Net zero and the role of gas and coal in energy transitions

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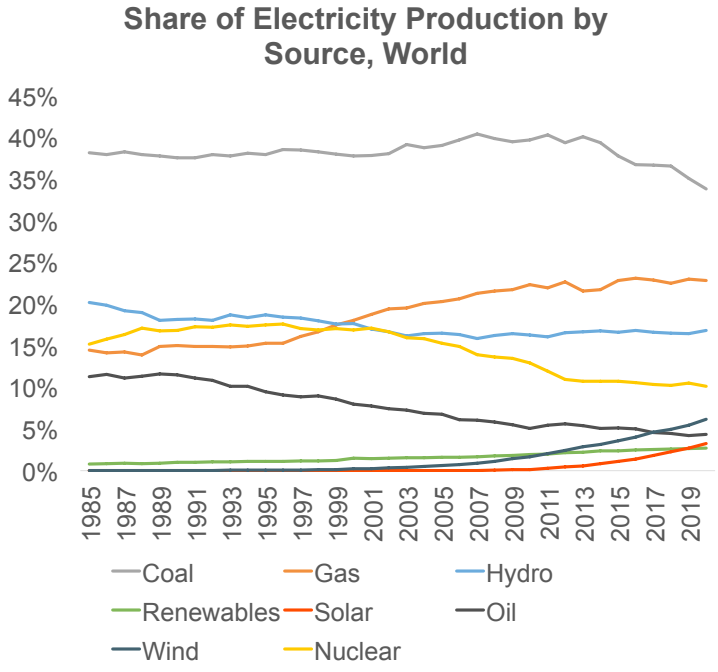
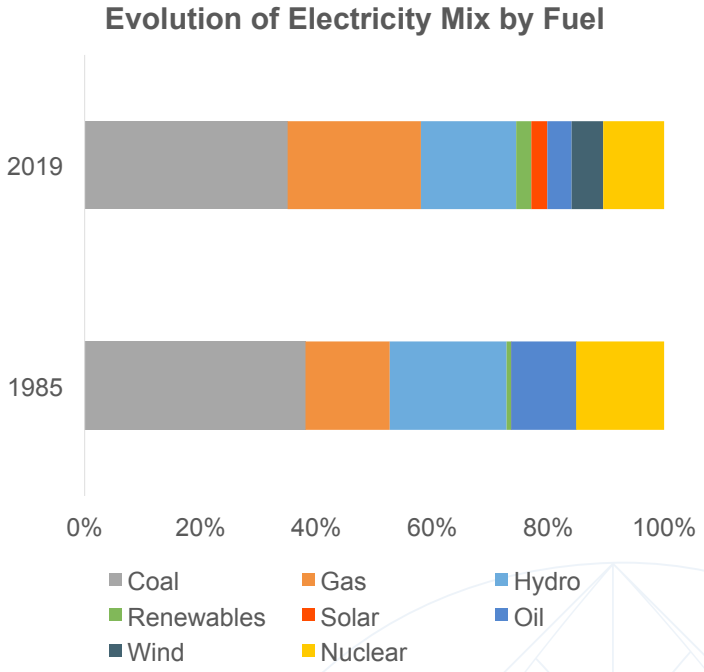
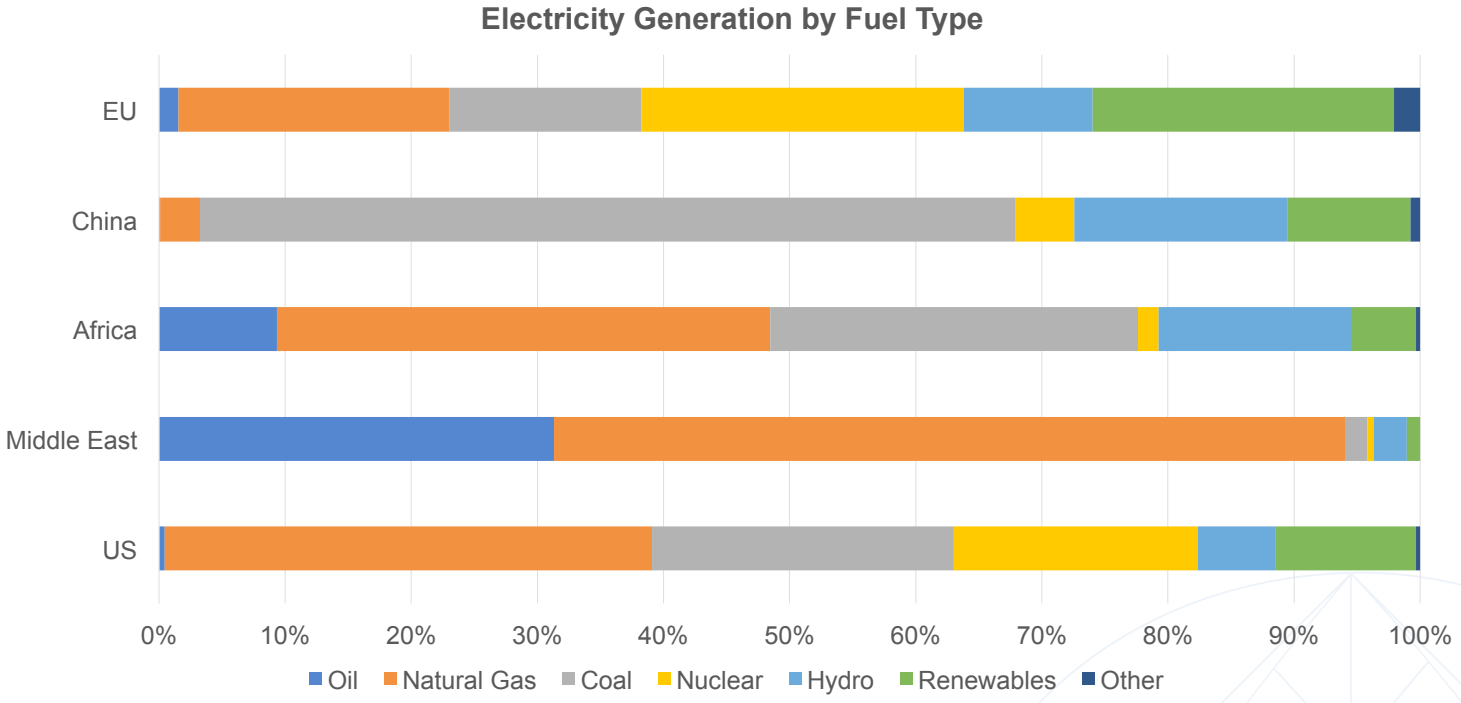
Evolution of global electricity mix





Source: BP, 2020, Ember, 2021

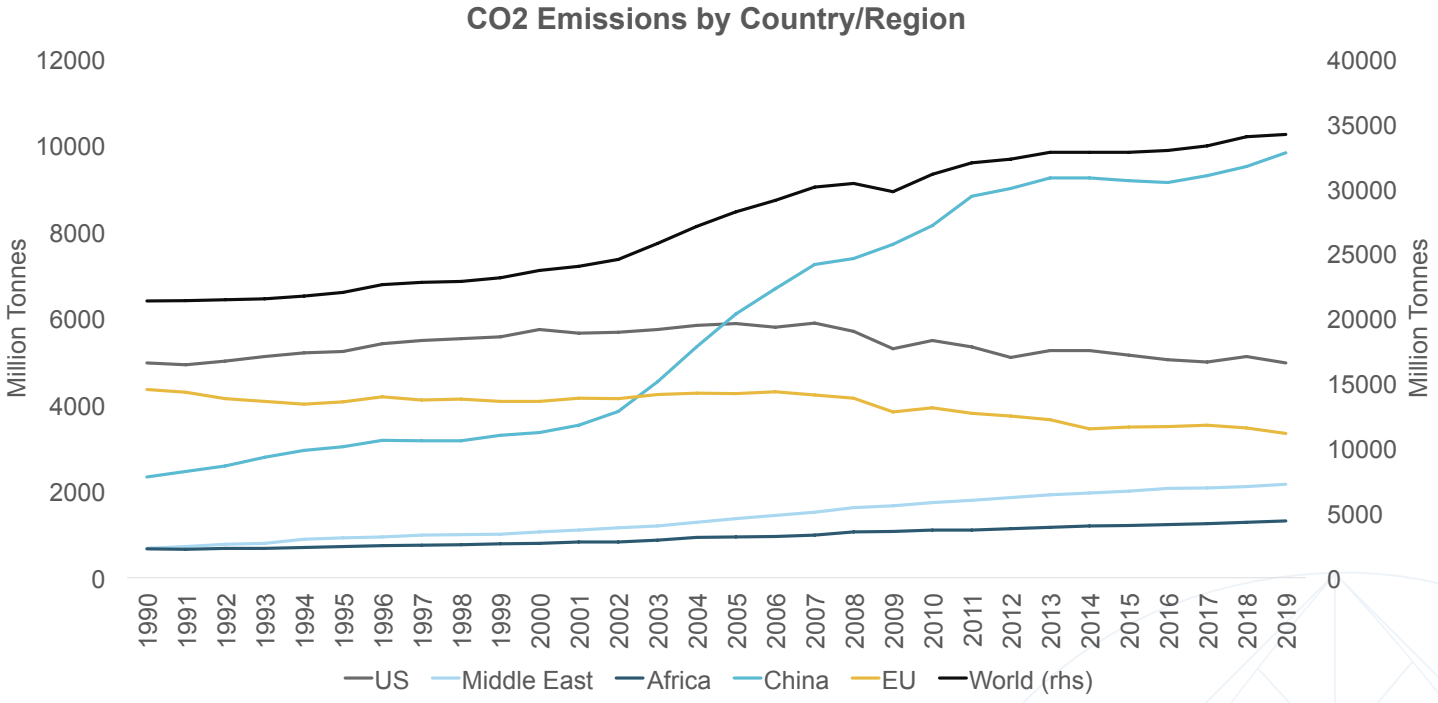
Electricity generation by fuel type in selected countries/regions



Source: BP, 2020

Note: EU includes UK

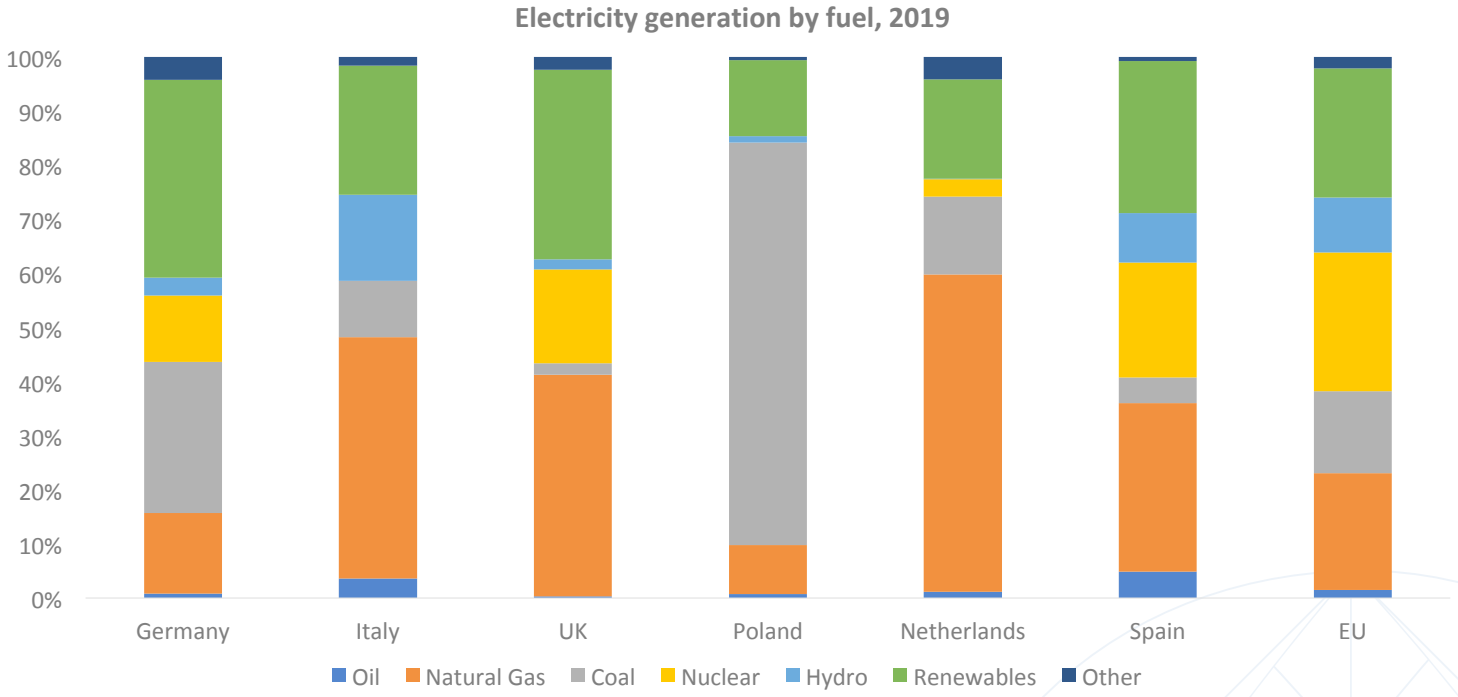
CO2 emissions by country/region



Source: BP, 2020

Note: EU includes UK

Europe: underneath the trend, a multispeed energy region



Source: BP, 2020

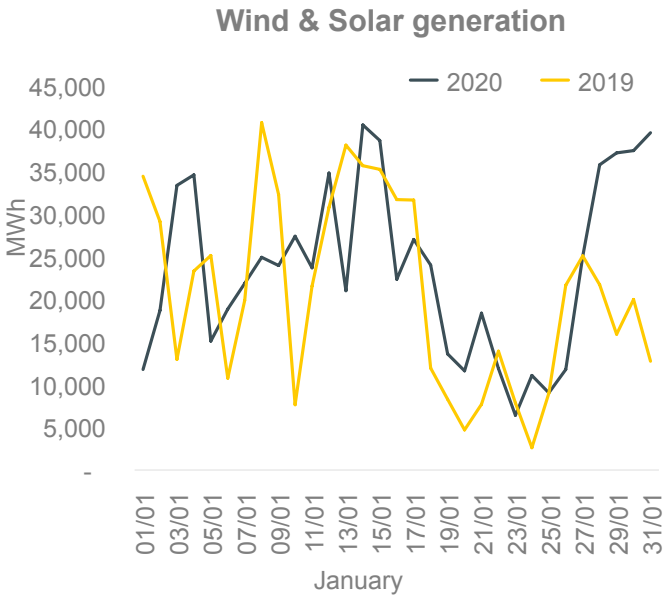
Note: EU includes UK

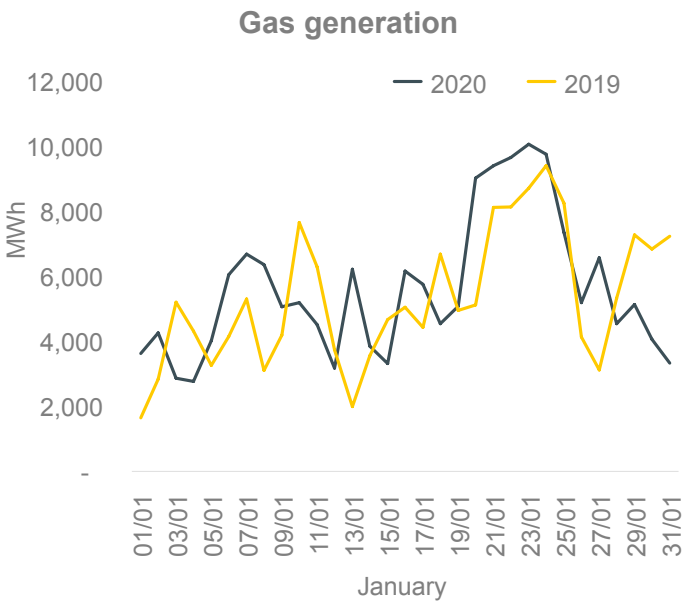
Climate, economics and politics

- EU aims to be climate-neutral by 2050 – an economy with net-zero greenhouse gas emissions.
  - Notable progress to date (23% reduction in CO2 1990-2018).
  - However, whatever has been accomplished to date has to be done now roughly three times faster.

- In power generation, key target to lower GHG emissions should be to minimize the role of coal.
  - From a climate perspective, ideally best is to replace coal fired with renewable generation but varying (and unpredictable) utilisation rate.
  - Natural gas can complement wind and solar both during seasonal variations in wind and solar availability and provide back-up during very short-term, literally minute to minute fluctuations in their outputs.

Daily gas, wind & solar electricity generation in Germany (2017 – 2020)





Source: Eikon Terminal

Gas vs coal

- A complete switch from coal (and oil) to gas would achieve a CO_2 emissions reduction equivalent to 6-years' worth of the historic annual reduction rate of CO_2 emissions (ca. 43 mn tCO_2).
- By comparison, to replace coal (and oil) with renewables (instead of gas) means to have to wait more than 11.5 years (assuming the average growth rate of renewable production achieved in the past 10 years).
- Europe's energy transition will largely be a story about gas and modern renewables.
- However, despite the climate rationale:
  - Pressure in some member states to protect coal mining jobs, especially when coal is often produced in remote and otherwise disadvantaged regions, with long (and proud) local tradition.
  - Low carbon price.
  - Security of supply concerns.

China: Reading between the lines

- Climate targets:
  - Reduce carbon intensity of the Chinese economy (i.e., carbon emissions per unit of GDP) by 65% from 2005 levels, compared to the original commitment of 60-65% made in 2015.
  - Achieve carbon neutrality by 2060.

- While these pledges may seem ambitious, the fact that the carbon emissions reduction target is promised in terms of intensity (per unit of GDP) means that China will retain some flexibility.

- Unlike many advanced economies which have committed to a reduction of carbon emissions in absolute terms (e.g., in terms of tonnes of CO2 relative to a particular benchmark year), choosing a relative carbon intensity target could also mean that GDP growth is expected to decelerate; in this case carbon emissions would not be reduced as strongly as the numbers suggest.

- Indeed, in the recent 14th Five Year Plan (FYP) (approved 11 March), instead of explicitly setting a numerical GDP growth rate target (as China would routinely do in every FYP), the government suggested a system of indicative economic growth rates for the period 2021-2025.

Uncertain gas outlook in favour of coal

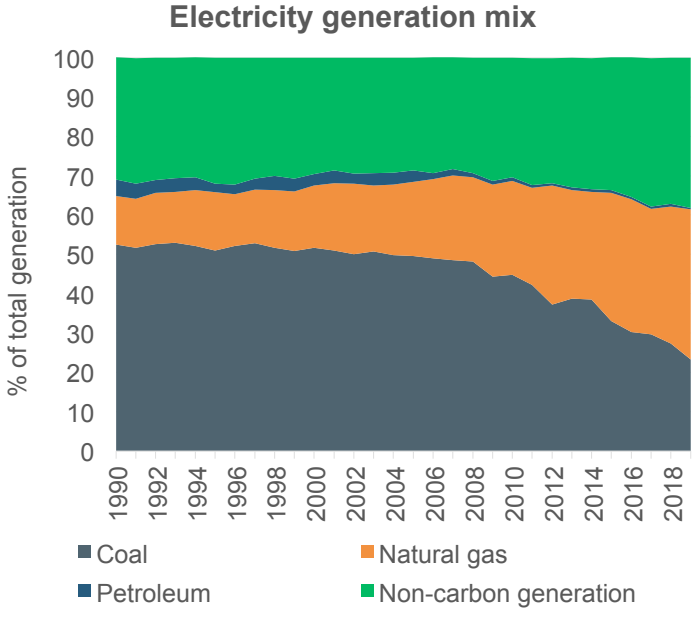
- The 14th FYP contains two specific energy targets:
  1. An increase of nuclear electricity generation capacity from the current level of 52 GW to 70 GW by 2025:
     - All else equal, this increase would boost the share of nuclear in primary energy to 5.7%, from the current level of 4%.
  2. Achieve 20% of primary energy consumption from non-fossil fuel by 2025.
     1. However, it has not capped the consumption of coal. This opens the option of reducing other fuels to reach the 20% target.
  - These targets could curtail a strong push toward increased gas consumption.

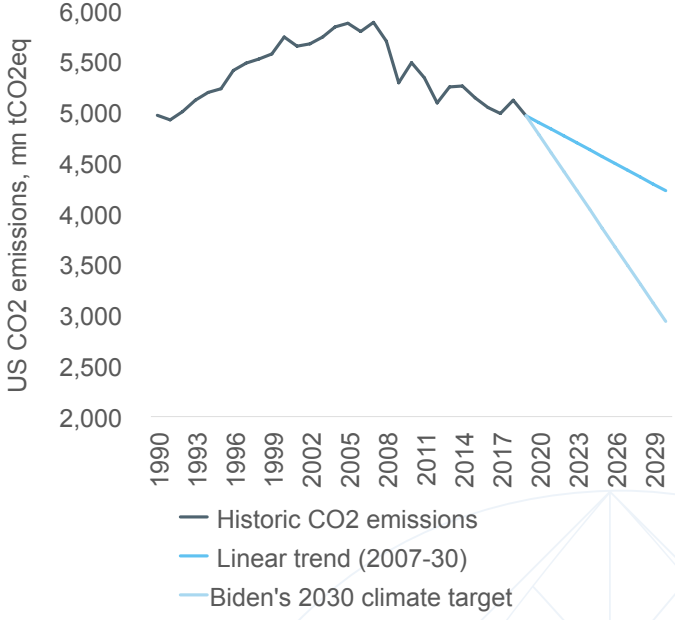
- Carbon price not high enough to incentivise coal to gas switching.

- Higher gas prices may lead to a slower shift from the more competitive coal to gas.

- Under existing conditions, the maximum technical potential to switch from coal to gas in electricity generation in China is only ca. 9% of current coal generation level.

US success





Source: EIA

But a lot more to be done

- US President Biden's recent climate target (50% GHG emissions reduction by 2030 relative to 2005) is very ambitious
  - Requires enormous investment in all types of clean technologies and low carbon energy sources.

- To put this target in the historic context of US CO2 emissions trend:
  - Since 2007 till 2019 emissions have been decreasing at an average pace of 67 mn tCO2eq/year.
  - This past trend indeed considers the effect of switching from coal to gas in the power sector, given the shale gas revolution.
  - However, to achieve Biden's new climate target, the rate of decline in CO2 emission would need to be 184 mn tCOeq/ year between now and 2030. **This is almost three times the rate of decrease that the US achieved in the recent past.**
  - The role of gas in this journey to meet the newly announced target will clearly be more important than ever.

Thank you!

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