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Get Smart About Heat, Not Just Energy

By Barry Sanders

The word "Smart" pervades much of the talk about energy efficiency these days, with smart meters, smart electricity, smart energy and more eclipsing "green" as the latest buzz word. However we have a gaping hole in our national dialogue on smart energy, and it's more than a little hot air.

That issue is waste heat. According to the Environmental and Energy Study Institute, thermal applications account for more than 30 percent of all U.S. energy consumption. The U.S. throws away fully two-thirds of the heat left over from power production, which is more heat than all of the energy used in Japan. U.S organizations also waste more than half of the heat byproduct created during industrial processes -- when many good uses exist for this waste heat.

What's more, a large percent of the thermal load occurs because of burning imported fuels, particularly in highly populated regions like the Northeast — in an era when as a nation we are attempting to shift to domestic supplies. By neglecting heat in our smart energy pursuit, we continue to forfeit domestic, efficient and inexpensive fuels in favor of polluting and pricey foreign imports.

What's Smart About Smart Heat?

Yet a good many uses exist for this thermal energy. Combined heat and power (CHP) systems, sometimes called cogeneration, or distributed generation, simultaneously produce two types of energy – heat and electricity – from one fuel source. This two-for-one approach offers tremendous efficiency and thus both cost savings and environmental benefits.

Notably, CHP systems also reuse this heat byproduct to heat and cool the air and water for hotels, schools, universities, nursing homes, hospitals, fitness centers, apartment buildings and other facilities. The CHP process is very similar to an automobile, where the engine provides the power to rotate the wheels and the byproduct heat is used to keep the passengers warm in the cabin during the winter months.

CHP systems are a tried-and-true technology that goes back to Thomas Edison. As a result, at first glance they may lack the luster of newer energy approaches that industry pundits may label as clean, green, or smart. Yet combined heat and power is very much all of those, and more – reducing energy waste with results that are here and now, in hard dollar savings, instead of requiring full capital outlays today with the promise of a future investment tax credit.

Clean

Typically CHP systems replace oil or coal in energy production with the use of natural gas, an inexpensive, clean and abundant domestic fuel source. The U.S. is the second largest producer of natural gas behind Russia, and prices continue to remain low.

Green

It's very important to achieve maximum energy efficiency in heating water because it represents the second largest use of energy in most buildings. These systems recover the heat produced in either the manufacture of electricity or from an industrial process, and then put it to good use. They also lower the amount of fuel required to produce the heat and electricity needed in a building.

Efficient

The U.S. fleet of centralized generation is only about 33 percent efficient (EPA estimates), yet CHP systems achieve efficiencies of 70-90 percent because they reuse the heat produced directly in a building. Additionally, since CHP systems are installed on site, they avert electricity line losses that occur when power travels over transmission lines. Installing this much CHP would save 5.3 quadrillion Btu of fuel annually, equal to nearly half of the total energy used by U.S. households per year.

Equally important, the CHP and efficiency industries have developed a range of financing options, such as an on-site utility program, that spare the customer upfront costs, operating responsibilities, fuel costs and other risks, so that they can see immediate energy savings and positive cash flow from installing CHP.

Encouraged by DOE

CHP systems have experienced a strong renaissance in the past 18 months with state, federal and utility backing, in part because of the growing refinement in installation practices and better sizing of systems in recent years. The U.S. Department of Energy has set a goal to boost CHP capacity from today's 85 GW (gigawatt) to 241 GW by 2030.

The industrial sector has long understood the value of heat efficiency. And now the commercial sector is becoming increasingly aware of its importance, via a campaign enhanced by the federal government's call for a 20 percent reduction by 2020 in the energy use of commercial buildings. Apparently the word is getting out: in December 2011 Pike Research estimated that total U.S. installed GW of industrial distributed generation systems may grow by up to 86 percent by 2016.

It's time for business operators to pay as much attention to their heating and cooling systems as they do to their electrical systems, as a way to save money, improve their environmental profile, and contribute to US energy independence.

Barry J. Sanders is president and chief operating officer of American DG Energy Inc. (NYSE MKT: ADGE), a leading On Site Utility offering clean electricity, heat, hot water and cooling solutions to hospitality, health care, housing and athletic facilities at lower costs than charged by local utilities – without any capital or start-up costs to the energy user. He can be reached at www.americandg.com.

AMERICAN DG ENERGY

45 First Avenue, Waltham, MA 02451
www.americandg.com