

The Solar Task Force Report

A Three-Year Tactical Plan for the El Paso Region

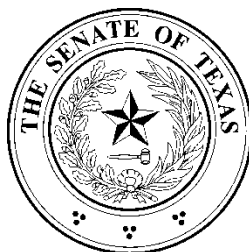
***“Do what you can, with what you have, where you are.”
–President Theodore Roosevelt***



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November 2010

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Table of Contents

Executive Summary	1
U.S.: Moving Towards Energy Independence	5
Texas: #1 in Solar Potential	6
Current Incentive Programs in Texas	7
Solar Power Generation Efforts	8
Solar and Affordable Housing	8
Solar Water Heaters	9
El Paso: Solar City, Texas.	9
Fort Bliss	9
El Paso County	11
The City of El Paso	11
University of Texas at El Paso	14
New Mexico State University	15
El Paso Community College	15
Legislation Considered During the 81st Legislative Session	16
Recommendations	19
Federal Policy Recommendations	19
State Policy Recommendations	21
Local Policy Recommendations	23
Looking into the Future	27
Endnotes	27

Commonly used abbreviations

Direct current (DC): The flow of electricity that flows continuously in one direction.

Frequency: The number of cycles through which an alternating current moves in each second. The standard electric utility frequency in the United States is 60 cycles per second or 60 Hertz.

Electrical grid: The electricity transmission and distribution system that links power plants to customers through high-power transmission line service.

Energy audit: A survey that produces the amount of energy used in a home during an average time period.

Grid connected system: A solar electric or photovoltaic (PV) system in which the PV arrays supplies power to the grid like a central generating plant.

Hertz (Hz): The unit of electromagnetic frequency that is equal to one cycle per second.

Kilowatt (kW): A standard unit of electrical power equal to 1000 watts. The term is commonly used to describe the capacity of an electric generator, particularly in reference to small solar photovoltaic and other generating systems.

Kilowatt-hour (kWh): The amount of kilowatts produced over a period of time or one-kilowatt of electricity supplied for one hour.

Leadership in Energy & Environmental Design (LEED): LEED, an internationally recognized green building certification system, was developed by the U.S. Green Building Council. It is intended to provide building owners and operators a concise framework for identifying and implementing practical and measurable green building design, construction, operations and maintenance solutions. LEED provides third-party verification that a building or community was designed and built using strategies aimed at improving performance across all the metrics that matter most (e.g., energy savings, water efficiency, CO₂ emissions reduction, improved indoor environmental quality, and stewardship of resources and sensitivity to their impacts).

Megawatt (MW): One thousand kilowatts or one million watts. One megawatt is enough to power 1,000 average California homes.

Meter: A device that measures the levels and volumes of customer's utility use.

Net metering: This term refers to systems that allow residential customers to run their electric meters backwards, which allows customers to offset their normal utility bill by providing energy to the grid. The term is often used in conjunction with legislation that requires all the investor-owned electric utilities in a state to allow residential customers to interconnect photovoltaic systems to the utility's distribution system.

Peak sun hours: The equivalent number of hours per day when solar irradiance averages 1000 watts per square meter. For example, six peak sun hours means that the energy received during total daylight hours was equivalent to the energy that would have been received had the irradiance been 1,000 W/m² for six hours.

Photovoltaic (PV) cell/module/panel: A device that produces an electric reaction by light, thereby producing electricity.

Photovoltaic (PV) array: An interconnected system of photovoltaic modules that function as a single electricity producing unit.

Solar energy: This term refers to light and heat radiated by the sun.

Solar panel: This term refers to devices that collect solar energy (e.g., solar photovoltaic modules, solar thermal collectors).

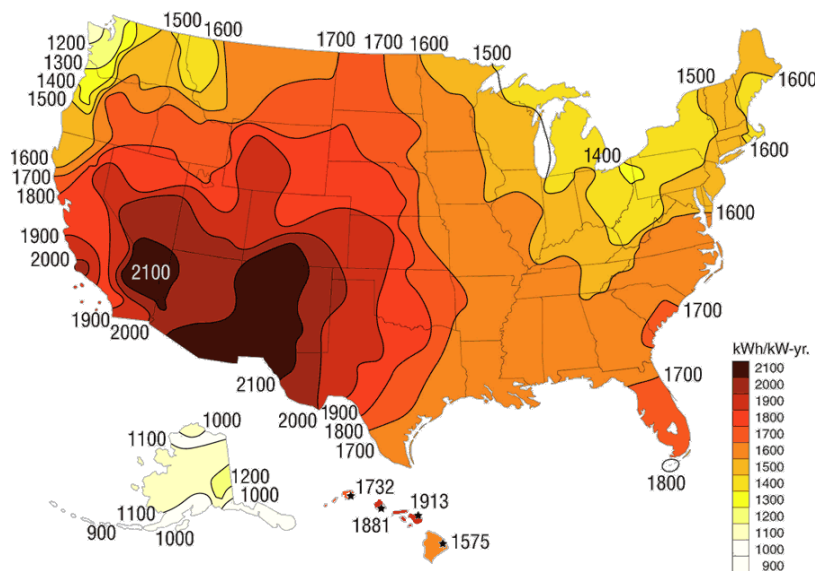
Solar thermal (heat) electric system: This type of system utilizes technology that converts solar energy to electricity by heating a working fluid to power a turbine, which in turn, drives a generator. Examples of these systems include central receiver systems, parabolic dish, and solar trough.

Ultraviolet (UV): Ultraviolet light is electromagnetic radiation with a wavelength in the range 10 to 400 nanometers, which shorter than that of visible light but longer than X-rays.

Executive Summary

For nearly a century, Texas has led the nation in hydrocarbon energy production. For the next hundred years, Texas is blessed once again to be able to lead in solar energy. All it takes is political will. In Texas, El Paso is literally the "Sun City"—we are best positioned to develop, market and lead the state in encouraging solar energy. With an average of 202 days of sun per year, El Paso ranks sixth in the country for the highest percentage of annual possible sunshine average (85 percent). El Paso should be the next energy capitol of Texas.

Texas alone receives enough solar energy to supply one and a half times the world's current energy consumption. El Paso's location makes it *the* place to best take advantage of solar energy and related business development. The map below shows the kiloWatt-hour (kWh) per 10 square miles. At 2100 kWh/kW-yr, El Paso has the most potential for harnessing solar energy in the state.

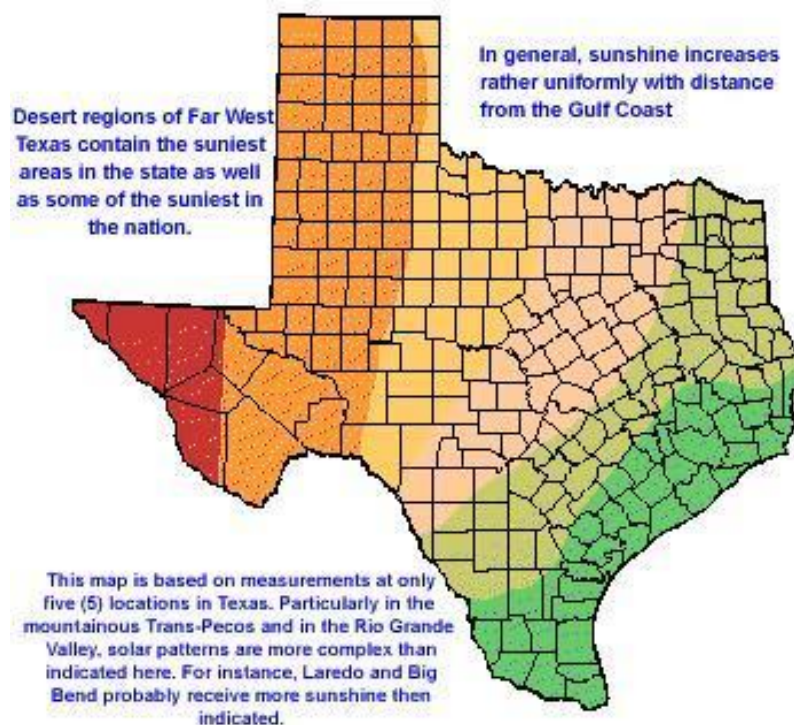


As the solar industry continues to develop throughout the world, it is increasingly imperative that we take steps to be at the forefront. By taking advantage of our available natural resources and developing an inherently clean industry will lead to energy independence, more high-wage jobs and affordable housing for the Paso del Norte region and the rest of Texas.

Throughout the years, the U.S. has become more and more dependent on foreign oil. Today, our country imports two-thirds of its oil from foreign sources, many of whom are governments overtly critical of the United States. [We import 2.055 million barrels per day of crude oil from Canada, 1.174 million barrels per day from Mexico, 1.143 million barrels per day from Nigeria, and 1.033 million barrels per day from Saudi Arabia.](#)¹ Every year, we literally send one trillion American dollars overseas to buy foreign oil. Incorporating more renewable sources into our nation's energy portfolio would both better ensure our security and boost our economy.

This can be achieved through the use of photovoltaic (PV) modules (also known as solar panels). These modules are used as a component of a larger photovoltaic system and offer electricity for commercial and residential applications. PV modules [covering only 0.3 percent](#) of U.S. land could provide for all of our country's electricity consumption.²

Harnessing Texas' natural resources for the production of high efficiency, clean energy will not only help preserve the environment, it will [boost the economy and help energy consumers save money](#).³ Today, Texas households [pay 56 percent more in monthly energy costs](#) than the national average.⁴ As the map below illustrates, El Paso and the majority of Texas are perfectly suited for solar. Texas receives enough solar energy to supply [one and a half times the world's current energy consumption](#).⁵



It just doesn't make economic sense to borrow money from other countries to pay for energy when we can produce it more cheaply at home. For this reason, President Obama laid out three campaign goals including a goal to double renewable energy production within three years. The President has pledged \$15 billion per year for ten years for investment in renewable energy.

There are perhaps five other places in the entire world that attract the amount of solar energy as we do, so it is time to adopt policies that will allow our country to move forward and embrace solar energy as the new norm. While a lack of legislation and incentives have hampered solar innovation and technology development in the U.S., China, Germany, Spain, Japan and Australia have all established themselves as market leaders in solar PV production. Similar to other industries, if the U.S. chooses not to compete, we will continue to export jobs and money to meet our energy needs.

In 2008, 25 U.S. cities won awards for their solar technology adoption at the local level. Houston, Austin, and San Antonio were among the 25 cities chosen for the award. In the very near future, El Paso needs to be included in this list. For several years, our Senate office has asked the El Paso Electric Company (EPEC) to take much more aggressive steps to lower costs, allow consumers to generate and sell solar power, and put El Paso on the map. Today, changing EPEC from a 1950s electric company to a 21st century energy company must be a top community priority. To date, the City of El Paso has initiated negotiations for a rebate program, and [the El Paso Electric Company began their solar program for consumers and businesses in July.](#)⁶ It is not enough. Becoming a solar city consists of significant increases in residential solar power use and large-scale solar installations as well as an increase in public awareness through promotions and citywide education.

Fort Bliss and the U.S. Department of Defense (DOD) recently made one of the most important announcements of the 21st century. The DOD is aggressively pursuing renewable energy and has chosen Fort Bliss as its model base for this endeavor. Earlier this year, General Pittard set a goal for Ft. Bliss to run on solar power by 2015. To achieve this goal, Fort Bliss has 80 projects in progress. In addition, by making energy independence a top priority, Fort Bliss will be able to expand their budget to fund more programs that will benefit military families and veterans. Ft. Bliss's current agenda is going to trail blaze the solar/renewable energy standard for governmental policies, and ultimately, lay out a framework of what could potentially be used in neighborhoods.

If Ft. Bliss is doing it, why can't we do it in our homes?

[House Bill 1937](#) from the most recent legislative session gave the City of El Paso a tremendous tool to encourage residents to make their homes more energy efficient by installing renewable energy devices on their homes.⁷ This bill was modeled after similar municipal financing programs from other states (e.g., Berkeley, San Diego). Improving how El Pasoans use and generate energy will have a significant positive impact on our state's environment.

During last session, our office worked vigorously with other members to pass S.B. 545 and S.B. 541. Both bills unanimously passed the Senate, but failed to pass the House of Representatives. S.B. 545 was an omnibus bill that would have made purchasing renewable energy devices more affordable for residential customers and provided tax incentives to encourage installation and use for residential and commercial customers. S.B. 541 would have provided funding for utility-scale solar, biomass and geothermal projects.

After these key solar bills did not pass during the 81st Legislative Session, our office began working with the "Solar Task Force," which is comprised of architects, realtors, educators, business owners, Sierra Club members, and other solar energy professionals in El Paso. We sought recommendations for the local, state, and federal levels regarding solar energy.

The members of the task force discovered that a lack of education and/or awareness of solar initiatives, affordability, and the absence of incentives were the main obstacles of early adoption. In addition, if a residential customer in New Mexico is able to get \$0.11 per kWh from

the same electric company that is generating our energy, then El Pasoans need to aggressively seek a competitive rate so that we are not essentially subsidizing the solar power market in New Mexico. In analyzing the region and its solar potential, the task force members aligned their recommendations following the mantra of President Theodore Roosevelt: “[d]o what you can, with what you have, where you are.” The task force came up with critical priorities for each level of government. The items below are listed in priority order as agreed upon by the task force members:

Independence Day for the U.S. – Federal Policies:

- Extension of federal tax credit for 20 years
- National net metering standard
- National renewable energy portfolio standard
- UTEP/NMSU/UACJ/EPCC/Monterrey Tech/EPCC solar research park
- Fort Bliss demonstration project
- UTEP Miners' solar village

Texas in the Sun – State Policies:

- Omnibus solar energy bills (S.B. 541, S.B. 545) that include RPU, tax credits for utilities and businesses using energy star, smart grid/EPEC incentives, and net metering
- Texas feed-in tariff
- Political economic analysis of solar energy conducted by a university-level group
- Solar manufacturing tax credits bill
- Solar research center at UTEP (line item appropriation)
- Renewable energy scholarships fund

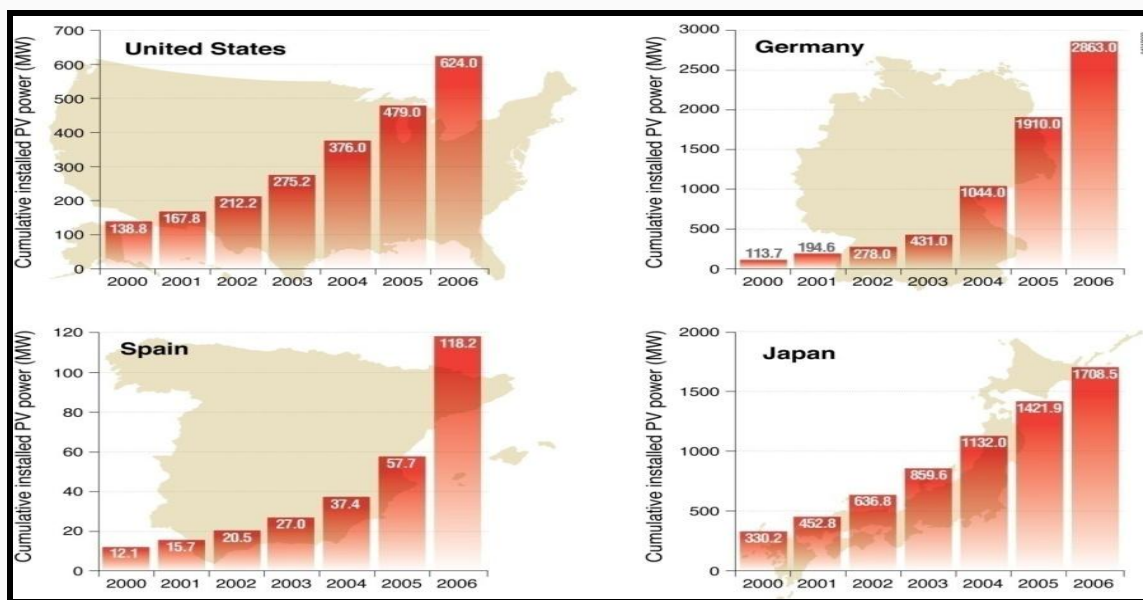
Solar City, Texas – Local Policies:

- Seek and obtain a \$0.13 per kWh from the El Paso Electric Company by 2011.
- Create a city rooftop program and set a numeric goal of 50,000 homes using the program that California created to meet their 33 percent renewable energy target. Organize a conference to invite CA officials and to ask them how they made it happen in city government.
- Develop 300 residential solar units, a solar community living center, and solar pedestrian-friendly neighborhoods
- Solar as the energy source for annual events
- Create a working solar business model
- Omnibus solar ordinance
- Energy conservation rebate (similar to the PSB water initiative)
- Butterfield Trail model for business
- "Good Jobs, Green Jobs" Council
- UTEP/EPCC/Region 19 Energy Jobs Council
- Solar Walk of Homes

We simply cannot afford to wait on another legislative session to achieve this agenda. Using the passion and determination of our community, it's time to move into the 21st century and make El Paso the next solar capitol of Texas. With this agenda, we can make it happen in three years.

U.S.: Moving Towards Energy Independence

The chart below displays how we compare with other countries in our potential to produce PV power.



China is already a world leader in renewable energy and is quickly passing the U.S. in terms of federal policies for renewable energy. [Through its policies, fair or otherwise, China has helped turn its makers of that equipment into the global leaders, while manufacturers in the United States and Europe have struggled financially, cut jobs and in some cases moved operations to China.](#)⁸ With China ahead in the solar manufacturing market, the only option for the United States to stay competitive is to pass energy policies that would increase domestic manufacturing.

To move toward national energy independence and to be able to compete with China and other countries, on October 27, 2009, President Obama announced that we would make the largest-ever investment in a smarter, stronger, and more secure electric grid. For this reason, President Obama and Congress included billions of dollars in the stimulus bill (ARRA). This investment was in the form of a hundred grants totaling \$3.4 billion; the grants have been awarded to private companies, utilities, cities, and other partners who submitted applications with plans to install smart grid technologies in their respective regions. Notably, many of the

grant recipients have been focused on the installation of smart meters—devices that can immediately benefit consumers who want to save money on their monthly electric bills.⁹

The Executive Order required federal agencies to set a 2020 greenhouse gas emissions reduction target within 90 days; increase energy efficiency; reduce fleet petroleum consumption; conserve water; reduce waste; support sustainable communities; and leverage federal purchasing power to promote environmentally-responsible products and technologies. [The federal government is the largest consumer of energy in the U.S. economy, and President Obama is aiming for a 28 percent reduction in direct greenhouse gas pollution by 2020.](#) As a result, on September 10, 2010, the Council on Environmental Quality published the [Strategic Sustainability Performance Plan](#), which states how solar energy is or will be incorporated into federal projects.¹⁰ Here are two examples:

1. Permanent military installations are already generating their own renewable energy. Nellis Air Force Base in Nevada has 72,000 solar panels, which produce 30 million kWh of electricity per year.
2. The Department of Housing and Urban Development (HUD) is [retrofitting](#) 126,000 public housing units in 2010 and 2011. HUD is spending about one-third of its \$4.86 billion in ARRA funds on “greening” existing public housing.¹¹

Texas: #1 in Solar Potential

Improving how Texans use and generate energy will have tremendous positive impacts on our state's environment. Texas is currently home to the highest greenhouse gas emissions in the nation and ranks seventh globally in carbon dioxide emissions. Harnessing Texas' natural resources for the production of high efficiency, clean energy will not only help preserve the environment, it will [boost the economy and help energy consumers save money](#).¹²

By 2025, there will be an estimated 254 square miles of roofs on residential and commercial buildings in Texas. Texas households [pay 56 percent more in monthly energy costs](#) than the national average.¹³ Customer-generated electricity would enable Texans to reduce their billed energy consumption while adding small contributions of electricity to the grid, thus reducing the demand on direct energy production by utility companies. Rooftops have the capacity to provide up to 70 or 80 percent of annual water heating energy in Texas and would generate 40 percent of the state's energy resources.

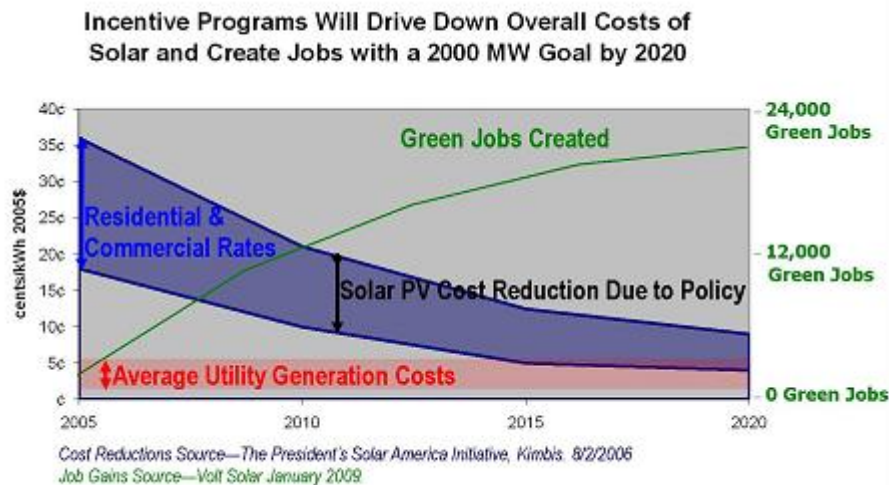
Last August, during the presentation of the [Texas' Clean Energy Economy](#) report¹⁴ at Texas Tech University, experts indicated [a clean energy economy would create more than 22,000 jobs and raise \\$280 million annually in local and state tax revenues in the next decade](#).¹⁵ An analysis conducted by Vote Solar found that under a 2000 MW program, the solar energy industry could create almost 21,500 new jobs in Texas by 2020.¹⁶

Nonetheless, current Texas leadership has yet to fully realize the state's immense potential and take aggressive steps to encourage the development and implementation of solar

power. In comparison, California and Arizona have announced almost 4,800 MW of large-scale solar projects, including 4,000 MW of PV and CSP (concentrating solar power creates focused sunlight up to 10,000 times its initial intensity) projects. Subsequently, 154,000 jobs, \$10.1 billion in earnings, and \$25.4 billion in economic output will be created in these states over the next 30 years.

A. Current Incentive Programs in Texas

Obviously, the more incentive programs that are created, the more affordable installing solar energy in homes will be. The chart below shows how the demand curve will drive prices down.



In 2004, Austin Energy created the first solar PV incentive program in Texas. The program grew quickly and offered more than \$2 million in annual incentives by 2005. The company has plans to roughly double that amount starting in 2010. In 2007, CPS Energy in San Antonio launched a similar program. To date, it has offered close to \$400,000; CPS Energy plans to significantly increase its program budget to \$2.5 million in incentives annually. Other municipal utilities now offering PV incentives include Bryan Texas Utilities, Guadalupe Valley Electric Cooperative, and Denton Municipal Electric.¹⁷

Although Texas PV incentive programs started with municipal utilities, investor-owned utilities began offering pilot programs in 2009. Texas electric utilities are budgeted to provide about \$9 million in incentives for PV installations in 2009 and over \$12 million in 2010. Incentive funds, which were budgeted in 2009, are expected to result in the installation of about 3 MW of distributed PV in the state. Over 50 percent of Texas electric customers now have access to a PV incentive program through their electric utility company.

In Dallas, Oncor has made a commitment to spend \$100 million per year on developing energy efficiency programs through 2012. In 2008, the company began an \$18.5 million campaign to increase consumer awareness of solar PV technology and to train solar PV installation and maintenance contractors. In addition, the company has set aside \$2 million in incentives for homeowners to install solar water heaters in their homes; the solar panels can

heat up to 80 percent of a household's hot water. In 2009, the company began offering incentives to customers who install solar PV systems with up to \$2.46 per watt offered for up to 10 kilowatts.

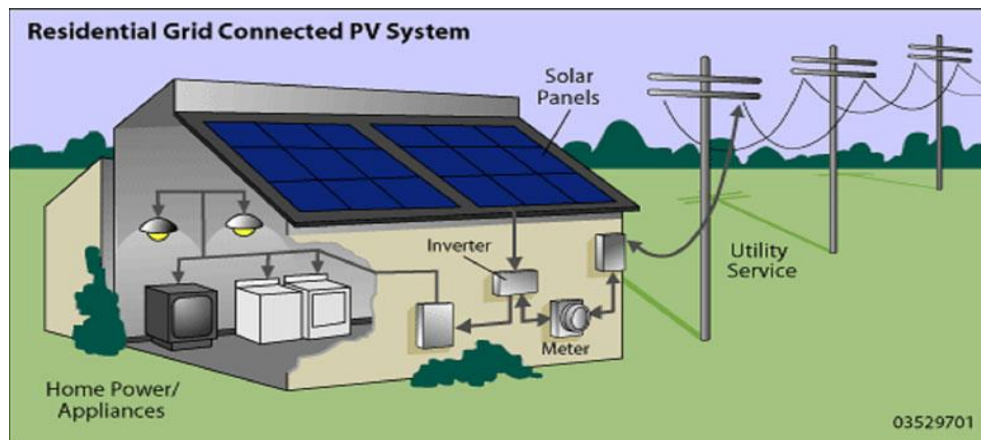
B. Solar Power Generation Efforts

In some Texas cities, utilities are already looking at increased use of solar cells as an alternative source of power generation. In Austin, the electric utility has opened two photovoltaic stations that generate 315 kW. As mentioned earlier, the utility has also worked to expand a new rooftop solar program and offers incentives to homeowners to produce their own power.

During Bill White's term as mayor of Houston, the city became one of the U.S. Department of Energy's top 25 cities. The city received a \$1.3 million grant to build mobile powered generators to be used during disasters to supply power to staging areas like hospitals. Its largest project was a 100 kW solar system for the George R. Brown Convention Center, which was funded by private and public investments of \$1 million. Through other municipal efforts, the City of Houston has reduced its kWh use by 5.46 percent from 2009. Notably, by implementing a strong solar municipal agenda, Houston raised its regional GDP by 5.06 percent.¹⁸

C. Solar and Affordable Housing

The idea of installing solar panels on the rooftops of energy-efficient, affordable homes was pitched to the City of Houston by Zach Burghli. By early fall 2008, Burghli had built 10 such homes. In June 2009, the second-hottest month recorded in Houston's history, the electric bill on one of these homes was "minus \$20." The homeowner actually got money back as a credit for his electricity!

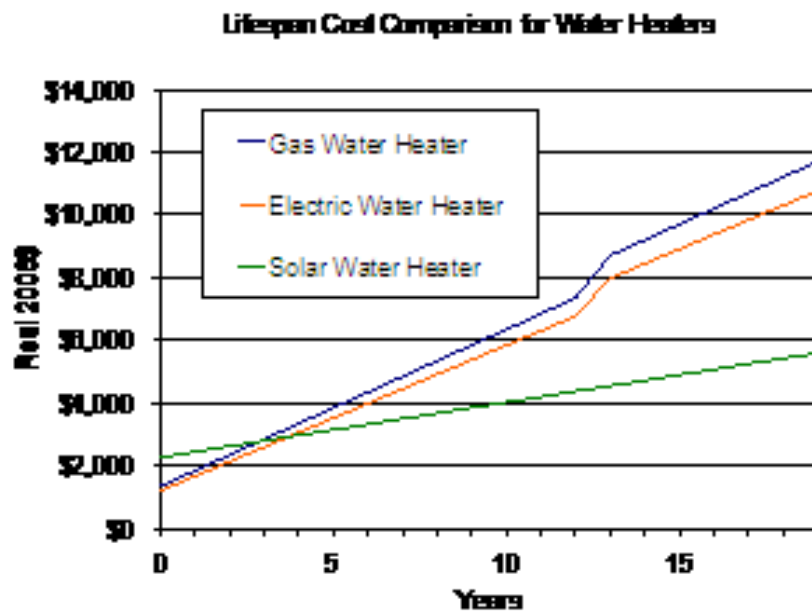


The Houston Hope program, which was spearheaded by ex-Mayor Bill White, makes energy-efficient homes available to low- to moderate-income families. Houston residents can sell excess electricity from their solar roofs to TXU energy company. TXU pays homeowners

7.5 cents per kWh. That excess energy then goes back into the grid for use across Houston. Incorporating solar into affordable housing makes economic sense; utility costs are reduced for some of the lowest-income families. Ultimately, the price of construction of these homes is offset by the energy savings plus the revenue from excess energy sold to the utility.

D. Solar Water Heaters

In October of 2009, Environment Texas released a report titled [Building for a Clean Future](#)¹⁹ in which they recommended including solar water heaters for all new building and inspection codes. Solar water heaters are common throughout the world from Canada to Israel, but have yet to gain traction in Texas primarily due to public misconceptions. The report's authors believe changes in federal policies will rectify this situation. Texas residents and businesses stand to gain a great deal from these federal incentives; an average consumer can save \$300 a year in energy expenses after four years. The chart below displays how solar water heaters are cost effective.



Source: ACEEE, NREL and EIA data

El Paso: Solar City, Texas

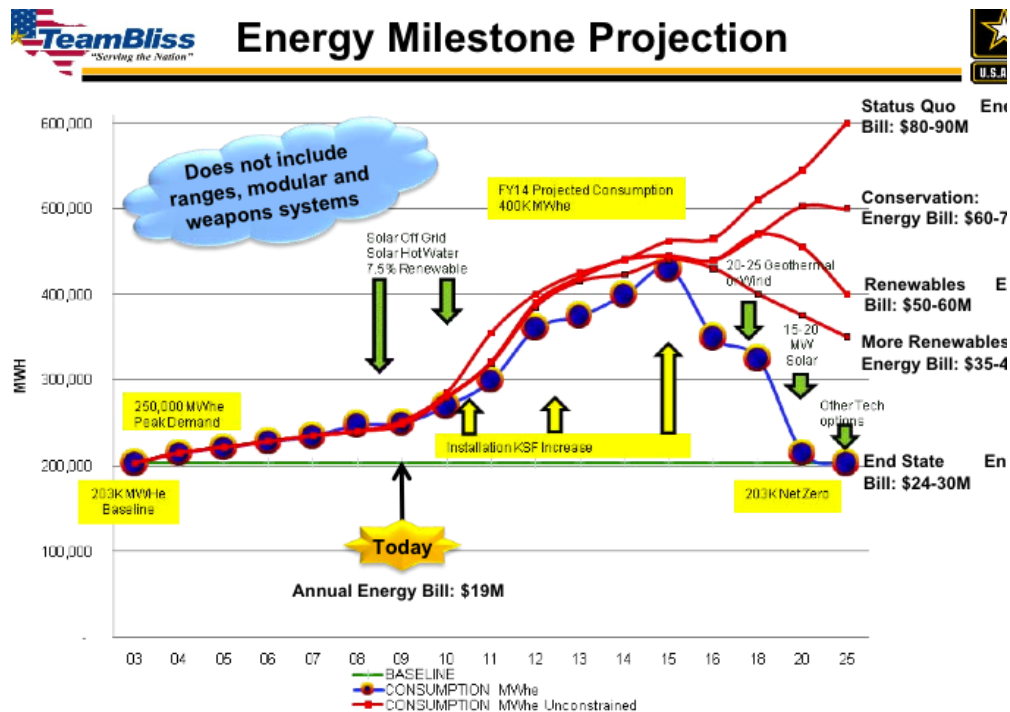
Herein below are current programs and initiatives that will help establish El Paso as the solar capitol of Texas:

A. Fort Bliss

On August 14, 2010, General Pittard announced that Ft. Bliss would run solely on solar power by 2015. Ultimately, meeting this goal will provide more security for the base by reducing its vulnerability to power outages or attacks.

As a result of the 2005 round of Base Realignment and Closure (BRAC), Fort Bliss will grow by over 52,000 soldiers, military students and family members. The base itself will eventually be almost three times its size prior to BRAC changes. According to current estimates, BRAC will have an estimated impact to the local economy of \$4 billion per year.

The Army had already begun evaluating energy conserving best practices when the Bush administration mandated annual gains via an executive order in 2003. Shortly after the announcement of this significant expansion of Fort Bliss, base leaders realized that cost effective energy alternatives would be essential to maintain a fiscally conservative budget. [If Fort Bliss maintained the status quo, the energy bill for the base would have reached \\$90 million by 2025.](#)²⁰ At the Ft. Bliss Green Summit in November 2009, Garrison Commander Colonel Manning provided this schematic as the fiscal reasoning behind Ft. Bliss achieving net zero energy use by 2015:



"We're doing a lot of stuff to make this the center of expertise. Our vision takes you to a net of zero, which means you pay no utilities," said Toufic Alhaj, chief of Fort Bliss' Energy and Business Operations Integration Division.²¹

One of the main projects underway at Ft. Bliss is a 1 gigawatt (GW), 10 square mile solar farm, which will convert heat from hot springs into electricity. Below is a picture of Ft. Bliss' Replica Pool, which is heated by a solar water heater. This pool was one of the first projects completed on the post.



Photo provided by Ft. Bliss

Last year, local government entities and area universities partnered with Ft. Bliss to contribute to the research, funding, planning, and implementation necessary to support Ft. Bliss' 80 renewable energy projects.

B. El Paso County

Solar energy projects for the El Paso County are already providing cost effective ways to help low income communities with limited resources for energy. One example can be seen in a project the County partnered with the University of Texas at El Paso. UTEP's design and installation of solar water purification in the colonias in the outskirts of El Paso County has conducted a demonstration project that they are working with Adults and Youth United Development Association (AYUDA) on to help residents that were on a previous water project list. [UTEP has designed solar hand washing system and solar showers.](#)²² The project managers also supplied the residents with a non-technical manual in Spanish and English.

C. The City of El Paso

During the last two years, the City of El Paso has set many goals to incorporate sustainability practices in their management plan. One major goal is to establish green building standards by 2015. In support of this goal, the city passed a resolution to insure that any new city building projects meet LEED Silver building standards and SMART code for development. In addition, a new ordinance requires any retrofit that is over 5,000 sq. ft. to meet USGBC LEED Silver requirements. The following projects all fall in this category:

- Cielo Vista Library
- Glory Road Transit Terminal
- Mission Valley Terminal
- Municipal Service Center

Another major goal of the city is to reduce their energy consumption by 30 percent within the next four years. To reach this goal, the city will implement 20 renewable energy projects by 2015. Recently, the city has received \$5.8 Million from the Federal Energy Block Grant. This will allow them to execute a solar outreach project, a solar PV power project, and provide money for any energy retrofits. The DOE Solar Americas City Program has already made significant efforts to determine existing barriers to disseminating information to its citizens.

During the 2009 legislative session, the Texas Legislature passed H.B. 1937, which was modeled after the Berkley/Palm Springs Solar Financing Model.²³ This type of municipal financing allows homeowners to pay for energy efficiency improvements and solar installation as a long-term assessment on their individual property tax bill. Typically, a city would create a district designed especially for homeowners to opt into this additional property tax. The city would provide funding through a bond or a loan, and the homeowner repays the assessment through the property tax over 20 years. The advantage of this model is that the tax stays with the property. In other words, if a homeowner decides to sell his or her home, then the next owner would assume the tax upon purchasing the home.

Taking advantage of H.B. 1937, the City of El Paso plans on providing a property tax financing for energy improvement (PACE) incentives and zoning a finance district.²⁴ Homeowners could borrow up to \$35,000 and businesses up to \$500,000. Ideally, the city would like to have 100 homeowners and 20 to 25 businesses participate. Similar programs across the nation charge property owners a 2 to 6 percent interest rate, and the City plans to design a program with the lowest interest rate and costs possible.

In implementing this initiative, the city would spend about \$50,000 to \$100,000 in federal funds to hire a consultant. The initial \$3 million pool for loans would be put up by the private company that the city hires. This company would see a return in its investment as loans are paid back and a loan surcharge.²⁵

For the business development sector, the City of El Paso recently approved a franchise fee that will provide the city \$4 million a year. The funds will be dedicated to helping local, new, or relocating businesses with an emphasis on renewable energy.

The city has also begun a Solar Art Downtown Demonstration Project at Calendar Park. Plans are centered on placing solar panels in the park to provide shade. The energy produced by these solar panels will generate energy for people to plug in their laptops, phones, and access the city's wireless network. It will also allow musicians to plug in their amplifiers to play music. This demonstration project should be in place by June 2011.²⁶



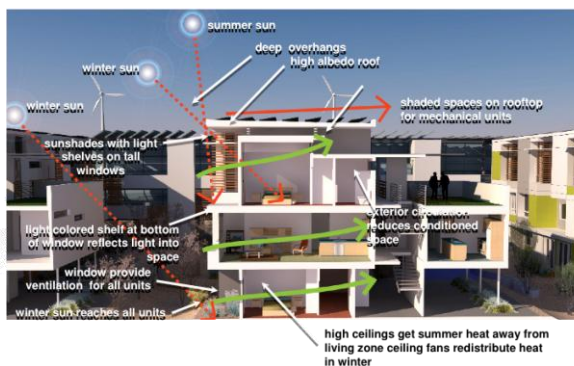
Photo provided by the City of El Paso

Two years ago, the city spent \$260,000 to purchase and install seven solar hot water systems at indoor pools. The city anticipates a savings of \$42,000 in gas every year. The solar water systems will pay for themselves within five years.

The city is partnering with the Housing Authority on The Paisano Project. The city received \$8 million to create a showcase project next to the coliseum and across the street from the El Paso Zoo. The partnership plans to build a mixed-use, low income assisted living development with rooftop solar panels to meet a net zero energy goal. Herein below are photos of the project:



optimal passive solar strategies



Related to building, the city obtained the Green Building Grant Program with \$2 million to be spent by constituents. If an owner meets building size and cost requirements, the city will give the owner a check. For example, for meeting LEED Silver requirements, an owner could receive a grant from \$50,000 to \$200,000. If it is five stories, an owner could receive up to \$400,000.

In addition, the city has committed \$1 million for El Paso Electric's residential rooftop solar photovoltaic rebate program for this year. The city plans to spend another \$1 million next year.

At the International Airport, there are plans to put in solar covered parking in 2011 with about 2 MW of capacity. The remote parking areas have already been converted and are completely powered by solar power.

Finally, the city has funding in its current budget for a 50 kW system for a city building, but it has not yet determined which building will receive the system.

D. University of Texas at El Paso

At UTEP's College of Engineering, research is being conducted on solar thermal cycles, thermal storage and advanced heat transfer fluid, and systems integrations. UTEP is also developing a revolutionary convergence of printing and materials technologies enabling a high speed and low temperature to cells. Currently, UTEP is working in partnership with the City of El Paso and Sierra Blanca.²⁷

In 2000, the Energy Center began a consult/teaching project with Organizacion Progresiva de San Elizario to build solar adobe homes. The U.S. Environmental Protection Agency is funding the San Elizario Energy Efficient Housing Community Revitalization Project. In its third year, the program has helped reduce utility costs through efficiency alone in more than 100 homes.²⁸ The photo below shows a student who is building a home based on an energy efficiency and passive solar design.



Since 1986, UTEP has been home to a solar pond that has been producing power. The El Paso Solar Pond project continues to be a research, development, and demonstration project. It has successfully shown that process heat, electricity, and fresh water can be produced in the southwestern United States using solar pond technology. [An organic Rankine-cycle engine](#)

[generator was installed on site in 1986, making it the first in the U.S. to generate grid connected power, producing up to 70 kW.](#)²⁹ Most of this power has been delivered to Bruce Foods Corporation for peak power shaving, which demonstrates one of the primary benefits of solar ponds—power on demand, even at night or after long periods of cloudy weather.

E. New Mexico State University

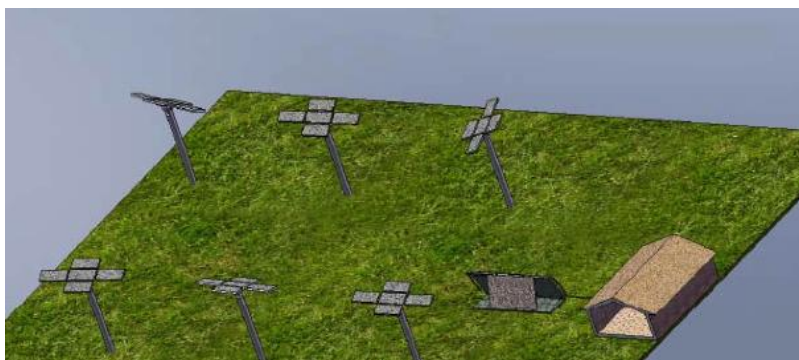
NMSU has two renewable Energy Departments: the [NMSU International Renewable Energy](#) and the [Institute for Energy and the Environment](#). The Renewable Energy Program for Latin America was established in 1992 by the former *SWTDI* (now located at NMSU) to support regional development activities for the U.S. Department of Energy, Sandia National Laboratories, National Renewable Energy Laboratory, U.S. Agency for International Development, Winrock International, World Bank, and numerous other agencies. Their goal is to promote economic and social development Latin America through renewable energy technologies that meet pressing regional development needs, especially in rural areas.

The institute's Renewable Energy Technologies program researches emerging contamination mitigation, carbon management, fuel cells, electrical utilities management, world-class manpower for public utilities, distributed generation and micro-grids, organic waste utilization for New Mexico, biomass development distributed energy resources, and bio-fermentation for methane rich biogas production.³⁰ On campus, the institute designed the first solar-powered parking structure.

The NMSU Engineering Technology Program offered its first introductory course on solar energy in the fall of 2009. With the national and regional emphasis being placed on renewable energy applications and technology, NMSU hopes this course is just the beginning of their presence in sustainable energy arenas. They also plan to partner with Alamogordo High School as a means to encourage high school students to pursue careers in this rapidly expanding job market. These classes will also assist homeowners in developing their own renewable energy plans.³¹

F. El Paso Community College

El Paso Community College is currently seeking a grant for students to be able to complete an associate's degree in renewable energy.³² Herein below is a rendering of the proposed green park, which is incorporated in EPCC's master plan:



Nine El Paso-area construction companies have partnered with El Paso Community College to provide job training using a \$343,928 Skills Development Fund grant from the Texas Workforce Commission (TWC). The construction consortium includes: Avilas Plumbing, Coefficient Systems Testing Inc., Dawco Builders LLC, El Paso J.A.G. Inc., E M Commercial and Industrial Electrical Services Inc., Longhorn Electrical Services Inc., Oscar Lara Electric LLC, Solar Smart Living LLC and Sun City Electric Co. Inc. The grant will be used to train 65 new and incumbent workers in photovoltaic design used in solar energy technology installation and application to work on renewable energy projects. Upon completion of training, the workers will earn an average hourly wage of \$19.29.³³

On August 13, 2010, EPCC made public statements regarding plans to expand their presence in the renewable energy and information technology markets.

Legislation Considered During the 81st Legislative Session

On March 27, 2009, Senator Shapleigh along with the El Paso Solar Association and UTEP engineering students held a press conference at Tom Lea Park in El Paso, Texas to announce several bills that were filed to increase energy efficiency and modernize Texas power utilities by encouraging greater use of solar energy.

[S.B. 211](#) would have prevented public utilities from raising rates to consumers unless they meet certain efficiency standards. The legislature has already set these minimum standards under the Public Utilities Code, however, many public utility companies have yet to improve efficiency standards.³⁴ S.B. 211 would require that the Public Utility Commission approve a rate increase for a public utility only if the utility can prove it has achieved each applicable energy efficiency goal.

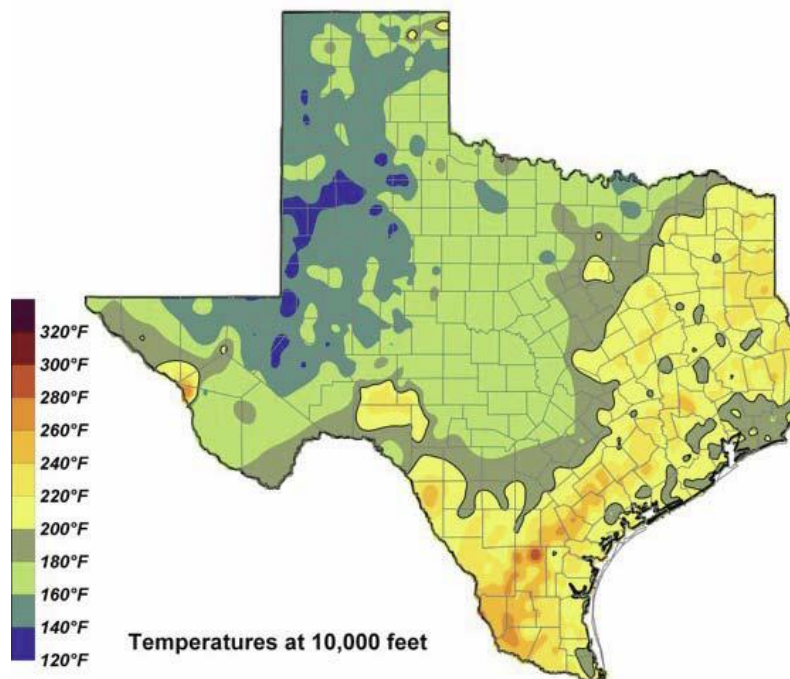
[S.B. 620](#) would have moved Texas' renewable energy program forward by increasing the goal for non-wind renewable energy production from 500 MW to 1,500 MW by 2015.³⁵ The bill would also have established a statewide target of 11,000 MW of installed renewable capacity by January 1, 2025.

[S.B. 618](#) would have required all public energy utilities to provide net metering to their customers.²⁷ Net metering allows utility companies to measure customer-produced electricity, like that created by household-installed solar devices, and sets the stage for consumers to sell their excess energy back to the utility company. Today, many Texans do not have access to net metering through their utility company.

[S.B. 677](#) would have helped Texas create energy from rooftops across the state by requiring homebuilders that build or plan to build more than 50 homes in a subdivision to offer installation of solar energy devices for heating, cooling or the production of power.³⁶

[S.B. 619](#) would have encouraged homeowners to invest in solar for their homes by creating a sales tax exemption for solar devices and complementing the existing franchise tax exemption for solar and wind energy devices.³⁷

Senator Shapleigh also co-authored [S.B. 427](#), which would have required electric utilities create programs to give homeowners and home builders a monetary incentive to build integrated solar and geothermal generation at their residences or places of business.³⁸ The bill would have required that electric utilities provide their customers educational materials on the program. Looking at the map below, El Paso is clearly one of the best regions in the state for geothermal energy generation:



Uncorrected temperatures of formations at 10,000 feet depth from oil and gas well logs.

[The map was produced by the SMU Geothermal Laboratory.](#)

[S.B. 670](#), which would require that every new state building be certified under the U.S. Green Building Council's Leadership in Energy and Environmental Design (LEED) rating system. By building to new energy efficient standards, the construction of buildings themselves would be easier on the environment, less costly to operate, and more sustainable for many years. LEED-certified buildings have lower energy and water costs than typical industry standards, easily paying for initial construction costs several times over.

Provisions of the bills Senator Shapleigh filed were added as amendments to two omnibus solar bills, S.B. 545³⁹ and S.B. 541. These bills were passed in the Texas Senate with a unanimous vote, but failed to pass the House of Representatives.

Key provisions of [S.B. 545](#) are:

- Creates a distributed solar generation incentive program for residential and business customers administered by electric utilities;
- Ensures that customers putting solar or other renewable energy on their property get paid a minimum fair market value should they generate surplus energy;
- Ensures that information about the incentive program and about what buyback rates are offered by retail electric providers is available on the PUC Web site and on customers' bills;
- Provides net metering policies requiring customers to receive real time market price for exported energy and allows them to obtain other offers from renewable energy producers and clarifies that customers can have third parties install solar energy devices on their home and lease the system;
- Bars residential homeowners associations from imposing arbitrary bans on solar technology on homes;
- Mandates that municipally-owned utilities and electric co-ops would have to report their own efforts to create solar rebate programs;
- Authorizes the State Energy Conservation Office to establish a revolving loan program to help schools install solar energy systems; and
- Requires that homebuilders of new subdivisions with more than 50 homes offer the installation of solar energy devices as an option for new homebuyers.

While S.B. 545 is focused on distributed generation (i.e., solar on rooftops), S.B. 541⁴⁰ focused on funding utility-scale solar, biomass and geothermal projects.

Key provisions of [S.B. 541](#) are:

- Builds on the 1999 renewable electricity standard and establishes a second tier to incent emerging technologies such as solar, biomass and geothermal;
- Requires the development of 1500 MW of clean renewable energy from sources such as solar, geothermal and biomass by 2020;
- By providing energy at peak demand during the day (solar) or round the clock (biomass and geothermal), these projects would complement wind energy, which generally maximizes capacity at night. Texas is already investing \$5 billion on new transmission lines for wind projects, so these projects could be co-located underneath wind farms, doubling the return on our investment; and
- Provides a net savings of over \$3 billion to Texas consumers by 2020 and would reduce carbon dioxide emissions by 20 million tons a year by 2020.

Both S.B. 541 and S.B. 545 could propel Texas to be a world leader in the development of solar, geothermal and biomass technologies, benefitting businesses across the state. Our solar task force recommended that these bills be filed again.

One piece of legislation that did get passed last session was H.B. 1937. The bill allows cities to establish financing programs through which homeowners can finance installation of solar or other renewable energy devices. The loan would become a

voluntary assessment on the homeowner's property tax bill. The advantage of this model is that the tax stays with the property. In other words, if a homeowner decides to sell his or her home, then the next owner would assume the tax upon purchasing the home. Earlier this year, the City of El Paso recently adopted a program as envisioned by this law. (For more information on this law, please see the section on the City of El Paso's current efforts.)

Finally, this summer, the PUC put forward a "[strawman](#)" proposal for promoting non-wind alternative power that would require 50 megawatts (one-tenth of the 2014 amount) to come from solar power. The "strawman" designation means that it is not yet a formal proposal but rather a placeholder that can draw early comments. Many details of the PUC's proposal are being vigorously debated. For example, The Solar Alliance wants the PUC to raise the penalty for non-compliance to prevent electric companies from buying their way out of the requirements. NRG Energy, which owns the retail business of Reliant Energy of Houston, wants to delay implementation of the mandate. The "strawman" proposal would have electric companies hit an interim 100-megawatt non-wind goal by the end of this year; NRG wants the date for initial compliance pushed forward to 2012.⁴¹

Recommendations

The task force evaluated what other state and local policies were effective to determine which best practices could be adopted in the Paso del Norte region. The task force also considered policies that could be implemented at the local/municipal level to help move this agenda forward at the state level the 82nd Legislative Session. Here are their recommendations:

Federal Policy Recommendations:

1. Extension of federal tax credit for 20 years, a national renewable energy portfolio standard, and a national net metering standard

As voters and taxpayers, we need to ensure that the federal government continues to invest in renewable energy for the next twenty years. In addition, the federal government should establish a national net metering standard as well as a national renewable energy portfolio standard so that the entire country moves towards solar and other renewable energy power sources. These actions will allow our country to become more energy independent and to better compete with other countries that are leaders in the renewable/sustainable energy market.

2. UTEP/NMSU/UACJ/Monterrey Tech/EPCC solar research park

We should move to elevate existing academic regional partnerships between UTEP, NMSU, UACJ, Monterrey Tech and EPCC and develop a solar research park. The first such research park in the country was created on the campus of Stanford University just after World War II—the 700-acre Stanford Research Park. At the time, Stanford had a significant amount of land but not much income. [They created a new income source by](#)

[using some of the land for commercial industry.](#)⁴² The park has 10 million square feet of commercial real estate and generates millions of dollars annually for Stanford. Notably, this park is considered "the epicenter of Silicon Valley" and is the home of Hewlett-Packard, Facebook, and Skype. We have the land acreage as well as an ideal geographic location for El Paso to develop a similar park focusing on solar and solar thermal energy. Herein below is a schematic of what Stanford Research Park looks like:

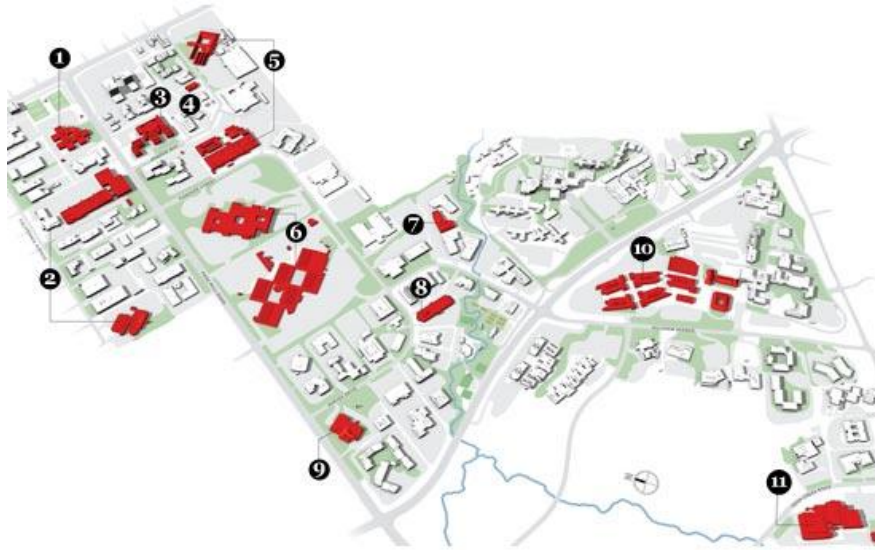


Photo provided by FastCompany

3. Fort Bliss demonstration project

The DOD recently designated Fort Bliss as the Center for Renewable Energy for the Army. El Pasoans need to continue to pursue these types of institutional partnerships to establish the "Sun City" as the solar capitol of Texas.

4. UTEP Miners' solar village



Photo provided by FastCompany

Above is a rendering from Walter Hood's sketches for the University at Buffalo, which envisions a solar park that doubles as a gathering place. This project is known as [Roam Hood](#).⁴³ He calls his design "The Solar Strand"—a double reference to landscape formations and DNA strands—and it is intended to be much more than a solar array. The panels themselves will be surrounded by grasses and trees that blend in with the surrounding campus. Nestled among them will be three "social rooms"—outdoor spaces defined by hillocks and ponds with added seating that blends into the land. When complete, the 5,000 solar panels will be among the largest arrays on any college campus and are expected to produce enough energy for 735 student apartments while reducing carbon emissions by 500 metric tons per year. At a cost of \$7.5 million, it's the first stage in a green development plan that will cost a total of \$21 million.³⁸

As the campus and student enrollment continues to grow at UTEP, and with money from the new student green fee, the next Miner Village addition should be a 100 percent energy-independent building. Sustainable living developments like these are becoming more popular at campuses throughout the country.

State Policy Recommendations:

1. Omnibus solar energy bills (e.g., S.B. 541, S.B. 545) need to be re-filed during the 82nd Legislative Session. These bills should include the following incentives:

- RPU;
- tax credits for utilities and businesses using Energy Star-rated devices;
- smart grid/public utility (EPEC) incentives; and
- net metering.

2. Texas feed-in tariff

At the end of the day, it is the price point of power generated by solar that will determine demand and increase consumption of residential and commercial customers. In its solar recommendations, the City of El Paso listed feed-in tariffs as a priority for this legislative session. The feed-in tariff is a policy tool used to encourage the adoption of renewable energy sources and to help accelerate the move toward grid parity. Typically, a feed-in tariff guarantees access to the grid, long-term contracts for the electric power that is produced, and purchase prices based on the cost to generate the specific renewable energy (e.g., solar or wind).

Feed-in tariffs have led to the success of renewable energy policies in Spain and Germany.⁴⁴ In addition, if a residential customer in New Mexico is able to get \$0.11 per kWh from the same electric company that is generating our energy, then El Pasoans need to aggressively seek a competitive rate of at least \$0.13 per kWh. Otherwise, we are essentially subsidizing the solar power market in New Mexico.

3. Political economic analysis of solar energy conducted by a university-level group

At the University of Massachusetts, the [Political Economy Research Institute](#) studied how the U.S. could create two million jobs by investing in a rapid green economic recovery program to strengthen the economy and increase our potential for energy independence.⁴⁵ Similarly, our regional institutions should write a report focusing on how the border region could accomplish comparable goals on a regional level.

4. Solar manufacturing tax credits bill

Builders and developers typically state that high cost is the reason why they do not incorporate solar into their building design projects on a broader basis. Solar manufacturing tax credits would remove this obstacle by making solar technology more affordable. In addition, it would benefit builders and developers as their construction projects will be much more likely to meet LEED standards.

Arizona passed [H.B. 2491](#), which established their Commercial/Industrial Solar Energy Tax Credit Program to stimulate the production and use of solar energy in commercial, industrial or any other non-residential applications. The program provides qualifying businesses an income tax credit to aid in the initial cost of installing solar devices.⁴⁶

5. Solar research center at UTEP (line item appropriation)

UTEP should establish a solar research center. Given that this center would have to be budgeted for and approved by the UT System and would be considered a capital project, UTEP will need a line item appropriation in the state budget or through a bill. Although the students enter a solar car competition each year, more funds would allow them to participate in more research competitions. Herein below is a picture of Lumenhaus, which was designed and built by a team of Virginia Tech professors and students. With its functional spaces and a modest size that allows for efficient energy use, Lumenhaus won the 2010 Solar Decathlon Europe, a competition that brought together 17 college teams from around the world in Madrid.⁴⁷ UTEP students should be able to participate in these types of opportunities.



6. Renewable energy scholarships fund

Today, a limited number of renewable energy scholarships exist in Texas. For example, at the West Texas A&M University's Alternative Energy Institute, Drs. Vaughn Nelson and Kenneth Starcher established a scholarship for students interested in studying alternative sources of energy.⁴⁸ The Texas Legislature should pass legislation establishing a fund for public institutions of higher education to offer scholarships to students who want to pursue a career in renewable energy research.

Local Policy Recommendations:

1. Seek and obtain a \$0.13 per kWh from the El Paso Electric Company by 2011

As of July 2010, the El Paso Electric Company will offer a flat rate of \$2.50 per Watt (DC) for all customers with a maximum rebate of \$25,000. However, there is a very limited amount of rebates available for this program. To receive rates from El Paso Electric Company that are comparable to those of our neighbors in New Mexico, El Pasoans need to push for a full solar net metering rate.

2. Create a city rooftop program and set a numeric goal of 50,000 homes using California's program as a model

This initiative would model what has been done in California cities after the California Senate approved a bill that would help California reach its goal of being 33% energy independent.⁴⁹ California maximized its solar roof top installation by 100%. Two long-term statewide programs in California provide rebates and other financial incentives to encourage rooftop solar panels, and individual municipalities like Berkeley are also beginning to offer financing for the solar arrays.⁵⁰ By setting a numerical goal and date, we too will see the results as cities in California have.



Photo by Noah Berger for The New York Times

3. Develop 300 residential solar units, a solar community living center, and solar pedestrian-friendly neighborhoods



Photo provided by FastCompany

El Paso City's Plan should include 300 solar units, a solar community living center, and a solar pedestrian friendly neighborhood. The pictures above are works from [Roam Hood](#), an architectural firm from Oakland that has built a solar park/gathering space in Pittsburg. This is public space as envisioned by Roam Hood: multitasking, respectful of the land, and rooted in—and watered by—the community.⁵¹ The City of El Paso is beginning to explore some of these practices, but these practices should become the standard for short-term and long-term future city developments.

4. Solar as the energy source for annual events

Since the first Sun Bowl game in 1902, El Paso has been branded the "Sun City." As the Sun City, we need to embrace and incorporate solar energy into events held annually. In recent years, with the increase in local solar projects, the [ECO El Paso Conference](#)⁵² has become an annual event during which builders and architects gather to learn about the newest policies and innovations in sustainable building.

Another idea is to encourage civic event planners to use solar panels as the source of energy for concerts. The picture below is from the [Solar Music Fest](#)⁵³ in Taos, New Mexico, which is held every summer. The other picture below is an example of a stage/shade that was generated with LED lights at [The Coachella Valley Music and Arts Festival](#) concert⁵⁴ in California. Both of these projects were the result of the cooperative work and initiative of local artists, environmentalists, and municipal event planners.



5. Create a working solar business model

An example of a working solar business model for homes is the one utilized by [Border Solar](#).⁵⁵ This company has been actively participating in educating the community about installing solar panels in homes and businesses and taking advantage of the federal tax rebate program. We will need more businesses in El Paso like Border Solar to meet the demand that will quickly follow new solar legislation.

6. An omnibus solar ordinance

According to Lucia Athens, author of [Building and Emerald City](#) and the Keynote Speaker at this year's ECO El Paso Conference, people are slow to adopt sustainable options for their homes due to a lack of information and the complexity of the subject matter.⁵⁶ If the city writes and passes an omnibus ordinance for solar with consumer end use as its primary goal, we can expect to see a rise in consumer buy-in. Today, El Paso is ranked 38th in the [Sustainable U.S. City Rankings](#).⁵⁷ With an omnibus, consumer-friendly solar ordinance, we can be number one and supersede Portland.

7. Energy conservation rebate (similar to EPWU water incentive)

El Paso Water Utilities (EPWU) supplies about 90 percent of all municipal water in El Paso County. For the past several years, EPWU has promoted water conservation through various incentive programs. Similar incentives should be provided by the El Paso Electric Company to homeowners who install solar energy devices or otherwise take steps to conserve energy.

8. Butterfield Trail model for business

The City of El Paso needs to be as aggressive about selling solar as an investment as it was for the Butterfield Trail Golf Course. In the long run, a solar business investment will increase our regional GDP, and in comparison, a golf course does not payback its investment as quickly as solar projects would.

9. "Good Jobs, Green Jobs" Council

There needs to be an aggressive push towards attracting solar entrepreneurs and companies to headquarter in this region. In addition, people from both the private and public sectors need to meet on a regular basis to ensure that this agenda moves forward.

In Wilmington, Ohio, a recent college graduate was able to lead his hometown out of a devastating economic loss after DHL, the top employer in the region, decided to shut down. He started Energize Clinton County, which was an initiative to create green jobs by encouraging investment in sustainable energy. In two years, he has helped lure more than \$1.3 million in funding to the area.⁵⁸

10. UTEP/EPCC/Region 19 Energy Jobs Council

Years ago, the Medical Center for the Americas Foundation was formed to coordinate efforts to broaden the health care industry in the region. A similar council should be formed to create a solar industry here in El Paso. One of the council's goals would be to encourage young El Pasoans to pursue degrees in fields related to solar and other renewable energy. By engaging and educating children from an early age, sustainable living will become a moral necessity and sustainable practices will become a part of everyday life rather than an afterthought.

As UTEP strives to be the next Tier I university in Texas, investment and research dollars need to be focused under a center of excellence with a focus on renewable energy. This "Energy Center" could be a valuable asset in achieving this goal. UTEP's College of Engineering should establish a stronger solar energy program that would contribute to the projects that Ft. Bliss, the City, and other entities in El Paso will launch in the next ten years. Instead of job fairs being centered on exporting our engineering graduates to Houston, Dallas, and Washington D.C., we should encourage these companies to establish regional offices in El Paso and to perform research on solar initiatives here.

11. Solar Walk of Homes



Above is a rendering of 2 Nest Village, which is a cluster of [container](#)-shaped, modern homes for El Paso, Texas. Designed by [OFIS Architects](#), the units are [prefabricated](#) and stacked in a way that optimizes light and ventilation and provides protection from the desert sun and wind. Each home has its own solar shade that not only keeps interior temperatures low but also adds an interesting design element, which is amplified due to the repetitive look of the complex. The positioning of the units also creates an oasis-like internal park, which is complemented by private terraces and roof gardens.⁵⁹ El Paso is the perfect location to showcase solar homes, and we have the ability to achieve national recognition for building sustainable homes such as the one pictured above.

Looking into the future

Today, the next generation of El Pasoans has shown a keen interest in developing renewable energy and sustainable living in our community. The competitive edge and consumer adoption of renewable energy can be seen in our college campuses. Last session, UTEP students wanted legislation to give them the right to vote on a green fee. In response, I filed [S.B. 2182](#),⁶⁰ which was passed by the Texas Legislature and gave students at UTEP the opportunity to vote for an environmental fee that would give the university revenue adopted sustainability practices on campus. In the spring 2010 Student Government Association General Election, 69 percent of the student body voted to support this referendum. Students at Texas A&M and UT Austin also approved similar referendums. All of these students actually voted to raise their tuition \$3 a semester to ensure that their university adopts renewable energy initiatives.

This is where we are as a population today. When UTEP students are taking the lead in what UTEP's going to look like, this next generation is showing us that they already have a vested interest in green policy and an awareness of its economic impact. Let's follow in their footsteps and take aggressive steps to lead the state and the country in solar energy.

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¹⁸ Presentation by Issa Dadoush, City of Houston, TX, "Houston's Path Toward Sustainable Growth," Second Annual El Paso Young Professionals Capitol Retreat, Austin, Aug. 29, 2010.

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