

GEW63-14

202 (New), 604.3

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Revise as follows:

604.3 Heating, ventilating and air-conditioning (HVAC) systems. The Auto-DR strategy for HVAC systems shall be capable of reducing the building peak cooling or heating HVAC demand by not less than 10 percent when signaled from the electric utility, regional independent system operator (ISO) or regional transmission operator (RTO), through any combination of the strategies and systemic adjustments, including, but not limited to the following:

1. Space temperature setpoint reset.
2. Increasing chilled water supply temperatures or decreasing hot water supply temperatures.
3. Increasing or decreasing supply air temperatures for variable air volume (VAV) systems.
4. Limiting capacity of HVAC equipment that has variable or multiple-stage capacity control.
5. Cycling of HVAC equipment or turning off noncritical equipment.
6. Disabling HVAC in unoccupied areas.
7. Limiting the capacity of chilled water, hot water, and refrigerant control valves.
8. Limiting the capacity of supply and exhaust fans, without reducing the outdoor air supply below the minimum required by Chapter 4 of the *International Mechanical Code*, or the minimum required by ASHRAE 62.1.
9. Limiting the capacity of chilled water or hot water supply pumps.
10. Anticipatory control strategies to precool or preheat in anticipation of a peak event.
11. Use of grid-interactive electric thermal storage (GETS) systems.

Exception: The Auto-DR strategy is not required to include the following buildings and systems:

1. Hospitals and critical emergency response facilities.
2. Life safety ventilation for hazardous materials storage.
3. Building smoke exhaust systems.
4. Manufacturing process systems.

Revise definition as follows:

DEMAND RESPONSE (DR). The ability of a building system to ~~reduce~~change the building's energy consumption for a specified time period after receipt of demand response signal typically from the power company or demand response provider. Signals requesting demand response are activated at times of peak usage or when power reliability is at risk.

DEMAND RESPONSE AUTOMATION SOFTWARE. Software that resides in a energy management control systems or equipment that can receive a demand response signal and automatically ~~reduce~~change space heating, ventilation, air-conditioning (HVAC), service water heating and lighting system loads.

GRID-INTERACTIVE ELECTRIC THERMAL STORAGE (GETS). An electric-powered heat storage system for space heating units and service water heating units that is controlled by electric system grid operators such as utilities, independent system operators (ISOs) and regional transmission organizations (RTOs).

Reason: While not imposing any additional mandatory requirements, this proposal would add Grid-Interactive Electric Thermal Storage as one of the specifically identified means of meeting the requisites of the Demand Response section of Chapter 6. Section 601.2 of the IGCC states, "[t]his chapter is intended to provide flexibility to permit the use of innovative approaches and techniques to achieve the effective use of energy."

Grid-Interactive Electric Thermal Storage is such an innovative approach with a growing reputation among market participants as a solution to some of today's most pressing energy issues.

1. Building owners like GETS because it provides affordable and dependable space and service water heating for their structures.
2. Electric grid operators like GETS because it helps them balance energy supply and demand in real time, thereby increasing grid stability while simultaneously reducing costs, energy and emissions. Maintaining grid stability becomes more challenging as the output of renewable energy generation (like wind and solar) is added to electric grids which explains why grid operators across the country (as well as the Federal Energy Regulatory Commission and the U.S. Department of Energy) have expressed their support for energy storage.
3. Renewable energy developers like GETS because it complements their projects by providing cost-effective energy storage when renewable energy production exceeds demand. Without adequate energy storage, these projects are often curtailed.

What is a Grid-Interactive Electric Thermal System ("GETS")?

For building owners and operators, GETS serve as traditional space and service water heating systems. GETS provide affordable and dependable space conditioning and domestic hot water. Nonetheless, GETS have significantly different operational and energy consumption characteristics from traditional space and service water heating systems as described in more detail below.

Thermal battery. Electric utilities dispatch their generators in the order from the most cost efficient (base load generation) to the least cost efficient (peaking load generation). GETS complements the efficient dispatch of generation by utilities by allowing the storage of energy that is produced more efficiently for use later, and by avoiding the requirement to operate less efficient generators at peak load conditions. GETS accomplishes this feat by charging (heating bricks, water, or other storage media) at times when utilities have excess capacity. Often this is at night but it can vary between utilities. Because the system is grid-interactive, a GETS can charge at times that are optimum for the utility, allowing utilities to efficiently manage their peak demands and their customer costs. Heat that is stored for later use effectively makes GETS a thermal battery.

Renewable energy. GETS is a unique complement to the generation of electricity from renewable energy like wind and solar. Many times peak power production from renewable energy sources does not coincide with a utility's demand for electricity. As an example, wind generation usually peaks at night when demand for energy is not usually the greatest. For that reason, Bonneville Power last year was forced to curtail the generation from wind generators at certain times because it didn't need all the electricity the wind generators were producing! GETS is a good fit for storing excess renewable energy and has been successfully deployed in Bonneville's service territory as well as the service territory of other electric utilities.

Reduces winter peak. When electrical demands on a utility's system grow, it is forced to dispatch less efficient generators to meet that demand, so to the extent demand is reduced the utility avoids costs (that would ultimately be passed on to customers) and saves energy. GETS allows the storage of energy produced by more efficient generators.

Replaces fossil fuel in utility grid control. When electrical demand on a utility's grid changes (up or down), the most immediate system response is for the grid's frequency to drift away from ideal (60 cycles per second). To control these frequency excursions, utilities have traditionally operated fossil fuel generators to add voltage to the grid to raise the frequency as it falls away from

60 cycles. Grid-interactive GETS can be dispatched in lieu of fossil fuel generators to remedy frequency excursions, thereby saving energy and costs. According to a Kema report, usage of a non-carbon emitting resource such as GETS for providing regulation services can reduce carbon emissions for regulation by nearly 65%.

GETS offer significant benefits to customers, including the ability to store renewable energy, the ability to reduce utility costs, and the ability to reduce the consumption of fossil fuel by utilities in the regulation of system frequency.

Bibliography:

See article at <http://www.pjm.com/about-pjm/exploring-tomorrows-grid/electricity-storage.aspx?p=1> for information on the value of ETS in the PJM Interconnection service territory.

See article at <http://www.sustainablebusinessoregon.com/articles/2012/04/bonneville-power-calls-for-first-wind.html?page=all> for information on Bonneville Power curtailment of wind generation amounting to almost 100,000 MWH's in 2011.

See Kema Consulting report (Commissioned by the U.S. Department of Energy under the supervision of Sandia National Laboratory) noting significant reduction in carbon emissions at <http://prod.sandia.gov/techlib/access-control.cgi/2008/088229.pdf>.

See <http://www.steffes.com/off-peak-heating/ets.html> for more information on utility benefits of WTS, including energy savings associated with thermal storage and frequency regulation.

See Sandia National Laboratory website at <http://www.sandia.gov/ess/> for information on the contributions of energy storage to electric grid stability.

For a detailed description of frequency regulation in North America see Department of Energy / National Energy Technology Laboratory Report Frequency Instability Problems in North American Interconnections, DOE/NETL-2011/1473, Final Report dated May 1, 2011 found at <http://www.netl.doe.gov/energy-analyses/pubs/TransmissionFreqProb.pdf>

Cost Impact: Will not increase the cost of construction.

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