

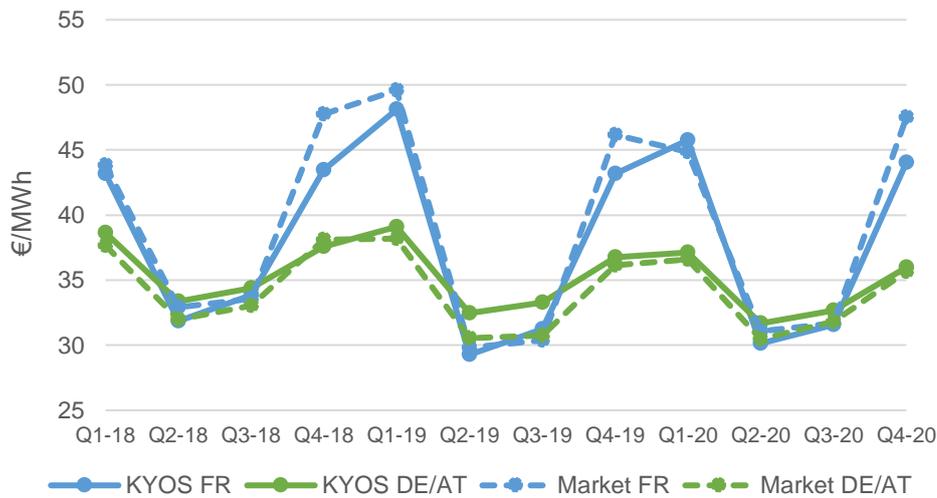


## KYOS Fundamental Power Market Analysis

### Power price assessments:

### Remarks:

KYOS power price assessments: DE/AT and FR

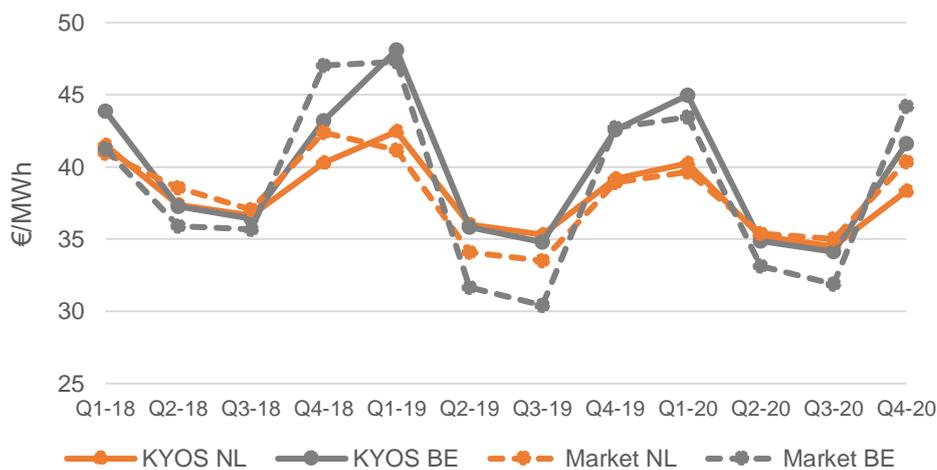


The trading date of the analysis is 5 February 2018. End-of-day closing prices from the relevant exchanges were used for all market prices. The KYOS power price assessments have been calculated with the fundamental power market model, KyPF.

This model allows for a very detailed hourly optimization of all individual power plants in the market, including gas, coal, lignite, nuclear and hydro power stations. The true flexibility of the assets is captured, optimizing between minimum and maximum load, using efficiency curves, and taking into account start costs.

This leads to a very realistic behavior of the individual power plants, very close to real market behavior. The model also optimizes the interconnection flows between the countries.

KYOS power price assessments: NL and BE



### KyPowerFundamentals (KyPF)

With KyPF you can create hourly power price forecasts and analyze a range of scenarios. It is provided with relevant data sets and integrated in our web-based Analytical Platform for ease of use. Let these forecasts assess the impact of policy changes, assist you with strategic investment decisions your trading activities. KyPF has the unique feature of integrating Monte Carlo simulations into fundamental power market modelling. This provides a much broader perspective on potential future developments than in the traditional deterministic fundamental market models.

For more information about the analysis, please contact us on [info@kyos.com](mailto:info@kyos.com).

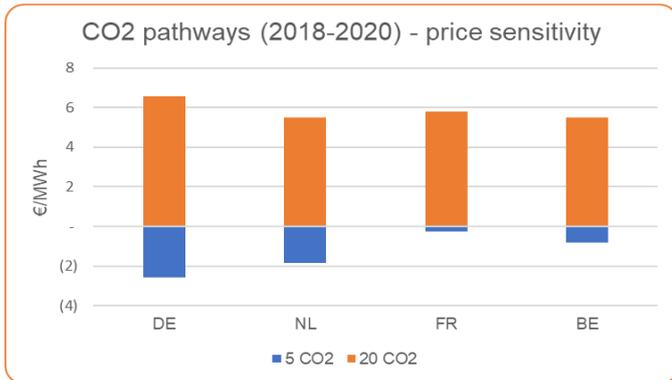
# CO<sub>2</sub> Pathways

## What-if the carbon price really does something?

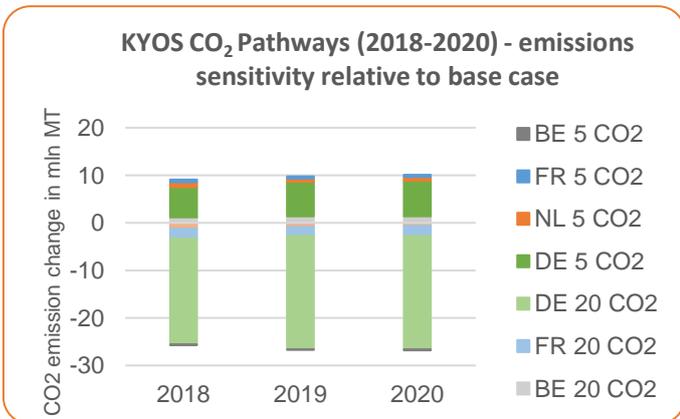
We have seen many reports and news stories of rising global temperatures due to the increase of greenhouse gas emissions. The EU Emissions Trading System (EU ETS) scheme has been set up as a cost-effective mechanism to reduce such emissions. However, policies supporting renewable energy production and the economic downturn, amongst others, have undermined this scheme and resulted in low carbon prices. Recently, the sentiment in the market started to change and EUA prices have gone up considerably from about 4-5 euros to 9-10 euros, mainly driven by the introduction of the market stability reserve. In this short report we assess: **what happens to the power sector if the CO<sub>2</sub> price makes another big move?**

## Assessment of different scenarios

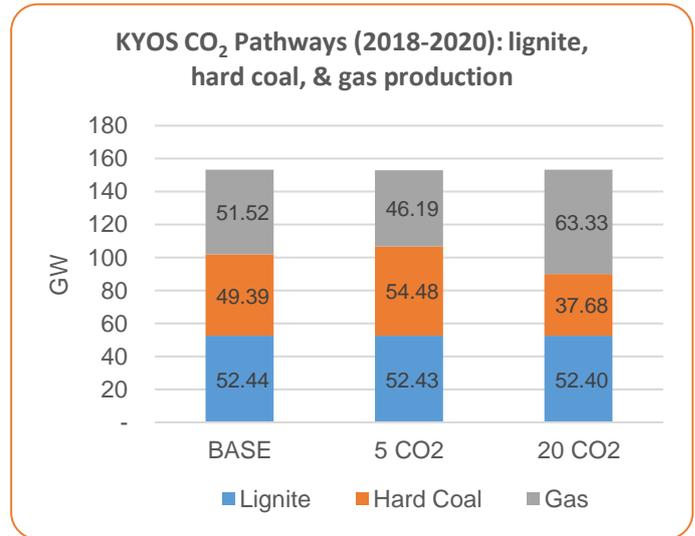
To answer this question, the KYOS fundamental model is the perfect analysis tool. We take the period until 2020, the tradable horizon, with a base case of 8.50, together with a 5 and a 20 euros scenario.



Immediately, we see power prices become overall less expensive in the 5 CO<sub>2</sub> scenario. The biggest changes are in Germany, where coal and lignite dominate.



In France and Belgium, prices move less due to the large portion of nuclear power. Obviously, due to the larger absolute CO<sub>2</sub> price change in the high price scenario, power prices respond more in the 20 CO<sub>2</sub> scenario.



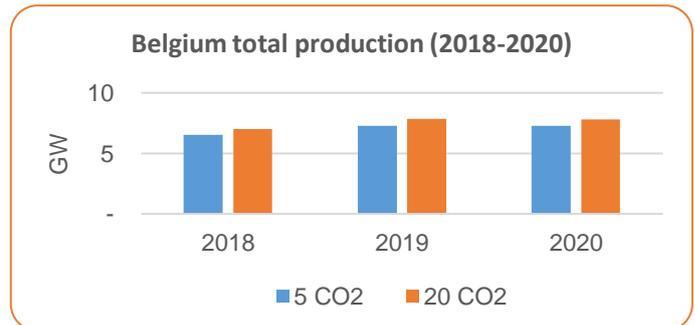
## Fuel mix affected

The analysis also shows how the CO<sub>2</sub> price can affect the fuel mix of coal, lignite and gas. In all scenarios the lignite production is constant, because lignite is rather cheap, and the CO<sub>2</sub> price of 20 is not even high enough to push it out of the generation mix.

This means, within this range of carbon prices, the shift is between hard coal and natural gas. For example, the average production from gas-fired stations rises from 51.52 GW in the base case scenario to 63.33 GW in the 20 CO<sub>2</sub> price scenario.

## Belgium is the exception

In terms of emissions, all countries appear to consistently follow the same trend: with a lower CO<sub>2</sub> price, the emissions go up and with a higher price they go down.



However, upon closer look, Belgium shows a reverse pattern. This happens because Belgium has no coal and lignite fired power stations. In the wider European market, its nuclear and gas-fired plants become less competitive when CO<sub>2</sub> prices drop and more competitive when they rise. In the 5 €/t CO<sub>2</sub> scenario this leads to higher import volumes and in the 20 €/t CO<sub>2</sub> scenario to lower import volumes.

