Meeting between Mr Richard Roudeix, Senior Vice President of LyondellBasell and Director General, Dominique Ristori, 30 April 2019, 15:00-16:00

Scene Setter/Context Of The Meeting

LyondellBasell is one of the major global players in the chemistry sector, especially in plastics, polypropylene and polyethylene, with many sites in several MS and a refinery in the US.

Mr Richard Roudeix is senior vice president of Olefins and Polyolefins, Europe, Asia and International. Mr Roudeix is also an executive board member of CEFIC in charge of the climate change and energy program.

Points for discussion

- We are happy to see the commitment of the Chemical industry towards the common target of decarbonising the European economy.
- We believe decarbonisation is an opportunity to modernise the European industry creating new business models and new markets for new products.
- In preparing our long-term vision, we took careful note of the work done by industry and by CEFIC in particular. Our analysis reaches similar conclusions.
- In particular, it is possible to decarbonise industry using technologies that are proven to work today: increased energy efficiency; electrification; fuel switch to biomass and hydrogen; innovative low carbon processes and Carbon Capture and Sequestration or Use.
- Digitalisation and automation are seen in the short term as some of the more promising options to increase competitiveness, leading both to efficiency gains and to greenhouse gas reductions.
- A combination of electrification, the increased use of hydrogen, biomass and renewable synthetic gas can reduce energy related emissions in the production of industrial goods.
- Oil and petroleum will mainly be used as feedstock for non-energy uses by 2050, in contrast to the current situation, where liquid fossil fuel consumption is predominantly related to energy use. This will have an impact on refining and petrochemical industries.

- Sustainable biomass has an important role to play in a net-zero greenhouse gas emissions economy. It can be transformed into biofuels and biogas and when cleaned can be transported through the gas grid substituting natural gas.

- Deployment of renewable electricity also provides a major opportunity for the decarbonisation also through the production of e-fuels through electrolysis (e.g. e-hydrogen).

- The potential advantage of power-to-X is that synthetic fuels can be stored and used in industrial processes that are otherwise hard to decarbonise.

- Producing hydrogen from electrolysis will require large amounts of emissions-free electricity. In our analysis, we reach similar results as in the study carried out by CEFIC, but hydrogen is not the only technology available.

- The deployment of carbon capture and storage (CCS) will be necessary – especially in the transitional phase – to decarbonise certain processes and CCS could also be used with biomass fuel to create negative emissions.

- It could also be possible to sequester CO_2 in petrochemical materials.

- The Commission estimates that additional investments in the range of € 175-290 billion a year will be needed between 2030 and 2050 in order to achieve a carbon-neutral economy in the EU. However, the distribution between sectors also depends on the pathway chosen.

- In industry, additional investments vary between €11 and €17 billion per year for complete decarbonisation by 2050.

- EU industry has a strong track record in competing internationally and reducing its energy costs in the face of exposure to volatile international fossil fuel prices.

- Our task will be to promote economic growth and safeguard the competiveness of European industry. However, the challenge of growth and competitiveness goes beyond energy policy and beyond the energy sector, as it necessitates the development of free and fair international trade environment.

- The Commission is working to expand the size and scope of the financial instruments needed to stimulate investments. Together with a stable policy and regulatory environment, this can facilitate the investment needed.

We are looking forward to cooperate with the chemical industry and with the High Level Group on energy intensive industries to prepare the Industrial Transformation Master Plan for climate-neutral industry by 2050.

Background information

Profile of LyondellBasell

LyondellBasell is one of the major global players in the chemistry sector, in particular for plastics production. LyondellBasell is the world's largest producer of polypropylene and the second largest in the world - but first in Europe - of polyethylene, particularly thanks to four crackers located on our three major European sites in Berre-l'Étang (Bouches-du-Rhône), Wesseling (near Cologne) and Münchsmünster (Bavaria), and various polymer production units in France, Germany, Italy, the Benelux, UK and Poland (the latter in a joint venture with PKN Orlén). In the United States, LyondellBasell also operate a refinery of 268,000 barrels / day in Houston, which just celebrated its centenary last year.

LyondellBasell Industries N.V. is a public multinational chemical company with American and European roots, incorporated in the Netherlands, with U.S. operations headquarters in Houston, Texas, and global operations in London, UK. The company is the largest licensor of polyethylene and polypropylene technologies. It also produces ethylene, propylene, polyolefins, and oxyfuels. LyondellBasell was formed in December 2007 by the acquisition of Lyondell Chemical Company by Basell Polyolefins. As of 2016, Lyondell was the third largest independent chemical manufacturer in the United States. Lyondell was established in 1985 out of previous industrial operation in the United States and grew through acquisition and stock swaps.

CV of Mr Richard Roudeix

Richard Roudeix is Senior Vice President of Olefins and Polyolefins, Europe, Asia and International for LyondellBasell, one of the world's largest plastics, chemicals and refining companies. The Olefins and Polyolefins segment produces and markets ethylene and its co-products, polyethylene and polypropylene.

Roudeix assumed this position in February 2017, and was previously senior vice president of Olefins and Polyolefins, Europe. Prior to this position, Roudeix served as

director of Olefins and Aromatics, Europe. He has also held positions in Europe and the U.S. for LyondellBasell predecessor companies, including serving as vice president of business units for Basell in Germany and vice president of polyethylene in the U.S.

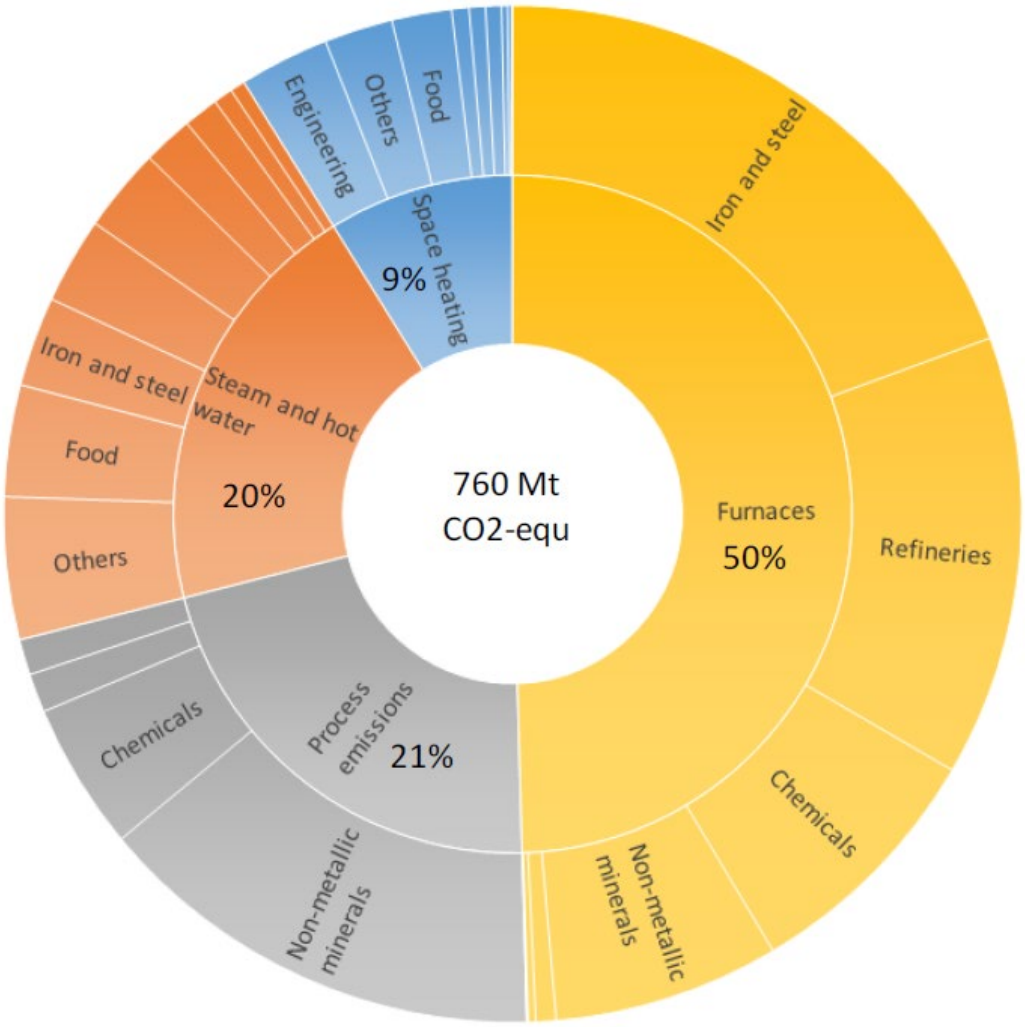
He served in a manufacturing and strategic development capacity for Royal Dutch Shell in France, as polyethylene manager in Belgium for Montell and as product line manager in Germany for Elenac.

Roudeix is an executive board member of CEFIC, Plastics Europe and the American Chamber of Commerce in the Netherlands. He graduated as a civil engineer from Ecole des Mines and completed a post-graduate program at the French Petroleum Institute (Ecole du Petrole et des Moteurs).

Emissions from manufacturing Industry

Most industrial greenhouse gas emissions stem from combustion of fossil fuels, be it for steam and hot water or high temperature applications. These emissions can be reduced through further efficiency improvements and by switching to low and zero carbon energy sources such as renewables-based electrification, sustainable biomass, synthetic fuels or hydrogen. Around a quarter of industrial emissions consists of process-related emissions (i.e., emissions from chemical reactions other than combustion), which are more difficult to reduce. Cutting these industrial emissions will require genuine process innovation or the application of carbon capture and storage technology. Innovative industries can also improve their resource efficiency and reduce greenhouse gas emissions by improving re-use and recycling through circular economy approaches and sector coupling. In the next decade significant innovation efforts are required to deploy economically competitive technologies necessary for a low-carbon and circular industrial transformation.

Figure 1: EU 28 Industrial direct emissions by end use and sub-sector in 2015.



Emissions from the Chemical sector

The European chemicals industry accounted in 2016 for around 4% of the verified emissions of al stationary installations of the European Union and 14% of industrial emissions excluding combustion.

The chemical sector is a very complex, wide and diverse sector, with even more diverse subsectors. The petrochemical sub-sector in which LyondellBasell operates, produces the building blocks for part of chemical industry.

The analysis in the long term strategy and other studies indicate that energy efficiency improvements and fuel switching can reduce emissions by 55-60% in 2050 compared to 2010. The largest share of reductions is coming from fuel switching. Deeper emissions reduction are also technically possible, but would require change of feedstock, application of CCS and CCU technologies and increased recycling rates.

Overall, studies performed for the chemicals sector indicate strong GHG reduction potential. The most recent study carried out by CEFIC[1] explored options for a carbon-

[1] Dechema (2017), Low carbon energy and feedstock for the European Chemical Industry,

neutral future for the industry, including synergies and opportunities of industrial symbiosis with other process industries. Three scenarios assessed different ambition levels, on top of a business-as-usual scenario. The theoretical maximum potential identified by the industry would achieve negative emissions in the chemical sector. The other two ambition levels considered correspond to 59% and 84% emissions reduction in 2050. The focus in these scenarios is mainly on the utilisation of alternative carbon feedstock (mainly electrolytic hydrogen, CO2 and bio
-based raw materials), together with further electrification of processes and energy efficiency.

A particular issue noted in the CEFIC study is that the considered hydrogen based technologies require high amounts of low carbon electricity, up to 4900 TWh for the most ambitious scenario and 1900 TWh for the intermediate ambition. The electricity demand is mainly driven the high electricity intensity of electrolysis to produce hydrogen.

PRIMES projects emissions reduction similar to the CEFIC study. In the case of the scenarios achieving 80% GHG reduction, CO2 emissions in chemicals are projected to decrease between 64% (in the P2X scenario) up to 70% (in the CIRC scenario) in 2050 compared to 2015. The 1.5°C GHG scenarios deliver negative emissions. These negative emissions are achieved by a combination of additional use of CCS and the potential of CO2 storage in materials. In particular, the 1.5°C scenarios include the possibility of sequestering in petrochemical materials, such as plastics.

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