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Statement of
The Heat is Power Association

House Committee on Energy and Commerce
Subcommittee on Energy and Power

A Hearing on American Energy Security and Innovation: An Assessment of Private-Sector Successes and Opportunities in Energy Efficient Technologies

February 26, 2013

The Heat is Power Association

The Heat is Power Association is the not-for-profit trade organization of the Waste Heat to Power (WHP) industry. The Association is committed to educating a variety of stakeholders about the benefits of WHP as a reliable, abundant, and emission-free source for electricity and an economic driver for global competitiveness. We support policies at the local, state, and federal levels that recognize WHP for its emission-free characteristics akin to renewables. Our members include WHP technology manufacturers, project developers, industrial end users, component manufacturers, packagers, research institutions, and other industry associations and stakeholders. A list of the association's membership is included as Attachment 1.

About Waste Heat Recovery and Waste Heat to Power

Waste heat recovery (WHR) is the capture of heat generated as a byproduct of industrial processes and the use of that waste heat for useful thermal applications or for WHP. Using heat that would otherwise be lost to the atmosphere helps reduce energy costs for industrial users.

A WHP system works by capturing waste heat at the source and converting it to electricity through heat transfer. No combustion. No emissions. Across America today, a vast amount of waste heat is being generated and lost. Oil and gas plants, compressor stations along pipelines, landfill gas engines, and energy intensive industries, including steel mills, paper plants, refineries, chemical plants, and cement kilns, generate massive quantities of industrial waste heat suitable for WHP applications.

The process used to convert industrial waste heat to power is identical to the process used to convert geothermal energy to electricity. Both processes use the same technologies and produce the same emission-free electricity as other renewable resources from a heat source. Whereas geothermal resources occur naturally in the ground in selected areas, waste heat occurs at sites across the country as a by-product of industrial processes. WHP can provide base load, emission-free power for use onsite to improve efficiency or it can be sold to the grid.

A recent Environmental Protection Agency (EPA) study[1] estimated that the waste heat produced by American industry could generate 10 GW of emission-free electricity annually, enough to power 10 million American homes, produce $3 billion in savings for industry, and create 160,000 new American jobs.

Technologies that Transform Waste Heat to Power

WHP encompasses a suite of technologies and applications that can improve industrial energy efficiency anywhere heat is vented or wasted, from energy intensive industries like those listed above to general manufacturing and pipeline compressor stations. Steam turbine technology has been used for WHP systems since the 1970's. More recently, technologies based on the Organic Rankine Cycle (ORC), Kalina Cycle, and the Sterling Engine, proven in the geothermal and solar thermal industries, are being used to capture waste heat at lower temperatures and at smaller scales than the more traditional steam cycles used in the power industry. Thermoelectrics, high-pressure CO_2 working fluids, and other new developments are creating additional opportunities for our industry to convert waste heat economically to electric power. Through the application of these technologies, industrial waste heat is no longer just a byproduct – it is a source for emission-free electricity, just like traditional renewables.

Waste Heat to Power Project Examples

The following three projects illustrate how waste heat to power can offer reliable, emission-free power, enhance efficiency and reliability, and improve US competitiveness.

North Lake Energy, LLC, East Chicago, Indiana, developed by Primary Energy for ArcelorMittal in 1996 & Upgraded in 2012

Primary Energy originally worked with ArcelorMittal to identify an opportunity to more efficiently utilize byproduct fuel from ArcelorMittal's principle blast furnace (No. 7), and use it to produce up to 75 MW of emission-free electricity. Project highlights:

- Built and owned by Primary Energy
- Steam delivered by ArcelorMittal from their existing blast furnace gas recovery boilers
- Increased reliability of the electric energy supply for ArcelorMittal's plant operations
- Substantially reduced energy costs compared to purchased power alternatives
- Supplies more than 20% of ArcelorMittal's electricity requirements
- Uses an onsite byproduct fuel that had principally been flared as waste heat
- Recognized by the EPA in 2007 for high environmental efficiency

In 2009 ArcelorMittal won an industrial energy efficiency grant with the Department of Energy to add an additional boiler to reduce flared byproduct gases from 22% to 5%. The new ArcelorMittal boiler was commissioned in 2012 and the North Lake project was upgraded to 90 MW of emission-free electricity. The project produces 215,000 fewer tons of carbon dioxide when compared to other plants using separate heat and power sources.

Gas Compression Facility, Edna, TX, developed by Gulf Coast Green Energy using ElectraTherm's Green Machine in 2010

Gulf Coast Green Energy teamed with a natural gas compression services company, a South

[1] EPA Waste Heat to Power Systems Paper: http://www.epa.gov/chp/documents/waste_heat_power.pdf

Texas natural gas field, and ElectraTherm to recover waste heat from an existing gas compressor engine. This was the first commercial stationary engine application in the US of the Green Machine, a modular, waste heat to power device that generates fuel-free, emission-free electricity utilizing Organic Rankine Cycle (ORC) and proprietary technologies. Project highlights:

- Generates emission-free electricity for use onsite from waste heat generated by GE Waukesha 5794 engine
- Provides a local source of power for oil production equipment
- Reduces the existing plant's retail electric purchases
- Increases engine efficiency by decreasing cooling requirements for the engine; the waste heat removed by the Green Machine to produce power increases the engine cooling capacity, allowing the compressor to operate at greater output during the high summer temperatures of West Texas
- Produces 25–35 kWe emission-free and fuel free electricity; similar projects can be up to 65 kW depending on engine size, waste heat capture scheme, and ambient conditions

Nucor Steel agreement with Seattle City Light to turn waste heat into power, anticipated online in 2014

Seattle City Light entered into an innovative energy conservation contract with Nucor Steel, its largest customer, to turn Nucor's waste heat from manufacturing processes into energy. Project highlights:

- First waste heat recovery project to get credit as an energy conservation measure under the state of Washington Energy Independence Act (I-937), a 2006 clean energy ballot initiative which requires utilities with more than 25,000 customers to acquire 15% of their energy needs through new renewable energy sources by the year 2020 and achieve all available cost effective energy conservation measures
- Will produce a maximum of 5,450 MWh per year
- Projected to save enough energy to heat 540 Seattle homes for a year
- Utility will provide financial support of $0.02 per kWh over the 12-year life of project, comparable to current wholesale power price during a historically low period
- Using waste heat recovery means carbon-free clean energy

While all three projects above are in the US developed by domestic companies, many US WHP companies are doing most of their business in Europe and Asia. This is because the legislative and regulatory environment for WHP in the US often does not promote this type of industrial energy efficiency, making it difficult for US manufacturers to implement it at their sites.

US Incentives for Other Energy Efficiency and Renewable Technologies, including CHP, Solar and Wind

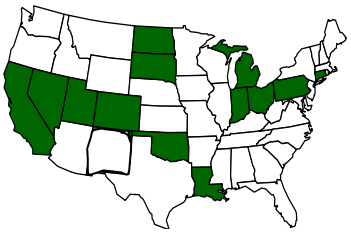
Combined Heat and Power (CHP), another type of energy efficiency technology, benefits from various incentives and has a clear track record in the US for producing energy efficient power and improving industrial energy efficiency. Although some waste heat recovery applications are considered a type of CHP, many WHP applications are not, as they do not involve the simultaneous generation of heat and electricity from a single fuel source. This distinction is important because it precludes WHP from receiving the same tax treatment as CHP.

Likewise, renewable resources that produce emission-free electricity are eligible for federal investment and production tax credits and other incentives to compete in the marketplace. Although the power produced from waste heat resources is the same as the power produced from renewable resources—both are emission-free and do not require additional combustion—WHP does not enjoy comparable incentives.

Government and regulatory support for renewable forms of emission-free electricity such as wind and solar has diverted investment away from WHP. Since the 2006 inclusion of an investment tax credit for solar power in the US tax code, annual solar installation has grow by over 1,600 percent, a compound annual growth rate of 76 percent[2]. Given similar tax treatment, industrial waste heat could provide enough emission-free electricity to power 10 million American homes, provide hundreds of thousands of new American jobs, and support critical US manufacturing industries. And Americans want more waste heat to power. A 2010 poll conducted by FTI Consulting found that an overwhelming majority (70%) of Americans support a proposal to provide tax credits for installing waste heat capture technology.

State Support of Waste Heat to Power

Currently, fourteen states—CA, CO, CT, IL, IN, LA, MI, NV, ND, OH, OK, SD, UT, and WV—provide incentives for WHP in their Renewable Portfolio Standard (RPS) or Energy Efficiency Resource Standard (EERS)[3]. WHP needs these incentives to compete in the marketplace with traditional resources such as low-priced coal and natural gas, and subsidized renewables which, like WHP, generate emission-free electricity.



States with policies favorable for WHP

The National Association of Regulatory Utility Commissioners (NARUC) has also recognized the many benefits of WHP. At its 2013 Winter Meeting in Washington, state regulators enacted a resolution supporting inclusion of WHP technologies in state and federal clean energy policies and programs (Attachment 2). NARUC support of WHP and encouragement of more states to follow suit is a clear indication of the power of WHP to contribute to overall improvements in industrial energy efficiency.

Recommendations to Help Establish Waste Heat to Power in the US Marketplace

There are a number of ways the federal government could help improve the legislative and regulatory

[2] Solar Energy Industries Association: http://www.seia.org/policy/finance-tax/solar-investment-tax-credit

[3] A review of the 14 state programs that include waste heat in their RPS or EERS refer to it as waste heat recovery, waste energy recovery, recycled energy, industrial cogeneration, bottoming cycle CHP, a qualified energy recovery process, waste gas and waste heat capture, a resource that makes efficient use of waste heat, and industrial by-product technologies.

climate for WHP projects.

Offer the investment or production tax credit for WHP. Currently, WHP does not qualify for any investment or production tax credit (ITC/PTC) under sections 45 or 48 of the US Tax Code (whereas traditional CHP does). A 30% ITC, as is available to other emission-free renewable resources, would encourage WHP development and help move the US toward our clean energy and industrial efficiency goals.

Make master limited partnerships (MLP) available to WHP. Currently, master limited partnerships do not include WHP. Proposed legislation would expand MLPs to include certain technologies in Sections 45 or 48 of the US tax code. Since WHP is not currently in section 45 or 48, however, it would not qualify under the proposed MLP legislation as introduced to the 112th Congress. Allowing WHP and other distributed generation resources to take advantage of MLP structures would enhance the attractiveness of WHP for investors and industrial waste heat producers. Qualifying WHP under the ITC or PTC could be another avenue to allow WHP to take advantage of MLP legislation under consideration.

Explicitly require or incent WHP in federal legislation, including any federal Clean Energy Standard or Renewable Electricity Standard. A number of states provide incentives for WHP in their RPS and EERS, and equate WHP with renewables given that WHP produces emission-free electricity. WHP could be included in federal portfolio standards, grants, energy loans, or other energy programs, as well. Ohio SB 315 is a good model for including WHP in RPS legislation.

Recognize WHP's potential in industrial energy efficiency. The President's Executive Order Accelerating Investment in Industrial Energy Efficiency (August 30, 2012) calls for deploying 40 GW of new, cost-effective industrial CHP by 2020. A similar target for WHP would encourage additional industrial energy efficiency by a group of technologies that, although related to CHP, do not typically qualify as CHP in legislation and regulations. DOE and EPA should specifically emphasize WHP applications in their programs, as well. The agencies call WHP a type of CHP, but as noted above, since WHP does not receive any of the regulatory incentives or benefits of CHP, it is not treated like CHP in the marketplace. Its potential contribution to industrial energy efficiency is therefore often overlooked.

Fund the Waste Heat Registry. The Energy Independence and Security Act of 2007 (EISA) included a requirement for the EPA to develop a Waste Heat Registry that would help industrials and technology providers identify opportunities for potential projects. This provision received no funding, however, and EPA abandoned the initiative. The waste heat registry remains a very important potential resource to help develop the WHP industry.

Include WHP in RFPs for alternative, clean or emission-free energy, particularly in DOD programs. In 2012, the US Army, acting through its Engineering & Support Center in Huntsville, Alabama, issued an RFP for renewable energy vendor qualifications. The RFP solicited vendor qualifications for procurement of up to $7 billion in renewable and alternative energy supplies under long-term power sale arrangements. The solicitation included alternative energy, but WHP did not qualify. While the federal government may not control many industrial facilities, it

nevertheless does have some waste heat producing operations that could be used to generate emission-free electricity.

Address barriers to entry for WHP technologies and projects. The FERC should promote markets for WHP by eliminating unfair and unwarranted costs and delays associated with interconnection, standby power, and access to the grid.

America's Responsible Energy Future includes WHP

WHP could provide the energy equivalent of over 60,000,000 barrels of oil annually. We cannot continue to ignore this ready, proven, reliable, and emission-free resource that supports American jobs, key industries, and the environment. As policymakers debate our energy future, we urge you to make WHP an integral component of industrial efficiency policy and a comprehensive energy strategy.

The Heat is Power Association appreciates this opportunity to offer its views and looks forward to working with Congress, the Administration, and the states to improve industrial efficiency and American competitiveness.

To learn more about WHP and The Heat is Power Association, visit heatispower.org or email susan@heatispower.org.

Members 2013

ERE-1 Resolution Supporting the Inclusion of Waste-Heat-to-Power Technologies in State and Federal Clean Energy Policies and Programs

Sponsored by the Committee on Energy Resources & the Environment
Adopted by the NARUC Board of Directors February 6, 2013

WHEREAS, Waste-Heat-to-Power is the process of capturing heat discarded by an existing energy conversion process and using that heat to generate power; and

WHEREAS, Waste-Heat-to-Power generates power with no new fuel and without combustion or related emissions; and

WHEREAS, Energy-intensive industrial processes – such as those occurring at refineries, steel mills, glass furnaces, pipeline pump and compressor stations, and cement kilns – all release hot exhaust gases and waste streams that can be harnessed with well-established technologies to generate electricity; and

WHEREAS, Opportunities exist for cost-effective applications of Waste-Heat-to-Power technologies in commercial and institutional energy systems; and

WHEREAS, The recovery of industrial waste heat for power is a largely untapped type of Combined Heat and Power (CHP), which is the use of a single fuel source to generate both thermal energy (heating or cooling) and electricity; and

WHEREAS, Waste-Heat-to-Power is a form of distributed generation that provides environmental and economic benefits; and

WHEREAS, Waste-Heat-to-Power is similar to CHP in that it can help industrial energy consumers to use most efficiently fuels consumed onsite to deliver energy; and

WHEREAS, On August 30, 2012, President Obama signed an Executive Order to accelerate investments in industrial energy efficiency, calling for 40 GW of new Energy Efficiency and CHP by 2020, including Waste Heat to Power; and

WHEREAS, In support of the Executive Order, the Department of Energy (DOE) and Environmental Protection Agency (EPA) released a new report: Combined-Heat-and-Power: a Clean Energy Solution that provides a foundation for national discussions on effective ways to achieve 40 GW of new, cost-effective CHP, including Waste-Heat-to-Power, by 2020; and

WHEREAS, Accelerating investment in industrial energy efficiency in an efficient and costeffective manner benefits manufacturers, utilities, and consumers and can improve American manufacturing competitiveness and create jobs while improving the nation's energy system and reducing harmful emissions; and

WHEREAS, Waste-Heat-to-Power has been omitted from some clean energy policies, including the federal investment tax credit, many State renewable and clean energy portfolio standards, energy efficiency resource standards, and various utility rebate programs and investments; and

WHEREAS, Fourteen States have recognized Waste-Heat-to-Power technology for inclusion in their State renewable and clean energy portfolio standards and/or energy efficiency resource standards; now, therefore be it

RESOLVED, That the Board of Directors of the National Association of Regulatory Utility Commissioners convened at its 2013 Winter Committee Meetings in Washington, D.C., is committed to working with the Waste-Heat-to-Power, Combined-Heat-and-Power, utilities and the broader energy efficiency community to help ensure that Waste-Heat-to-Power technologies are included in discussions on energy efficiency, distributed generation and clean energy technologies and are considered in the development of policies to allow for the more rapid adoption of waste heat-to-energy technologies, including explicit eligibility of Waste-Heat-To-Power in State energy efficiency resource standards and for consideration in State renewable and clean energy portfolio standards.

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