Magazine of EU-China Energy Cooperation Platform

EU-China Energy Magazine

2023 November 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 November 2023 issue of the EU-China Energy Magazine. In this issue, we explore the critical role of innovation in achieving net-zero emissions, China's progress in clean energy and climate action, the implications of the Carbon Border Adjustment Mechanism for the iron and steel sector, and key takeaways from the Florence School of Regulation policy brief 'Energy policy ideas for the next European Commission: from targets to investments'.

The path to net-zero emissions is paved with innovation. In our lead article, the International Energy Agency (IEA) highlights the need for accelerated innovation in clean energy technologies to meet ambitious climate goals. Despite the challenges, the IEA emphasises the significant progress already made in developing and deploying these technologies.

China, a global leader in renewable energy and electric vehicles, is demonstrating its commitment to climate action. In our second article, CREA projects that China's carbon emissions are set for a structural decline in 2024, driven by record growth in the installation of green energy sources, implying a foreseeable early carbon peaking before 2030.

China's dominance in the manufacturing of solar cells, lithium batteries, and electric vehicles is a testament to its strategic focus on clean energy technologies. In a curated article, China Dialogue delves into the factors that have propelled China to the forefront of these critical industries.

The Carbon Border Adjustment Mechanism (CBAM) is a policy being introduced by the EU that aims to level the playing field for European industries facing carbon pricing regulations. In another article, carboneer explores the potential impact of CBAM, providing a practical to-do list for companies to consider.

Finally, we summarise the key takeaways from Florence School of Regulation's latest policy brief 'Energy policy ideas for the next European Commission: from targets to investments'. The report offers a roadmap for the next European Commission to accelerate the energy transition and achieve the EU's ambitious climate goals.

On 13 December 2023, the EU China Energy Cooperation Platform will host a public event at the Wangfujing Peninsula Hotel to showcase its accomplishments over the past five years. We will also present the findings from three new studies: integrating renewable energy in rural China; business opportunities in LNG, green hydrogen, and carbon capture, utilisation, and storage (CCUS); and energy security in the context of the energy transition. Please save the date and join us either in person or online to help celebrate our five years of dedication.

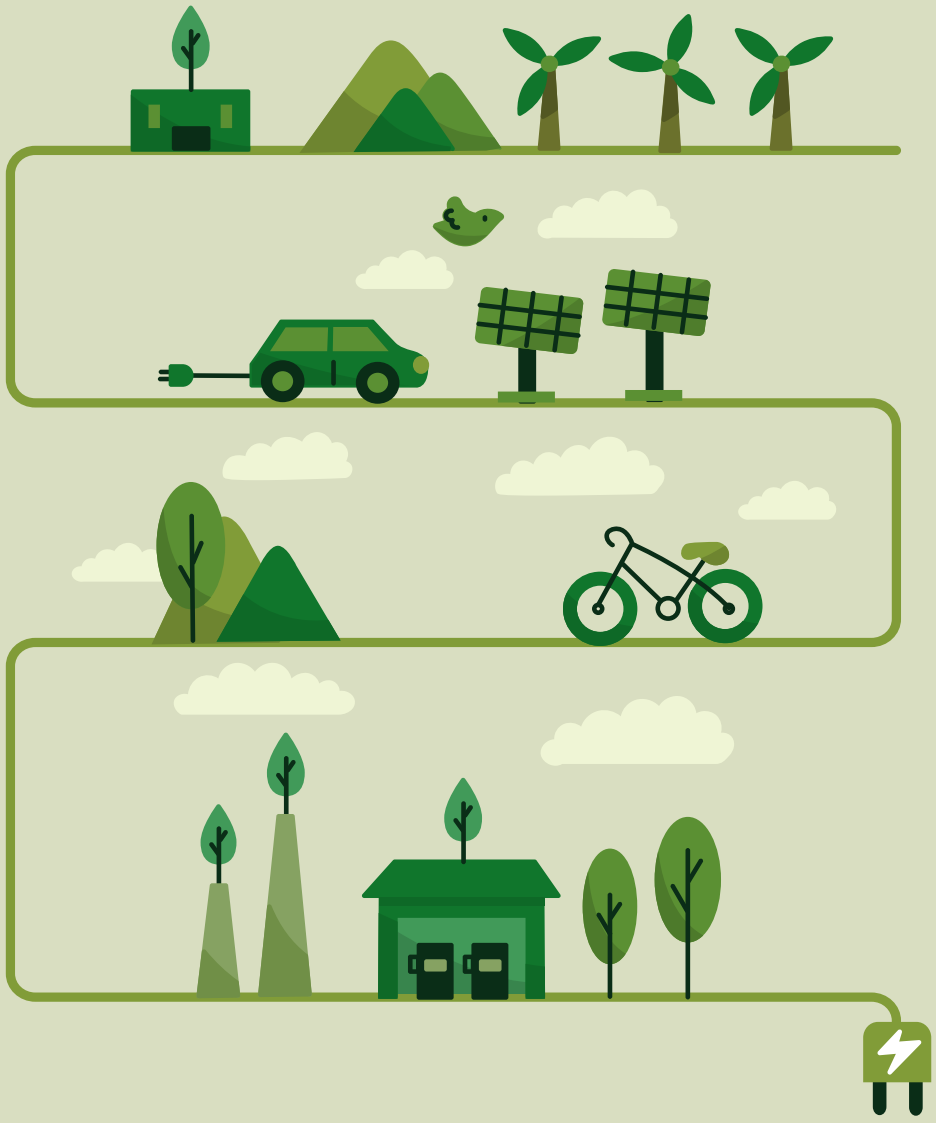
Our next issue (a double issue for December) will be published by 24 December 2023. Please keep an eye on your inbox for the latest edition.

We hope you enjoy this issue of EU-China Energy Magazine and find the articles informative and thought-provoking.

Warm regards,

Dr. Flora Kan
ECECP Team Leader

Reaching net zero emissions demands faster innovation, but we've already come a long way



Meeting climate targets will not require fundamentally new technology concepts, but it will require innovation

A new energy economy is emerging fast, building on a long history of technological progress. And if history is any guide, clean energy innovation can be a slow journey. For example, while the photovoltaic effect was discovered in the late 1830s and the first solar PV cell prototyped in the 1880s, technology progress only accelerated much later, in the 1950s. Solar power reached 1% of global electricity generation in 2015 only. Similarly, the first wind turbine was built in the 1880s, but wind power only reached 1% of national power generation in Denmark a century later, and 1% of global power generation later still, in 2008. The battery effect was demonstrated in 1800, but today's well-known lithium-ion batteries were prototyped for the first time in the 1980s and reached the mass market by 2010.

Reaching net zero CO_2 emissions from the energy sector by 2050 does not necessarily require fundamentally new scientific concepts or breakthroughs comparable to the initial discovery of solar, wind or batteries. However, innovation still plays an important role: about 35% of the CO_2 emission reductions needed in the recently updated Net Zero Emissions by 2050 Scenario (NZE Scenario) in 2050 come from technologies that are still in development and thus have not reached markets at commercial scale. Continued innovation will also be needed to improve performance and reduce costs of technologies already delivering emissions reductions, as well as to improve manufacturing processes. But our analysis suggests that even the most ambitious technology improvements in the NZE Scenario could be considered incremental in comparison to major discoveries.

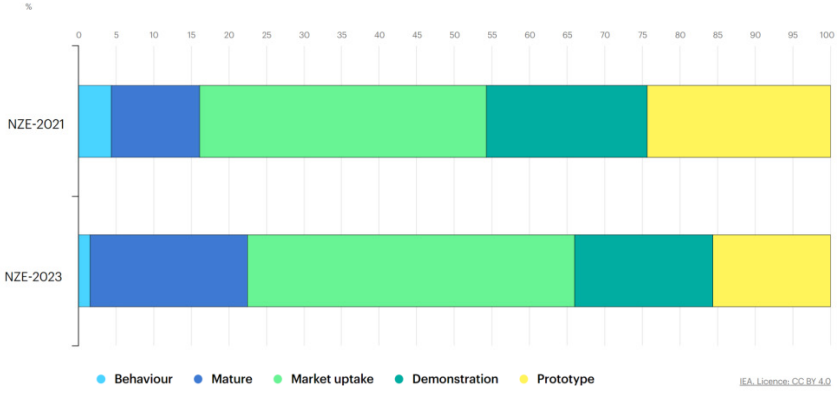
In many cases, the challenge is to bring new technologies to commercial scale in time to ensure an affordable energy transition. This calls for better designs or new combinations of existing technologies that can help to reduce costs, improve performance, address new use cases, minimise the use of critical resources, and mitigate other environmental impacts. Of course, completely new ideas may still arise, leading to new technology concepts or materials that could further accelerate the clean energy transition and broaden its scope. So even if it is reassuring that existing clean technologies can enable a net zero world, governments should continue to nurture and support early R&D to increase the chances of such breakthroughs.

Clean energy innovation is advancing rapidly

Considerable progress has been made in recent years to address pressing innovation gaps, resulting in important technology readiness upgrades. This has been reflected in the recently updated NZE Scenario: in our 2021 roadmap, the share of CO_2 emission reductions in 2050 from technologies that were not yet on the market at the time of writing stood at almost half (46%), a larger share than in our 2023 roadmap.

Recent major technology developments can be consulted in the ETP Clean Energy Technology Guide, an annually updated interactive database that tracks information on more than 550 individual designs and components that can contribute to getting on a path to the NZE Scenario. It includes indicators of technology readiness and background information on R&D and demonstration projects for such technologies around the world.

Comparison of CO_2 emissions reductions in 2050 relative to base year by technology maturity in the 2021 and 2023 NZE Scenarios



Recent examples include:

- Road transport: In 2022, electric cars accounted for nearly 15% of total car sales, little more than a decade after they were first commercialised. This was achieved thanks to strong policy support and technology progress, such as performance improvements and cost reductions in lithium-ion batteries, battery and vehicle integration, and charging. Innovation has now turned to new challenges, such as mitigating demand for critical minerals and increasing energy density for heavy-duty applications. After 40 years of incremental progress in R&D since the first prototypes in the 1980s, innovation in sodium-ion batteries – which do not contain any critical minerals – accelerated in the late 2010s, and the first sodium-ion powered electric cars are reaching the market this year, with new supply chains being quickly established.

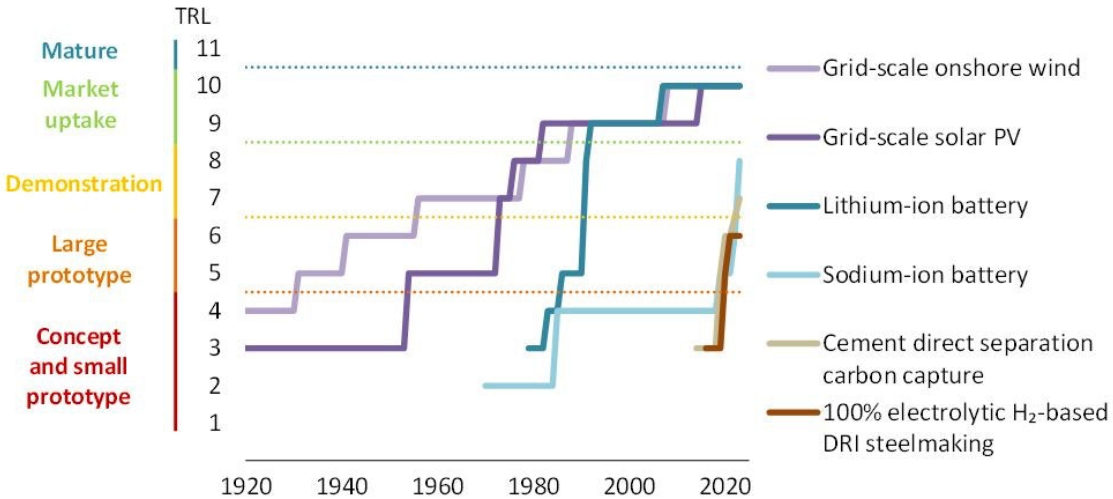
- Power: Construction of the first commercial small modular nuclear reactors has started, with operations expected by 2026. Floating offshore wind farms are getting larger than ever and could exceed the 1 GW mark in 2026. The first solar PV modules equipped with perovskite cells at an efficiency nearing 30% are reaching markets.

- Heavy industry: In 2021, fossil-free steel was produced for the first time using 100% electrolytic hydrogen, with plans to demonstrate industrial scale production. In 2023, final investment decisions were made to bring carbon capture demonstrators to commercial scale in cement production. And first-of-a-kind commercial production of carbon-free aluminium is expected by 2026, after the technology was first demonstrated in 2021.

- Long-distance transport: Short-haul all-electric planes for up to 20 passengers are under development and could reach commercial use by 2026. Production of hydrogen-based synthetic aviation fuels is taking place on a larger scale, and the first industrial plant to convert biogas into low-emissions bio-liquefied natural gas to replace heavy fuel oil in shipping could begin operations in early 2024.

Despite encouraging progress, innovation success should not be taken for granted. There is also a long list of innovation setbacks from the past decades, with technologies stuck in the pipeline, delays and failures. For example: solid-state battery prototypes have been experiencing delays in production; fuel-cell electric vehicles have not achieved the market potential once foreseen by large industry players; and fossil fuel-based electricity generation from facilities equipped with carbon capture – an area with several technologies currently at demonstration stage – is moving more slowly than projected just a few years ago.

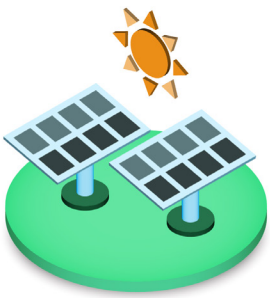
Historical evolution of the Technology Readiness Level for selected clean energy technologies



Growing demand for clean energy technologies could further shorten critical steps in the innovation journey

Every innovation journey is different, steered by diverse government policies, advances in complementary technologies or even unforeseen events, but in many cases, innovation remains slow and risky until demand for the technology strengthens. R&D and demonstration are typically expensive, and when cheaper alternatives can already be found on the market, there are fewer incentives to innovate. In contrast, pressing needs or promising business opportunities can induce much quicker innovation. For example, increasing demand from the US aerospace industry stimulated solar PV innovation. The oil crisis in the 1970s sparked energy security concerns globally, and in countries like Denmark, strong interest in alternative sources of energy enabled faster wind technology development. The rapid emergence of microelectronics since the 1990s and electromobility since the 2010s have supported the lithium-ion battery industry.

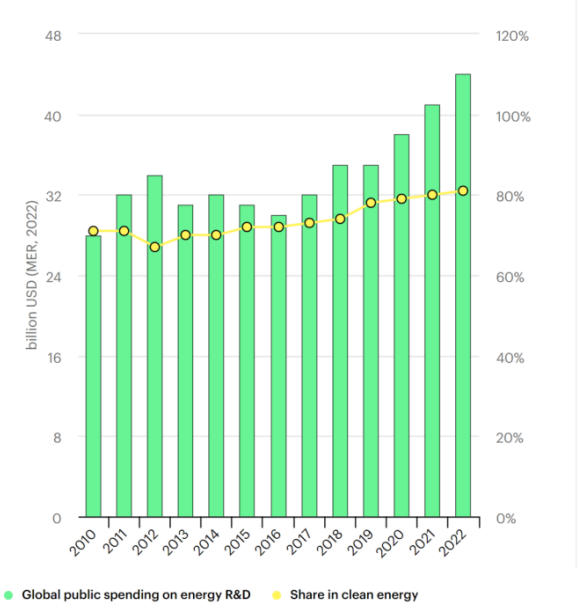
By supporting demand for clean energy, decision makers can help accelerate innovation. The drivers of innovation in any sector are multiple and complex, but there is strong evidence that policy plays an important role. Well-designed policy support, co-ordinated among innovation stakeholders, can facilitate the building of large prototypes, carrying out capital-intensive demonstration projects, and scaling up new products. Down the road, this can help shorten each individual step in the innovation journey and compress them together.



Spending on clean energy R&D hit a record high last year, despite the global energy crisis, geopolitical volatility and macroeconomic uncertainty. Public spending on energy R&D rose to nearly USD 44 billion globally in 2022, over 80% of which was allocated to clean energy. To bring clean energy demonstration projects in line with the needs in the NZE Scenario, in 2022 16 governments committed USD 94 billion in public funding for large-scale demonstration projects by 2026. The IEA is monitoring clean energy demonstration projects to improve global understanding of technology coverage, total public funds spent and private co-investment unlocked as a result. Major policy developments of the past few years, such as the Inflation Reduction Act in the United States, the Net Zero Industry Act in the European Union, and China's latest Five-Year Plan, will also have an impact on clean energy innovation and technology development.

On the corporate side, energy R&D spending by globally listed companies exceeded USD 130 billion in 2022, up 10% year-on-year and returning to the pre-Covid trajectory. Spending by companies developing renewables increased by 25% on average annually between 2020 and 2022, compared with just 5% over the 2010-2020 period; meanwhile oil and gas companies' R&D budgets were stable over 2010-2022. Beyond traditional energy companies – such as in aviation, rail, shipping, chemicals, cement and iron and steel – much lower shares of R&D budgets are typically spent on clean energy, indicating further opportunities to push clean energy innovation. The role of start-ups is also growing. Clean energy venture capital investments nearly doubled between 2010 and 2020, and then more than doubled again post-Covid-19, reaching USD 7 billion for early-stage and USD 35 billion for growth-stage start-ups in 2022, with notable increases in electric vehicles and batteries, renewables, and energy efficiency.

Global public spending on energy R&D, 2010-2022



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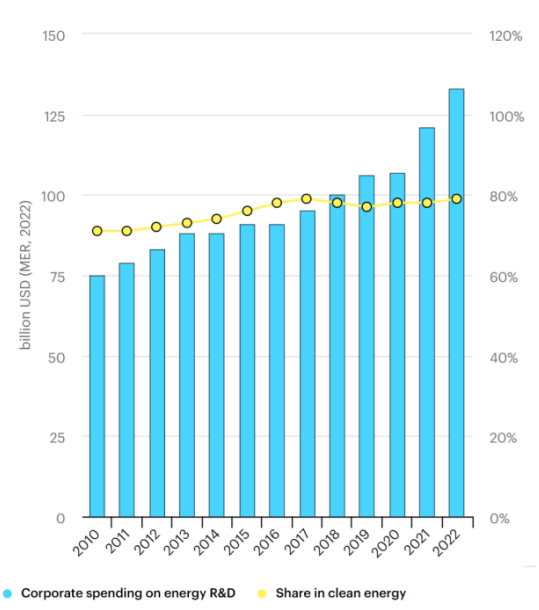
Corporate spending on energy R&D, 2010-2022



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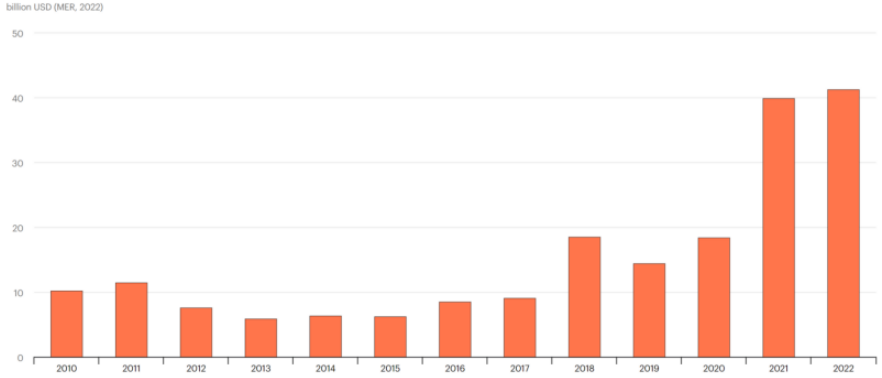
Venture capital investment in clean energy start-ups, 2010-2022



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Four priorities for decision makers

The rapid progress seen on certain clean energy technologies is an encouraging sign, suggesting the global clean energy innovation community will only get more vibrant by 2030. Recent technology developments are also creating new opportunities for entrepreneurs and countries seeking to position themselves in the new energy economy, especially in emerging and developing economies.

Yet sustained efforts will still be needed to get on track with net zero, and there are at least four priorities for decision makers:

- Stimulate innovation by fostering demand for clean energy, particularly in sectors where innovation needs are greater (e.g. heavy industry, long-distance transport), such as through public support, regulation and market incentives.

- Make pre-commercial technologies more bankable, especially in sectors where there are few clean energy options today. Contributing to fund prototyping and demonstration projects, supporting start-ups, and facilitating early-stage scale-up can share risks and improve the business case for technologies not yet on the market.

- Nurture a pool of innovators to generate diverse ideas, such as through funding for clean energy R&D and support for innovating institutions and companies. Even if net zero CO_2 emissions could be met without major discoveries, embracing the uncertainty and potential for radically new ideas as well as spillovers is important to address future challenges.

- Foster international collaboration on clean energy innovation to share good practice approaches, learnings and resources, building on existing multilateral initiatives such as the IEA Technology Collaboration Programme and Mission Innovation. Large-scale demonstration projects, in particular, can benefit from stronger collaboration.

By **Jean-Baptiste Le Marois,** Energy Innovation Programme Officer
Araceli Fernandez Pales, Head of Technology Innovation Unit
Simon Bennett, Energy Technology Analyst

China's emissions set to fall in 2024 after record growth in clean energy

Emissions are set to fall in 2024

China's CO_2 emissions have seen explosive growth over recent decades, pausing only for brief periods due to cyclical shocks.

Over the past 20 years, its annual emissions from fossil fuels and cement have climbed quickly almost every year – as shown in the figure below – interrupted only by the economic slowdown of 2015-16 and the impact of zero-Covid restrictions in 2022.

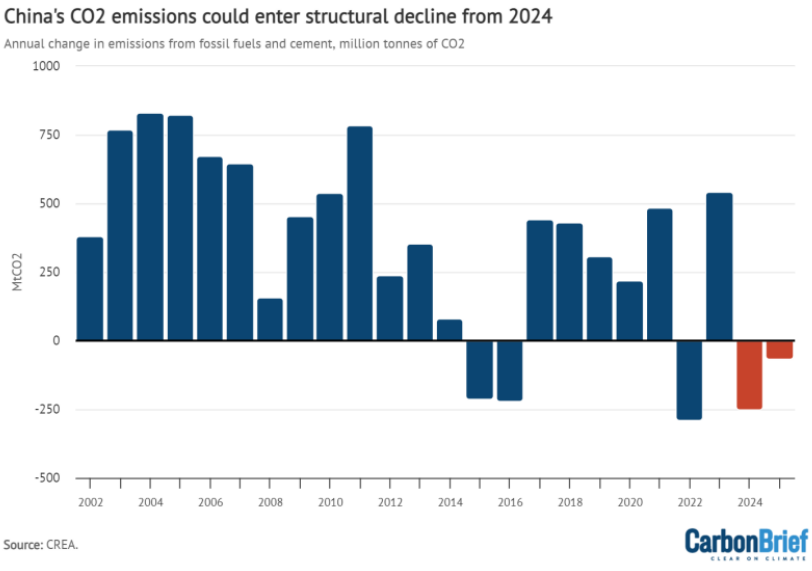
While CO_2 is rebounding in 2023 from zero-Covid lows (see: Why emissions grew in Q3 of 2023), there have also been record additions of low-carbon capacity, setting up a surge in electricity generation next year. (See: Solar, wind and hydropower set to surge in 2024.)

Combined with a rebound in hydro output following a series of droughts, these record additions are all but guaranteed to push fossil-fuel electricity generation and CO_2 emissions into decline in 2024, as shown in the figure below.

Moreover, with the power sector being China's second-largest emitter and with other major sectors, such as cement and steel, already seeing CO_2 falling, this drop in power-sector emissions could drive a sustained, structural emissions decline for the country as a whole.

This is because – for the first time – the rate of low-carbon energy expansion is now sufficient to not only meet, but exceed the average annual increase in China's demand for electricity overall.

If this pace is maintained, or accelerated, it would mean that China's electricity generation from fossil fuels would enter a period of structural decline – which would also be a first.



Year-on-year change in China's annual CO_2 emissions from fossil fuels and cement, million tonnes. Emissions are estimated from National Bureau of Statistics data on production of different fuels and cement, China Customs data on imports and exports and WIND Information data on changes in inventories, applying IPCC default emissions factors and annual emissions factors per tonne of cement production until 2019. Monthly values are scaled to annual data on fuel consumption in annual Statistical Communiques and National Bureau of Statistics annual Yearbooks. Chart by Carbon Brief.

Moreover, this structural decline could come about despite the new wave of coal plant permitting and construction in the country.

In addition, record additions of low-carbon energy deployment have been accompanied by rapid expansion in related manufacturing capacity.

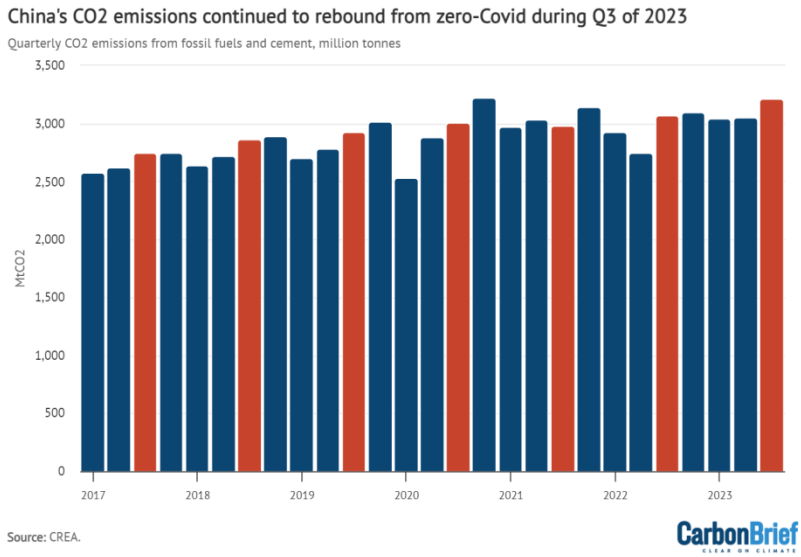
This could create tension with traditional interests in the country's coal industry, yet it also boosts the economic and political case for China to continue supporting low-carbon growth, both at home and abroad.

Why emissions grew in Q3 of 2023

China's CO_2 emissions continued to rebound in the third quarter of 2023, increasing an estimated 4.7% year-on-year, but slowing to 1% in September.

This follows rapid growth in the first and second quarters of the year, after the same periods in 2022 had seen emissions decline by record amounts.

China's quarterly CO_2 emissions from energy use and cement production are shown in the figure below, with the third quarter of each year highlighted in red.



The reasons for the emissions rebound this year are predictable. Most significantly and obviously, oil demand has risen from zero-Covid lows, following almost three years of pandemic controls.

Oil consumption is now approaching the pre-Covid trendline and does not yet show any sign of abating, increasing by an estimated 19% year-on-year in the third quarter. This is shown by the large light blue bar at the top of the figure below.

Electricity demand also rebounded from Covid lows in sectors that had been affected by pandemic controls, making power-sector coal use the second-largest driver of rising emissions in the third quarter of the year (the lowest grey bar).

China's quarterly CO_2 emissions from fossil fuels and cement, million tonnes of CO_2. Emissions are estimated from National Bureau of Statistics data on production of different fuels and cement, China Customs data on imports and exports and WIND Information data on changes in inventories, applying IPCC default emissions factors and annual emissions factors per tonne of cement production until 2019. Monthly values are scaled to annual data on fuel consumption in annual Statistical Communiques and National Bureau of Statistics annual Yearbooks. Chart by Carbon Brief.

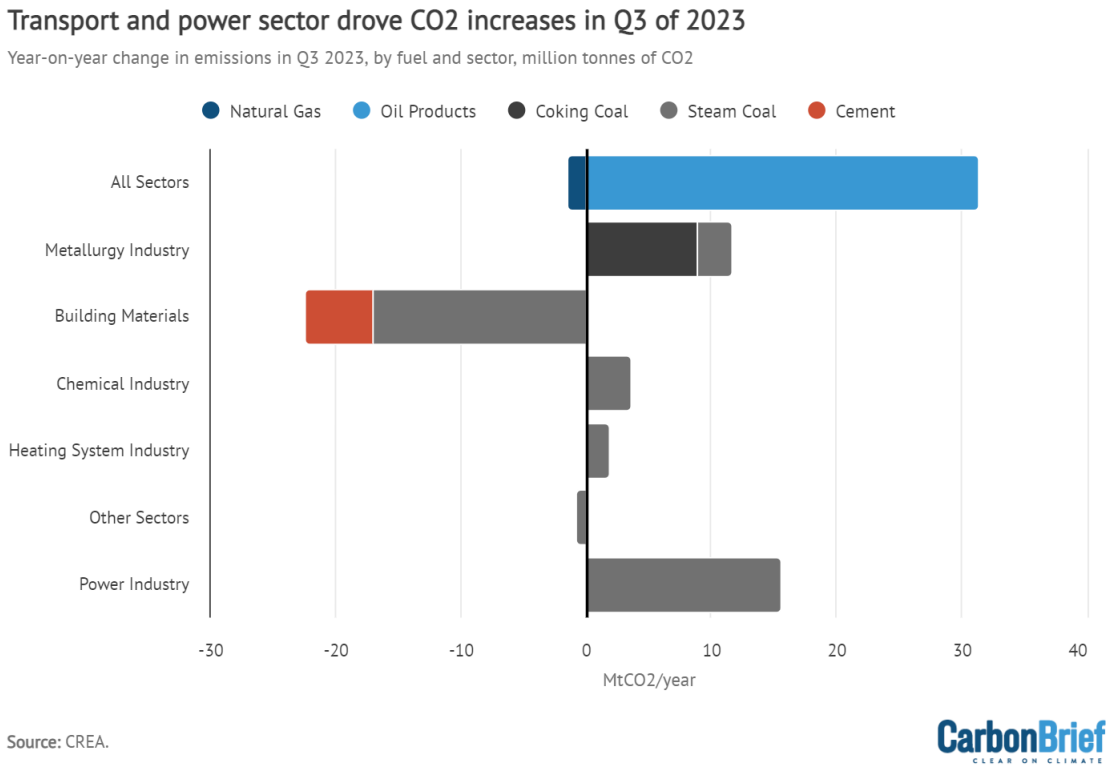
The increase in power-sector demand happened almost entirely in July, before hydropower generation began to rebound from historic lows caused by low rains in 2022 and early 2023.

Coal use outside the power sector fell (grey chunks), due to a major drop in building materials driven by the ongoing contraction of real-estate construction and construction of associated infrastructure. This is also reflected in the drop for cement emissions (red).

Other uses of coal increased, particularly the use of coking coal (black chunks). The increase in coal use for steelmaking was larger than the increase in steel output, indicating a shift from electric arc to coal-based steel production.

Investment growth – for example, investment in electrical machinery manufacturing grew 38% year-on-year and investment in railways grew 22% – has supported demand for energy-intensive commodities, despite an ongoing contraction in real estate, generally the main user of metals.

Gas use continued to fall (dark blue), reflecting a drop in demand and a shift from gas to electricity and coal due to high prices.



Annual change in quarterly CO_2 emissions broken down by sector and fuel, millions of tonnes. Emissions are estimated from National Bureau of Statistics data on production of different fuels and cement, China Customs data on imports and exports and WIND Information data on changes in inventories, applying IPCC default emissions factors and annual emissions factors per tonne of cement production until 2019. Chart by Carbon Brief.

Coal expansion threatens China's international commitments for 2025

The pattern of economic growth in China, both during and after the Covid-19 pandemic, was highly energy- and carbon-intensive. This has put China off track against the CO_2 and energy intensity targets – aimed at reducing CO_2 and energy use per unit of GDP – that it promised in its updated climate pledge (nationally determined contribution, NDC) in 2021.

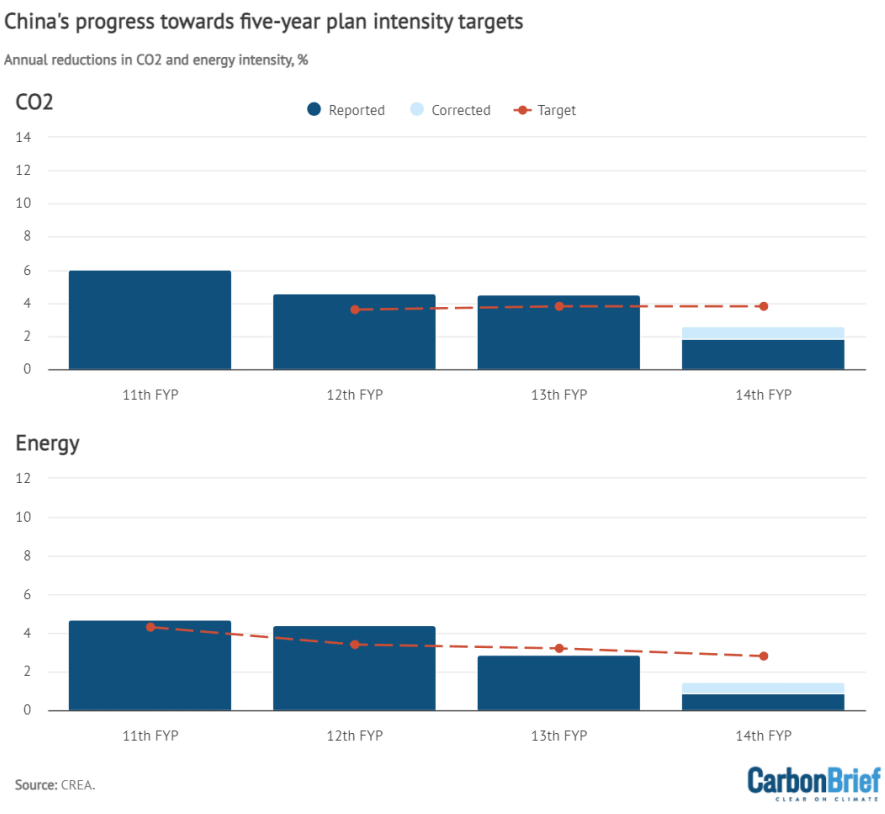
This would mark a departure from previous progress, with China having exceeded its energy and CO_2 intensity targets during the 11th (2006-2010) and 12th (2011-2015) five-year plan periods, as shown in the figure below.

The slowdown in progress on energy intensity began already at the end of the 13th five-year plan period (2016-2020), resulting in that target being missed.

The coming surge of low-carbon energy would put the country on track for the CO_2 intensity target, if similar levels are added next year.

The energy intensity target, in contrast, will not be met on current trends. Only a sharp shift to consumption-driven growth – which the government says it prefers, but has found the required measures hard to implement – could allow this target to be hit.

Permitting of new coal power plants continued, with at least another 25GW given the go-ahead in the third quarter, based on a compilation of permits reported by Polaris Network.



China's progress on reducing energy and CO_2 intensity of GDP compared to five-year plan targets, converted into required annual rates of progress. All previous targets since the 11th five-year plan (2006–11) have been met, but now progress has fallen short on both targets for three consecutive years. Source: Calculated from National Bureau of Statistics annual data on energy and GDP; 2022 calculated based on preliminary information released by the NBS. Figures for the latest five-year plan are shown as reported and as corrected for coal quality. Chart by Carbon Brief.

The resurgence of coal-plant construction contradicts a policy pledge that China's president Xi Jinping personally announced. Xi pledged to 'strictly control new coal-fired power generation projects' in China in 2021–25.

This pledge was made in the Leaders Summit on Climate in April 2021 and consequently added to China's NDC, just months before the current wave in coal power plant permitting and construction began.

The State Council Development Research Center recently projected that China's coal power capacity should peak at 1,370GW in 2030, up from 1,141GW at the end of June.

As 136GW was already under construction at the end of June, another 99GW had already been permitted, and a further 25GW has been permitted since, realising this projected peak would mean stopping new permits immediately.

Alternatively, retirements of existing capacity would have to be accelerated significantly, or some already permitted projects would have to be cancelled or shelved.

Solar, wind and hydropower set to surge in 2024

While emissions have climbed in 2023, it has also seen a historic expansion of low-carbon energy installations. The most striking growth has been in solar power, where expected installations in 2023 – some 210 gigawatts (GW) – are twice the total installed capacity of solar power in the US and four times what China added in 2020.

The newly installed solar, wind, hydro and nuclear capacity added in 2023 alone will generate an estimated 423 terawatt hours (TWh) per year, equal to the total electricity consumption of France.

About half of the solar panels added this year will be installed on rooftops, largely driven by China's 'whole county solar' model, where a single auction is carried out to cover a targeted share of the rooftops in a county with solar panels in one fell swoop.

Under this model, the developer negotiates with building owners and arranges contracts with the grid, financing, procurement, contracting and installations. This model – which could be described as centralised development of distributed solar – has enabled rooftop solar deployment at a vast scale.

The other half of solar installations are set to be in large utility-scale developments, particularly in the gigawatt-scale 'clean energy bases' in western and northern China.

All in all, 210GW of solar, 70GW of wind, 7GW hydro and 3GW of nuclear are expected to be added in China this year. This is shown in the table below, along with expected electricity generation assuming newly added capacity performs in line with the existing fleet.

Expected capacity additions in 2023 and added annual generation

Source	GW	Average utilisation	TWh
Solar	*210*	*13.6%*	*251*
Wind	*65*	*23.0%*	*130*
Nuclear	*3*	*83.4%*	*21*
Hydro	*7*	*36.7%*	*21*
Total	*284*	*17.0%*	*423*

In addition to the electricity generated by this newly added capacity, China is likely to see a large year-on-year increase in output from its massive hydropower fleet in 2024.

The utilisation of this fleet plumbed historical lows from August 2022 until July 2023, as a result of record droughts and heatwaves in summer 2022, followed by low rainfall into 2023.

The year-on-year drop in power generation was compounded as hydropower operators were conserving water in the spring and early summer of 2023, building up the water levels in their reservoirs for the peak demand season in August.

(This behaviour is clear in CREA analysis of hydropower generation data and water levels at 13 major hydropower reservoirs across China, reported by Wind Financial Terminal, showing water levels approaching historical highs while output remained low until July.)

This was in stark contrast with 2022, when spring and early summer had good rains and hydropower was generating at very high rates.

In China's rigidly regulated power system, hydropower operators do not have an economic incentive to time their output to the peak demand season. However, after the electricity shortages of summer 2022, administrative intervention appears to have replaced economic incentives and compelled generators to ensure high reservoir levels.

Now water levels in reservoirs have climbed up to or above their seasonal averages, based on data from Wind Financial Terminal. Long-term weather forecasts point to above-average rains lasting until February, the end of the forecast period, consistent with predictions for the current El Nino.

If these forecasts hold out, hydropower utilisation will not only recover but come in above historical averages in 2024. Meanwhile, another 29GW of hydropower has been added from the beginning of 2022 to September 2023, marking a 7% increase in capacity.

The hydropower generation rebound had already begun in August-September and will continue through this year. However, electricity demand growth at the end of last year was very weak due to strict Covid lockdowns, so emissions are unlikely to fall year-on-year.

Total CO_2 emissions fell 4% from the last quarter of 2020 to the last quarter of 2022, setting up a very low base of comparison for the last quarter of this year.

Continued clean-power growth can peak emissions in 2024

Given the low-carbon electricity capacity already installed this year – and the outlook for hydropower generation – a drop in power-sector emissions in 2024 is essentially locked in, barring a major acceleration in electricity demand growth.

From 2025 onwards, the development of power-sector emissions depends on whether low-carbon energy additions are maintained or accelerated.

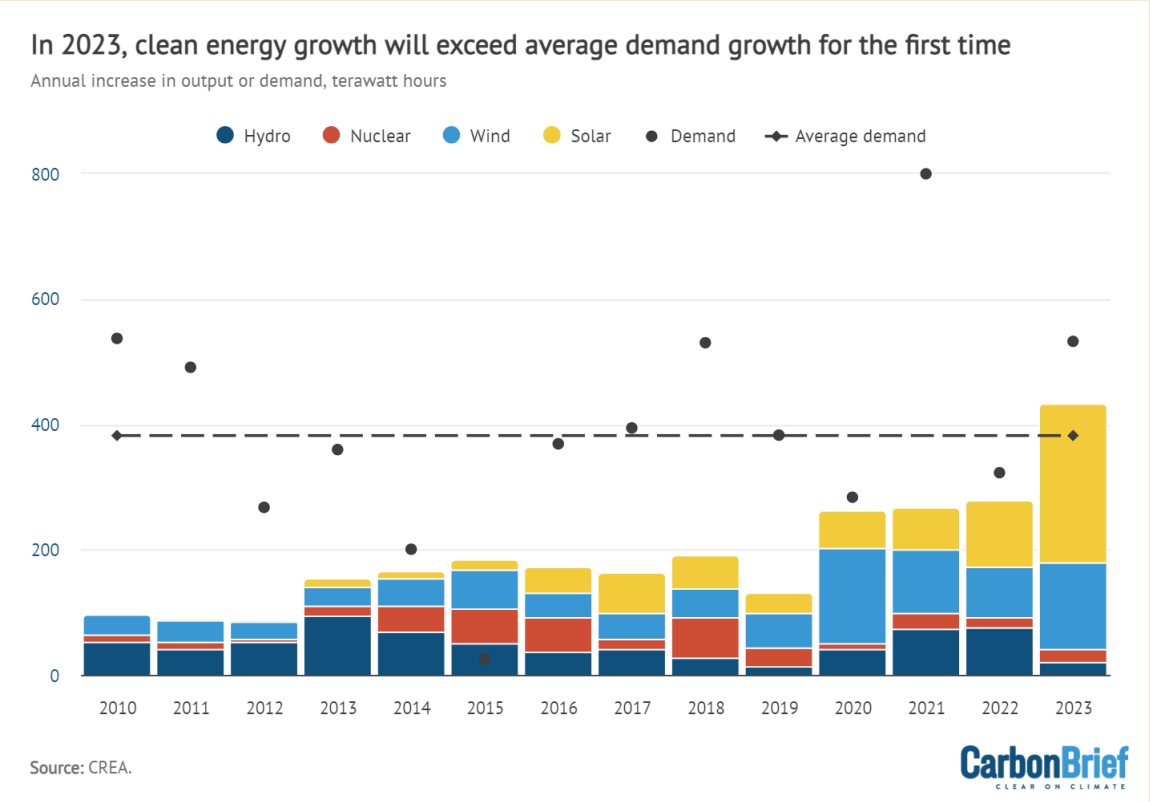
Looking at the added annual generation from low-carbon energy installations in 2023, the total comes out to more than the average annual increase in China's power demand, for the first time, marking a potential inflection point.

At this point, the growth of low-carbon electricity (columns in the chart below) would outweigh the overall growth of electricity demand (dots). As a result, the amount of electricity generated using fossil fuels – and the associated emissions – would decline.

As long as low-carbon energy installations are maintained at the projected 2023 level, the growth in low-carbon power generation would enable China to peak and decline coal use in the power sector imminently, with 2023 remaining the peak year.

How will power-sector emissions develop if the 2023 level of low-carbon energy additions is maintained?

A simple projection – assuming that electricity demand follows its historical trend of rising 5% per year and hydropower utilisation returns to historical averages – points to a significant drop in fossil fuel-based (thermal) power generation in the spring and summer of 2024, shown by the bottom left segment in the chart below, and zero growth thereafter.



Columns: Annual increase in expected electricity generation from new low-carbon installations, terawatt hours, broken down by source. Dots: Annual increase in electricity demand overall. Dashed line: Average increase in demand during 2010-2023. Figures for 2023 are forecast. Data sources: China Electricity Council (CEC) and Ember, with 2023 capacity additions from CEC and Bloomberg. Chart by Carbon Brief.

If China's current and expected economic slowdown results in slower electricity demand growth – or non-fossil energy additions accelerate further – power generation from fossil fuels will continue to fall, rather than stabilise.

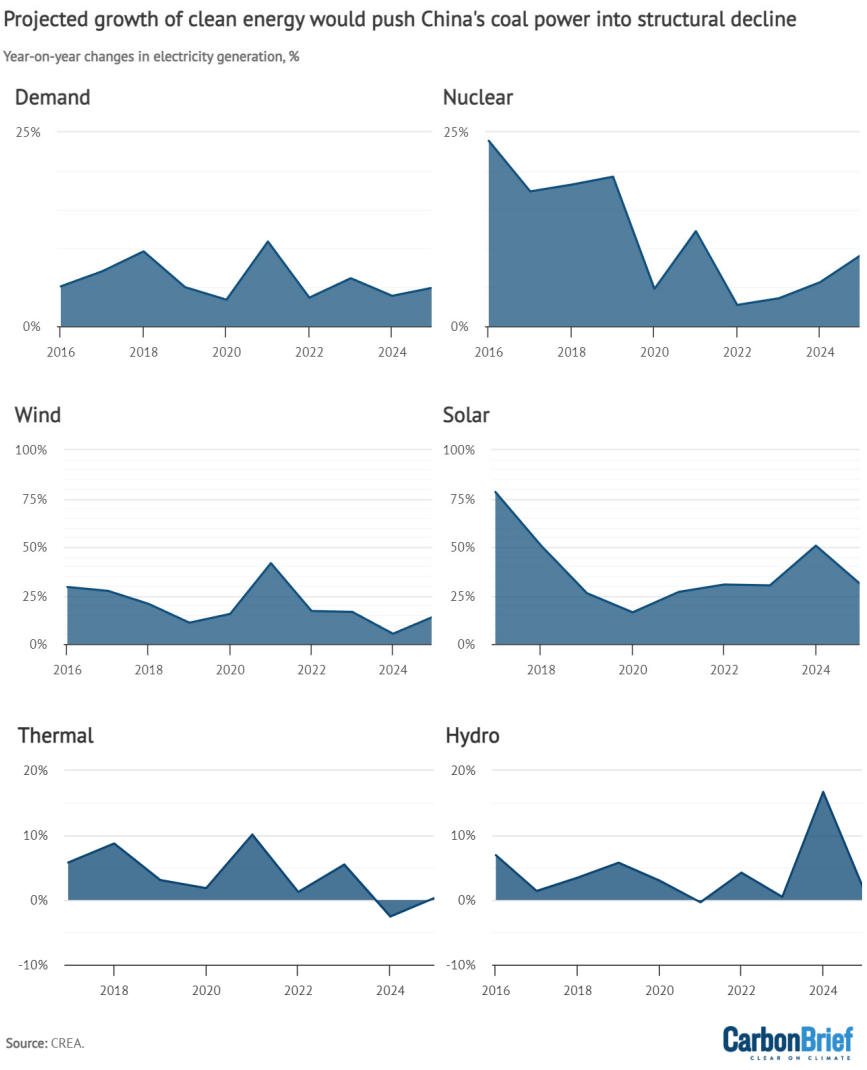
Under these assumptions, hydropower generation would see steep increases already in October 2023 - January 2024, but power generation from fossil fuels still climbs year-on-year, due to the low base set under the zero-Covid policy.

A return to average demand growth rates after the post-Covid rebound, (top left), continued strong growth in solar (centre right) and wind (centre left) output, combined with rebounding hydropower output (bottom right), would push fossil-fuel power generation down from February 2024 onwards (bottom left). This would mean fossil fuel-fired electricity generation falling 3% in 2024 and remaining at similarly reduced levels in 2025.

Moreover, rapid electrification has meant that almost all of the recent growth in China's CO_2 emissions has taken place in the power sector.

Therefore, when power-sector emissions peak, total emissions are likely to follow, as falling coal use outside the power sector balances out increases in oil and possibly gas demand, which are also mitigated by electrification.

Past and projected future year-on-year changes in monthly electricity generation, %. Top left to bottom right: Overall electricity demand; nuclear; wind; solar; thermal (coal and gas); and hydro generation. Data sources: China Electricity Council (CEC) and Ember, with 2023 capacity additions from CEC and Bloomberg. Chart by Carbon Brief.



Why did clean energy investments surge during and after Covid?

China's output of solar cells is set to exceed 600GW this year, up from 375GW last year and enough to produce 500GW of solar panels. For comparison, only 240GW of panels were installed globally last year.

The output of batteries in China will reach 800 gigawatt hours (GWh), up from 550GWh last year and enough to power 20m electric vehicles (EVs).

Electric vehicle output exceeded 8m units over the 12 months to September, representing more than 30% of all vehicles produced in China. The share of EVs in all vehicles sold in China is also on track to reach 30% in 2023, while production for the calendar year is set to reach 9m vehicles.

This is only the beginning of the industry's expansion plans. By 2025, solar-panel production capacity is expected to break 1,000GW (1 terawatt, TW), and battery production capacity to reach 3,000GWh.

What is causing this surge?

The announcement of the 2060 carbon neutrality target provided the political signal, but wider macroeconomic conditions have delivered low-carbon capacity growth far in excess of

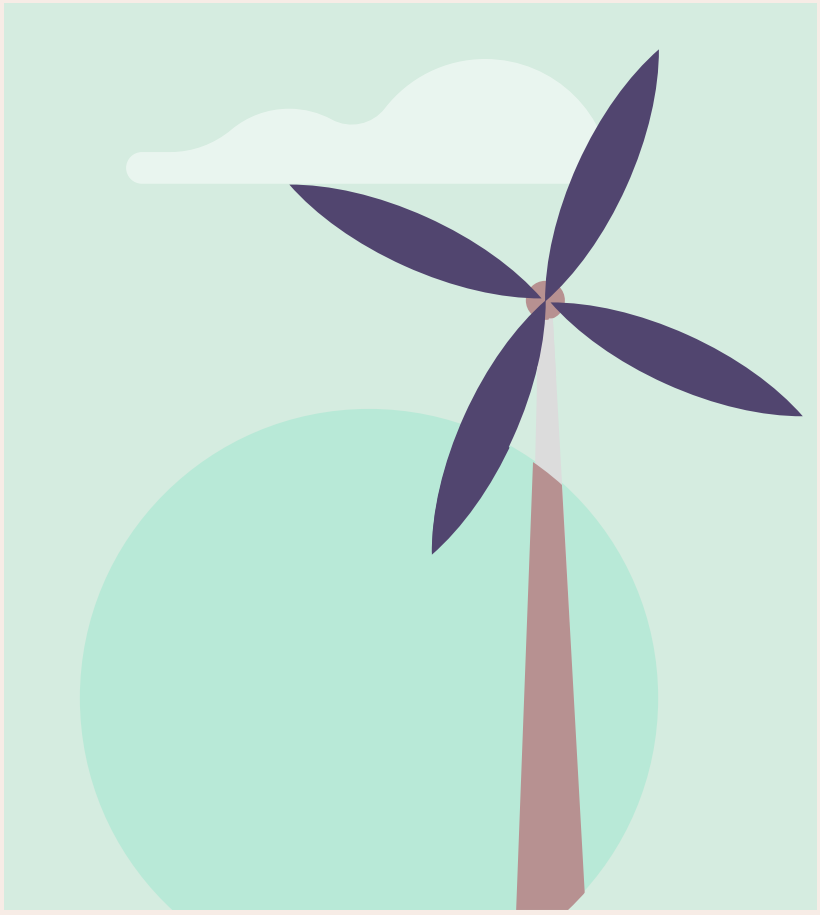
policymakers' targets and expectations, with this year's solar and wind installation target met by September and the market share of EVs already well ahead of the 20% target for 2025.

The clampdown on the highly leveraged real-estate sector, starting in 2020, led to a steep drop in the demand for land, commodities, labour and credit for apartments and associated infrastructure. This left a hole in the finances of local governments – which rely on land sales for a lot of their revenue – and hit economic growth rates.

Local governments were, thus, searching for alternative investment opportunities to drive economic growth. Yet, at the same time, their investment spending was under scrutiny due to debt concerns. China's high-level environmental and industrial policy goals made cleantech one of the acceptable sectors for their investment.

At the same time, the government made it easier for private-sector companies to raise money on the financial markets and from banks, as part of measures to stimulate the economy during the pandemic.

The low-carbon energy sector, in contrast with the fossil fuel and traditional heavy industries, is largely made up of private companies. Access to credit had earlier been a major bottleneck for them in a financial system that has heavily favoured state-owned firms.



As a result, much of the bank lending and investment that previously went into real estate is now flowing to manufacturing – largely cleantech manufacturing – as well as to cleantech deployment.

Local government enthusiasm for attracting investments to their regions meant that they often also offered major direct or indirect subsidies. Reportedly, it is common for local governments to build an entire factory and associated infrastructure, with the private company going on to occupy the site only covering the cost of machinery and operations.

All of this happened at a time when falling costs driven by technological learning and subsidies resulted in many low-carbon energy technologies becoming economically competitive against fossil fuels.

China's policymakers had favoured 'green' investments previously, as in the 2009 stimulus package launched in response to the global financial crisis. Yet the sector had been too small to absorb the huge amount of credit mobilised as a part of China's stimulus cycles. After experiencing extremely rapid growth since 2020, this has changed.

The construction of low-carbon energy manufacturing capacity, production of low-carbon energy equipment and construction of railways have been significant drivers of commodity demand this year, as the only areas of investment showing substantial growth.

This demand explains, among other things, why China's steel output has continued to grow despite the ongoing contraction in real-estate construction.

Conversely, the precipitous drop in demand for commodities from the real estate and conventional infrastructure sectors explains why the breakneck expansion of low-carbon energy sectors – and their commodity demand – has not resulted in a spike in prices.

The unprecedented investment in low-carbon technology manufacturing supply chains also means that China has, in effect, placed a major economic and financial bet on the success of the global energy transition, which could affect its diplomatic positioning.

What comes next for China's emissions peak and decline

Now that low-carbon energy expansion has reached the scale needed to start driving down China's emissions, the most important question is: will its growth continue?

China's low-carbon energy boom resulted from the confluence of numerous factors. There was – and is – clear political commitment and direction. The contraction of the real-estate market provided a push and an opportunity for the redirection of capital and investments into the renewable energy sector.

Technological learning and aggressive industrial policy improved quality and cut costs to the point where the market for low-carbon energy technologies started to expand rapidly.

It is also clear that the wave of manufacturing investment has resulted in significant overcapacity in the production of solar panels, batteries and EVs, among others, though the scale of this excess depends on the pace of the global energy transition.

This overcapacity is likely to be resolved – as in previous rounds of expansion – through consolidations and outright failures of individual players. Meanwhile, however, it will continue to depress the prices of low-carbon energy equipment.

Politically, the major challenge will only come when low-carbon energy begins to substantially cut into the demand for coal and coal-fired power.

This shift threatens the interests of the coal industry and local governments with a high exposure to the coal sector. These stakeholders could be expected to resist the transition, raising concerns about potential roadblocks.

When contraction in demand and capacity additions resulted in overcapacity in coal-fired power around 2015, coal power interests successfully argued that low-carbon energy deployment had been too fast.

As a result, the rate of low-carbon energy capacity additions slid down from 2015 until 2019, as seen in the figure above, making more space for excess coal capacity to generate power.

A similar balancing act could come into play once again, as coal and low-carbon generating capacity both continue to expand, competing to meet limited rises in demand.

The Chinese government and its advisers have argued that new coal power plants will not result in a surge in emissions, as they will be used for flexible operation at low utilisation.

China's climate targets do not yet reflect this belief, however. Its combination of intensity and low-carbon deployment targets would allow emissions to increase by another 10-15% from 2022 levels and only peak at the end of this decade.

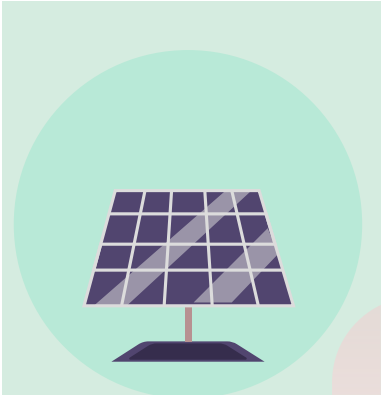
If the government wanted to more firmly cement the low utilisation of newly built coal plants, it could do so by moving towards an absolute cap on power-sector emissions under its emissions trading system – or by setting a limit on China's total CO_2 emissions.

As the government weighs these decisions, it is faced with a dramatically larger set of economic drivers and interests in the low-carbon energy sector, as compared with 2015.

These conditions could offer the motivation for policymakers to push a faster domestic transition away from fossil fuels. They also mean that China has an increasingly significant financial stake in the success of the low-carbon transition worldwide.

By **Lauri Myllyvirta**

Lead analyst at Centre for Research on Energy and Clean Air (CREA)



The ‘new three’: How China came to lead solar cell, lithium battery and EV manufacturing

Government support, economies of scale and constant innovation have helped propel China in key transition industries

The ‘new three’ has been a buzzword among Chinese officials and state media recently, as they highlight the strong performance of solar cells, lithium-ion batteries and electric vehicles (EVs) in driving China’s exports this year.

China accounts for more than 80% of the global solar cell exports, more than 50% of lithium-ion batteries and more than 20% of electric vehicles.

The main propellers behind the surging trio are consistent government support, an early start, strong and low-cost domestic supply chains, and a massive home market driving economies of scale, experts have told China Dialogue.

They also pointed to Chinese companies’ ability to continuously innovate.

But geopolitical tensions bring uncertainty to the global manufacturing future of the ‘new three’, some experts say. Trade restrictions placed on China by its major trading partners, particularly the US and Europe, could possibly affect its leading position, with some other countries showing a keenness to step in.

‘In the short term, China will likely maintain its advantage in these sectors. I don’t think other countries will overtake China suddenly,’ says Li Dan, executive secretary of the Renewable Energy Professional Committee of China Circular Economy Association.

She notes that this situation could potentially change only if other countries achieve major technological breakthroughs.

‘Very eye-catching’ performance

The concept of the ‘new three’ – or xin san yang – speaks directly to China’s ‘old three’ that were once the pillars of its exports: clothing, home appliances and furniture.

It remains unclear who coined the term, but one of the first Chinese officials to use it was Lv Daliang, spokesperson of the China General Administration of Customs. At a press conference in April, Lv highlighted the ‘very eye-catching’ performance of the ‘new three’ in first-quarter exports.

Combined exports of EVs, lithium-ion batteries and solar cells (the building blocks of solar panels) reached 264 billion yuan (US$36 billion) between January and March, a 66.9% year-on-year increase, Lv said. Altogether, they pulled up China’s overall export growth rate by two percentage points, he added.

EVs, which recorded a 122.3% year-on-year export increase in the period, led this growth. This was followed by lithium-ion batteries at 94.3% and solar cells at 23.6%, Lv explained.

This trend has continued further into the year. At a July press conference, Lv reported a 61.6% year-on-year jump for the three sectors in the first half of 2023.

China Dialogue speaks to Wu Wei, an assistant professor at Xiamen University’s China Institute for Studies in Energy Policy: ‘Because China has successfully seized the opportunity to develop its renewable energy industry, it now has substantial advantages in all three sectors globally.’

China achieved a near-monopoly in the global exports of solar cells last year, accounting for 83.8% of the total, according to data compiled by Natixis, a French corporate and investment bank.

The data shows that Chinese companies’ shares of lithium-ion battery and EV exports were less but still significant, standing at 52.3% and 23.4% respectively.

Manufacturing solar cells at a factory in Hefei, Anhui province, in October 2023. Chinese companies produce most of the world’s solar panels, as well as the parts needed to make them. (Image: Alamy)

China's share of global manufacturing at every stage of solar panel production exceeded 80% of the global total in 2022, according to Rystad Energy. The findings are presented in the Norway-based research and business intelligence company's Solar Market Report 2023.

According to the report, China's share in making polysilicon, wafers, solar cells and solar panels were, in order, 94%, 96%, 90% and 81%. Polysilicon is the key base material for the solar PV supply chain, while wafers (thin slices of semiconductors) are used to make integrated circuits in solar cells.

According to Aditya Lolla, China's battery manufacturing capacity in 2022 was 0.9 terawatt-hours, which is roughly 77% of the global share. Lolla is the Asia programme lead for Ember, a UK-based energy think-tank.

Long time coming

Although the term 'new three' is relatively fresh, the surge of the trio – all key to decarbonisation – has been a long time coming.

Beijing's policy support stretches back to the mid-2000s and has stayed consistent, laying the foundation for today's success; almost every expert that China Dialogue has spoken to emphasises this.

China introduced a renewable energy law back in 2005 to spur the exploration and usage of renewable energy. Two years later, the central government raised the energy industry to a national strategy in two key policies intended to spur the research into and manufacturing of renewable energy. The policies – the National Climate Change Programme and the Mid- to Long-Term Development Plan for Renewable Energy – elevated the industry's purpose beyond just tackling pollution.

In 2008, the industry got a huge boost (albeit indirectly) from the government's four-trillion-yuan (US$583 billion) stimulus plan to counter the global financial crisis. In the package, 210 billion yuan (or roughly 5%) was earmarked for energy-saving, emissions-reduction and ecological-engineering projects. This helped steer companies and investors towards renewables, according to a 2010 report published by WWF and China's Research Institute of Resources and Environment Policies.

The report stated: 'Large-scale new energy generation projects began one by one. Investments for the manufacturing of equipment for wind and solar power have been more active than ever before. In addition, applications in the new energy vehicle industry, such as the construction of commercial charging stations, have recently been tapped into in Shenzhen.'

By 2012, China had already 'formed a sound manufacturing chain' for the solar photovoltaics (PV) industry. According to a government paper of that year, the country was producing more than 40% of the world's solar cells.

This policy drive continued in 2015 with the launch of the 'Made in China 2025' strategy. The initiative aimed to transform China's manufacturing industry from labour-intensive to technology-intensive in 10 years. It had specific goals for the growth of domestic EV brands, and prompted a separate action plan to grow the manufacturing of power-generation equipment for solar, wind and other renewable energy sources.

The strategy was followed by two sectoral five-year plans, covering 2016-2025: the 13th and 14th five-year plans for intelligent manufacturing marked out new-energy vehicles and power-generating equipment as two of the key sectors for industrial upgrade.

Alex Wang, an expert on environmental law, tells China Dialogue that when he talked to people in China about those industrial pushes about 15 years ago, they would admit there was no clear sense of whether they would be successful.

The under-construction Chuneng New Energy lithium battery industrial park in Yichang, central China, April 2023. Once complete, this complex will be able to build 150 gigawatt-hours of batteries per year, or roughly three million EV batteries. (Image: Alamy)

'There was a logic to it and they were just trying it,' says Wang, who is now a UCLA School of Law professor and a faculty co-director of the US's Emmett Institute on Climate Change and the Environment. 'What's sort of remarkable is how incredibly successful the policy has turned out to be right now, a decade or more later,' he adds.

Supply chains and home market

Multiple experts single out China's early start and consistent policymaking for creating the country's solid home-based supply chains for these sectors – these now represent China's main edge over its competitors.

'From raw materials to the last components, [China's solar sector] has an integrated industry chain,' says Li Dan, of the China Circular Economy Association. She also identifies China's low labour costs as a bonus in the early phases of the manufacturing development.

The size of China's domestic market, which is almost unrivalled worldwide, has also given its companies a major boost.

'The Chinese market is very big and policy incentives are very generous. This means China can not only produce a lot of [renewable energy devices], but also consume many of them internally,' says Li Shuo, a global policy advisor for Greenpeace East Asia.

'Production and consumption motivate each other in such a cycle: if the products you make can be sold, it will enhance your manufacturing competitiveness,' Shuo tells China Dialogue. He adds that, as well as for labour, Chinese companies' costs on land-use and financing are helpfully low.

The economies of scale created by China's huge home market were compounded by policies that encouraged, or in some cases required, the procurement of home-grown products. For example, the 12th five-year plan (2011-2015) for the solar PV industry required 80% of the equipment and accessories used for manufacturing solar cells to be 'localised'.

Made in China 2025 stipulates that more than 70% of the one million-plus EVs and plug-in hybrids sold annually in China should be from home-grown brands by 2020. The targets for 2025 are more than 80% of the market share, or three million.

Shuo thinks the indigenous innovation of Chinese companies is often overlooked by people outside China: 'This includes the upgrade and development of those technologies that Chinese industries are already leading globally, as well as the continuous improvement of manufacturing techniques.

'China is the forerunner in the world in these areas, and that also results in China being so competitive in these sectors on the world stage.'

A solar farm being built in Saxony, Germany, using 1.1 million solar modules imported from China (Image: Jan Woitas / Alamy)

Subsidies and innovation

For some experts, the rise of the 'new three' owes much to government subsidies for manufacturers, power generators and consumers.

China Dialogue talks to Alicia García Herrero, a senior fellow at the Brussels-based think-tank Bruege: 'China used to have competitors [in these sectors], but it subsidised these industries heavily and its competitors did not … or stopped subsidising them at least 10 years ago, in the case of solar panels in the European Union.'

García Herrero says that by the end of the 2010s, the EU was home to around 60% of global solar panel production. To spur production, European countries – especially Germany and Spain – had been heavily subsidising the use of solar energy by individuals.

But because of the financial crisis, European countries lifted solar energy subsidies. 'Nobody wanted to install solar panels without subsidies [in Europe], so the market collapsed,' notes Herrero. 'There were some European companies that were operating in China, like the Spanish [company] GAMESA. [Europe] lost a lot of market share in China.'

Around the same time, China started to step up its solar push. The 'golden sun' initiative in 2009 was one of China's early efforts to drive the industry. It provided subsidies for: installing solar PV on buildings, formulating technical standards, and promoting certain key technologies.

Once its golden sun had set, China subsidised solar power generators from 2013-2019 by paying them extra when they sold their electricity to the grid. Different levels of regional governments have also been granting subsidies to encourage the development of large solar bases or the installation of roof-top solar panels, to help hit renewable installation targets.

For the new-energy vehicle industry, whose development is intertwined with that of the battery industry, subsidies have also been in play.

In one of the earliest policies for the industry, published in 2009, the central government pledged to invest 10 billion yuan over the following three years. This supported car companies in achieving various technical and product upgrades, such as developing new-energy vehicles and their accessories.

In another notice that year, the ministries of finance and technology offered one-off purchase subsidies for new-energy vehicles to public sector companies in 13 cities. Purchase boosts were extended to individual customers in 2013, which included cash rewards, tax breaks and free number plates. Today, only the tax breaks are still in place on a national level, due to run until the end of 2027.

In García Herrero's opinion however, the success of Chinese EV companies compared to their European rivals is down to something else: 'European companies opted for making hybrid cars while China focused on making electric vehicles.'

William Li, CEO of Chinese carmaker NIO, at the 2023 Shanghai Auto Industry Exhibition in April. The European Commission launched an investigation in October to determine if China's subsidies for its EV sector were 'illegal' or caused 'economic injury' to EU manufacturers. (Image: Ng Han Guan / Alamy)

Herrero also notes: 'Europe allowed for subsidies to consumers of hybrids (not pure electric), which was a mistake because it hampered the transition to the development of the EV industry.'

The US has since started subsidising its home-grown clean energy industry, particularly EVs, with the Biden administration's Inflation Reduction Act.

But Herrero says subsidies remain 'a very tricky issue' in the EU because the bloc cannot centralise them: 'You can see [EU] countries trying to give subsidies … But these are national subsidies, never as much as [those of] the US.'

Can China keep the lead?

Most experts believe China will maintain its advantage in the 'new three' sectors for the foreseeable future. But many also highlight the uncertainty brought about by geopolitical relations.

Shuo says it will be 'very hard' for western companies to overtake their Chinese competitors in the short term because they are unlikely to have the same favourable conditions – from consistent policy support to low production costs.

'I think this is an indisputable fact and something that [the US and European countries] are reluctant to accept,' he says.

But Shuo cautions that China's prospects in these sectors have become 'more of a political issue than an economic one', particularly in the US and Europe. He cites existing or potential trade restrictions, such as the US ban on Chinese solar panels and the EU's ongoing anti-dumping investigation against Chinese EVs.

There have been some suggestions that countries in other parts of Asia could seize the opportunity to boost their manufacturing.

Arsjad Rasjid, chairperson of the Association of Southeast Asian Nations (ASEAN) Business Advisory Council, told Al Jazeera in March that the ASEAN should be 'the supply chain of the world'. The Indonesian businessman, who owns the energy company Indika Energy, added that 'the new China is ASEAN'.

Ember's Lolla believes there is more to the story. He tells China Dialogue it is probably not possible for other countries to catch up to China's manufacturing capabilities for the 'new three' sectors. Instead, he sees opportunity in developing domestic, clean-energy manufacturing ecosystems as global demand continues to grow.

'I put it this way: the pie itself is growing, so despite a near-monopoly of China, there is scope for other countries to build manufacturing capacities with a good policy environment and timely interventions,' Lolla says.

Further, new technologies could have the power to change the sectors' dynamics.

'The idea that the US and Europe could compete [with China] on the existing technology seems almost impossible to imagine,' says Alex Wang. 'Where I could imagine the US and Europe could catch up is on the research and … development of new technologies.'

Wang notes that American universities have been very strong on research and development. The problem for US companies and researchers trying to develop these technologies is a lack of money, caused by years of inconsistent policy signals.

'The Americans are very aware of that past dynamic and they are putting a lot of money into research and manufacturing investment,' Wang adds. 'So, [in] the next round of technologies you could imagine, if [US companies] develop a completely new battery, chemistry or something like that, that could be a real advantage.'

By **You Xiaoying**

Implications of the Carbon Border Adjustment Mechanism for the Iron & Steel sector

On October 1st 2023, the Carbon Border Adjustment Mechanism (CBAM) became effective. As a measure to limit carbon leakage, the instrument complements the European Emission Trading System (EU ETS) by establishing a carbon price on imported goods that is equivalent to the carbon price on domestically produced goods. CBAM introduces reporting and compliance obligations for importers of goods into the European Union.

Why is CBAM needed?

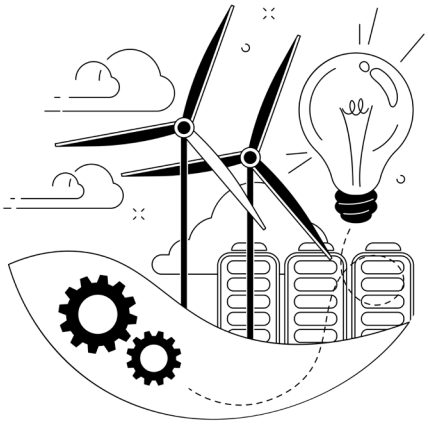
In a nutshell, CBAM is a policy instrument aiming to reduce the risk of carbon leakage under the EU ETS, the largest carbon pricing scheme worldwide that covers approximately 40% of the EU's emissions. Carbon leakage refers to the phenomenon where climate policy restricts the competitiveness of domestic manufacturers compared to foreign producers that underly less stringent policies and can produce in a less expensive but environmentally more harmful way. The risk then arises that industry moves from the regulated jurisdiction to countries with lower environmental standards. Climate policy that does not manage carbon leakage could lead to the relocation of emission-intensive manufacturers abroad. Emissions would be exported instead of mitigated, and the domestic economy remains weakened.

Under the EU ETS, regulated entities, that are subject to the risk of carbon leakage, receive emission allowances free of charge conditional on their emission intensity in relation to a sectoral benchmark. This way, the competitive disadvantage of European climate policy is mitigated. The distribution of free allowances is phased out until 2034 and CBAM serves as a substitute to reduce the risk of carbon leakage for EU's industry from there on.

What is the mechanism & scope of CBAM?

CBAM starts with a transitional period from October 2023 until end of 2025 with only reporting obligations for importers of certain goods. Importers or indirect customs representatives that transfer any CBAM goods into the EU, are obliged to calculate and report the embedded emissions that occur during the production process of CBAM goods and their precursors according to detailed rules.

The definitive period of CBAM starts in 2026. From then onwards, importers must purchase a proportional amount of CBAM certificates. The price of CBAM certificates is closely linked to the price of emission allowances in the EU ETS, momentarily around 85 Euro per ton of CO_2e and expected to range between 100 and 150 Euro by 2030. Any carbon price due for the embedded emissions in countries of origin reduces the



number of CBAM certificates to be surrendered (Figure 1). This mechanism assimilates the carbon price due for foreign and domestic goods that are sold on the EU market. Compared to the system of free allocations, CBAM not only increases the EU ETS revenues (free allocations of emission allowances are phased out), but also incentivizes ambitious carbon prices and industrial decarbonization abroad.

CBAM currently covers six EU ETS sectors accounting for roughly 50% of emissions in the EU ETS: aluminium, cement, electricity, fertilisers, hydrogen, and iron & steel. For now, in the iron & steel sector, 478 CN goods are combined into 8 aggregated goods categories that share similar production routes, system boundaries and precursors. The CBAM covers mostly emissions of CO_2 but includes perfluorocarbons for aluminium products and nitrous oxide for some fertilisers. For the iron & steel sector, only CO_2 emissions are relevant.

The European Commission will designate additional products further along the value chain of CBAM goods for potential inclusion in the regulation no later than by the end of 2024. Starting in January 2028 and subsequently every two years, the Commission will evaluate the overall effectiveness of CBAM and deliberate on the potential inclusion of additional sectors within CBAM.

What are the CBAM obligations for importers?

To fulfil their CBAM obligations, importers or indirect customs representatives must register as authorised CBAM declarants prior to the import of CBAM goods into the EU. For each calendar year, regulated companies must calculate the emissions embedded in imports following the methodology set out below and report the results through the CBAM declaration by May 31st in the following year. Within these declarations, the importers may also claim a reduction of CBAM certificates to be surrendered when a carbon price has been effectively paid in the country of origin. The information contained in the CBAM declarations must be

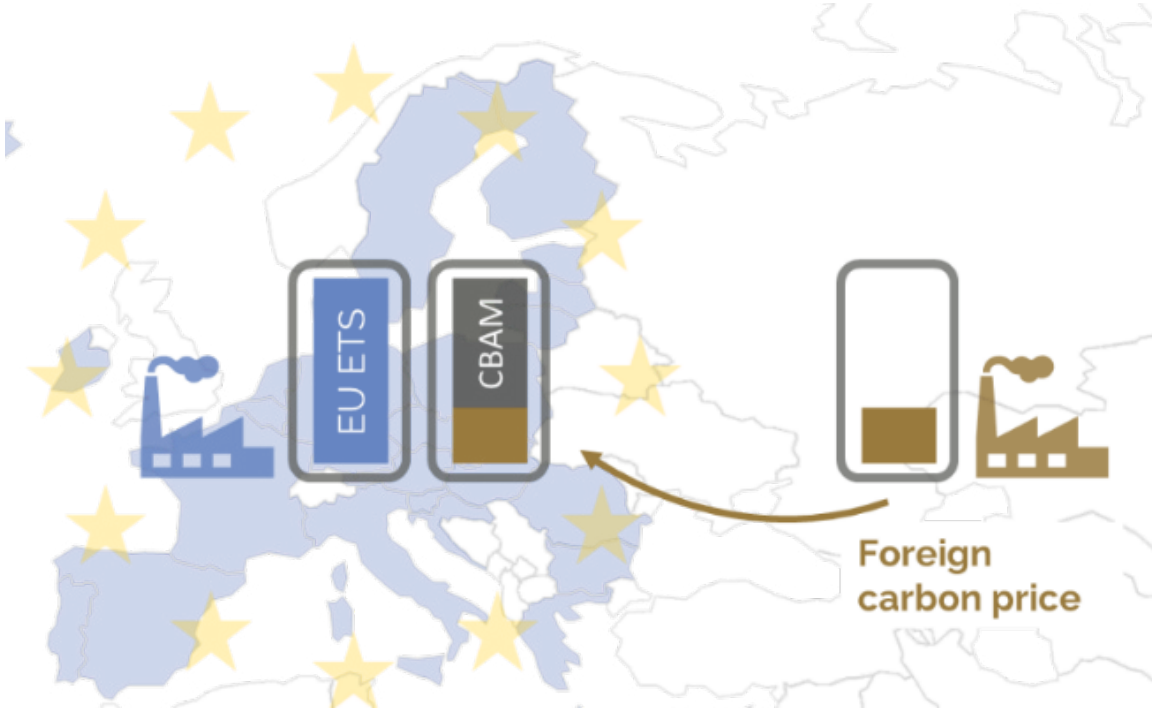


Figure 1 : CBAM - basic principle. Source: carboneer.

validated by third party verifiers that are accredited under the EU ETS regulation. Importers must get access to the CBAM registry, the platform where data on embedded emissions is communicated to authorities and where CBAM certificates are bought, surrendered, and excess certificates are sold back to the authorities.

The obligation to surrender CBAM certificates is phased in until 2034. For the transitional period, no CBAM certificates need to be purchased. Starting with the definitive period in 2026, importers need to surrender CBAM certificates. The number of CBAM certificates to be surrendered, increases proportionally to the phase-out of free allocations in the EU ETS: in 2026 regulated companies have to surrender CBAM certificates for 2.5% of their embedded emissions. This share gradually increases until it reaches 100% in 2034.

How to calculate embedded emissions

The EU defined detailed rules for the calculation of embedded emissions. Generally, CBAM declarants must consider direct emissions from the production process as well as indirect emissions from the generation of energy used in the production process. The CBAM Directive lists some goods (also from the iron & steel sector) for which only direct emissions are to be considered as the production facilities benefit from EU compensation for higher electricity prices due to carbon pricing. For the actual calculation of direct emissions, obliged entities can follow either of the methodologies:

- The calculation-based approach where raw materials and inputs used in production are combined with calculation factors such as net calorific values or emission factors.

- The measurement-based approach where emissions are determined through continuous measurement of flue gas flow and greenhouse gas concentrations in flue gases.

When CBAM declarants lack the required data to perform the calculations they can revert to default values to be used as emissions factors. Default values are to be published by the end of 2023, the EU has however published a first study indicating the differences in emission intensities among the EU and its trading partners for CBAM goods (Figure 2).

CBAM declarants can also ask their suppliers to register themselves as an operator located in a third country within the CBAM registry. They may apply above calculation methodology to their output and obtain verification according to EU ETS standards. Suppliers can then disclose the information on embedded emissions to CBAM declarants who in turn may use this information within their CBAM declarations.

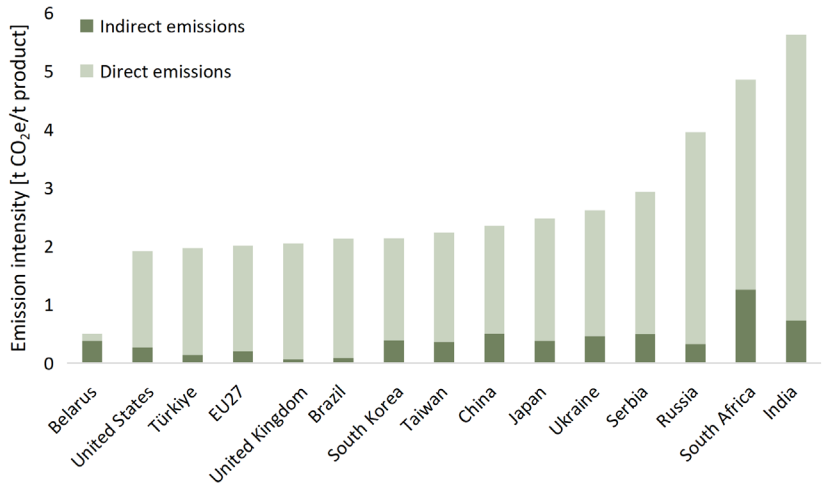


Figure 2: GHG emission intensity for CN code 7217 10 – Wires of non-alloy steel. Value for Belarus is based on the secondary production route. Source: Vidovic et al. (2023).

Which rules apply in the transitional period?

Acknowledging the challenges posed by the CBAM for declarants, the EU gradually implements the mechanism with a transitional period which started October 1st 2023 and ends December 31st 2025. The transitional period aims to function as a trial and educational phase for all involved parties, including importers, producers, and authorities. Its purpose is to gather valuable data on embedded emissions in order to improve the methodology for the definitive period starting January 1st 2026. CBAM obligations are reduced to reporting during the transitional period (Figure 3).

To increase the learnings during the transitional phase, instead of annual CBAM declarations, declarants must submit CBAM reports on a quarterly basis. The first report, covering the embedded emissions from the fourth quarter 2023 is to be submitted by January 31st 2024. The calculation and general reporting requirements are however somewhat eased for the transitional phase: In addition to the calculation methodology described above (EU Method), for the transitional period, two additional methodologies are available:

- Until December 31st 2024, embedded emissions can be determined through third country national systems such as carbon pricing schemes or monitoring systems whose accuracy and coverage is similar to the EU ETS.

- Until July 31st 2024, embedded emissions can be determined using only default values from the EU or elsewhere if calculation methodologies align.

For the transitional phase, all entities must report on both direct and indirect emissions. The exemptions for indirect emissions in the iron & steel sector mentioned above are only valid for the definitive period. Penalties can be imposed in cases where the reporting declarant fails to submit a correct or complete CBAM report or doesn't rectify errors when initiated, with penalties ranging from EUR 10 to EUR 50 per tonne of unreported emissions.

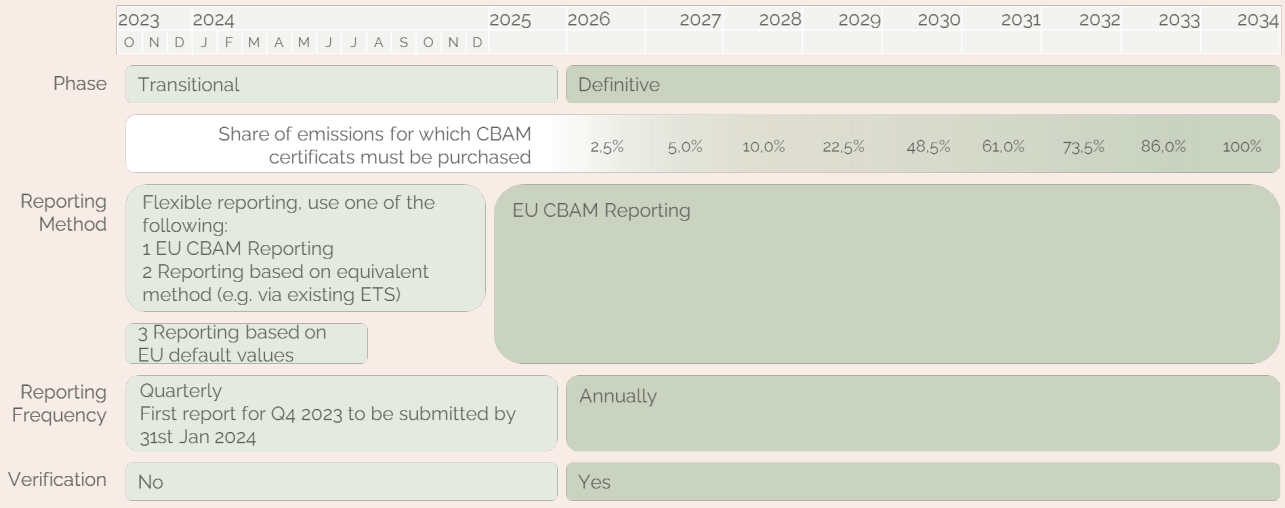
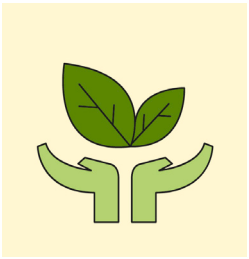


Figure 3: CBAM time schedule. Source: carboneer.

What are the immediate tasks for companies?

The definitive period is two years away, however, companies should prepare at once to comply with the legal obligations of the transitional period and to get a head start for the definitive period:

- Identify which of your imports are subject to CBAM regulations. Engage with suppliers and manufacturers to gather emissions data for imported goods. Collect information on carbon pricing schemes in countries of origin for your CBAM goods.
- Get registered as CBAM declarant or have your indirect customs representative getting registered.
- Get access to the transitional CBAM registry. This is the interface for regulators and regulated entities for the transitional period.
- Learn how to handle the CBAM reporting template published by the EU.
- Establish processes to collect emissions data and set aside personnel capacities to handle CBAM duties.
- Make use of EU ETS allowance price forecast and embedded carbon projections to assess the medium-term economic implications of CBAM regulations on your supply chain and business.
- Understand the implications of CBAM on your supply chain and assess your price and regulatory risk in different countries.



With the introduction of CBAM, emission monitoring and reporting along with carbon pricing plays an ever more important role for non-EU producers and importers. While the emission reporting obligations during the transitional period of CBAM are new to many companies and require comprehensive preparation, regulations on CBAM will evolve during the coming years and should be closely monitored by third country and EU producers as well as traders and importers alike. Details on CBAM implementation rules will for example still be required on the treatment of green electricity procurement through power purchase agreements in third-countries or on updated product lists subject to CBAM obligations. Ultimately, companies require a strategic approach towards these new realities of global trade and decarbonization.

Source:
Vidovic, D., Marmier, A., Zore, L. and Moya, J., Greenhouse gas emission intensities of the steel, fertilisers, aluminium and cement industries in the EU and its main trading partners, Publications Office of the European Union, Luxembourg, 2023, doi:10.2760/359533, JRC134682.

By **Simon Göß** and **Hendrik Schuldt**
Managing directors of carboneer
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Key Takeaways:

Energy policy ideas for the next European Commission: from targets to investments

Energy will be a crucial issue on the agenda of the next European Commission. The current geopolitical context has made clear the need to improve Europe's energy security, through a greater integration of energy markets and infrastructures among Member States. However, while this would improve Europe's resilience against shocks, it may also increase interdependencies. Moreover, the National Energy and Climate Plans (NECPs) suggest that there is a widening gap between what Member States will commit to at the national level, and what they think the EU should achieve collectively. The same risk looms for investment in clean tech manufacturing and for critical raw materials extraction, processing and recycling.

The Florence School of Regulation has produced a policy brief that identifies four main areas of intervention for the next European Commission. ECECP's researchers summarise its main points below.

1) Make Member States more accountable, encouraging them to live up to their national investment potential for energy efficiency and renewable energy

Current approach:

- Member States translate the EU targets into national pledges for decarbonisation through National Energy and Climate Plans (NECPs).
- NECPs are regularly updated to show progress, and are supervised by the European Commission.

Possible issues:

- The gap between action at the national level and the bloc's climate targets is widening, because while Member States have agreed to more ambitious targets (under the Fit-for-55 package), they have not yet translated their pledges into action.
- More ambitious greenhouse gas reduction targets, and a relatively weak framework for investments in renewables and energy efficiency, could translate into high carbon prices. If governments have to intervene in carbon markets to protect consumers and businesses, this could undermine investor confidence.

Main proposals:

- Create an EU Energy and Climate Plan, that includes tracking of progress in investments and recommendations for Member States. Such a move would counter the fragmentation in reporting while promoting cross-border cooperation. There is already a legal basis for such a Plan, and it could be extended to other sectors.
- Redirect existing EU funding for Member States towards renewables and energy efficiency investments. New funding could be made conditional upon energy targets.
- Set up a new EU fund to finance projects in Member States that possess resources but lack public budgets for green energy investments. Member States that fail to meet their investment potential, but have the economic strength, might be expected to contribute.

For more details on this section, see pages 2-4 of the policy brief.

2) Promote multilateral cooperation and solidarity among Member States network infrastructure, resource adequacy and flexibility

Current approach:

Many instruments exist both at the European and pan-European levels, such as:

- Ten-Year Network Development Plans (TYNDPs). These ensure that national plans undergo an EU consistency check.
- Trans-European Networks for Energy (TEN-E) Regulation. This includes instruments to identify Projects of Common Interest.
- European Resource Adequacy Assessment (ERAA). This process monitors the need for investments in electricity generation, storage, and demand response;
- Other instruments, including those set up in response to the energy crisis sparked by the conflict in Ukraine.

Possible issues:

- The public intervention in the market prompted by the crisis, has damaged investors' confidence, and this now needs to be restored.
- Investment is becoming increasingly challenging, but inefficiency and inadequate investment could lead to bottlenecks within existing networks that could hamper the energy transition.
- The framework or mandate under which regulators operate is not clear, due to the gap between the ambitions of the EU and those of its Member States.

Main proposals:

- Modernise and Europeanise capacity mechanisms. These can be useful to both consumers and investors to de-risk projects, but modernisation is vital if solutions are to be found that are compatible with net-zero ambitions. Europeanisation, or transferring responsibility to the European level, has the potential to enhance cooperation among Member States.
- Upgrade the ERAA to a multi-vector security assessment including all system needs. The focus should be on ensuring that Member States contribute to the security of the system, and on identifying systemic risks.
- Build an EU networks vision and new instruments for network cost allocation. Future projects will show greater interdependencies, thus requiring closer cooperation and solidarity. Potential actions include:
  - » Complementing the bottom-up TYNDP network planning exercise with a top-down EU networks vision exercise, based on a robust needs assessment.
  - » Development of a regional portfolio of projects, based on cross-border cost allocation decisions for individual projects. A regional tariff component could be applied to socialise some costs.

For more details on this section, see pages 3-4 of the policy brief.

3) Strengthen the management of the EU's global dependencies

(for more details on this section, see page 5-6 of the policy brief)

Current approach:

- Two initiatives have been proposed by the Commission, though they are subject to amendments during the law-making process.
- The Net Zero Industry Act (NZIA) includes measures to develop a European cleantech industry, aiming for 40% of the EU's cleantech needs to be manufactured in Europe.
- The Critical Raw Materials Act (CRM Act) makes provision for a restart of mining activities, as well as more local processing and recycling of raw materials, to reduce Europe's global dependencies by 2030.

Possible issues:

- Both the NZIA and CRM Act targets have not yet been translated into national targets. It is unknown how realistic these targets will be, while different CRMs applied at Member State level might involve different risk exposures.
- The EU lags behind other players: both China and the US have already published plans for more energy self-sufficiency, while EU spending is constrained by the current Multiannual Financial Framework (MFF) 2021-27.

Main proposals:

- Member States should assess the priority of CRMs and industrial policy at the start of discussions for the next MFF.
- Compulsory origin labelling or marking could engage customers to be part of the solution.
- New EU and national agencies could help track and manage global dependencies, to reduce the gap between the ambitious targets agreed upon collectively, and the Member States' national efforts.

For more details on this section, see page 5-6 of the policy brief.

4) Reinforce the EU institutional setup

Current approach:

- In the last crisis, energy markets proved able to allocate resources efficiently. Therefore, the continued integration and development of energy markets will remain a focus area.
- At an institutional level, responsibilities are disseminated across several entities:
  - a)Member States design and update the NECPs, which are then assessed by the European Commission.
  - b)ENTSO-E is in charge of the ERAA, while ENTSOs lead the TYNDP process, with ACER supervising both.
  - c)DSOs, supervised by their national regulatory authorities, are in charge of distribution network planning, with limited involvement from the EU DSO Entity.
  - d)A 'European Net-Zero Platform' and a 'European Critical Raw Materials Board' exist to facilitate coordination between the EU and Member States on responses to the NZIA and CRM Act, respectively.
  - e)Other entities include the European Scientific Advisory Board on Climate Change, the European Environment Agency, the European Climate Infrastructure and Environment Executive Agency.

Possible issues:

- There is a fragmentation of reporting efforts across different legislative remits. During the most recent energy crisis, it was difficult to access timely and strategic information.
- National governments struggle with NECPs, and the Commission has limited resources both to track progress and to intervene.
- The ERAA is focused only on electricity and does not take into account interdependencies.
- ENTSO-E and ENTSO-G are closer, respectively, to the interests of electricity and gas network companies.
- The EU DSO Entity is relatively new, so it is unclear how the planning efforts of DSOs will be coordinated with TSOs. Plans have been announced for a new entity for hydrogen (the European Network of Network Operators for Hydrogen - ENNOH).
- The ENTSOs and EU DSO Entity might be biased when considering the trade-offs between network solutions and non-network solutions.
- The competent authorities for the NZIA and CRM Act still have to be established. It remains to be seen whether they will have enough power and resources to act effectively.

Main proposals :

- Improve capacity building for national administrations. DG Reform can play a crucial role in building flagship projects.
- The Joint Research Centre of the European Commission can support Member States with their reporting requirements, for instance by providing modelling tools and resources to run them.
- Empower ACER with new resources and responsibilities could improve the technology neutrality of TYNDPs and ERAA, and support the decisions for cost allocation for network projects.
- Merge ENTSOs, ENNOH, and the EU DSO Entity into one EU Energy Networks entity, which could result in an organisation that is more independent of its members, thus reducing the decision bias between network and non-network solutions.
- Create an EU Energy Agency. This could be responsible for the EU Energy and Climate Plan, with investment progress tracking and recommendations for Member States. Moreover, it could support both the Member States and the Commission in the governance of the NECPs, and might supplant the new platforms put forward in the NZIA and CRM Act.
- Alternatively, the above responsibilities could be assigned to existing agencies, such as ACER. A new board of national energy agencies could complement the Board of Regulators to oversee the new tasks, although in the case of ACER the governance also provides for the new tasks to be without board oversight.
- Reducing the number of entities could make it easier to achieve overall governance of energy policies.

For more details on this section, see page 6-7 of the policy brief.

Conclusions

Main proposals:

- Create an EU Energy Climate Plan to track progress in investments and send recommendations to Member States, aimed at increasing their accountability.
- Build an EU networks vision to complement the existing bottom-up processes; expand the functions of the ERAA beyond electricity and adequacy; Europeanise and modernise capacity mechanisms.
- Increase funding and empower cost-allocation mechanisms for EU entities in several domains, including investment in renewables and energy efficiency, networks, and the EU energy system's flexibility and resource adequacy. The next MFF negotiations should address the amount of funding that Member States are willing to allocate for the energy transition.

Possible issues:

- DG Reform of the European Commission must have a pivotal role in enhancing capacity building for national administrations.
- Several proposals should be discussed, such as a reinforcement of ACER, merging ENTSOs with ENNOH, and creation of an EU Energy Agency.
- Reducing the number of entities has the potential to strengthen and simplify the governance framework.

Summarised by Andrea Montanari, ECECP Junior Postgraduate Fellow

For more information, please refer to the original full version.

Monthly News Round-Up

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

MEPs back plans to broaden Net-Zero Industry Act

Members of the European Parliament (MEPs) have voted to include 17 technologies in the EU's Net-Zero Industry Act (NZIA), which is intended to bolster Europe's manufacturing output in technologies needed for decarbonisation. Initially proposed by the Commission in March, the NZIA sets a target for Europe to produce 40% of its annual deployment needs in net-zero technologies by 2030 and to capture 25% of the global market value for these technologies. MEPs have now broadened the scope of the draft legislation to encompass the entire supply chain, including components, materials and machinery for producing net-zero technologies. Amendments include a comprehensive list of technologies, periodically updated, covering nuclear fission and fusion, sustainable aviation fuels (SAFs), and specific industrial technologies. The law also aims to streamline permitting processes, suggesting 'Net-Zero Industry Valley' initiatives to expedite the environmental assessment for Member States. Additionally, it incorporates the innovation principle and mandates an annual competitiveness review by the Net-Zero Europe Platform.

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ENTSO-E reports adequacy of electricity supply across the EU this winter

The overall security of Europe's electricity supply has improved, according to ENTSO-E, the EU network of transmission system operators for electricity in its Winter Outlook 2023-24. While some limited risks exist in remote areas due to possible extreme weather conditions and unplanned outages, the report finds that overall there is an adequate electricity security situation in the EU and neighbouring countries connected to the EU grid. The improvement is the result of EU's preparedness efforts: its gas storage facilities have been filled around two and a half months ahead of the 1 November deadline. In addition, the power generation fleet has expanded since the last winter, with a huge build out of the renewables, and therefore planned outages for this winter are lower. At the same time, demand for electricity is set to remain stable. These conditions create a favourable environment for adequacy and a lower reliance on gas for this winter.

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Intermediate gas storage filling targets announced for 2024

The European Commission has announced intermediate gas storage filling targets for EU Member States in order to ensure 90% of gas storage is filled by 1 November 2024, as required by the EU Gas Storage Regulation. Intermediate and binding targets are set for 1 February, 1 May, 1 July, 1 September 2024 for Member States with underground storage facilities and for European countries that are connected to the EU market. In 2023, EU-wide gas storage facilities were filled to 100% by 1 November, well above the 90% target.

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European Commission releases the EU ETS 2024 auction volumes

The European Commission has disclosed the EU ETS 2024 auction volume for general and aviation allowances, reflecting changes in the ETS Directive. A total of 244 million general allowances (EUAs) will be auctioned for Member States, and nearly 87 million for the Recovery and Resilience Facility. Additionally, over 35 million EUAs will be auctioned for the Innovation Fund, and almost 97 million for the Modernisation Fund from January to December 2024. The EU ETS covers emissions from over 11 000 EU installations, and from 2024 will include the maritime transport sector.

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EU reaches deal on new rules to curb methane emissions

The EU Council and Parliament have reached a provisional political agreement on a regulation aimed at tracking and reducing methane emissions in the energy sector. The new requirements will impact the oil, gas and coal sectors, requiring them to measure, report, and verify methane emissions. The rules include mitigation measures, such as detection and repair of methane leaks, and limits on venting and flaring. The regulation puts forward global monitoring tools to ensure transparency on methane emissions from oil, gas and coal imports into the EU. Exporters to the EU will need to apply monitoring, reporting and verification measures by 1 January 2027, and meet maximum methane intensity values by 2030.

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North Sea countries to tender 15 GW of offshore wind annually by 2030

Nine North Sea countries have agreed to collaborate with the European Commission on offshore wind tenders to allocate nearly 100 GW by 2030, in an effort to make the North Sea the largest source of sustainable energy in Europe. The North Seas Energy Corporation has undertaken to tender around 15 GW annually, which will enhance predictability and foster collaboration in the offshore wind sector, such as on cables, pipes, harbour infrastructure and access to resources. The collective planning process begins with a shared infrastructure plan for the North Sea, published by ENTSO-E, in January 2024. The NSEC comprises Belgium, Denmark, France, Germany, Ireland, Luxembourg, the Netherlands, Norway, and Sweden, which together aim to achieve 260 GW of offshore wind capacity by 2050, representing about 85% of the EU's goal of 300 GW by 2050.

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EU launches landmark Hydrogen Bank auction

The European Commission launched the first European Hydrogen Bank auction on 23 November 2023, providing renewable hydrogen production with EUR 800 million of funding. Renewable hydrogen producers can now bid for funding support from emissions trading revenues through the Innovation Fund which will be delivered in the form of a fixed premium per kilogram of hydrogen for up to 10 years. The terms and conditions for the auction, published in August (2023), set the fixed premium's ceiling price at EUR 4.5/kg. Bidders need to apply for the funding before 8 February 2024. Earlier, on 20 November 2023, European Commission President Ursula Von der Leyen announced plans for a second European Hydrogen Bank auction round, with a total value of EUR 3 billion, alongside further measures to diversify imports of renewable hydrogen.

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European Commission to create SMR Industrial Alliance

In response to calls from the nuclear industry, research community and nuclear safety regulators, the European Commission has announced plans to establish an Industrial Alliance centred on small modular reactors (SMRs) in early 2024, European Commissioner for Energy Kadri Simson has announced. SMRs are expected to help decarbonise hard-to-abate sectors in the EU. The groundwork for the Alliance has already been laid by the European SMR pre-Partnership, which was set up in June with the overall objective of identifying enabling conditions and constraints, including financial ones, relating to the safe design, construction and operation of SMRs in Europe in the next decade and beyond in compliance with the EU legislative framework in general and to the Euratom legislative framework in particular. This new move signals European Commission is now giving full backing to this key technology of the future.

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Germany presents hydrogen core network plan

German economy minister Robert Habeck has unveiled a plan for the development of a core hydrogen network spanning 9 700 km across the country, 60% of which will use retrofitted gas pipelines. The core hydrogen network is designed to reach all federal provinces with a threshold of 100 MW set as a reference point to determine the areas to which the core network should extend. This means that additional distribution network branches will have to be established in addition to the core network, in order to ensure hydrogen supply to all areas. The core network is designed for a capacity of 270 TWh, almost three times the projected hydrogen demand for 2030, estimated to be around 100 TWh. In the final stage of development, Germany is expected to produce enough hydrogen to meet 30% to 50% of its domestic demand, with the rest covered by imports. Construction is expected to begin next year after the final approval is in place.

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France unveils new National Energy and Climate Plan

France has unveiled its National Energy and Climate Plan (NECP), targeting a 50% reduction in GHG emissions excluding LULUCF (land use, land use change and forestry) by 2030 and carbon neutrality by 2050, with a focus on energy efficiency measures and the reduction of energy consumption alongside the deployment of more renewables and nuclear. The plan intends to achieve a 30% cut in final energy consumption by 2030 compared to 2012, and a primary energy consumption of 157 Mtoe. Fossil fuel consumption reductions include a 70% decline in coal-based energy, 50% in petroleum, and 40% in gas by 2030. Decarbonised energy should meet 58% of energy needs by 2030 and 71% by 2035. Renewable energy goals include 45% in heating and cooling by 2030, with substantial capacity targets for PV, onshore and offshore wind. Additionally, 9.9 GW of new nuclear capacity is planned by 2026.

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Sweden plans massive expansion of nuclear power

Sweden has outlined ambitious plans to build the equivalent of two conventional nuclear reactors by 2035 and aims for ten by 2045 to meet rising power demands from industry and transport. The expansion, projected to triple nuclear capacity, aligns with Sweden's goal to double electricity production to 300 TWh/yr by 2045. The government suggests that small modular reactors (SMRs) could be part of the mix. At the end of 2022, nuclear power constituted about 14% of Sweden's installed capacity, with 6.9 GW, and nearly 30% of power generation, amounting to 51.5 TWh.

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Sweden's Northvolt makes breakthrough in sodium-ion battery technology

Swedish start-up Northvolt has announced a breakthrough in its sodium-ion battery technology, developed for use in energy storage systems. The technology is based on a hard carbon anode and a Prussian White-based cathode, and does not involve the use of lithium, nickel, cobalt and graphite . Prussian White is a material used in the positive electrode of sodium-ion batteries, preferred for its low cost and high sustainability. Northvolt plans to be the first company to industrialise Prussian White-based batteries and bring them to commercial markets. The batteries' energy density stands at more than 160 watt-hours per kilogram (Wh/kg) compared with an average energy density of 200-300Wh/kg for a lithium-ion battery. The stability and energy capabilities of sodium-ion batteries have significantly improved over the past year as companies look to diversify away from lithium amid soaring costs and supply shortages.

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UK raises prices for projects in renewable energy auction

The UK government has increased the maximum price that renewable energy projects can receive in the next Contracts for Difference (CfD) auction round. This adjustment includes a 66% increase for offshore wind projects, from GBP 44/MWh to GBP 73/MWh, and a 52% increase for floating offshore wind projects, from GBP 116/MWh to GBP 176/MWh. Maximum bid prices for geothermal, solar and tidal power projects are also set to increase by 32%, 30% and 29%. The CfD scheme provides a guaranteed price for electricity generated by renewable energy projects. The recent changes aim to ensure that projects in the next CfD auction are economically viable and competitively priced.

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UK pledges GBP 960 million to green industries

In the UK's annual Autumn Statement, Chancellor Jeremy Hunt unveiled a GBP 960 million investment plan by 2030 for a 'green industries growth accelerator' program. The program will support manufacturing within clean energy sectors, focusing specifically on the ramping up of carbon capture utilisation and storage (CCUS), hydrogen, offshore wind, electricity grid networks and nuclear energy. The statement extended the Climate Change Agreement Scheme, offering GBP 300 million in annual tax relief to energy-intensive businesses, supporting energy efficiency and the net-zero transition until 2033. An electricity generator levy exemption for projects initiated after 22 November 2023 was also introduced. The statement addressed grid challenges, pledging 'substantive action' to reform the grid connection process, freeing up 100 GW of capacity as part of the Connections Action Plan. Observers were disappointed that the Autumn Statement did not include plans to introduce the UK's own carbon border tax to match the EU's CBAM.

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Norway opens world's first wind-powered offshore oil platform

The world's first wind-powered offshore oil platform has been officially opened off the west coast of Norway. Opened by Crown Prince Haakon, the new oil rig is powered by the world's biggest floating offshore wind farm, Hywind Tampern farm. Operated by fossil fuel giant Equinor, Hywind Tampern entered full operation in October 2023 and has 88 MW of capacity. It is hoped that emissions on the new rig will be slashed by using electricity generated by the 11 giant wind turbines. The development represents a significant step towards cleaner oil production as Norway looks to safeguard the oil sector.

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China to launch inter-provincial spot power trading by end-2023

China's National Development and Reform Commission (NDRC) is set to officially launch inter-provincial spot power trading across the country by the end of 2023. With the objective of establishing a national spot market in China by 2030, the NDRC plans to initiate continuous settlement operations for the inter-provincial power trading market after initial trials. Various provinces, including Fujian, Liaoning, Jiangsu, Anhui, Henan, Hubei, Hebei, Jiangxi, and Shaanxi, aim to pilot spot trading by the end of 2023. Zhejiang and the Beijing-Tianjin-Hebei regional power market anticipate beginning trials before June 2024. The ultimate goal is to integrate China's six regional power networks into a unified electricity market by 2030, facilitating spot trading between provinces and enabling a more responsive approach to supply and demand fluctuations. As of 2022, inter-provincial trades represented less than 1% of market-traded electricity, primarily settled through longer-term contracts rather than immediate supply and demand dynamics.

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China to launch coal power capacity pricing mechanism

China's National Development and Reform Commission (NDRC) has announced that Chinese coal-fired power producers will be guaranteed payments based on their installed capacity, starting in January 2024. With this move, the NDRC aims to ensure stability of supply in the country while it transitions towards renewable power sources. The payment will be in the form of a tariff paid to coal-fired power producers by the grid company, which will be collected through a surcharge from industrial and commercial end-users. The capacity payments will be calculated based on fixed costs of CNY 330/kW/yr for coal-fired power plants. According to the NDRC, coal-fired power plants in most of China's regions will be able to recover around 30% of their capital costs between 2024 and 2025 (up to 50% in some regions). From 2026 onwards, the capacity payment rate will be increased to cover at least 50% of capital costs in all regions of China.

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China unveils plan to tackle methane emission

The Ministry of Ecology and Environment in China has released a comprehensive plan outlining strategies to reduce methane emissions. Unveiled ahead of a US-China climate summit, the plan focuses on reducing emissions from various sources, including coal mines, rice paddies, landfills and other methane sources. Coal firms will be encouraged to capture more methane emissions, which can then be burned to produce electricity, heat the mines or dry coal. The country will also boost monitoring, reporting and data transparency to curb methane emissions. Notably, while the plan discusses emission reduction strategies, it lacks specific targets and does not commit China to the Global Methane Pledge, which seeks a 30% reduction in emissions by the end of the decade compared to 2020 levels.

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NEA releases new rules for grid dispatch of new energy storage

On 20 November 2023, China NEA released a draft notice on the integration and dispatch of new energy storage for public consultation. The document outlines the scope of new energy storage eligible for power system dispatch. These assets fall into two categories: dispatchable new energy storage and captive energy storage stations for power plant or consumer use. For new energy storage stations that already participate in the power markets, priority will be given to scheduling operations based on market clearing results. For those that do not currently meet market conditions, dispatching will be done through specific instructions. The document also advocates upgrades to existing new energy storage stations of various types so they can participate in grid dispatch, and deliver their full flexibility potential. This draft notice opens up significant growth potential for the new energy storage market.

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China to speed up carbon footprint management for products

China has pledged to build a carbon footprint database and introduce ways to calculate carbon footprints for 50 products by 2025, rising to 200 items by 2030, in a renewed push to reach peak carbon emissions. The policy advocates development of an internationally-recognised system for calculating the full life cycle of a product's carbon footprint and a national product carbon labeling certification system. It also flags plans to build China's own database to include carbon data from key industries. Observers remark that the policy signals China's intention for its carbon data calculations to be on a par with those of other world powers, and could be a response to the EU's introduction of its Carbon Border Adjustment Mechanism in October.

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China initiates pilot projects to boost biodiesel sector

The National Energy Administration (NEA) in China has announced the launch of pilot projects aimed at promoting domestic production and consumption of biodiesel. This move is part of China's efforts to strengthen environmental initiatives in the energy sector, where it currently lags behind other major economies. The initiatives include integrating the used cooking oil (UCO) feedstock supply chain, distributing biodiesel at highway gas stations, and advocating for its inclusion in a voluntary national certified emission reduction mechanism. The NEA has urged local authorities to conduct demonstration projects across various aspects of the biodiesel industry and recommended regional governments provide financial support.

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Fifteen cities to electrify all public vehicles

Fifteen cities across China have launched pilot projects that will see full electrification of public sector vehicles, the Ministry of Industry and Information Technology (MIIT) and seven other ministries have announced. The notice does not mention a specific timeline, but it is in line with a national plan on electric vehicle development that aims to electrify all public vehicles in the country by 2035. The 15 cities include Beijing and Shenzhen, as well as medium-sized cities in all parts of the country, such as Chongqing in the south-west and Changchun in the north-east. The aim is to get a total of 600 000 electric public sector vehicles on the cities' roads, the notice states. Public sector vehicles include buses, sanitation vehicles, taxis, postal vans, and more.

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China to pilot carbon-peaking in 100 cities and zones

China will launch carbon-peaking pilot projects in 100 cities and zones nationwide to solve bottlenecks constraining the country's green and low-carbon development and explore paths toward carbon-peaking for different areas, according to a plan unveiled by NDRC. By 2025, the policy mechanisms to encourage green and low-carbon development in the pilot areas will mostly be in place, together with many innovative practices and reform measures that are feasible, replicable, and can be applied elsewhere. By 2030, the pilot cities are expected to complete primary tasks, projects, and reforms, contributing essential support for a national-level carbon-peaking strategy. The initial phase will cover 15 provincial regions, taking into account their carbon-emission volume, growth trends, and local development status. It is hoped that those innovative practices and reform measures will then play a vital supportive role for carbon peaking at the national level.

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Energy storage sector growth momentum continues

As of the end of 2022, China's energy storage capacity approached 60 GW, showing a remarkable annual growth rate of nearly 40%, according to the 2023 Energy Storage Equipment Industry Development Report. In particular, additional new energy storage capacity reached 7.4 GW in 2022, marking a 200% year-on-year increase. Technologies like pumped hydro storage and lithium-ion batteries have reached the stage of commercial production, with China leading in technologies such as lithium-ion battery storage and compressed air storage. China's share in the lithium battery industry, dominated by leading players like CATL, BYD, and EVE Energy, stands at over 70%. While power and grid storage are currently the focus of activity, the market is exploring profitable models for mature front-meter storage. Future efforts will focus on enhancing industry-demand collaboration, exploring new applications in electric vehicles, construction, and maritime sectors, and driving diversified technological scalability and continual reduction in electricity costs.

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Steel industry continue to push for ultra-low emission modification

China has made significant strides in ultra-low emission modification within its steel industry. The country is committed to implement the world's strictest emission standards in the steel sector, according to the Blue Book On Social Responsibility of Steel Industry (2023) recently released by China Iron and Steel Association. Notably, 73 Chinese steel enterprises with a total production capacity of 362 Mt have achieved ultra-low emissions throughout their manufacturing processes; while 26 steel enterprises have publicly disclosed partial-process ultra-low emission transformations, covering a crude steel capacity of around 108 Mt. The report hails the steel industry's progress in promoting low-carbon practices and technologies, such as China Baowu's hydrogen-enriched carbon recycling blast furnaces, which reduce solid fuel consumption by over 30% and cut carbon emissions by 21%.

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China to strengthen regulations governing rare earth exports

China's commerce department announced that it had added rare earths, including compounds and alloys, to its list of mineral resources and other items requiring disclosure of information such as material type and export destinations. Traders will need to immediately report the shipment, amount and time of exports of bulk commodities that are on the list, according to the circular. Analysts said that the move is in line with common international practice and the purpose is to ensure the healthy and stable development of rare earths, which are central to next-generation technologies. Although China provides more than 85% of the world's rare earths, the development of the industry remains in its early stages, resulting in prices being pushed down to a relatively low level.

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China's top corporate PPA buyers see 95% increase in green power consumption

BloombergNEF's latest rankings report reveals that China's green energy market is witnessing active participation from technology giants, heavy industry firms, automakers, and advanced manufacturers. The top five corporate Power Purchase Agreement (PPA) buyers reported a substantial 95% year-on-year increase in their total green energy consumption in 2023 compared to the previous year. Alibaba Group, the largest buyer, inked contracts for 1 610 GWh of green energy, securing the top spot. Baosteel (Baoshan Base) follows with 900 GWh. Other notable buyers include Luxshare Precision, BMW Group China, and Tencent, which purchased 650 GWh, 560 GWh, and 534 GWh, respectively. BloombergNEF suggests that improved transaction transparency will contribute to the expansion of the corporate green energy market. With rising interest from industrial enterprises, China's corporate green energy PPA market is anticipated to see continued growth in 2024.

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China and US agree to accelerate substitution of fossil fuels

China and the United States have renewed their commitment to work together to address the climate crisis. In the Sunnylands Statement on 14 November 2023, the world's two largest climate polluters backed the G20 goal of tripling global renewable energy capacity by 2030. This will entail accelerated substitution of coal, oil, and gas generation in their own economies and thereby absolute power sector emission reduction, in the 2020s. Both sides have agreed to restart formal climate change talks and relaunch a working group on enhancing climate actions in the 2020s. The group will focus on energy transition, methane, circular economy and resource efficiency, low-carbon cities, and deforestation.

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China to expand market access, ensure level playing field for foreign investors

China will put in place more robust policies to attract greater foreign investment, continuing to relax market access and providing a level playing field for foreign investors, NDRC spokesperson Li Chao said at a press conference in November 2023. The country will shorten the negative list for foreign investment, and scrap all restrictions for foreign investors entering the manufacturing industry. While revising or repealing laws and regulations that are inconsistent with the country's Foreign Investment Law and regulations on improving the business environment, the country will also promote fair competition in areas such as procurement, tax and fee cuts, and licensing and project approval. China will step up policy support for major projects funded by foreign companies, with coordinated efforts to address issues concerning land use, environmental assessment and energy consumption.

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Sinopec and QatarEnergy sign a 3 Mt/yr LNG supply contract

Chinese state-owned energy group Sinopec has entered into a 27-year supply and purchase agreement (SPA) with QatarEnergy for the supply of 3 Mt/year of LNG from the North Field South (NFS) expansion project in Qatar. As part of the partnership, QatarEnergy will give Sinopec a 5% interest in a joint venture company that holds the equivalent of 6 Mt/year of LNG production capacity in the NFS project. This marks the third SPA agreement between the two companies, following a 27-year LNG supply deal in November 2022 (for 4 Mt/yr) and a 10-year SPA in 2021. Additionally, a partnership agreement was signed in April 2023 for Sinopec to acquire a 5% stake in the North Field East (NFE) LNG expansion project. In June 2023, QatarEnergy also signed 27-year LNG supply agreements with China National Petroleum Corporation (CNPC) for 4 Mt/yr.

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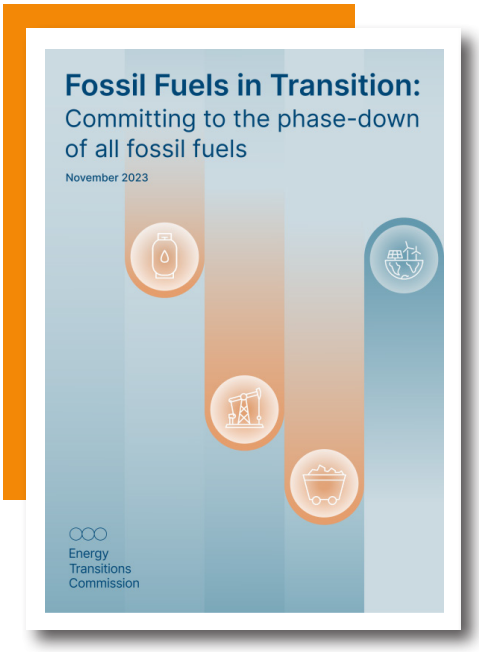
Featured Publication



Fossil Fuels in Transition: Committing to the phase-down of all fossil fuels

To meet the COP21 Paris Agreement targets, the use of coal, oil, and gas must see a dramatic reduction by 2050, making immediate action imperative. This latest report by the Energy Transition Commission (ETC) underlines the pivotal role of technology, policies, and reduced investment for a swift phase-down of fossil fuels. The analysis presents scenarios to dramatically reduce oil, gas and coal emissions from production, transport and processing of fossil fuels (scope 1 and 2 emissions). Despite encouraging signs such as EV deployment and renewable substitution of fossil fuels in the power sector, the report notes that policy will be required to extend this progress to other sectors. Crucially, the report dispels the notion that CCUS and carbon removal justify business as usual for fossil fuel production, and notes that investments in fossil fuel supply need to drop by 30%-35% by 2030 and 45%-65% by 2040, with exploration of new oil and gas fields deemed unnecessary. Any credible plans to keep global warming to 1.5°C or well below 2°C will require a significant reduction in fossil fuel demand.

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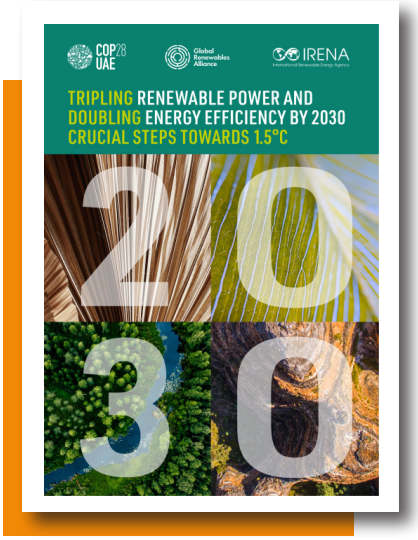

Tripling renewable power and doubling energy efficiency by 2030: Crucial steps towards 1.5°C

The success of limiting global surface temperature increase to 1.5°C above pre-industrial levels hinges significantly on the actions taken in this crucial decade. Despite this urgency, the current trajectory of the energy transition is dangerously off-track, demanding immediate, radical collective action. Tripling the deployment of renewable power generation and doubling energy efficiency are amongst the most important levers to cut greenhouse gas emissions. As the global community has an opportunity to come together at the upcoming COP28 to agree these global targets, IRENA and the Global Renewables Alliance (GRA) provides recommendations on how to achieve these targets. This report offers a high-level analysis of these targets, detailing existing shortfalls and identifying key enablers and actionable solutions in policy, regulation, infrastructure, supply chains and finance that can turn the ambitions to concrete outcomes.

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Hydrogen pipelines vs. HVDC lines: Should we transfer green molecules or electrons?

In the race to decarbonise global energy systems, a critical decision needs to be made: whether to transmit green energy as electrons through high-voltage direct current (HVDC) lines or as molecules via hydrogen pipelines. This paper by the Oxford Institute for Energy Studies explores this pivotal choice, comparing the technoeconomic characteristics of both transmission technologies. Hydrogen pipelines offer advantages when it comes to transporting larger energy volumes, capitalising on hydrogen's similarities to natural gas. However, there are challenges associated with hydrogen's small molecular size and compression requirements. HVDC lines transmit green electrons efficiently over long distances, forming a global network, but face challenges when it comes to intermittent renewable energy. Instead of viewing them as standalone competitors, this paper emphasises that the two technologies are complementary and advocates a holistic perspective in the emerging energy landscape.

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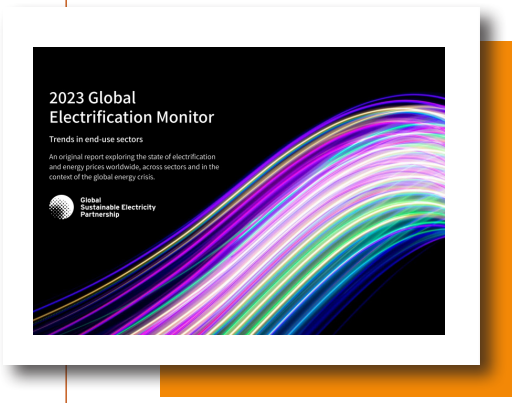

2023 Global Electrification Monitor

This flagship publication from the Global Sustainable Electricity Partnership (GSEP) presents a sweeping analysis of the state of electrification around the world and identifies the most promising opportunities for acceleration across the buildings, transport, and industry sectors. The current energy crisis has shone a spotlight on energy security and affordability, and the 2023 edition of the report includes a special analysis of energy prices through 2022. Its key findings reveal that the ongoing energy crisis is having a significant influence on global energy prices, and calls for efficient, electrified technologies to counter the impact on energy security and bills. It underscores the importance of government action in creating a fair environment for efficient electrified solutions and highlights the role of subsidies in community crisis response.

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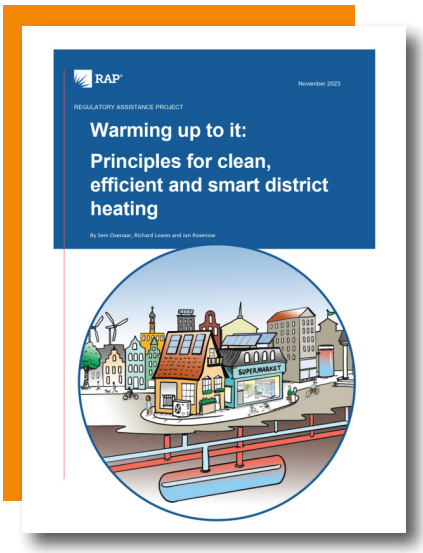
Warming up to it: Principles for clean, efficient and smart district heating

Accelerating the decarbonisation of heating is imperative to meet the EU's climate and renewable energy targets while ensuring a reliable and affordable heat supply. In the EU, the heating of space and water in buildings accounts for one-third of final energy demand, with only 25% of that energy coming from renewable and low-carbon sources. To achieve the 2030 target of 43% clean heat, a 2% annual increase in green heating capacity is required over the next seven years. District heating, utilising waste, and ambient and renewable heat can play a pivotal role, but the heating needs to be both clean and efficient. For this, modernisation and decarbonisation are vital for district heating systems of various sizes, while areas currently using fossil fuels for heating need to transition to clean sources. Coordinated policies integrating heat planning, district heating decarbonisation, building renovation, and gas grid phase-outs are essential. This paper by the Regulatory Assistance Project (RAP) explores and provides examples of various policy strands that can be used as part of a coordinated approach towards this end. It also proposes a set of guiding principles for clean, efficient and smart district heating for policy makers and regulators at the EU and national level.



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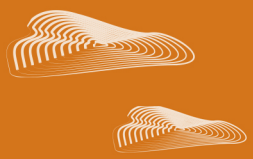

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