



European gas markets: today and into the future

EPRG Winter Seminar

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Warning: Uncertainties Ahead

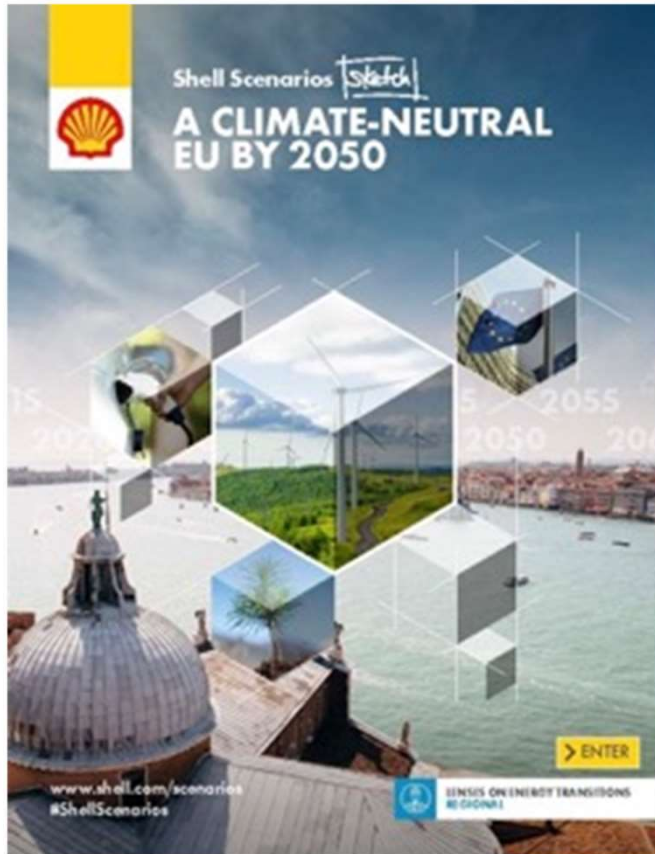
On March 4, 2020, the EU Commission proposed the European Climate Law that would establish a legally binding target of net-zero greenhouse gas emissions by 2050. Shell strongly supports the proposed European Climate Law and its binding target of net-zero greenhouse gas emissions by 2050. We believe meeting this target will be extremely challenging but possible. This report contains an assessment of what we believe may be needed to decarbonise the energy system in order for the EU to meet the proposed target of net-zero greenhouse gas emissions by 2050. This overview is not intended to be proscriptive and there are other pathways for the EU to follow in reaching the target. It is important to note that the suggestions contained in this report are those to be taken by the EU, and not necessarily Shell. While Shell is supportive of the EU target of net-zero greenhouse gas emissions by 2050, our current business plan is not consistent with the proposed EU target. However, as announced on April 16, 2020, Shell aims to be a net-zero emissions energy business by 2050. Accordingly, we expect that over time, our business plan will change as society and our customers move toward meeting the goals of the Paris Agreement. We believe that the proposed European Climate Law is a significant step in this journey.

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Pathway to climate neutrality by 2050

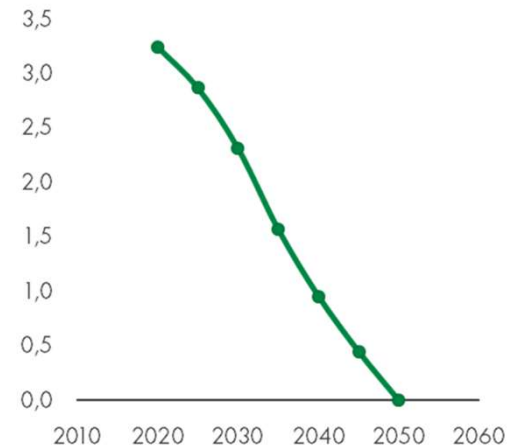


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A climate-neutral EU by 2050
EU energy system transformation
+ major reforestation*

Total CO₂ energy emissions + reforestation, Gt/ year



*The need for natural carbon sinks declines over time, the EU reaches climate neutrality without additional natural carbon sinks in the mid-2050s.

Accelerate clean technologies

- Double the use of electricity
- Renewables 75% of energy mix, no coal
- Commercialise new fuels: 10% hydrogen, triple biofuels

Target behavioural incentives

- Improve energy efficiency per unit of GDP by ~45%
- Incentivise low-carbon consumer and business choices
- Progressively raise government-led CO₂ price in the EU to over €200/ tCO₂e

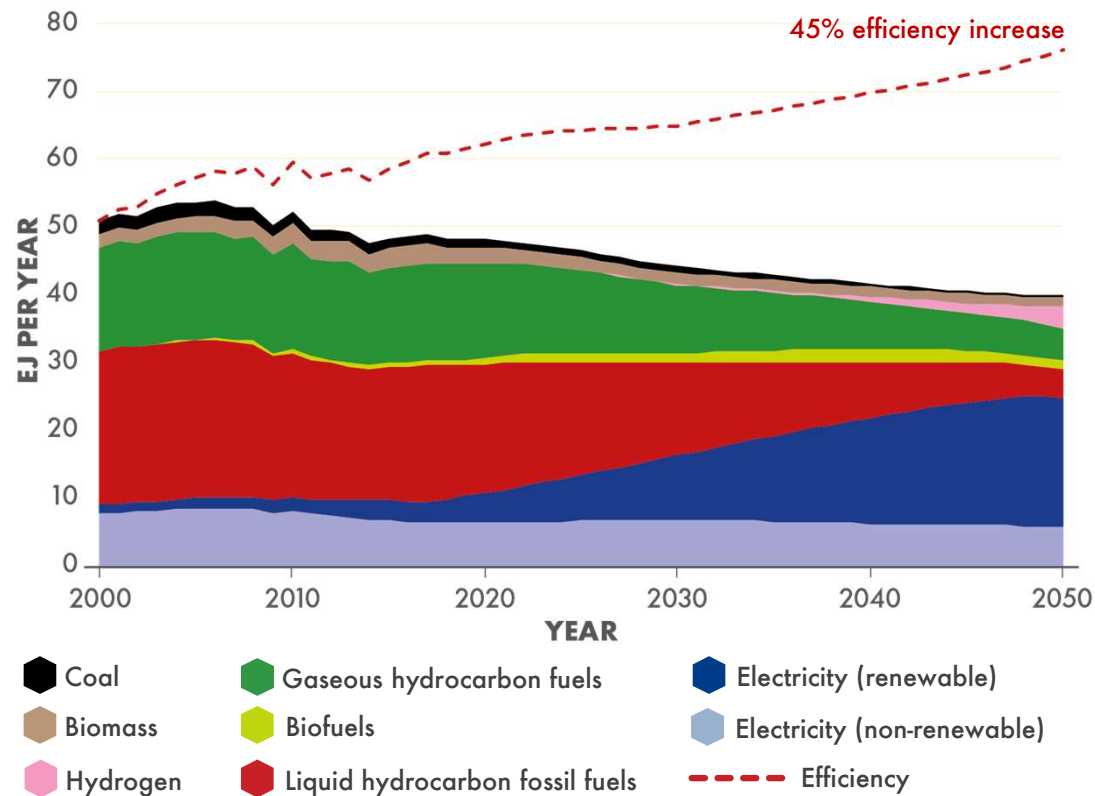
Remove emissions

- Build at least two major CCUS facilities every month (> 1 million tonnes per year each)
- Reforest at least 220,000 km² in the EU to remove the remaining 300 million tonnes of CO₂

RESTRICTED

Deep electrification, but molecules remain important

EU energy system electrons and molecules



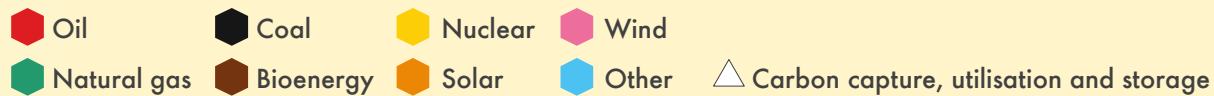
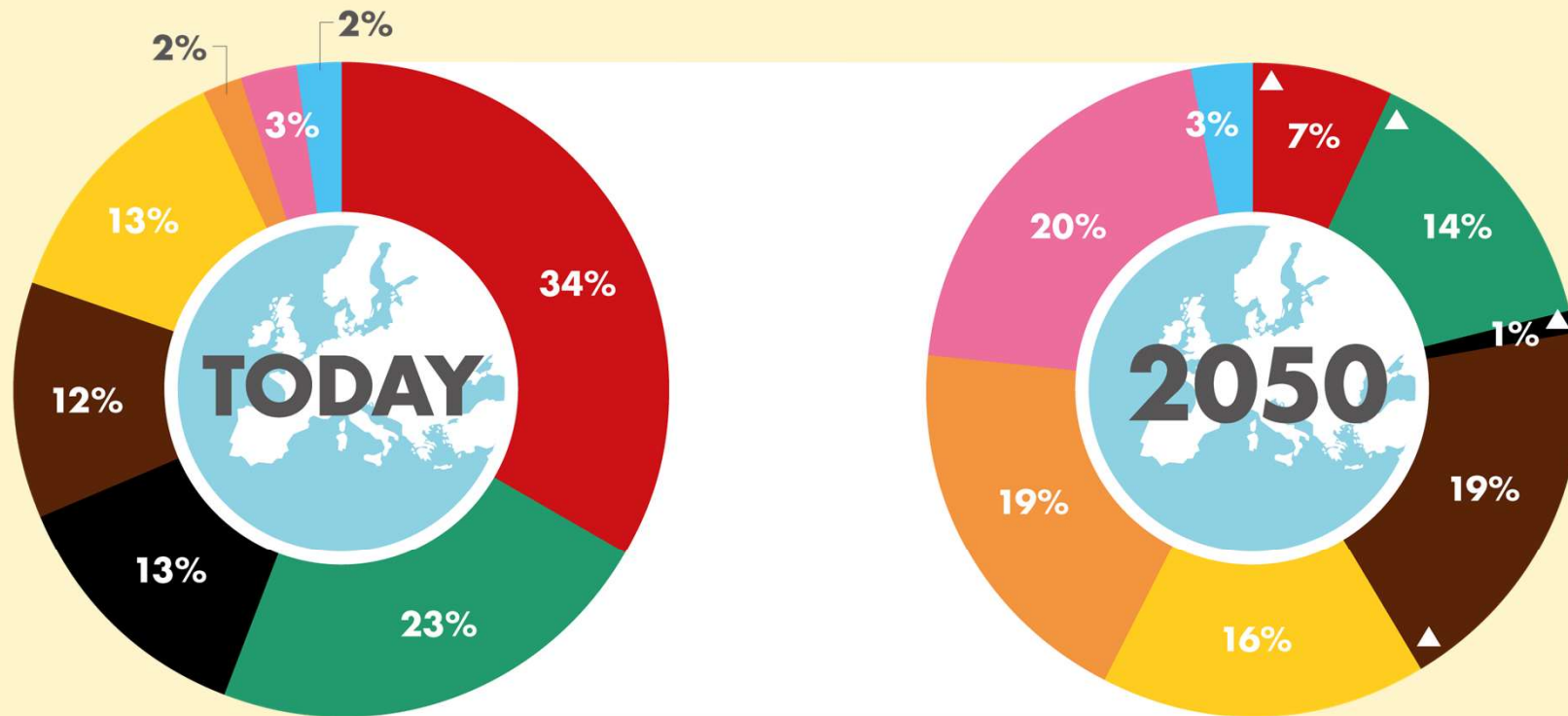
Source: Shell analysis

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Scenarios Sketch: A climate-neutral EU by 2050



Possible primary energy mix for a climate-neutral EU



Source: Shell analysis

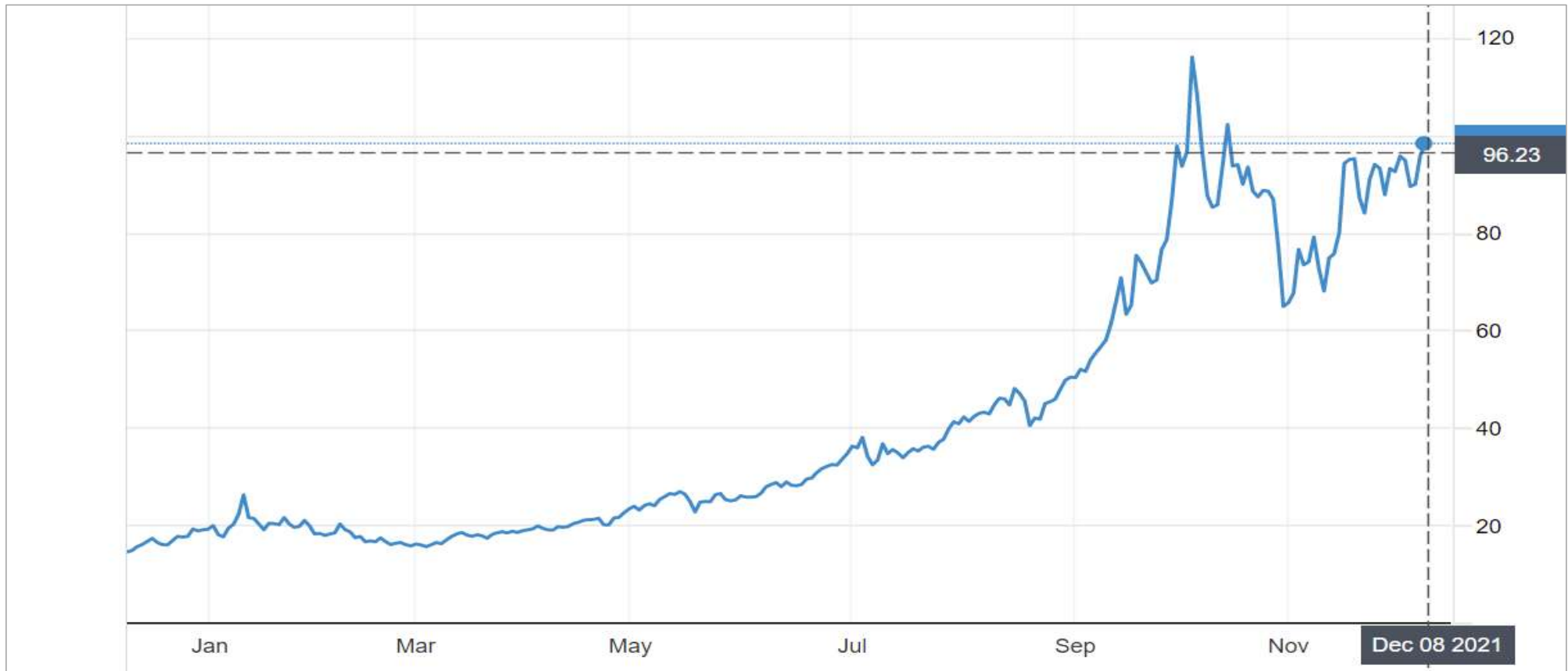
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Scenarios Sketch: A climate-neutral EU by 2050

The sum is more than 100% as a result of rounding.

EU natural gas markets today

Demand, supply, weather, geopolitics contributing to tightness



Important role for natural gas, in the transition and for abated gas in 2050

In the longer-term, this requires:

- ❑ adequate global investment in gas supply
- ❑ diversified EU sources of supply
- ❑ managing knock-on effects on electricity markets
- ❑ building out CCS capacity

