EU-CHINA ENERGY MAGAZINE

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EU-China Energy
Cooperation Platform

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About ECECP

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

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

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

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

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

Disclaimer:

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Dear All,

Welcome to the August 2026 issue of the EU-China Energy Magazine.

This summer marked a period of vibrant engagement, a highlight of which was European Energy Commissioner Dan Jørgensen's high-level visit to Shanghai, organised by ECECP with the support from New Energy Nexus. ECECP was equally privileged to organise a dedicated 'Meeting with Energy Experts' session with Commissioner Jørgensen in Beijing. This session provided an invaluable forum for constructive exchanges alongside senior executives and representatives from the Energy Foundation, SGERI, ECECP, GIZ, the Repower Initiative, and Fuel Cell China.

Our articles in this issue reflect a shared imperative: driving the green transition requires looking beyond isolated hardware to focus on system integration, market design, and supporting institutions. Our report on the Shanghai visit reflects how scaling clean technologies relies on testing infrastructure, research platforms, and ecosystem collaboration.

Looking at Europe, an analysis from the Florence School of Regulation explores the AI-energy nexus, offering insight into EU's Strategic Roadmap for Digitalisation and AI in the Energy Sector. Affordability remains essential for driving electrification; an insightful commentary from the International Energy Agency outlines how expanding renewables, reinforcing grids, extending nuclear operational lifetimes, and reforming taxation can lower consumer power prices to deliver the EU's electrification goals. Our cover story features Poland's coal-to-nuclear transition through the DEsire project, offering practical policy insights into managing just transitions in coal regions without stranding grid assets.

Turning to China, Anders Hove from OIES details a pragmatic pivot in China's hydrogen strategy away from fuel-cell vehicles towards green ammonia, methanol, and industrial decarbonisation. Finally, we continue our exploration of China's 15th Five-Year Plan energy agenda, bringing together the key targets set out for the power system, renewable energy, coal, and oil and gas sectors through 2030.

As both regions advance their decarbonisation pathways, moving from individual technologies to integrated system solutions remains a shared goal. I hope this issue offers meaningful perspectives to support your work.

Warm 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 Electrification Action Plan to accelerate transition away from fossil fuels »

The European Commission has launched a comprehensive Electrification Action Plan aimed at making Europe the world's first electricity-powered continent. The plan proposes an indicative electrification target of 46% by 2040 to boost competitiveness and decarbonisation. Achieving this milestone could slash fossil fuel import costs by EUR 260 billion (CNY 2029 billion) annually. The strategy focuses on reducing the price gap between electricity and fossil fuels by empowering Member States to lower electricity taxes and grid tariffs. It also aims to tackle grid bottlenecks, and accelerate the electrification of the industrial, building, and transportation sectors by stimulating the uptake of innovative clean technologies, ultimately strengthening the business case for a fully electrified European economy.

EU: ETS review to make carbon market an investment engine fit for 2040 climate goals »

The European Commission has proposed a reform of the EU Emissions Trading System (ETS), aiming to strengthen its role in supporting industrial decarbonisation and competitiveness. The plan includes adjusting the Linear Reduction Factor (i.e. the annual tightening of the cap on emissions) to 3.7%-points for 2031-2035 and to 1.7%-points for 2036-2040, making the trajectory more gradual and aligned with the EU's climate target for 2040. The proposal includes permitting up to 2%-points in high-quality international credits during the final years. A new EUR 100 billion Industrial Decarbonisation Bank will be established to support clean investments, with the 'ETS Investment Booster' serving as its first phase, while Member States would be required to reinvest 50% of national ETS revenues in measures to decarbonise covered sectors. While free allocation will be further reduced, those continuing beyond 2030 will be more closely tied to decarbonisation investments. Other proposed measures include integrating permanent carbon removals, reforming the Market Stability Reserve to improve market predictability, and strengthening provisions for aviation and maritime transport while extending the system to cover municipal waste incineration.

EU: New guidance on non-price criteria for net-zero technologies »

The European Commission has published two guidance documents on applying non-price criteria under the Net-Zero Industry Act, aiming to strengthen Europe's manufacturing base for net-zero technologies and improve the sustainability and resilience of clean-energy supply chains. The guidance covers public procurement procedures and renewable energy auctions, ensuring that plans for public spending take account of other factors apart from the lowest price. These include environmental sustainability, supply-chain resilience, responsible business conduct, cybersecurity and data security, and the ability to deliver projects on time. The guidance is intended to help national authorities, contracting bodies and market participants apply the requirements consistently and proportionately across the EU. The rules form part of the Net-Zero Industry Act, which aims to scale up EU manufacturing capacity while reducing strategic dependencies.

EU: Commission publishes toolbox to strengthen public participation in renewable energy projects »

The European Commission has published a toolbox to help EU countries strengthen public participation in renewable energy projects and improve local acceptance. The toolbox outlines eight key principles for effective participation, emphasising transparent communication, procedural engagement, and tangible benefit-sharing mechanisms, such as reduced household energy bills, community benefit funds, and co-investment opportunities. By aligning local acceptance with broad public support, the framework seeks to streamline permitting processes, reduce costly project delays, and help accelerate renewable energy deployment while supporting faster and more effective permitting.

Portugal and Spain: Iberian countries expand pumped storage plans »

Portugal and Spain are stepping up investment in pumped storage to support growing renewable energy generation and strengthen flexibility across the Iberian electricity system. Portugal has announced a National Energy Storage Strategy targeting 3.9 GW of pumped storage capacity by 2030 and more than 5 GW by 2040. Meanwhile, Spain has awarded EUR 165 million (CNY 1 287 million) to seven pumped storage projects across six regions, with a combined storage capacity exceeding 21 TWh. With renewables accounting for around 80% of Portugal's electricity generation, an expansion to long-duration storage is expected to play an increasingly important role in balancing variable renewable output.

Denmark: New rules on grid access »

Denmark has introduced emergency legislation to reform access to its electricity grid, replacing the current first-come, first-served system with new priority criteria. Existing customers seeking additional capacity, new households and small businesses, and projects supporting electrification and the green transition would receive the highest priority. Battery storage sites and very large electricity consumers, including data centres, would be prioritised according to their 'grid-friendliness' and ability to adjust demand during periods of grid constraints. Data centre applications could be rejected where sufficient capacity is unavailable. The measures aim to ease growing pressure on Denmark's grid and prevent connection constraints from slowing the country's green transition.

MARKET BUSINESS

EU: Renewables accounted for half of electricity consumption in 2025

Provisional data show that renewable energy accounted for 26.2% of the EU's gross final energy consumption in 2025, up from 25.2% in 2024. While the share has risen steadily from 9.6% in 2004, significant progress is still needed to reach the EU's 42.5% renewable energy target for 2030, requiring an average annual increase of 3.3 percentage points between 2026 and 2030. Renewables also supplied a record 49.9% of the EU's gross electricity consumption in 2025, up 2.4 percentage points year-on-year. Austria recorded the highest renewable electricity share at 90.8%, followed by Sweden at 89.2%. Meanwhile, the share of renewables in heating and cooling reached 27.4%, marking its highest level since 2004.

Image Source:©AdobeStock_Taskmanager

EU: New round of Hydrogen Mechanism will focus on hydrogen infrastructure

The European Commission plans to launch a new round of the EU Hydrogen Mechanism later this year to help transmission system operators (TSOs), hydrogen network operators (HNOs) and other relevant organisations assess market interest in planned hydrogen infrastructure projects, such as pipelines and storage. The process will involve agreeing on infrastructure parameters, collecting expressions of interest from registered market participants and sharing the resulting data with infrastructure developers. The Hydrogen Mechanism addresses major barriers to the development of the hydrogen market, including demand and supply uncertainty, limited infrastructure and funding challenges. By bringing together buyers and sellers, it supports market development, enabling participants to identify and engage with potential commercial partners.

EU: Digital Product Passport Registry is now live

The European Commission has launched the Digital Product Passport (DPP) Registry and a testing environment, marking a key step towards implementing the DPP across the EU market. Established under the Ecodesign for Sustainable Products Regulation, the DPP will provide digital product information to improve supply chain transparency, support consumer choice and facilitate compliance. The Registry will cover products including textiles, steel, aluminium, tyres, furniture, ICT and energy-related products, as well as certain batteries and other product groups. The Commission has also published six harmonised standards supporting DPP interoperability. The testing phase will support implementation ahead of the first deadline on 18 February 2027 for certain types of large batteries.

Image Source: Cascade

Germany: Hydrogen core network sees nearly 6 GW of reserved capacity »

Germany's hydrogen core network operators reported that market participants had reserved almost 6 GW of entry and exit capacity as of July 2026, roughly double the volume reported in May. An additional 0.6 GW of capacity has been contractually reserved for transport between network clusters, while requests for a further 0.5 GW are under assessment. The paid reservations provide transmission system operators with a firmer demand signal than non-binding expressions of interest, helping chart where production, import, and industrial offtake will emerge. However, the commitments do not guarantee that the associated hydrogen production, import or industrial projects will ultimately reach construction and commercial operation. The reservations span large parts of the planned 9 040 km national network rather than being concentrated in a single industrial region.

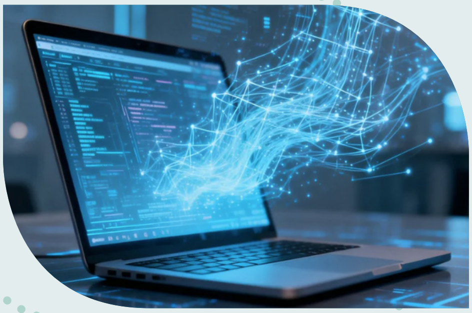
Europe: Phenogy and HDAT partner on sodium-ion batteries »

Switzerland's Phenogy AG and Germany's HD Advanced Technologies (HDAT) have formed a strategic partnership to develop and manufacture sodium-ion battery cells and energy storage systems in Europe. The planned joint venture will combine Phenogy's cell technology with HDAT's industrial manufacturing expertise, while HDAT – a wholly owned subsidiary of Heidelberger Druckmaschinen AG - will also produce storage cabinets and containers for Phenogy. The partnership aims to build a European technology and industrial platform for sodium-ion battery technology, covering battery cell development, manufacturing, system production and maintenance, supported by local supply chains.


Image Source:Heidelberger Druckmaschinen

TECHNOLOGY INNOVATION

EU: New EPREL tool to assist sustainable consumer purchasing »



The European Commission has launched a new online comparison tool on the European Product Registry for Energy Labelling (EPREL) database, allowing consumers and professional buyers across the EU to compare the energy efficiency and running costs of appliances. By enabling users to sort products based on energy consumption, noise levels, and expected lifetime operational expenses, the portal aims to empower citizens to make better-informed, environmentally friendly choices while lowering household energy bills and driving market demand for higher-efficiency products.

Spain: World's first commercial wooden wind turbine blade factory secures EU funding »

Image Source:NavarraAG

A consortium led by German manufacturer Voodin Blade Technology has secured a EUR 48.2 million grant (CNY 376 million) from the EU Innovation Fund to build the world's first commercial wooden wind turbine blade factory in Navarra, Spain. Scheduled to open in 2031, the facility will produce up to 160 sets of blades annually using laminated veneer lumber (LVL), a fully recyclable material branded VB1F. This innovation could replace traditional fiberglass blades with recyclable components that deliver high strength, reduced weight, and a lower carbon footprint. The highly automated, mould-free and fully electric manufacturing process is expected to allow greater flexibility in blade design.

Netherlands: PosHYdon produces green hydrogen on operational North Sea platform »

The Dutch PosHYdon pilot project has successfully produced green hydrogen on the operational Q13a-A offshore platform, marking a world-first integration of offshore wind power, hydrogen production and natural gas production at sea. Located 13 km off Scheveningen, the platform uses offshore wind electricity to produce hydrogen through electrolysis, with seawater first converted into demineralised water. The pilot aims to demonstrate the integration of multiple energy systems in a marine environment and assess the performance of electrolysers powered by variable offshore wind generation. It will also provide data on the costs, maintenance and operation of offshore hydrogen production. The project's findings are expected to be shared with the hydrogen sector in autumn.

PROJECTS INVESTMENTS

EU: EUR 2.5 billion in ETS revenues supports cleaner energy systems

The European Commission and the European Investment Bank have disbursed EUR 2.5 billion (CNY 19.5 billion) from the Modernisation Fund to support 51 energy-related projects across 11 EU Member States. Financed through EU ETS revenues, the latest funding brings total support from the Fund to EUR 23.2 billion (CNY 181 billion) since 2021. The supported projects cover renewable energy, energy efficiency, grid modernisation and energy storage, helping beneficiary countries reduce greenhouse gas emissions and modernise their energy systems. The Modernisation Fund supports lower-income EU Member States in advancing the clean energy transition and meeting their climate and energy targets.

EU: Clean Hydrogen Partnership selects 13 Hydrogen Valleys for development assistance »

The Clean Hydrogen Partnership has selected 13 Hydrogen Valleys from 12 countries to receive Project Development Assistance (PDA) under the second call of its H2V Facility. These projects include eight early-stage initiatives receiving six weeks of support and five more mature projects receiving up to 12 weeks of modular assistance to advance towards feasibility and final investment decisions. The support will begin in September 2026 and will cover commercial, technical, regulatory and governance aspects. Following this recent announcement, the PDA programme now supports 28 Hydrogen Valleys across 18 countries. The initiative supports the European Commission's objective of building 50 Hydrogen Valleys by 2030.

EU: CINEA launches final CB RES status call under current EU budget »

The European Climate, Infrastructure and Environment Executive Agency (CINEA) has launched the sixth call for projects seeking Cross-Border Renewable Energy (CB RES) status, the final such call under the EU's 2021-27 Multiannual Financial Framework. The status is required for projects seeking funding for studies and works under the CB RES window of the Connecting Europe Facility (CEF) Energy Programme. Applications are open to eligible cross-border renewable energy projects until 6 October 2026. Projects awarded CB RES status through this call may subsequently apply for the final CEF Energy CB RES funding call, expected in 2027. Since its launch in 2021, the programme has awarded more than EUR 165 million (CNY 1 287 million) to 17 projects involving technologies including wind, solar, sustainable biomass, ocean and geothermal energy.

Sweden: Offshore wind development to move to auction system »

Sweden has approved two offshore wind farms and rejected 11 others, ending a prolonged period of uncertainty over pending applications. The approved Fyrskeppet and Vidar projects are expected to generate up to 19 TWh of electricity annually. Sweden will also replace its open-door application process with a competitive auction system. Under the new approach, the government will first identify suitable development areas after considering defence, shipping, fisheries and environmental interests, before developers compete for the right to build projects. The government said the new approach aims to provide greater clarity on suitable locations and reduce investment risks.

Spain and Portugal: New electricity interconnection inaugurated »

A new electricity interconnection between northern Portugal and Galicia in north-west Spain has been inaugurated, increasing cross-border electricity exchange capacity by 1 000 MW. The project raises the transmission capacity from Spain to Portugal to 4 200 MW and from Portugal to Spain to 3 500 MW, strengthening the resilience and flexibility of both electricity systems. Delivered by Spanish transmission system operator Red Eléctrica and Portugal's REN, the infrastructure will facilitate greater renewable energy integration, enabling an estimated additional 281 GWh of renewable electricity annually and reducing CO_2 emissions by around 113 000 tonnes per year. Supported by the European Commission as a Project of Common Interest (PCI), the interconnection contributes to the EU's target of achieving a 15% electricity interconnection level by 2030.

POLICY INITIATIVES

China issues action plan to reach carbon peaking by 2030

China's State Council has issued an action plan for carbon peaking during the 15th Five-Year Plan period (2026-30), detailing target milestones and structural reforms to ensure national carbon emissions peak before 2030. By 2030, China aims to reduce CO_2 emissions per unit of GDP by 17% from the 2025 level and raise the share of non-fossil energy in total energy consumption to 25%. Key measures focus on advancing energy system transformation, accelerating industrial decarbonisation, scaling zero-carbon factories and green computing infrastructure, and embedding low-carbon practices across all economic sectors. To ensure delivery, the framework strengthens emissions statistics and accounting systems, expands market-based pricing mechanisms, enhances financial backing, and establishes strict provincial and local government accountability metrics.

China targets 440 million tonnes of oil and gas production by 2030

China aims to raise its domestic oil and gas production to 440 million tonnes of oil equivalent by 2030 under the new sectoral five-year plan. The strategy prioritises strengthening independent energy security, boosting domestic exploration, and enhancing cross-border and regional infrastructure. Under the framework, China will expand its long-distance oil and gas pipeline network by 20 000 kilometres to reach 220 000 kilometres by 2030, while increasing natural gas reserves to cover over 13% of national consumption. Additionally, the plan mandates scaling carbon capture, utilisation, and storage (CCS/CCUS) project injections to 10 million tonnes annually by 2030, alongside integrating wind, solar, and geothermal power to electrify oilfield operations and build low-carbon extraction sites.

China outlines roadmap to modernise coal industry by 2030

China has released a plan to modernise its coal industry by 2030, as it seeks to balance energy security with its green transition. Between 2026 and 2030, the country will upgrade and consolidate its coal industry, develop advanced production capacity and phase out outdated and inefficient mines. By 2030, large modern mines are expected to account for 87% of total coal production capacity, while smart coal mines will represent 75%. The plan also calls for cleaner and more efficient coal use, upgrades to coal-fired power generation and expanded coalbed methane development. Coal consumption is expected to peak by 2030 as China increases the share of non-fossil energy in its energy mix.

Five-year plan for greener industrial development »

China has released a five-year plan for the green and low-carbon transformation of its industrial sector, aimed at greening the industrial sector while industrialising the green sectors. The plan is for industrial CO_2 emissions to peak by 2030, and to cut energy consumption per unit of value added by major industrial enterprises by more than 10%. The plan includes establishment of 500 zero-carbon factories. Key measures include increasing the use of green energy, promoting low-carbon technological innovation and improving industrial resource recycling. China will also develop green computing facilities in regions with abundant renewable resources, accelerate the deployment of new technologies in equipment manufacturing of new energy vehicles, new energy equipment and new energy storage sectors, and expand the use of clean, low-carbon hydrogen in industry and transport.

Hainan province to ban sales of new combustion-engine cars by 2030 »

Hainan Province is the first Chinese province planning to ban the sale of new combustion-engine vehicles by 2030. Under its provincial 15th FYP, the province aims to increase the share of new energy vehicles (NEVs) in its vehicle stock from 23.75% in 2025 to 45% by 2030. This is much higher than the national target of 30% by 2030 set out in the recent Carbon Peak Action Plan for the same period. To support the transition, Hainan plans to provide at least one charging point for every 2.5 NEVs, improve its integrated charging and battery-swapping platform, and advance vehicle-to-grid (V2G) charging pilots in the provincial capital Haikou.

MARKET BUSINESS

Green fuel industry reaches new development milestone

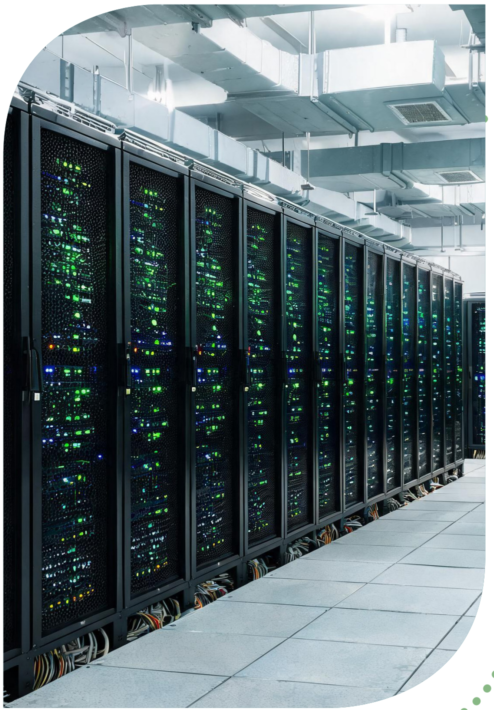
China's green fuel industry has made significant progress, according to the China Green Fuel Development Report published by NEA. By the end of 2025, the country's total green fuel production capacity had reached around 8 million tonnes of oil equivalent per year. Capacity for green methanol, green ammonia and sustainable aviation fuel stood at 380 000 tonnes, 700 000 tonnes and 1.7 million tonnes per year, respectively. Green fuels are also finding applications beyond road transport, including shipping, aviation and industry. Looking ahead, China aims to further develop green fuels to support deep decarbonisation in hard-to-abate sectors, while contributing to the integration and non-electricity use of wind and solar power (e.g. for heating, fuel production and mechanical applications).

Government to phase in battery consumption tax while exempting next-generation tech

China will phase in a consumption tax on batteries from September 2026, while temporarily exempting several emerging battery technologies through the end of 2028. Mercury-free primary batteries, nickel-metal hydride batteries, lithium-ion batteries and all-vanadium redox flow batteries will be taxed at 2% from September 2026, rising to 4% from September 2027. Sodium-ion batteries, solid-state batteries and fuel cells will be exempt through December 2028. Certain advanced photovoltaic technologies, including perovskite and tandem cells, will also receive temporary exemptions. The policy aims to promote technological innovation and support the high-quality development of China's battery industry.

New energy storage buildout slows in H1 2026

China's cumulative installed capacity of new energy storage reached 168.3 GW/448.7 GWh by the end of June 2026, up 59% and 71% year-on-year, according to the China Energy Storage Alliance (CNESA). Newly commissioned capacity in the first half of the year totalled 21.81 GW/58.60 GWh, down 18% and 16% respectively from a year earlier, signaling a shift from rapid scale expansion towards higher-quality growth. Meanwhile, Chinese companies' global shipments of energy-storage lithium-ion battery cells reached 380 GWh in H1 2026. Battery-cell production capacity reached 809.5 GWh by the end of June, with new build capacity slowing significantly. Overseas energy-storage orders totalled 298 GWh in H1, up 83% year-on-year. Europe remains a priority market, while Chinese companies are increasingly moving beyond product exports towards overseas manufacturing, localised services and integrated solutions.



Power use surges in EV charging and data services sectors

Electricity consumption in China's EV charging and battery-swapping sector rose 50.3% year-on-year to 16.4 billion kWh in July, while power use by internet data services increased 40.1% to 9.9 billion kWh, according to the NEA. While overall power consumption grew at a moderate pace at 1.7%, high-tech and equipment manufacturing recorded strong growth, with electricity use in this sector increasing 8.9%. In the first seven months of 2026, power consumption by charging and battery-swapping services rose 55.8%, while internet data services recorded growth of 43.3%, highlighting the increasing influence of the green and digital transitions on China's electricity demand.

Tax breaks for energy-saving and some new-energy vehicles to end in 2027

China will end 'vehicle and vessel' tax breaks for certain new-energy and energy-saving vehicles from 1 January 2027. Battery-electric commercial vehicles, plug-in and range-extended hybrid vehicles, and fuel cell commercial vehicles will no longer be exempt, while the half-rate tax that has applied to fuel-efficient vehicles will also be abolished. Battery-electric and fuel cell passenger cars will remain outside the scope of the tax. The preferential policies, introduced in 2012, helped support the development of China's new-energy vehicle industry. With NEVs now accounting for more than 50% of new vehicle sales in China in 2025, it is felt an adjustment is now due. Justifying the move, the authorities cite the sector's rapid development and the need to promote tax fairness.

Coal-fired power generation share falls below 50% for the first time

NEA statistics show that China's coal-fired power generation totalled 2.5 trillion kWh in the first half of 2026: its share in total power generation fell below 50% for the first time (49.7%). Meanwhile, the combined installed capacity of wind and solar power continued to expand, reaching 1.95 TW by the end of June, up 16.8% year-on-year. Wind and solar generation rose 9.3% to 1 250 TWh for H1 2026, accounting for 24.6% of total electricity consumption. These figures mark a further milestone in China's green and low-carbon energy transition.

TECHNOLOGY IINNOVATION

New stainless steel could reduce hydrogen production costs »

Scientists at the University of Hong Kong have developed a corrosion-resistant stainless steel that could replace expensive titanium components in hydrogen electrolysers. The new material, SS-H2, can withstand the harsh electrochemical conditions of water electrolysis, including chloride-rich environments. Its dual protective mechanism improves corrosion resistance across a wide range of operating conditions. Researchers estimate that replacing titanium with SS-H2 could cut structural material costs to around one-fortieth of their current level, potentially making seawater-based hydrogen production more economical.

World's first 630°C ultra-supercritical double-reheat power unit enters operation »

The world's first 630°C ultra-supercritical double-reheat coal-fired power unit has entered commercial operation in Shandong Province after completing a 168-hour full-load trial. The 1 000 MW Unit 1 at Datang's Yuncheng power project has achieved a coal consumption rate of 256.28 grams per kWh, setting records for operating temperature, pressure, efficiency and coal consumption among comparable units. Compared with conventional units of similar capacity, it is expected to save around 208 000 tonnes of standard coal and cut CO_2 emissions by approximately 540 000 tonnes a year. The project also marks progress in China's development of advanced coal power technologies, equipment and materials.

World's first bamboo-based offshore floating PV platform completed »

CIMC Raffles Shipyard has completed what it says is the world's first bamboo-based offshore floating solar platform in Yantai, Shandong Province. The 100 kW Jilin No. 2 platform uses bamboo-wood composite as structural materials, designed to provide high strength, low weight and corrosion resistance in harsh marine environments. The project builds on a 10 kW prototype launched in 2023 and represents a step towards larger-scale use of bamboo-based materials in offshore renewable energy infrastructure. The platform will be deployed at CIMC's offshore solar demonstration base, supplying electricity to a hydrogen, ammonia and methanol demonstration project. The project partners plan to develop a megawatt-scale pilot and larger floating solar arrays.

China's upgraded airborne wind turbine passes full test »

China's S4000 Stratosphere Airborne Wind Energy System (SAWES) has successfully completed a full-process flight test in Northwest China, reaching an operational altitude of 4 000 metres. The airship-like system is designed to capture stronger and more consistent winds at altitudes beyond the reach of conventional wind turbines. The test validated its full operating sequence, including ascent, station-keeping, electricity generation and controlled recovery. Building on the earlier 3 MW S2000 model, which achieved a grid-connected power demonstration over Sichuan Province in January 2026, the S4000 model features an upgraded configuration designed for direct connection to conventional power grids and has a service life of up to 20 years. This breakthrough brings high-altitude wind power systems closer to commercial deployment.

PROJECTS INVESTMENTS

Image Source: 123 Courtesy of China National Nuclear Corporation

China approves eight new nuclear power units »

China has approved four new nuclear power projects comprising eight generating units, with total investment exceeding CNY 170 billion (EUR 21.7 billion). The projects include Phase II of Jinqimen in Zhejiang, Phase III of Taipingling in Guangdong, and new nuclear power sites in Zhuanghe, Liaoning, and Laiyang, Shandong. The projects will deploy two of China's domestically developed Generation III reactor technologies: Laiyang will build two Guohe One units, each with a capacity of 1 43 MW, while the other projects will use the Hualong One design. The approvals mark the first batch of nuclear projects approved during China's 15th Five-Year Plan period, continuing the country's expansion of nuclear power under its policy of safe and orderly development.

Second batch of hydrogen pilot projects to focus on integrated applications »

China has approved five regional clusters for a new round of integrated hydrogen application pilots, covering the Beijing-Tianjin-Hebei region, the Greater Bay Area and several cross-regional partnerships linking hydrogen resource bases with major consumption centres. The four-year programme marks a shift from the earlier focus on fuel-cell vehicles towards broader, integrated applications across transport and industry. The projects will follow a '1+N+X' framework, covering fuel-cell vehicles and hydrogen corridors ('1'), industrial applications ('N') such as green ammonia and methanol, hydrogen-based chemicals and hydrogen metallurgy, as well as emerging uses ('X') including ships, mining vehicles and hydrogen storage. Financial support will be performance-based, with each cluster eligible for up to CNY 1.6 billion (EUR 210 million) support over four years.

China launches first large-scale wind turbine remanufacturing project »

China has launched its first large-scale project to repurpose retired wind turbines in Jiuquan, Gansu Province, remanufacturing 25 units that have been operating for more than 15 years. The project repairs and upgrades ageing components to improve turbine performance and extend their useful life, allowing the refurbished equipment to be reused in applications such as distributed wind power and industrial auxiliary power. According to the project developer, New Energy Technology Company (owned by China Resources Recycling Group), the approach could increase the utilisation rate of retired wind turbines from around 30% to 70%, compared with conventional disposal methods. China Resources Recycling Group is also working with Jiuquan to establish a dedicated recycling and remanufacturing base for retired wind and solar energy equipment.

CNOOC puts 16 MW floating wind platform into operation »

China National Offshore Oil Corporation (CNOOC) has started operating its 16 MW Haiyou Anlan floating wind platform in the South China Sea, supplying renewable electricity to the Lufeng oilfield around 136 kilometres offshore. The turbine is connected to the oilfield through a 4.3-kilometre subsea cable and is expected to generate approximately 54 million kWh annually. Built on a tension-leg platform foundation, the unit is designed to withstand severe offshore conditions, including typhoons. The project is expected to reduce the oilfield's reliance on fuel-based power generation, saving around 15 000 cubic metres of fuel oil and cutting approximately 35 000 tonnes of CO_2 emissions annually. CNOOC is also combining floating wind with conventional generation and energy storage to manage variable renewable output.

Image Source: 123 CNOOC Engineering

Beyond technology: The EU Energy Commissioner's July visit to Shanghai offered insights into China's green transition

By **New Energy Nexus China**

From clean mobility and industrial AI to energy systems and green buildings, Energy Commissioner Dan Jørgensen's two-day visit to Shanghai offered a closer look at the institutions and market conditions behind China's rapid clean-technology deployment.

On 19-20 July 2026, Dan Jørgensen, European Commissioner for Energy and Housing, visited Shanghai, accompanied by a delegation including Tomas Anker Christensen, Senior Adviser to the European Commission; Brieuc Posnic, Team Leader for North America and East Asia at the European Commission's Directorate-General for Energy; Laurent Bardon, Head of the Green Transition Section at the Delegation of the European Union to China; Maria Buzdugan, First Counsellor for Energy, Transport and Maritime Affairs; and Serena Ting Ting Tan, Policy Officer for Energy and Transport.

Over two days, the delegation met researchers, public technology platform representatives, industrial companies, European businesses operating in China and teams working on low-carbon urban projects. In both China and Europe, the energy transition and green industrial upgrade have reached a critical stage . Beyond exchanging views on individual technologies, there is a growing need for a common understanding of how both regions are applying green technologies: how research and innovation move towards industrial deployment, how individual technologies become integrated system solutions, and how different actors work together to advance the transition.

There are four separate ways to measure the green transition: research and innovation, industrial practice, urban transition and international cooperation. During the visit, the European visitors were able to view a wide range of technologies , including electric vehicles, batteries and hydrogen, industrial artificial intelligence, wind power and energy storage, green buildings and biodiversity. However, a key question raised throughout the visit was what enables green technologies to move from innovation to deployment at scale in China?

While the Shanghai visit offered the European visitors an opportunity to see examples of technology demonstrations, it also offered a view into the institutions around those technologies – universities, public testing platforms, industrial parks, supply chains, standards organisations, companies and urban projects, and into how these entities interact as technologies move from research to commercial application.

The visit also provided a chance to compare different perspectives on the transition. European participants raised topics such as energy security, industrial competitiveness, standards, existing infrastructure and the economics of deployment. Chinese experts, meanwhile, described an industrial system in which technological development, engineering, manufacturing and application increasingly take place in close proximity, with particular emphasis on how technologies move quickly from development into industrial use.

Five trends stood out during the visit.

1 Scaling clean mobility requires an innovation-to-deployment infrastructure

The delegation's first stop was Tongji University's Jiading Campus, where discussions with Professor Zhou Quan and Professor Wei Xuezhe from the School of Automotive and Energy Engineering traced the development of China's new-energy vehicle sector from early vehicle-power challenges to a broader system integrating batteries, fuel cells, intelligent vehicles and new energy applications.

The Tongji visit made it clear that the scale of development depends on the infrastructure around innovation: basic research and talent, testing and engineering validation, proof of concept, incubation, finance and links to industrial demand.

However, research capability alone is not the same as deployment capability. The institutions that reduce the distance between the two can be just as important as the technology itself.

2 Industrial decarbonisation depends on knowledge, data and supporting institutions

At Caohejing High-Tech Park and Rockwell Automation's Net Zero & Smart Manufacturing Innovation Center, the focus shifted from mobility to industrial decarbonisation. The examples presented covered automation, digital twins, industrial AI and data-driven optimisation across manufacturing, water treatment, energy and other industrial applications.

The industrial digitalisation trend is creating both efficiency gains and new forms of interdependence. Foreign companies operating in China are not simply exporters of equipment or software; many participate in local industrial ecosystems, generating knowledge and data that may differ from those used in their own domestic operations. In this context, an understanding of this operational reality is essential to any assessment of industrial competitiveness or technology transfer.

3 From manufacturing scale to system integration

The EU delegation visits the showroom at Envision.

On the morning of 20 July, the Commissioner visited Envision Group, toured the company's Cloud Centre exhibition hall, and held a closed-door discussion with Lei Zhang, chairman of Envision Group, and members of the management team.

The visit illustrated how Chinese renewable-energy companies are becoming providers of integrated system solutions and global industrial partners. Participants noted that the energy transition requires not only technologies such as wind, solar, energy storage and hydrogen, but also faster deployment of mature and relatively cost-effective energy-efficiency solutions that can deliver tangible emissions reductions in the near term.

4 Buildings bring the transition back to cost, operation and people

The final site visit focused on the built environment at the Yangtze River Delta Integrated Green Technology Demonstration Building and Liziyuan Park. The building brings together technologies including a high-performance building envelope, shallow ground-source heat pumps, photovoltaics, intelligent lighting, natural ventilation, rainwater recycling and digital operation and maintenance.

The visit highlighted the differences between the two markets. China offers examples of rapid integration and new-build deployment, while Europe has accumulated deep experience in building standards, renovation and regulatory implementation. In their discussions, the two parties agreed that no one model should be copied by the other, but that technology performance, cost and user behaviour have to be considered together if buildings are to deliver sustained energy savings.

5 European businesses in China provide a reality check on deployment

The discussion with European business representatives highlighted areas of complementarity in EU-China green-industry engagement as well as practical constraints relating to policy, business culture, financing and market mechanisms. This offers a useful lens through which to understand cross-border clean-technology deployment.

For policymakers, this matters because trade policy, industrial policy and energy transition are becoming increasingly intertwined. Measures intended to strengthen resilience or support domestic manufacturing can affect technology costs and investment incentives; at the same time, excessive dependence on concentrated supply chains can create strategic vulnerabilities.

European businesses operating in China sit directly within this tension, making their operational experience an important source of evidence for policy discussions.

Observations, not conclusions

A two-day visit cannot settle the larger debates surrounding Europe, China and the global clean-energy transition. It can, however, bring some of the underlying dynamics into focus.

First, China's ability to scale up its innovations is only part of the story. The Shanghai visits showed how research platforms, testing infrastructure, incubation mechanisms, suppliers and application scenarios help technologies move from innovation to deployment. These institutions are less visible than factories or installation statistics, but they are central to understanding why some technologies can quickly be developed and manufactured at scale.

Second, Europe and China face different deployment constraints. Europe's challenges are often linked to upgrading mature infrastructure, financing renovation, permitting, grid investment and maintaining affordability. China's rapid build-out creates a different set of pressures around system integration, electricity-market reform and the management of increasingly complex industrial ecosystems. These differences matter when comparing policy tools or technology costs.

Third, other policies such as AI, industrial policy or data governance are now integral to the energy transition. They increasingly shape where technologies are developed, manufactured and deployed. For companies, questions of supply-chain resilience, localisation, standards, data governance and market access are becoming part of the engineering and investment case itself.

A key outcome of the Shanghai visit may therefore be a better understanding of the systems behind the technologies - their strengths, aspects that required more attention and development, and the conditions under which they operate. For policymakers and companies on both sides, this is a more practical starting point than assuming that similar climate objectives necessarily produce similar transition pathways.

About New Energy Nexus

New Energy Nexus (NEX) is a global innovation platform dedicated to accelerating the energy transition. As part of NEX's global network, NEX China advances the energy transition and carbon neutrality through innovation-driven collaboration with subnational governments, industrial parks, businesses, and ecosystem partners.

NEX China's core services include research, consulting and training; corporate innovation and technology scouting; industry matchmaking and pilot deployment; cross-border collaboration and international market support; and strategic communications and international visibility.

More details can be found on our website: www.newenergynexus.cn

Affordable electricity is essential for the European Union's electrification goals

By **Brent Wanner,** *IEA Head of Power Sector Unit*
Max Schoenfisch, *Power Sector Modeller*
Hans-Kristian Ringkjøb, *Analyst consultant*

For households and businesses across the European Union, technologies such as heat pumps and electric vehicles are not always cost-competitive at current electricity prices. Making electricity prices more affordable is therefore critical to support the uptake of electric technologies and deliver on the EU Electrification Action Plan's objective of raising electricity's share of final energy consumption to 32% by 2030. In some parts of the EU, reducing electricity supply costs alone would be enough to make these technologies more cost-competitive than other sources of energy – but in most countries, a broader combination of policy measures will be needed.

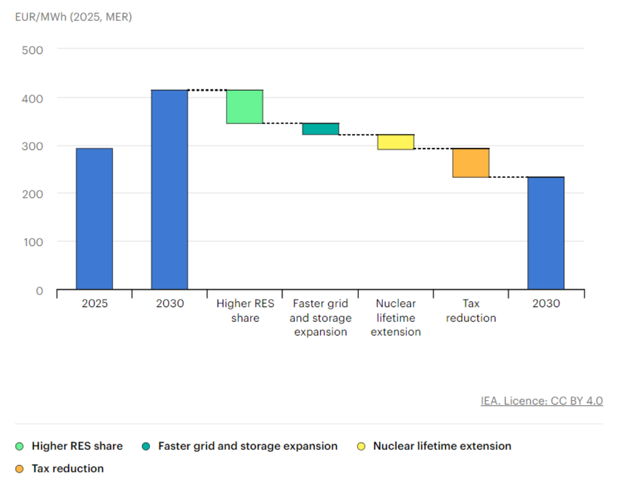
This commentary is the third and final in a series examining the case for increased electrification in the EU. The previous instalments explored the cost-competitiveness of electric technologies and where new electricity demand is expected to emerge across end-use sectors, highlighting the challenges and opportunities that come with an expansion of electrification. This instalment examines the practical, policy and supply-side measures that can help lower electricity prices. When well designed, such measures can reduce electricity system costs while safeguarding reliability and supporting the EU's long-term electrification objectives.

Policy action across electricity generation, grids and taxes could sharply reduce consumer electricity prices

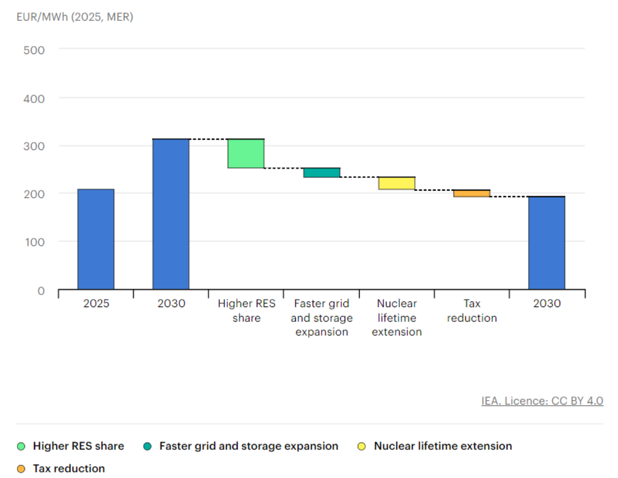
Increasing the share of renewables such as wind and solar power in the electricity mix, while also ensuring that new generation investments are optimised for system needs, can help lower electricity prices for consumers. Moreover, strengthening grids and expanding storage capacity to help ease congestion and integrate variable renewables – in addition to extending the lifetimes of existing nuclear power plants where safety, regulatory and economic conditions allow – can amplify these cost-lowering effects, particularly when combined with energy taxation reform.

Taken together, the measures outlined above could significantly reduce average consumer electricity prices in the EU. By 2030, average electricity prices could decline by around 20% for households and by more than 5% for commercial and industrial users compared with 2025 – even if natural gas prices remain, on average, at 2025 levels. Without these measures, electricity prices for all consumers would be more than 40% higher than they are today. In this counterfactual case, renewable deployment slows, more nuclear plants are permanently retired and grid congestion rises. As a result, the electricity system relies more heavily on gas-fired generation, pushing up wholesale electricity prices and, ultimately, consumer bills.

Potential reductions in average household electricity prices in the European Union by element compared with the counterfactual case, 2025-2030



Potential reductions in average industry electricity prices in the European Union by element compared with the counterfactual case, 2025-2030



Expanding low-emissions electricity generation, reinforcing grids and making power systems more flexible can bring down costs

Increasing the share of renewables in the energy mix – particularly wind and solar PV – plays a central role in lowering electricity supply costs. Wind and solar PV are among the most costcompetitive forms of new electricity generation in the EU, and a higher share of these lowers overall system costs by reducing reliance on relatively more expensive natural gasfired generation.

A higher share of renewables also helps to lower wholesale electricity prices. Spot electricity prices are typically set by the cost of the most expensive plant operating at any given moment – known as the marginal unit – and in the EU, these are often gasfired plants. As more electricity comes from wind and solar, these plants are needed less often, thereby reducing both average wholesale prices and system exposure to swings in global gas markets, as seen during the energy crisis in 2022. This helps to reduce price volatility and shield consumers from energy price shocks. With wind and solar accounting for 30% of electricity generation in 2025, the EU is one of the global leaders in the deployment and integration of variable renewables. Meeting the bloc's 2030 renewable energy target would means the share of wind and solar PV exceeding 50% by 2030, which would lower average enduser electricity prices by nearly 20%, compared with the counterfactual case in which slower deployment keeps the share of wind and solar at today's level.

Reinforcing and expanding grid infrastructure, alongside expanding storage, is essential for integrating growing volumes of variable renewable power and meeting rising electricity demand across the EU. By 2030, if the curtailment of renewables – the amount of potential renewable electricity production that is not fed into the grid – is 5 percentage points higher due to grid congestion, average consumer electricity prices across the EU would be 8% higher. Global spending on grids has risen in recent years, including an 11% increase in 2025, although this is still below the level required to keep pace with system needs. Delays in the development of grids and electricity storage – due to bottlenecks in planning, permitting or construction, for example – risk forcing more renewable energy to be curtailed, raising overall system costs. In this context, the European Commission's recent EU Grids Package aims to address these constraints.

Nuclear lifetime extensions also have an important role to play in lowering EU electricity prices. Subject to appropriate independent safety reviews, extending the operational lifetimes of existing reactors is a highly costeffective way to supply lowemissions electricity, with average generation costs of around EUR 45 per megawatt hour produced for a 20year extension – less than one-third the average generation cost of building a new reactor. In the EU, almost 40 gigawatts of nuclear capacity approaching the end of its licensed life has already been approved for extension and would therefore remain available in 2030. At nearly half of those reactors, the requisite works have been completed or are currently under way. Completing planned upgrades at the remaining reactors approaching the end of their licensed life would, on its own, reduce EU end-user electricity prices by around 10% in 2030 compared with the counterfactual case.

Further reductions in total system costs – and therefore in consumer prices – can come from boosting demandside flexibility through measures such as timeofuse electricity tariffs, smart digital controls and on-site battery storage, which help shift electricity demand to periods when power is cheaper and more abundant.

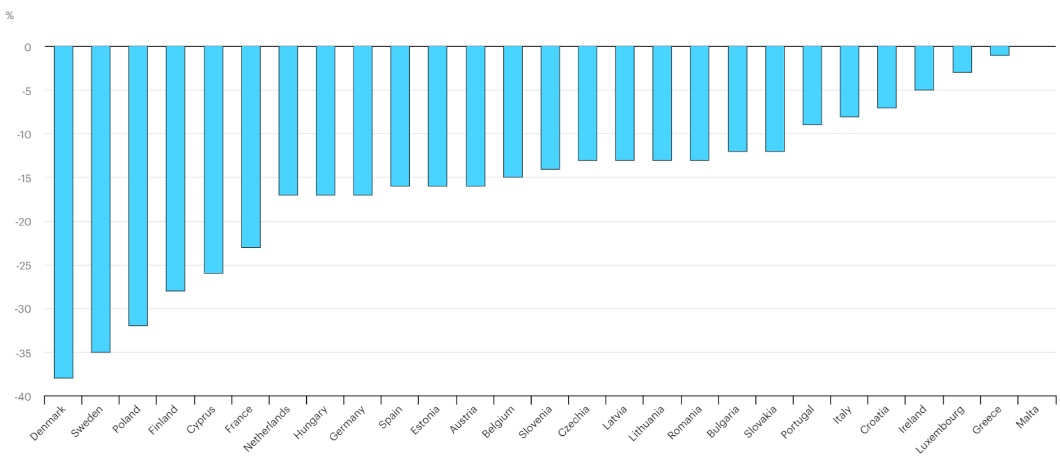
Energy taxation shapes electricity affordability

Taxes account for a significant share of consumer electricity prices, and electricity is often taxed more heavily than competing sources of energy. Reducing valueadded tax (VAT) and excise taxes on electricity to their legal minimum levels across the EU would lower average household electricity prices. Commercial and industrial consumers can usually pass on or reclaim VAT, so their effective VAT rate on electricity is zero. They are, however, still liable for environmental or excise taxes on the electricity they consume, and lowering these charges to the minimum permitted under EU law would reduce their electricity costs as well.

In 2025, excise taxes and VAT made up 28% of the average EU household electricity price, and around 14% for commercial and industrial users, with larger users typically facing lower rates. Electricity taxation varies widely across the EU, both in structure and magnitude. Some countries impose high shares of environmental and excise taxes on electricity, while others apply only minimal surcharges, resulting in substantial differences in enduser prices. VAT rates also diverge significantly: although the legal minimum is 5%, several countries apply rates of over 20%, while others offer reduced electricity rates for households. In addition to differences in tax levels, some governments also provide offsets, rebates or targeted compensation schemes. These measures can significantly lower effective electricity prices for certain groups of consumers, but they also add another layer of complexity to the tax and pricing landscape.

Across most of the EU, there is scope for further cuts to electricity excise duties and VAT. In 2025, the average VAT rate on electricity was 15%, and households paid an average of EUR 38 per megawatt hour in other electricity taxes. Lowering VAT and excise taxes to their legal minimums could materially reduce household electricity prices. Doing so across the EU would have reduced average electricity prices by more than 16% in 2025, and could reduce them by almost 15% in 2030 compared with the counterfactual case. The fiscal impact of any tax reduction requires careful consideration for each EU country, balanced against other priorities and spending needs. In countries with excise taxes or VAT well above the legal minimum, measures to compensate for lost government revenues are especially important.

Hypothetical impact on average household electricity prices from reducing taxes to the legal minimum by EU country, 2025



Cheaper gas can reduce electricity prices, but may weaken electrification incentives

A key determinant of electricity costs is the prevailing price of natural gas. Natural gas remains an important part of the EU electricity mix, with a share of 17% in 2025, and gasfired plants frequently set the marginal price in many of the region's wholesale electricity markets. Across the EU, gas, coal or oil set the price in roughly 50% of all hours in 2025. EU gas markets have experienced multiple supply shocks in recent years, with prices reaching record highs in 2022 and remaining elevated in 2025 and 2026, illustrating their exposure to geopolitical events.

However, several factors could lower natural gas prices in the EU by 2030. A large wave of new LNG export capacity is projected to enter the global market over the next five years, led by projects in the United States and Qatar. If this increase in export capacity outpaces demand growth, it could put downward pressure on prices. For example, if natural gas prices fell to around USD 6/ MMBtu by 2030, it could reduce overall electricity production costs by around 10%, while average end-user electricity prices could fall by another 15% to 20% when combined with the supply-side and tax measures outlined above.

Lower gas prices could also potentially weaken the incentives for electrification. All else being equal, falling natural gas prices would increase the electricitytogas price ratio, reducing the competitiveness of some technologies like heat pumps. In other words, even if electricity prices decline, gas prices would also decline and reduce the incentive for consumers to switch away from gas in end-use applications such as heating. Additional measures to lower the price of electricity – such as the supply side actions and tax reductions outlined above – therefore remain critical to reducing electricity prices and accelerating electrification in line with the EU's stated goals.

A multi-layered approach to making electricity more affordable for European consumers

Lowering electricity prices in the EU hinges on a coordinated approach that combines supply-side measures with energy taxation reform. Expanding low-cost, low-emissions generation, strengthening grids and flexibility and maintaining existing nuclear capacity can materially reduce prices, while aligning energy taxation with electrification goals ensures these gains are passed through to consumers. At the same time, evolving gas market conditions could provide some price relief, although their impact remains uncertain and depends on external factors. Taken together, these measures can make electric technologies more affordable and attractive, strengthen energy security and resilience, and support a cost-effective path towards a more electrified and sustainable energy system in line with the EU's energy and climate objectives..

The rapid development of Artificial Intelligence (AI) is transforming our daily lives and impacting our economies, including the energy sector. On the one hand, data centres hosting the computing power and databases, as well as the development, training and running of AI systems, have become a major source of additional electricity demand and congestion at the local level. On the other hand, AI might support new tools to improve the operation and planning of the electricity system, increasing its efficiency and reliability.

Several questions arise from the emerging context of the AI-Energy Nexus. How do AI systems work, and what are their current and potential applications in the electricity system? Which type of energy data is required to train and develop such AI systems? Can energy data be reused beyond its original operational or transactional purpose to train AI systems? What is the applicable legal framework for a trusted, transparent and secure energy data exchange?

Analysts from Florence School of Regulation (FSR) dive deep into these questions to unpack the relationship between Artificial Intelligence and the EU Electricity System.

AI and the EU Electricity System

1

AI and electricity in the EU Policy Agenda

The first part situate the discussion within the broader EU policy agenda, focusing on the Strategic Roadmap for Digitalisation and AI in the Energy Sector, recently adopted as part of the European Tech Sovereignty Package. We proceed in three steps: first, we introduce the AI-Energy Nexus; second, we explore the concepts of strategic autonomy and technological sovereignty; third, we map the Roadmap's Pillars and Flagship Actions.

By ***Alessandra Porcari,*** *Research Associate*
Lucila de Almeida, *Part-time Professor*
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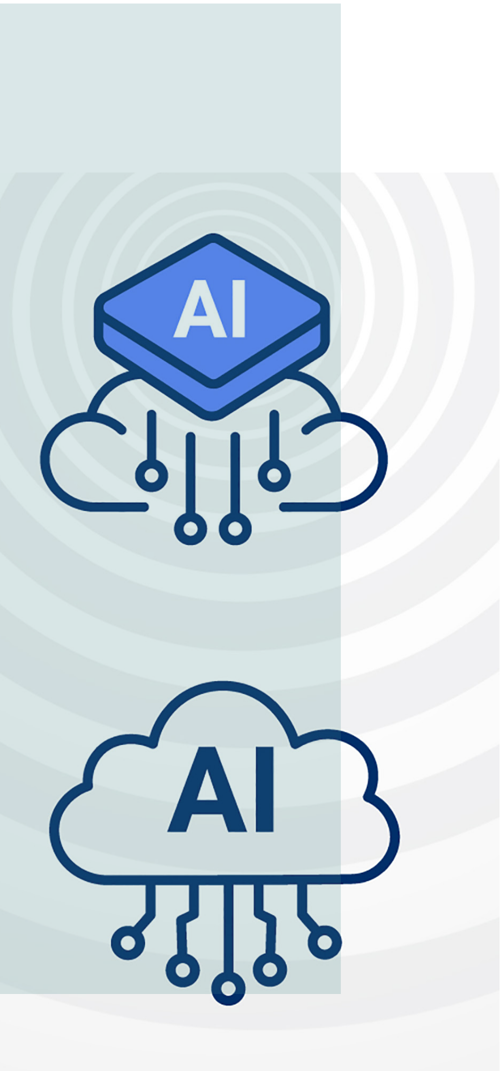
The AI-Energy Nexus

AI is increasingly considered as a potential enabler of a more efficient, flexible and decarbonised electricity system. Its potential applications span multiple layers of the system. In grid management, AI can support real-time monitoring, predictive maintenance, and grid balancing. On the demand side, it enables smart energy services, dynamic pricing, and demand-side flexibility. It also plays a growing role in improving forecasting and facilitating the integration of variable renewable energy sources. According to SmartEN and DNV's 2022 prediction, digitalisation of the EU's energy systems could deliver EUR 71 billion per year in direct consumer savings and more than EUR 300 billion in wider system benefits.

These benefits, however, depend on the availability, accessibility and quality of data. Energy-specific AI systems require large volumes of heterogeneous data, which must typically be accessible, standardised and interoperable. This data includes electricity grid operational data, wholesale market data, smart metering and consumption data, but also non-energy data such as weather and climate information. Training AI systems for energy applications requires large-scale, high-quality data that are pooled, representative, and statistically robust – alongside a trusted and secure environment for data sharing.

At the same time, AI itself is energy-intensive, as the computational intensity of AI systems' training and deployment, particularly in large-scale data centres, translates into significant electricity demand. This creates a fundamental dilemma: AI is used to improve the functioning of the energy system, while simultaneously placing additional strain on it. This dual relationship is commonly described as the 'AI–energy nexus'.

Strategic Autonomy and Technological Sovereignty

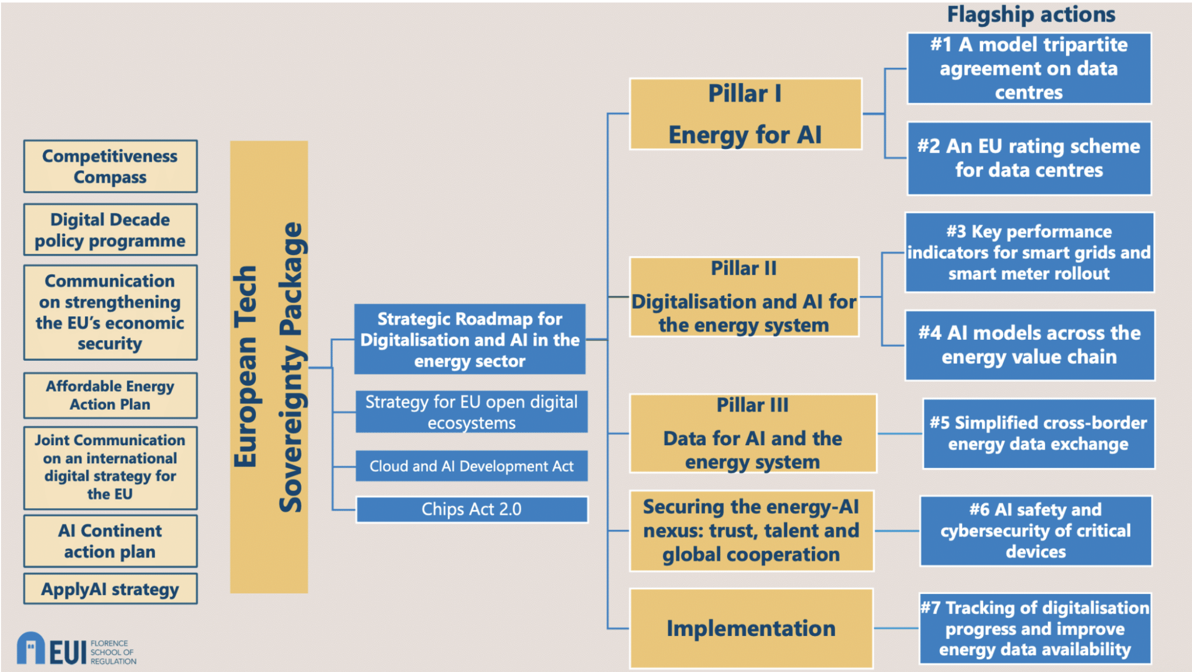


The development of AI is embedded in highly globalised supply chains. AI key components include the software and hardware level, encompassing the data infrastructures to store and process data and the compute infrastructure that powers AI systems training. These components are creating new forms of structural dependency, particularly around the control of hardware production, software design, standards setting, and data-flow infrastructures management. What began as a private-sector innovation has evolved into a key factor shaping global economic competition and geopolitical power dynamics, where the US and China are by far the dominant players. Currently, non-EU companies control most of the critical layers of the European digital stack, holding the intellectual property of 'choke points' for operating systems, cloud platforms, chip architectures and machine learning frameworks.

The picture becomes even more complex if we consider the critical nature of energy infrastructure. While the integration of digital technologies such as AI can enhance system performance and efficiency, it also introduces new risks, including safety concerns, hybrid threats, and cybersecurity vulnerabilities.

It is in this context that the concepts of strategic autonomy and technological (or digital) sovereignty have gained prominence in the EU policy discourse. The concept of EU strategic autonomy originated in the field of security and defence but has since expanded to encompass broader domains, including energy and digital policies. It generally refers to the EU's capacity to act independently in strategically important areas, reducing reliance on third countries for critical goods and services, but it does not imply autarky. Closely related (and slightly overlapping) is the concept of technological sovereignty, which emphasises the ability of a State or group of States to develop or access key technologies necessary for its welfare, competitiveness, and political agency, without becoming subject to one-sided structural dependencies.

The Strategic Roadmap for Digitalisation and AI in the Energy Sector



Strategic autonomy and technological sovereignty are framed as "mutually reinforcing goals" within the European Tech Sovereignty Package, published by the European Commission on 3 June 2026. The package consists of the Strategic Roadmap for Digitalisation and AI in the Energy Sector, the EU Open Source Strategy, and two legislative proposals, the Chips Act 2.0 and the Cloud and AI Development Act.

The Strategic Roadmap builds on a set of initiatives and measures adopted in the digital and energy areas and is structured around three core Pillars: Pillar I focuses on the sustainable integration of data centres into the energy system; Pillar II outlines measures to deploy digital and AI solutions across the energy system; Pillar III addresses the governance framework for energy data, enabling smart energy services and the scaling of AI applications. These pillars are complemented by a cross-cutting section on securing the AI–energy nexus and a concluding section on implementation.

Overall, the Roadmap sets out a vision for a digitalised energy system in which AI plays a central role in delivering secure, clean, and competitive energy for all consumers. It also identifies seven flagship actions aligned with its pillars and strategic objectives. When the European Commission launched the Strategic Roadmap on 3 June 2026, it simultaneously introduced two initiatives linked to Flagship Action 1 and Action 4. These included the signature of a declaration of intent by industry associations to collaborate, under the Commission's guidance, on the sustainable integration of data centres into the energy system, and the establishment of a Community of Practice for the development of AI models supporting grid management and planning.

2

What does the Strategic Roadmap mean for the deployment of AI in the energy sector?

By **Ellen Beckstedde,** *Research Associate*
Alessandra Porcari, *Research Associat*
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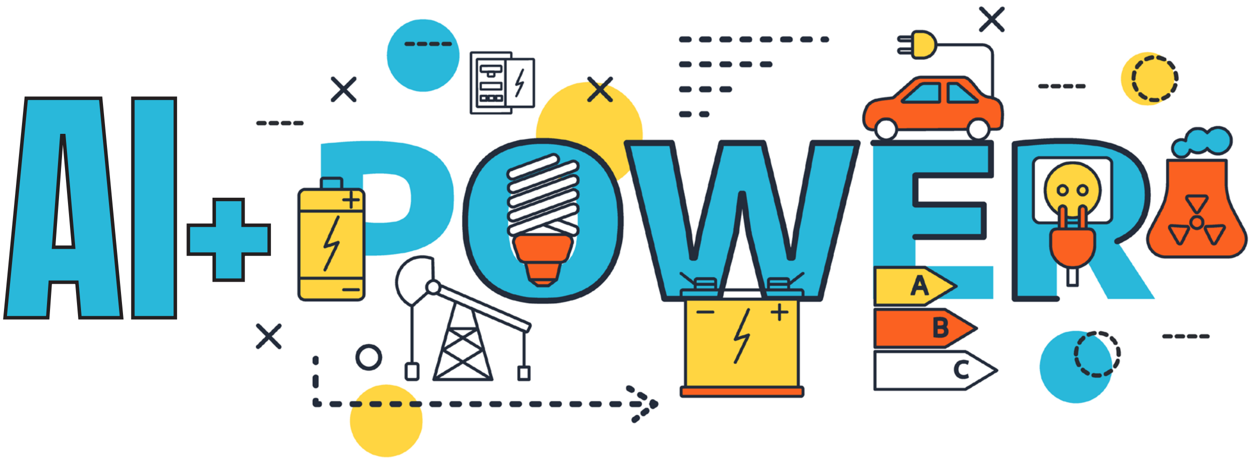
In this second instalment, we explore three questions: (1) where could Artificial Intelligence (AI) be deployed across the energy sector? (2) what types of AI models might be developed? and (3) what are the next steps the European Commission plans to take? We ask these questions in the context of the European Commission's recent Strategic Roadmap on digitalisation and AI in the energy sector. Pillar II, and in particular Flagship Action 4, of the Strategic Roadmap aims to foster the 'development of AI models across the energy value chain'.



Where across the energy sector could AI be deployed?

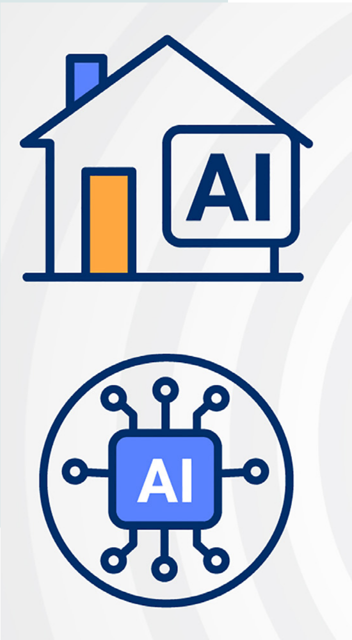
AI has the potential to bring important benefits to the European energy sector by supporting better decision-making, enhancing efficiency, improving accuracy and reducing costs across a wide range of use cases. A study by the Energy Transition Expertise Centre 2 (ENTEC2), which supported the preparation of the Strategic Roadmap, focuses on five use cases:

- Grid planning, operation, and real time control optimisation
- Demand-side management and intelligent flexibility activation
- Forecasting energy demand, renewable generation, and grid conditions
- Predictive maintenance and anomaly detection for energy assets
- AI-supported permitting of energy infrastructure

This list of use cases sparks two reflections. First, the use cases are organised around the tasks that AI can support rather than around specific segments of the energy value chain. The same part of the energy value chain may therefore appear in several use cases. Electricity grids, for example, feature across all five use cases: real-time optimisation, flexibility activation, forecasting, predictive maintenance and permitting.

Second, the potential applications of AI in the energy sector are likely to extend beyond the five use cases identified in the ENTEC2 study. These use cases were selected to illustrate areas where AI is expected to deliver some of the earliest benefits in terms of performance, reliability and cost efficiency. The Strategic Roadmap itself points to several additional applications. Examples include supporting safety and operational efficiency in nuclear facilities and assisting with renovation planning for buildings and energy-poor households.

Taken together, these reflections suggest that AI could be deployed across various parts of the energy sector, both within and beyond the priority use cases identified in the ENTEC2 study.



What type of AI models might be developed?

While a broad variety of AI models may deliver benefits across the energy sector, the Strategic Roadmap explicitly refers to two categories: foundation models and generative AI. It is therefore useful to clarify what is meant by these terms.

Foundation models are generally described as models trained on large and diverse datasets that can be adapted to a wide range of downstream tasks. Generative AI typically refers to AI systems capable of generating new content, such as text, images, audio, video, data or code. These definitions suggest that the two terms emphasise different aspects of AI systems. The term foundation models highlights the model's role as a common basis from which many more specific applications can be developed. Generative AI refers to the system's primary function; its capability to create new content. This distinction in emphasis is important, but it also makes the relationship between the two categories less straightforward.

Our current understanding is that foundation models and generative AI are closely related but distinct concepts. Many foundation models possess powerful generative capabilities, and the performance of generative AI often benefits from training on large and diverse datasets. However, in some cases, foundation models could be adapted for non-generative purposes or generative AI may not exhibit all the characteristics commonly associated with foundation models. As a result, although the two categories often overlap, neither concept seems to fully encompass the other, and caution should be applied when using the terms interchangeably.

Finally, it must be noted that the field of AI continues to evolve rapidly. As models, applications, and terminology continue to develop, the practical boundaries between these concepts may also evolve.

What are the next steps announced in the Strategic Roadmap?

To accelerate the deployment of AI across the energy sector, the Strategic Roadmap announces three key initiatives under Flagship Action 4.

The first initiative concerns the launch of the Community of Practice 'AI.grids' for the development of AI models to improve the management and planning of energy grids, which was signed alongside the Strategic Roadmap. AI.grids aims to build the first Pan-European AI foundation model for energy grid operations through a collaborative ecosystem of system operators, research organisations, and technology providers, comprising 48 partners.

The second initiative focuses on the development of digital portals for Member States to streamline permit review for renewable energy, storage and grid projects, using generative AI. This initiative is in line with the European Grids Package, in particular with the Commission's proposal on acceleration of permit-granting procedures. The Strategic Roadmap foresees the design of these AI tools in 2027, and for public authorities to start using them in 2028.

The third initiative is to support research and innovation on AI for the energy sector through Horizon Europe. More specifically, the Horizon Europe Work Programme of 2026-2027 on Climate, Energy and Mobility includes two dedicated calls titled 'Data sharing to support the training and development of AI foundation models in the energy sector' and 'Large scale operational validation and upscaling of state-of-the-art (Generative) AI tools and models powering a next generation digital energy system'. The two calls suggest that the Commission intends to maintain its focus on AI foundation models and generative AI, while extending the scope beyond the use cases of the first two initiatives.

China's hydrogen strategy shifts gears

By ***Anders Hove,*** *Senior Research Fellow, OIES*

» *This article was originally published in Oxford Energy Forum (Issue 150) and is here republished with permission from the Oxford Institute for Energy Studies (OIES).*

China is the world's largest producer and consumer of hydrogen, and policy has long supported hydrogen technologies as part of a national development strategy. As the world's largest producer of renewable energy, China has also viewed green hydrogen as a promising pathway for absorbing surplus wind and solar output. In the transportation sector, policy for many years promoted fuel-cell vehicles for both passenger cars and long-haul trucks. Now China's hydrogen strategy is entering a new phase, shifting away from its earlier focus on fuel-cell vehicles and transportation towards a greater emphasis on industrial decarbonization and energy system integration.

Today's pivot away from fuel cells and transportation is driven by multiple overlapping factors. Battery prices have continued to fall, and long ago closed off the pathway for fuel cells in passenger cars. Since 2025, electric vehicles have begun to rapidly penetrate the heavy truck sector as well, especially for shorter-range vehicles. Even for long-haul routes, however, major logistics companies such as SF.com and Alibaba have started replacing their fleets with EV heavy trucks, relying on proprietary charging networks. In ports, industry parks, and mining regions, battery swap has become a viable pathway for EV heavy trucks to operate continuously without lengthy charging sessions.

Although officials have not officially abandoned transportation fuel cells as a focus area for hydrogen technology, the main theme for the sector's development is clearly shifting towards industrial use of green hydrogen. This is influenced by the desire to increase industrial offtake of renewable energy supply, as well as increasing demand for green fuels in global markets.

Hydrogen vehicles: advocacy and early policy momentum

The early development of China's hydrogen strategy was closely associated with a prominent policy champion: Wan Gang, the head of the Ministry of Science and Technology from 2007 to 2018. Known as the Father of EVs, Wan Gang studied in Germany and worked as an engineer at Audi's headquarters in Ingolstadt, before returning to China to head the 863 Project, which led China's early R&D on electric and fuel cell vehicles (FCVs). Later, during his time at the Ministry of Science and Technology, Wan Gang became a prominent advocate of FCVs, which he saw as the 'next step' for passenger transportation after hybrid vehicles and EVs, which he viewed as a transitional technology[1]. During this period, China's battery and EV strategy had shown few signs of the stunning growth it experienced after 2021. China's EV market was largely limited to cheap city cars or expensive imports.

At the same time, the emphasis on fuel cells reflected broader institutional priorities, including technological diversification and the desire to hedge across multiple drivetrain pathways. Hydrogen and FCVs were promoted through national R&D programmes and early demonstration projects. Early on, six cities were named as FCV demonstration cities, including Beijing during its hosting of the 2008 Olympics. In the early 2010s, the Ministry of Industry and Information Technology and the National Development and Reform Commission favoured EVs and lithium-ion batteries, the introduction of the Toyota Mirai in 2016 led to renewed focus on FCVs.

China's 2016 Fuel Cell Vehicle technology development roadmap called for China to have 5,000 FCVs by 2020, 50,000 by 2025, and 1 million by 2030[2]. Central government funding was allocated for fuel cell passenger cars, buses, heavy trucks, and hydrogen fuel stations. The 2016 Energy Technology Revolution & Innovation Initiative targeted proton exchange membrane and solid oxide fuel cell technologies for R&D funds. Zhangjiakou (host of the 2022 winter Olympics) and Foshan were among the newly named FCV pilot demonstration cities.

Targets for fuel cells and hydrogen fuel infrastructure remained prominent in the 14th Five-Year Plan (2021–2025). In 2022 the National Development and Reform Commission and National Energy Administration (NEA) published the Medium and LongTerm Plan for Hydrogen Energy Industry Development (2021–2035), setting quantitative goals for FCVs and hydrogen fuel stations for 2025, 2030, and 2035.

Almost all provinces included hydrogen in their provincial five-year plans. For example, Sichuan called for 'strengthening the hydrogen energy industry chain and cultivating 25 domestic leading enterprises, covering hydrogen production, storage and transportation, refuelling, and utilization.' Guangdong province sought to 'promote the construction of hydrogen fuel cell industrial parks, and form an industrial agglomeration of hydrogen energy technology R&D, production, storage, and transportation'. Inner Mongolia promoted hydrogen from so-called 'multi-energy complementarity projects' combining wind, solar, energy storage, and hydrogen production[3]. These and other provincial plans typically included quantitative targets for FCVs and hydrogen refuelling stations, but did not set targets for green hydrogen production or utilization.

1. Bloomberg News (2019, 12 June), 'China's father of electric cars says hydrogen is the future', https://www.bloomberg.com/news/videos/2019-06-12/china-s-father-of-electric-cars-says-hydrogen-is-the-future-video.
2. Jane Nakano (2022, 3 February), 'China's hydrogen industrial strategy', Center for Strategic & International Studies, https://www.csis.org/analysis/chinas-hydrogen-industrial-strategy.
3. Wang Ju (2017, 16 October), Overview of Fuel Cell Vehicle Development in China, International Hydrogen Fuel Cell Association, https://cdn.lbma.org.uk/downloads/S5_JW.pdf.

At the regional level as well, local officials viewed hydrogen as a promising economic development pathway. Local policy sought to develop hydrogen fuel infrastructure, and local governments still typically subsidize hydrogen fuel to equalize its price relative to diesel. Several local governments developed 'hydrogen clusters', organized around vehicle manufacturing, fuel infrastructure, and bus or truck fleets that could operate in local corridors with fuel infrastructure.

The central government promoted these clusters by designating them as national pilots, qualifying them for subsidies and lowcost lending. The design of these incentives largely explains the focus of local government on fuelling infrastructure and FCVs. City buses could receive up to RMB3 million in purchase subsidies, and FCV trucks could receive nearly RMB400,000[4]. City pilot initiatives would be scored by the central government based on their deployment of vehicles and infrastructure. This design encouraged focus on transportation versus industrial use of hydrogen or scale-up of green hydrogen.

The quiet pivot to industry

Despite the profusion of government plans and policy documents that characterize the Chinese political system, policy shifts are often subtle, avoiding any hint at failure or technology dead ends. Instead of leading the market, energy policies are often reactive, especially when a technology succeeds unexpectedly, as is the case for EV heavy trucks.

The year 2025 was a watershed for EV trucks in China. For several years, LNG truck sales had been gaining ground against diesel, and hydrogen trucks were rolling out in small numbers. FCVs were seen as a promising path for heavy-duty vehicles, especially for longer routes. Encouraged by a generous trade-in subsidy, new energy vehicle (NEV) truck sales saw explosive growth in 2025, surging from under 10 per cent of the market to nearly 30 per cent, and outpacing LNG trucks. Industry insiders predicted that the NEV share would reach 50 per cent of the truck market within a few years.

Initially, NEV trucks were predominantly deployed in short-range use cases, such as within ports and industrial parks, or on restricted routes connecting mines to transportation hubs. This also began to change in mid-2025 as major truck fleets began switching to NEVs en masse, including for long-haul routes, due to favourable total cost of ownership and the availability of fast charging infrastructure or battery swap stations on key corridors.

Although China continues to issue policy documents promoting hydrogen in transportation, and hydrogen fuel infrastructure continues to expand in selected regions, high upfront costs, fuel costs, and limited infrastructure have restricted the role of hydrogen in the trucking sector. China had just 559 hydrogen fuel stations as of mid-2025, with roughly half concentrated in just a few provinces—Guangdong, Henan, Hebei, Shandong, and Zhejiang. Only 400 of these stations are operational[5]. Hydrogen fuel infrastructure is focused on a few local clusters or corridors. Many stations are located at closed industrial parks with licenses for handling hazardous chemicals. There is no real national network.

4. Lingzhi Lin (2023, December), Accelerating New Energy Vehicle Uptake in Chinese Cities: A 2023 Policy Update in a Post-Subsidy Era, International Council on Clean Transportation, https://theicct.org/wp-content/uploads/2023/12/ID-24-%E2%80%93-NEVs-2023-briefing-A4-70114-v4_final.pdf.
5. Fuel Cell China (2025, 8 July), 'China Hydrogen Alliance: half-year report on China's hydrogen industry development 2025', Fuel Cell China, https://www.fuelcellchina.com/Industry_information_details/6767.html.

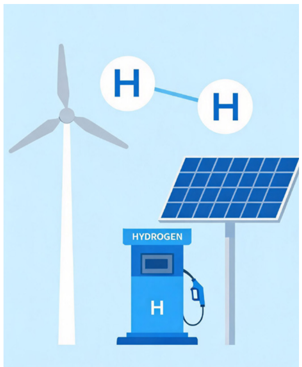
Although China views green hydrogen as a promising field for development, the high cost of renewable hydrogen compared to conventional hydrogen has limited the role of green hydrogen. At present hydrogen prices of around RMB30–40/kg, hydrogen fuel costs at least 25 per cent more than diesel or LNG trucks per km[6]. Many of China's hydrogen clusters include government fuel price subsidies for this reason[7]. Meanwhile, NEV trucks are able to achieve per-km running cost up to 40 per cent lower than diesel.

Because of high costs and geographic distance to the country's main renewable production zones, only 1 per cent of China's hydrogen supply comes from water electrolysis. Though inputs vary from year to year, in 2025, 56 per cent came from coal, 21 per cent from natural gas, and 21 per cent from industrial byproducts[8]. While there are green hydrogen projects in a number of provinces, the renewable capacity connected is only around 1.5 GW, a miniscule fraction of China's over 1,500 GW of wind and solar capacity[9]. Many of the renewable hydrogen projects are located in northern provinces such as Inner Mongolia and Xinjiang, far from China's main industrial clusters and hydrogen fuel infrastructure.

The central government continues to promote hydrogen for transportation as part of the green hydrogen push, as mentioned in the 15th Five-Year Plan[10]. Although hydrogen's classification as a hazardous fuel has not changed, and most refuelling stations are still located at chemical industrial parks, several provinces have relaxed regulation of hydrogen, and China's Energy Law in 2025 clarified that hydrogen is to be considered as an energy source. Some hydrogen fuel stations are now located at port facilities or along approved hydrogen highway corridors[11].

Yet there are strong signs that the emphasis of hydrogen policy has shifted towards industrial utilization over transportation. First, many of the FCV targets have been steadily reduced over time: the 2030 target of 1 million FCVs was trimmed in 2025 to 500,000, and further slashed to 100,000 in the March 2026 Hydrogen Integration Application Pilot Scheme. China had 30,000 hydrogen-fuelled vehicles at the end of 2025, missing a government target of 50,000 vehicles for the year. Only around 5,000 hydrogen-fuelled vehicles are sold per year, mainly heavy trucks and buses[12].

Second, a new hydrogen strategy released by the Ministry of Industry and Information Technology on 16 March clearly puts comprehensive industrial supply chains at the forefront[13]. To qualify for subsidies from the central government, pilot zones must have at least one green ammonia project at or above 100,000 tonnes per year capacity, or green methanol at 50,000 tonnes per year, backed by at least 20 per cent renewable hydrogen production capacity[14]. The policy bans projects from labelling coalbased ammonia or methanol as 'green', and sets new goals for reducing green hydrogen costs from the new hydrogen industrial clusters. This marks a shift in how central government evaluates hydrogen deployment—from counting vehicles and refuelling stations to measuring industrial output and green fuel production.



6. Mingyue Hu et al. (2024, 7 August), 'Competitive analysis of heavy trucks with five types of fuels under different scenarios—a case study of China', Energies, 17(16), https://www.mdpi.com/1996-1073/17/16/3936.
7. Fuel Cell China (2022), '2022 年国内部分省市氢能政策汇总', https://cn.fuelcellchina.com/Industrial_research_details/2.html; Metal.com (2025, 27 August), 'Supporting measures for the promotion and application of hydrogen fuel cell vehicles in Chongqing by 2025', https://news.metal.com/newscontent/103499697; Jiaxin Lin (n.d.), 'How China's hydrogen industry benefit from regulatory flexibility on hydrogen production?', Integral, https://www.integralnewenergy.com/?p=39047, accessed 27 February 2026.
8. National Energy Administration (2025, 30 April), '中国氢能发展报告 2025', https://www.nea.gov.cn/20250430/96022785b3a747248288ad1c57d3a025/83d863317f2f44edb605348e4de40993.pdf.
9. Fuel Cell China (2025, 8 July), 'China Hydrogen Alliance: half-year report'.
10. Zheng Xin (2025, 4 November), 'Hydrogen upping ante in green energy portfolio', China Daily, https://www.chinadaily.com.cn/a/202511/04/WS69095ac8a310f215074b8d00.html.
11. Vera Zhang (2024, 21 November), 'Hydrogen law, regulations & strategy in China', CMS Law, https://cms.law/en/int/expert-guides/cmsexpert-guide-to-hydrogen/china.
12. Adrian Leung (2025, 28 December), 'China 2025 hydrogen vehicle report: fleet around 30,000, core components 70 percent localized', Car News China, https://carnewschina.com/2025/12/28/china-publishes-2025-hydrogen-fuel-cell-vehicle-report-fleet-around-30000-corecomponents-70-percent-localized/.

As curtailment of renewable energy ticks up and inter-provincial trading of renewables faces barriers, the NEA is also including hydrogen in its strategy. NEA's 2026 work report promoted non-electricity utilization of renewable energy, including for ammonia and methanol. On 3 March 2026, just after the onset of the Iran war, NEA named hydrogen as among the green fuels that can substitute for oil, and stated that hydrogen policy would shift from being categorized as a climate policy to an energy security policy[15]. This reframing aligns hydrogen more directly with China's long-standing concern over oil import dependence, extending decarbonization efforts beyond the power sector into industrial fuels and feedstocks.

Some of these policies simply reflect developments in the market. Global and domestic demand for green hydrogen is set to increase, not least in response to the EU's Carbon Border Adjustment Mechanism. And Chinese companies are scaling up to meet the new demand. Early in 2026, Chinese wind player Envision completed the export of its first cargo of green ammonia compliant with certification for renewable fuels of non-biological origin from its site in Inner Mongolia to Lotte Group in South Korea[16]. The project is designed as a fully integrated supply chain, linking inland renewable resources with transport infrastructure and planned port export terminals. In Jilin province, the Songyuan project combines gigawatt-scale wind and solar generation with hydrogen production to supply hundreds of thousands of tonnes of green ammonia and methanol annually[17].

This direction is also consistent with recent guidance from energy authorities emphasizing the expansion of renewable energy use beyond the power sector into hydrogen, ammonia, and synthetic fuels. Increasingly, hydrogen development is liked directly to industrial decarbonization and the need to absorb growing volumes of renewable generation. And green hydrogen is perceived as a field of international competition where China can win, given its advantages in renewable energy cost and scale[18].

Conclusion

China's hydrogen strategy is being redefined. Earlier policy emphasized hydrogen for next-generation transportation technologies, especially for heavy trucks, supported by subsidies for fuel cell vehicles and refuelling infrastructure. That vision has proven difficult to realize at scale, whereas battery electric vehicles have taken off in the heavy-duty truck sector and are beginning to compete with diesel for long-haul routes.

What is emerging in its place is a more pragmatic and system-oriented strategy. Rather than competing directly with electrification, hydrogen is being repositioned as a complementary pathway that can absorb surplus renewable energy, support industrial decarbonization, and contribute to the production of tradable green fuels such as ammonia and methanol. Recent policy developments suggest a shift in emphasis from vehicle deployment to industrial output, from local infrastructure build-out to integrated supply chains, and from technology demonstration to cost reduction and commercialization.

As with past energy transitions in China, the evolution of hydrogen policy is likely to be gradual and uneven, with continued support for legacy applications alongside new priorities. Yet the direction of travel is increasingly clear. Rather than serving as a universal solution across the energy system, hydrogen is finding a more focused role shaped less by early technological ambition than by economic viability and system integration..

13. Ministry of Industry and Information Technology (2026, 16 March), '工信部等三部门部署开展氢能综合应用试点工作', https://mp.weixin.qq.com/s/_297tzEAr7p_gtADScTcEw.
14. Kai Yu (2026, 19 March), 'China's hydrogen "subsidy" 2.0 design: all you need to know', Energy Iceberg, https://energyiceberg.substack.com/p/chinas-hydrogen-subsidy-20-design.
15. Of Week, (2026, 4 March), '重大政策动向：我国将用绿色燃料替代进口石油'.
16. Polly Martin (2026, 27 February), 'Envision ships first cargo of green hydrogen-based ammonia from China to South Korea', Hydrogen Insight, https://www.hydrogeninsight.com/industrial/envision-ships-first-cargo-of-green-hydrogen-based-ammonia-from-china-to-south-korea/2-1-1950787.
17. Yin Yeping (2025, 16 December), 'World's largest integrated green hydrogen-ammonia-methanol project officially begins operations', https://www.globaltimes.cn/page/202512/1350756.shtml.
18. Edward White (2025, 22 December), 'China uses green tech dominance to take early lead in clean fuels race', Financial Times, https://www.ft.com/content/77283ccf-5a50-41e1-b6b9-9741ac3e7309.

Coal-rich Poland is embracing Coal-to-Nuclear repowering not just as a technological swap, but in a systemic change. In an exclusive ECECP interview, Dr Łukasz Bartela, professor at the Silesian University of Technology and Lead of the DEsire Project, explains how the concept has evolved from research and analysis into national-level energy planning.

From coal to nuclear: Repowering Poland's energy transition

*By **Daisy Chi,***
Editor in Chief of EU-China Energy Magazine

The crossroads in coal country

For decades, Poland's economic heartbeat was largely powered by coal, making today's clean transition one of the most challenging in Europe. Although Poland possesses substantial geological coal resources, the economically and technically accessible resource base of existing mines is now much more limited. Mining conditions are becoming increasingly challenging as extraction moves to greater depths, while many mines and coal-fired generating units are approaching the end of their planned operating lives: most of them are around 42 years old. In addition, fulfilling the government's commitment to reach carbon neutrality by 2050 requires a fundamental shift towards a greener energy mix, which means that a large proportion of the current coal fleet will have to be replaced with new energy sources over the next 25 years.

The nation's transition away from coal is already well underway: coal's share in the power mix dropped from nearly 70% in 2020 to 50.8% in 2025[1], replaced by wind (13.8%) and solar (11.8%) as well as natural gas (9.7%).

Today, the country has already built 27 GW of solar and 10 GW of wind capacity, which together exceed the capacity of the existing coal fleet (28.5 GW).[2] However, a massive expansion of variable renewables alone cannot provide all the reliable and dispatchable power currently supplied by coal, potentially leaving the national power system vulnerable to instability. Natural gas, while practical as a bridging fuel in the mid-term, presents its own strategic risks over the long run: in 2025, only 17% of Poland's gas came from domestic supplies.[3] A shift in power supply from domestic coal to imported natural gas simply trades carbon intensity for extreme geopolitical vulnerability.

Like in many other countries, nuclear power - which can provide stable, zero-emission baseload power - has emerged as a logical option for Poland's future energy mix, complementing the intermittent renewables.

However, in addition to the energy transition, there are huge socio-economic challenges associated with phasing down coal in a country where, over generations, entire communities worked in coal mining, power generation and related industries.

'That is why, in Poland, the question for the transition pathway is not simply what is cheapest on paper. The more relevant question is what can replace coal most effectively without destabilising the power system and the coal regions', comments Dr Łukasz Bartela, head of Poland's DEsire project, who led the development of the plan for modernisation and decarbonisation of the power industry through the use of nuclear reactors.

From coal to nuclear

Historically, Poland has never operated a commercial nuclear power plant. Early nuclear power development attempts were repeatedly shelved, derailed by shifts in politics and public opposition following global nuclear accidents.[4]

The strategic turning point arrived in 2014 with the Polish Nuclear Power Programme (PPEJ)[5], which lays down an enabling framework for establishing a domestic nuclear power industry. Updated in 2020[6], the roadmap established a target of building 6-9 GW of large-scale water-cooled reactors by 2040. These would replace nearly one-third of the country's current coal-fired power capacity.[7] This framework paved the way for Poland's first planned nuclear plant at Lubiatowo-Kopalino on the Baltic coast - a 3.75 GW facility for which the first nuclear concrete is scheduled in 2028. The site was strategically chosen to address the high electricity demand of the region and the lack of large, dispatchable generation sources in the area, while having easy access to cooling water and sea transport.

However, the most significant recent shift in Poland's nuclear vision is reflected in the 2026 draft update to the PPEJ[8], in which the Polish government proposes that a second nuclear power plant should be located in a coal region undergoing transition. Following the completion of the public consultation process, the draft update has been approved at the Ministry of Energy leadership level and will now proceed through further government work on the resolution updating the Programme. As stated in the draft Programme, this approach is intended both to maximise the use of existing infrastructure, including grid connections, and to preserve and revitalise the local economy.

1. Data of power generation mix is based on the 2020 and 2025 bulletins of the Statistical information on electricity, published by Energy Market Agency S.A. https://www.are.waw.pl/en/oferta/wydawnictwa#informacja-statystyczna-o-energii-elektrycznej
2. Data from ARE, https://www.are.waw.pl/en
3. Plan of decarbonisation of the domestic power industry through modernization with the use of nuclear reactors, DEsire project, September 2025, translated by the RePower Initiative. https://projektdesire.pl/en/raporty/decarbonization-plan-for-the-national-power-sector-through-modernization-using-nuclear-reactors/
4. https://www.blue-europe.eu/analysis-en/full-reports/polands-energy-transition-overcoming-the-coal-myth-and-embracing-nuclear-power/
5. https://www.gov.pl/web/polski-atom/program-polskiej-energetyki-jadrowej
6. https://www.gov.pl/web/polski-atom/program-polskiej-energetyki-jadrowej-2020-r
7. https://www.are.waw.pl/en
8. https://www.gov.pl/web/energia/program-polskiej-energetyki-jadrowej

Out of 27 evaluated locations, the plan narrows the candidates to four specific coal plant sites, naming Bełchatów (home to Europe's biggest coal-fired power plant) and Konin as priority sites, with Kozienice and Połaniec as alternative locations. Under the proposed schedule, the strategic partner is expected to be selected in 2027, the site to be designated in 2028, and construction to begin in 2032.

At its core, the draft update signals a growing recognition in Poland of Coal-to-Nuclear (C2N) as an important pathway that can not only modernise the power system with clean nuclear power, but also for offer an opportunity for coal regions to transition to green power and revitalise their local economies.

While the concept of repurposing or repowering coal-fired plants for nuclear energy is being discussed worldwide, this is the first time consideration has been given to incorporating C2N into a national strategy. 'Today Coal-to-Nuclear in Poland appears not to be a single experiment, but rather a direction of systemic change', comments Dr Łukasz Bartela.

This systemic shift did not materialise in a policy vacuum; it was forged through years of relentless analytical groundwork and strategic climate diplomacy led by the DEsire Project[9] (Platforma Transformacji Energetyki) and in collaboration with the Repower Initiative.[10]

The DEsire Project: Bridging the gap from concept to reality

Established in 2022, DEsire project was designed from the outset as a cross-sector initiative. The five-member consortium was led by the Silesian University of Technology and brought together the ministry responsible for energy policy (represented by the Ministry of Energy in the project's final stage), Energoprojekt-Katowice S.A., the Institute of Nuclear Chemistry and Technology, and the Sobieski Institute Foundation - combining academic research, public policy, engineering practice, nuclear expertise and socio-economic analysis within a single project. Funded by the National Centre for Research and Development under the GOSPOSTRATEG programme, DEsire set out to assess the technical and economic potential, social acceptability and human-resource readiness for C2N transformation and to translate these findings into a practical decarbonisation plan for Poland's power sector.[11]

The C2N concept is simple: replacing coal-fired capacity with nuclear capacity, and choosing locations where coal system power plants currently operate. This strategy allows for the reuse of existing infrastructure such as electricity transmission grids, water cooling systems, and local industrial facilities, which can significantly reduce capital costs and the construction timelines for new nuclear power plants.[12]

Depending how much of the old coal plant assets is preserved, four pathways for C2N are often discussed by academics, each of which involves different levels of asset adaptation.

Pathways for Coal-to-Nuclear

C2N Pathway	Strategy & Infrastructure Reuse	Key Benefit
Greenfield	New site near a retiring coal plant, reusing regional grid nodes and the local workforce.	Maximum design freedom, avoiding site-specific physical constraints.
Brownfield	Built directly on the existing coal site, reusing grids, water cooling systems, buildings and transportation.	Shorter investment cycles and reduced overall capital costs.
Direct	Replaces only the coal boiler with a reactor, reusing the existing steam turbine and cooling systems.	Highest potential capital savings (+35%)
Indirect	Like the direct path, but with thermal storage between the reactor and the turbine.	Enables flexible power output while the reactor runs at a stable baseload.

Source: Reproduced based on the research of DEsire project[13]

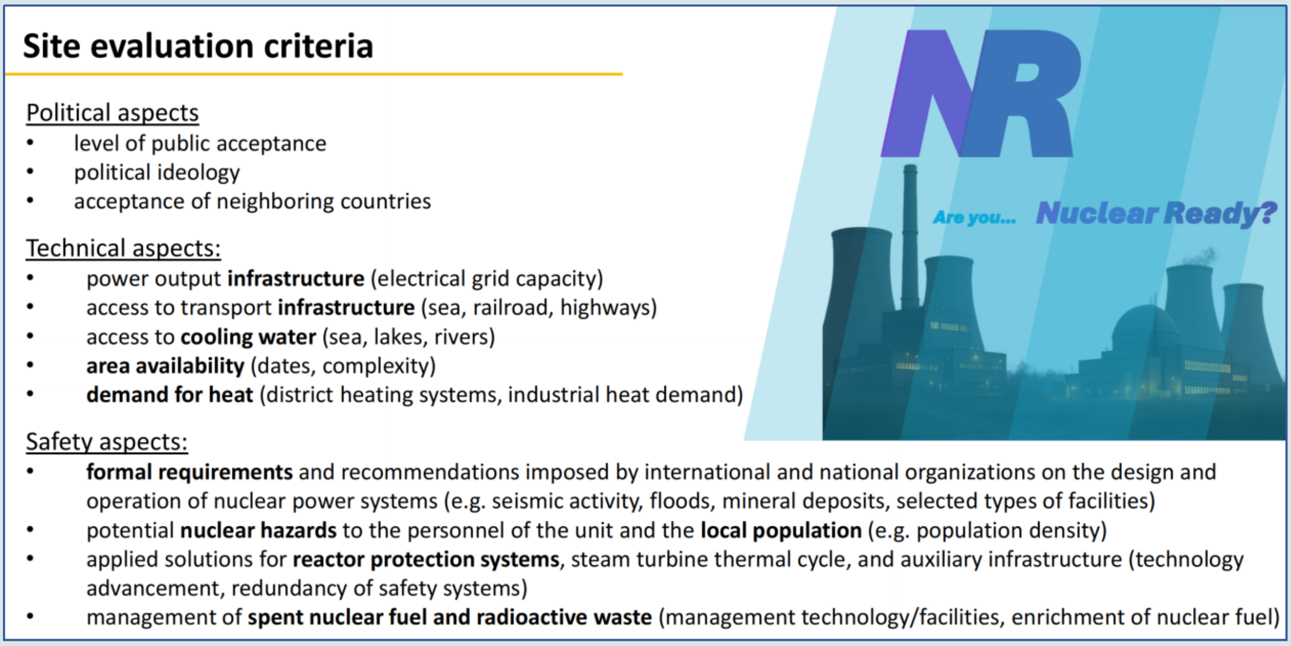
9. https://projektdesire.pl/en/domowa/
10. https://www.repower.world/news/the-end-of-coal-the-rise-of-the-atom-repowering-poland
11. https://projektdesire.pl/en/domowa/
12. Coal to Nuclear: Supporting a Clean Energy Transition, International Atomic Energy Agency (IAEA), October 2025, https://doi.org/10.61092/iaea.spu2-yaz1.
13. https://projektdesire.pl/en/raporty/decarbonization-plan-for-the-national-power-sector-through-modernization-using-nuclear-reactors/

While the greenfield and brownfield approaches simply inherit a coal plant's location and auxiliary assets for repurposing, the direct and indirect paths represent a much deeper technological repowering, involving the reuse of part of the coal plant's legacy thermal machinery. However, according to DEsire research, these latter repowering pathways are not currently considered feasible in Poland, as they require advanced, high-temperature Generation IV reactors, (which are not readily available in Europe) to produce the extreme steam temperatures and pressures needed to match conventional coal turbines. In addition, the deep utilisation of the core infrastructure of decades-old coal-fired units within a brand-new nuclear reactor is a regulatory and mechanical gamble that decision-makers simply cannot afford to take. Therefore, DEsire has focused on the more practical approach of brownfield repurposing, and has assumed that if the analysis demonstrates justification for investment, then the greenfield investment will also be justified.[14]

The team screened 23 coal-fired power and combined heat and power plants across Poland, factoring in grid connection and power export capability, access to cooling water, geological and hydrological conditions, population density, logistics, nuclear-safety constraints and the broader transition potential of the region. Additionally, they conducted detailed pre-feasibility studies on three specific sites Kozienice, Dolna Odra, and Opole, each representing a different C2N approach.

'We carried out site assessments and pre-feasibility studies not in order to select a single winner from a ranking, but to test different site profiles and understand the conditions under which C2N could be feasible,' explains Dr Łukasz Bartela. 'These three sites became our reference cases, allowing us to develop recommendations that could be applied more broadly.'

Based on this extensive research, the team has developed a 'Nuclear Ready' concept to standardise these complex evaluations. which may serve as a valuable tool for policymakers worldwide when assessing the feasibility of repurposing/repowering an individual coal plant. 'The Nuclear Ready concept was, in our view, the missing link between the Coal-to-Nuclear idea and practical implementation,'



Source: DEsire Project

14. Plan of decarbonisation of the domestic power industry through modernization with the use of nuclear reactors, DEsire project, September 2025, translated by the RePower Initiative.

Dr Bartela notes. 'Knowledge about the suitability of specific locations for nuclear investment is still far from widespread... Without an objective assessment, it is difficult to compare national sites, and this can create scepticism among political decision-makers towards the arguments presented to them.' This concept and framework was developed from a global perspective, with a view to nations that are still expanding their fossil fuel fleets. 'The message to investors in such countries is simple: if you are still going to build coal-fired capacity, it may be worth locating it in places where, in the foreseeable future, it could be replaced by nuclear capacity,' advises Dr Bartela. 'That is a question worth considering today, rather than when the coal plant is close to retirement.'

But does C2N investment really make economic sense? A sobering finding from the analyses carried out under the DEsire project is that 'locating a nuclear investment at, or near a coal-fired power plant does not automatically result in spectacular capital-cost savings', Dr Bartela emphasises. 'The scope for direct reuse of existing infrastructure can be limited, and the benefits more often arise from logistics, use of existing transmission infrastructure, and broader socio-economic effects than from simply reusing physical assets.'

Rather, the true value of C2N is found in the bigger picture. 'The economic case for C2N lies primarily in avoiding the costs of a disorderly transition: the loss of dispatchable capacity, the social consequences of closing coal regions, and the need to build from scratch both new energy infrastructure and a new regional economic base. This is systems economics - less spectacular in an Excel spreadsheet, but much closer to the reality of the economy,' states Dr Bartela.

Powering a just transition

Transitioning away from coal is more than a technological shift. It is a profound transformation of the industry's workforce, skills, and regional identity. To map this human resources transformation, the DEsire project carried out a comparative analysis[15] between coal-fired power plants and nuclear power plants to assess how much of the existing coal workforce could be transferred to a C2N facility and where entirely new skills would be required. It found substantial potential to reuse the existing coal workforce. Turbine mechanics, electricians and heavy equipment operators, for example, already possess many of the skills needed to operate and maintain a nuclear plant's conventional, non-nuclear systems. After all, much of a power plant's day-to-day operation involves running and maintaining thermal and mechanical systems rather than working directly with nuclear processes.

Crucially, a C2N conversion may even double the local workforce compared to the coal station it replaces, as it will bring in a substantial number of additional specialised nuclear engineers, large security teams, and additional supply chain and training roles.

15. Plan of decarbonisation of the domestic power industry through modernization with the use of nuclear reactors, DEsire project, September 2025, translated by the RePower Initiative.

To prevent structural unemployment during the transition, the report recommends conducting a comprehensive qualifications and skills audit five to six years before a coal plant's scheduled closure. This long-lead timeline allows utilities to map employee competencies, launch tailored training programmes, and coordinate proactive recruitment planning years before the reactor comes online.

This practical focus on livelihoods is exactly what local communities care about. 'The DEsire social assessment showed clearly that people want to talk not only about safety and waste, but also about costs, jobs, training, the impact on the region and what will actually remain for the local community', comments Dr Bartela.

By converting existing industrial skills into new nuclear competencies and creating new education and employment opportunities, C2N could help coal-dependent communities retain their workforce, reduce outmigration and build a longer-term economic future.

Building the enabling ecosystem

The explicit consideration of the C2N pathway in the draft upgrade of the Polish Nuclear Power Programme did not emerge in a policy vacuum. It was supported by sustained research, analysis and stakeholder engagement carried out by the DEsire team, inspired by earlier works carried out in collaboration with the Repower Initiative. [16] The DEsire team has presented the C2N pathway to multiple levels of decision-making entities, including ministries, local government entities, and energy groups across Poland, with continuing efforts through publications, panel discussions, and hundreds of conversations with experts and decision-makers.

'The promotion of the C2N concept among national decision-makers would certainly not have been successful without the interest of many people at the Ministry of Energy, who recognised the significant potential of this approach,' Dr Bartela recalls.

'The DEsire project played an important role because it helped move this idea from the level of intellectual debate to the level of a practical implementation methodology. We did not stop at asking whether C2N sounds reasonable. We began examining where it could be implemented, at what scale, with which technologies, and with what risks, social benefits and regulatory constraints. The project included not only technical research, but also social diagnosis, economic analyses, regulatory recommendations, and

16. https://www.repower.world/news/the-end-of-coal-the-rise-of-the-atom-repowering-poland

the creation of an open platform supporting cooperation between academia, industry and public administration. This kind of outreach, grounded in documented evidence, helped bring together different stakeholder groups. This is very important, because C2N does not develop on the basis of one single argument. It requires a strong and coherent body of evidence that creates a common language for investors, government, system operators, regulators and local communities. In my view, building this practical ecosystem was one of DEsire's greatest contributions to the wider recognition of the C2N concept.'

For countries exploring similar clean transition pathways, including China, the methodology and experience developed through DEsire could provide a valuable reference for assessing the potential of repowering coal plants with nuclear energy. 'Tools such as RepowerScore[17], developed by the Repower Initiative, are also useful, as they provide a structured, evidence-based first assessment of a site and can encourage investors to undertake more detailed studies', adds Dr Bartela.

'What made Poland's DEsire project so impactful was that it helped to build a national consensus that C2N can really be a viable option for the Just Transition,' says Wu Qian, Director of Repower China. 'For China, creating a similar collaborative space where policymakers, energy companies, grid operators, researchers and local decision-makers sit at the same table would be invaluable in exploring the potential of C2N for a Just Transition in our coal heartlands. In addition, C2N is only one of the many possible options available for repowering coal power. All of these efforts can form the foundations of flourishing future industries. After all, repowering means honouring the past and building something better.'

Tips for China	
Tip	**What it could mean in practice**
Start with the sites assessment	Develop a systematic national methodology to assess coal-fired sites and regional conditions. Identify technical constraints and existing assets before deciding on transition pathways.
Keep the portfolio of options open	Assess C2N alongside other repowering options, such as geothermal, thermal energy storage, renewable integration and hybrid solutions. Only then should technologies and business models be matched to individual projects.
Move from assessment to validation	Follow broad assessments with plant-level studies, technology deployment and pilot projects to test technical feasibility and commercial viability.
Think beyond the energy transition	Treat C2N and other repowering pathways as part of the broader transformation of coal regions, helping to retain industrial capabilities, develop new skills and support future industries.
Build the enabling ecosystem	Bring together government, energy companies, grid operators, regulators, researchers, financial institutions and local communities, while ensuring stable regulatory and financing frameworks.
Plan the transition early	Nuclear projects require long preparation periods. Planning for the future of coal assets, infrastructure and employment should therefore begin well before plants are retired.

17. https://www.repower.world/repowerscore

Energy Sub-sectors: the 15th Five-Year Plan in Figures

In March 2026, China formally released the overarching outline of its 15th Five-Year Plan (FYP), setting the broad direction for the country's economic and social development through 2030. Since May, a succession of national-level sectoral plans has been released, translating the country's broad ambitions into more concrete priorities.

Energy has been among the first sectors to receive detailed attention. In June, China released its 15th Five-Year Plan for Building a New Energy System, the master blueprint for the country's broad energy transition during the 2026-30 period, which we examined in detail in our June issue.

Subsequently, the National Development and Reform Commission (NDRC) and the National Energy Administration (NEA) released four dedicated sub-sectoral plans covering power, renewable energy, coal, and oil and gas. Together, these plans move China's energy strategy from broad direction to sector-specific action. They provide an important basis for implementing strategic tasks, planning major projects, allocating public resources and guiding investment and policy development.

The following tables bring together the key quantitative targets from the four sub-sectoral plans, offering a snapshot of where China wants its power system, renewable energy, coal, and oil and gas sectors to be by 2030.

Power System

Category	Indicator	2025 Baseline	2030 Target
Overall Development	Share of electricity in final energy consumption	30%	35%
	Total installed power generation capacity	3 890 GW	5 400 GW
Green and Low Carbon Power Supply	Share of non-fossil power generation capacity	61.70%	65%
	Share of non-fossil power in generation mix	42.30%	50%
	National renewable energy utilisation rate	—	≈90%
	Renewable energy integration	—	>2 800 GW
	Conventional hydropower capacity	—	≈410 GW
	Nuclear power installed capacity	—	≈110 GW
	Biomass, CSP, geothermal & marine energy installed capacity	—	≈65 GW
Power System Reliability	National power supply adequacy ratio	<1.1	>1.1 (Binding)
	Inter-provincial power exchange capacity	80 GW	120 GW
	Non-fossil generation's contribution to reliable capacity	—	≈40%
	Share of clean/efficient coal units (unit capacity ≥600 MW)	baseline	+10 percentage points
Grid Development	West-to-East power transmission capacity	340 GW	>420 GW
	Distribution grid integration capacity for distributed renewables	500 GW	900 GW
Demand-Side Synergy	Demand-side peak shaving capacity (as % of peak load)	>3%	>5%
	Demand-side peak shaving capacity (absolute volume)	—	>100 GW
	Virtual power plant (VPP) max regulation capacity	16.85 GW	>50 GW
System Flexibility	Installed new energy storage capacity	136 GW	300 GW
	Grid-side independent new energy storage capacity for peak supply	—	140 GW
	Installed pumped storage hydropower capacity	—	≈160 GW
	Controllable EV charging capacity through V2G	10 GW	50 GW
	Minimum generation output for CHP units	—	<40%
Power Market	Share of electricity traded in power markets	64%	70%
	Inter-provincial/inter-regional power trading	1 590 TWh	2 000 TWh
Public Power Services	Urban power supply reliability rate	99.98%	99.99%
	EV charging points	20.09 million	>40 million
	High-power EV charging facilities	—	≈300 000

**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.*

Renewable Energy

Category	Indicator	2025 Baseline	2030 Target
Renewable Energy Consumption	Total renewable energy consumption	1.18 bn tce	1.8 bn tce
Renewable Power Generation	Total installed renewable power capacity	2 340 GW	≈3 500 GW
	Wind and solar installed capacity	1 840 GW	>2 800 GW
	Concentrated solar power (CSP)	1.82 GW	15 GW
	Hydropower installed capacity	450 GW	570 GW
	Conventional hydropower capacity	—	≈410 GW
	Pumped storage hydropower capacity	66 GW	≈160 GW
	Ocean energy installed capacity	—	400 MW
	Newly added wind and solar capacity in "Three Norths" bases	baseline	>370 GW
	Newly added distributed renewable capacity	baseline	>300 GW
	Newly offshore wind capacity starting construction	baseline	≈100 GW
	Newly commissioned pumped storage capacity	baseline	≈100 GW
	Total renewable power generation	4 000 TWh	≈6 000 TWh
	Wind and solar electricity generation	2 300 TWh	>4 000 TWh
	Wind and solar generation share	—	30%
Non-Electric Use of Renewable Energy	Non-electric use of renewable energy	60 Mtce	150 Mtce
	Renewable hydrogen production	0.25 Mt	2.0 Mt
Reliable Renewable Power	National average firm capacity contribution[1] of wind and solar power (including co-located energy storage)	—	8%
	Firm capacity contribution of new centralised wind/solar plants	—	≥10% in principle
	Wind and solar share (including co-located energy storage) of power supply during summer and winter evening peaks	—	≥20%
	Newly added reliable peak-generation capacity from renewables	baseline	>300 GW

1. Firm capacity contribution refers to the ratio of the guaranteed available generation capacity at a 95% confidence level during designated security-of-supply periods to installed wind and solar capacity; National average firm capacity contribution refers to the capacity-weighted average of provincial wind and solar firm-capacity contributions, weighted by locally utilised grid-connected capacity.

Coal Industry

Category	Indicator	2025 baseline	2030 Target
Overall Target	Coal consumption	—	Peak by 2030
	Capacity share of large-scale modern coal mines	—	87%
	Capacity share of smart coal mines	—	75%
Coal Supply Security	Share of coal production from the five major coal bases	—	>80%
	Strategic coal production reserve capacity		>100 Mt/yr
Coalbed Methane and Mine Gas	Coalbed methane production	—	26 bcm
	Coal mine gas utilisation	—	6.5 bcm

Oil and Gas Industry

Category	Indicator	2025 Baseline	2030 Target
Supply & Reserves	Domestic oil and gas supply	—	440 Mtoe
	Oil reserve replacement ratio (RRR)[2]	—	≥1.0
	Natural gas reserves capacity as share of national consumption	—	>13%
Consumption	Oil consumption	—	peak by 2030
Pipeline Network & Infrastructure	Length of national long-distance oil and gas pipeline network	200 000 km	220 000 km
	LNG receiving terminal unloading capacity	—	200 Mt/yr
	Overland pipeline gas import capacity	—	114 bcm/yr
	Annual CO_2 injection through CCS/CCUS	—	10 Mt/yr

2 RRR = (Newly discovered reserves + Revisions to existing reserves) / Annual production volume

FEATURED PUBLICATION

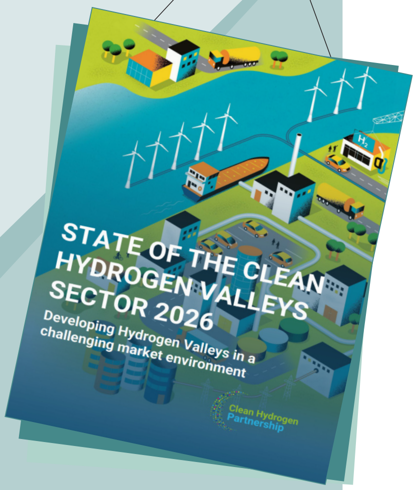
01 Flexibility as a Service

As Europe's energy system integrates growing shares of variable renewable generation, and electricity demand continues to rise through electrification, flexibility is becoming an increasingly important system resource. This white paper by the European Technology and Innovation Platform on Smart Networks for Energy Transition (ETIP SNET) examines the concept of Flexibility as a Service (FaaS), which reframes flexibility less as an inherent feature of certain technologies, and more as a service that can be specified, procured, delivered, measured and remunerated according to when and where it is needed. The paper explores the contractual, digital and market arrangements required to make this possible, drawing on a wide range of flexibility resources, from generation and storage to demand response and aggregated distributed assets. It also examines the role of TSO-DSO coordination, data interoperability, cybersecurity and cross-sector integration in enabling flexibility to be delivered reliably. Against a policy and regulatory landscape that increasingly recognises flexibility as a resource to be planned and procured, the paper recommends standardising flexibility products and interfaces, strengthening the digital infrastructure needed to verify delivery, and developing remuneration mechanisms that reflect the temporal and locational value of flexibility.

→ More

02 State of the clean hydrogen valleys sector 2026

Clean hydrogen deployment is entering a challenging phase, marked by project delays, high production costs, policy uncertainty and difficulties in securing binding offtake. Against this backdrop, a report by Clean Hydrogen Partnerships examines the role of Hydrogen Valleys - integrated local and regional ecosystems that combine hydrogen production, transport and end use - in advancing the clean hydrogen sector. Despite the wider market slowdown, development of Hydrogen Valleys has continued to progress, with the H2V Platform tracking 106 projects worldwide and a growing share reaching operational or final investment decision stages. Drawing on project data and a survey of developers, the analysis identifies offtake, financing, project economics and regulatory certainty as key factors shaping project development. It sets out recommendations for developers, policymakers and investors to strengthen demand, reduce project risks and costs, improve access to finance, and support the development of integrated hydrogen value chains.



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03 Beneath the surface: Geothermal's role in delivering clean heating, cooling and power

This insight briefing by the Energy Transitions Commission examines the potential of geothermal technologies and the conditions needed to unlock their wider deployment. It distinguishes between three main technologies, which differ significantly in their maturity, costs, applications and geographical constraints. The analysis finds that shallow geothermal technologies, such as ground-source heat pumps (GSHP) and underground thermal energy storage (UTES), are ready to scale but remain under-deployed, while conventional hydrothermal is mature and competitive but limited by geology to naturally hot, permeable aquifers. Next-generation technologies could expand geothermal development to a wider range of locations, but significant uncertainty lingers around costs and long-term performance. The report also examines the environmental, financing and policy challenges affecting deployment, emphasising the need to match policy interventions to specific technologies and local conditions. It is supported by four detailed technology factsheets, each highlighting a key technological innovation that can drive geothermal□s role in delivering clean heating, cooling and power.

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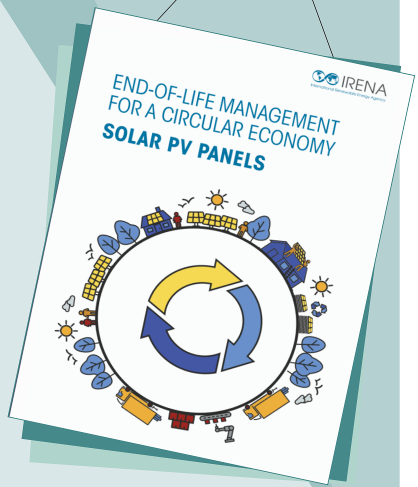
04 End-of-life management for a circular economy: Solar PV panels

The rapid expansion of solar PV is increasing both material demand and the volume of panels reaching the end of their operational life. This IRENA report examines how circular economy approaches can address these challenges, given that annual global solar PV waste is projected to exceed 25 million tonnes by 2050. It explores the potential of reducing material use and waste, extending the life of panels through repair and reuse, and recovering valuable materials through recycling. The analysis also highlights the economic potential of recovered materials, alongside the need to address barriers such as limited infrastructure, technology gaps, weak market demand and inadequate regulation. A coordinated policy framework, including extended producer responsibility, standards and incentives, is identified as essential for developing sustainable end-of-life management systems.



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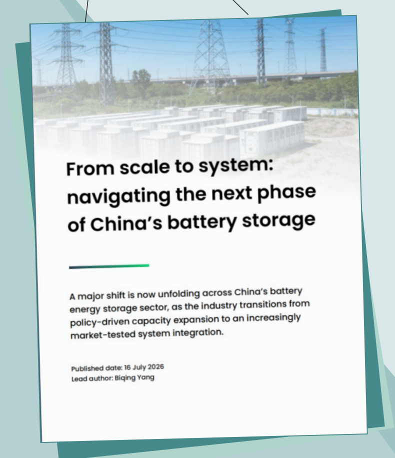
05 From scale to system: Navigating the next phase of China's battery storage



China has rapidly built the world's largest battery storage fleet, but the next phase of development will depend increasingly on the effective integration of these assets. This analysis by global energy think tank Ember examines the shift from rapid capacity expansion towards improving battery utilisation and system value. The authors highlight a growing shift from renewable-energy co-located storage towards standalone projects, which can operate more flexibly across the wider power system. They also identify a significant utilisation gap between the two models, reflecting differences in market access and operational arrangements. The paper examines how market reforms and evolving storage policies could enable batteries to provide greater system value, including by participating in multiple markets and responding more effectively to changing electricity system needs.

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info@ececp.eu

Room 705, Building 18 Courtyard 5A,
Shuguang Xili, Chaoyang District,
100028 Beijing, PR China

www.ececp.eu

Editor-in-chief: Jieqiao Chi
English editor: Helen Farrell
Feedbacks and Contributions: magazine@ececp.eu
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