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Release of the IEA's Energy Technology Perspectives 2020 (ETP2020)

On 10 September 2020, the IEA released the long-awaited remodelling of one of its flagship publications, Energy Technology Perspectives (ETP). While the publication is available for download online, the official release was presented by Dr Fatih Birol, the IEA Executive Director, and Dr Timur Gül, Head of the IEA's Energy Technology Policy Division via webinar.

The webinar began with Dr Birol putting the IEA's view on the global energy and climate challenge faced at this point in time into context. With a global pandemic and a major economic crisis, the year 2020 has been particularly challenging. In spite of this, he felt there were increasing reasons to be optimistic:

- Both solar energy and offshore wind had seen declining costs and had experienced broader geographical take-up;
- With central banks' policies on monetary easing, interest rates were extremely low;
- Many governments were pushing clean energy, both to reduce air pollution and to address net zero emissions; and
- Most energy companies were stepping up to the plate with their efforts on clean energy.

Taken overall, these steps were indeed seeds for optimism. However, challenges remained. Governments still needed to set the right policies and investors make the right investments!

For Dr Birol, there were three important take-aways from ETP2020:

- To-date there had been an overwhelming focus on the power sector, which is responsible for just 38% of emissions. Transforming the power sector would get the world only one-third of the way to net zero. While this was important, he emphasised the importance of addressing the other 62% of emissions.
- The world's attention was focused overwhelmingly on new build – whether in the power, industry, transport or building sector. In recent years, however, vast quantities of infrastructure had been built that, under normal conditions, would be with us – and emitting – for several decades to come. Unless these are addressed, he said, there was no chance of meeting our energy and climate goals. In fact, he stressed that this point would be highlighted by the IEA in a number of its forthcoming publications and events.
- CCUS, hydrogen and batteries make a shortlist of game-changing technologies that are, in his words, "ready for the big time". He said that governments would determine the fate of these technologies and, consequently, whether we ultimately meet our climate goals.

Dr Gül presented the contents of ETP2020, the first publication of this flagship report since ETP2017. He opened by recapping on some of the points made by Dr Birol. While a growing number of governments and companies had made ambitious pledges towards meeting net zero over the coming decades, achieving these while maintaining energy security would be challenging. Of course, some progress had been made; for example, the costs of some renewable energy technologies had seen substantial reductions. However, there were no reasons for complacency. Transitioning the energy sector to net-zero emissions would require broader technology efforts in three critical areas:

- First, existing infrastructure is too big to ignore. If no action is taken, existing assets in the energy sector would emit around 750 Gt CO_2 over the next five decades. Many existing assets are still young. In normal circumstances, for example, the lifetime of a coal plant can be 50

years ... and 80% of existing coal capacity in emerging Asia has been built in the last 20 years. Similarly, many assets in the industry sector are also young, with typical lifetimes of iron and steel, cement and chemicals plants in the 30-40 years range. Importantly, CCUS technologies can reduce the emissions of fossil-fired plants in power generation and industry, provide negative emissions and, in the longer term, make carbon-neutral CO_2 to produce fuels. Hydrogen and CCUS are projected to account for around half of cumulative emissions reductions in the steel, cement and chemicals sectors.

- Secondly, clean energy innovation must be accelerated. If the world is to reach net-zero emissions this century, faster progress will be needed in the end-use sectors, which will in turn depend on faster innovation in electrification, hydrogen, bioenergy and CCUS. CCUS is described as playing a multifaceted role, as a crucial technology for reaching net-zero emissions. In the Sustainable Development Scenario, CCUS is employed in the production of synthetic low-carbon fuels and to remove CO_2 from the atmosphere. It is vital for producing some of the low-carbon hydrogen that is needed to reach net-zero emissions, mostly in regions with low-cost natural gas resources and available CO_2 storage. At the same time, the use of modern bioenergy triples from today's levels, being used to directly replace fossil fuels (e.g. biofuels for transport) or to offset emissions indirectly through its combined use with CCUS. With around one-third of emissions in 2070 to come from technologies currently at the large prototype or demonstration stage, i.e. they are not yet commercially available, the importance of clean energy innovation is clearly made. In a faster innovation case, where net zero is reached by 2050, almost 50% of the technologies required are not yet commercial.
- Thirdly, and finally, to meet net-zero emissions, there will be a need for a major roll out of clean energy technologies and clean energy infrastructure. For example, in 2050, the demand for electricity will be two-and-a-half times current demand. An example of the push in CO_2 capture required to reach net zero through technology suggests that, in the faster innovation case, the equivalent of one Northern Lights project per week would need to come on line from now to 2050.

The decisive role of governments in setting the environment for net zero emissions is powerfully made. While the role of markets will be vital, policy will have a crucial role in:

- Tackling emissions from existing assets;
- Strengthening markets for technologies at an early stage of adoption;
- Developing and upgrading infrastructure that enables technology deployment;
- Boosting support for RD&D;
- Expanding international technology collaboration.

Economic stimulus measures in response to the Covid-19 crisis offer a key opportunity to take urgent action that could boost the economy while supporting clean energy and climate goals, including in the five areas above.

Throughout ETP2020, the important role of CCUS in the transition to a net-zero global energy system, with its substantial and varied role, is clearly made. The role of CCUS changes over the period to 2070, going through three phases on the pathway towards net zero in 2070:

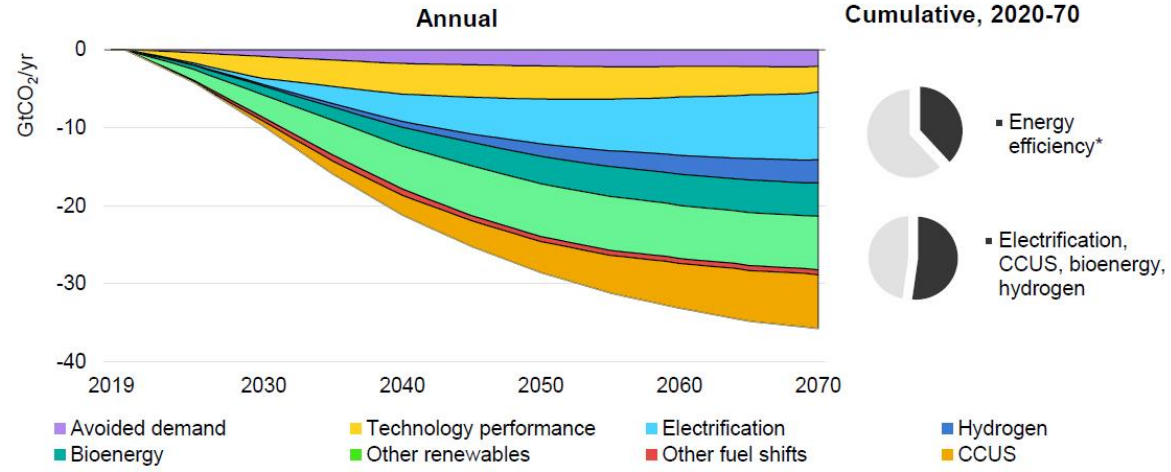
- Until 2030, the focus is on managing emissions from existing infrastructure and assets, with over 80% of all CO_2 emissions captured from fossil fuel and feedstock use in retrofitted coal-fired power units, chemical production (mainly for fertilisers), cement, and iron and steel facilities.
- From 2030 to 2050, the focus of capture in power generation gradually shifts to natural gas, supporting the integration of variable renewables, while natural gas with CCS is also used to

cover the growing demand for hydrogen. The scale of BECCS in power generation and biofuel production increases significantly and is responsible for around 15% of CO_2 captured in 2050.

- Finally, from 2050 to 2070 an important shift in the role of CCUS in the energy sector is marked by an emphasis away from reducing emissions from existing infrastructure and fossil fuel use towards CCUS for carbon removal and CO_2 use for fuel production. In 2070, over one-third of all CO_2 emissions captured are from BECCS or direct air capture for generating negative emissions of carbon-neutral fuels.

Of the cumulative emissions savings required to meet net zero by 2070, CCUS accounts for 15% of the total, as shown in the figure below.

Figure 2.2 Global energy sector CO_2 emissions reductions by measure in the Sustainable Development Scenario relative to the Stated Policies Scenario, 2019-70



* Energy efficiency includes enhanced technology performance as well as shifts in end-use sectors from more energy-intensive to less energy-intensive products (including through fuel shifts).

Notes: CCUS = carbon capture, utilisation and storage. See ETP model documentation for the definition of each abatement measure. *Hydrogen* includes low-carbon hydrogen and hydrogen-derived fuels such as ammonia.

It was Dr Birol's ambition that the ETP publication should become the world's guidebook on energy technology policy and investments: with ETP2020, for which more than 800 technologies had been analysed, he feels that ambition has been met.

Towards the end of September, another report in the ETP series will be released, the ***ETP Special Report on CCUS***. This report will provide the IEA's most in-depth look yet at this critical technology family and its role in reaching net-zero emissions.

IEAGHG was pleased to peer review the CCUS component of ETP2020.

Keith Burnard