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Utility firms' contemporary struggles

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- Utility firms' fleet carbon intensity can directly affect their net income
- The shift from coal to gas is not only affected by the prices of fossil fuels and the EU ETS price (European Emission Trading Scheme)…
- …equally important are power plants' efficiency levels, intra-day demand curves, the merit order construction, and pre-negotiated heat and power obligations
- Currently, coal-to-gas switching seems to be the new norm but not every minute of the day

Introduction

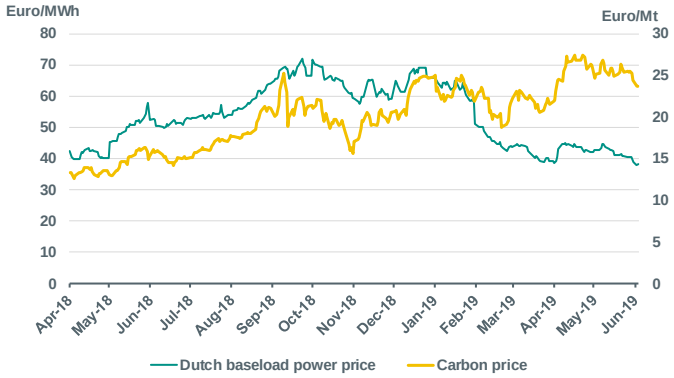
In the wake of the commodity price rebound in 2016 and the successful emission trading scheme reform, the Dutch baseload electricity price (first month contract) has been on the rise. In 2019, low coal and gas prices have started to weigh on electricity price. However, the downside seems to be protected by the pullback from commodity prices as (for instance) the higher ETS price has proved to be supportive. Utility firms are facing new challenges in this environment of low commodity prices, a high EU ETS price and a phase-out of baseload capacity. Reaping the profits of lower fossil fuel prices (lower input costs) while minimizing losses from a higher carbon price due to high fossil fuel emissions is among the firms' current struggles. Another challenge is the question of how to cope with a low thermal spread environment. A third issue involves the shift from coal to gas and renewables on the back of a higher carbon price, which is increasingly occurring, but there are other factors at play besides fossil fuel and carbon prices.

Does a higher/lower CO_2 intensity of electricity companies make a difference?

The EU ETS carbon price has risen since the start of 2018. Since then, the relationship between the carbon price and the power prices has also been strengthening. In other words, the higher carbon price has been reflected in a higher electricity price (see Figure 1). Still, there are other variables to watch, namely fossil fuel prices and their contribution to the electricity price. The carbon price has either offset the decrease in the fossil fuel price during a downturn (e.g., between March and May 2019) or has added to the upside (such as between April and September 2018). The graph below shows a stronger rolling correlation between the electricity price and the carbon price (see Figure 2)[1], meaning that the electricity price rises if the carbon price rises.

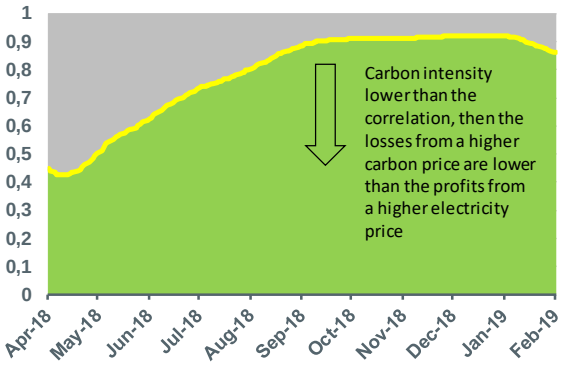
1 As part of a rolling regression analysis, the bi-variate correlation between the electricity price and carbon prices is calculated for a 400-day time window.

1. Carbon EU ETS price versus Dutch power price



Source: Thomson Reuters, ABN AMRO Group Economics

2. Carbon and electricity price, rolling correlation



Source: Thomson Reuters, Morningstar, ABN AMRO Group Economics

The carbon intensity of the energy-related utility company's weighted fleet depends on its mix of conventional and/or renewable power generation sources. A utility company with a carbon intensity below the correlation curve (Figure 2) is financially better off since the benefit from a higher electricity price (driven by a higher carbon price) exceeds the punishment for this higher carbon price. In other words, the utility's income would rise based on a higher electricity price and this would outweigh the higher costs that must be paid for carbon emissions rights[2]. The reverse is true in the opposite direction. If you are a utility company with a carbon intensity higher than the correlation, then your losses from a higher carbon price are higher than the profits reaped from a higher electricity price. As utility firms strive to remain below the correlation curve by diversifying their sources of generation and switching to less polluting sources, they should continue to benefit from the upside of the electricity price that are driven by the carbon price. This holds true if early closure of lignite and coal plants is compensated, creating a value-neutral position for utility firms.

Is it financially feasible to build new CCGT plants?

The performance of utility firms is measured in two ways: the clean dark spread, and the clean spark spread. They measure the profit of utility firms when using coal and paying for carbon allowances (clean dark spread) or using gas and paying for carbon allowances (clean spark spreads). If coal price is low and/or drop faster than gas price, utility firms that use coal are more profitable than those that use gas. But if gas price is lower and/or the carbon allowances rise quickly, coal-powered utility firms are at a disadvantage.

Thermal spreads for utility companies remain under pressure. This comes on top of the other challenges for utilities, like carbon intensity, fleet diversification and their earning thresholds. In 2018, the clean dark spreads were higher than clean spark spreads. This was because the coal price dropped faster than the gas price (see

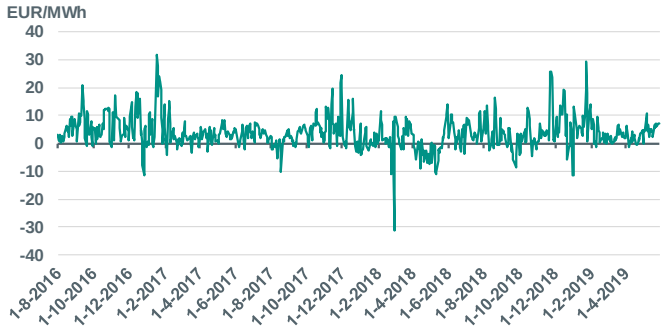
2 Assuming the correlation is around 0.7 (Figure 2), for each euro of carbon price increase the power price increases by EUR 0.7/MWh. If, for example, a company's carbon intensity of its generation facilities (power plants) is 0.5, then the marginal cash inflow is EUR 0.35/MWh.

Figures 3 and 4). However, since the beginning of 2019, both gas and coal prices have been under pressure. But with a high carbon price, clean dark spreads went negative while clean spark spreads remained low but positive.

Nevertheless, even with positive clean spark spreads, the spreads are not high enough to guarantee the de-mothballing of Combined Cycle Gas Turbines (CCGT)[3], let alone the construction of new CCGTs. According to the US Energy Information Administration (EIA) for baseload generation, the breakeven threshold is generally around EUR 5/MWh given the operation and maintenance costs to de-mothball CCGTs and around EUR 19/MWh for new CCGT construction. Given that clean spark spreads currently hover around EUR 3-7/MWh, this barely justifies the de-mothballing, let alone the construction of new CCGTs.

Still, coal-to-gas-switching is often mentioned as a solution in the Dutch debate in order to come to a solid climate policy in the form of the 'klimaatakkoord' (climate accord). However, this solution is discussed from a political point of view with little emphasis on the fundamentals of fossil fuel prices that can enable or inhibit coal-to-gas switching. Coal-powered utility firms will only shift to gas if the prospect of profitability dims and they are ensured that changing their power production input/processes would pay off in the future in terms of profitability.

3. Netherlands clean spark spread (50% efficiency)



Source: Thomson Reuters, ABN AMRO Group Economics

4. Netherlands clean dark spread (36% efficiency)

Source: Thomson Reuters, ABN AMRO Group Economics

Coal-to-gas switching the new norm?

Coal-to-gas switching for power generation is considered the new norm in a low gas-price environment, especially as the gas price (monthly contract) plummeted to levels below EUR 10/MWh in June. However, the shift from coal to gas is not just affected by the fossil fuel and EU ETS price alone.

(1) The intra-day demand curve is different than the demand curve over seasons. Because the demand for electricity during the day can be very low, a switch from coal to gas won't happen regardless of the prices. And during periods of high

3 CCGT: Combined Cycle Gas Turbines are electric power generations with a heat engine that enable them to work in tandem.

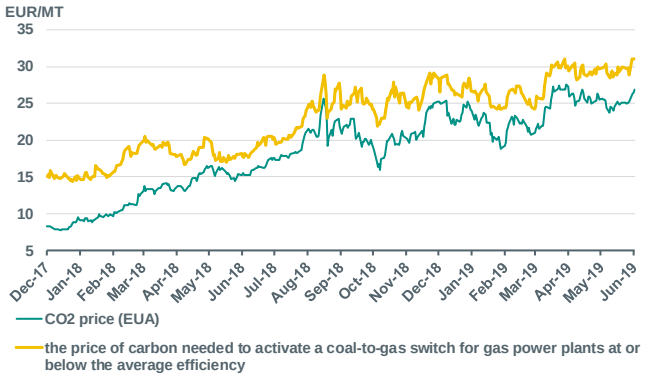
demand, where gas power plants are running at their highest capacity, there is not much gas power plant capacity left to ramp it up.

(2) The current carbon price allows for the coal-to-gas activation, especially as high efficiency gas power plants are replacing low efficiency coal power plants. But according to Bloomberg calculation, given current fuel and electricity prices, in order for gas power plants below the average efficiency (<48%) to be activated and to replace coal power plants, a higher carbon price must be reached (~EUR30/MT) (see Figure 5).

(3) The high production of wind and solar power intra-day can drive fossil fuel-powered power plants out of the merit order. This is true regardless of where the fossil fuel price stands.

(4) Ramping up/down a power plant and shifting to other fuel types does not happen overnight, especially when combined heat and power obligations have already been negotiated.

5. Carbon price for coal-to-gas switching



Source: Bloomberg, ABN AMRO Group Economics