Paris Energy Club Autumn (Virtual) Meeting
Friday 19 November 2021

Summary of Discussion

About the Meeting

The meeting discussed policies and technologies that are shaping sustainable mobility (session 1) and energy markets short term development and associated long-term signals (session 2).

In his opening remarks, the Club President, Pierre-Franck Chevet, expressed wishes of success to Leila Benali, Paris Energy Club member, for her recent appointment as Minister of Energy Transition and Sustainable Development of Morocco.

Session 1: Shaping sustainable mobility: what sets of policies and technologies?

Around one-quarter of global carbon emissions come from the transportation of people and goods, making sustainable mobility as one of the greatest environmental challenges the world faces today.

Decarbonization of energy vectors & fuels, management of travel demand, vehicles energy efficiency improvement, minimization of emissions beyond vehicle use and energy/fuel production are key pillars for decarbonization of the transport sector and its sustainability.

Electrification has a greater role to play in road and rail transport decarbonization, in particular through battery electric vehicles, starting with lighter vehicles before moving towards freight and heavier vehicles. In addition, road modes are probably a better fit for direct electrification. Electric road systems could be an interesting option to complement what is happening in short-distance urban deliveries, enabling trucks to travel longer distances in all-electric modes. Some companies (e.g. Scania and Siemens) are strongly behind such move, but it is not yet high on the agenda in Europe or elsewhere.

Fuel cell vehicles are facing greater challenges due to thermodynamic efficiency which still favours batteries and electric motors.

Managing transport demand for passengers and freight can be helped by the adoption of pricing/charges and regulations that are sensitive to location, time and occupancy/capacity utilization. The use of high capacity vehicles and adoption of digital technologies for route optimization and trip chaining could also help better managing transport demand and lower associated carbon emissions.

Vehicles energy efficiency could be significantly improved through well designed measures such as speed regulation (including slow steaming). Differentiated taxation & regulations (vehicle purchase

taxes, road use charges, port and airport fees, access restrictions & waivers, sales share mandates) based on environmental performance, if adopted, will certainly improve vehicles energy efficiency.

The full success of energy efficiency enhancement in transport sector require support and financing for R&D and demonstration projects, especially for emerging technologies that are still far from markets.

It was also noted that EVs can become an asset rather than a liability to the electricity sector. To this end, smart grids and electricity market reforms can serve to improve demand response using availability of EV batteries.

Participants also agreed that urban sprawl has an impact on transport structure and fuel consumption, and should be avoided, especially when looking at growing developing countries. There is however a different envelope of energy demand when considering European or Eurasian type of urban development, as opposed to a North American one. The overall level of energy needed to move people in European and Japanese cities at a similar income level is significantly lower than in North American cities. The big difference lies in the level of public transport in very dense cities.

Deploying sustainable mobility is not only about electrifying transport but includes also decarbonising liquid and gaseous fuels and developing hydrogen.

Low-carbon pathways to produce biofuels and synfuels are likely better suited to sectors like shipping and aviation. Concerning solutions for shipping, participants concurred that use of LNG is not a real decarbonising option when considering well-to-wheel emissions and shall be rather considered as a diversification option.

Ammonia is probably an interesting option for shipping, as well as for power generation in countries that cannot import low carbon electricity directly. However, there are challenges due to thermodynamic or handling losses in the case of hydrogen going into synfuels, as well as the scale of the roll out.

Methanol can also be used, provided the source of carbon is neutral, coming from biomass or air capture, but methanol option cost is higher compared to ammonia's option cost. From a technology deployment point of view, methanol provides a good short-term transitional fuel with significant gains, while ammonia, more complicated to deploy, will be the long-term target.

While electric powered engines were largely envisaged for planes 10 years ago, such solution for air transport is now over, and the mood is currently for hydrogen planes. One participant expressed doubt about the deployment of hydrogen as fuel for place as it would impact the structure of the plane, due to the low energy density of hydrogen. Biofuels may be another option but such option exhibits a high cost, something that air travel industry can't accommodate (fuel cost represents already about one-third of airlines ticket price). In addition to this, resources scarcity of biomass is another concern.

The e-fuels option may be considered as well, but both the low level of the maturity of this technology and the very high cost have to be considered as well.

The ongoing energy transition in transport and other sectors will certainly lead to a vast technology transition which provides new opportunities for industrial development in different parts of the world. However, such technological transition comes with important transitional risks that need to be properly managed.

State budgets have been historically fed by fuel taxes particularly but not only in Europe. As the transport energy mix is changing at the expense of fossil fuels, governments are looking at new taxation base in order to preserve budgetary resources while orienting consumer choices towards more sustainable transport modes. However, the move away from fuel taxes to electricity taxes is still not highly debated as the most pressing issue, especially in Europe, is to boost the industrial transition.

In the transition towards net zero, there will be a need to minimize emissions beyond vehicle energy use and production. Decarbonization of battery manufacturing as well as infrastructure can be achieved through material efficiency, material substitution, production optimisation and products for different economic contexts and minimisation of emissions from the materials needed for roads and car manufacturing, … all actions that are part of the industrial sector decarbonisation.

One participant highlighted the need to look beyond transport alone, underlying significant synergies between transport and other sectors. One example is the possibility of addressing the growing variability of renewable electricity production by using EVs batteries for electricity storage. Such development can bring significant opportunities but comes also with important risks that need to be properly managed. One type of risk is electricity demand pressure resulting from EVs charge in the evening or in peak hours. Such pressure is obviously creating a risk of security of supply but can be managed partly with further investment in networks and partly through the way the market is set up and its signals (prices) to consumers/users.

While there is an urgency to decarbonise transport sector, many of the actions to be taken towards mobility decarbonization will take time. In addition, even if all new cars are carbon free, there are a lot of carbon lock-ins because existing cars will continue to run for years and perhaps decades.

Therefore, all technologies should be mobilized to meet the huge challenge of transport decarbonization according to one participant who expressed concerns about decisions taken by some governments, particularly in Europe, to close doors to some technologies.

Another participant highlighted the need to develop urgently technologies that are better positioned to reduce carbon emissions, with enough knowledge about associated costs, about potential risks and market potential.

When addressing transport decarbonization, it is important to adopt solutions that have multiple advantages from safety, affordability, and emission reduction point of view, while generating a positive impact on economic and industrial development.

It is also important to keep in mind that limiting carbon emissions is not only about technological breakthrough but also about users/consumers behaviour. One participant noted that users' adoption of cleaner transport modes should not be taken for granted. There is indeed a difficulty for customers to move to EVs due to higher cost of accessing the technology, even if the savings per year for electric cars against internal combustion engine cars can be significant (between USD 500

and USD 900 per year per car according to one study analysing the US EV market and quoted by one of the participants).

Another participant puts forward the question of policy choice between waiting for people to change their behaviour on one side, and imposing constraints and authoritarian measures, which are probably the most efficient way to get rapid results on the other side (like measures that have been taken against diesel cars).

Companies' decarbonization strategies are scrutinized by investors with high expectations and visible impact on such companies' market capitalisation. Pressure is also coming on the policy side with evolving regulations. Such developments underline the need for players to strategically position themselves in anticipation of the ongoing decarbonization move in order to reap the associated benefits.

One participant indicated that COVD-19 pandemic results in a significant change in travel behaviour, particularly for business related travel that was replaced by virtual meetings. Unexpected developments such as Covid-19 pandemic can lead to a drastic change of transport needs at global scale. The long-term impact of Covid-19 pandemic on travel habits and more generally on mobility services need to be further studied.

Session 2: Energy markets: short-term development and long-term signals

While the sharp drop of global energy consumption due to Covid-19 crisis drove prices of many fuels to their lowest level in decades, energy prices have rebounded strongly after last summer.

From 20$ a barrel in mid-2020, crude oil prices settled above 70$/bl mid-November 2021. Oil demand is recovering steadily by 5.5 million barrels per day (Mb/d) this year and it will increase by another 3.4 in 2022, reaching pre-pandemic levels. Stock withdrawal will continue to the end of this year. US shale patch is responding to prices, although much slower than in the past cycle. The October oil supply jumped by 1.4 million barrels per day, partly because supply recovered from damage from the hurricanes and also because OPEC is on the path of increasing production, mostly by 0.4 Mb/d. If such trend continues, a rebuild of stocks is expected in the first quarter of 2022. The possible resurgence of a Covid-19 wave in European countries is a concern for oil demand going forward.

One participant expressed doubt about the dominant belief that oil demand price elasticity is low, in particular in regions such as Europe. He reminded the audience about oil demand reaction in the past cycle of price declines after 2015. Over the period 2016-2018, gasoline and diesel consumption in Europe rose significantly, underlying the fact that long periods of price fluctuation do have an impact on oil demand profile. In fact, the elasticity depends on the alternatives available for the consumer.

Spot natural gas prices reached their highest ever levels in Europe during the second half of 2021, more than 10-times the record lows reached in June 2020. Natural gas hit more than USD 50 per million BTU (MMBTU) in early October 2021 and on the same day, Japan/Korea Marker also went beyond USD 50 per MMBTU. Natural gas prices current level is far higher than the level reached after the big earthquake and nuclear power accident in Japan in 2011 when the price was almost USD 20 per MMBTU. Natural gas demand is recovering firmly this year due to economic recovery and weather factors (cold, long winters in the Northern Hemisphere and the hot summer and drought in some regions). On the supply side, there have also been some outages in natural gas production and

liquefaction plants. Some of those outages were carried over from last year due to Covid-19, but there was also some lower production in wind electricity generation in Europe.

Coal prices are also increasing because of fuel switching from gas to coal in the US, Europe and other regions. Coal consumption is growing strongly this year even in the US, with probably around 20% year on year growth, with similar growth path (double digits) in Europe.

High natural gas and coal prices have fed through to higher power prices in many markets.

The upward pressure on all commodity prices extends beyond energy to key critical minerals, such as lithium and copper. Those prices are already above the highest levels in the past decade.

On the demand side, energy prices are a powerful tool for governments in their attempt to drive consumers behaviour towards sustainable paths of energy consumption. While higher energy prices support energy conservation and efficiency, they raised concerns about energy security and affordability, putting households at risk of being disconnected from power and gas grids.

One participant indicated that there is an ongoing belief that high fossil fuels prices are a consequence of the ongoing green energy transition Expressing disagreement with such belief, one participant argued that a well-managed clean energy transition and call on renewables is the solution to energy prices volatility rather than the problem.

There is a risk that future trends in fossil fuel demand get out of step with supply. For many years, the IEA World Energy Outlook warned of a potential mismatch between the investments in oil and gas supply and the investments in green energy technologies, which is now becoming acute. In the case of oil and gas, upstream investment is now half its level in 2014, although oil and gas demand has not changed to a similar extent of course. This fall in investment was primarily due to the two major price drops in 2014-2015, as well as in 2020.

One participant indicated that industry has become much leaner and more efficient with oil and gas upstream spending in 2020 broadly aligned with near-term amounts that are projected in the IEA's net zero pathway. However, declines in oil and gas demand, as anticipated in the net zero pathway, has not materialized yet.

According to IEA, no new upstream investment beyond those approved by the end of 2021 would be necessary if demand declines along the net zero energy path. Should demand decline be lower and if simultaneously investors hesitate to raise supply, a new round of price volatility and supply security concerns may emerge. It is therefore urgent and important for governments to implement strong policy actions to reduce dependency on fossil fuels by strong policy intervention and to promote investment in clean technology. Clean energy needs to more than triple going forward in order to be aligned with IEA's net zero scenario.

One participant noticed that the call on the urgent need to reduce energy demand is made at a time when many governments pragmatically ask for more oil, want to re-open coal mines, or ask for more nuclear electricity. According to the same participant, a very strong message should be sent out on efficiency. In the IEA Net Zero Energy Roadmap, efficiency needs to improve by 4% per year when there was an improvement of much below 2% in the last few years. Some positive changes in consumer behaviour were observed during the lockdown but were cancelled quite rapidly and consumption is getting higher, except for business air travel.

Efficiency improvements will be difficult to achieve without transforming energy systems. Very rapid increases in wind and solar capacity was made possible by drastically reduced technology costs. New technologies should be deployed to reduce transaction costs so that consumers feel a lower level of pain with the transition. The new trend of using digital driven IT technologies can contribute to efficiency improvement.

The good news is that even though the efficiency investment is still not as high as needed, additional increases in spending on building efficiency improvements are registered in regions such as Europe, thanks to government supports. Driving efficiency improvements in the entire energy system need to put energy price as the dominant factor to lead investments in this area according to one participant.

Role of technology breakthroughs in achieving net zero in 2050 was also discussed. According to IEA, around half of the emission reduction required to achieve net zero target needs to come from technologies that are not yet commercialised. Participants concurred that even if technology breakthrough materialize in the future, it will be difficult to achieve net zero in 2050 without fundamentally changing consumption patterns in the advanced economies. Consumption habits are hard to change, but young generation in such economies seems to be moving on a path with other concerns and other approaches to consumption that are different from present and past generations.

An important question remains according to one participant: how to support technologies that will be used during early stages of the energy transition? The example of CCS is quite illustrative; lack of support to this technology makes this technology uneconomic and not profitable, while achieving net zero target by 2050 will be much more expensive and extremely difficult without CCUS and nuclear, i.e. wind or solar alone, or electrification will not solve the problem.

Another example is the cost associated with the deployment of hydrogen in Europe. An economic modelling showed that using only green hydrogen would increase the overall cost by EUR 1.5 trillion in 2050, compared to the use of a variety of options, including blue hydrogen. In Middle East, blue ammonia based on blue hydrogen could be the least costly option in the short term, waiting for the competitiveness of green hydrogen to improve in the longer-term.

The views expressed by participants of the meeting do not necessarily represent the opinions of the organizers.