

Grid reliability concerns from unit deactivations related to USEPA rulemaking

The electric generating units most likely to be prematurely retired due to currently proposed environmental regulation provide a variety of critical support services to our bulk electric system. The forced and simultaneous retirement of these units could place reliability of this system at risk. A phased-in approach to compliance will allow adequate time to address these issues.

Generating units with the greatest risk of premature retirement often provide ancillary services that allow the national electric grid to operate reliably. These services include voltage and reactive load support, black start or system restoration capability, and aid in maintaining automatic frequency control error within standard parameters of the North American Electric Reliability Corporation.

Five facets of transmission grid support are: capacity, load following ability, voltage and reactive load support, unit frequency response and system restoration or black start.

Capacity – AEP estimates that the proposed environmental regulations will require it to close approximately 5,000 megawatts (MW) of generating capacity by 2015 (national estimate is 40 gigawatts to 80 gigawatts). It is unlikely that enough replacement generation can be permitted, designed and built in time to fill this capacity void.

Load following – Subcritical steam turbine units tend to have a large load range so that they are able to respond to minute-by-minute load demands. Combustion turbines are significantly less efficient when they operate at less than full capacity. Because of this design characteristic, their load range is small, making them less ideal and uneconomical to respond to minute-by-minute load demands.

There are no standards mandating any replacement power to have ancillary services capability built into their designs. The absence of such standards could have widespread negative implications during this transition period and threaten the integrity of the bulk electric system.

Voltage and reactive load support – Transmission lines can be only so long before they need support to keep voltage and reactive load at required levels. Generating units most likely to be retired early often

Electricity generating units most likely to be adversely impacted by proposed environmental regulations typically

- Are at least 50 years old,
- Have generating capacity no greater than 500 MW,
- Have subcritical boiler type and
- Have a heat rate (efficiency) of 11,000 Btu/kWh or greater (higher heat rate indicates lower efficiency).

There are 25 such units with total generating capacity of 5,000 MW on the AEP system subject to premature retirement. These units are not good candidates for investment in new environmental control, yet they often provide ancillary services essential to the reliable and safe operation of the electricity grid.

provide this support. AEP has been working to address these needs to meet planned unit retirement dates. The ability to complete these projects in time to meet the early retirement dates is of great concern.

Unit frequency response – The U.S. bulk electricity system – from the largest generating units to small home appliances – is designed to operate at a frequency of 60 hertz. Frequencies greater or less than 60 hertz have destructive effects on motors and

equipment of all sizes and types. Steam turbines typically respond well when frequency corrections are needed.

System restoration or black start – In the event of a system brownout or blackout, load rejection capability allows units to rapidly shed load to an islanding condition (separate from the grid). This capability then allows the generator to reconnect and quickly help restart an electric grid that has gone down. Thirteen of AEP's 17 black start-capable units also have automatic load rejection capabilities. All 17 of these units would be prematurely retired under the proposed U.S. Environmental Protection Agency rules.