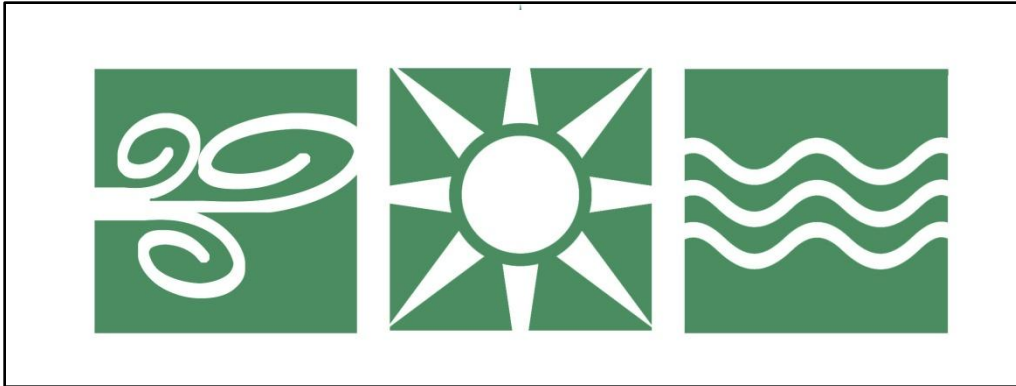


Texas' Clean Energy Economy

Where We Are. Where We're Going. What We Need to Succeed.



EXECUTIVE SUMMARY

A REPORT FOR THE CYNTHIA AND GEORGE MITCHELL
FOUNDATION

BILLY HAMILTON CONSULTING

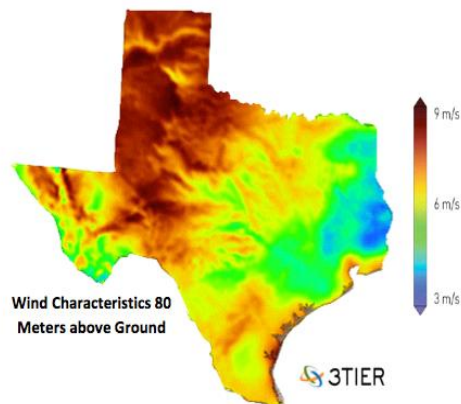
July 2010



Executive summary

As we enter the second decade of the 21st century, Texas has an opportunity to lead the nation in shaping the new energy economy. Drawing on our history as the global leader in the energy industry, Texas has enormous technical, financial and educational expertise in energy exploration and production. We have an opportunity to harness our state's expertise and our can-do attitude to ensure that we emerge as the leading clean energy economy in the United States and the world.

Texas Wind Potential



Source: United States Department of Energy and 3TIER, Inc.

Texas, with her windswept prairies, breezy coast, tall pines and sunny skies, is blessed with an ideal climate and terrain for generating electricity from the wind, sun and plants. Thanks to forward-looking policies enacted over the last ten years, Texas already leads the nation in wind generation, producing 2.6 million Megawatt hours (MWh) in April 2010 alone, enough to power 2.3 million homes for a month. In 2009, nearly a third of all wind power in the U.S. came from Texas.

Just as Texas has continued to lead the traditional energy industry by constantly innovating and adapting to changing demands, our state now has the opportunity to increase our economic gains by supporting an expanded, diversified clean energy sector. In the coming years, Texas will compete head-to-head with other states and countries to manufacture, install and maintain more wind power and other large-scale sources of clean energy such as solar and biomass. The good news, as demonstrated by the findings in this report, is that with minimal investment clean energy can become an even greater economic engine for Texas, creating jobs and prosperity for our state.

The Pew Charitable Trust has found that clean energy investment worldwide will top \$200 billion this year, and it seems clear that this is a growing industry that carries with it not only the promise of new sources of energy, but also of jobs and investment. However, to maximize the economic benefits that the clean energy economy can bring to Texas, we will need to institute coherent long-term state policies that support and encourage this sector of our energy economy.



This report examines the factors that affect our state's energy economy – rising demand for electricity, continued volatility in global energy markets, declining costs for clean energy sources such as wind, solar and biomass, the possibility of a regulatory price on carbon dioxide emissions, competition with other states and the concerns of average Texans over their electric bills -- and presents three possible scenarios for our state's clean energy economy over the next decade. With state policies that incentivize the development of a diversified clean energy economy, as Texas has done in

the past to promote high technology, bio-medical research and other cutting edge industries, we can build a strong clean energy sector and maintain our leadership in the race for a new energy economy.

Texas, along with numerous other states and countries, stands at a critical juncture. Texas used state policy to jumpstart our wind industry, and over the last decade our state went from having virtually no clean energy to being the national leader in that sector. Continued innovation is the key to maintaining our leadership. Over the next few years, some states and countries will institute policies that offer the right business climate, tax structure, workforce, and quality of life to develop a clean energy industry. Clean energy jobs, including manufacturing, will flow to the largest markets that present the best business environment for success, and significant research and workforce training dollars traditionally follow. This report is designed to help Texans decide how to compete and win in the race for those benefits.

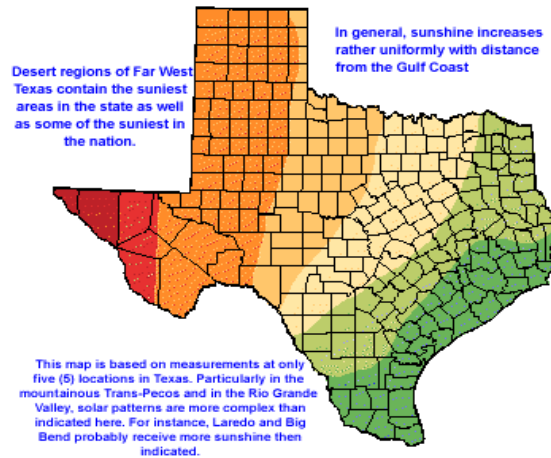
Benefits of a Clean Energy Economy

Texas' Clean Energy Economy: Where we are. Where we're going. What we need to succeed. is sponsored by The Cynthia and George Mitchell Foundation as part of their ongoing effort to spur the development of clean energy markets in Texas and meet the state's energy needs while reducing pollution and growing the economy.

The study explains how state policies that support growing the clean energy sector of our state's economy can provide our citizens with economic opportunities that create jobs, increase our gross state product (GSP) and increase local and state tax revenue. The study analyzes three scenarios – a Low Range estimate, a Baseline and a High Range.

The Low Range scenario is based on Texas' share of U.S. renewable electric generating capacity at its low point of 2.2 percent in 2004. This scenario would apply if Texas chooses not to innovate and clean energy development in Texas lags compared to more sustained policy commitments by other states and

Texas Solar Potential



Source: Texas State Energy Conservation Office

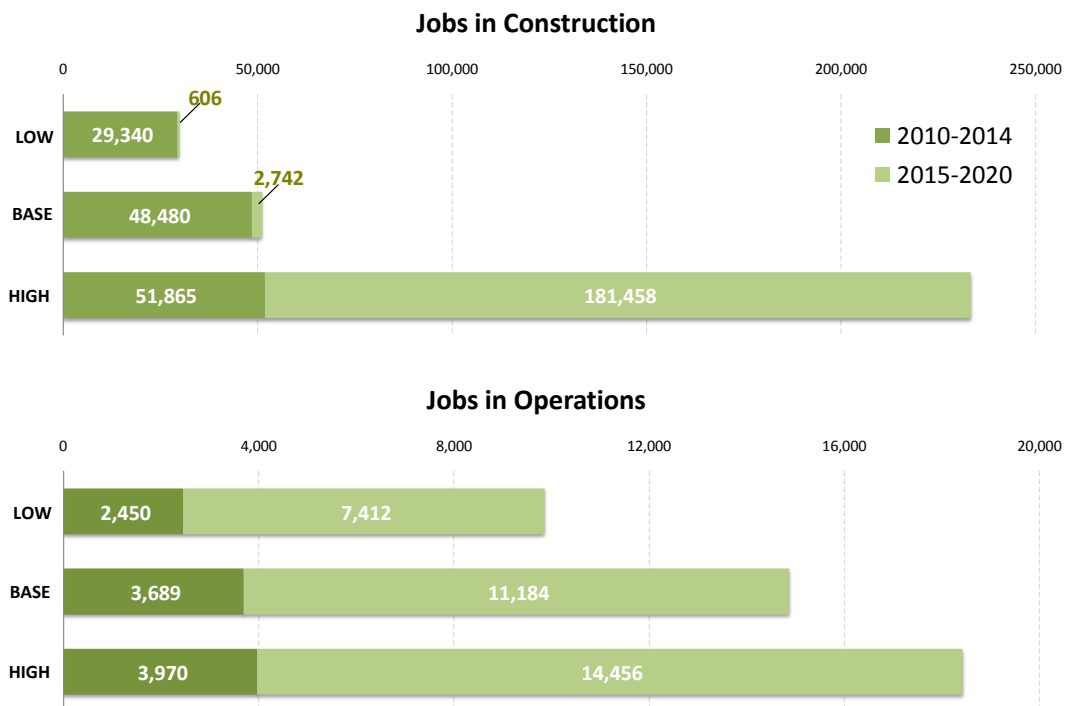


countries. While the clean energy sector would continue to be a steady source of job creation and economic growth, it would not thrive as in the other scenarios.

The Baseline scenario is based on Texas' 8.6 percent share of U.S. renewable electric generating capacity in 2009. Assuming that Texas would invest enough to maintain its share of U.S. clean energy capacity through 2020, Texas employment in the clean energy sector would increase by 6,000 jobs per year from 2010 to 2020. Texas gross state product (GSP) would increase by \$802 million annually, while state and local governments would gain an additional \$177 million per year in new tax revenues, or more than \$350 million per biennium. These are strong economic benefits for Texans, but we can do more with coherent state clean energy policies.

The High Range scenario is based on Texas's 29.7 percent share of the increase in U.S. renewable electric generation capacity during the state's wind power expansion from 2004 to 2009, plus an expanded Renewable Portfolio Standard (RPS) of 13,000 MW of renewable-based power and a set-aside for 3,500 MW of solar photovoltaic (PV) energy. If the state chooses to support the clean energy sector at this level, the economic benefits would be spectacular. If the 2011 Texas Legislature decides to raise the state's RPS to 13,000 MW of clean power and sets aside 3,500 MW for solar photovoltaic energy, as the High Range scenario assumes, the state's economic gains would be exponentially greater than the Baseline scenario. Job gains would jump to 22,900 per year, Texas GSP would increase by \$2.7 billion per year, and state and local tax revenues would increase by \$279 million per year, or more than half a billion dollars per biennium.

Economic Benefits of Expanded Clean Energy Development – Job Creation

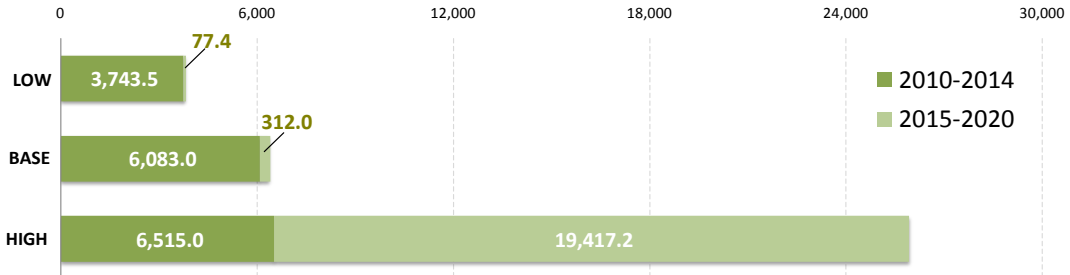


Source: Billy Hamilton Consulting

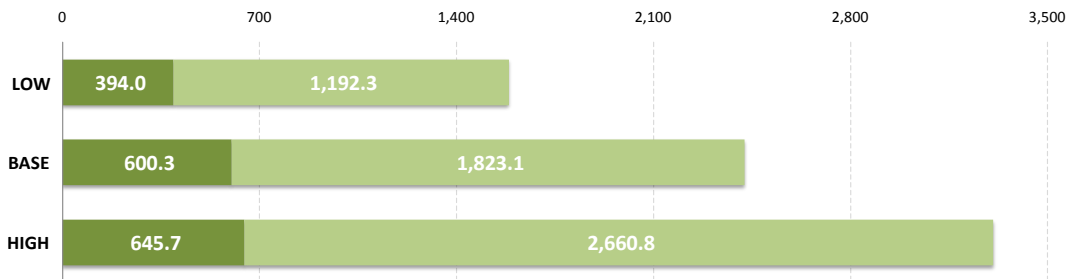


Economic Benefits of Expanded Clean Energy Development – GSP Increase

Gross State Product (Million \$) in Construction



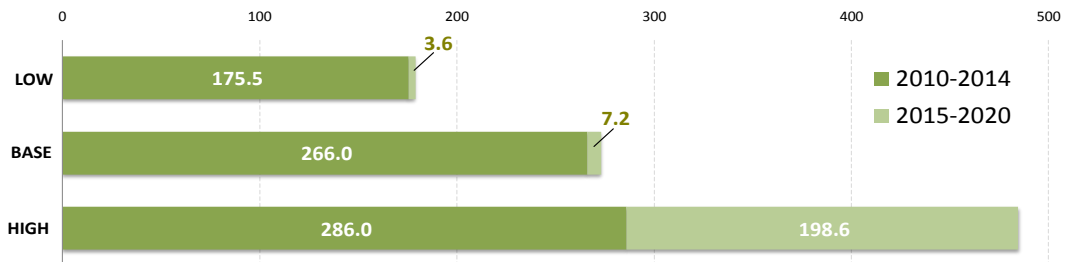
Gross State Product (Million \$) in Operations



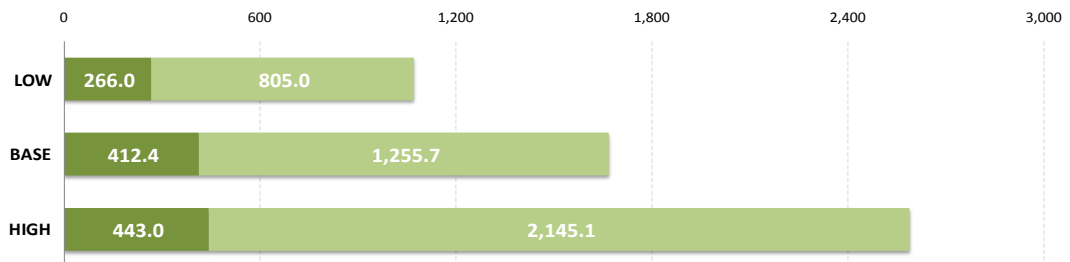
Source: Billy Hamilton Consulting

Economic Benefits of Expanded Clean Energy Development – Tax Revenue

State/Local Taxes (Million \$) - Construction



State/Local Taxes (Million \$) - Operations



Source: Billy Hamilton Consulting



These job creation numbers, if achieved, would contribute up to 25 percent of all new jobs in Texas over the next decade. The High Range scenario (achievable with an RPS of 13,000 MW and a 3,500 MW set-aside for solar) would create an average of 22,9500 jobs per year for the next decade. Based on Texas Workforce Commission data on new job creation in Texas over the past decade, the High Range would contribute 18% of all new jobs created in Texas. When compared to other estimates of job growth in Texas such as the U.S. Bureau of Labor Statistics, the High Range scenario would contribute between 15 and 25 percent of the average annual number of new jobs in Texas.

Also worthy of note is that much of the gains to the economy would accrue to rural areas of Texas, where many renewable projects would be located. Indeed, the job gains resulting from this sort of investment make it an ideal economic development policy for Texas' small towns and rural counties.

The economic development findings of this report, significant as they are, understate the promise that an expanded, diversified clean energy economy holds for Texas. For example, the report's three scenarios do not include the very real possibility of a regulatory price on carbon emissions. Likewise, the report does not attempt to quantify the likely significant increase in manufacturing jobs in Texas related to expanded investment in clean energy.

With its 25 million households, if the state of Texas were to adopt innovative state energy policies in addition to the existing human and natural capital of Texas, our state would be the logical destination for new clean energy manufacturing facilities. As in other industries, clean energy manufacturers will likely gravitate to the largest markets where state policies encourage the growth and success of the industry. Investments in research and workforce development traditionally seek out the same markets. For all these reasons, the economic contributions of the clean energy sector to the Texas economy would likely significantly exceed the High Range scenario projections.

Small Investment, Big Rewards

A central finding of the report is that a minimal investment in clean energy development – about the price of a single postage stamp per day for the average family – will allow Texans to claim the benefits forecast in the High Range scenario described above.

Under the High-Range scenario, the state's clean energy generating capacity would increase nearly 20 percent, in addition to the tremendous job gains, growth in state productivity and increased tax revenues discussed above. The cost to average Texans under the High-Range scenario would be an increase in their electric bills of about one cent per kilowatt hour – just over \$13 a month, almost exactly equal to the cost of one postage stamp a day.

For an even smaller investment, the Baseline scenario – which would cost the average residential consumer less than four-tenths of a cent per kilowatt hour, or about \$1 - \$3 a month by 2020 – would increase the state's clean energy generating capacity to 15 percent. As discussed above and in the report, this moderate scenario would create 6,000 new jobs per year and generate gains in state productivity as well as increased state and local tax revenues.

For most Texans, these incremental changes of a few cents per day would be an attractive investment to reap the job creation and other returns that the clean energy economy can create over the next decade and beyond. However, the report acknowledges that these investments, while small, could impose a financial burden on low-income Texans, the elderly and the disabled. The report notes that



numerous public policies, such as the System Benefits Fund administered by the Public Utility Commission, provide assistance for these Texans. Currently the System Benefit Fund has a balance of \$610 million, which is more than adequate to provide appropriate support for low-income, elderly and disabled Texans so that they will not be adversely impacted. Texas lawmakers may also choose to consider additional safeguards so that vulnerable Texans are held harmless.

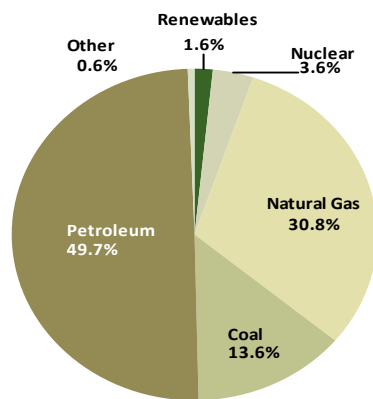
As would be expected from a relatively new sector of the energy industry, renewable energy costs have historically been higher than traditional fuels. To help improve the understanding of these cost factors and how they may affect the development of the clean energy economy in Texas, this report examines national data on the cost of various sources of clean energy to provide a more thorough cost comparison with traditional fuels.

Costs for clean energy have declined steadily over the last 30 years as clean energy technology improved, and the trend is expected to intensify. For example, the cost of wind energy declined from about 30-45 cents per kWh in 1980 to as low as 5 cents per kWh today. Wind, solar PV and biomass all have experienced significant drops in cost as their technology continues to advance.

The data show that wind and biomass are the least costly clean energy sources, and are quickly becoming competitive with natural gas and coal, the two primary fuels for electricity generation in Texas. Solar power has historically been more expensive, but its costs are coming down as well. Overall, the cost differences between clean and traditional energy are less extreme than critics often imply and the differential continues to decline steadily.

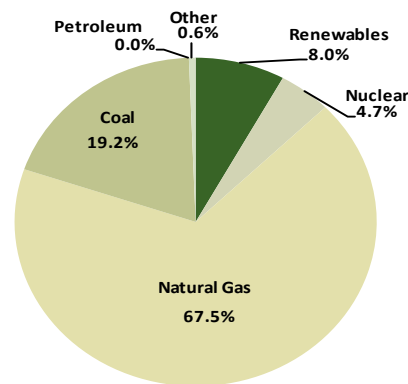
Total Energy Consumption and Electric Capacity by Fuel Source

Total Texas Energy Consumption in 2007



Source: U.S. Energy Information Administration, State Energy Data System

Texas Electric Capacity by Fuel Source in 2008



Source: U.S. Energy Information Administration

In keeping with the report's conservative approach, the cost estimates described above do not factor in a number of variables that will likely accelerate the downward trend in costs of clean energy relative to traditional energy. Although federal climate change legislation is not likely soon, EPA or other regulators could take action in the near-to-medium term that would put a price on carbon emissions and cause a spike in the cost of traditional fuels. In addition, as clean energy technologies



continue to mature and clean energy markets expand, economies of scale in the sector will accelerate the decline in prices for clean energy.

Challenges Facing the Clean Energy Sector

The report also examines a number of challenges related to the development of clean energy sources, including the intermittency of supply—i.e., the sun shines in the day and the wind tends to blow hardest best at night—as well as the need to develop a transmission infrastructure that can move power from remote areas of the state to high-demand urban areas.

The report notes that while these and other hurdles will require a concerted effort to overcome, none are insurmountable. Indeed, energy supply experts are already developing solutions to some problems – longer-lasting energy storage units, for example. Texas has already begun to make investments to overcome transmission problems for clean energy by tying the developing wind farms of West Texas into the state electrical grid using the CREZ system. The development of a new generation of plug-in hybrid and all-electric vehicles may also help balance electric demand. Because many motorists likely will re-charge their vehicle batteries at night, electric vehicles will likely create new demand for what has been under-utilized nighttime generating capacity.

Where We Stand Now

Americans have been aware of the need to find alternative sources of energy since the OPEC oil embargo in 1973. Some progress has been made at both the state and national levels, such as the successful RPS policies that have supported the growth of the wind industry in Texas, but greater benefits from clean energy will require a more sustained and coherent approach to energy policy.

Due to our state's large population and energy-intensive industries, Texas leads the nation in total energy consumption, accounting for more than 10 percent of total U.S. energy use. In 2007, Texas consumed 11,834.5 trillion Btus of energy from all sources, with nearly half of this total coming from oil, 30.8 percent comes from natural gas and 13.6 percent from coal.

Much of the fossil fuel consumption in Texas is related to industrial uses and electric power generation. In total, fossil fuels represent more than 94 percent of the energy consumed in the state. Nuclear power accounts for about 4 percent of total consumption, and renewable sources—primarily biomass, wind and hydroelectric—make up about 2 percent of total energy consumption in Texas.

When we isolate the fuels that generate electricity in Texas, clean energy already plays a significant role. From being virtually non-existent in Texas just 10 years ago, clean energy – primarily wind -- has expanded so rapidly that it now provides eight percent of the electricity capacity in Texas. Natural gas provides about two-thirds of the state's electric power, coal about 20 percent and nuclear about 5 percent.

In addition, our state's demand for energy is expected to rise, and rise faster than the nation as a whole, over the coming years. Given our state's ongoing need for greater and greater energy resources, clean energy sources such as wind, solar and biomass can help us meet our future energy needs. By definition, these sources do not have large, ongoing fuel costs, since they produce energy from readily available sources – namely wind and sunlight – which Texas has in abundance. These sources also offer



the advantage of producing lower carbon emissions and other pollutants, which helps control air quality costs in our urban areas.

The development of clean energy is going to be a force in creating jobs and investment in the years ahead. Clean energy can play a crucial role in helping Texas meet its large and constantly growing power needs. Given the commitment to clean energy in other countries—and indeed in many other states—the clean energy sector is going to develop with or without Texas’ participation. However, the economic potential of the clean energy sector presents an opportunity for Texas to exploit the full potential of the clean energy economy and continue to lead the nation in energy. As a state, the time is ripe to invest in policies that will spur greater development of Texas-based clean energy, meet our power needs and employ Texans in this fast-growing sector of our energy industry.

The Role of State Policy in Developing Clean Energy

The 2011 Texas Legislature will have a range of policy tools at its disposal to support and encourage an expanded, diversified clean energy sector. The chapter of the report entitled “Clean Energy Policies” discusses the various policies that states around the country are using and provides information for Texans to make wise choices about their policy options.

Over the past decade, the primary mechanism for incentivizing our state’s clean energy capacity has been the Renewable Portfolio Standard (RPS), a policy that requires electric utilities to produce a specified amount of electricity – either measured in megawatts or as a percentage of their total generating capacity -- from renewable sources. Texas was a national leader in enacting its first RPS in 2000, and the Texas clean energy sector responded quickly. The RPS policy enacted in 2000 required that Texas utilities, based on their market share, have 2,000 MW of new renewable energy capacity installed by 2009.

In 2005, encouraged by a strong positive response to the 2000 RPS, Texas lawmakers increased the state’s RPS requirement to 5,880 MW by 2015, with a 500 MW target for non-wind resources. Five years ahead of the deadline, Texas wind power alone has already surpassed that goal. The success of the RPS approach creates an opportunity for Texas to continue using this proven method to incentivize further expansion and diversification of the clean energy sector.

The report makes a series of recommendations for Texas’ RPS, including:

- Change the RPS measurement from megawatts of installed capacity to a percentage of overall generation within a target year, so that the RPS can keep pace with increasing electric demand in Texas;
- Set RPS targets in 5-year increments to 2035, with a benchmark of at least 25 percent clean energy by 2025; and
- Make RPS targets mandatory.

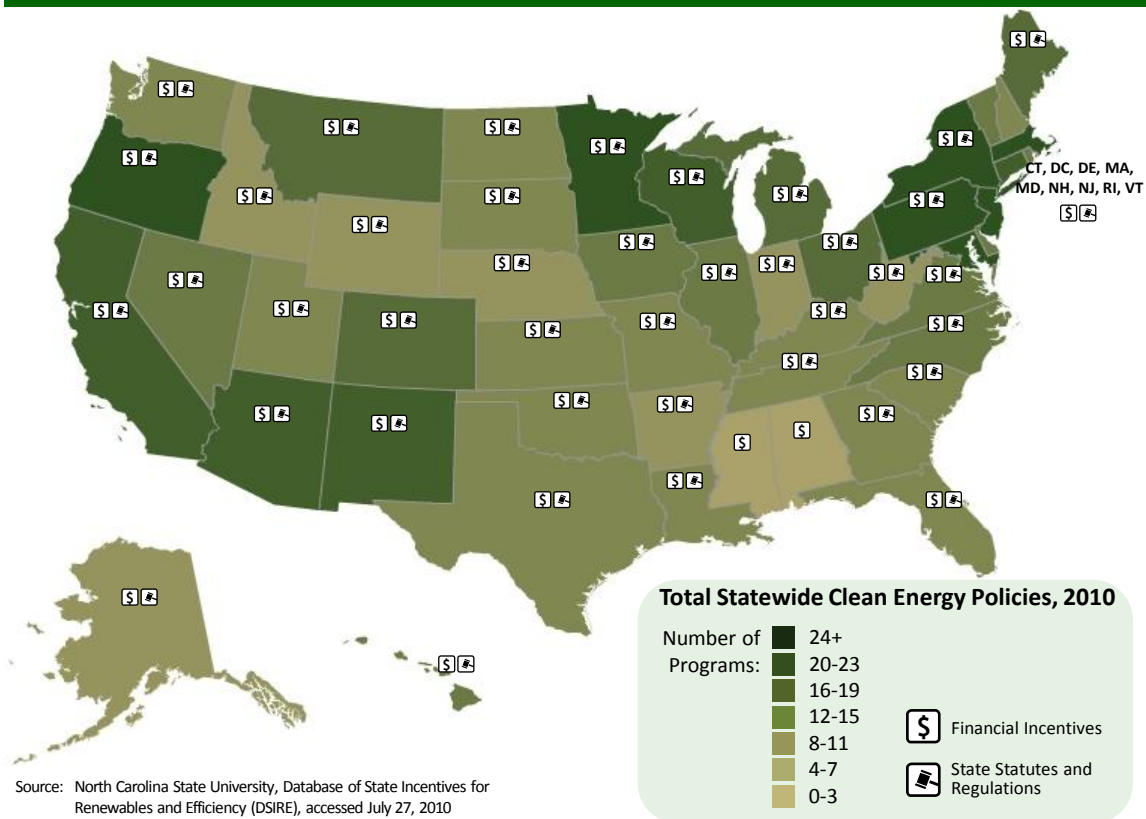
The report also considers additional policy options, such as:

- Enacting a statewide net metering program;
- Expanding financial incentives for clean energy, such as exempting clean energy devices and installation costs from state and local sales taxes.



The report also explores an array of obstacles posed by different levels of government regulation, as well as the effect of lapses in federal and state policies that were originally intended to promote the clean energy economy. This point—the periodic lapses in federal and state policy—can be especially problematic for the successful development of clean energy in the years ahead. For example, wind energy has grown at a rapid pace nationally in the last decade except during periods following a lapse in the federal Production Tax Credit. When Congress renews the tax credit, wind energy develops again. Similarly, Texas could face attrition of our leading role in the clean energy economy if we choose not to update the RPS standard, which has successfully incentivized wind development in the last decade, and we do not institute other policies such as net metering and tax policies that support the expansion and diversification of the clean energy sector.

States Are Competing to Attract Clean Energy



In this context, the report reviews various federal and state policies to expand and diversify the clean energy industry. The report catalogs the array of policies that states have undertaken to promote a clean energy economy. The report describes policies which have been successful and which policies Texas does—and does not—currently have. The report includes a detailed discussion of the leading options including tax incentives and net metering, which would encourage the installation of solar and wind energy devices on individual homes and businesses by allowing property owners to sell their excess generating capacity back into the power grid.



Clear-Cut Choices

Oil and natural gas have been centerpieces of the Texas economy for over a century. Although the energy industry is changing to incorporate clean energy like wind, solar and biomass, the energy industry will continue to be a linchpin of our state's economic prosperity. Thus, the question for Texas policymakers becomes how best to develop the emerging clean energy sector of our energy economy, so that Texas remains a leader in the new energy economy, as we have always been a leader in the traditional one.

Over the past decade, with the initial RPS policy in place, Texas has begun the task of extending its historic leadership of the energy industry into the clean energy sector, becoming the largest single producer of wind energy in the country. But the development of clean energy in Texas is still in its early stages, and small, strategic investments now can dramatically impact the growth of the industry in the next decade and beyond. The data and analysis compiled in this report demonstrate that small, incremental investments in the clean energy sector of the Texas economy would pay dividends in the form of new jobs, increased economic prosperity and a surge in state and local tax revenues. In addition, a number of factors such as the potential to attract clean energy manufacturing and the attendant investments in research and workforce training will likely make the economic benefits significantly greater than this report estimates.

However, just as in the traditional energy industry, Texas must continue to innovate in order to maintain its leadership in the clean energy sector. Other states, without a prominent traditional energy sector and perhaps more willing to explore new energy sources, are positioning themselves to move ahead, especially where Texas is vulnerable. We have developed wind resources and some biomass, but we have accomplished little in promoting solar energy, either for large-scale generation or for distributed use by homes or businesses. Competition against surrounding states and even foreign countries for new jobs and investment is nothing new. Whether Texas participates or not, the race is on to attract investment and economic benefits in the clean energy economy. It makes no sense for our state, the traditional leader in the energy industry, to choose to be left out of the economic promise of the clean energy economy.

Texas has made investments that have successfully incentivized the growth of our high tech, bio-tech and other cutting-edge industries. The state has undertaken policies to stimulate its natural gas sector and other important state industries, and we have used the RPS policy to turn Texas into a national leader in the wind industry in just 10 years. Now, Texas has the opportunity to make the same type of investment to develop a diversified clean energy economy and extend our historic leadership in the global energy economy into this new sector of the industry. This report provides data, analysis and recommendations to enable lawmakers, regulators and average Texans to make informed decisions about how to develop the clean energy economy in Texas.