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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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Dear All,

Welcome to the June issue of the EU China Energy Magazine.

It is certainly a fascinating time to be working in the energy sector. We are seeing electrification and digitalisation blend together more than ever before. Even with the ongoing geopolitical uncertainties, these shifts are steadily guiding us all towards a cleaner, smarter, and more secure energy future.

Here is a quick look at what we have lined up for you this month in carefully curated articles from across the energy sector:

We open with an analysis of how Europe is navigating the current geopolitical volatility. We explore how long-term investments in infrastructure, diversification, and electrification are paying off by boosting regional security and keeping European industries, buildings, and transport competitive.

We analyse the growing convergence of artificial intelligence and the power sector: modern electricity grids are fast becoming the vital foundation needed to support growing computing capacity, while keeping the wider system interconnected and green. Turning to China, we offer an exploration of the country's evolving hydrogen strategy and the rapid rise of zero-carbon industrial parks. This illustrates how industrial decarbonisation is moving forward through a mix of cutting-edge tech and smart industrial hubs.

Just as we were putting the finishing touches to this issue, China released its 15th Five-Year Plan for Building a New Energy System—a key framework that will guide its energy transition through to 2030. Before you wade through the entire document yourselves, we have put together a handy summary, Energy 15th FYP in Figures, to give you the essential targets at a glance.

Of course, you will also find our regular News in Brief and Reports sections to keep you fully up to speed with the latest innovations and regulatory updates from both the EU and China.
We hope you find this issue an enjoyable and insightful read.

Best regards,

Dr. Flora Kan
ECECP Team Leader

NEWS in Brief

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

Click on the headlines to learn more.

POLICY INITIATIVES

EU: Commission unveils strategic roadmap for digitalisation and AI in energy »

The European Commission has published its Strategic Roadmap for Digitalisation and Artificial Intelligence (AI) in Energy, a key component of the new European Technological Sovereignty Package. The plan addresses the growing energy demands of digital infrastructure while leveraging smart technologies to cut costs and reinforce the EU's energy autonomy against geopolitical vulnerabilities. According to the roadmap, demand-side flexibility and improvements to system efficiency could save EU consumers over EUR 71 billion per year and industry over EUR 94 billion per year by 2035. The roadmap is structured around three pillars: integrating data centres into the energy system; accelerating the rollout of smart meters and grid-enhancing technologies; and creating a secure, cross-border energy data-sharing framework.

EU: Provisional agreement reached on MSR reform for ETS2 »

The EU Council and the European Parliament have reached a provisional agreement to modify the Market Stability Reserve (MSR) ahead of the full launch of the ETS2 carbon market, which will cover buildings, road transport and additional sectors from 2028. The reforms aim to curb extreme price volatility and boost market predictability while shielding households and businesses from skyrocketing energy costs. The agreement extends the MSR beyond 2030 and doubles the volume of allowances released when carbon prices exceed EUR 45/tCO_2 from 20 million to 40 million. It also introduces a more gradual release mechanism for times when allowance supply falls below defined thresholds, in a bid to bolster market confidence and stability.

Global: 'Electrify Now' initiative to accelerate clean electrification »

During the London Climate Action Week in June 2026, the European Commission and a coalition of international partners launched Electrify Now, a global open platform aimed at accelerating clean electrification as a core strategy to strengthen resilience, stabilise energy costs and enhance long-term competitiveness. Supported by the IEA and IRENA, the initiative brings together governments, financial institutions, and industry stakeholders. The platform will drive progress toward a proposed global target of raising electrification to 35% of final energy demand by 2035. Work will focus on electrifying key sectors such as transport, industry and buildings, alongside grid modernisation, energy storage deployment and resilient clean generation supply chains. It will also facilitate practical policy exchanges and mobilise investment, particularly in emerging economies.

EU: T-MED initiative to mobilise EUR 25 billion for Mediterranean clean energy »

The European Commission has launched the Trans-Mediterranean Renewable Energy and Clean-Tech Cooperation (T-MED) initiative under the 'Pact for the Mediterranean' – an EU project to boost cooperation with countries in the south Mediterranean - aiming to mobilise up to EUR 25 billion in investments by 2035. The scheme targets the deployment of around 15 GW of renewable energy capacity, alongside grid upgrades and support for clean-tech value chains across the region. To de-risk investments, the EU will provide over EUR 5 billion in guarantee capacity through the European Fund for Sustainable Development Plus (EFSD+). T-MED will operate across five core pillars: investment mobilisation, regulatory alignment, clean-tech industrial cooperation, infrastructure upgrades, and a dedicated skills agenda.

France: Roadmap sets deadlines for fossil fuel phase-out »

France has published a national roadmap to phase out coal by 2030, oil by 2045 and natural gas (for energy purposes) by 2050, becoming one of the first countries to introduce hard deadlines for all major fossil fuels. The roadmap consolidates existing climate and energy policies under a single framework and reaffirms France's goal of achieving carbon neutrality by 2050. It includes commitments to electrify sectors such as heating and transport, phase out domestic fossil fuel production, and support clean energy transitions abroad. Although France only generates a fraction of its electricity from hydrocarbons, thanks to its extensive nuclear power generation, the strategy formalises a 5% annual emissions reduction target through 2028, which depends heavily on electrification of the transport and heating sectors.

Germany: Cabinet approves plan for 11 GW of new gas-fired capacity »

Germany's cabinet has approved legislation paving the way for the construction of 11 GW of new gas-fired power plants to support the country's renewable energy expansion and ensure security of supply. The plan includes tenders for 9 GW of capacity in 2026 and a further 2 GW in 2027, with all plants required to be hydrogen-ready and operational by 2031. The legislation also lays the groundwork for a capacity market that would compensate power plants for providing backup generation when renewable output is low. The bill now heads to parliament for fast-track approval. It forms part of Germany's strategy to replace nuclear generation, end its reliance on coal, and achieve climate neutrality by 2045.

MARKET BUSINESS

EU: Biomethane Mechanism to connect buyers and sellers »

The European Commission has officially launched the Biomethane Mechanism, under the EU Energy and Raw Materials Platform, to boost the uptake of biomethane, which is regarded as a key low-carbon energy source to support EU energy security and reduce dependence on imported fossil fuels. The mechanism is designed to connect project developers, investors and buyers, and support new business opportunities. It will also provide regulatory information and financing options, helping to reduce market fragmentation and improve transparency. Following the opening of registrations, the platform's first matching round is scheduled for September 2026.

Europe: Energy storage capacity overtakes nuclear »

Europe added a record 13.5 GW/26.4 GWh of electrochemical storage capacity in 2025, bringing total installed storage across all technologies to 102.7 GW, overtaking the region's nuclear fleet, according to the 10th edition of the European Market Monitor on Energy Storage (EMMES), published by LCP Delta and Energy Storage Europe. Growth was mainly driven by behind-the-meter systems, which reached 30.2 GW, particularly in Germany, Italy, the Netherlands, Austria and the UK, supported by solar+storage deployment, dynamic tariffs and electrification trends. Front-of-the-meter battery storage reached 18.5 GW, with strong growth in markets with established capacity mechanisms such as the UK, Italy, Poland and Belgium.

Europe: Spain and Portugal to lead long-duration energy storage market »

Long-duration energy storage (LDES) technologies could become a key pillar of Europe's decarbonised power system, according to a new report by European electricity industry association Eurelectric and consultancy AFRY. The study estimates that every gigawatt of installed LDES capacity could generate between EUR 150 million and EUR 250 million in annual power system savings by reducing renewable curtailment, easing grid congestion and enhancing security of supply. Beyond pumped hydro, emerging technologies such as iron-air batteries, compressed air energy storage and liquid air energy storage are starting to show commercial potential. Solar-rich countries such as Spain and Portugal represent some of the most promising markets for 8- to 12-hour storage systems, though diversifying revenue streams will be crucial to unlocking project profitability.

Europe: Heat pump sales rose 13% in 2025, cutting LNG dependence »

Heat pump sales across 21 European countries increased by 13% year-on-year in 2025, reaching 2.88 million units, according to the European Heat Pump Association (EHPA). Air-to-air systems remained the most popular, followed by air-to-water technologies. The report estimates that the new installations in 2025 could replace around 2.5 bcm of LNG and avoid nearly EUR 10 billion in import costs. At a national level, Germany led the market expansion with a 50% surge in sales, with heat pumps securing a record 50% share of the domestic space heating market for the first time, while France and Italy remained the largest national markets in absolute volumes.

Germany: Partnership advances e-SAF supply chain development »

Zaffra, the e-sustainable aviation fuel (e-SAF) joint venture between Topsoe and Sasol, has signed an agreement with German energy firm MB Energy to explore hydrogen supply, logistics and fuel distribution infrastructure for future e-SAF production across Europe. The partnership will assess hydrogen sourcing, fuel storage, blending and airport supply infrastructure, while MB Energy may also become a buyer of future e-SAF output. Initial efforts will focus on the Brandenburg e-SAF project in Germany, which is expected to produce more than 30 000 tonnes/yr of e-SAF from 2030. The project recently secured EUR 350 million in public funding and is expected to contribute significantly to Germany's sustainable aviation fuel targets under the EU's ReFuelEU Aviation framework.

TECHNOLOGY INNOVATION

EU: Horizon Europe project validates biogas-to-hydrogen technology »

The Horizon Europe-funded TITAN project, concluding on 31 August 2026, has successfully demonstrated a technology that converts raw biogas into hydrogen and solid carbon using microwave energy. Validated at Technology Readiness Level 5, the process achieved methane conversion rates above 85% and produced 51-57 grams of hydrogen per kilowatt-hour of electricity consumed, significantly higher than conventional water electrolysis. Furthermore, the byproduct — a stable iron-carbon material — shows zero adverse effects on soil microorganisms, signaling a robust avenue for long-term agricultural carbon storage. It is estimated that hydrogen costs could fall to between EUR 3.90 and EUR 4.50 per kilogram when the technology is applied at scale.

Spain: Wärtsilä validates world's first large-scale 100% hydrogen engine »

Finnish technology company Wärtsilä has begun validating what it describes as the world's first large-scale engine operating on 100% hydrogen at its testing facility in Bermeo, Spain. The Wärtsilä 31H2 engine is designed to provide flexible power generation and grid-balancing services for renewable-rich electricity systems. The demonstration shows that hydrogen-fuelled engines could help store surplus renewable energy and supply electricity during periods of low wind and solar generation. According to the company, the technology could support power grids, industrial facilities and off-grid applications while contributing to decarbonisation. The trial marks a key step toward the commercial deployment of hydrogen-based power generation and the wider use of sustainable fuels in the energy sector.

Spain: Offshore floating solar platform launched for sea trials »

Spanish renewable energy company BlueNewables has launched the first platform of its PV-bos offshore floating solar technology, marking a step toward commercial solar power generation at sea. The Paiporta platform was launched at a shipyard in Vigo and will be towed to Valencia for operational testing in open-sea conditions. Designed for offshore and port environments, the technology aims to expand solar deployment beyond land-constrained areas and can be integrated with floating offshore wind projects through shared infrastructure. The project is supported by Spanish public institutions and is intended to showcase the potential of marine floating solar as a new source of renewable electricity.

PROJECTS INVESTMENTS

EU: First tripartite agreement targets 35 GW energy storage surge »

The European Commission, alongside 22 EU Member States, industry leaders, and financial institutions, has signed an historic tripartite agreement in Luxembourg to accelerate energy storage development. To achieve a collective pledge of adding 30-35 GW of storage capacity over the next two years, Member States will eliminate regulatory barriers, introduce flexible network tariffs, and unlock funding via the Clean Industrial State Aid Framework (CISAF). For their part, project developers have undertaken to provide annual updates on new energy storage, while energy-intensive industries have committed to deploy on-site storage to optimise demand flexibility, offering clear updates on energy use. The Commission will oversee implementation through 2028, updating market rules and coordinating regional finance. This unified framework is vital for integrating renewables, lowering power prices, and developing Europe's storage capacity to achieve its 2030 target of 200 GW, up from the current 55 GW.

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EU: EUR 400 million awarded to industrial clean heat projects »

The European Commission has selected 65 projects across ten European countries to receive a share of EUR 400 million under the pilot Innovation Fund Heat Auction. The projects will deploy technologies including heat pumps, electric boilers, solar thermal and thermal energy storage to decarbonise industrial process heat in hard-to-abate sectors. The projects are expected to avoid more than 6.6 million tonnes of CO_2 emissions over 10 years and generate 16.3 TWh of decarbonised heat within their first five years of operation, replacing an estimated 1.5 billion cubic metres of natural gas. Building on strong industry interest, the Commission has already announced a second Heat Auction for 2026 with a budget of EUR 1 billion.

EU: Nine clean hydrogen projects to secure funding from European Hydrogen Bank »

Nine renewable and low-carbon hydrogen projects across seven European countries have been selected under the third auction of the European Hydrogen Bank, receiving EUR 1.09 billion funding from the Innovation Fund, channelled through the EU Emissions Trading System (ETS). These projects will supply nearly 1.1 GW of electrolyser capacity, producing more than 1.3 million tonnes of hydrogen over their first decade of operation to help reduce emissions from energy-intensive industries such as transport and chemicals. These projects will receive a fixed premium of between EUR 0.44 and EUR 3.49 per kilogramme of verified hydrogen produced over a maximum period of 10 years to cover the price differential between the production costs and the market price.

EU: Flagship projects on Data Centre Sustainability and AI for Grids »

EU policymakers and industry representatives have launched two flagship initiatives to support the digital transformation of Europe's energy system. The first brings together data centre operators, energy companies and public authorities to ensure the sustainable integration of rapidly growing data centres into the power system. Fourteen European associations and six major corporations signed strategic declarations of intent and support. At the same time, the launch of the 'AI.grids' project brings together 48 partners, including grid operators and research institutes, to develop European AI models for grid planning and operation. Both initiatives are intended to support the Commission's new Strategic Roadmap for Digitalisation and AI in Energy.

Spain: Government approves auctions for 1.2 GW of high-efficiency cogeneration »

Spain's government has approved a regulatory framework to auction 1.2 GW of high-efficiency cogeneration capacity, aiming to modernise the country's ageing industrial cogeneration fleet. Two competitive auctions of 600 MW each are planned for 2026 and 2027, covering both new projects and upgrades of existing facilities. Eligible plants must use natural gas or biomass, with gas-fired units required to be capable of operating with at least 10% renewable hydrogen. The government estimates successful bidders could help the country to avoid 8.4 million tonnes of CO_2 emissions over the plants' operational lifetime.

Italy: Gas operator expands hydrogen blending in gas network »

Italian gas distribution company Italgas plans to supply a hydrogen-natural gas blend to around 220 end users in Torre de' Passeri through 5 km of existing gas pipelines. The project will begin with a 10% hydrogen blend for domestic uses such as heating and cooking, before increasing to 20%. End users will face no additional costs, with Italgas covering the cost of any necessary modifications. The aim of the project is to show how existing gas infrastructure can support cleaner energy supplies without major new network investments.

POLICY INITIATIVES

China unveils action plan to drive synergy between AI and green energy »

China has launched an action plan to boost the mutual empowerment and deep integration of artificial intelligence (AI) within the energy sector. The framework outlines 29 key tasks structured around two primary objectives: leveraging clean energy to fuel AI computing infrastructure and deploying advanced AI solutions to accelerate the green energy transition. The primary goal is to support energy-hungry data centers with renewable power while leveraging AI to optimise power grids, manage renewable energy, and improve overall operational efficiency. By 2030, China aims to establish a world-leading highly integrated ecosystem featuring clean energy supply capacity for AI facilities and dedicated AI model innovation within the energy sector.

China introduces binding renewable energy consumption targets »

China has introduced binding targets for renewable energy consumption, shifting the focus of its energy transition from expanding generation capacity to increasing clean energy use. Effective from 1 August, the new rules require provinces to impose binding renewable energy targets on companies, with compliance monitored quarterly. Entities that fail to meet the targets will be required to purchase green electricity certificates. For the first time, non-electric uses of renewables are covered in policy targets, including heating and green fuels, signalling stronger support for sectors such as green hydrogen as China seeks to improve renewable energy utilisation and reduce curtailment of wind and solar power.

New guidelines promote multi-user direct connection model to boost local renewable energy use »

China has issued new guidelines to promote a multi-user direct connection model for green electricity. The mechanism allows electricity from renewable sources to be delivered directly to multiple end users via dedicated lines, bypassing the public grid. Households and agricultural users are excluded, while eligible consumers include industrial parks, major energy users, export-oriented firms and companies with carbon reduction requirements. Priority is given to data centres, green hydrogen, ammonia and methanol projects. The policy aims to improve local consumption of renewable energy. It also introduces a time-of-use metering system for physical green power traceability, linked with China's green electricity certificate (GEC) registry, supporting exporters in meeting international carbon accounting requirements.

China launches action plan to decarbonise energy-intensive industries »

China has launched a three-year action plan (2026-28) to improve energy efficiency and cut carbon emissions across nine energy-intensive industries: steel, electrolytic aluminium, cement, flat glass, oil refining, ethylene, synthetic ammonia, methanol and coal-fired power. By the end of 2028, the share of production capacity meeting China's benchmark energy-efficiency standards is targeted to increase by an average of 20 percentage points across the eight industrial sectors, while the coal-fired power sector aims for a 15 percentage-point increase. The majority of production facilities operating below minimum energy-efficiency standards will be shut down. The programme is expected to save more than 100 million tonnes of standard coal equivalent and reduce over 200 million tonnes of CO_2, supporting China's industrial decarbonisation and carbon-peaking goals.

New pilot initiative for geothermal expansion »

China's NEA has launched a four-year pilot program for geothermal projects from 2026. The plan promotes a wider range of geothermal applications, with a focus on scaling up medium-depth geothermal energy for urban heating as a substitute for natural gas. It also encourages the development of long-distance heat transmission systems to better match resource locations with demand, alongside simplified approval procedures for borehole heat exchange technologies. For shallow geothermal, the plan supports both rural heating solutions and clustered urban projects. It also promotes industrial uses, including repurposing abandoned oil and gas fields and integrating geothermal systems with critical mineral extraction, such as lithium, helium and boron.

China targets 40% market share for new-energy heavy-duty trucks by 2030 »

China has unveiled a master plan to accelerate the adoption of heavy-duty electric trucks, targeting a 40% market penetration rate and a fleet exceeding 1.6 million vehicles by 2030. Under the roadmap, jointly issued by 11 government agencies, these vehicles will carry 18% of highway freight volumes, with an 80% electrification rate required on fixed short-haul routes within key air pollution control regions like the Beijing-Tianjin-Hebei area. To underpin this rollout, 3 000 charging and battery-swapping stations are planned along 30 000 kilometres of zero-carbon freight corridors. To lower upfront costs and boost uptake, the plan encourages the separation of vehicle and battery ownership, enabling consumers to lease batteries separately, backed by a full-lifecycle battery traceability system to boost safety standards.

China launches pilot programme for AI applications in the energy sector »

China's NEA has issued a notice launching pilot applications for 'AI + energy' high-value scenarios, along with a call for project submissions. The first batch of priority application areas consists of 51 scenarios, including AI-assisted power grid planning and optimisation. The initiative encourages energy companies to open real-world application scenarios to accelerate the deployment and refinement of AI technologies in the energy sector. Energy firms may apply individually or jointly with AI technology providers, with the scenario demand-side entity taking the lead in pilot project applications. These practical energy sector pilots are intended to drive AI innovation and large-scale deployment.

MARKET BUSINESS

China's power generation capacity surpasses 4 TW milestone »

China's total installed power generation capacity reached 4.01 TW at the end of May 2026, showing an 11% year-on-year increase, according to the NEA. This milestone makes China the first country to exceed 4 TW in capacity, eclipsing the combined power fleets of the USA, the EU, India, Japan, and Russia. China's power capacity maintained an average 9.7% annual growth from 2010 to 2025. This pace of development is accelerating, with an expansion from 3 TW to 4 TW in just two years.

Power use for AI computing hubs hits 170 TWh in 2025 »

China's first 'AI + Energy Development Report 2026' shows that the country had built 42 mega AI computing clusters by 2025, while computing hubs overall accounted for 170 TWh annual energy consumption. Over the past three years, power demand from major computing hubs has grown by an average of 39.5%, outstripping the rise in overall electricity demand. Regional disparities are significant, with Inner Mongolia hubs recording average annual growth of 66.5%, reflecting a continued shift of computing capacity toward energy-rich regions. New data centres in national computing hubs are required to source over 80% of electricity from green power, by means of green power trading, direct renewable procurement, and integrated source-grid-load-storage systems. In parallel, China has deployed dozens of sector-specific AI models across power, renewables, coal, nuclear, oil and gas systems.

Coal power to rebound in 2026, reversing 2025 decline »

China's coal-fired power generation is expected to rebound in 2026 after recording its first annual decline in a decade, according to forecasts by several energy consultancies. Analysts attribute the increase to stronger electricity demand, weaker hydropower output linked to El Niño, slower growth in renewable generation, and reduced gas-fired generation as higher LNG prices curb imports. Thermal power generation rose 3.4% year-on-year in the first five months of 2026. The outlook underscores the challenges facing decarbonisation of China's power sector as rising electricity demand from data centres, electric vehicles, air conditioning and manufacturing continues to outpace the growth in clean power generation.

NEV passenger car exports surge 112% in May »

China's exports of NEVs rose 112.6% year-on-year to 424 000 units in May, according to the China Passenger Car Association (CPCA). NEVs accounted for 54.1% of the country's total passenger vehicle exports, marking a 9.5% year-on-year increase. Battery electric vehicles represented 59.3% of NEV exports, with compact A00 and A0-class models accounting for more than half of overseas sales. The CPCA reports that exports continue to drive growth in China's automotive industry as manufacturers continue expanding into markets including Latin America and Europe, offsetting weaker domestic demand and softer sales in the Middle East.

China launches rural campaign to boost NEV adoption »

China has launched the 2026 new energy vehicle (NEV) rural promotion campaign, with 155 models included in the recommended vehicle catalogue. The programme introduces expanded trade-in subsidies for rural consumers, alongside continued exemptions and reductions to vehicle purchase costs and to the Vehicle and Vessel Tax. It also promotes the deployment of smart mobility technologies, including intelligent connected vehicles, integrated solar-storage-charging systems, and vehicle-to-grid applications in rural areas. The campaign will bring together sales, after-sales service, charging and battery-swapping providers, as well as insurance and financing services, to improve the rural NEV ecosystem.

CATL and Octopus Energy to build European EV truck battery-swapping network »

Chinese battery giant CATL and UK energy tech business Octopus Energy have launched Swaptopus, a joint venture that will build a European network of battery-swapping hubs for EV heavy duty goods vehicles (HGVs). The partnership combines CATL's established swapping technology with Octopus's AI-powered energy trading and software capabilities. By replacing depleted truck batteries in minutes, the hubs eliminate long charging downtimes. The first UK mega-hubs are slated to open in 2027, with over 30 sites planned across Europe by 2035. These hubs will act like massive energy storage facilities, charging batteries during cheap, off-peak hours, and will leverage vehicle-to-grid (V2G) technology to feed back to the grid. Once fully operational, the partners estimate the network will support more than 300 000 electric trucks and unlock roughly GBP 30 billion in private investment.

TECHNOLOGY IINNOVATION

China advances wireless power transmission for space solar power »

Chinese researchers have reported progress in the technologies needed for future space-based solar power stations. A team at Xidian University has developed a ground-based wireless power transmission system capable of supplying electricity to multiple moving targets simultaneously. In recent tests, the system achieved a direct current-to-direct current transmission efficiency of 20.8% over 100 metres, delivering 1 180 W of power. The researchers also demonstrated wireless charging of a drone in flight, transmitting 143 W over 30 metres. The advances are part of the university's 'Sun Chasing' project, which aims to develop technologies for orbital solar power stations that could one day transmit clean energy to Earth, satellites and spacecraft. The next stage of the programme will focus on in-orbit testing.

Researchers develop prototype battery combining energy and hydrogen storage »

Researchers at the Dalian Institute of Chemical Physics (DICP), part of the Chinese Academy of Sciences, have developed a gas-solid hydride ion prototype battery (g-HIB) that combines electricity storage with hydrogen storage. According to an article in the journal Joule, the battery uses magnesium and hydrogen gas to reversibly store both electrical energy and hydrogen under ambient pressure and near-room-temperature conditions, potentially avoiding the need for high-pressure tanks or cryogenic storage. The prototype achieved an energy efficiency of 93.9% and retained more than 70% of its capacity after 60 charge-discharge cycles. The researchers say the technology could offer a new approach to integrating hydrogen storage with electrochemical energy storage, although further improvements are needed to make it commercially viable.

China deploys real-time grid inertia monitoring system »

China has deployed its first active real-time grid inertia monitoring system in Yunnan Province, providing a new tool for managing power systems with high shares of renewable energy. Unlike conventional methods that estimate grid inertia from the number of synchronous generators in operation, the new system injects small signals into the grid through a flexible HVDC link and uses high-precision sensors to measure the system's dynamic response in real time. The system offers a more accurate assessment of frequency stability as wind and solar generation increase, helping operators improve grid reliability, reduce unnecessary reserve generation and support the future development of inertia ancillary service markets..

World's first modular battery-swapping vessel launched in Anhui »

China has launched the Hetun Weilan 01, certified as the world's first standard modular battery-swapping vessel. Jointly developed by Wuhu Shipyard and Sandianshui New Energy Technology, the 3 000-tonne inland cargo vessel is powered by six interchangeable battery modules, each with a capacity of 405.5 kWh. Individual battery packs can be replaced in just five minutes, with a full battery swap completed within 30 minutes. The vessel's key innovation is a shared 'ship-vehicle-storage' battery-swapping system, allowing the same battery modules to be used by ships, port trucks, forklifts and stationary energy storage systems. The vessel has received certification and approval from the China Classification Society (CCS), Bureau Veritas (BV) and DNV, demonstrating a new approach to low-carbon and intelligent inland waterway transport.

PROJECTS INVESTMENTS

China to invest CNY 7 trillion in 'Six Networks' infrastructure in 2026 »

China is preparing implementation plans for its 'Six Networks' initiative, a major infrastructure programme covering water networks, smart power grids, computing networks, next-generation telecommunications, urban underground utility networks and logistics systems. According to official estimates, related investment will exceed CNY 7 trillion in 2026 alone. During the 15th FYP period, China plans to invest more than CNY 5 trillion in power grid upgrades, including new transmission corridors and distribution networks to support renewable energy integration. A further CNY 5 trillion is expected to be invested in modernisation of urban underground infrastructure, including gas, water supply, drainage and district heating networks, strengthening the resilience of cities and supporting China's broader green and digital transition.

Shanghai launches world's first commercial offshore wind-powered underwater data centre »

Shanghai has launched the world's first commercial underwater data centre powered by an offshore wind farm, showcasing a new approach to reducing the energy footprint of AI computing. Located 10 metres below the seabed, the facility uses seawater for natural cooling, achieving a power usage effectiveness (PUE) of below 1.15, compared with the typical 1.4-1.6 for conventional land-based data centres. A nearby 200 MW offshore wind farm supplies more than 95% of the centre's electricity. At full capacity, the project is expected to save 61 million kWh of electricity annually while significantly reducing land use.

Sinopec discovers China's first ultra-deep shale gas field »

Sinopec has announced the discovery of China's first large-scale ultra-deep shale gas field, with proven geological reserves of 235.69 bcm. Situated in the Sichuan Basin, the Ziyang Dongfeng reservoir lies at depths of between 4 500 and 5 200 metres, making it China's first large-scale shale gas discovery below the 4 500-metre threshold. According to Sinopec, the field is also the world's oldest commercial-scale shale formation, dating back more than 540 million years. Sinopec said the breakthrough follows more than a decade of technological development to overcome the challenges of ultra-deep drilling and is expected to strengthen China's domestic natural gas supply and long-term energy security.

China Three Gorges deploys massive 16 MW floating wind turbine »

China Three Gorges (CTG) Corporation has installed the 'Sanxia Linghang' (Three Gorges Pilot), the world's largest single-unit floating offshore wind platform, located 70 kilometres off Guangdong province. The 16 MW platform is engineered for deep-sea environments exceeding depths of 50 metres, where fixed-bottom foundations are not economically viable. Built to endure super typhoons with 20-metre waves and winds up to 73 m/s, the unit is projected to generate 44.65 GWh/yr. The project introduces several technical firsts for China's offshore sector. These include an active ballast control system, a flexible mooring network anchored by nine suction piles with high-performance polyester lines, and a specialised, domestically-developed 66 kV dynamic subsea cable designed to withstand strong ocean currents.

Inner Mongolia to expand coal-to-oil industry »

China's Inner Mongolia Autonomous Region plans to expand coal-to-oil, coal-to-gas and coal-to-chemicals production as part of efforts to strengthen domestic energy security and reduce reliance on imported oil and gas. Regional officials said they aim to build China's largest coal conversion base. Although coal conversion currently accounts for only a small share of China's oil and gas imports, new investment continues. In May, authorities approved a CNY 22.1 billion demonstration project in Ordos to produce 800 000/yr tonnes of olefins from coal. The plan highlights China's continued pursuit of its energy security objectives alongside its long-term decarbonisation goals.

How the war with Iran is reshaping Europe's gas security

When war with Iran erupted on 28 February 2026, attention initially focused on oil markets and geopolitical escalation. Beneath the headlines, however, a quieter yet equally critical disruption began to unfold: a shock to global gas supply chains. For Europe, already in the midst of reshaping its energy system, the war has exposed a new layer of vulnerability.

The European Union (EU) has made significant efforts to reduce its dependence on Russian gas, replacing it with diversified imports, particularly liquefied natural gas (LNG). This strategy has improved resilience. Yet the war with Iran has revealed a new reality: Europe's gas security is now closely tied to global maritime routes and geopolitical stability far beyond its borders.

The current crisis is global. The closure of the Strait of Hormuz, a narrow waterway through which around 20% of global LNG exports pass, has had immediate consequences for energy markets. Qatar, one of the world's largest LNG exporters, depends on this route for its shipments. During the winter of 2025–2026, approximately 7% of Europe's LNG imports came from Qatar. While this may appear modest, even small disruptions can have outsized effects in a tight market. The situation worsened when Iranian attacks damaged gas infrastructure. Qatar reportedly lost up to 17% of its LNG export capacity, with recovery likely to take years. What might have been a short-term disruption has therefore become a longer-term structural constraint.

Since 2022, the EU has made notable progress in strengthening its gas supply system. It has diversified supply sources, expanded LNG import infrastructure, and reduced gas demand through efficiency measures. These efforts have paid off. Despite the current crisis, there is no immediate risk of gas shortages. The European Commission has confirmed that, while supplies are tight, overall security of supply remains intact.

This resilience, however, comes with a trade-off. Europe has become more dependent on global markets. LNG is flexible and can be sourced from multiple regions, but it is also subject to intense international competition and vulnerable to transport disruptions. As the Agency for the Cooperation of Energy Regulators (ACER) notes, this shift has increased exposure to global price volatility and logistical risks.

The most immediate impact of the war has been on prices. European gas prices surged sharply after the conflict began, with benchmark TTF prices rising by around 70% within days.

Asia, which relies heavily on LNG imports, has been even more affected by disruptions to Middle Eastern supply. As a result, Asian buyers have been willing to pay a premium to secure cargoes, creating an unprecedented price gap. LNG prices in Asia have reached record levels above European benchmarks.

The crisis struck just as Europe emerged from winter with low gas storage levels. By the end of March 2026, storage facilities in several EU countries were below 30% capacity. Storage acts as a buffer against supply shocks; when levels are low, the system becomes more fragile. Europe now faces the difficult task of refilling storage ahead of the next winter season in a highly competitive global market. Meeting storage targets may require significantly higher LNG imports, potentially at much higher prices.

The impact of the war extends far beyond energy markets. Rising gas prices feed directly into inflation. The European Commission estimates that the EU has already spent an additional EUD 24 billion on fossil fuel imports since the start of the conflict. Industries that rely heavily on gas, such as chemicals, manufacturing, and fertilisers, are particularly vulnerable.

Given these pressures, why has Europe not experienced a full-blown supply crisis? The answer lies in preparation and the structural changes implemented in recent years.

First, the EU has diversified its supply sources. The United States has become the largest LNG supplier, accounting for around 30% of total gas imports, reducing dependence on any single region.

Second, Europe has expanded its LNG infrastructure. New terminals and increased capacity have enabled higher import volumes, ensuring that gas can be delivered where it is needed.

Third, demand reduction measures have played a crucial role. Since 2022, the EU has significantly reduced gas consumption, easing pressure on the system.

Finally, market integration allows gas to flow across borders within the EU, helping to balance supply and demand between Member States.

Together, these factors have created a system capable of withstanding shocks. Nevertheless, the war with Iran is a stark reminder of Europe's ongoing vulnerability. The EU still imports the majority of its energy, around 57% of total consumption. As long as this remains the case, external shocks will continue to pose risks.

The current crisis has reinforced the urgency of accelerating the energy transition. Moving away from fossil fuels is not only a matter of climate policy, but also of security.

The European Commission's AccelerateEU strategy highlights several key priorities: expanding renewable energy investment, accelerating electrification across sectors, and increasing energy efficiency. These measures aim to build a more resilient energy system that is less exposed to global market volatility. The challenge for policymakers is to strike the right balance, ensuring that the system remains both flexible and secure.

The war with Iran is unlikely to be resolved quickly. Even if the Strait of Hormuz fully reopens, damage to infrastructure and disruptions to supply chains will take time to repair. Markets are already pricing in a prolonged period of tight supply.

For Europe, this means continued uncertainty. The coming months will be critical. The ability to refill storage, secure LNG supplies, and manage demand will determine how effectively the EU can navigate the next winter.

The war with Iran is reshaping Europe's understanding of energy security. It is no longer sufficient to diversify suppliers or build infrastructure alone. Energy security is now a global issue, shaped by geopolitical events thousands of kilometres away. Europe has shown that it can adapt, having weathered multiple crises and built a more resilient system. Yet as long as the EU remains dependent on imported fossil fuels, it will continue to be exposed to external shocks.

The path forward is clear, even if challenging: reduce dependence, accelerate the transition, and build an energy system that is not only resilient, but truly secure.

By ***Andris Piebalgs***
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The energy crisis creates even stronger impetus for EU electrification

Electrification is central to meeting the European Union's goals on energy security, competitiveness, affordability, and emissions reductions. The closure of the Strait of Hormuz has highlighted the risks of over-dependence on imported fuels and concentrated supply routes, making the case for electrification even stronger.

In the EU, around 70% of electricity generation is already supplied from domestic, low-emissions sources. And yet end-users (industry, buildings and transport sectors), source less than one quarter of their energy consumption from electricity. Today, around two-thirds of end-use energy consumption relies on fossil fuels, of which the EU imports more than 80%.

This commentary is the first in a series examining the case for electrification in the EU, identifying cost competitiveness and areas where targeted policies could catalyse change.

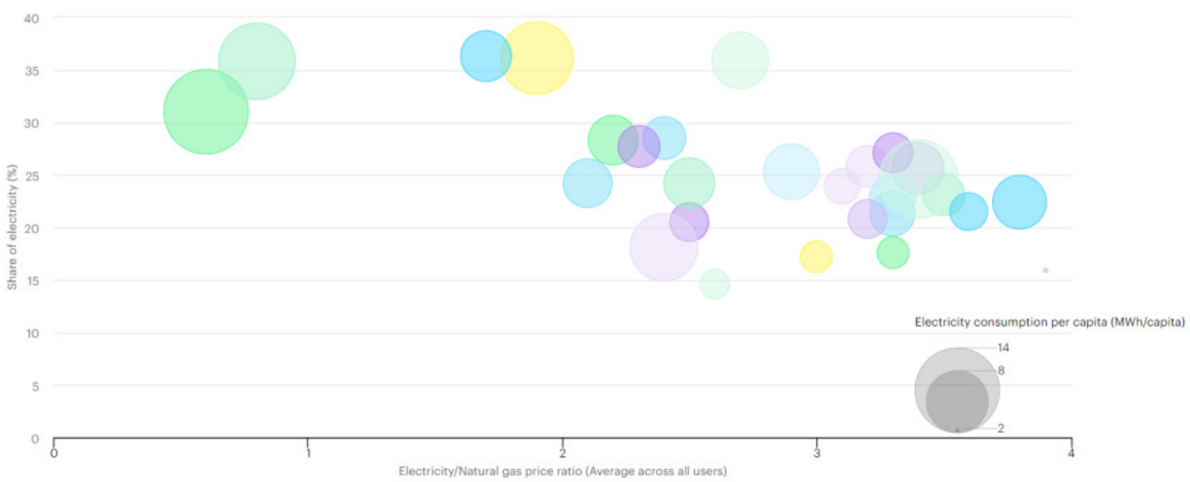
Fuel price ratios determine electrification competitiveness

To make electrification cost-competitive, electricity prices need to fall below a threshold ratio relative to the price of fossil fuels. Because most electrification options are several times more efficient than conventional alternatives, they can be cheaper to operate than conventional fuel-based technologies even when electricity costs more per unit of energy than the fuel they replace – i.e. a ratio greater than one.

EU countries today face very different price ratios. These differences are driven by historical choices in energy system design, energy taxation, and natural resources. They differ not only between countries, but also within them, as subsidies, taxes, and grid connection fees can vary substantially between industrial and household consumers. Averaging across these users, countries with lower price ratios typically see higher rates of electrification and per capita electricity demand.

There is no single energy price ratio at which electrification technologies become cost competitive. The breakeven point depends on the end-use application, as well as a host of other regional factors, including local climates, consumer behaviour, finance costs, and baseline energy prices. Countries with higher heating requirements and higher vehicle mileages see electrical technologies become competitive at higher price ratios, because the upfront costs of electrical technologies are offset by their lower operating costs if they have higher utilisation rates. Electric vehicles and high-temperature industrial heat need lower price ratios (usually between 1 and 2) to become cost-competitive compared with buildings and low-temperature industrial heat (usually between 2 and 3.5).

Share of electricity in total final energy consumption and weighted average electricity/gas price ratio by country, 2025



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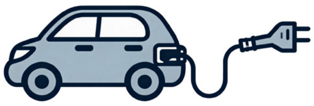
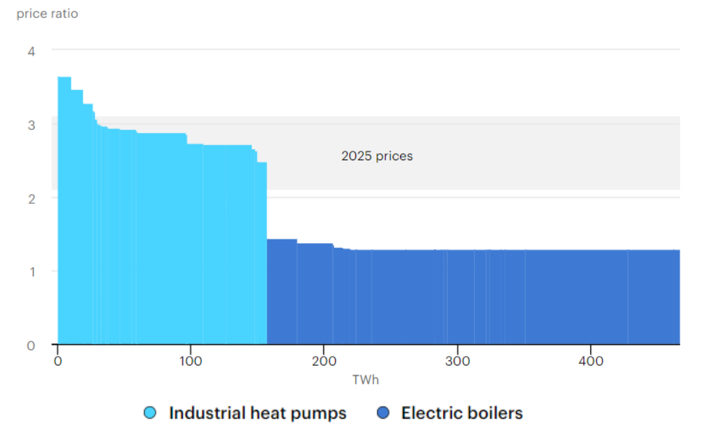


Achieving cost parity alone is insufficient to drive uptake of electrical technologies. High upfront costs discourage investment in electrification across all sectors. Buildings and industries may need modifications to accommodate heat pumps; new enabling equipment (like grids and EV chargers) needs to be rolled out; and consumers and business may be uncertain about switching to electric technologies. In 2025, Japan had a higher share of end-use electrification than any EU country, even though ten EU countries had lower average price ratios than Japan.This shows the need to complement favourable fuel price ratios with policies that address upfront costs and other non-financial barriers to adoption of electric technologies.

Potential for cost-competitive electrification of industrial heat at differentelectricity-to-fossil fuel price ratios, 2025



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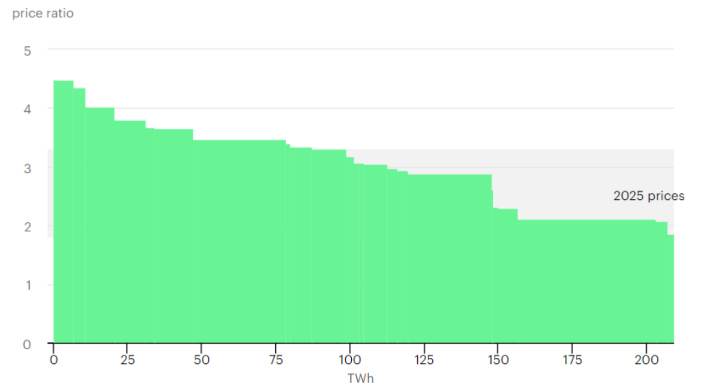
Potential for cost-competitive electrification of residential heat pumps atdifferent electricity-to-natural gas price ratios, 2025



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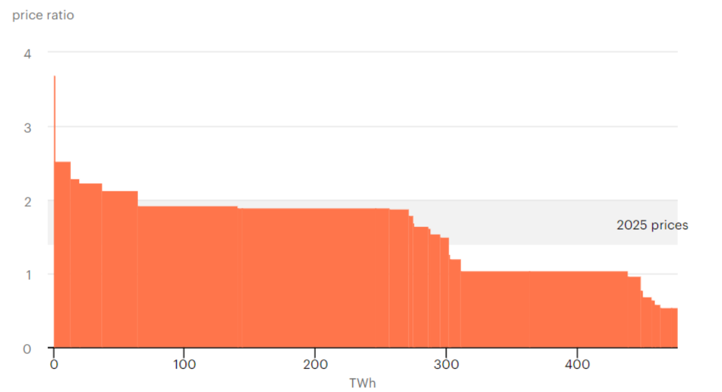
Potential for cost-competitive electrification of residential electric cars atdifferent electricity-to-oil products price ratios, 2025



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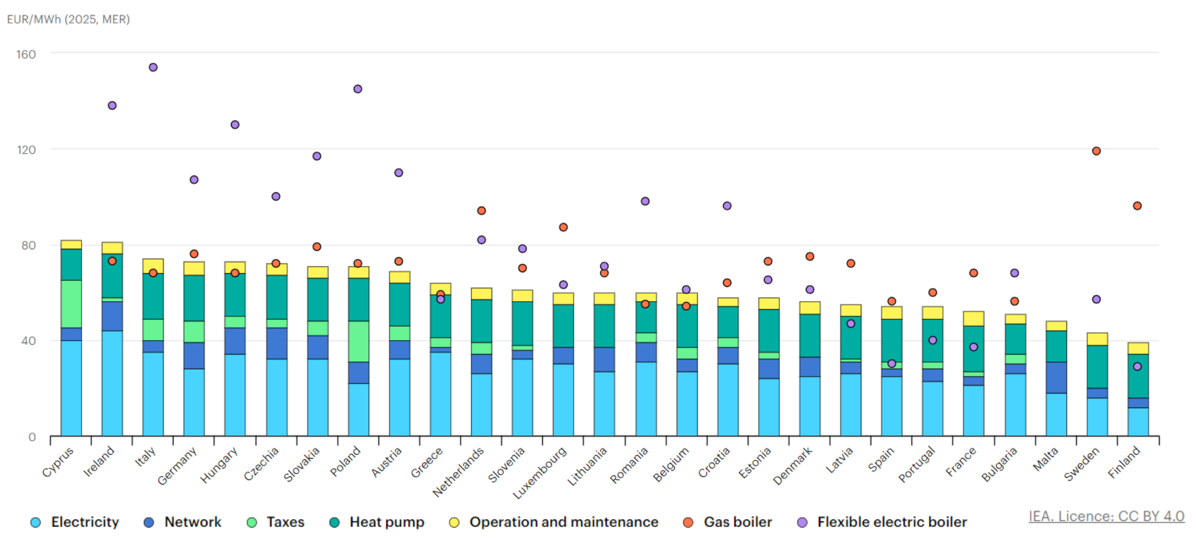
Heat pumps are competitive for 40% of low-temperature industrial heat

Heat pumps are the most cost-effective technology for electrification of most low-temperature industrial heat1. Based on 2025 prices, heat pumps have lower lifetime costs than gas boilers in 17 countries representing 40% of low-temperature thermal energy demand in the EU. A further 35% of low-temperature thermal demand is in countries where the cost of heat from a heat pump is within 5% of the equivalent from a gas boiler. Even in markets where heat pumps are cost competitive, installations remain low, and policy support is needed. Some plants require adaptation of infrastructure to integrate new equipment. Not all smaller facilities have the technical capacities or capital budgets to upgrade their heating sources, and they typically pay more per MWh for electricity than larger consumers. Long grid connection queues for medium-sized users may also delay uptake even where there is a financial incentive to electrify. The guidance on efficient and timely grid connections in the Grids Package provides policy options to reduce this barrier.

Low-temperature heat represents about 15% of industrial energy demand, which could be served almost exclusively by heat pumps. They can also be used at higher temperatures if waste heat is available, but in general other technologies like electric boilers, resistance heating, and arc furnaces are needed to extend electrification to higher temperatures. However, these technologies do not offer the same efficiency advantages as heat pumps and therefore are generally not competitive with gas today for baseload heat. However, because electric boilers have low upfront costs, some hybrid configurations which exploit off-peak electricity pricing could be competitive, for instance by coupling with flexible gas boilers or thermal storage.

Industrial consumers would benefit from tariff structures which pass through low-prices from day-ahead or intraday markets to flexible power consumers (without requiring consumers to act as electricity traders). In some EU countries, the end-user price of electricity is prohibitively high compared to gas even when the wholesale price is below 0, because of flat-fee network charges. Lower grid fees for flexible users, which are being implemented in Denmark, Germany and the Netherlands, could help reward flexibility to make some modes of electrification more competitive. Careful design of these policy solutions can steer consumers towards flexible demand that benefits the entire electricity system by shifting demand to more favourable periods.

Levelised cost of industrial heat from heat pumps by country, 2025



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Residential heat pumps are key to buildings electrification

Heat pumps are three-to-five times more efficient than conventional technologies, but adoption is highly uneven across the EU. The technology is the preferred distributed heating equipment across the Nordics, and accounts for around half of the equipment sales in Portugal, France and Austria, but remains marginal in other countries.

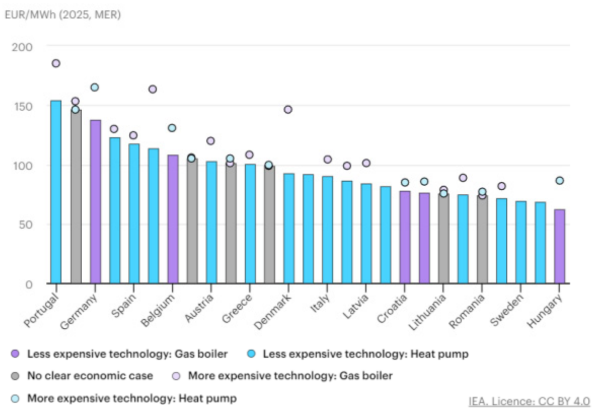
Across the heating equipment lifetime, residential heat pumps are competitive against gas boilers in 16 countries, representing around one-third of the EU's residential space heating demand. These countries all benefit from a favourable energy price environment, ranking within the 17 countries with the lowest electricity-to-gas price ratio. Beyond the Nordics, owning a heat pump is 15%-30% cheaper than a gas boiler in the Netherlands, Portugal or Bulgaria.

Over their lifecycle, in 2025 prices, heat pumps are equally or more expensive to own than a gas boiler in the other 11 countries, including major heating markets such as Germany, Poland and France, totalling two-thirds of EU's heating demand. However, in all but five of these countries, the ownership cost difference is below 5%, and upfront cost subsidies or an improved electricity-to-gas price ratio could shift the balance in favour of heat pumps.

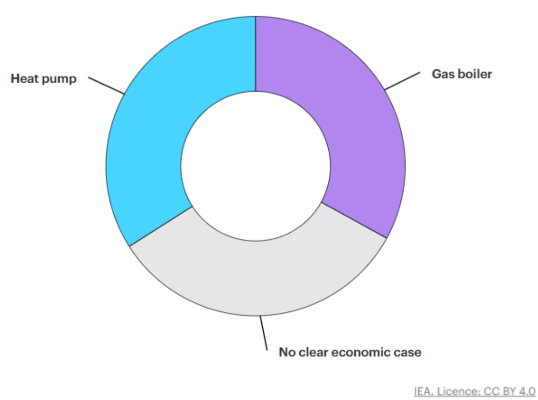
Heat pumps are cheaper to operate than gas boilers in almost all EU countries, with annual energy savings up to EUR 800. With appropriate installation and operation, heat pumps also last longer, improve thermal comfort, and increase property values, while reducing exposure to fossil-fuel price volatility and local air pollution. Air-to-air units also improve indoor air quality and boost productivity and wellbeing in the summer months.

However, upfront gas boiler costs are several thousand euros less than a heat pump. Gas boiler installations are also less likely to require adjacent works and provide consumers with greater certainty on execution and final price. The disruptive nature of heating system replacement also favours incumbent technologies – heating systems are most likely to break down during the coldest period of the year, when disruption is most harmful, which puts pressure on consumers to stick with incumbent technologies rather than engage in long-term financial planning. To shift the household heating market in favour of longer-term investments, policy makers must provide long-term policy certainty, low-to-zero interest financing, and project management support for major renovation projects.

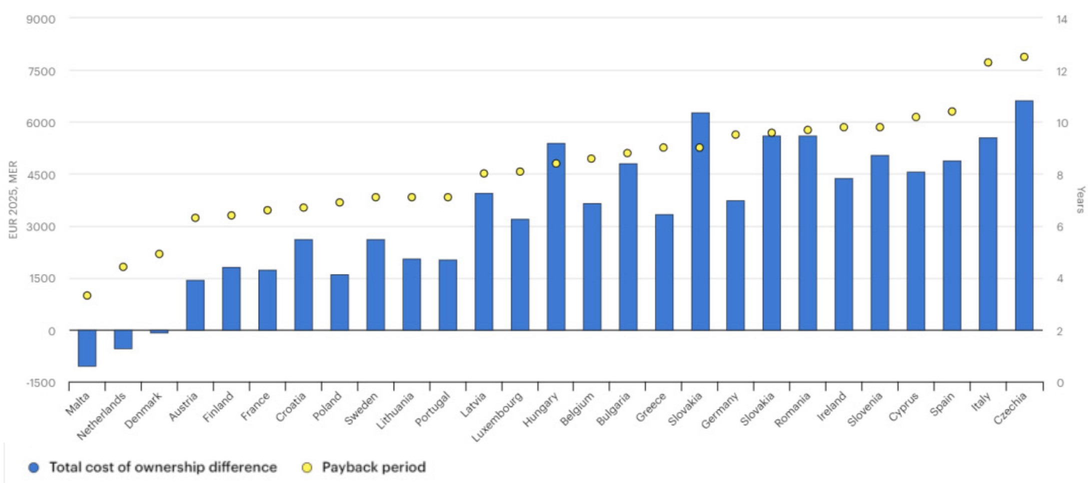
Levelised cost of using heat pumps versus gas boilers for residential spaceheating by country, 2025



Residential heating demand by most competitive technology, 2025



Total cost of ownership difference between BEV and ICE cars and BEV payback period



EVs are increasingly competitive for transport electrification

EVs sold today use four to five times less energy per kilometre than new Internal Combustion Engines (ICEs). Comparing the most sold ICE car model with an equivalent battery electric option in each EU country – without accounting for financial subsidies – EVs have a payback period of less than 8 years in 11 out of 27 countries (based on 2025 prices). In the largest markets, such as Germany and France, financial support (available at around EUR 4 000) halves the typical 7 to 10 year payback period to a range of 3-5 years.

The competitiveness of battery electric cars is expected to continue improving as more affordable EVs are launched and battery prices decline further. Today, the average price gap between battery electric cars and ICE cars in the EU is around EUR 10 000. In 2025, around 10 affordable EV models were available in the EU with starting prices of around EUR 25 000. In addition, the new Automotive Package will further support the rollout of small EVs, providing 'super-credits' for automakers for their production, making it easier to reach the CO_2 standards. However, many EU markets still require fiscal support and a greater availability of affordable electric models to incentivise EV uptake by narrowing the purchase price gap between electric and ICE cars.

Historic oil and gas crises have served as inflection points for energy systems

The oil crises of the 1970s ushered in a period of rapid change in global energy systems. Between 1975 and 1985, the EU added 80 GW of nuclear power generation, and the efficiency of a new vehicle sold in France increased by 20%. Because of the 2022 gas crisis, the EU is now in a position to remove all Russian gas from its energy system by 2027 – a significant feat given Russia was the largest supplier by a significant margin in 2021.

The current crisis is already improving the competitiveness of electric technologies: in April, the cost-savings associated with driving an EV in the EU grew 35% compared to those in 2025. Preliminary trends towards electrification have already been observed in the EU. Electric car sales in the region increased by around 30% during the first four months of 2026; and residential heat pump sales across 11 key European markets, including France, Germany and Poland, were up 17% in the first quarter of 2026. Supporting the electrification of end-use demand is an opportunity to protect consumers from the long tail of the current energy crisis, while making energy systems more resilient to future shocks.

*By **Nicholas Salmon, Oskaras Alšauskas, Sangitha Harmsen, Stéphanie Bouckaert***

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If electricity and data are the 'new oil', is grid connectivity the strategic bottleneck in the AI transformation?

Artificial intelligence (AI) is advancing faster than ever before, but the global energy system needs to keep pace for this progress to continue. Investment in AI data centres is growing faster than power grids can keep up, making grid connectivity a constraint. Strong leadership and a new mindset is needed to align clean energy investments, power grid build-out and AI growth for the benefit of all.

AI and data centre demand due to rise sharply

Artificial intelligence (AI) technology is advancing at an extraordinary pace. At the same time, the computing power used to train frontier AI models has been doubling every five to six months. Unlike the semiconductor scaling that defined previous technological eras, this growth is driven not by shrinking transistors but by deploying ever-larger chip clusters.

Combined with the scale of investment in data and computing infrastructure, this progress is already transforming entire industries. But the energy system must keep pace for progress to continue. This shift from silicon efficiency to physical scale is precisely why grid connectivity has become the binding constraint. Strong leadership is needed to align clean energy investments, grid build-out and AI growth.

The underlying issue is that investment in AI data centres is accelerating faster than power grids were designed to accommodate. While compute capacity, capital and talent remain critical, in many regions, connecting a new facility to the power grid can take 4-10 years, while AI data centres are typically planned and built within two to three. This misalignment increasingly determines which projects advance and which stall.

According to DNV's Global 2025 Energy Transition Outlook, electricity demand from AI and data centres will rise sharply up to 2030, with North America consuming half of the total demand by then.

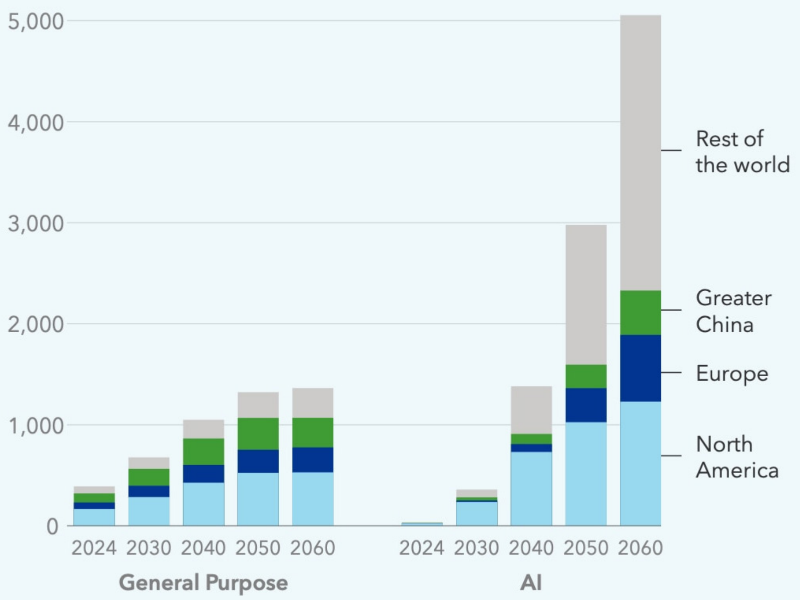
From 2035, AI training and inference (the moment where a trained model is applied to real-world data to generate answers) will become the dominant driver of data centre electricity use. By 2060, DNV estimates ~80% of data centre electricity demand will come from AI, and the sector reaches 11% (6,400 TWh) of final electricity demand, slightly less than for global space cooling demand.

Most of this additional load will connect through transmission grids. Approximately 10% of new transmission line connection requests in 2030, and 12% in 2040, will be for data centres, globally.

According to the International Energy Agency (IEA), permitting reform, grid-code harmonization, new financing models, and public-engagement efforts are moving, but not fast enough to match current AI investment. Efficiency helps, but it cannot remove the need for physical capacity, firm connections, and predictable operating envelopes.

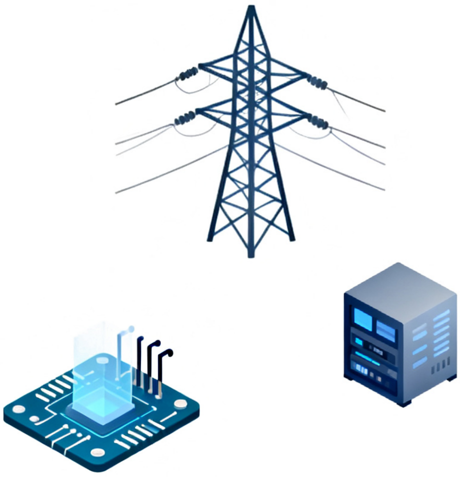
AI electricity demand will grow ten-fold to 2030

Data centre energy demand(TWh/yr)



The risk profile has shifted: access to the grid – rather than chips, capital, or algorithms – is increasingly the binding constraint. For developers, grid-connection uncertainty now rivals technology risk. For operators and policy-makers, the challenge is integrating a new demand class without compromising reliability.

Grid connectivity challenges for AI data centres



Until recently, most data-centre electricity demand fell into two categories: hyperscale cloud sites (predictable, suited to long-term planning) and cryptocurrency mining (volatile but often interruptible). AI data centres sit between these extremes.

They combine very high-power density with fast, uncertain ramping and a low tolerance for interruptibility – making them the most challenging load for today's grid planning and interconnection frameworks.

This makes AI data centres something of a stress test for grid connectivity as they turn it into a system-level challenge. Grid operators must assess not just individual projects, but also how clusters of AI data centres interact with existing assets and each other – often with limited data and under significant time pressure.

Near term, the aim is to reduce risk and deploy systems assurance, rather than bypassing the grid. Practical measures include:

- Choosing the right location from the start. Before committing land or capital, developers should assess where grid capacity is actually available, how long connection queues are and what technical limits apply locally. Sites near retired power plants or underused grid infrastructure can connect significantly faster than greenfield locations in congested areas.

- Behind-the-meter assets: Assets such as batteries, limited on-site generation, power-quality equipment, plus capacity procurement, like off-site power purchase agreements or own generation, enable operations within grid limits and reduce short-term stress.

- Interruptible 'emergency lane' connections: Power grids hold spare capacity in reserve for emergencies. Under managed contracts, this reserve can be made available to data centres willing to accept occasional, planned interruptions. A recent DNV study of the Dutch transmission network[1] suggests this approach could unlock 5–15% of additional capacity in congested areas without compromising system security, so long as clear rules govern when and how connections are curtailed. Regulators recognizing this as a standard option for data centres would meaningfully shorten connection queues.

- Demand flexibility: Data centres can ease grid pressure not just by using less power, but by using it more flexibly. Deferring non-urgent computing tasks, redirecting workloads to less congested locations, and prioritizing operations by criticality all reduce strain on local networks without cutting total output.

An AI campus, for example, secures capital and hardware but faces a multi-year grid queue. By combining phased connections with on-site storage and operational load controls, the project can begin operations earlier – while grid reinforcements are still under way – without compromising system security.

Leadership priorities for the next phase of AI

AI is already supporting grid planning and operations, such as accelerating powerflow studies, congestion analysis, AI-enhanced digital twins. But it cannot remove the regulatory, institutional and physical risk constraints, and it will not be able to offset AIdriven load growth within the timeframes that matter.

Leadership is needed from three stakeholder groups:

- Utilities and regulators should treat AI data centres as a distinct load class and adapt interconnection, queue management, and gridcode practices accordingly.

- Developers and hyperscalers need to price grid realities into early investment decisions, treating connection timelines, operational limits and compliance risks as core, not an afterthought.

- Policy-makers and investors must accelerate grid build-out while enabling interim flexibility mechanisms that protect reliability and maintain public trust.

The future electrification of our societies requires a new mindset toward digitalization and systems thinking: data centres can act as an important enabler for faster scaling, thanks to their strong business case, just as we are seeing with batteries for EVs, making storage another important enabler for the energy transition. Aligning AI growth with grid connectivity is now a central leadership responsibility.

*By **Ditlev Engel, Chief Executive Officer, Energy, DNV***

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Can China turn hydrogen into its next clean-energy industry?

China has said that hydrogen is a key 'future industry', important to both its energy transition and its industrial policy.

Hydrogen frequently goes through hype cycles, most recently driven by rising oil and gas prices due to the conflict in the Middle East.

Yet, even in China, the world's largest producer and consumer of the fuel, hydrogen remains expensive and inefficient to produce.

This is especially the case for 'green' hydrogen derived from renewables.

Moreover, there is limited supporting infrastructure and there is little incentive to use hydrogen over other energy sources.

As a result, uptake in China of hydrogen as an alternative fuel remains low.

Nevertheless, these challenges echo the early circumstances of another key clean-energy technology – electric vehicles (EVs).

In China, EVs benefited from a policy environment that included consistent signals of support, financial aid and the development of supporting infrastructure.

Many similar policies are now being deployed – and in some cases improved upon – to support the development of China's hydrogen industry.

This article examines China's approach to developing hydrogen and how its evolving industrial policy could make the fuel viable.

How is China using hydrogen and where does it come from?

Electrification and rising installations of solar and wind power have been the biggest drivers of China's decarbonisation story so far. However, how China will address the more energy-intensive, hard-to-electrify segments of its economy remains an open question.

Hydrogen is seen by some in China as a potential solution for reducing emissions in a range of 'hard-to-abate' industries, from steel and chemicals to aviation and shipping.

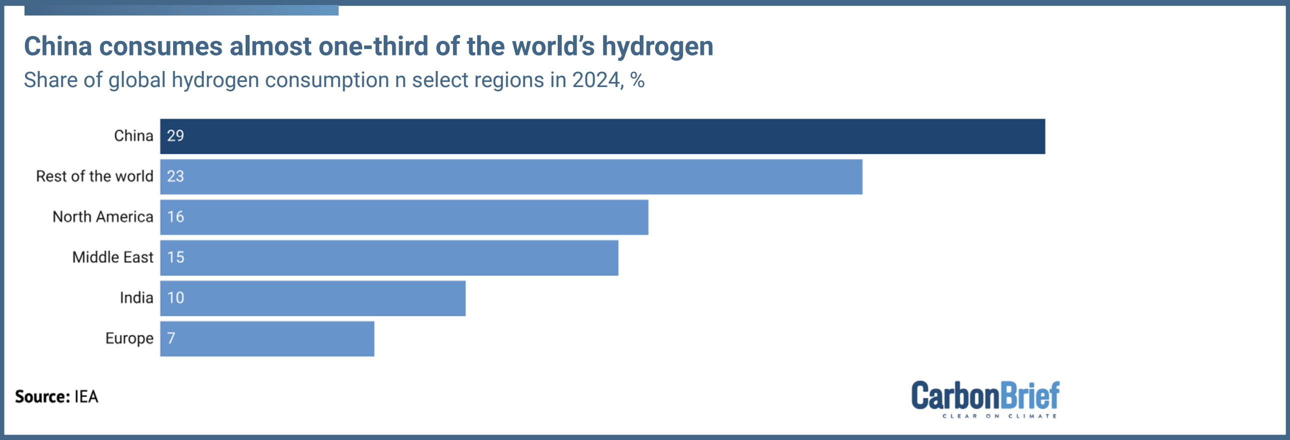
The country is the world's foremost producer and consumer of hydrogen. It produced 36.5m tonnes of the gas in 2024, with maximum production capacity standing at 50m tonnes that year.

It also consumed nearly a third of the world's hydrogen in 2024, as shown below.

Most of China's production capacity is in regions with potential for high demand, such as Shandong, Inner Mongolia, Shaanxi, Ningxia, Shanxi and other provinces with significant heavy industry.

In 2024, the vast majority of China's hydrogen – around 78% – was produced using fossil fuels, predominantly coal and gas, as shown in the figure below.

Another 21% was produced as an industrial by-product, while only 1% – just 320,000 tonnes – was derived from renewable-powered electrolysis of water.



One study found that, for every kilogram of hydrogen produced, 38.6kg of carbon dioxide (CO_2) is emitted if the hydrogen is produced using coal-fired power. Hydrogen made through coal gasification results in 28.5kg of CO_2 for every kilogram of hydrogen, while gas-based hydrogen creates 13kg of emissions.

By contrast, one kilogram of renewables-based hydrogen results in 0.5kg of CO_2.

The International Energy Agency (IEA) calculates that hydrogen and hydrogen-based fuels could help China avoid close to 16bn tonnes of CO_2 cumulatively by 2060 – but only if it comes from low-carbon sources.

The biggest reductions, it adds, would come from heavy industry, particularly chemicals and steel, with the maritime and shipping sectors also seeing some benefit.

Currently, around half of the hydrogen produced in China is used in synthetic ammonia and methanol production.

Ammonia is primarily used to manufacture fertiliser and is seen as a possible fuel technology for shipping. Methanol is used as a fuel for the transport industry, as well as for heating.

Another quarter of China's current hydrogen usage is consumed by the oil refining and coal-to-chemical sectors. The remaining amount is used in other industries, including transport, heating and metallurgy.

What are the barriers to scaling up hydrogen?

Although China is the largest producer and consumer of hydrogen globally, the industry faces several barriers to becoming a viable clean-energy technology.

Agora Energiewende, a thinktank focused on the energy sector, says that, in order to make hydrogen a practical clean-energy solution, China would need to expand the scale and range of its application, as well as improving the conversion efficiency of production and use.

Both BloombergNEF and the IEA highlight the importance of China creating demand for hydrogen, such as through quotas for industrial usage.

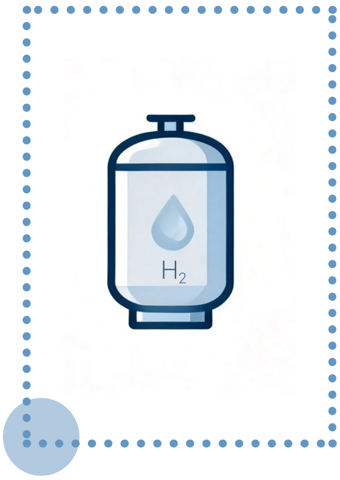
Hydrogen 'suffers from a relatively large efficiency loss during various conversion processes', adds Agora. For example, it notes that only around 22% of the energy put into hydrogen fuel-cell electric vehicles (FCEVs) is converted into motion, compared to 73% for battery electric vehicles. Producing hydrogen with renewable energy is also less efficient than coal-to-hydrogen processes.

Cui Chuansheng, technical director at East China Engineering Science and Technology, tells state news agency Xinhua that the variability of wind and solar power often leads to low utilisation of electrolysers, resulting in 'efficiency losses'.

Meanwhile, the cost of producing hydrogen – particularly green hydrogen – remains high.

One study placed the cost of hydrogen produced through alkaline water electrolysis (AWE), the most common method for producing green hydrogen in China, at USD 4-6 per kilogram, compared with USD 1.20-2.50/kg for steam methane reforming and USD 1.30-2 for coal gasification.

In some specific cases, such as blending hydrogen with gas, researchers find that hydrogen prices would need to fall to one-third of gas prices to incentivise uptake.



These constraints are all 'interdependent', Kevin Tu, managing director of Agora Energy China, tells Carbon Brief, with the need to ensure 'bankable demand' while also reducing costs and developing infrastructure. He adds:

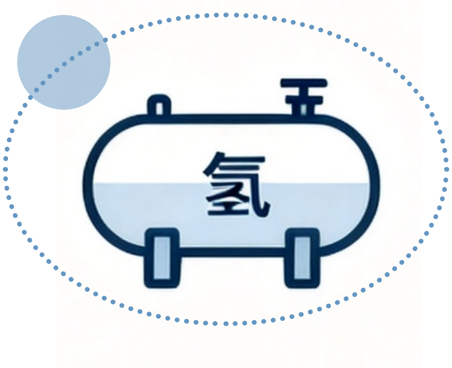
'Without credible offtake in the right sectors, costs will not fall; without lower costs and better logistics, downstream users will not commit.'

The IEA says that green hydrogen 'could become cost-competitive by the end of this decade due to low technology costs and cost of capital'.

For now, however, the China Hydrogen Bulletin Substack reports that China's four listed hydrogen equipment manufacturers all reported significant losses in 2025.

Meanwhile, a senior executive at a Chinese hydrogen company told economic news outlet Jiemian that he expected 40% of companies in the sector to have closed down by the end of 2026, with surviving companies only turning a profit in 2029 at the earliest.

The industry also lacks refueling and pipeline infrastructure. China's development of a pipeline network for hydrogen remains in its early stages, with around 400km of pipelines currently in operation. By contrast, its long-distance gas network stands at 128,000km. Similarly, storage remains expensive and inefficient, creating a further obstacle to wider uptake.



How is China supporting hydrogen development?

China began considering the use of hydrogen as an energy source in earnest in the early 2000s, to address concerns around pollution and dependence on imported oil for the transport sector.

A clearer signal of its importance came in 2015, when the State Council included the technology in a 10-year national industrial strategy known as the 'Made in China' initiative. This pitched hydrogen as a way to contribute to electrification of China's road-transport system through the development of FCEVs.

Yuki Yu, founder of research firm Energy Iceberg, tells Carbon Brief that, from 2018-2021, hydrogen was treated as a 'FCEV and manufacturing technology challenge'.

This has since evolved, she says, given that battery electric vehicles have emerged as the more popular technology.

Shen Xinyi, senior advisor at the Centre for Research on Energy and Clean Air (CREA), agrees, telling Carbon Brief that recent policy documents suggest the aim is now for hydrogen to be targeted at areas where direct electrification is harder, such as hydrogen-based chemicals, hydrogen metallurgy and some heavy-duty transport applications.

This is in line with the 'hydrogen ladder', an analysis of how likely different possibilities for applying hydrogen as a clean alternative are to become significant. The ladder sees significant future use of hydrogen in these hard-to-electrify areas as much more likely than for light vehicles.

Notable policy moves are being made in 'three layers', says Agora's Tu, which are combining to improve the technology's chances of scaling up. These are: the 'legal and institutional' layer; 'application-oriented' policies; and targeted measures to address 'practical bottlenecks' at the local level.

One of the documents underpinning this pivot was the 'medium- and long-term plan for the development of the hydrogen energy industry (2021-2035)', issued in March 2022.

According to a report by the National Energy Administration (NEA), the plan is an attempt to develop an 'industrial ecosystem' for hydrogen that features 'diverse stakeholders, coordinated innovation and clustered development'.

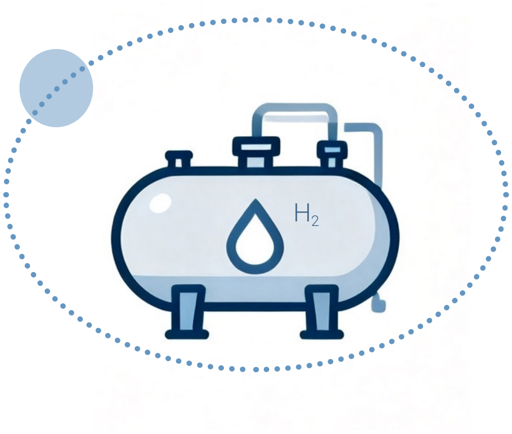
The plan was the first government document to 'lay out a long-term vision for China's hydrogen economy', unifying a previously disparate policy push into one document, according to the Oxford Institute for Energy Studies, a UK-based thinktank.

Following on from the 2022 plan, the importance of hydrogen as a broad clean-energy solution has been emphasised in a number of policies. These include its classification being changed from a hazardous chemical to an energy carrier in China's Energy Law, a 2024 action plan to 'accelerate' the use of low-carbon hydrogen in industry and a new pilot scheme offering subsidies for projects that achieve specific targets.

The table below sets out the timeline and content of China's hydrogen-related policies over the past 25 years.

Policy	Year published	Key features
10th five-year plan (2001–2005)	2001	Calls for 'actively developing' low-emission vehicles, understood to include hydrogen vehicles
Made in China 2025	2015	Pledges to 'continue to support' development of fuel cell vehicles and 'master core technologies' for low-carbon vehicles
Notice on implementation of demonstration projects for fuel cell vehicles	2020	Creates a dedicated subsidy programme for finding breakthroughs in FCEV core technologies and industrial applications
14th five-year plan (2021-2025)	2021	Hydrogen listed as a future industry
Medium- and long-term plan for the development of the hydrogen energy industry (2021–2035)	2022	Aims to reach 100,000-200,000 tonnes of green hydrogen production [this target has been met]. Also aims to get 50,000 FCEVs on the road by 2025, leading to a 'diversified' hydrogen industry by 2035
Opinions on accelerating the comprehensive green transformation of economic and social development	2024	Promotes further development of hydrogen production, transport, storage and applications
Implementation plan for accelerating the application of clean and low-carbon hydrogen in the industrial sector	2025	Outlines tasks to promote use of low-carbon hydrogen to reduce emissions in heavy industries, such as steel and chemicals
Energy law	2025	Sees hydrogen included in national legislation for the first time, re-classifies it from a hazardous chemical to an energy carrier
15th five-year plan (2026-2030)	2026	Again lists as a future industry, and calls for the development of green fuels derived from green hydrogen
Notice on the implementation of pilot projects for the comprehensive application of hydrogen energy	2026	Provides subsidies to projects to reduce hydrogen costs to 15-25 yuan/kilogram (USD 2.20-3.67/kg) and help develop a fleet of 100,000 FCEVs

Could a new pilot programme boost hydrogen's prospects?



Key policies in the development of China's hydrogen sector.

In addition, the NEA said in 2025 that local governments across China had issued more than 560 hydrogen-related energy policies by the end of 2024.

Tu notes that these local policies cover everything from permitting reforms and pipeline planning to exempting FCEVs from paying road toll.

Different provinces across China adopt distinct strategies for developing hydrogen industries, based on local conditions, says the US-based Center on Global Energy Policy, such as energy mix, availability of coal and industrial needs.

However, these local policies and targets are frequently more ambitious than the 'conservative' national-level targets, it adds.

A new pilot programme, announced in March 2026, aims to commercialise the country's hydrogen industry by funding projects to reduce the cost of the fuel to 15-25 yuan/kilogram (USD 2.20-3.67/kg) by 2030, as well as other targets.

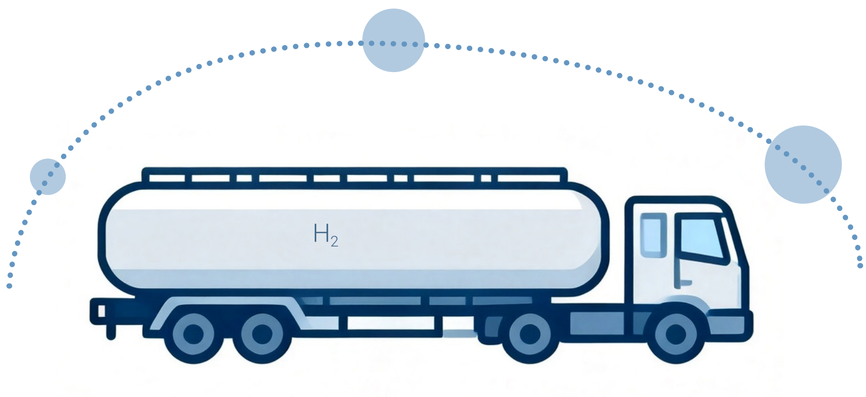
Unlike the 2020 subsidies, which focused on FCEVs, the new programme reaffirms China's interest in a broader series of sectoral applications for hydrogen, including in clean heating, production of low-carbon iron and steel, and production of 'green fuels' and other chemicals.

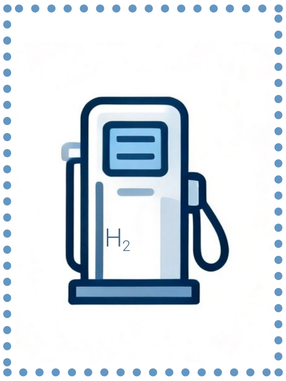
This new pilot is the 'strongest financial instrument ever released for China's green hydrogen application' in terms of creating a comprehensive hydrogen policy that covers a broad swathe of the economy, supporting it with financial backing and targeting application scenarios, Yu says.

However, she argues that strict grant caps – 240m yuan (USD 35m) per project and 1.6bn yuan (USD 235m) per selected region across only five regions – limited the overall funding scale available to the industry.

Energy Iceberg has calculated that only around 60-70 projects nationally could receive funding under the current rules, out of more than 670 active green hydrogen proposals in China.

Shen agrees that the pilot programme is significant and that it will expand the use of hydrogen in China's climate strategy, particularly green hydrogen.





She notes a provision that 'explicitly states that coal-based ammonia and methanol projects cannot be labelled as 'green' ammonia or methanol', suggesting that policymakers are increasingly paying attention to the 'integrity' of definitions for hydrogen and hydrogen-derived fuel.

The 'real value' of the pilot scheme, says Tu, is that it focuses on developing 'integrated city-cluster ecosystems linking supply, transport, infrastructure and end-use demand', rather than only supporting individual projects.

This 'should help identify viable business models, accelerate cost discovery and concentrate support on applications with stronger scale potential', as well as boost investor confidence, adds Tu.

However, he continues that the broader effect it will have on boosting production of hydrogen will 'depend on how quickly the selected clusters can translate the programme into real offtake and lower delivered hydrogen prices'.

How does this compare to China's EV policy push?

The debate around the viability of hydrogen is reminiscent of critiques of EVs.

Until recently, EVs were seen as too expensive for consumers, inefficient and challenging to use without supporting infrastructure. As a result, many western automakers chose to temper their focus on EVs, while continuing to develop internal combustion engines.

However, China has managed to develop a competitive EV industry with products that top global sales.

Part of the playbook that spurred China's success on EVs included consistent policy signalling in favour of the technology, including mentions in high-level documents and committing resources to building charging infrastructure.

'The defining features of China's industrial-policy success are its persistence and adaptability,' says Kyle Chan, fellow at the Brookings Institution, adding that 'long before the technology and economics of EVs and batteries were proven, China was making long-term investments and policy bets [in the sectors]'.

More tangible measures included direct and indirect subsidies and policy support in the shape of favourable loan rates and low-cost land. One estimate by US-based thinktank the Center for Strategic and International Studies (CSIS) pegs the amount of support allocated to the EV industry between 2009-2023 at USD 230.9bn.

This coupled with the success of private Chinese manufacturers in creating innovative, nimble companies that 'forc[ed] policymakers to adapt', as well as growing links between the automotive and information technology industries, according to a separate CSIS report.

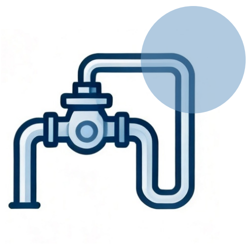
But this progress on EVs also reportedly came with significant fraud. In 2016, one investigation found that 33 companies were involved in subsidy fraud totalling 9.2bn yuan (USD 1.3bn).

(It should also be noted that profitability in the industry lags far behind the average for downstream industrial sectors, according to the Hong Kong-based South China Morning Post, which says that 'only a handful' of nearly 50 EV makers have reported profits.)

Being the subject of an industrial policy push alone does not guarantee success, states CSIS. It says the strength of the EV industry 'was neither inevitable nor the result of a single master plan' and that China's aims to develop globally-competitive industries in areas such as commercial aviation remain unaccomplished.

China’s approach to hydrogen has been markedly different.

Instead of offering blanket subsidies, the fuel cell demonstration programme it established in 2020 focused on performance-based rewards.



To avoid the subsidy issues seen in the solar and EV industries, the ministry of finance deliberately chose this indirect funding model, says Yu.

However, Yu argues, the programme did not work as well as hoped, due to the funding ceiling and the siloed attempts made by different regional governments to develop hydrogen ecosystems .

But Chinese policy thinking is becoming more selective and pragmatic for hydrogen compared with EVs, says Shen. She says:

‘Electrification remains the primary decarbonisation pathway [for road transport], while hydrogen is increasingly positioned for applications where direct electrification is more difficult.’

Tu echoes this, adding that China is ‘clearly moving toward a more supportive policy environment for hydrogen’.

But its approach is ‘unlikely to replicate the EV story one-for-one’, he adds.

China’s concerted hydrogen push is also unlikely to echo the EV story at a global level, according to the IEA.

In terms of green hydrogen, around 60% of global electrolyser manufacturing capacity is currently in China, prompting concerns from the EU about a repeat of China’s global dominance in the solar and EV sectors.

However, the IEA says, electrolysers made in China ‘might not supply other markets at scale in the short term’, due to difficulties transporting the bulky technology globally, expectations that costs will only fall gradually, uncertainty around global demand and questions over how well Chinese electrolysers perform against global alternatives.

China’s industrial focus on hydrogen is centred more on domestic use, Shen argues. ‘It is less about near-term export competitiveness and more about building domestic industrial ecosystems,’ she says.

*By **Anika Patel, Karen Teo***

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China's zero-carbon industrial parks, like this one in Jiangsu province, feature clusters of enterprises aiming to drive down their emissions (Image: Xinhua / Alamy)

Behind China's boom in 'zero-carbon industrial parks'

As the parks multiply, unified standards and better carbon accounting are needed to maximise their potential

The drive to create 'zero-carbon industrial parks' is here to stay. This was made clear last month at the annual plenary meetings of China's top legislature, the Two Sessions. Such parks were assigned a prominent role in two key documents emerging from the meetings, namely the 15th Five Year Plan – China's economic blueprint for 2026-30 – and the 2026 annual development plan.

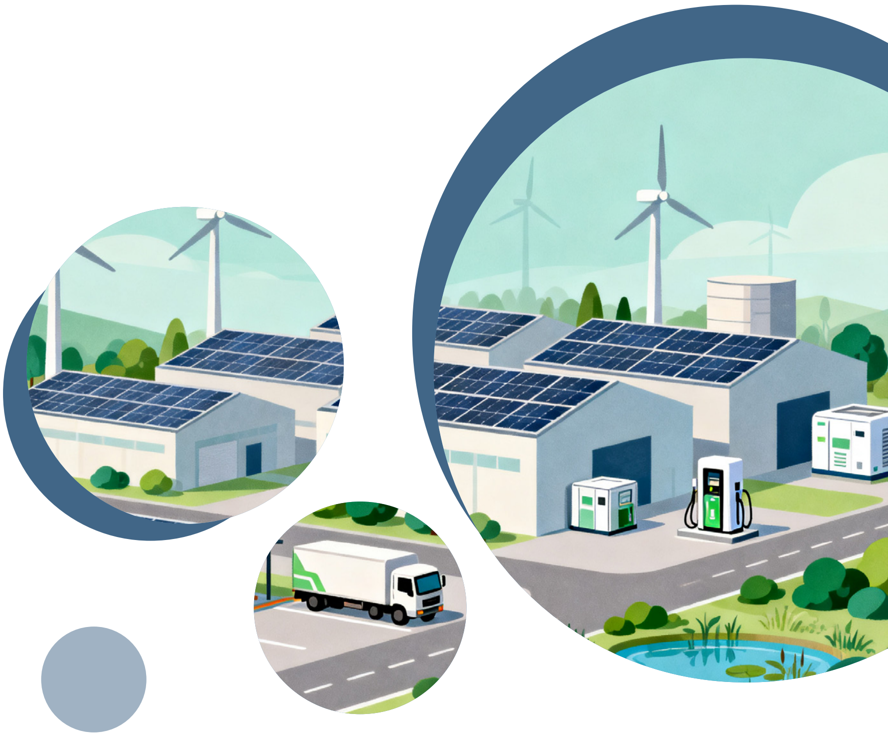
The drive could be highly significant because industrial parks as a whole currently account for 31% of China's carbon emissions, 50% of its industrial output value and 80% of its factories. They often contain a high concentration of companies involved in heavily emitting industries like steel, cement, autos or chemicals manufacturing.

In a recent report by Beijing-based think-tank the Institute for Global Decarbonization Progress, we analysed 85 pilot zero-carbon industrial parks in eight of China's provinces.

What decarbonisation experiences have they been accumulating? What do they tell us about the challenges ahead as the national government doubles down on the initiative?

As China ramps up its zero-carbon industrial parks effort, our key prescriptive takeaways are that voluntary standards should be elevated to national ones, parks should shift from isolated decarbonization projects to integrated system-wide designs, and carbon market and green finance mechanisms should be expanded.

What is a zero-carbon industrial park?



While there is no one official definition of a 'zero-carbon industrial park', Chinese policy and pilot practices are converging around common features. These parks are clusters of industrial enterprises that aim to achieve near-zero or net-zero emissions by combining deep decarbonisation and carbon-management measures like offsetting and energy-efficiency gains. They are usually located outside but not far from urban centres and can host anywhere from a handful to several hundred enterprises.

In practice, the zero-carbon designation often applies to pilot zones within larger economic development zones, rather than entire administrative districts. As a result, most pilots currently occupy a modest area – generally 10-20 sq km, with some in the 20-50 sq km range.

That upper limit is roughly comparable to the size of Manhattan, underscoring both the manageability of pilot projects and the challenge of scaling up to larger industrial systems. Guiding indicators in the zero-carbon industrial park national framework require clean energy to account for at least 90% of total energy consumption; carbon emissions per unit of energy to fall 90% below the current national average for industrial parks; and industrial solid waste utilisation to exceed 80%.

The background to China's push for zero-carbon industrial parks

China has promoted efforts to decarbonise its industrial parks since the launch of the eco-industrial park pilot program in 2001. Since then, related policies and implementation approaches have progressively evolved and expanded in scope. The '1+N' policy system under the 14th Five-Year Plan (2021-2025) reinforced efforts to promote circular transformation and cleaner production in industrial parks, build 'green and low-carbon industrial parks', and advance 'near-zero' carbon emission demonstration projects. The 2024 Central Economic Work Conference for the first time included 'zero-carbon industrial parks' at the national strategic level.

External pressure has also been driving decarbonisation in China's industrial parks. It has become necessary for industrial players to reduce their emissions due to the rise of carbon levies, such as the European Union's Carbon Border Adjustment Mechanism, and increasingly strict international market requirements for carbon footprint accounting.

And because industrial parks are concentrated areas of high energy consumption and carbon emissions, they are facing pressure to move away from carbon-intensive economic development models that go against the national imperative to achieve 'high-quality development'. These forces led to the July 2025 'Notice on carrying out zero-carbon park construction,' jointly issued by the National Development and Reform Commission, the Ministry of Industry and Information Technology, and the National Energy Administration. Among other mandates and guidelines, this called on local governments to nominate parks for inclusion in a first batch of 52 national pilots.

Regional differences

While only seven of the parks we analysed appear in the first batch of 52 pilots, they offer a view into the parks' development patterns and trends across different geographical and economic conditions.

The parks along China's eastern coastal areas evince a 'new-industry-driven' model that emphasises advanced manufacturing, export-oriented industries, 'high-end services' like IT and finance, and leverages complete industrial chains and mature technology. They tend to focus on 'strategic emerging industries' and promote use of renewable power, distributed energy and green building applications.

Wuxi, in Jiangsu, offers an interesting example. Early-mover advantages in solar photovoltaics and energy storage have enabled it to demonstrate pathways for green electricity consumption and industrial development, showcasing a zero-carbon development model driven by technological innovation.

What are 'strategic emerging industries'?

When China officially defined this concept in a 2010 State Council decision, it included seven industries, according to academics at Fudan University:

- Energy conservation and environmental protection
- New gen IT
- Biologicals
- High-end equipment manufacturing
- New energy
- New materials
- New energy automobiles

China's central areas have developed an 'energy-transition-driven' model oriented towards adjustments in the energy structure. Because these regions have a high proportion of traditional manufacturing and coal-fired power, their challenge is to drive high-quality economic development through green transformation. Parks in Shanxi, for example, have focused on promoting the transition away from coal and toward new energy industries. They are searching for synergies between the need to upgrade existing industries and cultivate emerging green industries.

The parks in China's south-west, meanwhile, display a 'clean-energy-driven' model that draws on local advantages in hydro, wind and solar power, to couple clean energy with industrial production. Parks in Sichuan, for example, tend to focus on developing industries such as electrolytic aluminium, silicon materials and batteries for new energy vehicles. Yunnan has been promoting the use of hydropower in green aluminium and green silicon industrial chains to develop a competitive advantage in international markets.

Standards and technical challenges

The technical standards for China's zero-carbon industrial parks have also been developing along different pathways.

Voluntary industry-association-led 'group standards' have been spearheaded by bodies like the China Energy Conservation Association and the China Association for Engineering Construction Standardization. In addition, local government standards have been made in accordance with local resource endowments and industrial characteristics. Finally, divergent local implementation plans have been developed to bridge high-level national policy and ground-level operational needs.

Our report found that these multifarious standards have led to challenges such as inconsistent carbon accounting methodologies, a lack of unified third-party verification protocols, and difficulties in benchmarking performance across parks.

This undermines the credibility of carbon reductions, raises compliance costs for businesses, and impedes the development of scalable financial instruments based on park-level carbon assets.

Building an energy supply system centred on green power is crucial for zero-carbon industrial parks, but practically challenging. The direct green power supply model – which sees a renewable power generator bypass the grid to supply an industrial consumer directly – often encounters issues such as complex approval procedures, high upfront investment costs, and imperfect market trading rules during implementation. Meanwhile, the technological challenges of integrating renewables into the grid at scale have yet to be resolved. Long-duration energy storage technology remains immature, for example.

High-quality carbon accounting data is the basis for measuring emission reduction effects, overcoming international trade barriers, and attracting green finance. However, current systems for carbon accounting have frailties.

First, measurement and monitoring suffer from weak underlying data-collection capabilities. Second, the accounting process is complex, professional talent is scarce, and unified, authoritative third-party verification and certification standards are missing. Third, the technological and economic bottlenecks of deep decarbonisation are becoming increasingly prominent, especially in high-emission traditional industries such as cement, steel and chemicals. These sectors are hampered by insufficient supply of key inputs such as green hydrogen, low technological maturity, poor economic viability, and incomplete supporting policy systems and market mechanisms.

What's next?

According to national plans, there will be 100 national zero-carbon industrial parks developed during the 15th Five-Year Plan period (2026-2030). The first batch of 52 pilots will be expected to demonstrate pathways for the subsequent scaling up of the pilot program.

Our analysis points to three areas of work that deserve special attention. First, the existing, industry-led group standards should be gradually upgraded to sectoral and national standards. A tiered and categorised carbon emission accounting and certification system would enhance the standardisation, comparability and implementation for parks in the system.

System integration is another priority. Overall operational efficiency and emission reductions could best be realised by strengthening the parks' links between energy, industrial production, transportation, buildings and resource recycling. This will require breaking down administrative and departmental barriers.

Third, to strengthen the foundations for carbon trading, the parks should accelerate the development of diversified trading mechanisms covering carbon emission rights, green power certificates, and voluntary emission reductions. This will facilitate the introduction of carbon financial products and services, allowing market-based incentive mechanisms to drive decarbonisation.

Further down the line, it will be interesting to see whether China's ministries coordinate to export lessons learned in its pilot program to its overseas industrial parks.

Ultimately, industrial parks will have to develop against policy mandates, assess the low-carbon demands of their consumer markets, and make the most of their local advantages.

*By **Liu Jingning, Yang Li, Diego Montero***

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China's Energy 15th Five-Year-Plan in Figures

On 25 June 2026, China released its 15th Five-Year Plan for Building a New Energy System. This energy sector blueprint underpins the country's broader 15th Five-Year Plan which was unveiled in March. The document sets out how China intends to navigate the next stage of its energy system transition while balancing economic development, energy security and decarbonisation.

The plan arrives a time when China's energy sector is entering a more complex phase of development, characterised by growing energy security risks, a faster transition to a low-carbon economy, rapid technological innovation, deeper market reforms, and a shifting geopolitical landscape for international energy cooperation. These changes require more than continued investment in clean energy: they call for a new energy system capable of balancing security, affordability, innovation and sustainability.

Energy security continues to be the cornerstone of that vision. The plan reaffirms that China must keep its energy supply 'firmly in its own hands' by strengthening domestic production, improving the resilience of critical infrastructure, and diversifying energy sources. Simultaneously, it reflects the evolving nature of China's energy transition. With renewables increasingly dominating new capacity additions, the strategic focus is pivoting from raw generation growth to system-wide integration. Greater emphasis is therefore placed on electricity networks, energy storage, demand-side flexibility and market reform to support a power system increasingly supplied by renewable electricity.

Alongside the continuing push for green electrification, the plan seeks to accelerate the substitution of fossil fuels with renewable energy across the wider economy, promoting renewable hydrogen and other clean fuels to decarbonise industry, transport and other sectors where direct electrification remains difficult.

Together, these priorities underpin China's goal of building a clean, low-carbon, secure and efficient new energy system by 2030. The table below summarises the plan's principal quantitative targets, organised in line with the document's key policy priorities.

China's Energy 15th FYP - Key 2030 targets

Category	Indicator	2025 baseline*	2030 target
Macro Targets	Domestic primary energy production capacity	5.13 bn tce	5.8 bn tce
	Coal and oil consumption	-	Peak by 2030
	Non-fossil share of primary energy consumption	21.7%	25%
	Total installed power generation capacity	3 890 GW	5 400 GW
	Non-fossil share in generation mix	42.3%	50%
	West-to-East power transmission capacity	340 GW	>420 GW
	Growth in flexible generation and storage capacity	baseline	↑ >40%
	Demand response capability	3%	>5%
	Share of electricity in final energy consumption	30%	35%
	Decline in carbon intensity of power generation	baseline	↓ >10%
	Energy savings in key sectors	baseline	>150 Mtce
Enhancing Clean Energy Supply	Share of wind and solar power capacity	-	>50%
	New energy (non-hydro renewables) share of electricity generation	-	30%
	Installed hydropower capacity	-	≈410 GW
	Operating nuclear power capacity	-	≈110 GW
	Installed concentrated solar power (CSP) capacity	-	15 GW
	Renewable hydrogen production	-	2 Mt/year
Boosting Green Energy Consumption	Annual residential electricity consumption per capita	-	1 500 kWh
	EV charging points	20 million	40 million
	New energy non-electricity utilisation	baseline	↑100% growth
Strengthening Energy Security	Domestic crude oil production	-	≈200 Mt/year
	Natural gas pipeline transmission capacity	-	500 bcm/year
	Expansion of the national oil and gas pipeline network	baseline	+ 20 000 km
	Share of coal production from the five major coal bases	-	>80%
	Strategic coal production reserve capacity	-	>100 Mt/year
Improving Energy System Flexibility and Resilience	Newly added West-to-East power transmission capacity	baseline	>80 GW
	Newly added inter-regional transmission capacity	baseline	≈40 GW
	Distributed renewable integration capacity	-	900 GW
	Installed pumped storage hydropower capacity	-	≈160 GW
	Installed new energy storage capacity	-	300 GW
	Controllable EV charging capacity (V2G)	-	≈50 GW
	Virtual power plant (VPP) capacity	-	>50 GW
Energy Innovation	Annual growth in international energy patent applications filed via the Patent Cooperation Treaty	-	>5%
	First-of-a-kind (FOAK) energy technology demonstration projects	-	>100 projects

**Note: The 'baseline' refers to the actual figures at the end of 2025, and all listed 2030 targets are calculated relative to the 2025 base. A hyphen (-) indicates that the 2025 data was not explicitly mentioned in the original policy document.*

FEATURED PUBLICATION

01 A pathway to Europe's competitiveness: The clean transition

This report from the EU's Joint Research Centre examines the European Union's clean transition as a pathway to long-term competitiveness. Adopting a systems-thinking approach, it explores how coordinated action across climate, energy, the circular economy, mobility, agri-food, and biodiversity can strengthen resilience and resource security. The analysis highlights the role of research, innovation, and technological development in accelerating clean technology deployment and transforming production systems. It also assesses the global supply-chain vulnerabilities and critical raw material dependencies that are affecting the EU's strategic autonomy. Finally, the report identifies a set of enabling cross-cutting conditions - including investment, skills development, policy coherence, and a just transition - that are needed to support sustainable competitiveness and coordinated implementation across sectors and governance levels.

→ More

02 Data exchange for demand-side flexibility and smart and bidirectional charging

This Joint Report, developed by the European Commission's Smart Energy Expert Group, the Sustainable Transport Forum, and the European Coalition of the Willing on Bi-Directional Charging, proposes a common European framework to simplify data exchange for flexibility, smart charging, and bi-directional charging. Drawing on more than a year of expert cooperation, the authors offer recommendations on standards, digital identity, cybersecurity, governance, and market organisation, while outlining both short- and long-term actions for policymakers and industry. Although focused on data exchange, the recommendations extend beyond EVs to cover heat pumps, battery storage, and other flexible assets. The report represents a European milestone, as all key stakeholders from the electricity and e-mobility sectors have agreed on a shared direction for market organisation, and common interoperability requirements (including standards, digital identity, operating principles, and governance).

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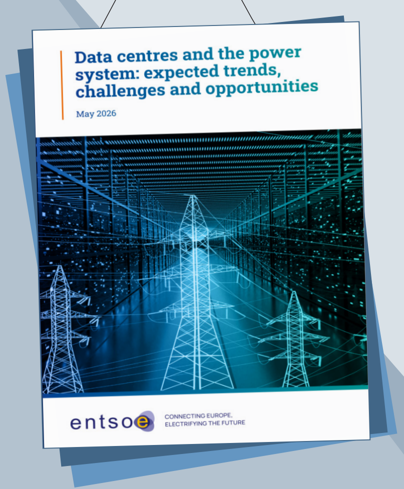
03 Data centres and the power system: expected trends, challenges and opportunities



This report by ENTSO-E examines the growing impact of data centres and artificial intelligence on Europe's electricity system. The analysis explores how data centres are evolving into systemically important energy users that directly influence infrastructure planning and grid security. While their rapid expansion presents distinct operational challenges, the study highlights critical opportunities for data centres to support grid stability. By actively adjusting their power consumption, participating in demand response programs, and balancing fluctuating renewable energy generation, these facilities can metamorphose from passive consumers to key contributors to a sustainable European energy transition. With its overview of expected trends, challenges, and opportunities, the report provides transmission system operators, policymakers, and industry stakeholders with insights into how best to integrate the burgeoning digital infrastructure into Europe's evolving electricity system.

→ More

04 China's energy transition and climate status report 2026

This analysis by Agora Energy China and Agora Energiewende provides a data-driven assessment of China's energy and climate trajectory. It examines ten key trends that were observed during the 14th Five-Year Plan period (2021-2025), while examining their implications for the 15th Five-Year Plan (2026-2030). The findings suggest that China's emissions are approaching a structural plateau, with future growth increasingly concentrated in heavy industry, while the power sector is showing early signs of structural change. The report also highlights emerging challenges, including regional disparities, system integration constraints, and rising electricity demand driven by electrification and AI-related computing. Complemented by two special studies on coal mine safety and energy security, the analysis concludes that China's economic resilience and ability to meet its long-term climate targets depend heavily on integrating renewables into its broader industrial systems, infrastructure, and governance frameworks.

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05 China power sector and policy landscape for round-the-clock clean power

Jointly published by EnergyTag and the Lantau Group, this report offers a practical primer on China's evolving power sector and evaluates the technical and commercial prospects for round-the-clock (RTC) and hourly matching for green power purchases. As provincial spot markets expand, intra-day scarcity and oversupply are becoming more visible. While China's Green Electricity Certificate (GEC) system forms the national backbone for renewable claims, the report notes that transitioning to hourly matching is crucial to unlock the value of rapidly growing storage assets and meet the requirements of trade-linked frameworks like the EU's CBAM. It concludes with a phased roadmap advising policymakers, grid companies, and retailers on how to standardise data governance, verification pathways, and contract templates to support this transition.

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