# An Assessment of the Potential for Renewable Energy and Water Stress at Texas Army National Guard Facilities

Paul Faeth and Alex Waldman

July 2016

**Cleared for Public Release**

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**Acknowledgments:** We would like to thank Kate Zerrenner and William Komiss for their review and the Texas Army National Guard for access to their data and their support for this project.

The Environmental Defense Fund sponsored this analysis.

**Authors:** Paul Faeth and Alex Waldman

**Document number:** IRM-2016-U-013350

This document represents the best opinion of CNA at the time of issue.

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**Photography Credit:** Solar panels at Texas Army National Guard Ellington Field Readiness Center, Houston, Texas, by Burhan Girgin.

**Approved by:** **July 2016**

Dave Kaufman
Safety and Security Division
Institute for Public Research

# Abstract

To evaluate renewable energy potential for the Texas Army National Guard, CNA mapped the Guard's facilities against maps for solar, wind, and geothermal resource potential. For each renewable energy type, we then ranked the facilities by greatest potential and by electricity price at each location. In addition to renewable energy potential, we assessed future water stress for each facility, assuming continued growth in water demand in Texas, as well as a moderate climate change scenario.

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# Executive Summary

Funded by the Environmental Defense Fund, CNA evaluated the potential for renewable energy and water stress at 60 installations of the Texas Army National Guard (TXARNG). To conduct this assessment, we mapped the locations of the installations against solar photovoltaic (PV), wind, and geothermal potential. Because of the rich endowment of Texas for all of these renewable resources, there are many opportunities for the Texas Army National Guard to implement renewable energy at their facilities.

Solar. We found that the top-10 installations of the TXARNG for solar PV potential are above the median of all utility-scale projects installed in 2014, suggesting that they are very suitable for solar energy. The best facilities are above the 90th percentile. High solar potential also suggests great potential for water heating.

Wind. Texas is the leader in the United States for wind energy by a large margin, so it is no surprise that there are 23 installations with excellent or very good potential for this energy source. However, the opportunity to implement wind is limited by the large scale of wind generation compared to the much smaller demand of most TXARNG facilities.

Geothermal. The use of geothermal energy for heating and cooling is essentially unlimited and could substantially reduce the Texas Army National Guard's electricity demand. There are 6 sites where Enhanced Geothermal Systems (EGS) could be used to directly produce electricity, and while there would be advantages for operation continuance that solar and wind do not have, EGS is still a young technology.

Water Stress. Conventional energy supplied through the grid in Texas is subject to periods of reduced supply, during which the grid manager asks the TXARNG to scale back its energy use. Due to increasing water demand and climate change, which is expected to cut precipitation and increase evapotranspiration, Texas will face increased water supply stress and possibly more frequent problems with power supply. Most of the Texas Army National Guard's facilities are located in counties that could face "extreme" water supply risk.

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# Glossary

| | |
|---|---|
| EGS | Enhanced Geothermal System |
| HQ | Headquarters |
| kWh | Kilowatt-hours |
| $kWh/m^2/day$ | Kilowatt-hours per square meter per day |
| m/s | Meters per second |
| MW | Megawatt |
| MWh | Megawatt-hour |
| NREL | National Renewable Energy Laboratory |
| PV | Photovoltaic |
| R.C. | Readiness Center |
| TXARNG | Texas Army National Guard |

# Research Scope

In Texas (as elsewhere around the United States and globally), the U.S. Department of Defense and installation commanders have become interested in renewable energy as a hedge to improve resilience to power outages, to improve the ability to achieve mission objectives, and to reduce greenhouse gas emissions. The Texas Army National Guard (TXARNG) has installed renewable energy at several of their installations and is interested in developing additional capacity. In an effort to identify the facilities with the best potential for renewable energy, CNA undertook this assessment, which was funded by the Environmental Defense Fund.

To evaluate their renewable energy potential, we mapped TXARNG's facilities against maps for solar, wind, and geothermal resource potential. For each renewable energy type, we then ranked the facilities by greatest potential. We also considered electricity use and cost by installation. We did not consider the unique mission objectives of each facility, as this was beyond the scope of this assessment.

In addition to renewable energy potential, we assessed future water stress for each facility, assuming continued growth in water demand in Texas, as well as a moderate climate change scenario.

# The Texas Army National Guard's Facilities

There are 77 Army National Guard facilities in Texas, which range from large training facilities to small recruiting centers. Seventeen of these do not purchase power because they are located in rented offices and, thus, were excluded from this analysis.[1]

Of the 60 facilities we assessed, 7 use more than 1 million kilowatt-hours (kWh) of electricity per year, with the largest use—Camp Mabry in Austin—at 12 million kWh per year. In addition, 6 facilities use 500,000–1,000,000 kWh of electricity per year,

[1] We obtained information about the Army National Guard's facilities in Texas directly from the Guard under a data sharing agreement. All information about TXARNG facilities mentioned in this report comes from that source.

26 use 100,000–500,000 kWh, and 21 use less than 100,000 kWh. The range of electricity prices paid by the facilities ranges from $0.06 per kWh to $0.15 per kWh, with no apparent correlation between scale and cost. See Appendix 1, table 6 for a complete list.

Six installations generate some of their own electricity, with Camp Mabry the largest, at 287,000 kWh per year (about 2 percent of its total). One facility in Austin generates almost half of its total electricity use. Table 1 shows the top ten TXARNG facilities ranked by electricity use.

Table 1. TXARNG facilities ranked by electricity use.

| **Facility** | **Electricity Use (kWh/yr)** |
|---|---|
| CAMP MABRY | 12,034,810 |
| BERGSTROM (ABIA) R.C.[a] | 3,197,727 |
| FORT BLISS R.C. | 2,340,648 |
| GRAND PRAIRIE | 1,402,800 |
| NW HOUSTON | 1,209,302 |
| LUBBOCK | 1,183,535 |
| DYESS | 1,045,642 |
| MARTINDALE R.C. | 762,913 |
| ELLINGTON FIELD | 755,168 |

Source: TXARNG

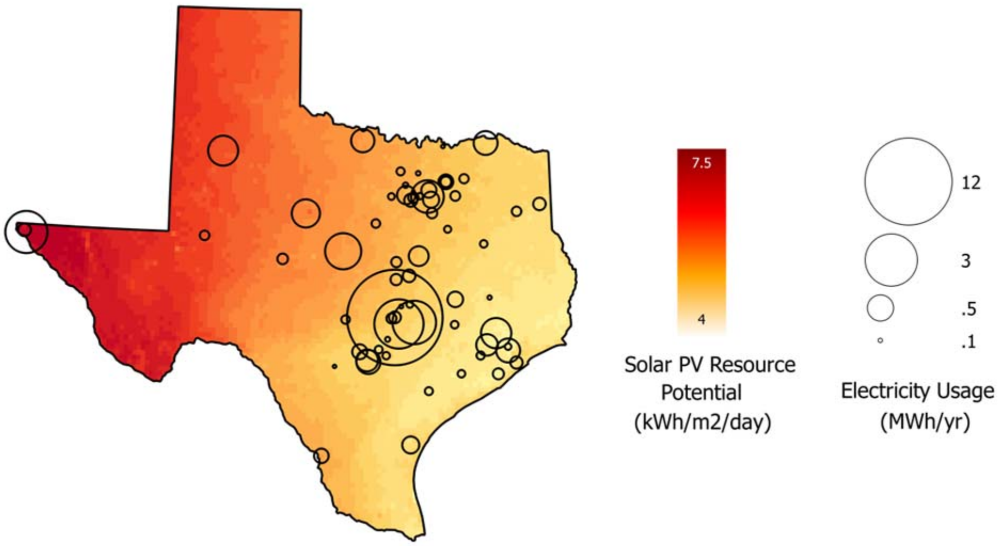
[a] Readiness Center

# Solar Potential

Texas has not yet made major investments in solar-powered generation but may well experience significant increases in the future [1]. Net generation from solar was 49,000 megawatt-hours (MWh) in 2015 [2], out of a state total of about 400,000,000 MWh [3]. However, the Electric Reliability Council of Texas (ERCOT), the main grid manager, reports that solar power capacity is expected to grow rapidly with potential for over 16 gigawatts (GW) of solar generation by 2029 [1]. There is currently about 80 GW of generating capacity [4].

To assess the solar resource potential for TXARNG installations, we mapped the location and energy use for each facility against solar resource potential for photovoltaic (PV) flat plate collectors across Texas. Data on solar resource potential was developed using averaged monthly 10km by 10km data from 1998 to 2009, and was obtained in JPEG format from the National Renewable Energy Laboratory (NREL) [5]. Solar resource potential follows a decreasing gradient across the state from west to east, ranging from approximately 7.5 kWh per square meter per day (kWh/$m^2$/day) to 4 kWh/$m^2$/day. Figure 1 shows the results.

Figure 1. Energy consumption of TXARNG facilities in Megawatt-hours per year mapped against solar resource potential for PV flat plates




Sources: NREL [5], TXARNG and CNA

In table 1, we've ranked the top-10 facilities according to their solar PV potential. The table shows that these facilities are all above 5 $kWh/m^2/day$, a number that suggests a high potential for PV development at these facilities. Overall, there are 22 facilities with insolation above 5 $kWh/m^2/day$, and all but one of the rest are above 4.

Table 2. The top-10 TXARNG facilities ranked by solar PV resource potential, indicated by both Latitude tilt and Global Horizontal Irradiance

| Facility | Electricity Use (kWh/yr) | Solar PV potential ($kWh/m^2/day$) | |
|---|---|---|---|
| | | Latitude tilt Irradiance[a] | Global Horizontal Irradiance[b] |
| FORT BLISS R.C. | 2,340,648 | 7.31 | 5.84 |
| EL PASO R.C. | 215,165 | 7.22 | 5.79 |
| MIDLAND AIRPORT | 118,880 | 6.41 | 5.46 |
| LUBBOCK | 1,183,535 | 6.33 | 5.33 |
| DYESS | 1,045,642 | 5.75 | 5.11 |
| SAN ANGELO R.C. | 148,063 | 5.73 | 5.17 |
| CAMP BOWIE | 1,719,760 | 5.50 | 5.01 |
| WICHITA FALLS R.C. | 710,030 | 5.46 | 4.90 |
| LAREDO R.C. | 277,819 | 5.42 | 5.13 |
| STEPHENVILLE R.C. | 96,498 | 5.36 | 4.91 |

Sources: NREL [5], TXARNG and CNA

[a] Latitude tilt irradiance is the amount of short-wave radiation measured on a flat surface tilted at an optimal southerly angle [6].

[b] Global horizontal irradiance is the amount of short-wave radiation measured on a flat surface horizontal to the ground [7].

A 2016 study conducted by the Lawrence Berkeley National Laboratory [8] reviewed 128 utility-scale PV projects totaling 3,201 megawatt (MW) of capacity. Results from the study (table 2), show the breakout of projects in 2014 by percentile for capacity, capacity factor, and PV potential in global horizontal irradiance measured in $kWh/m^2/day$. A comparison of the results of this study with the top-ranked TXARNG facilities show that all of them are above the 25th percentile of the 2014 projects, with three above the 75th percentile. The lowest global horizontal irradiance value for all Texas facilities is 4.54. This suggests that numerous sites available for the TXARNG would be very suitable for PV. In addition, high irradiance values also suggest significant potential for cost-effective solar hot water heating.

Table 3. Solar PV potential for TXARNG facilities compares well with utility-scale projects implemented in the United States in 2014.

| | Project Capacity (MW) | Net Capacity Factor (percent) | Global Horizontal Irradiance (kWh/m$^2$/day) |
|---|---|---|---|
| Minimum | 5.2 | 14.8 | 3.73 |
| 10th Percentile | 7.6 | 18.4 | 3.84 |
| 25th Percentile | 10 | 20.7 | 4.65 |
| Median | 15 | 25.7 | 5.39 |
| 75th Percentile | 20 | 29.9 | 5.61 |
| 90th Percentile | 39 | 31.8 | 5.81 |
| Maximum | 250 | 34.9 | 6.02 |

Source: Bolinger et al. [8]

# Wind Potential

Texas has made considerable progress in adopting renewable power. While it is ranked 5th in the United States for total renewables, including hydropower, Texas has more wind generating capacity than any other state, and twice that of the next largest, California [9]. Additions to the state's energy generating capacity in 2016 are expected to be about 12,500 MW, with wind comprising 7,863 MW and solar another 2,124 MW, for 80 percent of the total. These additions will bring Texas's renewable energy generating capacity to 21 percent of total power generation [10].

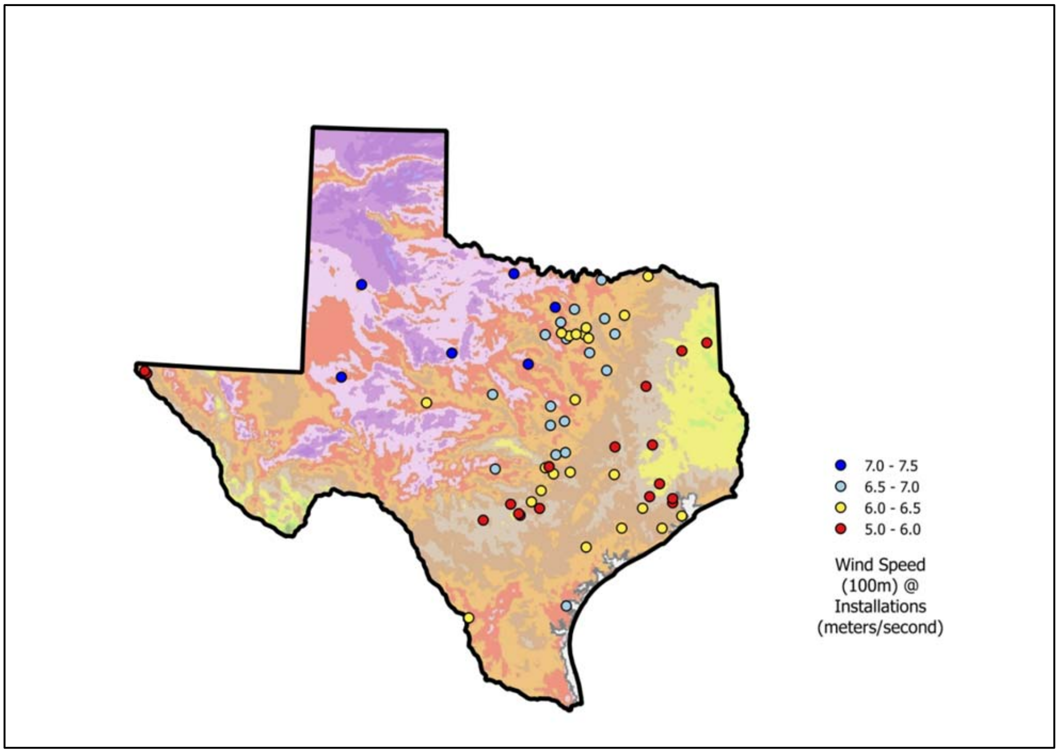
Figure 2 shows wind energy potential across Texas and at each TXARNG installation under analysis. Wind energy potential is provided in terms of wind speed at 100m elevation above ground, and generally follows a decreasing gradient across the state from northwest to southeast, ranging from approximately 8.0–8.5 meters per second (m/s) to 5.0–6.0 m/s. NREL provided wind speed data in JPEG format [11].

Table 3 provides the TXARNG facilities ranked by wind speed and then electricity use. Several of the larger facilities are located in areas with relatively high wind speeds, suggesting potential for this renewable resource. Six facilities are located in areas with wind speeds at 100m of 7.0–7.5 m/s, 17 with speeds of 6.5–7 m/s, 21 at 6.0–6.5 m/s, with the remainder at 6.0 m/s or below.

The scale of wind turbine generation is well beyond the consumption needs of all the TXARNG facilities, however, except Camp Mabry.[2] The implementation of wind power at most facilities will require contracts to sell surplus power to the grid.

[2] A 2.5-MW wind turbine operating at 30-percent capacity would generate about 6.5 MWh/year.

Figure 2. 100-meter wind speeds at TXARNG installations




Sources: NREL [11], TXARNG and CNA

Table 4. The top-10 TXARNG facilities ranked by wind resource potential

| Facility | Electricity Use (kWh/yr) | Wind Speed (m/s) |
|---|---|---|
| LUBBOCK | 1,183,535 | 7.0–7.5 |
| DYESS | 1,045,642 | 7.0–7.5 |
| WICHITA FALLS R.C. | 710,030 | 7.0–7.5 |
| MIDLAND AIRPORT | 118,880 | 7.0–7.5 |
| STEPHENVILLE R.C. | 96,498 | 7.0–7.5 |
| DECATUR R.C. | 84,018 | 7.0–7.5 |
| CAMP BOWIE (STATE) | 1,719,760 | 6.5–7.0 |
| CORPUS CHRISTI R.C. | 380,541 | 6.5–7.0 |
| FORT WORTH - SANDAGE R.C. | 221,599 | 6.5–7.0 |
| TEMPLE R.C. | 208,899 | 6.5–7.0 |

Sources: NREL [11], TXARNG and CNA

# Geothermal Potential

Geothermal energy can be used in two ways: to heat and cool using heat pumps, and to produce electricity.

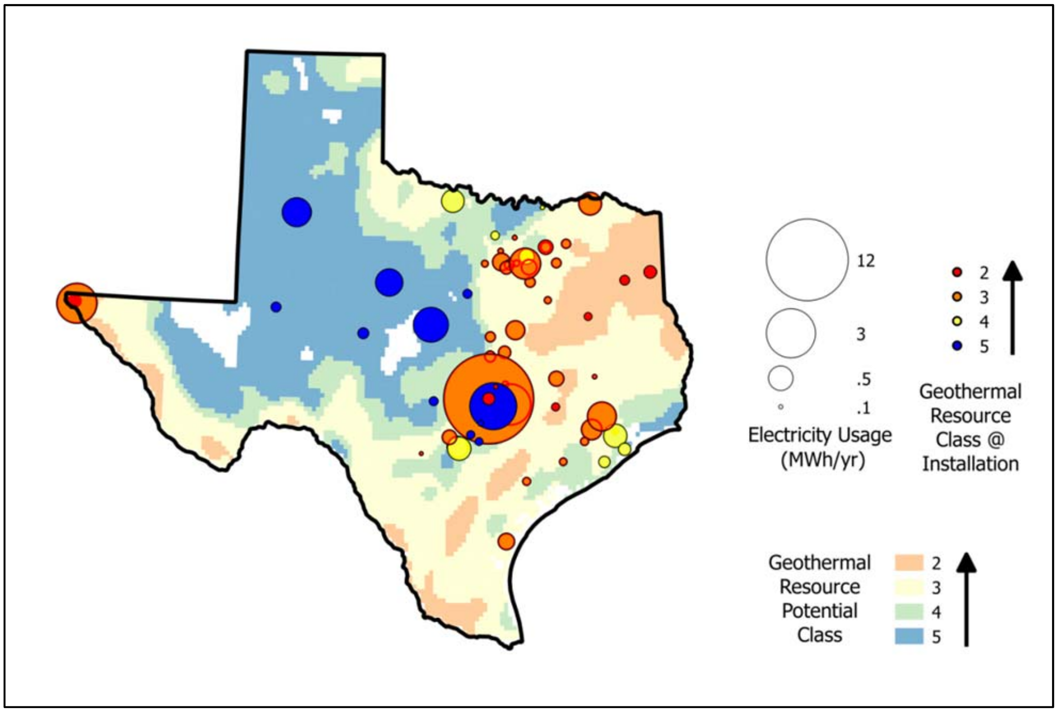
Because shallow ground maintains near-constant temperatures between 50 and 60 degrees Fahrenheit, geothermal heat pumps can be used to cool buildings in the summer and heat them in the winter. These systems can significantly reduce electricity demand compared to conventional systems, though not avoid it, as power is needed to pump the required fluid, run the fans, and add supplemental heat. The heat removed during the summer from indoor air can also be used to heat water, providing an additional energy benefit [12-13]. These systems operate independently from the weather, so they provide a constant source of energy for heating and cooling. In addition, they are scalable from home-sized systems to those for larger buildings, so they could be suitable for a variety of TXARNG facilities. If coupled with solar PV and batteries to run pumps, these systems could provide most or all the energy needed for building heating and cooling.

Large systems that produce electricity from hot rock deep underground, called enhanced geothermal systems (EGS) have a significant advantage compared to solar and wind in that they provide near-constant baseload power without the need for power storage. They have the disadvantage of being a new technology with little experience in implementation [14]. Another disadvantage is that EGS uses a lot of water, between 813-1,999 gallons per MWh, considerably more than coal, where solar and wind use little or no water [15].

The map in figure 3 shows geothermal resource potential across Texas, mapped against electricity usage at TXARNG installations. Electricity usage is depicted by bubble size, while geothermal resource class is illustrated by cell color across the state and by bubble color for each installation. Geothermal resource classes go from 1 (the most favorable) to 5 (the least favorable). The map depicts the eastern portion of Texas as having more-favorable geothermal resource potential, with Class 2 being the highest for Texas.

Table 4 lists the facilities by potential for EGS. There are no locations with the most favorable resource class, though there are five with the second-most favorable class. These are all relatively small facilities in terms of power demand. The TXARNG's largest facility, Camp Mabry, falls within the third-most favorable resource class.

Figure 3. Energy consumption of TXARNG facilities mapped against geothermal resource class for EGS




Sources: NREL [16], TXARNG and CNA

Table 5. The top-10 TXARNG facilities ranked by the potential for EGS.

| Facility | Electricity Use (kWh/yr) | Geothermal Resource Class |
|---|---|---|
| EL PASO R.C. | 215,165 | 2 |
| MARSHALL R.C. | 205,844 | 2 |
| KILGORE R.C. | 119,077 | 2 |
| BRENHAM R.C. | 76,416 | 2 |
| PALESTINE R.C. | 72,924 | 2 |
| BRYAN R.C. | 316,178 | 3 |
| CAMP MABRY | 12,034,810 | 3 |
| CAMP SWIFT | 2,493,106 | 3 |
| FORT BLISS R.C. | 2,340,648 | 3 |
| GRAND PRAIRIE | 1,402,800 | 3 |

Sources: NREL [16], TXARNG and CNA

# Electricity Prices and Renewable Energy Opportunities

The price of electricity is a key consideration for any investor when comparing renewable and conventional energy; the higher the cost of conventional power, the more attractive renewables look. Table 5 provides a ranking of TXARNG's facilities by their electricity price, along with indicators for resource potential.

Table 6. TXARNG facilities ranked by highest electricity price, as well as indicators for resource potential

| Facility | Electricity Use (kWh/yr) | Electricity Price ($/kWh) | Solar PV Potential (kW/m²/day) | Wind Speed (m/s) | Geothermal Resource Class |
|---|---|---|---|---|---|
| HONDO R.C. | 14,684 | $0.15 | 4.76 | 60 | 3 |
| EAGLE MOUNTAIN LAKE | 37,280 | $0.13 | 5.07 | 70 | 3 |
| DENTON R.C. | 25,364 | $0.13 | 5.14 | 70 | 3 |
| BEE CAVES R.C. | 132,504 | $0.13 | 4.78 | 65 | 3 |
| EL CAMPO R.C. | 73,329 | $0.12 | 4.28 | 65 | 3 |
| VICTORIA R.C. | 83,261 | $0.12 | 4.34 | 65 | 3 |
| AUSTIN FAIRVIEW | 184,346 | $0.12 | 4.72 | 60 | 3 |
| EL PASO R.C. | 215,165 | $0.12 | 7.22 | 55 | 2 |
| CORPUS CHRISTI R.C. | 380,541 | $0.11 | 4.45 | 70 | 3 |
| CAMP SWIFT | 2,493,106 | $0.11 | 4.60 | 65 | 3 |
| TEMPLE R.C. | 208,899 | $0.11 | 4.76 | 70 | 3 |
| CAMP BOWIE | 1,719,760 | $0.11 | 5.50 | 70 | 5 |
| ROUND ROCK | 18,993 | $0.11 | 4.79 | 70 | 3 |
| WICHITA FALLS R.C. | 710,030 | $0.11 | 5.46 | 75 | 4 |
| PALESTINE R.C. | 72,924 | $0.11 | 4.63 | 60 | 2 |
| ARLINGTON R.C. | 53,079 | $0.11 | 5.08 | 65 | 3 |
| SEGUIN R.C. | 70,629 | $0.10 | 4.62 | 60 | 5 |
| BERGSTROM (ABIA) R.C. | 3,197,727 | $0.10 | 4.69 | 65 | 5 |

Sources: NREL [5, 11, 16], TXARNG and CNA

In addition to the potential of available renewable energy resources, their relative costs are important to keep in mind. Fortunately, the cost for solar PV and wind are coming down quickly. Between 2009 and 2015, the levelized cost of energy (LCOE) for PV and wind came down by 82 and 61 percent, respectively [17]. Table 7 shows LCOEs for PV and wind in Texas, and geothermal for the United States. The LCOE for natural gas combined cycle is provided for comparison.

Table 7. Unsubsidized levelized cost of energy

| **Energy Type** | **$/MWh** |
|---|---|
| Solar PV - Texas | 57-193 |
| Wind - Texas | 36-51 |
| Geothermal – U.S. | 82-117 |
| Natural Gas Combined Cycle | 52-78 |
| Energy Efficiency – U.S. | 0-50 |

Source: Lazard [17]

Though this report focuses on the development of renewable energy at TXARNG facilities, investments in energy efficiency could also be very cost-effective and have the advantage of being independent of location. As shown in table 7, the cost of energy efficiency ranges from nothing to $50 per MWh. This suggests that energy efficiency should be part of TXARNG's energy strategy and could be considered a source of supply. For the TXARNG's larger facilities there may be economies of scale that make energy efficiency particularly favorable.

# Water Stress and Guard Facilities

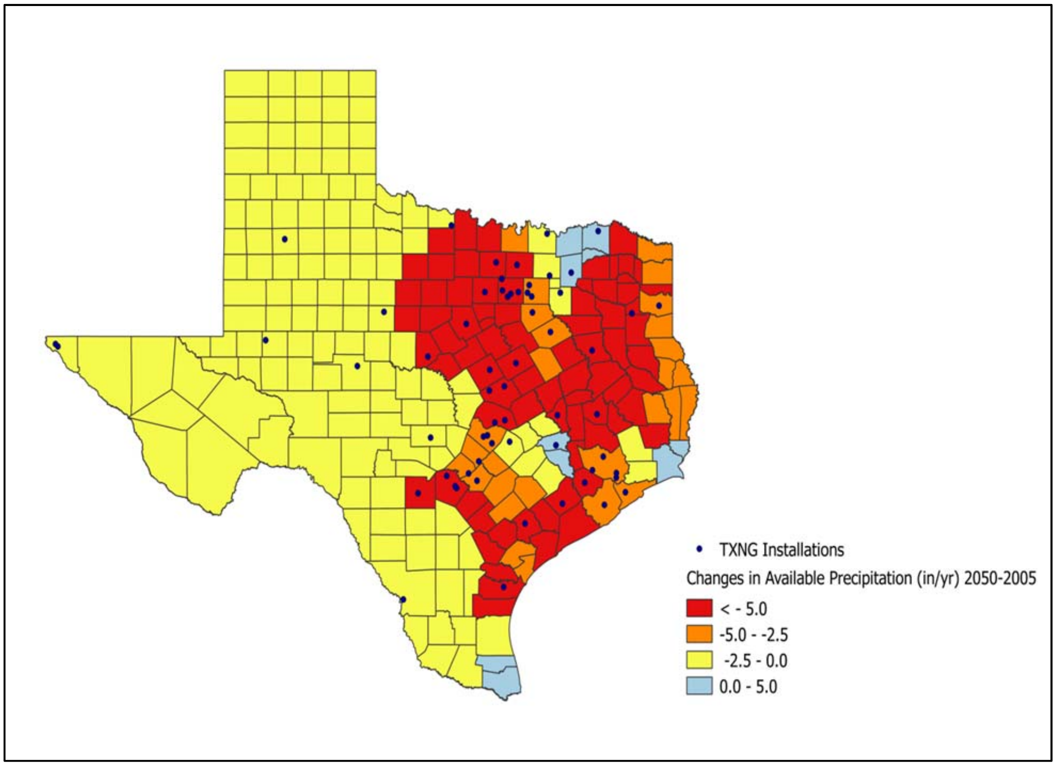
Texas is periodically subject to severe drought. In 2011, the state experienced the worst single-year drought in its recorded history [18]. Demand for electricity was at an all-time high because of the heat, and the water needed to cool the state's coal, nuclear, and gas power plants was in short supply. In some places, water levels had dropped below intake pipes; in others, the available water was too hot to provide effective cooling. Texans were warned that rolling blackouts were possible, as power plants that could not be properly cooled would have to shut down [19]. Power production constraints directly affect the operations of the TXARNG, as they are asked to curtail power use during times when consumption exceeds the grid's ability to provide supply [20]. Because wind generation uses no water for thermal cooling and solar PV only uses a small amount of water to wash the panels, Texas power production is moving towards less dependence on water and therefore less vulnerability to drought [21].

Global circulation models shows that Texas could experience a significant increase in temperature in the future due to climate change, which will heighten evapotranspiration losses and therefore water demand [22]. Analysis done for the *National Climate Assessment* of the change in water withdrawals between 2005 and 2060 shows that without climate change, withdrawals could go up 10–25 percent, with the exception of the Trinity River Basin, which could increase 25–50 percent. With the addition of climate change, however, models suggest that almost all of Texas would experience increased water withdrawals of 25–50 percent by 2060 [23].

Another study of water use and climate [22] used similar assumptions to those in the *Texas State Water Plan* [24] and explored the implications under climate change, assuming that domestic (municipal) demand would rise with population growth, as would the demand for water in the steam-electric power sector. Other sectors would remain flat.

The study's authors applied a moderate climate scenario using the averaged results of 16 general circulation models. They found that water supply risk would increase because precipitation would decrease, while temperature would increase by 2–3 degrees Celsius (3.6–5.4 degrees Fahrenheit) in bands across the state from the coast to the Panhandle. The net result would be that available precipitation (precipitation minus potential evapotranspiration) drops across the state, from 0–2.5 inches in the west, to more than 5 inches in the east (figure 4). Looking out to 2050, the results showed that Texas could face "extreme" water supply risks[3] as a result of increasing water demand and climate change (see figure 5) [14].

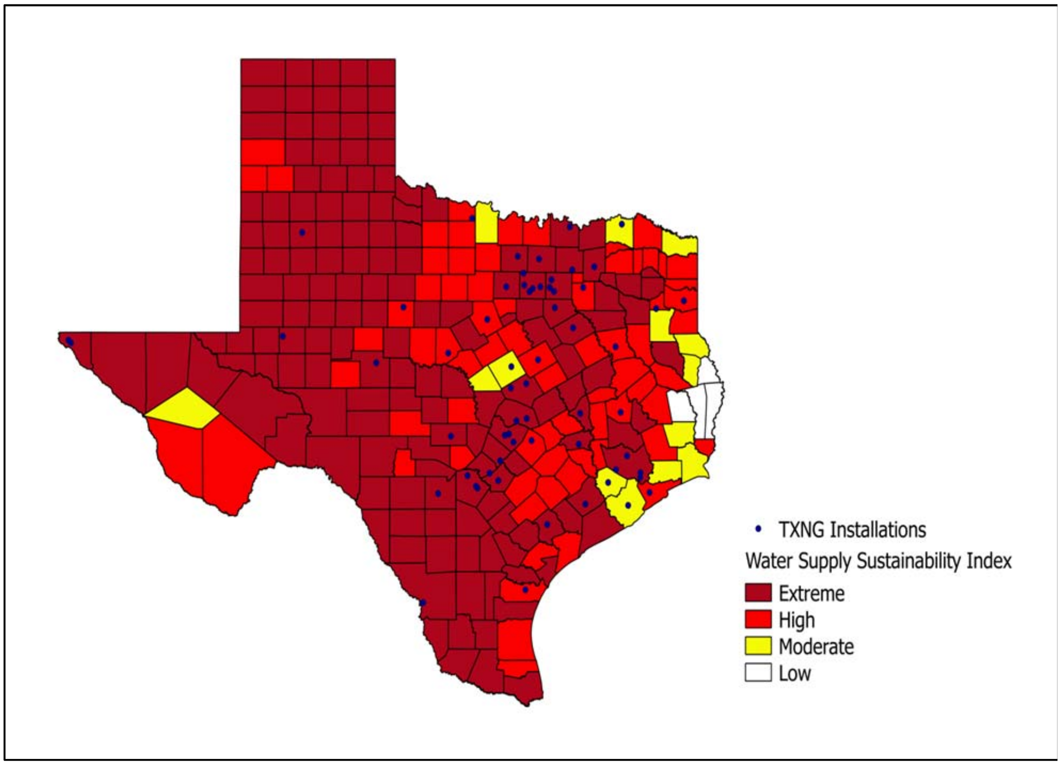
Figure 4. By 2050, available precipitation in Texas could decline by 5 inches or more in the eastern half of the state and up to 2.5 inches in the west, due to change in precipitation and evapotranspiration from climate change.




Sources: Roy, et al. [22], TXARNG and CNA

[3] As defined by the authors.

Figure 5. Much of Texas faces "extreme" water supply risk due to increased demand and climate change. Most TXARNG facilities are in counties facing extreme risk.




Sources: Roy et al. [22], TXARNG and CNA

# Conclusions

Based on CNA's analysis for this study, we conclude the following:

- There is extensive potential for the generation of electricity from solar PV at Texas Army National Guard facilities at prices that are likely to be comparable to current utility-scale PV projects.
- There is potential for the application of wind energy at Texas Army National Guard facilities under power contracts that allow surplus power to be sold to the grid.
- Substantial energy savings could be possible at all of the Texas Army National Guard's facilities by using geothermal heat pumps.
- There is limited potential for the application of Enhanced Geothermal Systems at the Texas Army National Guard's facilities.
- The cost of wind in Texas is the lowest in the country, and PV costs are also very favorable making them attractive investment opportunities. The cost of energy efficiency is the lowest of all the energy options.
- Most Texas Army National Guard facilities are located in counties likely to face extreme water stress by 2050.

# Appendix

Table 8. All Texas Army National Guard facilities ranked by electricity use, with associated solar photovoltaic (PV) potential, wind speed, and geothermal resource class

| Facility | Electricity Use (kWh/yr) | Solar PV Potential (kW/m2/day[a] | Wind Speed (m/s)[b] | Geothermal Resource Class[c] |
|---|---|---|---|---|
| CAMP MABRY | 12,034,810 | 4.72 | 60 | 3 |
| BERGSTROM (ABIA) R.C.[d] | 3,197,727 | 4.69 | 65 | 5 |
| CAMP SWIFT | 2,493,106 | 4.60 | 65 | 3 |
| FORT BLISS R.C. | 2,340,648 | 7.31 | 55 | 3 |
| CAMP BOWIE (STATE) | 1,719,760 | 5.50 | 70 | 5 |
| GRAND PRAIRIE | 1,402,800 | 4.84 | 65 | 3 |
| NW HOUSTON | 1,209,302 | 4.25 | 55 | 3 |
| LUBBOCK | 1,183,535 | 6.33 | 75 | 5 |
| DYESS | 1,045,642 | 5.75 | 75 | 5 |
| MARTINDALE R.C. | 762,913 | 4.61 | 60 | 4 |
| ELLINGTON FIELD | 755,168 | 4.24 | 60 | 4 |
| CAMP MAXEY T.S. HQ[e] | 746,823 | 4.71 | 65 | 3 |
| WICHITA FALLS R.C. | 710,030 | 5.46 | 75 | 4 |
| FORT SAM HOUSTON R.C. | 632,166 | 4.64 | 60 | 4 |
| HOUSTON – WESTHEIMER R.C. | 609,345 | 4.12 | 60 | 3 |
| WACO R.C. | 514,121 | 4.78 | 65 | 3 |
| FORT WORTH – SHOREVIEW R.C. | 446,031 | 5.18 | 65 | 3 |
| CORPUS CHRISTI R.C. | 380,541 | 4.45 | 70 | 3 |
| DALLAS – RED BIRD R.C. | 343,680 | 4.97 | 65 | 3 |
| BRYAN R.C. | 316,178 | 4.50 | 60 | 3 |
| DALLAS – CALIF. CROSSING R.C. | 301,499 | 5.01 | 65 | 4 |
| CAMP BULLIS | 292,911 | 4.53 | 60 | 3 |
| LAREDO R.C. | 277,819 | 5.42 | 65 | -- |
| FORT WORTH – SANDAGE R.C. | 221,599 | 5.09 | 70 | 3 |

| | | | | |
|---|---|---|---|---|
| EL PASO R.C. | 215,165 | 7.22 | 55 | 2 |
| TEMPLE R.C. | 208,899 | 4.76 | 70 | 3 |
| MARSHALL R.C. | 205,844 | 4.58 | 55 | 2 |
| LA MARQUE R.C. | 195,638 | 4.49 | 65 | 4 |
| AUSTIN FAIRVIEW | 184,346 | 4.72 | 60 | 3 |
| KILLEEN R.C. | 166,212 | 4.98 | 70 | 3 |
| ANGLETON R.C. | 160,198 | 4.17 | 65 | 4 |
| WYLIE R.C. | 150,724 | 4.93 | 70 | 3 |
| SAN ANGELO R.C. | 148,063 | 5.73 | 65 | 5 |
| WAXAHACHIE R.C. | 142,711 | 4.93 | 70 | 3 |
| FORT WORTH – COBB PARK R.C. | 140,321 | 5.14 | 65 | 3 |
| GATESVILLE R.C. | 138,085 | 5.05 | 70 | 3 |
| BEE CAVES R.C. | 132,504 | 4.78 | 65 | 3 |
| TERRELL – R.C. | 125,107 | 4.82 | 70 | 3 |
| KILGORE R.C. | 119,077 | 4.56 | 55 | 2 |
| MIDLAND AIRPORT | 118,880 | 6.41 | 75 | 5 |
| GREENVILLE R.C. | 111,644 | 4.82 | 65 | 3 |
| STEPHENVILLE R.C. | 96,498 | 5.36 | 75 | 5 |
| FREDERICKSBURG R.C. | 95,917 | 5.02 | 70 | 5 |
| ROSENBERG R.C. | 86,768 | 4.29 | 65 | 3 |
| DECATUR R.C. | 84,018 | 5.24 | 75 | 4 |
| VICTORIA R.C. | 83,261 | 4.34 | 65 | 3 |
| NEW BRAUNFELS R.C. | 78,507 | 4.49 | 65 | 5 |
| BRENHAM R.C. | 76,416 | 4.48 | 65 | 2 |
| EL CAMPO R.C. | 73,329 | 4.28 | 65 | 3 |
| PALESTINE R.C. | 72,924 | 4.63 | 60 | 2 |
| SEGUIN R.C. | 70,629 | 4.62 | 60 | 5 |
| CORSICANA R.C. | 64,229 | 4.83 | 70 | 3 |
| WEATHERFORD R.C. | 59,949 | 5.27 | 70 | 3 |
| TAYLOR R.C. | 58,262 | 4.73 | 70 | 3 |
| PASADENA R.C. | 55,361 | 3.96 | 60 | 3 |
| ARLINGTON R.C. | 53,079 | 5.08 | 65 | 3 |
| EAGLE MOUNTAIN LAKE | 37,280 | 5.07 | 70 | 3 |
| SAN MARCOS R.C. | 31,821 | 4.63 | 65 | 5 |
| DENTON R.C. | 25,364 | 5.14 | 70 | 3 |
| HUNTSVILLE | 22,759 | 4.38 | 60 | 3 |

| | | | | |
|---|---|---|---|---|
| ROUND ROCK | 18,993 | 4.79 | 70 | 3 |
| DENISON R.C. | 16,764 | 4.96 | 70 | 4 |
| HONDO R.C. | 14,684 | 4.76 | 60 | 3 |

Sources: NREL [5, 11, 16], TXARNG and CNA

[a] Kilowatt-hours per square meter per day

[b] Meters per second

[c] Geothermal resource classes go from 1 (the most favorable) to 5 (the least favorable).

[d] Readiness Center

[e] Headquarters

Click here to enter text.

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IRM-2016-U-013350

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