JENBACHER

IMPACT OF THE INFLATION REDUCTION ACT ON POWER GENERATION SOLUTIONS

Although the U.S. Congress has attempted comprehensive climate legislation for almost three decades, it always has run into hurdles. The Inflation Reduction Act (IRA), passed in August 2022, offers more than US $260 billion in funding for clean energy, mainly through tax credits. This white paper details how U.S. taxpayers can benefit from IRA funding with INNIO Group's Jenbacher solutions.

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1.

INFLATION REDUCTION ACT: ENERGY TAX CREDITS

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1. INFLATION REDUCTION ACT: ENERGY TAX CREDITS

1.1 Policy background

The U.S. has long had the goal to cut U.S. economy-wide greenhouse gas emissions at least 50% compared to 2005 levels by 2030. The first attempt to promote clean energy came with the Infrastructure Investment and Jobs Act (IIJA), also known as the Bipartisan Infrastructure Law.

Signed in November 2021, the IIJA devoted $80 billion to climate initiatives, including grid enhancement, nuclear subsidies, carbon capture, hydrogen research and development, electrified transit, and charging infrastructure. Then, after a year of negotiations, the U.S. Congress passed the Inflation Reduction Act (IRA) in August 2022, launching the country's largest-ever climate spending estimated at $370 billion over the 10-year period.

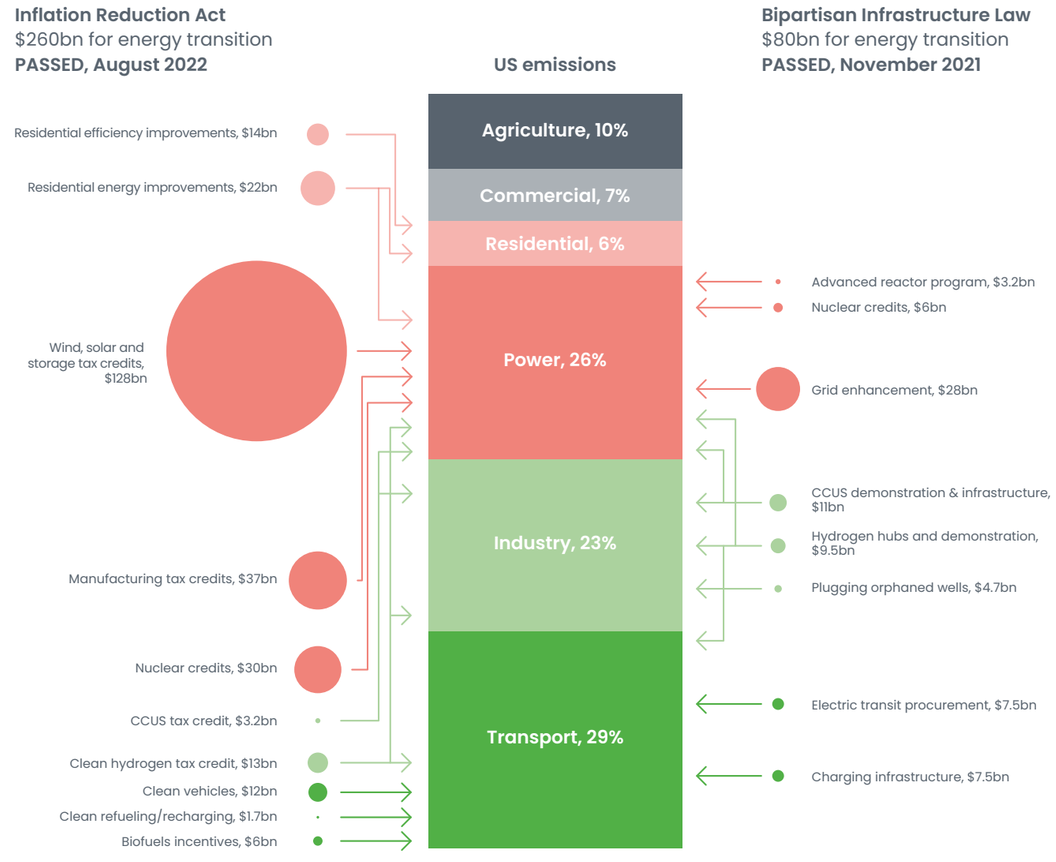

Figure 1: Estimated 2022–2031 energy transition spending in U.S. Inflation Reduction Act and Bipartisan Infrastructure Law
Source: EIA, EPA, Joint Committee on Taxation, BloombergNEF
Chart only captures tax credits and incentives, not grant programs or loans. Bn is billion. CCUS is carbon capture, utilization and storage.

1.2 How IRA funding works

At the heart of the IRA are tax credits. An estimated US$195 billion of the bill's total spending takes the form of tax credits focused on decarbonizing the U.S. power sector, which accounts for a little more than a quarter of all U.S. emissions. INNIO Group's Jenbacher power technologies qualify for the IRA funding either in the form of a production tax credit (PTC) or the investment tax credit (ITC).

These credits are not new, but previously not all technologies were eligible for funding. The IRA modifies and extends the current PTC and ITC through 2023 and 2024, at which point they will be phased out in favor of technology-neutral, emissions-based credits, called the Clean Electricity PTC and Clean Electricity ITC. The option to elect either tax credit should be evaluated by a qualified tax advisor for each individual project.

Agency	IRA Section	Tax Code Section	Program Name
Department of the Treasury	13101	45	Production Tax Credit for Electricity from Renewables
Department of the Treasury	13102	48	Investment Tax Credit for Energy Property
Department of the Treasury	13701	45Y	Clean Electricity Production Tax Credit
Department of the Treasury	13702 (h)	48E	Clean Electricity Investment Tax Credit

Table 1: Overview of tax credit legislation
Source: Department of the Treasury

Tax credits: uncapped upside

Most of the IRA's subsidies for clean energy deployment come in the form of tax credits or deductions that the law's authors deliberately left "uncapped": there is no limit to the amount of money that companies may claim, as long as they meet the legal requirements to certify their project with the Internal Revenue Service (IRS). Therefore, the Congressional Budget Office (CBO) and the Joint Committee by Taxation could dramatically understate the amount of clean energy activity the law could trigger (initial estimate is $260 billion over 10 years). The actual spending will depend largely on how many project developers are willing and able to use them.

Implementation is key

In addition to providing clean energy funding, the key to achieving U.S. climate goals is effective implementation. In the case of the earlier legislation—Infrastructure Investment and Jobs Act—grants and loans programs primarily will commence through the Department of Energy (DoE). In the case of the IRA, the Treasury Department and the IRS as well as other agencies will write the rules on implementing the tax credits.

1.3 Investment tax credit (ITC)

The investment tax credit (ITC) is one of the most impactful provisions in the IRA. This ITC, also known as Section 48 credit, is not a new instrument, but rather an evolution of a tax credit that Congress originally passed in 1978 and extended and modified every few years. The following technologies relevant to INNIO Group are considered "energy property" under the IRA and qualify for the updated ITC:

- Combined heat and power (CHP)
- Microgrid controllers (microgrid of less than 20 MW)
- Qualified biogas property

ITC Section 48: project beginning construction on or before December 31, 2024

The Section 48 ITC base credit rate is 6% per $1 of installed clean power generation capacity. Projects can increase the base rate by a 5x multiplier (30%) by meeting or being exempt from the prevailing wage and apprenticeship requirements determined by the U.S. Department of Labor (see table 2). The amount of the credit can be increased up to 50% if domestic content requirements are met and/or the project is located in an energy community (see table 3 and section 1.7).

Clean Electricity ITC Section 48E: project beginning construction after December 31, 2024

In 2025, lawmakers expect clean energy developers to turn to the Section 48E tax credit, a technology-neutral successor to the current ITC. The major difference to quality is that the project must yield **ZERO greenhouse gas emissions**. The credit begins to phase out in 2032 only if GHG emissions from electricity are below 25% of 2022 emissions level. This provision connects the incentives to the real-world climate targets.

1.4 Production tax credit (PTC)

The production tax credit (PTC) reduces the cost of producing electricity using green technology. The taxpayer receives a credit for each kWh of electricity produced and sold to a third party during the year. This PTC is not a new credit, but rather an evolution of a credit that Congress originally passed in 1992 and extended and modified every few years. The following technologies that can spur demand for INNIO Group's Jenbacher technologies qualify for the PTC:

- Biomass
- Municipal solid waste
- Landfill gas

PTC Section 45: project beginning construction on or before December 31, 2024

The Section 45 PTC base credit amount initially was set at $0.003 per 1 kWh of clean energy produced. The credit rate remains subject to the inflation adjustment based upon the U.S. GDP implicit price deflator. This adjustment factor equaled to 1.8909 for power sold in 2023. Projects can increase the base rate by a 5x multiplier. The rate in 2023 is 0.0275/kWh ($0.003 base rate x5 multiplier x1.8909 GDP Price Deflator) by meeting or being exempt from the prevailing wage and apprenticeship requirements determined by the U.S. Department of Labor (see section 1.5). Credit is increased by 10%, if the project meets certain domestic content requirements for steel, iron, and manufactured products. Credit is increased by 10%, if located in an energy community (see figure 2 and section 1.7).

Clean Electricity PTC Section 45Y: project beginning construction after December 31, 2024

In 2025, the PTC will be replaced with technology-neutral Section 45Y. As with the ITC, the payout structure stays the same. The only major difference to qualify is that a project must produce electricity with ZERO greenhouse gas emissions. The Clean Electricity PTC begins to phase out in 2032 only if U.S. greenhouse gas emissions from the power sector are below 25% of 2022 emissions level.

Investment Tax Credit

For **every dollar invested** in installing clean electricity generation, the **IRA pays tax credits** of:

Production Tax Credit Rate in 2023

For **every kWh generated** by a clean electricity project, **the IRA pays tax credits** of:

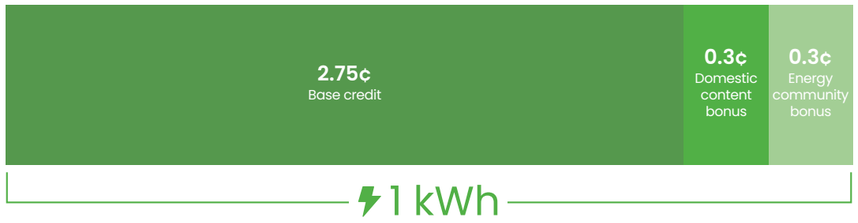

Figure 2: Overview of ITC and PTC structure – Full base credits are available when prevailing wage and apprenticeship requirements are met.
Source: Department of the Treasury, IRS, Bloomberg NEF

1.5 Prevailing wage and apprenticeship requirements

Wage requirements

The IRA requires project owners, contractors, or subcontractors to pay laborers "prevailing wages" during construction and for repairs or alterations performed during the tax credit period. For this purpose, "prevailing wages" refers to wages paid for similar work in the locality of the project site, as determined by the U.S. Secretary of Labor.

If a project owner, contractor, or subcontractor does not pay its laborers "prevailing wages" as required, it can remedy this failure by paying each worker the difference between the prevailing wage and wage actually paid, plus $5,000 per worker and interest. If the project owner intentionally fails to satisfy the wage requirement, additional costs will be imposed.

Apprenticeship requirements

Additionally, the IRA requires a percentage of labor hours based on the minimum number of hours for construction, alteration, or repair work to be performed by qualified apprentices. The labor hours percentage requirement varies, depending on the year in which construction begins, as illustrated in the table 2.

Exemptions from wage and apprenticeship requirements:

1. "One-megawatt exception" for credits available under PTC sections 45 and 45Y and ITC sections 48 and 48E: A facility that has a maximum net output of less than 1 megawatt of electrical energy (as measured in alternating current) or thermal energy may be eligible for the increased credit amount without satisfying the prevailing wage and apprenticeship requirements.

2. Construction or installation of a facility begun before January 29, 2023

Project Construction Period	Percentage of Apprentice Labor Hours
Construction beginning before January 1, 2023	10%
Construction beginning on or after January 1, 2023, and before January 1, 2024	12.5%
Construction beginning on or after January 1, 2024	15%

Table 2: Overview of apprenticeship requirements
Source: IRS

1.6 Domestic content requirements

What are domestic content requirements?
In general, domestic content requirements apply to any steel, iron, or "manufactured product" that is a component of an energy project. On May 12, 2023, the IRS released proposed guidance on bonuses for domestic content in the IRA. As stated in the original law, the IRA allows clean power project developers to receive up to a 10% tax credit bonus for using domestically made equipment in their plants. This bonus can be used on top of four tax credits mentioned in section 1.2 of this white paper: PTC sections 45 and 45Y and ITC sections 48 and 48E.

For the PTC, meeting domestic content requirements increases tax credit dollar values by 10%, including any 5x bonus from meeting requirements to pay prevailing wages and hire apprentices. For the ITC, the value of the credit would rise by 2% of the total invested amount, or 10% of the invested amount if the project also adheres to wage and apprenticeship rules. For example, a $100 million project could claim $30 million in tax credits if it met wage and apprenticeship requirements only or could be increased to $40 million for also meeting the domestic-content requirements.

Domestic content rule exemptions
The IRA provides domestic content exemptions for non-profit and local government organizations, a group that includes rural electric cooperatives and municipal utilities. Federal institutions are not exempt, with the exception of the Tennessee Valley Authority. All can also take advantage of the ITC and PTC as "direct pay" credits. After 2024, these entities receive only 90% of their credit amount if they do not meet the steel, iron, and manufactured products requirements—but they can still receive 100% credit if:

- Meeting requirements raises costs by 25% or more,
- U.S. domestic suppliers cannot provide enough quantity to meet project needs, or
- U.S. domestic manufacturers cannot provide sufficient quality supplies for project needs.

For INNIO Group's Jenbacher technologies manufactured in Europe, this potentially means that our municipal utilities customers (exempt from the rule) can claim the domestic content requirement bonus, regardless of the percentage of the domestic content. For private sector customers, the domestic content requirements for gensets manufactured outside the U.S. can still be met if U.S. labor or components amounting to the specified domestic content percentage are used. These requirements should be evaluated by a certified tax or legal professional on project-by-project basis.

2023	40%
2024	40%
2025	45%
2026	50%
2027 & later	55%

Table 3: Domestic content requirement percentages by year in the IRA
Source: IRS Notice 2023-38

What qualifies as domestic content?
The IRS guidance provides two key clarifications for eligibility criteria:

1. All manufacturing processes with respect to any steel or iron items that are components of an energy project must take place in the United States. For steel and iron structures, the 100% domestic content applies. Steel and iron structures are components such as girders, rebar, windmill towers, and any other parts essential to ensuring the facility firmly stands in place.

2. Other parts of the facility with different functions do not need to source all their steel and iron from U.S. suppliers, and only need to meet the less-restrictive "manufactured product" percentage standards (see table 3).

A manufactured product is considered to be produced in the U.S. only if:

1. All the manufacturing processes for the product take place in the United States **and**
2. All the components of the product are of U.S. origin, regardless of the origin of its subcomponents. Raw materials need not to come from the U.S. for a product to count as U.S.-made.

How to calculate domestic content
To determine if a manufactured product meets the domestic content cost percentage, taxpayers must divide the total "direct" material and labor costs for all components from the U.S. by the sum of all manufactured product costs.

The IRS may yet be called on to clarify which parts of a product count as "components" rather than subcomponents. The latest guidance says that components can count as U.S.-made even if all their subcomponents come from overseas, but the dividing line between a component and subcomponent is still unclear. Because of the complexity, all aspects must be discussed on a project-by-project basis with a qualified tax professional.

1.7 Energy community requirements

Both ITC and PTC credits include another 10% bonus for projects sited in "energy communities." Energy communities are specifically defined in the IRA statute, generally including communities that have suffered hardship from the decline of the fossil fuel industry. The U.S. Department of Energy has released a mapping tool to help identify energy communities as defined by the IRA (see figure 3).

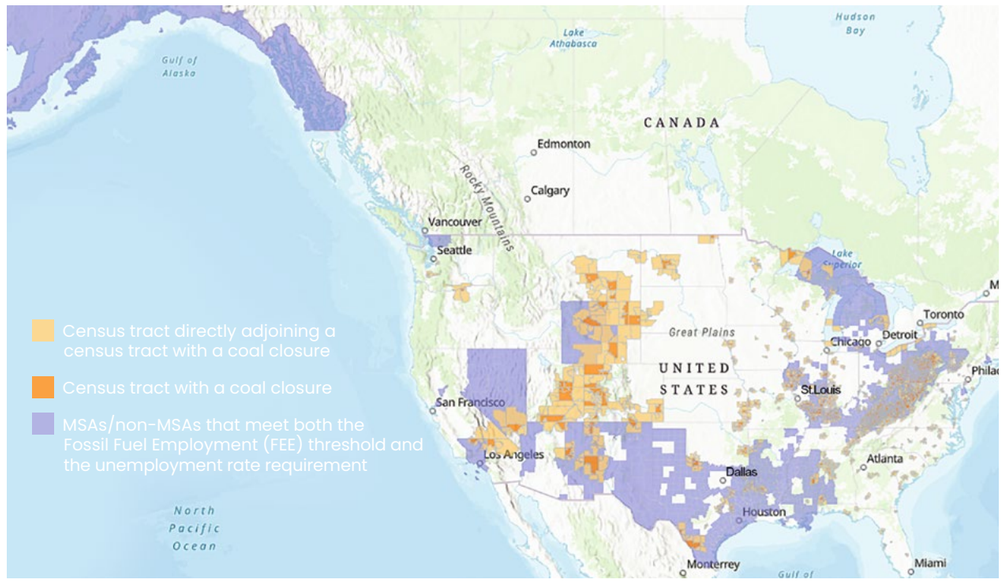

Figure 3: Energy Community Tax Credit Bonus, Last updated 06/15/2023
Source: https://arcgis.netl.doe.gov/portal/apps/experiencebuilder/experience/?id=a2ce47d4721a477a8701bd0e08495e1d

1.8 Tax credits: transferability and direct pay

The U.S.'s tax-based clean energy subsidies have long faced a problem: with energy tax credits substantially higher than most renewables developers' tax bills (mostly due to low income at the start of the project), projects have struggled to take advantage of federal incentives on their own. In the past, developers have gotten around their limited ability to absorb credits through complicated tax equity structures, in which investors with large tax liabilities claim their credits, usually by taking ownership of the project until they satisfy a pre-determined condition—like a set number of years or a specific internal rate of return (IRR). The legal and accounting complexity of these structures, however, has limited the scope of the renewables tax equity market to large financial institutions.

The IRA offered a smart solution to this problem, creating two new ways for projects to earn money from the start by monetizing the credits.

1. **Transferability**
   This mechanism is used to sell tax credits to another who will claim the tax credit. Entities gained the ability to transfer their tax credits to other taxpayers, effectively creating a market for developers to trade tax benefits for cash or financing up front—and with less complexity and transaction costs than the traditional tax equity market. Transfers of ITCs generally command lower pricing than PTCs, but the price also depends on the risk/quality of the credit.

Tax credit selling process:

- Seller completes electronic pre-filing registration on a new IRS tax transfer portal
- Seller arranges for a sale of a tax credit to an unrelated party
- Seller completes the necessary IRS paperwork to affect the sale of a tax credit
- Seller and buyer properly complete their tax returns to reflect the tax credit transfer

Risk/quality	Examples	Price band
Risky	New or unproven technology	<$0.80
Custom	Small projects or developers/sellers, uninsured deals	$0.80-$0.87
High quality	Known technology investment credits from experienced developers with tax insurance; future-year production tax credits	$0.87-$0.93
Premium	Spot (current year) production tax credits from large sponsors	$0.93-$0.96

Table 4: Tax credit price range by type, October 2023
Source: BloombergNEF interviews with market participants

2. **Direct pay**
   For certain key sectors, the IRA offered an even simpler alternative: direct payment from the IRS. This process allows entities exempt from income tax—such as nonprofits, state/local/Tribal governments, publicly owned utilities, and rural electric cooperatives—to claim the equivalent amount of tax credit in the form of a direct payment from the IRS. This enables tax-exempt entities to take advantage of clean energy tax credits for the first time. They previously had been shut out of claiming federal subsidies for renewables they owned.

For example, a public utility installs a Jenbacher CHP system that costs $100,000. Thanks to the IRA, they potentially can claim $30,000 of the project costs back (previously not allowed) and an additional $10,000 of domestic content bonus (utilities exempt from the rule of domestic content requirement, see section 1.6).

In addition, three emerging strategic industries with high start-up costs and uncertain profits also won the right to claim tax credits as direct payments for their first five operating years: clean hydrogen, carbon capture, utilization and storage (CCUS), and clean energy manufacturing.

Credit	Direct pay eligibility	Transferability	10 year-value (CBO)
45 Energy PTC	Tax-exempt entities only	Yes	$51 billion
48 Energy ITC	Tax-exempt entities only	Yes	$14 billion
30C Clean Refueling Property	Tax-exempt entities only	Yes	$1.74 billion
45Q Carbon Capture Utilization and Storage (CCUS)	Tax-exempt and commercial entities	Yes	$3.23 billion[1]
45U Nuclear	Tax-exempt entities only	Yes	$30 billion
45V Hydrogen	Tax-exempt and commercial entities	Yes	$7.85 billion
45X Advanced Energy Manufacturing	Tax-exempt and commercial entities	Yes	$30.6 billion
45Y Clean Power PTC	Tax-exempt entities only	Yes	$11.2 billion
45Z Clean Fuel	Tax-exempt entities only	Yes	$2.95 billion
48C Energy Project	Tax-exempt entities only	Yes	$6.26 billion
48E Clean Power ITC	Tax-exempt entities only	Yes	$50.9 billion
45W Commercial Clean Vehicle Credit	Tax-exempt entities only	No	$3.58 billion

Table 5: Overview of transferability and direct pay eligibility in the IRA
Source: Congressional Budget Office (CBO), Inflation Reduction Act, BloombergNEF
[1] BNEF estimates that projects already slated for development by 2030 could claim as much as $100 billion in CCS credits, far higher than this CBO estimate.

2.

HYDROGEN INCENTIVES IN THE INFLATION REDUCTION ACT

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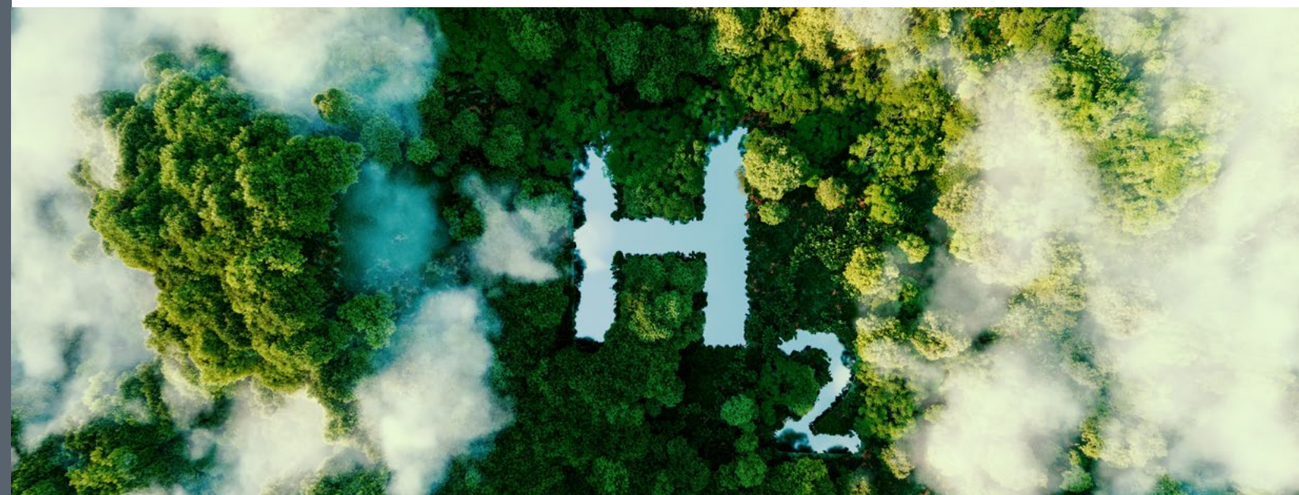
Clean hydrogen (H_2) is a major component of the U.S. strategy plan to decarbonize the industrial sector. In June 2021, the DoE launched the Hydrogen Shot, an effort to accelerate breakthroughs in hydrogen technology and cut the cost of clean hydrogen by 80% to $1 per kilogram in one decade. The Bipartisan Infrastructure Law mentioned in this white paper's introduction included $9.5 billion for clean hydrogen initiatives, with most of the funding for regional Clean Hydrogen Hubs. The winners under this initiative of the $7 billion funding were announced in October 2023. There will be seven hydrogen hubs across the United States that will produce 3 million metric tons of H_2 per year.

2.1 Clean hydrogen Production Tax Credit (Section 45V of the U.S. Tax Code)

The IRA established the world's first tax credits for clean hydrogen. These could add an estimated $13 billion of funding to U.S. clean hydrogen projects, on top of the existing $9.5 billion from the Bipartisan Infrastructure Law. A U.S. producer of clean hydrogen is now eligible for a tax credit per kilogram of hydrogen produced, based on the greenhouse gas emissions rate of the production process. The per kilogram amount ranges from $0.12 per kilogram on the low end, to $3.00 per kilogram on the high end.

The law has several other key provisions outlining how the credits will function:

- Low-carbon hydrogen projects can receive the new tax credits if operations begin between January 1, 2023 - December 31, 2032, and will receive the credits for the first 10 years of operations.
- With emissions-based payouts, the tax credits will be paid out according to the full life-cycle emissions intensity of the hydrogen. Table 6 shows the credit's payment schedule. To achieve the maximum value, projects must limit their emissions to 0.45kg CO_2 per kg-H_2. As with the ITC and PTC, there also is a bonus for adhering to certain wage requirements for workers and apprentices.
- The credits are eligible for direct pay and are transferable.
- Taxpayers can make an irrevocable election to choose the ITC in lieu of the 45V credit as long as they have not claimed the 45Q credit for carbon sequestration.



The tax credits will enable wider deployment and also will favor green H_2 made from renewable electricity due to a weighting based on life-cycle emissions calculations.

The cost of producing green H_2 is expected to fall quickly this decade, potentially reaching a level well below the $1/kg benchmark goal set by the US Department of Energy (DoE).

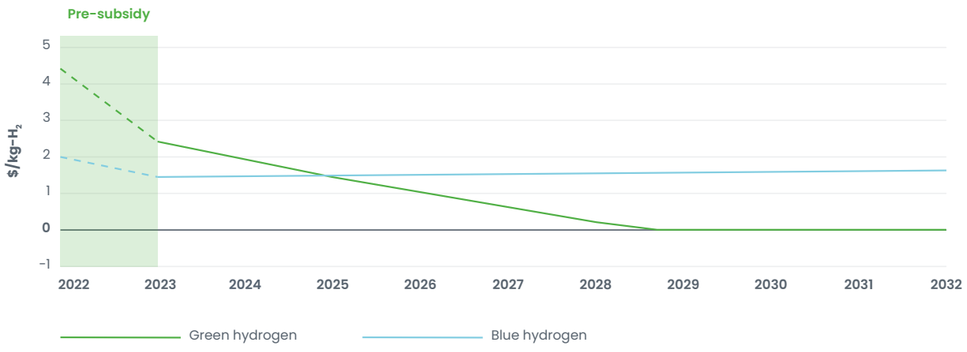


Figure 4: Effect of hydrogen PTCs on U.S. levelized cost of hydrogen, inflation adjusted to 2023
Source: BloombergNEF

Emissions intensity ($g\text{-}CO_2/g\text{-}H_2$)	Base value ($kg\text{-}H_2$)	Bonus PTC[2] ($kg\text{-}H_2$)	ITC % Base	Bonus ITC %[2]
<0.45	$0.60	$3.00	6%	30%
<1.5	$0.20	$1.00	2%	10%
<2.5	$0.15	$0.75	1.5%	7.5%
≤4	$0.12	$0.60	1.2%	6%

Table 6: Hydrogen Tax credit schedule based on emissions intensity
Source: BloombergNEF
[2] Bonus credit is rewarded if project meets prevailing wage requirements. The bonus value is paid instead of the base value. PTC stands for production tax credit. ITC stands for investment tax credit.

3.

INNIO GROUP'S JENBACHER SOLUTIONS TO BENEFIT FROM THE INFLATION REDUCTION ACT

3. INNIO GROUP'S JENBACHER SOLUTIONS TO BENEFIT FROM THE INFLATION REDUCTION ACT

3.1 Combined heat and power (CHP) and waste-to-heat power (WHP)

Under the IRA, the Investment Tax Credit (ITC) will be available to qualifying combined heat and power (CHP) or waste -to-heat (WHP) system property The IRA defines CHP as an "energy property" and waste-to-heat power (WHP) as "waste energy recovery property."

The credit is available not just for new-build but also for capital improvements in existing facilities

In the case of retrofitted property, the 80/20 rule applies: used property should not contain more than 20% of the total value of the energy property.

Key requirements to qualify:

- Begin construction before January 1, 2025
- Maximum capacity limit is 50 MW
- Projects of 15 MW or less receive the full credit
- Between 15 MW and 50 MW the credit has to be adjusted by the ratio between the system capacity and 50 MW. For example, for a system with capacity of 30 MW the credit could be 30% × (15 MW/30 MW) = 15%
- Total energy efficiency to exceed 60%
- At least 20% of the total useful energy should be in the form of thermal energy
- At least 20% of the total useful energy should in the form of electrical or mechanical power (or combination, thereof)

Figure 5: J620 CHP unit

Conversion of waste to power and heat from RNG/biomethan - BioTown Biogas, Inc.

Generally, CHP or WHP projects still can qualify for the ITC, even if construction began prior to the IRA being signed into law—if it was not placed in service in 2022.

INNIO Group's Jenbacher CHP (cogeneration) and CCHP (trigeneration) power plant solutions qualify for the 30% ITC with the possibility of also receiving bonuses of up to 50% for domestic content and energy community. With more than 13,000 CHP systems delivered globally, INNIO Group is among the global technology leaders when it comes to engine-based power generation and waste heat recovery solutions. INNIO Group offers its customers a comprehensive Jenbacher portfolio from 250 kW up to 10.6 MW of single unit electrical power output.

Projects that begin construction on January 1, 2025, or later

These projects can qualify for renewable energy tax credits under the new technology neutral tax incentive if the project yields zero greenhouse gas emissions. Under the zero-emission, technology-neutral regime, these capacity limitations do not apply. The challenge becomes qualifying as a zero-emission technology. This likely will be possible if the CHP system uses green hydrogen as a fuel, but the exact guidance is still pending. Jenbacher CHP systems can use a mixture of pipeline gas and CO_2-free hydrogen as fuel today and be converted to 100% hydrogen (H_2) operation once it becomes widely available. This option will help our customers continue receiving the IRA incentives under the technology-neutral provision of the tax code.

Section 48C "Advanced Manufacturing Tax Credit" also can be beneficial to CHP systems. It allocated $10 billion for facilities that reduce GHG emissions 20% with efficiency, waste reduction, carbon capture, or the introduction of low- or zero-carbon heat processes.

Project is taking longer than expected?
→ It can still be eligible for ITC under the IRS's "Safe Harbor" provision.

If the project is not put in service before January 1, 2025, it still can qualify for the ITC when:

- If "significant physical work is begun" on the project.
  Important to know: *preliminary activities, like obtaining permits or securing funding, do not qualify as physically significant, nor does any work involving assets already held in inventory.*

  OR

- 5% of the total cost of the project is incurred. This provision also known as "Safe Harbor" applies to the "total cost of the facility", which the IRS defines as "all costs properly included in the depreciable basis of the facility." This does not include land or any property not integral to the facility.

Purchasing CHP equipment for the new facility is usually the easiest and the most straight forward way to meet the 5% benchmark (rather than through costs related to permitting and design).

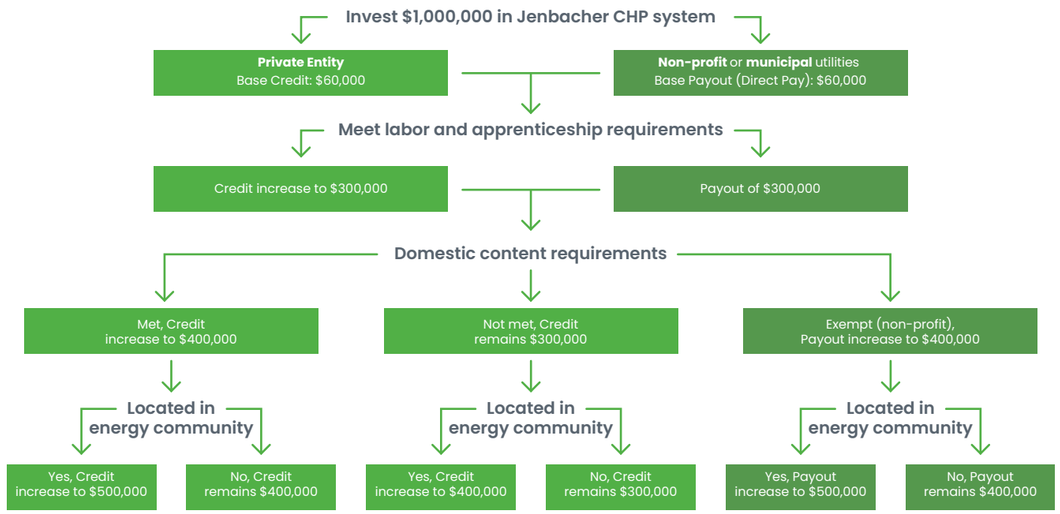


Figure 6: Hypothetical example of potential benefits of investment in INNIO CHP system
Note: The domestic content requirements for gensets manufactured outside the U.S. can still be met if U.S. labor or components amounting to the specified domestic content are used.

3.2 Biogas solutions

The sub-section 3.1 described how the IRA enables INNIO Group's Jenbacher CHP equipment to qualify for the ITC. The "biogas property" category establishes an incentive for conversion of biomass to biogas, which indirectly could favor biogas installation with or without heat recovery.

Biogas favored over renewable natural gas (RNG)
The ITC also lists "qualified biogas property" as eligible for the incentives under energy property definition. In November 2023, the IRA issued proposed regulations regarding what "qualified biogas property" means. It is a system that:

- Converts biomass into a gas that consists of not less than 52% methane by volume **and**
- Captures such gas for sale or productive use rather than disposal via combustion, among other parameters.

Qualified biogas property also includes any property that is part of such a system that cleans or conditions such gas. For example, qualified biogas property includes, but is not limited to, a waste feedstock collection system, a landfill gas collection system, mixing or pumping equipment, and an anaerobic digester. However, gas upgrading equipment necessary to concentrate the gas into the appropriate mixture for injection into a pipeline through removal of other gases such as carbon dioxide, nitrogen, or oxygen is not included in qualified biogas property.

Methane content requirement is measured at the point at which gas exits the biogas production system, which may include an anerobic digester, landfill gas collection system, or thermal gasification equipment. This is the point at which a taxpayer generally must determine whether to convert the biogas to fuel for sale or use it—either directly to generate heat or to fuel an electricity generation unit.

The proposed regulation suggests that production of biogas rather than renewable natural gas for injection in the pipeline will be incentivized. Based on evidence from other countries, such incentives might drive installation of biogas gensets for electricity generation on site. INNIO Group offers a comprehensive portfolio of biogas gensets with or without heat recovery with single-unit electrical power output from 250 kW up to 3.4 MW. INNIO Group has delivered more than 6,000 biogas engines globally that can generate a total electrical output of approximately 5.5 GW of electricity.

3.3 Microgrid controllers

In the IRA, microgrid controllers managing a microgrid of 4 kW to 20 MW are eligible for the ITC (see section 1.3). Bonus credits also are available for domestic content and as a part of the energy community. At the end of 2023, the IRS still was revising the legislation's definitions of a microgrid and a microgrid controller.

A proposed revision states that an eligible microgrid includes an electrical system that is capable of operating in connection with the larger electrical grid, whether or not the microgrid is physically connected to the electrical grid. For example, a microgrid located in a remote area that does not have a larger electrical grid to which it can physically connect still can be a qualified microgrid. The clarified definition would also stress functional independence of the microgrid controller as a part of energy property.

INNIO Group's Jenbacher microgrid controller is eligible for up to 50% ITC and can integrate a wide selection of distributed energy resources (DERs) such as renewables and storage devices while helping to ensure high power reliability and plant uptime.

With the current controller release, up to 100 DERs can be connected and configured individually to fit the desired plant-specific application requirements. To further improve the funding economics of the energy project, a Jenbacher CHP or biogas, landfill gas, or waste-to-power genset could be installed as part of a qualified microgrid. These equipment types also are eligible for incentives under the IRA.

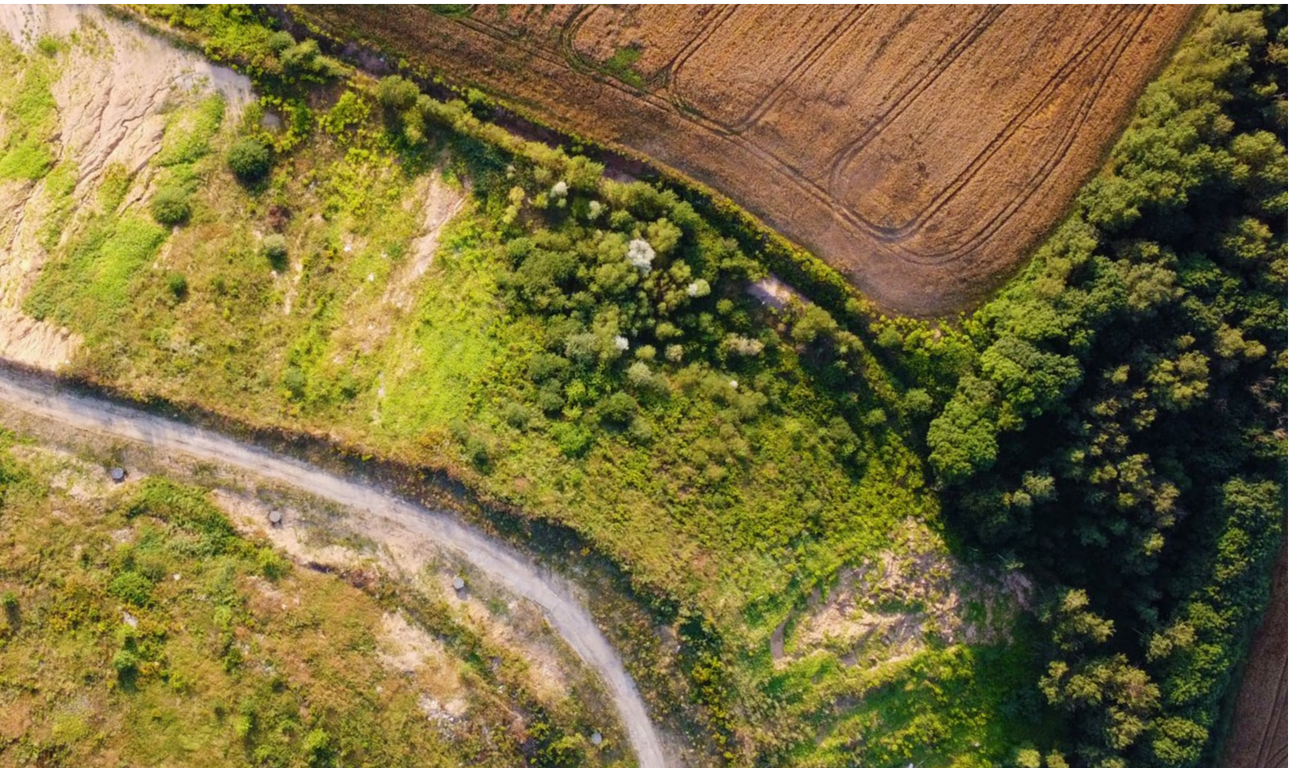
Energy management can be optimized further by connecting the microgrid to INNIO Group's myPlant Optimization offering. This self-learning digital platform takes a holistic approach, improving the operational efficiency of the entire plant portfolio—from engine and heat pump to heat storage and the photovoltaic system—while taking operational requirements and annual targets into account.

3.4 Landfill and other renewable gases solutions

Landfill gas is a high-value fuel that can be harnessed effectively for power generation in engines. Landfill gas treatment processes increase methane and reduce CO_2, N_2, and O_2. The result: a high-BTU gas called renewable natural gas (RNG) that can be used on site or added to pipelines. Biomass and municipal solid gas are also incentivized to produce clean electricity. For use in engines, however, biomass and municipal solid waste must be converted to a methane-containing gas rather than be used in direct combustion. For rates and eligibility, see Section 1.4.

For more than 30 years, INNIO Group has been using landfill gas to generate power economically, efficiently, and reliably—and optionally capturing thermal energy through a Jenbacher CHP solution. The Jenbacher landfill gas product line supports an electrical power output from 330 kW up to 3.1 MW per unit. INNIO Group has installed more than 2,700 landfill gas projects worldwide, with over 2,900 MW of total electricity output globally.

- **Each kWh of electricity produced from landfill gas qualifies for PTC**
- Landfill gas CHP systems, for example, can elect either the ITC or the PTC
- Unfortunately, the PTC and ITC **credits cannot be combined**
- Biomass and municipal solid waste also qualify for the PTC



3.5 "Ready for H_2" solutions

All new Jenbacher power plants are "Ready for H_2". In addition, engine versions with a corresponding option can be operated with up to 25% (vol) of H_2 in the pipeline gas. As hydrogen availability increases, all new plants and most of the currently installed Jenbacher natural gas-powered engines can be converted to run on 100% hydrogen. As of today, Jenbacher Type 4 engines—with an approximate electrical output of 800 kW to 1.5 MW—are available for operation with 100% hydrogen or mixtures of natural gas and hydrogen.

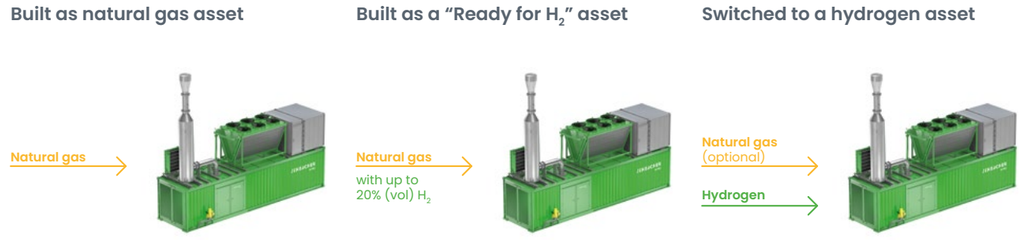


Figure 7: Demand-oriented conversion of INNIO Group's Jenbacher engines to hydrogen operation

LITERATURE

LITERATURE

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H.R.5376 - Inflation Reduction Act of 2022 (https://www.congress.gov/bill/117th-congress/house-bill/5376)

IRS Notice 2013-29 and subsequent amendments (Beginning of construction for purposes of the renewable electricity production tax credit and energy investment tax credit)

IRS Notice 2022-61 (guidance on the prevailing wage and apprenticeship requirements)

IRS Notice 2023-29 (regulations for determining what constitutes an energy community as defined in § 45(b)(11)(B) and as adopted by §§ 45Y(g)(7), 48(a)(14), and 48E(a)(3)(A) and for determining whether a qualified facility, an energy project, or an energy storage technology is located in an energy community)

IRS Notice 2023-38 (rules that taxpayers must satisfy to qualify for the domestic content bonus credit amounts under §§ 45, 45Y, 48, and 48E of the Internal Revenue Code)

New energy outlook U.S. net zero needs another policy push, BloombergNEF, 2023

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About INNIO Group

JENBACHER

INNIO Group is a leading energy solution and service provider that empowers industries and communities to make sustainable energy work today. With its product brands Jenbacher and Waukesha and its digital platform myPlant, INNIO offers innovative solutions for the power generation and compression segments that help industries and communities generate and manage energy sustainably while navigating the fast-changing landscape of traditional and green energy sources. INNIO is individual in scope, but global in scale. With its flexible, scalable, and resilient energy solutions and services, INNIO enables its customers to manage the energy transition along the energy value chain wherever they are in their transition journey.

INNIO is headquartered in Jenbach (Austria), with other primary operations in Waukesha (Wisconsin, U.S.) and Welland (Ontario, Canada). A team of more than 4,000 experts provides life-cycle support to INNIO's more than 55,000 delivered engines globally through a service network in more than 100 countries.

In March 2023, INNIO's ESG rating ranked first out of more than 500 companies worldwide in the machinery industry assessed by Sustainalytics.

For more information, visit the INNIO website at
www.innio.com

Follow INNIO Group and its brands on 𝕏 (formerly known as Twitter) and in.

ready for H_2

ENERGY SOLUTIONS.
EVERYWHERE, EVERY TIME.

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The information in this white paper may change as new Internal Revenue Service (IRS) guidance is released. INNIO assumes no warranty whatsoever for subsidies and tax rebates. All information is based on assumptions and varies according to individual circumstances.

In general, "Ready for H_2" Jenbacher units can be converted to operate on up to 100% hydrogen in the future. Details on the cost and timeline for a future conversion may vary and need to be clarified individually.

"Optimization/optimize" refers to the automatically generated recommendations for action by the myPlant energy management solution to improve the status quo of electricity trading and resource-efficient plant operation.

Jenbacher is part of the INNIO Group

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PLATINUM Top 1% 2023 ecovadis Sustainability Rating

SUSTAINALYTICS 2023 ESG INDUSTRY TOP RATED