

Backgrounder



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March 5, 2007

Renewable Energy Generation and Procurement

As of January 1, 2007 Arizona Public Service has the capacity to provide 106.5 megawatts (MW) of renewable energy, enough for almost 30,000 homes. This marks a 1,777 percent increase from the previous year. While some of the energy is generated by APS, most is purchased through long-term contracts.

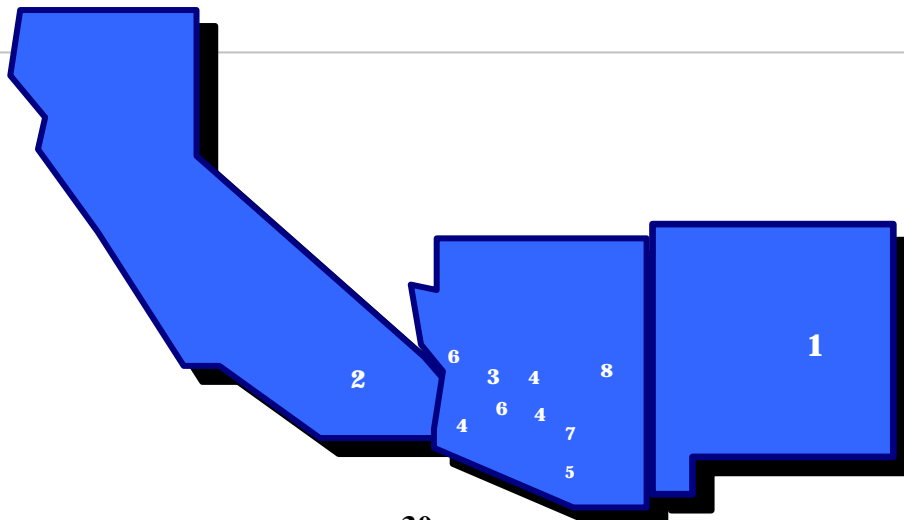
Going forward, APS continues to add renewable energy to its mix of sources of electricity.

Projects Online

	<u>Capacity</u> (Megawatts)	<u>Type</u>	<u>Acquired</u>
1. Aragonne Mesa	90 MW	Wind	Long-term contract
2. Salton Sea	10 MW	Geothermal	Long-term contract
3. Prescott Airport	3.5 MW	Solar	APS owns
4. STAR Center (and other sites around Arizona)	2.0 MW	Solar	APS owns
5. Saguaro	1 MW	Solar	APS owns

Future Projects

6. Skunk Creek Landfill	3 MW	Biogas	Long-term contract
7. 27 th Ave Landfill	3 MW	Biogas	Long-term contract
8. Snowflake White Mt. Power	14 MW	Biomass	Long-term contract



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Aragonne Mesa Wind Farm

Location – 40 miles southwest of Santa Rosa, New Mexico

Total Generation – The 90-megawatt (MW) wind farm will serve about 25,000 APS customers.

Construction – Took 18 months. It first produced electricity on December 21, 2006.

Owned and Operated – Aragonne Wind, LLC, a wholly-owned subsidiary of Babcock & Brown Operating Partners LLC. APS has a 20-year agreement to purchase all the power from the farm.



Milestones – When completed, it was the largest purchase power agreement for renewable energy ever signed by APS. It increased APS' renewable energy portfolio from 16 MW (10 MW geothermal, 6 MW solar) to 106 MW—a 563 percent increase.

Details

The power is sent on the western power grid to APS' Four Corners switchyard. This facility supplies power to the Phoenix-metropolitan area.

The 15-square-mile wind farm contains 90, one MW *Mitsubishi New Wind Turbines*. Each turbine has three blades and a one acre footprint, a majority of which are aligned along a NE to SW axis.

Turbine Facts

Hub height: 227 feet (from the center of the blades to the ground)

Blade length: 201 feet

Rotational speed (IIA) 19.8 rpm

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APS, Arizona's largest and longest-serving electricity utility, serves more than 1 million customers in 11 of the state's 15 counties. With headquarters in Phoenix, APS is the largest subsidiary of Pinnacle West Capital Corp. (NYSE: PNW)

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Salton Sea Geothermal Power Plant

Location – Calipatria, California, which is in Southern California’s Imperial Valley

Total Generation – The Salton Sea plant is one of 10 generating plants in the Salton Sea Known Geothermal Resource Area (SSKGRA), which produces about 340 megawatts (MW)

Construction – Built in 2000

Owned and Operated – The power plant is owned and operated by CalEnergy Generation LLC, a limited liability company partly-owned by MidAmerican Energy Holdings Company. APS, through a purchase power agreement, receives 10 MW, enough to serve about 2,500 homes.



Details

The Salton Sea Geothermal Power Plant captures superheated, highly pressurized water from reservoirs located thousands of feet beneath the Earth’s surface. When the hot water is quickly de-pressurized at the same hot temperature, it “flashes” into steam. It is this steam that is used to drive a turbine. After being cooled, the steam is transformed back into liquid form (water), at which time it is reinserted into the earth.

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Prescott Airport Solar Power Plant

Location – Next to the Prescott Municipal Airport (Ernest A. Love Field), 96 miles NW of Phoenix

Total Generation – 3.5 megawatts (MW)




Construction – Began in 2002, final installation December 2006

Owned and Operated – Arizona Public Service

Milestones – Second largest solar project in the United States



Three different solar photovoltaic power systems are used at the site

<p>Dual-axis high concentration</p> 	<p>The concentration photovoltaic systems use plastic lenses to concentrate sunlight on to solar cells, making them 250 times more efficient than regular photovoltaic systems.</p> <p>To follow the sun, they can rotate and tilt in any direction.</p>	<ul style="list-style-type: none"> • Five on site • Each with 33.60 kilowatts of capacity
<p>Horizontal single axis tracking</p> 	<p>These standard photovoltaic panels follow the sun across the sky.</p>	<ul style="list-style-type: none"> • 20 on site • Each with a capacity ranging from 102.85 to 162.44 kWh
<p>Tilted single axis tracking</p> 	<p>These photovoltaic panels are titled at an angle that maximizes their latitude location.</p> <p>Just like a standard horizontal single axis, they follow the sun across the sky.</p>	<ul style="list-style-type: none"> • 16 on site • Each with a capacity of 24.28 kWh

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APS Solar Test and Research (STAR) Center

The APS STAR Center is both a laboratory and power plant. It is where Arizona Public Service works with manufacturers, universities and government labs in finding technological advancements in converting solar energy into electricity. While it is doing so, it provides electricity to the local neighborhood.

Location – In Tempe, Arizona, near Arizona State University

Total Generation – While mainly a research center, it does send approximately 500 kilowatts of electricity to the power grid. The energy from this testing facility is enjoyed by about 125 Arizona homes.

Construction – Founded in 1985 and is constantly changing.

Owned and Operated – Arizona Public Service Company is the sole owner and operator of the site.



Milestones – It is a world-renown proving ground for cutting edge renewable, solar technologies.

Details

The 33-acre park is one of the most advanced solar testing sites in the world, with virtually all types of photovoltaic technology and high concentration tracking systems. Among the many projects, the site includes various single axis tracking photovoltaic (PV) systems; high concentration PV solar systems and a tilted tracker PV solar plant.

The STAR center is also a resource for the community. Along with regularly scheduled public tours, the facility hosts an annual open house, which takes place each spring.

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Other APS Renewable Energy Sites

APS owns and operates more than 30 on-grid and off-grid small solar systems around the state. Together they produce about 1.5 megawatts (MW) of renewable energy. Below is a sample of some of the more unique sites.

<p>Scottsdale Water Campus</p> 	<p>Total Generation: 303 kilowatts Constructed: 2002 Milestones: This site is an excellent example of the efficient use of space when developing a solar power plant. Details: The single-axis trackers were built on concrete covered water reservoirs.</p>
<p>Carol Spring Mountain</p> 	<p>Total Generation: 34 kilowatts Constructed: 1998 Milestones: The system has provided reliable electric service for more than eight years and was the forerunner of a number of other APS solar hybrid power plants. Details: The hybrid system consists of fixed photovoltaic panels, batteries and a backup diesel generator.</p>
<p>Flagstaff Solar Power Plant</p> 	<p>Total Generation: 95 kilowatts Constructed: 1997 Milestones: When completed, it was Arizona's first commercial solar generating plant. Details: It consists of six rows of horizontally mounted photovoltaic (PV) modules that track the sun from East to West. This simple tracking system produces 25 percent more energy over the course of a year than fixed panels.</p>
<p>Glendale Airport</p> 	<p>Total Generation: 203 kilowatts Constructed: 1999 Details: Project includes a two-axis, 113kW High Concentration Photovoltaic (HCPV) System. HCPV uses plastic lenses to concentrate sunlight 250 times onto small, high-efficiency solar cells.</p>

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Saguaro Solar Power Plant

Location – Near Red Rock, Arizona

Total Generation – The one megawatt (MW) plant can serve an average of 300 homes

Construction – Completed in 2005

Owned and Operated – Arizona Public Service Company is the sole owner and operator of the site.

Milestones – Saguaro is the first solar trough ever constructed in Arizona and the first built in the U.S. in almost 20 years. The plant was named one of the top 12 power plants in the world by *Power* magazine.



The Saguaro Solar Power Plant is the first in the world to combine solar trough technology with an Organic Rankine Cycle Power Block (technology that uses pentane, an organic fluid, which turns to vapor at a lower temperature).

Details

The \$6 million, 14-acre plant consists of six rows of parabolic mirrors that track the sun as it moves across the sky. The mirrors focus sunlight on specially-coated steel tubes filled with flowing mineral oil. The oil, heated to 600 degrees Fahrenheit, is used to heat a second fluid, pentane. Pentane vapor is then forced under pressure through a turbine generator.

Unlike a photovoltaic solar plant, which uses sunlight to produce electricity, a solar trough uses heat from the sun to create electricity. The technology can be easily combined with a storage facility, allowing it to hold energy and provide electricity when needed — not just when the sun is shining; something traditional photovoltaic solar plants are unable to do.

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