Magazine of EU-China Energy Cooperation Platform

EU-China Energy Magazine

2023 October Issue

About ECECP

EU-China Energy Cooperation Platform was launched on 15 May 2019, to support the implementation of activities announced in the 'Joint Statement on the Implementation of EU-China Energy Cooperation'.

The Joint Statement was signed during the 8th EU-China Energy Dialogue that was held in Brussels on 9th April between Commissioner for Climate Action and Energy Miguel Arias Cañete and the Administrator of the National Energy Administration of China Mr ZHANG Jianhua, back-to-back with the 21st EU-China Leaders' Summit on 9 April 2019 and was witnessed by Jean-Claude Juncker, President of the European Commission; Donald Tusk, President of the Council of Europe and Dr Li Keqiang, Premier of China.

The start of the implementation of the EU-China Energy Cooperation Platform (ECECP) was included in the EU-China Leaders Summit Joint Communique.

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 II of ECECP is implemented by a consortium led by ICF, and National Development and Reform Commission - Energy Research Institute.

EU-China Energy Magazine

2023

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Dear All,

Welcome to the October 2023 issue of the EU-China Energy Magazine.

October has been a busy and productive month for the EU-China Energy Cooperation Platform (ECECP). This issue of the magazine highlights some of our key activities.

On 11-13 October 2023, the EU Energy Commissioner Kadri Simson and DG ENER officials visited China for the 11th EU-China Energy Dialogue, where ECECP provided secretariat services. The successful dialogue saw both sides reaffirming their commitment to working together to achieve the shared goals of climate change mitigation and energy security.

On 12 October, ECECP held a public launch event for the ECECP II flagship project 'Investment and Technologies for Net-Zero Carbon Infrastructure'. The event was attended by over 100 participants from government, industry, academia, civil society, as well as local and international media.

On 13 October, ECECP organised a side visit to the Huadian Energy's 1 GW PV-salt-aquaculture power station in Tianjin, the largest of its kind in the world. The project incorporates salt fields, shrimp farming and solar power and is expected to save 500,000 tons of coal each year and reduce CO_2 emissions by 1.25 million tons.

In the same month, ECECP has published its final three Joint Statement reports on LNG, innovation, and energy efficiency, as well as the international Chinese-language edition of the Handbook on Electricity Markets. These publications provide valuable information on the latest developments in these key areas of EU-China energy cooperation.

As the world transitions to a clean energy future, the need to invest massively in new infrastructure, such as renewable energy generation, transmission and distribution grids, and energy storage, is becoming increasingly clear. Modelling offers a highly effective tool to ensure that such investments yield the most effective outcome possible. In this issue, we feature an article from Helen Farrell, our English Editor, on the newly-published findings from the ECECP II flagship project, Investment and Technologies for Net-Zero Carbon Infrastructure. Additional articles include: an overview of the Belt and Road Initiative (BRI) energy projects over the coming decade; how heat pumps became a Nordic success story; and an explanation of how Germany is gearing up for a second winter without Russian gas.

This issue of the magazine includes a photo montage from the recent EU-China energy dialogue and dissemination event, as well as a short introduction to the Joint Statement reports on LNG, energy efficiency, and innovation.

We hope you gain valuable insights into the latest developments in EU-China energy cooperation and the transition to a clean energy future.

Last but not least, the work of ECECP II will end on 31 December 2023. We are organising a closing event (party!) on 13 December. Please mark your calendars!

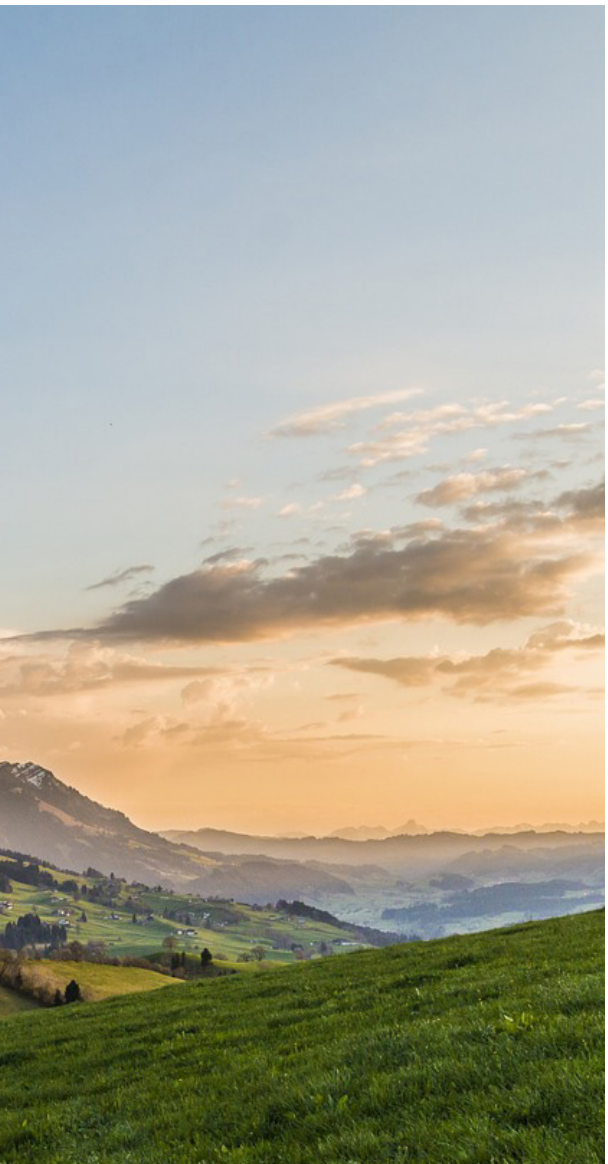
Dr. Flora Kan
ECECP Team Leader

China and the EU plan together for a net-zero future

As the world contemplates the switch away from fossil fuels and towards electrification and renewable energy sources, energy planners now need to find ways to plan for a revised infrastructure that can integrate renewable energy sources into a nationwide energy system while avoiding the risks of curtailment, stranded assets and blackouts.

The EU is ahead of China in this regard: since 1996, it has worked to develop an energy market that is able to respond rapidly to changing geopolitical conditions and to ensure security of supply. China, on the other hand, is still developing strategies to integrate fluctuating Variable Renewable Energy (VRE) resources and has yet to develop effective market systems to support a transition away from fossil fuels.

A report published in October 2023, 'Investment and Technologies for Net-Zero Carbon Infrastructure', is the 11th in a series of 14 EU-China projects overseen by the EU-China Energy Cooperation Platform. The reports evidence a sharing of expertise and knowledge that is intended to help both China and the EU to achieve their ambitious targets for climate neutrality.



This latest report is the result of three years of work by energy analysts from China's State Grid Energy Research Institute (SGERI), China Electricity Council (CEC), Energy Research Institute (ERI) and Ea Energy Analyses, who have continued to work together even after being forced online during the Covid-19 pandemic. It offers a detailed analysis of the modelling required to ensure that energy planners can make maximum use of existing infrastructure even as the use of fossil fuels is gradually phased down.

New energy infrastructure, which includes pipelines, power plants and carbon capture facilities, needs to be planned years, if not decades, ahead and requires huge investments from both private and public sources. How should those planning the transition to clean energy predict demand and consumption and at the same time factor in variable energy generation which relies on highly unpredictable weather patterns? What storage options and mitigation measures should be planned for, and at what scale?

Two key challenges in planning for the net-zero scenario have been identified in China. Firstly, the fluctuating VRE resources are hard to integrate and will bring risks to the safe operation of the power system; secondly, a high proportion of renewable energy imposes more requirements on the market. China's power market currently lacks an effective auxiliary service market, a capacity market, a transmission rights market and other supporting mechanisms. Meanwhile, energy production is failing to keep pace with energy demand, imposing constraints on the supply side.

Since 1996, Europe has adopted measures to address market access, transparency and regulation, consumer protection, supporting interconnection and adequate levels of supply. Its most recent measures - Fit for 55 (designed to accelerate the move to climate neutrality) and REPowerEU (in response to the escalation

in hostilities between Russia and Ukraine) - have demonstrated the EU's ability to ensure security of supply even as it makes rapid adjustments to its long-term plans in response to the energy challenges facing its 27 Member States.

The EU's energy planning systems explicitly take account of the variability of weather conditions and the impact on both VRE generation and demand. Europe's power sector has been unbundled and liberalised, creating open markets for generation, with transmission and generation handled separately. In terms of planning, each Member State establishes a reliability standard and performs a national assessment. At the EU level, it is the responsibility of the European Association of Transmission System Operators (ENTSO-E) to prepare the adequacy assessment report, while it is the duty of the EU's Agency for the Cooperation of Energy Regulators (ACER) to approve the report or request amendments. The assessment informs policy decisions aimed at solving capacity adequacy issues.

It is only logical, therefore, for the EU to share with China its methods and strategies for modelling so that the different challenges facing the energy industry, against a background of rising global temperatures and extreme weather events, can be taken into account.

This latest report provides an overview of modelling in the Chinese and EU energy industries, and then goes on to present a series of models of the Chinese energy system under liberalised market conditions. These models allow industry experts to work out which will yield the most accurate forecasts for how to mitigate against the risks associated with VRE.

Its initial finding is that an integrated energy system approach can enhance efficiency, promote renewable energy integration, improve flexibility and resilience, enable sector coupling and electrification, optimise costs, and support coordinated policy and planning efforts, all of which contribute to achieving decarbonisation targets more effectively.

The benefits of an integrated modelling approach are highlighted by a series of scenarios that take account of the physical transmission infrastructure, which are then compared to a scenario that does not take account of the

physical gas and X-pipelines.

The report clarifies that alternative forms of energy commodity transportation need to be considered as part of the modelling. For example, more hydrogen pipeline capacity is likely to be constructed in provinces with high VRE potential to ship to provinces with high energy consumption.

Furthermore, when the gas pipeline infrastructure is factored in to the modelling, the usage of natural gas for power generation is higher, since the gas infrastructure has been already built and is used as long as it is economically the better option and within the emissions constraint.

With regard to Power-to-X (P2X) infrastructure additions, the results show that the utilisation rate of the X-pipelines is significantly higher in the scenarios that take account of the existing physical transmission infrastructure. This is because once a pipeline has been built it can be used virtually cost-free.

In all the scenarios, CO_2 capture and storage facilities are installed primarily in regions which have heavy industries that continue to emit CO_2 in 2060. Also, carbon capture is mounted on power plants where biomass can be sourced, so that the CO_2 can be captured and used or stored to generate negative CO_2 emissions.

Pipeline investments connect the captured CO_2 with areas which hold carbon sequestration potential.

In general, provinces showing high volumes of carbon import and capture have high potential for carbon sequestration. The report demonstrates that high load provinces in the centre, north and south are importing CO_2, while provinces in the north-east and north-west are more export-oriented. It offers further evidence that an integrated system approach better represents the existing resources and ensures that they are used. This can be applied to help ensure a cost-efficient transition towards the net zero target.

Energy modelling is often focused on the power sector when seeking to achieve net zero targets: knowledge of how to decarbonise the power system already exists and the costs and challenges are understood. However, solutions for 'hard-to-abate' emissions require an integrated focus on the energy supply chain, resources, technologies, system efficiency and sector coupling.

By showcasing an integrated modelling approach of China's electricity, gas and P2X sector, the project has strengthened analysts' understanding of the need for more coordinated approaches towards energy infrastructure investment and operational planning and regulation.

This final report not only demonstrates the advantages of integrated energy system modelling, but also represents a hugely beneficial instance of cooperation between European and Chinese teams.

The report's authors are clear: cooperation is key if the world is to step away from the looming climate catastrophe. Their avowed hope is that China's energy experts are able to make use of the hard-won knowledge and experience of their EU counterparts to plan for maximum energy efficiency within the country's energy infrastructure. 'The time to achieve a net zero energy system is very limited,' they write. 'If each country develops technology on their own, it will be difficult to reach the target. The EU will not be able to reach its climate targets without China, and China will not be able to reach its climate targets in isolation from the rest of the world.'

By **Helen Farrell**
Editor of ECECP

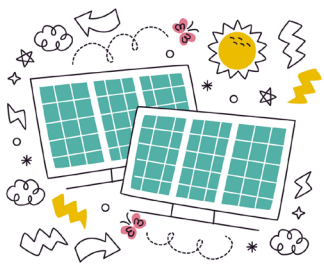


Photo Clipping

2023 EU-China Energy Dialogue and the Dissemination event for ECECP II flagship project

Investment and Technologies for Net-zero Carbon Infrastructure

Workshop videos and Presentations are available on ECECP website.


Results disseminati
ECECP II Flagship project
Infrastru


Mr. Stefano GRASSI


Infrastructure
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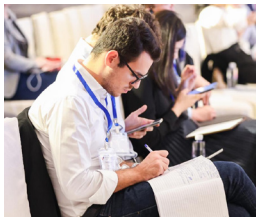


EU-China Energy Cooperation Platform
中欧能源合作平台
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ECECP publication

ECECP is proud to announce the publication of its three final Joint Statement reports on building energy effiency, LNG and innovation.

Market Financing for Energy Efficiency in Buildings in EU and China

In both the EU and China, buildings account for a significant proportion of overall energy consumption and emissions. In Europe, buildings are responsible for about 40% of total energy consumption, while in China, the proportion is between 26% and 29%. The vast majority of buildings in both regions have not yet been renovated to reduce emissions, leaving potential for significant energy efficiency improvements.This ECECP study focuses on the role the market plays in driving further improvements and aims to provide a deeper understanding of the role of market instruments in the building sector. The authors outline current approaches and list the options available in both regions that can help finance building energy efficiency. After analysing the main bottlenecks and barriers hampering financing energy efficiency in building sector, the authors highlight some key insights that can be shared to inform further improvements as the two regions race to cut emissions. Looking ahead, there is scope for further harmonisation to facilitate the flow of investments between the two regions. Both China and the EU would benefit from a regular exchange of knowledge and experience, while adoption of innovative approaches such as green mortgages and one-stop shops could help boost public awareness and increase the impact of energy efficiency measures.

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Presenting the Conditions and Outlining Priorities for Joint Cooperation on Flexible and Efficient Global Energy Markets for LNG

The past three years of global economic turmoil sparked first by the Covid-19 pandemic and its aftermath, and then by the Russia-Ukraine conflict, have offered stark reminders of the vital role played by LNG in ensuring global energy security. In Europe, the natural gas alternative has helped ensure the region's economic and social stability, while in China, it not only assisted the economic rebound but also is now playing a central role in the coal-to-gas transition to produce electricity or heat as a key measure to mitigate both its GHG emissions and air pollution. China's economic development and its policy decisions work as a key determinant of global LNG market dynamics, demonstrating the complex interconnections of global economies. This ECECP study aims to reflect the most recent business and policy developments relating to natural gas and LNG in both China and the EU. Acknowledging the differences and interactions of both regions, the Report offers some practical suggestions for an orderly development of energy policies directly or indirectly concerning both the LNG market and the natural gas market.

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Reciprocal Opportunities and Challenges for Local and International Innovative Firms Operating on a Level Playing Field in the Energy Sector

Both the EU and China have introduced programmes to encourage development of innovative technologies that will boost production and development of renewable energy. There is plenty of appetite for collaboration and cooperation amongst innovative energy solution providers in China and the EU, but also anxiety about the bureaucratic, cultural and linguistic barriers. By conducting interviews with 15 leading industry players in the EU and China, this ECECP study seeks to find out what stands in the way of clean energy cooperation, and what can be done to overcome those obstacles. The survey reveals that for both regions, communication is a key common issue that needs to be addressed. Companies in the EU and China are calling for improved information flow at a sub-regional level to overcome difficulties when dealing with policies and regulations in EU Member States and in Chinese provinces. The report concludes with some key action points for the EU and for China that can encourage energy innovation and cooperation and so help the world to turn the tide of climate change towards climate neutrality.

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Electricity Grids and Secure Energy Transitions

Enhancing the foundations of resilient, sustainable and affordable power systems

Grids have been the backbone of electricity systems for more than a century, underpinning economic activity by bringing power to homes, industry and services. As clean energy transitions advance, the role of electricity will be more prominent, making grids even more important for society and economies. Electrification and renewables deployment are both picking up pace, but without adequate grids to connect the new electricity supply with the demand, there is a risk that clean energy transitions will stall. This report offers a global stocktake of the world's electricity grids as they stand today, taking a detailed look at grid infrastructure, connection queues, the cost of outages, grid congestion, generation curtailment, and timelines for grid development. We find that there are already signs today that grids are becoming a bottleneck to clean energy transitions and analyse the risks we face if grid development and reform do not advance fast enough. We find that delayed action means prolonging reliance on fossil fuels, resulting in an increase in emissions and costs to society. An unprecedented level of attention from policy makers and business leaders is needed to ensure grids support clean energy transitions and maintain electricity security. The report concludes with key recommendations for policy makers, highlighting the necessary actions in areas including investment, regulation and planning.

Image by alyoshine from Pixabay

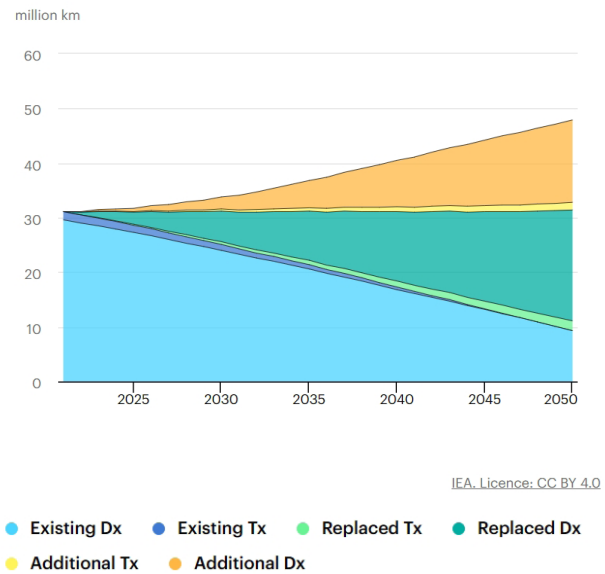
Modern, smart and expanded grids are essential for successful energy transitions

The backbone of today's electricity systems, grids are set to become increasingly important as clean energy transitions progress, but they currently receive too little attention. Grids have been delivering power to households, businesses and industry for over 100 years. Clean energy transitions are now driving the transformation of our energy systems and expanding the role of electricity across economies. As a result, countries' transitions to net zero emissions need to be underpinned by bigger, stronger and smarter grids.

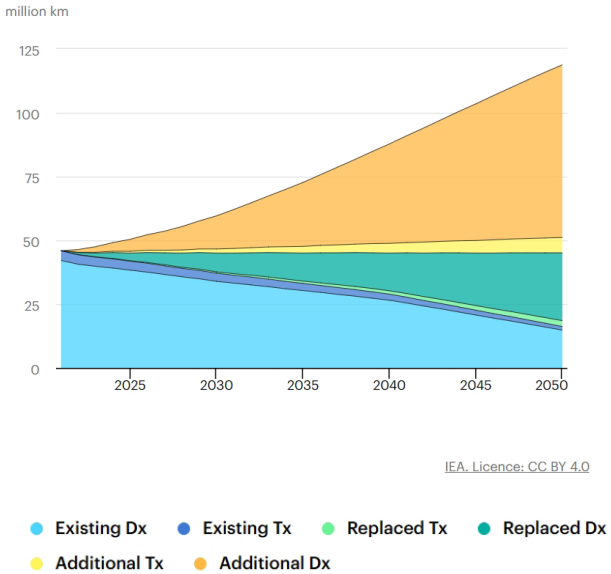
To achieve countries' national energy and climate goals, the world's electricity use needs to grow 20% faster in the next decade than it did in the previous one. Electricity demand needs to grow even more rapidly in a global pathway to net zero emissions by 2050, which is consistent with limiting the rise in global temperatures to 1.5 °C. Expanded grids are critical to enable such levels of growth as the world deploys more electric vehicles, installs more electric heating and cooling systems, and scales up hydrogen production using electrolysis.

Reaching national goals also means adding or refurbishing a total of over 80 million kilometres of grids by 2040, the equivalent of the entire existing global grid. Grids are essential to decarbonise electricity supply and effectively integrate renewables. In a scenario in which countries' national energy and climate goals are met on time and in full, wind and solar PV account for over 80% of the total increase in global power capacity in the next two decades, compared with less than 40% over the past two decades. In the International Energy Agency's (IEA) Net Zero Emissions by 2050 Scenario, wind and solar account for almost 90% of the increase. The acceleration of renewable energy deployment calls for modernising distribution grids and establishing new transmission corridors to connect renewable resources – such as solar PV projects in the desert and offshore wind turbines out at sea – that are far from demand centres like cities and industrial areas.

Grid length development in advanced economies in the Announced Pledges Scenario, 2021-2050



Grid length development in emerging market and developing economies in the Announced Pledges Scenario, 2021-2050



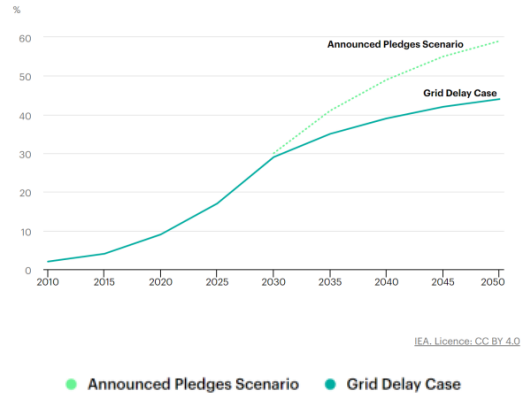
Modern and digital grids are vital to safeguard electricity security during clean energy transitions. As the shares of variable renewables such as solar PV and wind increase, power systems need to become more flexible to accommodate the changes in output. In a scenario consistent with meeting national climate goals, the need for system flexibility doubles between 2022 and 2030. Grids need to both operate in new ways and leverage the benefits of distributed resources, such as rooftop solar, and all sources of flexibility. This includes deploying grid-enhancing technologies and unlocking the potential of demand response and energy storage through digitalisation.

Grids risk becoming the weak link of clean energy transitions

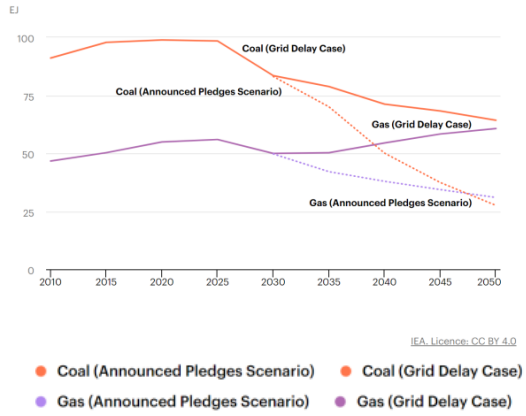
At least 3 000 gigawatts (GW) of renewable power projects, of which 1 500 GW are in advanced stages, are waiting in grid connection queues – equivalent to five times the amount of solar PV and wind capacity added in 2022. This shows grids are becoming a bottleneck for transitions to net zero emissions. The number of projects awaiting connection worldwide is likely to be even higher, as data on such queues is accessible for countries accounting for half of global wind and solar PV capacity. While investment in renewables has been increasing rapidly – nearly doubling since 2010 – global investment in grids has barely changed, remaining static at around USD 300 billion per year.

Delays in grid investment and reform would substantially increase global carbon dioxide (CO_2) emissions, slowing energy transitions and putting the 1.5 °C goal out of reach. For this report, we developed the Grid Delay Case to explore the impacts of more limited investment, modernisation, digitalisation and operational changes than are envisioned in the IEA's climate-focused scenarios. The Grid Delay Case shows transitions stalling, with slower uptake of renewables and higher fossil fuel use. Cumulative CO_2 emissions from the power sector to 2050 would be 58 gigatonnes higher in the Grid Delay Case than in a scenario aligned with national climate targets. This is equivalent to the total global power sector CO_2 emissions from the past four years. It would also mean that the global long-term temperature rise would go well above 1.5 °C, with a 40% chance of it exceeding 2 °C.

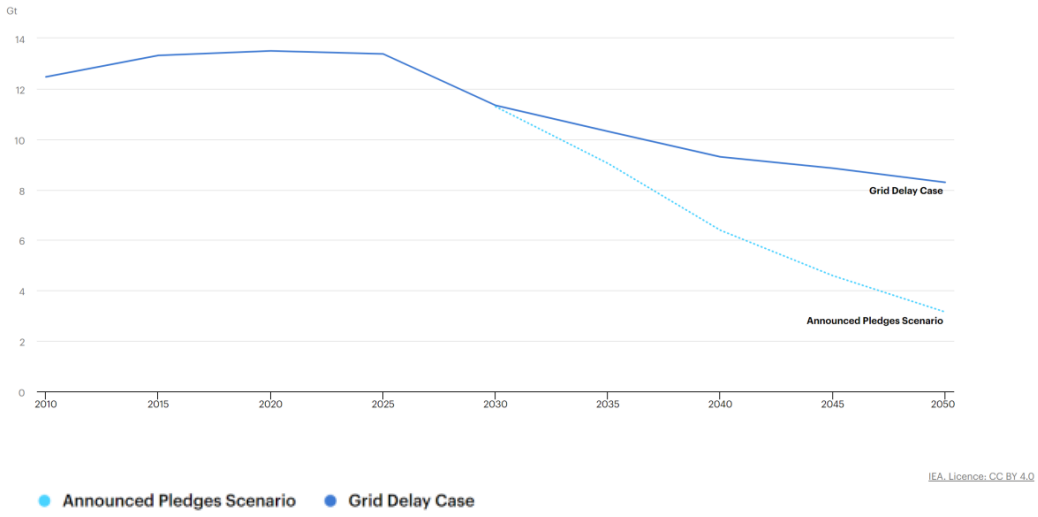
Share of solar PV and wind in power generation worldwide in the Grid Delay Case and the Announced Pledges Scenario, 2010-2050



Coal and natural gas use worldwide in power generation in the Grid Delay Case and the Announced Pledges Scenario, 2010-2050



Power sector CO2 emissions worldwide in the Grid Delay Case and the Announced Pledges Scenario, 2010-2050



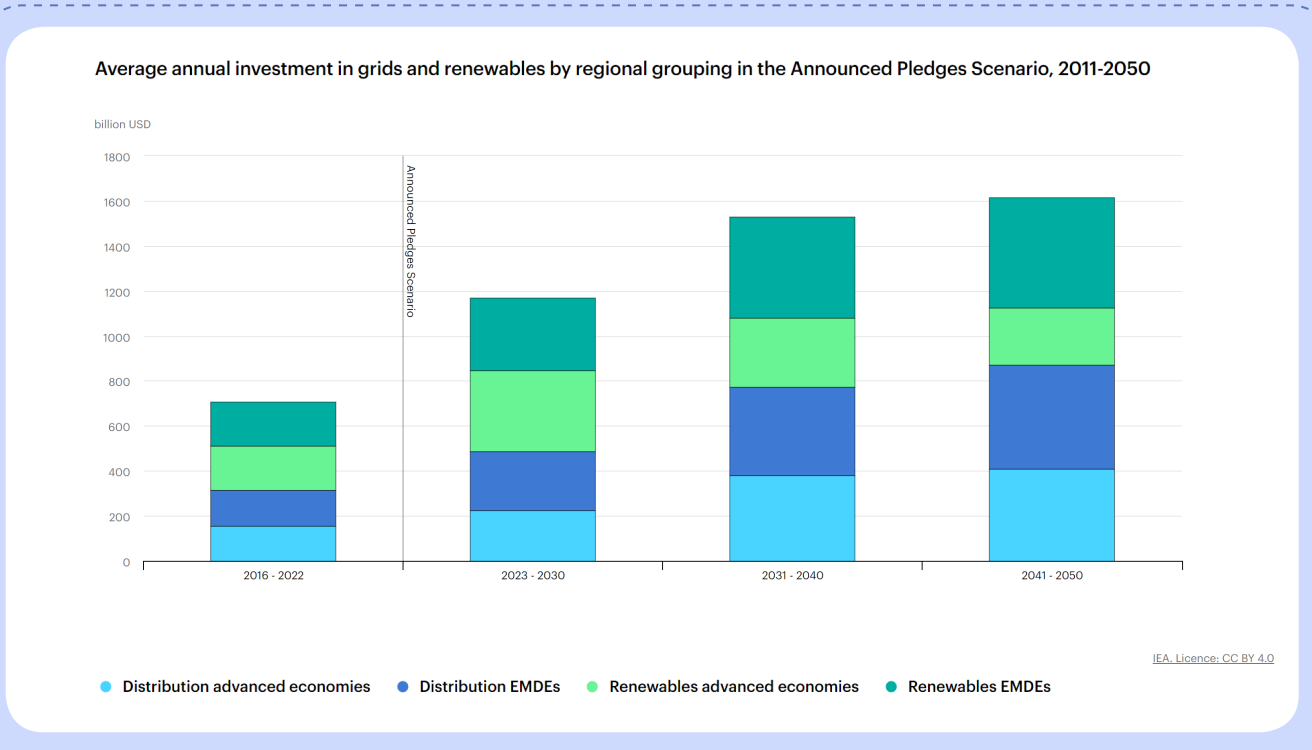
At a time of fragile natural gas markets and concerns about gas supply security, failing to build out grids increases countries' reliance on gas. In the Grid Delay Case, global gas imports are over 80 billion cubic metres (bcm) a year higher after 2030 than in a scenario aligned with national climate targets – and coal imports nearly 50 million tonnes higher. Delayed grid development also increases the risk that economically damaging outages would multiply. Today, such outages already cost around USD 100 billion a year, or 0.1% of global GDP.

Action today can secure grids for the future

Regulation needs to be reviewed and updated to support not only deploying new grids but also improving the use of assets. Grid regulation needs to incentivise grids to keep pace with the rapid changes in electricity demand and supply. This requires addressing administrative barriers, rewarding high performance and reliability, and spurring innovation. Regulatory risk assessments also need to improve to enable accelerated buildout and efficient use of infrastructure.

Planning for transmission and distribution grids needs to be further aligned and integrated with broad long-term planning processes by governments. New grid infrastructure often takes five to 15 years to plan, permit and complete, compared with one to five years for new renewables projects and less than two years for new EV charging infrastructure. Grid plans need to integrate inputs from long-term energy transition plans across sectors, anticipating and enabling the growth of distributed resources, connecting resource-rich regions including offshore wind, and reflecting links with other sectors including transport, buildings and industry, and fuels such as hydrogen. Robust stakeholder and public engagement is key to inform scenario development. The public needs to be aware and informed about the link between grids and successful energy transitions.

To meet national climate targets, grid investment needs to nearly double by 2030 to over USD 600 billion per year after over a decade of stagnation at the global level, with emphasis on digitalising and modernising distribution grids. Concerningly, emerging and developing economies, excluding China, have seen a decline in grid investment in recent years, despite robust electricity demand growth and energy access needs. Advanced economies have seen steady growth in grid investment, but the pace needs to step up to enable rapid clean energy transitions. Investment continues to rise in all regions beyond 2030.



Building out grids requires secure supply chains and a skilled workforce. Governments can support the expansion of supply chains by creating firm and transparent project pipelines and by standardising procurement and technical installations. They also need to build in future flexibility by ensuring interoperability of all the different elements of the system. There is also a significant need for skilled professionals across the entire supply chain, as well as at operators and regulatory institutions. It will be essential to build out a pipeline of talent, ensure digital skills are integrated into power industry curricula and manage the impacts of the energy transition and increased automation on workers through reskilling and on-the-job training.

The most important barriers to grid development differ by region. The financial health of utilities is a central challenge in some countries, including India, Indonesia and Korea, while access to finance and high cost of capital are key barriers in many emerging market and developing economies, particularly in Sub-Saharan Africa. Financial barriers can be addressed by improving the way grid companies are remunerated, driving targeted grid funding and increasing cost transparency. For other jurisdictions, such as Europe, the United States, Chile and Japan, the strongest barriers relate to public acceptance of new projects and the need for regulatory reform. Here, policy makers can speed up progress on grids by enhancing planning, ensuring regulatory risk assessments allow for anticipatory investments and streamlining administrative processes.

The Belt and Road ahead:

BRI energy projects for the next decade

China could guide early retirement of coal power plants in BRI countries and use public–private partnerships to boost renewables, experts say.

Workers hoist a 123-metre wind turbine blade onto a ship in Lianyungang, Jiangsu province, in June this year (Image: Alamy)

Energy has been central to the Belt and Road Initiative (BRI). In every year since 2013, when the global infrastructure initiative was first announced, to 2022, the energy sector accounted for the majority of investments and construction deals signed.

Until very recently these investments were dominated by fossil fuel projects, triggering concerns that countries signed up to the BRI would replicate China's emission-intensive development pathway. In doing so, they might become heavily dependent on fossil fuels just as the world wakes up to the urgent need to transition to renewables.

Then, at the UN General Assembly (UNGA) in September 2021, President Xi Jinping announced that China would no longer support the construction of coal-fired power plants abroad. He also stated that the country would 'step up' support for 'green and low-carbon energy' in fellow developing countries.

Data from the Green Finance and Development Center, at Fudan University in Shanghai, suggests that this may finally be happening. In the first half of this year, investments and contract signings for solar and wind power projects accounted for nearly 42% of Chinese engagement in the overseas energy sector, compared to 26% in the whole of 2022 and 15% in 2021. In terms of value, engagement in solar and wind grew slightly compared to the first half of 2022 off the back of an uptick in construction contracts. Coal projects saw zero investment, while gas and oil projects accounted for around 22% of each.

At the same time, however, overall investment of Chinese companies in the overseas energy sector has declined to its lowest level since the start of the BRI ten years ago. The year 2021 was also the first since 2000 to see no new loans to overseas energy projects from China's state-run banks.

'Green development' on the BRI will be discussed at one of three high level forums taking place during the Third Belt and Road Forum in Beijing on 16 and 17 October. As the BRI enters its second decade, will it be able to fulfil the 2021 promise to 'step up' support for green energy in developing countries? What opportunities and obstacles stand in its way?

A difficult transition

In the years running up to Xi's UNGA announcement, coal power projects on the Belt and Road became a hotspot for controversy and discontent. Projects such as one at Lamu in Kenya, Hunutlu in Turkey, Celukan Bawang in Indonesia, and Gwadar in Pakistan, to name a few, attracted criticism for their emissions implications, failure to properly consult local communities, and risks to the local environment.

In 2019, people in Nairobi marched to the Kenyan Ministry of Energy and the Chinese embassy to protest a planned coal power plant in Lamu. The BRI project was cancelled in November 2020. (Image: © Paul Basweti / Greenpeace)

Since 2021, however, many of these projects have been cancelled. Forthcoming analysis by the Centre for Research on Energy and Clean Air (CREA) indicates that 36 coal power plants, representing nearly 36 gigawatts (GW) of capacity, have been cancelled since September 2021. Some projects have still moved to construction even after Xi's announcement, particularly 'captive' coal power plants designed to serve industrial facilities. CREA argues that a further 19.2 GW worth of coal power that is currently in the pipeline should be cancelled as the projects have still yet to receive permits or finance. The organisation also says that a further 10 plants, for which permitting or financing deals have already been signed but have not yet entered construction, 'should be converted to renewables'.

'A project will need to be built to ensure no breach of contract. However, because no physical infrastructure is in place yet, it is still possible for contracts to be renegotiated to renewables,' explains CREA director Nandikesh Sivalingam.

The expansion of wind and solar energy along the Belt and Road may be easier said than done, however. Dr Wei Shen of the Institute of Development Studies at Sussex University, UK, explains that high levels of debt and rising interest rates on loans have increased project risk and affected investor sentiment. Added to this, he argues, Chinese institutions tend to be relatively inflexible and slow to respond to the changing overseas investment environment.

Specifically, Shen's research suggests that Chinese energy companies investing overseas can no longer rely on the finance and construction model, underwritten by sovereign guarantees of the host country, that has dominated BRI infrastructure projects until recently. Rather, companies will need to be more creative and flexible in finding financing and working with non-Chinese parties. To date, private companies have proven much more capable of doing this than China's big state-owned companies. As a result, we see a number of renewable energy infrastructure partnerships involving companies from both China and elsewhere, including Europe and the US, but also emerging markets such as the UAE and Turkey.

For example, a construction contract signed for a 115 megawatt (MW) solar plant in Upington, South Africa, in the run-up to Xi Jinping's state visit to the country in August, involved a consortium of Chinese state-owned companies, China Energy Engineering Corporation and Gezhouba, South African partners, as well as France's EDF.

The obstacles are not just financial, however. Two recent reports from the Green Finance and Development Center called attention to the 'intricate political-economic circumstances and vested interests' of the energy sectors of Pakistan and Vietnam, two of the largest destinations for China's overseas energy investments over the last decade. The authors note that both local government and state-owned companies in Pakistan have an interest in preserving the coal power and mining industries. Moreover, despite the declining costs of renewables, these interests are unlikely to shift anytime soon, due to insufficient risk presented to coal investors in Pakistan's power sector, report co-author Haneea Isaad tells China Dialogue. Similarly, in Vietnam the authors point to the interests of coal power plant operators and coal importers, who have signed long term-contracts on the supply of coal. The authors conclude that the 'acceleration of green energy transition is not a one-size-fits all model.'

A different approach

Another way Chinese financiers and companies could help accelerate energy transitions in Belt and Road countries is by aiding the early retirement of coal power plants they have been involved in building over the last decade.

One way to do that is by conditional refinancing of such projects. This involves offering a new loan at a lower interest rate to pay back the original loan, on the condition that the plant be retired earlier than its planned lifespan, which is often 30 to 40 years. Freed-up capital or portions of the low-interest loan could then be invested in renewable projects. Such early retirements could also lower the risk of Chinese-backed plants becoming 'stranded assets' as countries move towards lower-emission power generation as part of their climate pledges and energy security goals.

'Chinese sponsors have a large portfolio of plants that can potentially be phased down early,' explains Professor Christoph Nedopil, director of the Griffith Asia Institute and co-author of the Pakistan and Vietnam reports. 'Early retirement can be a win-win-win situation: for the Chinese sponsors who are cutting losses of existing plants and improving their returns through combined investments into renewables, for the host country's economy, and for the environment.'

Another approach particularly relevant to countries with high sovereign debt could be 'debt-for-climate' swaps. These could involve payments owed to Chinese policy banks being partially cancelled or renegotiated in return for the early retirement of coal power assets or construction of renewable energy projects. The swap could also be extended to include agreements on Chinese companies' involvement in new (and more profitable) renewable energy projects, Nedopil explains.

'The financial instruments are aplenty,' says Isaad. 'However, this is all very theoretical at this point. To my knowledge, the Chinese have not been brought in on these initiatives yet and without that we cannot progress even an inch.'

Solar king

China is the major supplier to solar projects across the world, accounting for over 80% of solar panel manufacturing worldwide, according to the International Energy Administration (IEA).

Despite the complexities of transitioning to cleaner energy investments overseas, exports of solar components manufactured in China are soaring. In the first half of 2023, they increased 13% compared to the same period last year, according to Chinese customs' data, one of very few bright spots amid China's current economic travails.

While the European market accounted for around half of those exports, data compiled by China Dialogue indicates that Belt and Road geographies are also a part of the picture of this boom in demand for Chinese solar components.

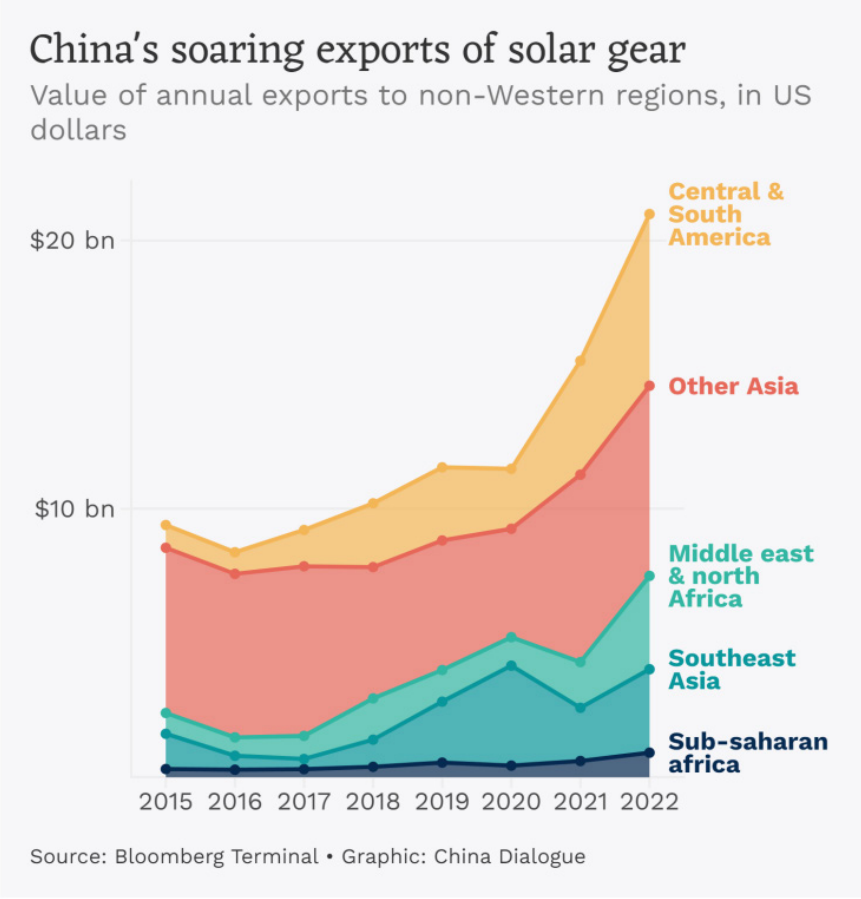
Yunnan Chen from the Overseas Development Institute, a think-tank headquartered in London, notes that the first decade of energy infrastructure investment on the Belt and Road was shaped by the overcapacity and spillovers from China's domestic economy. So too will the second decade of the BRI feel the influence of that economy, says Chen. As China shifts towards renewables and develops its world-leading solar and battery manufacturing power, Chinese companies will seek out new markets abroad.

China's involvement in the energy transitions of the Belt and Road is complex and evolving. With an increasingly difficult global economic environment, innovative solutions to make true on Xi's UNGA promise to 'step up' support for green and clean energy overseas will be needed, including new types of financing and international partnerships.

This month, at the 3rd Belt and Road Forum, policymakers from BRI countries and beyond will be looking to the high-level forum on green development for some hint of new approaches to 'greening' the initiative.

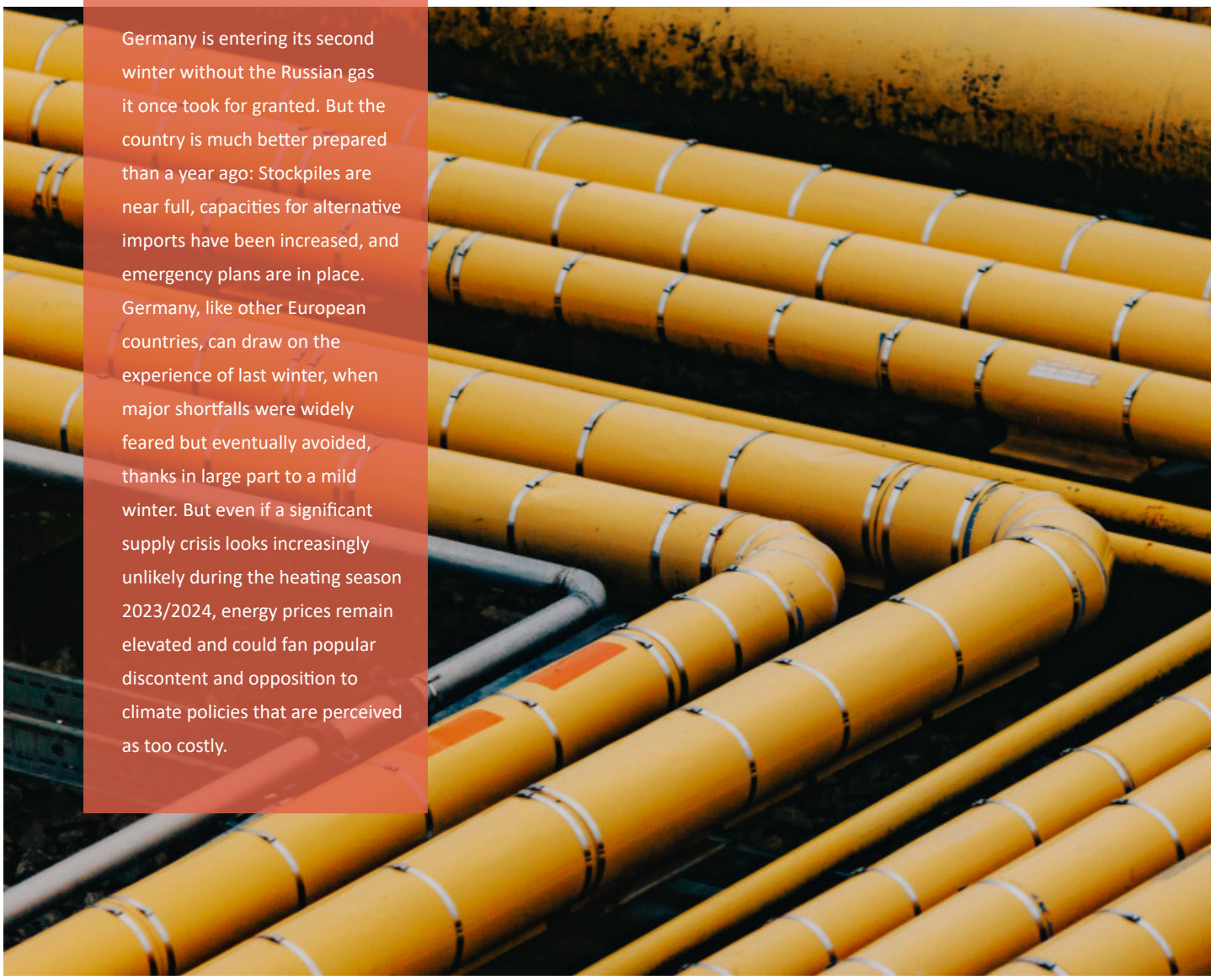
By **Tom Baxter**

Data assistance by Yedan Li



Geared-up Germany enters second winter without Russian gas

Germany is entering its second winter without the Russian gas it once took for granted. But the country is much better prepared than a year ago: Stockpiles are near full, capacities for alternative imports have been increased, and emergency plans are in place. Germany, like other European countries, can draw on the experience of last winter, when major shortfalls were widely feared but eventually avoided, thanks in large part to a mild winter. But even if a significant supply crisis looks increasingly unlikely during the heating season 2023/2024, energy prices remain elevated and could fan popular discontent and opposition to climate policies that are perceived as too costly.



Brimming gas stockpiles

Before the war in Ukraine and the halt of Russian supplies, Germany was particularly dependent on Russian fossil fuels, especially natural gas that arrived via pipelines. The energy crisis dealt a heavy blow to Europe's biggest economy but, overall, the country emerged from the first winter without Russian gas relatively unscathed: Contrary to widespread fears, it didn't experience gas shortages, nor large-scale social unrest.

Germany and Europe now enter the heating season 2023/2024 much better prepared and more confident than last year – with new sources of supply, and storage facilities filled sooner. And the weather may once again lend a helping hand, with an increasing probability that Europe will see another mild winter, according to the EU's Copernicus Climate Change Service.

Capacities for importing liquefied natural gas (LNG) have already been increased in Germany and other European countries, and more floating LNG import terminals are set to be added this winter.

German gas storages were around 95 percent full by the beginning of October, but various factors still could significantly influence the supply situation, according to the grid agency's (BNetzA) weekly gas status report. Consumption could rise sharply in the event of very cold weather, for example, and scenarios of a partial or complete failure of natural gas pipelines cannot be fully ruled out, the agency warned. The 'alert level' for gas supply, the second level in the country's three-step emergency gas plan that was triggered in June 2022, remained in place as of October 2023.

Gas markets anxious about heating season

The sabotage of the Nord Stream pipeline, in which the gas transport link between Germany and Russia in the Baltic Sea was badly damaged in September 2022 - and it is still unclear who is responsible - has exposed significant risks to the safety of Europe's energy infrastructure.

LNG gas storage. Image by Adobestock

These were reinforced after another incident on a Baltic Sea pipeline in October 2023, when the Balticconnector pipeline between Finland and Estonia was taken offline due to a leak, for which sabotage is suspected. Norway, Germany's new largest gas supplier, and other states subsequently heightened its security level and increased its navy presence around marine energy infrastructure.

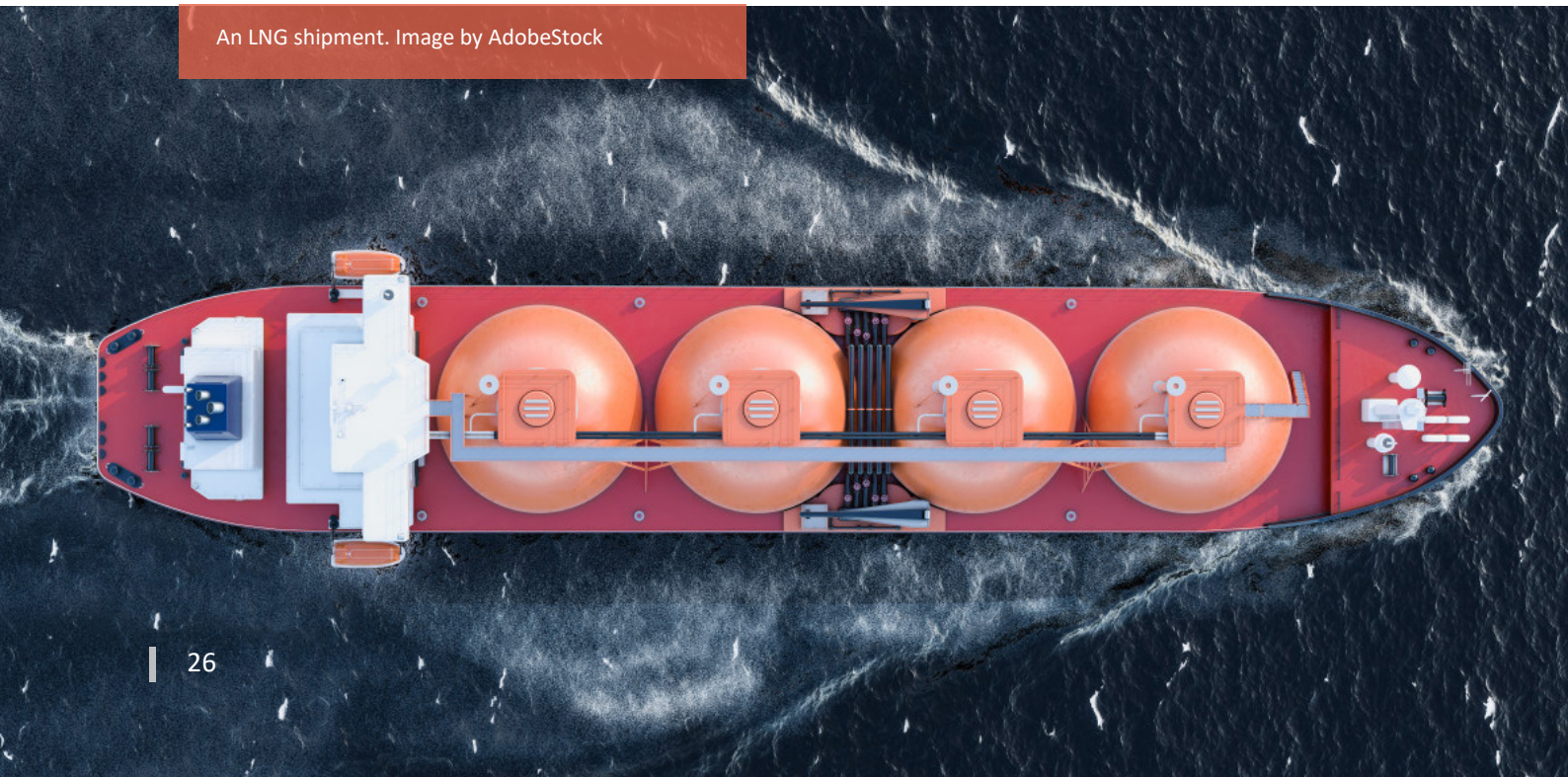
Germany has conducted test runs for a possible gas supply crisis, aiming to practice what would happen in case supplies must be rationed. The country 'is much better prepared regarding this winter than it was last year,' grid agency head Klaus Müller said. 'We can certainly be optimistic, but it is still too early to sound the all-clear.' The economy ministry also updated its 'Natural Gas Emergency Plan' to include the experiences gained last year.

The EU as a whole is also 'reasonably well-prepared' for the coming winter season, according to a report by the Bruegel think tank. 'Demand cuts, alternative supply, and the green energy rollout mean the EU likely has enough gas for winter, even if Russian supplies are cut completely,' the researchers said in early October, adding that the EU met its 90 percent gas storage target two months ahead of a November deadline. 'Notwithstanding these developments, Europeans should not be complacent. Fears about gas shortages or power cuts have receded, but a gas price that is persistently higher than in other markets and ongoing price volatility could still have repercussions for the EU industrial structure and economy,' Bruegel said.

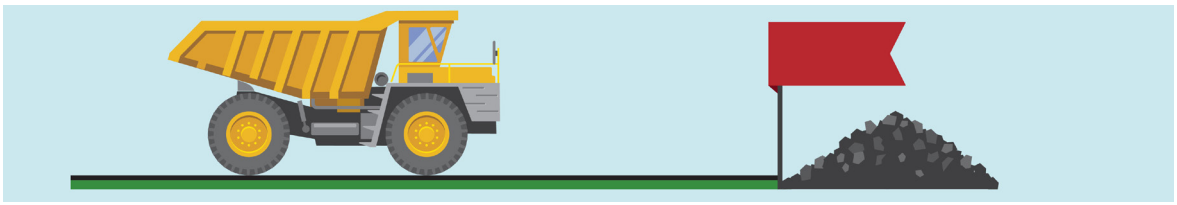
Volatility in the gas market became apparent in mid-October, when gas prices shot up to the highest level in eight months in response to the attack on Israel and the Balticconnector incident. 'Even though stockpiles are high and demand is weak, the market is anxious about winter,' according to Bloomberg's Stephen Stapczynski.

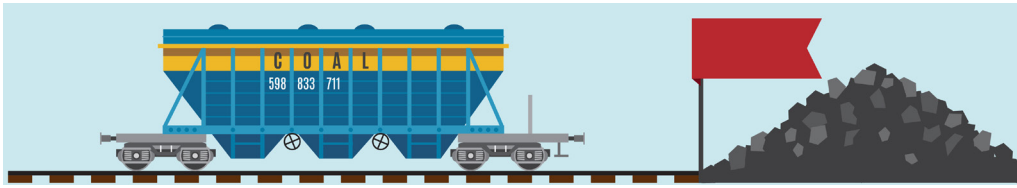
Coal plants in reserve to secure supply

Germany last year decided to allow lignite power plants that had already been in a reserve to re-enter the market in order to help secure electricity supply and save gas during the heating period. The policy will be continued this winter. Other countries in Europe took similar precautions to bolster their supply security. France, for example, also extended the life of its two remaining coal-fired power stations until the end of 2024.



An LNG shipment. Image by AdobeStock





The German government said reactivating coal plants from the reserve will not affect the country's coal phase-out, which is scheduled to be brought forward to 2030, if possible, from its planned 2038 date. However, state governments in eastern Germany have voiced concerns over whether the earlier exit date is still viable, given the new threats to supply security.

Economy minister Robert Habeck in mid-October also announced that the reactivated plants from the reserve capacity will be decommissioned for good in 2024, as the country will then have sufficient LNG import capacity to cope with lower pipeline-based gas supplies. 'The infrastructure will be ready by then and that's when we no longer need any additional coal plants. That's the plan,' Habeck said. He added that, even though Germany is likely to get through the winter without trouble regarding the power supply, coal plants still act as a 'safety net' for the unlikely event of a shortfall.

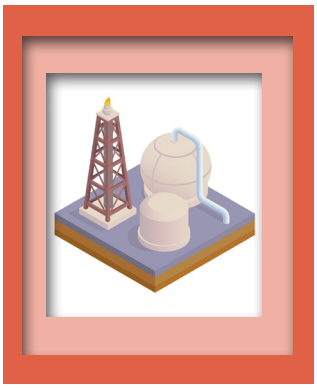
After the winter, the German government plans to evaluate whether the measure has led to additional greenhouse gas emissions and, if that is the case, make a proposal on how to compensate them. An analysis by consultancy Energy Brainpool published in early 2023 found that the 'intensive use' of coal plants during the energy crisis caused Germany to emit nearly 16 million tonnes of CO_2 more than it would have without it (out of a total of some 750 million tonnes of greenhouse gas emissions in 2022).

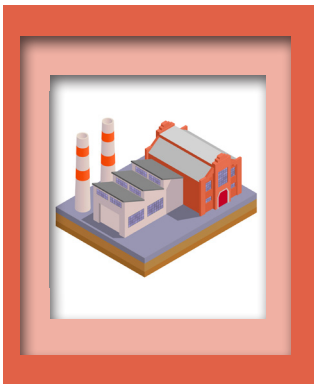
Reconnecting deactivated coal plants back to the grid had also been criticised against the backdrop of Germany's nuclear power phase-out, which was finalised in April 2023. The government had delayed the end of nuclear power because of the energy crisis. Germany's economy ministry estimated the emissions reduction benefit of the three additional months of nuclear power to range somewhere around 1.3 million tonnes of CO_2, compared to producing the same amount of electricity with coal.

A winter of discontent?

The German government capped electricity and gas prices under its energy 'price brakes' and cut the VAT for natural gas in a bid to protect consumers from skyrocketing costs during the energy crisis. The price caps are currently set to run out at the end of 2023, but the government is in talks with the EU to extend them until the end of the heating season in April as an 'insurance against rising prices.'

The government last year also launched a campaign urging citizens to save energy. But few households turned down their heating despite sharply higher prices, an analysis of consumption patterns found. Overall heating energy use went down more than ten percent in German households in 2022, but this was largely due to the mild winter. Adjusted for





temperatures, heat energy use fell by little more than one percent – partly because it is hard to reduce consumption in badly insulated buildings, according to non-profit consultancy co2online. Household gas prices in Germany had nearly halved by October 2023 since their peak about one year earlier, but the share of households under financial pressure from higher energy costs has risen steeply since the onset of the European energy crisis in 2022. The number of households paying more than 10 percent of their income on energy had jumped from 26 percent to 43 percent between March 2022 and June 2023, according to a report by the country's Expert Council for Consumer Affairs. Concerns about inflation, which is mainly driven by energy prices, has topped the list of citizens' worries in many European countries. In Germany, a large majority of citizens say they fear that rising living costs will erode their standard of living, fuelling fears of social decline.

In early October, the parties of Germany's government coalition suffered heavy losses in two state elections in economically strong Hesse and Bavaria in western and southern Germany. The far-right populist AfD celebrated significant gains, contradicting the common perception that the party is largely confined to disadvantaged voters in poorer eastern Germany. The flagging economy, climate policy and the energy transition, as well as immigration, had been the most important topics for voters.

Opposition to climate action

Signs of discontent among parts of the electorate over many government policies had been rising even before Russia's invasion of Ukraine amid increasing inflation throughout 2022, which hit Germany and many other countries just as they were coming out of the socially stressful and divisive coronavirus pandemic. The government's handling of the war then fuelled further dissatisfaction, with some voters saying the coalition was not resolute enough in supporting Ukraine, and others arguing that Germany should not oppose Russia, not least due to the negative economic and energy supply effects this would likely entail. The latter particularly included voters of the far-right AfD.

The party's success is likely to fan the debate about the impact of ambitious climate policies and emissions reduction efforts initiated by the coalition of the SPD, the Greens and the FDP. Introducing a law on banning fossil fuel heating amid skyrocketing energy prices had been a constant source of disputes among the government parties. The warring made the three-party

government prone to attacks from the opposition CDU/CSU conservative alliance, as well as from the AfD, which claimed that the coalition ignored the concerns of many citizens. The strong performance of the climate-sceptic AfD is reinforcing concerns among centrist parties about the election year 2024, when both the European elections in spring and three state elections in eastern Germany in autumn could further elevate the party, which rejects all emissions reduction efforts and advocates the restart of Russian gas imports.

Fears of permanent damage to industry persist

The energy price hike not only put a strain on household budgets but also greatly affected Germany's sizeable industrial sector, as well as the economy at large. Many industrial companies in the country, in particular energy-intensive ones such as chemicals producers or steelmakers, had bet on the availability of cheap Russian pipeline gas. The energy crisis - compounded by tenacious supply chain problems, especially in the automotive industry - hit many companies at a critical stage of their plans to transition away from fossil fuels. While the costs associated with industry decarbonisation added to companies' woes, many also acknowledged that reducing reliance on fossil fuel supplies and increasing energy efficiency would ultimately make energy cheaper and more secure.

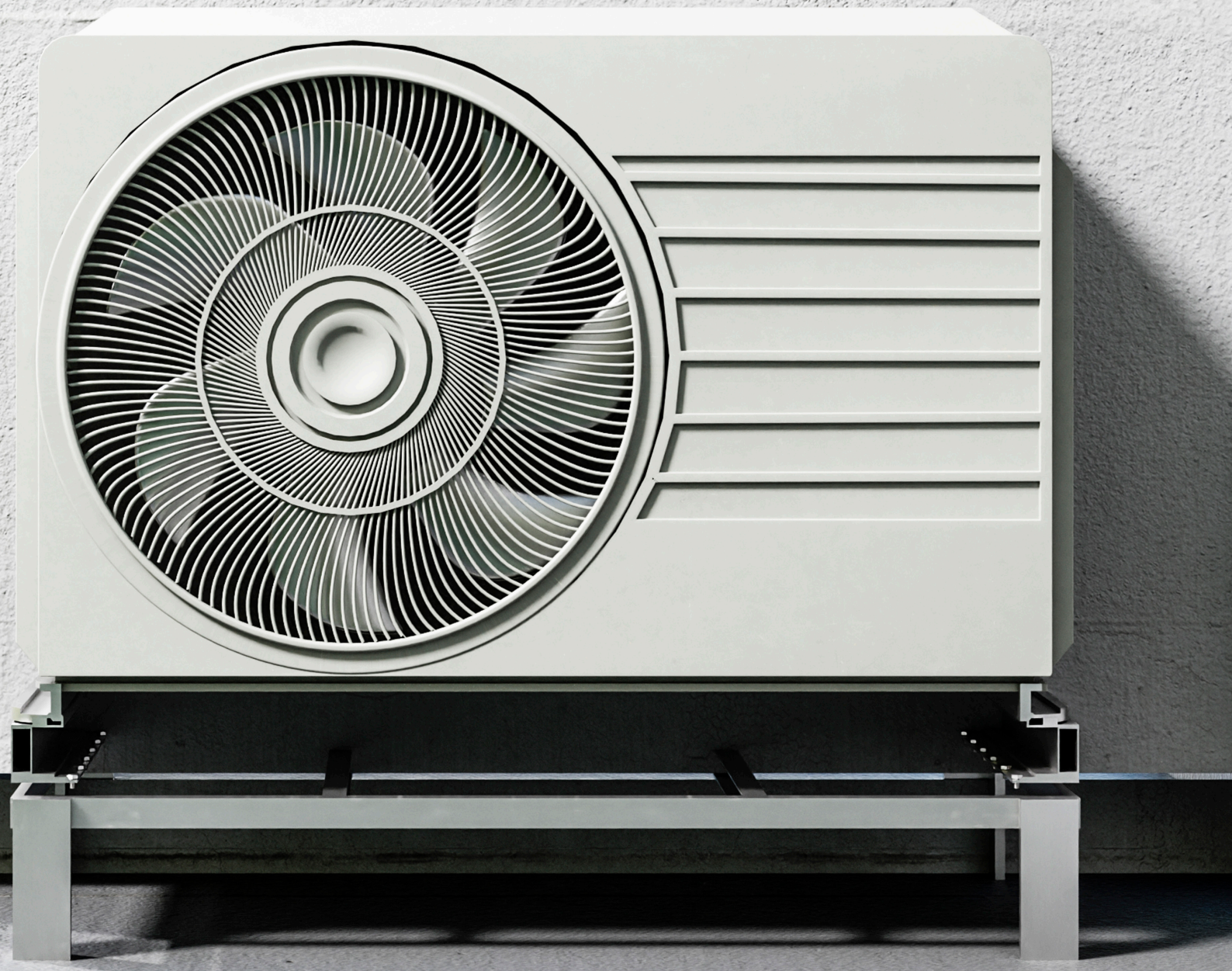
While fears of imminent de-industrialisation of Europe's largest economy largely turned out to be overblown, economic growth remained significantly depressed throughout 2023. The government revised its growth expectations in its autumn projection and stated that Germany will recover more slowly from its recession and achieve lower growth in 2024 than previously expected. Some industries, for example construction, recorded the worst business climate in several decades, not least owing to rising interest rates and a much more difficult investment environment, leading the government to relax energy efficiency standards.

Germany, in part because of the energy crisis, is currently debating whether it needs to subsidise the electricity used by heavy industry to maintain competitiveness. The economy and climate ministry is considering a plan to spend billions of euros to lower power prices for energy-intensive companies if they promise to decarbonise, and to stay within the country. Economy minister Habeck even suggested Germany should consider lifting its restrictions on new state debt, given the high costs of industry decarbonisation amid an economic downturn. Many economists reject the plans, arguing they could easily turn into permanent subsidies that delay necessary structural change.

However, the government has stressed that the EU as a whole is under pressure to respond to industry subsidy schemes rolled out elsewhere in the world. This is particularly true in China and the U.S., where the Inflation Reduction Act (IRA), created to woo investments in green technologies, has caused disputes over a trade conflict in Berlin and other European capitals. Chancellor Scholz in October insisted that effective climate action in Germany and Europe requires economic growth to prove it does not undermine prosperity, and that it opens a perspective for industrial success in the future. Together with his French counterpart, president Emmanuel Macron, Scholz repeatedly said that the EU will require a concerted effort to implement decarbonisation measures while remaining competitive. The two countries, which represent about 45 percent of the EU's economic output vowed closer cooperation on bolstering a strong and sustainable industry and create new industrial champions.

By **Sören Amelang**
Benjamin Wehrmann

How heat pumps became a Nordic success story



A common criticism of heat pumps is that they do not work in cold weather.

However, the Nordic region – particularly Sweden, Finland and Norway – offers a rebuttal to this assessment, as our research at the Regulatory Assistance Project (RAP) shows.

These three European countries have the highest heat pump sales per 1,000 households in the continent.

Sweden, Norway and Finland also have the coldest climates in Europe. In all three countries, there are now more than 40 heat pumps per 100 households, more than in any other country in the world.

At RAP, we have analysed the driving factors that led to this Nordic success story, as part of the development of our heat pump policy toolkit, which we launched at the COP27 climate summit in Sharm el-Sheikh last year.

Heat pump market growth

Installations of heat pumps in the Nordics rose quickly after 2000 and, despite a slowdown in 2012, again continued to surge after 2015.

Heat pumps work like an air conditioning unit (or a fridge) in reverse, to concentrate heat energy from the outside air – or a water or ground source – into building interiors.

The most common are 'air-to-air' units, meaning they take heat from the outside air to blow warm air inside, whereas air-to-water units make hot water. Heat pumps are the 'central technology' for low-carbon heat, the International Energy Agency (IEA) says.

Norway has the highest penetration of heat pumps worldwide, most of which are air-to-air systems. By 2020, there were 60 heat pumps installed per 100 households in Norway. Most of this happened after 2001 when the heat pump market grew significantly from a low base of around 2,000 units per year to more than 155,000 units sold in 2022.

Similarly, in Finland, before 2000 only a few hundred units of heat pumps were installed per year. From the mid-2000s onwards, the country saw a rapid growth with cumulative installations now exceeding 1m units.

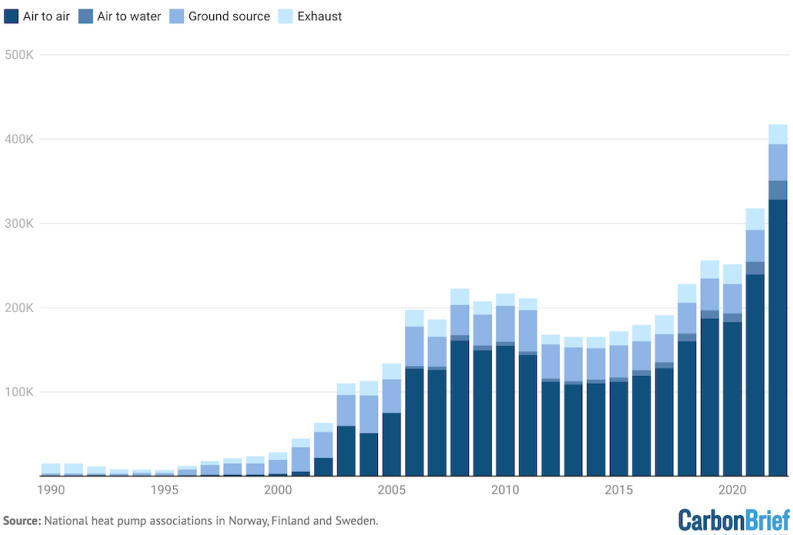
This can be seen in the chart below, which shows annual heat pump sales in Finland, Norway and Sweden from 1990 to 2021.

Because heat pumps use electricity that increasingly comes from low-carbon sources they lead to carbon emission reductions overall. Cumulatively, the heat pumps sold over the past 30 years contributed to a -72% drop in carbon dioxide (CO_2) emissions from heating in Finland, -83% in Norway and -95% in Sweden.

In addition, recent RAP analysis shows that heat pumps, even at temperatures sub-zero, are two- to three times more efficient than fossil-fuel heating systems.

Heat pump sales surge across Nordic countries

Heat pump sales in Norway, Finland and Sweden from 1990-2022



Source: National heat pump associations in Norway, Finland and Sweden.

CarbonBrief

This rapid reduction in carbon emissions from heating cannot be attributed to heat pumps alone — district heating, also known as heat networks, has become less carbon intensive and buildings have been built and retrofitted to a higher fabric efficiency standard over time. However, heat pumps played a key part.

Achieving heat pump leadership

The Nordic countries were previously heavily reliant on heating oil to keep warm, a result of the absence of a widespread gas grid.

They – Finland, Norway and Sweden (Denmark uses district heating as its main source of heating, with two-thirds of homes relying on it) – made an early decision to move away from heating oil following the energy crisis in the 1970s. This had seen the oil price rocket by almost 300% due to an oil embargo by the Organisation of Arab Petroleum Exporting Countries (OAPEC).

This crisis led to a widely supported goal to become independent from fossil-fuel imports, perhaps most starkly evident with the creation of a Commission for Oil Independence in Sweden in 2005.

Despite changes in political parties over time, this has remained a constant focus in national energy policy across these countries – and explains why fossil fuels make up a low share of heating fuels in Finland (22%), Norway (less than 1%) and Sweden (3%).

The decision to move away from oil heating provided an important stimulus for research and development of heat pump technology, followed by various promotional government programmes, including information campaigns and grant payments.

For Norway, specifically, it also had a large share of homes using electric heating. Converting electrically heated homes to heat pumps provides significant reductions in electricity demand and running costs because heat pumps are, typically,about three times more efficient than direct resistance heating.

More recently, regulations, such as the complete ban of using heating oil in buildings for heating, have come into effect in Norway. In June 2018, the government adopted a regulation banning the use of mineral oil (fossil oil) for the heating of buildings from 2020. The ban covers the use of mineral oil for heating in residential buildings, public buildings and commercial buildings.

Historic household electricity prices in all three countries were also relatively low compared to many other European countries with about €0.17 per kilowatt hour (KWh) in Finland and Norway and €0.20/kWh in Sweden before the price crisis.

Carbon taxation

Carbon taxation has played a key role in making heat pumps economically competitive in all three countries. In 1990, Finland was the first country in the world to introduce a carbon tax, which currently stands at €53 per tonne of CO_2 (tCO_2) for heating fuels.

Shortly after Finland, Sweden adopted a CO_2 tax in 1991. Since its introduction, it has increased from €21/tCO_2 to €102/tCO_2 in 2022.

Norway also introduced a carbon tax in 1991, which reached €76/tCO_2 in 2023. The government's white paper on energy policy announced that the tax would rise to €196/tCO_2 in 2030, which would be one of the highest levels in the Organisation for Economic Co-operation and Development (OECD).

Many other countries across Europe have addressed imbalances in taxation of heating fuels to encourage heat pump uptake, including the Netherlands, Denmark and Germany, according to RAP analysis.

In Denmark, electricity used for heat pumps in homes is exempt from energy taxes to the minimum amount allowed under EU law. In

Germany, levies have been shifted from bills to the public budget.

Air-to-air heat pumps

It is notable from the RAP data presented above that two-thirds of the heat pumps sold in the three countries are air-to-air heat pumps. This differs from other major European heat pump markets, such as Germany and Poland, where the majority of heat pumps are air-to-water.

The reason for this is that, in many cases, heat pumps replaced electric resistive heating with no hot water running through radiators.

Furthermore, the architecture in the Nordic countries tends to be more open plan compared to other European countries. This makes the application of air-to-air a more attractive proposition, without the need for extensive ducting or multiple individual fans.

In addition, air-to-air heat pumps are lower cost compared to air-to-water heat pumps, according to the IEA.

Air-to-air heat pumps can also be used for cooling. However, the Finnish Heat Pump Association estimates that air-to-air heat pumps used for cooling account for only 10%-15% of the market, with the majority being used for heating only.

In some cases (although, according to the Finnish heat pump association, this is a small minority) more than one heat pump is installed in a single building and heat pumps are also often operating with a second heat source being present.

Many homes continue to use wood stoves after having installed a heat pump as a study from the Oslo Centre for Research on Environmentally Friendly Energy (CREE) on heat pumps shows, albeit less frequently. This resulted in about a quarter less wood being used for heating in 2021 compared to 2010. The continued use of wood is at least in part a result of aesthetic and cultural preferences.

In Finland, heat pumps are often installed as an additional heating system complementing mainly electric heating.

Nordic clean heating lessons

RAP's analysis has found that the success of heat pumps in the Nordics is not accidental.

Instead, it is the result of a mix of policy instruments working in concert, such as carbon taxation, government incentives, regulations, quality standards, consumer protection for example through the creation of bodies to deal with complaints and offer redress, and information campaigns.

The natural efficiency of heat pumps has also helped their deployment.

The key takeaway is that there is no single policy that can deliver a mass market for heat pumps. A well-designed policy mix of economic instruments, financial support and regulation, underpinned by coordination and engagement, turns out to be the most effective recipe for scaling up heat-pump deployment, according to RAP's research.

The experience in the Nordic countries illustrates not only what can be achieved in just two decades, but how to do it.

Policymakers in countries where heat pumps are still in their infancy do not have to start from scratch, but can learn from – and build on – the heat-pump success story in Norway, Finland and Sweden.

By **Dr Jan Rosenow**

Principal and director of European programmes at the Regulatory Assistance Project (RAP)

Monthly News Round-Up

ECECP highlights the key energy news headlines from the past month in the EU and China

EU reveals European Wind Power Package to support the EU wind power sector

In October 2023, the European Commission set out its plans to maintain a healthy and competitive wind energy supply chain, with a clear and secure pipeline of projects. The European Wind Power Package includes an Action Plan that is designed to expedite wind power development by enhancing predictability and streamlining permitting procedures. It includes the launch of the 'Accele-RES' initiative, which is intended to ensure the swift implementation of revised EU renewable energy regulations. The European Commission aims to refine auction design, simplify access to EU funding, promote fair trade practices, establish Large-Scale Skills Partnerships for Renewable Energy to develop skills development projects, and develop an EU Wind Charter to enable the European wind industry to remain competitive.

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EU urges Member States to ramp up climate action

EU has published its first technical assessment of the implementation of National Energy and Climate Plans (NECP) by its Member States. The result reveals that although EU greenhouse gas net emissions fell by around 3% in 2022, the pace of emissions reduction needs to increase to almost triple the average annual reduction over the last decade in order to achieve a 55% emissions reduction by the end of the decade. In 2021, the share of renewables in gross final energy consumption reached 21.8%, but faster growth is needed to achieve the new 2030 target of 42.5%. The EU's primary energy consumption remained lower than pre-pandemic levels despite the region's strong economic recovery. The publication also notes that although cross-border capacity has improved, enhancing EU internal energy market, further efforts are required to meet 2030 interconnectivity objectives, in particular in terms of the timely delivery of planned cross-border projects between Member States.

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EU to push for COP28 deal on phasing out unabated fossil fuels

Climate ministers have reached agreement on the EU's negotiating position at COP28 summit, which will be held in the UAE in November 2023. have The bloc wants to push for a world-first deal to phase out the 'unabated' global use of fossil fuels. This stated goal makes the EU one of the most ambitious negotiators at the annual United Nations climate talks. The proposal allows countries to keep burning coal, gas and oil only if they use technologies such as CCUS to 'abate' the resulting emissions. The EU is also calling for 'inefficient' fossil fuel subsidies to be phased out by 2030, maintaining that no new coal-fueled power plants can be built if the world is to avert severe climate change.

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EU Council reaches agreement on electricity market reform

On 17 October, the European Council reached consensus on a proposal to amend the EU's electricity market design (EMD). The reform is intended to make electricity prices less dependent on volatile fossil fuel prices, shield consumers from price spikes, accelerate the deployment of renewable energies and improve consumer protection. It mandates two-way contracts for difference (CfDs) for new renewable projects with public funding after a transition period. Revenue collected will be redistributed to benefit customers and reduce costs. Consumers will be offered supplier choice and there will be protection for vulnerable customers, while small businesses in crisis could benefit from temporary regulated prices. Capacity mechanisms will no longer be temporary, though a derogation on existing CO_2 emission limits for generators to receive support from capacity mechanisms is set to continue until the end of 2028. Member States also agreed that approval procedures for capacity mechanisms need to be simplified.

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European Commission adopts new Auctioning Regulation for Fit for 55

The European Commission has approved a new Auctioning Regulation as part of the Fit for 55 legislative package and the REPowerEU plan. This updated regulation extends the ETS to encompass the maritime sector and introduces eligibility criteria for shipping companies to participate in auctions. It also makes provision for a new emissions trading system targeting buildings, road transport, and other sectors. Furthermore, the regulation includes adjustments to aviation auction volumes, allowances for the Innovation Fund, and introduces clauses governing the auctioning of allowances for the Recovery and Resilience Facility in the context of REPowerEU and the Social Climate Fund. If agreed by the European Parliament and Council, the regulation will be published in the EU's Official Journal within two months.

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Ten European cities receive awards for climate neutrality goals

Ten European cities have received awards for their plans to achieve climate neutrality by 2030. These include Sønderborg (Denmark), Mannheim (Germany), Madrid, Valencia, Valladolid, Vitoria-Gasteiz and Zaragoza (Spain), Klagenfurt (Austria), Cluj-Napoca (Romania) and Stockholm (Sweden). The winners of the award, known as the Label of the EU Mission for Climate-Neutral and Smart Cities, were announced by the European Commission on 13 October, in recognition of their effective action and investment plans to achieve climate neutrality by 2030 - 20 years earlier than the EU target. Cities that have received the EU Mission Label will have access to EU, national, and regional funding and financing sources, in particular private investment. These cities will act as experimentation and innovation hubs, with all European cities set to follow suit by 2050.

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EU electricity and gas prices stabilise in H1 2023

After the eye-watering price hikes of 2022, Europe's electricity and gas prices are now stabilising, latest Eurostat statistics shows. Although in the first half of 2023, average household electricity and gas prices in the EU continued to show an increase compared with the same period in 2022, from EUR 25.3 per 100 kWh to EUR 28.9 per 100 kWh and from EUR 8.6 per 100 kWh to EUR 11.9 per 100 kWh respectively, prices before tax are now falling. Some countries have withdrawn their support measures, slightly pushing up final customer prices (including taxes). The share of taxes in electricity bills dropped from 23% to 19% (-4%) and in gas bills from 27% to 19% (-8%). All EU countries have introduced state allowances and subsidies or reduced taxes and levies to mitigate high-energy costs.

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EU Council agrees on new emission standards for heavy-duty vehicles

The Council of the European Union has tabled a proposal to bolster CO_2 emission standards for heavy-duty vehicles in the EU. This proposal introduces more stringent targets, including a 45% emissions reduction by 2030 (compared to the previous 30%), 65% for 2035, and an ambitious 90% reduction by 2040. Furthermore, the amendment sets a 100% zero-emission goal for urban buses by 2035, with an interim target of 85% by 2030. The regulation now encompasses a broad spectrum of heavy-duty vehicles, including smaller trucks, urban buses, coaches, and trailers, with certain exemptions for specific vehicle types and purposes. The Commission will review the regulation's effectiveness and impact in 2027, taking into account factors such as recharging infrastructure and a carbon correction factor in the shift to zero-emission mobility.

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EU PPA market hits record 7.8 GW, buyers urge for barriers removal

The European Union's market for renewable corporate power purchase agreements (PPAs) has set a new annual record, with 7.8 gigawatts (GW) of such contracts inked in 2023, according to the RE-Source Platform, an alliance of clean energy buyers and suppliers. The data shows that the information and communication technology (ICT) sector accounted for 2 GW, heavy industry for 1.8 GW, and telecoms for 650 megawatts (MW) of corporate renewable PPAs by the end of Q3. Together, these sectors contributed over 60% of the total corporate renewable PPAs, with other sectors such as retail, transport and automotive industries also becoming increasingly involved. Corporate energy buyers are calling for the removal of remaining barriers to PPAs in the upcoming EU electricity market design (EMD) reform, including simplifying corporate PPA adoption, and safeguarding routes to market for renewable projects.

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France unveils plans to meet its 2030 green goals

French President Emmanuel Macron has unveiled a new package of plans to reduce greenhouse gas emissions and meet the country's climate-related commitments within the next seven years. The government aims to further reduce the country's dependency on fossil fuels from 60% to 40% by 2030. France's two remaining coal-burning plants are now set to be converted to biomass energy by 2027. Measures to boost electric vehicle uptake will also be introduced, including a state-sponsored system to allow households with modest incomes to lease European-made electric cars for about EUR 100 per month. By 2027, France will have produced at least 1 million electric vehicles and opened four battery plants in the north of the country. The government also promised to triple production of low energy heat pumps, aiming to produce 1 million devices and train tens of thousands of skilled engineers by 2027.

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UK adopts comprehensive legislation for fit-for-future energy system

The Energy Act 2023, designed to enhance energy security and support the UK's net-zero ambitions, has been granted Royal Assent. The legislation, considered the most significant energy legislation in a generation, forms the groundwork for a future-proofed energy system. Industrial bodies note that the law offers certainty to investors in hydrogen and bioenergy with carbon capture and storage (BECCS), and paves the way for the UK's future hydrogen economy by establishing provisions for Hydrogen Production Business Models, Hydrogen Transport, and Storage Business Models. Additionally, the Act aims to maintain low energy costs by enhancing competition in Great Britain's onshore electricity networks. It updates Ofgem's responsibilities and establishes a new independent body, the Future System Operator, which will coordinate and ensure strategic planning, and will be fully separate from the transmission network owner.

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Germany to accelerate hydrogen infrastructure development

The head of Germany's Economy Ministry's energy security department, Philipp Steinberg, has revealed that the country is putting in place a hydrogen acceleration law to accelerate hydrogen infrastructure development. According to a separate draft law, grid operators are likely to start applying for their first hydrogen infrastructure projects as early as November 2023. These projects would include repurposing existing gas lines and building new links. The government wants grid operators to plan gas and H2 networks jointly from 2025. It would also require operators to update their plans every second year. According to industry data, approximately 97% of Germany's grid is capable of transporting hydrogen fuel.

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Danish government proposes plan to quadruple energy from solar and onshore wind

The Danish Government has set out a plan to power more than 11 million households with predominantly green energy. Central to this proposal are compensation schemes designed to benefit citizens and communities located near renewable energy installations. Power producers are expected to deliver a fourfold increase in green electricity, while contributing an additional EUR 268 billion in compensation to nearby communities, amounting up to EUR 603 billion by 2030. This funding will be allocated to a green pool, serving the dual purpose of supporting local community activities and providing a renewable energy bonus to citizens and communities residing near the renewable energy facilities. A screening process has identified 32 potential energy park locations, marking significant progress toward meeting these targets.

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New breakthroughs for efficient EV battery recycling

Scientists at Sweden's Chalmers University of Technology have developed a recycling method that allows recovery of 100% of the aluminum and 98% of the lithium in electric car batteries. In traditional recycling, known as hydrometallurgy, all the metals in an EV battery cell are dissolved in an inorganic acid. What sets this new approach apart is the reversal of the traditional recycling process, where extraction of lithium and aluminum area prioritised while significantly reducing the loss of valuable materials such as nickel, cobalt, and manganese. The new technique can successfully separate a substantial amount of lithium using eco-friendly oxalic acid which can be easily found in plants such as rhubarb and spinach, while efficiently removing all aluminum. The lithium and aluminum in the finely ground material of the used EV batteries dissolve in the oxalic acid, while other metals are left as solids. By separating these metals and recovering the lithium, the recycled materials can then be used to manufacture new batteries.

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World's first 100% hydrogen gas turbine tested in France

A breakthrough in hydrogen power has been achieved by a European consortium led by Siemens Energy, who have successfully tested a gas turbine that can run on pure hydrogen, natural gas, and any mix of the two. The HYFLEXPOWER project, funded by the EU's Horizon 2020 program, aims to demonstrate the feasibility and flexibility of using renewable hydrogen as a clean and reliable energy source for electricity and heat generation. The project is based at the Saillat-sur-Vienne paper packaging plant in France, hosting a Siemens Energy SGT-400 industrial gas turbine, modified to operate with up to 100% hydrogen. The project proves that existing gas-fired power plants can be converted to hydrogen without compromising their performance or efficiency.

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China issues revised gas use policy

China's National Energy Administration (NEA) has issued a draft natural gas utilisation policy for public comment. The draft outlines various measures to improve the pricing of natural gas, including the introduction of a mechanism that links upstream and downstream gas prices. It also proposes differential pricing policies for regions in China with significant seasonal variations in gas demand. The policy emphasises the importance of improving the reliability of gas supply at the local level and prioritises the rapid development of gas infrastructure, calling on suppliers and users to agree long-term supply contracts. The draft policy defines priority users, which include urban consumers such as hospitals and schools, as well as setting limits on consumption by others, including some rural 'coal-to-gas' clean heating projects. This revised draft policy builds on earlier gas market and pricing reforms, which introduced liberalisation of residential sales pricing for city-gas distributors.

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NEA initiates renewable energy development demonstration pilots program

On 18 October 2023, the NEA issued a notice to launch the renewable energy development demonstration pilots program. The goal is to implement a series of demonstration projects by 2025 that are technologically advanced, economically viable, and have promising prospects for wide application potential, in order to foster suitable supporting policies, technical standards, and business models. In terms of technological innovation pilots, support will be provided for deep-sea wind technologies including floating wind turbines, high-efficiency new PV cells, solar thermal, geothermal generation, and mid-deep geothermal heating. Development of projects such as desertification control using PV panels, zero-subsidy offshore wind, offshore PV, offshore energy islands, and biomass clean heating will also be encouraged. The country is also keen to develop high-level renewable power generation, supply and utilisation demonstration zones, aiming to achieve over 70% green power use and establish rural new energy microgrid pilots.

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Demand side management measures updated

China recently issued the 'Electricity Demand-Side Management Measures (2023 Version)'. The updated measures define electricity demand-side management as the reinforcement of comprehensive electricity usage management across society. The measures include the application of rational and feasible technical, economic, and managerial measures to optimise the allocation of electricity resources. This entails promotion of energy-saving, demand response, green electricity use, electrification, smart electricity use, and orderly electricity consumption to facilitate the secure decarbonisation and enhanced efficiency of the new power system. Unlike the early versions of 2010 and 2017, the new measures put special emphasis on demand response with an expanded focus on green power consumption and the extensive use of new-generation information technology tools to unlock demand side potential.

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China issues key policy to accelerate spot power trading

On 12 October 2023, China's NDRC and NEA jointly issued a significant guidance document on further accelerating development of the spot power market. This directive follows previous documents in July and September that aimed to deepen power sector reforms and establish spot power market rules. The document acknowledges the vital role of the spot power market in optimising resource allocation, enhancing power supply security and facilitating renewable energy integration. It outlines several key areas for accelerating the development of the spot power market. These include further expanding the scope of market entities especially on the demand side, encouraging the participation of various power sources including distributed renewable energy, promoting the active participation of new entities such as energy storage, virtual power plants, and demand aggregators for peak shaving and power quality optimisation. The document identifies Fujian, Zhejiang, and Sichuan as future development targets for provincial spot power markets.

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China to cap crude oil refining capacity at 1 000 Mt/yr by 2025

China's National Development and Reform Commission (NDRC) has announced that it will cap the country's crude oil refining capacity at 1 000 Mt/yr (20 mbl/d) by 2025, in order to modernise its oil processing sector and limit CO_2 emissions. The NDRC will also push for the upgrading and optimisation of existing refineries while accelerating the closure of small and outdated facilities. New refinery capacity will be limited. According to the plan, refineries with a capacity of 10 Mt/yr or more will account for 55% of China's processing facilities by 2025 and every new refinery must have a capacity of at least 10 Mt/year. Older and smaller refineries (2 Mt/yr or less) will be phased out. The NDRC wants more energy efficiency and carbon emission management in the refining industry and has announced plans to establish a national information database for the sector. As of the end of 2022, China's refining capacity was nearly 17.3 mbl/d.

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Carbon credit system one step closer to relaunch

China is one step away from relaunching its voluntary carbon credits program after updating key rules for the scheme. On 20 October 2023, the Ministry of Ecology and Environment (MEE) and the State Administration for Market Regulation (SAMR) jointly issued a regulation on China Certified Emission Reductions (CCER) trading for trial implementation, with a view to gradually expanding the number of sectors covered by the mechanism. Four days later, the government unveiled methodologies for quantifying net emission reductions in forestation, solar thermal power, offshore wind power generation, and mangrove revegetation projects, providing an important basis for certification of CCER projects. These recent moves signal a potential relaunch of the carbon credits program, which would complement China's extensive national carbon trading market. It was suspended in 2017 due to low trading volume and standardisation issues, but is now being revitalised with a focus on economically viable project types.

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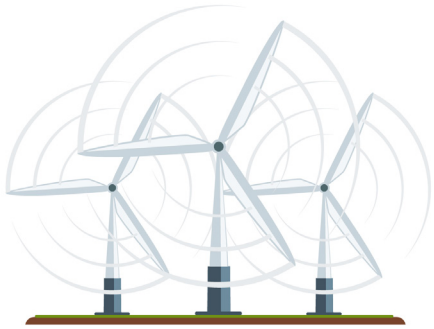

Deregulation to boost distributed wind power market

On 24 October 2023, China's NEA officially exempted distributed wind power projects from electricity business permits. The new directive affects all distributed wind power projects, expanding on a previous policy that exempted projects connected to electrical grids with voltage levels of 35 kV and below. The move signals a relaxation of regulations for distributed wind power, reducing approval complexities and stimulating development of distributed wind power projects.

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Energy efficiency classification updated for key energy-using products and equipment

On 24 October 2023, China's NDRC released a circular seeking public consultation on updates to the energy efficiency classification of 22 types of key energy-using products and equipment. These products will be classified into three energy efficiency levels, namely 'advanced level', 'energy-saving level' and 'access level' (referring to market access). These products and equipment are sorted into six categories: industrial, information and communication, transportation, commercial, household, and lighting. By adding 22 new product types including EV charger, industrial boiler and PV module to the existing 20 with established energy efficiency levels, the NDRC aims to cover all key energy-using products and equipment, supporting energy efficiency and carbon reduction in critical sectors.

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NEA to crack down on local market interference in renewable development

China's NEA has issued an urgent notice that cracks down on improper market interference in the development of new energy and pumped storage energy projects. The rectification plan targets renewable projects launched since 1 January 2023 relating to wind power, PV, and pumped storage energy projects organised and implemented by local governments. Local governments and authorities are known to require industries to set up local manufacturing facilities when embarking on renewable energy projects. The notice also aims to address cases where local authorities require developers to pay substantial deposits or investment guarantees, and where local governments exert control over or restrict additional benefits from such projects, such as revenues from carbon emission allowances.

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IEA: China's energy demand could peak by 2025

Apart from China, no large energy-consuming country has such a disproportionate impact on global consumption of fossil fuels and renewables. China's economic growth and infrastructure build-out in the last three decades have changed the world of energy. Today, however, China is setting the pace of the global energy transition, says the International Energy Agency (IEA) in its new World Energy Outlook 2023 report. The IEA anticipates that China's total energy demand could peak around the middle of this decade as the country's economic growth slows, with robust expansion of clean energy putting overall fossil fuel demand and emissions into decline. The IEA acknowledges that China plays a leading role in the global supply chain of clean energy technology, and that further trade restrictions could slow the energy transition due to China's dominance of the supply chains relating to several key minerals and technologies.

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Investment in China's power industry to exceed CNY 100 trillion by 2060

The investment scale of China's power industry is expected to exceed CNY 100 trillion (about USD 13.93 trillion) from 2020 to 2060, according to the State Grid Corporation of China. The development of a new power system will lead to the expansion of both the power industry and the power market, according to a book written by the company and published in October 2023. By the end of 2060, the investment value of individual key sectors, including energy storage, integrated energy and energy internet, is expected to hit CNY 1 trillion, the authors write.

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CNOOC finds 110 bcm onshore natural gas deposit in northern China

China's CNOOC has announced the discovery of a large deep-coalbed methane field in northern China, with proven reserves of over 110 bcm of natural gas. The SM2-33-CH1 discovery well is part of the Shenfu coal seam gas field located in Yulin, Shaanxi Province. The discovery well found 16.5 metres of coal seam at approximately 2 011 metres below the surface. The well yielded 19 000 cm of gas a day during test production. It is the second sizeable onshore gas discovery for CNOOC, following a similar-sized discovery in Linxing, Shanxi Province in 2021. At the end of 2022, China's proven gas reserves stood at 2 887 bcm. The country produced more than 219 bcm of natural gas in 2022.

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China's largest NEV-grid integration network demo zone now in operation in Jiangsu

China's largest vehicle-grid integration network demonstration zone has become operational in the city of Wuxi, in Jiangsu Province, eastern China. It can simultaneously draw electricity to the smart grid from 50 new energy vehicles (NEV). According to the State Grid Jiangsu Electric Power Co. Ltd., NEV owners can receive subsidies by sending unused power from their vehicles to the grid through charging piles at the demonstration centre. The centre is set to add enough charging piles to charge 144 vehicles and discharge 50 vehicles in its second phase, as well as a battery changing service for 400 vehicles at a time. The aim of the smart network is to adjust power loads for electric vehicle charging, and to encourage electric vehicle owners to sell electricity in car batteries to the grid at peak times and charge their batteries during off-peak hours.

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China's first hydrogen-powered vessel completes maiden voyage

China's first hydrogen-powered vessel, Three Gorges Hydrogen Boat No 1, completed its maiden voyage in Yichang, Hubei province, marking a breakthrough in the application of hydrogen fuel cell technology in inland waterway vessels. Compared to traditional fuel-powered ships, the new vessel is expected to save 103 metric tons of fuel and reduce CO_2 emissions by 343 tons per year. It can travel 200 kilometers on a single hydrogen charge. The maiden voyage marks a substantial step towards the utilisation of hydrogen energy along the Yangtze River and signifies a milestone in the green and low-carbon development of inland river transportation.

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China and Kazakhstan deepen energy cooperation

During the latest Belt and Road Initiative summit in Hong Kong, Kazakhstan has forged new oil and gas agreements with China. Astana and China National Petroleum Corporation (CNPC) will extend an oilfield development contract to allow CNPC to continue oil production in Kazakhstan's Aktobe region after 2025. CNPC-Aktobemunaygaz has operated the licence for the past 26 years, producing about 3.3 billion barrels of oil and 150 bcm of gas. It is one of the largest oil projects in Kazakhstan. National gas company QazaqGaz has signed a new gas export contract with China's PetroChina International for the period 2023-26, and another cooperation agreement with China's privately owned oil producer Geo-Jade Petroleum for development of the Pridorozhnoye gas field. Kazakhstan's sovereign wealth fund Samruk-Kazyna JSC also signed a joint development agreement with China Power International Holding to build a 1 GW wind farm in Kazakhstan's Zhambyl region.

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Featured Publication

Clean Energy Technology Observatory:

Overall Strategic Analysis of Clean Energy Technology in the European Union - 2023 Status Report

Clean Energy Technology Observatory (CETO), published by the EU, provides an evidence-based analysis of the competitiveness of clean energy technologies. It monitors EU research and innovation activities relating to the clean energy technologies needed for the delivery of the European Green Deal, and assesses the competitiveness of the EU clean energy sector and its positioning in the global energy market. This overall strategic assessment highlights various aspects of the clean energy technology sector in the EU, including the uptick in energy consumption and carbon intensity due to economic recovery, falling greenhouse gas emissions, the growth of the renewable energy sector, the deployment of carbon pricing, research and innovation investment, rising employment in the renewable energy sector, challenges faced by the manufacturing industry, the need for upskilling and digitalisation, and the need for improved public data. Technical reports on specific clean energy technologies within the CETO series can also be found online, in the JRC Publications Repository.

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Scaling up Offshore Wind Energy in Europe

Interest in Europe's offshore wind sector is surging, yet the sector is facing what has been described as a 'perfect storm,' characterised by strong demand, limited supply, and increased costs. This report by the Centre for Regulation in Europe (CERRE) offers an analysis of how EU regulatory action can support the expansion of offshore renewable energy (ORE) in individual Member States and at a continental level. For development of offshore wind energy capacity to accelerate in the EU, swift and targeted action is necessary to boost ORE in power generation, transmission/distribution, and market design across the EU and its Member States. This report identifies four key areas for targeted EU action to support the expansion of offshore wind in Europe: planning, permitting, cross-border projects, while recognising of the mutual benefits and need for coexistence of ORE projects. It also takes a closer look at potential interventions that might address the upcoming challenges associated with large-scale deployment of offshore wind, which call for more hybrid systems and inter-connected networks crossing Member States' borders.

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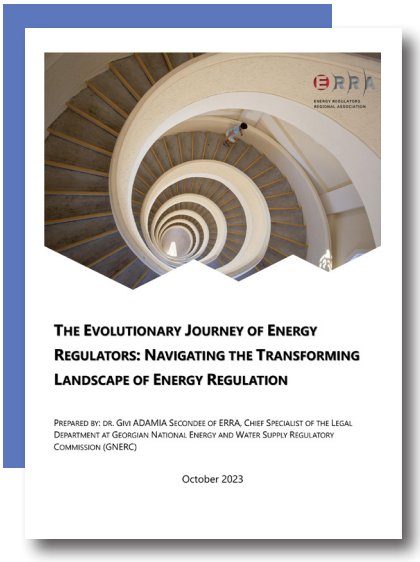
The Evolutionary Journey of Energy Regulators: Navigating the Transforming Landscape of Energy Regulation

Energy regulatory bodies play a vital role in modern energy systems. Although basic principles of the functioning of these bodies are fairly standard at an international level, and determined by the modern legal regulations of individual states, it is worth noting that their role is under constant review. This research paper by the Energy Regulators Regional Association offers a comprehensive account of the evolution of energy regulators from their inception. Additionally, it considers the likely future of these regulatory bodies. The paper notes the formidable challenges that energy regulators face today when seeking to ensure equitable market competition, balancing diverse stakeholder interests, promoting energy efficiency, and addressing pressing environmental concerns. These challenges are matched by the opportunities presented by technological advancements, which can offer regulators the tools to enhance monitoring and enforcement capabilities.



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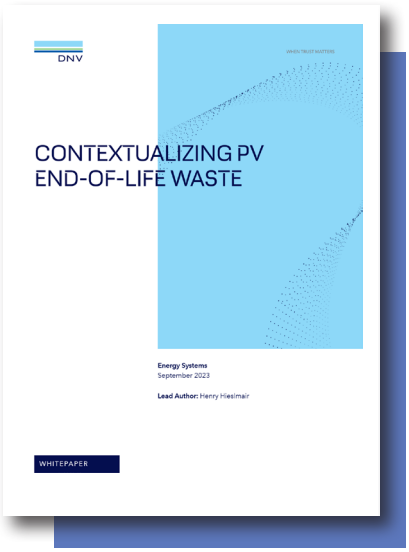
Contextualizing PV End-of-Life Waste



This study by Norway's DNV presents an updated analysis of photovoltaic (PV) waste stream models, focusing on the influence of module durability and providing a context for PV waste in terms of scale and toxicity. By examining various rates of average module durability improvement and setting deployment targets for 2050 at 24 or 75 TWp (terawatt peak), the study demonstrates that future PV end-of-life (EOL) waste can be effectively managed and substantially reduced by accelerating module durability. It argues that while recycling is the preferred end-of-life option within the PV sector, it is crucial to acknowledge that the PV EOL waste stream is not, and should not be depicted as, an alarming environmental crisis.

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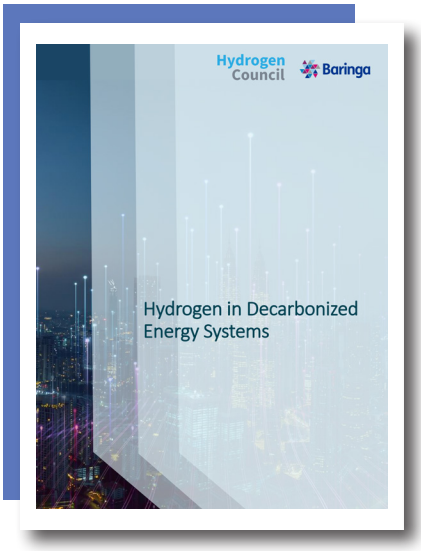
Hydrogen in Decarbonized Energy Systems

This report released by the Hydrogen Council in collaboration with Baringa Partners LLP underscores the integral role played by hydrogen in global energy systems that are transitioning from unabated fossil fuels to clean energy. The existence of network infrastructure and practical market design rules are prerequisites for decarbonisation using hydrogen. The report highlights strategies for Texas, Central-West Europe, and Japan, showcasing opportunities for greater affordability and flexibility in integrating hydrogen into resource-rich, resource-poor and islanded energy systems. It emphasises that hydrogen's true potential lies in its ability to play a flexible role within and beyond the power market, free from restrictions related to additionality and temporality. Its authors argue that hydrogen can create better resiliency, security and flexibility by linking power, gas and liquid systems. Additionally, the report underscores the importance of collaboration between industry and government to scale up hydrogen and make it a centerpiece of the global energy future. This will require market design, as a critical enabler for a decarbonised energy system.



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