PROGRESS Arkansas

Advocating Economic, Energy & Environmental Solutions for Arkansas' Future

Base Load Power

What Arkansans Need to Know

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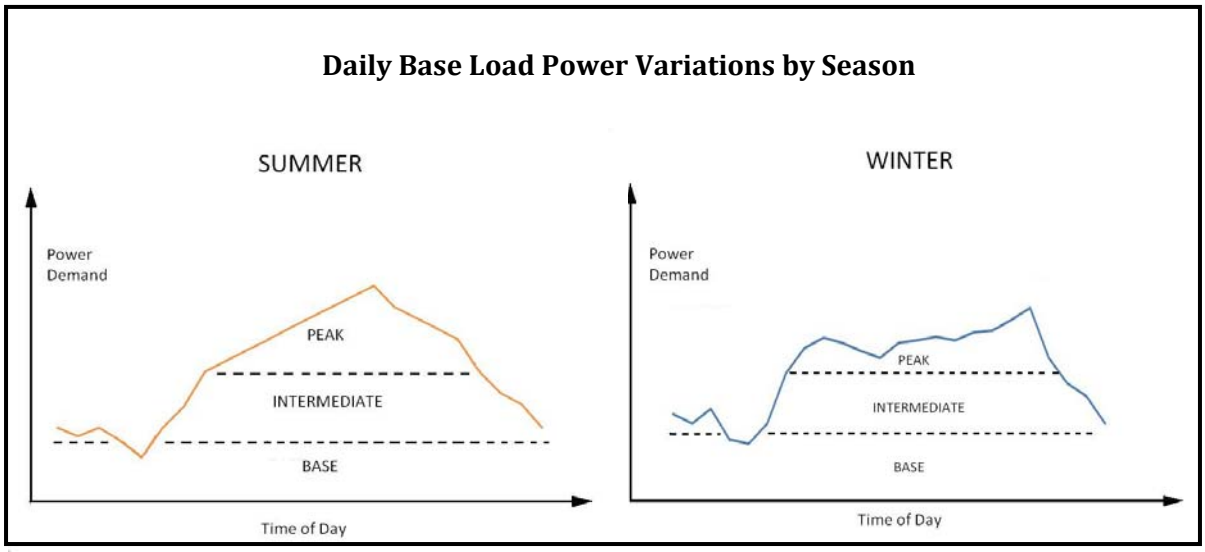
OVERVIEW

The country as a whole is being challenged to make decisions about sources of electric power for today and for the future. Arkansas is no exception. It is a critical time for Arkansas to maintain a healthy and robust electrical grid in order to stimulate economic development and create jobs. The following issue brief lays out the critical role of base load power, its limitations, and the impact that intermediate and peak power plants have in Arkansas' electricity portfolio and the power sources typically suited to each application.

WHAT IS BASE LOAD SUPPLY?

Base load is the foundation of a sound electrical system. It is the minimum level of demand on an electrical supply system over 24 hours. Base load power sources are those power plants which can generate dependable power to consistently meet demand around the clock, efficiently and reliably.

Power demand typically follows a bell curve on a daily basis, with the highest demands changing depending on the season of the year. During the late evening and early morning, demand for power is relatively low, but never below a certain "base." This is the amount of power, or base load, which grid operators must always provide to electricity consumers.



There are three different types of electricity demand, as demonstrated in the illustration above, – base load, intermediate, and peak. These illustrations also reflect the two different seasonal variations, with

fall and spring being relatively similar. Every electric grid system has the need for base load power, intermediate power, and peaking power in order for them to operate reliably and efficiently, and to ensure that a sufficient capacity reserve is available should a major power plant go offline or in the event of extreme temperatures.

Base load power plants produce continuous, reliable and efficient power at very low prices. However, given their size, in general base load plants are relatively inefficient when operating at less than full output. These plants run continuously all year except when they require unforeseen repairs or are scheduled for refueling and maintenance. Their reliability to provide a continuous supply of electricity to customers is of utmost importance, and serves as the foundation of the electric grid.

For a typical power system, base load power normally comprises 35–40 percent of the maximum load throughout the year. Sharp increases in demand are handled by intermediate or peak power plants, which are typically smaller and quicker to come online which allows them to be more responsive to demand changes.

Primarily, base load power plants use coal and nuclear forms of fuel because they are the least expensive and produce a steady stream of electricity. Geothermal and hydroelectric power plants can also be used for base load power, but are dependent on regional availability.

PEAK AND INTERMEDIATE SOURCES OF ELECTRICITY

Demand for electricity varies throughout the day, over the course of the week, and seasonally. Demand is also impacted by location, population and climate. To meet the constantly changing demand for electricity, peak and intermediate power plants are a critical component of the electricity supply system.

Peak load power plants, often referred to as “peakers,” provide electricity at periods when consumers are using the most power, i.e. the peak of the load curve. Peaker plants are designed to be highly responsive to changes in electrical demand and can be started up quickly and vary the quantity of electrical output by the minute.

However, peak load plants typically operate only 10 to 15 percent of the time and are significantly smaller than base load power plants. For this reason, peaker plants are very expensive to operate compared to the amount of power they produce and the cost of the fuel they use to power them. At the same time, because of their size they are less expensive and easier to build. Peaker plants are most often natural gas combustion turbine plants, but some do use light oil as a fuel source.

Intermediate power plants cover the remainder of electricity demand between base load and peaker plants, and are also known as “load following” power plants. From a cost and flexibility standpoint, they are larger than peaker plants, so construction costs are higher, but they also run more efficiently so the power they produce isn’t as expensive. They typically operate between 30 and 60 percent of the time in accordance with daily, weekly, and seasonal demands.

Intermediate power plants are generally steam turbines fueled by a wide variety of resources including natural gas, as well as renewable sources like wind and solar. Wind and solar sources are intermittent, as wind turbines only produce power when the wind is blowing, and solar only generates power when the sun is shining. Given their sporadic nature, wind and solar can only be used as intermediate power sources because they cannot be relied upon to meet constant supply needs, nor can they be

immediately called upon to generate electricity during peak demand periods. But in the intermediate demand realm they can help reduce the need for fossil fuel intermediate plants or overuse of peaker plants during heavy demand days.

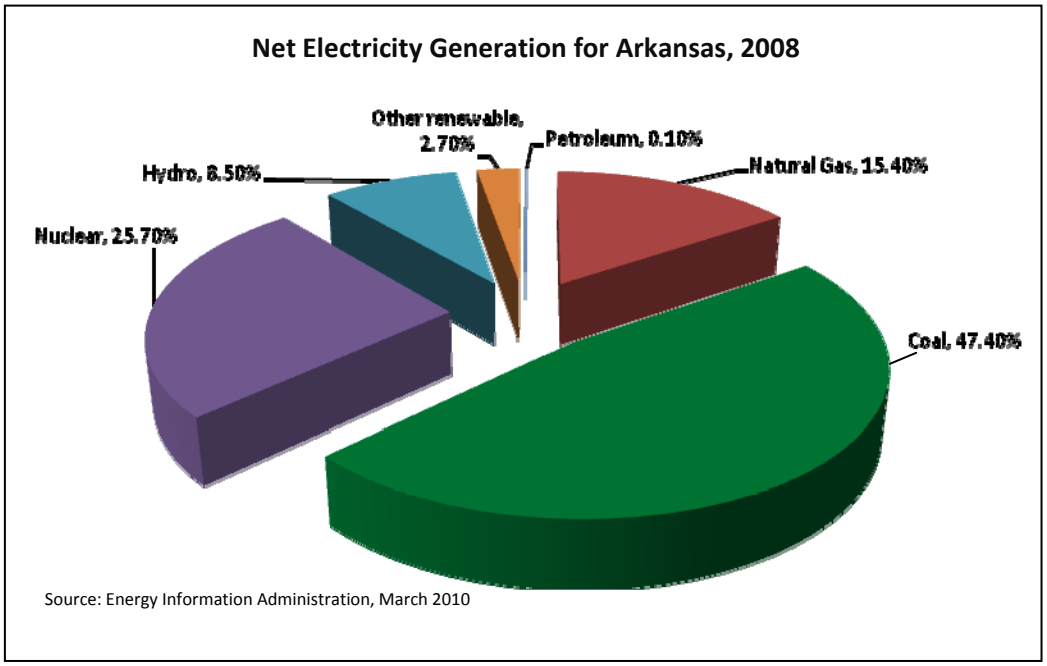
ARKANSAS' ENERGY PORTFOLIO

Arkansas' electric rates are well below the national average due largely to the state's variety of generation sources for electricity. Coal and nuclear power plants are the principal sources of electricity generation in the state, followed by natural gas and hydroelectric plants. Coal-fired power plants generate about one-half of Arkansas' electricity. Arkansas Nuclear One, the state's only nuclear plant, is responsible for over one quarter of the electricity generated in the state. There are hydroelectric power plants in three areas of the state: the White River Basin, the Arkansas River and the Ouachita River Basin. With the growth of the Fayetteville shale production industry, it is expected that natural gas will become an even larger player in the electricity generation portfolio.

With the continued economic growth in Arkansas, electricity demand is projected to increase. Though the state has adopted several policies to encourage renewable energy and energy efficiency, these steps alone will not be able to offset the anticipated demand growth.

For Arkansans, this makes the current base load supply increasingly vital and presents substantial challenges for building new base load power. Additionally, with the growing demand for hybrid and plug-in electric vehicles, as well as other new technologies, even more electricity will be required.

In addition to promoting the development of new technologies, ensuring that Arkansas' electric utilities can continue to invest in our state's electric grid, address issues as they arise, and have the necessary resources at hand to restore power during extreme weather conditions is essential to increasing economic opportunities for Arkansas now and in the future.



Reliable base load supply is vital to keeping electric bills stable and ensuring that Arkansans have dependable service every time they flip on a light switch or open a refrigerator door. By working to develop new base load supply and maintaining our current supply, we can build the foundation upon which new energy technologies can be developed to benefit the State of Arkansas over the next decades.

About Progress Arkansas: Established in October 2008 under the leadership of Bob Lamb who serves as voluntary chairman, Progress Arkansas is a coalition of business and community-based leaders dedicated to moving Arkansas forward. Our mission is to build consensus and support for economic energy and environmental policies that will support growth and prosperity for the State of Arkansas. Visit Progress Arkansas on the web at www.progressarkansas.com

Resources

Renewable Energy World
http://www.renewableenergyworld.com/rea/news/reinsider/story?id=52157

U.S. Energy Information Administration
www.eia.doe.gov
http://tonto.eia.doe.gov/state/state_energy_profiles.cfm?sid=AR
http://www.eia.doe.gov/cneaf/electricity/st_profiles/arkansas.html

U.S. National Renewable Energy Laboratory
http://www.nrel.gov/rredc/wind_resource.html

World Nuclear Association
www.worldnuclear.org
http://www.worldnuclear.org/info/electricity_cars_inf120.html?terms=base+load
http://www.worldnuclear.org/info/inf10.html