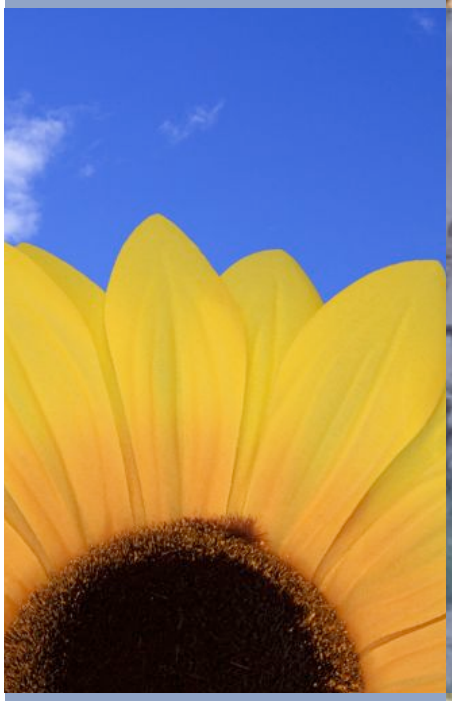
MARCH 2007



SUN POWER

Texas' Solar Future

A report by
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ENVIRONMENT TEXAS
Clean Air. Clean Water. Open Spaces.

With the best solar resource potential in the nation, high projected energy needs and a considerable existing energy infrastructure, Texas is in a prime position to be a world solar leader. Developing a thriving, self-sufficient solar power market in Texas can have huge benefits for the state—reducing air pollution, protecting consumers from volatile electricity prices, reducing the need to fire up expensive power plants, and avoiding costly upgrades to electricity transmission and distribution systems. A solar market could also bring billions of dollars in investment to the state and create thousands of jobs.

The best way for Texas to ensure that the state sees a future expansion in solar power capacity is by committing to long-term market development programs that include financial incentives and new construction design policies. Experience in California and in other countries, especially Japan, has shown that such government programs can lead to increased demand, lowered prices, and ultimately a robust, self-sufficient solar market in which government incentives are no longer necessary.

Texans want more solar power in this state and they're willing to pay for it. A January 2007 poll by Baselice & Associates found that sixty percent of Texas voters are willing to pay more than fifty cents per month to encourage solar developments.

In 1999, the Texas Legislature created one of the nation's earliest and most successful renewable energy standards. In 2005, the Legislature increased the standard and set a target of generating 10,000 megawatts of renewable energy by the year 2025. These laws created a boom for wind power that helped propel Texas to become the national leader for wind energy. By creating incentives for homeowners and businesses to install solar photovoltaics, the Legislature can help Texas meet our growing demand for electricity and continue our leadership in the field of clean energy.

How Solar Photovoltaics (PV) Works

Photovoltaic technology converts sunlight directly into electricity without using any moving parts. The basic building block is the photovoltaic cell, which is made of semiconductor materials. Cells can be connected together to form modules, and modules can be connected to form arrays. A few PV cells will power a hand-held calculator, while interconnected arrays can serve as a power plant for a city. Although PV panels only generate electricity when the sun is shining, connection with the grid makes it possible to depend on PV, both from the consumer and the state planning perspectives. On hot days, when electricity consumption is at its peak, PV panels feed excess electricity into the grid. In the evening when the sun is down and electricity demand is lower, customers draw electricity from the grid.

A variety of technologies exist that tap the energy of the sun, including traditional, silicon-based PV systems, which have come down in price and seen significant improvements in efficiency over the past two decades and thin-film PV systems,

ADVANTAGES OF PHOTOVOLTAIC TECHNOLOGIES

SIMPLICITY
With no moving parts (or very few, for some applications), operation and maintenance costs are minimal.

VERSATILITY
PV can connect to the existing infrastructure of the utility grid and serve as an alternative power source during peak periods of power demand or it can operate remotely (off the utility power-line grid). Many PV systems are easily transported.

RELIABILITY
First developed for U.S. man-made satellites in the 1950s – where low maintenance was an absolute necessity – and now with over 40 years of technical advancements improving performance, PV has very high online availability.

SCALABILITY
PV is modular and can be easily scaled according to the amount of power needed.

which use technology similar to that in solar calculators and have the potential to eventually be produced more cheaply than traditional PV systems, since they are less reliant on high-grade silicon. But they require technological advances to increase their efficiency at turning sunlight into energy.

Texas Potential for Solar

According to the State Energy Office, Texas has the greatest solar natural resource potential in the nation. The energy from sunshine falling on just a single acre of land in West Texas is capable of producing the energy equivalent of 800 barrels of oil each year.[1] Sufficient solar radiation is available throughout Texas and could supply much of the energy needs of our urban areas.

Texas also has exemplary human and technical resources for solar. Texas' large microprocessor industry could be put to work manufacturing solar technologies. Solar cells and microprocessors are both types of semiconductors, are both made from polysilicon, and use the same manufacturing processes. For example, semiconductor equipment can be retooled to make silicon solar wafers and "thin film" solar cells. This technological capacity for photovoltaic technology, as well as our experienced engineering workforce, gives Texas the potential to become a world center for solar production and installation.

"The three largest technology initial public offerings of 2005 were for solar companies."

According to a PV industry analysis, with some incentives, the solar photovoltaic market could attract more than a thirty-four billion investment by 2015. Texas could attract almost five billion of the investment.[2] Furthermore, according to a study by the state of Wisconsin, increased use of renewable energy sources like solar would create three times more jobs than increased use of traditional sources of electricity.[3] In fact, the solar energy industry has the ability to create between 28,000 and 42,000 new jobs in the U.S. by 2015, including 6,000 jobs in Texas.

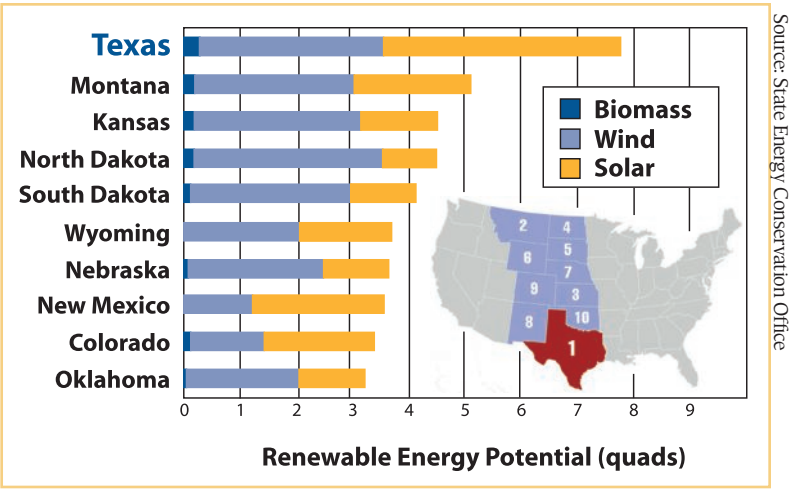
The increasing development of the PV industry makes the economic benefits feasible. Solar photovoltaic technologies have declined in price every year since they were introduced at an average rate of about four percent per year. In 2006, the U.S. solar energy industry saw record growth.[4] The results are decreasing costs and increasing economies of scale. The price decrease of PV is driven by improved research and development and most of all by steady increases in sales volume.[5] In 1954, approximately one watt of PV generating devices was manufactured; in 2004, approximately one billion watts were manufactured worldwide. The world PV market is growing at approximately twenty-five percent annually and Wall Street is taking notice. The three largest technology initial public offerings of 2005 were for solar

companies.[6]

Solar Can Help Meet Texas' Growing Energy Needs

According to ERCOT, which manages most of Texas' electric grid, demand for energy is growing at a rate of 2.3% each year, and in 2009, demand will exceed safe levels of supply. The growth in the housing sector is a major part of this increased demand, with more than 170,000 new homes built each year. These new buildings add considerable strain to our electric grid, but they also provide the state with the opportunity to leverage private investments from homeowners to quickly build decentralized, clean power plants right on to the roofs of our homes and businesses.

A recent study by the American Council for an Energy Efficient Economy found that all of Texas' projected growth in demand could be offset through energy efficiency and on-site renewable energy, including solar PV. The report highlighted PV for its "statewide applicability, extreme versatility, and unlimited potential, and the prospect of providing a highly desirable emission-free, onsite generation source for congested urban settings" and called for "special consideration of incentives for PV."[7]



Source: State Energy Conservation Office

Pollution Reduction

With more than half of Texas' population living in areas that are failing or close to failing federal air quality standards, solar can play an important role in clearing the air. Solar energy systems emit zero pollutants. By reducing demand for fossil fuels, increased use of solar will reduce the pollution that causes smog, soot, global warming, and mercury contamination of our lakes and rivers.

Solar power reduces emission at a time when smog is at its greatest concentration. Sunlight hours often coincide with peak power demands, so solar panels produce electricity when it is needed most. A study by the National Renewable Energy Laboratory found that a photovoltaic system meeting only half of the electrical needs of a typical household would eliminate approximately half a ton of soot-forming sulfur dioxide pollution and 600 pounds of smog-forming nitrogen oxides from the air over its twenty year lifetime.[8]

Barriers to Solar Development

The price of solar panels has declined dramatically over the last two decades. The 1970 cost of a PV watt was one hundred dollars. By 2002 it was close to four dollars. In inflation adjusted dollars, this is a staggering advance.[9] However, in the absence of government incentives, the cost is still higher than the value of the home's electricity demand that it offsets. The installation costs are still high enough that they outweigh the savings on a homeowner's electricity bill – though these savings do not reflect all of the economic benefits of a residential PV system, like lessening the need for transmission capacity upgrades and new power plants.

A homeowner can already recoup much of the installed cost of solar PV over the lifetime of the system. In a year, a typical 3 kW system will generate electricity worth approximately $527 at current Texas electricity rates. Over the system's lifetime, it will generate about $13,175 worth of electricity, and even more if electricity rates increase in the long term. However, a typical 3 kW system would cost $22,333. With a federal tax credit of up to $2000, a homeowner would still lose more than $7000 over the life of the system. Incentives, such as state-supported rebates, are critical to making solar cost-effective.

Another way homeowners can recoup some of the cost of a PV system is by getting credit from their electric utility for excess power sold to the grid, an arrangement known as net metering. Unfortunately, in a ranking of the states, the Network for New Energy Choices gave Texas an "F" for net metering policies in the state. It notes that statewide electricity market deregulation beginning in 1999 significantly hindered the efficacy of Texas' net metering rule.[10] The law weakened existing customer protections by exempting the state's largest utilities from having to give credit for any energy supplied to the grid by generators less than one hundred kilowatts (the typical residential solar system is only 3 kilowatts).[11] Another problem is that some utilities require customers to carry expensive liability insurance in order to interconnect a small renewable generating system to the grid.[12]

Despite the lack of legislative clarity and promotion of net metering, Texas has seen some progress. For example, Austin Energy provides net metering to customers with on-site generating systems that are powered by renewable energy resources and interconnected with the municipal utility's electric system. If a renewable-energy generating system produces more power than the property consumes, then the extra power will flow into the Austin Energy electric grid. When a solar system sends more power into the Austin Energy grid than the home takes, the difference is credited on the customer's electric bill.[13]

The oil and gas industry is the largest user of PV. Here, solar panels power the monitoring equipment on a pipeline in the Texas Panhandle.

TexSUN Solar Energy Rebate Program

The TexSUN Solar Energy Rebate Program, as proposed by Rep. Garnet Coleman and Sen. Rodney Ellis in the 80th Legislature (House Bill 2226 and Senate Bill 1357), would help create a solar power market in Texas. The measure would create a five year, half-billion incentive program that would make it cost-effective for approximately 50,000 Texas homeowners and businesses to put solar panels on their roofs. The program would be funded by a surcharge on our electric bills of 65 cents a month, something polls show strong majorities of Texans would gladly pay to help develop solar power.

The TexSUN program would have significant benefits for the environment, reducing smog pollution by 5000 tons and global warming pollution by 3 million tons and conserving 11.6 million gallons of water. The program would also help develop Texas' emerging clean energy economy. According to PV Now, an estimated billion dollars in investment would come to the state, creating over 4000 job-years in employment.

At the time this report was written, the bills were awaiting hearings in their relevant committees.

Recommendations

Texas is in a prime position to be a world solar leader, bringing significant environmental, public health, and economic benefits. Policies targeted at increasing demand for solar power installations are the best way to simultaneously increase solar generating capacity and drive down the cost of solar technologies in the long-term. This will increase the amount of electricity generated from clean, distributed sources, build the strength of the solar industry, and pave the way for further growth in generation from clean solar power in the decades ahead. To harness these gains, Environment Texas makes the following recommendations for electric utilities, the state Legislature and Congress:

Dedicate funds for solar incentives such as rebates
Expand net metering programs
Encourage solar through utility billing practices such as time-of-use billing
Offer tax incentives for solar technologies
Improve standards and consumer protection
Increase research and development
Ensure all homeowners have the right to install solar energy systems

Growing the new solar home market, as well as the existing home and commercial markets, will create the demand needed to drive down prices in the long term while providing a more stable, pollution free energy resource. Doing so will also benefit ratepayers by reducing peak demand, reducing the need for polluting power plants and reducing the need for expensive upgrades to transmission and

JAPAN'S SOLAR SUCCESS

Since the start of Japan's solar incentive program in 1994, the average system cost has fallen by about 75 percent in real (2004) dollars, and the country is approaching the point at which government rebates will no longer be needed. However, much of the cost reduction has occurred in parts of the system price that are specific to Japan (such as balance-of-system components and installation), and therefore has not resulted in equally large price reductions in California and in other markets. By following the example of Japan's incentive program, California could achieve similar results by allowing designers, installers, and service companies in California's market to develop similar knowledge.

Japan's average annual investment of $115 million over the last 10 years has led to a 35-fold increase in photovoltaic capacity. In fact, Japan has installed almost as much capacity over the last decade as the rest of the world combined. Despite reductions in the size of the incentive from 50 percent of system costs to 10 percent, demand for solar PV has continued to skyrocket. The country achieved its goal of equipping 70,000 homes with solar PV systems by 2000, and it is on track to meeting its goal of installing building-integrated photovoltaic systems on half of all new homes by 2010. In addition, Japan's solar manufacturing industry has surged ahead to become the largest in the world.

distribution systems. Building a mainstream, self-sufficient solar market will also decrease the nation's reliance on fossil fuels while bringing cleaner air and more local jobs. Ultimately, building solar homes can benefit the next generation of new Texas homeowners by providing a stable source of pollution free and local energy.

(ENDNOTES)

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3 Cassady and Morrison, Environment Texas, ***Generating Solutions: How Clean, Renewable Energy is Boosting Local Economies and Saving Consumers Money***, 16 April 2003.

4 Solar Energy Industries Association <http://www.seia.org>

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6 <http://www.cleanedge.com/reports-trends2006.php>

7 American Council for an Energy Efficient Economy, ***Potential for Energy Efficiency, Demand Response, and Onsite Renewable Energy to Meet Texas's Growing Electricity Needs***, March 2007

8 Solar Energy Industries Association<http://www.seia.org/mythsandfacts.php>

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10 <http://www.newenergychoices.org/>

11 CSGServices, Inc, ***Interconnection and Net Metering of Small Renewable Resources in Texas: Final Report of the Texas RE-Connect Project***, June 2005

12 Ibid.

13 Database of State Incentives for Renewables & Efficiencies <http://www.dsireusa.org>

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