EU-CHINA ENERGY MAGAZINE

2025 JULY ISSUE

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EU-China Energy Cooperation Platform

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About ECECP

EU-China Energy Cooperation Platform was launched on 15 May 2019.

The overall objective of ECECP is to

'enhance EU-China cooperation on energy. In line with the EU's Energy Union, the Clean Energy for All European initiative, the Paris Agreement on Climate Change and the EU's Global Strategy, this enhanced cooperation will help increase mutual trust and understanding between EU and China and contribute to a global transition towards clean energy on the basis of a common vision of a sustainable, reliable and secure energy system.'

Phase I of ECECP (2018 – 2021) was implemented by a consortium led by ICF, with National Development and Reform Commission – Energy Research Institute and CECEP Consulting Company.

Phase II (2021 – 2023) was implemented by a consortium led by ICF, and with National Development and Reform Commission- Energy Research Institute.

Phase III (2024 – 2029) is implemented by a consortium led by GOPA Worldwide Consultants and with GIZ.

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ECEC

Dear All,

I introduce the latest issue of the EU-China Magazine with a renewed sense of purpose, following the 12th EU-China Energy Dialogue held in Beijing on 14 July. The joint readout from the Dialogue between Mr Wang Hongzhi, Administrator of the National Energy Administration of the People's Republic of China, and Mr Dan Jørgensen, European Commissioner for Energy and Housing, reaffirmed the overarching objective of EU-China bilateral cooperation: to expedite the global transition to clean energy.

The discussions at the Dialogue, which covered the acceleration of the energy transition, ensuring energy security, and designing efficient energy markets, are mirrored in the articles we have curated for you in this July edition.

In line with the Dialogue's emphasis on accelerating the energy transition, this issue focuses on one of the most challenging yet crucial areas: decarbonising the industrial sector. In our Policy Updates section, we explore the EU Clean Industrial Deal, a recent key comprehensive strategy aimed at fostering a sustainable and competitive industrial sector through its six pillars. We also delve into the EU's proposed ambitious climate target of cutting emissions by 90% by 2040, unpacking the rationale behind this crucial step and its alignment with industrial growth.

Our Innovation Spotlight features an analysis by the Regulatory Assistance Project (RAP), which examines the promising potential of electro-thermal energy storage (ETES) for electrifying industrial process heat. Its deployment could significantly enhance demand-side flexibility in the energy system. Complementing this, a commentary by the IEA underscores how industrial facilities can achieve substantial savings and contribute to global energy efficiency goals by implementing robust energy management systems. Additionally, an insightful opinion piece highlights how China is 'financing green' to support its green transformation.

As we reflect on the outcomes of the EU-China Energy Dialogue, the EU-China Energy Cooperation Platform (ECECP) continues to play its role in facilitating essential conversations and collaboration. The articles in this magazine offer a deeper understanding of the policies, market mechanisms, and technological innovations that are steering both the EU and China towards a sustainable energy future.

Dr. Flora Kan
ECECP Team Leader
28 July 2025

NEWS IN BRIEF

Click on the headlines to learn more.

ECECP highlight some recent key energy news headlines in the EU and China

EUROPE NEWS

Policy Initiatives

EU: New methodology for low-carbon hydrogen and fuels

The European Commission has introduced a new greenhouse gas emissions methodology for low-carbon hydrogen and fuels, as outlined in the Hydrogen and Gas Market Directive. This methodology complements those for renewable hydrogen and renewable fuels of non-biological origin (RFNBOs), thereby completing the EU's regulatory framework for hydrogen. The move aims to provide legal clarity, attract investment, and accelerate clean hydrogen deployment across sectors like aviation, shipping, and industry.

EU: New guidance to accelerate clean energy and cut power bills

The European Commission has released new guidance to help EU countries reduce electricity costs and speed up the clean energy transition. The package includes recommendations to support the roll-out of innovative renewable energy technologies such as floating solar and ocean energy, faster procedures for grids and storage developments, as well as the design of future-proof power grid tariffs. This move supports the revised Renewable Energy Directive and the reform of Electricity Market Design, as well as the EU's Affordable Energy Action Plan, all of which aim to boost energy independence and cut energy bills across the bloc.

EU: New regulation package for energy efficiency and decarbonisation of the building sector

The European Commission has released a package of documents to support EU countries implementing the Energy Performance of Buildings Directive (EPBD), in a bid to strengthen energy independence, lower energy bills, and lower grid investment needs. The package will also help the EU to achieve its energy efficiency goal of reducing energy consumption by 11.7% by 2030 and stimulate the roll-out of renewables in buildings. Moreover, it should create a stable environment for investment decisions and make the EU's construction industry and cleantech companies more competitive.

EU: Budget proposal opens door to nuclear energy funding

The European Commission's EUR 2 trillion EU budget proposal for 2028-34 includes nuclear power as an eligible activity for a national share of the budget, allowing funding for new or additional fission energy capacity installed in GW. Given that conventional nuclear projects have hitherto been excluded, this marks a major policy shift. With EUR 865 billion in national funding at stake, the proposal sets the stage for contentious negotiations among Member State over the EU's energy future. However, the proposal is not necessarily final and will have be negotiated by the co-legislators.

Greece: First dedicated law to support green hydrogen

The Greek government has passed the country's first dedicated hydrogen law, establishing a framework designed to license, certify and support the production of green hydrogen. The Law introduces a Hydrogen Producer Certificate (HPC) – a primary requirement for anyone building a hydrogen production plant in Greece, which will be valid for 25 years. The law aligns with the EU's Renewable Fuels of Non-Biological Origin (RFNBO) certification. Green hydrogen production must demonstrate additionality, temporal correlation, and geographical correlation. The certification will be issued by DAPEEP, Greece's designated Guarantees of Origin authority.

Market / Business

EU: Energy and Raw Materials Platform launched
The European Commission has launched the EU Energy and Raw Materials Platform, aiming to strengthen industrial competitiveness and accelerate the decarbonisation of Europe's energy system. The online platform will help EU companies efficiently source hydrogen, raw materials, gas, and biomethane by matching and aggregating demand and supply. The Hydrogen Mechanism is the first to go live, and will support the development of renewable and low-carbon hydrogen and its derivatives including ammonia, methanol, and eSAF by matching supply and demand. The first matching round is scheduled for September 2025.

EU: Solar becomes EU's largest electricity source for the first time
New data from energy think tank Ember shows that solar accounted for 22.1% of the EU's electricity mix in June 2025, narrowly overtaking nuclear, and far outpacing fossil fuels. At least 13 Member State hit monthly solar power records, including the Netherlands (40.5%) and Greece (35.1%), thanks to a surge in capacity and a stretch of sunny weather. The shift also helped the EU manage a spike in energy demand driven by the early-summer heatwaves that continue to batter the continent.

France: Lifespan extension of 20 nuclear reactors approved by regulator
France's nuclear regulator ASN has approved extending the lifespan of 20 EDF-operated 1 300 MW reactors from 40 to 50 years, following safety standard enhancements. These reactors, Commissioned between 1984 and 1994, supply over 40% of France's nuclear power. EDF will invest EUR 6 billion to extend their operational life. Preparatory work on the first of the reactors had already begun last year. The move aligns with France's 2030 energy strategy, which includes extending the lifetime of existing nuclear reactors and a recovery plan for nuclear power.

Equinor and BASF sign 10-year natural gas supply deal
European chemicals giant BASF and Norway's Equinor have entered into a long-term strategic agreement for the supply of up to 2 bcm/year of natural gas over a ten-year period. The contract will cover a significant portion of BASF's natural gas requirements in Europe. Deliveries are set to begin on 1 October 2025, with the gas sourced from Norway.

Technology Innovation

ENTSO-E and DSO Entity launch new data interoperability repository

European associations for transmission system operators (ENTSO-E) and distribution system operators (DSO Entity) have launched a Joint Working Group (JWG) Data Interoperability Repository, a new digital platform designed to support transparent, harmonised access to electricity data across Europe. The platform offers a central access point to national implementation reports from Member State on interoperability requirements, EU reference models and technical documentation, and outputs from Task Force 3, which supports the development of harmonised data models and alignment with standardisation efforts. Open to all energy sector stakeholders, the platform ensures secure, simple, and non-discriminatory access to key electricity data resources, representing a major step towards a digital, decentralised, and decarbonised electricity system.

EU: SPECTRUM Project to develop next-generation hybrid solar technologies

The newly-launched Horizon Europe-backed SPECTRUM Project aims to revolutionise solar technologies by developing next-generation hybrid systems that combine electricity, heat, and hydrogen production to support industrial sustainability and decarbonisation efforts. By harnessing the full solar spectrum through spectral splitting to optimise the conversion of solar energy into multiple energy vectors, the project will significantly enhance energy efficiency, while supporting the circular economy through industrial wastewater treatment. The 42-month project will develop and test prototypes of hybrid solar collectors and assess their economic feasibility.

Sweden: Innovative waste-to-circular hydrogen project secures EU funding

Swedish clean tech firm Plagazi AB has secured a EUR 29.5 million grant from the EU Innovation Fund for its Gävle Circular Park project. Set to launch in 2028, the facility will convert 66 000 tonnes of non-recyclable waste annually into 12 000 tonnes of circular hydrogen and supply 10MW of district heating. Plagazi designs and builds plasma gasification plants using a patented process and InEnTec-supplied plasma gasification technology to turn non-recyclable waste into circular hydrogen and captured, liquid CO_2, which can be used to decarbonise both industry and transport sectors.

Projects Investments

EU: Boost to clean energy with EUR 3.66 billion EIB funding

The European Commission and the European Investment Bank have announced a EUR 3.66 billion disbursement from the EU's Modernisation Fund to support 34 energy projects across nine Member State. Funded by revenues from EU ETS, this marks the fund's largest disbursement to date, bringing total allocations to EUR 19.1 billion since January 2021. The selected projects, ranging from renewable energy, grid upgrades, energy efficiency, and clean transport, will support the modernisation of energy systems, strengthen the EU's industrial competitiveness, foster innovation and help to reduce fossil fuel imports. Greece has received funding for the first time following its inclusion in January 2024.

EU: EUR 852 million to support EV battery manufacturing

The European Commission has awarded EUR 852 million from the EU Innovation Fund to six pioneering electric vehicle battery cell projects located in France, Germany, Sweden, and Poland. Selected under the 2024 Battery Call, these projects aim to strengthen the EU's battery manufacturing industry, offering a combined annual production capacity of 56 GWh. The funding will cover both capital and operational expenditures, disbursed based on project milestones. All projects aim to be operational before 2030. Additional promising but less mature proposals may receive development assistance from the European Investment Bank.

EBRD, the EU and partners announce plan to boost renewables in Ukraine

A newly announced strategic initiative, the Ukraine Renewable Energy Risk Mitigation Mechanism (URMM), aims to accelerate renewable energy investments and support Ukraine to restore its power capacity while delivering secure and clean energy. The mechanism is designed to stabilise revenues for developers. Projects benefiting from the URMM will be selected through competitive auctions. Fundraising efforts are already underway, with the EU committing EUR 180 million under its Ukraine Investment Framework (UIF) and the Netherlands pledging EUR 12 million in grants. Germany, Norway, Sweden, and Switzerland are also considering support. Once operational, the mechanism could mobilise up to EUR 1.5 billion in investments to deploy 1 GW of new renewable energy capacity.

Italy: Renewable auction attracts 17.5 GW of solar project proposals

The Italian energy agency GSE has received 1 387 solar PV project proposals with a combined capacity of 17 537 MW as part of the first auction under the country's new incentive scheme for renewable energy (FER X programme). The same auction saw 93 wind project proposals totalling 2 878 MW. Prequalified project developers can submit final offers until 12 September 2025. As part of this auction, the country plans to award between 600 MW and 8 000 MW of solar capacity, with a target of 1 000 MW, and between 200 MW and 2 500 MW of wind capacity, targeting 300 MW.

Poland: Plan to regroup coal-fired assets abandoned

Poland has abandoned its plan to create the National Energy Security Agency (NABE), which would have taken over the country's coal-fired power plants. The decision follows concerns over a projected EUR 12.6 billion financial gap and doubts about EU approval of state support if coal assets were concentrated in a single entity. Instead, the government will reform the capacity market to ensure energy security and support cost-effective decarbonisation. The country will also support the development of flexibility market, and build new low-emission units that will ensure system security and generation adequacy.

CHINA NEWS

Policy Initiatives

China plans to develop zero-carbon industrial parks as part of green push

China has issued a new policy to develop zero-carbon industrial parks, signaling a key policy in support of localised, system-level decarbonisation. Released in June 2025 by the NDRC and two other agencies, the plan positions industrial parks as key testbeds for integrated decarbonisation solutions. It outlines eight priority tasks, including energy transition, emissions management, and technological innovation. Local governments have been asked to nominate up to two candidate parks by 22 August 2025, for inclusion in the first batch of national zero-carbon demonstration zones. While the policy provides clear direction and generous institutional support, challenges remain. These include aligning stakeholder incentives, ensuring data accuracy for carbon management, and translating demonstration success into scalable models.

China rolls out direct producer-to-user green power policy

China has announced the Green Electricity Direct Connection policy, which will enable renewable power producers to deliver electricity directly to end users, bypassing the public grid. The policy allows exporters to meet global clean energy requirements by enabling them to easily trace their green power source. It allows renewable energy plants to build private lines to supply specific users like factories, while permitting non-grid companies to invest in and build such grid infrastructure. Projects must use at least 60% of their green power on-site and source at least 30% of their total power needs via direct supply, with these ratios expected to increase over time.

New pilot program to boost hydrogen production and use

China NEA has launched a national hydrogen pilot program to accelerate the development of a full hydrogen value chain. According to the notice, selected projects and regions will test advanced technologies, key equipment, and cross-sector coordination models to support the hydrogen industry. Two types of pilots will be carried out: project-based pilots, led by enterprises to validate hydrogen technologies and equipment as well as replicable development models; and regional pilots, led by cities to explore coordinated governance, green value mechanisms, and integrated policy support. The initiative aims to foster diversified and scalable hydrogen development pathways to support hydrogen production, storage, transport, and use across China's energy system.

NEA launches pilot program to accelerate new power system breakthroughs

China NEA has initiated a pilot program to drive innovation in development of a new power system, focusing on cutting-edge technologies and models. Pilot projects will be carried out either at national hubs or in areas with good renewable resources. Initial efforts will target seven key areas including grid-forming technologies, system-friendly renewable power stations, smart mini grids, power-computing sector integration, virtual power plants, large-scale renewable power transmission, and new generation coal-fired power plants. NEA will evaluate the pilots and will revoke pilot project status for those that fail to make progress.

Market / Business

Power sector statistics of H1 2025 shows decline in capacity utilisation

China's total installed power generation capacity reached 3.65 TW by the end of June 2025, an 18.7% increase year-on-year, according to data from the National Energy Administration. Solar power capacity rose sharply to 1 100 GW, up by 54.2%, while wind power capacity grew by 22.7% to 570 GW. Despite a significant rise in renewable capacity, average utilisation hours of power generation equipment fell to 1 504 hours in the first half of the year, 162 hours lower than the same period in 2024.

China launches NEV promotional campaigns in rural regions

China is stepping up efforts to promote new energy vehicle (NEV) adoption in rural regions by improving the supporting ecosystem. Authorities will showcase reliable NEV models suited for rural use through exhibitions and test drives, while organising after-sales service providers, charging and battery-swap operators, and financial service firms to bring integrated support to the countryside. The initiative also encourages vehicle-grid integration to boost rural green development. Preferential policies such as tax exemptions, trade-in subsidies, and funding for charging infrastructure will be applied to spur carmakers to expand product offerings and services, ultimately driving up NEV uptake in rural markets.

State-backed fusion energy firm debuts in Shanghai

China has launched China Fusion Energy in Shanghai, its most ambitious commercial fusion venture to date, backed by a CNY 15 billion investment. Led by China National Nuclear Corporation (CNNC) with a 50.35% stake, the new firm, formerly known as China Nuclear Fuel Co. Ltd, focuses on magnetic-confinement fusion using tokamak technology. The company aims to build a full fusion power pipeline, from pilot and demonstration reactors to commercial power plants.

China takes further steps to regulate competition in NEV sector
Chinese government agencies held a meeting with new energy vehicle (NEV) industry players to strengthen oversight and promote fair competition. Led by the MIIT, NDRC, and State Administration for Market Regulation, the meeting emphasised lawful, honest, and well-ordered market practices. The authorities plan to monitor pricing, inspect product conformity, and shorten supplier payment terms. They have also pledged to accelerate development of standards for NEV energy efficiency and battery recycling safety, alongside establishing regular communication channels with manufacturers to address industry concerns.

China moves to curb disorderly coal production amid oversupply
China's National Energy Administration has announced a broad inspection campaign to rein in excessive coal output and restore market order, amid nationwide oversupply and falling prices during 2025. The move targets coal mines in eight key producing provinces, including Shanxi, Inner Mongolia, and Shaanxi, where some mines have exceeded approved output in an attempt to offset lower prices. The authorities stress that annual coal production must not surpass approved capacity, with monthly output capped at 110% of that limit. Violators will be subject to forced shutdowns and corrective action, as the government aims to stabilise the market.

China HBIS to supply green steel to Italy
Hebei Iron and Steel Group (HBIS) has recently signed a 10 000-ton export deal for green steel, with shipments to Italian end users set to begin in late August. This transaction marks China's largest green steel export deal to date and reflects the reaction of Chinese steelmakers to the EU's Carbon Border Adjustment Mechanism (CBAM). The steel is produced using a hydrogen-based process, resulting in a carbon footprint approximately 50% lower than that of traditional methods, and is accompanied by an internationally recognised Environmental Product Declaration (EPD) to certify its carbon reduction benefits.

Technology Innovation

Global energy interconnection standards issued to boost green development

The Global Energy Interconnection Development and Cooperation Organisation (GEIDCO) has released seven international standards aimed at advancing global green development. Announced at a launch event in Beijing, the standards cover areas such as new power system planning, onshore wind resource assessment, cross-border grid interconnection, and technical requirements for grid integration of PV power plants. Additional standards address testing of AC electrical equipment and control systems for pumped storage. Drawing on best practices and innovations from China and abroad, these standards mark a significant step towards global clean energy development and transnational power interconnection.

CHN Energy unveils world's first 100B-parameter AI model for power generation

China Energy Investment Corp (CHN Energy) has officially launched 'Qingyuan' (□□), the world's first 100-billion-parameter large AI model tailored for the power generation industry. The model is designed to address the sector's multi-scenario, highly complex, and deeply specialised needs. The model supports intelligent decision-making across power trading, production scheduling, equipment maintenance and safety management, marking a leap from experience-based operations to AI-driven intelligent management across China's power sector.

Envision launches world's largest green hydrogen-ammonia plant

Located in the Chifeng Net Zero Industrial Park in Inner Mongolia, this project is a world-first in delivering green ammonia at industrial scale. The facility, powered entirely by the largest off-grid renewable energy system, is a major leap forward in clean energy and industrial decarbonisation. Currently capable of producing 320 000 tonnes per year of green ammonia, the plant will be scaled up to 1.5 million tonnes a year by 2028, with exports expected to begin in late 2025. There is already a long-term offtake agreement with Marubeni Corporation, one of Japan's largest trading houses. The system uses AI to optimise electrolyser performance and converts surplus power into liquid nitrogen for stable operation. By using green ammonia as a transport and storage medium, Envision presents a scalable solution for hydrogen adoption in heavy industry. Its modular design offers a replicable model for clean industrial hubs globally.

Projects Investments

China releases 2025 catalogue of green finance-supported projects

China's financial regulators have released the 2025 edition of the green finance-supported project catalogue. The catalogue covers projects across a wide range of industries, including energy conservation and carbon reduction, environmental protection, resource recycling, green and low-carbon energy transition, ecological protection and restoration, green infrastructure upgrades, as well as green services and trade. It aims to enhance market liquidity, improve asset management efficiency, and lower evaluation costs. Serving as a key reference for green loans and bonds, the catalogue will take effect on 1 October 2025, supporting the 'Beautiful China' initiative (a concept first unveiled by the Chinese government in 2012).

China allocates CNY 4.19 billion renewable energy subsidies for 2025

China's Ministry of Finance has announced the allocation of CNY 4.19 billion in renewable energy subsidies for 2025, aimed at supporting wind, solar, and biomass power projects. The funds will be distributed to key regions including Inner Mongolia, Yunnan, and Xinjiang. According to the official notice, priority will be given to poverty-alleviation solar projects, distributed PV installations arranged by private individuals, and competitive-bidding solar schemes.

China starts work on world's largest hydropower plant

China has begun building the world's largest hydropower project on the Yarlung Tsangpo River in Linzhi, Tibet, with Premier Li Qiang attending the groundbreaking ceremony. The Motuo Hydropower Station features a dramatic 2 000 meter drop over 50 kilometers, offering vast hydropower potential. With a planned capacity of 60 GW—nearly triple that of the Three Gorges Dam—the CNY 1.2 trillion project aims to generate 300 TWh of electricity annually by 2035 with five cascade hydropower stations. The development has sparked regional concerns, particularly in India and Bangladesh, over potential downstream impacts.

Sinopec launches China's first industrial-scale offshore floating PV project

The project will be constructed in Sinopec's Qingdao hydrogen demonstration park. Spanning 60 000 square meters, the 7.5 MW facility will generate 16.7 GWh annually and will reduce carbon emissions by 14 000 tons. The seawater-based design adapts to tides, boosting efficiency by between 5% and 8%. The project features innovative salt-resistant materials, typhoon-resilient anchoring, and low-cost maintenance. Its pioneering dual-use design aligns with the company's broader strategy to integrate renewables and hydrogen. Sinopec plans to expand the floating PV capacity by an additional 23 MW, further enhancing its clean energy supply capabilities.

Shanghai Electric produces first batch of green methanol

Shanghai Electric has successfully produced green methanol at its integrated wind and biomass-based facility in Taonan, Jilin Province—the first commercial-scale project of its kind in China. The plant combines wind power and biomass gasification to create a closed-loop production system that turns agricultural and forestry waste into syngas, adds green hydrogen from wind energy, and synthesises methanol on-site. Certified under ISCC-EU standards, the facility is expected to produce 50 000 tonnes of green methanol in 2025, with plans to expand to 250 000 tonnes of e-methanol and 10 000 tonnes of green aviation fuel per year.

The EU Clean Industrial Deal

In this article, we give a brief overview of the main features of the Clean Industrial Deal, one of the key initiatives of the second Von der Leyen mandate, aimed at ensuring that the European industry can decarbonize its processes while regaining and maintaining competitiveness on the global stage. We do so by answering the following questions: What is the Clean Industrial Deal? Which policy areas does it cover? What are its six pillars?

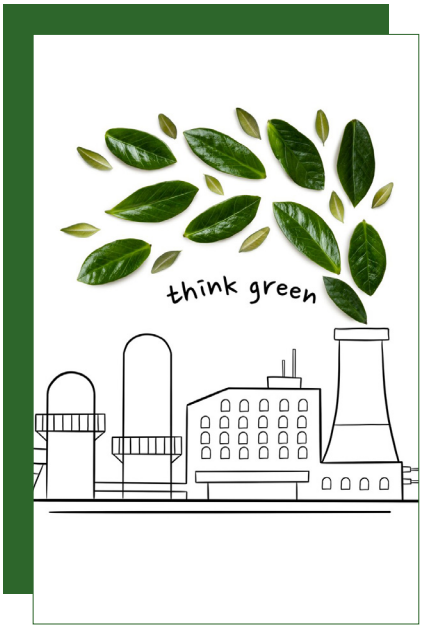
What is the Clean Industrial Deal?

On February 26th 2025, the European Commission (EC) published the Clean Industrial Deal, outlining concrete actions to transform the decarbonization process into a growth driver for the European industry. The Plan includes measures to reduce energy costs, create jobs and foster favourable conditions for business success.

In line with the Draghi Report, the Plan pays particular attention to two key elements:

- Energy-intensive industries such as steel, metals, and chemicals, which urgently need support to decarbonize their production processes and address global competition;
- The green technology sector, which is central to Europe's future competitiveness.

Besides these two elements, the Plan has a focus on circularity, aiming at reducing waste and extending the lifespan of goods and materials by promoting reuse, recycling, and sustainable production. Maximizing the use of currently limited productive resources within the European Union (EU) and reducing excessive reliance on raw material suppliers from non-EU countries is crucial for a competitive and resilient EU market.



Which policy areas does the Clean Industrial Deal cover?

The document about the Deal highlights six pillars of action:

- Affordable energy;
- Lead markets for clean industry;
- Public and private investments;
- Circular economy;
- Global markets and international partnerships;
- Skills and jobs for a just transition.

These areas of intervention need to be complemented by horizontal actions, such as reducing bureaucracy, leveraging the potential of the single market (including the gradual integration of EU candidate countries), promoting digitalization, accelerating innovation, and improving policy coordination at both national and EU levels.

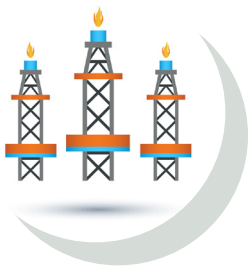
Which are the six pillars of the Clean Industrial Deal?

Pillar I – Access to affordable energy: how to ensure it?

Energy prices in Europe are significantly higher than those faced by industries in the United States and China; providing affordable energy is a fundamental condition for competitiveness, especially for energy-intensive sectors. To address this, along with the Clean Industrial Deal, an Action Plan for Affordable Energy was adopted, encompassing measures aimed at reducing costs for industries, businesses, and households. The plan includes the following three lines of intervention:

1. **Lowering energy bills**
   The starting point must be the full implementation of the measures introduced through the 2024 Electricity Market Design Reform and the promotion of energy efficiency. The 2024 reform encourages the adoption of long-term electricity power purchase agreements (PPAs) and contracts for difference (CfDs), which are essential for making clean energy production more accessible to industrial players. Furthermore, the Commission intends to simplify state aid rules to accelerate the deployment of renewable energy installations and ensure sufficient production capacity for clean technologies within Europe. Lastly, the European Grid Package is expected to simplify the construction and operation of trans-European energy networks, foster collaboration in planning and implementing cross-border projects, reduce the time needed to get permitting done, and promote network digitalization and innovation;

2. **Accelerating the roll-out of renewables, energy storage, grids and clean manufacturing**
   The Commission will support Member State in this process of transposition and implementation of the Renewable Energy Directive and, through the Industrial Decarbonisation Accelerator Act, will propose concrete measures to address bottlenecks caused by lengthy authorization procedures for renewable energy production for industrial uses while maintaining high environmental standards. An increased use of digital technologies to speed up procedures and increase time predictability will be promoted;



3. **Ensuring well-functioning gas markets**
   In February 2025, the Commission established a Gas Market Task Force to examine the functioning of the EU's natural gas market and, if necessary, adopt measures to optimize its functioning and prevent commercial practices that could distort prices based on demand-supply dynamics, drawing from the experience of the 2022 energy crisis.

Pillar II – Lead markets: how to boost clean supply and demand?

To ensure the attractiveness of the investments necessary for the green transition of the industrial sector, it is essential to promote the demand for decarbonized products and low-carbon technologies, creating a market for them. In this direction, the Commission aims, via the Industrial Decarbonisation Accelerator Act, to boost the demand for decarbonised products manufactured in the EU by introducing sustainability, circularity, and cybersecurity criteria into public and private procurement processes for energy-intensive economic sectors. The revision of the Public Procurement Framework will strengthen the attention to sustainability, resilience, and preference for European products in the EU's public procurement for strategic sectors, while also clarifying and consolidating interactions between related provisions in various legislative acts.

Finally, addressing the proliferation of different carbon accounting methodologies in the EU and internationally is necessary to avoid confusion for EU companies leading the development of cleaner products. In this direction, the Commission intends to simplify and harmonise carbon accounting methodologies as well as point out priority areas and the potential for simplification, harmonisation and robust verification.

Pillar III – Public and private investments: which measures to incentivise them?

The green transition of the European economy requires significant investments, both public and private, which in turn depend on long-term regulatory stability and effective coordination of national and European policies. The EU Multiannual Financial Framework (MFF 2028–2034) plays a key role in this regard.

Additionally, the Competitiveness Fund is seen by the EC as a tool providing support for innovation in the European industry, while other EU funding programs will enable substantial investments in infrastructure and connectivity necessary to complete the Energy Union. Furthermore, the Commission intends to adopt a Strategy for the Union of Savings and Investments to mobilize private capital and position Europe as a preferred destination for investments in industrial decarbonization and clean technologies.

Additionally, a proposal will be made to establish an Industrial Decarbonization Bank to provide EUR 100 billion in funding through the Innovation Fund, additional revenues from the Emissions Trading System (EU ETS), whose Directive will be revised in 2026, and a revision of the InvestEU Program to mobilize up to EUR 50 billion in further public and private investments. The Commission will also propose an amendment to the InvestEU Regulation to repurpose surpluses from the European Fund for Strategic Investments and unlock additional funds for major EU strategic priorities, such as modernizing industrial processes, producing and deploying clean technologies, financing energy infrastructure projects, green mobility, and reducing and recycling waste.

Lastly, the Commission aims at adopting a new State Aid Framework in the context of the Clean Industrial Deal, providing greater investment certainty for projects that contribute to its objectives while avoiding distortions of competition within the single market. It will also closely collaborate with Member State to facilitate the preparation of new European Projects of Common Interest that support industrial decarbonization.

Pillar IV – Powering the circular economy: which way to secure access to materials and resources?

According to the Deal, the EU should adopt a more strategic approach to sourcing raw materials and secondary materials in order to drastically reduce its reliance on unreliable third-country suppliers and avoid the risk of supply disruptions.

In March 2025, the Commission approved, under the Critical Raw Materials Regulation, an initial list of strategic projects to ensure the diversification of supplies across the entire production chain of specific technologies and to facilitate access to public and private financial support for these projects. An EU Critical Raw Material Centre will also be established to facilitate joint procurement on behalf of interested businesses, in collaboration with Member State.

Furthermore, although the EU industry proved a front runner in circularity, this leading role is currently hampered by a lack of scale and of a well-structured, operational single market for waste, secondary raw materials, reusable materials. Therefore, in 2026, a Circular Economy Act will be proposed to promote the free movement of reusable and recyclable products, secondary materials, and waste, while simultaneously boosting demand for them. One of the measures in the proposal will be a revision of the existing legal framework for waste from electrical and electronic equipment to simplify it and enhance the recovery of critical raw materials contained in it. Additionally, the responsibility of manufacturers regarding the disposal of their electronic products will be expanded and streamlined. In this context, the Commission also intends to initiate an Industrial Dialogue on Circularity to support the well-informed preparation of the legislative proposal.

Pillar V – Global markets and international partnerships: how to make the most out of them?

The EU's extensive network of trade agreements provides European businesses with privileged access to third-country markets and, consequently, to a broader choice of essential goods for production processes. It is, therefore, crucial for the Union to finalize and implement pending free trade agreements and continue negotiations for new ones. Green trade and investment partnerships will complement these agreements, being more tailored to the EU's and its partners' priority commercial interests. These efforts aim to better manage strategic dependencies and secure a prominent position for the EU in global supply chains which are critical to the energy transition.

Moreover, the Commission proposes to simplify the Carbon Border Adjustment Mechanism (CBAM) to reduce administrative burdens for industries and their supply chains while continuing to encourage global carbon pricing; additionally, the Commission aims at presenting a review report on CBAM, assessing its scope of application and a potential extension.

Regarding foreign investments in the Union, measures will be proposed to ensure these contribute more effectively to the EU industry's long-term competitiveness, economic resilience, and local job creation. For instance, for projects involving foreign investments in strategic sectors like the automotive industry or renewable energy, Member State will be encouraged to carefully consider conditions such as the EU origin of production factors, employment of EU-based personnel, and potential intellectual property transfers. Lastly, a guidance document clarifying key concepts under the Foreign Subsidies Regulation, detailing how the distortive effects of such subsidies on competition will be assessed, will be put forward by the European Commission.

Pillar VI – Skills and quality jobs: which actions to ensure social fairness and a just transition?

The European industry requires a skilled workforce and must offer adequate working conditions to attract it. Keeping workers and local communities at the centre of the industrial transformation while harnessing and further developing the necessary skills is crucial for the success of the green transition.

The Commission has introduced the Union of Skills as a comprehensive strategy to equip workers with the skills they need to enter and remain in the labour market, while ensuring employers have access to the profiles they require. EU's support models via sector-specific skills initiatives (including the Academies, the Pact for Skills, the Alliance for Apprenticeships and Centres of Vocational Excellence) will be reviewed to optimize the European landscape for strengthening sectoral skills in strategic industries tied to the Clean Industrial Deal. Additionally, a Quality Jobs Roadmap will be developed to assist Member State and industries in ensuring decent working conditions, high standards of health and safety, access to continuous training, and fair occupational transitions for both employed and self-employed workers.

By **Sofia Nicolai** and **Nicolò Rossetto**

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The European Commission has set out a proposal to cut EU emissions 90% by 2040, with up to 3% coming via carbon credits purchased from other countries.

In a proposed amendment to EU climate legislation, the Commission has laid out what it calls a 'new way to get to 2040', including 'flexibilities' to ease the burden on Member State.

Besides the limited use of carbon credits, the proposal also gives a potentially larger role to carbon dioxide (CO_2) removal technologies and leaves the door open for weaker sectoral goals.

It has drawn criticism from climate NGOs and left-leaning European politicians, who argue that it 'waters down' the EU's climate ambitions and presents 'considerable risks'.

Q&A: European Commission's proposal to cut EU emissions 90% by 2040

Yet, the proposal is seen by many as an acceptable compromise option, following strong pushback from many Member State to the 90% target, originally proposed last year.

With all nations expected to come forward with new international climate targets for 2035 by September and ahead of the COP30 climate summit, the 2040 goal will also be crucial in determining where the EU's pledge lands.

In this Q&A, Carbon Brief outlines what the amendment proposed by the Commission includes, why it has proved controversial and what is expected to happen next.

What has the European Commission proposed?

The European Commission has proposed an amendment to the EU Climate Law, which would set a target for a 90% reduction in net greenhouse gas (GHG) emissions by 2040, compared to 1990 levels.

It will 'give certainty to investors, innovation, strengthen industrial leadership of our businesses and increase Europe's energy security', the Commission says.

In a statement, Ursula von der Leyen, president of the European Commission, added:

'As European citizens increasingly feel the impact of climate change, they expect Europe to act. Industry and investors look to us to set a predictable direction of travel. Today we show that we stand firmly by our commitment to decarbonise [the] European economy by 2050. The goal is clear, the journey is pragmatic and realistic.'

The proposal includes new 'flexibilities', such as a limited role for 'high-quality international credits' from 2036, the use of domestic permanent emissions removals within the EU Emissions Trading System (EU ETS) and additional flexibilities across certain hard-to-decarbonise sectors.

These additional flexibilities are designed to allow countries to meet targets in a cost-effective and 'socially fair' way, the Commission adds. It says they will provide the possibility that a member state could compensate for a struggling land-use sector with overachievement in other areas, such as emissions from waste or transport.

The target will 'send a signal to the global community' that the EU will 'stay the course on climate change, deliver the Paris Agreement and continue engaging with partner countries to reduce global emissions', says the Commission.

It has been announced ahead of the UN COP30 climate summit in Belém, Brazil in November.

The European Commission says it will now work with the council presidency – representing EU member state governments – to finalise the EU's climate pledges for 2035, so that the EU can submit its 'nationally determined contribution' (NDC) under the Paris Agreement.

The EU was among the 95% of countries that missed the UN deadline to submit their NDCs by February of this year.

A recent update from the European parliament noted that the EU 'needs to update its NDC by September', in order to meet an extended deadline from the UN.

In 2023, independent advisory body the European Scientific Advisory Board on Climate Change recommended that the EU should aim for net emissions reductions of 90-95% by 2040, compared to 1990 levels.

As such, the advisory board said that the bloc would need to limit its cumulative emissions from 2030-50 to 11-14bn tonnes of CO_2 equivalent ($GtCO_2e$), in order to be in line with bringing global warming down to 1.5C by the end of the century.

The 90% emissions reduction figure set out by the EU is on the lower end of guidance.

Why is the Commission making this proposal now?

The European Commission's new proposal builds on previous targets and roadmaps, representing a significant step towards enshrining the 2040 target in law.

In July 2021, the European Climate Law officially entered into force, setting a target of a net GHG reduction of at least 55% by 2030, compared to 1990 levels, as shown in the chart below.

Rules were introduced governing sectors, such as clean energy, energy efficiency and transport, among others, to help meet this target.

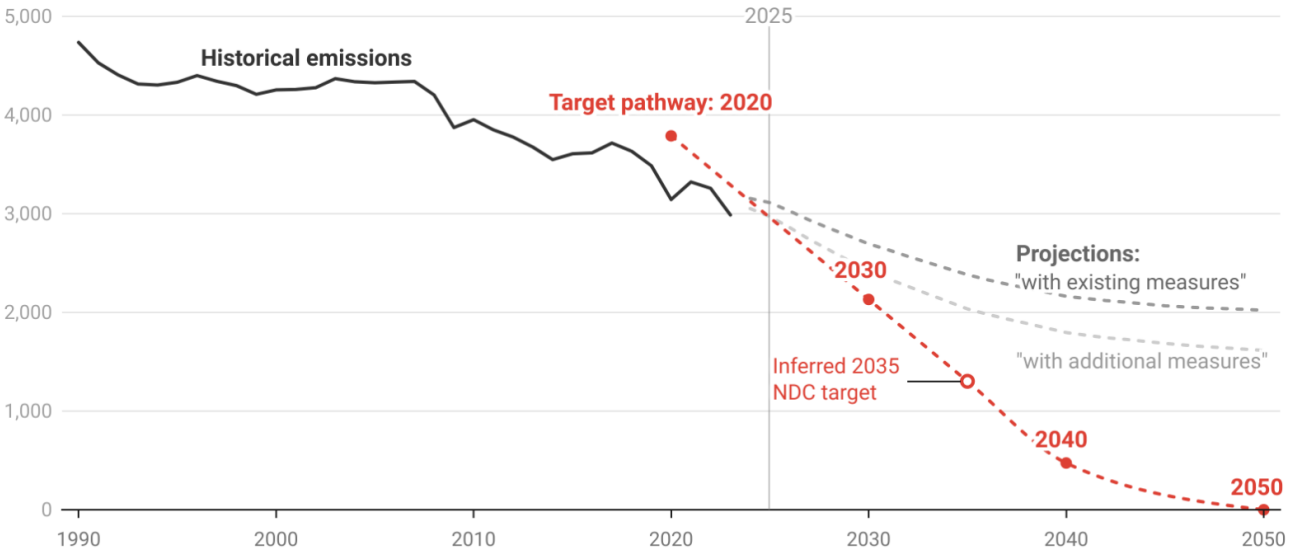
If all were successful in their implementation, they would reduce emissions by roughly 57% by 2030, according to a European parliament assessment in 2022.

Subsequently, the Commission has been working on developing a target for 2040, as an interim benchmark between the 2030 target and the EU goal – announced in 2018 – to be 'climate neutral' by 2050. At this point, the bloc would reach net-zero emissions overall and would stop adding to global warming.

In 2024, the Commission published an impact assessment, detailing the underlying qualitative analysis it had undertaken around emissions reduction targets for 2040.

The EU will need new climate policies to meet its targets

Total net GHG emissions, MtCO2e



Source: Eurostat and Carbon Brief analysis

CarbonBrief
CLEAR ON CLIMATE

This, together with the European Scientific Advisory Board on Climate Change's report (detailed above) and advice from the UN's Intergovernmental Panel on Climate Change, formed the basis for the 90% target, the Commission says.

The headline 90% target for 2040 was announced as part of a roadmap outlined by the Commission in February 2024.

The roadmap kicked off a lengthy process in which EU politicians and institutions worked to cement the details of this target, ahead of this week's proposal on turning it into law.

This process included 'substantial engagement' with Member State, the European parliament, stakeholders, civil society and citizens, the Commission says.

In particular, certain European countries have been placing pressure on the Commission to change or adapt the 2040 target, slowing the progress of this week's proposal, which had been due out in February.

For example, Italy called for the goal to be weakened and France asked for 'flexibility' to be introduced .

The Commission hopes that publishing the proposed target now will allow it to be factored into the EU's upcoming NDC, in which it will establish an emissions reduction target for 2035.

What does it say about international carbon credits and 'flexibilities'?

The European Commission's proposal sets out a 'pragmatic' pathway towards the 2040 target, including specific measures to give EU Member State 'flexibility'.

Of these, the one that has received the most attention is to allow limited use of international carbon credits, under Article 6 of the Paris Agreement, starting in 2036.

In effect, this flexibility means that emissions within the EU would only need to fall to 87% below 1990 levels by 2040, with the remaining 3% taking place overseas.

This would mean Member State could buy credits generated by emissions-cutting projects in other countries and count those cuts towards their own targets.

Other nations, including Japan and Switzerland, have already welcomed the use of international credits to meet their climate goals.

In an unusual intervention that coincided with the proposal itself, the European Scientific Advisory Board on Climate Change stated that the EU should not count such credits towards the 2040 target. It said:

'Using international carbon credits to meet this target, even partially, could undermine domestic value creation by diverting resources from the necessary transformation of the EU's economy.'

The board also mentioned other concerns that are frequently levelled at 'carbon offsetting', such as credits not resulting in real-world emissions cuts.

The Commission's proposal refers to 'high-quality international credits under Article 6', but does not specify which types of credit. This leaves the door open for lower quality options.

For example, carbon trading under Article 6.2 is subject to far less oversight than trading of Article 6.4 credits.

The proposal also states that: 'The origin, quality criteria and other conditions concerning the acquisition and use of any such credits shall be regulated in union law.'

This suggests that the EU would conduct its own assessment of any credits used by Member State, beyond the rules that have been negotiated at an international level.

Jonathan Crook, the lead expert on global carbon markets at Carbon Market Watch, tells Carbon Brief that additional safeguards would be 'essential', given outstanding issues with Article 6 carbon credits.

A Q&A accompanying the Commission proposal states that credits would be bought from 'credible and transformative' projects in nations with Paris-aligned climate goals.

It mentions direct air carbon capture and storage (DACCS) and bioenergy with carbon capture and storage (BECCS) as examples of the kinds of projects that the EU could source credits from.

This could severely limit the pool of available credits, because – as it stands – almost all carbon credits are from tree planting, forest conservation and clean-energy projects.

DACCS and BECCS projects could result in relatively permanent carbon removal. Crook says this would be one of the 'many necessary safeguards' needed for credit purchases, although he points to potential issues with such projects. He adds:

'This potential durability criterion is only mentioned in the Q&A, rather than in the actual Commission proposal and so currently has very limited standing unless it is introduced [into the legal text] during the co-legislation process.'

There are two additional 'new flexibilities' mentioned in the Commission's proposal, to help Member State meet the 2040 emissions target more easily.

One is the inclusion of permanent carbon dioxide (CO_2) removal in the EU ETS, something that was already being discussed as part of an ETS revision.

This would mean that DACCS and BECCS projects in EU Member State could sell credits to help high-emitting companies, such as steel plant operators, stay within their ETS limits.

Paying for such credits could become more appealing as the number of available emissions 'allowances' under the overall 'cap' for ETS system shrinks and the allowances become more expensive.

The Commission says this would help to 'compensate for residual emissions from hard-to-abate sectors', referring to those that are expensive or difficult to reduce to zero.

The need to remove CO_2 from the atmosphere is widely recognised and inclusion in the ETS could help to drive investment into early-stage technologies, such as DACCS.

However, there are concerns that focusing on removals diverts investment from readily available technologies that cut emissions, such as electric-arc furnaces for steel plants.

In its recommendations, the European Scientific Advisory Board on Climate Change says there should be separate targets for emissions reductions and removals. This would ensure the removals contribute to EU targets 'without deterring emission reductions', it says.

Finally, the Commission's proposal also includes a vague mention of 'enhanced flexibility across sectors, to support the achievement of targets in a cost-effective way'.

Linda Kalcher, executive director of the thinktank Strategic Perspectives, tells Carbon Brief that this is 'alluding to the fact that we might see weakening of some laws'.

Michael Forte, a senior policy advisor at thinktank E3G, expands on this, noting that it could mean Member State adjusting emissions targets between different parts of the EU climate architecture, depending on where they were over- or underperforming.

'I would infer that this means letting Member State transfer a greater share of their mitigation efforts between these different instruments,' Forte tells Carbon Brief.

Kalcher notes that such changes cannot be regulated in this law, but instead would need to be part of the expected 2040 framework or other pieces of law:

'They are more alluding to future changes, instead of making them now. So that…gives confidence to the countries that have concerns [about the 2040 target] that something will happen.'

Who has supported and opposed the proposed climate target?

Climate campaigners and left-leaning politicians were highly critical of the 'flexibilities' included in the Commission's proposal, in particular the use of international carbon credits.

The options proposed were described by civil-society groups as 'creative accounting' and a 'dangerous new precedent' that relies on 'outsourcing Europe's responsibility' to other countries.

The European parliament's centre-left Socialists and Democrats coalition issued a statement warning that 'the inclusion of international carbon credits as a means to meet the target carries considerable risks'.

Critics also noted that using such flexibilities contradicted the official advice offered by the European Scientific Advisory Board on Climate Change.

Yet the proposal, presented as a 'new way to get to 2040', is widely viewed as an attempt to find a political compromise against a tricky geopolitical backdrop.

It allows the EU to aim for the target set out by its scientific advisers, albeit at the lower end of the '90-95%' emissions reduction that had been proposed. This is in spite of a strong political pushback from some Member State.

A statement released by Peter Liese and Christian Ehler, German members of the European parliament's centre-right European People's Party (EPP) group, explained:

'We think it's very dangerous to criticise the European Commission because they intend to include flexibility in their proposal on the 2040 target. We don't see a majority in parliament nor council for any 2040 target without flexibility.'

Some Member State, including Spain and Denmark, supported the 90% target without asking for major concessions. Others, including Poland and Italy, have argued for a less stringent headline goal.

Meanwhile, others pushed for some kind of compromise during discussions of the new target.

Notably, the newly elected, right-leaning German government gave qualified support for the 90% goal in its coalition agreement, subject to conditions such as the inclusion of international carbon credits. Other influential nations have also increasingly stressed the need for 'flexibility' around the target.

Meanwhile, according to Politico, France has been part of a push – alongside 'climate laggards' Hungary and Poland – to separate discussions of the EU's domestic 2040 target from its international 2035 NDC pledge.

According to the news outlet, such decoupling could result in a weaker 2035 target, compared to the 2035 target that is expected to be derived from the 90% reduction 2040 goal.

The Commission says its 2040 proposal goes 'hand in hand' with its clean industrial deal strategy, its affordable energy action plan and its 'competitiveness compass' plan.

Alongside tabling its 2040 climate goal, the Commission issued a new 'communication' on 'delivering on the clean industrial deal'. (The deal was first announced in February.)

How does the goal fit with the EU's industrial growth plans?

The communication says that 'decarbonisation and reindustrialisation are two sides of the same coin' and reaffirms that the aim of the deal is to 'enable the EU to lead in developing the clean-technology markets of the future'.

The Commission says delivery of the deal is 'already underway'. It points to the adoption of the clean industrial deal state aid framework on 25 June, an EUR 85bn (USD 100bn) state-aid package for helping Member State transition their economies.

Environmental law charity Client Earth said a draft version of the framework risked 'entrenching support for fossil gas and fossil based low-carbon gases'.

The clean industrial deal communication also notes that the Commission this week published recommendations on tax incentives for speeding up the energy transition.

On 18 June, the European parliament and council agreed on a Commission proposal to simplify the EU's Carbon Border Adjustment Mechanism (CBAM), a policy for taxing carbon-intensive imports at levels equivalent to the EU ETS.

The agreement introduces a new exemption threshold of 50 tonnes for CBAM goods, meaning small and medium-sized companies that do not exceed this weight of imports per year will now be exempt from the measure.

EU climate Commissioner Wopke Hoekstra described it as a 'win for both climate policy and competitiveness of our companies', with the new measure meaning 90% of companies will now be exempt from the CBAM, but 99% of emissions will still be covered.

Previous analysis has found that, in isolation, the CBAM will have a limited impact on global emissions.

What comes next?

Before the target can be adopted, it must be agreed by Member State and pass through the European parliament.

Once the parliament and national ministers have agreed on their separate positions, three-way 'trialogue' negotiations between them and the Commission can begin with the aim of finalising the 2040 legislative proposal.

All nations were asked to submit new 2035 climate pledges, known as 'nationally determined contributions' (NDCs), to the UN by February of this year (see: What has the European Commission proposed?). The EU was among the vast majority of parties to miss the deadline.

UN climate chief Simon Stiell has now asked all parties to submit their NDCs 'by September'. This is to allow time for the preparation of a report on the collective ambition of all nations' pledges before COP30 in November.

The EU's NDC will include an 'indicative 2035 figure' derived from the bloc's 2040 climate target, according to the Commission.

The Commission says it will work with the Danish presidency of the EU council and Member State to finalise its NDC.

It is expected that the EU will aim to finalise both its 2035 NDC and its 2040 climate goal ahead of the next UN general assembly, which starts on 9 September in New York.

By **Josh Gabbatiss**
Daisy Dunne
Molly Lempriere

Flexing industrial muscle:

Electrifying process heat with electro-thermal energy storage

European industry is a very large user of heat, consuming 1,900 TWh heat per year for processes, ranging from melting glass and steel or firing ceramics at high temperatures (800-1,500°C) to generating hot water and steam (<200°C) for chemical, food and drink processing. This is roughly equivalent to the amount of energy needed for space and water heating in 50% of all European buildings.

The electrification of heat is emerging as a main pathway for decarbonisation, industrial modernisation and competitiveness of European industry. It makes the most of an increasingly decarbonised electricity grid and will lead to high energy savings through increased energy efficiency, reducing the need for fossil fuel imports. Currently, only 3-4% of industrial process heat is generated using electricity. With current commercially available technology, however, 60% of this heat could be electrified.

Several barriers hinder the broad uptake of electrification solutions for process heat, especially the high price of electricity compared to fossil fuels and insufficient electricity infrastructure. In addition, many industrial heat users are unaware of the wide range of electrification solutions now commercially available.

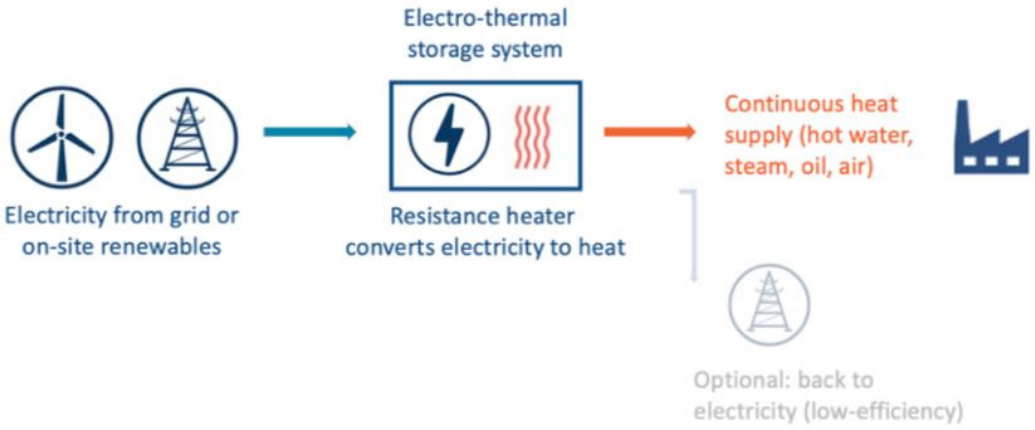
Electrifying industrial heat is not only key for decarbonisation, modernisation and competitiveness but can enable significant potential for demand-side flexibility in the electricity system, which is essential to achieve cost-effective integration of renewable energy. As industrial processes often require a continuous supply of heat, electrification should be combined with storage to be able to shift electricity demand in time (demand response).

Wide-scale deployment of electro-thermal energy storage (ETES) could bring both public and private benefits, including cost savings for industry through, potentially, reduced average costs of electricity due to flexible offtake; additional revenue from participation in ancillary and flexibility services; and (cheaper) flexible connections to the grid. Moreover, when combined with local renewable energy sources, ETES can enhance the resilience of an industrial facility to energy supply and price shocks. Increased flexibility from industrial demand can lead to lower system costs for all due to reduced renewables curtailment, potentially lower grid upgrade needs and reduced system management costs.

What is electro-thermal energy storage?

ETES technologies, sometimes called heat batteries, use electricity to generate and store heat (see Figure 1). Heat is generated, often using a resistance heater, and stored in low-cost media such as rocks, bricks, low-grade metal, sand and/or salts. The main application of ETES is to turn variable renewable or off-peak electricity into heat, store it, and release it on demand for process heating, typically steam, thermal oil, hot water or air. When taking electricity from the grid (charging) these technologies can make use of the lowest price hours and avoid times with peak prices, reducing the average cost of electricity for the end user.

Figure 1. Use of electro-thermal storage in industry (schematic overview)



Why do we need electro-thermal energy storage?

ETES has the potential to be a key solution for industrial electrification, as it can enable more flexible electricity demand without interrupting heat delivery.

As industrial heat generation electrifies over the coming decade, its potential to provide demand-side flexibility (DSF) will increase significantly. There are two ways in which industrial demand for electricity can be shifted. The first is direct demand-side flexibility, where temporarily lowering (or increasing) heat demand leads to lower (or higher) electricity demand, for example, by scheduling processes to run at specific times of the day or week or running equipment at lower or higher capacity (modulation). The second requires the integration of either electric or thermal storage

into the process, allowing continuous heat demand but reducing electricity off-take from the grid when beneficial.

Direct demand-side flexibility using scheduling or modulation has long been used in industry to benefit from off-peak electricity prices, especially in electricity-intensive industries that operate non-continuous ('batch') processes such as electric arc furnaces for steel recycling. This method, however, is not viable for processes with continuous or hard-to-schedule heat demand. It also provides limited economic benefits for industries that are not very sensitive to the cost of electricity, given the added complexity and cost of flexible operations.

The second option, however, could be applied widely across industrial sectors using electricity storage (lithium-ion, or Li-ion, batteries) combined with heat electrification equipment such as a heat pump or e-boiler. ETES, however, could be more beneficial as it generally has lower total installed costs compared to electricity storage with an electrified heating solution, as it uses low-cost materials for the storage medium, can achieve higher longevity and possibly higher energy density, and generally has higher energy efficiency when delivering heat (and not electricity) than batteries.

Until recently, thermal energy storage largely took the form of hot water tank storage and was meant for lower temperature applications such as domestic hot water and space heating or very short-term storage (buffering) in industry. But, as hot water storage offers limited energy density and a low maximum temperature, additional thermal energy storage options are needed for industrial uses.

ETES is changing this with increasing deployment of systems delivering heat in the range of 200-300°C, and systems capable of delivering up to 400°C commercially available. Beyond being able to store energy as heat for hours to days, these ETES systems can generate high temperature heat at the scale and temperature needed for many industrial processes. The current generation of ETES systems is especially applicable for steam or hot water provision in light industry, as it can be integrated easily into common processes across the food and drink, paper and pulp, and textiles industries. But it is also relevant for heavy industries such as chemicals and alumina refining, which are among the largest steam users. In the lower temperature ranges (<160°C) ETES, however, also competes with more efficient - but less flexible and not always applicable - industrial heat pumps.

The potential for industrial demand-side flexibility with electro-thermal energy storage

The technical potential for ETES to provide demand-side flexibility is significant. Meeting just 10% of industrial heat demand with thermal storage would amount to 80GW of demand-side flexibility potential - around 2.5 times the total installed electricity storage capacity in Europe in 2024 (35 GW). Actual technological potential for industrial demand response is likely much higher. One study indicated that 20-30% of process heat generation globally could become flexible in 2050, based on the current outlook, with even greater potential in a high adoption of electric and thermal storage scenario.

Moreover, without deployment of storage the flexibility potential of electrified heat will be much more limited, as industry would like to run their processes for as many hours per year as possible. For example, looking at industrial demand-side response potential without electrified heat, one study found a potential of around only 22GW by 2030.

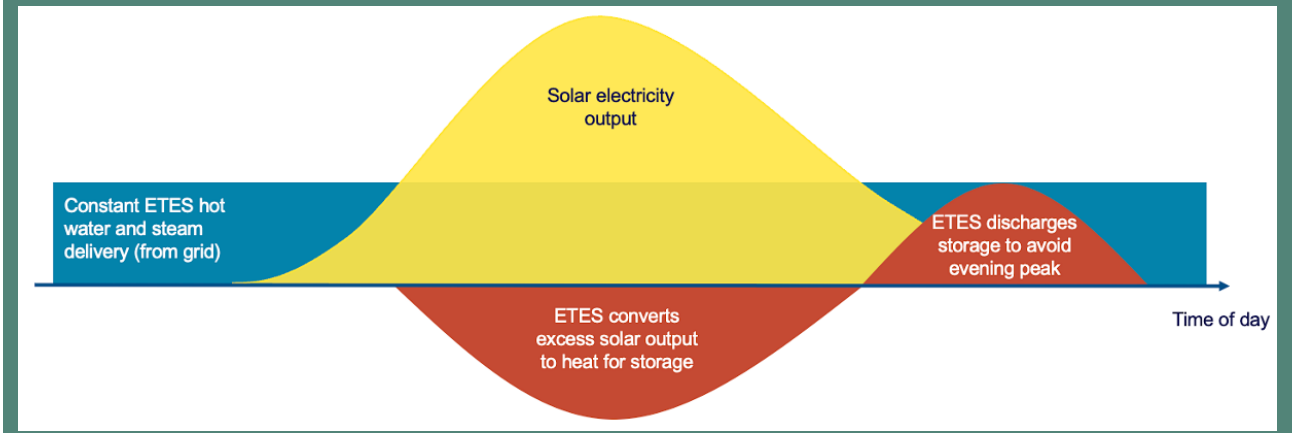
Making the economics of electro-thermal energy storage work

There are many benefits to electrifying heat and enabling more demand-side flexibility, including cost savings for industry, yet it is currently difficult to make the business case for the combination of ETES and electricity from the grid. Electrification of heat can deliver savings on fuel and emission allowance costs and generate revenue for industrial end-users through provision of electricity system services. Generally, however, this does not yet outweigh the (much) higher cost of electricity compared to that of fossil fuels across Europe. Especially as, per unit of energy, electricity is often taxed much higher than gas or oil and has more levies applied to it.

Combined with the relatively high initial cost of financing new equipment, elevated electricity prices lead to overly long investment payback times. While technologies utilising lower temperature heat, such as industrial heat pumps, are already more cost efficient than fossil fuel boilers in many European countries due to their very high efficiency, this is not yet the case for higher temperature solutions which require more electricity and at higher capacities, such as ETES.

Industrial firms can lower their cost of electricity by installing onsite renewables such as solar PV and wind turbines in conjunction with storage. In this case, ETES is charged at times of high onsite production, as made visible by the schematic in Figure 2. In the case of solar PV, for example, peak charging is around noon on a sunny day, with the heat stored for later use (see Figure 3). Additional electricity is taken from the grid when onsite production is not sufficient. The average cost of electricity is reduced due to the low cost of electricity generated onsite, savings on grid tariffs and the ability to evade peak prices; combined, these returns outweigh the cost of investment in onsite generation. Not every industrial site, however, has the space available for (enough) onsite renewable energy generation.

Figure 2. Charging ETES with electricity from onsite solar and the grid (schematic overview)

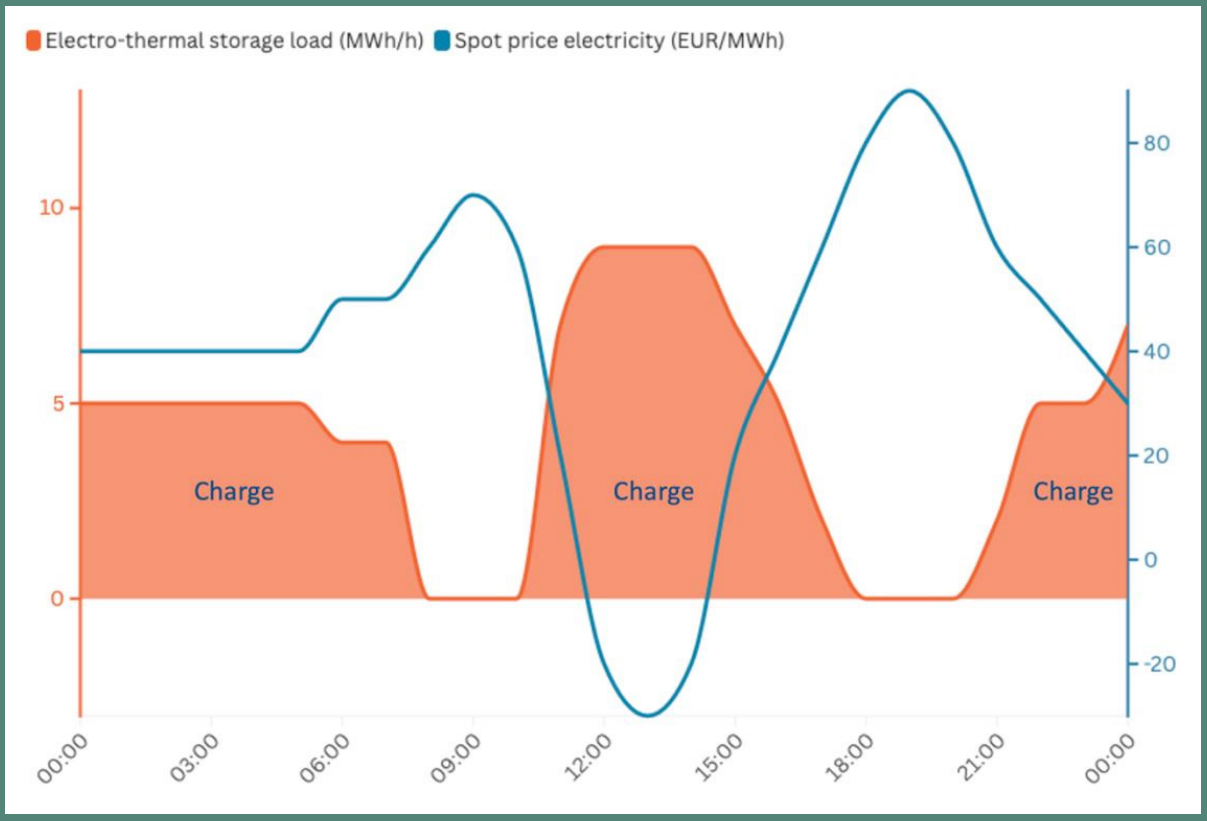


Lower electricity costs can also be achieved by optimizing charging profile when using electricity from the grid. Electricity prices can vary widely throughout the day. And charging costs can be reduced by buying electricity from the grid when prices are low, or even negative, and reducing electricity demand when prices are high, drawing from the storage instead to meet heat demand (Figure 4). Although it is technologically feasible to store heat for several days, to become economically viable, ETES systems will likely need to run several cycles a day and can realistically shift demand by around 4-8 hours.

Although flexible use of ETES means drawing more electricity from the grid in fewer hours, necessitating a larger grid connection compared to constant use, flexible connection agreements ('non-firm contracts') could potentially alleviate this constraint. With flexible connection agreements, end users do not have continuous access to the grid and/or at the same capacity levels, although flexible connection agreements could be combined with shared connections on industrial sites to facilitate quicker grid access. In this way, an end user with spare grid capacity at specific times could, for example, lease or share this space with other onsite end users. Another viable compromise that still delivers significant fossil fuel and emissions savings would be a hybrid system, where the ETES is installed in addition to an existing fossil fuel heat generation technology (see textbox).

Finally, flexible use of ETES could generate additional revenue for end users from the provision of system services such as balancing, ancillary, and local network flexibility, and/or participation in capacity mechanisms. Most very large industrial electricity users already participate in such schemes, but ETES could enable a wider range of industrial end users to utilize these options, especially through aggregators and heat-as-a-service.

Figure 3. Charging ETES only with electricity from the grid (schematic overview)

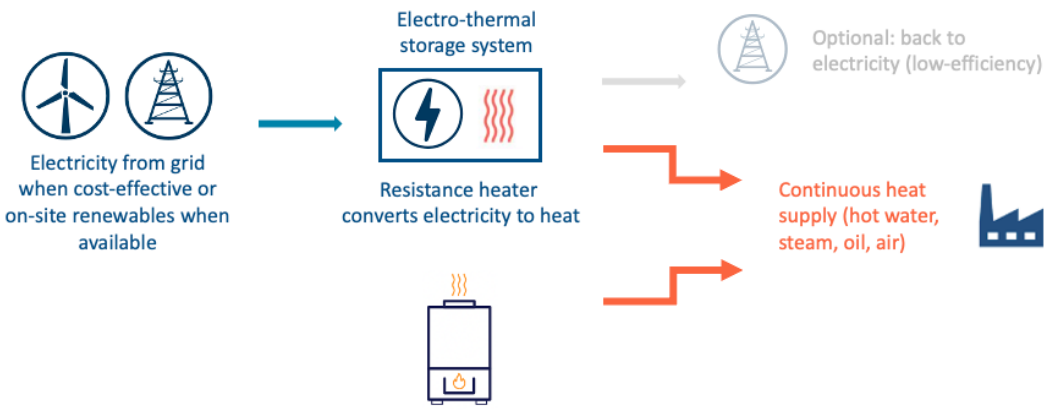


Why going hybrid gas-electric with ETES makes sense

ETES offers the potential to electrify industrial heating at comparable or lower cost than fossil fuels, as low-cost electricity is available at least part of the day. Even though low or negatively priced electricity is becoming increasingly common in regions with high solar and/or wind generation, however, wholesale prices can remain high for extended periods – even up to a couple of weeks. During these times there are limited to no possibilities for low-cost grid charging, with detrimental effect for the business case of all-electric ETES systems.

This makes adding an ETES to existing fossil heaters on site a sensible compromise. Hybrid projects allow site operators to decide which heating system to use depending on market prices (see Figure 4). Plenty of sunshine or strong winds and near-zero electricity prices? Charge the ETES at full power. Gas peaking plants are called in to balance the grid and electricity prices go up? Use the gas boiler and avoid price spikes. This brings not only financial benefits, but could also lower emissions at system level, especially in countries with high fossil fuel use in the electricity mix.

Figure 4. Hybrid ETES use (schematic overview)



Policy recommendations for electro-thermal energy storage

Promoting the installation of ETES and uptake of demand-side flexibility in industrial heat requires a mix of policies tackling the economic, regulatory and infrastructure barriers. In doing so, it is important to safeguard total system efficiency to ensure lowest costs for all end users. This requires addressing four key areas:

Prioritise electrification of industrial heat.

- Put in place targeted programmes to increase the electrification rate in industrial heat, tackling economic, infrastructure, technological and awareness barriers.
- Ensure fair access to public support for all electrification technologies, including electro-thermal storage, in EU State aid and national government programmes. Consider setting up dedicated policies for demand-side flexibility in industry.

Reduce the price of electricity compared to fossil fuels.

- Rebalance taxes and levies between electricity and gas to reduce the price ratio between electricity and gas. Additionally, a tax discount could be considered for electricity used for heat when paired with energy efficiency measures.

Incentivize flexible use of electricity.

- Reform network tariffs and electricity prices to be time-differentiated (time-of-use) and possibly even locational. This incentivizes flexible use while ensuring demand-side flexibility is provided at the times when and locations where it is most beneficial to the system.

Connect flexible loads to the grid.

- Allow flexible connection agreements and consider offering discounted tariffs in line with the benefit provided by such contracts. For example, grid operators could provide a discount to end users that allow their connection capacity to be temporarily reduced at pre-determined times or with sufficient notice.
- Ensure easy market access for demand-side flexibility, including for smaller end users and through aggregators.

By **Sem Oxenaar** and **Elian Pusceddu**

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Achieving global target to double energy efficiency progress requires industrial energy management

Recent global upheavals and uncertainties are putting increasing strain on businesses around the world prompting governments to look closely at energy efficiency as a means to promote industrial competitiveness and the resilience of businesses.

At the COP28 climate change conference in 2023, nearly 200 countries reached a landmark agreement to work together to collectively double the global average annual rate of energy efficiency improvements by 2030. Global energy efficiency progress – measured by the rate of change in primary energy intensity – saw only a weak improvement of about 1% in 2024, about half the rate achieved last decade.

The main reason behind this slowdown in recent years has been a lack of energy efficiency progress in industry, which has driven 80% of the growth in final energy demand since 2019. However, over this time the sector's energy intensity has not improved and demand is increasing on average by almost 2% per year. Today, the share of industry in total final energy consumption accounts for around 170 EJ, or approximately 39% of the total.

In 2022, industry in IEA countries alone spent over USD 1.2 trillion on energy, an increase of nearly 80% from 2020 costs.

Industrial facilities could save billions by implementing energy management

While industry is one of the most difficult sectors in which to reduce emissions, it is also the one where funding yields the best results. Only 6% of the total increased investment could deliver 20% of the total energy intensity improvements by 2030.

Although energy efficiency measures have frequently been demonstrated to provide competitiveness and productivity benefits, energy efficiency improvements are still not typically or widely prioritised as a strategic

investment in future profitability, and substantial opportunities to improve energy efficiency remain underexploited. Government-led energy management programmes and associated measures have been shown to effectively address many of the barriers to the uptake of energy efficiency and stimulate higher and sustained levels of saving for industry.

Energy management can quickly deliver significant improvements and benefits

Energy management is the proactive and systematic monitoring, control, and optimisation of an organisation's energy. An analysis of more than 300 energy management case studies in 40 countries has shown an average 11% energy savings within the first years of implementation, well exceeding average improvements in energy intensity across industry. A growing number of companies are demonstrating even larger savings of 30% and even higher, with many of them low- or no-cost measures. Comparisons between implementation of energy efficiency measures identified by audits at sites with and without energy management and monitoring systems indicate that sites with systems have higher levels of implementation.

Even companies that have previously invested in energy efficiency find that, once they put energy management in place, significant and continuous energy efficiency opportunities are uncovered. Analysis shows that companies with energy management systems achieve continuous improvements even after 12 years of having the system in place, regardless of the sector. There are case studies around the world:

Energy management in a Korean plastics manufacturer saved the company USD 31 million, or 4.9% of total energy costs, in just one year.

By implementing energy management, a flour mill in Indonesia reduced energy costs in the first year by more than USD 1 million, or 5% of total energy costs, and continued to reduce energy use and costs year on year – reducing cost of production by almost USD 6/tonne of product after 3 years of implementation.

A vegetable oil producer in Oman reduced natural gas use by 23% and electricity use by 11% in its first year of implementing energy management, cutting energy cost by USD 779 000/year.

A textile company in India reduced its energy demand by more than 30% in its first year of implementing energy management with a payback period of less than a year.

A dairy enterprise in Ireland reduced energy bills by USD 560 000, or 2.9% of the total energy costs, equivalent to the cost of 1.6 million litres of milk.

Energy costs can be a significant proportion of total production costs, up to 50%, therefore even small efficiency improvements can have a significant effect on profit margins. For industries where net profit margins are low, reducing energy costs can be particularly impactful. For example, a company with a 5% profit margin and an annual energy saving of USD 500 per year saving from energy efficiency makes the equivalent profit as USD 10 000 of extra sales.

Energy management also provides a framework for digitalisation of production, enabling improved understanding of processes and hence identification of improvement opportunities. Digitalisation of demand and process optimisation in industry powered by AI could by 2035 save the equivalent of the total energy demand of Mexico today.

Energy management delivers a range of benefits beyond energy bill savings

Beyond energy efficiency, energy management can deliver a wide range of benefits leading to enhanced productivity, reduced environmental impact and compliance costs and improved safety and working environment for employees. Efforts to quantify and monetise non-energy benefits have been shown to increase the value of energy efficiency measures by 40% to 250%. Globally, if the value of simple avoided energy costs is in the hundreds of billions, the real value including these multiple benefits could be far higher, even in the trillions.

The ability of industry to reduce energy demand and contribute to demand response services will become increasingly important as countries electrify and decarbonise. Some countries are already experiencing power grid congestion where new energy users cannot be connected and companies cannot increase capacity, endangering economic growth. Energy management can alleviate strain on grids, as shown by a pharmaceutical company in Ireland that protected its operations from potential outages, reduced pressures on the grid, and gained EUR 200 000 through delivering demand response.

Companies are beginning to pursue energy management as an effective way to manage their decarbonisation. This need has led the International Standards Organization to develop a standard linking energy management and GHG reductions (ISO 50100), to be completed in 2026.

Policy action is needed

While effective energy management can be carried out without certification to standards, monitoring ISO 50001 certifications serves as an indicator to tracking the uptake of energy management practices in industry. Looking at the number of new certifications each year, it is clear that policy has a role in increased uptake. The number of new certifications has increased from 450 in 30 countries in 2011 to nearly 25,000 in more than 100 countries in 2023. Increases can be seen to follow the adoption and subsequent updating of the Energy Efficiency Directive (EED) in the EU, which mandated energy management for large companies, and the implementation of China's 13th 5-year plan, which came into force in 2016.

Alternative policy approaches include the US Department of Energy's (US DoE) 50001 Ready programme, also used in other countries such as Canada and Saudi Arabia, which has reported high levels of engagement and energy savings achieved while only providing for self-certification.

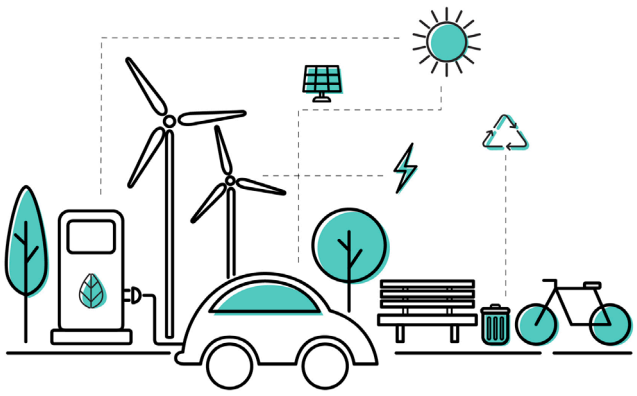
Governments could consider the following actions to stimulate energy management in industry:

- Set-up effective partnerships, as has been done by the US, where programmes are implemented together with national laboratories that develop free tools and deliver training and industrial assessment centres that carry out free audits.
- Establish long term networks and agreements to support implementation, as has been done in Ireland and Finland.
- Combine incentives to implement energy management with benchmarking systems to provide guidance and further drive implementation, such as the approach used in Japan.
- Provide tailored information, incentives and support to small and medium sized companies like in France and Japan.
- Provide easy to access, tailored information and capacity building as has been done by Saudia Arabia that has developed a comprehensive online platform with information and trainings for different levels of expertise.

Policy makers can empower energy management through increased focus on implementation

To meet the need for urgent action on energy efficiency implementation, the IEA launched the Energy Efficiency Implementation Drive to support energy efficiency policy makers with insights, learnings and analytics to develop increasingly effective policy packages. To explore energy efficiency progress across regions and countries, the IEA launched the Energy Efficiency Progress Tracker, which has a specific focus on the industry sector. This dynamic dashboard enables users to explore historical data, latest market estimates, and scenarios for energy demand, energy efficiency, and electrification progress.

By **Vida Rozite, Emma Mooney, Chris Matthew**



What other countries can learn from how China financed a green transformation

> China's green transformation has come about more from 'financing green' than 'greening finance', write Calvin Quek and Mathias Larsen

Have pity for the climate change scientist. Despite decades of warnings that carbon emissions must fall to limit global warming, year after year, emissions continue to rise.

That's why recent news that emissions from the world's largest emitter – China – actually fell may give climate scientists something to cheer about.

While China's emissions have declined during past economic slowdowns, this time emissions fell 1.6% year-on-year in the first quarter of 2025, even as its economy grew by 5.4% over the same period.

Driving this shift has been an unprecedented expansion of clean energy capacity: solar and wind capacity in China increased respectively by 28% and 5% year-on-year in 2024, with 277GW of new solar and 79GW of new wind connected to the grid.

China's clean energy installation accounted for an eye-watering 64% of the world's newly installed renewable energy capacity. As a result, 39% of China's electricity generation came from clean energy sources, up 5% year on year.

China has also become a major force in 'green finance' – a suite of policy tools like green bonds, loans, taxonomies, and disclosure rules aimed at making the financial system more sustainable.

In 2023, China issued a world-leading USD 131.3 billion in green bonds, and by 2024, green loans reached USD 4.9 trillion.

At the global level, momentum in green finance continues: Since 2018, the cumulative green bond market has grown nearly six-fold, reaching approximately USD 3.4 trillion by 2024. Over the same period, over 40 countries have adopted national green finance or sustainable finance strategies, up from 17, while green taxonomies have increased from three to 47.

Additionally, the landscape of sustainability disclosure frameworks has become more complex, with over 600 different ESG reporting provisions identified globally.

Yet the relationship between green finance and China's renewable energy expansion remains complex.

Many green finance tools in China, such as bonds and disclosure, are market-based and may have limited measurable impact on directing new capital flows.

Most green bonds and green loans are issued by state-owned banks, but transparency about around how proceeds are used remains limited.

In addition, green bonds may play only a modest role in financing actual renewable energy projects, in a country where project finance remains overwhelmingly bank-led, casting doubt on their additionality, i.e. how much new money is raised through bonds.

Moreover, disclosure requirements vary across at least four overlapping standards, and although a mandate for environmental reporting was announced in 2016, analysts estimate that only around 10% of listed companies are currently subject to comprehensive rules.

Also, China still lacks a unified green taxonomy, and some versions still allow for 'clean coal'.

Indeed, China's renewable energy surge may have more to do with industrial policy than with green finance.

A seminal 2024 report from the Oxford Institute for Energy Studies argues that four main synergistic industrial pillars underpin China's clean energy success:

- First, long-term policy support in the form of generous feed-in tariffs, sustained R&D subsidies and clear industrial targets have provided certainty and reduced investor risk.
- Second, vertically integrated Industrial clusters in the Yangtze and Pearl River Deltas, optimize supply chains and manufacturing, enabling rapid product development and cost reductions.
- Third, strategic technology engagement, once reliant on licensing and joint ventures, has evolved into collaborative innovation with global players.
- And fourth, China's booming science, technology, engineering & mathematics (STEM) talent and its private sector entrepreneurs have driven commercialization with remarkable speed.
- The results speak for themselves. In 2024, China installed more than half the world's new clean energy, produced 71% of the world's batteries, exported over 235GW of solar panels (80% of global demand), and shipped 1.28 million electric vehicles (making it the world's largest exporter).

All told, cleantech industries contributed 10% to China's GDP, surpassing real estate.

That is not to say that green finance tools are not important. The PBOC's green lending scheme, which cuts banks' borrowing costs if they lend to green companies and projects, led to USD 123 billion in new financing in less than two years.

But these green finance tools form part of a larger suite of catalysts that underpin state-driven industrial policy. For example, China's state-capitalized equity funds have invested over half a trillion dollars into strategically important industries, of which the clean energy sector is one of its largest beneficiaries.

Fiscal policy complements this with direct subsidies, tax incentives, public procurement, and R&D support.

If countries want to learn from China's success, it is crucial to focus on what actually delivers results. While green finance tools such as taxonomies, disclosure standards, and bonds have a role to play, particularly in building market integrity and investor confidence, they are most effective when embedded within a coherent industrial strategy.

Indeed, China's experience shows that its green transformation, has come about more from 'financing green', i.e. directing capital to green sectors as part of a larger industry strategy, as opposed to solely 'greening finance', i.e. making the financial system itself more sustainable from within.

As industrial policy regains prominence globally as a topic, this distinction matters.

Policymakers, researchers, and companies must focus on what actually works. That means moving beyond symbolic market measures and embracing the transformative potential of a holistic green industrial strategy.

By **Calvin Quek,** University of Oxford
Mathias Larsen, Brown University
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FEATURED PUBLICATION

Regional energy transition outlook: European Union

This regional energy transition outlook for the European Union, developed by the International Renewable Energy Agency (IRENA) in collaboration with the EU and its Member State, sets out a practical roadmap to achieve climate neutrality while enhancing energy security and economic competitiveness. It highlights key enablers of the transition, including integrated energy planning, grid expansion, electrification, and deeper market integration. The report highlights the need for stronger coordination, improved governance, and flexible policy frameworks to address uneven progress across the region. Trade and diversified supply chains are also critical to ensuring a fair and cost-effective transition. Achieving a climate-aligned future will require decisive action to accelerate investment in renewables, storage, and smart grids; phase down fossil fuels; and align industrial strategy with climate and energy goals.

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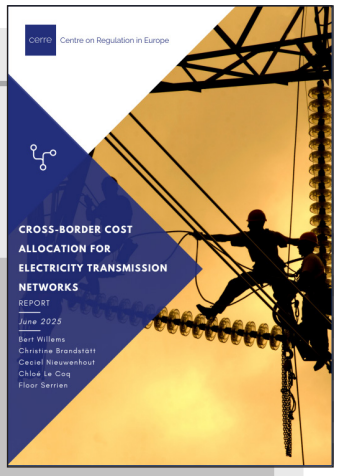
Cross-Border Cost Allocation for Electricity Transmission Networks



This report from the Centre on Regulation in Europe explores the regulatory and economic challenges facing cross-border energy infrastructure in the EU. Such infrastructure is essential for a fully integrated internal energy market and achieving Europe's decarbonisation goals. However, the need for new infrastructure raises complex issues around cost, benefits and risk allocation, particularly for hybrid offshore wind projects involving multiple countries. The study examines the existing regulatory framework and its challenges, such as the lack of cross-sectoral coordination and harmonisation. It analyses different mechanisms for cost-sharing, including congestion income handling, bidding zone design, cross-border capacity targets, inter-transmission system operator compensation (ITC), as well as network tariff structures, supported by case studies from the Nordic countries, Germany, France, and the UK. The authors recommend strengthening cross-border investment governance across the EU, both at bilateral and regional levels; improving planning and cost-benefit analysis integration; reviewing risk allocation models; and enhancing EU-level financing to account for hard-to-measure benefits like energy security and resilience.

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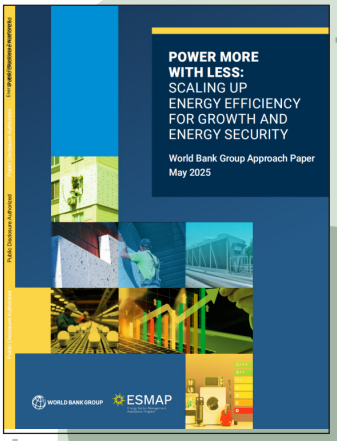

Power More With Less: Scaling Up Energy Efficiency for Growth and Energy Security

Energy efficiency is one of the most powerful tools for sustainable development, yet it remains vastly under-utilised. Despite the demonstrably high returns —USD 3 to USD 5 for every USD 1 spent— it is still not a high priority for most governments, accounting for only a small fraction of energy investments in emerging economies. Political will and supportive policies are in short supply, and inadequate financing and unreliable information also hinder progress. This new World Bank report outlines a compelling case for scaling up energy efficiency in developing countries as a cost-effective pathway to meet growing power demand, reduce fiscal and trade deficits, and enhance energy security. Citing global best practice from low- and middle-income countries that have prioritised energy efficiency in their energy sector policies, targets, and programs, the authors encourage governments and partners to prioritise efficiency within national development strategies to achieve more with less—faster, cheaper, and more equitably.

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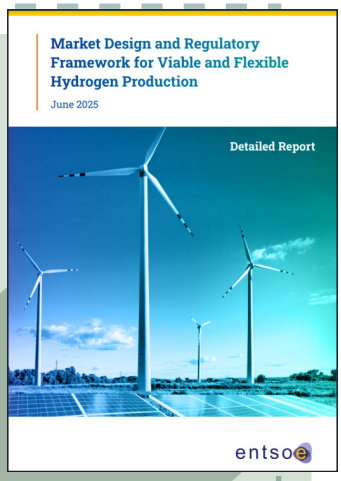
Market Design and Regulatory Framework for Viable and Flexible Hydrogen Production



The development of the hydrogen sector, and in particular the electrification of green hydrogen production, is expected to have a major impact on power system planning and operation. ENTSO-E's new report takes a deep dive into the integration of hydrogen into electricity markets and power systems, with a focus on the flexibility potential of electrolysers and their ability to support power system needs. It analyses various operational modes of electrolysers, explores their cost structures and potential revenue streams, and examines how hydrogen and electricity markets can interact more effectively to enhance grid stability and resource allocation, taking into account price signals, demand patterns, and infrastructure planning. Given the current gap between electrolyser costs and achievable revenues, the report reviews targeted support mechanisms that can improve their commercial viability. It also evaluates how guarantees of origin (GO) with spatial and temporal granularity could influence electrolyser deployment and system integration. Based on these insights, the report offers recommendations to enable cost-effective, large-scale integration of electrolysers, in order to deliver mutual benefits for both the hydrogen and electricity sectors.

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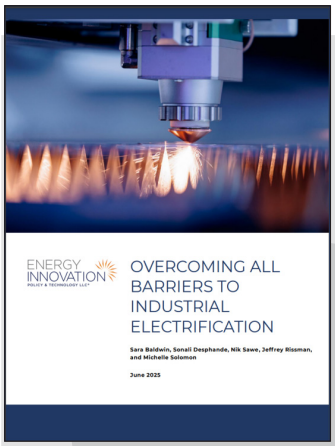

Overcoming All Barriers To Industrial Electrification

Industrial processes, including steel, cement, chemicals, and manufacturing, are the largest consumers of global energy consumption, and account for a significant share of greenhouse gas emissions. This report from US thinktank Energy Innovation presents a compelling case for industrial electrification as a faster, more efficient, and cost-effective path to decarbonisation compared to alternatives like green hydrogen or bioenergy. It provides a comprehensive overview of electric technologies that can meet a wide range of industrial heat needs, from heat pumps and electric boilers to electric arc furnaces, powered by increasingly clean grids. The report identifies key barriers such as high electricity costs, limited grid readiness, as well as technology maturity and awareness barriers, and proposes targeted policy solutions to address these issues while modernising industrial operations. Key solutions include accelerating renewable energy deployment, enabling co-location with carbon-free resources, incentivising clean industry, and developing new financing tools. It also advocates for measures to increase efficiency and flexibility to reduce demand and cost, adopting carbon pricing policies. The report is intended to guide and inform decision-makers on the range of options as they develop policies that will underpin an industrial shift towards electrification.

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info@ececp.eu

Unit 1201A, Tower D1, DRC Liangmaqiao Diplomatic
Office Building, 19 Dongfang East Road,
Chaoyang District, Beijing, People's Republic of China

www.ececp.eu

Editor-in-chief: Jieqiao Chi

English editor: Helen Farrell

Feedbacks and Contributions: magazine@ececp.eu

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