

# State Incentives for Waste Heat to Power

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# Overview

- Many states provide incentives for electricity produced from an array of resources to help achieve economic, energy security and environmental objectives
- These incentives fall into many categories including:
  - Tax incentives
  - Project incentives
  - Incentives for attributes

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# Tax Incentives

- Production tax credits
- Investment tax credits
- Tax abatements
- Criteria range from
  - meeting capital investment hurdles
  - locating projects in specific areas
  - deploying specific technologies
  - achieving certain levels of environmental performance
  - creating jobs

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# Project Incentives

- Incent certain preferred technologies or projects
- Examples include
  - simplified siting and permits
  - exemptions from certain rules or procedures
  - elimination or reductions in fees
  - guaranteed decision dates

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# Incentives for Attributes

- Mandatory or voluntary programs that ascribe a value to specific characteristics of a resource, project or technology
- Examples include
  - renewable portfolio standards
  - energy efficiency standards
  - emission offsets
  - renewable energy credits

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# How does WHP fare in these Incentive Programs?

- WHP qualifies for all three of these types of incentives (tax incentives, project incentives, attribute incentives), either because it is directly called out or because it falls into a more general category.
- The challenge is keeping track of these incentives and making sure they are known to customers, project developers and other stakeholders

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# The Name Game

- Near universal agreement regarding the name and a basic definition of renewable technologies and resources -- wind, solar, geothermal
- Unfortunately, WHP is known by many names and definitions which makes it much more challenging

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# Examples of State Names for WHP

<b>CA:</b>	Waste heat to power
<b>LA, IN*:</b>	Waste heat recovery
<b>MN:</b>	Waste heat recovery converted into electricity
<b>UT:</b>	Waste gas or waste heat capture or recovery
<b>OH:</b>	Waste energy recovery system
<b>NV:</b>	Energy recovery process
<b>CO, SD, ND, WV:</b>	Recycled energy
<b>IN, OK:</b>	Industrial byproduct technology
<b>ME:</b>	Class II Resource
<b>CT:</b>	Waste Heat Recovery System
<b>MI:</b>	Industrial Cogeneration

\* WHP qualifies under both terms in IN

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# Efforts to Track Incentives

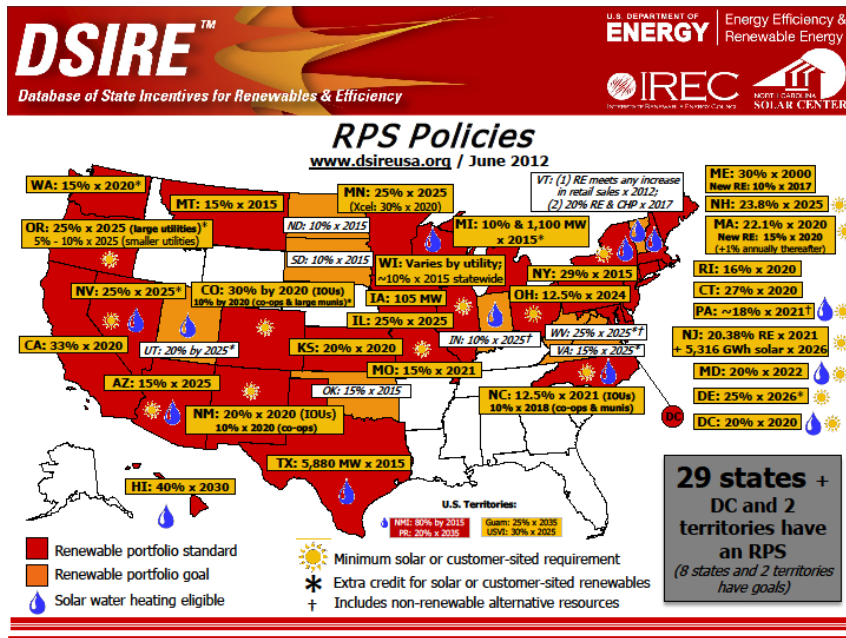
- Several substantial projects to track state incentives have been undertaken
- We looked at two programs
  - Database of State Incentives for Renewables and Efficiency (DSIRE)
  - The EPA CHP Partnerships CHP Policies and Incentives Database (dCHPP)

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# DSIRE



- Operated by the N.C. Solar Center at N.C. State University
- Funded by the U.S. Department of Energy

Source: www.dsireusa.org

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# EPA dCHPP



<http://www.epa.gov/chp/policies/database.html>

## Combined Heat and Power Partnership dCHPP (CHP Policies and incentives database)

The dCHPP (CHP Policies and incentives database) is an online database that allows users to search for CHP policies and incentives by state or at the federal level. dCHPP has two primary purposes:

- Policy makers and policy advocates can find useful information on significant state/federal policies and financial incentives affecting CHP.
- CHP project developers and others can easily find information about financial incentives and state/federal policies that influence project development.

The [glossary \(PDF\)](#) (2 pp, 53K) contains definitions for the policy and incentive types included in dCHPP.

Please select one or both of the search filters to return your desired results. To select more than one option within a search filter (e.g., New York and Texas in the Search by State filter), hold down the Control key on your keyboard while selecting the options. You can then sort the results by selecting the desired column heading. To start over, select "Reset Filters."

Policies and Incentives

- [dCHPP \(CHP Policies and incentives database\)](#)
- [Policy Resources](#)
  - [Output-Based Regulations](#)
  - [Interconnection Standards](#)
  - [Utility Rates](#)
  - [Portfolio Standards](#)
  - [Public Benefits Funds](#)

Search by State:  Show All  U.S./Federal  Alabama  Alaska  Arizona

Search by Policy/Incentive Type: [Reset Filters >>](#)

Show All  Bond  Commercial PACE  Feed-in Tariff  Grant

<a href="#">Policy/Incentive Name</a>	<a href="#">Policy/Incentive Type</a>	<a href="#">State</a>
<a href="#">2012 Integrated Energy Policy Report Update</a>	State Energy Plan	CA
<a href="#">Anaheim Public Utilities - Low Interest Energy Efficiency Loan Program</a>	Loan	CA
<a href="#">California Departing Load Charge Exemption</a>	State Utility Rate Policy	CA
<a href="#">California Feed-in Tariff</a>	Feed-in Tariff	CA



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# Ohio

## Ohio Alternative Energy Portfolio Standard



dCHPP Database



- **CHP Eligibility Requirements** Renewably-fueled CHP systems, and **waste heat-to-power systems qualify as renewable resources** under the AEPS. All types of CHP including fossil-fueled CHP and **waste heat-to-power qualify as an advanced energy resource** under the alternative energy targets, however, there are no annual compliance targets prior to 2025. All types of CHP and waste heat-to-power also qualify under Ohio's EEPS; however, projects can only take credits under one standard. Projects must start on or after January 1, 1998.

- **Eligible Efficiency Technologies:** CHP/Cogeneration, Others Not Specified
- **Eligible Renewable/Other Technologies:** Solar Thermal Electric, Photovoltaics, Landfill Gas, Wind, Biomass, Hydroelectric, Geothermal Electric, Fuel Cells, Municipal Solid Waste, CHP/Cogeneration, **Waste Heat**, Energy Storage, Clean Coal, Coal Mine Methane, Advanced Nuclear, Anaerobic Digestion, Fuel Cells using Renewable Fuels, Microturbines

Neither database uses the term written in the Ohio policy - Waste energy recovery system

DSIRE points out that waste heat is considered a renewable resource but not an efficiency technology

dCHPP accurately points out that WHP is considered renewable and an advanced energy resource

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# Connecticut

## Connecticut Renewable Portfolio Standard



dCHPP Database



- **Policy Summary** Class III resources include CHP, demand response, electricity savings from conservation and load management (C&LM) programs, and **waste recovery** systems.
- **CHP Eligibility Requirements** Both fossil-fueled and renewably-fueled CHP systems are eligible under the RPS. Eligible CHP systems must have been developed on or after January 1, 2006, to qualify under the RPS. **Eligible systems that recover waste heat or pressure from commercial and industrial processes** must be installed on or after April 1, 2007.
- **Minimum Efficiency Required/ Other Performance Requirements** **A CHP system must meet an overall efficiency level of at least 50%.** The sum of all useful electrical energy output must constitute at least 20% of the system's total usable energy output. The sum of all thermal energy outputs must also constitute at least 20% of the system's usable energy output.
- **Eligible Efficiency Technologies:** Solar Thermal Electric, Photovoltaics, Landfill Gas, Wind, Biomass, Hydroelectric, Geothermal Electric, Fuel Cells, Municipal Solid Waste, CHP/Cogeneration, Low E Renewables, Anaerobic Digestion, Tidal Energy, Wave Energy, Ocean Thermal, Fuel Cells using Renewable Fuels
- **Eligible Renewable/Other Technologies:** Class III resources include: (1) **customer-sited CHP systems, with a minimum operating efficiency of 50%**, installed at commercial or industrial facilities in Connecticut on or after January 1, 2006; (2) electricity savings from conservation and load management programs that started on or after January 1, 2006, provided that on or after January 1, 2014, no such programs supported by ratepayers shall be eligible; and (3) **systems that recover waste heat or pressure from commercial and industrial processes** installed on or after April 1, 2007.

Is a little misleading as WHP is defined separately from CHP in CT and WHP does not have to meet efficiency requirements.

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# Colorado



- **Policy Summary** Colorado's Renewable Portfolio Standard (RPS) includes renewably-fueled CHP and waste-heat-to-power as eligible resources.
- **CHP Eligibility Requirements** Renewably-fueled CHP systems and "recycled energy" (i.e., waste-heat-to-power) qualify under the RPS. "Recycled Energy," is defined as "energy produced by a generation unit with a nameplate capacity of not more than 15 MW that converts the otherwise lost energy from the heat from exhaust stacks or pipes to electricity and that does not combust additional fossil fuel."
- **Minimum Efficiency Required/ Other Performance Requirements** Does Not Specify

Misleading - In none of the four renditions of the CO RPS (2004, 2007, 2010, 2013) is CHP or combined heat and power mentioned.

- **Eligible Efficiency Technologies:** none
- **Eligible Renewable/Other Technologies:** Solar Thermal Electric, Photovoltaics, Landfill Gas, Wind, Biomass, Hydroelectric, Geothermal Electric, **Recycled Energy\***, Coal Mine Methane (if the Commission determines it is a greenhouse gas neutral technology), Pyrolysis of Municipal Solid Waste (if the Commission determines it is a greenhouse gas neutral technology), Anaerobic Digestion, Fuel Cells using Renewable Fuels

The accurate description of WHP is in DSIRE

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# How do these Databases Fare?

- DSIRE is the most comprehensive of the two in terms of the resources, policies and programs it covers but it does not index for WHP
- dCHPP looks at fewer incentive programs but focuses solely on CHP and WHP.
- The most helpful features of both
  - useful as screening tools
  - provide links to the underlying legislation, regulation or program

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# The Verdict?

- Neither DSIRE nor dCHPP provide the complete picture
- HiP's efforts:
  - started our own process to track incentives
  - focusing first on state renewable portfolio standards
  - hope to expand to other incentive programs
  - trying to work with other tracking sites to improve their capture and characterization of WHP

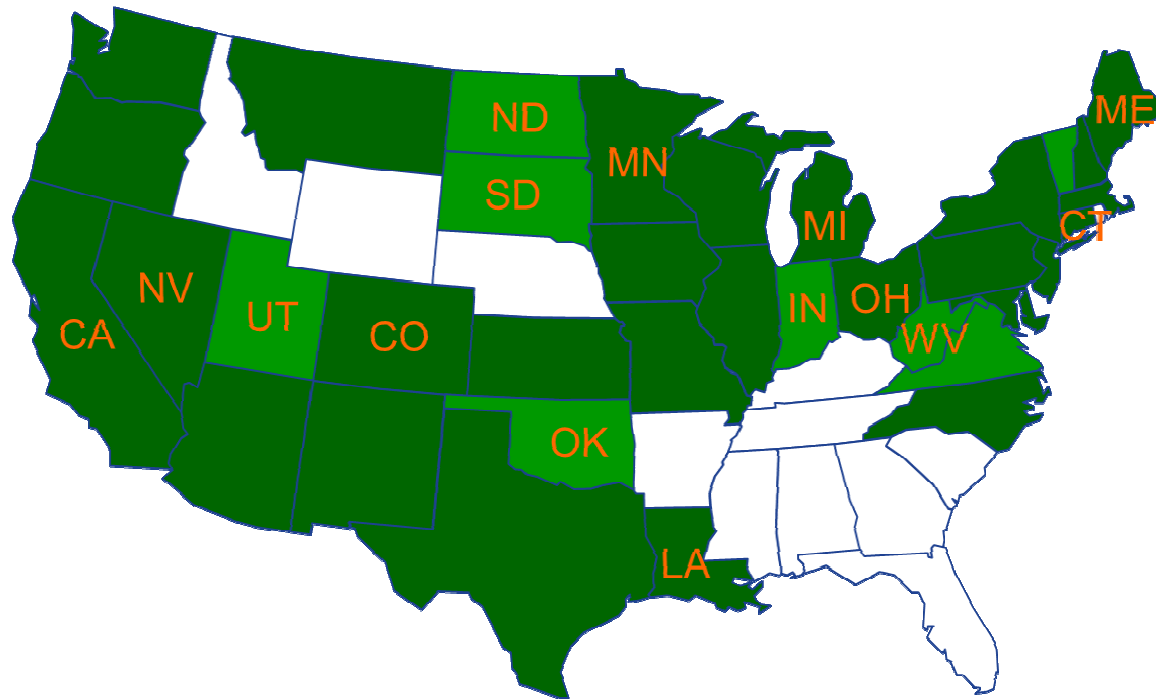
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# Waste Heat to Power considered Renewable in 15 States



- Renewable Portfolio Standard (29 states + DC)
- Renewable Portfolio Goal (8 states)
- WHP included

In 15 states, waste heat to power (WHP) qualifies as a renewable resource, either in the state's Renewable Portfolio Standard, goal or pilot program or in the case of CA, in the SGIP.

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# Ohio

## Waste Energy Recovery System

- Ohio's Alternative Energy Portfolio Standard (AEPS) qualifies Waste Energy Recovery Systems both as a renewable energy resource and as an energy efficiency resource
  - "Waste energy recovery system" means a facility that generates electricity through the conversion of energy from either of the following:
    - Exhaust heat from engines or manufacturing, industrial, commercial, or institutional sites, except for exhaust heat from a facility whose primary purpose is the generation of electricity
    - Reduction of pressure in gas pipelines before gas is distributed through the pipeline, provided that the conversion of energy to electricity is achieved without using additional fossil fuels
- Of the total AEPS requirement of 25% in 2025, at least half must come from renewable energy resources and half from advanced energy resources.

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# Connecticut

## Waste Heat Recovery System

- Connecticut's Renewable Portfolio Standard (RPS) includes Waste Heat Recovery Systems installed on or after April 1, 2007 as a Class III resource
  - a waste heat recovery system produces electrical or thermal energy by capturing preexisting waste heat or pressure from industrial or commercial processes
- The RPS requires each electric supplier and electric distribution wholesale supplier to obtain at least 23% of its retail load by using Class I & II resources.
- The total RPS target for all three Classes is 27% by 2020.
- Eligible systems that recover waste heat or pressure from commercial and industrial processes must be installed on or after April 1, 2007. Existing units that have been modified on or after January 1, 2006, may earn certificates only for the incremental output gains.

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# Michigan

## Industrial Cogeneration

- Michigan's Alternative Portfolio Standard (APS) includes Industrial cogeneration as an advanced cleaner energy credit
  - Industrial cogeneration facility, "a facility that generates electricity using industrial thermal energy or industrial waste energy."
- The APS applies to the State's investor-owned utilities, alternative retail suppliers, electric cooperatives, and municipal electric utilities.
  - Under the APS, all utilities must generate 10% of their retail electricity sales from renewable energy resources by 2015.
  - There are three credit types that utilities can use to meet the APS: renewable energy credits (RECs), energy optimization credits (EOCs), and advanced cleaner energy credits (ACECs). One credit of any type is equal to 1 MWh. Utilities may use EOCs or ACECs instead of RECs with approval of the PSC and no more than 10% of a utility's obligation may be met using a combination of EOCs and ACECs.

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# North Dakota

## Recycled Energy

- North Dakota's voluntary renewable energy objective includes Recycled Energy as a qualifying resource
  - "recycled energy system" is defined as "recycled energy systems producing electricity from currently unused waste heat resulting from combustion or other processes into electricity and which do not use an additional combustion process."
  - The term does not include any system whose primary purpose is the generation of electricity unless the generation system consumes wellhead gas that would otherwise be flared, vented or wasted.
  - Systems must have been installed on or after August 1, 2007.
- Under the objective 10% of all retail electricity sold in the state must be obtained from renewable energy and recycled energy by 2015. The objective's target applies to all types of utilities. Municipal and electric cooperatives that receive wholesale electricity through a municipal power agency or generation and transmission cooperative can aggregate their renewable and recycled energy to meet the objective. The objective is voluntary; there is no penalty for failing to comply.

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# Minnesota

## Waste Heat Recovery Converted into Electricity

- Minnesota's Energy Efficiency Resource Standard (EERS) sets energy savings targets for electric and gas utilities that include Waste heat-to-power systems.
  - "Waste heat recovery converted into electricity" means an energy recovery process that converts otherwise lost energy from the heat of exhaust stacks or pipes used for engines or manufacturing or industrial processes, or the reduction of high pressure in water or gas pipelines.
  - The goal is a 1.5% reduction in annual average retail sales (for both electric and gas utilities) beginning in 2010.
- Utilities may meet savings targets through "energy conservation programs, rate design, energy codes, appliance standards, market transformation programs, programs to change human behavior, utility infrastructure improvements, and waste heat recovery (converted into electricity)".

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# Colorado

## Recycled Energy

- Colorado's Renewable Portfolio Standard (RPS) includes Recycled Energy as a eligible renewable energy resource
  - “Recycled energy” is defined as “energy produced by a generation unit with a nameplate capacity of not more than 15 megawatts (MW) that converts the otherwise lost energy from the heat from exhaust stacks or pipes to electricity and that does not combust additional fossil fuel.”
- For IOUs, the RPS calls for 3% of retail electricity sales in Colorado to come from renewable electricity in 2007, increasing to 30% in 2020 and each year thereafter. For cooperatives and municipal utilities, the RPS calls for 1% of retail electricity sales on Colorado to come from renewable electricity in the years 2008-2010, increasing to 10% in 2020 and each year thereafter.

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# The Heat is Power Association

For additional information about  
the Association's efforts

contact Susan Brodie

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# California

## Waste Heat Capture

- The Self-Generation Incentive Program (SGIP) offers incentives to customers who produce electricity with waste heat to power.
- Systems less than 30 kW will receive their full incentive upfront. Systems with a capacity of 30 kW or greater will receive half the incentive upfront and the other half will be paid over the following 5 years based on the actual performance. For 2013, the incentive payments range from \$0.48/W - \$2.03/W for renewable energy systems depending on the type of system with a maximum incentive of \$5 million or 60% of eligible project costs. The following technologies will receive the corresponding upfront incentive (or half of this figure if the system is 30 kW or larger):
- Waste Heat Capture:
  - Waste Heat to Power: \$1.19/W.
  - Pressure Reduction Turbine: \$1.19/W.

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# Utah

## Waste Gas or Waste Heat Capture or Recovery System

- Utah's Renewables Portfolio Goal includes a waste gas or waste heat capture or recovery system as an eligible resource.
- Systems must have become operational after January 1, 1995.
- The goal requires investor-owned utilities, municipal utilities, and cooperative utilities to use eligible resources to account for 20% of their 2025 adjusted retail electric sales. It has no interim targets, so the first compliance period is 2025.
- The goal applies to "adjusted retail electric sales," defined as the total kWh of retail electric sales reduced by the kWh attributable to nuclear power plants, demand-side management measures, and fossil fuel power plants that sequester their carbon emissions.

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# Nevada

## Qualified Energy Recovery Process

- Nevada's Energy Portfolio Standard (EPS) includes a Qualified Energy Recovery Process as an eligible renewable energy system.
  - “Qualified energy recovery process” means a system with a nameplate capacity of not more than 15 megawatts that converts the otherwise lost energy from:
    - (a) The heat from exhaust stacks or pipes used for engines or manufacturing or industrial processes; or
    - (b) The reduction of high pressure in water or gas pipelines before the distribution of the water or gas, to generate electricity if the system does not use additional fossil fuel or require a combustion process to generate such electricity.
    - The term does not include any system that uses energy, lost or otherwise, from a process whose primary purpose is the generation of electricity, including, without limitation, any process involving engine-driven generation or pumped hydrogeneration.
- The EPS requires the state's two investor-owned utilities to derive or save a portion of their electricity using renewable energy systems or efficiency measures. The target increases 3% every 2 years, reaching 20% in 2015 through 2019, 22% in 2020 through 2024, and 25% in 2025 and thereafter.

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# Louisiana

## Waste Heat Recovery

- Louisiana established its Renewable Energy Pilot Program in 2010 to determine whether a renewable portfolio standard is suitable for Louisiana. Waste Heat Recovery is an eligible system
  - Waste Heat Recovery is defined as “any technology that recovers heat that is normally discharged to the atmosphere as a byproduct of a separate process and utilizes that waste heat to produce electricity”
- The program has two major components : the Research Component and the Request for Proposal (RFP) Component
  - The Research Component is an opportunity for utilities to collect data on the feasibility of different renewable energy resources. Each investor-owned utility (IOU) must develop a minimum of three projects. Projects must be fully operational by the end of 2013.
  - Under the standard offer tariff option, utilities can develop tariffs and associated contracts to purchase renewable energy facilities. Developers must deliver energy from new renewable resources.
  - The RFP Component applies to both IOUs and cooperative utilities.

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# South Dakota

## Recycled Energy

- South Dakota's Renewable, Recycled and Conserved Energy Objective includes Renewable and Recycled Energy as "Qualifying electricity"
  - Defined as electricity "produced from wind, solar, hydroelectric, biomass and geothermal resources, and electricity generated from currently unused waste heat from combustion or another process that does not use an additional combustion process and that is not the result of a system whose primary purpose is the generation of electricity."
- Under the objective 10% of all retail electricity sales must be obtained from renewable energy and waste heat-to-power (defined as "recycled energy") by 2015. As a voluntary objective, there are no penalties or sanctions for retail providers that fail to meet the goal.

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# Indiana

## Waste Heat Recovery/Industrial Byproduct Technologies

- Indiana's Clean Energy Portfolio Standard (CPS) allows for both Industrial Byproduct Technologies and Waste Heat Recovery to qualify as a clean energy resource
  - Industrial byproduct technologies use fuel or energy that is a byproduct of an industrial process;
  - Waste heat recovery captures and reuses the waste heat in industrial processes for heating or for generating mechanical or electrical work
- The CPS is a voluntary goal of 10% clean energy by 2025, based on the level of electricity supplied by the utility in 2010.
- To participate in the CPS, qualifying electric utilities must apply to the Indiana Utility Regulatory Commission (IURC) no later than 2 years after the beginning of the first two goal periods; goal period I is from 2013 through 2018, and goal period II is from 2019 through 2024. Only public utilities may participate in the program

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# West Virginia Recycled Energy

- West Virginia's Alternative and Renewable Energy Portfolio Standard includes Recycled Energy as a renewable energy resource
  - Recycled energy, which means useful thermal, mechanical or electrical energy produced from: (i) Exhaust heat from any commercial or industrial process; (ii) waste gas, waste fuel or other forms of energy that would otherwise be flared, incinerated, disposed of or vented; and (iii) electricity or equivalent mechanical energy extracted from a pressure drop in any gas, excluding any pressure drop to a condenser that subsequently vents the resulting heat
- The AREPS requires investor-owned utilities (IOUs)\* with more than 30,000 residential customers to supply 25% of retail electric sales from eligible alternative and renewable energy resources by 2025.

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# Maine

## Class II Resource

- Maine's original *Renewable Resource Portfolio Requirement* allows for projects that meet the definition of a small power production facility under the Federal Energy Regulatory Commission rules, 18 Code of Federal Regulations, Part 292, Subpart B, as in effect on January 1, 1997; to qualify as a Class II Resource
  - Waste heat to power projects meet the definition because the primary energy source of the project was "waste," and waste is further defined as "a listed energy input, or any energy input that has little or no current commercial value and exists in the absence of the qualifying facility industry," and further "residual heat" is a listed energy input.
- Each electricity provider must supply at least 30% of their total electric sales using electricity generated by eligible renewable and certain energy efficiency resources with specific set-asides for Class I resources.

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# Oklahoma

## Industrial By-Product Technologies

- Oklahoma's Renewable Energy Goal for electric utilities includes Industrial By-Product Technologies as demand side management (DSM) measures
  - Industrial by-product technologies are defined as “the use of a by-product from an industrial process, including the reuse of energy from exhaust gases or other manufacturing by-products that are used in the direct production of electricity at the facility of a customer”
- The goal calls for 15% of the total installed generation capacity in the State to be derived from renewable sources or energy efficiency by 2015. DSM measures qualify. Energy efficiency can also be used to meet up to 25% of the goal.

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