Paris Energy Club - Autumn Meeting
Friday 23 November 2018

Summary of Discussion

The Autumn Meeting of the Paris Energy Club was structured around three sessions: the first discussed recent energy market development and prospects while the second tackled various themes and regional issues. As the Club was gathering a few days before COP24 in Poland, members devoted the third session to discussion of climate-related policies and agreements.

1. Energy market development and prospects

Oil markets

There is significant turmoil in the oil market; this is a fairly common occurrence, but we are currently seeing particularly large swings in pricing. Before the summer, the market was highly concerned about tightness in supply-demand balance. A few months later, the situation has flipped completely: prices have been collapsing, dropping 25% in just a few weeks, with a concern about over-supply.

The drop in prices is with the basic picture given by global inventories, which are returning to their levels of a year ago with a sharp rebound, with stocks rebuilding at a very fast pace; at around 1.4 million barrels per day before the Club's meeting.

The old view that OECD stocks were a good indicator of what is happening in the rest of the world because the price signals were the same has been well and truly disproven. It is important to look at both OECD and non-OECD stocks. Indeed, there was an immediate response in price when global stocks started to go down.

There have been also several cycles in the market's perception of how the sanctions on Iran would be implemented. When the US first exited the JCPOA there was a fair amount of scepticism about the likelihood that the sanctions would be implemented efficiently, due to the lack of international support for the sanctions, in contrast to 2012 when the full P5+1 was in support of the sanctions. However, companies started to signal quite early that they would abide by US requests.

The market perception swung to a view that there would be loose implementation, at least in its early phase, when waivers were granted eight countries that altogether represent around 75% of Iranian exports..

Meanwhile, despite expectations that the US would run against capacity constraints in terms of pipeline takeaway capacity, US production is rising dramatically. As per IEA's last report, US production is estimated at about 16 million in oil liquid, an incredible record high. The other two top producers (Saudi Arabia, Russia) have also been producing at record highs, leading to an abundance of supply, without any meaningful reduction in Iranian exports so far. Although the future of Iran's sanctions remain uncertain, there is still considerable political risk, not least in Saudi Arabia, which could impact prices and supply in 2019.

In the longer term, lack of demand and concerns about stranded assets, is impeding investment in oil production. Reduced investment since the collapse in prices of 2014 will probably lead to a shortfall in supply and a run-up in prices in the next few years, probably in the period 2022-2025. The expectation of a peak in oil demand is gaining momentum dramatically, with more and more forecasters projecting a peak in demand in the near future.

Expectations of peak demand in the longer term are having an immediate effect on investment, which is a new development. The growing perception that peak demand is around the corner, the role of climate policy, the growing demands from investors that oil companies prepare for the energy transition, all of these are making capital less available to companies to invest in the upstream sector, thus raising the cost of capital and leading companies to move some of their investment programmes away from the oil sector to new areas of energy (gas, and more particularly to renewable energy and electricity).

Gas markets

Global energy markets registered a strong growth in 2017 (2.2% for total energy) driven by natural gas and renewables, but also for the first time in four years by coal. The global gas market grew by about 3% in 2017, largely driven by China, and 2018 will be even more bullish. Gas demand growth is expected to be very strong indeed, landing anywhere between 4% and 6%, mostly driven by two countries: the United States and China.

The long-awaited gas market glut hasn't yet materialised, but investment remains limited. The question is whether the gas sector is at the beginning of a new LNG investment wave or not (only two final investment decisions have been taken in 2018, in the United States and Canada).

Gas prices in the US market have been flat, about $3 per MMBTU for almost the whole of 2017, and 2018, before starting to increase recently to above $4.5 per MMBTU due to insufficient gas in storage. Asian and European gas prices have also been increasing.

Currently, the natural gas share is still increasing in the global primary energy mix. Looking back at 2017, the switch from coal to natural gas in the industrial and residential sectors in China was one of the main drivers of gas demand growth. On the supply side, Russia has benefitted from the growth of the global gas market last year, with some 200 billion cubic metres of pipeline gas to be exported to Europe this year, the highest level ever. The other source of increase in terms of production was coming from Australia and the United States, driven by increasing LNG exports.

Over the first eight months of 2018, US gas demand has increased by 12%, due to a cold winter and higher demand from power generation, itself caused by nuclear power plant outages, and

significant decommissioning of coal-fired plants. The growth of US gas consumption in 2018, a market of about 770 cubic metres (bcm), was in the range of 60 to 70 billion bcm, the size of the Italian gas demand.

Despite the reduced growth in Chinese gas demand in 2018 (China is pressuring less for more gas in domestic energy mix, with a view to making space for clean coal), this demand is still expected to increase at about 15%. For the first nine months it has stood at around 16%, so there is strong growth, and as natural gas production in China is unable cope with such an increase, we are also seeing a massive increase in pipeline imports as well as LNG imports. However, China is unlikely to witness a winter of discontent similar to that of 2017. China is fully prepared, with high levels of stocks, and much-improved preparation by gas companies.

China and new markets such as Pakistan and Bangladesh have started importing. There is still an increase in LNG demand in Taiwan, Japan, and Korea will probably set records due to nuclear issues. All of these factors combined mean that LNG has been flowing to Asia once again this year, confirming the trend we have been seeing over the past few years.

For the past two months, gas prices have begun to increase in the US as a result of low levels of gas storage (15% or 16% below the five-year average while approaching the end of the injection season). The EIA storage report released recently indicated the highest ever withdrawal at the beginning of the withdrawal season; already low gas stocks are therefore being massively reduced, pushing stored gas volumes to even lower levels.

In the US, energy price movements tend to trigger switching between coal and gas. However, we have seen some four or 5 GW of coal-fired plants decommissioned in Texas, so there is less switching available. Add to that numerous outages in nuclear power plants, many of them in the southern US, and there is even less potential for switching as a result.

2019 may be finally the first year where we see a lot of new LNG export capacity, with its full effect to be felt in 2020. Some 100 to 150 additional MTPA will be entering the market, or taking FID over the next year (USA, Mozambique, Qatar, potentially Russia, with Artic LNG, etc.), although US LNG may have to take into account the trade war between US and China, the largest market for LNG.

Contracts are becoming shorter and smaller, with the portfolio players driving the change. The question is what kind of LNG contracts will be supporting the new LNG projects. Will we be moving to 10-year contracts, and what does that mean for financing? Do we need more and more small LNG contracts in order to make a plant move forward, or are we going to move to a world where the portfolio players like BP and others are the ones who take the final investment decisions and the risk of contracting the gas, before optimising their portfolio?

Future natural gas demand is expected to enjoy strong growth, driven mostly by industry and power generation, coal to gas switching, as in China, and a large increase in industrialisation or power growth, as in Africa. On the supply side, many countries have significant natural gas resources available at a relatively low price, as in the United States, North America and the Middle East.

Russia

The battle for market share on the European market between pipeline gas and LNG is growing. Due to US pressure against North Stream, Chancellor Merkel, who has always been a strong supporter of North Stream, announced that Germany intends to build an LNG plant in the north of country, at a cost of €500 million. One participant thinks that Germany, by trying to accommodate both North Stream gas and (US) LNG, runs the risk of being over-supplied.

Despite the tensions in the European market and US political pressure, including further sanctions to get US LNG to the European market, Gazprom managed to increase its share in the European market (expected to reach 38% in 2018).

Gazprom is adapting its strategy to market needs. The company is moving to shorter contracts, and successfully started early autumn trading on the electronic trading platform. Gazprom is moving its trading business from London to St Petersburg, and initial trading showed very good demand and good volumes.

Poland will be one of the key players on the European market as it attempts to diversify its gas supply sources. Poland's decision to switch from Russian gas to US LNG is highly frustrating for Russia (Poland declared that it intends to fully replace its Russian gas supplies with US LNG within the next five years). One participant underlined the political dimension of this decision, expressing doubt that LNG from the US could be cheaper than pipe gas from Russia.

2. Regional developments

Reviewing recent major international developments, participants agreed on the significance of the competition between the China and United States, which will – in their view - dominate the geopolitical global scene over the next decade and beyond.

China-US rivalry

Some compare the present US-China rivalry to the Cold War, when the entire international scene was dominated by the competition between the Soviet Union and the US. However, the competition between US and China is much more complex, as there are intertwined economic interests that did not exist during the Cold War. Indeed, the natural ideological divide which existed during the Cold War cannot be translated into the current context.

As far as Russia is concerned, one of the discussants was of the view that Western countries missed the opportunity for real rapprochement with Russia in the '90s, and Russia is now clearly leaning towards the East, and China.

One of the discussants offered their thoughts on the Trump-led trade war with China, highlighting the dramatic change witnessed by the energy scene over the last 10 years, both in China and in the US. During the period 2007 to 2017, energy demand in the US was characterised by great stability. Total energy, and oil consumption, decreased by some 4% and, refining

capacity remained almost stable, while natural gas consumption increased by 80% (although to the detriment of coal, which decreased by 50%).

In contrast, total energy consumption for China increased by 45% over the same period. Oil consumption increased by 54% and refining capacity by 66%. Gas production almost doubled, but at the time gas consumption increased fourfold, making China the second largest importer of LNG behind Japan. Coal consumption grew by 20% but coal demand peaked in 2013. The share of coal in the total energy mix was reduced from 74% in 2007 to 60.4% now. Energy security is the Achilles heel of China, as China's oil import dependency rose to almost 68%, and natural gas import dependency to 40%.

The development of non-conventional hydrocarbons in the US has been a game-changer; the US is the largest oil producer ahead of Russia and Saudi Arabia, and the US is now a net gas exporter. Thanks to the shale revolution, US energy dependence has fallen from 29% to just 8%, and this is opening up greater opportunities for US diplomacy, which is clearly explained by Trump's America-first energy plan. The clear objective of the US strategy is to make America energy independent, and the energy independence of Obama has been replaced by energy dominance.

China has become a significant destination for US energy export; China has taken a large share of incremental volumes of LTOs and emerged as the second-largest buyer of US crude in 2017. However, the US accounted for less than 3% of China's total crude imports. As the oil market is global in nature, China is likely to replace the Iranian lost barrels from other top suppliers (thanks to the waivers, China will continue to import increasing quantities of Iranian crude oil). In the short term, OPEC and Russia have been the biggest winners in an oil trade war between China and the US.

The US is the third largest LNG exporting country (by capacity) but represents less than 4% of total Chinese LNG imports. However, the 10% tariff imposed on US LNG in retaliation could have a significant impact on the new wave of LNG projects, and may delay or even completely stall some of the US' LNG projects. A cut in US LNG imports by China will open the door to further cooperation with Russia and other LNG exporters (see recent FID taken by LNG Canada, clearly targeting Asia and the Chinese market).

In 2017, China imported 3 million tonnes of US coal, representing around 1% of total Chinese imports, and clearly almost nothing on its total consumption. The additional 25% import tariff imposed since 23 August by China on US coal will have a limited impact for China. In contrast, China accounts for 5% of US coal exports, but the potential growth of the Chinese market is significant for the US coal industry. Therefore, the effect of the Chinese tariff can be seen as a missed opportunity for US miners.

As far as renewables are concerned, the Trump administration also decided to impose a tariff of 30% on solar panels (on top of a quota of 2.5 gigawatts). The objective was to stimulate the creation of jobs in the US, but the impact on the downstream industry will be significant, leading the solar energy industries association to oppose the tariffs. Developers have since reported the cancellation of more than $2.5 billion in large projects.

We should also consider the indirect impact on the US oil and gas industry of US tariffs on imported steel, as the price of US steel products have soared following the introduction of such tariffs. The oil industry is opposed to the new tariffs as the specifications on steel products cause disruption and higher costs for the pipeline industry.

Egypt: gas sector reforms and gas balance

Egypt is one of the largest economies of the Middle East, North Africa region and one of the largest energy markets in Africa. Over the past four to five years, Egypt's national economy has undergone tremendous change, especially in the gas sector.

Egyptian gas demand grew almost fourfold between 1996 and 2016, while indigenous supply was declining due, among other factors, to the lack of incentives for companies to drill or develop more reserves (especially in the difficult offshore regions). As a consequence, over the period from mid-2000 to 2013, Egypt's status changed from gas exporter to net importer.

Reforms implemented in the Egyptian gas sector managed to reverse the situation by containing demand surge while finding and developing new gas resources. On the supply side, 3 key driving factors should be highlighted:

1) The first was the adjustment of gas pricing mechanisms for developed supplies. The price paid by the government to international oil and gas companies that produce gas in Egypt was initially $2.65 per million BTU; quite low by international markets standards. Starting from 2013-2014, Egypt agreed to adjust gas prices upward, between $4 and around $6 per million BTU.

2) The second is the Government decision to tackle the repayment of IOC arrears, with the objective of repaying all debts by the end of this decade (debt to IOCs was reduced and currently stands at $1 billion, from as high as $6 billion in 2013).

3) The third was the move by the Egyptian authorities to tackle institutional bureaucracy and smooth all administrative processes for IOCs to register in the country, hire workforce and bring in the required expertise from outside.

The Zohr Field was indeed discovered in August 2015, and started production in December 2017. If all goes according to plan, these new sources could add between five and six billion cubic feet a day of gas; a major gas supply. New supplies are expected to eliminate the gas balance deficit by the end of 2018. Meanwhile, Egypt stopped importing natural gas at the end of September 2018.

The top priority of the Egyptian government over the last four or five years has been to supply the domestic market, a change in strategy from the past, when at least one third of domestic gas production was reserved for export. However, as the gas balance started to improve on the supply side, the government declared that it expected to fully resume exports. Initial supplies of gas (via pipeline) to Jordan have been recorded this year. The cross-border gas pipeline from Cyprus to Egypt (at a cost of more than 1 billion dollars) has already been agreed. This deal between producers in Israel and Egypt is aimed at re-establishing gas exports to markets outside Egypt. Exports from Egypt would be limited in terms of size and time. Unless more discoveries

are made, Egypt is not expected to go back to the sustained 10 bcm per annum, and the balance may last until 2023 or 2024, depending on the scenarios under consideration.

However, Egypt's aspiration is to become an East-Med gas export hub. One option is to export gas supplies from Egypt using the underutilised LNG plants in Egypt by sourcing gas from other East-Med producers. According to one Club member, Egypt is bound to play a central role as it has the largest gas infrastructure in the East-Med, in addition to the largest energy market in the region.

Looking forward, gas balance remains a challenge. Demand is expected to continue to grow, though at much lower rate than in the past. The reform of domestic energy prices had produced an impact and will continue to do so. Energy-intensive industries are shifting to other energy sources: the cement sector has switched to coal, and the increase of Electricity tariffs will continue to impact gas demand as most electricity is gas-generated.

Gas reform is part of a package of economic reform measures, supported by international institutions. On the demand side, domestic gas prices were adjusted in 2014 (from a range of between $1.25 and $3 per million BTU to between $4 and $8, depending on the sector in question). There was also a continuous and significant reduction of price subsidies for transport fuel and electricity. The power sector accounts for a dominant share in Egypt's gas consumption, and is the one sector in which subsidies have not been completely removed. The price for gas to power was raised from $1.25 to $3 per million BTU; still below the LNG import price of $4-$5 per million de BTU. The Egyptian government's objective is to remove all subsidies by the end of 2019.

In August 2017, Egypt established a gas market regulatory authority. The new gas market law allows private entities to trade in gas, including transportation, and the government will no longer act as aggregator. The expectation is that this will increase the number of gas players as well as availability in the Egyptian market, although some issues still remain to be clarified: What are the conditions for eligibility of players? How will they be regulated and taxed? What are the conditions to access the gas transportation network, etc.?

Saudi Arabia's future energy mix: possible paths

The Vision 2030 was underpinned by the recognition that the old development model of relying on cheap energy, cheap imported labour and the over dependence on the government expenditure for employment and growth is not sustainable. However, making the Saudi economy more competitive and productive may be challenging as it requires a change of mind set of the government, the private sector, and Saudi citizens altogether.

The lion share of the fiscal revenues comes from oil exports, therefore energy constitutes a major building block for the Saudi economic reform.

On the demand side, reliance on cheap energy has resulted in wasteful consumption, and discouraged investments in energy efficiency. Saudi government have therefore made of energy pricing review a very first step of the economic reforms that are aiming at rationalizing energy consumption and diversifying the power mix. Domestic prices have been increased in successive rounds although they are still low compared to international benchmarks, on a percentage level.

Natural gas was shielded from further price increase in 2018 because of its strategic role as a driving fuel for industrialisation and diversification of the electricity mix. Saudi government are however planning to deploy future gradual increases of domestic natural gas prices and benchmark it to a market reference price.

The electricity tariffs reform aims at rationalising electricity demand but also at attracting private investors, as Saudi Arabia is envisaging the open up of the power sector to the participation of private companies. Increase of electricity prices has tripled the electricity bill of an average household (middle class range) that consumes up to 4000 kWh. The Saudi electricity regulators have been considering for some time now the unbundling of the Saudi electricity sector, and moving to a single buyer model.

Saudi domestic natural gas demand has been growing at about 4.3% annually in the last 10 years, totalling a growth of 54% between 2006 and 2016. Most of the naturel gas consumed in the country is directed towards power, although there is more gas going into industry nowadays. Natural gas makes 50% of the power mix, with the remaining part being sourced from liquid fuels. The consumption of the latter was as high as 0.9 Mb/d in 2017 or 30BCM natural gas equivalent.

Meeting the fast growing demand for power generation and water desalination remains a challenge despite the increase of domestic natural gas production. Infrastructure constraints represent the other challenge that Saudi policy makers are trying to address. Oil and gas fields are mostly concentrated in the eastern region of Saudi Arabia, making the western and southern regions of the Kingdom to rely almost exclusively on crude oil burning.

Within the framework of The Vision 2030, Saudi Aramco plans to double gas supply by 2026/2027, targeting a gas supply of 182 bcm by 2020. It is worth noting that unlike in the past when most of the natural gas used in Saudi Arabia was associated gas, new gas supplies are mostly non-associated, more sour, and probably more unconventional, thus exhibiting higher supply costs.

Saudi Arabia is also considering gas imports to supplement domestic supplies (the kingdom does not import, nor export, natural gas so far). An import terminal on the west coast can facilitate imports from nearby exporters such as Egypt, and East Africa, with limited quantities sourced from Yemen once LNG exports resume, and possibly from US. There are other potential suppliers within the region (Qatar, Iran, Israel, etc.) with significant gas reserves and export capability but would not be considered due to geopolitical reasons. Should Saudi Arabia go for imported LNG, the country can benefit from the countercyclical nature of its gas market (Saudi Arabia demand for gas is to meet the air conditioning load during the summer) compared to the rest of the LNG market where 60% of the LNG imports are taking place during the winter. Saudi Arabia could therefore get a price discount ranging from 50 cent to a dollar compared to other LNG buyers. But when considering displacement of oil from the Saudi power generation, all options, not just LNG, are actually on the table, including renewable energy (particularly solar), nuclear, and domestic gas that can compete with LNG. But the scalability and adaptability of LNG provides a room for imported LNG should there be delays in domestic gas targets, in renewables targets, and even gas infrastructure targets in general.

In conclusion, natural gas continues to be the fuel for the future for Saudi Arabia and its continuing industrialisation. The government is likely to take a more gradual approach in increasing natural gas use in the power sector. The share of non-associated gas is set to increase, leading probably to an upwards shift in the cost curve. LNG may play a role in Saudi Arabia, especially if domestic targets for gas, or renewables that are not met on time (the Kingdom targets 9.5 gigawatt of renewables sourced capacity by 2023).

3. Climate policies: short-term concern and long term goals

As the Club was gathering a few days before COP24 in Poland, members discussed climate-related policies and agreements, taking stock of the implementation of the Energiewende in Germany and examining the EU 2050 carbon neutral strategy.

Germany's climate and energy policy; revisiting the Energiewende

Members were reminded that the Energiewende in Germany is based on four targets;

1) Climate mitigation (reducing greenhouse gas emissions, generally speaking by 2050, by 80% to 95%)
2) Nuclear phase-out, a key pillar of the energy transition in Germany.
3) Energy efficiency, another key pillar for the German energy transition.
4) Development of renewable energy, for which the government set new objectives at the beginning of 2018.

Fairly ambitious targets have been set to reduce CO2 emissions and the nuclear phase-out has already been decided on and engaged, with completion expected by the end of 2022. At the beginning of the year, the objective for renewables in the electricity sector was increased by the new government coalition to 65%, from around 55%.

Fossil fuels still provide 80% of Germany's primary energy consumption (2017 figures). Nuclear energy has been reduced quite heavily and renewable energy currently represents about 13% of primary energy consumption.

Between 1990 and 2010, considerable reductions were achieved in CO2 emissions, but these have since stagnated. The reunification of Germany and the collapse of industry in the emission-heavy former-East, led to a reduction up to the year 2000, helped in part by the modernisation of climate policy. However, despite the considerable development of renewables in the electricity sector, improvements have been halted, mainly due to coal power generation.

In the energy sector, the industry produces the most CO2 emissions, followed by industry, construction and transport. The only sector in which emissions have been increasing is transport, as people are more mobile and more goods are transported. However, some achievements have been made in other sectors.

The majority of the development of renewables has been achieved in the power sector, with 36% of electricity consumption now sourced from renewable energies. It is still quite low in the heating and transport sectors and some progress will have to be made if Germany wants to meet

its targets. It has been recognised that most of the 2020 targets are unattainable, so the target for most of them is now 2030.

The targets at EU level may become slightly harder, meaning there is still more to be done on Germany's targets for 2050. Much work remains to be done in order to reduce energy consumption through efficiency, but also to achieve lower emissions in energy production and use.

In 2017, around 600 terawatt hours of consumption (around 36%) came from renewables, mostly wind and solar. Up to 2014, there was a push for biomass that subsequently stopped. Coal power production is still key in the German context and it is currently being discussed very critically across the political scene.

In January 2018, a target was set for 65% of gross power consumption sourced from renewable energies by 2030. It is currently at 36% and it will be difficult to bridge that gap. The main effort in developing the country's share of renewables is focused on solar and wind energy. Biomass development is stagnating for a number of reasons, including cost and capacity availability and the scalability of the technology in Germany.

Although there has been a remarkable increase in renewables, with the nuclear phase-out happening in parallel, CO2 emissions are not reducing as fast as they should. Coal power production has been diminishing slowly, but it is still a very large part of the German power sector's production.

At the beginning of the year, the government established a commission to discuss the trajectory to allow a phase-out of coal by 2030 or 2040 at the latest. At the end of October, there was a recommendation on the policy instruments for social and structural measures to help the regions that would suffer from a coal phase-out in terms of employment and social welfare. The recommendations and a phase-out plan for coal were due by end of November 2018, knowing that at least half of the coal power production should be out of the system if Germany is to achieve its targets at all. Even if Germany did reduce its coal power production by 50%, it is already in over-capacity and has enough gas power production.

Towards an EU 2050 carbon neutral strategy?

Turning to the European Union, global emissions have increased again by 1.4% in 2018, after three years of relative stability, and European-based emissions have also experienced an increase, albeit a moderate one of 0.6% according to the latest figures from the European Environment Agency.

The EU, which is an historical climate leader and one of the driving forces behind the Paris Agreement, has seen its emissions rising. Meanwhile, the US and its climate change-denying Administration, while pursuing an America first, energy dominant strategy, has actually seen a drop in emissions.

However, these are short term trends and the more structural trend is more positive for the EU, as the Union has taken major steps on the regulatory front in 2017 and 2018.

In 2017, the ETS carbon market reform was finalised and adopted, with a higher linear reduction factor for beyond 2021, and the introduction of a new mechanism, the market stability reserve, to help reduce the surplus in allowances on the EU ETS market. This ETS reform was quite predictable and a direct follow-up on the EU's pledge during COP21. Perhaps more surprising is the soon-to-be finalised adoption of two revised targets, the first on renewables and the second on energy efficiency. The share of renewables in final consumption will have to reach 32% by 2030 and energy efficiency must be improved by 32.5%, compared to the benchmark for primary and final energy consumption. On both renewables and energy efficiency, the EU is committed to going beyond its pledge in its submission to the UNFCCC secretariat in 2015.

The central question is now why the EU and the European Commission have engaged in the development of a new long-term greenhouse gas reduction strategy. The first reason is to ensure compliance with the Paris Agreement. The Paris Agreement has temperature targets, the well-known target of less than 2 degrees and efforts to pursue a limit of 1.5 degrees. These temperature limits are complemented by targets in terms of global emission reductions in Article 4 of the Agreement, which requires parties to work collectively towards two targets; 1- a global peak in emissions as soon as possible, 2- achieve a balance between emissions and removals (climate neutrality) in the second half of the century, without setting a date for such target. The Paris Agreement also states that all parties should contribute their fair share towards these collective agreements, and to ensure this, it invites (but does not oblige) the parties to formulate and communicate long-term low greenhouse gas emission development strategies by early 2020.

To demonstrate the EU's status as a good climate player, its first step in this exercise was to develop a long-term strategy. The need to do this has perhaps been confirmed by the latest IPCC findings and the report published in October, which clarified that net zero emission climate neutrality should be reached by 2050 if we wish to avoid hitting the 1.5-degree increase mark. Therefore, it is a matter of the EU honouring international commitments, but it is also seen as an opportunity to take stock of the progress made so far in terms of climate policy in the EU and to gain an understanding of the potential missing links for the coming decades.

The low carbon transition in Europe has been underway for some time, and there is a growing consensus that we are reaching a point where more fundamental questions are emerging. These include social justice and the need to ensure that consumers and citizens do not ultimately reject the transition on social grounds. It is about how to push R&D for technologies like CCUS or hydrogen, which will soon be needed if we wish to reach climate neutrality at a global level, but do not yet have a business case. There are also questions as to the limitations of full electrification of other sectors, as well as the issue of raw materials and the new kinds of input dependency that may arise with the growing use of new technologies and renewable technologies in particular, or batteries. Some reflection is needed on carbon pricing tools and the most relevant instruments domestically and internationally. In addition, the EU will have questions about its domestic climate policy going forward, in a world where trading partners may not have the same ambitions.

The European Commission will not have definite answers to all of these complex questions in the very near future, but the new document should provide some clarity and a clear direction for governments, civil society and economic agents in Europe.

In the EU debate so far, there has been a strong focus on electricity and the expansion of renewables in the electricity sector. However, it is becoming clear that it has not led to comparable progress in terms of emissions intensity in the power sector. The only country that is doing well on both renewables and emissions intensity is the UK, mainly because it has managed to reduce coal-based electricity production at the same time, which is not the case elsewhere. With this 2050 discussion, it is becoming clear that the most pressing issue in terms of EU climate policy is in fact the slow decline of coal in the regions, 20% at EU level, 40% in Germany and 60% in Poland. It seems that while there is no political decision on how to phase-out coal in Germany, it will not be possible to discuss the next steps in climate strategy at EU level. All important decisions on the future regulatory framework for the coming decades will only be delayed.

Another striking element of the EU 2050 discussion is the progressive shift from a focus on electricity to a focus on the transport sector. The transport sector is the one where emissions are steadily increasing, both in the EU and almost all member states. One of the key roles of the 2050 strategy is to clarify the limitations of full electrification of the transport sector and some of the environmental alerts that are being raised, such as the environmental footprint of electric vehicles depending on the context, the actual electricity mix behind the strategy, the recycling rates for the materials that would be part of this electric vehicle revolution, questions of access to raw materials becoming problematic in terms of resource availability and societal, ethical concerns, the availability of fast charging infrastructures and how to manage peak electricity demand within the EU system.

Last but not least, there is the industrial aspect of the EV revolution and whether it will involve a new PV scenario where the EU creates demand and gives financial support to rising EU demand for EV vehicles that can only be met by external suppliers and imported technologies. This is particularly true for batteries and battery cells, where there are no credible EU players at the moment and only Asian, mainly Chinese players, are sufficiently competitive.

The 2050 EU Strategy starts with modelling, figures and analysis, but soon becomes highly political. The Environment Ministers of 10 member states sent a letter to the head of the European Commission, Jean-Claude Juncker, asking for a credible, detailed and feasible scenario (in technical terms) for net zero by 2050, as they were concerned that the European Commission would not provide enough details on the climate neutrality scenario. These 10 member states represent 51% of the EU population, but that also means that 17 or 18 members are missing, including Germany, and Poland (the host of COP24), representing a respective 21% and 9% of total EU emissions, as well as the UK. As a strong climate advocate, the UK's voice is becoming absent in the context of Brexit.

The question of whether the EU will revise its 2030 pledge before the UN Climate Convention is yet to be answered, and the answer will in fact depend on how the discussion unfolds in 2019, the forthcoming EU Parliament elections and the political balance in each country, particularly Germany.