



WHITE PAPER

WASTE ENERGY RECOVERY PROPERTY & FEDERAL TAX APPLICATIONS

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INTRODUCTION

Under 26 U.S.C. §48(c)(5), waste energy recovery property (WERP), commonly referred to as waste heat to power (WHP), is included as an eligible property for the §48 energy investment tax credit (ITC). WERP gained eligibility through the enactment of the 2021 Consolidated Appropriations Act. The Inflation Reduction Act extended the ITC through December 31, 2024, raised the credit availability for WERP to 30%, and enacted new technology-neutral clean electricity investment (§48E) and production (§45Y) credits that take effect in 2025.

WHP represents a suite of existing and developing technologies that capture waste heat or pressure from an existing process and use that waste energy to generate clean electricity or power. WHP is primarily used as a decarbonization tool for heavy industry. The technologies convert waste heat produced as a byproduct of an industrial process (e.g., petroleum refining, glass manufacturing, steel manufacturing, natural gas infrastructure, cement production, and smelting) into clean electricity that can be plugged back into the industrial process or sold off-site. WHP is a stand-alone, add-on unit, independent of the industrial facility and process that creates waste heat.

WHY WERP BECAME AN ENERGY TAX INCENTIVE

Congress intended to broadly incentivize the use of WHP technologies that capture waste heat emanating from buildings and equipment at industrial and commercial facilities, but not the waste heat emanating from utility power plant operations.

According to data from the Energy Information Administration, the industrial sector accounts for 33% of the nation's primary energy use and nearly 30% of greenhouse gas emissions, including indirect emissions from the sector's electricity consumption. WHP reduces waste, improves efficiency, and vastly reduces the carbon intensity of energy-intensive industrial processes. WHP serves as a critically important tool to decarbonize the industrial sector and help the U.S. transition to a net-zero future.

WHP TECHNOLOGIES

Waste heat streams are generated by kilns, furnaces, ovens, turbines, engines, boilers and other steam and thermal systems, and pollution control equipment. In addition to processes at industrial plants, waste heat streams suitable for WHP are generated at field locations, including landfills, gas expansion systems, compressor stations, wastewater treatment, and mining sites. Steam Rankine Cycle, Organic Rankine Cycle, and Kalina Cycle (a variation of the Rankine Cycle) are the predominant WHP technologies used to recover waste heat.

Waste heat streams are also produced in residential and commercial buildings (R&C), but R&C waste heat streams typically provide lower temperatures and lower volumetric flow rates compared to industrial sites. Power generation from waste heat used to be limited to only medium- to high-temperature waste-heat sources, however, advances in alternate power cycles have increased the feasibility of generation at low temperatures. Certain closed process cycles also enable WHP technologies to transform waste heat into mechanical work (i.e. power) from low- and medium-grade heat in different thermodynamic cycles.

DEFINITION OF WASTE ENERGY RECOVERY PROPERTY

Under 26 U.S.C. §48(c)(5), WERP is defined:

(5) Waste energy recovery property

- (A) **In general.** The term “waste energy recovery property” means property that generates electricity solely from heat from buildings or equipment if the primary purpose of such building or equipment is not the generation of electricity.
- (B) **Capacity limitation.** The term “waste energy recovery property” shall not include any property which has a capacity that exceeds 50 megawatts.

(C) **No double benefit.** Any waste energy recovery property (determined without regard to this subparagraph) which is part of a system which is a combined heat and power system property shall not be treated as waste energy recovery property for purposes of this section unless the taxpayer elects to not treat such system as a combined heat and power system property for purposes of this section.

(D) **Termination.** The term “waste energy recovery property” shall not include any property the construction of which does not begin before January 1, 2025.

CONGRESSIONAL CLARIFICATION OF DEFINITION

[Footnote 266 Page 1044](#) under **Title XIII Subtitle G (Green Energy)** from the Committee Report on the Budget House of Representatives to accompany H.R. 5376, “The Build Back Better Act” further elucidates this definition.

In the case of waste energy recovery property, the phrase "if the primary purpose of such building or equipment is not the generation of electricity" under paragraph (A) of subsection (c)(5) is intended to refer to building or equipment that is a utility-scale power plant or enterprise whose primary purpose is the generation of electricity. Electrical generation equipment that generates waste heat as a byproduct at industrial, commercial, or residential facilities is eligible for the credit so long as it otherwise meets subsection (c)(5). Any sources of waste heat that generate electricity without additional emissions or fuel, including pressure drop applications¹, qualify for the credit.

WHAT IS EXCLUDED AND WHAT QUALIFIES

The WERP definition expressly **excludes** waste heat from standalone, simple cycle power plant operations. The definition is designed to prevent the conversion of simple cycle combustion turbine power plants to combined cycle power plants. Components of a combined heat and power system property (CHP) cannot be claimed to be both a CHP and a WERP.²

¹ [Joule-Thomson Effect](#) is the change in temperature that accompanies the expansion of a gas without the production of work or transfer of heat. This effect is acknowledged in the WERP definition clarified by the House Report, which includes pressure drop applications.

² Any severable components of a system that serve only the CHP or WERP system may individually claim only the credit applicable to CHP or WERP respectively, but no component is eligible for both credits. Any non-severable components of a combined system may be designated as serving either the CHP or WERP system, but not both.

Qualifying WHP Systems are those systems that:

- (1) capture waste heat from an existing industrial process (building or equipment) to generate electricity,
- (2) do not add fuel or have incremental emissions—this includes WHP with pressure drop applications, and
- (3) do not have the primary purpose of generating electricity.

ITC EFFECTIVE DATES, ELIGIBILITY AND BENEFICIARY

- The Inflation Reduction Act (IRA) made the §48 ITC available to WERP from **January 1, 2021 through December 31, 2024**. The base credit for WERP is 6% or 30% if prevailing wage and apprenticeship requirements are met. The IRA also makes certain stackable “bonus credits” available that can add to the ITC, including:
 - 10% adder for building in an Energy Community;
 - 10% adder for complying with domestic content requirements

“Commence construction” rule for existing §48 qualifying technologies:

Construction will be deemed to have begun on the date the taxpayer first satisfies one of the two methods:³

- **Physical Work Test** is satisfied when physical work of a significant nature begins, and other requirements provided in section 4 of [Notice 2018-59](#) are met.
- **Five Percent Safe Harbor** is satisfied when a taxpayer pays or incurs—within the meaning of Regulations section 1.461-1(a)(1) and (2)—5% or more of the total cost of the energy property and meets other requirements provided in section 5 of [Notice 2018-59](#).

³ The requirements to begin construction may be modified in certain limited circumstances involving significant national security concerns. See Notice 2019-43, 2019-31 I.R.B. 487, available at [IRS.gov/irb/2019-31_IRB#NOT-2019-43](#), for details.

Also, see Notice 2020-41, 2020-25 I.R.B. 954, available at [IRS.gov/irb/2020-25_IRB#NOT-2020-41](#), on tax relief for delays caused by COVID-19.

Additionally, see Notice 2021-5 for more information on beginning of construction requirements applied to offshore and federal lands projects.

- **The ITC beneficiary** is the owner of the project on the day it is placed in service.

Claw back provision: An owner who sells its interest in the property or otherwise ceases to be eligible for the credit within 5 years of the date property is placed in service is subject to a recapture of a ratable portion of the credit claimed (20% for each of five years).

- **How to obtain the ITC**

The tax credit is claimed through submission of [Form 3468](#).

Filing instructions: <https://www.irs.gov/pub/irs-pdf/i3468.pdf>

TECHNOLOGY-NEUTRAL CREDITS

§45Y Clean Electricity Production Credit

Section 13701 of the IRA created a new clean electricity production credit (§45Y) to replace the existing §45 production credit with one that is not technology specific. It will apply to electricity generation facilities that have a greenhouse gas emissions rate of no more than zero. The credit takes effect on January 1, 2025.

The new §45Y PTC is an inflation-adjusted credit amounting to 0.3 cents per kilowatt hour (kWh), which can be increased to 1.5 cents per kWh if prevailing wage and apprenticeship requirements are met. A qualified facility can take the credit for 10 years. The bonus credits for meeting domestic content requirements (10%) and building in a designated Energy Community (10%) can be stacked on top of the credit.

Facilities eligible for the §45Y PTC and §48E ITC may only claim one of the credits during a taxable year.

§48E Clean Electricity Investment Credit

Section 13702 of the IRA created a new clean electricity investment credit (§48E) to replace the existing §48 investment credit with one that is not technology specific. It will apply to electricity generation facilities that have a greenhouse gas emissions rate of no more than zero and to qualified energy storage technologies. At this time, it is unclear whether some technologies that produce emissions may be eligible for the credit at a reduced rate. The credit takes effect on January 1, 2025.

The base credit for the new §48E ITC is 6% or 30% if prevailing wage and apprenticeship requirements are met. The bonus credits for meeting domestic content requirements (10%) and building in a designated Energy Community (10%) can be stacked on top of the credit.

Facilities eligible for the §45Y PTC and §48E ITC may only claim one of the credits.

WHAT'S NEXT

In 2022, the Heat is Power Association (HiP) submitted [comments](#) in response to Notice 2022-49, the Department of Treasury's *Request for Comments on Certain Energy Generation Incentives*. The comments include HiP's recommendations for issuing guidance to implement the §48 energy investment credit and the clean electricity §45Y production and §48E investment credits.

In 2025, the technology-neutral clean electricity tax credits will replace existing energy investment and production credits. The Department of Treasury is expected to issue guidance for implementing the new credits sometime in 2024. Treasury officials are working closely with the Department of Energy and the Environmental Protection Agency to develop guidance.

The HiP is meeting with key offices and staff at the Department of Treasury and Department of Energy to discuss HiP's recommendations and WERP's inclusion in the implementing guidance. This White Paper will be updated as additional guidance is published.