Reactive power plays a critical role in the operation of the bulk power system. PJM Interconnection manages reactive power to ensure the stability and reliability of the power grid.

In alternating-current electrical systems like the power system in the United States, reactive power helps keep electricity flowing and helps maintain voltage levels that are needed for system stability.

Electricity consists of **current**, the flow of electrons in the wire, and **voltage**, the force that pushes the current through the wire. The amount of work the two can do is measured in **watts**.

This is often called active power or real power. It is frequently described with an analogy to water in a pipe. The current is the drops of water in the pipe. The voltage is the pressure that pushes the water through the pipe.

Reactive power, on the other hand, does not do the work of electricity we all know, like lighting a lamp or heating water. Instead, the AC system consumes reactive power to keep electricity flowing.

As the amount of electricity flowing on a line increases, so does the amount of reactive power needed to move the additional electricity and maintain the proper voltage. The longer the distance power moves on a line, the more reactive power is consumed.

When reactive power is insufficient, voltage drops. If it continues to drop, protective equipment will shut down affected power plants and lines to protect them from damage. In the water analogy, the voltage drop is like a reduction in pressure in the pipe. With no pressure, there is no flow of water.

Power plant generators produce real power and reactive power. They can be adjusted to change the output of both. Capacitors and Static VAR Compensators, which are generally installed in substations, also are capable of injecting reactive power to help maintain voltage.

PJM continuously monitors and manages reactive power, which is measured in VARs, for volt-amperes reactive.

For example, PJM:

- Gathers real-time information about voltage levels and the need for reactive power at various locations on the grid.
- Limits the amount of energy that can move from point to point if there is insufficient generation locally to produce the needed reactive power.
- Adjusts the output of generating stations under its control to increase the supply of reactive power when it is needed.
- Pays generation owners to compensate them for lost energy revenue when they must increase their output of reactive power at the expense of megawatts.
- Requires new generators connecting to the PJM grid to agree to specific reactive-power obligations, with financial penalties for noncompliance.

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