Webinar - European Power Market Outlook

October 19th, 2021

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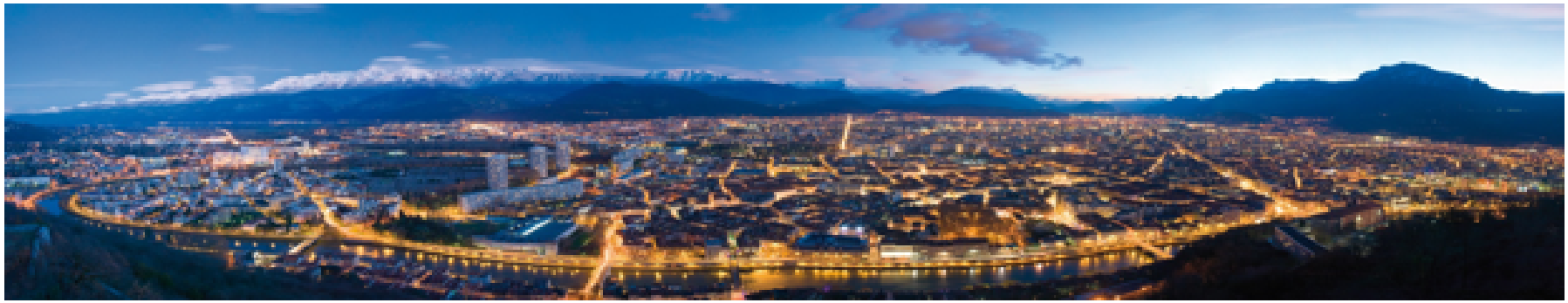
0. About Enerdata and Compass Lexecon

Enerdata

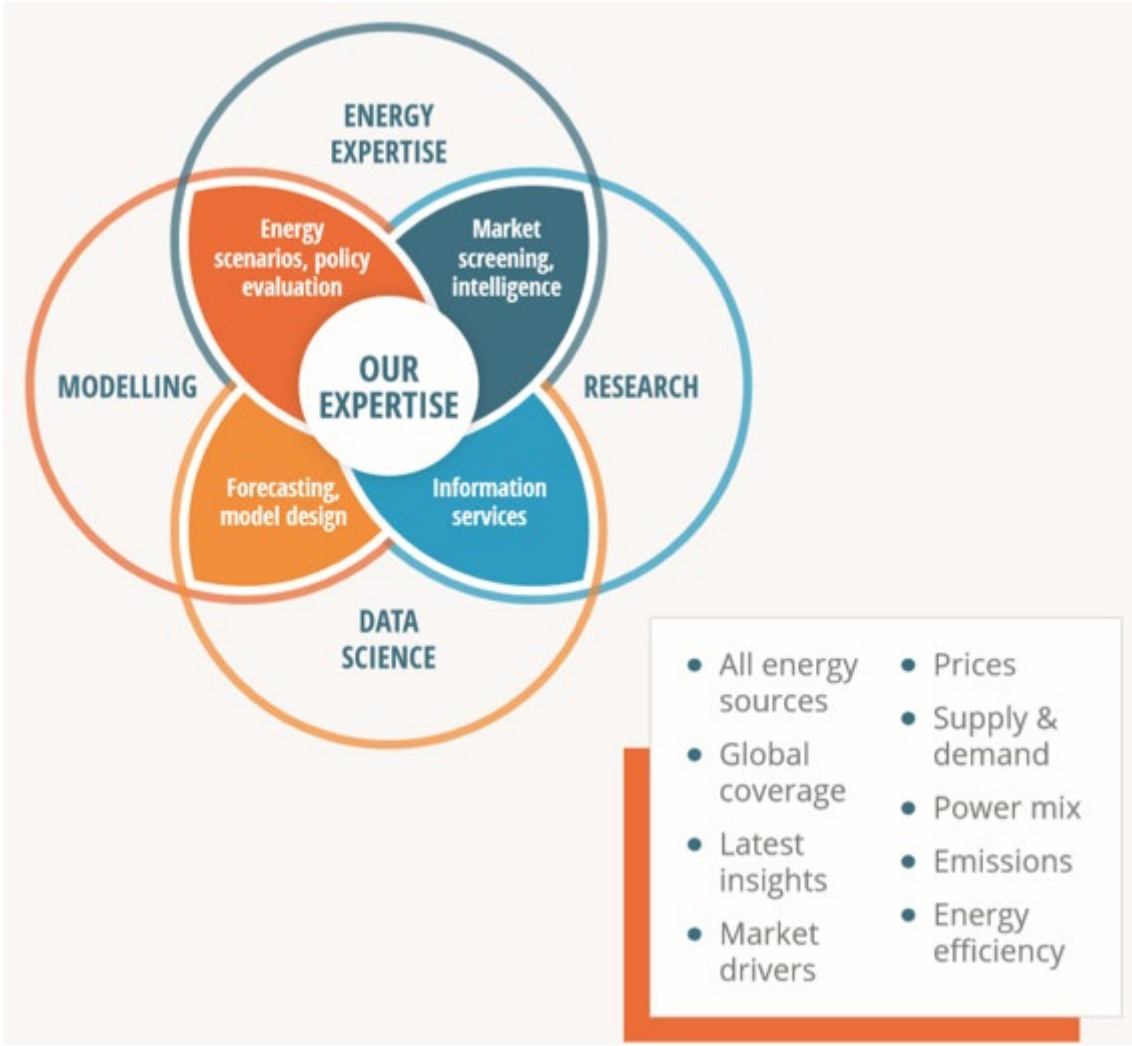
An independent Research Company since 1991

- Spin-off of a **research centre**
- Expert in **analysis and forecasting** of **global energy & sustainability** issues
- In-house and globally recognized **databases** and forecasting **models**
- Headquartered in Grenoble (French Alps)
- Subsidiary in Singapore
- **Global reach**:
  - A wide network of partners across the globe
  - Clients and projects in Europe, Asia, Americas, Middle East, Africa



Enerdata

Helping You Shape Energy Transition Strategies and Policies



Energy Transition Monitoring: 4 case studies

Compass Lexecon is a global Economic and financial advisory firm

Compass Lexecon at a glance

Compass Lexecon is a global advisory firm, subsidiary of FTI Consulting, that provides multidisciplinary solutions to complex challenges and opportunities faced by international companies.

GLOBAL REACH

With over 4,700 employees in 29 countries on six continents, our breadth and depth extends across every major social, political and economic hub across the globe.

EXPERIENCED PROFESSIONALS

Compass Lexecon are trusted advisors with diverse expertise and exceptional credentials serving clients globally including accountants, economists, engineers, former CFOs and strategists.

The Compass Lexecon trademark brings together world-renowned competition and antitrust experts.

DEEP INDUSTRY EXPERTISE

Compass Lexecon combines unparalleled expertise and industry knowledge to address critical challenges for clients. Our largest industry groups are:

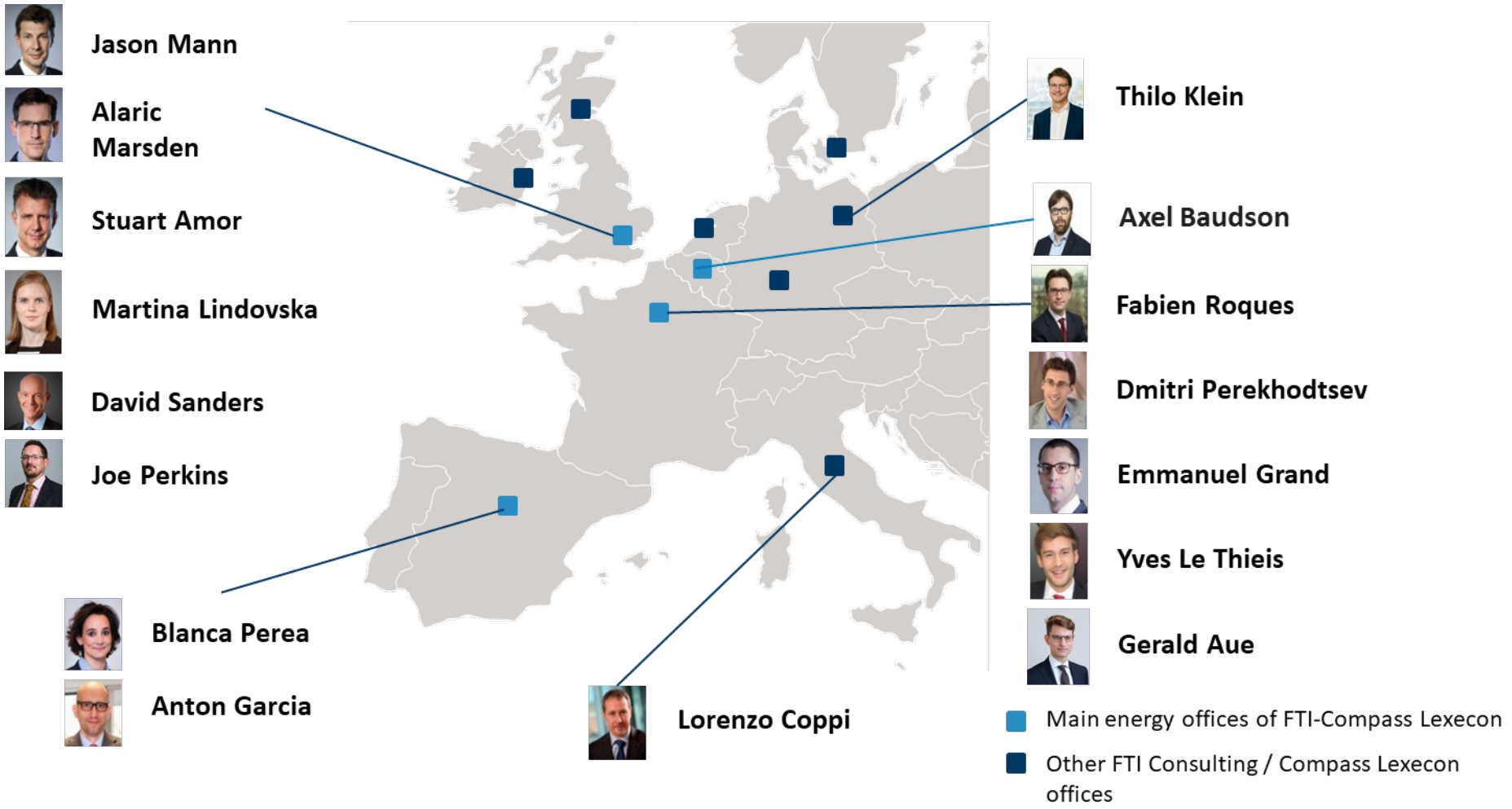
- **Energy, Power & Products**
- Financial Institutions & Insurance
- Healthcare & Life Sciences
- Real Estate
- Retail & Consumer
- Telecom, Media & Technology

FACTS AND FIGURES

1,300+ Clients served	3 Nobel laureates	AMCF Association of Management Consulting Firms 2012 award for corporate strategy FTI Consulting was rewarded for its support in the redesign of The E.W. Scripps Company's newspaper business model
700+ Industry experts	1982 Year founded	
$2 BLN Market capitalisation	FCN Publicly traded – NYSE	

Compass Lexecon Energy practice gathers senior experts across Europe

Compass Lexecon's senior energy experts in Europe



- FTI-Compass Lexecon's senior energy experts are supported by a **team of 40+ experienced consultants**.

The European Power Markets Outlook service

A deep-dive analysis of power market drivers, fundamentals and projections at country level

- ✓ Analytical country reports with annual market forecasts to 2050 (demand, capacities, generation, prices)
- ✓ Excel dataset with comprehensive and detailed forecasts
- ✓ 1 baseline scenario
- ✓ Main European *countries* covered
- ✓ Bi-annual updates
- ✓ OPTION: Premium version offering:
  - ✓ hourly granularity
  - ✓ captured prices
  - ✓ additional scenarios
  - ✓ further customisation

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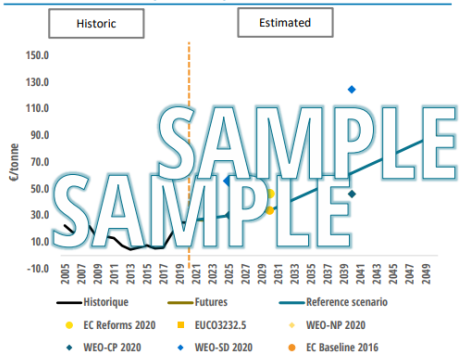
The European Power Markets Outlook service

A deep-dive analysis of power market drivers, fundamentals and projections at country level

B. Market driver 1 – Commodity prices

Outlook for CO2 prices

CO2 EU ETS outlook (real 2019)



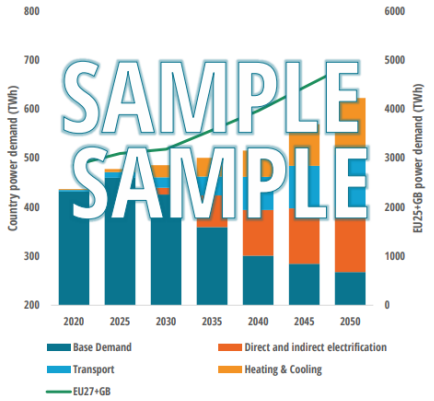
Source: FTI-CL Energy based on Bloomberg, IEA World Energy Outlook

- In February 2018, the approval of the EU ETS reform
- Despite this new reform, **important uncertainties remain** regarding the level of carbon prices, driven by:
  - EU ETS rules in the long term
- These uncertainties are illustrated by the different scenarios provided by the IEA, the EC and FES as shown on the figure.
- In the reference case we
- In the [illegible] scenario

C. Market driver 2 – Supply and Demand levels

Electricity demand is expected to remain flat until 2030, and increase thereafter with electrification of new usages

Electricity demand outlook (TWh)



Annual power demand outlook will depend on several factors:

- The increase in **efficiency** is the main downward factor;
- Several factors could increase the electricity demand:
  - Other new usages : **change in industrials processes, hydrogen** ....
- Uncertainties around all these factors create an important range of scenarios for demand in EU and

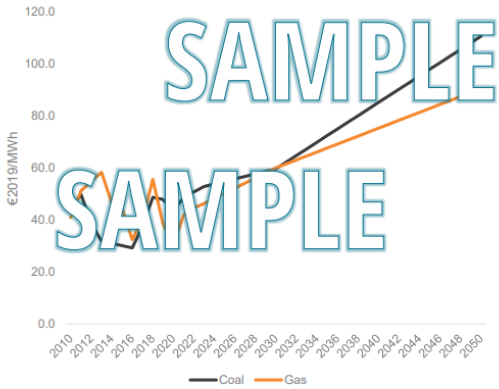
Climate reference year:

- **Hourly demand profiles** are based on hourly demand data from ENTSO-E.

B. Market driver 1 – Commodity prices

Commodity prices outlooks combine into thermal Short Run Marginal Cost (SRMC) of production outlooks

SRMC outlook (€2019/MWh)



SRMC projections

- Commodity prices outlooks combine into thermal SRMC projections for each scenario.
- **In the reference,** the combination of gas, coal and CO2 price are such that gas generation remains cheaper than coal generation throughout the modelled horizon. Gas would thus be called before coal in the dispatch.

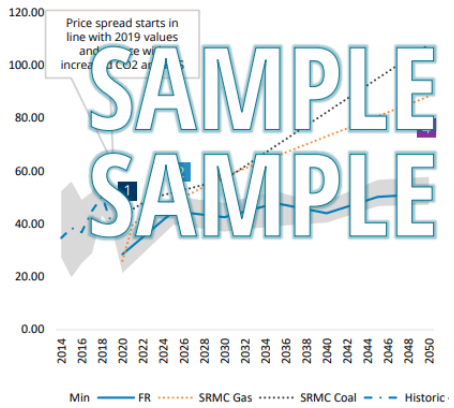
F. Annual power price outlook

Power price outlook in the Reference scenario

With the increase of RES, European power price starts to de-correlate from SRMC from 2030 onwards

1. The recent COVID-19 crisis has a downward impact on French power price as a result of the combined impact on power demand and commodity prices.
2. With the projected rebound of commodity prices and the still limited renewable penetration, power prices rebound by 2025 reaching pre-COVID-19 crisis comparable levels.
3. [illegible]
4. Further increase of RES development and low carbon supply and demand side flexibility towards decarbonisation of the power system, increase the decorrelation between gas SRMC (coal being less relevant by 2050) and average power price thus implying an increase of power price volatility.

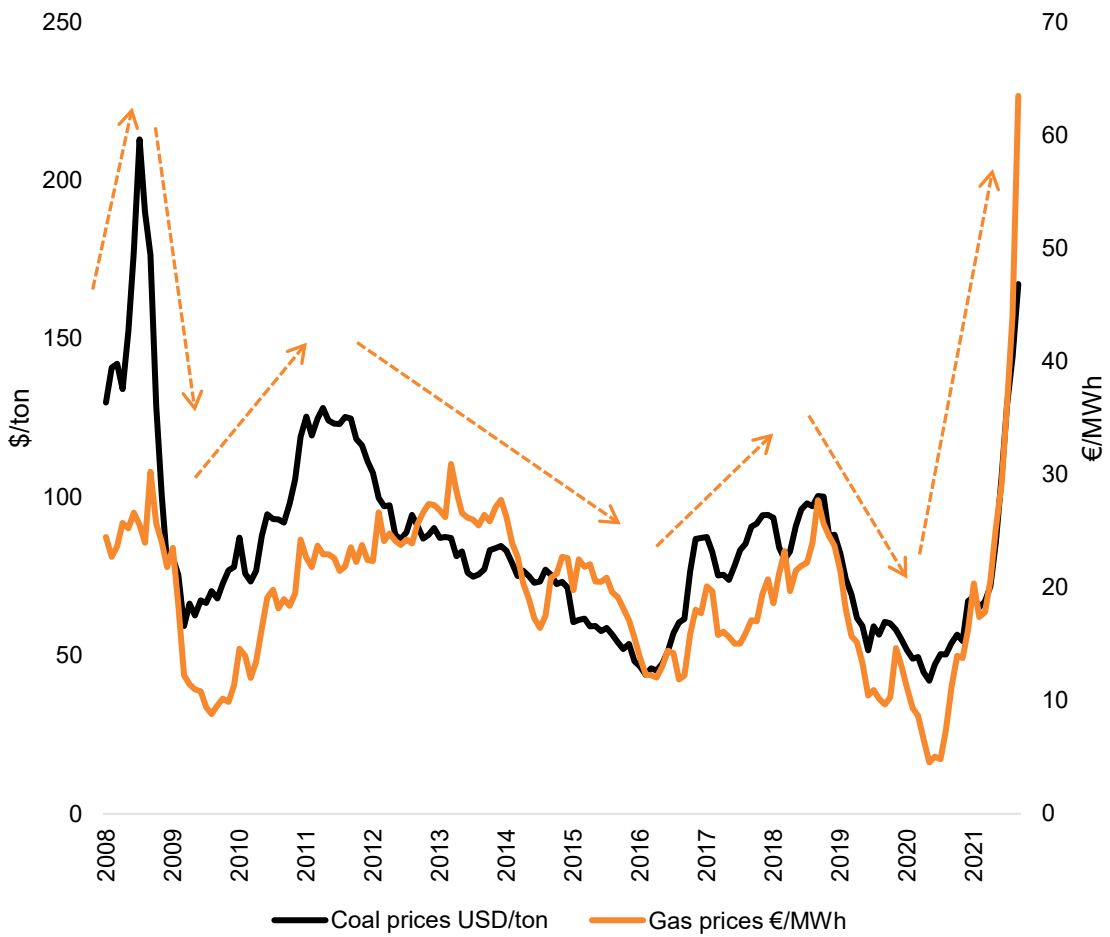
Electricity prices (€2019/MWh)



1.1. Focus on recent evolution of fossil fuel prices

Since 2008, gas and coal prices experienced more and more frequent and extreme cycles

Historical commodity prices

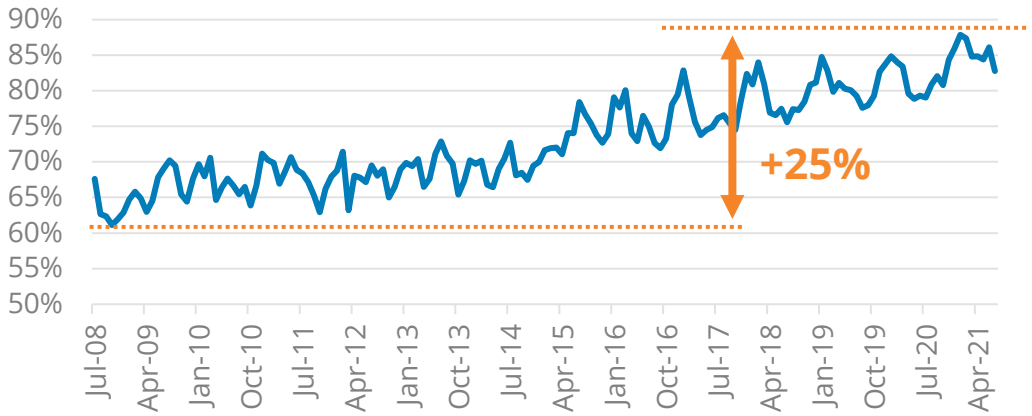


Source: Energy Market Price

- Since power prices are largely driven by short-run marginal costs of thermal plants based on the fuel and CO_2 prices, the evolution of commodity prices has a direct impact on power prices.
- In particular, **from 2008 to 2016, commodity prices collapsed** by around 65% for coal and 45% for gas, which explains partly the power price drop seen over this period.
  - The decrease in coal prices from 2011 is mainly explained by the global oversupply of coal, resulting from the shale gas revolution in the US:
    - Cheap shale gas replaced the use of coal in the US resulting in an oversupply of coal in the US
    - Exports to Europe increased and plummeted coal prices
  - Regarding the gas market, after years of increase, gas prices have declined in 2014, following the fall in oil prices.
- Since 2016, both commodities experienced two new cycles; prices have started rising again from 2016 **followed by a sharp decrease in 2019 amplified by the COVID-19 crisis in 2020, which is today recovered and reaching new highs under the current market tensions**

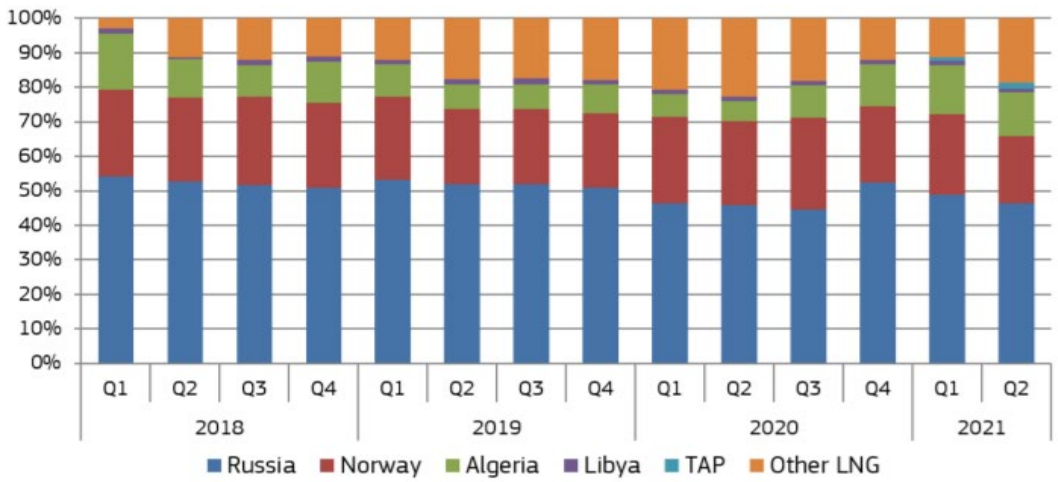
Europe depends increasingly on natural gas imports and storage

Share of Natural gas Imports (Pipe+LNG) & consumption from storage vs. consumption, EU+UK



Source: EnerMonthly, Enerdata

Share of Natural gas Imports, EU

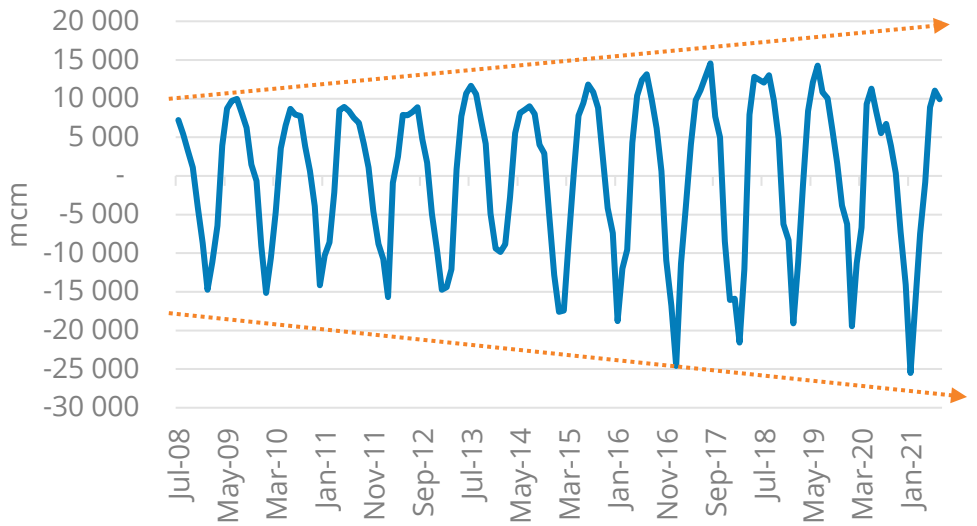


Source: Based on data from the ENTSO-G Transparency Platform, data as of 13 September 2021.

Recent surge in gas prices are **both structural and cyclical**. Regarding structural drivers, Europe faces:

- **Depleting reserves** and significant **decrease in natural gas production** : Share of consumption from imports and storage are up by 25% vs. past decade
- Increasing dependency on **storage**
- Increasing dependency on **key exporter such as Russia** (50% of total imports)
- **a slightly growing demand** that should peak by the end of the decade

Gas stock variation, EU+UK

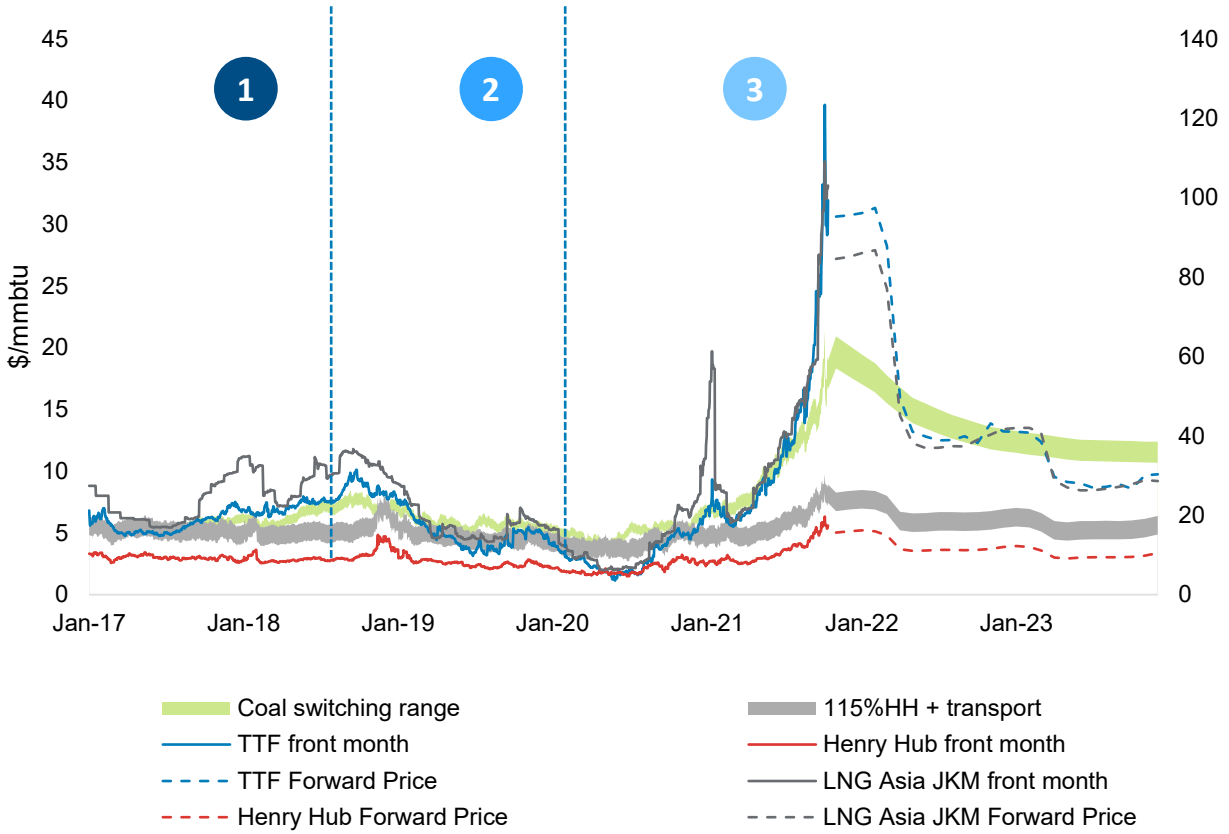


Source: EnerMonthly, Enerdata

European gas prices went through significant changes since mid-2017, distinguished into three periods

1. **Jan 2017 – Sep 2018:** price spread US/Europe increases driven by the tightness of European hubs and Asian demand growth;
2. **Sep 2018 – Feb 2020**: price spread US/Europe falls following European gas price falls because of the LNG supply glut; and
3. **2020-2021**: In Q1 a slump due to COVID-19 demand shock but strong rebound in Q3 2020, signaling that market has bottomed, steadily recovering and now tight to Asian market tension and sharp rebound.

Evolution of gas prices since 2017 (nominal)



1. **European gas markets tightened and strong growth in Asian demand in the second half of 2017**
2. European gas prices plunge over 60% since September 2018 due to excess supply flooding Europe
3. **COVID-19 slump in Q1 2020 with sharp recovery in Q3 2020 signalling steady rebound and now tight to Asian market sharp rebound**

Source: Energy Market Price, EEX

Notes: 1$/MMBTU = 2.83 €/MWh with an exchange rate at 1.2044$/€

Swings in European gas prices were largely driven by the global LNG market and by the European local drivers

1 **Between January 2017 and September 2018 European gas prices surge due to several factors:**

- European gas price is largely influenced by demand from Asia -> LNG flows towards Asia. Continuing strong demand from Asia pulling LNG away from Europe reduced European supply, tightening the market already since 2017;
- Demand for gas has increased due to increase in coal price inducing more usage of gas accompanied by reduced French nuclear output and low Spanish hydro availability in power markets since 2017; and
- Other factors, such as heat weaves during the summer 2018 and outages in the North Sea (Norwest gas hub) contributed to the price surge

2 **Between September 2018 and February 2020, European gas prices followed a sudden reversal due to the same drivers** behind the price rise acting in reverse:

- Global lower economic growth expectations as trade war tensions grew across 2018 Q4;
- Decrease of other commodity fuel prices having a downward pressure on gas demand and gas price;
- LNG flows back into Europe after being diverted to Asia across the summer following weaken Asian demand; and
- Reinsured Russian supply as Gazprom has auctioned over 1bcm of incremental gas across Q4 via the Ukraine/Slovakia import route

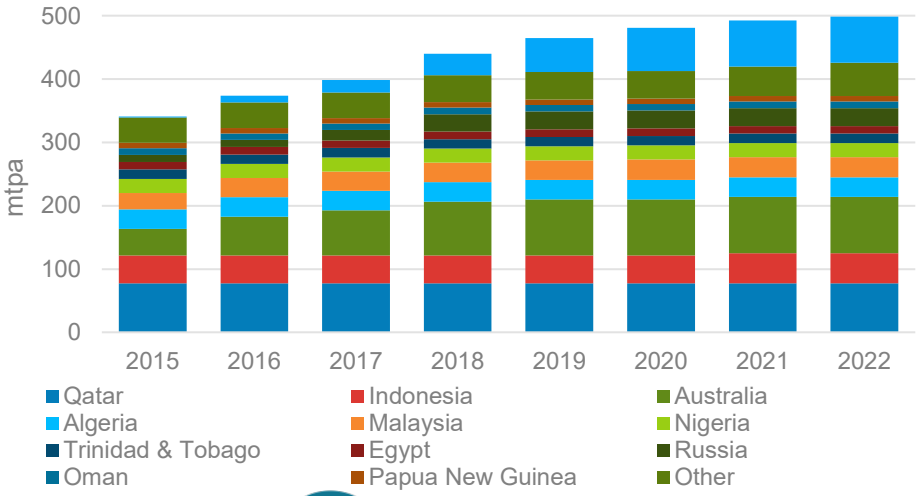
3 **From August 2020 onwards, European gas prices see a robust rebound signalling that the market has bottomed and is now on track of sharp price recovery driven by:**

- Aggressive global monetary and fiscal COVID-19 stimuli driving the global economic and demand recovery;
- Sustained Asian LNG demand and its response to low prices despite of the pandemic;
- Decrease in European gas production and imports from Russia, Norway and North Africa; and
- Low oil prices curbing gas production (strengthening Henry Hub prices) and strong US gas export shut ins relieving short term oversupply.

While the next wave of LNG supply has already been triggered, the looming glut materialized sooner than anticipated

Abundant LNG supply is coinciding with the LNG market entering its most intense phase of volume ramp up

- 42 mtpa of new liquefaction capacity came online in 2018 (10,4% increase in global LNG supply)
- In 2019, 19 mtpa of new capacity came online (Prelude FLNG, Freeport T1, Corpus Christi T2, Cameron T1, Elba T1,2,3,4,5,6, Tango FLNG), 4.6 mtpa additional capacity is still expected before the end of the year (Freeport LNG T2)
- 16 mtpa of new supply is scheduled to flow first gas in 2020 (e.g. Freeport T3, Cameron T2,3, Elba T7,8,9,10, Petronas FLNG 2)
- A net total of 34 mtpa of committed new supply is still to come online between 2020-22, a further 7% increase in global supply
- Between 2015-2022, global LNG supply is expected to rise by 157 mtpa (+46%), driven by the United States, Australia and Russia



The surge in LNG project FIDs was being driven by the perception of major LNG portfolio players that a global supply-demand gap is emerging early to mid next decade.

- The next LNG wave takes shape with a total of 167 mtpa of committed and credible new capacity which could come online in the mid 2020s
- Restarts and committed projects are anticipated to increase supply by around 49 mtpa by the mid 2020s.
- There is another 32 mtpa of Qatari gas that will almost certainly come to market mid next decade, but with some uncertainty around timing. In addition a further 86 mtpa of capacity has credible FID potential across the next 2-3 years
- ICIS expects liquefaction capacity to increase by 356 mtpa in 2022-2027 with a significant increase of US liquefaction capacity (+150 mtpa), Russia (+50 mtpa) and Canada (+50 mtpa)

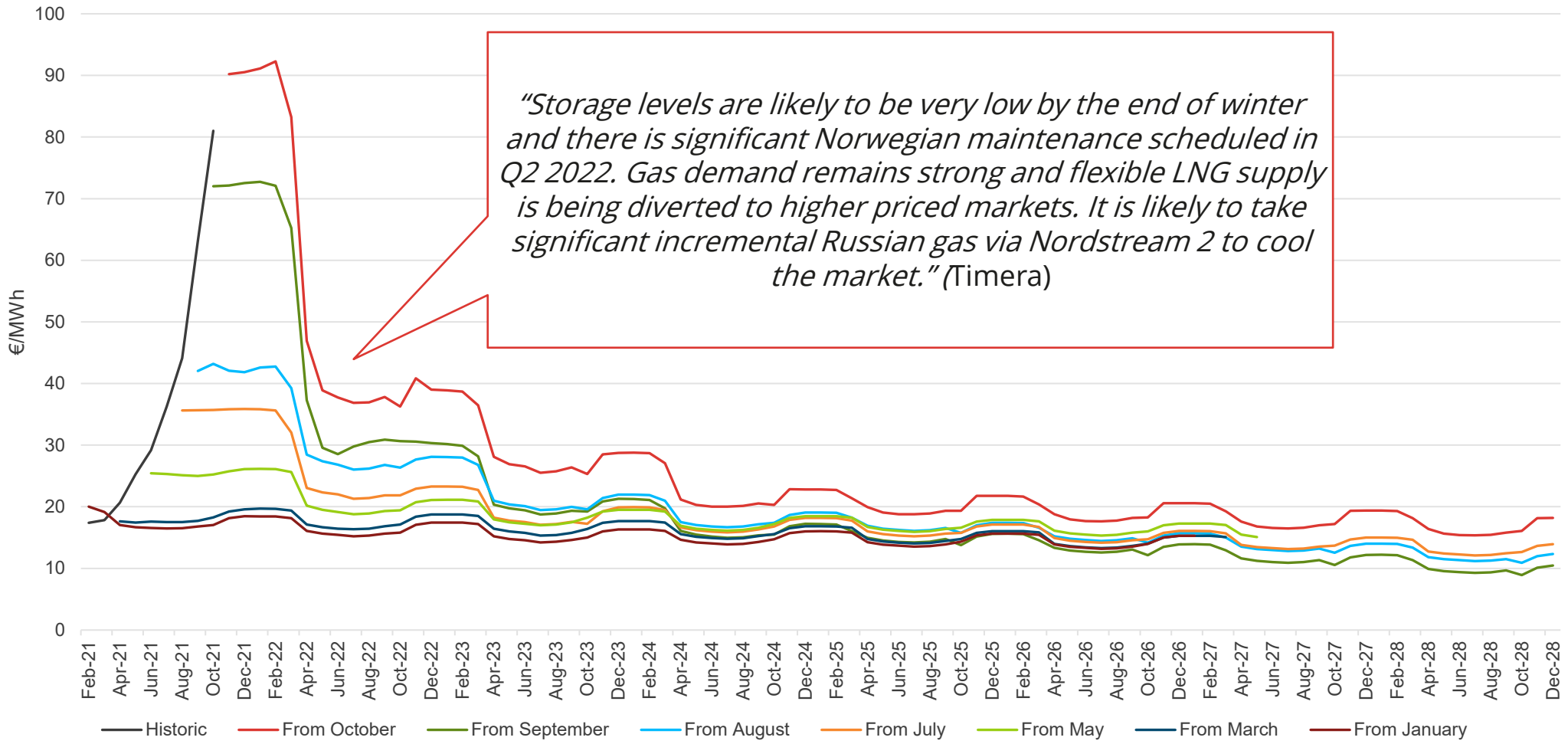
While until when the market will remain tight depends on when the next wave comes online in 2023-2025, analyst says likely until at least 2024.

Illustrative scenario of global LNG balance evolution

Source: FTI-CL Energy, ICIS

Current market tensions mainly impact the front months of the TTF futures curves while the back end remains around 15-20€/MWh

Evolution of TTF forward curve in 2021 (€/MWh)

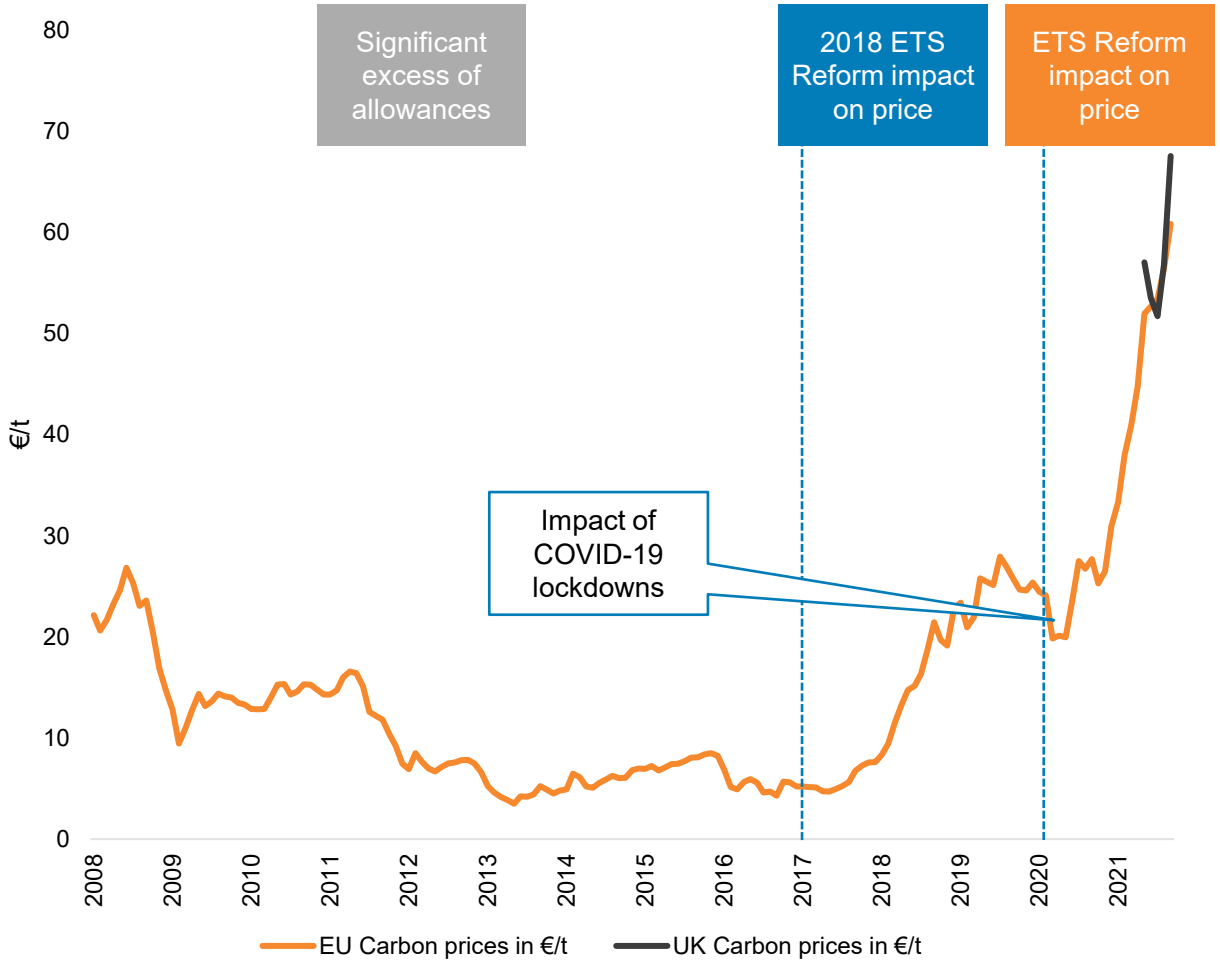


Source: FTI-CL Energy based on Bloomberg, Energy Market Price

1.2. Focus on recent evolution of the EU CO_2 ETS market

After a period of low prices between 2012 and 2017, CO_2 prices have recently increased following the enacted and announcement of future reforms of the ETS market

Evolution of CO_2 price (€/ton, nominal)



Source: Energy Market Prices

- Between 2008 and 2016, CO_2 prices fell by around 65%.
- A combination of several political and economic factors has led to a significant excess of emission allowances:
  - Significant imports of international allowances during phase II of the ETS market
  - The reduction of industrial sector demand for quotas following the economic crisis in 2008
  - The implementation of European or national policies superimposed on the ETS market and led to a reduction of CO_2 emissions covered by the ETS market
- The 2018 negotiations and agreements for the ETS market reform (in particular the establishment of the market stability reserve (MSR), which reduces some of the excess quota from 2019) have led to an increase in CO_2 from 2017 to 2020: between 2017 and 2020, CO_2 prices quadrupled.
- While COVID-19 first European lockdown had a temporary impact on prices, the recent announcements of increased EU ambition towards decarbonisation, future EU ETS reforms and increased gas prices have reset the prices and pushed them towards new highs recently reaching 60€/t.

Future EU ETS reforms expected in the context of the green deal

2018 EU ETS Reform for Phase IV (2021-2030)

- In 2018, the EU adopted an important reform of the ETS to help tackle the oversupply issues and bring long-term price certainty

- The reforms will kick-in for the next phase of the EU ETS:
  - **Increased Linear Reduction Factor (LRF) set at 2.2%** (compared to 1.74% today) from 2021
  - **Doubling of withdrawal rate of the MSR set at 24% for 5 years starting in 2019** and then back at 12% a year from 2024
  - **Allowances in the MSR above the allowances auctioned during the previous year** are no longer valid and therefore **cancelled as from 2023**

- ETS: Mid-term ETS price trajectory updated, with carbon prices in 2020, 2025 and 2030 of respectively € 19.2, 23 and 28 (in € 2013 prices).
- Baseline 2016 indicated a price of 90€/tCO_2 (in €2013) in 2050

Green Deal increased ambitions – Future reforms in addition to 2018 EU ETS reform

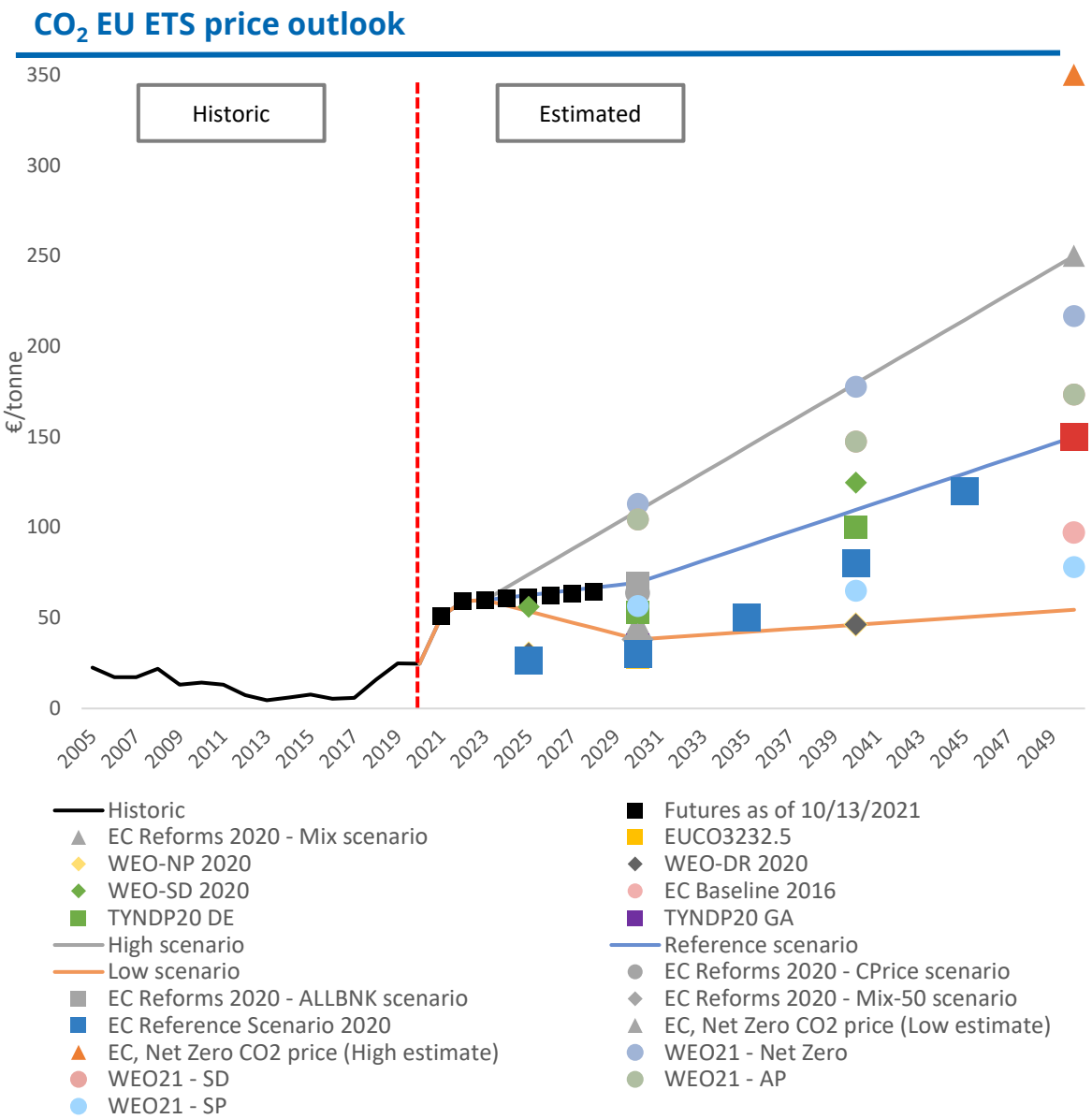
- Increased target for emissions reduction: -55% in 2030 (current target at -40%)
- Creation of a **parallel ETS for road transport and buildings starting in 2025**
- **Revisions of the EU ETS to align the scheme with the increased climate ambitions:**
  - **Increased LRF parameter** (**4.2%**) so as to cut EU ETS emissions at 61% below 2005 levels by 2030
  - **Including the maritime sector** (+7% to emissions regulated by scheme)
  - **One-off reduction of 117m allowances** available for auction to correct trajectory of the market before LRF kicks in
  - Sectors subject to CBAM would **see free allocation phased out by 2035** (aviation within the EU by 2026)
- Introduction of the **Carbon Border Adjustment Mechanism** to mitigate the carbon leakage risk indexed on EU ETS prices:
  - Starting in 2023 with a three-year transition phase

- The updated range of ETS prices in 2030 with the enacted reforms is: 34-69 €/t CO_2 (in €2020).
- Updated 2020 Baseline indicates a price of 150€/t CO_2 (in €2015) in 2050

CO_2 Price Forecasts

We base our scenarios for carbon prices on carbon futures, the European Commission and the IEA's WEO.

- **Central scenario:** In the short term (2021-2023), we use carbon futures. In the medium term, the future ETS reform will lead to an increase of CO_2 prices to c65€/T in 2030. In the long-term, prices will continue to increase to decarbonise European market and reach 150€/t in 2050 according to EU Reference Scenario 2020.
- **High scenario**: In the short term (2021-2023), we use carbon futures. In the longer term, we base our forecast in the most ambitious European Commission target in terms of CO_2 emission reduction with a target of 250€/t by 2050. High level of carbon prices will be necessary to drive a full decarbonisation of the European economy.
- **Low scenario**: In the short term (2021-2023), we use carbon futures. In the longer term, we base our forecast on the EC MIX 50 scenario, which assumes a 50% net emission reduction by 2030, and in 2040, we base our forecast on WEO 2020 National policies / Delayed recovery scenario (same value). Low recovery of the Covid crisis and other mechanisms to decarbonize the European economy would maintain carbon prices at low levels.

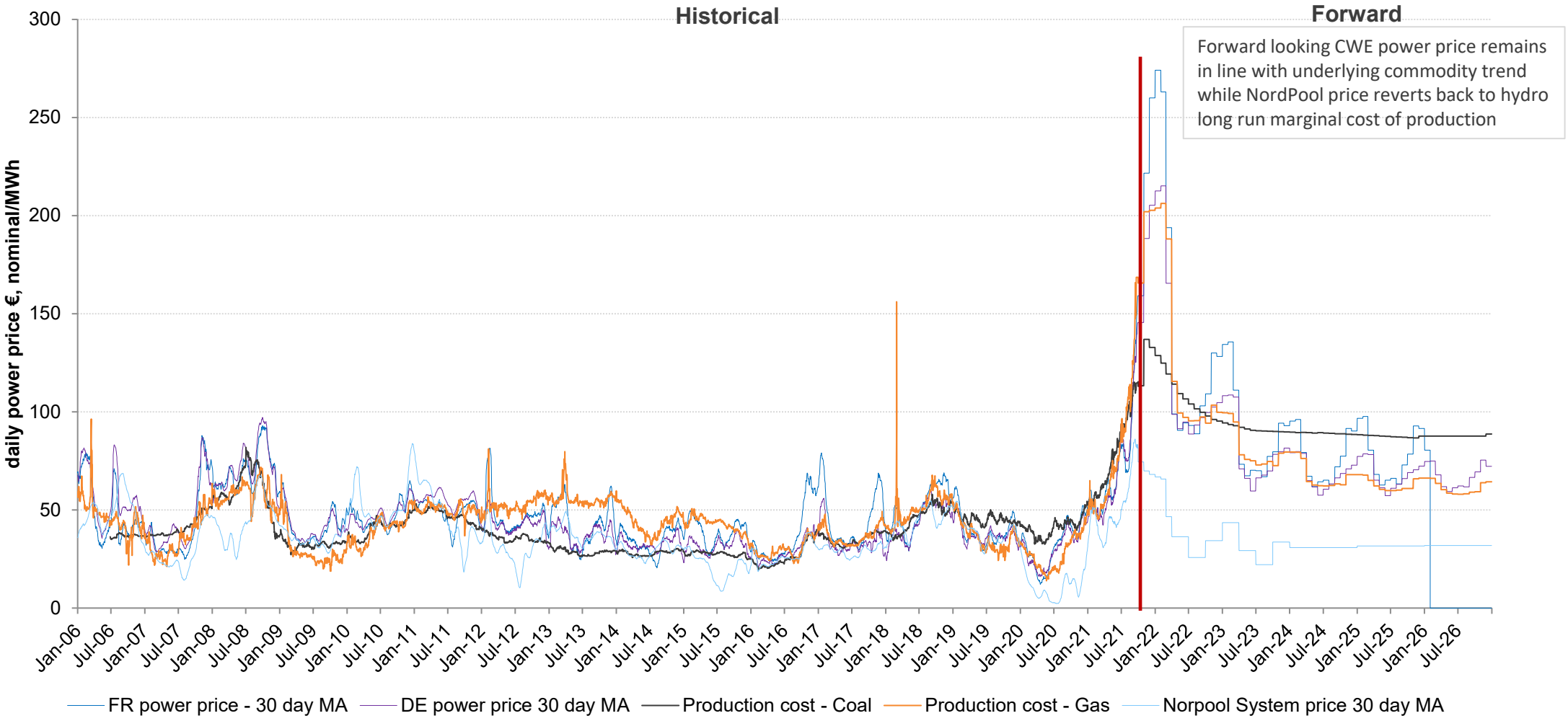


Source: FTI-CL Energy based on Bloomberg, IEA 2021&2020 World Energy Outlook, EC Latest Impact Assessment Oct 20, EC EUCO3232.5 scenario and EC 2016 Scenario

1.3. Focus on recent evolution of power prices

The price of electricity is strongly correlated with the cost of producing electricity from thermal power plants

Evolution of electricity spot prices and production costs (daily €/MWh, nominal)



Source: EnergyMarketPrice, FTI-CL Energy

Note: For coal and gas plants, we assume an efficiency of 36% and 50%, an emission factor of 0.93 and 0.39, a variable O&M cost of 3 and 2€/MWh, respectively. MA means moving average.

2.1. Overview of the latest energy policies

The European green deal: a path to carbon neutrality in 2050?

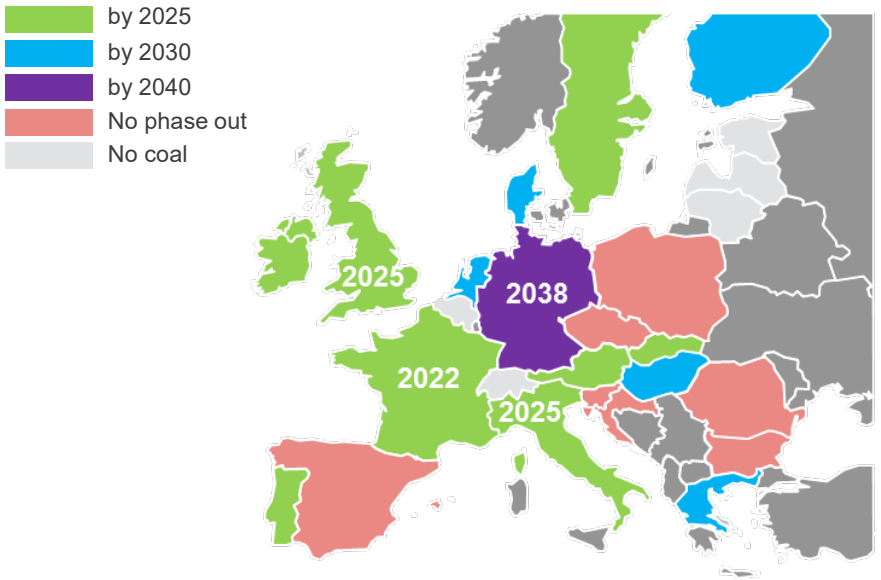
Objectives and strategies of the Green Deal:

- Increase the EU target for carbon emissions reduction in 2030 (compared to 1990 levels) to **55%** in 2030 (current target is 40% reduction).
- Reach **carbon neutrality by 2050** (current target is 80-95% emissions reduction by 2050).
- **The Sustainable Europe Investment Plan** as the EU Green Deal's investment pillar: adding **up to €260 bn/year** of additional investment by 2030 and **mobilising €1 trillion over the next decade** to meet the objectives.
- **A Just Transition Mechanism as part of the Investment Plan** to address the specific challenges encountered by some regions: €100 billion investments over 2021-27.
- Proposal for the first **European Climate Law** unveiled on March 2020 and revision of **all the relevant legislation** by March 2021: RES Directive, Energy Efficiency, EU ETS, etc.

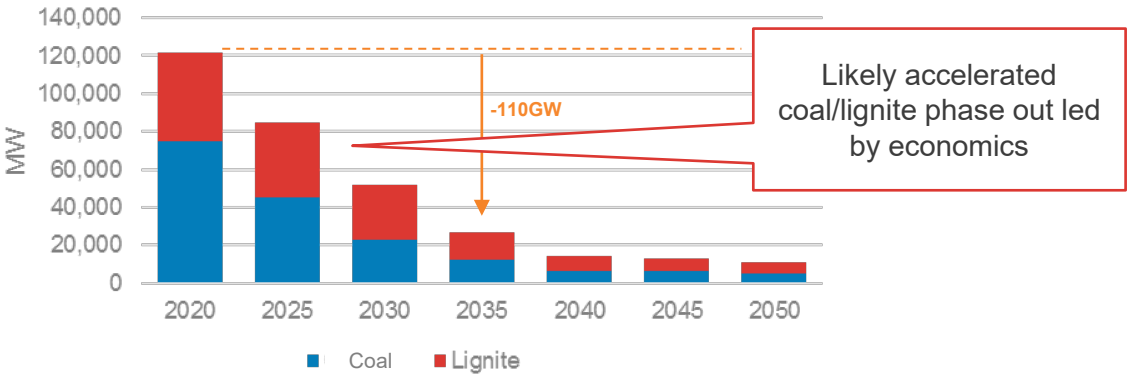
The increased ambitions proposed by the Green Deal for 2030 and 2050 will trigger a revision of the EUCO3232.5 scenario and increase the current renewable and energy efficiency targets for 2030

Coal phase outs in Europe will drive flexible capacities down by 110 GW in 2040

Coal phase out plan in Europe1



EU-28 coal/lignite capacity evolution1



Many European countries committed to close coal facilities by 2030: from 120 GW today, lignite/coal capacity will be reduced to **52 GW in 2030 and 14 GW in 2040**.

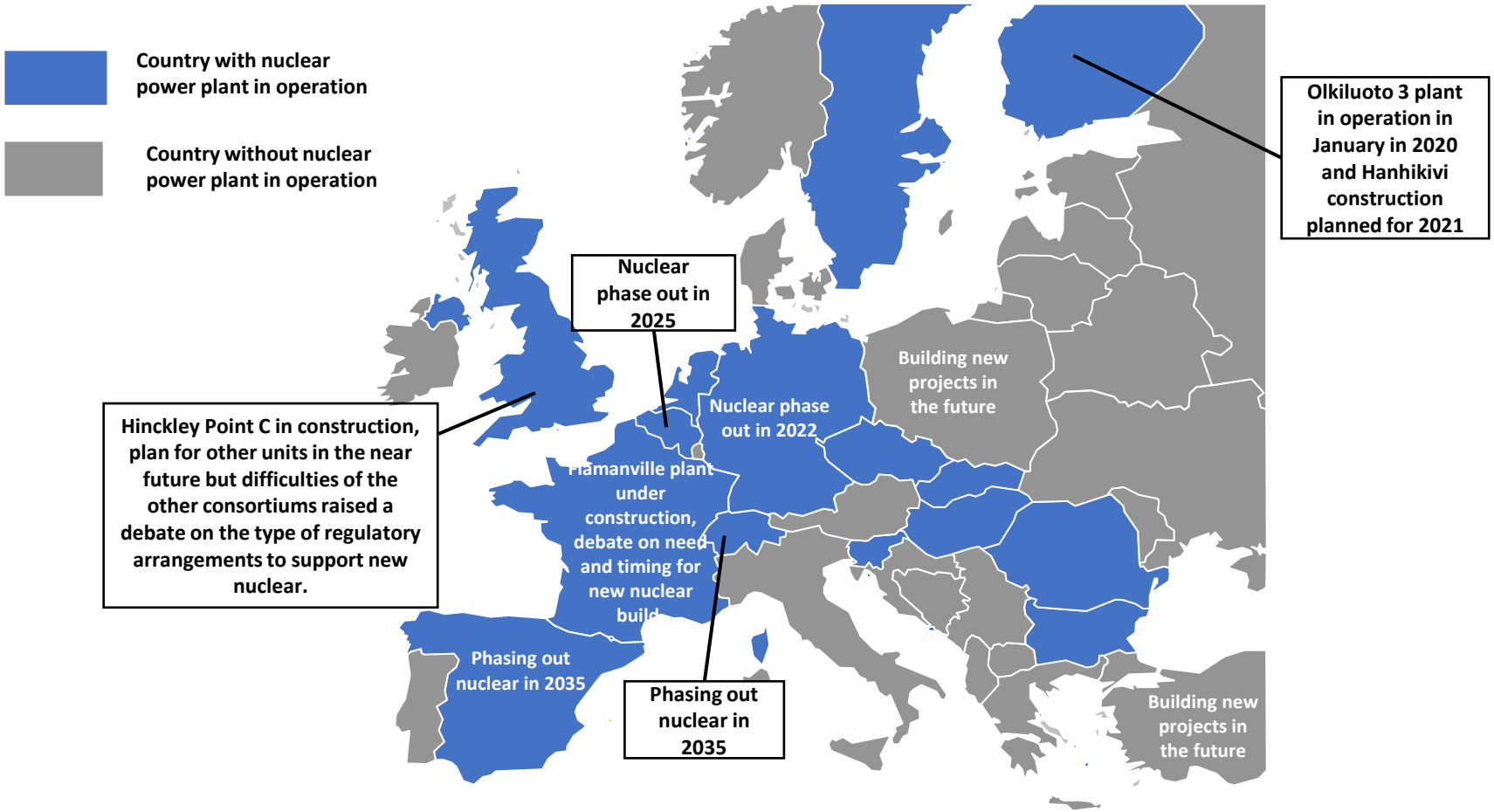
Flexible gas power plants capacities should also decrease significantly towards 2050, through :

- **regulatory compliance**, as in France where the Multiannual Energy Plan prevents the construction of new thermal capacities,
- **economic environment,** such as CO_2 prices detrimental to those technologies.

These phase outs will **sharply reduce flexible capacities** in Europe, and **stress issues related to renewables' intermittency** and **need for flexibility.**

1. CL Energy analysis

Diverging nuclear strategies in Europe with some countries engaged in new build whilst others are phasing out nuclear



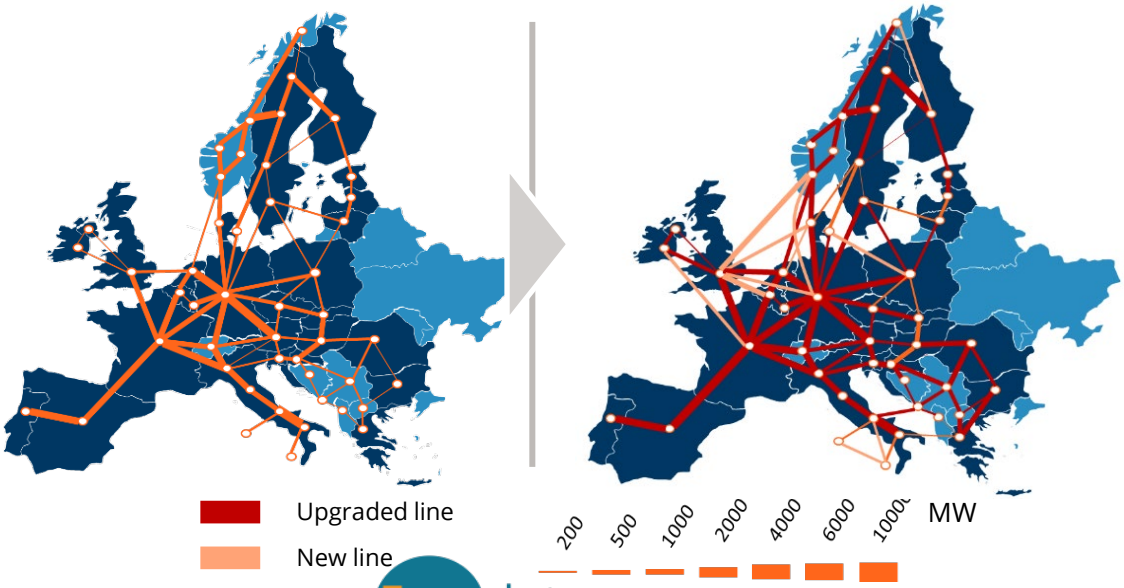
Source: ENTSOE , CL Energy analysis

EU objective is to significantly develop the transmission network to 2050

Interconnection level for selected EU countries

Country	Ratio between interconnection capacity and generation capacity	
	EC communication	
	2017	2020 (EU target 10%)
DE	9%	13%
FR	9%	12%
ES	6%	6%
PT	9%	21%
DK	51%	59%
SE	26%	28%
FI	29%	19%
PL	4%	8%

European network change between 2015 and 2050



- EU objective is to ensure that Member State countries have 10% interconnection capacity in 2020 **and at least 15% interconnection capacity by 2030** as called by the European Council.

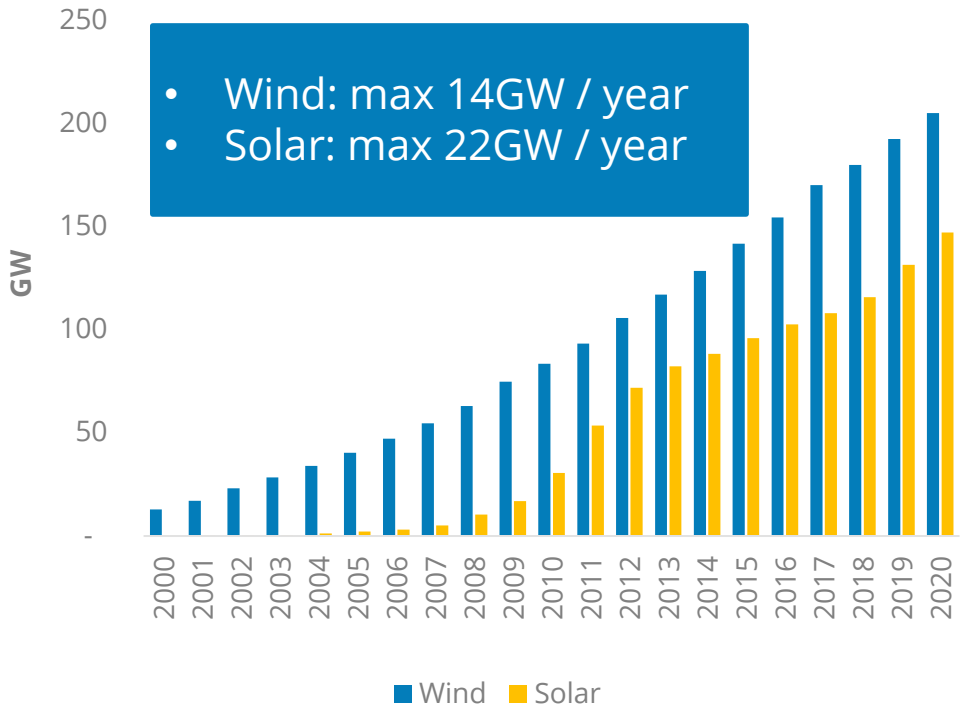
- In addition, the Commission recommends in its communication that:
  - *"Countries where the nominal transmission capacity of interconnectors is below **30% of their peak load should urgently investigate options** of further interconnectors";*
  - *"Countries where the nominal transmission capacity of interconnectors is below **30% of installed renewable generation capacity should urgently investigate options** of further interconnectors."*
  - *"Member States should therefore aim at minimising differences in their wholesale market prices. **Additional interconnections should be prioritised if the price differential exceeds an indicative threshold of 2€/MWh** between Member States, regions or bidding zones to ensure all consumers benefit from the internal market in a comparable manner";*

Source: Communication on strengthening Europe's energy networks,

2.2. Focus on Increased Renewables penetration in the power sector

Thanks to European renewables support schemes, renewable capacity have soared in Europe over the previous decades.

Cumulative capacity additions in Wind and PV (EU28)



Source: Enerdata, Global Energy and CO2 data

European policy decisions promoted the development of renewables (notably wind and PV) to reach the target of 20% energy from renewables by 2020 with subsidy schemes (FiT, FiP, green certificates…)

As a result, Europe experienced an investment boom in RES technologies: in 2017, wind, PV and biomass represented around **21% of gross electricity production in EU 28**, up from around 10 % in 2010.

As renewables have **zero marginal cost production** and since they get **priority dispatch**, wind and PV always produce first and replace some of the thermal plants in the merit-order curve

- This tends to reduce power prices as cheaper technologies are producing: this is known as the **merit-order effect**
- In the most extreme cases, renewables can even supply the whole power demand, resulting in **zero or negative prices**
  - In 2019, Germany experienced negative prices on the day-ahead market during 207 hours (about 2.4% of total time)

Thanks to European renewables support schemes, renewable capacity have soared in Europe for the previous decade. Since they have a zero marginal cost production, wind and PV generation lowers power prices and reduces residual demand.

The increased ambitions proposed by the Green Deal for 2030 and 2050 will trigger a revision of the EUCO3232.5 scenario and increase the current renewable and energy efficiency targets for 2030

Objectives and strategies of the Green Deal:

- Proposed by the new Von der Leyen European Commission in December 2019 to step up the level of ambition of Europe facing climate change challenges.
- Increase the EU target for carbon emissions reduction in 2030 (compared to 1990 levels) to **55%** in 2030 (current target is 40% reduction)
- Reach **carbon neutrality by 2050** (long-term strategy is to push the current target to reduce carbon emissions in 2050 by 80-95% to reach a 100% net emissions reduction in 2050)
- **The Sustainable Europe Investment Plan** as the EU Green Deal's investment pillar: adding **up to 260 billion euros a year** of additional investment by 2030 and **mobilising 1 trillion euros over the next decade** to meet the objectives.

European Climate Law:

- Proposal for the first **European Climate Law** unveiled on March 2020 and details of the current strategic proposition to be developed to start a revision of the **all the relevant legislation** by March 2021:
- **Renewable Energy Directive and the Energy Efficiency Directive, but also the Emissions Trading Directive** and the Effort Sharing Regulation, as well as the LULUCF directive dealing with land use change.
- Focus on **carbon pricing** : extension of the EU ETS scope to new sectors and the revision of certain designs of the ETS scheme and consideration the implementation of a Carbon Border Tax Adjustment Mechanism (CBA).

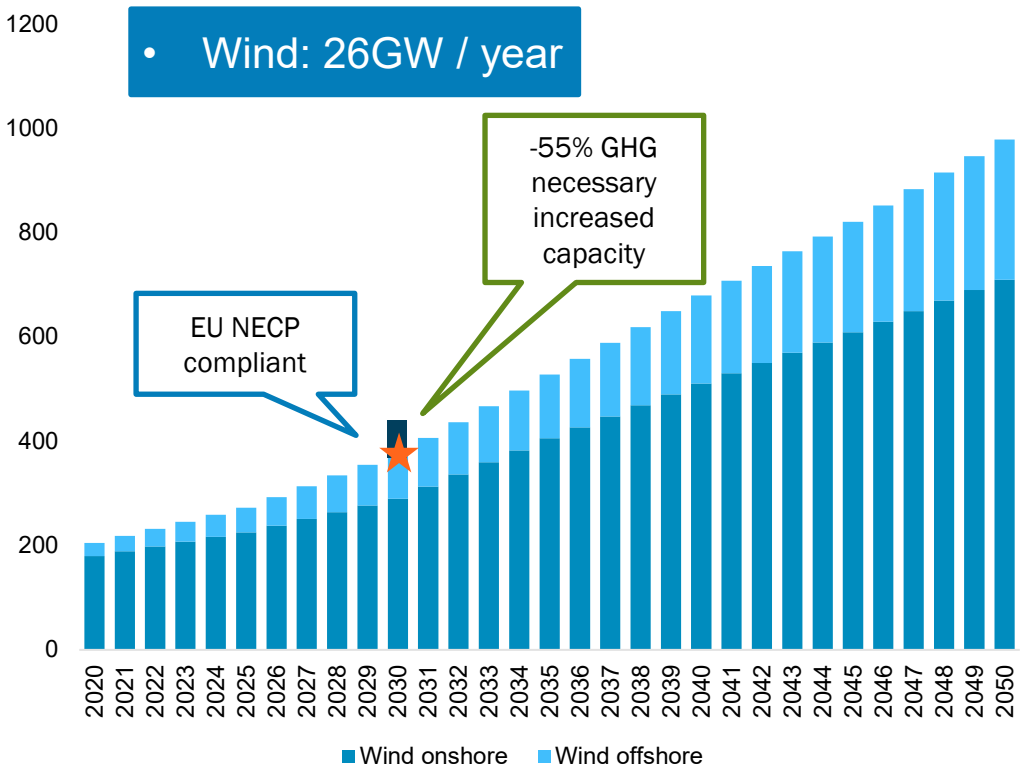
	2030 - BSL	2030 - MIX-50	2030 - REG	2030 - MIX	2030 - CPRICE	2030 - ALLBNK	NECP
RES share in total energy consumption (%)	32.2%	35.1%	38.7%	38.4%	37.9%	40.4%	33.5%
RES share in electricity (%)	55%	58%	64%	65%	64%	67%	60%

Note: Scenario BSL meet the previous 40% GHG emission objective, MIX-50 achieves 50% net GHG emission reduction, while scenario REG, CPRICE, MIX and ALLBNK meet the new 55% net GHG reduction objective. Further details are provided in **appendix.**

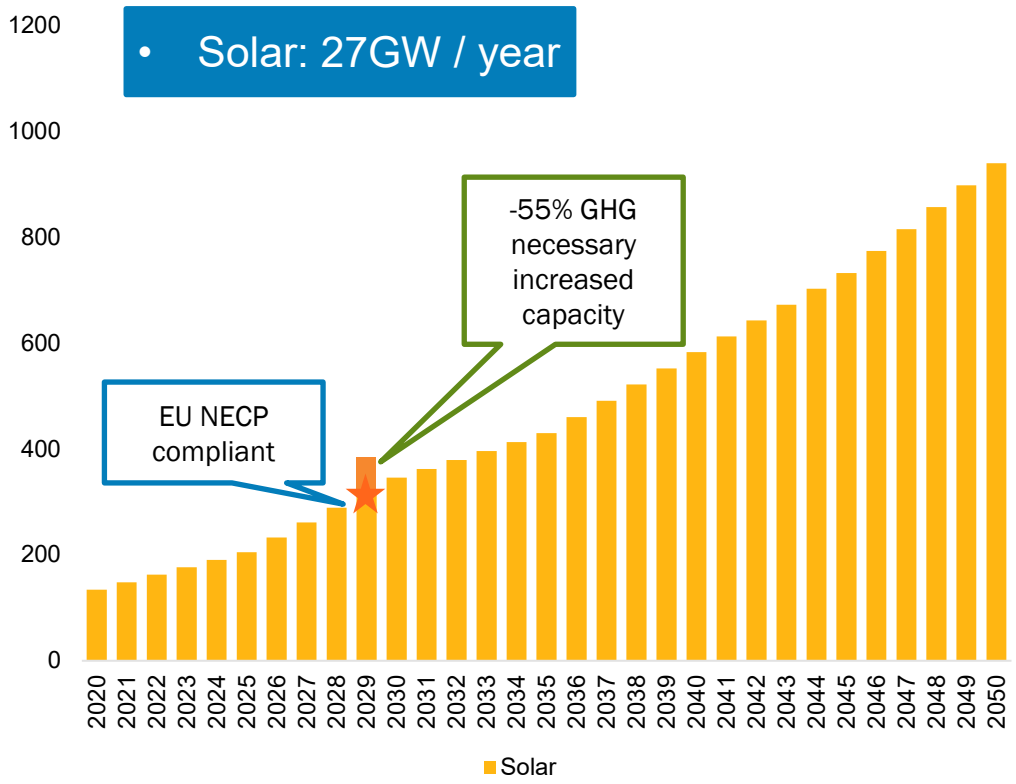
In line with current NECPs and increased ambition, renewable capacity is bound to further increase at a sustained pace to 2050

- Across Europe, RES penetration is assumed to reach 39% in 2020, 60% in 2030 in line with TSOs forecast and NECPS. RES penetration is then assumed to reach beyond 70% in 2040 assuming a continuous trend post 2030 on the route to 2050 decarbonisation.
- Increased 2030 ambition would require at least 64-65% RES penetration in 2030

Wind capacity between 2020-2050 (GW)



Solar capacity between 2020-2050 (GW)



Source: CL Energy, ENTSO-E MAF 2020, TYNDP 2020, TSOs forecast, NECP

2.3. Focus on The role of electricity in decarbonisation

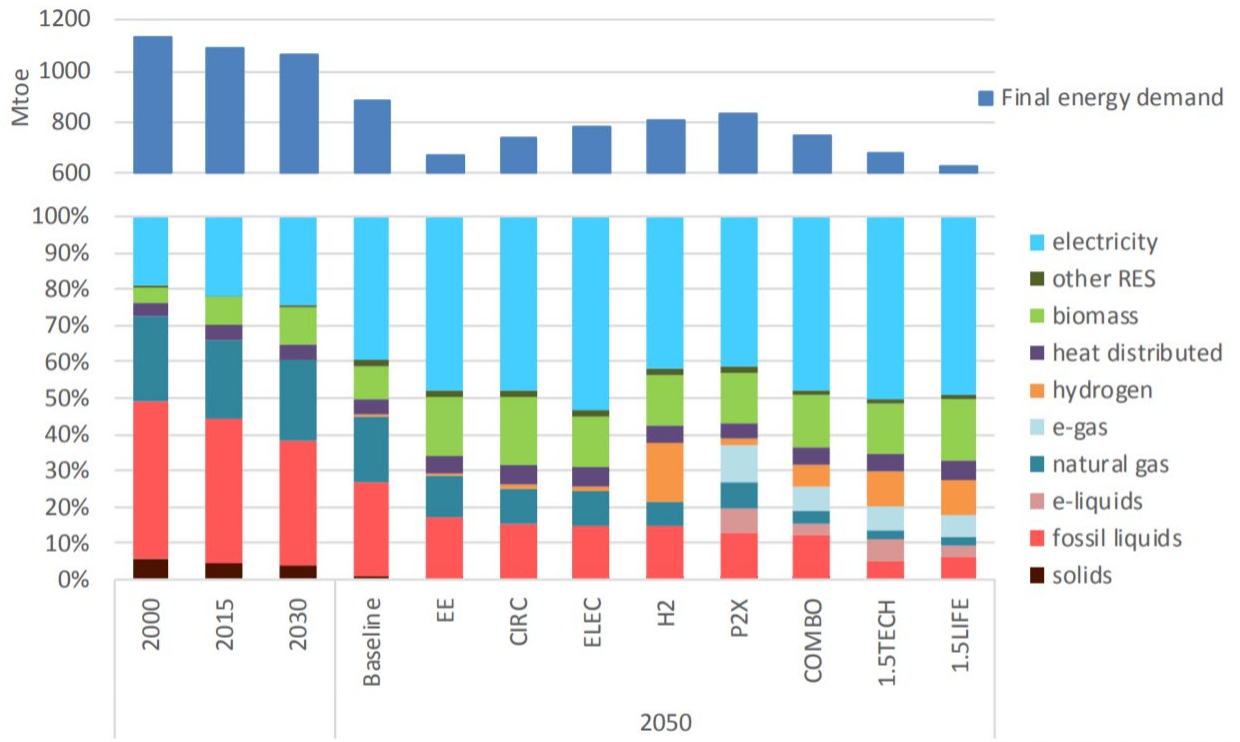
European Commission scenarios: strategic options for decarbonisation

Electrification of demand is a key option led by:

- electrification of heating and cooling (notably with heat pumps)
- a continuous increase of IT, leisure and communication appliances in the residential and tertiary sectors
- further electrification of the rail and the gradual penetration of electric vehicles + modal shift in transportation
- Specific electric heating processes in industry

Long Term Strategy options, EC

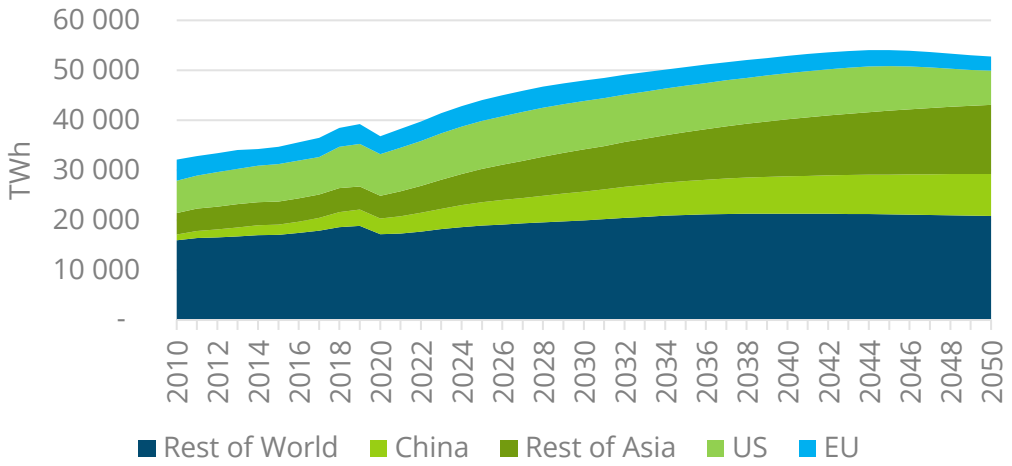
Figure 20: Share of energy carriers in final energy consumption



Source: Eurostat (2000, 2015), PRIMES.

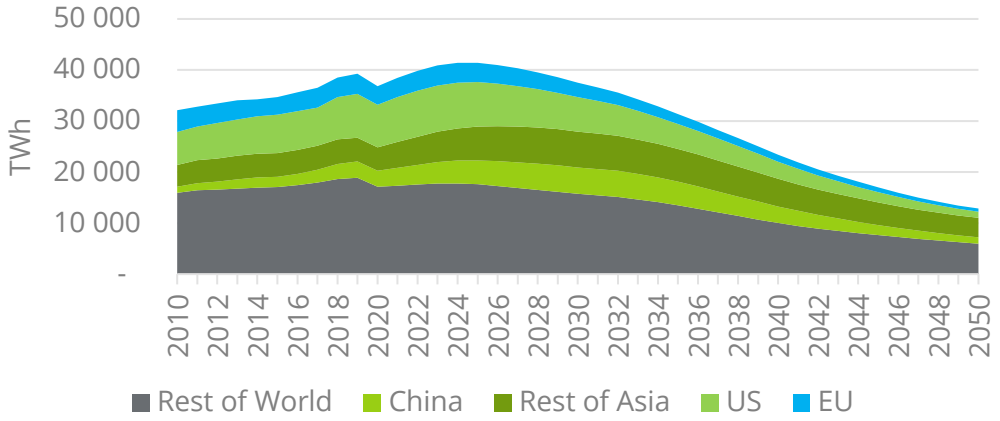
A shrinking European natural gas market in the coming decades

Global natural gas demand, EnerBlue



Source: EnerFuture, Enerdata

Global natural gas demand, EnerGreen



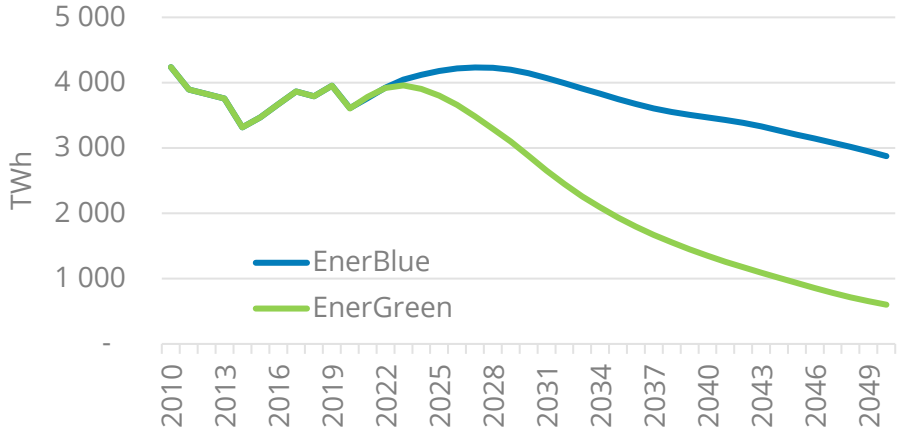
Source: EnerFuture, Enerdata

- In both a 2°C and 3-4°C scenarios, EU's natural gas demand is expected **to peak by the end of the decade**
- Share of EU in global natural gas demand **will halve by 2050** from 10% to only 5%
- Natural gas could still play a key role in **power grid flexibility**

EnerBlue scenario: Achievement of NDCs as submitted at COP21 (~3-4°C)

EnerGreen scenario: Ambitious GHG emissions budget in line with Paris agreement (<2°C)

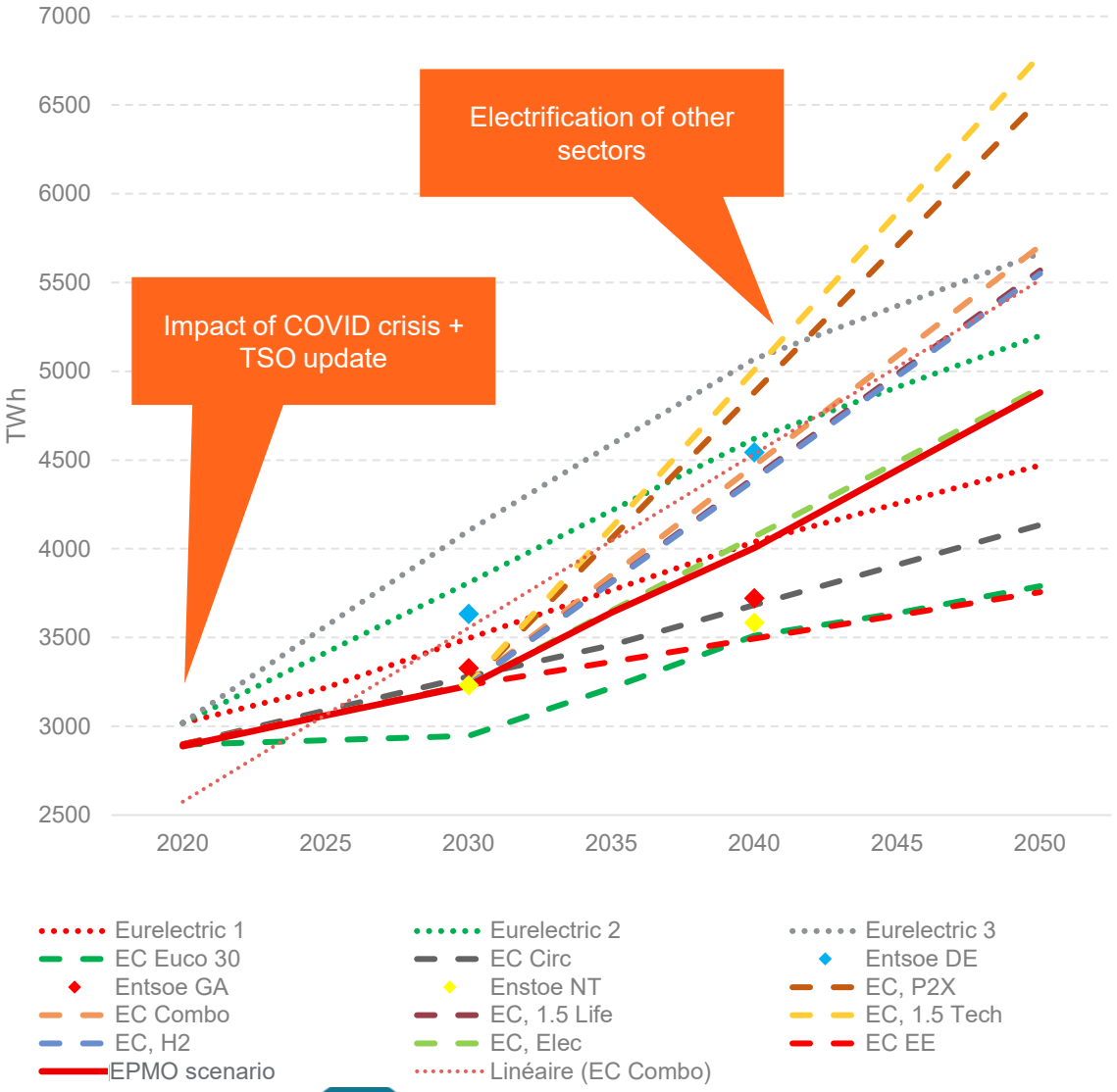
Gas demand, EU



Source: EnerFuture, Enerdata

European electricity demand is projected to rebound strongly by 2050 in EPMO scenario

Annual Demand Outlook (TWh), Europe



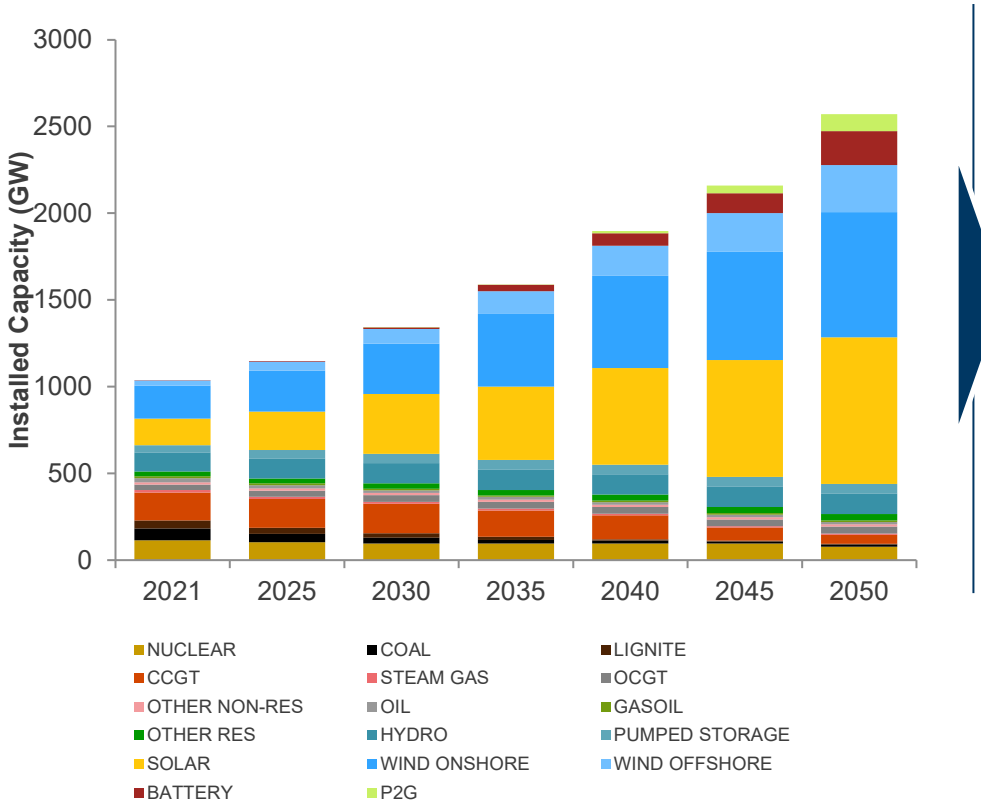
- Despite progress in energy efficiency and lifestyle changes, electricity demand increases, driven by:
  - **Electrification of end uses**
  - **New specific uses of electricity**
  - **Power-to-X, especially H2**
- Different trajectories are possible on a European scale, depending on the relative weight of each of the energy carriers.

3. Analysis of the latest price projections to 2050 in CWE

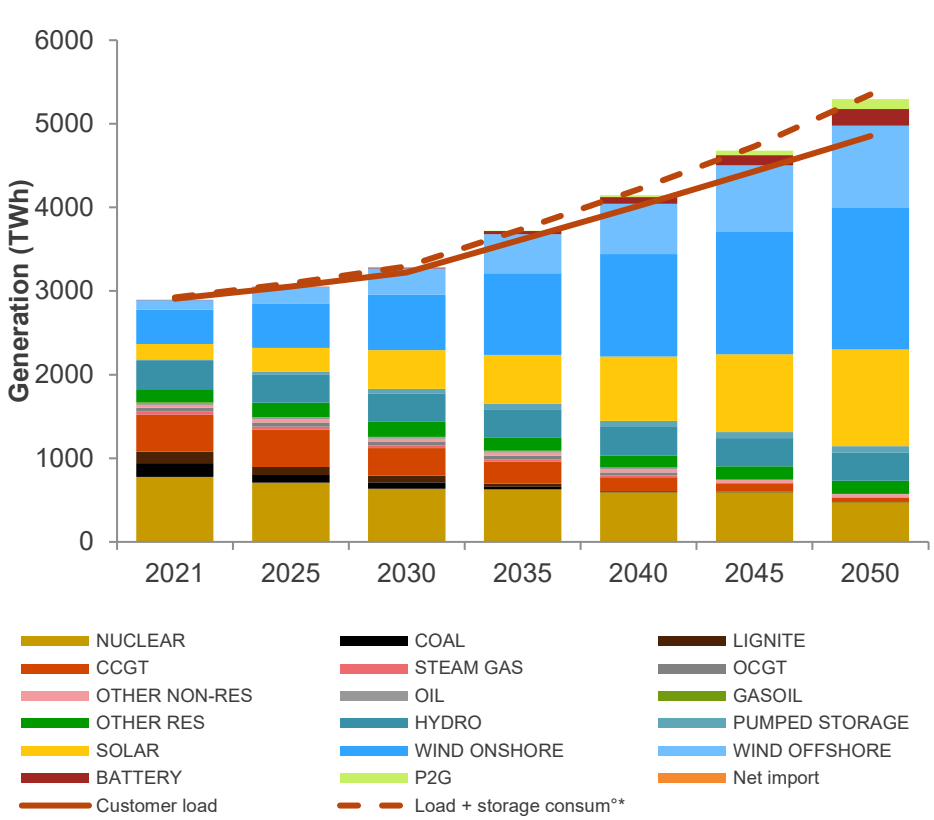
Capacity and generation mix outlook in the EPMO scenario

- Throughout the horizon, nuclear power generation and renewable capacities ensure low carbon generation.
- RES generation represents respectively 57%, 72% and 84% of gross electricity consumption respectively in 2030, 2040 and 2050.

Capacity mix (GW)



Generation mix (TWh)



Source: CL Energy

Note: Pumped Storage, Batteries and Power-to-Gas are part of the storage capacities *Geographic scope: EU27 + UK*

Power price outlook in the EPMO scenario

With the increase of RES, European power price starts to de-correlate from SRMC from 2030 onwards

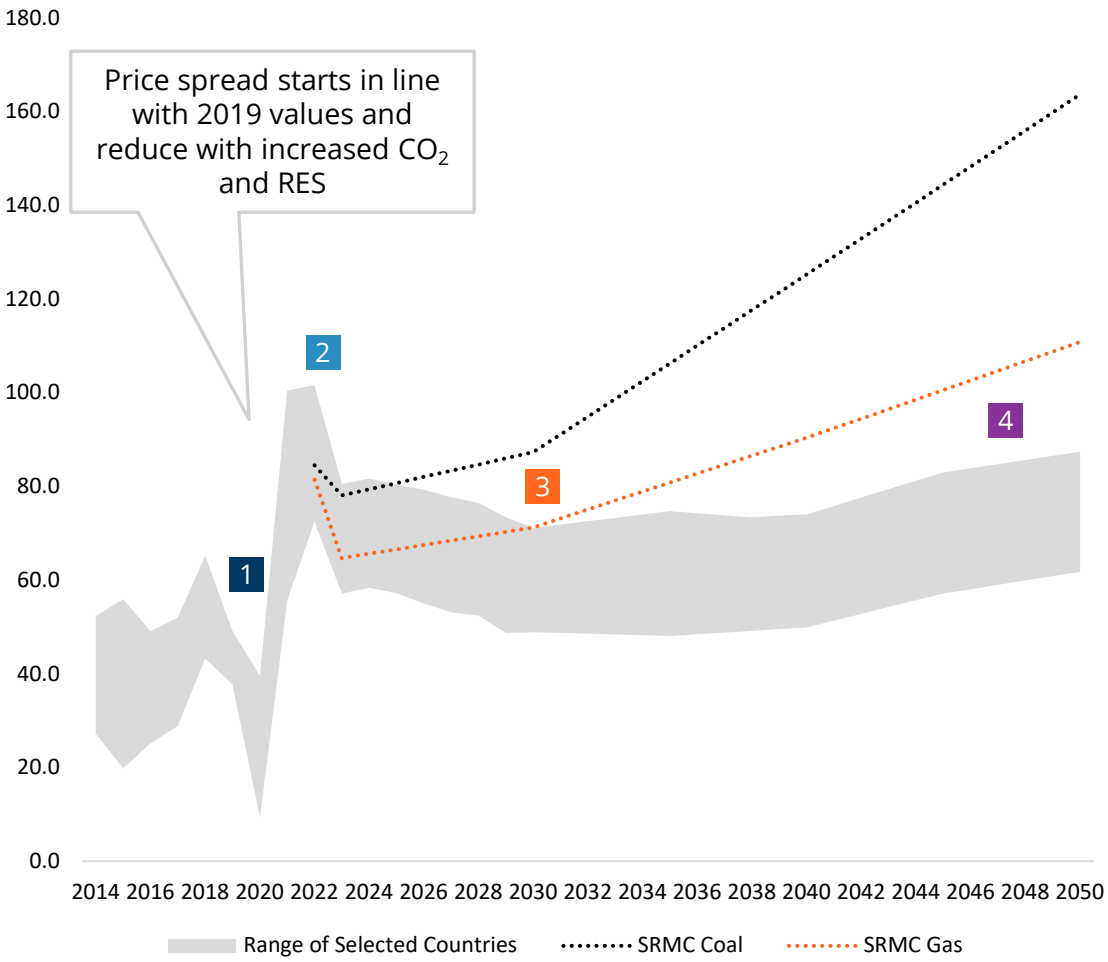
1 The recent COVID-19 crisis has a downward impact on EU power price as a result of the combined impact on power demand and commodity prices.

2 With the sharp rebound of commodity prices and the still limited renewable penetration, power prices rebound in the early 20s.

3 With further renewable development in line with the NECPs and the limited electrification of processes and end-uses impact on overall demand, power prices decorrelate from gas and coal SRMCs and stabilize around 50-70€/MWh.

4 Further increase of RES development and low carbon supply and demand side flexibility towards decarbonisation of the power system, increase the decorrelation between gas SRMC (coal being less relevant by 2050) and average power price thus implying an increase of power price volatility.

Electricity prices (€2020/MWh)



Source: CL Energy

Q&A

Webinar - European Power Market Outlook

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