GridBeyond®

Targets, trajectories and temporalities

Contextualising net zero

Global Energy Trends 2024

A GridBeyond Academy Resource

Introduction

In an era defined by uncertainty, complex geopolitical tensions, volatile supply chains and the urgent need for rapid cuts in global emissions, the energy transition has reached a critical inflection point. But the need to reach net zero remains as critical as ever.

In this White Paper, which is the 2023-24 edition of our Global Energy Trends series, we look at the reality of, expectations for, and pathways towards net-zero, evaluate whether we on the right track? Explore how the gaps can be bridged by action and technology? And ask what can be done by policy-makers, regulators and industry to move the energy transition from target and trajectories to net zero.

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Foreword

"In an era marked by unprecedented challenges and opportunities, the global energy landscape stands at a crossroads. Over recent years we have witnessed a profound transformation in the energy sector, driven by a commitment to address the climate crisis and secure a sustainable future for all, which has spurred the global race toward achieving net-zero emissions.

"World leaders, governments and corporations have pledged to reduce carbon emissions and transition to cleaner, more efficient energy systems and the energy industry was moving quickly to understand how it could continue to evolve to achieve these ambitious new targets. Since then, the energy landscape has changed dramatically.

"The 2021–23 global energy crisis had far-reaching impacts on the global energy system, disrupting supply and demand patterns and fracturing long-standing trading relationships and resulted in many countries facing shortages and increased prices in oil, gas and electricity markets. As a result. emphasis and attention from policy-makers refocussed on security and affordability of energy. While this implies a detour on the path to net zero, this also signals an under-appreciated benefit of the energy transition—that greater energy security and independence can result from a reduced reliance on imported fossil fuels.

"Energy transition will never be a straight path. Times of crisis put the spotlight on governments to take immediate action, but as the energy markets stabilise into their new "normal" this presents an opportunity for stakeholders of all types, to take longer-term steps to accelerate the changes in energy markets that create a net-zero future, which ensures supplies are available at a price that is affordable for all consumers."

Michael Phelan

CEO and Co-Founder

GridBeyond

Record-breaking temperatures

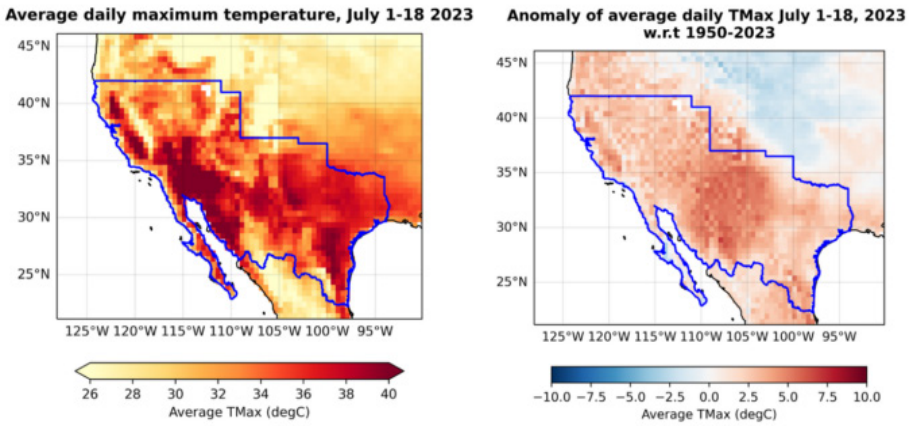
In 2018, IPCC highlighted the unprecedented scale of the challenge required to keep warming to 1.5°C. Five years later, that challenge has become even greater with record temperatures reported globally.

The IPCC finalised the Synthesis Report for the Sixth Assessment Report during the Panel's 58th Session held in Switzerland in March 2023. It concluded that human activities, principally through emissions of greenhouse gases, have "unequivocally caused global warming, with global surface temperature reaching 1.1°C above 1850-1900 in 2011-2020". It also raised concerns that global greenhouse gas emissions have continued to increase, with "unequal historical and ongoing contributions arising from unsustainable energy use, land use and land-use change, lifestyles and patterns of consumption and production across regions, between and within countries, and among individuals". This impact was demonstrated in Summer 2023 as local heat records were broken across the planet.

According to the NOAA, in June–August 2023 the global surface temperature was 2.07 degrees F (1.15 degrees C) above the 20th-century average of 60.1 degrees F (15.6 degrees C). This also ranks as the warmest June–August period in the 174-year record, and 0.43 of a degree (0.24 of a degree C) above the previous record. The past 10 June–August periods are the 10-warmest such periods on record. Globally, 2023 YTD ranked as the second-warmest recorded, at 1.55 degrees F (0.86 of a degree C) above the 20th-century average of 57.3 degrees F (14.0 degrees C).

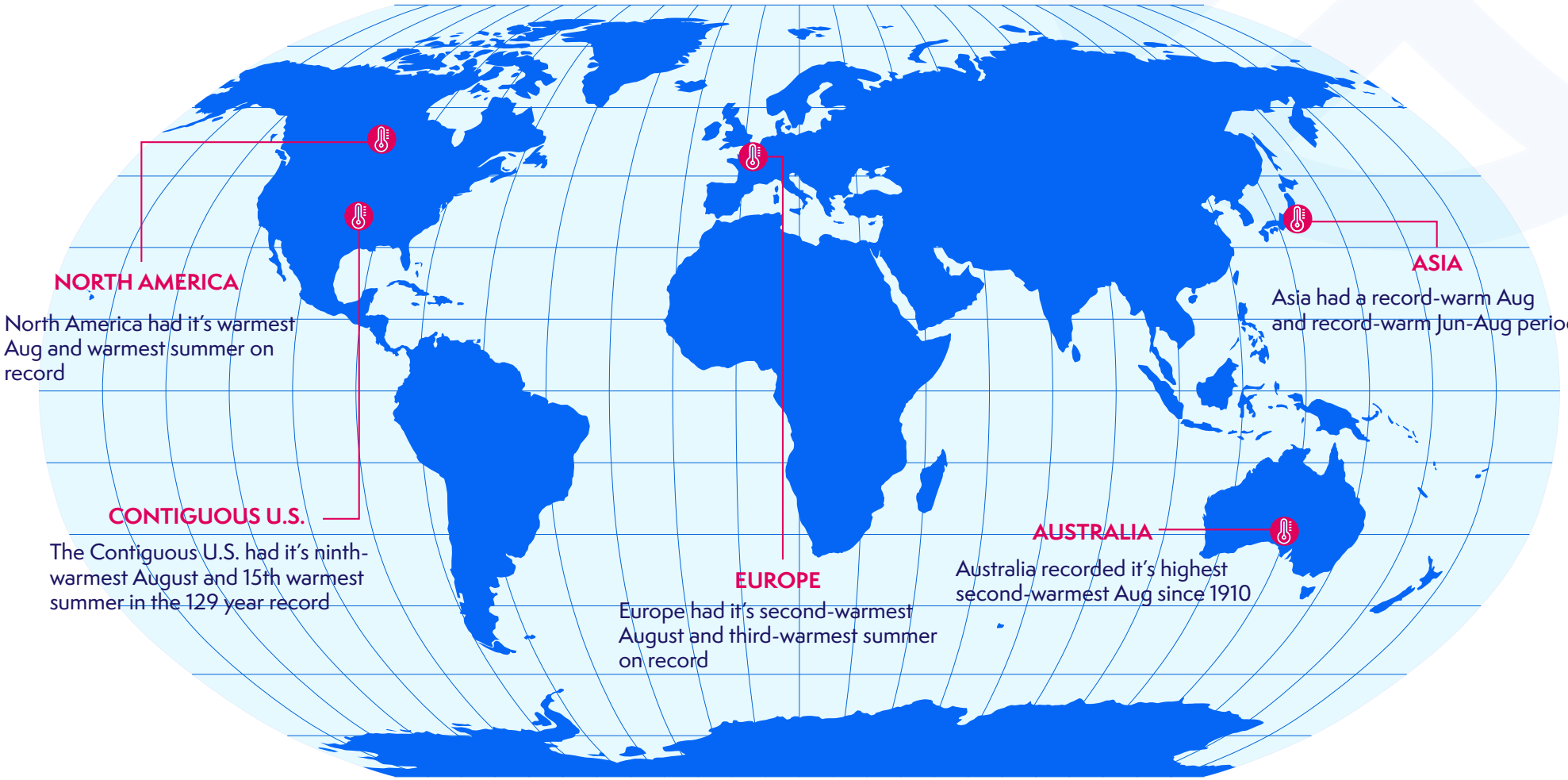
Analysis by World Weather Attribution has said heat waves are not rare in today's climate with an event like the 2023 summer now expected approximately once every 15 years. But it added that without human induced climate change these heat events would however have been "virtually impossible to occur in the US/Mexico region".

Region 1: USA/Mexico



Source: World Weather Attribution

Global average temperature

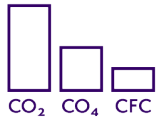


Source: NOAA

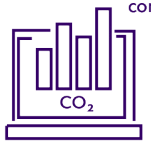
Brief history of climate action

• 1824 Joseph Fourier discovers the greenhouse effect

• 1957 monitoring of atmospheric CO2 begins

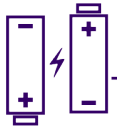


• 1967 Scientists create the first computer model of planet Earth's climate, which predicts doubling concentrations of CO2 could raise global temperatures by 2°C



• 1979 first international climate conference is held

• 1985 the lithium-ion battery is invented in Japan



• 1988 IPCC set up to analyse climate data

• 1994 UNFCCC enters into force

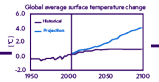
• 1992 Rio Earth Summit

• 1997 The first mass-market electric hybrid car is produced by Toyota, swift progress in large wind turbines, solar electricity, and other energy alternatives

• 1997 the Kyoto Protocol is agreed

• 1998 The original "hockey stick" graph is published in Science journal Nature

• 2000 IPCC predicts warming of up to 6C by the end of the century



• 2016 Paris Agreement enters into force

• 2008 The UK passes the world's first long-term legally binding framework for tackling climate change into law

Kyoto Protocol

• 2005 Kyoto Protocol enters into force

• 2003 Scientists link extreme weather to climate change

• 2016 Solar electricity and wind power become economically competitive with fossil fuels in some regions

•2021 COP26 takes place in Glasgow

•2022 The USA passes legislation providing subsidies to reduce the nation's greenhouse gas emissions

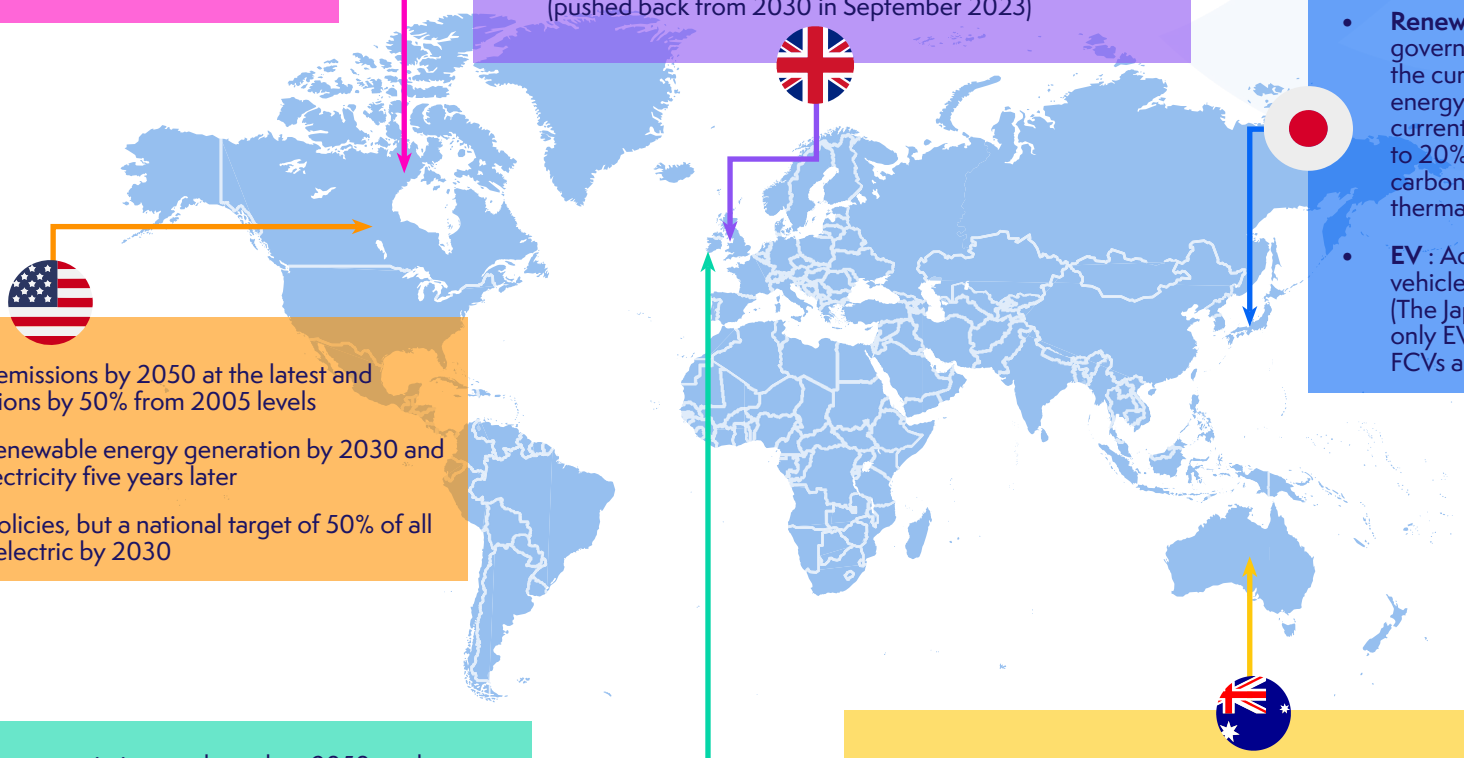
Key targets

Key policies and targets by Countries

- **Net zero** : Net-zero emissions by 2050
- **Renewables** : By 2030, for 90%, and in the long-term 100%, of Canada's electricity to be generated from renewable and non-emitting resources
- **EV** : All new light-duty vehicles sold are zero emission vehicles by 2035

- **Net zero** : Reduce carbon emissions by 68% by 2030 compared to 1990 levels, 77% for 2035, net zero by 2050
- **Renewables** : Deliver a decarbonised power sector by 2035 and net zero by 2050
- **EV** : Ban on the sale of petrol and diesel cars by 2035 (pushed back from 2030 in September 2023)

- **Net zero** : Reduce carbon emissions by 46% (and will continue to challenge themselves to reach the 50% mark) by 2030 compared to 2013, net zero by 2050
- **Renewables** : By 2030, the government intends to increase the current 17% share of renewable energy to 22%-24% and the current 6% share of nuclear power to 20%-22%. Aiming to reduce carbon dioxide emissions from thermal power generation.
- **EV** : Achieve 100% electric vehicles in new car sales by 2035. (The Japanese target includes not only EVs but also HVs, PHVs and FCVs as electric vehicles.)



- **Net zero** : Net zero emissions by 2050 at the latest and reducing 2030 emissions by 50% from 2005 levels
- **Renewables** : 80% renewable energy generation by 2030 and 100% carbon-free electricity five years later
- **EV** : Based on state policies, but a national target of 50% of all new vehicle sales be electric by 2030

- **Net zero** : Net-zero emissions no later than 2050, and to a 51% reduction in emissions by the end of this decade
- **Renewables** : Increasing the share of renewables electricity up to 80% by 2030
- **EV** : 30% of private car fleet switched to electric by 2030

- **Net zero** : Net Zero by 2050, by 2030 emission levels of 43% below 2005 levels
- **Renewables** : A national renewable electricity target of 82% by 2030
- **EV** : Government's target for 50% of new passenger vehicle sales to be zero emissions by 2030 and 100% by 2036

A closing window

Despite broad consensus on the need to reach net zero, global energy-related greenhouse gas emissions are still reported to be heading in the wrong direction.

The latest edition of the Statistical Review of World Energy found that in 2022 (the latest data available at the time of writing this paper), carbon dioxide emissions from energy use, industrial processes, flaring and methane (in carbon dioxide equivalent terms) continued to rise to a new high-growing 0.8% in 2022 to 39.3 GtCO2 e, with emissions from energy use rising 0.9% to 34.4 GtCO2 e.

Publishing the 72nd Statistical Review of World Energy in June 2023, Energy Institute President Juliet Davenport, OBE HonFEI, said: "Just as the world emerged from the huge impact on energy demand caused by the global pandemic, 2022 witnessed energy markets again in crisis, as Russia's invasion of Ukraine upended assumptions about supply and sent out ripples around the world [but] more fundamentally, we have seen further and ever more dangerous impacts of climate change across all continents. And despite broad consensus on the need to reach net zero, global energy-related greenhouse gas emissions are still heading in the wrong direction." This was followed by a warning from the Climate Action Tracker (CAT) in September that no country is fully progressing toward transitioning from fossil fuels to renewable energy generation.

In the analysis CAT analysed progress across 16 countries (Australia, Brazil, Chile, China, EU27, Germany, India, Indonesia, Japan, Mexico, Morocco, Türkiye, South Africa, United Arab Emirates, the UK, and the US), and then looked to see how they measure up against benchmarks for fossil gas, coal and renewable power. No country assessed is fully on track for this power shift, but there are some positive signs.

A closing window

The analysis by CAT showed that the US and the UK's 2035 power sector decarbonisation targets are in line with the needed unabated fossil gas phase-out by that time, but both need to do more to achieve them. The UK is on track to phase out coal by 2024 - which is on a 1.5°C compatible timeline, with the EU, Germany, Chile and South Africa heading in the right direction. Most countries are not doing enough to accelerate the renewable energy transition, with Japan and Mexico noted as countries behind development needs. Germany and Chile are ahead in terms of renewables deployment.

The report came just days after the United Nations said the world was facing catastrophic climate change. To accelerate action by governments, businesses, finance, local authorities and civil society, and hear from "first movers and doers," the United Nations Secretary-General convened a Climate Ambition Summit at United Nations Headquarters in New York on 20 September 2023, where leaders agreed on the urgency of the climate crisis and that the window of opportunity to act was quickly closing. They also agreed that it was still possible to achieve the 1.5-degree goal of the Paris Agreement but that this would require accelerating the transition away from fossil fuels in a "just and equitable manner".

The pace and scale of what has been done so far, and current plans, are insufficient to tackle climate change.

There are multiple, feasible and effective options to reduce greenhouse gas emissions and adapt to human-caused climate change, and they are available now.

Country progress towards 1.5 °C compatible benchmarks in the power sector for coal, fossil gas and renewables

September 2023 climateactiontracker.org	COAL	FOSSIL GAS	RENEWABLES
United Kingdom	✓ 1.5°C COMPATIBLE	MIXED PICTURE	MIXED PICTURE
Chile	RIGHT DIRECTION	WRONG DIRECTION	AHEAD OF THE PACK
Germany	RIGHT DIRECTION	WRONG DIRECTION	AHEAD OF THE PACK
South Africa	RIGHT DIRECTION	MIXED PICTURE	MIXED PICTURE
China	WRONG DIRECTION	RIGHT DIRECTION	MIXED PICTURE
EU27	RIGHT DIRECTION	WRONG DIRECTION	MIXED PICTURE
India	WRONG DIRECTION	RIGHT DIRECTION	MIXED PICTURE
Australia	MIXED PICTURE	WRONG DIRECTION	MIXED PICTURE
UAE	MIXED PICTURE	WRONG DIRECTION	MIXED PICTURE
United States	WRONG DIRECTION	MIXED PICTURE	MIXED PICTURE
Brazil	WRONG DIRECTION	WRONG DIRECTION	MIXED PICTURE
Indonesia	WRONG DIRECTION	WRONG DIRECTION	MIXED PICTURE
Morocco	WRONG DIRECTION	WRONG DIRECTION	MIXED PICTURE
Turkey	WRONG DIRECTION	WRONG DIRECTION	MIXED PICTURE
Japan	WRONG DIRECTION	WRONG DIRECTION	LAGGING BEHIND
Mexico	WRONG DIRECTION	WRONG DIRECTION	LAGGING BEHIND

Source: CAT

What happened at COP28?

The 2023 United Nations Climate Change Conference, also known as COP28, was the 28th United Nations Climate Change Conference. During the 13-day summit (November 30 to December 12) heads of State, ministers and negotiators, along with climate activists, mayors, civil society representatives and CEOs, focussed discussions on 3 main pillars: industrial decarbonisation; accelerating the just green energy transition; and innovation for climate action.

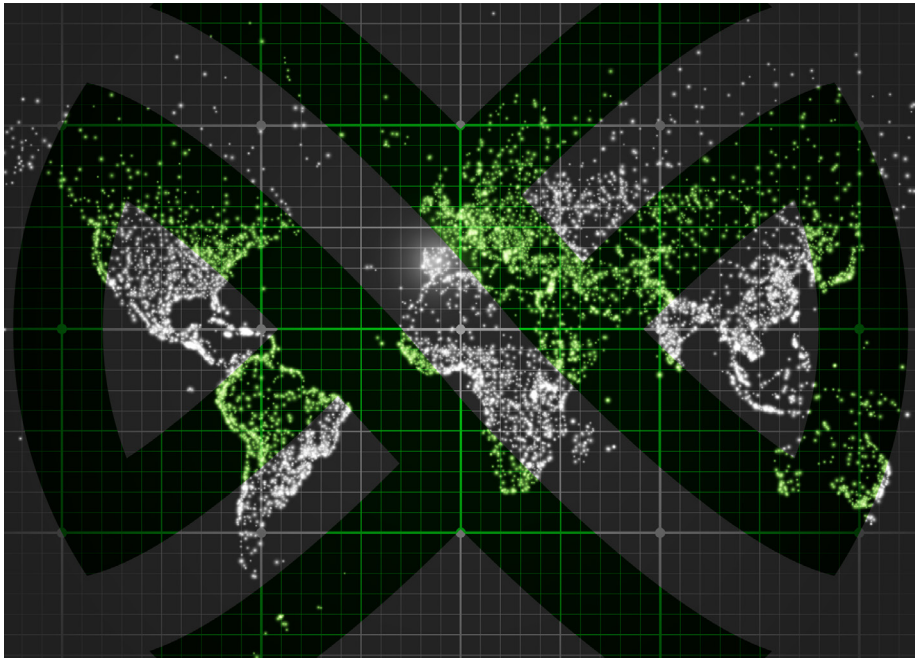
Global Stocktake

When 193 countries signed on to the Paris Agreement, they committed to three goals: 1) reduce emissions enough to hold global temperature rise to "well below 2 degrees C (3.6 degrees F)" above pre-industrial levels, and ideally 1.5 degrees C; 2) build communities' resilience to the impacts of climate change; and 3) align the world's financial flows with low-carbon, climate-resilient development. They also agreed to assess their progress toward these goals every five years (beginning in 2023) and strengthen their action in response, a process known as the "Global Stocktake."

At COP28, the first-ever "Global Stocktake," assessing the world's collective progress toward addressing the climate crisis was concluded.

The Global Stocktake synthesis report released in September 2023 revealed that the world is far off track from its goal of holding global temperature rise to 1.5 degrees C (2.7 degrees F) to avoid some of the most disastrous impacts of climate change.

The stocktake found that implementation of the Paris Agreement is lacking across all areas and calls for a systems transformation, which follows a whole-society and whole-economy approach that mainstreams climate resilience and development aligned with low greenhouse gas emissions. The stocktake also points to a growing gap between the needs of developing countries and the support provided and mobilised for them, and calls for the unlocking and redeployment of trillions of dollars towards climate action and climate-resilient development.



What happened at COP28?

On 8 December the new Global Stocktake draft text was published, which will inform the next round of climate action plans under the Paris Agreement (nationally determined contributions, or NDCs) to be put forward by 2025.

Renewables and efficiency pledge

Australia, Canada, Japan, Ireland, the UK and the USA were among the 118 countries to sign a pledge to treble renewables to 11TW by 2030. The Global Renewables and Energy Efficiency Pledge was signed on 2 December. Signatory countries recognised that to maintain the collective goal of the Paris Agreement, accelerating the pace renewables are deployed needs to be increased between now and 2030.

The statement from the signing countries also recognises the need to strengthen collaboration on renewables and energy efficiency by co-operating on resilient value chains and technology; expanding financial support to emerging markets to deploy renewables or accelerating cross-border grid interconnections among others.

In response to the Global Pledge, the European Union announced it would invest €2.3 billion (£1.8 billion) to support the energy transition in neighbouring countries and across the globe. The UK also joined France, Canada, Japan and the USA in endorsing a global ambition to treble civil nuclear power capacity between 2020 and 2050.

Transitioning away

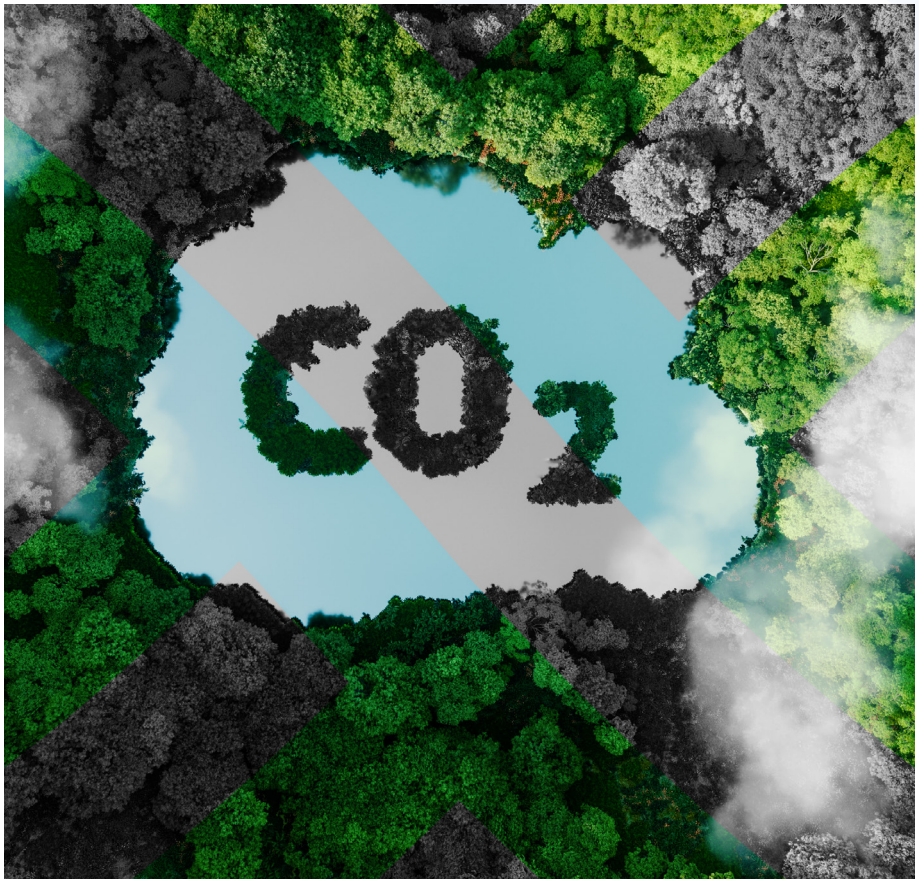
COP27 ended with generic provisions on the need to boost "low-emission energy" and did little to define the future of fossil fuels. Earlier this year, however, G7 leaders stated their objective to rely predominantly on renewables by 2035. They pledged to intensify efforts to phase-out unabated coal power generation (where power plants generate coal without equipment for emission control such as carbon capture or storage technologies).

What happened at COP28?

As COP28 entered its final 48 hours on 11 December, UN Secretary-General António Guterres delivered a clear message: "We must conclude the conference with an ambitious outcome that demonstrates decisive action and a credible plan to keep 1.5-degree goal alive, protecting those on the frontlines of the climate crisis." A coalition of more than 80 countries including the USA, the EU and small island nations pushed for an agreement that includes language to "phase out" fossil fuels.

On 13 December a deal was approved that would, for the first time, push nations to transition away from fossil fuels to avert the worst effects of climate change. It came hours after the presidency released the final draft of a summit agreement. The UAE Consensus calls for "transitioning away from fossil fuels in energy systems, in a just, orderly and equitable manner ... so as to achieve net zero by 2050 in keeping with the science." It also calls for a tripling of renewable energy capacity globally by 2030, speeding up efforts to reduce coal use, and accelerating technologies such as carbon capture and storage that can clean up hard-to-decarbonise industries.

COP28 president Sultan al-Jaber hailed the deal, which was approved by almost 200 countries, as an "historic package" of measures which offered a "robust plan" to keep the target of 1.5C within reach." US climate envoy John Kerry said: "This document sends very strong messages to the world." UK climate minister Graham Stuart said: "this is the beginning of the end of the fossil fuel era [...] this outcome is something we can genuinely celebrate." Wopke Hoekstra, EU climate chief, told the meeting that "humanity has finally done what is long overdue. Thirty years we've spent to arrive at the beginning of the end of fossil fuels." Mary Robinson, chair of the Elders and former president of Ireland said "if 1.5C is our north star, and science our compass, we must swiftly phase out all fossil fuels to chart a course towards a liveable future.



Severe weather impacts

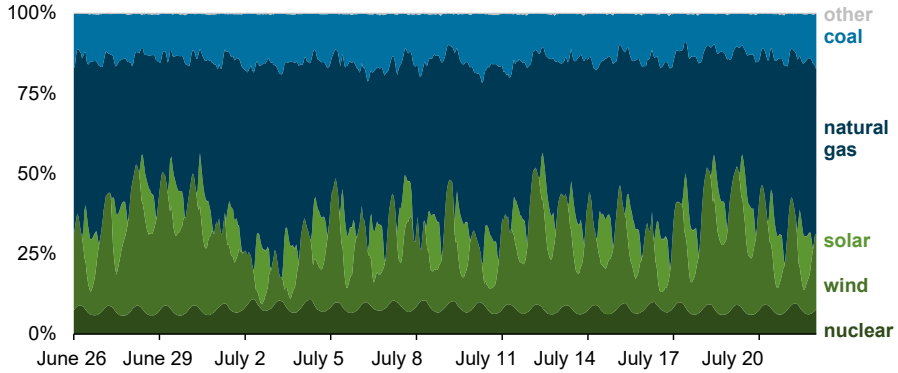
In addition to the increased demand experienced during severe weather events, coal and gas power plants exhibit higher susceptibility to breakdowns in severe weather conditions compared to renewable energy sources and batteries, as demonstrated during the recent events in Texas.

Winter Storm Uri in 2021 led to the freezing of equipment at both natural gas and coal plants, as well as natural gas pipelines. Similarly, the 2023 heat waves seen across southern states of the USA compelled coal and gas plants to shut down. These traditional facilities are intricate, featuring numerous valves, pipelines, and other moving components, introducing multiple potential failure points when exposed to extreme environments. In contrast, renewable energy sources such as solar and wind, along with battery systems, have minimal moving parts and simpler designs, which reduces their vulnerability to weather-induced failures.

For Texas, the state's grid held up under the significant demand peaks seen during the summer 2023 heatwaves, largely due to a shift in the type of resources used in ERCOT in recent years, especially compared with heat waves in previous years. However, the extreme heat led to hourly wholesale electricity prices in excess of $4,000/MWh and to ERCOT issuing appeals for consumer electricity conservation for several days in August. A combination of continued high temperatures into September and lower wind and solar output in the evening led ERCOT to declare an Energy Emergency Alert (EEA) Stage 2 on September 6, 2023. An EEA Stage 2 is the last step before a grid operator is forced to enter rotating outages to ensure grid stability.

At the peak hour on June 27, wind and solar provided about 35% of the power in ERCOT, with gas contributing 44%, coal 14%, and nuclear 6%. Solar power generation peaked at a record of 13,086MW on June 25, and wind power reached a high of 24,237 MW on June 28. Non-fossil fuel resources contributed as much as 55% of total generation on June 28 and 29 and between 43%–47% in the evening peak load hours of 4:00–8:00 p.m. CT, keeping the share generated by natural gas below 50% of the fuel mix during those hours. In prior periods of high demand, such as in August 2019 and August 2022, non-fossil fuel resources never reached more than 50% of total generation in ERCOT.

ERCOT share of electricity generation (June 26 – July 21, 2023)



Source: EIA

Accelerating renewables growth

As we grapple with the unprecedented challenge of transitioning rapidly and comprehensively from fossil fuels to low-carbon alternatives, we face a truly unique energy landscape.

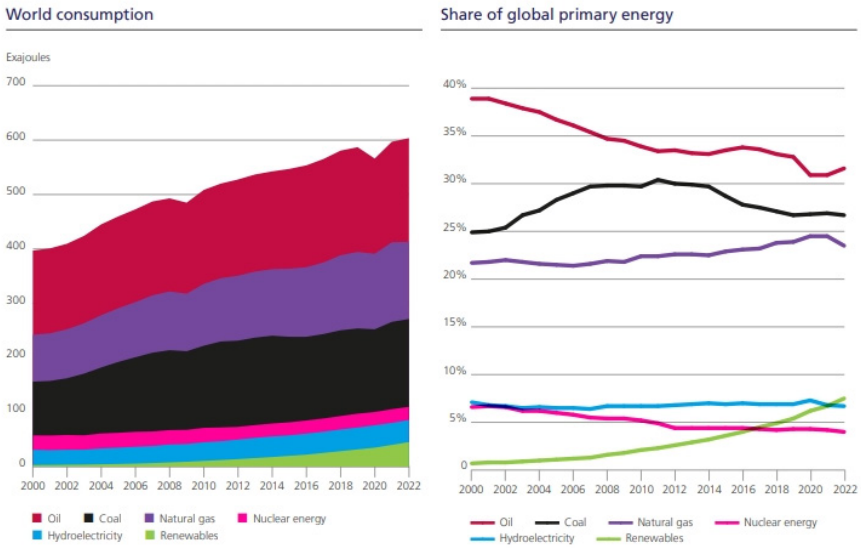
Today, when considering the composition of our energy sources, we contemplate a broad spectrum, encompassing coal, oil, natural gas, nuclear power, hydropower, solar energy, wind power, and biofuels. However, if we cast our minds back, our energy sources were notably uniform, and shifts in technology happened slowly. Prior to the mid-19th century, traditional biomass, involving the combustion of solid materials like wood, agricultural residue, or charcoal, reigned as the predominant energy source worldwide.

The onset of the Industrial Revolution ushered in the era of coal, followed by the emergence of oil, natural gas, and by the turn of the 20th century, the introduction of hydropower. It wasn't until the 1960s that nuclear energy found its place in the energy mix. What we commonly term as renewables and low-carbon technologies such as solar and wind power, made their significant entry much later. But overall, the growth of renewables has been significant and is projected to continue at a high rate in the coming years.

The Statistical Review of World Energy report notes that in 2022, the energy system switched from concerns around demand post-COVID to supply concerns arising from the conflict in Ukraine combined with legacy supply chain issues. According to the report, 2022 saw a 1% increase in total primary energy consumption taking it to around 3% above the 2019 pre-COVID level.

Global electricity generation increased by 2.3% in 2022, although this was lower than the previous year's growth rate of 6.2%, wind and solar reached a record high of 12% share of power generation with solar recording 25% and wind power 13.5% growth in output. The combined generation from wind and solar once again surpassed that of nuclear energy. Globally coal remained the dominant fuel for power generation in 2022, with a stable share around 35.4%, marginally down from 35.8% in 2021. Natural gas-fired power generation remained stable in 2022 with a share of around 23%. Renewables (excluding hydro) met 84% of net electricity demand growth in 2022.

World Consumption



Source: Statistical Review of World Energy

Accelerating renewables growth

According to the IEA, global renewable capacity additions are set to soar by 107GW, the largest absolute increase, to more than 440GW in 2023. Under the agency's accelerated case, global renewable capacity additions could reach 550GW in 2024 as countries around the world, particularly in Europe, took action to reduce dependence on Russian natural gas imports. Looking further ahead global renewable power capacity is expected to grow by 2,400GW over the 2022-27 period.

One of the primary stumbling blocks with weather-dependent technologies is their intermittent nature. This intermittency is further compounded by the integration challenges faced by grid operators, which find themselves needing to gauge how much renewable energy is currently being generated, anticipate future levels of generation, and formulate responses to these fluctuations. This challenge is further compounded by the diverse array of energy resources scattered across the power grid in terms of both size and location, requiring grid operators not only to take account of the system as a whole, but to manage and respond to in some cases very localised constraints.

In addition, the rules governing the connection of distributed generation systems, such as small-scale distributed renewables or co-located systems, to the electricity grid vary widely and with increasing numbers of smaller distributed projects looking to connect to the system many markets are seeing a backlog in their interconnection processes.

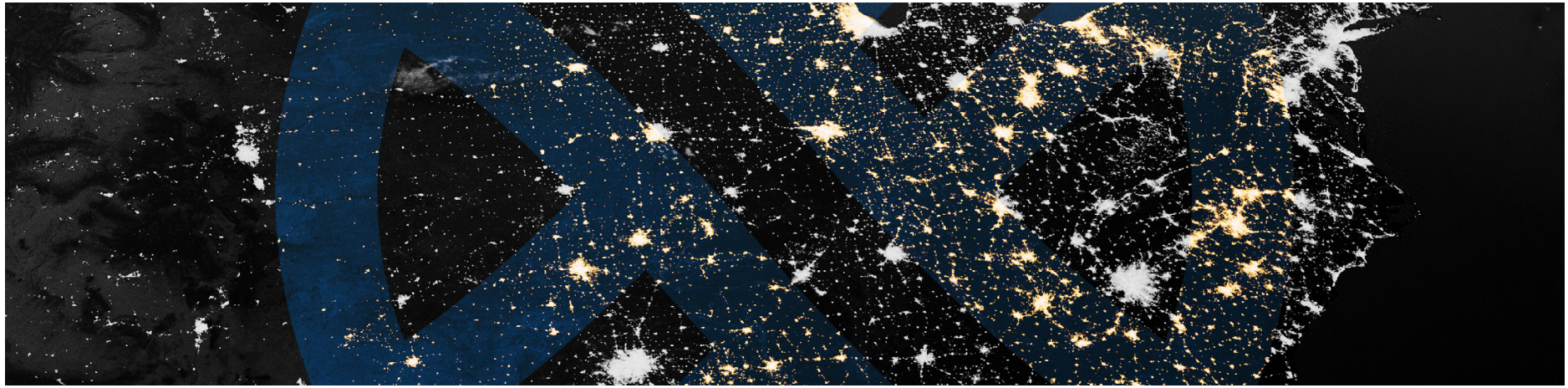
Reducing the backlog | PJM Interconnection process reforms

On November 29, 2022, FERC issued an order approving a proposal by PJM to reform its interconnection procedures to enable it to process new interconnection requests more efficiently. The PJM reforms represent one of several proposed remedies by transmission operators to address significant delays and backlogs resulting from the influx of interconnection requests by renewable energy developers.

The reforms shift the way PJM processes interconnection requests from its prior "first-come, first-served" approach to a "first-ready, first-served" methodology, which is intended to reduce the number of speculative projects that withdraw from the interconnection queue late in the interconnection process. Under the revised interconnection procedures, PJM will use an application and study process that includes three study phases and three decision points to evaluate clusters of interconnection requests.

PJM's interconnection reforms represent a positive step toward clearing its interconnection queue backlog, accelerating clean energy development, and streamlining the interconnection process.

The rapidity and magnitude of the energy transition presents a novel challenge and grid operators around the world are all seeking solutions for how to integrate more renewables while maintaining a reliable and cost-effective power system. Overcoming these hurdles requires innovative solutions, comprehensive planning, and a harmonious blend of technology, policy, and regulatory adjustments to ensure a smoother transition to a cleaner and more sustainable energy landscape.



Changing dynamics

As renewable penetration on the grid increases, the need for technologies and assets that can provide on-demand supply or demand reduction will also rise. Traditional fossil-fuel plants operate at a pre-mitigated level, they provide a consistent and predictable amount of electricity. Renewables, on the other hand, are a much more unreliable source. To mitigate against this volatility installed capacity from energy storage systems are on the rise.

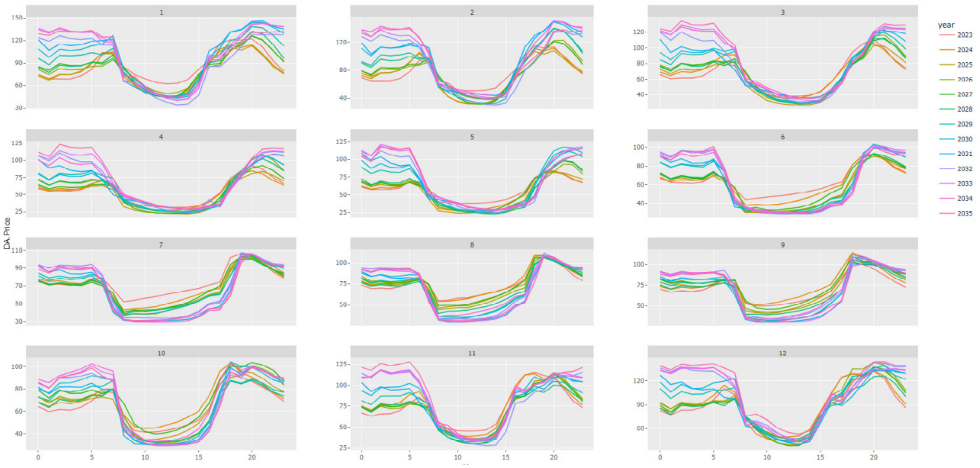
Traditionally, the electricity demand curve follows a pattern with spikes in the morning and evening. However, the increasing deployment of solar photovoltaic (PV) has caused a shift in this curve. This is demonstrated in markets with more solar capacity coming online resulting in them routinely experiencing a dramatic drop in net load during the midday hours when solar generation is at its peak.

This dip in net load is followed by a significant ramp up as the sun sets. The result is that the 18.00-19.00 peak has become a key battle ground for energy prices – as demand remains high but solar generation starts to fall away. On days with low wind conditions this can result in tight system conditions and the inevitable high prices that follow.

The deepening of the net load clearly presents at least two challenges for grid operators:

- Low (and in some cases negative) midday prices reduce revenues of thermal power plants because they are utilised for far fewer hours on many days, potentially making some flexible plants uneconomic.
- The extreme swings in the net load exert additional wear and tear on conventional thermal generators, which are required to ramp up and down quickly to meet the peak demand.

The "duck curve"



Source: GridBeyond

The promise of storage

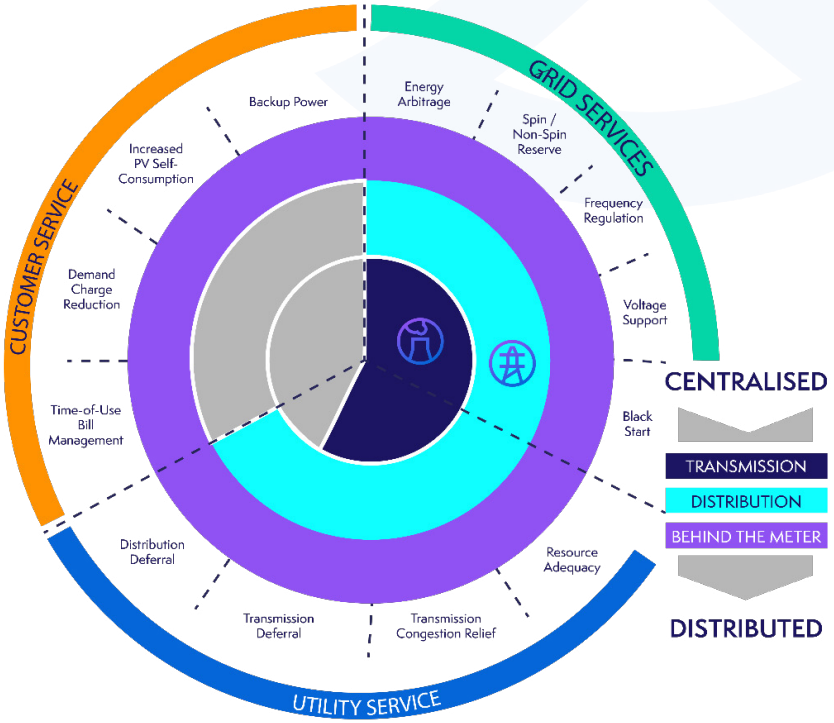
One of the big beneficiary of the transition to a renewables dominant energy mix is energy storage. This is largely because batteries contribute other services and benefits to the grid besides energy.

Energy storage can transform intermittent clean energy—primarily derived from wind and solar—into a reliable source of 24/7 generation. As a result, energy storage has seen tremendous policy support, as well as a large influx of capital from private investors seeking environmental, social, and governance (ESG) focused investments.

Electricity systems already require a range of ancillary services to ensure smooth and reliable operation. Supply and demand need to be balanced in real time to ensure supply quality (e.g., maintaining constant voltage and frequency), avoid damage to electrical appliances and maintain supply to all users.

Batteries have great potential to bolster resilience in modern grids by smoothing imbalances between supply and demand and replacing fossil fuel "peaker" plants thereby supporting the move to net-zero by helping overcome one of the biggest obstacles to renewable energy—the mismatch between supply and demand. Beyond this key benefit batteries can provide numerous other services to the grid and to customers. The further downstream batteries are located the more services they can offer to the system at large.

Batteries can provide upto 13 services to three stakeholder groups



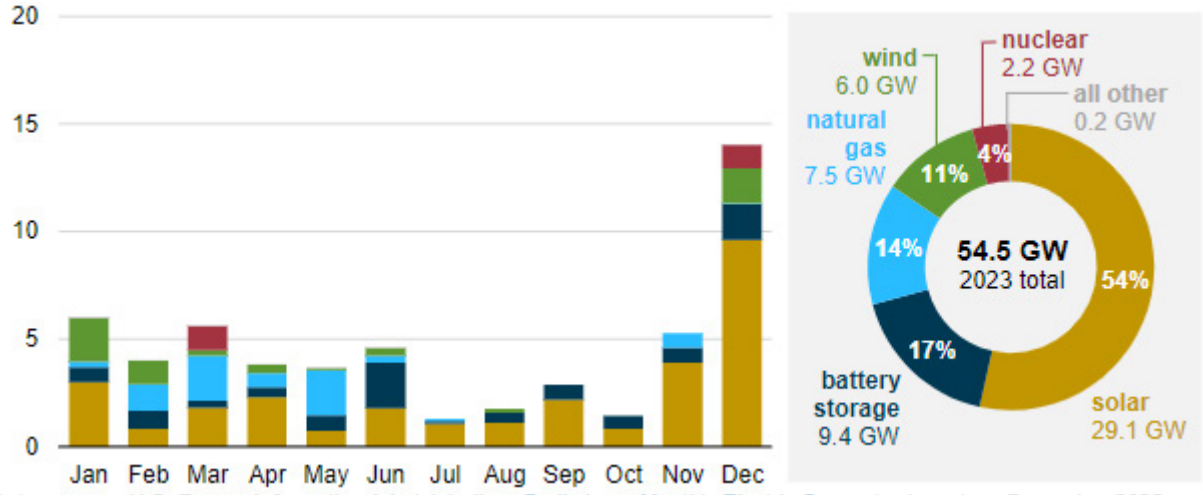
Source: Rocky Mountain Institute

The promise of storage

The utility-scale storage sector has seen significant growth in many markets. On February 6, the EIA said in 2023, battery capacity will likely more than double. Developers have reported plans to add 9.4GW of battery storage to the existing 8.8GW of battery storage capacity. It expects that 71% of the new battery storage capacity will be in California and Texas, states with significant solar and wind capacity.

Energy storage projects generally have a more complicated part to play in energy grids than renewable energy generation. Storage systems can fulfil different roles for example, from short-term balancing of supply and demand, to restoring grid operation following a blackout, to providing operating reserves or deferring investment in networks. Because of their fast response times, they are ideal for providing services such as frequency regulation and flexible ramping product. In addition, batteries can moderate the extremes in daily price swings through arbitrage, by increasing demand for renewables during the very low-priced hours of the day and increasing supply in the evening to bring prices down.

U.S. planned utility-scale electric-generating capacity additions (2023)



Source: US Energy Information Administration, Preliminary Mnthly Electric Generator Inventory, December 2022

Electrification era

The rapid electrification of all sectors makes electricity even more central to energy security around the world than it is today. Electricity system flexibility – needed to balance wind and solar with evolving demand patterns – quadruples by 2050 even as retirements of fossil fuel capacity reduce conventional sources of flexibility.

It is estimated that electricity demand will grow by about 30% from 2020 to 2035, owing to electrification of fuel-based building demand (e.g. heating), vehicles, and industrial processes.

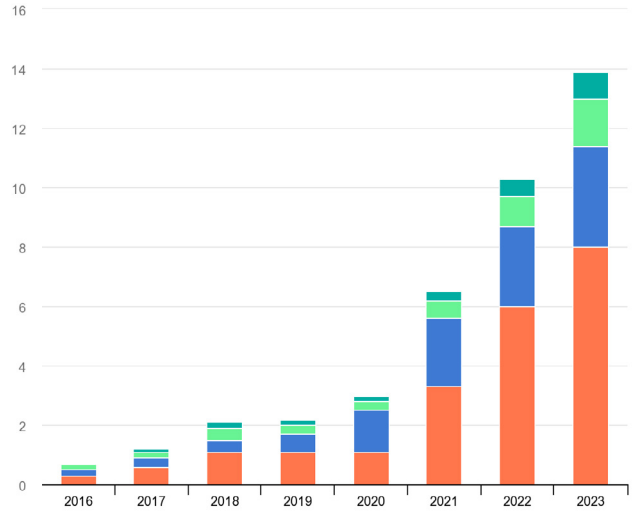
With significant potential to mitigate emissions and decarbonise energy supply chains, electrification is an important strategy to reach net zero goals. According to the IEA, electrification holds great potential to reduce final energy demand because the efficiency of technologies is generally much higher than fossil fuel-based alternatives. In addition, the emission reduction benefits from electrification go hand in hand with an increase in renewable energy.

The transport sector has seen significant movement towards electrification in the last 12 months, with increasing consumer demand and the greater availability of electric models, the number of electric cars is growing at a rapid rate. supported by ambitious policy targets.

According to the IEA's latest data, electric car sales saw another record year in 2022. Electric car sales – including battery electric vehicles (BEVs) and plug-in hybrid electric vehicles (PHEVs) – exceeded 10M last year, up 55% relative to 2021. The share of electric cars in total car sales jumped from 9% in 2021 to 14% in 2022, more than 10 times their share in 2017.

As of the end of September 2023, there are now around 900,000 fully electric cars on UK roads and a further 550,000 plug-in hybrids. Although in a recent policy speech, Prime Minister Rishi Sunak announced that the UK government was to delay the ban on new diesel and petrol cars from 2030 to 2035. The zero emission vehicle (ZEV) mandate unveiled late September requires 80% of new cars and 70% of new vans sold in Great Britain to be zero emission by 2030, increasing to 100% by 2035.

U.S. planned utility-scale electric-generating capacity additions (2023)



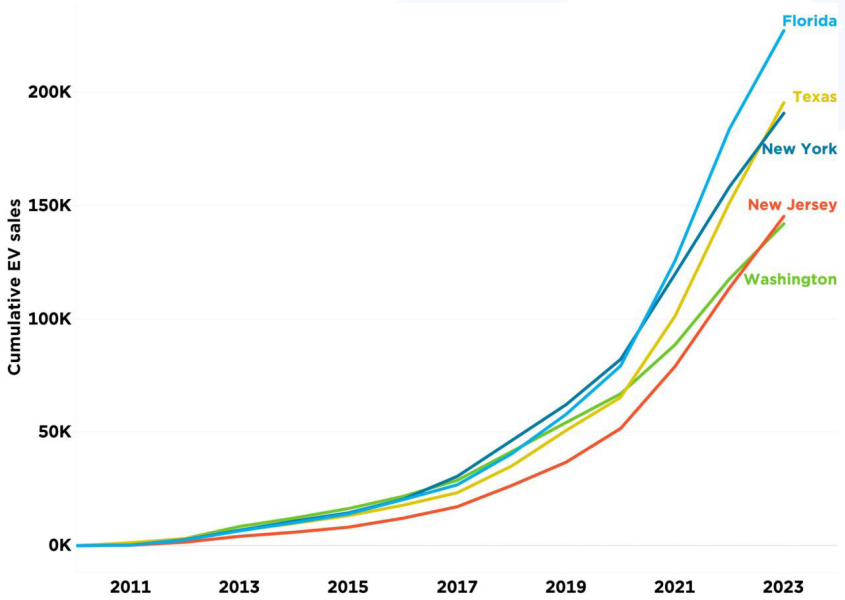
Source: IEA https://www.iea.org/data-and-statistics/charts/electric-car-sales-2016-2023

Electrification era

In the USA, it took 8 years for the first million EV sales. The IEA estimates that the EV market in the United States broke records in 2022, with just under 918,500 light electric vehicle sales. In just the first half of 2023, it is estimated that over 670,000 EVs were sold, with over 80% of those fully-electric battery electric vehicles. From 2014 through 2017, more than half of all EVs sold in the USA were purchased in California, but that fraction has now fallen. Florida and Texas are now second and third in cumulative EV sales.

In Japan the Ministry of Economy, Trade and Industry (METI) recently set new targets for the EV sector. In the statement, issued in August 2023, it said it aims to accelerate the installation of EV chargers so that Japan can achieve its target of increasing the proportion of electrified vehicles, including hybrids, to 100% of its new car sales by 2035. Among the measures outlined were a doubling of the target for the installation of EV charging outlets to 300,000 by 2030. The ministry also outlined a plan to support the establishment of standard EV chargers mainly at condominiums and commercial facilities, and fast chargers at expressway rest areas. It also seeks an improvement in the performance of EV chargers to reduce charging time and said that charging fee programs should be reviewed for a shift from charging time to amount of electricity used.

EV market in the United States



Source : Union of Concerned Scientists https://blog.ucsusa.org/dave-reichmuth/electric-vehicle-sales-in-us-hit-the-accelerator-pedal/

Electrification era

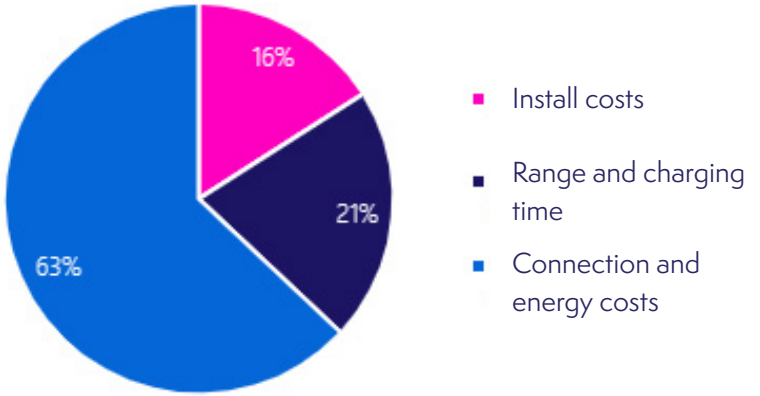
In our recent poll, 63% of respondents highlighted charge point connection and high energy costs as a key challenge for the roll out of EVs. While electric cars are often much cheaper to run than similar-sized petrol or diesel vehicles, they are also generally more expensive to buy.

The cost of charging an electric vehicle depends on where, when and how it's done. EV fleet owners with charging facilities on site can take advantage of cheaper electricity rates, especially during off-peak hours. Costs increase significantly when drivers use public chargers. But there are opportunities for EV fleet owners to use their fleets to earn revenues from grid programmes.

In all sectors, the cost of going electric translates into high initial investment costs. Governments can provide clear pathways for grid operators to allow investments to be made in a timely manner. Currently, targets exist for EVs, heat pump installations, and renewable energy capacity, but governments will need to translate these targets into concrete geographical capacity that can meet future needs.

The transition calls for major increases in all sources of flexibility: batteries, demand response, and low-carbon flexible power plants, supported by smarter and more digital electricity networks.

Vehicle electrification is growing but what are the biggest challenges for the mass roll-out of EV fleets? (2023)



Integration challenges

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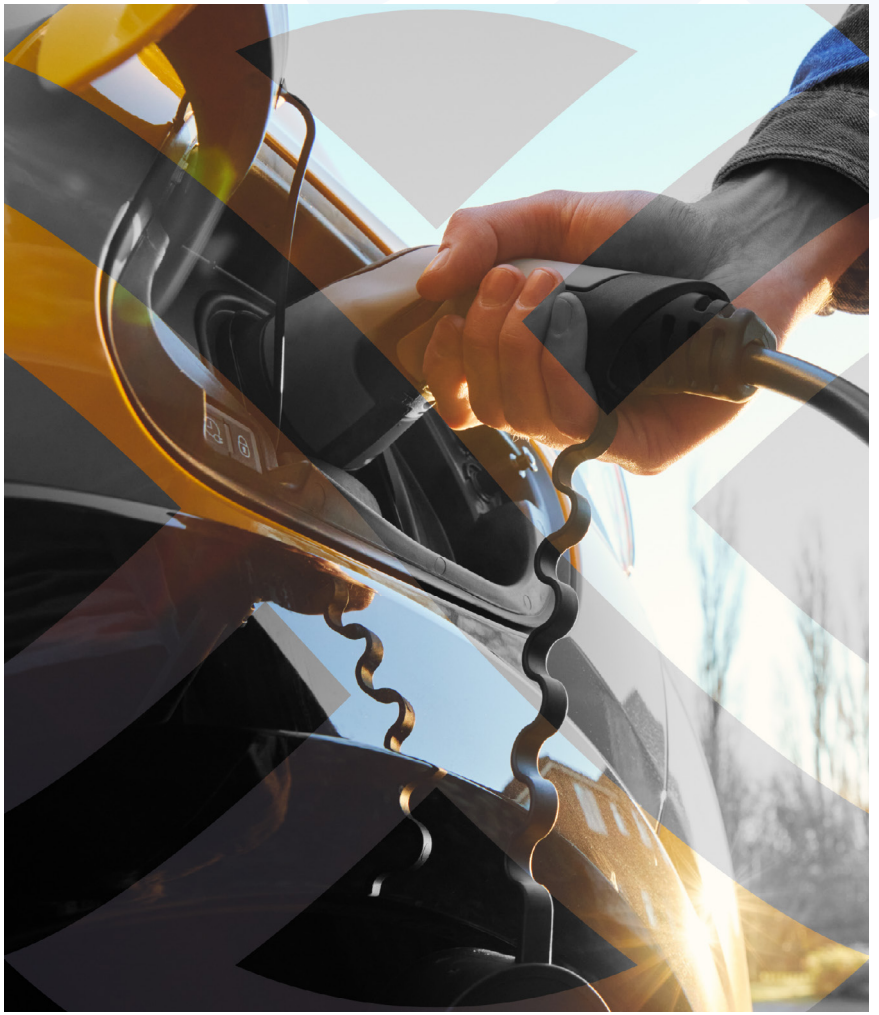
There are two main ways that EVs can be used to support the grid. The first and simplest way is through smart charging but a better way is through Vehicle to Grid (V2G) optimisation.

Smart (also known as managed or intelligent) charging is where an EV is charged in a way that spreads the load across a specific time scale. This is made possible through a system where an EV and a charging device share a data connection with a charging operator. It essentially allows the charging station owner to monitor real-time data such as supply and demand on the local electricity network and to manage the use of their devices remotely to optimise charging of the EV.

Consumers can benefit from cheaper power, and operators benefit from an easier to balance system by avoiding all cars being charged simultaneously. Smart meters have the potential to allow more detailed information on consumption to be sent to energy suppliers and more reactive use of power for customers. It could also allow EV fleet owners to access "time of use" tariffs in the future, with potential financial savings or to use on-site energy storage to its maximum potential.

An extension of smart charging, the concept of V2G (vehicle to grid). When supply is low and demand high, EVs connected to the grid to charge can instead release power back into the grid. Owners of the vehicles can then be paid for this balancing service in a similar way to electricity storage unit operators.



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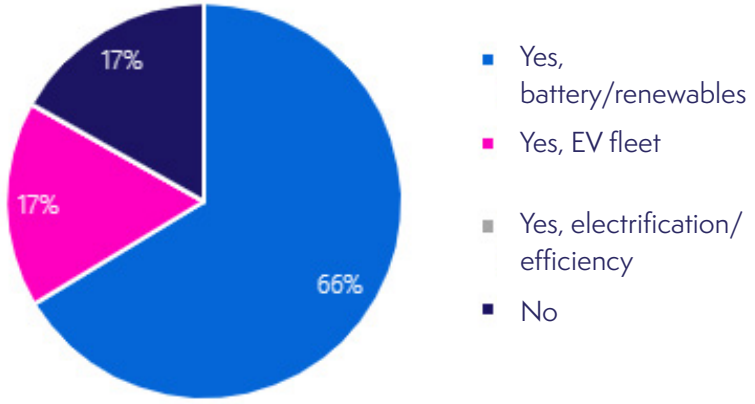
By combining battery storage with any on-site generation or load assets you can further reduce your carbon footprint and help increase the volume of renewables in the energy mix. If your on-site generation exceeds your needs, batteries allow you to store surplus energy or export electricity to the grid. However, the cost of equipment can be significant. Despite this many businesses have already made or are planning to make investments in energy assets. According to GridBeyond's research 66% of respondents have or are planning to make investments in battery storage and/or renewables technology and a further 17% in fleet electrification.

The transition to net zero is a complex process that requires significant changes in the way we produce, distribute, and consume energy. Renewable energy is expected to play a significant role in the global energy transition, and many countries and companies have set net-zero targets to reduce their greenhouse gas emissions to zero by 2050 or earlier. But the transition is not without its challenges.

Has your business made, or is planning to make investments in energy assets? (2023)

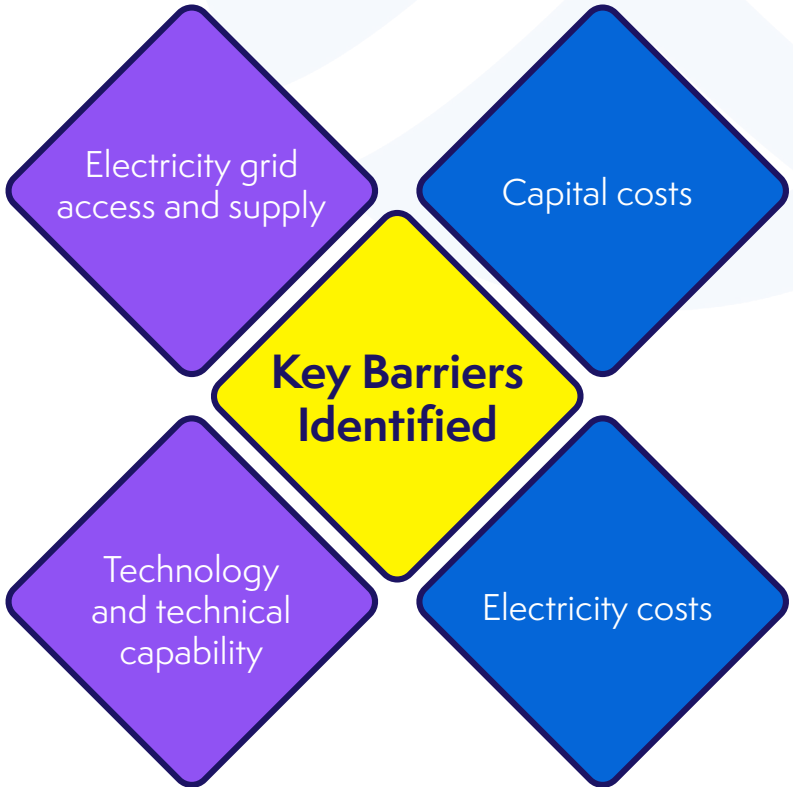


Beyond vehicles

Carbon-intensive industrial sectors are facing a critical inflexion point. Some countries are already taking action to decarbonise their industry while moving to protect those industries from high-carbon competitors.

UK industry currently emits about 60 MtCO2 /yr – 15% of UK (territorial) emissions. The government already provides support to industry with electricity prices by offering exemptions from a range of costs, such as policy costs (i.e., renewables support) and carbon costs (i.e., ETS exemptions). Analysis from the Climate Change Committee (CCC) indicates that a balanced pathway to industrial decarbonisation will see overall energy use in industry (manufacturing and construction) fall due to improved overall efficiency. However, electricity consumption rises from 2030 while unabated fossil fuel use is largely phased out by 2050, with remaining fossil fuel consumption mostly coupled with carbon capture and storage (CCS). Low carbon hydrogen grows from the mid-2020s for use in sectors where it is difficult to fully electrify.

In the UK, the Powering up Britain: The Net Zero Growth Plan, published in March, envisaged that industrial emissions will need to fall by 62% to 75% on average over 2033-2037, relative to 2021 levels, to be on track to achieve net zero. To achieve this, the government set out an ambition to replace around 50TWh of fossil fuels with low carbon alternatives by 2035. A call for evidence was launched over the summer on Enabling Industrial Electrification.



Source: DESNZ https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1173738/industrial-electrification-call-for-evidence.pdf

Beyond vehicles

In the USA, the Department of Energy (DOE) has released three reports, titled "Pathways to Commercial Liftoff," that delve into the difficulties of industrial decarbonisation faced by industries such as cement, chemicals, iron, and steel, among others. The reports, published on September 18, notes that US industrials are a significant contributor to emissions, accounting for 23% of US CO2e emissions in 2021 total. Within that total energy and process-related emissions accounted for 14% of emissions totaling ~880 MT CO2e in 2021. Chemicals and refining as a subsector has the largest share of these emissions, making up over 60% of emissions from industrial sectors of focus and 7% of total US CO2e emissions.

The report notes the challenges with decarbonatisation of these industries but says if the transport and power sectors decarbonise in line with administration targets and limited abatement occurs in industrials, the share of emissions from all US industrials could rise to 27% of total CO2e emissions by 2030. It notes at US industrial players are at risk of lagging behind net-zero targets, with a focus on short-term, easy-to-implement solutions; however, momentum is growing for deployment of industrial decarbonisation solutions. While the Bipartisan Infrastructure Law and Inflation Reduction Act have created unprecedented tools to support industrial decarbonisation, achieving meaningful reductions could require up to $1,100B in capital expenditure and a bold shift in leadership and technology adoption across various sectors.

To ensure the industrial sector keeps pace with national decarbonisation goals and provides opportunities the reports suggested (among other measures) decarbonisation strategies must be integrated into near- and long-term capital planning, facility retrofits, and equipment downtime and action must be taken to bolster demand-side pull and leverage industry coalitions to accelerate decarbonisation ambition.

Beyond vehicles

In Australia in mid-November, the Albanese Government opened the first of two consultations as part of its Carbon Leakage Review, that seeks to identify options to help address the risk of carbon leakage and protect the future of Australia's heavy industries, such as steel and cement.

The latest Quarterly Update of Australia's National Greenhouse Gas Inventory noted that emissions were 465.9Mt CO2-e in the year to March 2023. This is relatively flat compared with the previous year, with emissions estimated to be up 0.1% (0.3 Mt CO2-e). Emissions in the year to March 2023 were 24.4% below June 2005 levels – the base year for Australia's 2030 Paris Agreement target. The trend over the year reflects movement across the sectors, including: Ongoing reductions in electricity emissions (down 3.9%; 6.3 Mt CO2-e) as renewable energy uptake continues to displace fossil fuel power sources; decreased fugitive emissions (down 1.1%; 0.6 Mt CO2-e), reflecting a fall in coal production of 4.6%; decreased emissions from stationary energy (excluding electricity) (down 0.8%; 0.9Mt CO2- e), driven primarily by decreased activity in the manufacturing sector.

The review noted that Australia is committed to net zero emissions by 2050, and a process for developing a net zero plan and six sectoral net zero plans is underway. Views are sought on a range of policy options, including an Australian Carbon Border Adjustment Mechanism, product standards, targeted public investment in firms' decarbonisation, and multilateral initiatives.

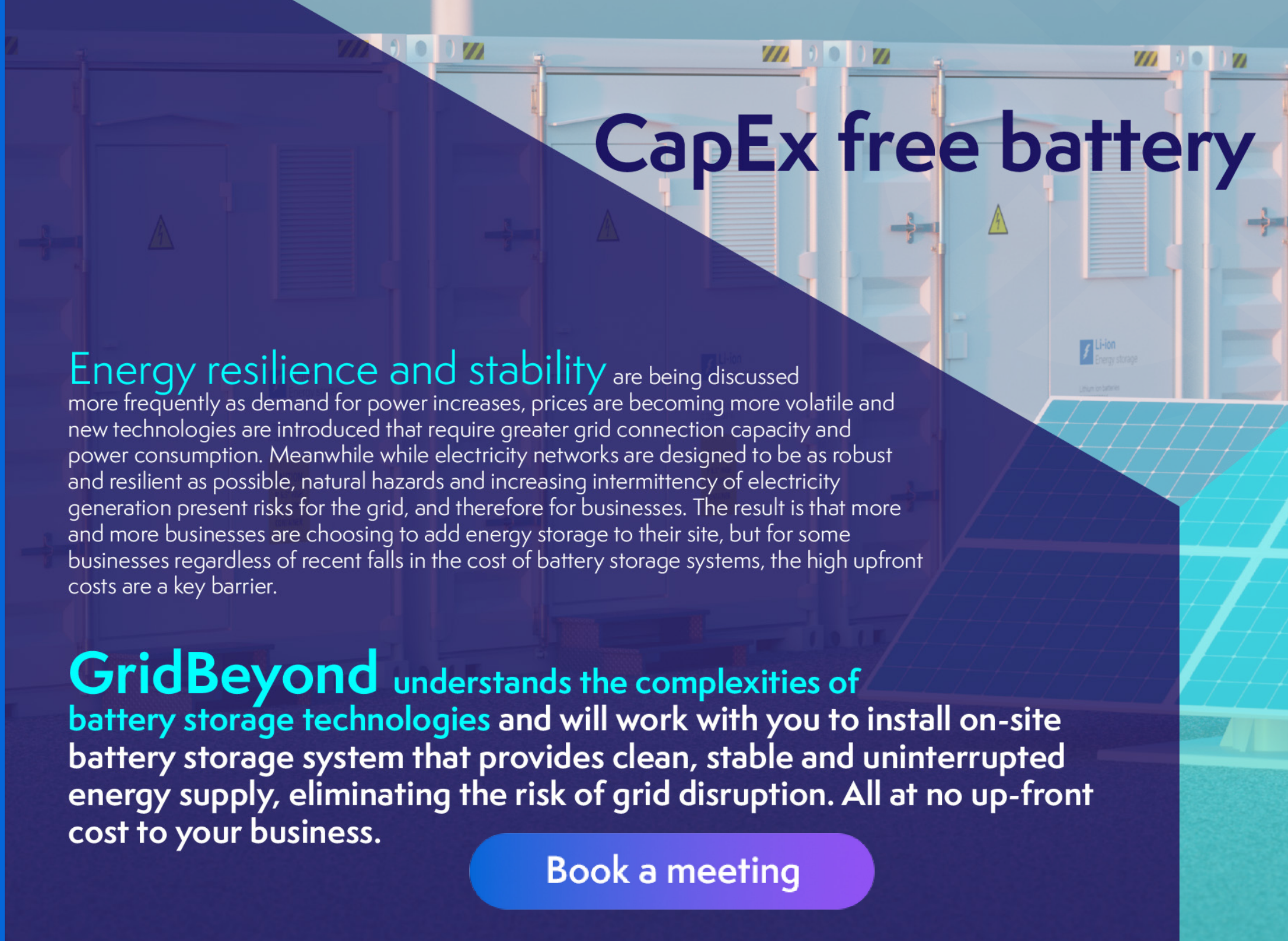
A second round of consultation will be held in mid-2024 and will seek input on the feasibility of detailed policy options to address any identified leakage risks.

Electricity is projected to account for over half of industrial energy demand by the late 2030s. Electrification in all sectors goes hand-in-hand with digitalisation as a means of operating electrical infrastructure, tracking sustainable renewable energy sources, and integrating services between businesses. Instead of relying on a continuous production of electricity, organisations are looking to optimise its use by means of producing power at the most lucrative times and creating ample amounts of energy storage for tapping into during off-peak times. But key to this is the ability to identify and harness energy flexibility.

Launching the consultation on carbon leakage on 13 November, Minister for Climate Change and Energy Chris Bowen said:

"We want to see Australia's heavy industry decarbonise, while continuing to manufacture the steel, cement, aluminium and other products needed for the energy transformation [...] "By continuing to address carbon leakage risk, we will protect Australia's reputation as a reliable and secure trading partner, promote our ambition to become a renewable energy superpower and secure a future home for green industrial goods like green steel."

Chris Bowen
Minister for Climate Change and Energy



CapEx free battery

Energy resilience and stability are being discussed more frequently as demand for power increases, prices are becoming more volatile and new technologies are introduced that require greater grid connection capacity and power consumption. Meanwhile while electricity networks are designed to be as robust and resilient as possible, natural hazards and increasing intermittency of electricity generation present risks for the grid, and therefore for businesses. The result is that more and more businesses are choosing to add energy storage to their site, but for some businesses regardless of recent falls in the cost of battery storage systems, the high upfront costs are a key barrier.

GridBeyond understands the complexities of battery storage technologies and will work with you to install on-site battery storage system that provides clean, stable and uninterrupted energy supply, eliminating the risk of grid disruption. All at no up-front cost to your business.

Book a meeting

Finding flexibility

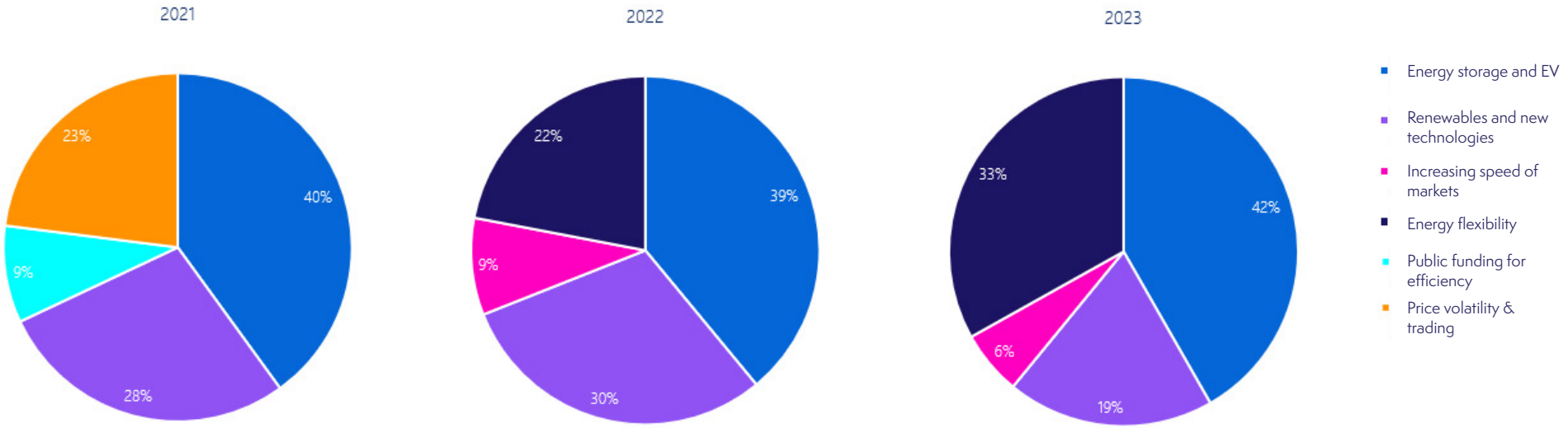
Some markets have taken action to further expand the flexibility available from the demand side to support the grid during peak periods.

In our recent research over 30% of survey respondents saw energy flexibility as being the biggest trend impacting the energy markets of the future. When combined with enabling flexible technologies such as battery and electric vehicles this percentage was near 75% of respondents. This is a sharp shift from year-ago levels, when just 22% saw energy flexibility as a key trend for the future (60% when again combined with enabling technologies).

This trend is supported by a series of policy and regulatory developments in markets across the world as grid operators seek new and innovative measures to encourage flexibility in the power system.

In Great Britain, despite the winter outlook suggesting that system margins will be slightly higher than the previous year, National Grid ESO is actively taking measures to enhance resilience. The DFS program is set to operate from November 2023 to March 2024, encompassing 12 testing events, including the potential for real-time utilisation. The first half of these tests is scheduled to occur before the end of 2023, with the remaining six taking place from January to March 2024.

What technologies and trends do you think will have the biggest impact on energy markets of the future?



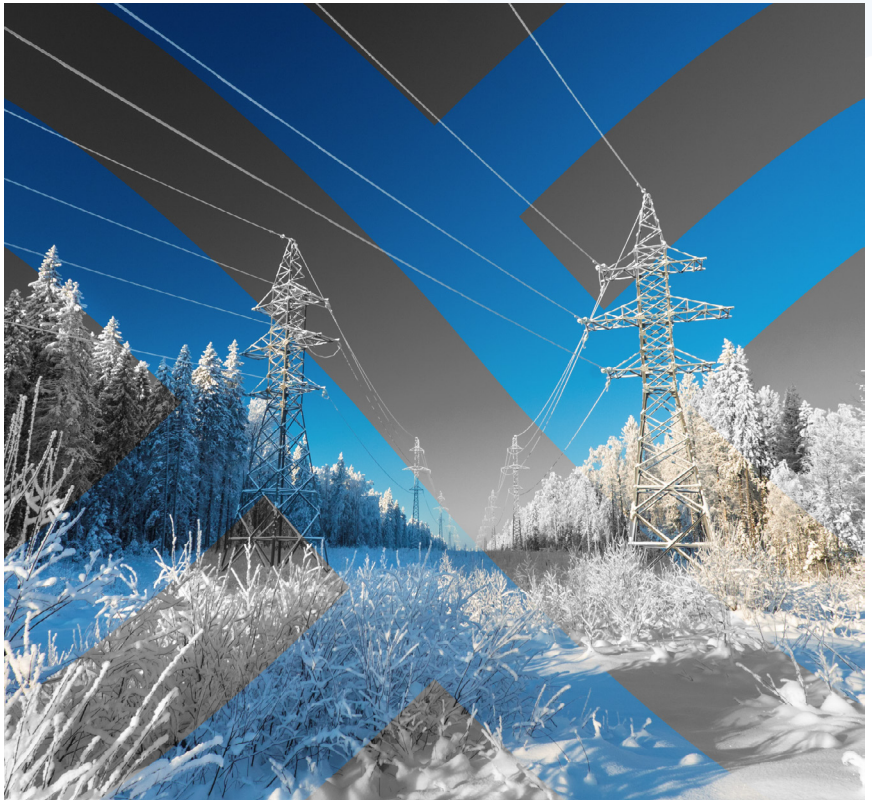
Finding flexibility

This year's DFS service introduces a Guaranteed Acceptance Price (GAP) of £3,000 per MWh or £3 per KWh for at least six of the 12 tests, starting from January 2024, contingent on registered volumes. For live usage of the service, there will be no fixed GAP. Instead, National Grid ESO will consider the lowest available bids to manage network requirements, aligning with its approach for other market services. Unlike the previous winter, all tests will be accessible to all registered DFS participants, eliminating the concept of onboarding tests.

DFS, which was introduced last winter to help the UK cope with tight energy supplies, saved over 3,300MWh during peak demand periods, providing valuable support to the grid during periods of heightened strain, National Grid ESO confirmed. In total, 1.6M households and businesses signed up to participate in 22 events across the winter, covering both live events to balance the electricity network and monthly test events to deliver savings for consumers and demonstrate how effective the system could be.

GridBeyond was one of the approved providers of DFS service and by working with our clients over the winter we helped contribute a total delivered MWh across the five months of 190.01 MWh.

Also in Great Britain, from November 2024, independent aggregators and Virtual Lead Parties (VLPs), are to be able to trade in the wholesale market for the first time. Currently, VLPs are only able to take actions in the Balancing Mechanism, and only suppliers or generators can take physical actions in the wholesale market. This is because the BSC assigns all flexibility delivered by a customer to their Supplier, with the exception of flexibility instructed by National Grid in the Balancing Mechanism or Replacement Reserve market (TERRE), which can be assigned to a third party (a VLP). But the approval of Balancing and Settlement Code (BSC) modification P415 will open up the market for flexibility.



Finding flexibility

The P415 change will effectively delink the wholesale trading role from a supply license, and give small scale and demand side response capacity more options to offer their flexibility into the market. Participation of these flexible assets is crucial for operating a zero carbon energy system. Approval of P415 will give flexibility providers access to wholesale markets to realise the value of flexible assets and will make energy more affordable in the long-term for the public and businesses.

In the United States, ERCOT has launched the Contingency Reserve Service (ECRS), a new daily procured ancillary service. As energy demand continues to grow in Texas, ERCOT said that adding ECRS will support grid reliability and mitigate real-time operational issues to keep supply and demand balanced. ECRS will complement and provide support to the four procured ancillary services ERCOT currently uses: Regulation Up, Regulation Down, Responsive Reserve Service and Non-Spin Reserve Service. ECRS, which was launched June 12, is the first daily procured ancillary service introduced to the ERCOT market in more than 20 years.

The move comes as ERCOT implements the final piece of a 2019 decision to address the increased levels of intermittent renewable resources on the grid. Nodal Protocol Revision Request (NPRR) No. 863 was approved in February 2019 with the objective to stabilise frequency and reduce inertia on the system.

As part of the same decision, ERCOT approved and previously completed changes to the existing Responsive Reserve Service (RRS).

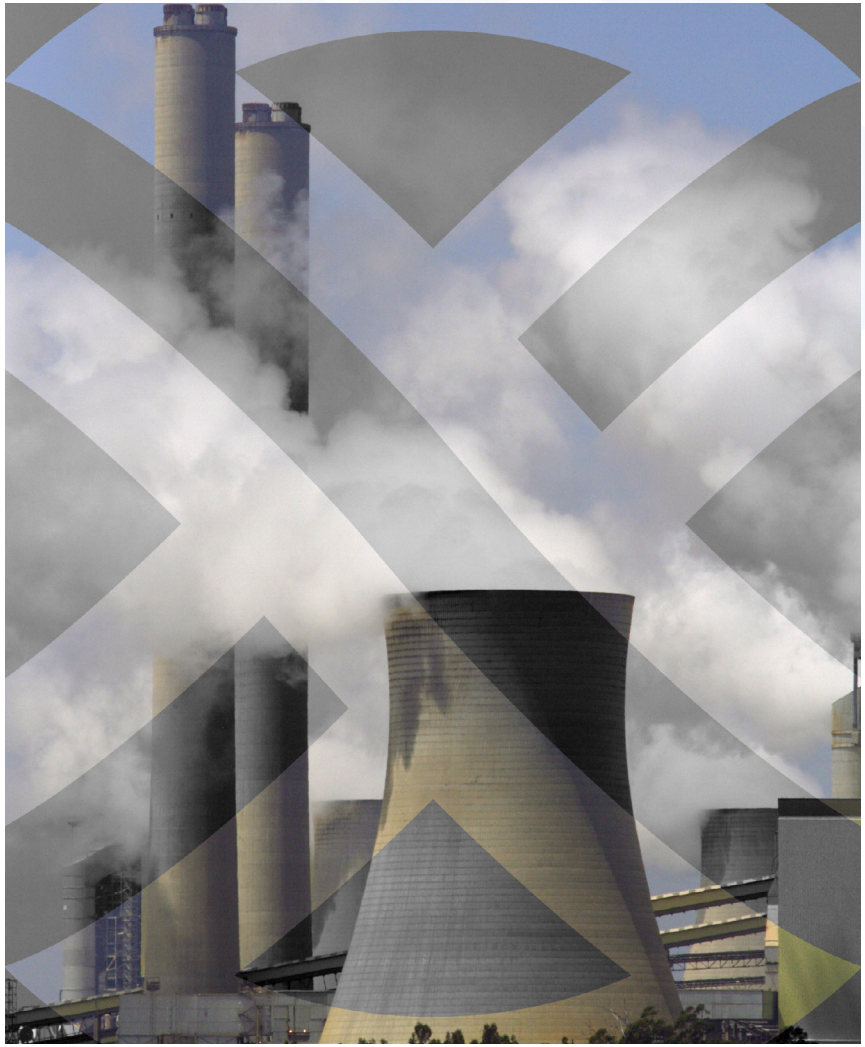
Finding flexibility

In Japan, new ancillary services markets are set to launch in 2024, with rolling weekly and day-ahead markets offering additional revenue streams for storage. A new, low-carbon capacity market will allow battery storage of three hours to participate in auctions scheduled in 2023 and 2024 for delivery in 2027 or sooner.

The Australian Energy Market Operator (AEMO) has published its 2023 Electricity Statement of Opportunities (ESOO) report, which provides a 10-year reliability outlook for each state within the National Electricity Market (NEM). In the next ten years, electricity consumption and peak demand are anticipated to rise and AEMO identified a number of reliability gaps, primarily attributed to the expected retirement of 62% of the current coal fleet by 2033.

AEMO CEO Daniel Westerman said the report underscores the rapid pace of Australia's energy transition and the pressing need for prompt investments to ensure that consumers have access to dependable, cost-effective, and cleaner energy. He emphasised that while the central scenario indicates increased reliability risks, it does not account for the reliability potential stemming from the 248GW of proposed generation and storage projects, actionable transmission projects, and government energy initiatives currently in progress.

As flexibility markets open up and evolve, they create new opportunities for businesses to realise value from their energy assets.



Changing procurement practices

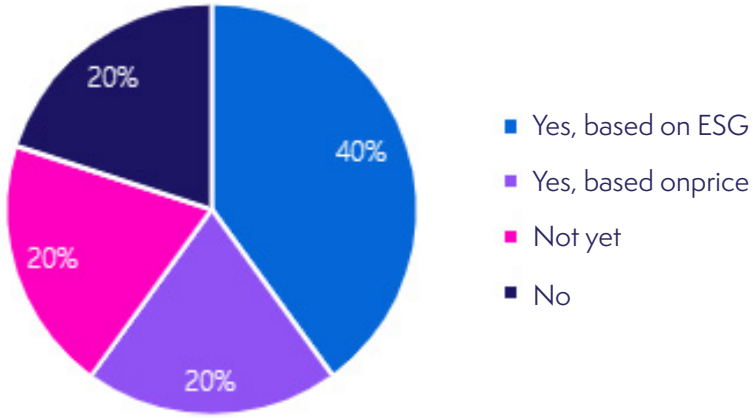
Large buyers can undertake advanced forms of procurement and practices. Matching clean energy purchasing with the timing of their energy use, incorporating demand flexibility, purchasing dispatchable clean electricity, adopting enabling technologies (such as energy storage), maximising emissions reductions, reducing costs and driving the transition to clean energy.

While 80% of businesses (according to GridBeyond's research) have made changes to either how they procure energy (often shifting to flexible contracts) or taking action to limit energy use, large energy buyers play an important role in the clean energy transition and some could go further and expand their approaches to clean energy procurement and demand flexibility.

Renewable procurement or power matching is the practice of purchasing clean energy that aligns with an individual buyer's load on an hourly basis and in the local grid. But there are various levels of sophistication.

- Load shifting: Where buyers reshape load profiles, often using thermal or battery storage, to align demand with clean energy availability.
- Time-based matching: where buyers establish a target to meet a fraction or all of their load with clean energy sources on an hourly basis. The most ambitious form of time-coincident procurement is 24/7 matching, where clean energy portfolios are matched to buyer load every hour of the year.

The way businesses are procuring energy is changing, has your business made changes to its energy strategy? (2023)



Changing procurement practices

- Firm, dispatchable clean energy or storage: Buyers can achieve time coincidence by buying more output from firm clean energy resources whose generation profiles align with buyer load profiles or use energy storage to save and dispatch energy when needed.
- Market-based instruments and verification: Buyers can achieve time coincidence by participating in emerging market-based programs that can help verify time-based transactions.
- Time-coincident procurement may involve additional costs, particularly at higher matching percentages, that may need to be weighed against other strategies considering grid needs.

To enable transformative clean energy procurement practices, the right incentive and reward structures must be present to encourage buyers to undertake advanced procurement measures, particularly given that they can be more complex than common forms of procurement today. In designing new products and services, the incentives offered to the customers providing these services should reflect the value of any grid benefits and increased resiliency that can accrue to utilities, grid operators, or other market participants.

Book a meeting

At GridBeyond, we're your partners in the journey towards 24/7 carbon-free energy.

While reaching the ultimate goal of a 100% renewable power grid may still be on the horizon, we've mapped out a strategic pathway for businesses to significantly enhance their carbon-free energy consumption, taking you from an average of 34% renewable grid-supplied electricity to 83% carbon-free energy*.

Power of participation

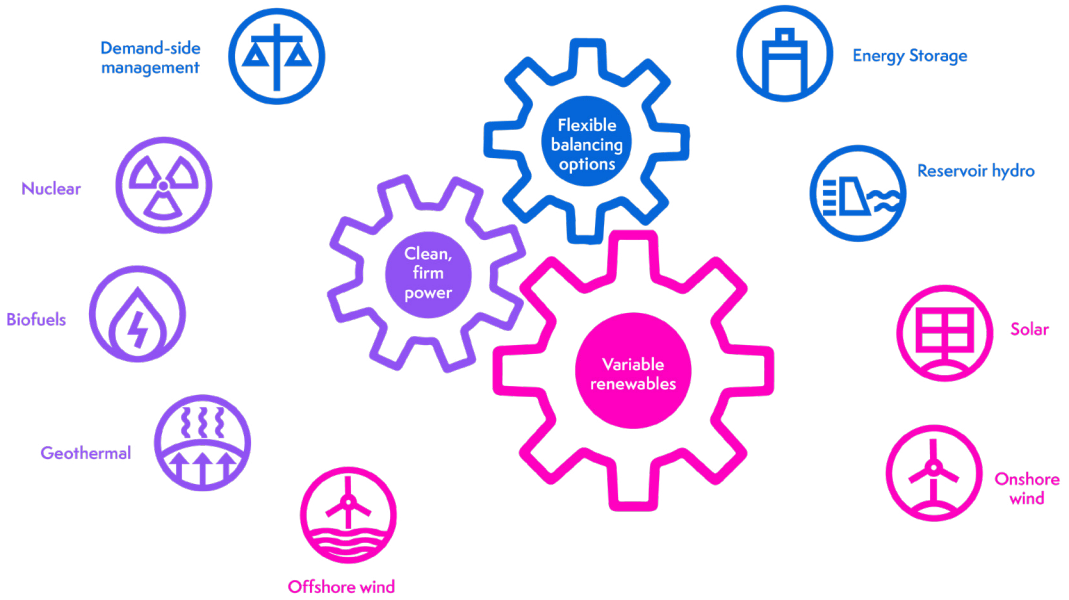
The energy sector stands on the brink of its next evolution. Innovators are leading the way into a fresh era characterised by a strong emphasis on sustainability and efficiency, which are now considered essential rather than optional.

This crucial juncture presents an opportunity for both established and aspiring companies to move away from the conventional volume-based, commodity sales approach and adopt the following strategies:

- Prioritise participation: Embrace an unwavering dedication to empowering customers. This involves understanding their needs, preferences, and concerns, and providing them with the tools and information to make informed choices.
- Implement advanced risk management solutions: To build trust and assurance among customers, it is essential to integrate sophisticated risk management solutions. By offering robust protection measures, customers can feel confident and secure in their dealings with the business.
- Introduce transformative energy services: In the downstream sector, focus on developing innovative energy services that can lead to transformative changes. These services should go beyond traditional offerings and present new and sustainable solutions for energy consumption.

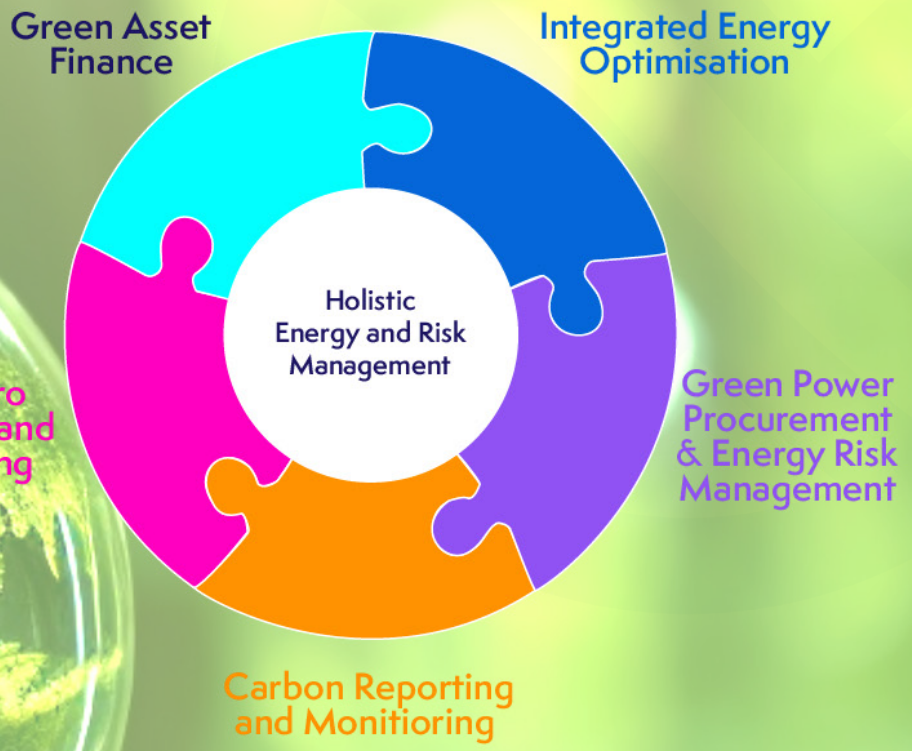
By adopting these forward-thinking approaches, businesses can thrive in the evolving landscape, fostering a culture of responsible growth and meeting the needs of an environmentally conscious and discerning customer base.

Resource roles in a decarbonised power grid



Wherever you are on your net zero journey towards, we can support your business get there!

Book a meeting



When it comes to reaching net zero there are a variety of paths that businesses can take. But each comes with its own challenges and impacts on both operations and budgets. GridBeyond provides a cutting-edge suite of products and services, designed to transform the way you purchase, use and manage your energy.

Built on top of our metering solution, GridBeyond's net zero solutions allow users to track their real-time metrics and progress towards corporate ESG goals and evaluate and fund further steps to help you reach your targets.

Our solutions combine machine learning, AI and data solvers with an experienced trading team to deliver carbon and cost savings, while simultaneously addressing the commercial and operational aspects of your asset portfolio through clean power purchasing, energy risk management and asset finance, installation and operation.

Harnessing potential

There has been a renewed focus on sustainability and environmental reporting; the introduction of net zero targets, combined with the "Greta effect" means that people are taking more notice when it comes to climate change and carbon emissions. For major energy users, adopting a flexible approach to energy becomes a key asset in staying competitive in a net zero future.

Distilled to a simple equation, "net zero" is achieved when [emissions released] – [emissions removed] = 0 (i.e. the emissions removed from the atmosphere completely cancels out the emissions released). Pledges often adopt the following formulation: "X company commits to achieving net zero emissions by Y".

Some net-zero pledges deal with a company's direct greenhouse gas (GHG) emissions from their activities (scope 1) and consumption of electricity (scope 2). Others are more all-encompassing and deal with (scope 3) emissions generated by the consumption of a company's products.

The most common form of net-zero pledge commits to cancelling out current and future emissions, generally by 2050. The mid-century timeframe was based on evidence that net-zero emissions needed to be achieved by 2050 to limit the global temperature increase to 1.5°C above pre-industrial levels. But the Intergovernmental Panel on Climate Change (IPCC)'s Sixth Assessment Report, Climate Change 2021: The Physical Science Basis, published in August 2021, indicates that climate change is occurring much faster than previously predicted. The most recent estimates show that the global temperature could exceed 1.5°C of warming, relative to 1850-1900, by 2030. Consequently, companies may choose to reconsider their existing pledges and target date to align with the latest IPCC report as a precaution.

Net-zero pledges now cover 92% of GDP and 88% of emissions worldwide. Despite this, the definition of net-zero and the path to get there has been interpreted in different and inconsistent ways.

Harnessing potential

As tracked by the Energy and Climate Intelligence Unit, over 130 countries have committed to carbon neutrality to date, by making pledges to the Carbon Neutrality Coalition and/or by introducing new internal net-zero regulations.

For businesses many are now choosing to aim towards the SBTi's Corporate Net-Zero Standard, which provides a common, robust, science-based understanding of net-zero. It gives business leaders clarity and confidence that their near- and long-term decarbonisation plans are aligned with climate science.

But setting the target is just the first step. Based on the SBTi's database the actions that businesses are taking to reach their targets generally fall into one of five categories:

- Renewables: The most frequently mentioned action, as almost all companies have reported using renewable energy sources or purchasing green energy
- Optimisation: Many companies have cited optimisation measures, which typically include energy efficiency improvements and process optimisations
- Green energy purchasing: This is similar to renewables but specified as purchasing energy with renewable origins, often including the purchase of energy certificates like Guarantees of Origin (GoOs)
- EV/ EV optimisation: Many companies cited transitioning to electric vehicles and optimising their use, which cuts down Scope 1 emissions from company-owned fleets
- Carbon tracking: A significant number of companies are actively tracking their carbon footprint, which is essential for setting accurate targets, reporting progress, and implementing effective carbon management strategies

Harnessing potential

In the pursuit of a sustainable future, the global community has rallied behind net-zero commitments, emphasising the critical need to curb carbon emissions and combat climate change. The heightened environmental awareness has propelled a significant shift towards prioritising sustainability.

To achieve net-zero emissions, companies are redefining their strategies, embracing a flexible approach to energy utilisation as a core asset in remaining competitive within this new landscape. The essence of "net zero" revolves around the equilibrium between emissions released and emissions removed, culminating in a balance of zero. However, the definition of this concept and the pathways to attain it vary widely across different sectors. Current IPCC assessments project a more urgent need for action, revealing a faster pace of climate change than previously anticipated, prompting a reconsideration of existing net-zero pledges to align with the evolving scientific data. While the majority of nations and a significant portion of global emissions have committed to carbon neutrality, the interpretations and methods to reach these objectives remain inconsistent. Businesses are now gravitating towards internationally recognized standards, such as the SBTi's Corporate Net-Zero Standard, to ensure a scientifically grounded approach to their decarbonization plans. These efforts encompass a range of strategies, including the utilization of renewables, optimization measures, green energy procurement, transitioning to electric vehicles, and rigorous carbon tracking. While setting targets marks a crucial starting point, the real essence lies in the tangible actions undertaken to fulfill these commitments. The collective pursuit of net-zero emissions stands as a beacon of hope, yet the true impact will be determined by the resolute implementation of sustainable practices and the unyielding commitment to transformative change across all sectors of society.

Conclusion

Energy transition will never be a straight path. Times of crisis put the spotlight on governments to take immediate action to secure energy supplies, but severe weather events have once again highlighted the importance on ensuring the transition continues. But it is also important to realise that the feasibility of meeting energy, renewables and net zero targets depends on the availability of sustainable and cost-effective solutions.

As the energy markets stabilise into their new "normal", this presents an opportunity for stakeholders of all types to take action to accelerate the changes in energy markets that create a net-zero future, which ensures supplies are available at a price that is affordable for all. But the key to ensuring that energy remains affordable to all consumers is the ensure that investments are made in the right place and that opportunities presented by cost limiting actions and technologies (such as taking advantage of demand side flexibility) will prove vital.

As governments and regulators grapple with issues around integrating renewables and how to support their growth, it is up to businesses of all shapes and types to take action and ensure that they are meeting their targets in the most cost-effective way.

At GridBeyond we provide a suite of solutions to support your business revolutionise its energy strategy and accelerate your journey towards net zero. Wherever you are on your net zero journey towards, we can support your business get there!

GridBeyond – Delivering net zero

GridBeyond has developed a unique AI-powered platform that is accelerating the transition to a net-zero energy sector. Our platform, Point, integrates with and optimises energy demand and generation assets of all shapes and sizes, from refrigeration and arc furnaces to batteries and solar PV, supporting our customers to make more strategic decisions about the way energy is used, stored and managed – helping your business and the wider energy sector reach net zero.

Your roadmap to Net Zero

AI powered Energy Services

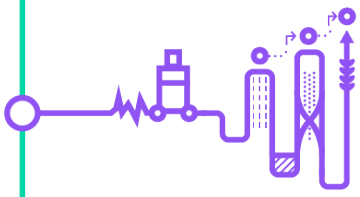
Starting with optimisation of your existing assets and energy trading strategy, our AI-powered platform, Point, processes 70+ data points to ensure your assets are optimised in real time and in the right market to maximise cost savings and revenues. Our machine learning, solvers, robotic trading, and data scientists use this data to further optimise your assets and boost your bottom line.

Sub-second Monitoring and Optimisation

Monitoring of your assets through our proprietary hardware, TouchPoint, ensures that your assets are working at maximum efficiency and any equipment faults can be detected early, reducing downtime and increasing visibility of energy use for accurate benchmarking and carbon reporting.

Funded Battery for Resilience, Carbon Reduction, and Revenue

With an in-depth understanding of your site energy profile, its operational parameters and grid supply, we install, with no CapEx, stationary battery storage, providing your business with an additional revenue stream, energy resilience and protecting vital equipment during voltage dips while supporting the green transition of the grid.



Financing on-site genetation

Revenues generated through monetising asset flexibility, robotic trading, and operational savings provide capital to further optimise your energy strategy for cost saving, carbon reduction and resilience through the installation of on-site generation and solar PV.

Integrating EV Fleets

From project sizing to grid connection, we support the electrification of your vehicle fleets. By ensuring your EVs are fully optimised alongside your existing assets, we help you reduce import charges, integrate fast EV charging, boost resilience and gain additional revenues.

Net Zero

All without impacting your operations and supporting your net-zero ambitions and those of the wider energy sector.

GridBeyond solutions

DSR

Unlock additional revenue streams with Robotic Trading. Let AI handle the complexities of providing ancillary services, optimising your participation and generating extra income effortlessly.

Trading as a Service

Asset optimisation solutions to help you earn the most revenue possible from your participation in energy markets. By optimising your assets, you can take advantage of market conditions and increase revenues.

Forecaster

Harness AI models to forecast price, demand, renewable power generation, and other time series data using Forecaster to ensure that all revenue streams are maximised.

Peak Management

With AI-driven Peak Management, you can efficiently manage peak demand periods, ensuring minimal expenses and maximising your overall savings.

Bid Optimizer

AI-powered optimisation and Robotic Trading to drive profitability to new heights by ensuring optimal bids that maximise gross margin or P&L across all forward trading periods.

SaaS

A suite of software to maximise profitability of your investments in the energy sector - from planning to optimisation, powered by AI.

Designer

A powerful tool to assist asset and project developers in planning, designing, and analysing prospective revenues from investments in the energy sector.

CapEx free battery

Asset optimisation solutions to help you earn the most revenue possible from your participation in energy markets. By optimising your assets, you can take advantage of market conditions and increase revenues.

Baseline

Deliver cost and carbon savings with unparalleled reliability and efficiency, while simultaneously addressing the commercial aspects of your portfolio, as you accelerate the mission to end global dependence on fossil fuels.

GridBeyond®

Targets, trajectories and temporalities
Contextualising net zero

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