CHAPTER 9
Overview: Renewable Energy

The oil price shocks of the 1970s and 1980s spurred a national movement to develop other kinds of energy and decrease our dependence on petroleum. In this period, Texas oil and gas production peaked and the industry began to play a diminishing yet still important role in the state's economy. As energy prices fell, however, interest in renewable energy sources waned. Recent events, including dramatically higher oil prices and environmental concerns, again have led to heightened interest in renewable sources of energy, such as solar and wind energy, biomass, hydropower and geothermal power, which are virtually inexhaustible and relatively clean.

In a sense, at the beginning of the 21st century, Texas has come full circle. Windmills that pumped water for farms and ranches in the late 1800s now stand in the shadow of giant wind turbines that generate electricity. Native Americans and settlers once gathered buffalo chips for fuel to build fires on the High Plains; soon cattle feedlots near Hereford will provide manure to fuel ethanol plants. Settlers once burned wood in East Texas to heat their cabins and cook their food — and a proposed plant near Nacogdoches may burn forest products to produce electricity.

By definition, renewable energy is abundant and constantly replenished. It includes energy from the sun, earth and wind. Most renewable energy comes either directly or indirectly from the sun, which itself is a fusion nuclear reactor 93 million miles from earth. The sun projects a reliable, continuous spectrum of radiation. Sunlight intercepted by the earth provides renewable solar energy that can be used to generate electricity, provide heat and light and drive photosynthesis — the essential life-giving process by which the energy of sunlight creates food for green plants.

The sun's heat also drives the earth's winds. The earth's rotation and topography combine to produce predictable wind patterns that can be used by large wind turbines to generate electricity. The motive power of wind (and moving water) has historically played a valuable role in turning milling wheels, driving pumps and sending ships across the sea. Today, wind power accounts for a growing part of Texas' energy portfolio.

Biomass is defined as any plant or animal matter used to produce electricity, heat or transportation fuels. Sources of biomass include wood products, food crops, grasses, agricultural residues, manure, municipal solid waste and landfill gas. The stored hydrocarbons in biomass provide the same chemical building blocks as coal, oil and natural gas, which are simply ancient forms of biomass gathered and transformed by nature. While most renewable sources of energy are used to produce electricity, some biomass sources are well-suited, through appropriate technology, for conversion into transportation fuels or boiler fuels.

Hydropower relies on capturing the energy in flowing water, which is linked to the sun through the hydrological cycle — water evaporation from the oceans turns into clouds and later condenses, falling as rain. The ocean itself can produce energy from the action of the waves (driven by the sun's heat and winds) and tides, based on the gravitational pull of the sun and moon.

Geothermal energy uses the internal heat of the earth to generate electricity, as well as more direct uses such as spas and greenhouses. The ground itself, due to its more constant temperatures, provides a form of geothermal energy that is used for climate control of buildings (as with ground-source heat pumps). The heat of geothermal resources generally increases in intensity with depth. In the richest geothermal zones, heat from deep underground penetrates the earth's surface as geysers and volcanically active areas.

Renewable Energy Consumption in the U.S.

According to the federal Energy Information Administration (EIA), just 7 percent of the energy consumed in the U.S. in 2006 came from renewable

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energy sources, just behind nuclear power, which accounted for 8 percent (**Exhibit 9-1**). Fossil fuels — petroleum, coal and natural gas — supplied the remaining 85 percent of the nation's energy needs. Renewable energy production and consumption rose by more than 6 percent between 2005 and 2006, a faster pace than in the previous three years, but not enough to overtake nuclear power.[1]

Renewable energy provided 9.5 percent — 385 billion kilowatt-hours (kWh) — of U.S. electricity in 2006, slightly more than in the previous two years.[2] In 2006, the electric power sector accounted for 56 percent of the nation's renewable energy consumption. The remaining 44 percent was used for industrial, transportation, residential and commercial purposes.

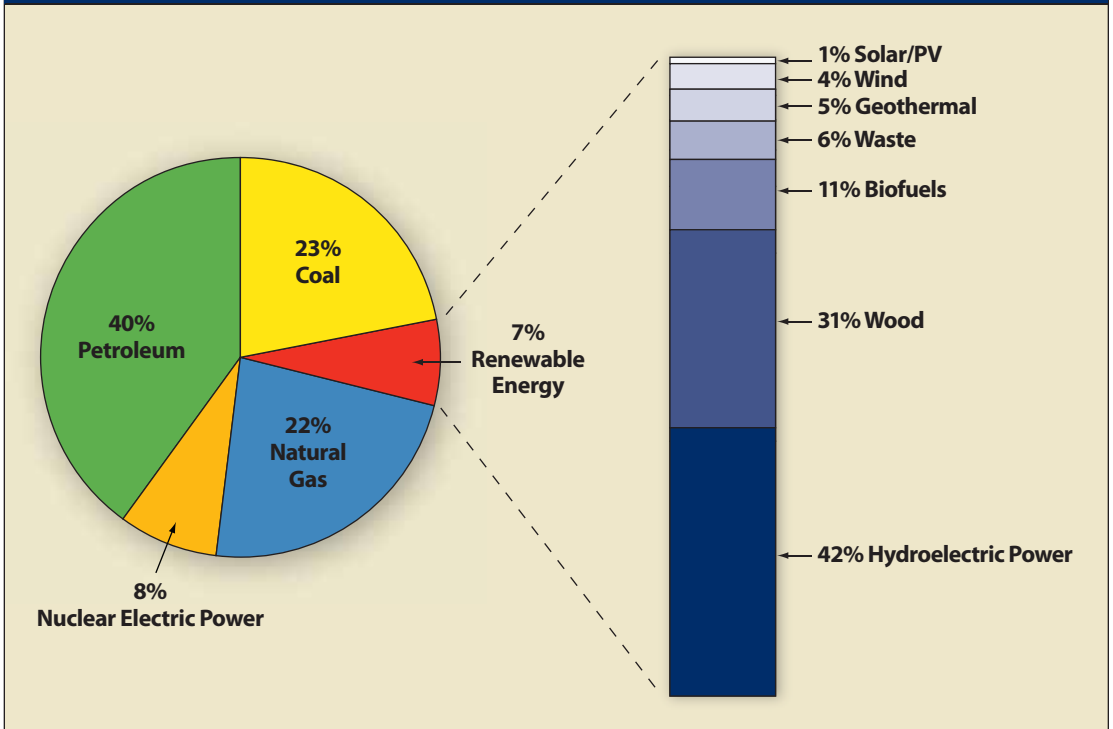
In the industrial sector, wood and wood waste are an important source of energy for the lumber and paper manufacturing industries, which use these products for boiler fuel to produce electricity, and in some cases steam. Wood also accounts for the majority of the renewable energy consumed in the residential sector, followed by solar/PV and geothermal energy. The transportation sector is using more biofuels; ethanol consumption rose by 34 percent between 2005 and 2006. The commercial sector primarily used wood and wood waste, landfill gas and other biomass and some geothermal energy.[3]

Eight states — Washington, California, Oregon, New York, Idaho, Alabama, Montana and Texas — provided 70 percent of all U.S. renewable energy generated in 2006.[4] Washington and California continue to rank first and second, respectively, due to their abundant hydropower supplies. Texas leads the nation in electricity generated from wind; Washington leads

Eight states — Washington, California, Oregon, New York, Idaho, Alabama, Montana and Texas — provided 70 percent of all U.S. renewable energy generated in 2006.

EXHIBIT 9-1

U.S. Renewable Energy Consumption as Share of Total Energy in 2006



Source: U.S. Energy Information Administration.

in hydroelectric power; Florida leads in landfill gas; Alabama leads in the use of wood and derived fuels to generate power; and California leads in geothermal, other biomass and solar power.[5]

Renewable Energy Consumption in Texas

In Texas, wind energy accounts for the vast majority—about 79 percent—of all renewable energy generated in 2006 (**Exhibit 9-2**). Texas' total wind energy capacity rose from 180 megawatts (MW) in 1999 to 2,739 MW in 2006. By the end of 2007, wind energy capacity was 4,296 MW.[6]

Wood and hydropower each accounted for about 11 and 8 percent, respectively, of renewable energy generated in the state in 2006. The pulp and paper industry often uses the biomass energy from wood it produces to generate electricity, heat and steam it uses on site. This biomass energy is not placed on the electric grid, however.

Wind energy provided 2.1 percent of the Electric Reliability Council of Texas' (ERCOT's) electricity in 2006, up from 1.1 percent in 2004.[7] In 2007, wind energy accounted for 2.9 percent of electricity generated in the ERCOT region. Unlike biomass energy, the vast majority of Texas wind-generated energy is sent over transmission lines to electric utilities. In 2007, hydroelectric power accounted for 0.4 percent of ERCOT's electricity, and another 0.4 percent of its electricity was categorized as "other" and included some renewables — landfill gas, biomass solids, biomass gases — in addition to very small amounts of petroleum coke and other fuels.[8]

Renewable Energy Potential

Although Texas does not yet use much renewable energy, it has an abundance of renewable energy resources, especially wind and solar power.

A federal research center ranked Texas as second for wind potential, just behind North Dakota.[9] The state's strongest winds are in the Panhandle and along the West Texas mesas. Other promising areas for wind development are in South Texas along the coast and offshore.[10] In 2006, Texas surpassed California to become the state with the most wind generating capacity.[11]

Exhibit 9-2

Total Renewable Net Generation in Texas by Energy Source, 2006*

Fuel Type	Total MWh	Percent of Total Renewable Net Generation
Wind	6,670,515	78.5%
Wood & Derived Fuels	900,888	10.6
Hydropower	661,971	7.8
Landfill Gas	218,813	2.6
Biomass	43,516	0.5
Solar	not available	0.0
Geothermal	not available	0.0
Total**	**8,495,704**	

*Includes renewable energy sent over transmission lines to electric utilities, and renewable energy generated and used on site.
**Does not reflect solar or geothermal energy production. Numbers may not total due to rounding.
Source: U.S. Energy Information Administration.

Texas also is one of seven states identified as having the nation's most plentiful solar resources. West Texas has the state's highest solar radiation readings, making it a good candidate for utility-scale concentrating solar power.[12] Since Texas has abundant solar resources statewide, photovoltaic (PV) systems and solar water heating can be used in every Texas county, in rural and urban settings alike.[13]

Texas has many opportunities to generate energy from biomass. One example is the use of feedlot biomass as fuel; ethanol plants under construction or planned in the Panhandle will use manure for this purpose. And using manure along with coal for electric generation, in what is called a reburn process, can cut air pollution. Perhaps most importantly, using manure for fuel mitigates possible environmental problems associated with feedlot and dairy operations, helping maintain this vital segment of Texas' agricultural economy.

Another energy source with some potential in Texas is landfill gas, which is generated by the decomposition of organic waste deposited in landfills. The methane gas emitted by landfills can be used to generate electricity or to fire boilers. There are 23 landfill gas facilities already in operation and an estimated 58 to 89 sites that could develop

Although Texas does not yet use much renewable energy, it has an abundance of renewable energy resources.

landfill gas.[14] Texas has an opportunity to turn more of its waste into cash.

Wood biomass is used to produce electricity for the grid in various places around the U.S., although it is not being used in Texas at this writing. But Texas mills and pulp and paper plants routinely use wood waste to create electricity to power their own facilities. Wood biomass has strong potential to be a niche energy market, greatly benefiting rural communities in Texas.

Hydropower provides a fraction of 1 percent of Texas' electricity; only 23 of the many dams in the state have a generating plant.[15] While there is some undeveloped potential for additional hydroelectricity, the importance of managing Texas water as a scarce resource is likely to outweigh the relatively tiny amount of power it could add to the grid. The value of Texas' existing hydro plants lies in their ability to come online within seconds and boost supply during times of peak demand. This is dependent, however, on sufficient supplies of water in the reservoirs to allow its release through turbines. Unlike other renewable forms of energy, hydropower has probably developed about as far as it can in Texas.

Texas is the nation's leading producer of biodiesel.

Ocean power — generating electricity from waves or tidal currents — is making waves of its own in various places around the world. Texas, however, is not one of those places. Despite hundreds of miles of coastline, the characteristics of the Gulf of Mexico do not make it a good candidate for producing this form of power.

Geothermal power comes from the heat contained within the earth itself, usually accessed by means of heated water. This includes not only electricity generation, but also direct uses such as drying lumber and aquaculture. Geothermal energy is also applied to buildings' heating and cooling systems with geothermal heat pumps (GHPs), a very efficient form of air conditioning. Texas can make use of GHPs' energy-saving technology to offset some of the large amount of electricity it uses to cool and heat its homes and other buildings. Experts believe that 2,000 to 10,000 MW of geothermal electric capacity could be developed in Texas in the not-too-distant future, particularly if existing depleted oil and gas wells can be converted to access geothermal resources. The state's first geothermal land leases were purchased in January 2007.[16] Geothermal power may have a significant role to play in the state's renewable portfolio.

In the arena of renewable transportation fuels, Texas has taken the lead in producing biodiesel, but is not as strong in ethanol production and consumption. Texas is the nation's leading producer of biodiesel, with 22 plants capable of making 200 million gallons of the fuel each year.[17]

Ethanol in the U.S. currently is produced from corn. At present, there are two ethanol production facilities operating in Texas, and two more facilities are under construction. All are expected to begin operations in 2008. Ethanol can be blended with gasoline to fuel vehicles. E85 is 85 percent ethanol and 15 percent gasoline and can be used by special flexible fuel vehicles (FFVs), which are widely available in Texas. But E85 fueling stations are scarce; there are fewer than 30 public fueling stations in the state.[18]

Recent increases in the price of corn and other crops have resulted in growing criticism of government biofuels policy, including incentives to produce ethanol. Federal subsidies and mandates have resulted in the expansion of ethanol preoduction. As a result, an increasing percentage of the U.S. corn crop goes to ethanol, contributing to increased feed costs for poultry and livestock feeders.

Government Policies and Renewable Energy

Government policies are used to encourage the development and deployment of renewable energy sources.[19] Several countries and U.S. states have set ambitious targets for renewable energy use, and provide various investment and production incentives that have spurred growth in the renewables industry.[20]

According to the U.S. Government Accountability Office (GAO), government leadership is needed to overcome technological and economic barriers to advanced energy technologies, whether renewable energy, nuclear or clean coal.[21] GAO identified numerous barriers to the deployment of advanced renewable energy technologies, including the difficulty of making the technologies more efficient and the high up-front capital cost that make them less cost-competitive with existing energy sources.[22]

Federal Policies

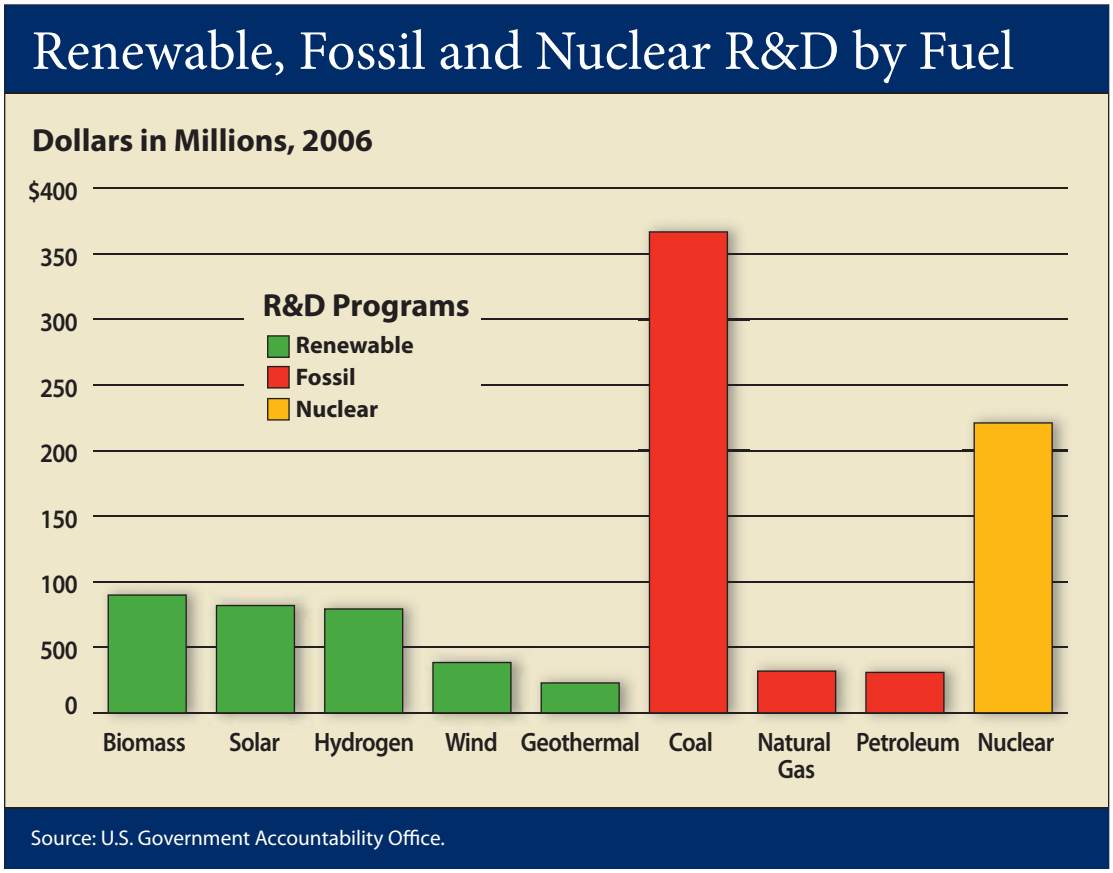
The U.S. Congress has been debating the need for a federal Renewable Portfolio Standard (RPS) that would require utilities to generate or buy a percentage of their electricity from renewable sources. At present, the main federal policy promoting renewables is the Volumetric Ethanol Excise Tax Credit (VEETC), accounting for 41.6 percent of 2006 federal subsidies for all renewables (see Chapter 28 of this report for further discussion of the tax credit).

Spending on energy research and development (R&D), whether from the private or public sector, is important for continued innovations in advanced energy technologies.[23] The U.S. Department of Energy's (DOE's) R&D investment in advanced renewable, fossil and nuclear energy technologies fell by 85 percent in real terms between 1978 and 2005, while overall federal government R&D investments rose by about 6 percent annually.[24] The energy sector accounted for 10 percent of all federal government R&D investments in the 1980s, but just 2 percent in 2005.

In 2005, the federal government invested about $1 billion less in energy R&D than ten years before. Furthermore, private investment in the energy sector has declined even more rapidly than public-sector investment. In the 1980s and 1990s, the public and private sectors each accounted for about half of R&D invested in energy, but by 2005 the private sector accounted for only 24 percent.[25]

Of the $982 million that Congress budgeted for energy R&D in 2006, $434 million went for fossil energy, $324 million for renewable energy and $224 million for nuclear energy (**Exhibit 9-3**).[26] Eighty percent of the $324 million budgeted for renewable energy R&D was divided between biomass, solar and hydrogen energy programs.[27] A significant portion of these research dollars went to fund hydrogen fuel cell technologies; the

EXHIBIT 9-3



Source: U.S. Government Accountability Office.

remaining $65 million went toward wind and geothermal energy programs.

In 2006, President Bush unveiled an Advanced Energy Initiative and a Solar America Initiative to provide additional funds in 2007 for clean-energy technology research at the Department of Energy.[28] The funding for these initiatives would reverse a decade-long decline in federal energy research and development.[29] The ultimate goal of this initiative is to improve the efficiency of renewable energy sources and to reduce their cost, making them more competitive with fossil energy. In his 2008 budget request to Congress, President Bush sought about $1.2 billion to fund research and development for clean and renewable energy programs, an increase of 5 percent from 2007.[30]

State Government Policies

State governments have been important supporters of renewable energy development. State policies used to promote renewable energy sources include renewable portfolio standards, renewable energy credits (RECs), interconnection and net metering rules and financial incentives including exemptions from state taxes. Texas has been aggressive in applying some of these measures.

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The Texas Legislature also has recognized the need for new transmission lines in areas of the state with renewable resources and authorized the Public Utility Commission (PUC) to designate Competitive Renewable Energy Zones (CREZs), areas to be connected to the electrical grid through the construction of additional transmission lines. Thus far, the CREZ areas include only wind energy projects, although all renewable energy sources are eligible.

Renewable Portfolio Standards

Texas' 1999 electricity deregulation legislation — Senate Bill 7 — created a renewable portfolio standard (RPS) for Texas that requires electricity providers engaged in the competitive market to acquire a minimum amount of electricity from renewable energy sources. Municipally owned utilities and cooperatives are excluded from the RPS requirement, but can choose to participate. Renewable resources include solar, wind, biomass, landfill gas, geothermal, hydroelectric, wave and tidal energy. Any of these energy sources can satisfy the RPS goal.

By 2006, Texas had exceeded S.B.7's goal for Texas power generators to install 2,880 MW of generating capacity from renewable energy by 2009. Senate Bill 20 increased the state's RPS to 5,880 MW of electricity from renewable energy sources by 2015, and established a state goal of 10,000 MW by 2025.[31]

In Texas, wind energy has thus far satisfied the majority of the RPS goal because the state has significant wind resources and the cost of wind power is lower than other renewables. For example, today solar energy is much more expensive than wind energy. In 2006, solar photovoltaic (PV) systems generated electricity for about 18 to 23 cents per kWh, while large-scale wind power prices ranged from 3 to 6 cents per kWh.[32]

To encourage the development of renewables other than wind, the 2005 Texas Legislature set a *voluntary* goal specifying that 500 MW of the 5,880 MW should come from a source other than wind. Legislation carving out a *mandatory* set-aside for non-wind generation failed in the 2007 legislative session.

As of February 2008, 25 states and Washington D.C. had implemented an RPS with binding targets for renewable energy sources.[33] Another four states—Missouri, North Dakota, Virginia, and Vermont—had enacted voluntary renewable energy portfolio goals. (**Exhibit 9-4**). Texas' RPS goal is stated as a minimum number of megawatts; other states define their RPS goals as a percentage of total electric production.

The 2015 goal represents about 4 to 5 percent of the state's projected electric annual generation production, and roughly 8 percent of ERCOT's currently installed generation capacity of 72,416 MW. Based on a study of wind's effective load-carrying capability, however, ERCOT determined that next year only 8.7 percent of installed wind capacity in its region can be reliably counted on to serve peak summer demand, a time of year when the wind is typically calm.[34] As a result, and assuming all 5,880 MW is met by wind energy, only 0.7 percent of ERCOT's estimated 75,596 MW of peak summer demand would be served by wind generation.

The 2025 goal of 10,000 megawatts would represent 14 percent of ERCOT's currently installed

EXHIBIT 9-4

Renewable Portfolio Standards by State, February 2008

State	Amount	Year	Organization Administering RPS
Arizona	15%	2025	Arizona Corporation Commission
California	20%	2010	California Energy Commission
Colorado	20%	2020	Colorado Public Utilities Commission
Connecticut	23%	2020	Department of Public Utility Control
District of Columbia	11%	2022	DC Public Service Commission
Delaware	20%	2019	Delaware Energy Office
Hawaii	20%	2020	Hawaii Strategic Industries Division
Iowa**	1,105 MW	2010	Iowa Utilities Board
Illinois	25%	2025	Illinois Department of Commerce
Massachusetts	4%	2009	Massachusetts Division of Energy Resources
Maryland	9.5%	2022	Maryland Public Service Commission
Maine	10%	2017	Maine Public Utilities Commission
Minnesota	25%	2025	Minnesota Department of Commerce
Missouri*	11%	2020	Missouri Public Service Commission
Montana	15%	2015	Montana Public Service Commission
New Hampshire	16%	2025	New Hampshire Office of Energy and Planning
New Jersey	22.5%	2021	New Jersey Board of Public Utilities
New Mexico	20%	2020	New Mexico Public Regulation Commission
Nevada	20%	2015	Public Utilities Commission of Nevada
New York	24%	2013	New York Public Service Commission
North Carolina	12.5%	2021	North Carolina Utilities Commission
North Dakota*	10%	2015	North Dakota Department of Commerce
Oregon	25%	2025	Oregon Energy Office
Pennsylvania	18%	2020	Pennsylvania Public Utility Commission
Rhode Island	15%	2020	Rhode Island Public Utilities Commission
Texas***	5,880 MW	2015	Public Utility Commission of Texas
Vermont*	10%	2013	Vermont Department of Public Service
Virginia*	12%	2022	Virginia Department of Mines, Minerals, & Energy
Washington	15%	2020	Washington Secretary of State
Wisconsin	10%	2015	Public Service Commission of Wisconsin

*Missouri, North Dakota, Virginia and Vermont have voluntary goals for adopting renewable energy instead of an RPS with binding standards.
**Iowa has had a mandatory RPS goal of 105 MW since 1983. In 2001, the state governor established a secondary voluntary goal of 1,000 MW of wind by 2010.
***Texas' RPS goal of 5,880 MW equates to 4 to 5 percent of total energy production by 2015. Texas may reach this level by the first quarter of 2008.
Sources: U.S. Department of Energy, Energy Efficiency and Renewable Energy and North Carolina State University.

generation capacity. Assuming the SB 20 goal is met by wind generation, the 10,000 MW would represent about 11 percent of ERCOT's estimated 89,883 MW peak summer demand in 2025.

Texas' RPS goals have entailed some costs to taxpayers. The fiscal impact of the renewable energy goal to a residential customer who uses about 1,000 megawatt-hours of electricity was equivalent to roughly 12 cents per month in 2005 and seven cents per month in 2006.[35] This five-cent decline in the monthly impact was due to falling renewable energy credit prices.

Renewable Energy Credits

To facilitate the RPS standards, the Texas Legislature created a system of "renewable energy credits," or RECs, that competitive electricity retailers can purchase or trade among one another to meet their individual requirements. (One REC or credit represents one megawatt-hour of qualified renewable energy generated and metered in Texas.) Any retail electric provider (REP) can meet its renewables requirement either by purchasing power directly from a renewable energy generator or by purchasing RECs from another party that has a surplus of renewable energy credits available to sell.[36]

At present, Texas generates more electricity from renewable sources than the RPS requires.

State law requires REPs to acquire renewable energy based on their market share of electricity sales. For example, a REP that sold 5 percent of all retail electricity in Texas would be responsible for achieving 5 percent of the statewide renewable goal by 2015.[37] It should be noted that they can use renewable energy contracts in place before September 1999 to reduce their requirements. If they do not acquire their required minimum number of RECs, they face an administrative penalty of up to $50 per megawatt-hour of shortfall.

Municipally owned utilities and cooperatives are not required to achieve the renewable energy goals, but those that generate renewable energy can sell credits to REPs who need them. Municipally owned utilities and electric cooperatives that choose to enter the competitive electric market fall under the broad category of "competitive retailer (CR)" and become subject to REC requirements. CR is a broad term that also includes REPs.

In addition to meeting minimum RPS requirements, RECs can be purchased "voluntarily" to substantiate claims made to consumers who choose a "green" or renewable energy plan. In such cases, the REP must acquire (or a co-op or municipally owned utility may generate) sufficient credits to "authenticate" or prove that the electricity sold to these customers was generated from renewable sources.

It should be noted, however, that current Texas law considers "voluntary" and "required" RECs to be two different things. The RPS legislation that passed in 2005, S.B. 20, led some REPs to believe they could use voluntary credits to fulfill their RPS goal. H.B. 1090, approved by the 2007 Texas Legislature, forbids REPs from counting the acquisition of voluntary credits toward their mandatory credit requirement, which should further increase the amount of energy being generated by renewable technologies.

ERCOT manages the renewable energy credit program for PUC. When retail electric providers electronically submit their credits to ERCOT to certify they have met their RPS requirement, the credit is considered "retired." RECs remain active for up to three years, after which they are retired automatically, regardless of whether they were turned in to meet a particular REP's requirement. Thus, if a generator has a surplus of RECs, it may hold on to them for up to three years before selling them.[38]

In another change mandated by 2007's H.B. 1090, large industrial customers can tell their REPs that they choose to "opt out" of the RPS requirement. This may allow such customers to avoid paying higher prices for electricity produced from renewable resources. REPs with customers that opt out in this fashion can reduce their renewable energy requirement by an amount equivalent to the customers' electricity usage. The overall requirement for the state, however, is not reduced. The requirement attributable to an industrial power load that "opts out" thus is spread out among all of the state's REPs.

At present, Texas generates more electricity from renewable sources than the RPS requires, so a surplus of credits is available each year.[39]

Competitive Renewable Energy Zones

While S.B. 7 created state goals for renewable energy generation, it made no provision to ensure that

an adequate system of transmission lines would be available to *move* energy from new, renewable energy generators to customers who need the electricity.

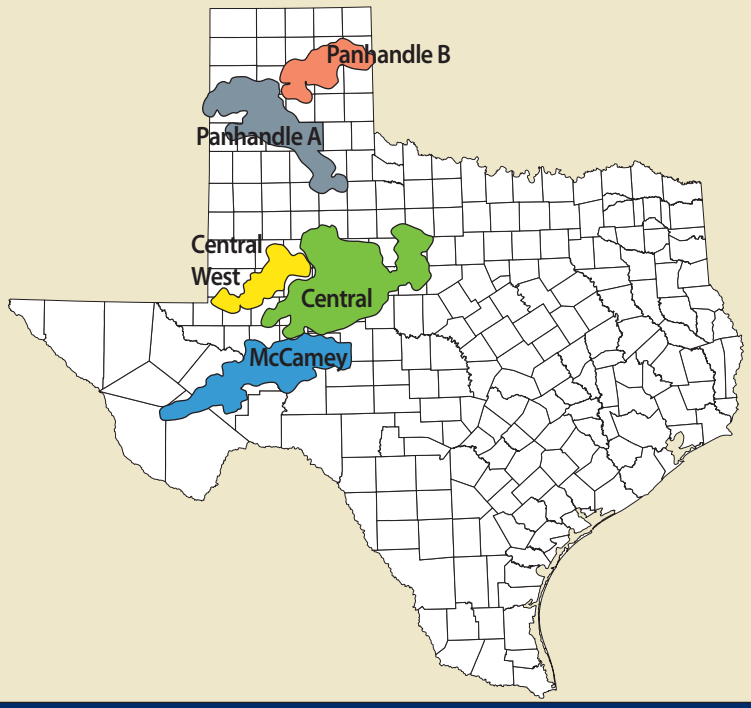
S.B. 20 attempted to alleviate this problem by authorizing PUC to identify areas in Texas most suitable for generating capacity from renewable energy technologies, including solar, wind, biomass, landfill gas, geothermal, hydroelectric, wave and tidal energy. PUC then could pre-designate a need for new transmission lines connecting these areas, based on the existence of the renewable energy resource and demonstrable evidence that generators are committed to developing the areas, which are called "Competitive Renewable Energy Zones" or CREZs.

In Texas, the fastest-growing renewable energy technology is wind power. In 2005, PUC delegated to ERCOT the task of determining which land areas throughout Texas would be most conducive to wind energy, and roughly estimating the cost to build transmission lines to each of those areas. While other renewable energy technologies are eligible for CREZ status (such as solar energy), the current demand for new transmission lines is coming from the wind industry. ERCOT noted that potential wind generators representing about 17,000 MW of electricity, mostly in West Texas, had requested connection to ERCOT's energy grid. That is more than three times the amount of existing wind capacity in Texas.[40]

ERCOT's study identified 25 areas in the state with significant potential for wind development, but lacking the necessary transmission improvements. PUC evaluated ERCOT's findings, weighing wind-resource data and developer commitments against the likely cost of building the needed transmission lines, and selected for further study six major CREZ areas in August 2007 (**Exhibit 9-5**).[41] The CREZs are located in the Panhandle; the McCamey area, south of Odessa; and near Sweetwater and Abilene.

EXHIBIT 9-5

ERCOT Selected CREZ Zones*



*The McCamey Area includes two CREZ areas.
Source: The Electric Reliability Council of Texas.

PUC also was charged with developing a plan to build the transmission capacity needed to move electricity from the CREZ locations to the power grid. The cost of that construction will be charged uniformly to all Texas electricity consumers. A recent ERCOT study estimates that it will cost about $1.5 million per mile to build transmission lines to transport wind generated electricity from West and Northwest Texas to urban areas.[42]

PUC asked ERCOT to study the transmission needs for four different scenarios of CREZ zones and to complete a report for its review.[43] On April 2, 2008, ERCOT finalized its CREZ Transmission Optimization Study. The estimated cost of building new transmission lines to windy parts of the state ranges from $3 billion for 12,053 MW of wind generation capacity to $6.4 billion for 24,859 MW.[44] Each scenario includes 6,903 MW of wind generation that was either in-service or had signed interconnection agreements as of fall 2007.

PUC will issue final designation of transmission solutions for the CREZ areas, and decide which transmission companies will be selected to build transmission lines. The expansion of transmission lines to the CREZ zones would move large amounts of wind power to the state's electric grid.

Net metering is a utility practice that allows owners of qualifying electricity generation resources to capture the value of electric energy they produce beyond their own needs.

Net Metering

Net metering is a utility practice that allows owners of qualifying electricity generation resources — solar energy, wind, geothermal electric, biomass, landfill gas, hydroelectric, tidal energy, wave energy and ocean thermal energy — to capture the value of electric energy they produce beyond their own needs. For example, under net metering, homeowners or businesses with PV solar energy systems or small wind turbines can reduce their use of grid electricity and sell excess electricity they produce back to the utility. Net metering is considered of particular importance to the development of distributed solar energy.

State and utility net metering implementations, both nationally and in Texas, often have differing technical and legal requirements, creating obstacles to growing a market for renewable energy systems.[45] Each state or utility adopts interconnection standards and net metering rules that establish which utilities must participate; which customers of distributed energy are eligible for net metering; the size of an individual system eligible for net metering; the treatment of net excess generation of electricity (whether it is credited to customer's next bill, purchased by the utility monthly at retail rate, etc.), and the process and requirements for interconnection.

As of August 2007, at least some electricity customers in 42 states and the District of Columbia had access to net metering. Several electric utilities in Texas offer net metering to customers, most notably Austin Energy and San Antonio's CPS Energy.[46]

In 1986, net metering was first introduced in Texas in response to federal legislation. PUC adopted rules, applicable to investor-owned utilities (IOUs), allowing customers with renewable electricity generators capable of producing 50 kW or less to have their net energy consumption measured with a single meter capable of spinning forward and backward. This rule is still in effect for investor-owned utilities (IOUs) outside the ERCOT power grid (such as El Paso Electric Company, Entergy Texas, South Western Electric Power Company and Xcel Energy), which currently account for 15 percent of all Texas electricity sold in the state.[47] Municipally owned utilities, electric cooperatives and river authorities are not required to offer net metering, though some have done so voluntarily.

In 1999, however, S.B. 7 deregulated the electric industry within the ERCOT area, creating new distinctions between entities responsible for delivering energy (transmission and distribution service providers, or TDSPs) and selling energy (retail electric provider, or REPs), and making the appropriate application of the PUC's existing net metering requirements unclear.

To reestablish net metering within ERCOT, the Texas Legislature approved H.B. 3693 in 2007. H.B. 3693 directed ERCOT and PUC to establish protocols and rules requiring REPs to offer to purchase net excess generation from schools, and to enable them to voluntarily offer to purchase excess generation from other customers with distributed renewable generation by January 1, 2009.[48]

In October 2007, ERCOT convened a Distributed Generation Task Force to begin addressing H.B. 3693 by presenting options and recommendations to PUC on net metering policy for distributed renewable generation. On January 15, 2008, the

ERCOT Board of Directors asked PUC to clarify the definition of "net metering" since the legislation is ambiguous about the meaning of the term and its intended application in Texas' competitive electricity market.[49]

The most common method of net metering uses a single, bidirectional meter that runs forward and backward; one alternative method requires utilities to separately measure energy in-flows and outflows. The choice of metering method is a technical one, but has important financial ramifications for customers, transmission and distribution service providers, and retail electric providers.[50]

PUC is expected to provide guidance on the definition of net metering in spring 2008, and to complete more detailed net metering rulemaking for IOUs within ERCOT by fall 2008. Full implementation of this measure is expected by January 1, 2009.[51] In other areas of the state, however, Texans will continue to encounter different net metering programs depending on the type and location of utility to which the customer is interconnected.

Outlook

Texas is a state rich in energy resources. In the 20th century, the state tapped into its fossil fuel — oil, gas and coal — reserves and reaped economic benefits. Texas is also rich in renewable energy resources — wind, solar, geothermal and biomass — and can continue to play a major role in the energy economy of the 21st century.

The following chapters examine, in greater detail, these renewable energy resources.

Endnotes

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