

Capturing energy waste in Ohio

Using combined heat and power to upgrade electric system

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In 2009, Ohioans spent nearly \$41 billion to fuel cars, to run our homes and businesses, and to power industry. This amounted to about 9 percent of Ohio's gross product that year. Because we use energy very inefficiently, however, billions of dollars are wasted. As a result, Ohio ranks 28th in the nation for energy productivity, which is the economic value achieved from the energy we use.

The biggest source of Ohio's energy waste comes from inefficiencies in the electric power industry itself. In 2009, we lost more than one quadrillion British thermal units (Btus) of energy in Ohio's electricity-generation system, worth an estimated \$17.6 billion.

Combined heat and power (CHP) technologies, which generate power from heat that is normally wasted, can help transform this inefficient system and cut energy losses.

The overall energy efficiency of a factory is typically in the range of 50 to 55 percent. By using a single fuel source to produce both heat and power, CHP technologies achieve much higher industrial plant efficiencies than separate heat and power systems, result in significantly lower utility bills, and cut related emissions. Recovery and use of all the heat typically rejected in the electric generation process can achieve industrial plant efficiencies as high as 75 to 85 percent.

There are two types of combined heat and power. Conventional CHP uses fuel to generate electricity, normally through an engine, turbine, or fuel cell; heat generated during the production of electricity is captured and recycled to meet the thermal needs of the facility. Waste heat recovery (WHR) captures and recycles, from an already occurring industrial process, heat that is normally released to the atmosphere. (Together, these CHP technologies are also known as cogeneration.) Generating electricity on-site or near energy consumers, particularly manufacturers, would allow us to capture heat energy typically wasted, save billions of dollars spent on polluting fossil fuels, and significantly reduce emissions.

Key findings

- Ohio ranks 28th in nation for energy productivity—the bang we get for our energy buck
- Nearly 1/3 of all energy consumed in Ohio, worth an estimated \$17 billion, is lost in our outdated electric system
- Ohio ranks 44th in nation for adoption of CHP technology designed to capture energy traditionally wasted
- Increasing CHP share of total electric power capacity by 10 percent would generate \$1.3 billion in energy savings annually, reduce emissions by 13 million metric tons

Ohio has great CHP potential. The state currently ranks in the top five for potential use of CHP technology, but we rank 44th in the nation for actual adoption. While Ohio has a technical potential to generate 25 percent of its electricity from CHP, current capacity is less than 2 percent of total electric power capacity. If we were to increase CHP's share of total electric power capacity by 10 percent in Ohio (an increase of 3.6 gigawatts), we would see \$1.3 billion in annual energy savings. This would also reduce emissions by 13 million metric tons, the equivalent of taking 2.3 million cars – nearly 30 percent of passenger vehicles registered in Ohio – off the road.

Ohio's manufacturing sector is a prime target for CHP development. Early candidates for CHP/WHR investments include manufacturers that use large quantities of both electric and heat energy at the same time. Industry, made up largely of manufacturing, accounts for one-third of our state's energy use. Manufacturers burn fuels on-site, largely to heat chemicals, metals, wood, and glass in various industrial processes, and they access the electric power grid to run electric motors that drive things like metal cutting and forming tools, power welding tools, electric furnaces, and electric forklifts. Ohio manufacturers spent an estimated \$5.9 billion on energy in 2008, and \$4.4 billion in 2009 (more than one quarter the amount of their payroll costs). Ohio already has 552 megawatts (MW) of combined heat and power capacity, approximately 80 percent of which can be found in the manufacturing sector. For perspective, if that energy were used in the residential sector, it would be enough to power more than 450,000 homes.

There are many barriers to greater CHP adoption in Ohio. A lack of cooperation from electric utilities, along with complicated rate structures that discourage CHP adoption, has been a major impediment to greater adoption of these technologies. At the same time, achieving energy savings from CHP technologies has not been a priority for manufacturers or state and local economic development officials.

Recommendations

To overcome these barriers, the state of Ohio and local governments can implement policies that promote CHP development. The state should support local CHP efforts by creating an implementation schedule for existing CHP/WHR requirements under Ohio's alternative energy standard, with specific annual targets (a CHP/WHR "carve-out" within Ohio's alternative energy standard, similar to the renewable energy and solar requirements).

Ohio cities can provide "green incentives" to manufacturers as an economic development tool. Ohio manufacturers pay seven times more for energy than they do for state and local taxes. Green incentives – access to cheap and clean light, heat, and power – can help improve a company's energy productivity without the negative impact tax incentives would have on already strained state and local budgets. Cities can offer manufacturers green incentives by arranging long-term power purchasing agreements for affordable clean energy; co-locating industries within eco-industrial parks where heat and power energy resources can be shared cheaply; or by purchasing excess power generated by manufacturers that have invested in on-site CHP or WHR facilities.