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Harness the Heat to Save Money, Improve Competitiveness and Resiliency

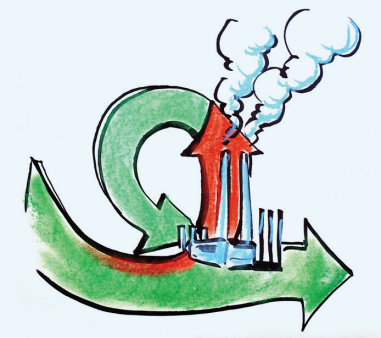
Overview

Each year, U.S. utilities and factories send enough energy in the form of heat up their chimneys to power all of Japan.[1] That heat, when captured and processed through proven technologies, can be put to work to heat or cool buildings and generate additional electricity. Utilizing otherwise wasted heat significantly reduces costs, making U.S. industries more competitive, enhancing energy security and storm resilience, and creating skilled jobs.

> More than two-thirds of the fuel used to generate power in the United States is lost as heat.
>
> *Oak Ridge National Laboratory*.

Industrial energy efficiency technologies, such as combined heat and power and district energy, have been used sporadically for more than 100 years in large power plants, industrial sites, and major cities. Combined heat and power, or CHP, are technologies that provide reliable electricity, mechanical power, or thermal energy by capturing heat that is wasted during electricity generation. District energy takes heat from a CHP system to heat or cool entire complexes such as a university campus, office park, or downtown area. More recently, a process called waste heat to power, or WHP, has been used to capture heat released during industrial processes that convert raw materials into products. These onsite technologies allow businesses to achieve energy efficiencies of up to 80 percent.[2]

Increasing efficiency results in jobs, private investment, cost savings, and manufacturing competitiveness



A significant increase in industrial energy efficiency could create as many as 1 million highly skilled jobs, according to Oak Ridge National Laboratory.[3] Further, improving the efficiency of power generation could result in more than $200 billion in private investment over 10 years according to a study by the Industrial Energy Consumers of America, which represents many of the country's largest manufacturers.[4] With rising energy prices affecting companies of all sizes, harnessing heat that would otherwise be wasted can reduce power bills, giving businesses the flexibility to invest that money elsewhere.

In order to better compete at a global level, manufacturers are challenged to find new ways to be increasingly productive. On-site energy generation presents a significant opportunity for industry to maximize efficiency and productivity, cut expenses, create jobs, and reduce emissions. With the help of CHP and WHP, manufacturers can generate at least a portion of their own power on site at reduced long-term cost and with greater efficiency and reliability.

Distributed power generation increases resiliency

Generating power where it is used—also known as distributed power—protects businesses and institutions from unexpected electricity power outages caused by natural disasters and other disruptions. A CHP system with the ability to operate independently from the grid (also known as "island-ability") can maintain power even when the grid is down, ensuring that a facility stays productive.

This type of system can also become a shelter to its community during times of disaster. When Hurricane Katrina struck in 2005, the electricity generated by the gas turbine CHP system at Baptist Medical Center in Jackson, MS, enabled the hospital to maintain patient care—the only

one in the area able to do so on the first night of the disaster. Despite the widespread grid failure, the hospital provided electricity, hot water, and cooling services to nearby residents in need.[5] Similarly, during the August 2003 blackout that affected parts of the Midwest and Northeast and resulted in nationwide economic losses of $4 billion to $10 billion, many manufacturers and food processors with CHP systems stayed open while the rest of the area was without power for up to 10 days.[6]

Recently, in 2012, more than 8 million people lost power in the Northeast and Mid-Atlantic during the devastation inflicted by Hurricane Sandy.[7] But those communities, institutions, hospitals, and businesses that had invested in CHP generation systems were able to keep the lights and heat on, providing refuge for residents and also maintaining essential operations. Co-op City in the Bronx, NY, Salem Community College, and Princeton University in New Jersey, and New Milford and Danbury hospitals in Connecticut were among a handful of institutions that maintained critical functions by generating their own electricity with CHP.[8]

Policy matters: Increasing energy efficient technologies through tax policy

The United States has the capacity to generate 82 gigawatts of electricity through industrial efficiency technologies—about 12 percent of total U.S. production.[9] Currently, there are nearly 3,600 facilities using these systems.[10] In August 2012, President Barack Obama signed an Executive Order that set a national goal of generating an additional 40 gigawatts by deploying industrial energy efficiency through technologies such as CHP and WHP. While this initiative is a step in the right direction, more is needed to ensure that the U.S. meets and exceeds this target.

Companies that invest in industrial energy efficiency technologies can benefit from an investment tax credit. Currently the credit is limited to 10 percent for the first 15 megawatts of a project that is up to 50 MW in total size. But the credit is not applicable to companies that use WHP systems. These limits on size, capacity, and type of technology prevent large industrial users from accessing the tax incentive. With small modifications to the existing investment tax credit, such as removing restrictions and setting flexible incentives, more U.S. companies could install these systems, making some of the largest energy users and power generators more efficient, productive, and competitive.

To learn how CHP works, watch this video:
pewtrusts.org/industrialefficiency

For technical assistance go to:
eere.energy.gov/manufacturing/distributedenergy/chptaps.html

Endnotes

1 Oak Ridge National Laboratory, *Combined Heat and Power: Effective Energy Solutions for a Sustainable Future* (2008), 5, https://www1.eere.energy.gov/manufacturing/distributedenergy/pdfs/chp_report_12-08.pdf.

2 U.S. Environmental Protection Agency, "Combined Heat and Power: Frequently Asked Questions," http://www.epa.gov/chp/documents/faq.pdf.

3 Oak Ridge National Laboratory, *Combined Heat and Power: Effective Energy Solutions for a Sustainable Future*, 4.

4 "Economic Impact of the Industrial Energy Consumers of America's Sustainable Manufacturing & Growth Initiative," Keybridge Research, prepared for Industrial Energy Consumers of America, July 23, 2010, 21.

5 U.S. Department of Energy, Industrial Technologies Program, 3, http://www1.eere.energy.gov/manufacturing/distributedenergy/pdfs/itp_chp.pdf.

6 Anne Carlson and Jan Berry, "Experiences with Combined Heat and Power during the August 14, 2003 Northeast Blackout," prepared for the Power-Gen 2004 Conference, 1, http://web.ornl.gov/~webworks/cppr/y2001/pres/121715.pdf.

7 Julie Johnsson and Jim Polson, "Sandy Cuts Power to More Than 8 Million in U.S. Northeast," Bloomberg, Oct. 30, 2012, http://www.bloomberg.com/news/2012-10-30/hurricane-blackouts-cut-power-to-about-8-million-customers.html.

8 William Pentland, "Lessons From Where the Lights Stayed on During Sandy," *Forbes*, Oct. 31, 2012, http://www.forbes.com/sites/williampentland/2012/10/31/where-the-lights-stayed-on-during-hurricane-sandy/.

9 Oak Ridge National Laboratory, *Combined Heat and Power: Effective Energy Solutions for a Sustainable Future*, 4.

10 U.S. Environmental Protection Agency, *Combined Heat and Power: Frequently Asked Questions*.

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