CENTRE FOR ECONOMIC POLICY RESEARCH

CEPR CLIMATE CHANGE

Fifth CEPR/EAERE Webinar on Climate Policy: The Transition to Net Zero by 2050

28 October 2021 – 5.00-6.30 PM CET (Frankfurt/Paris/Amsterdam) – Online

The number of countries announcing pledges to achieve net-zero emissions over the coming decades continues to grow. But the pledges by governments to date – even if fully achieved – fall well short of what is required to bring global energy-related carbon dioxide emissions to net zero by 2050 and give the world an even chance of limiting the global temperature rise to 1.5 °C. The International Energy Agency (IEA) recently published a comprehensive study of how to transition to a net zero energy system by 2050 while ensuring stable and affordable energy supplies, providing universal energy access, and enabling robust economic growth. The study sets out a cost-effective and economically productive pathway, resulting in a clean, dynamic and resilient energy economy dominated by renewables like solar and wind instead of fossil fuels. It also examines key uncertainties, such as the roles of bioenergy, carbon capture and behavioural changes in reaching net zero.

A few days before the 6th UN Climate Change Conference of the Parties (COP26) in Glasgow, this Sixth CEPR/EAERE Webinar on Climate Policy was the occasion to discuss the content of the IEA Report on NetZeroby2050 with Laura Cozzi, IEA Chief Energy Modeller, who led the writing team. Her presentation was followed by a discussion moderated by Carlo Carraro (Ca' Foscari University of Venice, CMCC, CEPR and Climate Change RPN Member) and a Q&A session with the audience.

Panellist:

Laura Cozzi
International Energy Agency

Moderator:

Carlo Carraro
Ca' Foscari University of Venice, CMCC, CEPR
and Climate Change RPN Member

Key Points of the Webinar

- ## The projected impact of announced pledges

  - ### A gradual decoupling of growth and emissions still insufficient

The pre-COP21 Paris agreement policy landscape was projected to lead to a temperature increase of around 3.5°C s in 2100, with a pattern of energy-related emissions continuing to grow in a more or less linear fashion following GDP. The picture already looks different today. New policies, technology cost reductions and the pandemic have indeed flattened the expected global emission curve and put forward a forecast of a decoupling beginning between economic growth and emissions. Temperatures are still however expected to increase by around 2.6°C by 2100.

Considering the Glasgow pledges, 50% of participating countries have committed to updated ambitions for 2030 and around 70% for a net zero target by 2050. The inclusion of these new targets, and considering that the engagements would be implemented, has led to a projected dissociation between growth and emissions, seeing first emissions declining and then significantly bending post-2030. In this scenario, global warming is still estimated at around 2.1°C above pre-industrial levels, far from the 1.5°C target set in Paris in 2015. Despite some positive signs, pledges going into Glasgow thus close less than 20% of gap to the Net zero by 2050 scenario.

  - ### Evolution of the energy demand outlook

From the energy angle, only considering agreed policy, the next decade will very much look like the past, meaning a very strong rebound in energy use for all types of sources.

However, announced pledges already introduce a significant break with the energy markets as we have known them up to now. The Commitments taken on the way to Glasgow shall indeed lead to a peak in fossil fuels demand in the current decade followed by a flattening and then decline. On the oil side, this evolution would be mostly due to a change in today's largest part of demand, passenger cars, via a huge push in electric vehicle development. On the gas side, this transformation would result from strong change in the power sector's - and the building sector in advanced economies - ways of producing electricity, and much more reliance on solar and wind energy. Considering coal, after a decade of increase in generation capacity, construction of unabated coal power plants is projected to sharply declines under announced pledges. Cancellations could cut 20 Gt of emissions by 2050, comparable to savings from the EU reaching net zero by 2050. On the other hand, solar PV and wind capacity should know a tremendous expansion, their capacity additions reaching 470 GW in 2030.

In terms of the value of international energy-related resource trade, oil and gas, the main commodities traded today globally will become less important under announced pledges: oil is projected to decrease from 66% in 2019 to 58% in 2050 of energy related trade value and gas from 14% to 12%. The shares of critical minerals, from 11% to 18%, and hydrogen should reversely increase.

Despite strong changes in this resource trade outlook, these projections are still far from those expected in a world fully compatible with net zero in which the market changes dramatically. In this scenario, oil, and gas shares know a sharp decline, reaching respectively 11% and 5% in 2050. Oil does not however fully disappear but becomes really concentrated while oil security remains a concern even in this pathway. On the other hand, hydrogen's share would be projected to reach 35% and critical minerals 47% by 2050. In that regard, trade and security become key for these two resources with potential expected mismatches between demand and supply.

• Closing the gap to net zero emissions by 2050

○ Technologies and policies available to bridge the gap

The size of the ambition gap highlighted is still about 14 gigatonnes to be reduced by 2030.

40% of the gap completion can be filled by cost effective technologies and policies currently available. Most of them consider the electricity sector, as well as limiting emissions from the existing young coal assets and substituting them by low carbon, and now cheaper, options. To do so, an important expansion of wind and solar energy as an increase in additional nuclear or hydropower, when acceptable, could save 3GT. Those technologies would constitute the cheapest way to produce electricity, leading to similar or lower electricity price. A second cost-effective field concerns methane abatement and technologies reducing methane leak. Finally, a critical identified area, is the increase in energy efficiency who can take place through different ways, like electrification or minimum energy performance standards and appliances.

The remaining 60% notably considers similar types of measures, which would however lead to an overall net cost. In addition, policies and programmes related to behavioural changes, such as recycling or reuse, for which cost-effectiveness is difficult to assess, are also to be considered here and could fill 20% of the gap. Finally, innovation could constitute a very important part of the push from 2030 onwards but could only by effective by that date if an effort is put in place from now onwards.

○ A strong need for investment and innovations efforts

A major issue regarding the energy market is the investments required to meet the world's future energy needs. There is a looming risk of more turbulence ahead for energy markets due to transition-

related spending not rising fast enough, with, today, a factor of three lower than what would be needed in clean energy and infrastructure investment. The longer today's mismatch in energy investment persists, the great the risks to energy security and price volatility. A massive policy-driven surge in clean energy transitions is thus the way forward, with a key investment area in that regard being renewals spending specifically on the demand side (*e.g.*, energy efficiency electrification, biofuels, *etc.*).

Advanced economies are currently filling two thirds of the expected investments needed - considering both public and private - to be fully on track with net zero. We observe that a large share of post-pandemic recovery plans have been very much targeted toward clean energy. These are however falling short in emerging and developing economies, where less than 20% of the investments that would be needed have been put in place. The pandemic has put the topic of transition in the background in these regions, while the cost of borrowing money and capital for the clean energy transition is high and increasing. In that regard, support from advanced economies and stronger global cooperation is required, while the private sector needs to be brought to the conversation table.

Another critical area concerns innovation. While all the needed technologies to reduce emissions by 2030 are available, only 50% of them are on the market today when it comes to getting to net zero by 2050. Unlocking the next generation of low-carbon technologies requires more clean energy R&D and 90 billion dollars in demonstrations by 2030. This innovation push concerns mostly three technology fields in which, if there is not enough pick up, strong difficulties will be generated in getting to net zero by 2050: hydrogen, batteries, and CO_2 Capture.

- **The emergence of a new global energy economy**

A new global energy economy is emerging, one that will be more efficient, digitalized and clean and offering enormous potential of growth and employment. A huge industrial opportunity is indeed associated with the energy transition. Exploding growth in clean energy deployment over the next decades could for instance create a market opportunity for manufacturers of key equipment worth a cumulative USD 27 trillion through to 2050. Clean energy equipment (inc. fuel cells, electrolysers, battery packs, wind turbines, solar PV modules) estimated market sizes will outsize in the next decade -15 years. In that regard, there is an increasing understanding that reaching net zero can somehow be considered as a "second industrial revolution" opportunity and one can start to observe a competition among countries to position themselves as the first to grab this substantial market shares of those clean energy technologies.