CONFRONTATIONS EUROPE

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Seminar

The electricity production and the EU ETS

This briefing summarizes the contributions of the four panellists:

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This text is a short summary of their introductory presentations, their answers to participants' questions, and participants' contributions.

INTRODUCTION

According to the winter package "Clean energy for all Europeans", nearly 50% of all electricity consumed by 2030 should come from renewable sources. The package asserts the primacy of the electricity wholesale market to guide investment in generation, from conventional and renewable sources. The idea is that if the market reflects rigorously the cost, it will deliver a signal which will enable renewable energy to continue its development without subsidy by 2030. The proposals contain several provisions aiming at strengthening the role of the market, which shall be "energy only market" based, such as dividing up price zones according to transmission capacity, scarcity-pricing, intra-day market etc.

What kind of electricity generations can sustain Europe 2030 goals, with remuneration based on spot market and long term low carbon price? What will be the 50% non-renewable sources composed of?

THE APPROACH OF THE EUROPEAN COMMISSION

In the Clean Energy package, the focus is very much on the electricity market design, including cogeneration aspects. The previous packages set up the environment in which networks and generators have to act and create an actual competitive market. On the contrary, the current proposal is not so much centred on the institutional set-up but much more on making sure that the future developments of generation are properly accounted for in the new market design. Two developments have made this necessary: the objective of 50% of renewable sources by 2030, and the concerns of Member States regarding security of supply and investment incentives.

The package addresses these developments: regarding renewables, the details of the market design have to be adapted to the needs of the new producers and the overall system costs have to be reduced in order to benefit to the consumers. Regarding capacity adequacy, the proposals integrate all the elements in a market type context.

Four different categories of measures can be distinguished:

1. ***Ensuring level-playing field:*** this is necessary to ensure long-term investments. This relates to the phasing out of priority dispatch for renewables but also for indigenous conventional fuels available in certain countries. It is also connected to eliminating exceptions related to imbalance responsibility, which means that the regulatory framework faced by all assets is as equal as it can possibly be.

2. ***Improving the short term market****:* this provides the opportunity to a give a further push to better integration of intraday trading cross-market. This will allow markets to borrow liquidity from each other, and therefore improve the ability to short term trading.

3. ***Balancing markets:*** by including the balancing requirements in the price signals, we can also make the overall market more effective. Here again, some progress has been done, but the Commission also wants to give a push to the procurement and site-location of reserves needed by TSOs on a more regional basis.

4. ***Integrating consumers and decentralising the market:*** a number of measures relate to the incentives and the ability of consumers to act in the market. The idea is to enable consumers to reduce their consumption and act according to market signals, with billing and metering, smart meters etc. The incentives are linked to scarcity pricing: even if you have a smart meter, if there is no price motivation, there is also no incentive in participating in the market, neither for consumers nor for other actors.

About the 50% in conventional capacities, some statements can be made which refer to the Impact Assessment of the Commission:

1. First of all, the exposure of renewables to balancing responsibility will reduce, to a certain extent, the need for balancing reserves, which are traditionally provided by cogeneration. Secondly, taking away some advantages granted to renewables out of the market will level the playing field in favour of the otherwise available capacity. Finally, in case of congestion, the rule will be to give priority to the assets which are the least costly for the system. The basic principle here is market-based curtailment. Hence, according to the Commission's previsions, the implementation of these measures will make negative prices disappear.

2. Concerning short-term markets, there are two new components: balancing markets and cross-border markets. According to the law of large numbers, if you increase the size of balancing markets, the amount of reserves that you need will decrease. In addition, part of these measures allow renewables to integrate the market, including the balancing markets. Of course that means more competition and this has an impact on the conventional generation. On the other side, the Commission expects that more efficient integration across borders can optimise baseload on a much larger area. Moreover, these assets will become less needed to provide reserves, because there are renewables in the market; therefore, the share of their operation in real base load will increase.

3. Renewable can also participate in demand response. This will lead to an increasing competition for additional sources of flexibility in the market.

Overall, the objective of the Clean Energy Package is also to improve the stability of the electricity market. First of all, measures need to be taken to improve the quality of the price signal in the electricity market, which will make assets more competitive. By doing so, we will ensure that the assets which are most valuable will remain and only those which are not will exit. Indeed, today we need some capacity exit to establish a new equilibrium in the market. As a consequence, the Commission expects that Combined Cycle Gas Turbines (CCGT) will be profitable as of 2025, thanks to the increase of scarcity price. Coal and lignite will go in a different direction, as these kind of assets will become less profitable because of the projected rise in carbon prices. In fact, half of the exit that the Commission predicts are old coal and lignite fired power plants.

THE APPROACH OF POWER PRODUCERS

(Slides from the presentation are available on the website of Confrontations Europe)

There is a common belief that we cannot invest in carbon free generation because it is extremely capital intensive, while marginal prices remain low. The market design should be transformed in order to cope with this problem. For the time being, energy markets are fully jeopardized. Example: on the German wholesale market the current range of prices is more or less half the level of the full cost of any known non-conventional technology. There is not sign of evolution, meaning that even in Member States where generation is actually needed, this is not going to be triggered by market signals.

We are clearly not prepared to a situation where prices might be set most of the time by renewables: spot prices would be close to zero. An EDF internal study simulates what would happen in a scenario with 60% of electricity generation coming from renewable sources, out of which 40% variable. As of 2035, base load generation is going to be reduced, meaning that prices are often set either by peak units or by demand side response. However, if you go to your bank, tell them that you have a project of a peak unit which can sell electricity at scarcity prices up to 20 000 €/MWh, you will be asked “How often?”, and you will answer maybe 5 to 10 times in the next 10 years: the bank will have better projects to fund.

Given this context, markets have to integrate the fact that with more capital intensive generation, we need more long term signals in order to create more security of investments. A better energy markets signal is needed, something that even a very good Clean Energy Package cannot achieve next year or within the next five years. During this transition period before energy markets are fully restored, there is no possibility to invest without long term arrangements. In order to create security for markets, smart capacity markets that do not distort energy markets are needed. Of course capacity mechanisms should not distort the competition on the free markets, but if there is enough capacity and if the capacity market is well designed, then the price of capacity is close to zero and it does not bring additional remuneration to power producers. Why abolish in 2017 and restore in 2019 a system just because the level price is zero for 2 years? We should simply keep it, sometimes it will be zero, sometimes it will be positive.

Carbon markets are also clearly jeopardized. The last 10-year evolution of the carbon price of the ETS shows that it does not incentivise anything, neither operations nor investments in less emitting plants. Meaningful and predictable carbon price is crucial, which requires an ambitious reform of the ETS. At the end of the day, the market framework has to remain to ensure a cost effective decarbonisation policy of the European economy. The current low energy prices and low carbon prices lead to no market signals, and low emitting technologies are paradoxically at a competitive disadvantage. This creates an addiction to subsidies, which destroys the cost effectiveness of the climate and energy policies. The carbon price should at least reach an appropriate level to incentivise fuel switch or to be in line with what people regard as the social costs of CO_2. The ETS is clearly facing a crisis; with carbon prices close to zero from 2010 to 2020, the ETS is going to die. Therefore, some short term tools are required to address this issue. The idea of a more cost efficient policy is to accept to pay significantly more for CO_2 in order to dramatically reduce what we have to pay in policy costs.

Currently many ideas are on the table in order to fix the ETS: a higher reduction factor, a voluntary cancellation of allowances, an increase of the outtake rate of the stability reserve, a possible price corridor, or an adjustment of the carbon market to avoid overlapping or interfering with energy policies. On the latter, some argue that the European Commission itself should make the assessment and potentially launch corrective measures.

As a conclusion, there is right now on the agenda a possibility of introducing something in the governance regulation, the sooner the better, because the next opportunity will not be before 2020.

THE APPROACH OF THE CIVIL SOCIETY

There is a dichotomy between the energy and the climate communities: on the one hand, some say that Europe should fully rely on the ETS to give the right signals, and that renewable energies or energy policies are not necessary. On the other hand, others argue that the ETS is not really achieving any emission cuts, and that Europe therefore needs energy efficiency and climate policies, instead of the ETS.

Both of these different elements are needed to fight climate change. The reason to put a price on carbon is to make sure that externalities are priced in products, with the underlying idea of making the polluters pay. This system does not work, because of a large share of free allocations and indirect cost compensations have been granted to the industry.

There are three reasons why we need to enhance renewables and energy efficiency on top of a carbon price:

1- **The carbon pricing alone cannot do the job**. Carbon price is not the right measure to achieve energy efficiency because of the many existing market barriers, such as split incentives among tenants and landlords, or the lack of information, etc. At the same time, renewables deployment support or research development are also needed in order to bring forward new options and lower the costs of transition in the long term. So if we have a longer term perspective, it also makes sense to have innovation support beyond a solely common pricing instrument.

2- **If you have multiple policy objectives, it is justified to have multiple policy instruments**. In the case of the Energy Union there are several objectives at play such as energy poverty, security or jobs creation. This is important to make sure that not only we meet our climate change target but that we get support from citizens to achieve all the objectives.

3- **Ideally, a carbon price reflects the cost to society**. At the moment however it is not the case: the carbon price is at 5 €/ton, and it is not expected to rise significantly over the next decade. Therefore, there is a justification for additional policies to ensure that we do not lock ourselves in high emissions infrastructures.

As a conclusion, this European package of different policies should include carbon pricing, energy efficiency measures, renewables deployment policies and coal phase out. However, at the moment there is an unvirtuous situation in which a higher energy efficiency or a high renewables target lowers the prices in the EU ETS, because the cap has not been adjusted to reflect these other policies.

At the national level, the argument of the "waterbed effect" (communicating vessels) is still very present. According to this argument, if you close one power plant in one country, this will lead to increasing emissions somewhere else in the future. A study from EcoFys came to the conclusion that while there is a waterbed effect, it is not very significant, and that measures exist to reduce this impact. These solutions are currently being discussed at the Council and at the Parliament. One of them is a proposal from the Council to ultimately cancel surplus allowances in the Market Stability Reserve.

On the interactions between energy efficiency and the ETS, the Commission’s Impact Assessment for the draft Directive on Energy Efficiency shows that if we do not factor energy efficiency into the ETS, it will actually lower the carbon price. This effect can be quite significant; the assessment says that it could lower the price by 40 up to 70%. In other words, any specific measures to tackle into energy efficiency potential should be accompanied by changes on the ETS market leading to higher carbon prices. A low carbon price means that to achieve the same reductions, we need costlier measures.

The best way to improve the different synergies between the Clean Energy Package and the EU ETS has already been mentioned: setting a cap that reflects the EU energy policy developments to make sure there is alignment between the two. The market only works if there is scarcity, but at the moment supply is much higher than demand, and will remain like that in the future.

There are other options:

- Increasing the rate to which surplus is moved to the Stability Reserve: we need at least an integration rate of 30%.

- Cancelling surplus, EU-wide and at international levels, to avoid that surplus from plant retirements are used to emit in the future.
- Introducing a carbon floor price that better reflects the social costs of climate change, at national, local and EU level.

DISCUSSION:

Energy intensive consumers:

ETS is still the best policy tool to reach an agreed emissions reduction target at the lowest cost. The proposals made in the previous interventions would move the ETS towards a tax and change the ETS into a system which promises high prices whatever efforts industry or households make to reduce emissions. Increasing the carbon price would be welcomed by power producers, no matter where these emission reductions come from but all consumers will have to pay, including those who made efforts to reduce emissions. We should encourage reduction of emissions at the lowest cost and also reward achievements; we should not encourage emission reduction coming from relocation of production outside Europe. How can we safeguard that industry remains in Europe; that industry can produce and invest in Europe in high efficiency installations? This issue is especially sensitive in a time when we still don't have similar carbon cost outside Europe.

Power producers:

According to the assessments made by power producers, a higher carbon price does not mean a higher final electricity price. Closing down the German lignite fired sector by control and command measures would be much costlier than having it self-retired by an ETS cost of around 30 or 40 €/t CO_2. With such a price, most of the renewable generation in Europe is in the market, meaning much lower policy costs.

The problem with the low price of ETS allowances in the electricity sector is that an emitting plant hardly pays nothing and a company which is well below average regarding specific emissions is under pressure: good behaviour is not rewarded! The power sector therefore supports a full compensation for large industrial companies which are technologically efficient and are exposed to extra European competition. And we support this to a further extent, as it is currently written in the draft legislation: we believe that the compensation should not depend on the Member State. Nowadays, if you are operating in a rich country you are likely to be compensated, if you are operating in a poor one you are likely not to be compensated. If there is some undue competitive disadvantage due to the fact that other parts of the world do not implement an ETS, the industry should be fully compensated everywhere in the EU.

Civil society:

We should certainly meet our climate objectives at the lowest cost. But the key question is at the lowest cost for whom? Small consumers see that we have a EU ETS system where there seems to be a lot of handouts to industry; we compensate industry for higher electricity bills but we do not do the same for households. Moreover, the present compensation rules have led the EU into a system where production is subsidised ten times more than innovation.

Besides, whatever the carbon price is, it cannot decarbonise the whole economy: we need the energy efficiency and the renewable energy directives and other policies.

A CASE FOR INNOVATION: NUCLEAR COGENERATION

(Slides from the presentation are available on the website of Confrontations-Europe)

The energy transition can give some incentives to think about nuclear cogeneration. Where nuclear energy exists, why use it to produce only electricity if we can do something more with it? Today, heat is the main part of the global energy consumption, and all around the world, in rich and poor countries, this energy consumption is provided mainly by fossil fuels. So if we want to reduce the carbon emissions of the worldwide energy system, we must do something in the heating sector as well, and not only in the power sector. However, heat always has a local dimension. Electricity is easy to transport on long distance; with heat this was not the case. Nowadays new technologies might help to wider the areas where to deliver heat.

The definition of cogeneration is simple: a single process will create two co-products, electricity and heat. In nuclear reactors today we are trying to maximise the electric output; at the very end we still have heat in the form of water around 40°C, but no one needs such low temperature water. If we want to do something of this wasted final heat output, we have to increase its temperature; then it will decrease the electricity output. There is a competition between these two co-products, but at the very end, the overall efficiency of the reactor can be improved. By decreasing the electric output by a few percent, we can gain dozens of percent from the resources that are used, like uranium.

Three main applications are either already used today around the world or in progress:

1. **Desalination of water**. This is of particular interest for Middle-East countries that are thinking of nuclear energy instead of oil plants. In Europe it's not the main goal of nuclear cogeneration.
2. **District heating**. It is largely developed in Russia and also in Eastern Europe and Switzerland.
3. **Industrial heat**. There are some very large applications, e.g. in Canada, to the benefit of the paper industry.

Several issues are specific to nuclear cogeneration compared to biomass for instance:

1. Extracting heat from the reactor is almost free; everything is designed in such a way that it is easy to install new pipes around it. For safety reasons, nuclear power plants are located far from large cities. Therefore, if we want to transport heat from nuclear plants to consumption sites, we'll have to build a heat network suitable for large amounts of energy, let's say buried pipes of 1m diameter, and the corresponding costs will be high, hundreds of millions of euros.
2. About thermal losses, this was a problem during a long time; now technologies have made such improvements that transporting large amounts of heat over distances of hundreds kilometres is achievable at an affordable cost.
3. The final point that is very important today and wasn't 30 years ago is that existing reactors will likely be shut down in 10 or 20 years. Therefore, there is a narrow window to retrofit them to produce heat if we want to make profit and spare carbon before they are shut down. Countries about to build new reactors have to design them appropriately.

As regards district heating, some countries like Germany and Poland have a long history of heat networks. There are some areas in Europe were these could be developed more. There is one for instance in Paris as well as in other French towns, and some nuclear reactors exist not very far from them. A study shows that in several large French cities, there is a potential benefit to link existing reactors to the existing district heating system. The corresponding construction cost allows to produce heat that can be sold to consumers at a lower price than today. In some other cities, it may be too expensive today, but this may evolve. The study is currently being extended to other cities in Europe, in countries promoting nuclear energy such as Finland.

For industrial heat, we have different technologies corresponding to different temperature of operation. Today with the existing fleet of nuclear power plants, we can go up to 250°C maximum. With this temperature we can meet the requirements of paper production, some chemistry and food production. In the future, if we think of some new reactor technology (like Poland is working on: high temperature gas reactors, and France: sodium reactors), the available temperature can be pushed up to meet new requirements. However, more than 100

TWh is consumed by the industry for applications below 250°C. If we look around existing nuclear sites where part of this industry consumes the heat, we can already meet up to 20 TWh. This would lead to a reduction of dozens of mega tons of CO_2 within the existing system. Now if we go further thanks to appropriate incentives, more industries could benefit from the heat available in existing reactors in a win-win agreement.

Some challenges:

- Can future small and medium reactors be placed in locations not far from consumption sites?
- If we want to change the system from pure electricity generation to partly heating system, what about the flexibility of operation?
- Can we improve profitability with a storage plugged to the plant?
- Nuclear is not considered as a low carbon industry: will incentives be granted to use the heat?

Finally, around 80 nuclear sites currently have or have previously used cogeneration on different markets for economic benefit. Because nuclear heat is a low carbon source, there could be some interest to develop it wider.

COMMENTS ON THE PRESENTATION

Part of the proposals regarding the electricity market design aims at a better remuneration of flexibility. The challenge of flexibility mentioned in the final remarks translates into the possibility to get more revenue streams for investors.