Rhodia Houston Plant		OTH	NG	0.3			--	0.00	0.00
50054	H	Harris	-95.3999	29.7212	Rice University	Rice University		NG		0.05			--	0.00	0.00
3468	H	Harris	-95.1719	29.7300	NRG Energy	Sam Bartron	GT	NG		0.27	686	686	0.40	0.40	0.00
7325	H	Harris	-95.0498	29.6578	Texas Genco II, LP	San Jacinto Steam Electric Station		NG		0	0	0	--	0.00	0.00
50304	H	Harris	-95.1222	29.7162	Shell Oil Co-Deer Park	Shell Deer Park	ST	NG	PUR	0.23			--	0.00	0.00
3469	H	Harris	-95.5317	29.9416	NRG Energy	T H Wharton	GT	NG		0.23			--	0.00	0.56
50229	H	Harris	-95.2552	29.6992	Texas Petrochemicals Corp	Texas Petrochemicals		NG	OG	0.3			--	0.00	0.00
52012	H	Harris	-95.2554	29.7203	Valero Refining Co - TX	Valero Refining Texas Houston		NG		0.05			--	0.00	0.00
3471	H	Harris	-95.1036	29.5300	NRG Energy	Webster		NG		0.05	0	0	0.00	0.39	0.00
54330	H	Harris	-95.6469	29.7213	Shell Chemical LP	Westhollow Technology Center		NG		0.05			--	0.00	0.00
55176	D	Harrison	-94.6917	32.4472	Eastman Cogeneration LP	Eastman Cogeneration Facility	CT-CA	NG		0.23			--	0.00	0.00
55664	D	Harrison	-94.3713	32.5482	Entergy Power Ventures LP	Harrison County Power Project	CT-CA	NG		0.23	12,174	12,174	3.61	0.00	0.00
54972	D	Harrison	-94.3700	32.5400	Norit Americas Inc	Norit Americas Marshall Plant		LIG	NG	0.35	0	0	--	0.00	0.00
7902	D	Harrison	-94.4850	32.4607	Southwestern Electric Power Co	Pirkey		LIG		0.35	18,743	18,743	1.36	0.88	0.00
50141	D	Harrison	-94.3763	32.5754	Snider Industries Inc	Snider Industries		WDS		0.7			--	0.00	0.00
55144	L	Hays	-97.9896	29.7811	ANP Operations Co - Hays	Hays Energy Project	CS	NG		0.1			--	0.00	0.00

EIA-906/920 (2006)					EIA-906/920 (2006)	EIA-906/920 (2006)	EIA-906/920 & EIA-860 (2006)	EIA-906/920 & EIA-860 (2006)	EIA-906/920 & EIA-860 (2006)	Stakeholders, General factors	TCEQ	TCEQ	Calculated	Calculated	TWDB, Calculated
Facility ID	Reg. Water Planning Area	County	Longitude	Latitude	Company	Plant Name	Prime Mover 2	Energy Source 1	Energy Source 2	Consumption (gal/kWh) TWDB, Educated Guesses, and Industry input	2006 Total Consumption reported to TCEQ (ac-ft)	2006 Non-Industrial Consumption reported to TCEQ (ac-ft)	gal/kWh: from 2006 TCEQ Consumption Only	gal/kWh from 2001-2006 cumulative data (TCEQ Consumption/ EIA Generation)	gal/kWh, 2001-2005 avg, TWDB groundwater data and EIA MWh
											305,688	249,398	--	<- Totals ->	0.00
50263	L	Hays	-97.9437	29.8888	Texas State University - San Marcos	Southwest Texas State University		NG	DFO	0			--	0.00	0.00
3507	C	Henderson	-96.1016	32.1245	Luminant Generation Company LLC	Trinidad	IC	NG	RFO	0.35	57	57	0.33	0.67	0.00
55098	M	Hidalgo	-98.3800	26.2300	Frontera Generation Limited Partnership	Frontera Energy Center	CT-CA	NG		0.23			--	0.00	0.00
55545	M	Hidalgo	-98.1751	26.3417	Calpine Corp-Hidalgo	Hidalgo Energy Center	CT-CA	NG		0.23			--	0.00	0.00
3438	M	Hidalgo	-98.4084	26.2170	NuCoastal Power LLC	J L Bates		NG	DFO	0.7	448	448	0.00	0.00	1.16
55123	M	Hidalgo	-98.1751	26.3417	Calpine Corp-Magic Valley	Magic Valley Generating Station	CT-CA	NG		0.23			--	0.00	0.00
8063	G	Hood	-97.7187	32.4018	DeCordova Power Company LLC (Luminant)	DeCordova Steam Electric Station	GT	NG	DFO	0.35	90	90	0.26	0.03	0.01
55139	G	Hood	-97.7316	32.3337	Wolf Hollow I LP	Wolf Hollow I LP	CT-CA	NG		0.338			--	0.00	0.00
10569	F	Howard	-101.4195	32.2697	Alon USA LP	Big Spring Texas Refinery		PUR		0.05			--	0.00	0.00
54979	F	Howard	-101.3589	32.2375	Caithness Operating Co LLC	Big Spring Wind Power Facility		WIND		0			--	0.00	0.00
52176	F	Howard	-101.4216	32.2684	Power Resources Ltd	C R Wing Cogen Plant		NG		0.23			--	0.00	0.00
56402	F	Howard	-101.3600	32.2400	West Texas Renewables	West Texas Renewables LLC		WIND		0			--	0.00	0.00
4195	D	Hunt	-96.1106	33.1442	Greenville Electric Util Sys	Powerlane Plant		NG	DFO	0.35			--	0.00	0.00
55064	A	Hutchinson	-101.3547	35.8400	Borger Energy Associates LP	Black Hawk Station		NG	OG	0.05			--	0.00	0.00
50067	A	Hutchinson	-101.4350	35.6659	Sid Richardson Carbon Ltd	Borger Plant		OG	NG	0.3			--	0.00	0.00
10072	A	Hutchinson	-101.4350	35.6659	Engineered Carbons Inc	Engineered Carbons Borger Cogen		OG	NG	0.3			--	0.00	0.00
3487	A	Hutchinson	-101.4100	35.7100	Southwestern Public Service Co	Riverview		NG		0.05	0	0	--	0.00	0.00
55230	C	Jack	-98.1700	33.2300	Brazos Electric Power Coop Inc	Jack Energy Facility	CT-CA	NG	NG	0.23	2,263	2,263	0.24	0.00	0.00
50101	I	Jasper	-94.0657	30.3419	MeadWestvaco Corp	MeadWestvaco Evadale		BLQ	WDS	0.7	0	0	0.00	1.52	0.00
7200	I	Jasper	-94.0000	30.9200	USCE-Fort Worth District	Robert D Willis		WAT		0			--	0.00	0.00
6413	I	Jasper	-94.1062	31.0608	USCE-Fort Worth District	Sam Rayburn		WAT		0			--	0.00	0.00
55309	I	Jefferson	-93.9300	29.9000	Air Products LP	Air Products Port Arthur	CT-CA	NG		0.23			--	0.00	0.00
50625	I	Jefferson	-94.0690	30.0664	ExxonMobil Corp	ExxonMobil Beaumont Refinery	ST	NG		0			0.00	0.00	0.00
54321	I	Jefferson	-94.0700	30.0700	Goodyear Tire & Rubber Co	Goodyear Beaumont Chemical Plant	ST	NG	WO	0.05			--	0.00	0.00
54637	I	Jefferson	-93.9485	29.9789	Huntsman Corp	JCO Oxides Olefins Plant		NG		0.05			0.00	0.00	0.00
55122	I	Jefferson	-93.9397	29.8846	BASF Corp	NAFTA Region Olefins Complex Cogen Fac		NG		0.05			--	0.00	0.00
50973	I	Jefferson	-93.9691	29.8601	Motiva Enterprises LLC	Port Arthur Refinery	CT-CA	NG	OG	0.23			0.00	0.00	0.00
52108	I	Jefferson	-93.8856	29.9543	Valero Energy Corporation	Port Arthur Refinery	CT-CA	NG		0.23			--	0.00	0.00
10568	I	Jefferson	-93.8922	29.9650	Total Petrochemicals USA Inc	Port Arthur Texas Refinery		NG	OG	0.05			--	0.00	0.00
54748	I	Jefferson	-93.9517	29.9785	Air Liquide America-Pt Neches	Port Neches Plant		NG		0.05			--	0.00	0.00
54817	G	Johnson	-97.4082	32.3988	Brazos Electric Power Coop Inc	Johnson County	CT-CA	NG	DFO	0.23			--	0.00	0.00
4938	G	Jones	-99.6826	32.5826	AEP Texas North Company	Fort Phantom		NG	DFO	0.35			0.00	0.00	0.00
55480	C	Kaufman	-96.4737	32.7587	FPLE Fomey LP	Fomey Energy Center	CT-CA	NG		0.23			--	0.00	0.00
55097	D	Lamar	-95.5896	33.6315	Lamar Power Partners LP	Lamar Power Project	CT-CA	NG		0.23			--	0.00	0.00
50109	D	Lamar	-95.5575	33.6967	Tenaska III Texas Partners	Tenaska Paris Generating Station	CT-CA	NG	DFO	0.23			--	0.00	0.00
3485	O	Lamb	-102.4113	34.1662	Southwestern Public Service Co	Plant X		NG	DFO	0.7			--	0.00	1.03
6194	O	Lamb	-102.5688	34.1848	Southwestern Public Service Co	Tolk		SUB	NG	0.55			--	0.00	0.54
55556	H	Liberty	-94.8000	30.0500	Viridis Energy	Security		LFG		0	0	0	--	0.00	0.00
298	G	Limestone	-96.2525	31.4224	NRG Energy	Limestone		LIG	SUB	0.6	4,000	4,000	0.10	0.36	0.02
4937	K	Llano	-98.3695	30.5566	Lower Colorado River Authority	Thomas C Ferguson		NG	DFO	0.35	625	625	0.24	0.11	0.00
7131	O	Lubbock	-101.8500	33.5800	Lubbock City of	Brandon Station		NG		0.05	0	0	--	0.00	0.00
3604	O	Lubbock	-101.8550	33.5777	Lubbock City of	J Robert Massengale	NGCC	NG		0.23			--	0.00	0.00
3482	O	Lubbock	-101.7399	33.5240	Southwestern Public Service Co	Jones		NG	DFO	0.7			--	0.00	0.00
3602	O	Lubbock	-101.8296	33.5549	Lubbock City of	Ty Cooke	GT	NG	DFO	0.75			--	0.00	0.02
3478	D	Marion	-94.5469	32.8487	Southwestern Electric Power Co	Wilkes		NG		0.35	2,304	2,304	0.49	0.30	0.00
6251	K	Matagorda	-96.0489	28.7952	STP Nuclear Operating Co	South Texas Project		NUC		0.58	37,912	0	0.58	0.58	0.02
3437	M	Maverick	-100.3152	28.7413	Maverick Cnty Wtr Control & Imp Dst No 1	Eagle Pass		WAT		0			--	0.00	0.00
10317	G	McLennan	-97.1171	31.5480	Baylor University	Baylor University Cogen		NG		0.05			--	0.00	0.00
3502	G	McLennan	-96.9867	31.4635	Luminant Generation Company LLC	Lake Creek	IC	NG	DFO	0.35	101	101	0.33	2.33	0.02
3506	G	McLennan	-96.9645	31.5730	Tradinghouse Power Company LLC (Luminant)	Tradinghouse		NG	DFO	0.35	509	509	0.32	0.41	0.02
54458	F	Midland	-102.0850	32.0370	Western Gas Resources Inc	Benedum Plant		NG		0			--	0.00	0.00
6648	G	Milam	-97.0639	30.5644	Luminant Generation Company LLC	Sandow No 4		LIG	DFO	0.35	0	0	--	0.00	0.00
52071	G	Milam	-97.0652	30.5665	Alcoa Inc	Sandow Station		LIG	DFO	0.35	15,032	0	1.97	1.10	0.00
3492	F	Mitchell	-100.9157	32.3363	Luminant Generation Company LLC	Morgan Creek	GT	NG	DFO	0.35	38	38	0.11	0.26	0.00
55555	H	Montgomery	-95.4600	30.3200	Viridis Energy	Conroe		LFG		0	0	0	--	0.00	0.00
3457	H	Montgomery	-95.5478	30.4369	Entergy Gulf States Inc	Lewis Creek		NG		0.7	2,316	2,316	0.44	0.18	0.09
3483	A	Moore	-101.9400	35.8400	Southwestern Public Service Co	Moore County		NG		1.2			--	0.00	2.59
3477	D	Morris	-94.6994	32.9205	Southwestern Electric Power Co	Lone Star		NG		0.35			--	0.00	0.00
55358	I	Newton	-93.7364	30.2583	Cottonwood Energy Co LP	Cottonwood Energy Project	CT-CA	NG		0.23			--	0.00	0.00
6595	I	Newton	-93.5660	31.1737	Entergy Gulf States Inc	Toledo Bend		WAT		0			--	0.00	0.00
56211	G	Nolan	-100.4795	32.3347	Babcock & Brown Power Op Partners LLC	Brazos Wind Farm		WIND		0			--	0.00	0.00
56212	G	Nolan	-100.3667	32.3289	Babcock & Brown Power Op Partners LLC	Sweetwater Wind 2 LLC		WIND		0			--	0.00	0.00
56311	G	Nolan	-100.3667	32.3289	Babcock & Brown Power Op Partners LLC	Sweetwater Wind 3 LLC		WIND		0			--	0.00	0.00
55968	G	Nolan	-100.1988	32.4253	Trent Wind Farm LP	Trent Wind Farm, L.P.		WIND		0			--	0.00	0.00
50615	G	Nolan	-100.3653	32.4925	Luminant	TXU Sweetwater Generating Plant	CT-CA	NG	DFO	0.23			--	0.00	0.00
4939	N	Nueces	-97.3117	27.6067	Topaz Power Group LLC	Barney M Davis		NG	DFO	0.27			--	0.00	0.00
10243	N	Nueces	-97.8253	27.5670	Celanese Engineering Resin Inc	Celanese Engineering Resin		NG		0.05	0	0	--	0.00	0.00
50475	N	Nueces	-97.5936	27.8111	Equistar Chemicals LP	Corpus Christi		NG		0.05			--	0.00	0.00
55206	N	Nueces	-97.4284	27.8144	Calpine - Corpus Christi Cogeneration LP	Corpus Christi Energy Center	CT-CA	NG		0.23			--	0.00	0.00
50026	N	Nueces	-97.5267	27.8321	Flint Hills Resources LP	Corpus Refinery		NG	OG	0.05			--	0.00	0.00

EIA-906/920 (2006)					EIA-906/920 (2006)	EIA-906/920 (2006)	EIA-906/920 & EIA-860 (2006)	EIA-906/920 & EIA-860 (2006)	EIA-906/920 & EIA-860 (2006)	Stakeholders, General factors	TCEQ	TCEQ	Calculated	Calculated	TWDB, Calculated
Facility ID	Reg. Water Planning Area	County	Longitude	Latitude	Company	Plant Name	Prime Mover 2	Energy Source 1	Energy Source 2	Consumption (gal/kWh) TWDB, Educated Guesses, and Industry input	2006 Total Consumption reported to TCEQ (ac-ft)	2006 Non-Industrial Consumption reported to TCEQ (ac-ft)	gal/kWh: from 2006 TCEQ Consumption Only	gal/kWh from 2001-2006 cumulative data (TCEQ Consumption/ EIA Generation)	gal/kWh, 2001-2005 avg, TWDB groundwater data and EIA MWH
											305,688	249,398	--	--	--
3440	N	Nueces	-97.6167	27.8503	NuCoastal Power LLC	Lon C Hill		NG		0.7			--	0.00	0.00
3441	N	Nueces	-97.4192	27.8192	Topaz Power Group LLC	Nueces Bay		NG	DFO	0.27			--	0.00	0.00
10203	N	Nueces	-97.4464	27.8124	Valero Refining Co	Valero Refinery Corpus Christi East		NG		0.05	0	0	--	0.00	0.00
50121	N	Nueces	-97.4852	27.8170	Valero Refining Co	Valero Refinery Corpus Christi West	ST	PC	OG	0.3			--	0.00	0.00
56557	A	Ochiltree	-101.0100	36.4200	John Deere Wind 1 LLC	John Deere Wind 1 LLC		WND		0			--	0.00	0.00
56558	A	Ochiltree	-101.0100	36.4200	John Deere Wind 2 LLC	John Deere Wind 2 LLC		WND		0			--	0.00	0.00
56559	A	Ochiltree	-101.0100	36.4200	John Deere Wind 3 LLC	John Deere Wind 3 LLC		WND		0			--	0.00	0.00
56561	A	Ochiltree	-101.0100	36.4200	John Deere Wind 5 LLC	John Deere Wind 5 LLC		WND		0			--	0.00	0.00
56562	A	Ochiltree	-101.0100	36.4200	John Deere Wind 6 LLC	John Deere Wind 6 LLC		WND		0			--	0.00	0.00
10187	I	Orange	-93.7208	30.1518	Engineered Carbons Inc	Engineered Carbons Echo Cogeneration		OG	NG	0.3			--	0.00	0.00
10425	I	Orange	-93.7400	30.0900	Temple-Inland	Inland Paperboard and Packaging		BLQ	WDS	0.7	66	0	0.08	0.00	0.00
3459	I	Orange	-93.8752	30.0208	Entergy Gulf States Inc	Sabine		NG		0.27	3,235	3,235	0.24	0.25	0.07
55104	I	Orange	-93.7718	30.0497	Sabine Cogen LP	Sabine Cogen		NG		0.23			--	0.00	0.00
10789	I	Orange	-93.7543	30.0540	E I DuPont De Nemours & Co	Sabine River Works	CT-CA	NG		0.23			0.00	0.00	0.00
55120	I	Orange	-93.7718	30.0497	SRW Cogeneration LP	SRW Cogen LP	CT-CA	NG		0.23			--	0.00	0.00
3557	G	Palo Pinto	-98.4265	32.8701	Brazos River Authority	Morris Sheppard		WAT		0			--	0.00	0.00
3628	G	Palo Pinto	-98.3103	32.6582	Brazos Electric Power Coop Inc	R W Miller	GT	NG	DFO	0.35	918	918	0.39	0.36	0.00
3627	C	Parker	-97.6946	32.7784	Brazos Electric Power Coop Inc	North Texas		NG	DFO	0.35			0.00	0.12	0.00
3624	C	Parker	-97.8000	32.7500	Weatherford Mun Utility System	Weatherford		NG	DFO	0			--	0.00	0.00
55992	F	Pecos	-101.9495	30.8850	Desert Sky Wind Farm LP	Desert Sky		WND		0			--	0.00	0.00
55796	F	Pecos	-102.4398	30.9523	Pecos Wind I LP	Woodward Mountain I		WND		0			--	0.00	0.00
55795	F	Pecos	-102.4398	30.9523	Pecos Wind II LP	Woodward Mountain II		WND		0			--	0.00	0.00
6193	A	Potter	-101.7476	35.2989	Southwestern Public Service Co	Harrington		SUB	NG	0.6			--	0.00	0.05
3484	A	Potter	-101.7460	35.2831	Southwestern Public Service Co	Nichols		NG		0.7			--	0.00	0.05
7030	G	Robertson	-96.6934	31.0930	Altura Power	Twin Oaks Power One		LIG	NG	0.6	0	0	0.00	0.00	0.59
6146	I	Rusk	-94.5708	32.2607	Luminant Generation Company LLC	Martin Lake		LIG	SUB	0.35	24,872	24,872	0.45	0.36	0.00
55132	I	Rusk	-94.6201	32.0178	Tenaska Gateway Partners Ltd	Tenaska Gateway Generating Station	CT-CA	NG	DFO	0.23			--	0.00	0.00
55086	N	San Patricio	-97.2500	27.9000	DPS Gregory LLC	Gregory Power Facility	CT-CA	NG		0.23			--	0.00	0.00
55313	N	San Patricio	-97.2000	27.8500	Ingleside Cogeneration LP	Ingleside Cogeneration	CT-CA	NG		0.23			--	0.00	0.00
54291	N	San Patricio	-97.2586	27.8890	Sherwin Alumina Company	Sherwin Alumina		PUR		0.7			--	0.00	0.00
56111	F	Scurry	-101.1172	32.9503	Shell Wind Energy Inc.	Brazos Wind Farm		WND		0			--	0.00	0.00
56233	F	Scurry	-100.9588	32.7496	Kinder Morgan Production Company LP	EG178 Facility	CT-CA	NG		0.23			--	0.00	0.00
55025	F	Scurry	-101.0700	32.7000	Kinder Morgan Yates Operation	Yates Gas Plant		NG		0.05			--	0.00	0.00
6145	G	Somervell	-97.7858	32.2983	Luminant Generation Company LLC	Comanche Peak		NUC		0.58	19,905	19,905	0.33	0.34	0.00
6410	M	Starr	-99.1640	26.5574	International Bound & Wtr Comm	Falcon Dam & Power		WAT		0			--	0.00	0.00
56479	F	Sterling	-101.0500	31.8400	Airtricity Inc	Sand Bluff Wind Farm		WND		0			--	0.00	0.00
3489	C	Tarrant	-97.4795	32.9060	Luminant Generation Company LLC	Eagle Mountain		NG	RFO	0.35			0.00	0.00	0.00
3491	C	Tarrant	-97.2192	32.7287	Exelon Generation Co LLC	Handley		NG	DFO	0.35	1,300	1,300	0.59	0.48	0.00
54520	C	Tarrant	-97.2450	32.6500	Ft Worth City of	Village Creek Wastewater Treatment Plant	GT	NG	OBG	0			--	0.00	0.00
56240	G	Taylor	-100.1100	32.3100	Buffalo Gap Wind Farm	AES SeaWest Inc		WND		0			--	0.00	0.00
56270	G	Taylor	-100.0155	32.3118	FPL Energy Callahan Wind, LLC	Callahan Divide Wind Energy Center		WND		0			--	0.00	0.00
56291	G	Taylor	-100.0453	32.2220	FPL Energy Horse Hollow LLC	Horse Hollow Wind Energy Center I		WND		0			--	0.00	0.00
3558	O	Terry	-102.2700	33.1800	Brownfield City of	Brownfield	IC	NG	DFO	0	0	0	--	0.00	0.00
6147	D	Titus	-95.0416	33.0918	Luminant Generation Company LLC	Monticello		LIG	SUB	0.35	15,943	15,943	0.35	0.22	0.00
6139	D	Titus	-94.8372	33.0404	Southwestern Electric Power Co	Welsh		SUB		0.35	28,977	28,977	0.94	0.55	0.00
3527	F	Tom Green	-100.4923	31.3935	AEP Texas North Company	San Angelo/Concho (retired)	CT-CA	NG	DFO	0.23			0.00	0.00	0.00
3594	K	Travis	-97.7850	30.2938	Lower Colorado River Authority	Austin		WAT		0			--	0.00	0.00
10184	K	Travis	-97.8425	30.3974	Minnesota Mining & Mfg Co	Central Utility Plant	IC	NG	DFO	0.3			--	0.00	0.00
3548	K	Travis	-97.6128	30.3038	Austin Energy	Decker Creek	GT	NG	DFO	0.35	5,446	5,446	1.26	0.49	0.00
56373	K	Travis	-97.7252	30.3975	Austin Energy	Domain Plant		NG		0.05			--	0.00	0.00
50118	K	Travis	-97.7351	30.2867	University of Texas at Austin	Hal C Weaver Power Plant	CT-CA	NG	DFO	0.23			--	0.00	0.06
3549	K	Travis	-97.7221	30.2513	Austin Energy	Holly Street (retired in 2008)		NG		0.35			--	0.00	0.00
3600	K	Travis	-97.9072	30.3910	Lower Colorado River Authority	Marshall Ford		WAT		0			--	0.00	0.00
56374	K	Travis	-97.7091	30.3060	Austin Energy	Robert Mueller Energy Center	IC	NG		0.05			--	0.00	0.00
7900	K	Travis	-97.6138	30.2087	Austin Energy	Sand Hill	GT	NG	DFO	0.23	2,457	2,457	0.50	0.00	0.00
55588	K	Travis	-97.7600	30.1700	Gas Recovery Systems Inc	Sunset Farms		LFG		0	0	0	--	0.00	0.00
55581	F	Upton	-102.2444	31.2357	FPL Energy Upton Wind LP	King Mountain Wind Ranch 1		WND		0			--	0.00	0.00
54459	F	Upton	-101.8400	31.6300	Western Gas Resources Inc	Midkiff Plant		NG		0			--	0.00	0.00
55367	F	Upton	-102.1915	31.2793	West Texas Wind Epy Ptnrs LLC	West Texas Wind Energy LLC		WND		0			--	0.00	0.00
6128	J	Val Verde	-101.0557	29.4496	International Bound & Wtr Comm	Amistad Dam & Power		WAT		0			--	0.00	0.00
54976	D	Van Zandt	-95.7100	32.6700	Morton International Inc	Morton Salt Grand Saline		NG		0.3			--	0.00	0.00
3631	L	Victoria	-97.1347	28.8950	South Texas Electric Coop Inc	Sam Rayburn	ST	NG	DFO	0.05	0	0	--	0.00	0.05
3443	L	Victoria	-97.0103	28.7897	Topaz Power Group LLC	Victoria		NG		0.7			--	0.00	0.00
10790	L	Victoria	-96.9552	28.6737	Invista	Victoria Texas Plant		NG		0.05			--	0.00	0.00
3494	F	Ward	-102.9638	31.5841	Luminant Generation Company LLC	Permian Basin	GT	NG	DFO	0.7			--	0.00	0.79
3439	M	Webb	-99.5090	27.5670	Topaz Power Group LLC	Laredo		NG	DFO	0.7	2,061	2,061	0.77	0.00	0.00
50137	K	Wharton	-95.8989	29.2638	Wharton County Power Partners	Newgulf Cogen		NG		0.05	11	11	0.21	0.00	0.00
50127	B	Wichita	-98.5895	33.8627	Mirant Wichita Falls LP	Mirant Wichita Falls LP	CT-CA	NG	PG	0.23			--	0.00	0.00
54364	B	Wichita	-98.5530	34.0030	PPG Industries Inc Works 4	PPG Industries Works 4		DFO		0	0	0	--	0.00	0.00
127	B	Wilbarger	-99.1754	34.0826	Public Service Co of Oklahoma	Oklauion		SUB		0.6	7,277	7,277	0.60	0.36	0.00

EIA-906/920 (2006)					EIA-906/920 (2006)	EIA-906/920 (2006)	EIA-906/920 & EIA-860 (2006)	EIA-906/920 & EIA-860 (2006)	EIA-906/920 & EIA-860 (2006)	Stakeholders, General factors	TCEQ	TCEQ	Calculated	Calculated	TWDB, Calculated
Facility ID	Reg. Water Planning Area	County	Longitude	Latitude	Company	Plant Name	Prime Mover 2	Energy Source 1	Energy Source 2	Consumption (gal/kWh) TWDB, Educated Guesses, and Industry input	2006 Total Consumption reported to TCEQ (ac-ft)	2006 Non-Industrial Consumption reported to TCEQ (ac-ft)	gal/kWh: from 2006 TCEQ Consumption Only	gal/kWh from 2001-2006 cumulative data (TCEQ Consumption/ EIA Generation)	gal/kWh, 2001-2005 avg, TWDB groundwater data and EIA MWh
											305,688	249,398		<- Totals ->	
55053	C	Wise	-97.7500	33.2100	Devon Gas Services	Bridgeport Gas Processing Plant		NG		0			--	0.00	0.00
55320	C	Wise	-97.9103	33.0583	Wise County Power Co., LP	Wise County Power LP	CT-CA	NG		0.23			--	0.00	0.00
54962	D	Wood	-95.2000	32.5900	Exxon Mobil Production Co	ExxonMobil Hawkins Gas Plant		NG		0			--	0.00	0.00
55065	O	Yoakum	-102.7418	32.9728	Denver City Energy Assoc LP	Mustang Station	CT-CA	NG		0.23			--	0.00	0.00
56326	O	Yoakum	-102.7418	32.9728	Yoakum Electric Generating Cooperative	Mustang Station 4		NG		0.05			--	0.00	0.00
52122	O	Yoakum	-102.7545	33.0099	Occidental Permian Ltd	Wasson CO2 Removal Plant		NG		0.05			--	0.00	0.00
3490	G	Young	-98.6120	33.1348	Luminant Generation Company LLC	Graham		NG	RFO	0.35	517	517	0.33	0.00	0.00

EIA-906/920 (2006)					EIA-906/920 (2006)	EIA-906/920 (2006)	Final Used Factors	Final Calculations
Facility ID	Reg. Water Planning Area	County	Longitude	Latitude	Company	Plant Name	gal/kWh consumption	Ac-Ft consumed
								481,632
55052	I	Anderson	-95.6400	31.7700	WTG Jameson, L.P.	Jameson Gas Processing Plant	0.00	0.0
55747	I	Anderson	-101.9495	30.8850	NWP Indian Mesa Wind Farm LP	NWP Indian Mesa Wind Farm	0.00	0.0
54948	F	Andrews	-102.5500	32.3200	Duke Energy Field Services	Fullerton	0.00	0.0
50249	I	Angelina	-94.6776	31.3572	Abitibi Consolidated-Lufkin	Abitibi Consolidated Lufkin	0.30	0.0
6183	L	Atascosa	-98.4723	28.7092	San Miguel Electric Coop Inc	San Miguel	0.87	7842.1
55168	K	Bastrop	-97.5500	30.1458	Bastrop Energy Partners, LP	Bastrop Energy Center	0.23	1392.4
55154	K	Bastrop	-97.2706	30.1465	Lower Colorado River Authority	Lost Pines 1 Power Project	0.23	2436.8
3601	K	Bastrop	-97.2750	30.1419	Lower Colorado River Authority	Sim Gideon	0.34	796.4
7512	L	Bexar	-98.5000	29.4000	San Antonio Public Service Bd	Arthur Von Rosenberg	1.10	4659.3
7097	L	Bexar	-98.3203	29.3066	San Antonio Public Service Bd	J K Spruce	0.71	8804.5
6181	L	Bexar	-98.3228	29.3075	San Antonio Public Service Bd	J T Deely	0.71	11989.9
3609	L	Bexar	-98.5758	29.3512	San Antonio Public Service Bd	Leon Creek	0.62	242.0
3611	L	Bexar	-98.3245	29.3080	San Antonio Public Service Bd	O W Sommers	0.71	2844.5
54606	L	Bexar	98.6220	29.5830	Wim-Sam Inc	University of Texas at San Antonio	0.00	0.0
3612	L	Bexar	-98.3814	29.2564	San Antonio Public Service Bd	V H Braunig	1.20	4025.6
3613	L	Bexar	-98.4178	29.5305	San Antonio Public Service Bd	W B Tuttle	2.27	178.3
56457	F	Borden	-101.3847	33.1910	FPL Energy Red Canyon LLC	Post Wind Farm LP	0.00	0.0
55172	G	Bosque	-97.3588	31.8590	Mirant Corp	Bosque County Peaking	0.23	955.7
6414	G	Bosque	-97.3718	31.8652	USCE-Fort Worth District	Whitney	0.00	0.0
55311	H	Brazoria	-95.4000	29.0000	BASF Corporation	BASF Freeport Works	0.23	440.3
10418	H	Brazoria	-95.2062	29.2434	Solutia Inc-Chocolate	Chocolate Bayou Plant	0.30	239.5
10154	H	Brazoria	-95.1945	29.2323	INEOS USA LLC	Chocolate Bayou Works	0.05	40.6
52120	H	Brazoria	-95.3800	28.9860	Dow Chemical Co	Dow Chemical Texas Operation	0.23	2967.9
54676	H	Brazoria	-95.3800	28.9860	Dow Chemical Company-Oyster Creek VIII	Oyster Creek Unit VIII	0.23	2005.8
55015	H	Brazoria	-95.7459	29.0749	Sweeny Cogeneration LP	Sweeny Cogen Facility	0.05	511.5
3561	G	Brazos	-96.3725	30.6444	Bryan City of	Bryan	0.96	367.9
6243	G	Brazos	-96.4611	30.7219	Bryan City of	Dansby	0.35	382.5
3595	K	Burnet	-98.4179	30.7514	Lower Colorado River Authority	Buchanan	0.00	0.0
3597	K	Burnet	-98.3382	30.5561	Lower Colorado River Authority	Granite Shoals	0.00	0.0
3598	K	Burnet	-98.3853	30.7312	Lower Colorado River Authority	Inks	0.00	0.0
3599	K	Burnet	-98.2571	30.5558	Lower Colorado River Authority	Marble Falls	0.00	0.0
50404	L	Calhoun	-96.8341	28.5715	INEOS Nitriles Greenlake	BP Chemicals Green Lake Plant	0.30	208.1
10554	L	Calhoun	-96.5446	28.6846	Formosa Plastics Corp	Formosa Utility Venture Ltd	0.83	10267.0
52069	L	Calhoun	-96.5523	28.6611	Alcoa World Alumina LLC	Point Comfort Operations	0.30	302.9
10167	L	Calhoun	-96.7950	28.5130	Seadrift Coke L P	Seadrift Coke LP	0.23	31.8
50150	L	Calhoun	-96.7720	28.5108	Union Carbide Corp-Seadrift	Union Carbide Seadrift Cogen	0.23	524.9
3442	M	Cameron	-97.6389	26.1334	NuCoastal Power LLC	La Palma	0.70	1347.3
54338	M	Cameron	-97.8300	26.2600	Rio Grande Valley Sugar Growers, Inc.	Rio Grande Valley Sugar Growers	0.70	39.1
3559	M	Cameron	-97.5216	25.9136	Brownsville Public Utils Board	Silas Ray	0.70	461.2
55579	A	Carson	-101.2335	35.4673	Shell Wind Energy Inc.	Llano Estacado Wind Ranch	0.00	0.0
54097	D	Cass	-94.0693	33.2562	International Paper Co	International Paper Texarkana Mill	0.30	325.1
3460	H	Chambers	-94.9255	29.7502	NRG Energy	Cedar Bayou	0.40	3429.1
10261	H	Chambers	-94.9113	29.8618	Enterprise Products Optg LP	Enterprise Products Operating	0.05	28.6
3504	I	Cherokee	-94.9883	31.9382	Luminant Generation Company LLC	Stryker Creek	0.29	550.0
3500	C	Collin	-96.8138	33.1997	Luminant Generation Company LLC	Collin	0.79	0.0
3576	C	Collin	-96.4528	33.0682	Garland City of	Ray Olinger	0.35	530.7
791	L	Comal	-98.1955	29.8700	Guadalupe Blanco River Auth	Canyon	0.00	0.0
55399	E	Culberson	-104.7437	31.6780	Delaware Mountain LP	Delaware Mountain Windfarm	0.00	0.0
54966	E	Culberson	-104.7764	31.3388	WindPower Partners, 1994, L.P.	West Texas Windplant	0.00	0.0
3574	C	Dallas	-96.6243	32.9127	Garland City of	C E Newman	0.70	26.6
3452	C	Dallas	-96.5461	32.8362	Luminant Generation Company LLC	Lake Hubbard	0.45	709.7
3453	C	Dallas	-96.9361	32.7235	Exelon Generation Co LLC	Mountain Creek	0.48	780.9
3454	C	Dallas	-96.9750	32.9507	Luminant Generation Company LLC	North Lake	0.35	80.3
54248	C	Dallas	-96.8076	32.7432	Rock-Tenn	Rock Tenn Dallas Mill	0.30	0.0
55390	C	Dallas	-96.7730	32.7730	State Farm Mutual Auto Ins Co	State Farm Insur Support Center Central	0.00	0.0
54607	C	Dallas	-96.7500	32.9880	University of Texas at Dallas	University of Texas at Dallas	0.00	0.0
50569	C	Denton	-96.9593	33.0197	WM Renewable Energy LLC	DFW Gas Recovery	0.05	4.4
794	C	Denton	-96.9643	33.0685	Garland City of	Lewisville	0.00	0.0
796	C	Denton	-97.0488	33.3529	Denton City of	Ray Roberts	0.00	0.0
4266	C	Denton	-97.1028	33.2043	Garland City of	Spencer	0.70	390.8
55000	L	DeWitt	-97.3112	29.1297	Small Hydro of Texas Inc	Small Hydro of Texas	0.00	0.0
55215	F	Ector	-102.3261	31.8389	Odessa-Ector Power Partners LP	Odessa Ector Generating Station	0.23	3513.5
9	E	El Paso	-106.5232	31.7812	El Paso Electric Co	Copper	0.14	7.1
55536	E	El Paso	-106.5000	31.8000	Maytag Corp	Hoover Company	0.00	0.0
55578	E	El Paso	-105.3904	31.4595	El Paso Electric Co	Hueco Mountain Wind Ranch	0.00	0.0
55637	E	El Paso	-106.5783	31.8978	Leviton Manufacturing Inc	Leviton Manufacturing	0.00	0.0
3456	E	El Paso	-106.4322	31.9843	El Paso Electric Co	Newman	0.16	816.1
54628	E	El Paso	-106.3800	31.7600	Phelps Dodge Refining Corp	Phelps Dodge Refining	0.05	6.3
50241	E	El Paso	-106.5020	31.7692	Tenet Hospital Ltd	Providence Memorial Hospital	0.00	0.0
55223	C	Ellis	-96.6753	32.3199	Ennis Tractebel Power Co LP	Ennis Tractebel Power LP	0.23	974.9

EIA-906/920 (2006)					EIA-906/920 (2006)	EIA-906/920 (2006)	Final Used Factors	Final Calculations
Facility ID	Reg. Water Planning Area	County	Longitude	Latitude	Company	Plant Name	gal/kWh consumption	Ac-Ft consumed
								481,632
55091	C	Ellis	-97.0541	32.4295	ANP Operations Co	Midlothian Energy Facility	0.00	0.0
3508	C	Fannin	-96.3650	33.6437	Valley NG Power Company LLC (Luminant)	Valley	0.38	325.2
6179	K	Fayette	-96.7506	29.9175	Lower Colorado River Authority	Fayette Power Project	0.35	10741.5
55357	H	Fort Bend	-95.6244	29.4731	Calpine - Brazos Valley	Brazos Valley Generating Facility	0.23	1398.9
3470	H	Fort Bend	-95.6331	29.4836	NRG Energy	W A Parish	0.51	31582.4
3497	C	Freestone	-96.0547	31.8207	Big Brown Power Company LLC (Luminant)	Big Brown	0.29	7931.2
55226	C	Freestone	-96.1491	31.7049	Calpine - Freestone Power Generation LP	Freestone Power Generation LP	0.23	2237.2
3630	L	Frio	-99.3026	29.0195	South Texas Electric Coop Inc	Pearsall	1.55	189.2
55470	H	Galveston	-94.9181	29.3711	South Houston Green Power LP	Green Power 2	0.00	0.0
3466	H	Galveston	-94.8797	29.4872	NRG Energy	P H Robinson	0.48	0.0
52132	H	Galveston	-94.9237	29.3791	South Houston Green Power LP	Power Station 4	0.23	354.7
54253	H	Galveston	-94.9200	29.3700	S&L Cogeneration Co	S&L Cogeneration	0.05	43.7
50153	H	Galveston	-94.9437	29.3767	Union Carbide Corp-Texas City	Texas City Plant Union Carbide	0.23	132.2
52088	H	Galveston	-94.9439	29.3784	Calpine Corp-Texas City	Texas City Power Plant	0.23	889.2
52013	H	Galveston	-94.9171	29.3702	Valero Refining Co-Texas City	Valero Refining Texas City	0.05	3.0
56394	F	Glasscock	-101.2650	31.9700	Airtricity Inc	Forest Creek Wind Farm LLC	0.00	0.0
6178	L	Goliad	-97.2142	28.7131	American Natl. Power (was Topaz Power Group)	Coletto Creek	0.36	5789.3
7394	L	Gonzales	-97.4552	29.4972	Gonzales City of	Gonzales Hydro Plant	0.00	0.0
7678	A	Gray	-101.0485	35.4813	Southwestern Public Service Co	Celanese	0.70	738.9
6416	C	Grayson	-96.5697	33.8180	USCE-Tulsa District	Denison	0.00	0.0
3625	C	Grayson	-96.9100	33.6600	Whitesboro City of	Whitesboro	0.00	0.0
3476	D	Gregg	-94.6427	32.3746	Southwestern Electric Power Co	Knox Lee	0.47	769.7
6136	G	Grimes	-96.0778	30.6169	Texas Municipal Power Agency	Gibbons Creek	2.67	29588.8
55062	G	Grimes	-95.9180	30.5929	Tenaska Frontier Partners Ltd	Tenaska Frontier Generation Station	0.23	2924.3
3581	L	Guadalupe	-98.0406	29.5944	Guadalupe Blanco River Auth	Abbott TP 3	0.00	0.0
3582	L	Guadalupe	-98.0664	29.6539	Guadalupe Blanco River Auth	Dunlap TP 1	0.00	0.0
55153	L	Guadalupe	-98.1396	29.6232	Guadalupe Power Partners LP	Guadalupe Generating Station	0.23	3131.7
3583	L	Guadalupe	-97.6246	29.4956	Guadalupe Blanco River Auth	H 4	0.00	0.0
3584	L	Guadalupe	-97.4920	29.4682	Guadalupe Blanco River Auth	H 5	0.00	0.0
3585	L	Guadalupe	-97.9394	29.5288	Guadalupe Blanco River Auth	Nolte	0.00	0.0
55137	L	Guadalupe	-97.9733	29.5931	Rio Nogales Power Project LP	Rio Nogales Power Project	0.23	2754.6
3586	L	Guadalupe	-97.9996	29.5485	Guadalupe Blanco River Auth	TP 4	0.00	0.0
56225	A	Hansford	-101.3500	36.2800	Aelous Wind, LLC	Acolus Wind Facility	0.00	0.0
50253	H	Harris	-95.1080	29.8815	Abitibi Consolidated-Sheldon	Abitibi Consolidated Sheldon	0.30	0.0
10670	H	Harris	-95.2269	29.7173	AES Deepwater Inc	AES Deepwater	0.30	1113.5
55526	H	Harris	-95.2000	29.9900	Viridis Energy	Atascosita	0.00	0.0
10298	H	Harris	-95.0442	29.6176	Air Liquide Large Industries U S LP	Bayou Cogen Plant	0.05	304.2
55551	H	Harris	-94.9700	29.7300	Viridis Energy	Baytown	0.00	0.0
55327	H	Harris	-94.9019	29.7731	Calpine Central LP	Baytown Energy Center	0.23	2881.3
55552	H	Harris	-95.2000	29.8000	Viridis Energy	Bluebonnet	0.00	0.0
55299	H	Harris	-95.2269	29.7117	Calpine - Channel Energy	Channel Energy Center	0.23	2004.8
55187	H	Harris	-95.1216	29.8369	Reliant Energy Channelview LP	Channelview Cogeneration Plant	0.23	3691.0
10741	H	Harris	-95.0631	29.6245	Calpine - Clear Lake	Clear Lake Cogeneration	0.30	222.5
55554	H	Harris	-95.2400	29.4200	Viridis Energy	Coastal Plains	0.00	0.0
50815	H	Harris	-95.1083	29.8166	Cogen Lyondell	CoGen Lyondell	0.23	1952.1
3461	H	Harris	-95.2266	29.7233	AES Western Power LLC	Deepwater	0.27	0.0
55464	H	Harris	-95.1361	29.7153	Calpine - Deer Park	Deer Park Energy Center	0.23	3856.9
55365	H	Harris	-95.0718	29.7031	Exelon Generation Co LLC	Exelon LaPorte Generating Station	0.05	12.5
10436	H	Harris	-95.0091	29.7411	Exxon Mobil Refining and Supply Co.	ExxonMobil Baytown Refinery	0.05	145.0
10692	H	Harris	-95.0125	29.7557	Exxon Mobil Refining and Supply Co.	ExxonMobil Baytown Turbine	0.05	384.2
3464	H	Harris	-95.2186	29.8216	NRG Energy	Greens Bayou	0.81	743.7
50043	H	Harris	-95.1052	29.7273	Oxy Vinyls LP	Houston Chemical Complex Battleground	0.30	969.6
10638	H	Harris	-95.1910	29.7160	Air Products LP	Pasadena	0.05	0.4
55047	H	Harris	-95.1792	29.7300	Calpine - Pasadena Cogeneration LP	Pasadena Cogeneration	0.23	1794.1
52065	H	Harris	-95.2712	29.7198	Rhodia Inc	Rhodia Houston Plant	0.30	50.6
50054	H	Harris	-95.3999	29.7212	Rice University	Rice University	0.05	4.3
3468	H	Harris	-95.1719	29.7300	NRG Energy	Sam Bartron	0.40	678.6
7325	H	Harris	-95.0498	29.6578	Texas Genco II, LP	San Jacinto Steam Electric Station	0.00	0.0
50304	H	Harris	-95.1222	29.7162	Shell Oil Co-Deer Park	Shell Deer Park	0.23	963.0
3469	H	Harris	-95.5317	29.9416	NRG Energy	T H Wharton	0.56	3297.1
50229	H	Harris	-95.2552	29.6992	Texas Petrochemicals Corp	Texas Petrochemicals	0.30	233.0
52012	H	Harris	-95.2554	29.7203	Valero Refining Co - TX	Valero Refining Texas Houston	0.05	1.9
3471	H	Harris	-95.1036	29.5300	NRG Energy	Webster	0.39	0.0
54330	H	Harris	-95.6469	29.7213	Shell Chemical LP	Westhollow Technology Center	0.05	5.2
55176	D	Harrison	-94.6917	32.4472	Eastman Cogeneration LP	Eastman Cogeneration Facility	0.23	1491.8
55664	D	Harrison	-94.3713	32.5482	Entergy Power Ventures LP	Harrison County Power Project	0.23	776.0
54972	D	Harrison	-94.3700	32.5400	Norit Americas Inc	Norit Americas Marshall Plant	0.35	16.2
7902	D	Harrison	-94.4850	32.4607	Southwestern Electric Power Co	Pirkey	0.88	12156.7
50141	D	Harrison	-94.3753	32.5754	Snider Industries Inc	Snider Industries	0.70	60.8
55144	L	Hays	-97.9896	29.7811	ANP Operations Co - Hays	Hays Energy Project	0.10	1319.6

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Facility ID	Reg. Water Planning Area	County	Longitude	Latitude	Company	Plant Name	gal/kWh consumption	Ac-Ft consumed
50263	L	Hays	-97.9437	29.8888	Texas State University - San Marcos	Southwest Texas State University	0.00	481,632
3507	C	Henderson	-96.1016	32.1245	Luminant Generation Company LLC	Trinidad	0.67	117.0
55098	M	Hidalgo	-98.3800	26.2300	Frontera Generation Limited Partnership	Frontera Energy Center	0.23	1437.8
55545	M	Hidalgo	-98.1751	26.3417	Calpine Corp-Hidalgo	Hidalgo Energy Center	0.23	1326.0
3438	M	Hidalgo	-98.4084	26.2170	NuCoastal Power LLC	J L Bates	1.16	0.0
55123	M	Hidalgo	-98.1751	26.3417	Calpine Corp-Magic Valley	Magic Valley Generating Station	0.23	1140.5
8063	G	Hood	-97.7187	32.4018	DeCordova Power Company LLC (Luminant)	DeCordova Steam Electric Station	0.04	14.1
55139	G	Hood	-97.7316	32.3337	Wolf Hollow I LP	Wolf Hollow I, L.P.	0.34	3973.6
10569	F	Howard	-101.4195	32.2697	Alon USA LP	Big Spring Texas Refinery	0.05	0.0
54979	F	Howard	-101.3589	32.2375	Caithness Operating Co LLC	Big Spring Wind Power Facility	0.00	0.0
52176	F	Howard	-101.4216	32.2684	Power Resources Ltd	C R Wing Cogen Plant	0.23	429.9
56402	F	Howard	-101.3600	32.2400	West Texas Renewables	West Texas Renewables LLC	0.00	0.0
4195	D	Hunt	-96.1106	33.1442	Greenville Electric Util Sys	Powerlane Plant	0.35	37.1
55064	A	Hutchinson	-101.3547	35.8400	Borger Energy Associates LP	Black Hawk Station	0.05	241.0
50067	A	Hutchinson	-101.4350	35.6659	Sid Richardson Carbon Ltd	Borger Plant	0.30	112.7
10072	A	Hutchinson	-101.4350	35.6659	Engineered Carbons Inc	Engineered Carbons Borger Cogen	0.30	0.9
3487	A	Hutchinson	-101.4100	35.7100	Southwestern Public Service Co	Riverview	0.05	0.6
55230	C	Jack	-98.1700	33.2300	Brazos Electric Power Coop Inc	Jack Energy Facility	0.23	2162.1
50101	I	Jasper	-94.0657	30.3419	MeadWestvaco Corp	MeadWestvaco Evadale	1.52	2131.0
7200	I	Jasper	-94.0000	30.9200	USCE-Fort Worth District	Robert D Willis	0.00	0.0
6413	I	Jasper	-94.1062	31.0608	USCE-Fort Worth District	Sam Rayburn	0.00	0.0
55309	I	Jefferson	-93.9300	29.9000	Air Products LP	Air Products Port Arthur	0.23	0.0
50625	I	Jefferson	-94.0690	30.0664	ExxonMobil Corp	ExxonMobil Beaumont Refinery	0.00	0.0
54321	I	Jefferson	-94.0700	30.0700	Goodyear Tire & Rubber Co	Goodyear Beaumont Chemical Plant	0.05	41.1
54637	I	Jefferson	-93.9485	29.9789	Huntsman Corp	JCO Oxides Olefins Plant	0.00	0.0
55122	I	Jefferson	-93.9397	29.8846	BASF Corp	NAFTA Region Olefins Complex Cogen Fac	0.05	75.9
50973	I	Jefferson	-93.9691	29.8601	Motiva Enterprises LLC	Port Arthur Refinery	0.23	422.6
52108	I	Jefferson	-93.8856	29.9543	Valero Energy Corporation	Port Arthur Refinery	0.23	190.8
10568	I	Jefferson	-93.8922	29.9650	Total Petrochemicals USA Inc	Port Arthur Texas Refinery	0.05	40.4
54748	I	Jefferson	-93.9517	29.9785	Air Liquide America-Pt Neches	Port Neches Plant	0.05	39.5
54817	G	Johnson	-97.4082	32.3988	Brazos Electric Power Coop Inc	Johnson County	0.23	325.5
4938	G	Jones	-99.6826	32.5826	AEP Texas North Company	Fort Phantom	0.35	0.0
55480	C	Kaufman	-96.4737	32.7587	FPLE Fomey LP	Fomey Energy Center	0.23	5814.3
55097	D	Lamar	-95.5896	33.6315	Lamar Power Partners LP	Lamar Power Project	0.23	3182.3
50109	D	Lamar	-95.5575	33.6967	Tenaska III Texas Partners	Tenaska Paris Generating Station	0.23	353.7
3485	O	Lamb	-102.4113	34.1662	Southwestern Public Service Co	Plant X	1.03	4006.3
6194	O	Lamb	-102.5688	34.1848	Southwestern Public Service Co	Tolk	0.54	12168.0
55556	H	Liberty	-94.8000	30.0500	Viridis Energy	Security	0.00	0.0
298	G	Limestone	-96.2525	31.4224	NRG Energy	Limestone	0.38	14821.6
4937	K	Llano	-98.3695	30.5566	Lower Colorado River Authority	Thomas C Ferguson	0.35	924.6
7131	O	Lubbock	-101.8500	33.5800	Lubbock City of	Brandon Station	0.05	9.5
3604	O	Lubbock	-101.8550	33.5777	Lubbock City of	J Robert Massengale	0.23	241.2
3482	O	Lubbock	-101.7399	33.5240	Southwestern Public Service Co	Jones	0.70	5065.0
3602	O	Lubbock	-101.8296	33.5549	Lubbock City of	Ty Cooke	0.77	296.5
3478	D	Marion	-94.5469	32.8487	Southwestern Electric Power Co	Wilkes	0.30	1401.4
6251	K	Matagorda	-96.0489	28.7952	STP Nuclear Operating Co	South Texas Project	0.60	39346.0
3437	M	Maverick	-100.3152	28.7413	Maverick Cnty Wtr Control & Imp Dst No 1	Eagle Pass	0.00	0.0
10317	G	McLennan	-97.1171	31.5480	Baylor University	Baylor University Cogen	0.05	2.9
3502	G	McLennan	-96.9867	31.4635	Luminant Generation Company LLC	Lake Creek	2.35	720.6
3506	G	McLennan	-96.9645	31.5730	Tradinghouse Power Company LLC (Luminant)	Tradinghouse	0.43	688.1
54458	F	Midland	-102.0850	32.0370	Western Gas Resources Inc	Benedum Plant	0.00	0.0
6648	G	Milam	-97.0639	30.5644	Luminant Generation Company LLC	Sandow No 4	0.35	4166.0
52071	G	Milam	-97.0652	30.5665	Alcoa Inc	Sandow Station	1.10	8405.3
3492	F	Mitchell	-100.9157	32.3363	Luminant Generation Company LLC	Morgan Creek	0.26	91.4
55555	H	Montgomery	-95.4600	30.3200	Viridis Energy	Controe	0.00	0.0
3457	H	Montgomery	-95.5478	30.4369	Entergy Gulf States Inc	Lewis Creek	0.27	1426.6
3483	A	Moore	-101.9400	35.8400	Southwestern Public Service Co	Moore County	2.59	359.6
3477	D	Morris	-94.6994	32.9205	Southwestern Electric Power Co	Lone Star	0.35	22.6
55358	I	Newton	-93.7364	30.2583	Cottonwood Energy Co LP	Cottonwood Energy Project	0.23	1705.8
6595	I	Newton	-93.5660	31.1737	Entergy Gulf States Inc	Toledo Bend	0.00	0.0
56211	G	Nolan	-100.4795	32.3347	Babcock & Brown Power Op Partners LLC	Brazos Wind Farm	0.00	0.0
56212	G	Nolan	-100.3667	32.3289	Babcock & Brown Power Op Partners LLC	Sweetwater Wind 2 LLC	0.00	0.0
56311	G	Nolan	-100.3667	32.3289	Babcock & Brown Power Op Partners LLC	Sweetwater Wind 3 LLC	0.00	0.0
55968	G	Nolan	-100.1988	32.4253	Trent Wind Farm LP	Trent Wind Farm, L.P.	0.00	0.0
50615	G	Nolan	-100.3653	32.4925	Luminant	TXU Sweetwater Generating Plant	0.23	204.4
4939	N	Nueces	-97.3117	27.6067	Topaz Power Group LLC	Barney M Davis	0.27	436.9
10243	N	Nueces	-97.8253	27.5670	Celanese Engineering Resin Inc	Celanese Engineering Resin	0.05	37.2
50475	N	Nueces	-97.5936	27.8111	Equistar Chemicals LP	Corpus Christi	0.05	43.2
55206	N	Nueces	-97.4284	27.8144	Calpine - Corpus Christi Cogeneration LP	Corpus Christi Energy Center	0.23	1310.4
50026	N	Nueces	-97.5267	27.8321	Flint Hills Resources LP	Corpus Refinery	0.05	41.5

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Facility ID	Reg. Water Planning Area	County	Longitude	Latitude	Company	Plant Name	gal/kWh consumption	Ac-Ft consumed
3440	N	Nueces	-97.6167	27.8503	NuCoastal Power LLC	Lon C Hill	0.70	481.632
3441	N	Nueces	-97.4192	27.8192	Topaz Power Group LLC	Nueces Bay	0.27	0.0
10203	N	Nueces	-97.4464	27.8124	Valero Refining Co	Valero Refinery Corpus Christi East	0.05	30.6
50121	N	Nueces	-97.4852	27.8170	Valero Refining Co	Valero Refinery Corpus Christi West	0.30	295.7
56557	A	Ochiltree	-101.0100	36.4200	John Deere Wind 1 LLC	JD Wind 1 LLC	0.00	0.0
56558	A	Ochiltree	-101.0100	36.4200	John Deere Wind 2 LLC	JD Wind 2 LLC	0.00	0.0
56559	A	Ochiltree	-101.0100	36.4200	John Deere Wind 3 LLC	JD Wind 3 LLC	0.00	0.0
56561	A	Ochiltree	-101.0100	36.4200	John Deere Wind 5 LLC	JD Wind 5 LLC	0.00	0.0
56562	A	Ochiltree	-101.0100	36.4200	John Deere Wind 6 LLC	JD Wind 6 LLC	0.00	0.0
10187	I	Orange	-93.7208	30.1518	Engineered Carbons Inc	Engineered Carbons Echo Cogeneration	0.30	43.5
10425	I	Orange	-93.7400	30.0900	Temple-Inland	Inland Paperboard and Packaging	0.70	595.3
3459	I	Orange	-93.8752	30.0208	Entergy Gulf States Inc	Sabine	0.32	4306.8
55104	I	Orange	-93.7718	30.0497	Sabine Cogen LP	Sabine Cogen	0.23	431.3
10789	I	Orange	-93.7543	30.0540	E I DuPont De Nemours & Co	Sabine River Works	0.23	461.9
55120	I	Orange	-93.7718	30.0497	SRW Cogeneration LP	SRW Cogen LP	0.23	1376.6
3557	G	Palo Pinto	-98.4265	32.8701	Brazos River Authority	Morris Sheppard	0.00	0.0
3628	G	Palo Pinto	-98.3103	32.6582	Brazos Electric Power Coop Inc	R W Miller	0.36	840.4
3627	C	Parker	-97.6946	32.7784	Brazos Electric Power Coop Inc	North Texas	0.12	3.0
3624	C	Parker	-97.8000	32.7500	Weatherford Mun Utility System	Weatherford	0.00	0.0
55992	F	Pecos	-101.9495	30.8850	Desert Sky Wind Farm LP	Desert Sky	0.00	0.0
55796	F	Pecos	-102.4398	30.9523	Pecos Wind I LP	Woodward Mountain I	0.00	0.0
55795	F	Pecos	-102.4398	30.9523	Pecos Wind II LP	Woodward Mountain II	0.00	0.0
6193	A	Potter	-101.7476	35.2989	Southwestern Public Service Co	Harrington	0.65	15206.5
3484	A	Potter	-101.7460	35.2831	Southwestern Public Service Co	Nichols	0.75	2811.1
7030	G	Robertson	-96.6934	31.0930	Altura Power	Twin Oaks Power One	0.59	4258.0
6146	I	Rusk	-94.5708	32.2607	Luminant Generation Company LLC	Martin Lake	0.36	19688.8
55132	I	Rusk	-94.6201	32.0178	Tenaska Gateway Partners Ltd	Tenaska Gateway Generating Station	0.23	2921.7
55086	N	San Patricio	-97.2500	27.9000	DPS Gregory LLC	Gregory Power Facility	0.23	1910.0
55313	N	San Patricio	-97.2000	27.8500	Ingleside Cogeneration LP	Ingleside Cogeneration	0.23	1865.6
54291	N	San Patricio	-97.2586	27.8890	Sherwin Alumina Company	Sherwin Alumina	0.70	404.3
56111	F	Scurry	-101.1172	32.9503	Shell Wind Energy Inc.	Brazos Wind Farm	0.00	0.0
56233	F	Scurry	-100.9588	32.7496	Kinder Morgan Production Company LP	EG178 Facility	0.23	602.2
55025	F	Scurry	-101.0700	32.7000	Kinder Morgan Yates Operation	Yates Gas Plant	0.05	4.1
6145	G	Somervell	-97.7858	32.2983	Luminant Generation Company LLC	Comanche Peak	0.58	35414.0
6410	M	Starr	-99.1640	26.5574	International Bound & Wtr Comm	Falcon Dam & Power	0.00	0.0
56479	F	Sterling	-101.0500	31.8400	Airtricity Inc	Sand Bluff Wind Farm	0.00	0.0
3489	C	Tarrant	-97.4795	32.9060	Luminant Generation Company LLC	Eagle Mountain	0.35	0.0
3491	C	Tarrant	-97.2192	32.7287	Exelon Generation Co LLC	Handley	0.48	1053.0
54520	C	Tarrant	-97.2450	32.6500	Ft Worth City of	Village Creek Wastewater Treatment Plant	0.00	0.0
56240	G	Taylor	-100.1100	32.3100	Buffalo Gap Wind Farm	AES SeaWest Inc	0.00	0.0
56270	G	Taylor	-100.0155	32.3118	FPL Energy Callahan Wind, LLC	Callahan Divide Wind Energy Center	0.00	0.0
56291	G	Taylor	-100.0453	32.2220	FPL Energy Horse Hollow LLC	Horse Hollow Wind Energy Center I	0.00	0.0
3558	O	Terry	-102.2700	33.1800	Brownfield City of	Brownfield	0.00	0.0
6147	D	Titus	-95.0416	33.0918	Luminant Generation Company LLC	Monticello	0.22	10101.2
6139	D	Titus	-94.8372	33.0404	Southwestern Electric Power Co	Welsh	0.55	16939.4
3527	F	Tom Green	-100.4923	31.3935	AEP Texas North Company	San Angelo/Concho (retired)	0.23	0.0
3594	K	Travis	-97.7850	30.2938	Lower Colorado River Authority	Austin	0.00	0.0
10184	K	Travis	-97.8425	30.3974	Minnesota Mining & Mfg Co	Central Utility Plant	0.30	23.2
3548	K	Travis	-97.6128	30.3038	Austin Energy	Decker Creek	0.49	2110.2
56373	K	Travis	-97.7252	30.3975	Austin Energy	Domain Plant	0.05	0.4
50118	K	Travis	-97.7351	30.2867	University of Texas at Austin	Hal C Weaver Power Plant	0.29	304.3
3549	K	Travis	-97.7221	30.2513	Austin Energy	Holly Street (retired in 2008)	0.35	507.6
3600	K	Travis	-97.9072	30.3910	Lower Colorado River Authority	Marshall Ford	0.00	0.0
56374	K	Travis	-97.7091	30.3060	Austin Energy	Robert Mueller Energy Center	0.05	0.2
7900	K	Travis	-97.6138	30.2087	Austin Energy	Sand Hill	0.23	1138.7
55588	K	Travis	-97.7600	30.1700	Gas Recovery Systems Inc	Sunset Farms	0.00	0.0
55581	F	Upton	-102.2444	31.2357	FPL Energy Upton Wind LP	King Mountain Wind Ranch 1	0.00	0.0
54459	F	Upton	-101.8400	31.6300	Western Gas Resources Inc	Midkiff Plant	0.00	0.0
55367	F	Upton	-102.1915	31.2793	West Texas Wind Epy Ptnrs LLC	West Texas Wind Energy LLC	0.00	0.0
6128	J	Val Verde	-101.0557	29.4496	International Bound & Wtr Comm	Amistad Dam & Power	0.00	0.0
54976	D	Van Zandt	-95.7100	32.6700	Morton International Inc	Morton Salt Grand Saline	0.30	0.0
3631	L	Victoria	-97.1347	28.8950	South Texas Electric Coop Inc	Sam Rayburn	0.05	76.4
3443	L	Victoria	-97.0103	28.7897	Topaz Power Group LLC	Victoria	0.70	0.0
10790	L	Victoria	-96.9552	28.6737	Invista	Victoria Texas Plant	0.05	89.9
3494	F	Ward	-102.9638	31.5841	Luminant Generation Company LLC	Permian Basin	0.79	2327.1
3439	M	Webb	-99.5090	27.5670	Topaz Power Group LLC	Laredo	0.70	1880.3
50137	K	Wharton	-95.8989	29.2638	Wharton County Power Partners	Newgulf Cogen	0.05	2.7
50127	B	Wichita	-98.5895	33.8627	Mirant Wichita Falls LP	Mirant Wichita Falls LP	0.23	54.0
54364	B	Wichita	-98.5530	34.0030	PPG Industries Inc Works 4	PPG Industries Works 4	0.00	0.0
127	B	Wilbarger	-99.1754	34.0826	Public Service Co of Oklahoma	Oklauion	0.36	4379.9

EIA-906/920 (2006)					EIA-906/920 (2006)	EIA-906/920 (2006)	Final Used Factors	Final Calculations
Facility ID	Reg. Water Planning Area	County	Longitude	Latitude	Company	Plant Name	gal/kWh consumption	Ac-Ft consumed
								481,632
55053	C	Wise	-97.7500	33.2100	Devon Gas Services	Bridgeport Gas Processing Plant	0.00	0.0
55320	C	Wise	-97.9103	33.0583	Wise County Power Co., LP	Wise County Power LP	0.23	2204.7
54962	D	Wood	-95.2000	32.5900	Exxon Mobil Production Co	ExxonMobil Hawkins Gas Plant	0.00	0.0
55065	O	Yoakum	-102.7418	32.9728	Denver City Energy Assoc LP	Mustang Station	0.23	1701.4
56326	O	Yoakum	-102.7418	32.9728	Yoakum Electric Generating Cooperative	Mustang Station 4	0.05	13.6
52122	O	Yoakum	-102.7545	33.0099	Occidental Permian Ltd	Wasson CO2 Removal Plant	0.05	8.2
3490	G	Young	-98.6120	33.1348	Luminant Generation Company LLC	Graham	0.35	555.6

C.2 New Planned Power Plants included for post-2006 projections

This section describes the Excel worksheet “*NewPlants_2007-2018*” of Excel file *TWDBData_Calculations_FINAL.xls* that contains data used to project future water consumption for electric power generation in Texas.

Table C2. Columns of Excel file listed in order from Column A to Column R:

Column	Title	Description	Source
A	Facility ID (interim)	Fictitious Facility Number assigned to proposed facilities for sorting purposes only	None
B	Reg. Water Planning Area	The TWDB Regional Water Planning Area within which the proposed facility will reside.	Based upon county listed by facility announcement list of Column N
C	County	The county within which the proposed facility is to reside.	Listed source in Column N
D	Longitude	The longitudinal coordinates of the power plant facility (sometimes general value for city or county)	
E	Latitude	The latitudinal coordinates of the power plant facility (sometimes general value for city or county)	
F	Company	Name of the company that owns the power plant facility	Listed source in Column N
G	Plant Name	Name of the power plant facility	Listed source in Column N
H	Nameplate	The rated power capacity of	Listed source in Column N

	Capacity (kW)	the power plant facility for all generating units	
I	Cooling Type	Type of cooling system planned for use at power facility	Estimated or through communication with facility operators. Cooling towers are assumed for facilities with no other information.
J	Water Source	The main water source type for cooling water	Estimated and from stakeholders
K	CHP?	Y = the facility is a combined heat and power facility N = the facility only sells electricity	Assumed N, unless proposed generation unit is an addition to an existing CHP facility
L	Industrial?	Y = facility is will be on-site at an industrial facility and assumed not to substantially contribute electricity to the electric grid N = facility is listed with an NAICS code of 22	Assumed N, unless proposed generation unit is an addition to an existing industrial facility
M	Prime Mover	The major type of prime mover (by MWh) used at the power plant	Assumed ST for all coal and nuclear facilities. Assumed combined cycle for all natural gas facilities unless specified in any of the sources of Column N. WT for all wind facilities.
N	Source of Information	These are the data sources from which proposed power plants originate.	“PUCT – “completed””= power plants listed as completed since 2006 by the Public Utility Commission of Texas (PUCT) “PUCT – “construction”” = power plant facilities listed by PUCT as in the construction phase during the completion of this report “PUCT – “announced”” = power plants listed by PUCT as announced for possible completion PUCT data from: http://www.puc.state.tx.us/electric/maps/ and

			http://www.puc.state.tx.us/electric/maps/gen_tables.xls “ERCOT CDR 2008”: the Electric Reliability Council of Texas (ERCOT) Capacity, Demand and Reserves (CDR) report for 2008 ERCOT CDR available (after registration) at: http://planning.ercot.com/ “TWDB/TCEQ list”: power plants on a list provided by the Texas Water Development Board that also were represented on a TCEQ-supplied list from the Chief Engineer’s office
O	Energy Source	Fuel used for power plant	COL = coal, WND = wind, PC = petroleum coke, NG = natural gas, WDS = wood wastes, NUC = nuclear material
P	Water Consumption (gal/kWh)	Water consumption rate for power plant facility and/or generator	These values are assumed from general factors except as provided by power plant operators and stakeholders
Q	Start Year (no month)	Assumed year when power plant will begin operation	Source of Column N when a year is provided. Some years were not listed and were estimated by the authors.
R	Initial Year of Operation (PUC Data)	Initial year of operation as listed in PUCT data source	http://www.puc.state.tx.us/electric/maps/gen_tables.xls

Facility ID (Interim)	Reg. Water Planning Area	County	Longitude	Latitude	Company	Plant Name	Nameplate Capacity (kW)	Cooling Type	Water Source	CHP?	Industrial?	Prime Mover
2006-1	G	Taylor	-100.0453	32.2220	FPL Energy Horse Hollow LLC	Horse Hollow Wind Energy Center II	224,000	Air	none	N	N	WT
2006-2	G	Shackelford	-99.44	32.73	Horizon Wind Energy	Lone Star Wind - Mesquite	200,000	Air	none	N	N	WT
2007-1	C	Freestone	-96.05473	31.82072	Luminant	Big Brown 1 - upgrade	20,000	Once Through	Lake	N	N	ST
2007-10	A	Oldham	-102.37	35.26	Edison Mission Group	Wildorado Wind Ranch	161,000	Air	none	N	N	WT
2007-11	F	Sterling	-101.04	31.82	FPL Energy	Capricorn Ridge Wind	262,000	Air	none	N	N	WT
2007-12	C	Jack	-98.17	33.23	Gamesa Energy	Barton Chapel Wind 1	120,000	Air	none	N	N	WT
2007-13	G	Shackelford	-99.44	32.73	Horizon Wind Energy	Lone Star Wind - Post Oak	200,000	Air	none	N	N	WT
2007-14	G	Nolan	-100.41	32.3	DKRW/BabcockBrown	Sweetwater Wind 5	80,000	Air	none	N	N	WT
2007-15	F	Scurry	-100.92	32.75	Enel North America/WKN USA	Snyder Wind Project	63,000	Air	none	N	N	WT
2007-16	O	Floyd	-101.32	34.02	Renewable Energy Systems	Whirlwind	60,000	Air	none	N	N	WT
2007-17	G	Erath	-98.23	32.23	BP/Clipper Windpower	Silver Star Phase I	60,000	Air	none	N	N	WT
2007-18	D	Martin	-101.95	32.3	Invenery	Stanton Wind Energy	120,000	Air	none	N	N	WT
2007-19	F	Scurry	-100.92	32.75	Airtricity	Champion Wind Farm	126,000	Air	none	N	N	WT
2007-2	F	Ector	-102.3800	31.8600	Navasota Odessa Energy Partners LP	Quail Run Energy Center	275,000	unknown	Unknown	N	N	NGCC
2007-20	F	Howard	-101.43	32.31	Duke Energy	Ocotillo Windpower 1	59,000	Air	none	N	N	WT
2007-3	K	Wharton	-96.1900	29.3100	Navasota Wharton Energy Partners LP	Colorado Bend Energy Center	275,000	unknown	Unknown	N	N	NGCC
2007-4	H	Brazoria	-95.36	28.95	Calpine-Dow Chemical	Freeport Energy Center - expansion	200,000	Cooling Tower	Unknown	Y	Y	NGCC
2007-5	O	Yoakum	-102.82	33	Golden Spread EC	Mustang Station 5	150,000	Cooling Tower	Groundwater	N	N	NGCC
2007-6	K	Matagorda	-96.0489	28.7952	STP Nuclear Operating Co	South Texas Project - 10 year total upgrades	200,000	Once Through	Lake	N	N	ST
2007-7	G	Nolan	-100.3667	32.3289	Babcock & Brown Power Op Partners LLC	Sweetwater Wind 4 LLC	300,000	Air	none	N	N	WT
2007-8	F	Scurry	-100.92	32.75	Invenery Services LLC	Camp Springs Wind Energy Center (Scurry County Wind LP)	130,000	Air	none	N	N	WT
2007-9	G	Taylor	-100.1100	32.3100	AES Wind Generation Inc	Buffalo Gap II	233,000	Air	none	N	N	WT
2008-1	H	Fort Bend	-95.63305	29.48358	NRG Energy	W A Parish 7 uprate	40,000	Cooling Tower	Lake	N	N	ST
2008-10	A	Childress	-100.20	34.53	WindRosePower	Childress Wind Project	100,800	Air	none	N	N	WT
2008-11	F	Howard	-101.43	32.31	Airtricity	Panther Creek	111,000	Air	none	N	N	WT
2008-12	B	Cottle	-100.26	34.07	Airtricity	Wild Horse Wind Farm 2	39,100	Air	none	N	N	WT
2008-13	F	Andrews	-102.64	32.30	UNKNOWN	M Bar Wind	194,000	Air	none	N	N	WT
2008-14	O	Dawson	-101.95	32.74	Airtricity	Lamesa	147,000	Air	none	N	N	WT
2008-15	F	Borden	-101.43	32.74	UNKNOWN	Bull Creek Wind Plant	180,000	Air	none	N	N	WT
2008-16	B	Cottle	-100.26	34.07	Airtricity	Wild Horse Wind Farm 1	60,000	Air	none	N	N	WT
2008-17	G	Nolan	-100.41	32.30	Airtricity	Inadale	212,000	Air	none	N	N	WT
2008-18	F	Scurry	-100.92	32.75	Airtricity	Pyron	303,000	Air	none	N	N	WT
2008-19	F	Borden	-101.43	32.74	UNKNOWN	Gray Wind Project	141,000	Air	none	N	N	WT
2008-2	H	Galveston	-95	29.42	BP	Texas City Refinery	250,000	Cooling Tower	Unknown	Y	Y	NGCC
2008-20	N	Kenedy	-97.61	26.94	Superior Renewable Energy	Gulf Wind 1	187,000	Air	none	N	N	WT
2008-21	G	Nolan	-100.41	32.30	UNKNOWN	Turkey Track Energy Center	300,000	Air	none	N	N	WT
2008-22	F	Howard	-101.43	32.31	UNKNOWN	Wild Horse Mountain	120,000	Air	none	N	N	WT
2008-23	F	Howard	-101.43	32.31	UNKNOWN	Gunsight Energy Center	200,000	Air	none	N	N	WT
2008-24	G	Shackelford	-99.35	32.74	Renewable Energy Systems	Hackberry Wind Farm	165,000	Air	none	N	N	WT
2008-25	N	Kenedy	-97.61	26.94	PPM Energy	Penascal Wind Farm	202,000	Air	none	N	N	WT
2008-26	F	Ector	-102.54	31.87	UNKNOWN	Pistol Hill Wind Energy	300,000	Air	none	N	N	WT
2008-27	G	Taylor	-99.89	32.30	UNKNOWN	South Trent Wind Farm	101,000	Air	none	N	N	WT
2008-28	F	Ector	-102.54	31.87	Duke Energy	Ntotes Windpower	150,000	Air	none	N	N	WT
2008-29	H	Galveston	-94.9181	29.3711	BP Global Power	South Houston Green Power Expansion	244,000	Cooling Tower	Unknown	Y	Y	NGCC
2008-3	L	Victoria	-97.0103	28.78971	NuCoastal Energy	Victoria (refurbish)	300,000	Cooling Tower	Unknown	N	N	NGCC
2008-4	F	Ector	-102.3800	31.8600	Navasota Odessa Energy	Quail Run Energy Center	275,000	Cooling Tower (assum	Unknown	N	N	NGCC
2008-5	K	Wharton	-96.1900	29.3100	Navasota Wharton Energy	Colorado Bend Energy Center	275,000	Cooling Tower (assum	Unknown	N	N	NGCC
2008-6	F	Scurry	-100.92	32.75	Airtricity	Roscoe Wind Farm 1	209,000	Air	none	N	N	WT
2008-7	G	Taylor	-100.1100	32.3100	AES	Buffalo Gap 3	170,000	Air	none	N	N	WT
2008-8	F	Scurry	-100.92	32.75	Invenery	Camp Springs Energy expansion	120,000	Air	none	N	N	WT
2008-9	F	Coke	-100.53	31.89	Edison Mission Group	Goat Mountain Wind Ranch	150,000	Air	none	N	N	WT
2009-1	G	Milam	-97.06391	30.56437	Luminant-Alcoa	Sandow 5	581,000	Cooling Tower	Wastewater pot	Y	Y	ST
2009-10	N	Nueces	-97.4192	27.8192	Topaz Power Group	Nueces Bay Power Plant	350,000	Once Through	Salt	N	N	NGCC
2009-11	N	Nueces	-97.3117	27.6067	Topaz Power Group	Barney M. Davis Power Plant	350,000	Once Through	Salt	N	N	NGCC
2009-12	G	Somervell	-97.7858	32.2983	Luminant	Comanche Peak 1.2 upgrade	86,000	Once Through	Lake	N	N	ST
2009-13	L	Calhoun	-96.5446	28.6846	Formosa Plastics	Point Comfort	300,000	Cooling Tower	Unknown	Y	Y	ST
2009-14	G	Nolan	-100.41	32.30	UNKNOWN	Buffalo Gap 4	378,000	Air	none	N	N	WT
2009-15	D	Martin	-101.95	32.31	WindTex Energy	Lenorah Wind Farm	350,000	Air	none	N	N	WT
2009-16	F	Borden	-101.43	32.74	WindTex Energy	Stephens Wind Farm	141,000	Air	none	N	N	WT
2009-17	F	Sterling	-101.04	31.82	UNKNOWN	Sterling Energy Center	300,000	Air	none	N	N	WT
2009-18	O	Dickens	-100.78	33.62	Invenery	McAdoo Wind Energy	120,000	Air	none	N	N	WT
2009-19	N	Kenedy	-97.61	26.94	Superior Renewable Energy	Gulf Wind 2	400,000	Air	none	N	N	WT
2009-2	G	Robertson	-96.52	31.03	Oak Grove Power Company LLC (Luminant)	Oak Grove Steam Electric Station, Gen 1	855,000	Once Through	Lake	N	N	ST
2009-20	A	Carson	-101.35	35.40	UNKNOWN	B&B Panhandle Wind	1,001,000	Air	none	N	N	WT
2009-21	G	Coryell	-97.80	31.39	UNKNOWN	Gatesville Wind Farm	200,000	Air	none	N	N	WT
2009-22	M	Webb	-99.50897	27.56698	Topaz Power Group	Laredo Peaking 4 & 5	193,000	Cooling Tower	Surface	N	N	GT
2009-23	K	Fayette	-97.008	30.019	Lower Colorado River Authority (LCRA)	Winchester Power Park	178,000	Cooling Tower	Surface	N	N	GT
2009-3	A	Gray	-100.94	35.52	UNKNOWN	Pampa Energy Center	165,000	Cooling Tower (assum	Groundwater	N	N	ST
2009-4	G	Bosque	-97.64	31.9	LS Power	Bosque expansion	255,000	Cooling Tower (assum	Unknown	N	N	NGCC
2009-5	H	Harris	-94.92553	29.75023	NRG Energy	Cedar Bayou 4	550,000	Once Through	Salt	N	N	NGCC
2009-6	D	Hunt	-96.08	33.12	Cobisa	Greenville	1,750,000	Cooling Tower (assum	Unknown	N	N	NGCC
2009-7	L	Bexar	-98.38144	29.25636	CPS Energy	V H Brauning 6	185,000	Cooling Tower	River/Reuse	N	N	NGCC
2009-8	K	Travis	-97.6138	30.2087	Austin Energy	Sand Hill expansion	100,000	Cooling Tower	Reuse	N	N	NGCC
2009-9	H	Harris	-95.1361	29.7153	Calpine	Deer Park Energy Center	400,000	Cooling Tower	Municipal	N	N	NGCC
2010-1	L	Bexar	-98.32033	29.30664	CPS San Antonio	J K Spruce 2	750,000	Once Through	Reuse	N	N	ST
2010-2	G	Robertson	-96.52	31.03	Oak Grove Power Company LLC (Luminant)	Oak Grove Steam Electric Station, Gen 2	855,000	Once Through	Lake	N	N	ST
2010-3	H	Fort Bend	-95.63305	29.48358	NRG Energy	W A Parish 7 uprate	60,000	Cooling Tower	Lake	N	N	ST
2010-4	F	Ector	-102.3800	31.8600	Navasota Odessa Energy	Quail Run Energy Center	275,000	Cooling Tower (assum	Unknown	N	N	NGCC
2010-5	K	Wharton	-96.1900	29.3100	Navasota Wharton Energy	Colorado Bend Energy Center	275,000	Cooling Tower (assum	Unknown	N	N	NGCC
2010-6	E	El Paso	-106.43219	31.98431	El Paso Electric	Newman 5	288,000	Cooling Tower (assum	Unknown	N	N	NGCC

Facility ID (interim)	Reg. Water Planning Area	County	Longitude	Latitude	Company	Plant Name	Nameplate Capacity (kW)	Cooling Type	Water Source	CHP?	Industrial?	Prime Mover
2010-7	F	Scurry	-100.92	32.75	UNKNOWN	Camp Springs Energy III	350,000	Air	none	N	N	WT
2010-8	N	Kenedy	-97.61	26.94	Superior Renewable Energy	Gulf Wind 3	400,000	Air	none	N	N	WT
2010-9	G	Throckmorton	-99.21	33.18	UNKNOWN	Throckmorton Wind Farm	400,000	Air	none	N	N	WT
2011-1	G	Robertson	-96.69335	31.09296	Altura Power LP	Twin Oaks 3	630,000	Cooling Tower	Groundwater	N	N	ST
2011-2	H	Harris	-95.26	29.71	Texas Petrochemicals	Sims Bayou Cogeneration	580,000	Cooling Tower	Unknown	Y	Y	NGCC
2011-3	H	Harris	-95.1361	29.7153	Calpine	Deer Park Energy Center	607,000	Cooling Tower	Municipal	N	N	NGCC
2011-4	C	Dallas	-96.93613	32.72346	Exelon Power	Mountain Creek	700,000	Cooling Tower	Unknown	N	N	NGCC
2011-5	H	Galveston	-94.80	29.33	Wind Energy Systems Technology	Galveston Offshore Wind	300,000	Air	none	N	N	WT
2012-1	G	McLennan	-97.2	31.55	LS Power	Sandy Creek Energy Station	900,000	Cooling Tower	Unknown	N	N	ST
2012-2	G	Limestone	-96.25251	31.4224	NRG Energy	Limestone 3	800,000	Cooling Tower	None	N	N	ST
2012-3	L	Calhoun	-96.51	28.71	Calhoun County Navigation District	Point Comfort	303,000	Cooling Tower	Unknown	N	N	ST
2012-4	I	Nacogdoches	-94.64	31.53	Nacogdoches Power LLC	Nacogdoches Power	100,000	Cooling Tower	Unknown	Y	Y	ST
2012-5	F	Tom Green	-100.38	31.42	UNKNOWN	Fort Concho Wind Farm	400,000	Air	none	N	N	WT
2012-6	I	Nacogdoches	-94.64	31.53	Nacogdoches Power LLC	Nacogdoches Power	330,000	Cooling Tower	Unknown	Y	Y	NGCC
2013-1	G	Nolan	-100.41	32.30	Tenaska	Nolan County IGCC with CO2 Capture	600,000	Cooling Tower	Unknown	N	N	IGCC
2013-2	L	Goliad	-97.21419	28.71305	South Texas Elec. Coop - International Power P	Coletto Creek - expansion	650,000	Cooling Tower	Lake	N	N	ST
2013-3	F	Howard	-101.43	32.31	Summit Power	IGCC Plant - unknown W. Texas Location	500,000	Cooling Tower	Groundwater	N	N	IGCC
2013-3	H	Fort Bend	-95.76	29.53	Hunton Energy	Lockwood IGCC Plant	1,200,000	Cooling Tower	Unknown	N	N	IGCC
2014-1	N	Nueces	-97.4600	27.7800	Las Brisas Energy Center	Las Brisas Energy Center	1,200,000	Cooling Tower	Unknown	Y	Y	ST
2015-1	G	Somervell	-97.7858	32.2983	Luminant	Comanche Peak 3, 4	3,200,000	Cooling Tower	Lake	N	N	ST
2015-2	K	Matagorda	-96.0489	28.7952	NRG Energy	South Texas Project 3, 4	2,716,000	Once Through	Lake	N	N	ST
2021-1	L	Victoria	-96.97	28.79	Exelon Power	Victoria Nuclear Facility	3,040,000	Cooling Tower	Lake	N	N	ST
2021-2	A	Potter	-101.82	35.21	Amarillo Power (UniStar Nuclear)	Amarillo Power Nuclear Facility	2,700,000	Cooling Tower	Lake	N	N	ST

Facility ID (Interim)	Reg. Water Planning Area	County	Longitude	Latitude	Company	Plant Name	Source of Information	Energy Source	Water Consumption (gal/kWhr)	Start Year (no month)	Initial Year of Operation (PUC Data)
2006-1	G	Taylor	-100.0453	32.2220	FPL Energy Horse Hollow LLC	Horse Hollow Wind Energy Center II	PUCT - "completed"	WIND	0	2006	2006
2006-2	G	Shackelford	-99.44	32.73	Horizon Wind Energy	Lone Star Wind - Mesquite	PUCT - "completed"	WIND	0	2006	2006
2007-1	C	Freestone	-96.05473	31.82072	Luminant	Big Brown 1 - upgrade	PUCT - "completed"	COL	0.35	2007	2007
2007-10	A	Oldham	-102.37	35.26	Edison Mission Group	Wildorado Wind Ranch	PUCT - "completed"	WIND	0	2007	2007
2007-11	F	Sterling	-101.04	31.82	FPL Energy	Capricorn Ridge Wind	PUCT - "completed"	WIND	0	2007	2007
2007-12	C	Jack	-98.17	33.23	Gamesa Energy	Barton Chapel Wind 1	PUCT - "construction"	WIND	0	2007	2007
2007-13	G	Shackelford	-99.44	32.73	Horizon Wind Energy	Lone Star Wind - Post Oak	PUCT - "construction"	WIND	0	2007	2007
2007-14	G	Nolan	-100.41	32.3	DKRW/BabcockBrown	Sweetwater Wind 5	PUCT - "construction"	WIND	0	2007	2007
2007-15	F	Scurry	-100.92	32.75	Enel North America/WKN USA	Snyder Wind Project	PUCT - "construction"	WIND	0	2007	2007
2007-16	O	Floyd	-101.32	34.02	Renewable Energy Systems	Whirlwind	PUCT - "construction"	WIND	0	2007	2007
2007-17	G	Erath	-98.23	32.23	BP/Clipper Windpower	Silver Star Phase I	PUCT - "construction"	WIND	0	2007	2007
2007-18	D	Martin	-101.95	32.3	Invenery	Stanton Wind Energy	PUCT - "construction"	WIND	0	2007	2007
2007-19	F	Scurry	-100.92	32.75	Airtricity	Champion Wind Farm	PUCT - "construction"	WIND	0	2007	2007
2007-2	F	Ector	-102.3800	31.8600	Navasota Odessa Energy Partners LP	Quail Run Energy Center	PUCT - "completed"	NG	0.23	2007	2007
2007-20	F	Howard	-101.43	32.31	Duke Energy	Ocotillo Windpower 1	PUCT - "announced"	WIND	0	2007	Dec-07
2007-3	K	Wharton	-96.1900	29.3100	Navasota Wharton Energy Partners LP	Colorado Bend Energy Center	PUCT - "completed"	NG	0.23	2007	2007
2007-4	H	Brazoria	-95.36	28.95	Calpine-Dow Chemical	Freeport Energy Center - expansion	PUCT - "completed"	NG	0.23	2007	2007
2007-5	O	Yoakum	-102.82	33	Golden Spread EC	Mustang Station 5	PUCT - "completed"	NG	0.23	2007	2007
2007-6	K	Matagorda	-96.0489	28.7952	STP Nuclear Operating Co	South Texas Project - 10 year total upgrades	PUCT - "completed"	NUC	0.6	2007	2007
2007-7	G	Nolan	-100.3667	32.3289	Babcock & Brown Power Op Partners LLC	Sweetwater Wind 4 LLC	PUCT - "completed"	WIND	0	2007	2007
2007-8	F	Scurry	-100.92	32.75	Invenery Services LLC	Camp Springs Wind Energy Center (Scurry County Wind LP)	PUCT - "completed"	WIND	0	2007	2007
2007-9	G	Taylor	-100.1100	32.3100	AES Wind Generation Inc	Buffalo Gap II	PUCT - "completed"	WIND	0	2007	2007
2008-1	H	Fort Bend	-95.63305	29.48358	NRG Energy	W A Parish 7 uprate	PUCT - "announced"	COL	0.35	2008	2008
2008-10	A	Childress	-100.20	34.53	WindRosePower	Childress Wind Project	PUCT - "announced"	WIND	0	2008	May-08
2008-11	F	Howard	-101.43	32.31	Airtricity	Panther Creek	PUCT - "announced"	WIND	0	2008	Jun-08
2008-12	B	Cottle	-100.26	34.07	Airtricity	Wild Horse Wind Farm 2	PUCT - "announced"	WIND	0	2008	Aug-08
2008-13	F	Andrews	-102.64	32.30	UNKNOWN	M Bar Wind	PUCT - "announced"	WIND	0	2008	Sep-08
2008-14	O	Dawson	-101.95	32.74	Airtricity	Lamesa	PUCT - "announced"	WIND	0	2008	Oct-08
2008-15	F	Borden	-101.43	32.74	UNKNOWN	Bull Creek Wind Plant	PUCT - "announced"	WIND	0	2008	Oct-08
2008-16	B	Cottle	-100.26	34.07	Airtricity	Wild Horse Wind Farm 1	PUCT - "announced"	WIND	0	2008	Nov-08
2008-17	G	Nolan	-100.41	32.30	Airtricity	Inadale	PUCT - "announced"	WIND	0	2008	Nov-08
2008-18	F	Scurry	-100.92	32.75	Airtricity	Pyron	PUCT - "announced"	WIND	0	2008	Nov-08
2008-19	F	Borden	-101.43	32.74	UNKNOWN	Gray Wind Project	PUCT - "announced"	WIND	0	2008	Dec-08
2008-2	H	Galveston	-95	29.42	BP	Texas City Refinery	PUCT - "construction"	NG	0.23	2008	2008
2008-20	N	Kenedy	-97.61	26.94	Superior Renewable Energy	Gulf Wind 1	PUCT - "announced"	WIND	0	2008	Dec-08
2008-21	G	Nolan	-100.41	32.30	UNKNOWN	Turkey Track Energy Center	PUCT - "announced"	WIND	0	2008	Dec-08
2008-22	F	Howard	-101.43	32.31	UNKNOWN	Wild Horse Mountain	PUCT - "announced"	WIND	0	2008	Dec-08
2008-23	F	Howard	-101.43	32.31	UNKNOWN	Gunsight Energy Center	PUCT - "announced"	WIND	0	2008	Dec-08
2008-24	G	Shackelford	-99.35	32.74	Renewable Energy Systems	Hackberry Wind Farm	PUCT - "announced"	WIND	0	2008	Dec-08
2008-25	N	Kenedy	-97.61	26.94	PPM Energy	Penascal Wind Farm	PUCT - "announced"	WIND	0	2008	Dec-08
2008-26	F	Ector	-102.54	31.87	UNKNOWN	Pistol Hill Wind Energy	PUCT - "announced"	WIND	0	2008	Dec-08
2008-27	G	Taylor	-99.89	32.30	UNKNOWN	South Trent Wind Farm	PUCT - "announced"	WIND	0	2008	Dec-08
2008-28	F	Ector	-102.54	31.87	Duke Energy	Notrees Windpower	PUCT - "announced"	WIND	0	2008	Dec-08
2008-29	H	Galveston	-94.9181	29.3711	BP Global Power	South Houston Green Power Expansion	ERCOT CDR 2008	NG	0.23	2008	Jul-08
2008-3	L	Victoria	-97.0103	28.78971	NuCoastal Energy	Victoria (refurbish)	PUCT - "construction", ERCOT CDR 2008	NG	0.23	2008	2008
2008-4	F	Ector	-102.3800	31.8600	Navasota Odessa Energy	Quail Run Energy Center	PUCT - "construction"	NG	0.23	2008	2008
2008-5	K	Wharton	-96.1900	29.3100	Navasota Wharton Energy	Colorado Bend Energy Center	PUCT - "construction"	NG	0.23	2008	2008
2008-6	F	Scurry	-100.92	32.75	Airtricity	Roscoe Wind Farm 1	PUCT - "construction"	WIND	0	2008	2008
2008-7	G	Taylor	-100.1100	32.3100	AES	Buffalo Gap 3	PUCT - "construction"	WIND	0	2008	2008
2008-8	F	Scurry	-100.92	32.75	Invenery	Camp Springs Energy expansion	PUCT - "construction"	WIND	0	2008	2008
2008-9	F	Coke	-100.53	31.89	Edison Mission Group	Goat Mountain Wind Ranch	PUCT - "construction"	WIND	0	2008	2008
2009-1	G	Milam	-97.06391	30.56437	Luminant-Alcoa	Sandow 5	PUCT - "announced", ERCOT CDR 2008	COL	0.6	2009	Jul-09
2009-10	N	Nueces	-97.4192	27.8192	Topaz Power Group	Nueces Bay Power Plant	PUCT - "announced"	NG	0.23	2009	2009
2009-11	N	Nueces	-97.3117	27.6067	Topaz Power Group	Barney M. Davis Power Plant	PUCT - "announced"	NG	0.23	2009	2009
2009-12	G	Somervell	-97.7858	32.2983	Luminant	Comanche Peak 1.2 upgrade	PUCT - "announced"	NUC	0.35	2009	Oct-09
2009-13	L	Calhoun	-96.5446	28.6846	Formosa Plastics	Point Comfort	PUCT - "construction"	PC	0.25	2009	2009
2009-14	G	Nolan	-100.41	32.30	UNKNOWN	Buffalo Gap 4	PUCT - "announced"	WIND	0	2009	Mar-09
2009-15	D	Martin	-101.95	32.31	WindTex Energy	Lenorah Wind Farm	PUCT - "announced"	WIND	0	2009	May-09
2009-16	F	Borden	-101.43	32.74	WindTex Energy	Stevens Wind Farm	PUCT - "announced"	WIND	0	2009	May-09
2009-17	F	Sterling	-101.04	31.82	UNKNOWN	Sterling Energy Center	PUCT - "announced"	WIND	0	2009	Jun-09
2009-18	O	Dickens	-100.78	33.62	Invenery	McAdoo Wind Energy	PUCT - "announced"	WIND	0	2009	Jun-09
2009-19	N	Kenedy	-97.61	26.94	Superior Renewable Energy	Gulf Wind 2	PUCT - "announced"	WIND	0	2009	Sep-09
2009-2	G	Robertson	-96.52	31.03	Oak Grove Power Company LLC (Luminant)	Oak Grove Steam Electric Station, Gen 1	PUCT - "announced", ERCOT CDR 2008	COL	0.35	2009	Nov-09
2009-20	A	Carson	-101.35	35.40	UNKNOWN	B&B Panhandle Wind	PUCT - "announced"	WIND	0	2009	Sep-09
2009-21	G	Coryell	-97.80	31.39	UNKNOWN	Gatesville Wind Farm	PUCT - "announced"	WIND	0	2009	Dec-09
2009-22	M	Webb	-99.50897	27.56698	Topaz Power Group	Laredo Peaking 4 & 5	ERCOT CDR 2008	NG	0.05	2009	Jul-08
2009-23	K	Fayette	-97.008	30.019	Lower Colorado River Authority (LCRA)	Winchester Power Park	ERCOT CDR 2008	NG	0.05	2009	Jul-09
2009-3	A	Gray	-100.94	35.52	UNKNOWN	Pampa Energy Center	PUCT - "announced"	COL	0.6	2009	Dec-09
2009-4	G	Bosque	-97.64	31.9	LS Power	Bosque expansion	PUCT - "construction", ERCOT CDR 2008	NG	0.23	2009	2009
2009-5	H	Harris	-94.92553	29.75023	NRG Energy	Cedar Bayou 4	PUCT - "construction", ERCOT CDR 2009	NG	0.2	2009	2009
2009-6	D	Hunt	-96.08	33.12	Cobisa	Greenville	PUCT - "announced"	NG	0.23	2009	May-09
2009-7	L	Bexar	-98.38144	29.25636	CPS Energy	V H Brauning 6	PUCT - "announced"	NG	0.23	2009	May-09
2009-8	K	Travis	-97.6138	30.2087	Austin Energy	Sand Hill expansion	PUCT - "announced"	NG	0.23	2009	Sep-09
2009-9	H	Harris	-95.1361	29.7153	Calpine	Deer Park Energy Center	PUCT - "announced"	NG	0.23	2009	2009
2010-1	L	Bexar	-98.32033	29.30664	CPS San Antonio	J K Spruce 2	PUCT - "construction", ERCOT CDR 2008	COL	0.35	2010	2010
2010-2	G	Robertson	-96.52	31.03	Oak Grove Power Company LLC (Luminant)	Oak Grove Steam Electric Station, Gen 2	PUCT - "announced", ERCOT CDR 2008	COL	0.35	2010	May-10
2010-3	H	Fort Bend	-95.63305	29.48358	NRG Energy	W A Parish 7 uprate	PUCT - "announced"	COL	0.23	2010	2010
2010-4	F	Ector	-102.3800	31.8600	Navasota Odessa Energy	Quail Run Energy Center	PUCT - "announced"	NG	0.23	2010	2010
2010-5	K	Wharton	-96.1900	29.3100	Navasota Wharton Energy	Colorado Bend Energy Center	PUCT - "announced"	NG	0.23	2010	2010
2010-6	E	El Paso	-106.43219	31.98431	El Paso Electric	Newman 5	PUCT - "announced"	NG	0.23	2010	2010

Facility ID (interim)	Reg. Water Planning Area	County	Longitude	Latitude	Company	Plant Name	Source of Information	Energy Source	Water Consumption (gal/kWhr)	Start Year (no month)	Initial Year of Operation (PUC Data)
2010-7	F	Scurry	-100.92	32.75	UNKNOWN	Camp Springs Energy III	PUCT - "announced"	WND	0	2010	Mar-10
2010-8	N	Kenedy	-97.61	28.94	Superior Renewable Energy	Gulf Wind 3	PUCT - "announced"	WND	0	2010	Sep-10
2010-9	G	Throckmorton	-99.21	33.18	UNKNOWN	Throckmorton Wind Farm	PUCT - "announced"	WND	0	2010	Dec-10
2011-1	G	Robertson	-96.69335	31.09296	Altura Power LP	Twin Oaks 3	PUCT - "announced"	COL	0.6	2011	Jun-11
2011-2	H	Harris	-95.26	29.71	Texas Petrochemicals	Sims Bayou Cogeneration	PUCT - "announced"	NG	0.23	2011	2011
2011-3	H	Harris	-95.1361	29.7153	Calpine	Deer Park Energy Center	TWDB/TCEQ list	NG	0.23	2011	2011
2011-4	C	Dallas	-96.93613	32.72346	Exelon Power	Mountain Creek	PUCT - "announced"	NG	0.23	2011	May-11
2011-5	H	Galveston	-94.80	29.33	Wind Energy Systems Technology	Galveston Offshore Wind	PUCT - "announced"	WND	0	2011	2011
2012-1	G	McLennan	-97.2	31.55	LS Power	Sandy Creek Energy Station	PUCT - "announced", ERCOT CDR 2008	COL	0.6	2012	2012
2012-2	G	Limestone	-96.25251	31.4224	NRG Energy	Limestone 3	PUCT - "announced"	COL	0	2012	2012
2012-3	L	Calhoun	-96.51	28.71	Calhoun County Navigation District	Point Comfort	PUCT - "announced"	PC	0.6	2012	2012
2012-4	I	Nacogdoches	-94.64	31.53	Nacogdoches Power LLC	Nacogdoches Power	PUCT - "announced"	WDS	0.6	2012	2012
2012-5	F	Tom Green	-100.38	31.42	UNKNOWN	Fort Concho Wind Farm	PUCT - "announced"	WND	0	2012	Jul-12
2012-6	I	Nacogdoches	-94.64	31.53	Nacogdoches Power LLC	Nacogdoches Power	PUCT - "announced"	NG	0.6	2012	2012
2013-1	G	Nolan	-100.41	32.30	Tenaska	Nolan County IGGC with CO2 Capture	TWDB/TCEQ list	COL	0.49	2013	2013
2013-2	L	Goliad	-97.21419	28.71305	South Texas Elec. Coop - International Power P	Coletto Creek - expansion	TWDB/TCEQ list	COL	0.6	2013	2013
2013-3	F	Howard	-101.43	32.31	Summit Power	IGCC Plant - unknown W. Texas Location	TWDB/TCEQ list	COL	0.49	2013	2013
2013-3	H	Fort Bend	-95.76	29.53	Hunton Energy	Lockwood IGCC Plant	PUCT - "announced"	PC	0.35	2013	2013
2014-1	N	Nueces	-97.4600	27.7800	Las Brisas Energy Center	Las Brisas Energy Center	TWDB/TCEQ list	PC	0.6	2014	2014
2015-1	G	Somervell	-97.7858	32.2983	Luminant	Comanche Peak 3, 4	PUCT - "announced"	NUC	0.6	2015	Jan-15
2015-2	K	Matagorda	-96.0489	28.7952	NRG Energy	South Texas Project 3, 4	PUCT - "announced"	NUC	0.6	2015	Jan-15
2021-1	L	Victoria	-96.97	28.79	Exelon Power	Victoria Nuclear Facility	TWDB/TCEQ list	NUC	0.6	2018	2018
2021-2	A	Potter	-101.82	35.21	Amarillo Power (UniStar Nuclear)	Amarillo Power Nuclear Facility	TWDB/TCEQ list	NUC	0.6	2018	2018

Facility ID (interim)	Reg. Water Planning Area	County	Longitude	Latitude	Company	Plant Name
2006-1	G	Taylor	-100.0453	32.2220	FPL Energy Horse Hollow LLC	Horse Hollow Wind Energy Center II
2006-2	G	Shackelford	-99.44	32.73	Horizon Wind Energy	Lone Star Wind - Mesquite
2007-1	C	Freestone	-96.05473	31.82072	Luminant	Big Brown 1 - upgrade
2007-10	A	Oldham	-102.37	35.26	Edison Mission Group	Wildorado Wind Ranch
2007-11	F	Sterling	-101.04	31.82	FPL Energy	Capricorn Ridge Wind
2007-12	C	Jack	-98.17	33.23	Gamesa Energy	Barton Chapel Wind 1
2007-13	G	Shackelford	-99.44	32.73	Horizon Wind Energy	Lone Star Wind - Post Oak
2007-14	G	Nolan	-100.41	32.3	DKRW/BabcockBrown	Sweetwater Wind 5
2007-15	F	Scurry	-100.92	32.75	Enel North America/WKN USA	Snyder Wind Project
2007-16	O	Floyd	-101.32	34.02	Renewable Energy Systems	Whirlwind
2007-17	G	Erath	-98.23	32.23	BP/Clipper Windpower	Silver Star Phase I
2007-18	D	Martin	-101.95	32.3	Invenery	Stanton Wind Energy
2007-19	F	Scurry	-100.92	32.75	Airtricity	Champion Wind Farm
2007-2	F	Ector	-102.3800	31.8600	Navasota Odessa Energy Partners LP	Quail Run Energy Center
2007-20	F	Howard	-101.43	32.31	Duke Energy	Cootillo Windpower 1
2007-3	K	Wharton	-96.1900	29.3100	Navasota Wharton Energy Partners LP	Colorado Bend Energy Center
2007-4	H	Brazoria	-95.36	28.95	Calpine-Dow Chemical	Freeport Energy Center - expansion
2007-5	O	Yoakum	-102.82	33	Golden Spread EC	Mustang Station 5
2007-6	K	Matagorda	-96.0489	28.7952	STP Nuclear Operating Co	South Texas Project - 10 year total upgrades
2007-7	G	Nolan	-100.3667	32.3289	Babcock & Brown Power Op Partners LLC	Sweetwater Wind 4 LLC
2007-8	F	Scurry	-100.92	32.75	Invenery Services LLC	Camp Springs Wind Energy Center (Scurry County Wind LP)
2007-9	G	Taylor	-100.1100	32.3100	AES Wind Generation Inc	Buffalo Gap II
2008-1	H	Fort Bend	-95.63305	29.48358	NRG Energy	W A Parish 7 uprate
2008-10	A	Childress	-100.20	34.53	WindRosePower	Childress Wind Project
2008-11	F	Howard	-101.43	32.31	Airtricity	Panther Creek
2008-12	B	Cottle	-100.26	34.07	Airtricity	Wild Horse Wind Farm 2
2008-13	F	Andrews	-102.64	32.30	UNKNOWN	M Bar Wind
2008-14	O	Dawson	-101.95	32.74	Airtricity	Lamesa
2008-15	F	Borden	-101.43	32.74	UNKNOWN	Bull Creek Wind Plant
2008-16	B	Cottle	-100.26	34.07	Airtricity	Wild Horse Wind Farm 1
2008-17	G	Nolan	-100.41	32.30	Airtricity	Inadale
2008-18	F	Scurry	-100.92	32.75	Airtricity	Pyron
2008-19	F	Borden	-101.43	32.74	UNKNOWN	Gray Wind Project
2008-2	H	Galveston	.95	29.42	BP	Texas City Refinery
2008-20	N	Kenedy	-97.61	26.94	Superior Renewable Energy	Gulf Wind 1
2008-21	G	Nolan	-100.41	32.30	UNKNOWN	Turkey Track Energy Center
2008-22	F	Howard	-101.43	32.31	UNKNOWN	Wild Horse Mountain
2008-23	F	Howard	-101.43	32.31	UNKNOWN	Gunsight Energy Center
2008-24	G	Shackelford	-99.35	32.74	Renewable Energy Systems	Hackberry Wind Farm
2008-25	N	Kenedy	-97.61	26.94	PPM Energy	Penascal Wind Farm
2008-26	F	Ector	-102.54	31.87	UNKNOWN	Pistol Hill Wind Energy
2008-27	G	Taylor	-99.89	32.30	UNKNOWN	South Trent Wind Farm
2008-28	F	Ector	-102.54	31.87	Duke Energy	Notrees Windpower
2008-29	H	Galveston	-94.9181	29.3711	BP Global Power	South Houston Green Power Expansion
2008-3	L	Victoria	-97.0103	28.78971	NuCoastal Energy	Victoria (refurbish)
2008-4	F	Ector	-102.3800	31.8600	Navasota Odessa Energy	Quail Run Energy Center
2008-5	K	Wharton	-96.1900	29.3100	Navasota Wharton Energy	Colorado Bend Energy Center
2008-6	F	Scurry	-100.92	32.75	Airtricity	Roscoe Wind Farm 1
2008-7	G	Taylor	-100.1100	32.3100	AES	Buffalo Gap 3
2008-8	F	Scurry	-100.92	32.75	Invenery	Camp Springs Energy expansion
2008-9	F	Coke	-100.53	31.89	Edison Mission Group	Goat Mountain Wind Ranch
2009-1	G	Milam	-97.06391	30.56437	Luminant-Alcoa	Sandow 5
2009-10	N	Nueces	-97.4192	27.8192	Topaz Power Group	Nueces Bay Power Plant
2009-11	N	Nueces	-97.3117	27.6067	Topaz Power Group	Barney M. Davis Power Plant
2009-12	G	Somervell	-97.7858	32.2983	Luminant	Comanche Peak 1,2 upgrade
2009-13	L	Calhoun	-96.5446	28.6846	Formosa Plastics	Point Comfort
2009-14	G	Nolan	-100.41	32.30	UNKNOWN	Buffalo Gap 4
2009-15	D	Martin	-101.95	32.31	WindTex Energy	Lenorah Wind Farm
2009-16	F	Borden	-101.43	32.74	WindTex Energy	Stephens Wind Farm
2009-17	F	Sterling	-101.04	31.82	UNKNOWN	Sterling Energy Center
2009-18	O	Dickens	-100.78	33.62	Invenery	McAdoo Wind Energy
2009-19	N	Kenedy	-97.61	26.94	Superior Renewable Energy	Gulf Wind 2
2009-2	G	Robertson	-96.52	31.03	Oak Grove Power Company LLC (Luminant)	Oak Grove Steam Electric Station, Gen 1
2009-20	A	Carson	-101.35	35.40	UNKNOWN	B&B Panhandle Wind
2009-21	G	Coryell	-97.80	31.39	UNKNOWN	Gatesville Wind Farm
2009-22	M	Webb	-99.50897	27.56698	Topaz Power Group	Laredo Peaking 4 & 5
2009-23	K	Fayette	-97.008	30.019	Lower Colorado River Authority (LCRA)	Winchester Power Park
2009-3	A	Gray	-100.94	35.52	UNKNOWN	Pampa Energy Center
2009-4	G	Bosque	-97.64	31.9	LS Power	Bosque expansion
2009-5	H	Harris	-94.92553	29.75023	NRG Energy	Cedar Bayou 4
2009-6	D	Hunt	-96.08	33.12	Cobisa	Greenville
2009-7	L	Bexar	-98.38144	29.25636	CPS Energy	V H Braunig 6
2009-8	K	Travis	-97.6138	30.2087	Austin Energy	Sand Hill expansion
2009-9	H	Harris	-95.1361	29.7153	Calpine	Deer Park Energy Center
2010-1	L	Bexar	-98.32033	29.30664	CPS San Antonio	J K Spruce 2
2010-2	G	Robertson	-96.52	31.03	Oak Grove Power Company LLC (Luminant)	Oak Grove Steam Electric Station, Gen 2
2010-3	H	Fort Bend	-95.63305	29.48358	NRG Energy	W A Parish 6 uprate
2010-4	F	Ector	-102.3800	31.8600	Navasota Odessa Energy	Quail Run Energy Center
2010-5	K	Wharton	-96.1900	29.3100	Navasota Wharton Energy	Colorado Bend Energy Center
2010-6	E	El Paso	-106.43219	31.98431	El Paso Electric	Newman 5

Notes

Cooling reservoir is from wastewater treatment pond (which has both a ground water constituent from mine de-watering, and the ability to divert from assumed same cooling system as currently exists
Assumed same cooling system as currently exists

Facility ID (interim)	Reg. Water Planning Area	County	Longitude	Latitude	Company	Plant Name	Notes
2010-7	F	Scurry	-100.92	32.75	UNKNOWN	Camp Springs Energy III	
2010-8	N	Kenedy	-97.61	28.94	Superior Renewable Energy	Gulf Wind 3	
2010-9	G	Throckmorton	-99.21	33.18	UNKNOWN	Throckmorton Wind Farm	
2011-1	G	Robertson	-96.69335	31.09296	Altura Power LP	Twin Oaks 3	
2011-2	H	Harris	-95.26	29.71	Texas Petrochemicals	Sims Bayou Cogeneration	
2011-3	H	Harris	-95.1361	29.7153	Calpine	Deer Park Energy Center	Guess at 2011, after all other listed NG expansions
2011-4	C	Dallas	-96.93613	32.72346	Exelon Power	Mountain Creek	
2011-5	H	Galveston	-94.80	29.33	Wind Energy Systems Technology	Galveston Offshore Wind	
2012-1	G	McLennan	-97.2	31.55	LS Power	Sandy Creek Energy Station	
2012-2	G	Limestone	-96.25251	31.4224	NRG Energy	Limestone 3	The facility owner has stated to TWDB that Limestone generation unit 3 will employ an air cooling condenser
2012-3	L	Calhoun	-96.51	28.71	Calhoun County Navigation District	Point Comfort	
2012-4	I	Nacogdoches	-94.64	31.53	Nacogdoches Power LLC	Nacogdoches Power	
2012-5	F	Tom Green	-100.38	31.42	UNKNOWN	Fort Concho Wind Farm	
2012-6	I	Nacogdoches	-94.64	31.53	Nacogdoches Power LLC	Nacogdoches Power	
2013-1	G	Nolan	-100.41	32.30	Tenaska	Nolan County IGCC with CO2 Capture	Guess at 2013, after all other coal plants where latest date is 2012
2013-2	L	Goliad	-97.21419	28.71305	South Texas Elec. Coop - International Power P	Coletto Creek - expansion	Guess at 2013, after all other coal plants where latest date is 2012
2013-3	F	Howard	-101.43	32.31	Summit Power	IGCC Plant - unknown W. Texas Location	Guess at 2013, Guess at 500 MW, Guessed county near EOR
2013-3	H	Fort Bend	-95.76	29.53	Hunton Energy	Lockwood IGCC Plant	Guess at 2013, after all other coal plants where latest date is 2013
2014-1	N	Nueces	-97.4600	27.7800	Las Brisas Energy Center	Las Brisas Energy Center	Guess at 2014
2015-1	G	Somervell	-97.7858	32.2983	Luminant	Comanche Peak 3, 4	
2015-2	K	Matagorda	-96.0489	28.7952	NRG Energy	South Texas Project 3, 4	
2021-1	L	Victoria	-96.97	28.79	Exelon Power	Victoria Nuclear Facility	No documentation - assume 2 GW and 2018 online date
2021-2	A	Potter	-101.82	35.21	Amarillo Power (UniStar Nuclear)	Amarillo Power Nuclear Facility	No documentation - assume 2 GW and 2018 online date

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Map No.	Company	Facility	City	County	Resource	Capacity (MW)	Status	In Service	Interconnection	Region	Notes
1	LG&E	Texas Wind Power Project		Culberson	Wind	35	Completed	Oct-95		ERCOT	
2	Brownsville Public Utilities Board	Silas Ray	Brownsville	Cameron	NG	43	Completed	Jun-96	BPUB	ERCOT	
2	Brownsville Public Utilities Board	Silas Ray 10	Brownsville	Cameron	NG	48	Completed	Nov-04	BPUB	ERCOT	
3	Tenaska IV Texas Partners	Tenaska IV Texas Partners	Cleburne	Johnson	NG	258	Completed	Nov-96	TU/BEPC	ERCOT	
4	CSW Energy	Sweeny Cogeneration	Sweeny	Brazoria	NG	330	Completed	Feb-98	TNMP	ERCOT	Host: 90 MW
4	AEP-Phillips	Sweeny (expansion)	Sweeny	Brazoria	NG	110	Completed	Jan-01	TNMP	ERCOT	Host: 35 MW
5	Calpine/Phillips	Pasadena Power Plant I	Pasadena	Harris	NG	240	Completed	Jul-98	Reliant	ERCOT	Host: 90 MW
5	Calpine	Pasadena Power Plant II	Pasadena	Harris	NG	540	Completed	Jul-00	Reliant	ERCOT	
6	Borger Energy Associates	Black Hawk Station	Borger	Hutchinson	NG	254	Completed	Aug-98	SPS	SPP	Host: 38 MW
7	York Research	Big Spring Wind Power	Big Spring	Howard	Wind	34	Completed	Feb-99	TU	ERCOT	
7	York Research	Big Spring Wind Power	Big Spring	Howard	Wind	7	Completed	Jun-99	TXU	ERCOT	
8	FPL Energy	Southwest Mesa Wind Project	McCamey	Upton	Wind	75	Completed	Jun-99	WTU	ERCOT	
9	American National Wind Power	Delaware Mountain Wind Farm		Culberson	Wind	30	Completed	Jun-99	TXU	ERCOT	
10	Golden Spread/LS Power	Mustang Station	Denver City	Yoakum	NG	280	Completed	Jun-99	SPS	SPP	
10	Golden Spread/LS Power	Mustang Station	Denver City	Yoakum	NG	198	Completed	May-00	SPS	SPP	
11	BASF	Freeport	Freeport	Brazoria	NG	93	Completed	Jul-99	Reliant	ERCOT	
12	CSW Energy	Frontera Power Station	Mission	Hidalgo	NG	344	Completed	Jul-99	CPL	ERCOT	
12	CSW Energy	Frontera Power Station	Mission	Hidalgo	NG	170	Completed	May-00	CPL	ERCOT	
13	Conoco Global-OxyChem	Ingleside Cogeneration	Ingleside	San Patricio	NG	440	Completed	Oct-99	CPL	ERCOT	Host: 235 MW
14	Reliant Energy/Air Liquide/Bayer	Sabine Project	Sabine	Orange	NG	100	Completed	Dec-99	Entergy	SERC	Host: 36 MW
15	CPS	A. von Rosenberg	San Antonio	Bexar	NG	500	Completed	May-00	CPS	ERCOT	
16	Calpine	Hidalgo Energy Center	Edinburg	Hidalgo	NG	500	Completed	Jun-00	CSW	ERCOT	
17	Southern Energy	Bosque County Power Plant	Lake Whitney	Bosque	NG	308	Completed	Jun-00	Brazos	ERCOT	
17	Mirant	Bosque County Power Plant	Lake Whitney	Bosque	NG	248	Completed	Jun-01	Brazos	ERCOT	
18	LG&E/Columbia-Reynolds	Gregory Power Plant	Gregory	San Patricio	NG	450	Completed	Jul-00	CSW	ERCOT	Host: 50 MW
19	Lubbock Power & Light	J. Robert Massengale	Lubbock	Lubbock	NG	43	Completed	Sep-00	LPL	SPP	
20	FPL Energy/Panda Energy	Lamar Power Plant	Paris	Lamar	NG	1,000	Completed	Sep-00	TXU	ERCOT	
21	Tenaska/PECO Power Team	Tenaska Frontier Gen. Sta.	Shirow	Grimes	NG	830	Completed	Sep-00	Reliant/EGS	ERCOT SERC	
22	ANP	Midlothian I	Midlothian	Ellis	NG	820	Completed	Oct-00	TXU	ERCOT	
22	ANP	Midlothian I	Midlothian	Ellis	NG	280	Completed	Feb-01	TXU	ERCOT	
22	ANP	Midlothian II	Midlothian	Ellis	NG	550	Completed	Aug-02	TXU	ERCOT	
23	Union Carbide	Seadrift	Calhoun	NG	40	Completed	Nov-00	CPL	ERCOT	Host: 40 MW	
24	Texas Independent Energy	Guadalupe Power Plant	Marion	Guadalupe	NG	1,000	Completed	Jan-01	LCRA	ERCOT	
25	Cielo/EI Paso Electric	Hueco Mountain Wind Ranch	Hueco Mtn.	EI Paso	Wind	1	Completed	Apr-01	EPE	WSCC	
26	Enron/Austin	Sand Hill Energy Center	Del Valle	Travis	NG	180	Completed	Jun-01	AE	ERCOT	
26	Austin Energy	Sand Hill Energy Center	Del Valle	Travis	NG	300	Completed	Sep-04	AE	ERCOT	
27	Calpine/Gen Tex Power	Lost Pines I	Lost Pines	Bastrop	NG	520	Completed	Jun-01	LCRA/AE	ERCOT	
28	Garland Power & Light	Ray Olinger Power Plant	Garland	Collin	NG	75	Completed	Jun-01	GP&L	ERCOT	
29	Orion Energy/American National	Indian Mesa		Pecos	Wind	83	Completed	Jun-01	WTU	ERCOT	
30	Tenaska/Coral Energy	Tenaska Gateway Gen. Station	Henderson	Rusk	NG	845	Completed	Jul-01	TXU/AEP	ERCOT SPP	
31	FPL/Cielo/TXU	Woodward Mountain Ranch	McCamey	Pecos	Wind	160	Completed	Jul-01	WTU	ERCOT	
32	Calpine-Lyondell-Citgo	Channel Energy Center	Houston	Harris	NG	160	Completed	Jul-01	Reliant	ERCOT	Host: 160 MW
32	Calpine-Lyondell-Citgo	Channel Energy Center	Houston	Harris	NG	400	Completed	Apr-02	Reliant	ERCOT	
33	Fina BASF		Port Arthur	Jefferson	NG	80	Completed	Aug-01	EGS	SERC	Host: 80 MW

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Map No.	Company	Facility	City	County	Resource	Capacity (MW)	Status	In Service	Interconnection	Region	Notes
34	Texas Independent Energy	Odessa-Ector Power Plant	Odessa	Ector	NG	1,000	Completed	Aug-01	TXU	ERCOT	
35	AEP/Eastman Chemical		Longview	Harrison	NG	440	Completed	Aug-01	SWEPCO	SPP	Host: 130 MW
36	Exelon/Air Products & Chemicals	ExTex Power Station	La Porte	Harris	NG	165	Completed	Aug-01	Reliant	ERCOT	
37	Reliant Energy / Equistar	Reliant Energy Channelview	Channelview	Harris	NG	172	Completed	Aug-01	Reliant	ERCOT	
37	Reliant Energy / Equistar	Reliant Energy Channelview	Channelview	Harris	NG	608	Completed	Jun-02	Reliant	ERCOT	Host: 293 MW
38	Calpine	Magic Valley Gen. Station	Edinburg	Hidalgo	NG	350	Completed	Sep-01	CPL	ERCOT	
38	Calpine	Magic Valley Gen. Station	Edinburg	Hidalgo	NG	380	Completed	Dec-01	CPL	ERCOT	
39	Conoco Global/Dupont	SRW Cogeneration	Orange	Orange	NG	420	Completed	Nov-01	EGS	SERC	Host: 70 MW
40	AEP	Trent Mesa	Sweetwater	Nolan	Wind	150	Completed	Nov-01	TXU	ERCOT	
41	AEP	Desert Sky (Indian Mesa II)	Iraan	Pecos	Wind	160	Completed	Dec-01	WTU	ERCOT	
42	FPL/Cielo	King Mountain Wind Ranch	McCamey	Upton	Wind	278	Completed	Dec-01	WTU	ERCOT	
43	Shell Wind Energy	Llano Estacado Wind Ranch	White Deer	Carson	Wind	79	Completed	Jan-02	SPS	SPP	
44	Calpine-Bayer	Baytown Power Plant	Baytown	Chambers	NG	700	Completed	Apr-02	Reliant	ERCOT	Host: 300 MW
45	Tractebel	Ennis Tractebel Power Project	Ennis	Ellis	NG	343	Completed	Jun-02	TXU	ERCOT	
46	Constellation Power	Rio Nogales Power Plant	Seguin	Guadalupe	NG	800	Completed	Jun-02	LCRA	ERCOT	
47	Calpine	Freestone Energy Center	Fairfield	Freestone	NG	1,040	Completed	Jul-02	TXU	ERCOT	
48	FPL Energy/Coastal Power	Bastrop Energy Center		Bastrop	NG	535	Completed	Aug-02	AE/LCRA	ERCOT	
49	ANP	Hays Station	San Marcos	Hays	NG	550	Completed	Apr-02	LCRA	ERCOT	
49	ANP	Hays Station	San Marcos	Hays	NG	550	Completed	Aug-02	LCRA	ERCOT	
50	Calpine-Citgo	Corpus Christi Energy Center	Corpus Christi	Nueces	NG	520	Completed	Oct-02	AEP-CPL	ERCOT	Host: 60 MW
51	Reliant/Jenbacher	(landfill sites)		Harris	LFG	23	Completed	Dec-02	CenterPoint	ERCOT	
51	Reliant/Jenbacher	(landfill sites)		Montgomery	LFG	8	Completed	Feb-03	Entergy	SERC	
52	FPL/Cobisa	Forney	Forney	Kaufman	NG	1,789	Completed	Apr-03	Oncor	ERCOT	
53	Tenaska	Kiamichi Generating Station	Kiowa	(Oklahoma)	NG	1,220	Completed	Apr-03	Oncor	SPP ERCOT	
54	AES	Wolf Hollow Power Plant	Granbury	Hood	NG	730	Completed	May-03	Oncor	ERCOT	
55	Cargill	Brazos Valley Energy	Thompsons	Fort Bend	NG	633	Completed	Jun-03	CenterPoint	ERCOT	
56	Calpine	Deer Park Energy Center	Deer Park	Harris	NG	354	Completed	Jun-03	CenterPoint	ERCOT	
56	Calpine	Deer Park Energy Center	Deer Park	Harris	NG	657	Completed	Jun-04	CenterPoint	ERCOT	
57	InterGen	Cottonwood Energy Project	Deweyville	Newton	NG	1,200	Completed	Aug-03	Entergy	SERC	
58	Entergy/NTEC	Harrison County Gen Station	Marshall	Harrison	NG	550	Completed	Aug-03	SWEPCO	SPP	
59	STEC	Sam Rayburn expansion	Nursery	Victoria	NG	185	Completed	Oct-03	STEC	ERCOT	
60	Cielo/Orion/Green Mountain	Brazos Wind Ranch	Fluvana	Scurry	Wind	160	Completed	Dec-03	ONCOR	ERCOT	
61	Aeolus Wind			Hansford	Wind	3	Completed	2003	SPS	SPP	
62	DKR Development	Sweetwater Wind 1	Sweetwater	Nolan	Wind	38	Completed	Dec-03	LCRA	ERCOT	
62	DKRW Development	Sweetwater Wind 2	Sweetwater	Nolan	Wind	92	Completed	Feb-05	LCRA	ERCOT	
62	DKRW Energy	Sweetwater Wind 3 (Cottonwood)	Sweetwater	Nolan	Wind	135	Completed	Dec-05	LCRA	ERCOT	
62	DKRW/BabcockBrown	Sweetwater Wind 4 (Cottonwood)	Sweetwater	Nolan	Wind	300	Completed	May-07	LCRA	ERCOT	CPS Energy 241 MW
63	Bryan Texas Utilities	Dansby expansion		Brazos	NG	50	Completed	Feb-04	BTU	ERCOT	
64	BP/Cinergy	Texas City	Texas City	Galveston	NG	570	Completed	Apr-04	TNMP	ERCOT	Host
65	City Public Service San Antonio	Leon Creek expansion		Bexar	NG	185	Completed	Jun-04	CPS	ERCOT	
66	Tractebel	Wise County	Bridgeport	Wise	NG	720	Completed	Aug-04	TXU	ERCOT	
67	ExxonMobil	Baytown expansion	Baytown	Harris	NG	160	Completed	Feb-05	CenterPoint	ERCOT	Host: 160 MW
68	FPL Energy	Callahan Divide Wind Energy C	Abilene	Taylor	Wind	114	Completed	Feb-05	AEP-TNC	ERCOT	
69	Occidental Chemical	Battleground (expansion)	Deer Park	Harris	NG	80	Completed	May-05	CenterPoint	ERCOT	
70	ExxonMobil	Beaumont	Beaumont	Jefferson	NG	495	Completed	Jun-05	Entergy	SERC	Host: 140 MW

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71	Kinder Morgan Production	Sun Substation location		Scurry	NG	111	Completed	Jul-05	TXU	ERCOT	No power to grid
72	AES Seawest	Buffalo Gap 1	Abilene	Taylor	Wind	120	Completed	Sep-05	AEP/TNC	ERCOT	Direct Energy 120 MW
72	AES	Buffalo Gap 2 (Cirello 1)	Abilene	Taylor	Wind	233	Completed	Aug-07	AEP/TNC	ERCOT	Direct Energy 233 MW
73	FPL Energy	Horse Hollow Phase 1	Abilene	Taylor	Wind	213	Completed	Oct-05	AEP/TNC	ERCOT	
73	FPL Energy	Horse Hollow Phase 2	Abilene	Taylor	Wind	224	Completed	May-06	AEP/TNC	ERCOT	
73	FPL Energy	Horse Hollow Phase 3	Abilene	Taylor	Wind	299	Completed	Sep-06	AEP/TNC	ERCOT	
74	Brazos Electric Power Coop	Jack County Project		Jack	NG	620	Completed	Jan-06	BEPC	ERCOT	
75	Waste Management	Covel Gardens	San Antonio	Bexar	LFG	9	Completed	Jan-06	CPS	ERCOT	
76	Deere & Company	JD Wind 1, 2, 3, 5	Gruver	Hansford	Wind	40	Completed	Dec-06	SPS	SPP	
77	NRG Energy	W. A. Parish		Fort Bend	Coal	17	Completed	Apr-06	CenterPoint	ERCOT	Uprate unit 7
78	Golden Spread Elec. Co-op	Mustang Station 4	Denver City	Yoakum	NG	145	Completed	May-06	SPS	SPP	Peaking service
78	Golden Spread EC	Mustang Station 5	Denver City	Yoakum	NG	150	Completed	Jul-07	SPS	SPP	
79	FPL Energy	Red Canyon 1		Borden	Wind	84	Completed	May-06	BEPC	ERCOT	
80	NRG Energy	Limestone Elec. Gen. Station		Limestone	Coal	110	Completed	May-06	CenterPoint	ERCOT	Uprate Unit 2
81	Sid Richardson Carbon and En	Big Spring Carbon Plant	Big Spring	Howard	NG	20	Completed	Aug-06	TXU-ED	ERCOT	16 MW to grid
82	Austin Energy	Mueller Energy Center	Austin	Travis	NG	4	Completed	Oct-06	AE	ERCOT	onsite power plant
83	Airtricity	Forest Creek Wind Farm		Sterling	Wind	124	Completed	Dec-06	TXU-ED	ERCOT	TXU contract 124 MW
84	Airtricity	Sand Bluff Wind Farm		Sterling	Wind	90	Completed	Dec-06	TXU-ED	ERCOT	Direct Energy 90 MW
85	Horizon Wind Energy	Lone Star Wind - Mesquite		Shackleford	Wind	200	Completed	Dec-06	TXU-ED	ERCOT	Direct Energy 200 MW
86	Calpine-Dow Chemical	Freeport Energy Center (expans	Freeport	Brazoria	NG	236	Completed	Apr-07	CenterPoint	ERCOT	Host: 200 MW
87	Edison Mission Group	Wildorado Wind Ranch	Wildorado	Oldham	Wind	161	Completed	Apr-07	SPS	SPP	
88	TXU	Big Brown 1 (upgrade)		Freestone	Coal	20	Completed	May-07	Oncor	ERCOT	
89	Navasota Odessa Energy	Quail Run Energy Center	Odessa	Ector	NG	275	Completed	Jun-07	TXU-ED	ERCOT	
90	Navasota Wharton Energy	Colorado Bend Energy Center	Wharton	Wharton	NG	275	Completed	Jun-07		ERCOT	
91	Invenegy	Camp Springs Wind Energy Center		Scurry	Wind	130	Completed	Jul-07		ERCOT	previously Scurry County
92	FPL Energy	Capricorn Ridge Wind		Sterling	Wind	262	Completed	Sep-07		ERCOT	
93	NRG Energy	South Texas Project upgrades		Matagorda	Nuc	200	Completed	Sep-07		ERCOT	10-year total upgrades

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94	Gamesa Energy	Barton Chapel Wind 1		Jack	Wind	120	Construction	Oct-07	TXU-ED	ERCOT	
95	Horizon Wind Energy	Lone Star Wind - Post Oak		Shackelford	Wind	200	Construction	Dec-07	TXU-ED	ERCOT	
96	DKRW/BabcockBrown	Sweetwater Wind 5	Sweetwater	Nolan	Wind	80	Construction	Dec-07	LCRA	ERCOT	
97	Enel North America/WKN USA	Snyder Wind Project	Snyder	Scurry	Wind	63	Construction	Dec-07	BCEC	ERCOT	
98	Renewable Energy Systems	Whirlwind	Floydada	Floyd	Wind	60	Construction	Dec-07		ERCOT	Austin Energy 60 MW
99	BP/Clipper Windpower	Silver Star Phase I		Erath	Wind	60	Construction	Dec-07	Oncor	ERCOT	
100	Invenergy	Stanton Wind Energy		Martin	Wind	120	Construction	Dec-07	Oncor	ERCOT	
101	Airtricity	Champion Wind Farm		Scurry	Wind	126	Construction	Dec-07		ERCOT	
102	Airtricity	Roscoe Wind Farm 1		Scurry	Wind	209	Construction	Mar-08	Oncor	ERCOT	TXU 209 MW
103	BP	Texas City Refinery	Texas City	Galveston	NG	250	Construction	Apr-08		ERCOT	excess only to market
104	AES	Buffalo Gap 3		Taylor	Wind	170	Construction	Apr-08		ERCOT	Direct Energy 170 MW
105	NuCoastal Energy	Victoria (refurbish)	Victoria	Victoria	NG	300	Construction	Apr-08		ERCOT	
106	Navasota Odessa Energy	Quail Run Energy Center	Odessa	Ector	NG	275	Construction	May-08	Oncor	ERCOT	
107	Navasota Wharton Energy	Colorado Bend Energy Center	Wharton	Wharton	NG	275	Construction	May-08		ERCOT	
108	Invenergy	Camp Springs Energy expansion		Scurry	Wind	120	Construction	Jun-08		ERCOT	
109	Edison Mission Group	Goat Mountain Wind Ranch		Coke	Wind	150	Construction	Dec-08		ERCOT	
110	LS Power	Bosque expansion	Laguna Park	Bosque	NG	255	Construction	Mar-09		ERCOT	
111	NRG Energy	Cedar Bayou 4	Houston	Harris	NG	550	Construction	Aug-09	CenterPoint	ERCOT	
112	Formosa Plastics	Point Comfort	Point Comfort	Calhoun	PC	300	Construction	2009		ERCOT	
113	CPS San Antonio	J K Spruce 2	San Antonio	Bexar	Coal	750	Construction	Jun-10	CPS	ERCOT	

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114	Duke Energy	Ocotillo Windpower 1		Howard	Wind	59	Announced	Dec-07	Oncor	ERCOT	
115	WindRosePower	Childress Wind Project		Childress	Wind	101	Announced	May-08		ERCOT	
116	Airtricity	Panther Creek		Howard	Wind	111	Announced	Jun-08	Oncor	ERCOT	
117	Airtricity	Wild Horse Wind Farm 2		Cottle	Wind	39	Announced	Aug-08	AEP/TNC	ERCOT	
117	Airtricity	Wild Horse Wind Farm 1		Cottle	Wind	60	Announced	Nov-08	AEP/TNC	ERCOT	
118		M Bar Wind		Andrews	Wind	194	Announced	Sep-08		ERCOT	
119	Airtricity	Inadale		Nolan	Wind	212	Announced	Nov-08		ERCOT	
120	Airtricity	Lamesa		Dawson	Wind	147	Announced	Oct-08		ERCOT	
121	Airtricity	Pyron		Scurry	Wind	303	Announced	Nov-08		ERCOT	
122		Bull Creek Wind Plant		Borden	Wind	180	Announced	Oct-08		ERCOT	
123		Gray Wind Project		Borden	Wind	141	Announced	Dec-08		ERCOT	
124	Superior Renewable Energy	Gulf Wind 1		Kenedy	Wind	187	Announced	Dec-08	AEP/TCC	ERCOT	
124	Superior Renewable Energy	Gulf Wind 2		Kenedy	Wind	400	Announced	Sep-09	AEP/TCC	ERCOT	
124	Superior Renewable Energy	Gulf Wind 3		Kenedy	Wind	400	Announced	Sep-10	AEP/TCC	ERCOT	
125		Turkey Track Energy Center		Nolan	Wind	300	Announced	Dec-08		ERCOT	
126		Wild Horse Mountain		Howard	Wind	120	Announced	Dec-08		ERCOT	
127		Gunsight Energy Center		Howard	Wind	200	Announced	Dec-08		ERCOT	
128	Renewable Energy Systems	Hackberry Wind Farm		Shackleford	Wind	165	Announced	Dec-08		ERCOT	
129	PPM Energy	Penascal Wind Farm		Kenedy	Wind	202	Announced	Dec-08		ERCOT	
130		Pistol Hill Wind Energy		Ector	Wind	300	Announced	Dec-08		ERCOT	
131		South Trent Wind Farm		Taylor	Wind	101	Announced	Dec-08		ERCOT	
132	Duke Energy	Notrees Windpower		Ector	Wind	150	Announced	Dec-08		ERCOT	
133	NRG Energy	W A Parish 7 uprate		Fort Bend	Coal	40	Announced	2008	CenterPoint	ERCOT	
133	NRG Energy	W A Parish 6 uprate		Fort Bend	Coal	60	Announced	2010	CenterPoint	ERCOT	
134		Buffalo Gap 4		Nolan	Wind	378	Announced	Mar-09		ERCOT	
135	Cobisa	Greenville	Greenville	Hunt	NG	1,750	Announced	May-09		ERCOT	
136	WindTex Energy	Lenorah Wind Farm		Martin	Wind	350	Announced	May-09		ERCOT	
137	CPS Energy	V H Braunig 6		Bexar	NG	185	Announced	May-09		ERCOT	
138	WindTex Energy	Stephens Wind Farm		Borden	Wind	141	Announced	May-09		ERCOT	
139		Sterling Energy Center		Sterling	Wind	300	Announced	Jun-09		ERCOT	
140	Invenergy	McAdoo Wind Energy		Dickens	Wind	120	Announced	Jun-09		ERCOT	
141	TXU-Alcoa	Sadow 5	Rockdale	Milam	Coal	581	Announced	Jul-09		ERCOT	No power to grid. Units 1-3 to be retired
142		B&B Panhandle Wind		Carson	Wind	1,001	Announced	Sep-09		ERCOT	
143	Austin Energy	Sand Hill expansion	Del Valle	Travis	NG	100	Announced	Sep-09	Austin	ERCOT	adding two GTs
144	Luminant	Comanche Peak 1,2 upgrade		Somervell	Nuc	86	Announced	Oct-09	Oncor	ERCOT	
144	TXU	Comanche Peak 3, 4		Somervill	Nuc	3,200	Announced	Jan-15	TXU	ERCOT	
145	TXU	Oak Grove 1	Bremont	Robertson	Coal	855	Announced	Nov-09	TXU	ERCOT	
145	TXU	Oak Grove 2	Bremont	Robertson	Coal	855	Announced	May-10	TXU	ERCOT	
146		Gatesville Wind Farm		Coryell	Wind	200	Announced	Dec-09		ERCOT	
147		Pampa Energy Center		Gray	Coal	165	Announced	Dec-09		ERCOT	
148	Calpine	Deer Creek Energy Center	Deer Park	Harris	NG	400	Announced	2009	CenterPoint	ERCOT	adding two CTs
149	Topaz Power Group	Nueces Bay Power Plant	Corpus Christi	Nueces	NG	350	Announced	2009		ERCOT	air permit request 4/07
150	Topaz Power Group	Barney M. Davis Power Plant	Corpus Christi	Nueces	NG	350	Announced	2009		ERCOT	air permit request 4/07
151		Camp Springs Energy III		Scurry	Wind	350	Announced	Mar-10		ERCOT	
152		Throckmorton Wind Farm		Throckmorton	Wind	400	Announced	Dec-10		ERCOT	

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153	Navasota Odessa Energy	Quail Run Energy Center	Odessa	Ector	NG	275	Announced	2010	TXU-ED	ERCOT	
154	Navasota Wharton Energy	Colorado Bend Energy Center	Wharton	Wharton	NG	275	Announced	2010		ERCOT	
155	El Paso Electric	Newman 5	El Paso	El Paso	NG	288	Announced	2010	EPE	WECC	
156	Exelon Power	Mountain Creek	Dallas	Dallas	NG	700	Announced	May-11		ERCOT	
157	PNM Resources	Twin Oaks 3		Robertson	Coal	630	Announced	Jun-11		ERCOT	
158	Wind Energy Systems Technol	Galveston Offshore Wind		Galveston	Wind	300	Announced	2011		ERCOT	
159		Fort Concho Wind Farm		Tom Green	Wind	400	Announced	Jul-12		ERCOT	
160	LS Power	Sandy Creek Energy Station	Riesel	McLennan	Coal	900	Announced	2012		ERCOT	
161	NuCoastal Energy	Point Comfort	Point Comfort	Calhoun	PC	303	Announced	2012		ERCOT	former E.S. Joslin site
162	NRG Energy	Limestone 3		Limestone	Coal	800	Announced	2012	CenterPoint	ERCOT	
163	NRG Energy	South Texas Project 3, 4		Matagorda	Nuc	2,716	Announced	Jan-15	CenterPoint	ERCOT	Unit 3 planned for 2014
164	EMI/BayCorp	Nacogdoches Power	Sacul	Nacogdoches	WDS	100	Announced			ERCOT	air permit issued 3/07
165	Hunton Energy	Lockwood IGCC Plant		Fort Bend	PC	1,200	Announced			ERCOT	site and other changes?
166	Texas Petrochemicals	Sims Bayou Cogeneration	Houston	Harris	NG	580	Announced			ERCOT	air permit revised 8/07

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Map No.	Company	Facility	City	County	Resource	Capacity (MW)	Status	In Service	Interconnection	Region	Notes
167	AEP-TNC	Fort Phantom 1,2		Jones	NG	362	Mothballed	1974-77		ERCOT	
168	AEP-TNC	San Angelo 1,2		Tom Green	NG	123	Mothballed	1965-66		ERCOT	
169	Bryan Texas Utilities	Atkins 3,4,5,6		Brazos	NG	109	Mothballed	1955-69		ERCOT	
170	CPS San Antonio	W.B. Tuttle 2		Bexar	NG	90	Mothballed	1956		ERCOT	
171	Extex Laporte	Handley 1,2		Tarrant	NG	122	Mothballed	1948-50		ERCOT	
172	Extex Laporte	Mountain Creek 3		Dallas	NG	70	Mothballed	1949		ERCOT	
173	J.L. Bates, LP (Sempra)	J.L. Bates 1,2		Hidalgo	NG	181	Mothballed	1958-60		ERCOT	
174	Nueces Bay WLE LP (Sempra)	Nueces Bay 5, 6, 7		Nueces	NG	560	Mothballed	1949-72		ERCOT	
175	Texas Genco II	Cedar Bayou 3		Chambers	NG	743	Mothballed	1974		ERCOT	to retire when CB4 built
176	Texas Genco II	P.H. Robinson 1,2,3,4		Galveston	NG	2,187	Mothballed	1966-73		ERCOT	
177	TXU Generation Company	Collin 1		Collin	NG	154	Mothballed	1955		ERCOT	
178	TXU Generation Company	Eagle Mountain 1,2,3		Tarrant	NG	671	Mothballed	1954-71		ERCOT	
179	TXU Generation Company	Morgan Creek 6		Mitchell	NG	457	Mothballed	1966		ERCOT	
180	AEP-TNC	Abilene 4		Taylor	NG	18	Retired	1949		ERCOT	
181	AEP-TNC	Fort Stockton 2		Pecos	NG	5	Retired	1958		ERCOT	
182	AEP-TNC	Lake Pauline 1,2		Hardeman	NG	35	Retired	1928-51		ERCOT	
183	AEP-TNC	Oak Creek 1		Coke	NG	85	Retired	1962		ERCOT	
184	AEP-TNC	Paint Creek 1,2,3,4		Haskell	NG	217	Retired	1953-71		ERCOT	
185	AEP-TNC	Presidio 5,6		Presidio	DFO	2	Retired	1967		ERCOT	
186	AEP-TNC	Rio Pecos 4,5,6		Crockett	NG	140	Retired	1959		ERCOT	
187	AEP-TNC	Vernon 1,2,3,4,7		Wilbarger	DFO	9	Retired	1952-68		ERCOT	
188	Austin Energy	Holly 1,2,3,4		Travis	NG	575	Retired	1960-74		ERCOT	
189	AEP-TCC	E.S. Joslin 1		Calhoun	NG	254	Retired	1971		ERCOT	
190	City of Coleman	9 IC Units		Coleman	NG	17	Retired	1955-86		ERCOT	
191	City of Garland	C.E. Newman 1,2,3,4		Dallas	NG	51	Retired	1957-61		ERCOT	
192	City of Garland	Spencer 1,2,3		Denton	NG	53	Retired	1955-62		ERCOT	
193	City of Robstown	IC Units 3-11		Nueces	NG	18	Retired	1955-79		ERCOT	
194	CSW Services	Ft. Davis Wind Farm	Ft. Davis	Jeff Davis	Wind	7	Retired	1996		ERCOT	
195	Texas Genco II	Deepwater 7		Harris	NG	159	Retired	1955		ERCOT	
196	Texas Genco II	H.O. Clarke (6 units)		Harris	NG	78	Retired	1968		ERCOT	
197	Texas Genco II	T.H. Wharton 2		Harris	NG	229	Retired	1960		ERCOT	
198	Texas Genco II	Webster 3,21		Harris	NG	387	Retired	1965-67		ERCOT	
199	La Palma WLE (Sempra)	La Palma 4,5,6,7		Cameron	NG	243	Retired	1947-75		ERCOT	
200	Lon C. Hill LP (Sempra)	Lon C. Hill 1,2,3,4		Nueces	NG	559	Retired	1954-69		ERCOT	
201	TXU Generation Company	Morgan Creek 2,3,4		Mitchell	NG	133	Retired	1950-54		ERCOT	
202	TXU Generation Company	North Main 4		Tarrant	NG	85	Retired	1952		ERCOT	
203	TXU Generation Company	Parkdale 1,2,3		Dallas	NG	334	Retired	1953-57		ERCOT	
204	TXU Generation Company	River Crest 1		Red River	NG	111	Retired	1954		ERCOT	
205	Wharton County Power Partners	New Gulf 2		Wharton	NG	15	Retired	1988		ERCOT	

PUCT New Electric Generating Plants in Texas Since 1995
(Updated 11/16/2007)

Map No.	Company	Facility	City	County	Resource	Capacity (MW)	Status	In Service	Interconnection	Region	Notes
	Golden Spread Electric Co-op	Holcomb East	Holcomb	(Kansas)	Coal	400	Delayed			SPP	KS air permit denied
	CCNG, Inc.		San Diego	Duval	CAES	270	Delayed			ERCOT	
	Cielo	Capital Hill Wind Ranch		Pecos	Wind	60	Delayed			ERCOT	
	Cielo/Austin Energy				Wind	40	Delayed			ERCOT	
	Cielo/Lubbock Power & Light	Llano Estacado at Lubbock	Lubbock	Lubbock	Wind	2	Delayed			SPP	
	DFW Airport			Tarrant	NG	110	Delayed			ERCOT	
	Sabine Power I/Port of Port Arthur		Port Arthur	Jefferson	PC	1,000	Delayed			SERC	
	Thermagen	Bayport Energy Center	Pasadena	Harris	NG	80	Delayed			ERCOT	
	ANP		Edinburg	Hidalgo	NG	550	Cancelled			ERCOT	air permit expired
	ANP		El Paso	El Paso	NG	450	Cancelled			WECC	air permit expired
	ANP		Houston	Harris	NG	2,150	Cancelled			ERCOT	air permit voided
	BayCorp Holdings	Nacogdoches Power	Cushing	Nacogdoches	NG	1,000	Cancelled			ERCOT SPP	
	BP/Cinergy		Alvin	Brazoria	NG	70	Cancelled			ERCOT	
	Brazos Electric Power Cooperat	Hugo 2		(Oklahoma)	Coal	375	Cancelled		BEPC	ERCOT	withdrew from project
	Calpine	Amelia Energy Center	Beaumont	Jefferson	NG	800	Cancelled			SERC	air permit expired
	Calpine	Channel Energy Center expans	Houston	Harris	NG	180	Cancelled			ERCOT	
	Celanese		Pasadena	Harris	NG	284	Cancelled			ERCOT	
	Constellation Power	Gateway Power Project	Gilmer	Upshur	NG	800	Cancelled			ERCOT	
	Duke Energy			Bell	NG	500	Cancelled			ERCOT	
	Dynegy	Lyondell expansion		Harris	NG	155	Cancelled			ERCOT	
	Hartburg Power		Deweyville	Newton	NG	800	Cancelled			SERC	air permit expired
	KM Power			Harris	NG	1,070	Cancelled			ERCOT	
	KM Power		Booneville	Wise	NG	510	Cancelled			ERCOT	
	Sempra Energy Resources	MC Energy Partners	Dobbin	Montgomery	NG	600	Cancelled			ERCOT SERC	air permit voided
	Mirant		Weatherford	Parker	NG	650	Cancelled			ERCOT	air permit expired
	Newport Generation	Palestine Power Project	Palestine	Anderson	NG	1,600	Cancelled			ERCOT SPP	
	Orion Energy	Delaware Mountain Wind Farm		Culberson	Wind	175	Cancelled			ERCOT	
	Ridge Energy Storage	Markham Compressed Air Ener	Bay City	Matagorda	CAES	540	Cancelled			ERCOT	air permit voided
	Sempra Energy Resources	Cedar Power Project	Dayton	Liberty	NG	600	Cancelled			ERCOT SERC	air permit expired
	Steag Power		Ennis	Ellis	NG	1,200	Cancelled			ERCOT	
	Texas Independent Energy	Archer Power Partners	Holliday	Archer	NG	500	Cancelled			ERCOT	
	Tondu Corporation	Nueces IGCC Plant	Corpus Christi	Nueces	PC	600	Cancelled			ERCOT	
	Tractebel	Ennis – Tractebel II	Ennis	Ellis	NG	800	Cancelled			ERCOT	air permit voided
	TXU	Big Brown 3		Freestone	Coal	858	Cancelled		TXU	ERCOT	
	TXU	Lake Creek 3		McLennan	Coal	858	Cancelled		TXU	ERCOT	
	TXU	Martin Lake 4		Rusk	Coal	858	Cancelled		TXU	ERCOT	
	TXU	Monticello 4		Titus	Coal	858	Cancelled		TXU	ERCOT	
	TXU	Morgan Creek 7		Mitchell	Coal	858	Cancelled		TXU	ERCOT	
	TXU	Tradinghouse 3		McLennan	Coal	858	Cancelled		TXU	ERCOT	
	TXU	Tradinghouse 4		McLennan	Coal	858	Cancelled		TXU	ERCOT	
	TXU	Valley 4		Fanin	Coal	858	Cancelled		TXU	ERCOT	

PUCT New Electric Generating Plants in Texas Since 1995
 (Updated 11/16/2007)

Map No.	Company	Facility	City	County	Resource	Capacity (MW)	Status	In Service	Interconnection	Region	Notes
	Notes to table:										
	Resource: Compressed air energy storage (CAES); distillate fuel oil (DFO); landfill gas (LFG); natural gas (NG); nuclear (Nuc); petroleum coke (PC); wood/wood waste (WDS)										
	In Service: Dates shown for units with Status of "Construction" or "Announced" are estimated future dates.										

Solid Fuel Power Plant Projects

Updated 07/03/2008

Pending Applications

Applicant	Permit Number (State / Federal)	Location (Nearest City, County)	Size of Project (MW-Net)	Fuel	Permit Engineer	Date Appl. Recd.	Status	Combustor Emissions in TPY [lb/mmBtu]
Twin Oaks Power III now Altura Power LP (Sempra sold project to PNM Resources and project is now with Altura Power LP) (1 boiler)	76381/ PSD-TX-1054	Bremond, Robertson County	600 MW	Lignite & PRB Coal	Jim Linville	07/13/05	Hearing requests received on first notice. Revised draft permit sent to applicant 5/06. Meeting 8/06 to discuss modeling and draft permit. Altura plans in 1/08 to update the app. with modeling; a BACT analysis to account for permits issued since their submittal in July 2005; and respond to the 5/06 draft permit. Sent applicant 45 day letter on April 11, 2008. Granted extension to respond on May 13, 2008 until August 11, 2008.	NO _x 2,036 [0.07] CO 4,364 SO ₂ 5,818 VOC 87 PM/PM ₁₀ 1,018 Hg 0.43
NRG Limestone Electric Generating Station Unit 3 (boiler)	79188/ PSD-TX-1072	Jewett, Limestone County	800 MW	Subbituminous & bituminous coal & petroleum coke	Jim Linville	6/12/06	Hearing and meeting request received from Rep. Dunnam on 8/16/2006. Modeling received 11/28/2006, 3/16/07, 6/6/2007 and 8/8/07. Revised BACT received 6/20/07. 2nd PN published 11/07 and 11/08/2007. Public Meeting held 12/10/2007 and permit was direct referred to SOAH. SOAH prehearing conference 1/24/2008. Hearing scheduled for 7/28-8/01/08. Hearing temporarily abated for a 112(g) application and review. Application received May 12, 2008. Combined 1st and 2nd notice is being drafted.	NO _x 1,752 [0.07/0.05] CO 5,256 SO ₂ 2,102 VOC 126 PM/PM ₁₀ 1,226 Hg 0.07

Texas Commission on Environmental Quality – Recent Permit Applications for Power Plants

Applicant	Permit Number (State / Federal)	Location (Nearest City, County)	Size of Project (MW-Net)	Fuel	Permit Engineer	Date Appl. Recd.	Status	Combustor Emissions in TPY [lb/mmBtu]
Coletto Creek LLC Unit 2 (boiler)	83778/ PSD- TX- 1118	Fannin, Goliad County	650 MW	Subbituminous and bituminous	Sean O'Brien	1/4/08	Completed first public notice. Hearing requests and public meeting request received. Undergoing technical review.	NO _x 1,461 [0.06/0.05] CO 3506 SO ₂ 1753 VOC 99 PM/PM ₁₀ 935 Hg 0.07
Tenaska Trailblazer Partners LLC	84167/ PSD- TX- 1123	Sweetwater, Nolan County	900 gross 600 net	Subbituminous	Richard Hughes	2/19/08	Completed first public notice. Hearing received. Undergoing technical review.	NO _x 1,819 [0.05] CO 5,458 SO ₂ 2,183 VOC 131 PM/PM ₁₀ 1,092 Hg 0.20
Las Brisas Energy Center, LLC (4 CFBs)	85013/ PSD- TX- 1138	Corpus Christi, Nueces County	1200 MW	Petroleum Coke	Combustion Team - individual assignment pending	5/19/08	Administratively complete 5/23/08. First public notice authorized. Undergoing technical review.	NO _x 3,776 [0.07] CO 8,096 SO ₂ 10,480 VOC 270 PM/PM ₁₀ 2,808 Hg 0.16

Texas Commission on Environmental Quality – Recent Permit Applications for Power Plants

Completed Permits

Applicant	Permit Number (State / Federal)	Location (Nearest City, County)	Size of Project (MW-Net)	Fuel	Permit Engineer	Date Appl. Recd.	Status	Boiler/Combustor Emissions in TPY [lb/mmBtu]
City Public Service (1 boiler - Unit No. 2)	70492/ PSD-TX-1037	San Antonio, Bexar County	750 MW	Powder River Basin (PRB) Coal	Erik Hendrickson	11/24/03	Permit Issued 12/28/05.	NO _x 1,752 [0.05] CO 5,256 SO ₂ 2,102 VOC 88 PM/PM ₁₀ 771 Hg 0.07
Sandy Creek Energy Associates (1 boiler)	70861/ PSD-TX-1039	Riesel, McClennan County	800 MW	PRB Coal	Randy Hamilton	01/09/04	Permit Issued 7/18/2006. Lawsuit against issuance filed in Travis County District Court August 2006; merits argued March 2007 and decided in favor of TCEQ March 30, 2007.	NO _x 1,804 [0.05] CO 5,380 SO ₂ 3,585 VOC 135 PM/PM ₁₀ 1,490 Hg 0.075
Formosa Plastics Corporation, Texas (2 fluidized bed combustors)	76044/ PSD-TX-1053	Point Comfort, Calhoun County	300 MW	Petroleum Coke / PRB Coal	Johnny Vermillion	05/31/05	Permit issued 12/19/06	NO _x 920 [0.07] CO 1,446 SO ₂ 2,608 VOC 68 PM/PM ₁₀ 544 Hg 0.04

Texas Commission on Environmental Quality – Recent Permit Applications for Power Plants

Applicant	Permit Number (State / Federal)	Location (Nearest City, County)	Size of Project (MW-Net)	Fuel	Permit Engineer	Date Appl. Recd.	Status	Boiler/Combustor Emissions in TPY [lb/mmBtu]
Nacogdoches Power LLC (100 MW Bubbling Fluidized Bed Boiler plus 330 MW Combined Cycle Gas Turbine)	77679/ PSD-TX-1061	Sacul, Nacogdoches County	430 MW	100 MW Wood Refuse Biomass-plus Natural Gas Combined Cycle Turbine;	Jim Linville	12/22/05	Permit issued 3/1/07.	NO _x 759 [0.018 - Turbine] [0.10 - BFB] CO 1247 SO ₂ 171.6 PM/PM ₁₀ 280.8 VOC 96.6 No mercury emissions
TXU Oak Grove (2 boilers)	76474/PS D-TX-1056	Franklin, Robertson County	1600 MW	Lignite	Randy Hamilton	07/27/05	Commission approved permit on June 13, 2007.	NO _x 6,286 [0.08] CO 26,716 SO ₂ 15,086 VOC 352 PM/PM ₁₀ 3,144 Hg 0.72
Calhoun County Navigation District (1 fluidized bed boiler)	45586/ PSD-TX-1055	Point Comfort, Calhoun County	300 MW	Petroleum Coke	Johnny Vermillion	07/11/05	Parties settled contested case hearing. Permit issued August 20, 2007.	NO _x 813 [0.07] CO 1,741 SO ₂ 2,071 VOC 58 PM/PM ₁₀ 597 Hg 0.035

Texas Commission on Environmental Quality – Recent Permit Applications for Power Plants

Withdrawn/Voided Applications

Applicant	Permit Number (State / Federal)	Location (Nearest City, County)	Size of Project (MW-Net)	Fuel	Permit Engineer	Date Appl. Recd.	Status	Combustor Emissions in TPY [lb/mmBtu]
Nueces Syngas 2 IGCC turbines	80024/ PSD- TX- 1078	Corpus Christi, Nueces County	600	Coal and/or Petroleum coke	Randy Hamilton	9/29/06	Application withdrawn 3/19/2008.	NO _x 424 [0.018] CO 876 SO ₂ 392 PM/PM ₁₀ 294.4 VOC 76.6 Hg 0.04
TXU Morgan Creek Unit 7 (boiler)	78761 PSD- TX- 1066	Colorado City, Mitchell County	860 MW	PRB Coal	Erik Hendrickson	4/20/06	Application withdrawn 3/17/2008.	NO _x 1,894 [0.05] CO 7,575 SO ₂ 3,787 VOC 136 PM/PM ₁₀ 1,515 Hg 0.08
TXU Monticello Unit 4 (boiler)	78744/ PSD- TX- 1069	Mount Pleasant, Titus County	860 MW	PRB Coal	Erik Hendrickson	4/20/06	Applicant asked SOAH to remand applications back to TCEQ, because they do not want to pursue the project. SOAH remanded back to TCEQ on June 12, 2008.	NO _x 1,894 [0.05] CO 7,575 SO ₂ 3,787 VOC 136 PM/PM ₁₀ 1,515 Hg 0.08
TXU Martin Lake Unit 4 (boiler)	78750/ PSD- TX- 1071	Tatum, Rusk County	860 MW	PRB Coal	Erik Hendrickson	4/20/06	Applicant asked SOAH to remand applications back to TCEQ, because they do not want to pursue the project. SOAH remanded back to TCEQ on June 12, 2008.	NO _x 1,894 [0.05] CO 7,575 SO ₂ 3,787 VOC 136 PM/PM ₁₀ 1,515 Hg 0.08

Texas Commission on Environmental Quality – Recent Permit Applications for Power Plants

Applicant	Permit Number (State / Federal)	Location (Nearest City, County)	Size of Project (MW-Net)	Fuel	Permit Engineer	Date Appl. Recd.	Status	Combustor Emissions in TPY [lb/mmBtu]
TXU Lake Creek Unit 3 (boiler)	78751/ PSD- TX- 1070	Riesel, McLennan County	860 MW	PRB Coal	Erik Hendrickson	4/20/06	Applicant asked SOAH to remand applications back to TCEQ, because they do not want to pursue the project. SOAH remanded back to TCEQ on June 12, 2008.	NOx 1,894 [0.05] CO 7,575 SO2 3,787 VOC 136 PM/PM10 1,515 Hg 0.08
TXU Big Brown Unit 3 (boiler)	78759/ PSD- TX- 1065	Fairfield, Freestone County	860 MW	PRB Coal	Erik Hendrickson	4/20/06	Applicant asked SOAH to remand applications back to TCEQ, because they do not want to pursue the project. SOAH remanded back to TCEQ on June 12, 2008.	NOx 1,894 [0.05] CO 7,575 SO2 3,787 VOC 136 PM/PM10 1,515 Hg 0.08
TXU Trading-house Units 3 & 4 (2 boilers)	78762/ PSD- TX- 1067	Waco, McLeannan County	1720 MW	PRB Coal	Erik Hendrickson	4/20/06	Applicant asked SOAH to remand applications back to TCEQ, because they do not want to pursue the project. SOAH remanded back to TCEQ on June 12, 2008.	NOx 3,788 [0.05] CO 15,150 SO2 7,574 VOC 272 PM/PM10 3,030 Hg 0.16
TXU Valley Unit 4 (boiler)	78763/ PSD- TX- 1068	Savoy, Fannin County	860 MW	PRB Coal	Erik Hendrickson	4/20/06	Applicant asked SOAH to remand applications back to TCEQ, because they do not want to pursue the project. SOAH remanded back to TCEQ on June 12, 2008.	NOx 1,894 [0.05] CO 7,575 SO2 3,787 VOC 136 PM/PM10 1,515 Hg 0.08

Appendix D: Water and Electricity Projection Results

D.1 Water consumption projections for Texas Total electricity generation (acre-feet/yr):

Pages D-2 thru D-17.

		All Scenarios				
		2006	2007	2008	2009	2010
A	Armstrong	0	0	0	0	0
A	Carson	0	0	0	0	0
A	Childress	0	0	0	0	0
A	Collingsworth	0	0	0	0	0
A	Dallam	0	0	0	0	0
A	Donley	0	0	0	0	0
A	Gray	739	739	649	2,697	2,507
A	Hall	0	0	0	0	0
A	Hansford	0	0	0	0	0
A	Hartley	0	0	0	0	0
A	Hemphill	0	0	0	0	0
A	Hutchinson	355	355	151	152	136
A	Lipscomb	0	0	0	0	0
A	Moore	360	360	358	358	358
A	Ochiltree	0	0	0	0	0
A	Oldham	0	0	0	0	0
A	Potter	18,018	18,018	15,973	15,464	14,784
A	Randall	0	0	0	0	0
A	Roberts	0	0	0	0	0
A	Sherman	0	0	0	0	0
A	Wheeler	0	0	0	0	0
A Total		19,471	19,471	17,131	18,672	17,786
B	Archer	0	0	0	0	0
B	Baylor	0	0	0	0	0
B	Clay	0	0	0	0	0
B	Cottle	0	0	0	0	0
B	Foard	0	0	0	0	0
B	Hardeman	0	0	0	0	0
B	King	0	0	0	0	0
B	Montague	0	0	0	0	0
B	Wichita	54	54	208	182	188
B	Wilbarger	4,380	4,380	5,526	5,338	5,087
B Total		4,434	4,434	5,734	5,520	5,274
C	Collin	531	531	771	771	771
C	Cooke	0	0	0	0	0
C	Dallas	1,598	1,598	3,372	3,372	3,372
C	Denton	395	395	349	349	348
C	Ellis	975	975	1,086	951	981
C	Fannin	325	325	1,261	1,261	1,261
C	Freestone	10,168	10,281	10,177	9,589	9,323
C	Grayson	0	0	0	0	0
C	Jack	2,162	2,162	1,662	1,456	1,502
C	Kaufman	5,814	5,814	4,632	4,059	4,186
C	Navarro	0	0	0	0	0
C	Parker	3	3	24	24	24
C	Rockwall	0	0	0	0	0
C	Tarrant	1,053	1,053	2,640	2,640	2,640
C	Wise	2,205	2,205	1,937	1,697	1,751
C/I	Henderson	117	117	460	460	460
C Total		25,346	25,459	28,371	26,629	26,617
D	Bowie	0	0	0	0	0
D	Camp	0	0	0	0	0
D	Cass	325	325	362	367	315
D	Delta	0	0	0	0	0
D	Franklin	0	0	0	0	0
D	Gregg	770	770	665	665	665
D	Harrison	14,502	14,502	16,301	15,507	14,957
D	Hopkins	0	0	0	0	0
D	Hunt	37	37	84	4,066	4,190
D	Lamar	3,536	3,536	4,131	3,620	3,733
D	Marion	1,401	1,401	747	747	747
D	Morris	23	23	40	40	40
D	Rains	0	0	0	0	0
D	Red River	0	0	0	0	0
D	Titus	27,041	27,041	28,914	27,930	26,617
D	Upshur	0	0	0	0	0
D	Van Zandt	0	0	1	1	1
D	Wood	0	0	0	0	0
D/I	Smith	0	0	0	0	0
D Total		47,634	47,634	51,244	52,942	51,264
E	Brewster	0	0	0	0	0
E	Culberson	0	0	0	0	0
E	El Paso	829	829	262	262	938

Scenario 1L						
2010	2015	2020	2030	2040	2050	2060
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
2,507	1,711	1,722	1,367	1,163	960	757
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
136	61	60	65	66	71	81
0	0	0	0	0	0	0
358	375	319	365	373	420	503
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
14,784	12,360	12,059	41,782	40,364	39,054	37,849
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
17,786	14,508	14,161	43,579	41,967	40,505	39,190
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
188	124	121	138	141	159	190
5,087	4,174	4,121	3,191	2,659	2,127	1,595
5,274	4,298	4,242	3,329	2,800	2,286	1,786
771	808	686	786	803	903	1,083
0	0	0	0	0	0	0
3,372	4,615	4,023	4,607	4,709	5,292	6,347
348	361	307	351	359	403	483
981	646	630	722	738	829	995
1,261	1,321	1,122	1,285	1,314	1,476	1,771
9,323	7,256	7,146	6,112	5,431	4,937	4,626
0	0	0	0	0	0	0
1,502	989	965	1,105	1,130	1,270	1,523
4,186	2,757	2,690	3,080	3,149	3,539	4,244
0	0	0	0	0	0	0
24	25	22	25	26	29	34
0	0	0	0	0	0	0
2,640	2,765	2,354	2,695	2,755	3,096	3,713
1,751	1,153	1,126	1,290	1,318	1,482	1,777
460	482	410	469	480	539	646
26,617	23,179	21,483	22,527	22,212	23,794	27,243
0	0	0	0	0	0	0
0	0	0	0	0	0	0
315	65	82	82	82	82	82
0	0	0	0	0	0	0
0	0	0	0	0	0	0
665	696	592	678	693	778	934
14,957	11,844	11,681	9,638	8,384	7,316	6,428
0	0	0	0	0	0	0
4,190	2,793	2,712	3,105	3,175	3,568	4,279
3,733	2,459	2,399	2,747	2,808	3,156	3,785
747	782	665	761	778	875	1,049
40	41	35	40	41	46	56
0	0	0	0	0	0	0
0	0	0	0	0	0	0
26,617	21,841	21,566	16,896	13,914	11,131	8,348
0	0	0	0	0	0	0
1	1	1	1	1	1	2
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
51,264	40,523	39,734	33,749	29,877	26,954	24,962
0	0	383	1,043	2,839	7,725	21,024
0	0	307	834	2,271	6,180	16,819
938	720	979	1,604	3,058	7,065	17,880

Scenario 1BAU						
2010	2015	2020	2030	2040	2050	2060
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
2,507	1,691	1,844	1,925	1,620	1,316	1,011
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
136	61	66	61	72	77	89
0	0	0	0	0	0	0
358	375	370	328	425	471	575
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
14,784	12,219	13,067	45,639	43,751	41,718	39,853
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
17,786	14,346	15,346	47,953	45,869	43,581	41,527
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
188	151	140	124	161	178	218
5,087	4,122	4,441	4,653	3,856	3,058	2,260
5,274	4,273	4,580	4,777	4,016	3,236	2,478
771	808	796	706	915	1,013	1,238
0	0	0	0	0	0	0
3,372	4,853	4,664	4,140	5,365	5,936	7,258
348	361	355	316	409	452	553
981	788	731	649	841	930	1,137
1,261	1,321	1,301	1,155	1,497	1,656	2,025
9,323	7,538	7,827	7,912	7,307	6,448	5,881
0	0	0	0	0	0	0
1,502	1,207	1,119	993	1,287	1,424	1,741
4,186	3,364	3,119	2,768	3,587	3,969	4,853
0	0	0	0	0	0	0
24	25	25	22	29	32	39
0	0	0	0	0	0	0
2,640	2,765	2,729	2,422	3,139	3,473	4,246
1,751	1,407	1,306	1,159	1,502	1,662	2,032
460	482	475	422	546	604	739
26,617	24,919	24,446	22,665	26,424	27,599	31,742
0	0	0	0	0	0	0
0	0	0	0	0	0	0
315	65	82	82	82	82	82
0	0	0	0	0	0	0
0	0	0	0	0	0	0
665	696	666	609	789	873	1,068
14,957	12,069	12,714	13,043	11,576	9,853	8,417</

		All Scenarios					Scenario 3L							Scenario 3BAU						
		2006	2007	2008	2009	2010	2010	2015	2020	2030	2040	2050	2060	2010	2015	2020	2030	2040	2050	2060
E	Hudspeth	0	0	0	0	0	0	0	307	834	2,271	6,180	16,819	0	0	312	869	2,419	6,732	18,737
E	Jeff Davis	0	0	0	0	0	0	0	307	834	2,271	6,180	16,819	0	0	312	869	2,419	6,732	18,737
E	Presidio	0	0	0	0	0	0	0	307	834	2,271	6,180	16,819	0	0	312	869	2,419	6,732	18,737
E	Terrell	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E Total		829	829	262	262	938	938	747	2,708	6,160	15,503	40,248	107,067	938	831	2,910	6,591	16,641	43,844	119,249
F	Andrews	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
F	Borden	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
F	Brown	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
F	Coke	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
F	Coleman	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
F	Concho	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
F	Crane	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
F	Crockett	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
F	Ector	3,513	4,024	4,376	3,835	4,600	4,600	3,212	3,482	4,152	5,761	7,131	8,564	4,600	3,782	4,216	5,102	6,703	7,780	9,409
F	Glasscock	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
F	Howard	430	430	599	525	541	541	4,197	3,978	3,554	3,240	13,532	30,920	541	4,264	4,064	3,665	5,123	22,469	39,880
F	Irion	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
F	Kimble	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
F	Loving	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
F	Martin	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
F	Mason	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
F	McCulloch	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
F	Menard	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
F	Midland	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
F	Mitchell	91	91	1,001	1,001	1,001	1,001	1,049	1,050	1,251	1,736	2,150	2,581	1,001	1,049	1,271	1,538	2,020	2,345	2,836
F	Pecos	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
F	Reagan	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
F	Reeves	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
F	Runnels	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
F	Schleicher	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
F	Scurry	606	606	314	275	284	284	198	215	257	356	441	529	284	233	261	315	414	481	582
F	Sterling	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
F	Sutton	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
F	Tom Green	0	0	327	287	296	296	206	224	267	370	458	550	296	243	271	328	431	500	605
F	Upton	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
F	Ward	2,327	2,327	2,447	2,447	2,447	2,447	2,564	2,566	3,060	4,246	5,256	6,312	2,447	2,564	3,107	3,760	4,940	5,734	6,934
F	Winkler	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
F Total		6,968	7,478	9,064	8,369	9,168	9,168	11,426	11,515	12,540	15,710	28,968	49,457	9,168	12,134	13,189	14,708	19,632	39,309	60,245
G	Bell	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
G	Bosque	956	956	1,446	1,848	1,905	1,905	1,330	1,442	1,720	2,386	2,954	3,548	1,905	1,566	1,746	2,113	2,777	3,223	3,897
G	Brazos	750	750	526	526	526	526	551	552	658	913	1,130	1,357	526	551	668	809	1,062	1,233	1,491
G	Burleson	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
G	Callahan	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
G	Comanche	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
G	Coryell	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
G	Eastland	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
G	Erath	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
G	Falls	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
G	Fisher	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
G	Grimes	32,513	32,513	28,254	27,073	25,968	25,968	20,420	19,308	17,144	15,432	13,604	11,807	25,968	20,693	19,659	17,600	15,883	13,915	12,212
G	Hamilton	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
G	Haskell	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
G	Hill	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
G	Hood	3,988	3,988	3,220	2,838	2,922	2,922	2,086	2,290	2,731	3,789	4,690	5,633	2,922	2,432	2,773	3,356	4,409	5,117	6,188
G	Johnson	325	325	463	405	418	418	292	317	377	524	648	779	418	344	383	464	609	707	855
G	Jones	0	0	359	359	359	359	376	376	448	622	770	925	359	376	455	551	724	840	1,016
G	Kent	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
G	Knox	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
G	Lampasas	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
G	Lee	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
G	Limestone	14,822	14,822	13,824	13,353	12,725	12,725	10,111	9,446	8,115	6,785	5,455	4,124	12,725	10,111	9,446	8,115	6,785	5,455	4,124
G	McLennan	1,412	1,412	3,808	3,808	3,808	3,808	12,410	11,860	11,520	12,258	12,722	13,258	3,808	12,410	12,702	12,610	13,339	13,466	14,226
G	Milam	12,571	12,571	12,919	19,658	18,734	18,734	14,885	13,906	11,947	9,989	8,030	6,072	18,734	14,885	13,906	11,947	9,989	8,030	6,072
G	Nolan	204	204	893	783	807	807	5,148	4,894	4,408	4,087	14,681	32,589	807	5,248	5,023	4,575	6,079	23,924	41,867
G	Palo Pinto	840	840	613	613	613	613	643	643	767	1,064	1,317	1,582	613	643	779	942	1,238	1,437	1,738
G	Robertson	4,258	4,258	4,392	10,405	15,789	15,789	18,438	17,226	14,800	12,374	9,947	7,521	15,789	18,438	17,226	14,800	12,374	9,947	7,521
G	Shackelford	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
G	Somervell	35,414	35,414	33,722	34,829	34,829	34,829	81,283	76,382	65,965	65,965	65,965	65,965	34,829	81,283	76,382	65,965	65,965	65,965	65,965
G	Stephens	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
G	Stonewall	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
G	Taylor	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
G	Throckmorton	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
G	Washington	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
G	Williamson	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
G	Young	556	556	627	627	627	627	657	658	784	1,088	1,347	1,617	627	657	796	963	1,266	1,469	1,777

		All Scenarios				
		2006	2007	2008	2009	2010
A	Armstrong	0	0	0	0	0
A	Carson	0	0	0	0	0
A	Childress	0	0	0	0	0
A	Collingsworth	0	0	0	0	0
A	Dallam	0	0	0	0	0
A	Donley	0	0	0	0	0
A	Gray	739	739	649	2,697	2,507
A	Hall	0	0	0	0	0
A	Hansford	0	0	0	0	0
A	Hartley	0	0	0	0	0
A	Hemphill	0	0	0	0	0
A	Hutchinson	355	355	151	152	136
A	Lipscomb	0	0	0	0	0
A	Moore	360	360	358	358	358
A	Ochiltree	0	0	0	0	0
A	Oldham	0	0	0	0	0
A	Potter	18,018	18,018	15,973	15,464	14,784
A	Randall	0	0	0	0	0
A	Roberts	0	0	0	0	0
A	Sherman	0	0	0	0	0
A	Wheeler	0	0	0	0	0
A Total		19,471	19,471	17,131	18,672	17,786
B	Archer	0	0	0	0	0
B	Baylor	0	0	0	0	0
B	Clay	0	0	0	0	0
B	Cottle	0	0	0	0	0
B	Foard	0	0	0	0	0
B	Hardeman	0	0	0	0	0
B	King	0	0	0	0	0
B	Montague	0	0	0	0	0
B	Wichita	54	54	208	182	188
B	Wilbarger	4,380	4,380	5,526	5,338	5,087
B Total		4,434	4,434	5,734	5,520	5,274
C	Collin	531	531	771	771	771
C	Cooke	0	0	0	0	0
C	Dallas	1,598	1,598	3,372	3,372	3,372
C	Denton	395	395	349	349	348
C	Ellis	975	975	1,086	951	981
C	Fannin	325	325	1,261	1,261	1,261
C	Freestone	10,168	10,281	10,177	9,589	9,323
C	Grayson	0	0	0	0	0
C	Jack	2,162	2,162	1,662	1,456	1,502
C	Kaufman	5,814	5,814	4,632	4,059	4,186
C	Navarro	0	0	0	0	0
C	Parker	3	3	24	24	24
C	Rockwall	0	0	0	0	0
C	Tarrant	1,053	1,053	2,640	2,640	2,640
C	Wise	2,205	2,205	1,937	1,697	1,751
C/I	Henderson	117	117	460	460	460
C Total		25,346	25,459	28,371	26,629	26,617
D	Bowie	0	0	0	0	0
D	Camp	0	0	0	0	0
D	Cass	325	325	362	367	315
D	Delta	0	0	0	0	0
D	Franklin	0	0	0	0	0
D	Gregg	770	770	665	665	665
D	Harrison	14,502	14,502	16,301	15,507	14,957
D	Hopkins	0	0	0	0	0
D	Hunt	37	37	84	4,066	4,190
D	Lamar	3,536	3,536	4,131	3,620	3,733
D	Marion	1,401	1,401	747	747	747
D	Morris	23	23	40	40	40
D	Rains	0	0	0	0	0
D	Red River	0	0	0	0	0
D	Titus	27,041	27,041	28,914	27,930	26,617
D	Upshur	0	0	0	0	0
D	Van Zandt	0	0	1	1	1
D	Wood	0	0	0	0	0
D/I	Smith	0	0	0	0	0
D Total		47,634	47,634	51,244	52,942	51,264
E	Brewster	0	0	0	0	0
E	Culberson	0	0	0	0	0
E	El Paso	829	829	262	262	938

Scenario 4L						
2010	2015	2020	2030	2040	2050	2060
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
2,507	1,537	1,673	1,450	1,135	920	920
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
136	61	66	229	432	629	827
0	0	0	0	0	0	0
358	375	370	370	362	303	246
0	0	0	0	0	0	0
0	0	0	0	0	0	0
14,784	11,152	11,659	36,399	40,775	53,748	68,569
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
17,786	13,125	13,768	38,447	42,704	55,599	70,561
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
188	145	140	253	392	511	631
5,087	3,728	4,616	4,352	3,864	3,368	3,368
5,274	3,873	4,756	4,605	4,257	3,879	4,000
771	808	796	1,080	1,422	1,650	1,883
0	0	0	0	0	0	0
3,372	4,804	4,667	6,992	9,816	11,978	14,171
348	361	356	431	518	556	596
981	759	731	4,020	8,117	12,111	16,110
1,261	1,321	1,302	1,898	2,621	3,158	3,705
9,323	6,932	8,566	9,932	11,342	12,267	13,823
0	0	0	3	7	11	15
1,502	1,162	1,120	2,025	3,137	4,091	5,052
4,186	3,239	3,121	5,645	8,745	11,402	14,080
0	0	0	0	0	0	0
24	25	25	70	126	179	231
0	0	0	0	0	0	0
2,640	2,765	2,730	3,797	5,082	5,980	6,896
1,751	1,355	1,307	2,368	3,671	4,790	5,917
460	482	475	582	707	765	826
26,617	24,013	25,196	38,844	55,312	68,938	83,303
0	0	0	0	0	0	0
0	0	0	0	0	0	0
315	63	82	82	82	82	82
0	0	0	0	0	0	0
0	0	0	0	0	0	0
665	696	686	930	1,222	1,417	1,617
14,957	11,031	10,889	10,565	9,966	10,060	11,622
0	0	0	0	0	0	0
4,190	3,266	3,146	5,666	8,760	11,409	14,078
3,733	2,889	2,783	5,034	7,798	10,168	12,557
747	782	771	1,235	1,802	2,258	2,720
40	41	41	61	86	106	125
0	0	0	0	0	0	0
0	0	0	0	0	0	0
26,617	19,507	23,906	22,400	19,717	17,093	17,093
0	0	0	0	0	0	0
1	1	1	2	3	4	5
0	0	0	9	20	31	42
0	0	0	0	0	0	0
51,264	38,277	42,307	45,985	49,457	52,629	59,940
0	0	383	1,043	2,839	7,725	21,024
0	0	307	834	2,271	6,180	16,819
938	798	1,087	2,358	4,710	9,424	20,872

Scenario 4BAU						
2010	2015	2020	2030	2040	2050	2060
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
2,507	1,537	1,290	696	148	148	148
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
136	61	139	281	307	596	855
0	0	0	0	0	0	0
358	375	475	469	528	353	317
0	0	0	0	0	0	0
0	0	0	0	0	0	0
14,784	11,152	9,514	47,294	67,167	81,197	90,258
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
17,786	13,125	11,418	48,740	68,150	82,294	91,578
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
188	169	222	319	356	504	673
5,087	3,728	2,991	1,436	0	0	0
5,274	3,897	3,214	1,755	356	504	673
771	808	1,130	1,365	1,529	1,691	2,073
0	0	0	0	0	0	0
3,372	5,007	6,869	8,827	9,867	12,063	15,362
348	361	485	545	611	586	673
981	881	2,173	5,038	5,567	11,430	16,662
1,261	1,321	1,897	2,397	2,681	3,194	4,030
9,323	7,233	6,931	6,077	4,606	6,521	8,710
0	0	1	4	4	10	15
1,502	1,348	1,778	2,552	2,845	4,029	5,381
4,186	3,758	4,957	7,114	7,930	11,229	14,998
0	0	0	0	0	0	0
24	25	49	88	98	171	241
0	0	0	0	0	0	0
2,640	2,765	3,909	4,797	5,369	6,100	7,556
1,751	1,572	2,077	2,984	3,327	4,716	6,301
460	482	651	736	826	805	931
26,617	25,560	32,907	42,524	45,260	62,545	82,935
0	0	0	0	0	0	0
0	0	0	0	0	0	0
315	63	82	82	82	82	82
0	0	0	0	0	0	0
0	0	0	0	0	0	0
665	696	973	1,175	1,316	1,453	1,780
14,957	11,333	10,232	7,686	4,654	6,582	8,780
0	0	0	0	0	0	0
4,190	3,774	4,988	7,141	7,961	11,240	15,000
3,733	3,351	4,420	6,344	7,072	10,014	13,375
747	782	1,165	1,558	1,740	2,	

D.2 Projected Electricity Texas Total net generation *plus* electricity for carbon capture (MWh/yr)
Pages D-19 thru D-34.

		All Scenarios				
		2006	2007	2008	2009	2010
A	Armstrong	0	0	0	0	0
A	Carson	256,633	175,200	175,200	2,367,390	1,999,971
A	Childress	0	0	220,752	220,752	186,491
A	Collingsworth	0	0	0	0	0
A	Dallam	0	0	0	0	0
A	Dewey	0	0	0	0	0
A	Gray	343,968	306,600	302,220	1,413,776	1,317,942
A	Hall	0	0	0	0	0
A	Hansford	83,475	72,270	72,270	72,270	61,054
A	Hartley	0	0	0	0	0
A	Hemphill	0	0	0	0	0
A	Hutchinson	1,697,761	391,292	377,328	379,080	361,560
A	Lipscomb	0	0	0	0	0
A	Moore	45,243	47,216	45,070	45,070	45,070
A	Ochiltree	0	0	0	0	0
A	Oldham	0	352,590	352,590	352,590	297,868
A	Potter	8,844,514	8,027,314	7,940,239	7,684,798	7,344,209
A	Randall	0	0	0	0	0
A	Roberts	0	0	0	0	0
A	Sherman	3,799	43,800	43,800	43,800	37,002
A	Wheeler	0	0	0	0	0
A Total		11,275,392	9,416,282	9,529,470	12,579,526	11,651,168

B	Archer	0	0	0	0	0
B	Baylor	0	0	0	0	0
B	Clay	0	0	0	0	0
B	Cottle	0	0	217,029	217,029	183,346
B	Foard	0	0	0	0	0
B	Hardeman	0	0	0	0	0
B	King	0	0	0	0	0
B	Montague	0	0	0	0	0
B	Wichita	76,437	338,136	330,602	294,686	297,490
B	Wilbarger	3,964,478	5,045,760	5,001,610	4,831,315	4,604,256
B Total		4,040,915	5,383,896	5,549,241	5,343,031	5,085,092

C	Collin	494,119	562,646	537,071	537,071	537,071
C	Cooke	0	0	0	0	0
C	Dallas	1,131,303	2,686,420	2,567,044	2,568,296	2,555,769
C	Denton	216,151	228,697	202,598	203,114	197,858
C	Ellis	8,438,321	8,106,154	7,917,638	6,937,369	7,154,152
C	Fannin	278,892	1,132,615	1,081,133	1,081,133	1,081,133
C	Freestone	12,081,231	12,359,659	12,194,905	11,437,554	11,161,344
C	Grayson	71,607	452,542	137,637	137,970	134,641
C	Jack	3,063,108	2,673,552	2,617,488	2,325,955	2,349,642
C	Kaufman	8,237,423	6,719,218	6,562,957	5,750,400	5,930,100
C	Navarro	0	0	0	0	0
C	Parker	8,257	103,368	99,759	100,258	95,265
C	Rockwall	0	0	0	0	0
C	Tarrant	750,457	2,137,563	2,042,771	2,043,857	2,032,995
C	Wise	3,163,027	2,852,957	2,786,994	2,447,789	2,516,809
C/I	Henderson	56,903	234,444	223,787	223,787	223,787
C Total		37,990,799	40,249,835	38,971,772	35,794,544	35,970,567

D	Bowie	0	0	0	0	0
D	Camp	0	0	0	0	0
D	Cass	353,096	398,580	392,886	398,580	341,640
D	Delta	0	0	0	0	0
D	Franklin	0	0	0	0	0
D	Gregg	533,649	482,764	460,820	460,820	460,820
D	Harrison	7,757,780	9,006,252	8,870,577	8,227,318	8,099,471
D	Hopkins	0	0	0	0	0
D	Hunt	34,526	81,617	77,907	5,719,347	5,895,642
D	Lamar	5,009,525	5,992,225	5,852,871	5,128,230	5,288,487
D	Marion	1,522,180	849,895	811,264	827,005	811,264
D	Morris	21,014	38,544	36,792	36,792	36,792
D	Rains	0	0	0	0	0
D	Red River	0	0	0	0	0
D	Titus	24,997,132	25,607,232	25,383,169	24,518,925	23,366,599
D	Upshur	0	0	0	0	0
D	Van Zandt	0	1,445	1,380	1,380	1,380
D	Wood	0	64,386	63,466	64,386	55,188
D/I	Smith	0	0	0	0	0
D Total		40,228,902	42,522,941	41,951,132	45,367,041	44,357,283

E	Brewster	0	0	0	0	0
E	Culberson	125,120	139,284	139,284	139,284	117,667
E	El Paso	1,719,920	656,746	629,546	630,702	1,576,130
E	Hudspeth	0	0	0	0	0
E	Jeff Davis	0	0	0	0	0
E	Presidio	0	0	0	0	0

		Scenario 1L						
		2010	2015	2020	2030	2040	2050	2060
		0	0	0	0	0	0	0
		1,999,971	3,570,024	5,380,928	8,864,822	12,161,530	14,948,816	16,349,732
		186,491	332,894	501,755	826,618	1,134,026	1,393,932	1,524,563
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		1,317,942	920,107	923,708	730,665	620,354	510,043	399,733
		0	0	0	0	0	0	0
		61,054	108,983	164,265	270,619	371,259	456,347	499,113
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		361,560	290,376	255,829	288,936	294,754	327,831	387,712
		0	0	0	0	0	0	0
		45,070	47,216	40,126	45,945	46,967	52,781	63,305
		0	0	0	0	0	0	0
		297,868	531,706	801,415	1,320,293	1,811,292	2,226,419	2,435,066
		7,344,209	6,125,693	5,985,557	22,218,522	21,506,422	20,840,861	20,221,063
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		37,002	66,050	99,555	164,012	225,005	276,574	302,493
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		11,651,168	11,993,050	14,153,138	34,730,432	38,171,609	41,033,603	42,182,779

		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		183,346	327,280	493,293	812,677	1,114,901	1,370,423	1,498,851
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		297,490	181,717	179,182	203,969	208,325	233,088	277,918
		4,604,256	3,778,013	4,604,256	2,888,135	2,406,779	1,925,423	1,444,067
		5,085,092	4,287,010	4,402,983	3,904,781	3,730,004	3,220,837	3,220,837

		537,071	562,646	478,154	547,492	559,678	628,951	754,361
		0	0	0	0	0	0	0
		2,555,769	4,147,266	3,722,964	4,260,681	4,355,179	4,892,397	5,864,958
		197,858	180,447	159,602	186,123	195,325	220,649	260,326
		7,154,152	4,712,880	4,597,917	5,264,667	5,381,842	6,047,873	7,253,914
		1,081,133	1,132,615	962,532	1,102,111	1,126,640	1,266,088	1,518,541
		11,161,344	8,601,209	8,466,241	7,375,312	6,624,916	6,138,794	5,912,544
		134,641	118,796	163,668	267,447	365,163	448,316	490,935
		2,349,642	1,797,902	1,964,738	2,549,769	2,950,579	3,458,097	3,972,254
		5,930,100	3,906,522	3,811,229	4,363,900	4,461,027	5,013,185	6,012,794
		95,265	74,607	64,677	74,055	75,704	85,074	102,037
		0	0	0	0	0	0	0
		2,032,995	2,074,995	1,766,166	2,022,280	2,067,289	2,323,166	2,786,396
		2,516,809	1,641,344	1,601,913	1,834,208	1,875,032	2,107,112	2,527,261
		223,787	234,444	199,238	228,130	233,207	262,072	314,328
		35,970,567	29,185,674	27,959,039	30,076,176	30,271,580	32,891,872	37,770,650

		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		341,640	70,806	89,441	89,441	89,441	89,441	89,441
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		460,820	482,764	410,268	469,761	480,217	539,655	647,260
		8,099,471	6,071,749	5,970,725	5,451,236	5,029,000	4,870,757	4,970,868
		0	0	0	0	0	0	0
		5,895,642	3,914,117	3,808,373	4,360,631	4,457,684	5,009,429	6,008,289
		5,288,487	3,483,852	3,398,869	3,891,744	3,978,362	4,470,778	5,362,234
		811,264	849,895	722,268	827,005	845,411	950,051	1,139,487
		36,792	38,544	32,756	37,506	38,341	43,086	51,677
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		23,366,599	19,173,415	18,932,326	14,657,285	12,214,404	9,771,523	7,328,642
		1,380	1,445	1,228	1,406	1,438	1,616	1,938
		55,188	11,406	12,038	13,783	14,090	15,834	18,991
		0	0	0	0	0	0	0
		44,357,283	34,097,792	33,378,291	29,799,798	27,148,386	25,762,169	25,618,827

		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		117,667	210,040	441,473	861,438	1,640,489	3,396,779	7,812,584
		1,576,130	1,222,308	1,250,811	1,630,529	2,247,798	4,003,840	6,829,269
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		0	0	0	0</			

		All Scenarios				
		2006	2007	2008	2009	2010
E	Terrell	0	0	0	0	0
E Total		1,845,040	796,030	768,830	769,986	1,693,798
F	Andrews	0	18,396	442,993	443,256	374,690
F	Borden	202,601	183,960	886,950	1,195,740	1,010,161
F	Brown	0	0	0	0	0
F	Broke	0	0	328,500	328,500	277,517
F	Coleman	0	0	0	0	0
F	Concho	0	0	0	0	0
F	Crane	0	0	0	0	0
F	Crockett	0	0	0	0	0
F	Ector	4,977,708	5,311,941	7,185,688	6,418,046	7,349,078
F	Glasscock	5,001	271,998	271,998	271,998	229,784
F	Howard	707,244	1,263,849	2,187,460	2,082,821	1,897,924
F	Irion	0	0	0	0	0
F	Kimble	0	0	0	0	0
F	Loving	0	0	0	0	0
F	Martin	0	0	0	0	0
F	Mason	0	0	0	0	0
F	McCulloch	0	0	0	0	0
F	Menard	0	0	0	0	0
F	Midland	4,359	12,264	12,089	12,264	10,512
F	Mitchell	114,583	1,314,061	1,254,331	1,254,331	1,254,331
F	Pecos	1,082,764	882,570	882,570	882,570	745,595
F	Reagan	0	0	0	0	0
F	Reeves	0	0	0	0	0
F	Runnels	0	0	0	0	0
F	Schleicher	0	0	0	0	0
F	Scurry	1,390,826	1,508,682	2,881,952	2,827,017	3,109,090
F	Sterling	0	770,880	770,880	1,427,880	1,206,273
F	Sutton	0	0	0	0	0
F	Tom Green	0	474,617	463,579	406,184	418,877
F	Upton	912,976	795,145	794,230	795,145	672,011
F	Ward	959,847	1,057,455	1,009,389	1,009,389	1,009,389
F	Winkler	0	0	0	0	0
F Total		10,357,909	13,865,819	19,373,209	19,355,140	19,565,231
G	Bell	0	0	0	0	0
G	Bosque	1,368,643	2,282,068	2,098,458	2,666,772	2,748,573
G	Brazos	480,983	281,468	268,674	268,674	268,674
G	Burleson	0	0	0	0	0
G	Callahan	0	0	0	0	0
G	Comanche	0	0	0	0	0
G	Coryell	0	0	0	438,000	370,022
G	Eastland	0	0	0	0	0
G	Erath	0	131,400	131,400	131,400	111,007
G	Falls	0	0	0	0	0
G	Fisher	0	0	0	0	0
G	Grimes	7,754,076	6,717,790	6,607,664	6,072,350	6,023,999
G	Hamilton	0	0	0	0	0
G	Haskell	0	0	0	0	0
G	Hill	0	0	0	0	0
G	Hood	3,945,283	4,164,294	4,042,705	3,673,916	3,755,475
G	Johnson	461,095	671,244	655,633	574,460	592,412
G	Jones	0	349,787	333,887	333,887	333,887
G	Kent	0	0	0	0	0
G	Knox	0	0	0	0	0
G	Lampasas	0	0	0	0	0
G	Lee	0	0	0	0	0
G	Limestone	12,709,534	11,958,451	11,853,815	11,450,217	10,912,087
G	McLennan	640,501	1,642,649	1,567,983	1,567,983	1,567,983
G	Milam	6,368,467	6,682,829	6,624,354	10,297,412	9,813,460
G	Nolan	1,674,043	3,034,639	4,125,785	4,796,906	4,259,189
G	Palo Pinto	771,469	734,929	596,144	596,144	596,144
G	Robertson	2,351,664	2,447,194	2,425,781	8,080,375	13,168,172
G	Shackelford	0	438,000	799,350	799,350	675,291
G	Somervell	19,896,009	18,668,524	18,945,252	19,836,144	19,836,144
G	Stephens	0	0	0	0	0
G	Stonewall	0	0	0	0	0
G	Taylor	2,016,737	2,628,219	3,221,709	3,221,709	2,721,700
G	Throckmorton	0	0	0	0	740,045
G	Washington	0	0	0	0	0
G	Williamson	0	0	0	0	0
G	Young	517,312	611,597	583,797	583,797	583,797
G Total		60,955,815	63,445,080	64,882,391	75,389,495	79,078,061
H	Austin	0	0	0	0	0
H	Brazoria	11,788,603	8,761,629	8,544,758	7,556,644	7,775,169
H	Chambers	2,980,081	2,236,227	2,134,580	2,134,580	2,134,580
H	Fort Bend	22,160,640	31,395,472	31,346,688	29,965,462	29,180,635

		Scenario 1L						
		2010	2015	2020	2030	2040	2050	2060
		0	0	0	0	0	0	0
E Total		1,693,798	1,432,348	2,223,064	3,936,462	7,819,420	18,099,035	45,557,147
F	Andrews	374,690	643,948	969,119	1,594,850	2,186,576	2,687,290	2,939,606
F	Borden	1,010,161	1,803,176	2,717,841	4,477,514	6,142,641	7,550,466	8,258,051
F	Brown	0	0	0	0	0	0	0
F	Broke	277,517	495,378	746,660	1,230,086	1,687,539	2,074,304	2,288,695
F	Coleman	0	0	0	0	0	0	0
F	Concho	0	0	0	0	0	0	0
F	Crane	0	0	0	0	0	0	0
F	Crockett	0	0	0	0	0	0	0
F	Ector	7,349,078	5,778,972	6,428,101	8,485,706	9,964,794	11,731,850	13,413,485
F	Glasscock	229,784	410,173	618,234	1,018,512	1,397,282	1,717,523	1,878,480
F	Howard	1,897,924	5,137,872	10,072,062	19,768,797	44,402,168	69,797,548	96,780,484
F	Irion	0	0	0	0	0	0	0
F	Kimble	0	0	0	0	0	0	0
F	Loving	0	0	0	0	0	0	0
F	Martin	0	0	0	0	0	0	0
F	Mason	0	0	0	0	0	0	0
F	McCulloch	0	0	0	0	0	0	0
F	Menard	0	0	0	0	0	0	0
F	Midland	10,512	2,172	2,293	2,625	2,684	3,016	3,617
F	Mitchell	1,254,331	1,314,061	1,116,731	1,278,669	1,307,129	1,468,917	1,761,813
F	Pecos	745,595	1,330,916	2,006,026	3,304,832	4,533,854	5,572,963	6,095,228
F	Reagan	0	0	0	0	0	0	0
F	Reeves	0	0	0	0	0	0	0
F	Runnels	0	0	0	0	0	0	0
F	Schleicher	0	0	0	0	0	0	0
F	Scurry	3,109,090	5,094,492	7,534,723	12,281,329	16,743,599	20,548,684	22,510,844
F	Sterling	1,206,273	2,153,243	3,245,481	5,346,775	7,335,169	9,016,307	9,861,263
F	Sutton	0	0	0	0	0	0	0
F	Tom Green	418,877	1,596,948	2,260,302	3,588,478	4,815,211	5,885,587	6,474,572
F	Upton	672,011	1,169,700	1,761,267	2,899,529	3,976,172	4,886,957	5,345,508
F	Ward	1,009,389	1,057,455	898,658	1,028,974	1,051,876	1,182,070	1,417,770
F	Winkler	0	0	0	0	0	0	0
F Total		19,565,231	27,988,506	40,377,497	66,306,676	105,546,694	144,123,481	179,009,417
G	Bell	0	0	0	0	0	0	0
G	Bosque	2,748,573	1,827,424	1,803,178	2,098,965	2,185,008	2,471,721	2,944,527
G	Brazos	268,674	281,468	239,200	273,887	279,983	314,637	377,374
G	Burleson	0	0	0	0	0	0	0
G	Callahan	0	0	0	0	0	0	0
G	Comanche	0	0	0	0	0	0	0
G	Coryell	370,022	660,504	995,546	1,640,115	2,250,052	2,765,738	3,024,927
G	Eastland	0	0	0	0	0	0	0
G	Erath	111,007	198,151	298,664	492,035	675,016	829,721	907,478
G	Falls	0	0	0	0	0	0	0
G	Fisher	0	0	0	0	0	0	0
G	Grimes	6,023,999	4,437,566	4,357,445	4,118,012	3,865,991	3,853,679	4,077,082
G	Hamilton	0	0	0	0	0	0	0
G	Haskell	0	0	0	0	0	0	0
G	Hill	0	0	0	0	0	0	0
G	Hood	3,755,475	2,887,716	2,677,075	3,065,281	3,133,504	3,521,350	4,223,493
G	Johnson	592,412	390,258	380,738	435,950	445,653	500,813	600,673
G	Jones	333,887	349,787	297,260	340,366	347,941	391,007	468,973
G	Kent	0	0	0	0	0	0	0
G	Knox	0	0	0	0	0	0	0
G	Lampasas	0	0	0	0	0	0	0
G	Lee	0	0	0	0	0	0	0
G	Limestone	10,912,087	13,151,682	12,986,311	10,053,919	8,378,265	6,702,612	5,026,959
G	McLennan	1,567,983	6,365,165	6,059,109	5,208,576	4,642,456	4,243,006	4,007,447
G	Milam	9,813,460	8,052,415	7,951,162	6,155,739	5,129,782	4,103,826	3,077,869
G	Nolan	4,259,189	9,463,148	16,306,239	29,638,113	58,191,380	87,058,812	116,232,824
G	Palo Pinto	596,144	622,582	551,184	659,699	707,154	808,237	952,692
G	Robertson	13,168,172	14,110,878	13,933,446	10,787,184	8,989,320	7,191,456	5,393,592
G	Shackelford	675,291	1,205,420	1,816,872	2,993,210	4,106,344	5,047,472	5,520,492
G	Somervell	19,836,144	45,064,944	42,912,293	37,060,000	37,060,000	37,060,000	37,060,000
G	Stephens	0						

		All Scenarios				
		2006	2007	2008	2009	2010
M	Maverick	50,480	73,584	19,657	19,657	19,657
M	Starr	62,230	193,158	51,601	51,601	51,601
M	Webb	875,278	180,386	172,187	349,708	349,708
M	Willacy	0	0	0	0	0
M	Zapata	0	0	0	0	0
M Total		7,379,335	8,545,608	8,140,559	7,418,174	7,610,767
N	Aranzas	0	0	0	0	0
N	Bee	0	0	0	0	0
N	Brooks	0	0	0	0	0
N	Duval	0	0	0	0	0
N	Jim Wells	0	0	0	0	0
N	Kenedy	0	0	851,910	1,727,910	2,199,783
N	Kleberg	0	0	0	0	0
N	Live Oak	0	0	0	0	0
N	McMullen	0	0	0	0	0
N	Nueces	3,698,103	3,489,169	3,393,352	5,394,496	5,455,800
N	San Patricio	5,537,250	3,763,296	3,677,098	3,241,901	3,317,587
N Total		9,235,353	7,252,465	7,922,360	10,364,306	10,973,171
O	Bailey	0	0	0	0	0
O	Briscoe	0	0	0	0	0
O	Castro	0	0	0	0	0
O	Cochran	0	0	0	0	0
O	Crosby	0	0	0	0	0
O	Dawson	0	0	321,930	321,930	271,966
O	Deaf Smith	0	0	0	0	0
O	Dickens	0	0	0	262,800	222,013
O	Floyd	0	131,400	131,400	131,400	111,007
O	Gaines	0	0	0	0	0
O	Garza	0	0	0	0	0
O	Hale	0	0	0	0	0
O	Hockley	0	0	0	0	0
O	Lamb	8,609,944	8,379,676	8,290,990	8,022,303	7,664,054
O	Lubbock	2,886,845	746,405	712,477	712,477	712,477
O	Lynn	0	0	0	0	0
O	Motley	0	0	0	0	0
O	Parmer	0	0	0	0	0
O	Swisher	0	0	0	0	0
O	Terry	0	17,248	16,464	16,464	16,464
O	Yoakum	2,552,319	2,713,883	2,646,633	2,340,979	2,408,575
O Total		14,049,108	11,988,612	12,119,894	11,808,353	11,406,557
P	Jackson	0	0	0	0	0
P	Lavaca	0	0	0	0	0
P Total		0	0	0	0	0
TX Total check		401,227,140	405,370,123	409,950,660	418,424,285	426,196,025

		Scenario 2L						
		2010	2015	2020	2030	2040	2050	2060
		19,657	19,657	27,311	44,993	61,725	75,872	82,982
		51,601	51,601	71,690	118,106	162,028	199,164	217,828
		349,708	366,361	383,176	341,954	417,415	371,986	455,077
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		7,610,767	5,196,134	6,324,362	5,719,852	7,004,474	6,318,902	7,692,387
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		2,199,783	3,926,696	5,918,523	9,750,485	13,376,558	16,442,314	17,983,192
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		5,455,800	5,881,291	6,000,806	5,544,234	6,380,043	5,876,869	6,797,178
		3,317,587	2,054,255	2,557,356	2,285,791	2,782,924	2,483,640	3,031,032
		10,973,171	11,862,242	14,476,685	17,580,510	22,539,525	24,802,823	27,811,403
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		271,966	485,470	731,727	1,205,485	1,653,788	2,032,818	2,223,322
		0	0	0	0	0	0	0
		222,013	396,302	597,328	984,069	1,350,031	1,659,443	1,814,956
		111,007	198,151	298,664	492,035	675,016	829,721	907,478
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		7,664,054	6,498,869	5,279,437	5,896,878	5,451,466	6,234,980	6,595,731
		712,477	746,405	780,663	696,680	850,421	757,866	927,150
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		16,464	17,248	18,040	18,099	19,652	17,513	21,425
		2,408,575	1,591,193	1,969,317	1,748,535	2,134,396	1,902,100	2,326,071
		11,406,557	9,933,639	9,665,175	11,039,781	12,134,769	13,434,441	14,817,033
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		426,196,025	439,359,845	467,307,734	568,841,157	688,934,356	832,644,610	977,043,572

		Scenario 2BAU						
		2010	2015	2020	2030	2040	2050	2060
		19,657	19,657	29,981	49,863	68,708	84,662	92,574
		51,601	51,601	78,700	130,892	180,358	222,238	243,006
		349,708	366,361	406,990	397,736	408,742	303,923	501,516
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		7,610,767	6,027,095	6,720,301	6,642,274	6,889,105	5,246,802	8,480,396
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		2,199,783	4,259,997	6,497,258	10,805,996	14,889,751	18,347,289	20,061,818
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		5,455,800	6,361,693	6,264,570	6,162,071	6,283,977	5,123,006	7,311,541
		3,317,587	2,456,865	2,714,241	2,653,276	2,725,784	2,035,248	3,336,972
		10,973,171	13,078,555	15,476,069	19,621,342	23,899,512	25,505,543	30,710,331
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		271,966	526,677	803,277	1,335,981	1,840,869	2,268,336	2,480,309
		0	0	0	0	0	0	0
		222,013	429,941	655,737	1,090,597	1,502,750	1,851,703	2,024,742
		111,007	214,970	327,868	545,298	751,375	925,851	1,012,371
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		7,664,054	6,498,869	5,914,224	4,821,403	3,542,875	4,714,217	5,661,476
		712,477	746,405	829,180	810,326	832,750	619,198	1,021,763
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		16,464	17,248	19,161	18,726	19,244	14,309	23,612
		2,408,575	1,873,335	2,081,086	2,033,767	2,090,046	1,554,071	2,564,433
		11,406,557	10,307,445	10,630,535	10,656,097	10,579,909	11,947,685	14,768,705
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		426,196,025	462,798,377	518,642,733	618,958,117	739,552,542	889,959,004	1,063,402,922

		All Scenarios				
		2006	2007	2008	2009	2010
E	Terrell	0	0	0	0	0
E Total		1,845,040	796,030	768,830	769,986	1,693,798
F	Andrews	0	18,396	442,993	443,256	374,690
F	Borden	202,601	183,960	886,950	1,195,740	1,010,161
F	Brown	0	0	0	0	0
F	Broke	0	328,500	328,500	277,517	0
F	Coleman	0	0	0	0	0
F	Concho	0	0	0	0	0
F	Crane	0	0	0	0	0
F	Crockett	0	0	0	0	0
F	Ector	4,977,708	5,311,941	7,185,688	6,418,046	7,349,078
F	Glasscock	5,001	271,998	271,998	271,998	229,784
F	Howard	707,244	1,263,849	2,187,460	2,082,821	1,897,924
F	Irion	0	0	0	0	0
F	Kimble	0	0	0	0	0
F	Loving	0	0	0	0	0
F	Martin	0	0	0	0	0
F	Mason	0	0	0	0	0
F	McCulloch	0	0	0	0	0
F	Menard	0	0	0	0	0
F	Midland	4,359	12,264	12,089	12,264	10,512
F	Mitchell	114,583	1,314,061	1,254,331	1,254,331	1,254,331
F	Pecos	1,082,764	882,570	882,570	882,570	745,595
F	Reagan	0	0	0	0	0
F	Reeves	0	0	0	0	0
F	Runnels	0	0	0	0	0
F	Schleicher	0	0	0	0	0
F	Scurry	1,390,826	1,508,682	2,881,952	2,827,017	3,109,090
F	Sterling	1,206,273	770,880	770,880	1,427,880	1,206,273
F	Sutton	0	0	0	0	0
F	Tom Green	0	474,617	463,579	406,184	418,877
F	Upton	912,976	795,145	794,830	795,145	672,011
F	Ward	959,847	1,057,455	1,009,389	1,009,389	1,009,389
F	Winkler	0	0	0	0	0
F Total		10,357,909	13,865,819	19,373,209	19,355,140	19,565,231
G	Bell	0	0	0	0	0
G	Bosque	1,368,643	2,282,068	2,098,458	2,666,772	2,748,573
G	Brazos	480,983	281,468	268,674	268,674	268,674
G	Burleson	0	0	0	0	0
G	Callahan	0	0	0	0	0
G	Comanche	0	0	0	0	0
G	Coryell	0	0	438,000	370,022	0
G	Eastland	0	0	0	0	0
G	Erath	0	131,400	131,400	131,400	111,007
G	Falls	0	0	0	0	0
G	Fisher	0	0	0	0	0
G	Grimes	7,754,076	6,717,790	6,607,664	6,072,350	6,023,999
G	Hamilton	0	0	0	0	0
G	Haskell	0	0	0	0	0
G	Hill	0	0	0	0	0
G	Hood	3,945,283	4,164,294	4,042,705	3,673,916	3,755,475
G	Johnson	461,095	671,244	655,633	574,460	592,412
G	Jones	0	349,787	333,887	333,887	333,887
G	Kent	0	0	0	0	0
G	Knox	0	0	0	0	0
G	Lampasas	0	0	0	0	0
G	Lee	0	0	0	0	0
G	Limestone	12,709,534	11,958,451	11,853,815	11,450,217	10,912,087
G	McLennan	640,501	1,642,649	1,567,983	1,567,983	1,567,983
G	Milam	6,368,467	6,682,829	6,624,354	10,297,412	9,813,460
G	Nolan	1,674,043	3,034,639	4,125,785	4,796,906	4,259,189
G	Palo Pinto	771,469	734,929	596,144	596,144	596,144
G	Robertson	2,351,664	2,447,194	2,425,781	8,080,375	13,168,172
G	Shackelford	0	438,000	799,350	799,350	675,291
G	Somervell	19,896,009	18,668,524	18,945,252	19,836,144	19,836,144
G	Stephens	0	0	0	0	0
G	Stonewall	0	0	0	0	0
G	Taylor	2,016,737	2,628,219	3,221,709	3,221,709	2,721,700
G	Throckmorton	0	0	0	0	740,045
G	Washington	0	0	0	0	0
G	Williamson	0	0	0	0	0
G	Young	517,312	611,597	583,797	583,797	583,797
G Total		60,955,815	63,445,080	64,882,391	75,389,495	79,078,061
H	Austin	0	0	0	0	0
H	Brazoria	11,788,603	8,761,629	8,544,758	7,556,644	7,775,169
H	Chambers	2,980,081	2,236,227	2,134,580	2,134,580	2,134,580
H	Fort Bend	22,160,640	31,395,472	31,346,688	29,965,462	29,180,635

		Scenario 3L						
		2010	2015	2020	2030	2040	2050	2060
		0	0	0	0	0	0	0
E Total		1,693,798	1,469,729	2,420,009	4,223,674	8,681,056	19,313,530	47,017,824
F	Andrews	374,690	643,842	969,731	1,595,742	2,189,253	2,691,063	2,944,143
F	Borden	1,010,161	1,803,176	2,717,841	4,477,514	6,142,641	7,550,466	8,258,051
F	Brown	0	0	0	0	0	0	0
F	Broke	277,517	495,378	746,660	1,230,086	1,687,539	2,074,304	2,268,695
F	Coleman	0	0	0	0	0	0	0
F	Concho	0	0	0	0	0	0	0
F	Crane	0	0	0	0	0	0	0
F	Crockett	0	0	0	0	0	0	0
F	Ector	7,349,078	6,036,542	7,173,160	9,572,251	13,224,430	16,326,384	18,939,344
F	Glasscock	229,784	410,173	618,234	1,018,512	1,397,282	1,717,523	1,878,480
F	Howard	1,897,924	5,084,822	5,982,204	7,719,714	9,508,064	20,870,075	38,062,288
F	Irion	0	0	0	0	0	0	0
F	Kimble	0	0	0	0	0	0	0
F	Loving	0	0	0	0	0	0	0
F	Martin	0	0	0	0	0	0	0
F	Mason	0	0	0	0	0	0	0
F	McCulloch	0	0	0	0	0	0	0
F	Menard	0	0	0	0	0	0	0
F	Midland	10,512	2,102	2,701	3,220	4,468	5,531	6,643
F	Mitchell	1,254,331	1,314,061	1,315,395	1,568,389	2,176,286	2,694,015	3,235,241
F	Pecos	745,595	1,330,916	2,006,026	3,304,832	4,533,854	5,573,963	6,095,228
F	Reagan	0	0	0	0	0	0	0
F	Reeves	0	0	0	0	0	0	0
F	Runnels	0	0	0	0	0	0	0
F	Schleicher	0	0	0	0	0	0	0
F	Scurry	3,109,090	5,110,339	7,581,378	12,349,367	16,947,715	20,836,391	22,866,869
F	Sterling	1,206,273	2,153,243	3,245,481	5,346,775	7,335,169	9,016,307	9,861,263
F	Sutton	0	0	0	0	0	0	0
F	Tom Green	418,877	1,613,504	2,308,193	3,658,320	5,024,738	6,180,919	6,829,770
F	Upton	672,011	1,169,574	1,762,001	2,900,600	3,979,385	4,891,485	5,350,953
F	Ward	1,009,389	1,057,455	1,058,528	1,262,117	1,517,306	2,167,934	2,603,471
F	Winkler	0	0	0	0	0	0	0
F Total		19,565,231	28,225,127	37,487,535	56,007,440	75,902,130	102,995,360	129,190,441
G	Bell	0	0	0	0	0	0	0
G	Bosque	2,748,573	1,934,120	2,111,814	2,549,059	3,535,291	4,374,977	5,233,578
G	Brazos	268,674	281,468	281,753	335,944	466,153	577,049	692,978
G	Burleson	0	0	0	0	0	0	0
G	Callahan	0	0	0	0	0	0	0
G	Comanche	0	0	0	0	0	0	0
G	Coryell	370,022	660,504	985,546	1,640,115	2,250,052	2,765,738	3,024,927
G	Eastland	0	0	0	0	0	0	0
G	Erath	111,007	198,151	298,664	492,035	675,016	829,721	907,478
G	Falls	0	0	0	0	0	0	0
G	Fisher	0	0	0	0	0	0	0
G	Grimes	6,023,999	4,485,562	4,517,547	4,669,210	5,458,946	6,086,571	6,756,441
G	Hamilton	0	0	0	0	0	0	0
G	Haskell	0	0	0	0	0	0	0
G	Hill	0	0	0	0	0	0	0
G	Hood	3,755,475	2,994,098	3,153,322	3,759,808	5,217,085	6,458,207	7,755,659
G	Johnson	592,412	413,673	448,471	534,727	741,983	918,498	1,103,023
G	Jones	333,887	349,787	350,142	417,486	579,300	717,113	861,181
G	Kent	0	0	0	0	0	0	0
G	Knox	0	0	0	0	0	0	0
G	Lampasas	0	0	0	0	0	0	0
G	Lee	0	0	0	0	0	0	0
G	Limestone	10,912,087	12,734,517	11,897,137	10,221,484	8,545,831	6,870,178	5,194,525
G	McLennan	1,567,983	6,215,369	5,916,349	5,630,910	5,789,120	5,834,615	5,909,483
G	Milam	9,813,460	7,796,996	7,284,291	6,258,334	5,232,378	4,206,421	3,180,465
G	Nolan	4,259,189	9,408,485	12,096,257	17,288,906	22,423,533	36,905,231	56,042,683
G	Palo Pinto	596,144	622,582	639,116	787,934	1,091,860	1,350,489	1,604,860
G	Robertson	13,168,172	13,663,287	12,764,834	10,966,970	9,169,106	7,371,242	5,573,378
G	Shackelford	675,291	1,205,420	1,816,872	2,993,210	4,106,344	5,047,472	5,520,492
G	Somervell	19,836,144	45,064,944	42,912,293	37,060,000	37,060,000	37,060,000	37,060,000
G	Step							

		All Scenarios				
		2006	2007	2008	2009	2010
M	Maverick	50,480	73,584	19,657	19,657	19,657
M	Starr	62,230	193,158	51,601	51,601	51,601
M	Webb	875,278	180,386	172,187	349,708	349,708
M	Willacy	0	0	0	0	0
M	Zapata	0	0	0	0	0
M Total		7,379,335	8,545,608	8,140,559	7,418,174	7,610,767
N	Aranzas	0	0	0	0	0
N	Bee	0	0	0	0	0
N	Brooks	0	0	0	0	0
N	Duval	0	0	0	0	0
N	Jim Wells	0	0	0	0	0
N	Kenedy	0	0	851,910	1,727,910	2,199,783
N	Kleberg	0	0	0	0	0
N	Live Oak	0	0	0	0	0
N	McMullen	0	0	0	0	0
N	Nueces	3,698,103	3,489,169	3,393,352	5,394,496	5,455,800
N	San Patricio	5,537,250	3,763,296	3,677,098	3,241,901	3,317,587
N Total		9,235,353	7,252,465	7,922,360	10,364,306	10,973,171
O	Bailey	0	0	0	0	0
O	Briscoe	0	0	0	0	0
O	Castro	0	0	0	0	0
O	Cochran	0	0	0	0	0
O	Crosby	0	0	0	0	0
O	Dawson	0	0	321,930	321,930	271,966
O	Deaf Smith	0	0	0	0	0
O	Dickens	0	0	0	262,800	222,013
O	Floyd	0	131,400	131,400	131,400	111,007
O	Gaines	0	0	0	0	0
O	Garza	0	0	0	0	0
O	Hale	0	0	0	0	0
O	Hockley	0	0	0	0	0
O	Lamb	8,609,944	8,379,676	8,290,990	8,022,303	7,664,054
O	Lubbock	2,886,845	746,405	712,477	712,477	712,477
O	Lynn	0	0	0	0	0
O	Motley	0	0	0	0	0
O	Parmer	0	0	0	0	0
O	Swisher	0	0	0	0	0
O	Terry	0	17,248	16,464	16,464	16,464
O	Yoakum	2,552,319	2,713,883	2,646,833	2,340,979	2,408,575
O Total		14,049,108	11,988,612	12,119,894	11,808,353	11,406,557
P	Jackson	0	0	0	0	0
P	Lavaca	0	0	0	0	0
P Total		0	0	0	0	0
TX Total check		401,227,140	405,370,123	409,950,660	418,424,285	426,196,025

		Scenario 3L						
		2010	2015	2020	2030	2040	2050	2060
		19,657	19,657	27,311	44,993	61,725	75,872	82,982
		51,601	51,601	71,690	118,106	162,028	199,164	217,828
		349,708	366,361	366,733	437,267	606,749	751,092	901,986
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		2,199,783	3,926,696	5,918,523	9,750,485	13,376,558	16,442,314	17,983,192
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		5,455,800	5,154,064	5,818,680	6,599,921	8,477,103	10,075,846	11,747,150
		3,317,587	2,253,773	2,449,030	2,913,706	4,030,239	4,981,159	5,975,238
		10,973,171	11,334,533	14,186,233	19,264,112	25,883,900	31,499,320	35,705,581
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		271,966	485,470	731,727	1,205,485	1,653,788	2,032,818	2,223,322
		0	0	0	0	0	0	0
		222,013	396,302	597,328	984,069	1,350,031	1,659,443	1,814,956
		111,007	198,151	298,664	492,035	675,016	829,721	907,478
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		7,664,054	6,190,377	5,811,268	5,132,385	4,566,555	3,972,003	3,384,935
		712,477	746,405	747,162	890,866	1,236,160	1,530,237	1,837,661
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		16,464	17,248	17,266	20,587	28,566	35,362	42,466
		2,408,575	1,744,020	1,875,237	2,235,905	3,102,528	3,840,605	4,612,182
		11,406,557	9,777,973	10,078,651	10,961,331	12,612,643	13,900,188	14,823,000
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		426,196,025	439,012,458	462,182,734	537,141,157	634,974,356	751,914,610	891,693,572

		Scenario 3BAU						
		2010	2015	2020	2030	2040	2050	2060
		19,657	19,657	29,981	49,863	68,708	84,662	92,574
		51,601	51,601	78,700	130,892	180,358	222,238	243,006
		349,708	366,361	444,007	537,336	705,966	819,376	990,913
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		2,199,783	4,259,997	6,497,258	10,805,996	14,889,751	18,347,289	20,061,818
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		5,455,800	5,679,213	6,674,575	7,708,282	9,576,034	10,832,153	12,732,100
		3,317,587	2,649,024	2,958,109	3,572,950	4,683,875	5,431,005	6,561,078
		10,973,171	12,588,234	16,129,942	22,087,228	29,149,660	34,610,447	39,354,996
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		271,966	526,677	803,277	1,335,981	1,840,869	2,268,336	2,480,309
		0	0	0	0	0	0	0
		222,013	429,941	655,737	1,090,597	1,502,750	1,851,703	2,024,742
		111,007	214,970	327,868	545,298	751,375	925,851	1,012,371
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		7,664,054	6,190,377	5,899,558	5,246,719	4,679,916	4,050,020	3,486,539
		712,477	746,405	904,598	1,094,741	1,438,300	1,669,354	2,018,835
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		16,464	17,248	20,904	25,298	33,237	38,577	46,653
		2,408,575	2,020,284	2,270,370	2,747,593	3,609,662	4,189,763	5,066,985
		11,406,557	10,145,902	10,882,313	12,086,226	13,856,310	14,993,604	16,136,343
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		426,196,025	462,201,891	502,182,733	592,448,117	700,342,542	829,309,004	983,462,922

		All Scenarios				
		2006	2007	2008	2009	2010
E	Terrell	0	0	0	0	0
E Total		1,845,040	796,030	768,830	769,986	1,693,798
F	Andrews	0	18,396	442,993	443,256	374,690
F	Borden	202,601	183,960	886,950	1,195,740	1,010,161
F	Brown	0	0	0	0	0
F	Broke	0	0	328,500	328,500	277,517
F	Coleman	0	0	0	0	0
F	Concho	0	0	0	0	0
F	Crane	0	0	0	0	0
F	Crockett	0	0	0	0	0
F	Ector	4,977,708	5,311,941	7,185,688	6,418,046	7,349,078
F	Glasscock	5,001	271,998	271,998	271,998	229,784
F	Howard	707,244	1,263,849	2,187,460	2,082,821	1,897,924
F	Irion	0	0	0	0	0
F	Kimble	0	0	0	0	0
F	Loving	0	0	0	0	0
F	Martin	0	0	0	0	0
F	Mason	0	0	0	0	0
F	McCulloch	0	0	0	0	0
F	Menard	0	0	0	0	0
F	Midland	4,359	12,264	12,089	12,264	10,512
F	Mitchell	114,593	1,314,061	1,254,331	1,254,331	1,254,331
F	Pecos	1,082,764	882,570	882,570	882,570	745,595
F	Reagan	0	0	0	0	0
F	Reeves	0	0	0	0	0
F	Runnels	0	0	0	0	0
F	Schleicher	0	0	0	0	0
F	Scurry	1,390,826	1,508,682	2,881,952	2,827,017	3,109,090
F	Sterling	0	770,880	770,880	1,427,880	1,206,273
F	Sutton	0	0	0	0	0
F	Tom Green	0	474,617	463,579	406,184	418,877
F	Upton	912,976	795,145	794,830	795,145	672,011
F	Ward	959,847	1,057,455	1,009,389	1,009,389	1,009,389
F	Winkler	0	0	0	0	0
F Total		10,357,909	13,865,819	19,373,209	19,355,140	19,565,231
G	Bell	0	0	0	0	0
G	Bosque	1,368,643	2,282,068	2,098,458	2,666,772	2,748,573
G	Brazos	480,983	281,468	268,674	268,674	268,674
G	Burleson	0	0	0	0	0
G	Callahan	0	0	0	0	0
G	Comanche	0	0	0	0	0
G	Coryell	0	0	0	438,000	370,022
G	Eastland	0	0	0	0	0
G	Erath	0	131,400	131,400	131,400	111,007
G	Falls	0	0	0	0	0
G	Fisher	0	0	0	0	0
G	Grimes	7,754,076	6,717,790	6,607,664	6,072,350	6,023,999
G	Hamilton	0	0	0	0	0
G	Haskell	0	0	0	0	0
G	Hill	0	0	0	0	0
G	Hood	3,945,283	4,164,294	4,042,705	3,673,916	3,755,475
G	Johnson	461,095	671,244	655,633	574,460	592,412
G	Jones	0	349,787	333,887	333,887	333,887
G	Kent	0	0	0	0	0
G	Knox	0	0	0	0	0
G	Lampasas	0	0	0	0	0
G	Lee	0	0	0	0	0
G	Limestone	12,709,534	11,958,451	11,853,815	11,450,217	10,912,087
G	McLennan	640,501	1,642,649	1,567,983	1,567,983	1,567,983
G	Milam	6,368,467	6,682,829	6,624,354	10,297,412	9,813,460
G	Nolan	1,674,043	3,034,639	4,125,785	4,796,906	4,259,189
G	Palo Pinto	771,469	734,929	596,144	596,144	596,144
G	Robertson	2,351,664	2,447,194	2,425,781	8,080,375	13,168,172
G	Shackelford	0	438,000	799,350	799,350	675,291
G	Somervell	19,896,009	18,668,524	18,945,252	19,836,144	19,836,144
G	Stephens	0	0	0	0	0
G	Stonewall	0	0	0	0	0
G	Taylor	2,016,737	2,628,219	3,221,709	3,221,709	2,721,700
G	Throckmorton	0	0	0	0	740,045
G	Washington	0	0	0	0	0
G	Williamson	0	0	0	0	0
G	Young	517,312	611,597	583,797	583,797	583,797
G Total		60,955,815	63,445,080	64,882,391	75,389,495	79,078,061
H	Austin	0	0	0	0	0
H	Brazoria	11,788,603	8,761,629	8,544,758	7,556,644	7,775,169
H	Chambers	2,980,081	2,236,227	2,134,580	2,134,580	2,134,580
H	Fort Bend	22,160,640	31,395,472	31,346,688	29,965,462	29,180,635

		Scenario 4L						
		2010	2015	2020	2030	2040	2050	2060
		0	0	0	0	0	0	0
E Total		1,693,798	1,542,136	2,400,192	4,506,618	9,030,469	19,636,849	47,300,112
F	Andrews	374,690	643,842	969,670	1,596,621	2,190,338	2,692,068	2,945,020
F	Borden	1,010,161	1,803,176	2,717,841	4,477,514	6,142,641	7,950,466	8,258,051
F	Brown	0	0	0	0	0	0	0
F	Broke	277,517	495,378	746,660	1,230,086	1,687,539	2,074,304	2,268,695
F	Coleman	0	0	0	0	0	0	0
F	Concho	0	0	0	0	0	0	0
F	Crane	0	0	0	0	0	0	0
F	Crockett	0	0	0	0	0	0	0
F	Ector	7,349,078	6,529,360	7,098,189	10,642,653	14,546,290	17,549,524	20,007,263
F	Glasscock	229,784	410,173	618,234	1,018,512	1,397,282	1,717,523	1,878,480
F	Howard	1,897,924	4,945,546	11,936,341	16,767,749	21,551,329	23,611,615	24,619,889
F	Irion	0	0	0	0	0	0	0
F	Kimble	0	0	0	0	0	0	0
F	Loving	0	0	0	0	0	0	0
F	Martin	0	0	0	0	0	0	0
F	Mason	0	0	0	0	0	0	0
F	McCulloch	0	0	0	0	0	0	0
F	Menard	0	0	0	0	0	0	0
F	Midland	10,512	2,102	2,660	3,806	5,192	6,201	7,227
F	Mitchell	1,254,331	1,314,061	1,295,405	1,853,803	2,528,750	3,020,155	3,519,984
F	Pecos	745,595	1,330,916	2,006,026	3,304,832	4,533,854	5,572,963	6,095,228
F	Reagan	0	0	0	0	0	0	0
F	Reeves	0	0	0	0	0	0	0
F	Runnels	0	0	0	0	0	0	0
F	Schleicher	0	0	0	0	0	0	0
F	Scurry	3,109,090	5,140,659	7,576,684	12,416,395	17,030,489	20,912,983	22,923,742
F	Sterling	1,206,273	2,153,243	3,245,481	5,346,775	7,335,169	9,016,307	9,861,263
F	Sutton	0	0	0	0	0	0	0
F	Tom Green	418,877	1,645,182	2,303,374	3,727,124	5,109,706	6,259,542	6,898,415
F	Upton	672,011	1,169,574	1,761,927	2,901,655	3,980,687	4,892,690	5,352,006
F	Ward	1,009,389	1,057,455	1,042,441	1,491,797	2,034,342	2,430,387	2,832,618
F	Winkler	0	0	0	0	0	0	0
F Total		19,565,231	28,640,668	43,320,932	66,779,323	90,074,208	107,306,727	117,467,892
G	Bell	2,748,573	2,138,267	2,080,758	2,992,466	4,082,862	4,881,655	5,675,956
G	Bosque	268,674	281,468	277,471	397,078	541,650	646,907	753,971
G	Brazos	0	0	0	0	0	0	0
G	Burleson	0	0	0	0	0	0	0
G	Callahan	0	0	0	0	0	0	0
G	Comanche	0	0	0	0	0	0	0
G	Coryell	370,022	660,504	995,546	1,640,115	2,250,052	2,765,738	3,024,927
G	Eastland	0	0	0	0	0	0	0
G	Erath	111,007	198,151	298,664	492,035	675,016	829,721	907,478
G	Falls	0	0	0	0	0	0	0
G	Fisher	0	0	0	0	0	0	0
G	Grimes	6,023,999	4,543,045	4,352,752	4,894,322	5,501,417	6,036,238	6,934,885
G	Hamilton	0	0	0	0	0	0	0
G	Haskell	0	0	0	0	0	0	0
G	Hill	0	0	0	0	0	0	0
G	Hood	3,755,475	3,197,641	3,105,400	4,444,016	6,062,027	7,240,046	8,438,280
G	Johnson	592,412	458,475	441,655	632,036	862,152	1,029,692	1,200,107
G	Jones	333,887	349,787	344,821	493,459	673,122	803,928	936,979
G	Kent	0	0	0	0	0	0	0
G	Knox	0	0	0	0	0	0	0
G	Lampasas	0	0	0	0	0	0	0
G	Lee	0	0	0	0	0	0	0
G	Limestone	10,912,087	11,746,494	11,184,984	8,629,613	5,278,307	3,351,306	3,351,306
G	McLennan	1,567,983	5,860,589	5,635,640	5,416,084	5,056,415	4,978,750	5,603,575
G	Milam	9,813,460	7,192,056	6,848,259	5,283,676	3,231,763	2,051,913	2,051,913
G	Nolan	4,259,189	9,258,451	18,202,620	26,615,680	34,793,307	39,677,510	42,188,852
G	Palo Pinto	596,144	622,582	630,268	914,264	1,247,868	1,494,846	1,730,897
G	Robertson	13,168,172	12,603,205	12,000,742	9,259,000	5,663,272	3,595,728	3,595,728
G	Shackelford	675,291	1,205,420	1,816,872	2,993,210	4,106,344	5,047,472	5,520,492
G	Somervell	19,836,144	45,064,944	42,912,293	30,260,000	37,740,000	54,400,000	71,400,000
G	Stephens							

		All Scenarios				
		2006	2007	2008	2009	2010
M	Maverick	50,480	73,584	19,657	19,657	19,657
M	Starr	62,230	193,158	51,601	51,601	51,601
M	Webb	875,278	180,386	172,187	349,708	349,708
M	Willacy	0	0	0	0	0
M	Zapata	0	0	0	0	0
M Total		7,379,335	8,545,608	8,140,559	7,418,174	7,610,767
N	Aranzas	0	0	0	0	0
N	Bee	0	0	0	0	0
N	Brooks	0	0	0	0	0
N	Duval	0	0	0	0	0
N	Jim Wells	0	0	0	0	0
N	Kenedy	0	0	851,910	1,727,910	2,199,783
N	Kleberg	0	0	0	0	0
N	Live Oak	0	0	0	0	0
N	McMullen	0	0	0	0	0
N	Nueces	3,698,103	3,489,169	3,393,352	5,394,496	5,455,800
N	San Patricio	5,537,250	3,763,296	3,677,098	3,241,901	3,317,587
N Total		9,235,353	7,252,465	7,922,360	10,364,306	10,973,171
O	Bailey	0	0	0	0	0
O	Briscoe	0	0	0	0	0
O	Castro	0	0	0	0	0
O	Cochran	0	0	0	0	0
O	Crosby	0	0	0	0	0
O	Dawson	0	0	321,930	321,930	271,966
O	Deaf Smith	0	0	0	0	0
O	Dickens	0	0	0	262,800	222,013
O	Floyd	0	131,400	131,400	131,400	111,007
O	Gaines	0	0	0	0	0
O	Garza	0	0	0	0	0
O	Hale	0	0	0	0	0
O	Hockley	0	0	0	0	0
O	Lamb	8,609,944	8,379,676	8,290,990	8,022,303	7,664,054
O	Lubbock	2,886,845	746,405	712,477	712,477	712,477
O	Lynn	0	0	0	0	0
O	Motley	0	0	0	0	0
O	Parmer	0	0	0	0	0
O	Swisher	0	0	0	0	0
O	Terry	0	17,248	16,464	16,464	16,464
O Total	Yoakum	2,552,319	2,713,883	2,646,833	2,340,979	2,408,575
O Total		14,049,108	11,988,612	12,119,894	11,808,353	11,406,557
P	Jackson	0	0	0	0	0
P	Lavaca	0	0	0	0	0
P Total		0	0	0	0	0
TX Total check		401,227,140	405,370,123	409,950,660	418,424,285	426,196,025

		Scenario 4L						
		2010	2015	2020	2030	2040	2050	2060
		19,657	19,657	27,311	44,993	61,725	75,872	82,982
		51,601	51,601	71,690	118,106	162,028	199,164	217,828
		349,708	366,361	361,159	516,841	705,016	842,020	981,375
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		2,199,783	3,926,696	5,918,523	9,750,485	13,376,558	16,442,314	17,983,192
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		5,455,800	5,474,740	5,756,949	7,481,280	9,565,509	11,082,967	12,626,464
		3,317,587	2,495,128	2,412,313	3,437,931	4,677,615	5,580,187	6,498,247
		10,973,171	11,896,565	14,087,785	20,669,695	27,619,682	33,105,468	37,107,903
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		271,966	485,470	731,727	1,205,485	1,653,788	2,032,818	2,223,322
		0	0	0	0	0	0	0
		222,013	396,302	597,328	984,069	1,350,031	1,659,443	1,814,956
		111,007	198,151	298,664	492,035	675,016	829,721	907,478
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		7,664,054	5,742,565	5,482,124	4,501,803	3,197,859	2,481,001	2,640,222
		712,477	746,405	735,807	1,052,985	1,436,364	1,715,489	1,999,404
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		16,464	17,248	17,004	24,333	33,193	39,643	46,204
		2,408,575	1,912,717	1,846,738	2,642,794	3,605,003	4,305,554	5,018,127
		11,406,557	9,498,860	9,709,391	10,903,504	11,951,253	13,063,669	14,649,712
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		426,196,025	439,151,882	469,767,734	560,621,157	678,554,356	810,314,610	965,093,572

		Scenario 4BAU						
		2010	2015	2020	2030	2040	2050	2060
		19,657	19,657	29,981	49,863	68,708	84,662	92,574
		51,601	51,601	78,700	130,892	180,358	222,238	243,006
		349,708	366,361	522,473	652,727	730,199	854,339	1,070,533
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		2,199,783	4,259,997	6,497,258	10,805,996	14,889,751	18,347,289	20,061,818
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		5,455,800	5,999,889	7,543,664	8,986,354	9,844,429	11,219,409	13,613,969
		3,317,587	2,890,380	3,475,037	4,333,138	4,843,514	5,661,342	7,085,608
		10,973,171	13,150,265	17,515,958	24,125,488	29,577,695	35,228,039	40,761,395
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		271,966	526,677	803,277	1,335,981	1,840,869	2,268,336	2,480,309
		0	0	0	0	0	0	0
		222,013	429,941	655,737	1,090,597	1,502,750	1,851,703	2,024,742
		111,007	214,970	327,868	545,298	751,375	925,851	1,012,371
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		7,664,054	5,742,565	4,868,988	2,796,353	834,293	976,131	1,223,144
		712,477	746,405	1,064,460	1,329,833	1,487,669	1,740,587	2,181,048
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		16,464	17,248	24,598	30,731	34,378	40,223	50,401
		2,408,575	2,189,981	2,671,595	3,337,629	3,733,769	4,368,644	5,474,020
		11,406,557	9,866,788	10,416,524	10,466,422	10,185,104	12,171,374	14,446,035
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		426,196,025	462,341,315	506,682,733	607,448,117	716,842,542	868,459,004	1,041,962,922

D.3 Water consumption projections for Texas *non-industrial* electricity generation (acre-feet/yr):
Pages D-36 thru D-51.

		All Scenarios				
		2006	2007	2008	2009	2010
A	Armstrong	0	0	0	0	0
A	Carson	0	0	0	0	0
A	Childress	0	0	0	0	0
A	Collingsworth	0	0	0	0	0
A	Dallam	0	0	0	0	0
A	Donley	0	0	0	0	0
A	Gray	739	739	649	2,697	2,507
A	Hall	0	0	0	0	0
A	Hansford	0	0	0	0	0
A	Hartley	0	0	0	0	0
A	Hemphill	0	0	0	0	0
A	Hutchinson	242	242	39	39	39
A	Lipscomb	0	0	0	0	0
A	Moore	360	360	358	358	358
A	Ochiltree	0	0	0	0	0
A	Oldham	0	0	0	0	0
A	Potter	18,018	18,018	15,973	15,464	14,784
A	Randall	0	0	0	0	0
A	Roberts	0	0	0	0	0
A	Sherman	0	0	0	0	0
A	Wheeler	0	0	0	0	0
A Total		19,358	19,358	17,020	18,559	17,689
B	Archer	0	0	0	0	0
B	Baylor	0	0	0	0	0
B	Clay	0	0	0	0	0
B	Cottle	0	0	0	0	0
B	Foard	0	0	0	0	0
B	Hardeman	0	0	0	0	0
B	King	0	0	0	0	0
B	Montague	0	0	0	0	0
B	Wichita	54	54	208	182	188
B	Wilbarger	4,380	4,380	5,526	5,338	5,087
B Total		4,434	4,434	5,734	5,520	5,274
C	Collin	531	531	771	771	771
C	Cooke	0	0	0	0	0
C	Dallas	1,598	1,598	3,367	3,367	3,367
C	Denton	395	395	349	349	348
C	Ellis	975	975	1,086	951	981
C	Fannin	325	325	1,261	1,261	1,261
C	Freestone	10,168	10,281	10,177	9,589	9,323
C	Grayson	0	0	0	0	0
C	Jack	2,162	2,162	1,662	1,456	1,502
C	Kaufman	5,814	5,814	4,632	4,059	4,186
C	Navarro	0	0	0	0	0
C	Parker	3	3	24	24	24
C	Rockwall	0	0	0	0	0
C	Tarrant	1,053	1,053	2,640	2,640	2,640
C	Wise	2,205	2,205	1,937	1,697	1,751
C/I	Henderson	117	117	460	460	460
C Total		25,346	25,459	28,365	26,624	26,612
D	Bowie	0	0	0	0	0
D	Camp	0	0	0	0	0
D	Cass	0	0	0	0	0
D	Delta	0	0	0	0	0
D	Franklin	0	0	0	0	0
D	Gregg	770	770	665	665	665
D	Harrison	14,425	14,425	16,221	15,427	14,887
D	Hopkins	0	0	0	0	0
D	Hunt	37	37	84	4,066	4,190
D	Lamar	3,536	3,536	4,131	3,620	3,733
D	Marion	1,401	1,401	747	747	747
D	Morris	23	23	40	40	40
D	Rains	0	0	0	0	0
D	Red River	0	0	0	0	0
D	Titus	27,041	27,041	28,914	27,930	26,617
D	Upshur	0	0	0	0	0
D	Van Zandt	0	0	0	0	0
D	Wood	0	0	0	0	0
D/I	Smith	0	0	0	0	0
D Total		47,232	47,232	50,801	52,493	50,878
E	Brewster	0	0	0	0	0
E	Culberson	0	0	0	0	0
E	El Paso	823	823	260	260	935
E	Hudspeth	0	0	0	0	0
E	Jeff Davis	0	0	0	0	0
E	Presidio	0	0	0	0	0
E	Terrell	0	0	0	0	0
E Total		823	823	260	260	935

		Scenario 3L						
		2010	2015	2020	2030	2040	2050	2060
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		2,507	1,657	1,442	1,239	1,036	833	630
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		39	41	35	43	63	81	99
		0	0	0	0	0	0	0
		358	375	314	392	578	736	902
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		14,784	12,002	11,110	42,000	41,083	40,089	39,115
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		17,689	14,075	12,900	43,674	42,761	41,739	40,746
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		188	131	126	157	232	296	363
		5,087	4,042	3,776	3,244	2,712	2,180	1,649
		5,274	4,173	3,902	3,401	2,944	2,476	2,011
		771	808	676	843	1,243	1,584	1,941
		0	0	0	0	0	0	0
		3,367	4,674	4,057	5,058	7,462	9,510	11,651
		348	361	301	375	554	705	864
		981	685	660	822	1,214	1,547	1,895
		1,261	1,321	1,105	1,378	2,033	2,591	3,175
		9,323	7,173	6,751	6,434	6,682	6,787	6,929
		0	0	0	0	0	0	0
		1,502	1,049	1,010	1,259	1,858	2,368	2,901
		4,186	2,923	2,816	3,510	5,179	6,600	8,086
		0	0	0	0	0	0	0
		24	25	21	26	39	49	61
		0	0	0	0	0	0	0
		2,640	2,765	2,314	2,885	4,257	5,425	6,647
		1,751	1,222	1,177	1,468	2,166	2,760	3,381
		460	482	403	503	742	946	1,159
		26,612	23,488	21,292	24,562	33,428	40,873	48,689
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		665	696	583	727	1,072	1,366	1,674
		14,887	11,593	10,906	10,005	9,670	9,191	8,750
		0	0	0	0	0	0	0
		4,190	2,955	2,836	3,535	5,215	6,647	8,143
		3,733	2,607	2,511	3,130	4,618	5,886	7,211
		747	782	655	816	1,205	1,535	1,881
		40	41	35	43	64	81	100
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		26,617	21,148	19,757	16,975	14,192	11,409	8,626
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		50,878	39,823	37,282	35,231	36,036	36,116	36,384
		0	0	383	1,043	2,839	7,725	21,024
		0	0	307	834	2,271	6,180	16,819
		935	744	989	1,685	3,526	7,779	18,778
		0	0	307	834	2,271	6,180	16,819
		0	0	307	834	2,271	6,180	16,819
		0	0	307	834	2,271	6,180	16,819
		0	0	307	834	2,271	6,180	16,819
		0	0	0	0	0	0	0
		935	744	2,599	6,066	15,448	40,225	107,079

		Scenario 3BAU						
		2010	2015	2020	2030	2040	2050	2060
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		2,507	1,657	1,442	1,239	1,036	833	630
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		39	41	44	55	75	89	110
		0	0	0	0	0	0	0
		358	375	399	501	687	811	1,000
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		14,784	12,002	11,348	42,309	41,390	40,300	39,390
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		17,689	14,075	13,233	44,105	43,188	42,033	41,129
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		188	154	160	202	276	326	402
		5,087	4,042	3,776	3,244	2,712	2,180	1,649
		5,274	4,196	3,936	3,446	2,988	2,507	2,050
		771	808	859	1,079	1,478	1,746	2,151
		0	0	0	0	0	0	0
		3,367	4,878	5,153	6,478	8,870	10,479	12,913
		348	361	382	480	658	777	958
		981	806</					

D.4 Projected Electricity Texas *non-industrial* net generation *plus* electricity for carbon capture (MWh/yr)

Pages D-53 thru D-68.

		All Scenarios				
		2006	2007	2008	2009	2010
A	Armstrong	0	0	0	0	0
A	Carson	256,633	175,200	175,200	2,367,390	1,999,971
A	Childress	0	0	220,752	220,752	186,491
A	Collingsworth	0	0	0	0	0
A	Dallam	0	0	0	0	0
A	Donley	0	0	0	0	0
A	Gray	343,968	306,600	302,220	1,413,776	1,317,942
A	Hall	0	0	0	0	0
A	Hansford	83,475	72,270	72,270	72,270	61,054
A	Hartley	0	0	0	0	0
A	Hempthill	0	0	0	0	0
A	Hutchinson	1,574,375	268,652	256,440	256,440	256,440
A	Lipscomb	0	0	0	0	0
A	Moore	45,243	47,216	45,070	45,070	45,070
A	Ochiltree	0	0	0	0	0
A	Oldham	0	352,590	352,590	352,590	297,868
A	Potter	8,844,514	8,027,314	7,940,239	7,684,798	7,344,209
A	Randall	0	0	0	0	0
A	Roberts	0	0	0	0	0
A	Sherman	3,799	43,800	43,800	43,800	37,002
A	Wheeler	0	0	0	0	0
A Total		11,152,007	9,293,642	9,408,582	12,456,886	11,546,048
B	Archer	0	0	0	0	0
B	Baylor	0	0	0	0	0
B	Clay	0	0	0	0	0
B	Cottle	0	0	217,029	217,029	183,346
B	Foard	0	0	0	0	0
B	Hardeman	0	0	0	0	0
B	King	0	0	0	0	0
B	Montague	0	0	0	0	0
B	Wichita	76,437	301,344	294,336	257,894	265,954
B	Wilbarger	3,964,478	5,045,760	5,001,610	4,831,315	4,604,256
B Total		4,040,915	5,347,104	5,512,975	5,306,239	5,053,556
C	Collin	494,119	562,646	537,071	537,071	537,071
C	Cooke	0	0	0	0	0
C	Dallas	1,131,215	2,592,759	2,474,906	2,474,906	2,474,906
C	Denton	216,151	228,697	202,588	203,114	197,858
C	Ellis	8,438,321	8,106,154	7,917,638	6,937,359	7,154,152
C	Fannin	278,892	1,132,615	1,081,133	1,081,133	1,081,133
C	Freestone	12,081,231	12,359,659	12,194,905	11,437,554	11,161,344
C	Grayson	71,607	452,542	137,637	137,970	134,641
C	Jack	3,063,108	2,673,552	2,617,488	2,325,955	2,349,642
C	Kaufman	8,237,423	6,719,218	6,562,957	5,750,400	5,930,100
C	Navarro	0	0	0	0	0
C	Pepper	8,257	103,368	99,759	100,258	95,265
C	Rockwall	0	0	0	0	0
C	Tarrant	714,854	2,061,526	1,967,820	1,967,820	1,967,820
C	Wise	3,123,527	2,810,033	2,744,683	2,404,865	2,480,017
C/I	Henderson	56,903	234,444	223,787	223,787	223,787
C Total		37,915,608	40,037,212	38,762,373	35,582,193	35,787,737
D	Bowie	0	0	0	0	0
D	Camp	0	0	0	0	0
D	Cass	0	0	0	0	0
D	Delta	0	0	0	0	0
D	Franklin	0	0	0	0	0
D	Gregg	533,649	482,764	460,820	460,820	460,820
D	Harrison	7,714,387	8,961,576	8,826,462	8,183,238	8,060,401
D	Hopkins	0	0	0	0	0
D	Hunt	34,526	81,617	77,907	5,719,347	5,895,642
D	Lamar	5,009,525	5,925,225	5,852,871	5,128,230	5,288,487
D	Marion	1,522,180	849,895	811,264	811,264	811,264
D	Morris	21,014	38,544	36,792	36,792	36,792
D	Rains	0	0	0	0	0
D	Red River	0	0	0	0	0
D	Titus	24,997,132	25,607,232	25,383,169	24,518,925	23,366,599
D	Upshur	0	0	0	0	0
D	Van Zandt	0	0	0	0	0
D	Wood	0	0	0	0	0
D/I	Smith	0	0	0	0	0
D Total		39,832,413	42,013,854	41,449,285	44,858,615	43,920,005
E	Brewster	0	0	0	0	0
E	Culberson	125,120	139,284	139,284	139,284	117,667
E	El Paso	1,678,803	556,917	531,732	531,732	1,488,723
E	Hudspeth	0	0	0	0	0
E	Jeff Davis	0	0	0	0	0
E	Presidio	0	0	0	0	0
E	Terrell	0	0	0	0	0
E Total		1,803,923	696,201	671,016	671,016	1,606,390
F	Andrews	0	0	424,860	424,860	358,922
F	Borden	202,601	183,960	886,950	1,195,740	1,010,161
F	Brown	0	0	0	0	0
F	Coke	0	0	328,500	328,500	277,517
F	Coleman	0	0	0	0	0

		Scenario 1L						
		2010	2015	2020	2030	2040	2050	2060
		0	0	0	0	0	0	0
		1,999,971	3,570,024	5,393,782	8,885,998	12,190,581	14,984,525	16,388,787
		186,491	332,894	502,954	828,593	1,136,735	1,397,262	1,528,205
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		1,317,942	920,107	854,908	661,864	551,554	441,243	330,932
		0	0	0	0	0	0	0
		61,054	108,983	164,658	271,265	372,145	457,437	500,305
		0	0	0	0	0	0	0
		256,440	268,652	181,296	216,796	223,035	258,502	322,710
		45,070	47,216	31,963	38,103	39,199	45,433	56,717
		297,868	531,706	803,329	1,323,447	1,815,618	2,231,738	2,440,883
		7,344,209	6,125,693	5,905,291	22,142,342	21,430,960	20,769,479	20,157,069
		0	0	0	0	0	0	0
		37,002	66,050	99,792	164,403	225,543	277,235	303,215
		0	0	0	0	0	0	0
		11,546,048	11,971,325	13,937,874	34,532,811	37,985,370	40,862,852	42,028,825
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		183,346	327,280	494,472	814,618	1,117,564	1,373,697	1,502,432
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		265,954	175,200	144,242	172,487	177,450	205,669	256,754
		4,604,256	3,778,013	3,730,508	2,888,135	2,406,779	1,925,423	1,444,667
		5,053,556	4,280,493	4,369,222	3,875,240	3,701,793	3,504,789	3,203,253
		537,071	562,646	379,694	454,043	467,109	541,389	675,862
		0	0	0	0	0	0	0
		2,474,906	4,125,759	3,011,810	3,601,558	3,705,201	4,294,401	5,361,070
		197,858	180,447	122,078	150,103	159,581	186,405	228,784
		7,154,152	4,712,880	3,880,120	4,639,893	4,773,416	5,532,483	6,906,674
		1,081,133	1,132,615	764,331	913,996	940,298	1,089,824	1,360,521
		11,161,344	8,601,209	8,120,684	7,074,538	6,332,012	5,890,631	5,745,378
		134,641	118,796	162,478	266,416	364,350	447,615	490,177
		2,349,642	1,797,902	1,752,694	2,366,314	2,772,859	3,308,755	3,873,321
		5,930,100	3,906,522	3,216,244	3,846,023	3,956,700	4,585,894	5,724,965
		0	0	0	0	0	0	0
		95,265	74,607	50,348	60,206	61,939	71,798	89,620
		0	0	0	0	0	0	0
		1,967,820	2,061,526	1,391,194	1,663,606	1,711,480	1,983,639	2,476,347
		2,480,017	1,633,740	1,345,060	1,608,439	1,654,725	1,917,859	2,394,228
		223,787	234,444	158,211	189,191	194,635	225,586	281,619
		35,787,737	29,143,094	24,354,947	26,834,328	27,094,305	30,076,269	35,608,565
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		460,820	482,764	325,787	389,580	400,791	464,524	579,906
		8,060,401	6,055,823	5,617,055	5,137,537	4,718,561	4,601,224	4,780,501
		0	0	0	0	0	0	0
		5,895,642	3,914,117	3,210,380	3,839,010	3,949,486	4,577,532	5,714,527
		5,288,487	3,483,852	2,969,260	3,429,899	3,529,601	4,089,719	5,106,547
		811,264	849,895	573,541	685,847	705,583	817,785	1,020,912
		36,792	38,544	26,011	31,104	31,999	37,088	46,300
		0	0	0	0	0	0	0
		23,366,599	19,173,415	18,932,326	14,657,285	12,214,404	9,771,523	7,328,642
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		43,920,005	33,998,410	31,553,360	28,170,262	25,549,425	24,359,395	24,576,334
		0	0	156,112	424,851	1,156,216	3,146,593	8,563,322
		117,667	210,040	442,229	862,684	1,642,198	3,398,880	7,814,882
		1,488,723	1,189,083	1,024,556	1,418,642	2,038,443	3,808,838	8,460,240
		0	0	124,889	339,881	924,972	2,517,274	6,850,657
		0	0	124,889	339,881	924,972	2,517,274	6,850,657
		0	0	124,889	339,881	924,972	2,517,274	6,850,657
		0	0	0	0	0	0	0
		1,606,390	1,399,124	1,397,565	3,725,820	7,611,775	17,906,133	45,390,415
		358,922	640,689	967,987	1,594,712	2,187,764	2,689,175	2,941,188
		1,010,161	1,803,176	2,724,334	4,488,210	6,157,315	7,568,502	8,277,778
		277,517	495,378	748,443	1,233,025	1,691,570	2,079,259	2,274,115
		0	0	0	0	0	0	0

		Scenario 1BAU						
		2010	2015	2020	2030	2040	2050	2060
		0	0	0	0	0	0	0
		1,999,971	3,873,050	5,921,205				

		All Scenarios				
		2006	2007	2008	2009	2010
A	Armstrong	0	0	0	0	0
A	Carson	256,633	175,200	175,200	2,367,390	1,999,971
A	Childress	0	0	220,752	220,752	186,491
A	Collingsworth	0	0	0	0	0
A	Dallam	0	0	0	0	0
A	Donley	0	0	0	0	0
A	Gray	343,968	306,600	302,220	1,413,776	1,317,942
A	Hall	0	0	0	0	0
A	Hansford	83,475	72,270	72,270	72,270	61,054
A	Hartley	0	0	0	0	0
A	Hemphill	0	0	0	0	0
A	Hutchinson	1,574,375	268,652	256,440	256,440	256,440
A	Lipscomb	0	0	0	0	0
A	Moore	45,243	47,216	45,070	45,070	45,070
A	Ochiltree	0	0	0	0	0
A	Oldham	0	352,590	352,590	352,590	297,868
A	Potter	8,844,514	8,027,314	7,940,239	7,684,798	7,344,209
A	Randall	0	0	0	0	0
A	Roberts	0	0	0	0	0
A	Sherman	3,799	43,800	43,800	43,800	37,002
A	Wheeler	0	0	0	0	0
A Total		11,152,007	9,293,642	9,408,582	12,456,886	11,546,048
B	Archer	0	0	0	0	0
B	Baylor	0	0	0	0	0
B	Clay	0	0	0	0	0
B	Cottle	0	0	217,029	217,029	183,346
B	Foard	0	0	0	0	0
B	Hardeman	0	0	0	0	0
B	King	0	0	0	0	0
B	Montague	0	0	0	0	0
B	Wichita	76,437	301,344	294,336	257,894	265,954
B	Wilbarger	3,964,478	5,045,760	5,001,610	4,831,315	4,604,256
B Total		4,040,915	5,347,104	5,512,975	5,306,329	5,053,556
C	Collin	494,119	562,646	537,071	537,071	537,071
C	Cooke	0	0	0	0	0
C	Dallas	1,131,215	2,592,759	2,474,906	2,474,906	2,474,906
C	Denton	216,151	228,697	202,588	203,114	197,858
C	Ellis	8,438,321	8,106,154	7,917,638	6,937,359	7,154,152
C	Fannin	278,892	1,132,615	1,081,133	1,081,133	1,081,133
C	Freeston	12,081,231	12,359,659	12,194,905	11,437,554	11,161,344
C	Grayson	71,607	452,542	137,637	137,970	134,641
C	Jack	3,063,108	2,673,552	2,617,488	2,325,955	2,349,642
C	Kaufman	8,237,423	6,719,218	6,562,957	5,750,440	5,930,100
C	Navarro	8,257	103,368	99,759	100,258	95,265
C	Rockwall	0	0	0	0	0
C	Tarrant	714,854	2,061,526	1,967,820	1,967,820	1,967,820
C	Wise	3,123,527	2,810,033	2,744,683	2,404,865	2,480,017
C/I	Henderson	56,903	234,444	223,787	223,787	223,787
C Total		37,915,608	40,037,212	38,762,373	35,582,193	35,787,737
D	Bowie	0	0	0	0	0
D	Camp	0	0	0	0	0
D	Cass	0	0	0	0	0
D	Delta	0	0	0	0	0
D	Franklin	0	0	0	0	0
D	Gregg	533,649	482,764	460,820	460,820	460,820
D	Harrison	7,714,387	8,961,576	8,826,462	8,183,238	8,060,401
D	Hopkins	0	0	0	0	0
D	Hunt	34,526	81,617	77,907	5,719,347	5,895,642
D	Lamar	5,009,525	5,925,225	5,852,871	5,128,230	5,288,487
D	Marion	1,522,180	849,895	811,264	811,264	811,264
D	Morris	21,014	38,544	36,792	36,792	36,792
D	Rains	0	0	0	0	0
D	Red River	0	0	0	0	0
D	Titus	24,997,132	25,607,232	25,383,169	24,518,925	23,366,599
D	Upshur	0	0	0	0	0
D	Van Zandt	0	0	0	0	0
D	Wood	0	0	0	0	0
D/I	Smith	0	0	0	0	0
D Total		39,832,413	42,013,854	41,449,285	44,858,615	43,920,005
E	Brewster	0	0	0	0	0
E	Culberson	125,120	139,284	139,284	139,284	117,667
E	El Paso	1,678,803	556,917	531,732	531,732	1,488,723
E	Hudspeth	0	0	0	0	0
E	Jeff Davis	0	0	0	0	0
E	Presidio	0	0	0	0	0
E	Terrell	0	0	0	0	0
E Total		1,803,923	696,201	671,016	671,016	1,606,390
F	Andrews	0	0	424,860	424,860	358,922
F	Borden	202,601	183,960	886,950	1,195,740	1,010,161
F	Brown	0	0	0	0	0
F	Coke	0	0	328,500	328,500	277,517
F	Coleman	0	0	0	0	0

		Scenario 4L						
		2010	2015	2020	2030	2040	2050	2060
		0	0	0	0	0	0	0
		1,999,971	3,570,024	5,393,782	8,885,998	12,190,581	14,984,525	16,388,787
		186,491	332,894	502,954	828,593	1,136,735	1,397,262	1,528,205
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		1,317,942	825,849	736,324	568,100	347,479	220,621	220,621
		0	0	0	0	0	0	0
		61,054	108,983	164,658	271,265	372,145	457,437	500,305
		0	0	0	0	0	0	0
		256,440	268,652	220,465	342,876	490,836	598,562	708,135
		0	0	0	0	0	0	0
		45,070	47,216	38,747	60,262	86,266	105,199	124,457
		0	0	0	0	0	0	0
		297,868	531,706	803,329	1,323,447	1,815,618	2,231,738	2,440,883
		7,344,209	5,520,202	5,195,978	18,543,872	20,872,420	28,066,002	36,253,079
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		37,002	66,050	99,792	164,403	225,543	277,235	303,215
		0	0	0	0	0	0	0
		11,546,048	11,271,576	13,156,029	30,988,815	37,537,624	48,338,580	58,467,689
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		183,346	327,280	494,472	814,618	1,117,564	1,373,697	1,502,432
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		265,954	205,825	175,406	272,798	390,518	476,226	563,405
		4,604,256	3,374,352	3,213,050	2,478,982	1,516,271	962,712	962,712
		5,053,556	3,907,457	3,882,927	3,566,399	3,024,353	2,812,635	3,028,548
		537,071	562,646	461,726	718,096	1,027,975	1,253,587	1,483,071
		0	0	0	0	0	0	0
		2,474,906	4,393,727	3,662,505	5,696,080	8,154,099	9,943,700	11,764,010
		197,858	180,237	146,481	228,654	326,429	398,271	468,914
		7,154,152	5,536,691	4,718,411	7,338,268	10,504,938	12,810,484	15,155,593
		1,081,133	1,132,615	929,463	1,445,539	2,069,330	2,523,491	2,985,446
		11,161,344	8,321,222	7,656,931	7,687,785	7,598,648	7,780,740	8,909,706
		134,641	118,663	163,080	268,354	368,465	452,840	496,099
		2,349,642	2,042,902	2,001,989	3,168,804	4,477,401	5,473,216	6,326,531
		5,930,100	4,589,382	3,911,106	6,082,715	8,707,578	10,618,653	12,562,521
		0	0	0	0	0	0	0
		95,265	74,407	625	95,220	136,310	166,226	196,656
		0	0	0	0	0	0	0
		1,967,820	2,061,526	1,691,758	2,631,093	3,766,484	4,593,123	5,433,948
		2,480,017	1,919,318	1,635,657	2,543,842	3,641,582	4,440,809	5,253,751
		223,787	234,444	229,217	229,217	428,338	522,346	617,967
		35,787,737	31,167,781	27,232,735	38,203,668	51,207,577	60,977,487	71,654,214
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		460,820	482,764	396,172	616,144	882,027	1,075,608	1,272,510
		8,060,401	6,048,846	5,501,668	6,027,844	6,588,097	7,143,972	8,274,789
		0	0	0	0	0	0	0
		5,895,642	4,584,038	3,903,975	6,071,824	8,691,702	10,599,292	12,539,616
		5,288,487	4,092,829	3,487,940	5,424,590	7,765,453	9,469,757	11,203,307
		811,264	849,895	697,453	1,084,708	1,552,790	1,893,585	2,240,227
		36,792	38,544	31,631	49,193	70,421	85,877	101,598
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		23,366,599	17,124,836	16,306,229	12,580,836	7,695,074	4,885,762	4,885,762
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		43,920,005	33,221,752	30,325,068	31,854,938	33,245,565	35,153,851	40,517,809
		0	0	0	0	0	0	0
		117,667	210,040	156,112	424,851	1,156,216	3,146,953	8,563,322
		1,488,723	1,299,333	1,217,525	2,039,791	3,357,804	5,484,188	10,359,090
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		0	0	0	0	0	0	0
		1,606,390	1,509,373	2,190,534	4,346,970	8,931,136	19,581,484	47,289,265
		358,922	640,689	967,987	1,594,712	2,187,764	2,689,175	2,941,188
		1,010,161	1,803,176	2,724,334	4,488,210	6,157,315	7,568,502	8,277,778
		277,517	495,378	74				

		All Scenarios					Scenario 4L						Scenario 4BAU							
		2006	2007	2008	2009	2010	2010	2015	2020	2030	2040	2050	2060	2010	2015	2020	2030	2040	2050	2060
F	Concho	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
F	Crane	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
F	Crockett	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
F	Ector	4,977,708	5,311,941	7,185,688	6,418,046	7,349,078	7,349,078	6,529,360	6,543,206	10,383,309	14,643,381	17,906,508	20,627,174	7,349,078	7,462,558	9,235,457	12,866,665	15,603,453	18,818,031	22,782,391
F	Glasscock	5,001	271,998	271,998	271,998	229,784	229,784	410,173	619,711	1,020,945	1,400,620	1,721,626	1,882,967	229,784	444,989	680,309	1,131,464	1,559,062	1,921,091	2,100,614
F	Howard	707,244	1,254,651	2,178,393	2,073,623	1,890,040	1,890,040	4,943,970	11,875,763	16,746,136	21,575,586	23,669,787	24,710,633	1,890,040	5,209,184	6,006,700	7,472,859	8,803,921	10,800,319	12,068,416
F	Irion	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
F	Kimble	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
F	Loving	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
F	Martin	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
F	Mason	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
F	McCulloch	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
F	Menard	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
F	Midland	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
F	Mitchell	114,583	1,314,061	1,254,331	1,254,331	1,254,331	1,254,331	1,314,061	1,078,363	1,677,116	2,400,838	2,927,756	3,463,717	1,254,331	1,314,061	1,698,778	2,199,734	2,497,690	2,975,134	3,806,615
F	Pecos	1,082,764	882,570	882,570	882,570	745,595	745,595	1,330,916	2,010,818	3,312,727	4,544,685	5,586,275	6,109,788	745,595	1,443,885	2,207,443	3,671,337	5,058,792	6,233,490	6,816,001
F	Reagan	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
F	Reeves	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
F	Runnels	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
F	Schleicher	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
F	Scurry	510,658	1,049,010	2,433,090	2,433,090	2,703,014	2,703,014	4,824,982	7,289,838	12,009,661	16,475,892	20,251,981	22,149,878	2,703,014	5,234,529	8,002,665	13,309,734	18,339,690	22,598,336	24,710,119
F	Sterling	0	770,880	770,880	1,427,880	1,206,273	1,206,273	2,153,243	3,253,234	5,359,548	7,352,691	9,037,845	9,884,819	1,206,273	2,336,012	3,571,347	5,939,731	8,184,448	10,084,952	11,027,377
F	Sutton	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
F	Tom Green	0	474,617	463,579	406,184	418,877	418,877	1,645,182	2,272,113	3,717,723	5,125,919	6,294,746	6,951,669	418,877	1,809,187	2,626,217	4,207,552	5,661,012	6,949,281	7,740,471
F	Upton	900,754	773,070	773,070	773,070	653,090	653,090	1,165,790	1,761,337	2,901,718	3,980,828	4,893,189	5,351,750	653,090	1,264,743	1,933,567	3,215,836	4,431,150	5,460,104	5,970,344
F	Ward	959,847	1,057,455	1,009,389	1,009,389	1,009,389	1,009,389	1,057,455	867,783	1,349,613	1,932,009	2,356,031	2,787,330	1,009,389	1,057,455	1,367,045	1,770,175	2,009,947	2,394,157	3,063,269
F	Winkler	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
F Total		9,461,160	13,344,213	18,863,298	18,899,280	19,106,070	19,106,070	28,314,374	42,012,930	65,794,442	89,469,096	106,982,681	117,412,806	19,106,070	30,765,329	42,204,524	63,893,000	83,321,186	102,001,164	115,138,327
G	Bell	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
G	Boesque	1,368,643	2,282,068	2,098,458	2,666,772	2,748,573	2,748,573	2,138,267	1,848,806	2,881,651	4,118,441	5,023,828	5,926,511	2,748,573	2,472,584	2,879,796	3,756,694	4,295,839	5,124,077	6,516,670
G	Brazos	480,983	281,468	268,674	268,674	268,674	268,674	281,468	230,982	359,233	514,252	627,116	741,917	268,674	281,468	363,873	471,176	534,997	637,264	815,364
G	Burleson	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
G	Callahan	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
G	Comanche	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
G	Coryell	0	0	0	438,000	370,022	370,022	660,504	997,924	1,644,033	2,255,427	2,772,345	3,032,153	370,022	716,568	1,095,505	1,822,003	2,510,567	3,093,544	3,382,631
G	Eastland	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
G	Erath	0	131,400	131,400	131,400	111,007	111,007	198,151	299,377	493,210	676,628	831,704	909,646	111,007	214,970	328,652	546,601	753,170	928,063	1,014,789
G	Falls	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
G	Fisher	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
G	Grimes	7,754,076	6,717,790	6,607,664	6,072,350	6,023,999	6,023,999	4,543,045	4,084,133	4,765,769	5,542,164	6,200,246	7,224,270	6,023,999	4,929,938	4,951,171	5,021,492	4,772,171	5,684,393	7,273,050
G	Hamilton	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
G	Haskell	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
G	Hill	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
G	Hood	3,945,283	4,164,294	4,042,705	3,673,916	3,755,475	3,755,475	3,197,641	2,689,859	4,183,381	5,988,628	7,302,967	8,639,861	3,755,475	3,530,970	4,237,415	5,486,995	6,230,213	7,421,146	9,495,185
G	Johnson	461,095	671,244	655,633	574,480	592,412	592,412	458,475	390,716	607,658	869,879	1,060,794	1,254,984	461,095	531,844	615,506	797,014	904,971	1,077,960	1,379,225
G	Jones	0	349,787	333,887	333,887	333,887	333,887	349,787	287,047	446,427	639,073	779,332	921,988	333,887	349,787	452,194	585,542	664,854	791,944	1,013,274
G	Kent	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
G	Knox	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
G	Lampasas	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
G	Lee	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
G	Limestone	12,709,534	11,958,451	11,853,815	11,450,217	10,912,087	10,912,087	11,746,494	11,184,984	8,629,613	5,278,307	3,351,306	3,351,306	12,709,534	11,746,494	9,425,549	4,524,263	0	0	0
G	McLennan	621,373	1,639,373	1,564,856	1,564,856	1,564,856	1,564,856	5,857,313	5,361,638	5,191,033	4,890,533	4,855,947	5,524,590	1,564,856	5,857,313	5,503,863	4,368,880	3,116,022	3,711,664	4,748,988
G	Milam	3,878,580	4,138,925	4,102,709	3,963,020	3,776,769	3,776,769	2,767,906	6,848,259	5,283,676	3,231,763	2,051,913	2,051,913	3,878,580	4,138,925	5,771,005	2,770,082	0	0	0
G	Nolan	1,674,043	3,034,639	4,125,785	4,796,906	4,259,189	4,259,189	9,258,451	18,124,310	26,601,608	34,853,479	39,793,177	42,355,630	1,674,043	3,034,639	4,125,785	12,668,692	22,885,941	28,128,547	31,144,229
G	Palo Pinto	771,469	734,929	596,144	596,144	596,144	596,144	622,582	534,337	836,283	1,191,559	1,454,326	1,706,400	771,469	734,929	596,144	814,522	1,077,775	1,249,009	1,493,653
G	Robertson	2,351,664	2,447,194	2,425,781	8,080,375	13,168,172	13,168,172	12,603,205	12,000,742	9,259,000	5,663,272	3,595,728	3,595,728	2,351,664	2,447,194	2,425,781	10,112,985	4,854,233	0	0
G	Shackelford	0	438,000	799,350	799,350	675,291	675,291	1,205,420	1,821,212	3,000,360	4,116,154	5,059,530	5,533,679	0	438,000	799,350	1,999,297	3,325,156	4,581,784	5,645,717
G	Somervell	19,836,144	18,668,524	18,945,252	19,836,144	19,836,144	19,836,144	45,064,944	42,912,293	30,260,000	37,740,000	54,400,000	71,400,000	19,836,144	45,064,944	42,912,293	48,280,000	75,480,000	91,800,000	102,000,000
G	Stevens	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
G	Stonewall	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
G	Taylor	2,016,737	2,628,219	3,221,709	3,221,709	2,721,700	2,721,700	4,858,337	7,340,233	12,092,685	16,589,791	20,391,984	22,303,002	2,016,737	5,270,716	8,057,988	13,401,745	18,466,474	22,754,559	24,880,942
G	Throckmorton	0	0	0	0	740,045	740,045</													

Appendix E: Programs and inputs for Electricity and Water Projections

Water Consumption for Steam-electric: Projection Methodology

Calculate “Today’s” Water (2006)

Input File (.xls):

- TWDBData_Calculations_FINAL.xls
 - Worksheet “MatlabInput-2006”

Translation file:

- TWDB_MatlabCalculator.m

Output to Files (.xls):

- TWDBFutureProjectionFinalData_Total
 - Worksheet “2006”
- TWDBFutureProjectionFinalData_nonindus
 - Worksheet “2006”

Near Term Projection (2007-2015)

Input Files (.xls):

- TWDBData_Calculations_FINAL.xls
 - Worksheets “MatlabInput-2007” thru “MatlabInput-2010”
 - Worksheets “MatlabInput-2015-1L” thru “MatlabInput-2015-4BAU”

Translation file:

- TWDB_MatlabCalculator.m

Output to Files (.xls):

- TWDBFutureProjectionFinalData_Total
 - Worksheets “2007” thru “2015-4BAU”
- TWDBFutureProjectionFinalData_nonindus
 - Worksheets “2007” thru “2015-4BAU”

Long Term Projection (2020-2060)

Input File(s):

- TWDBProjections_ScenarioN.xls
 - Worksheet “Low Case, Scen *N*”
 - Worksheet “BAU Case, Scen *N*”
- gal/kWh per fuel per county from:
 - TWDBFutureProjectionFinalData_Total.xls for year 2015 for each scenario

Translation file:

- TWDB_FutureProjectionFinalData_total
 - Worksheets “2020” thru “2060”
- TWDB_FutureProjectionFinalData_nonindus
 - Worksheets “2020” thru “2060”

Output Files (.xls):

- TWDBFutureProjectionFinalData_Total
 - Worksheets “2020” thru “2060”
- TWDBFutureProjectionFinalData_nonindus
 - Worksheets “2020” thru “2060”

Figure E1. The files that are used for the method for projecting future water demand for electricity generation as shown in Figure 3.2.

Appendix F: Notes and Minutes from Public Meetings

F.1 Meeting 1

Steam-electric Water Projections Stakeholder Meeting

Date: June 24, 2008

Time: 1:00 pm

Location: Texas Water Development Board, Room 513 F

Purpose: Discuss TWDB contract with the Bureau of Economic Geology to review and update steam-electric water demand projections.

TWDB staff in attendance: Carolyn Brittin, Dan Hardin, David Meeseey, Stuart Norvell, Matt Nelson, and Laila Johnson

Non-TWDB staff in attendance:

Greg Carter, Chris Bisset and Kenneth Patton of American Electrical Power; Michael Webber, Ian Duncan, and Carey King of the Bureau of Economic Geology; Sandy Dannhard and Rick Gangluff of the South Texas Project; Jerry Johnson and Gary Spicer of Luminant Inc. and Ted Long of NRG Inc.

Meeting Notes/Discussion:

Carolyn Brittin began the meeting, welcomed attendees to the TWDB and asked for introductions, and Dr. Ian Duncan gave a brief overview of the study and progress made since the report was initially distributed for public comment. In particular, the study authors have located large amounts of additional data from the TCEQ. Industry representatives then provided commentary on the draft report. Major concerns and comments are:

- Regarding the role of drought planning - the focus should be on demands during drought rather than impacts during drought.

- Data gathered from 2006 may overestimate water demands and projections since this was a dry year for many areas of the state; the general consensus is that this is appropriate given that it is better to overestimate rather than underestimate.
- Industry representatives stated that it would be beneficial for them to look at TCEQ data to help ensure that data are correct and applicable for use in the study. They volunteered to review these data and compare them to records at their respective facilities.
- The authors will revamp draft projections using steam-electric projections from 2006 regional water plans as the baseline in this study. They will also include all planned and announced electrical generating units including the nuclear facility planned for Victoria (Region L).
- The report contains a sundry of different projection scenarios under various energy policy settings. The BEG will recommend a scenario they consider “most likely” and this scenario will be used in the current round of planning.
- Several agencies, including the TWDB, TCEQ and Texas Parks and Wildlife, will need to agree on demand projections used in the current round of planning and the Board will have to approve them.
- Although the projections numbers will be adopted by the Board, planning groups may submit requests for revisions during the planning cycle.
- The draft report needs to clearly state the methodology used so that planning groups can easily understand what numbers are included and how the authors arrived at the figures.
- In the current report some projections are less than the numbers used in the last planning cycle. Ian Duncan noted that this was mistake that they will correct in the final report.
- Terminology in the report should be clearly defined – in some cases industry representatives were not familiar with the terminology used in the report.
- The group suggested that the authors clarify where the terms in the report originated and include alternate terms and a glossary.
- Discussion took place regarding how projections were taken from ERCOT and a statement was made that ERCOT accounts for about 90 percent of generation in Texas although some areas in the state are not on the ERCOT grid.
- Descriptions of new or alternative cooling technologies in the report are inaccurate or misleading, and there is too much emphasis placed here, and although it is part of the original request for

proposal, the report should focus primarily on water demands and projections for the industry rather than analyzing and recommending different types of cooling technology.

- Similarly, the report should not contain any type of policy recommendation and remain strictly technical in nature.
- The Energy Policy Act is the primary driving force for how the industry is selecting fuel types for future electricity demands as opposed to potential carbon emission caps. Also, the impact of Section 316b of the Clean Water Act is not entirely accurate in that there may be some misunderstanding how 316b is affecting current and future plant operations.
- There appears to be a significant misunderstanding between the amount of water circulated through a power plant and the amount of water actually consumed. The critical metric for steam-electric water demand is the amount of water actually consumed. The amount of water circulated to condense steam is a factor of steam turbine and surface condenser design.
- The group agreed that they want a report that can be built upon and updated in the future with clear terminology and methodology so planning groups can easily understand the document. In other words, we should produce a “living document” that can be updated each planning cycle using consistent methodologies and terms.

The meeting adjourned.

Appendix G: Texas Water Development Board Comments on First Draft of Report

Carter _____
Norvell _____

Dr. Ian Duncan
Associate Director for Earth and Environmental Systems
Bureau of Economic Geology
University Station, Box X
Austin, TX 78713-8924

Re: Water Research Contract Between The Bureau of Economic Geology (BEG) and the Texas Water Development Board (Board), TWDB Contract No. 070483756, Draft Report Comments

Dear Dr. Duncan:

Staff members of the Texas Water Development Board have completed a review of the draft report under TWDB Contract No. 070483756. As stated in the above-referenced contract, the BEG will consider incorporating draft report comments, shown in ATTACHMENT I from the EXECUTIVE ADMINISTRATOR as well as other commentors, into the final report. In addition, the BEG will include a copy of the EXECUTIVE ADMINISTRATOR's draft report comments in the Final Report. Please note that the Board's draft report comments were compiled and based partly on comments solicited from the general public. The BEG has received copies of public comments submitted by the Board.

The Board looks forward to receiving one (1) electronic copy of the entire Final Report in Portable Document Format (PDF) and nine (9) bound double-sided copies. The BEG shall also submit one (1) electronic copy of any computer programs or models and an operations manual developed under the terms of this CONTRACT.

If you have any questions concerning this contract, please contact Mr. Stuart Norvell, the Board's designated Contract Manager for this study, at (512) 463-7928.

Sincerely,

Carolyn L. Brittin
Deputy Executive Administrator
Water Planning and Information

Enclosures

cc: Stuart Norvell, TWDB

ATTACHMENT I
TWDB Comments Contract 0704830756
“Water Demand for Power Generation in Texas”

General comments

1. Disaggregate state and regional level projections to the county level.
2. In the report, please provide a succinct and clear description of the methodology used to generate estimates and forecasts.
3. Remove all policy recommendations from the report including statements recommending different types of cooling systems.
4. At the beginning of the executive summary and introduction to the main body clearly state the background, objectives, and goals of the study.
5. In the executive summary provide a clear and focused synopsis of study results with the primary focus on water demand projections with graphs comparing projections in this study to those used in the 2006 regional water plans and 2007 state water plan.
6. Provide a clear discussion of what “water use” entails with respect to power generation including distinguishing the difference between diversions, withdrawals, consumption and discharges. From a planning perspective, the most important aspects are diversions, consumption and releases/discharges. Eliminate data or statements using “withdrawals” in the context of re-circulating flows in closed loop cooling cycles; do not add water diverted for cooling tower makeup to the amount of water diverted for once through cooling; and eliminate references to diversions to cooling lakes as a “consumptive” use. In general, limit the use of the term withdrawal, and do not use interchangeably with “diversions.” The report should focus primarily on consumptive use.
7. Use consumption parameters consistent with those recommended by industry representatives: 0.2-0.7 gal/k/Wh for coal, 0.6 gal/k/Wh for nuclear, 0.5-0.7 gal/k/Wh for natural gas steam turbines, 0.6 gal/k/Wh for natural gas combined cycle units, and 0.0 gal/k/Wh for wind turbines.
8. Throughout the report refer to the South Texas Project as a re-circulating closed cooling system (RC).
9. Provide a comparison of electrical generation projections with projections from other sources including ERCOT and the Public Utilities Commission.
10. Report all water data in acre-feet.
11. Edit the report extensively for syntax and grammar.
12. Submit final report in double-sided format on recycled paper.

13. Submit all data, maps (including GIS databases as specified in the contract), and functioning analytic models in an electronic format along with the final report per the contract.
14. Please provide brief summaries (dates, locations, agendas, attendees) of any public or other meetings held as required per the scope of work.
15. Recognize all power industry representatives who provided technical expertise and comments in the acknowledgement section of the report.
16. Use existing Board approved steam-electric projections from 2006 regional water plans as the baseline for projections; discuss and present this information in the report.
17. Include water demands for all electrical generating units currently in the planning, design or construction phase and provide a tabular listing of these facilities along with projected water requirements. Include the following facilities:
 - Limestone County (Region G): NRG Energy is adding an 800 MW pulverized coal unit expected operational in 2012.
 - Robertson County (Region G): “Oak Grove 1 and 2” (1,710 MW) under construction by Luminant (formerly TXU) and expected operational by 2010.
 - Bexar County (Region L): “Spruce 2” (750 MW) expected operational in 2010.
 - McClennan County (Region G): Brazos Electric is adding a 900 MW pulverized coal facility (“Sandy Creek”) expected to be operational in 2012.
 - Goliad County (Region L): International Power PLC and South Texas Electric Cooperative announced their partnership and filed for a permit with the TCEQ to build and operate a second 650 MW electric power generating unit at International Power's Coletto Creek plant.
 - Nolan County (Region G): Teneska announced in March 2008 its intent to develop a 600 MW net advanced coal fueled generation plant able to capture 90 percent of CO2 emissions.
 - Summit Power announced plans for an Integrated Gasification Combined Cycle (IGCC) project to be located in West Texas; however they have not announced a specific site.

- Chambers County (Region H): NRG Energy is adding a natural gas fueled combined cycle generating plant at its Cedar Bayou Generating Station that will add 550 MW to the Texas grid.
- Harris County (Region H): Calpine is expanding the capacity of its Deer Park Energy Center near Houston to include a 1,007 MW low-carbon natural gas fired combined cycle cogeneration facility.
- Wharton County (Region K) and Midland County (Region F), Navasota Energy is doubling the capacity of its power plants from 275 MW to 550 MW with additional combined cycle units at each location. The Colorado Bend facility at Wharton is expected to be complete in June 2008, and the Quail Run facility in Odessa is slated for completion in May of 2008.
- Matagorda County (Region K): NRG Energy and CPS Energy filed for licenses with the Nuclear Regulatory Commission (NRC) to build two new reactors at the South Texas project.
- Somervell County (Region G): Luminant Power (formerly TXU) is expanding its Comanche Peak facility.
- Victoria County (Region L): Exelon Nuclear selected Victoria County for the site of a new facility. Exelon expects to submit its construction and operation license application to the NRC in September 2008.
- Potter County (Region A): Amarillo Power announced that it has selected UniStar Nuclear to construct a new two-reactor facility near Amarillo, Texas. An application is expected to be filed in late 2008.
- Robertson County (Region G), Twin Oaks facility of Altura Power LP.
- Limestone County (Region G), Limestone Station Unit 3 of NRG.
- Fannin County (Region G), Coletto Creek Unit 2 of Coletto Creek LLC.
- Brazoria County (Region H), Ineos USA.
- El Paso County (Region E), Newman Unit 6, El Paso Electric Co.
- Bexar County (Region L), Elmendorf, City Public Service.

- Yoakum County (Region O), Occidental, Occidental Energy Ventures Corps.
 - Dallas County (Region C), 1 ExTex Laporte, ExTex Laporte, LP.
 - Lamar County (Region D), Lamar Power, Lamar Power Partners II, LLC.
 - Madison County (Region H), Madison Bell, Madison Bell Partners, LP.
 - Travis County (Region K), Sand Hill expansion, Austin Energy.
 - Bell County (Region C), Panda– Temple, Panda Temple Power, LLC.
 - Hardin County (Region I), East TX Electric Coop, East TX Electric Coop – Hardin Co.
 - San Jacinto (Region H), East TX Electric Coop, East TX Electric Coop – San Jacinto Co.
 - Hood County (Region G), Wolf Hollow 1 – Plant 2, Wolf Hollow 1 LP.
 - Fannin County (Region C), Patillo Branch, Pattillo Branch Power Co. LLC.
 - Navarro County (Region C), Pine Oak, Oin Creek Energy LLC.
 - Montgomery County (Region H), Lewis Creek expansion, Entergy Texas, Willis.
 - Jack County (Region C), Jack Energy expansion, Brazos Electric Power Coop Inc.
18. Do not include water demands by cogeneration facilities in the projections. The Board and regional water plan projections place demands for cogeneration facilities with the manufacturing sector.
19. Provide current information and projections for power plants in Appendix C-1 sorted by regional water planning area by county, owner and operator name, plant site, and individual unit.

Page Specific Comments

Executive Summary

20. Paragraph 1 [and on Page 1, Paragraph 1]: Replace “30 gallon per kilowatt hour” with “1.0 gallon per kilowatt hour.”
21. Paragraph 3: Include the U.S. Energy Policy Act of 2005 as major driver for future plant development.

Section 1.1

22. Page 1, paragraph 1: Revise the second sentence of the first paragraph of Section 1.1 to read as: “*Currently, each kWh generated in Texas from coal requires up to 30 gallons of available water to produce although only about 0.2-0.7 gallons of such water are actually consumed for each kWh generated.*”
23. Page 1, paragraph 2: “*Withdrawal is the total volume of water taken from the source, whereas consumption is the volume of withdrawn water not returned to the source.*” Clarify that the same water is normally being diverted/reused many times for once-through cooling.
24. Page 2, paragraph 3: Provide a reference for statement that per capita water withdrawals in the U.S. have declined by 30% from 1960 to 1990 or delete reference.
25. Page 1, paragraph 3: Insert word “*surface*” before “*water rights.*”
26. Page 1, paragraph 3: “*Existing water rights in Texas account for most of the surface water.*” If the reference is that most of the surface water in the state is already appropriated, limit the statement to portions of the state, i.e., “*In some portions of the state, little additional surface water may be available for appropriation....*,” or provide further clarification of the statement.
27. Page 1, paragraph 3: “*Possible future regulations will likely favor closed loop cooling towers that require much lower water withdrawals.*” *USEPA 316(b) phase I regulations for new generating facilities are in place and are not part of the court ordered remand that has placed the Phase II rules for existing facilities in limbo.*”
Revise sentence to read: “*USEPA’s 316(b) regulation for new facilities will most likely drive the decision to select closed loop cooling towers that require much less water withdrawals but have a higher consumption rate when compared to open loop cooling systems.*”
28. Page 1, paragraph 4: The second sentence of the fourth paragraph of Section 1.1 refers to the energy efficiency of pulverized coal power

plants being 35%. On the other hand, the second sentence of the second paragraph of Section 1.1.2 refers to the energy efficiency of pulverized coal power plants being 32%. Please reference the correct percentage in both places.

29. Page 1, paragraph 4: Spell out COGEN as “cogeneration” throughout report.
30. Page 1, paragraph 5: Report states that: “*The recent controversy and change in strategy by TXU (now Luminant) has shown that the electric power generating industry in Texas is entering a period of change. In 2007, there were other coal fired plants being considered besides TXU plants.*” Delete “**TXU (now Luminant)**” and substitute such as: “*Recent controversy over the construction of coal fired plants has shown that the electric power generating industry in Texas is entering a period of change.*” In addition, substantiate what controversy is being referred to in the sentence.
31. Page 2, paragraph 2: Delete statement suggesting that power plant water usage “*threatens domestic water supplies.*”
32. Page 2, paragraph 2: Rewrite paragraph. Last sentence undermines several conclusions that precede it.
33. Page 3, bullet 1: Rewrite to note that supercritical coal plants are not a new technology.

Section 1.1.1

34. Page 3, paragraph 1: Add ash transport to the list of water uses in a coal plant.

Section 1.1.2

35. Page 4, paragraph 1: Substantiate this comment or delete from the report: “*the large magnitude of withdrawals reduces water availability for other uses while impacting water quality...*”
36. Page 4, paragraph 1: Revise the second part of the first paragraph of Section 1.1.2 to read as follows: “*The effects of climate change over the next 50 years ~~are likely to~~ may pose additional stresses on ~~Texas’s~~ Texas’ water resources. Possible effects from climate change in Texas may include ~~likely~~ lower summer flows in Texas rivers, longer duration and more severe ~~and~~ droughts, sea level rise, and deterioration of wetlands. However, uncertainty of climate change*”

models simulations make it impossible difficult to make confident projections of climate impact.”

37. Page 4, paragraph 4 (also Page 17, paragraph 2): Report states: “*But these regulations will likely be grandfathered as 316(b) Phase II, dealing with existing facilities is now suspended due to legal challenges.*” Rewrite this sentence to clarify the intended meaning, particularly the use of the term ‘grandfathered’ in reference to a regulation.
38. Page 4, paragraph 5, first sentence: Substantiate this statement or remove it from the report.
39. Page 4, paragraph 5: Revise the second sentence in the fifth paragraph of Section 1.1.2 to read as: “*...New environmental policies and a lack of water rights ownership may force new power plant installations to use closed loop systems that require less water withdrawal and total water access, but result in significantly higher water consumption rates.*” Change the term “*air-dried*” in the third sentence to “*air-cooled.*”
40. Page 5, paragraph 2: The statement, “*Substantial water withdrawals... will have an impact on local surface and groundwater sources...*” should be substantiated or removed.
41. Page 5, paragraph 3: Paragraph overstates the amount of desalination being planned. Delete or rewrite with numbers of cities and expected numbers of kWh consumption cited. Delete statement “*impending water shortages.*”
42. Page 5, paragraph 4: Report states that: “*The 2007 controversy with TXU (now Luminant) over the construction of almost a dozen new coal plants has shown that the electric power generating industry in Texas is entering a period of change.*” In 2007, there were other coal fired plants being considered by other companies, cities besides TXU. Delete “*with TXU (now Luminant)*” and substituting a more generic description such as “*The 2007 controversy over the construction of almost a dozen new coal plants...*”

Section 1.2

43. Page 6, paragraph 1, bullets 1 and 2: Add reference to municipal owned plants and industrial owned power generation.
44. Page 6, paragraph 1, bullet 4: Delete “*TXU (now Luminant)*” and substitute a more generic description.
45. Page 6, bullet 5: See comment 21.

Section 1.3.1

46. Page 7, paragraph 1 after Table 1.1: Revise second paragraph of Section 1.3.1 to read as: *“The USGS reports (See Figure 1.2) that the two sectors responsible for the majority of water withdrawal in Texas are thermoelectric (steam-electric) power (13,260 Mgal/d, 45% of Texas total in 2000) and irrigation (8,630 Mgal/d, 21% of Texas total in 2000). Although thermoelectric power has the highest water withdrawal rate, it also has the highest rate of return of the withdrawn water to the source following its use resulting in thermoelectric power having very small net consumption of water. Fortunately, at the present time, ~~they~~ the thermoelectric power and irrigation sectors take water primarily from different sources. In 2000, about 75% of the groundwater withdrawals in Texas were for irrigation (USGS, 2004). Of all water withdrawn by the Texas thermoelectric power industry, over 98% is from surface water, both fresh and saline (See Table 1.1).”*
47. Page 8: Clarify what numbers in parentheses mean in Table 1.1.
48. Page 9, paragraph 1: Provide discussion regarding why USGS total withdrawal estimates are underestimated and how the USGS estimates were obtained.
49. Page 10, Figure 1.3: (see general comment 6). The proper comparison is of once through consumptive use due to forced evaporation and cooling lake supplemental makeup water versus cooling tower makeup water.

Section 1.3.2

50. Page 13, paragraph 1: (see general comment 6).
51. Page 12, paragraph 3: Add “The diverted water replaces that evaporated from the lake surface and maintains reservoir level.”
52. Page 12, paragraph 3: Report states: “*Additionally, 184 Mgal/d...of thermoelectric... consumption comes from water diverted from rivers into cooling ponds lakes and ponds.*” Clarify whether this amount is in addition to 550 Mgal/d of consumption and provide a reference for this estimate.
53. Pages 14 & 15, figures 1.6 and 1.7: Consumption rates greater than 2 gal/kWh for once-through cooling systems appear to be very high and inaccurate. Please confirm or revise the rate.

Section 1.3.3

54. Page 16: Spell out “PV” as “photovoltaic” in the initial reference.
55. Page 16, paragraph 3: “*Today, there are no concentrating solar power (CSP) facilities in Texas, but progressive utilities such as Austin Energy are moving toward this concept.*” Substitute “some” for “progressive”

Section 1.3.4

56. Page 17, paragraph 3: Revise the end of the third paragraph of Section 1.3.4 to read as follows so as to more specifically address the possible impacts of the legal challenges to the Phase II 316(b) rules on the use of open loop cooling at existing power plants: “... *even with existing facilities, it is suspended indefinitely after legal challenges. However, unless the U.S. Supreme Court overturns the Second U.S. Circuit Court of Appeals’ ruling prohibiting USEPA from using cost/benefit analyses to determine what is the “best technology available” for minimizing “adverse environmental impacts” at cooling water intake structures, many existing Texas power plants that use open loop cooling may have to convert to closed loop cooling towers. If, on the other hand, the U.S. Supreme Court overturns the Second Circuit Court’s ruling, thus OL cooling will likely only be used at existing locations, given the associated generator’s potential competitive advantage in access to water and with more efficient OL cooling.*”

Section 1.4

57. Page 18, paragraph 1, 1st sentence: Rewrite sentence to note that Texas nuclear generation has steadily increased due to a combination of increased capacity factors and power up-rates of the existing reactors. Reference:
http://www.eia.doe.gov/cneaf/nuclear/page/at_a_glance/states/statestx.html
58. Page 18, last sentence of 1st paragraph: Ensure that the 7.8 million MWh value here for 2006 is consistent with the description on the top of page 16 that reads: “*In 2006, approximately 1,740 MW of installed wind capacity generated just over 5 million MWh, or 1.3% of Texas electricity.*”
59. Page 22, Figure 1.13: Quantify units of measure in the “*Power Plant Total Water Consumption*” index.
60. Page 21 and 22: Revise Figures 1.12 and 1.13 with more accurate data and provide a written description of them in the text.

Section 2.1

61. Page 23, paragraph 1: Delete or clarify sentence, “*In comparing the power and water use efficiency of a power plant cooling system, they*

are basically inversely related.”-- the more efficient a plant is, the less water it requires.

Section 2.1.1

62. Page 23, paragraph 3: Delete statement that closed loop systems use 12.4 gal/kWh. This may not be meaningful unless it is the flow rate of water re-circulated from cooling towers to condensers and back and would be based on condenser design and not the amount of water evaporated/consumed.

Section 2.2.3

63. Page 32, paragraph 2: See comment no. 32 regarding super-criticals.

Section 2.3.2

64. Page 33, paragraph 4: Report states: *“Two strategies, aside from general energy efficiency measures, in Texas for dealing with a carbon price and increases in electricity demand are to (1) build power facilities (nuclear, coal, solar, geothermal) that emit no carbon dioxide and...”* Substitute *“reduced”* for *“no.”*
65. Page 34, paragraph 1: Report states: *“This rate is high compared to Texas natural gas CO2 emissions rate of 0.58 tonne CO2/MWh...”* Substitute *“higher”* for *“high.”*
66. Page 34, paragraph 2: *“In power plants with CCS, the water usage rates in gallons per net kWh generated will go up for three major reasons...”* This is the first time that “net” is used in the report. Explain difference between “gross” and “net” generation.

Section 2.3.3.1

67. Page 37, paragraph 1, second sentence: Delete the word *“both”* before NRG. Change *“National Regulatory Council”* to *“Nuclear Regulatory Commission.”* Add phrase at end of sentence: *“...and Luminant Power has announced that it intends to add units at its existing location at Comanche Peak.”*
68. Page 37, paragraph 2: Report states: *“Recall from the introductory chapter that the two nuclear sites in Texas consume water at a rate of approximately 0.58 gal/kWh. The withdrawal for each nuclear facility is different since one uses open loop cooling (Comanche Peak) with a cooling pond withdrawing 55 gal/kWh and the other uses closed loop cooling (South Texas Project) with a cooling pond withdrawing 39.2 gal/kWh.”* Correct the consumption rate for Comanche Peak as follows: withdrawals of water at 55 gal/kWh and consumed water for forced evaporation at approximately 0.33 gal/kWh.

Section 2.3.3.2

69. Page 38, paragraph 1: Revise second to last sentence under to read as: “...*Using typical Texas values for water consumption and withdrawal, in 2007 wind power avoided approximately 7-9 Mgal/d, which is equivalent to about 8,000-10,000 acre-feet/year (at a rate of 0.3-0.4 gal/kWh-consumption).*”

Section 2.4.1

70. Page 38: Revise the end of the first paragraph to read as follows so as to more specifically address the possible impacts of the legal challenges to the Phase II 316(b) rules on the use of open loop cooling at existing power plants: “. . . *Phase II of the USEPA 316(b) ruling regarding whether or not to grandfather existing facilities is essentially suspended [EPA 2007b]. However, unless the U.S. Supreme Court overturns the Second U.S. Circuit Court of Appeals’ ruling prohibiting USEPA from using a cost/benefit analysis to determine what is “best technology available” for minimizing “adverse environmental impacts” at cooling water intake structures, most existing Texas power plants that use open loop cooling will have to be converted to use closed loop cooling towers.*” Revise title of Figure 2.7 to: “*Growth of once-through and re-circulated cooling by U.S. power plants . . .*”

Section 2.4.2

71. Page 39, paragraph 2: Revise the first and second sentences of the second paragraph of Section 2.4.2 to read as follows: “. . . *Many of Texas’ existing power generation sites exist at locations ~~that have existing or spare water~~ with access to cooling lakes and ponds and have water rights to use the water in these lakes and ponds in amounts greater than what the companies currently need. Power plant companies obtain sufficient water rights to ensure they will have adequate water available for future generating units and for existing electric generating units during droughts ~~with access to cooling lakes and ponds.~~ From a water demand standpoint, some of these locations could be considered . . .”*

Section 3.1

72. Page 41, Figure 3.1: Correct to compare water and generation data from the same calendar year. It appears that EIA water data is based on 2005 and generation data on 2007.

Section 3.2

73. Page 42, Figure 3.2: Explain why nominal renewable generation volumes versus relative shares would be generally higher in the “L” low scenarios than in the “H” high scenarios so readers can understand factors influencing the results of the various scenarios.
74. Page 42, Figure 3.2: Provide an accompanying figure showing total projected energy use based on the actual population projection used in the report, and provide a reference for the data portrayed in the figure.
75. Page 43: Provide a more succinct written description of what the scenarios are in bullet form.
76. Page 43, paragraph 2: See comment 21 regarding Federal Energy Policy Act.

Section 3.2.2.1

77. Page 45, paragraph 1: Please include water demand projections for all planned nuclear facilities (see general comment no: 17).
78. Page 45, paragraph 1, 3rd sentence: See comment 21 regarding Federal Energy Policy Act

Section 3.2.1.2

79. Page 46, figures 3.3 and 3.4: Clarify the meaning of the dotted line in the figures.

Section 4.1.1

80. Page 62, paragraph 2: Delete “*smog forming*” and just state that due to air quality compliance issues citing a plant east of I-35 will be difficult.
81. Page 62, paragraph 3: Capitalize West Texas.
82. Page 62, paragraph 4: Revise to read as: “...*Due to increased wind power on the electric grid, natural gas plants will likely be required to level out the fluctuating generation, especially during each spring and fall seasons when relatively low demand creates a situation when wind contributes at a maximum percentage of total generation. Fluctuations in the generation of wind power are due to the unpredictable nature of wind in terms of how often, how fast and how consistently it blows. To address the variability of wind power generation, fossil fuel-fired plants will need to be on “spinning reserve” to avoid a power blackout in the state like the one that almost occurred in 2007.*”
83. Page 62, paragraph 4: Add percentage of wind generation during spring and fall.
84. Page 63, paragraph 1 1st sentence: Revise statement “*any expansion of nuclear presents a significant local water demand impact*” to reflect the fact that water demands for the South Texas Project have already been

incorporated and approved through the regional planning process, and water rights are in place to support this additional demand.

Section 4.1.2

- 85. Page 63, paragraph 3: Provide a reference for statement that desalination projects require 3,000-10,000 kWh/ac-ft.

Appendix B

- 86. Appendix B, Table (page B-1): Clarify the origin of information for columns 3 and 4 regarding electric generation under “high” and “low” scenarios. Add a description of “high” and “low” electric generation assumptions as a footnote or an introduction page to Appendix B, similar to introduction page to Appendix C. Provide some introductory text highlighting conclusions from data presented in the Table in the introduction page to Appendix B.
- 87. Appendix B, Table (page B-1): Correct any discrepancies between data in Appendix B Table (page B-1) and Tables in Appendix D. In Appendix B Table (page B-1), it is not readily apparent why “electric generation - high” of 761 million MWhs is different from the electric generation - high” of 718 million MWhs listed in other tables summarized below.

	Year selected	Elec. Gen "High" (million MWh)	Elec. Gen "Low" (million MWh)
Line item from Appendix B Table (page B-1)	2060	761?	493
Line item from Appendix D Table D.1.1 (page D-2)	2060	718 ?	493
Line item from Appendix D Table D.2.1 (page D-7)	2060	718	493
Line item from Appendix D Table D.3.1 (page D-12)	2060	718	493
Line item from Appendix D Table D.4.1 (page D-17)	2060	718	493

Appendix C

88. Specify sources of data in this appendix and specify the planning region and county in which the plants are located.
89. Page C-4, Change the source on “Utility ID 21535 for the South Texas Project; Change Cooling System” to “River.”
90. Page C-3, Utility ID 50023, Unit ID 3470, W.A. Parish is described as having a cooling system and lake water source. The facility actually has 8 generating units, and 6 are once-through cooling systems that use lake water as a cooling source. Two units use cooling towers with river water as a cooling source. Please correct information.
91. Page C-3, delete “Utility ID 50023, Unit ID 3471, Webster” from table as it has been sold and demolished.
92. Page C-4, correct owner information for “Utility ID 50023, Unit ID 7325, San Jacinto Steam Electric” from “Texas Genco II, LP” to “NRG Energy.”
93. Provide data sources information for each data column. For instance:

Data in this Appendix:

- Company: Name of power generator operator (Reference: EIA (2007b ?))
- Plant Name: name of the power plant location (Reference: EIA (2007b ?))
- 2006 Nameplate capacity (kW): 2006 power generation capacity of plant in kilowatts (Reference: EIA (2007b ?))
- 2006 Generation (MWh): electricity generated at facility in 2006, in megawatt hours (Reference: EIA (2007b ?))
- Cooling System: type of cooling system (Cooling Tower, Once-through, Air, or N/A for hydropower) (Reference: EIA (2007b ?))
- Water Source: type of source for power plant cooling water (Reference: EIA (2007b ?))
- Main prime mover: prime mover that produced the most electricity in 2006; NGCC = natural gas combined cycle, ST = steam turbine (could be part of NGCC when with natural gas), GT = gas turbine (could be part of NGCC), HY = hydroelectric turbine, WT = wind turbine, IC = internal combustion, CT = combustion turbine, (Reference: EIA (2007b ?))
- Main energy source: fuel that is use the most at the facility; NG = natural gas, LIG = lignite coal, SUB = subbituminous coal, WAT = water, WND = wind, NUC = nuclear (uranium), PUR = purchased steam, WDS = wood waste solids, DFO = distillate fuel oil, AB = agricultural byproducts, BLQ = black liquor (renewable), WH = waste heat, OTH = other (Reference: EIA (2007b ?))
- Consumption rate (gal/kWh): typical average rate of water consumption for facility (Reference: ?)
- Plant Consumption (Mgal/d): the estimated water consumption at the plant in millions of gallons per day obtained by multiplying the water use rate by the electricity produced at the plant

Consumption due to cooling lake diversion (ac-ft/yr): taken from Sledge et al. (2003) for estimating water diverted to cooling lakes at particular power plants (Reference: Sledge et al. (2003))

Consumption due to cooling lake diversion (Mgal/d): cooling lake diversion converted from ac-ft/yr into Mgal/d

Total water consumption (diversion and cooling) (Mgal/d): “Plant consumption” column plus “Consumption due to cooling lake diversion” column

Total gal/kWh with diversion water: “Total water consumption (diversion and cooling) (Mgal/d)” divided by electricity generated at plant

Appendix D

94. Before the table in Appendix D, add language summarizing important conclusions based on the table. In addition, please identify the source of each category of data (e.g., “Electric Generation (million MWh)” in or under the table.
95. Appendix D, Table (page D-1): Add a description of the “high” and “low” electric generation assumptions as a footnote or an introduction page to Appendix D, similar to introduction page to Appendix C and add citations and references to the table.
96. Appendix D tables are inaccurate for nuclear capacity and do not take into account life extension of existing units. Revise the tables based on input from the respective companies.