

## What is Waste Heat?

Anywhere there is an industrial process that involves transforming raw materials into useful products – steel mills, paper plants, refineries, chemical plants, oil and gas pipelines, and general manufacturing -- heat is generated as a byproduct. This waste heat is produced whenever the operation is running, often 24 hours a day, seven days a week, 365 days a year. If not recovered for reuse as lower temperature process heat or to produce emission-free power, the heat will dissipate into the atmosphere, a wasted opportunity.

## What is Waste Heat to Power?

Waste Heat to Power (WHP) is the process of using recovered waste heat to generate electricity with no combustion and no emissions.

## Technologies that Transform Waste Heat to Power

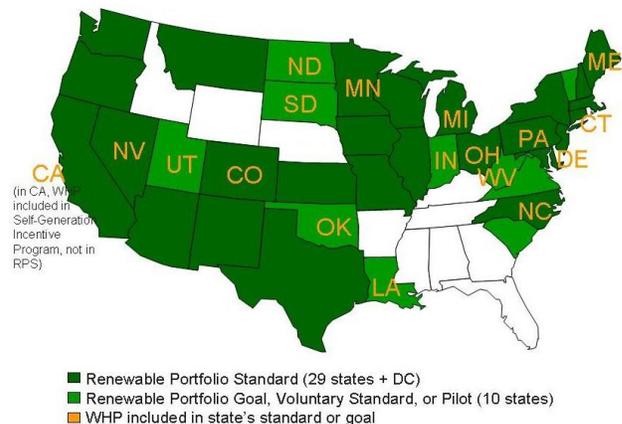
Waste heat to power systems use the same technologies as geothermal and solar thermal systems to capture heat at the source and convert it into electricity with no combustion and no emissions.

Waste heat to power isn't new, yet it is often overlooked and is underdeveloped. Steam turbine technology has been used for WHP systems since the 1970's. More recently, technologies based on the Organic Rankine Cycle, 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<sub>2</sub> working fluids and other new developments are creating additional opportunities for waste heat to be converted into useful power. Through the application of these technologies, industrial waste heat is no longer just a byproduct – it is a resource for emission-free electricity, just like traditional renewables.

## Is Waste Heat like a Renewable Resource?

Heat that is no longer needed in an industrial process is often vented through stacks, released into the air, or, if it contains hazardous gases, burned in a flare. Before it is vented, released or flared, the waste heat is an industrial byproduct that if captured, can be used to generate electricity.

WHP requires no additional fuel and, like geothermal and solar thermal, generates power without combustion or emissions. The energy source for this power is waste heat, not natural gas or any other fossil fuel that may have been used in the industrial process. Because it is an emission-free, combustion-free resource that industrial sources generate around the clock, the Heat is Power Association believes that waste heat should be treated similarly to other zero-carbon, emission-free resources. Indeed, eighteen U.S. states include WHP as a qualifying resource in their Renewable, Clean Energy, or Energy Efficiency Portfolio Standards. *Continued on other side*



## Why is Waste Heat to Power Development Lagging Traditional Renewable Sources?

Although the resource is abundant and the technologies are readily available and proven, emission-free waste heat to power continues to be overlooked and underdeveloped. Without parity with other fuel-free, emission-free resources, WHP is forced to compete with conventional sources of power at prices often under \$0.05/KWhr, with renewable resources that receive investment and production tax credits, and without access to long term power purchase agreements (PPAs) that many independent power producers (IPPs) and traditional renewables enjoy.

Since the 2006 inclusion of a federal investment tax credit for solar power in the US tax code, annual solar installation has grown by over 1,600% - a compound annual growth rate of 76 percent<sup>1</sup>. Given equal tax treatment, industrial waste heat could provide enough emission-free electricity to power approximately 10 million American homes, provide hundreds of thousands of new American jobs, and support critical US manufacturing industries. Eighteen states – CA, CO, CT, DE, IN, LA, ME, MI, MN, NV, NC, ND, OH, OK, PA, SD, UT, and WV – have legislative and regulatory policies that treat waste heat as a renewable resource, clean energy resource or energy efficiency resource. These programs provide WHP parity with fossil-fuel resources such as low priced coal and natural gas, and subsidized renewables which, like waste heat to power, generate emission-free electricity.

## What is The Heat is Power Association doing to Gain Recognition for Waste Heat as a Clean, Emission-Free Resource?

The Heat is Power Association advocates for federal and state recognition of WHP as a reliable, abundant and emission-free source of electricity. Our efforts include educating policy makers, regulators, and energy and environmental stakeholders about the barriers to deployment of WHP technologies and advocating for fair and equivalent treatment of WHP. Our interests in policy development include gaining inclusion of WHP as an emission-free resource in federal and state clean energy programs such as renewable portfolio and energy efficiency standards, obtaining equivalent tax treatment for WHP on the federal and state levels with other sources of emission-free electricity, and eliminating barriers such as interconnection challenges to WHP deployment. As examples, the Association worked hard to ensure WHP was included in the bipartisan POWER Act of 2014 and the bipartisan and bicameral Master Limited Partnership Parity Act of 2013. We continue to advocate for passage of these and other bills.

## Who is The Heat is Power Association?

The Heat is Power Association (HiP) is the trade association of the waste heat to power industry. A not-for-profit organization, HiP is committed to educating decision makers about the characteristics of waste heat to power as a source of electricity and an economic driver for global competitiveness. HiP promotes the efficient, industrial use of emission-free electricity generated through waste heat to power processes. Members include WHP technology manufacturers, packagers, project developers, industrial end users, component manufacturers, research institutions, and other industry associations and stakeholders. *Learn more at [www.heatispower.org](http://www.heatispower.org)*

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<sup>1</sup> Solar Energy Industries Association: <http://www.seia.org/policy/finance-tax/solar-investment-tax-credit>