

From Black to Green Power

Online Workshop co-hosted by ECECP, the Danish Energy Agency (jointly with the Embassy of the Royal Kingdom of Denmark in Beijing) and State Grid Energy Research Institute, on 19 August 2021

This is a summary, not a verbatim transcript, of the key points made during the online event.

Background

The aim of the workshop 'From Black to Green Power' was to present the experiences of the European electricity sector. Kristian Ruby, secretary general of EURELECTRIC, presented the sustainable business strategy for European power producers, and Christian Zinglensen, director of ACER (Agency of European Energy Regulators), explained the key drivers for the transformation of the European power sector from a regulatory perspective. The Danish Energy Agency presented the Danish experience, drawing on its recent report 'From black to green - a Danish sustainable energy growth story', which offers a case study showing how a utility can switch from fossil fuels to renewable energy and the framework conditions that have made this possible. The workshop also included a presentation on the role of the European Emissions Trading Scheme (ETS) in the transition to green energy, following the launch of the Chinese ETS this summer.



Highlights

- Danish solutions are an example of European experience under the given policy framework.
- Fit for 55: EU Commission proposes cross-sectoral policy action to deliver Europe's Green Deal strategy and create the first climate-neutral continent, and sets of reliable targets for investors and project developers.
- Long-term targets, demonstration projects, economic incentives, competition as well as permitting and risk mitigation are necessary to attract investment in the energy transition and create the right framework conditions for a green energy transition.

- Denmark's Ørsted case study shows that the transition requires a sustainable vision and a strategy for phasing out fossil fuels and phasing in renewable energy.
- The Emissions Trading Scheme (ETS) is an important policy instrument that sets a pricing framework to facilitate a green transition.

Fit for 55 – making EU energy policy fit for climate targets

Tomasz Jerzyski, international relations officer, DG ENER

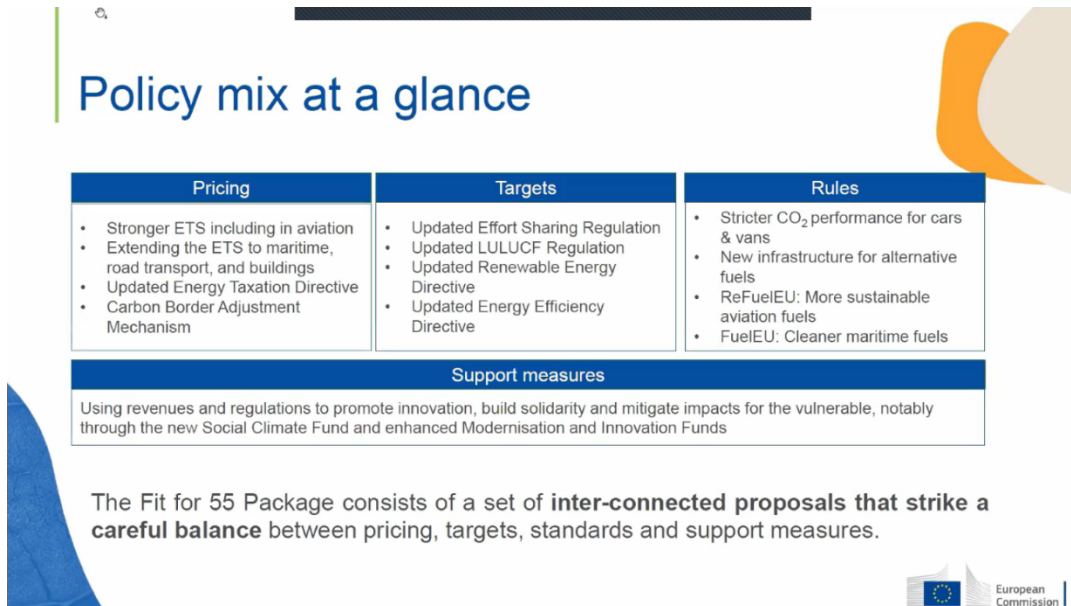
The Green Deal, Europe's new strategy adopted in 2019, is about making the European economy climate neutral in all sectors and leaving no one behind. On 14 July 2021, the European Commission adopted the 'Fit for 55' package, a set of legislative tools designed to achieve the goals of the European Climate Law and to deliver the European Green Deal. This is a crucial step towards fundamentally transforming European society and preparing it for a fair, green and prosperous future, shaping EU policies on climate, energy, land use, transport and tax to reduce greenhouse gas emissions by at least 55% by 2030, and so becoming the first climate neutral continent by 2050.



This package of proposals prioritises energy efficiency, electrification, and innovation where electrification is not possible (for example, using low-carbon fuels such as hydrogen). The proposals are based on positive trends that are evident in the energy sector, such as the dramatic decline in GHG emissions, new records in wind and solar generation, an acceleration in the move away from coal to gas, and lower energy prices.

Highlights of the 'Fit for 55' proposals:

- Extend EU ETS to new sectors, lower overall emissions cap, increase innovation and set up a facilitation fund.
- Revision of the current Renewable Energy Directive: increase the renewable energy target (total energy mix, not just electricity) to 40% by 2030 (previously 32%); set a new binding EU



target for 2030 for final and primary energy consumption.

- Policy measures in the transport sector: stricter CO₂ emission standards.
- Tax and trade: shift tax incentives away from fossil fuels and towards clean energy technologies.
- Social climate fund: finance from the EU budget to support households, transport users and micro-enterprises; promote investment in energy efficiency and renovation; provide direct revenues to support vulnerable households; finance for zero- and low-emission mobility.

A Danish sustainable energy growth story: the case of Ørsted

Alexander Newcombe, advisor, Danish Energy Agency

The Ørsted case study shows how an energy utility can transition from fossil fuels to renewable energy and the enabling regulatory framework that has made it possible.

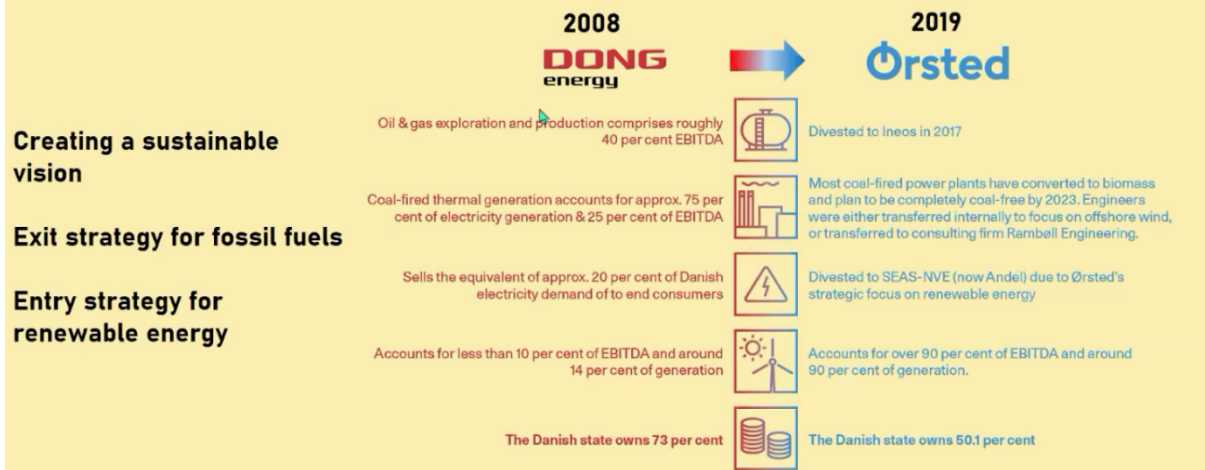
In the 1970s and 1980s, the growing oil crisis required new energy policies and technologies. Denmark's oil and coal companies merged to form DONG energy (later Ørsted). From 1996 to 2000, the EU internal market was gradually liberalised and the Nordpool market developed. In 2007, the EU agreed to implement the 20-20-20 targets, which were subsequently translated into targets for individual member states (including Denmark). In subsequent years, Denmark resolved to phase out coal and set even more ambitious targets for its green transition. DONG announced new sustainability targets, but then ran into some financial difficulties. However, following a successful financial restructuring, DONG eventually expanded successfully worldwide, was renamed Ørsted, and has now become the world's foremost developer of offshore wind power.

Policy-side learnings

Planning – setting ambitious and reliable targets	Long-term, stable, inclusive and transparent energy planning procedures, supported by legislation, concrete reforms, and dialogue with the industry and with the public, are an essential part of the green transition
Demonstration projects	Demonstration projects provide invaluable regulatory, technical and engineering learning and boost investors' confidence, proving the scalability of the technology.
Economic incentives	Subsidies, taxes and CO ₂ prices have proved instrumental, when designed in a transparent manner to reduce regulatory risk
Competition	An electricity sector built on the fundamental concept of competition creates incentives to innovate and lowers prices
Permitting and de-risking	Appropriate allocation of risk and the streamlining of permitting procedures reduce regulatory risk and potential delays

On the policy side, a stable policy framework, demonstration projects, carefully designed economic incentives as well as a permitting and de-risking strategy are the key elements needed.

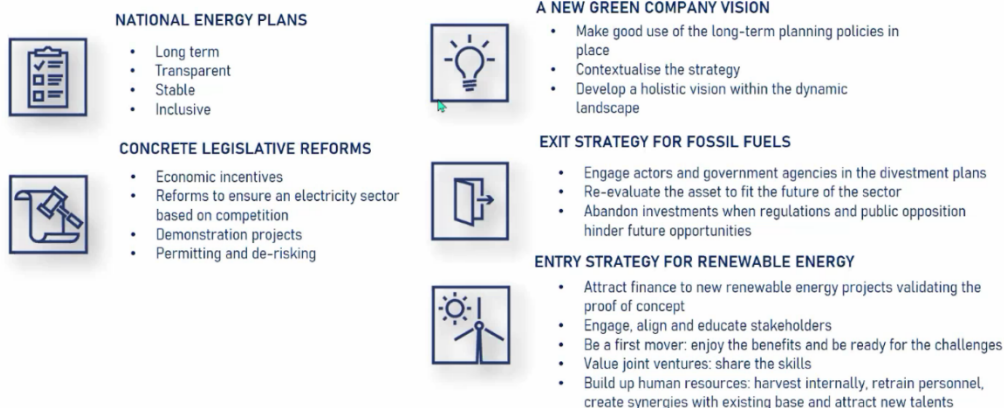
Learnings from the energy company's business transformation



On the business side, the case study shows that it is essential to create a sustainable vision, an exit strategy for fossil fuels and entry options for renewables.

RECOMMENDATIONS

Transitioning from black to green energy

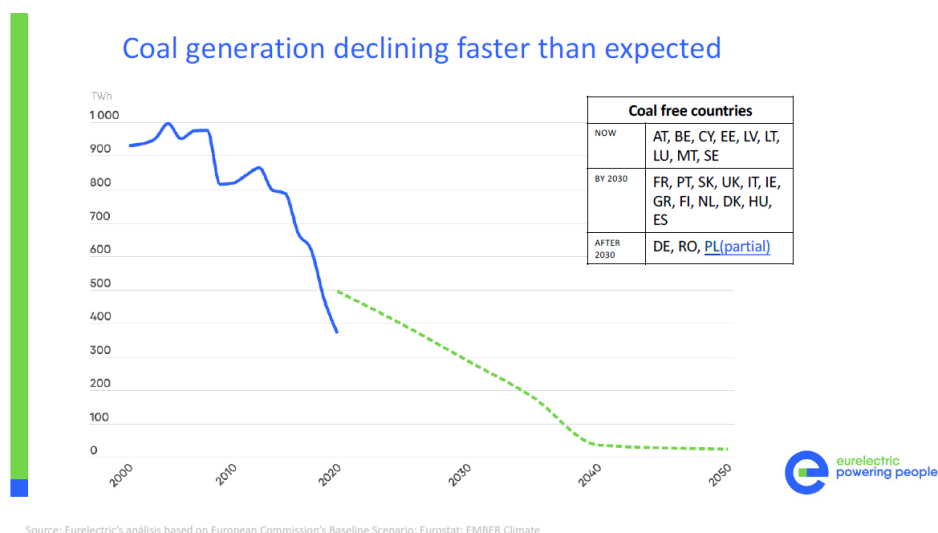


Policy measures and business strategies must complement each other to achieve an efficient green transformation.

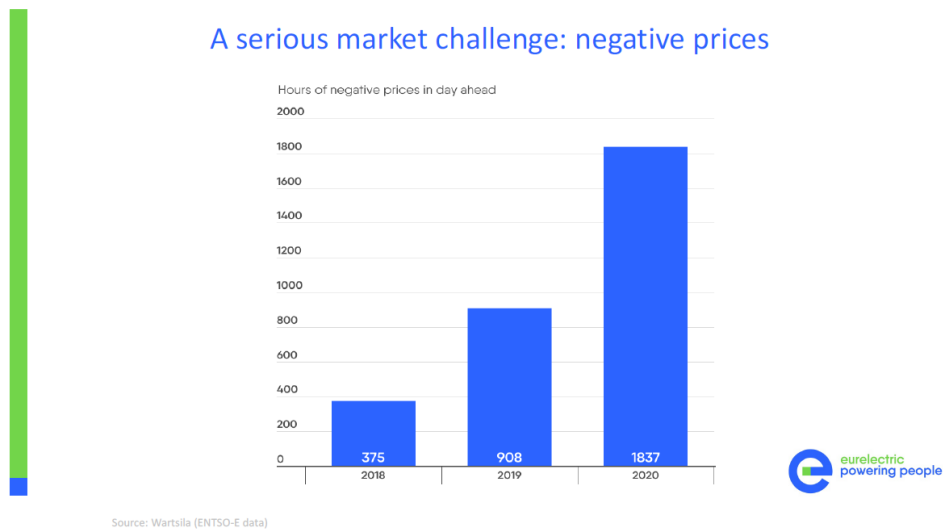
European power sector strategies: the main drivers

Kristian Ruby, Eurelectric secretary general

Europe has only nine and a half years to achieve its ambitious target of 55% emissions reduction by 2030. To achieve a fully neutral carbon sector, 80% of the continent's power needs to be produced from carbon-free sources. Kristian Ruby outlines the European strategy for expanding the electricity market and delivering value for customers.



To achieve this, an additional 1000GW of capacity is necessary. The main bottleneck is obtaining permissions for these projects. Currently, the process can take between five and 10 years. This lead time is unwelcome, and a faster and more integrated approach is vital.



In parallel with the construction of more renewables (wind, solar, hydro), the region needs more storage capacity for dispatchable electricity. Transmission grids are indispensable in the electricity network of the future. Therefore, the energy transition will require EUR400 billion of investment for modernisation and digitalisation of the region's distribution grids.

An increased capacity on the supply side requires rapid and extensive electrification, so that new renewables can meet the increased demand for clean energy. Hence, the now familiar phrase 'electrification whenever, wherever' requires a reliable public infrastructure for EV charging stations, which in turn will need substantial investment. The same goes for heat pumps, where a similar increase in demand is anticipated.

The European ETS system

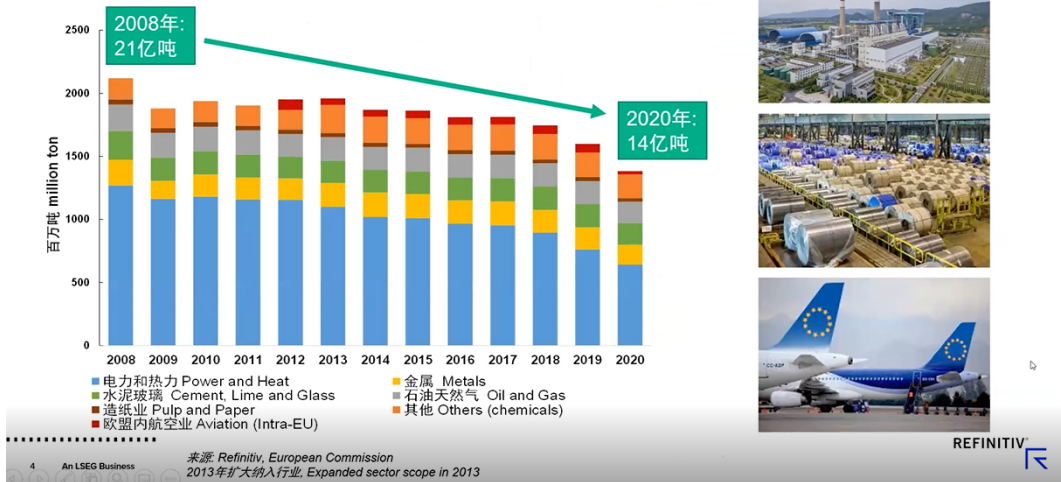
Yan Qin, lead analyst, Refinitiv

The EU ETS was established in 2005. It extends to all 27 EU member states, Norway, Iceland and Liechtenstein, and has links to the Swiss ETS. It is made up of more than 12,000 facilities, most of which are compliance entities. Information is available online: <https://ec.europa.eu/clima/ets>

Carbon pricing is a vital driver for the energy transition.

欧盟碳市场行业排放量逐年下降，电力行业减幅更大

EU ETS sectors' emissions on declining path since 2008, especially in power sector



The market price is decisive to the effectiveness of the ETS and has been very volatile since its launch, rising from an initial EUR 3/tonne to over EUR 50/tonne.

欧盟碳配额价格由于供给过剩长期处于低位，在碳市场改革方案出台后近年大幅回升，过50欧

EU ETS allowance price stayed at low levels for years, then rebound strongly on market reform policy, >€50

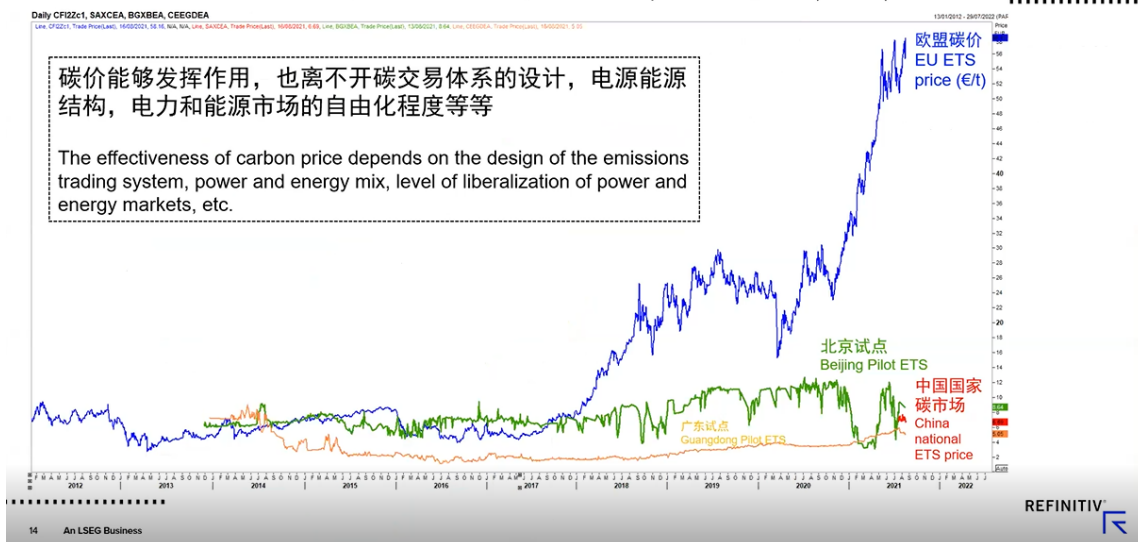


The EU Green Deal and Fit for 55 proposals will strengthen and support the carbon price, which is forecast to rise to EUR100/tonne.

In China, the ETS started with regional pilots in 2013. The price of the national carbon market in China is clearly lower than that of the EU ETS, though the prices are not directly comparable as the markets are designed differently and cover different sectors.

中国国家碳市场2021年启动，目前碳价在50元/吨的水平

China national carbon market launched in 2021, allowance price 50 CNY/t (€6.5/t)



Key enablers of Europe's power sector transformation from a regulatory perspective

Christian Zinglersen, Director of ACER (the EU Agency for the Cooperation of Energy Regulators)

Christian Zinglersen's presentation on the significant transformation of the European power sector is divided into three parts; power market integration revolution; main elements underpinning the integration process; challenges ahead for an increased cross-provincial power trade.

The increase of power trade volumes across Europe shows that cross-border trade on the continent has increased over the last decade. Allocating more capacity for cross-zonal trade will achieve economic optimisation, lower costs and early attainment of the region's ambitious decarbonisation targets.

Market coupling has proven to be a highly efficient strategy for power market integration in Europe. This optimises the allocation of cross-border capacity between countries in one efficient process. A shared approach to ensuring adequate resources within Europe will result in lower costs and higher market compatibility. Together, the EU member states will ensure that there is enough generation, including back-up generation.

Citing the power crisis in Texas in February 2021, and the system split in Europe that occurred on 8 January 2021, Zinglersen emphasises that there is an urgent need for a broader system security. Transmission System Operators (TSOs) will have better security of supply if reserves and resources are pooled across different European states. Meanwhile, the regulatory framework needs to facilitate a more dynamic and flexible power system.

The main focus ahead should be to further improve cross-border power trading in Europe. One key task is to increase the capacity available for trade using existing interconnectors. There are several avenues for tackling this (such as grid reinforcement, more remedial action and adjustments to the current bidding zones to reflect the physical congestion realities of the grid - an approach some member states have already applied). A future with more shared (renewable) resources will require rapid infrastructure development, which may well prove to be increasingly controversial given current permitting delays and public opposition in some quarters. Going forward, construction of vast renewable generation facilities at sites far away from demand centres may prove more useful for transit rather than for their immediate surroundings. Hence, different sharing models for costs are needed, where the focus is less on local benefits and more on the wider benefits across the continent.

Finally, Zinglersen reflects on another challenge facing the sector, namely the increasing interdependence of European nations. Drawing on the respective resource endowments of member states may well lead to a significant shift in the roles of structural energy exporter and structural energy importer amongst countries. Over decades, the EU has built up rules, protocols, institutional cooperation, regulatory oversight and enforcement via the courtroom and so on. Is the political conversation on further mutual reliance keeping up with this development? That is an open question.

Panel discussion: Green power transformation in a Chinese context

- Moderator: Kaare Sandholt, Chief International Expert, Center for Renewable Energy Development, Energy Research Institute of NDRC

Panellists

- Jiang Liping, vice president, State Grid Energy Research Institute
- Bente Hagem, former chair of ENTSO-e (European organisation for transmission network operators)
- Lei Xiaomeng, senior advisor, China Electricity Council
- Lucian Ion, general manager, ENEL X China and vice president of Business Development Asia
- Yan Qin, lead analyst, Refinitiv
- Christian Zinglersen, director, ACER
- Kristian Ruby, secretary general, EURELECTRIC



Jiang Liping, Vice President, State Grid Energy Research Institute

The EU's 'Fit for 55' is a good example of the 1+N policy system that the Chinese government is currently developing to promote the 'double carbon' goal.

Like Denmark, most of China's energy and power companies are state-owned. China can learn from the experience of Denmark's successful DONG/Ørsted transition and explore ways in which state-owned enterprises can play a more productive role in driving towards the emission reduction targets set by the government.

One implicit benefit of state ownership was that Ørsted could take a long-term view when transitioning to renewable energy. Key lessons from the Danish experience are that the respective roles and responsibilities of government and businesses must be clearly defined and that business must be given full independence as a market player and the right to make management decisions. In this way, the complementary strengths of both can be ensured. Like its EU electricity counterparts, China is also working to promote a nationwide electricity market, the difference being that the EU's market environment is more mature and the market awareness of stakeholders more robust. As a result, its market role and effectiveness is more evident.

With regard to cross-border trading and the problems that arise in coordinating the various interests involved, Ms Jiang noted that 'the EU does not seem to have developed the best solution yet either', and there is more room for communication between China and Europe on this issue.



Bente Hagem, former chair, ENTSO-e

Introduction of an European integrated electricity market and the Ten Year Network Development plan for interconnectors as a strategy for the energy transition is of great importance. The integrated European market has enabled rapid changes in the energy transition and also led to more competition, better prices, lower emissions and lower infrastructure costs. The European electricity market now covers 100% of all EU countries and is the world's largest electricity market.

Given that the "target model" for market coupling is well known and with the resources and competences China possesses, the development of an integrated energy market could happen faster than in the EU. According to the IEA report of March 2019 the recommendations were the following: implement market coupling, allow trade between regions and build more interconnectors and give flexibility a price. Modelling results for 2035 showed that operational cost of the Chinese power system can be reduced by 10-15% yearly. In addition CO₂ emissions could be reduced with 750 million ton yearly.



Lei Xiaomeng, Senior Advisor, China Electricity Council

1. China-EU cooperation in energy transition is of great significance

In recent years, China and the EU have made significant progress in the field of RE development in the power industry. REN21's 2020 Global Renewable Energy Status Report lists the top five countries for renewable energy development. China has ranked first for many years, and some EU countries have also regularly ranked in the top five. The pace of energy transition of EU countries is ahead of that of China. The 2030 target formulated by China before 2020 is basically equivalent to the 2020 target of EU, and the 2030 / 60 target issued by China in September 2020 represents another step forward. At the same time, the EU's goals are constantly being adjusted, from the CE4AE in 2019 to the Fit for 55 energy package in 2021, in an effort to accelerate the 2030 target.

2. Mr Lei presented the key findings of the power adequacy and flexible capacity assessment that he is currently working on as part of a power development planning study for the energy transition process until 2030 and 2050.
- The assumptions in the study, such as demand forecast, generation resources deployment, renewable energy performance indicators, flexible capacity of conventional generations and so on, are roughly in line with most other similar studies.
 - For the 2030 target, variable renewable energy assets are assumed to be 1375GW, with coal generating capacity reduced to 1123GW by 2030. Total Pump and Battery (P&B) storage will be tripled to provide peak loading in the six regional systems during the annual peak period. This means flexible capacity in the system is sufficient during the off-peak period in most regional systems, even those with a high proportion of wind generation. In the northeast regional system, the need for flexible capacity is met partially by other systems through regional interconnection.
 - For 2050, variable renewable energy resources are assumed to be 5000GW, with coal generation reduced to between 400GW and 600GW. A huge amount of P&B will be needed to provide both peak load and flexible capacity for additional variable renewable generation. There is more potential for curtailment of solar PV than for wind generation.



Christian Zinglersen, Director of ACER

- Energy balancing is likely to be a key issue in China when managing the link between the phasing out of thermal generation and the need for additional flexible resources in the system. Hydropower is an efficient means of balancing in an integrated power system, but an improved demand side response is also relevant.
- Non-market solutions are of questionable merit: the very ambitious decarbonisation trajectory is likely to involve reaping the benefits and efficiencies of increased competition, leveraging the market and trading opportunities. That is why policy interventions and subsidies require constant calibration with an eye to these wider perspectives.



Kristian Ruby, secretary general, Eurelectric

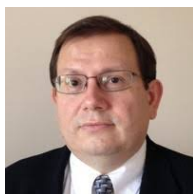
The interaction of policies and measures must be carefully coordinated and should support the policy objectives. Instruments that cancel out the effect of others should be avoided. The trick is to achieve harmonisation across the sector and to give the right signals to industry.



Yan Qin, lead analyst, Refinitiv

China needs to establish a customised ETS but can draw on aspects of the EU model. The EU carbon market has existed for 16 years and has facilitated carbon emission reductions. This is because the market has been aligned with climate policy and targets, and reforms have been used as a stabilising mechanism.

Additionally, the EU ETS is designed to be fair, open and transparent. A high carbon price encourages emissions reduction, and EU established innovation and modernization funds to support low-carbon transition. Higher carbon price then also means more auctioning revenue, which can be used to mitigate against severe burden for the industry.



Lucian Ion, general manager, ENEL X China and vice president of Business Development Asia

ENEL X China has facilitated a dialogue on policy and energy planning, including how to commercialise the technology that makes this energy transition possible. This exchange of information supports business development on both sides.

New energy vehicles (NEVs) are growing in importance as mobile energy sources. Their batteries and charging patterns play an increasing role in both grid planning and operation.

Innovative policy and technical solutions that enable bundled participation in the future energy/capacity/ancillary markets are likely to be beneficial.

Summary compiled by Helena Uhde and Alliance Niyigena, Junior Postgraduate Fellows of ECECP and edited by Helen Farrell, English Editor, EU-China Energy Magazine