

Electric Resistance Heating Plays Integral Role for Grid Management and Renewable Energy

Jim Deichert, Division Manager—Offpeak Electric Heating, Steffes Manufacturing

Utilities have long been faced with the challenge of balancing electric generation with consumer demand. Generation from traditional power plants is typically varied to maintain grid balance and stability. The introduction of renewable generation increases the need for fast-acting, grid-balancing resources.

Generation from wind and solar is extremely variable as the intensity of the sun and wind can change rapidly from minute to minute. Affordable and effective energy storage is needed to respond to these rapid variations. It is beneficial to utilities, consumers, and the grid for balancing supply and demand in “real time” and maintaining power grid stability. Today, there is another cost-effective balancing option that brings significant economic and environmental benefit.

GETS Systems

Grid-interactive electric thermal storage (GETS) is distributed energy storage that provides a low-cost and effective means of grid-balancing services while delivering low-cost space and water heating to consumers. Combining two-way, real-time communication and controls with electric thermal storage space and water heaters makes a GETS system. Electric thermal storage (ETS) is a technology that stores electricity as heat in dense ceramic brick inside ETS heaters or domestic water heaters, and delivers energy as needed.

A GETS system provides utilities responsive power regulation and management services with precise, dependable, predictable, and verifiable “up” and “down” dispatchable load. GETS systems can be used to reduce load or store extra energy to help manage the power system and balance the needs of the consumer, utility, and electric grid. This distributed electric storage technology serves as a low-cost, long-life “thermal battery” that provides many benefits of energy storage like traditional electro-chemical or other storage devices, but at a substantially lower cost.

What most people don't realize is that energy storage has been a part of their lives for years. Take the water heater in your home as an example. It

has an ample amount of hot water stored to meet your needs throughout the day, but what if it had “smart” or grid-interactive communication and control?

This would allow the utility to direct additional energy to the water heater or “super-charge” it during hours when abundant renewable power is available. The utility could also turn off your water heater when supply is short. In return, the utility would provide you a reduced electric rate, a monetary payment, or other incentive. You would receive economic benefit and help the utility manage power, and the environment would benefit from utilization of clean, renewable energy. A win-win-win situation. The same benefit can be achieved through using electric thermal storage space heaters.

ETS Space and Water Heaters

ETS space and water heaters are a type of electric resistance heating (ERH). In the past decade, ERH has been under scrutiny by code development groups, environmental agencies, and the Department of Energy (DOE). ERH is often viewed negatively since it is as carbon-intensive as the grid itself. Some critics focus on areas of the country in which electricity comes mostly from coal, yet they ignore that in other parts of the country electricity is produced by a large and growing amount of renewable, low-, and non-carbon resources. Add to this ERH's ability to store variable energy resources like wind and solar, and it becomes clear that this technology has an important role to play in a low-carbon future. As such, it should be integrated into national regulations and building codes.

The International Code Council (ICC) and ASHRAE are two building code development organizations that provide regulation models that can be adopted on a national, state, and local level. Significant work over recent years has not only protected the interests of ERH within these codes and standards, but also made sure that the benefit and value of advanced electric heating technologies is recognized and encouraged.

In addition to ICC and ASHRAE, DOE rule makings also impact availability and utilization of ERH technologies. In 2010, a final rule was



GETS Storage Water Heater, ,
courtesy Steffes Manufacturing

approved by DOE that essentially bans production of electric resistance water heaters greater than 55 gallons. An unforeseen consequence of this rule is the restriction on utilities to use electric water heaters to provide balancing services and renewable integration. Efforts are underway to establish a waiver so production of certain large-capacity electric water heaters can continue in the future.

There have been significant advances with electric resistance heating over recent years. While some may consider ERH as being old technology, improved efficiencies and advances in its application make ERH a great option for consumers. With real-time communication, grid-interactive electric space and water heaters can bring additional benefits to utilities, consumers, and the environment by providing the ability to integrate renewables and deliver other critical balancing needs for the grid. Ⓔ



*Thermal Storage Space Heater,
courtesy Steffes Manufacturing*

> Electric Resistance Heating Section Organized to Address Code Issues

Electric Resistance Heating, one of NEMA's newest sections, is composed of members from Cadet Manufacturing Company, Dimplex North America Ltd., Emerson Electric Co., Marley Engineered Products, Steffes Corporation, Stelpro Design Inc., and TPI Corporation.

Chaired by Jim Garrigus (Marley Engineered Products), the section and its technical committee are developing a white paper to address building code issues, influencing the U.S. Department of Energy rulemaking for electric resistance heating and providing research on the North American market.

Learn more at www.advancedheat.org

Harry Massey, Industry Director |
harry.massey@nema.org

GE
Industrial Solutions

Lighten up your
installation with
Spectra* Series Busway



imagination at work

* Trademark of General Electric Company



www.geindustrial.com