



ELECTRIFICATION OF THINGS (EoT) WITH THERMON

European Regulation and Incentives

In Europe, several countries are actively leveraging carbon emissions credits and incentives to promote the transition to low-carbon technologies. Germany, for instance, has robust policies under the EU ETS and offers additional national subsidies for energy-efficient upgrades. The United Kingdom, though no longer part of the EU, has its own emissions trading scheme (UK ETS) that mirrors the EU's system and supports projects that reduce carbon emissions. Italy and Spain both utilize the EU ETS and provide national grants and tax incentives to encourage industrial decarbonization and the adoption of renewable energy technologies. The Netherlands is a strong proponent of carbon capture and storage (CCS) projects and offers substantial financial incentives for such initiatives. Sweden and Denmark are leaders in renewable energy, with policies that favor electrification and energy efficiency improvements, supported by national and EU funds. Belgium and Austria similarly support industrial emissions reductions through the EU ETS and national subsidy programs. Even the laggards, like Poland, while heavily reliant on coal, is increasingly investing in cleaner technologies and leveraging EU funds to support its transition to a low-carbon economy. These countries collectively showcase Europe's comprehensive approach to reducing greenhouse gas emissions through a combination of regulatory frameworks and financial incentives. The pathway to decarbonization doesn't take too many exhaustive steps, but collaboration and focus.

Steps to Qualify for Credits and Incentives

1. **Project Documentation:** Detailed documentation of the project, including the baseline emissions from the existing fossil-fired technology and the projected emissions from the new electric equipment.
2. **Energy Audits and Assessments:** Conduct an energy audit to quantify the emissions reduction and energy savings from the retrofit.
3. **Application for ESCs:** Submit an application for Energy Savings Certificates, demonstrating the energy savings achieved through the electric boiler installation.
4. **EU ETS Reporting:** Ensure accurate reporting of reduced emissions to benefit from lower allowance requirements under the EU ETS.
5. **Grant Applications:** Apply for relevant national or regional subsidies and grants to support the project.



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Country Specific Programs and Incentives

Finding incentive programs in Europe can be a difficult and confusing process, given the multiple jurisdictions and regulatory agencies. To help, Thermon has created a detailed list of programs and incentives available for each country. If a country you are hoping to support is not on this list, please reach out to a Thermon representative in your country or region for a custom report and guide for taking advantage of the subsidies and incentives for your next electrification project with Thermon.



Germany

Germany offers a comprehensive range of programs and incentives to reduce carbon emissions and promote climate action. Key initiatives include:

- **CO2 Pricing:** Companies trading in fossil fuels like heating oil, gas, petrol, or diesel must pay a CO2 price, starting from €25 per tonne in 2021, rising to between €55 and €65 per tonne by 2026. This revenue is reinvested in climate action measures and returned to citizens to offset higher costs ([Bundereg Info](#)) ([Clean Energy Wire](#)).
- **Renewable Energy Support:** Germany aims to generate 65% of its electricity from renewable sources by 2030, with substantial investments in wind and solar power. Specific reforms include the Renewable Energy Act, which sets capacity targets for onshore and offshore wind, and solar power ([Clean Energy Wire](#)).
- **Building Efficiency:** The Building Energy Act mandates that new heating systems installed from the mid-2020s must use at least 65% renewable energy. Additional support is available for energy-efficient construction and renovations, including higher loans and tax breaks for homeowners ([Clean Energy Wire](#)).
- **Industry Decarbonization:** Germany supports energy-intensive industries in transitioning to climate-friendly production through various programs. These include Carbon Contracts for Difference (CCfD) to incentivize low-emission technologies, and substantial investments in hydrogen projects ([Clean Energy Wire](#)).
- **National Climate Initiative (NKI):** This program funds local climate action projects, having invested nearly one billion euros in over 28,750 projects, leveraging substantial additional investments ([Bundereg Info](#)).
- **Coal Phase-Out:** Germany plans to phase out coal by 2038, with support for affected regions to manage structural changes. The legislative framework for this transition includes accelerated development of renewable energy sources ([Bundereg Info](#)).
- **Energy-Efficient Buildings:** Financial incentives are available for energy-efficient buildings, including payments for replacing old oil heating systems and increased subsidies for energy-efficient construction ([Bundereg Info](#)).

These programs collectively aim to achieve significant reductions in greenhouse gas emissions, promote renewable energy, and ensure a sustainable energy transition in Germany.



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UNITED KINGDOM

The UK, like many nations, is actively seeking ways to reduce its carbon footprint. However, it is a bit behind the curve of those connected to the EU and their ETS foundation. Carbon credits have emerged as a valuable tool in this fight, offering both financial incentives and environmental benefits. Here's a concise breakdown of the current mechanisms and options for carbon credits in the UK:

- **Woodland Carbon Code (WCC):** This standard focuses on woodland creation and peatland restoration, encouraging projects that sequester carbon through tree planting and peatland regeneration.
- **Peatland Code (PC):** This code specifically targets the restoration of degraded peatlands, which release significant amounts of CO₂ when damaged.

These standards ensure that projects generating carbon credits adhere to stringent regulations, guaranteeing the legitimacy and permanence of the carbon storage.

The UK offers two primary avenues for trading carbon credits:

- **Compliance Market:** This market caters to entities legally obligated to reduce their carbon emissions. They can purchase credits from certified projects to offset their footprint and meet regulatory requirements. The UK Emissions Trading Scheme (UK ETS) is currently under development and is expected to become a key player in this market.
- **Voluntary Carbon Market (VCM):** This market caters to individuals and organizations seeking to voluntarily offset their carbon footprint beyond regulatory requirements. The VCM offers greater flexibility in choosing projects that align with specific environmental goals, such as renewable energy development or forest conservation.
- As of September 1, 2024, a revised VAT (Value Added Tax) treatment comes into effect for the VCM. This update eliminates VAT on transactions involving taxable voluntary carbon credits traded on terminal markets, making participation in the VCM more financially attractive.



Carbon credits provide a valuable tool for the UK's decarbonization efforts. They incentivize investment in clean technologies and practices that reduce emissions, while also offering financial rewards for entities implementing these solutions. However, ensuring the legitimacy and permanence of carbon storage remains crucial. The development of the UK ETS and the ongoing evolution of the VCM are promising signs for the future of carbon credits in the UK. These mechanisms, coupled with robust domestic carbon standards, can play a significant role in the nation's pursuit of a sustainable future.



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FRANCE

France has specific programs and incentives aimed at reducing carbon emissions and promoting energy efficiency:

- **Energy Savings Certificates (ESC or CEE - Certificats d'Économies d'Énergie):** This program incentivizes energy-saving projects. Replacing a fossil fuel boiler with an electric boiler qualifies for ESCs, which can be sold or used to meet regulatory requirements. Businesses can earn certificates by demonstrating the energy savings achieved through the retrofit.
- **Subsidies and Grants:** Various national and regional subsidies are available for businesses that invest in energy-efficient and low-carbon technologies. These can help offset the initial investment costs of replacing a fossil fuel boiler with an electric one.
- **ADEME Programs:** The French Environment and Energy Management Agency (ADEME) offers support and funding for projects that reduce greenhouse gas emissions and improve energy efficiency. Companies can apply for grants and technical assistance from ADEME for such initiatives.

NETHERLANDS

The Netherlands, a champion of sustainability, is actively exploring carbon credits as a tool to combat climate change. These tradable units, representing the avoidance or removal of a tonne of CO₂, offer a market-based solution for emissions reduction. Let's delve into the current mechanisms and options for carbon credits in the Netherlands.

While the Netherlands primarily focuses on developing carbon capture and storage (CCS) networks, recognition is growing for Carbon Dioxide Removal (CDR) projects as a viable strategy. The Dutch Climate Act sets ambitious goals: a 55% reduction in greenhouse gas emissions by 2030 and complete climate neutrality by 2050. Several large-scale CCS projects are underway, and the Stimulation of Sustainable Energy Production and Climate Transition (SDE++) scheme provides subsidies that could potentially apply to CCS-based CDR projects like BECCS (Bioenergy with Carbon Capture and Storage) and DACCS (Direct Air Capture and Carbon Storage).

The Netherlands currently lacks a dedicated national carbon credit trading scheme. However, Dutch entities can participate in two established international markets:

- **The EU Emissions Trading System (EU ETS):** This is the world's largest carbon market covering a significant portion of Dutch emissions. The EU ETS operates on a cap-and-trade principle, setting a limit on total emissions and allowing companies to buy and sell permits to emit within that limit.
- **The Voluntary Carbon Market (VCM):** This global market allows companies and individuals to voluntarily offset their carbon footprint beyond regulatory requirements. The VCM offers a wider variety of carbon offset projects, such as renewable energy projects, forestry initiatives, and soil carbon sequestration.





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NETHERLANDS (Continued)

Despite the lack of a dedicated national scheme, interesting developments are taking place within the Netherlands:

- **Rabobank Carbon Bank:** This initiative represents a pioneering effort by a Dutch bank to sell carbon credits generated by Dutch farmers who adopt sustainable practices like reduced tillage and cover cropping. These practices store carbon in the soil, leading to emission reductions.
- **Dutch Research Centre Offset Project:** A Dutch research center recently partnered with a UK-based carbon removal company to offset employee travel emissions through a rewilding project in the UK. This project highlights the growing interest in nature-based solutions for carbon removal.

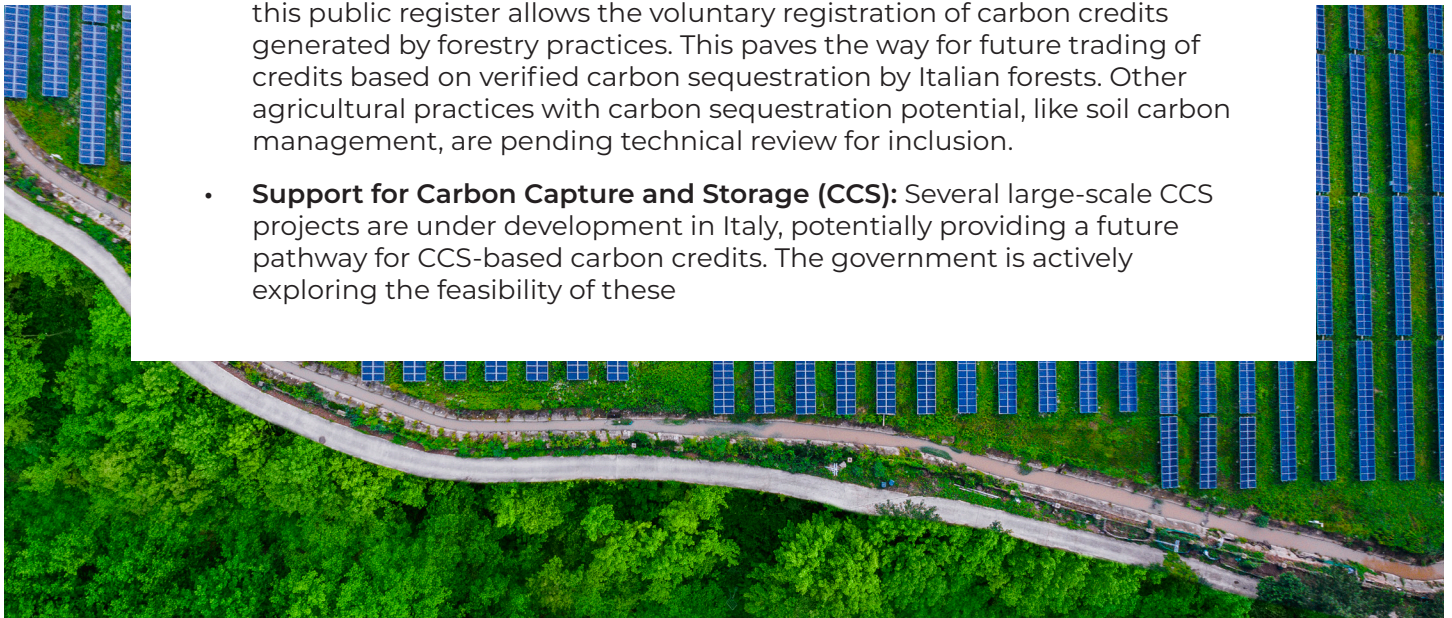
The Dutch carbon credit landscape is evolving rapidly. As the EU ETS strengthens and the VCM continues to grow, Dutch companies and individuals will have increasing opportunities to participate in carbon offsetting. With continued innovation in carbon removal projects and supportive policy frameworks, carbon credits can be a powerful tool in the Netherlands' path towards a sustainable future.

ITALY

Italy, a nation renowned for its cultural and historical treasures, is also taking strides towards a more sustainable future. Carbon credits, tradable units representing the avoidance or removal of greenhouse gas emissions, are emerging as a critical tool in this fight. Let's explore the current mechanisms and options available in Italy's carbon credit landscape.

Italy is currently fostering the development of a legal framework for carbon removal projects. While the nation lacks a dedicated national carbon credit trading scheme, policy changes signal a shift towards a more robust system.

- **Public Register for National Agroforestry Credits:** Established in 2023, this public register allows the voluntary registration of carbon credits generated by forestry practices. This paves the way for future trading of credits based on verified carbon sequestration by Italian forests. Other agricultural practices with carbon sequestration potential, like soil carbon management, are pending technical review for inclusion.
- **Support for Carbon Capture and Storage (CCS):** Several large-scale CCS projects are under development in Italy, potentially providing a future pathway for CCS-based carbon credits. The government is actively exploring the feasibility of these





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Case Study Example

This case study examines the potential environmental and economic benefits of replacing a 25MW gas-fired boiler (90MM kJ/hr) with a new electrode boiler powered by renewable electricity at Company X. The analysis focuses on the European Union Emissions Trading System (EU ETS) as a mechanism for monetizing the avoided carbon emissions achieved through electrification. Additionally, the study explores the potential cost savings associated with reduced fuel consumption and maintenance requirements.

- **Background:** Company X currently operates a 25MW gas-fired boiler to meet its industrial heating needs. However, the company is committed to reducing its environmental footprint and exploring more sustainable heating solutions. This study investigates the feasibility of transitioning from a fossil fuel-based system to a cleaner alternative – an electrode boiler powered by renewable electricity.
- **Proposed Project:** The proposed project involves retrofitting the existing gas-fired boiler with a new 25MW electrode boiler. This electric boiler utilizes electrical resistance to directly heat water, eliminating the need for fossil fuel combustion and associated emissions. The electricity powering the electrode boiler will be sourced from renewable sources, further minimizing the environmental impact.
- **Operational Profile:**
 - Boiler Size: 25MW heat duty
 - Operational Hours: 10 hours per day
 - Operational Days: 6 days per week
- **Emission Reduction and EU ETS Benefits:** The transition from a gas-fired boiler to an electrode boiler powered by renewable electricity will have a significant positive impact on Company X's carbon footprint. By eliminating the direct combustion of natural gas, the project will drastically reduce greenhouse gas emissions, particularly carbon dioxide (CO₂).
- **Quantifying Emission Reduction:**
 - Average natural gas emission factor: 56.1 kg CO₂/GJ (source: European Environment Agency)
 - Annual boiler operation: 10 hours/day * 6 days/week * 52 weeks/year = 3120 hours/year
 - Annual fuel consumption: 25MW (heat duty) * 3120 hours/year = 78,000 MWh/year
 - Annual CO₂ emissions reduction: 78,000 MWh/year * 56.1 kg CO₂/GJ * (1 GJ / 3.6 MWh) = 1,104,722 kg CO₂/year (or 1,105 tonnes CO₂/year)



The EU ETS allows companies to trade emission allowances. One allowance represents the right to emit one tonne of CO₂. By reducing their emissions through the electrification project, Company X will generate carbon credits equivalent to the avoided CO₂ emissions (approximately 1,105 tonnes CO₂/year).



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- **Monetizing Carbon Credits:** The price of carbon credits within the EU ETS fluctuates based on market demand. Using the current price of €68.34 per tonne CO₂ (as of July 11, 2024), the annual revenue generated from carbon credits could be:
 - **Annual carbon credit revenue:** 1,105 tonnes CO₂/year * €68.34/tonne CO₂ = €75,581.70/year
 - **Cost Savings from Electrification:** Replacing the gas-fired boiler with an electrode boiler presents potential cost savings in several areas (assumptions included):
 - **Natural Gas Price:** €8.00 per MWh (source: illustrative price, actual prices may vary)
 - **Electricity Price:** €0.10 per kWh (source: illustrative price, actual prices may vary)
 - **Maintenance Cost Reduction:** Estimated at 40% lower for electrode boiler compared to gas-fired boiler.
- **Potential Savings:**
 - **Reduced Fuel Costs:** The project eliminates reliance on natural gas, with potential annual savings of 78,000 MWh/year * €8.00/MWh = €624,000/year
 - **Lower Maintenance Costs:** Assuming a current annual maintenance cost of €60,000 for the gas-fired boiler, a 40% reduction translates to potential annual savings of €24,000.
 - **Potential Efficiency Gains:** While detailed analysis is required, assuming a 5% improvement in energy efficiency with the electrode boiler translates to potential savings of: 78,000 MWh/year * 5% = 3,900 MWh/year.
- **Applying the electricity price:** 3,900 MWh/year * €0.10/kWh = €390,000

Summary

The European Union Emissions Trading System (EU ETS) offers a powerful incentive for businesses to embrace cleaner technologies. By electrifying their operations, companies can significantly reduce their carbon footprint, a move that translates to financial benefits. Transitioning from fossil fuel-based systems to electric alternatives, like electric boilers powered by renewable energy, allows companies to generate tradable carbon credits within the EU ETS. These credits hold real market value, potentially generating substantial revenue streams. Additionally, electrification offers cost savings through reduced fuel consumption, lower maintenance requirements for electric systems compared to traditional boilers, and potential efficiency gains. While initial investments are a factor to consider, the combination of environmental

responsibility, financial rewards from the EU ETS, and potential cost savings make electrification a compelling path for businesses seeking sustainable and cost-effective solutions. For specific eligibility and applications, consulting with energy consultants or environmental specialists is advisable. Thermon is happy to support your electrification goals and put you in touch with key partners, consultants, or stakeholders in your geography.

