

## Electric System

The integrated, instantaneous electric system ranks as the most important infrastructure element of a modern economy. Without plentiful and affordable electric power, our economy simply cannot grow. Unlike the need for a new road or public park, the demand for electricity cannot be deferred.

APS electric system includes power plants for generation of electricity, transmission lines for carrying the electricity from the power plant to a substation where it is transferred over to the distribution system which carries the electricity to our more than 1.1 million customers.

This section discusses key sustainability issues relative to our electric system facilities.

### INTEGRATED RESOURCE PLANNING: POWER FOR THE FUTURE

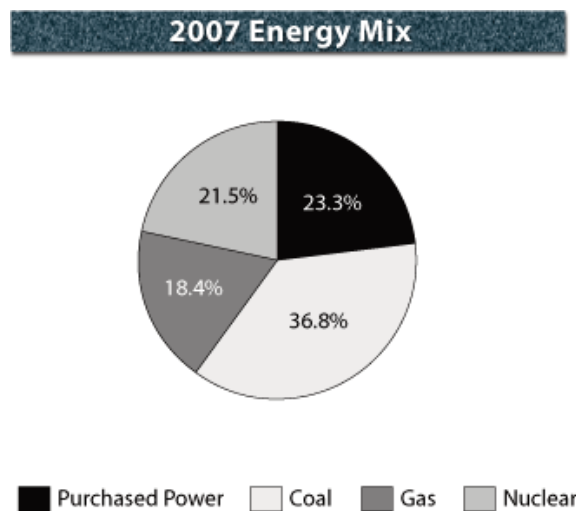
Resource planning for future energy sources plays a critical role in meeting future customer needs in an economical manner while minimizing impacts to the environment. The decisions we make in resource planning will impact our customers and our company for decades to come. The challenge is even greater for APS than for many other utilities due to the strong load growth that APS continues to experience. In planning for future resource needs, APS faces a number of challenges, including projecting customer and electric load growth, fuel price volatility, limited availability of regional capacity, transmission constraints, construction cost escalation and climate change issues. As a regulated utility, APS seeks to work with our customers, the Arizona Corporation Commission and our other stakeholders to develop an integrated resource plan that balances all of these issues and provides the sustainable energy future that we all desire.

To address these challenges, APS has initiated a process to involve key stakeholders in the resource planning process with the goals of both educating and seeking input from these stakeholders. This public process began in January, 2008 when APS filed its Resource Alternatives Report with the Arizona Corporation Commission (ACC). This report provided information related to a host of resource planning issues such as load growth projections, potential carbon costs associated with various energy sources, technology choices, and key challenges. As a follow-up to the report, APS has initiated a series of stakeholder meetings in which the issues raised in the report can be explored in greater detail. These meetings also provide a forum for open discussion between the stakeholders and APS' experts on different topics. APS expects that these stakeholder meetings will continue through the first half of 2008. Following their conclusion, APS intends to utilize the input from the stakeholders and additional internal analyses to develop a resource plan which will present the resources that APS will utilize to meet future customer needs.

The APS Resource Alternatives Report, the APS Resource Alternatives Technical Report and the information from the public meetings on our integrated planning process are available to the public at [www.aps.com/resources](http://www.aps.com/resources). This information contains detailed analysis on items such as projected customer and load growth; evaluation of different energy sources including renewables, coal, natural gas and nuclear; projected carbon emissions and potential impact of carbon legislation on each energy source scenario, and more. The interested reader should review this information for more details.

### APS GENERATION

Electrical generation is at the heart of our business and provides the electricity that we ultimately sell to our customers as product. We obtain our energy from both APS owned generating sources and from purchased power from merchant power producers (mostly natural gas plants). In 2007, 23.3 percent of our total energy sources were from purchased power, generally under long term contracts with merchant generators. The majority of our renewable en-



ergy comes from purchased power, and is primarily reflected in the purchased energy section of the below energy mix chart. Renewable energy is discussed in more detail in the Renewable Energy section of this report. In addition to the purchased power, our 2007 energy mix included APS owned generation consisting of: coal 36.8 percent; nuclear 21.5 percent; and gas 18.4 percent. Renewable energy from APS owned generation accounts for less than 1 percent of our overall energy mix.

#### Pinnacle West's Current Generating Resources

Our electric generating facilities use a mix of fuels including coal, natural gas, oil and nuclear, as well as renewable sources. Having a balanced fuel mix has provided APS with a number of financial and environmental benefits. This fuel mix allows us to enter into long-term fuel-purchasing agreements with our suppliers, which reduces our costs and provides stable fuel sources into the future. In addition, it gives us operational flexibility so we can respond to changing markets and current events. Our fuel mix has been a significant factor in our ability to decrease our air emissions intensity while continuing to add generation resources to meet our rapid customer growth. This is discussed in more detail in the Air Emissions section of this report.

We also remain committed to our policy of producing energy from natural resources in the most economic and efficient ways possible. We purchase approximately 97 percent of our coal locally. When feasible, energy is produced from local and regional fuel sources in an effort to limit the economic and environmental impact of transportation.

More detail on our fuel supply and purchased power may be found in the Investors section of our Pinnacle West Web site.

APS owned generating capacity in 2007 is shown below:

#### Generating Energy From Nuclear Power

Capacity (kW)	
<b>Capacity (kW)</b>	
<b>Coal</b>	
Units 1, 2 and 3 at Four Corners	560,000
15% owned Units 4 and 5 at Four Corners	225,000
Units 1, 2 and 3 at Cholla	641,000
14% owned Units 1, 2 and 3 at the Navajo Generating Station	315,000
<b>Subtotal</b>	<b>1,741,000</b>
<b>Gas or Oil</b>	
Two steam units at Ocotillo and two steam units at Saguaro	430,000
Twenty-two combustion turbine units	992,000
Seven combined cycle units	1,862,000
<b>Subtotal</b>	<b>3,284,000</b>
<b>Nuclear</b>	
29.1% owned or leased Units 1, 2, and 3 at Palo Verde	1,126,752
<b>Solar</b>	<b>5,817</b>
<b>Total</b>	<b>6,157,569</b>

Nuclear energy is an important part of our generation mix, and will be into the future, providing economic and environmental benefits, including significant air emissions avoidance. APS nuclear generation is from the Palo Verde Nuclear Generating Station, located about 50 miles west of Phoenix, Arizona. APS operates the plant and owns 29.1 percent of PV Units 1 and 3 and about 17 percent of Unit 2. In addition, APS leases about 12.1 percent of Unit 2, resulting in a 29.1 percent combined interest in that Unit. Nuclear energy is also one of the four scenarios for potential additional future generation resources, as discussed in the Integrated Resource Plan section of this report.

Palo Verde's third major equipment-replacement project began in late September, 2007. The planned refueling outage included the replacement of Unit 3's two steam generators and three low-pressure turbine rotors. Similar work was completed

for Unit 2 in 2003 and Unit 1 in 2005. This work resulted in the design electric rating of the three units increasing from 3,810 MW to 4,008 MW, an increase of 198 MW in net generating capacity.

Nuclear power is a critical aspect of climate change response, generating large amounts of electricity with essentially no carbon emissions. Each year Palo Verde Nuclear Plant, the nation's largest energy producer, helps avoid 31.7 million tons of CO2 emissions when compared to equivalent generation from a coal fired power plant.

Nuclear power plant operators are required to enter into spent fuel disposal contracts with the DOE, and the DOE is required to accept and dispose of all spent nuclear fuel and other high-level radioactive wastes gen-

<sup>1</sup> As of January 26, 2008, nuclear capacity increased to 1,147,122, KW reflecting completion of the steam generator replacement program.

erated by domestic power reactors. Although the Nuclear Waste Policy Act required the DOE to develop a permanent repository for the storage and disposal of spent nuclear fuel by 1998, the DOE has announced that the repository cannot be completed before at least 2017.

The Palo Verde Nuclear Generating Station and other nuclear power plants produce two forms of radioactive waste: high-level waste and low-level waste. High-level waste consists primarily of spent nuclear fuel. This spent fuel is highly radioactive for many years, but can be safely stored in spent fuel storage pools or specially designed and licensed spent fuel storage casks.

We have existing spent fuel storage pools at Palo Verde and have constructed and are using a facility for on-site dry cask storage of spent fuel while we are awaiting the completion of the Nuclear Waste Storage facility at Yucca Mountain in Nevada. With the existing storage pools and the addition of the on-site dry cask storage facility, we believe spent fuel storage methods will be available for use by Palo Verde on-site to allow continued safe operation through the term of the operating license for each of Palo Verde's three units. On average, Palo Verde replaces 200 fuel assemblies annually.

Some low-level waste has been stored on-site in a low-level waste facility; however APS is currently shipping low-level waste to off-site disposal facilities which are permitted to accept these types of wastes. Examples of low-level waste include used protective clothing, resins and filters.

Low Level Radioactive Wastes	
Years	Cubic Meters
2007	1094
2006	358
2005	656
2004	232
2003	477

**PVNGS Low-Level Solid Radioactive Wastes**

The increase in low-level wastes in 2007 was due primarily to waste materials associated with a one-time removal project of a retention basin, and wastes associated with the steam generator replacement project. Further information on spent nuclear fuel and low-level wastes can be found in the PNW annual report and 10K report.

**Nuclear Performance and Safety**

In 2006, the performance at the Palo Verde Nuclear Generating Station dropped to disappointing levels, well below its previous world-class standards. Working closely with the Nuclear Regulatory Commission, last year we implemented a performance improvement program to restore the plant's operations to previous levels of excellence.

As part of its improvement effort, Palo Verde completed the Improved Performance And Cultural Transformation project, or ImPACT. The ImPACT project staff — which numbered as many as 100 APS employees and external experts — were tasked with identifying issues and corrective actions aimed at improving Palo Verde's safety culture and overall performance for the long term. The actions identified through ImPACT are being implemented and tracked through the site integrated improvement plan.

The plan is designed to restore the plant's operation to historical levels of excellence by realigning the organization where needed, identifying and permanently fixing problems, and giving employees the tools they need to perform their jobs.

Emergency planning for Palo Verde is a cooperative effort involving Pinnacle West Capital Corporation/Arizona Public Service Company (Operating Manager for Palo Verde), the State of Arizona, Maricopa County and the Town of Buckeye. All planning activities represent a comprehensive response to federal regulations and guidelines. The Arizona Division of Emergency Management's Radiological Emergency Preparedness Program has detailed information on emergency planning for Palo Verde.

Discussion on key issues associated with nuclear safety and recent NRC activity and inspections at PVNGS can also be found in our PNW 10K Report.

**Purchased Power**

Our purchased power agreements are summarized below (in capacity of MW):

**ELECTRIC SYSTEM RELIABILITY**

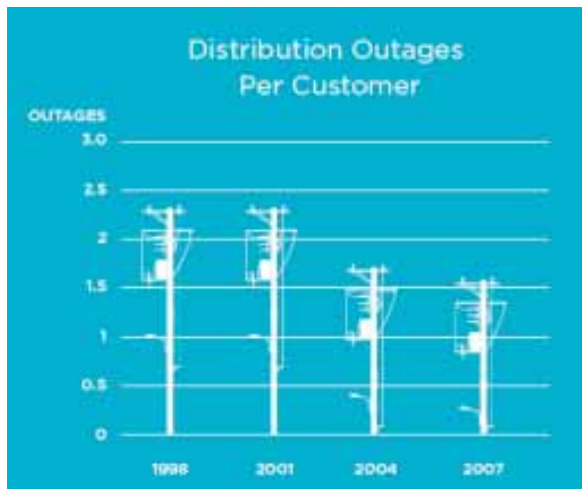
Reliable and affordable electric power is the key energy cornerstone for a dynamic modern economy. When the lights go out, it becomes clear to all of us just how dependent our businesses and personal lives are on

electric power. That is why electric system reliability is so important to Pinnacle West. Providing reliable electrical service is essential to a successful utility company, and our company has numerous programs in place to help ensure the efficiency and reliability of our electrical system. This starts with high standards in the planning, engineering and construction of our systems, and continues with the ongoing maintenance and improvements to our system.

Purchased Power Agreements		
Purchased Power Agreement	Dates Available	(MW)
Purchase Agreement	Year-round through June 15, 2010	234
Exchange Agreement	May 15 to September 15 annually through 2020	480
Tolling Agreement	June 2007 through May 2017	510
Tolling Agreement	June 2010 through October 2019	560
Day-Ahead Call Option Agreement	June 2007 through September 2015 (summer seasons)	500
Day-Ahead Call Option Agreement	June 2007 through summer 2016	150
Wind Agreement	December 2006 through December 2026	90
Geothermal Agreement	January 2006 through 2029	10
Landfill Gas Agreement	Deliveries expected to commence in 2008; expires 2028	3
Biomass Agreement	Deliveries expected to commence in 2008; expires 2022	14

### A highly reliable year : Customers benefit from system improvements

A concerted effort to improve the health of the electric grid over the last decade cumulated in an all-time best year for reliability for the company. In 2007, APS recorded all-time best results in measures that reflect outage frequency. According to the final Clear Weather System Average Interruption Frequency Index (SAIFI) metrics, APS customers saw an average of 0.98 outages, down from 1.0 last year and 1.66 in 1996. With weather factored, customers experienced 1.57 outages, down from the previous record of 1.60 set in 2002 and 2.78 in 1996. Distribution outages are down 67 percent from a decade ago. Put another way, in 2007, despite adding another 34,000 customers, we kept the power flowing 99.98 percent of the time, even with our summer storms.



Meanwhile, APS nearly beat its record for System Average Interruption Duration Index (SAIDI), which measure total minutes of outages per customer to year. In 2007, the average customer experienced 101 minutes of outages, just off the record of 100.

Our coal units set performance records again with an 88 percent capacity factor, well above the latest national average of 71 percent.

APS was able to achieve these results while serving the fastest growing service territory in the country, with 34,000 new meter sets.

To help ensure system reliability, APS is also involved in several power line projects in Arizona. APS is continuously evaluating new technologies and implementing those new technologies that make sense. Several examples of new technologies that we

are implementing are highlighted below:

### Smart meters allow APS to serve the customer of the future

The use of "smart meters" and advanced metering technology holds the potential of providing our customers with a quantum leap in service in the future. The new devices improve reliability, increase control of energy usage and allow for a level of customer service never imagined by prior generations.

Traditional meters only measure customer energy usage, while smart meters, which look no different than their predecessors, have the ability to offer real-time communication between the customer and APS. Smart meters will allow customers to monitor their energy consumption, make easy comparison and selection of

energy plans, control of appliances from remote locations, and potentially lead to fewer outages. Smart meters update energy usage information hourly as opposed to monthly, allowing the customer to better understand his or her energy use and the effects of conservation measures.

We installed our 100,000th smart meter last year and the company is currently replacing more than 7,000 meters per month. Within five years, APS expects to deploy about 800,000 smart meters.

### **Distribution Operations Management System (DOMS)**

APS prides itself on innovation and service, and the latest developments in smart meters and the company's Distribution Operations Management System (DOMS) are two cutting edge technologies which will benefit customers and APS.

APS designed the DOMS software system to replace wall maps, track outages information in real time, and manage electrical loads, construction and repair crews. Like many utilities across the country, APS relies on paper wall maps with color-coded pins to understand the big picture of its distribution electrical grid.

When completed, DOMS will allow APS to manage and track information and make updates to this grid via computer. Currently, DOMS will be implemented in a pilot phase replacing the Trouble Call Management System in the second quarter of 2008. Overall completion of the majority of the project is anticipated in 2012.

While APS' traditional methods of managing electrical loads and its response to outages work well, there is a need for new technology to address the continued rapid growth of APS' service territory. The company's goal is to not only address the growth, but to remain ahead of it. The objective of the DOMS project is to improve outage communications and reliability reporting, and further reduce customer power-outage durations. Improved customer satisfaction and enhanced safety practices are just a couple of benefits that would follow.

Before DOMS can be implemented, some preparation must take place. APS is going through a process of field-phasing verification to ensure the information in the DOMS correlates to what is out in the field. In a service territory that adds, on average, 10 new distribution substations each year and more than 125 new customers each day, that's quite an undertaking.

In the long run, the overall effect of DOMS will be a mass integration of APS services and systems. This will consolidate the systems at five distribution operating centers covering about 35,000-square miles in the Phoenix Metro area and four state regions into one as needed. It also means a merging and addition of computer systems. From this, DOMS will have the potential for quickly providing planning analysis, power-flow analysis and suggested switching tools to maintain the electrical grid.

The implementation of DOMS will improve many of the ways APS does business in the future. The DOMS computer stations will be used to provide simulator training to new operators, enabling them to hit the ground running. It will affect the areas of construction, operations, maintenance, data quality and customer care. For APS crews in the field, DOMS will offer crew management and call-out tools to better monitor manpower requirements. The systems fault locator ability will also reduce the time necessary for troubleshooting to isolate faults.

### **Raising capacity, reducing line sag**

Replacing an existing transmission line with aluminum conductor composite reinforced transmission line allowed APS to increase a transmission line's capacity without disrupting the surrounding community, while using the existing poles, towers and line location. The aluminum line carries more than twice the electrical power of conventional lines the same size and does it at higher operating temperatures with minimal conductor sag. This is another new technology that will help APS meet the demands of the future.

