

PUBLIC POWER CONNECTIONS

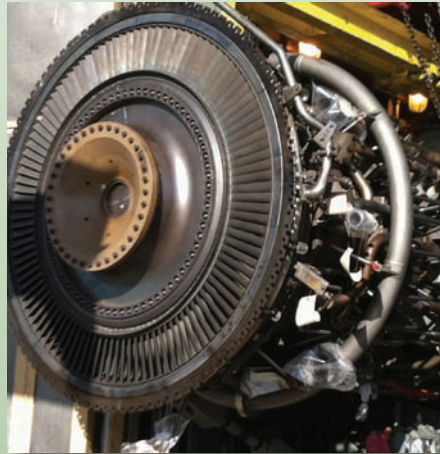
HOW GENERATION PRICES DRIVE POWER COSTS

The cost of producing and transmitting power contributes to overall industry prices

There are three major factors that drive the price of power: consumer demand, generation prices, and environmental and regulatory issues. This article will focus on generation prices.

Variable costs are the main factors contributing to generation prices. These prices are dependent on a power plant's cost to produce, which is dependent on the plant's efficiency, fuel costs and other variable operation and maintenance costs. In addition to variable costs, power plants must also cover their fixed costs over the long term. Fixed costs include the debt associated with building the plant, personnel costs and fixed operation and maintenance costs.

Typically marginal units such as coal and natural gas set the price of power because those plants have some ability to change their output to meet the demand of load. These variable costs are what drive generation prices.



Energy sources such as wind, solar, hydro and nuclear have lower variable costs, but usually have higher fixed costs because they cost more to build. Because their variable costs are so low, these types of units do not normally set the price of power.

A natural gas or coal plant relies on fuel and therefore, in general, has higher variable costs, but lower fixed costs. This is why the market looks to those types of units when determining the price of power: If the units need to run a lot to meet load demands, power prices go up – and if they aren't needed, power prices go down.

Transmission costs also contribute to generation prices and the overall price of power. In general, power plants are typically not built in the areas where the load is (near homes and businesses) and so there is a cost of moving the power into towns and cities through power lines and substations.

WHAT IS...? POLAR VORTEX

The winter of 2014 was a particularly cold one for the United States and "polar vortex" became very popular to blame as the cause for nasty weather. While not all cold weather is due to the polar vortex, it was the cause of some exceptionally chilly weather in January, especially on Jan. 7, 2014.

A polar vortex is a circulating pattern of strong winds flowing around a low-pressure system. This normally sits over the Arctic in the winter and keeps cold air circulating within the polar region, but it can, and did, split and sent colder air farther south.

This extreme cold had a big impact on the power grid. Cold weather always sends prices up a bit as the demand for power gets higher when it's colder, but the polar vortex cold caused two other main issues: higher-than-normal generation outages and gas distribution shortage issues.

PJM Interconnection, a grid operator and coordinator, anticipates that generation losses over peaking hours (when the demand for electricity is at its maximum) in the winter are generally 8 percent, but in 2014 they were about 22 percent – a huge increase due to the polar vortex.

Just like cars or other machines, plants have trouble operating in extreme cold. This includes freezing pipes, and fuel transportation and staffing issues.

As coal units retire, more natural gas plants are taking their place. This puts additional strain on the natural gas system. In the summer months, residents don't use much gas, but as people turn on their gas furnaces when it gets cold, it comes from the same place that natural gas power plants get their supply. This creates competition for gas pipe space with power plants. There are only so many pipes and only so much that can fit through a pipe at one time – the dramatic increase in load from the polar vortex intensified this issue.

Plants have to buy what is called "firm gas pipeline capacity" ahead of time. The AMP Fremont Energy Center, a natural gas combined cycle facility, was available during the polar vortex because American Municipal Power, Inc. bought long-term pipeline capacity. This process can be thought of in terms of buying a parking pass. Peaking plants don't need to buy an annual pass because they only "drive" a few days out of the month, but on Jan. 7, they desperately needed a day pass and it wasn't available because there were no "parking spots" left.

The more natural gas plants that come online increase the number of entities competing for space. The January 2014 polar vortex intensified the problem, which has caused the industry to examine solutions of how to deal with pipeline shortage issues in the future.

FOCUS ON SAFETY WHEN OPERATING A GENERATOR

A portable generator is very helpful during a prolonged power outage, but use it improperly and you risk carbon monoxide (CO) poisoning, electrical shock or electrocution and fire.

Keep your family safe during an outage by following these tips from the National Fire Protection Association and American Red Cross.

Placement: Operate your generator in a well-ventilated, outdoor location away from all doors, windows and vent openings where exhaust fumes might enter. An attached garage, even with the door open, is not a safe location. Neither is a combustible surface like a wood deck.

CO alarms: For added safety, have either battery-operated CO alarms or plug-in CO alarms with battery back-up in your home. Follow the manufacturer's installation instructions.

Fuel storage: Never store fuel for your generator in your home. Store gasoline and other flammable liquids outside of living areas in approved, properly labeled safety containers kept away from fuel-burning appliances.



Refueling: Never refuel a generator while it's running. Turn it off and let it cool before refueling. Also, turn off all appliances the generator is powering before shutting it down.

Operation: Follow the manufacturer's instructions for grounding the generator. Plug appliances either directly into the generator or into an outdoor-rated, grounded extension cord free of cuts – preferably one with a ground-fault circuit interrupter.

Do not try to power the house wiring by plugging the generator into a regular wall outlet. Called "back feeding," this is extremely dangerous. Not only can it damage your home's wiring and start a fire, but it can also send electricity into the utility system and seriously injure or kill an unsuspecting lineworker helping to restore power.

Do use a transfer switch: If you want to connect the generator to the house wiring to power appliances, you need a properly rated transfer switch installed by a qualified electrician in accordance with the *National Electrical Code* and all applicable state and local electrical codes.

WINTER DRIVING SAFETY: PREPARATION IS KEY

Driving in snow and ice is just a part of life for many U.S. residents in the winter, but safety goes beyond being careful and allowing extra time for slow travel.

Preparations for winter driving should include maintaining your car. Check your battery, windshield wipers, tire tread, and top off washer fluids and antifreeze. Make sure you have important items on hand in case of an emergency such as a flashlight, jumper cables, snow brush/scrapper, flares, blankets, snacks and

water. It's also a good idea to keep some kind of abrasive material on hand (such as sand or kitty litter) to help aid traction on icy roads.

We've all heard to leave more distance between cars in icy weather. This is because dry pavement has more than twice the friction of a surface covered with snow and ice. Stopping distance at 30 mph on dry roads is about 40 feet, but extends to more than 100 feet on snow or ice. If possible, brake on straights and not during corners in winter road conditions. Maintaining an appropriate speed is critical.

Have a new driver in the family? Consider taking them to an empty lot during the day to practice maneuvers slowly on ice or snow. The chance to safely experience first-hand how steering and brakes react in winter conditions is important for any driver.

Don't forget that safety applies all year round: Always wear a seat belt, use child safety seats properly, be aware of pedestrians walking in the road, do not text while driving, and never drink and drive.



EFFICIENCY FOCUS

Using a humidifier in the winter can actually save you money. People require a higher temperature to remain comfortable in dry air than they do in humid air. Placing an energy-efficient humidifier in your living space during the winter months keeps the air from being as dry, which means you won't need the heat cranked as high to feel warm.