



Air Force Civil Engineer Center Energy Talking Points 2012



Energy is a directorate of the Air Force Civil Engineer Center, Tyndall Air Force Base, Fla. It consists of engineers, energy experts, contract officers and support staff who provide expertise to installations and Major Commands. They identify, evaluate and help implement technologies and funding strategies to reduce Air Force energy consumption and costs to meet federal energy goals.

ENERGY CONSERVATION

- Total facility energy use: 64.5 trillion BTUs at a cost of \$1.06B
- Total electricity used: 9.3 Billion KWh or 31.8 trillion BTUs
- Facility energy intensity: down 16.3% versus FY03.
Goal: 30% by 2015
- Interim energy intensity FY11 goal 18%
- Factors contributing to goal shortfall:
 - Bad weather year - Δ 1%
 - Decrease in the allowable Renewable Energy Purchase Credit - Δ 1.2%
 - Minimal energy investments in FY 07-09



METERS

- Installing software and communications in 2012 and 2013 to fully enable the Advanced Meter Reading System at more than 80 installations.
 - Analyze near real-time utility information
 - Identify anomalies
 - Measure energy consumption at facility level

The Air Force has reduced raw facility energy consumption 35% since 1994, but utility costs increased 92% during the same period.

FY11 facility energy price tag was \$579M lower than it would have been had we not invested in energy conservation over the last 15 years.

WATER CONSERVATION

- Potable water intensity: down 13.2% versus FY07
- Interim potable water intensity goal: 8%
 - Leak repair projects
 - Extensive use of xeriscaping



- Installation of reclaimed water irrigation systems
- Incorporation of LEED design principles into new MILCON and major renovations
- Water audits

AUDITS

- Completed energy audits at 40 installations
- Covered 84M SF of the 534M SF in the Air Force
- Identified 15,000 energy and water conservation opportunities
- Identified 6 trillion BTUs in potential annual energy savings

RETRO/RE-COMMISSIONING (RCX)

- In FY11, AFCEC's Civil Engineer Maintenance, Inspection, and Repair Team improved performance of facility systems at 31 buildings on 14 installations.
- In 2012, AFCEC is scheduled to complete RCx at 26 buildings.
- AF is seeking a strategically sourced contract available for use at all CONUS AF bases by FY13.



Renewable Energy

Based on FY11 data

- Renewable electricity accounts for 6% of the total electricity consumed, exceeding the 5% goal for FY11, but slightly less than 2010 results of 6.4%. Extenuating factors:
 - Intentional reduction in renewable energy certificate purchases
 - Increase in electricity consumption (joint basing, weather severity and more accurate reporting)
- There are 131 operational renewable projects and 50 awarded/under construction on 77 major installations, reserve and guard bases. The total electrical capacity represents 56MW.
- Evaluated resource availability and economic feasibility for developing renewable energy sources at 62 installations; 22 showed good possibility and are being further evaluated.
- The Air Force has a plan to produce renewable energy equal to 27% of its total electrical consumption in accordance with 10 USC 2911. The plan relies on a mix of renewable energy sources:
 - Wind, solar, biomass, geothermal, waste-to-energy, and landfill gas
 - Power purchase agreements and enhanced use leases will be used to fund the projects.
- In FY11, the Air Force issued six requests for information for small-wind, geothermal, small-solar, large-wind, large-solar and biomass/waste-to-energy project ideas. The Air Force collected 139 industry responses.
 - AFCEC evaluated the responses and referred 28 to the Air Force Research Lab for further study and deemed 19 as appropriate to move forward in the development process.

	Solar PV	Solar Thermal	Geothermal Ground Source Heat Pumps	Wind	Day Lighting	Landfill Gas
Projects Online	50 26.2 MW	13	55	7 8.7 MW	5	1 2.4 MW
Projects In Construction	20 6.1 MW	13	9	7 4.9 MW	0	1 7.2 MW

FY11 Renewable Energy Performance

2005 EPCAct (5.0% goal)	6%	Renewable electricity use (purchases, production, on-base credit)	561,475.9 MWh
10 USC 2911e (11.0% goal)	7.1%	Renewable energy use (10 USC 2911e)	2,264,660 MBTU
Renewable electricity produced on base	79,106 MWh	Total electric use	9,319,049 MWh or 31,796,595.18 MBTU
Renewable non-electric production	589,536 MBTU		

Renewable Energy (continued)

1,000 Megawatt Plan for FY11–13

Enhanced Use Lease Pipelines			PPA & Direct AF Investment		
Energy Source	Project Total	Capacity (MW)	Energy Source	Project Total	Capacity (MW)
Photovoltaic	7	630	Photovoltaic	12	64
Biomass	3	90	Biomass	1	25
Waste to Energy	1	15	Waste to Energy	1	5.4
Natural Gas	1	117	Wind	6	70
Total		852 MW	Landfill Gas	1	5
			Total		170 MW



Air Force Renewable Energy Production		FY09	FY10	FY11	FY11–13
Operating	# of Projects	75	84	131	
	Generation (MWh)	52,264	71,366	79,106	
	RE Capacity (MW)	N/A	37.2	37.3	
	# of Bases	55	42	56	
	Solar (PV)	35	43	50	
	Solar (Thermal)	12	9	18	
	Wind	6	8	7	
	Geothermal (GSHP)	21	23	55	
	Waste to Energy	0	0	0	
	Landfill Gas	1	1	1	
In Construction	# of Projects		43	50	
	RE Capacity (MW)		7	18.2	
	# of Bases		23	35	
	Solar (PV)		8	20	
	Solar (Thermal)		4	13	
	Wind		3	7	
	Geothermal (GSHP)		15	9	
	Waste to Energy		0	0	
Landfill Gas		0	1		
Planned	# of Projects				30
	RE Capacity (MW)				758
	# of Bases				
	Solar				18
	Wind				6
	Biomass				1
	Waste to Energy				1
	Landfill Gas				1
Natural Gas				3	



Capital Investments

Based on FY11 data

\$100M heat plant decentralization project at Tinker AFB. Expected energy savings are 400,000 MBTUs/year.

- In FY11, AFCEC continued central program management of a \$2.2B funding strategy through FY15 for energy/water conservation and renewable energy.
- AFCEC centrally managed and executed \$320M in FY11 for:
 - Energy and water conservation projects
 - Contract labor support at all levels to identify and execute the projects
 - Sustainable Infrastructure Assessments at 40 installations covering 63MSF
- Programmed 365 energy/water conservation projects with a savings to investment ratio of 2.7
- The \$185M FY11 investment will reduce utility bills by \$500M over the life of the projects.
- Most investments require two years from contract award date to realize measureable energy savings due to contract and construction lag time.
- Mechanical and HVAC projects accounted for 40.5% of the energy savings associated with FY11 conservation projects. Other projects creating energy savings included: 23.5% from lighting and electrical, 11.7% energy management control systems, 5.4% whole building projects, 4.9% building envelope, and 3.5% recommissionings.



- The Air Force uses Energy Savings Performance Contracts (ESPCs) and Utility Energy Service Contracts (UESCs) to fund energy conservation projects to fill the gap in direct investments to meet the federal mandates. ESPCs generally do not save the Air Force money due to the financed cost of the investment paid out of savings from the annual utility account.



- AFCEC is currently evaluating ESPC/UESC contracts that could save enough energy to power 16,474 average homes a year:
 - \$80-90M heat plant decentralization project at Tinker AFB. Expected energy savings are 400,000 MBTUs/year.
 - \$27M airfield lighting and building improvement project at Lackland AFB. Expected savings are 146,000 MBTUs/year.
 - The Air Force is evaluating two projects at Hill AFB that incorporate process energy savings in addition to facility energy savings.
- In December 2011, President Obama issued a presidential memorandum establishing a \$2 billion third-party investment goal to upgrade federal buildings for energy efficiency. The Air Force anticipates entering into contracts valued around \$250 million over the next two years in support of the plan. An additional \$400 million worth of potential ESPCs/UESC projects are in the pipeline for evaluation and could be implemented over the next five years.



Energy Spotlight

UTILITIES PRIVATIZATION

- The Utilities Privatization (UP) project management office evaluated 50 utility systems for privatization, made award decisions for 29 of the systems, and privatized five systems valued at \$74.3M, creating a cost avoidance of \$10.1M.
- The UP program began in 1998 and now includes 55 privatized systems.

ENERGY SECURITY

- Sandia Labs Energy Surety Microgrid is assessing “smart grid” capability at four bases including Maxwell, Kirtland, Schriever, and Vandenberg.
- The Air Force is
 - Analyzing the impact of utilities privatization on installation energy security.
 - Assessing backup power requirements for mission critical functions.
 - Participating in the Smart Power Infrastructure Demonstration for Energy Reliability and Security (SPIDERS) Joint Capability Technology Demonstration (JCTD).
 - Improving emergency generator maintenance and testing policy.
 - Placing emphasis on energy security efforts in all Air Force Unit Compliance Inspections and interactive exercises with utilities.



UTILITY RATES MANAGEMENT TEAM

- In FY11, AFCEC’s Utility Rate Management Team supported the Air Force’s Utility Law Field Support Center with rate negotiations and interventions in 14 states.

ENERGY AWARENESS

- In late 2011, the Air Force created an energy awareness online training module accessible via the Air Force Portal. It’s designed to help Airmen save energy while at work.
- The Air Force received almost half of DOE’s Federal Energy Management Program awards earned by the Department of Defense in 2011 and a quarter of the awards overall. The Air Force won seven awards, more than double the combined total it earned for the past two years, three each for 2009 and 2010.





Case Studies

SOLAR ARRAYS AT EDWARDS AFB, CALIF.

- In 2010, Edwards AFB awarded a Power Purchase Agreement to Borrego Solar for the construction of three 1MW photovoltaic (PV) sites throughout the base with no upfront cost to the base. Borrego will sell the power back to the base at an economical, fixed rate.
- The PV sites will generate 6,750 MWh annually.
- Edwards' annual utility bill ranges \$15M to \$18M. Utility bills in the summer double but consumption only goes up 3 percent.
- The average summer peak demand is 35 MW. The PV sites will generate 8.5% of summer peak demand and save up to \$400K by offsetting high demand charges from Southern California Edison.



GEOHERMAL POWER PLANT AT MOUNTAIN HOME AFB, IDAHO

- The Air Force has partnered with the Department of Energy and Utah State University to drill a 6,000-foot geothermal test well at Mountain Home AFB, Idaho in hopes of finding a natural source of hot water that can be used to produce electricity.
- The research project may allow the Air Force to create its first geothermal power plant.
- Several months of drilling in late 2011 and early 2012 resulted in promising data with the temperature at the bottom of the well reaching more than 300 degrees. Information is preliminary.
- Mountain Home could save \$1M a year on utility costs and become energy independent from the commercial power grid.

WIND TURBINES AT MASSACHUSETTS MILITARY RESERVATION



- In 2009, the Air Force and the Army worked together to install a 1.5MW \$4.6M wind turbine at the MMR. The turbine provides 30% of the power needed to operate nine groundwater cleanup systems to clean 13 million gallons of contaminated groundwater a day. It saves an estimated \$500K a year in electric costs.
- In 2011, the Air Force and Army installed two more 1.5MW wind turbines at a cost of \$9.62M. The project is expected to pay for itself in just seven years.
- The three turbines provide 100% of the power needed to clean up plumes of polluted groundwater created by the military's past uses of the land.

