IAEA Climate Conference Ends with Call for Major Nuclear Role

11 Oct 2019

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IAEA Intl. Conference on Climate Change and the Role of Nuclear Power

Vienna, Austria

11 October 2019

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Hoesung Lee, Director General of UN IPCC

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Nuclear power currently supplies about 11% of the world's electricity. Today's output is lower than it was a decade ago.

10 years ago when there was no Paris Agreement, when the world's global temperature was not as high as today's 1°C above pre industrial levels, when the world did not have the benefit of having IPCC's special report on 1.5, we didn't know at that time the impact of global warming between 1°C, 1.5°c and 2°C and its policy implications.

Four years ago in December 2015, at the COP in Paris, the countries asked the IPCC to provide a special report on this very important aspect and the impacts of keeping this warming to 1.5° as well as the comparable mitigation pathways to achieve that global warming.

1:23:30

One of the key conclusions, as was very often mentioned in this conference, as well as also before this conference, is that it is feasible to achieve limiting the warming to 1.5°. Considering that the world has already experienced a 1°C warming, it is feasible to achieve limiting the warming to 0.5°C. It is feasible.

But a more important message is, limiting that warming to 0.5°C comes with opportunities for a clean economy, job creation, better jobs, innovation, and great potential for achieving sustainability.

1:24

We analyzed 21 models globally available, and we came up with the conclusion that to limit global warming to 1.5°C, global net anthropogenic CO_2 emissions must reach net zero around 2050. But that must be accompanied by very deep reductions in non-CO_2 emissions as well.

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Obviously, emission reductions on that scale require very rapid transitions in energy, industries and consumption. Emissions in all of these sectors must be virtually eliminated - net zero - within a few decades.

Achieving this will require a wide portfolio of mitigation options and a significant upscaling of investments in those options. The transitions required to realize these emissions reductions are clearly unprecedented in terms of scale but not necessarily in terms of speed.

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The benefit of restricting warming to 1.5°C is lower risks to ecosystems, health, security, water supply, and economic growth.

Now, what are the implications for the energy sector transitions?

We have so much relied on fossil fuel energy systems during the last 100 years.

Reducing energy sector emissions to zero by 2050 involves 3 broad strategies:

energy efficiency improvement, increased electrification, and decarbonisation of electricity supply.

We examined 21 models and those 21 models provided a total of 85 pathways consistent with 1.5°C.

1:27

We look at efficiency first.

Efficiency is reflected in the data of the primary energy supply.

Across these 85 pathways, 1.5°C implies that the median primary energy supply declines from 582 exajules in 2020 (that's next year) to 503 exajules in 2030 - in 10 years - and then 581 exajules in 2050.

These projections are of course uncertain and the range increases as they go further into the future. For 2050 the range is 289 to 1012 exajules.

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In short, over the next 30 years global primary energy supply could grow at a rate of 1.9% or decline at a rate of 2.3% per year. The median projection is no growth of primary energy supply to 2050.

Stabilizing primary energy for the next 30 years while global population and income rise is possible only with significant improvements in efficiency of energy production, transformation, distribution and final use.

The electricity share of global energy use is projected to more than double.

1:29

It's generally known that electricity is more versatile than fossil fuels and in most energy use, more efficient.

Based on median values of the 89 1.5C pathways, electricity share as primary equivalent of total primary energy rises from 19% in 2020 (next year) to 43% in 2050.

As usual, the ranges across the pathways are very large over 3 decades, but in every case global electricity consumption rises. The rate of growth varies between 0.5% and 5% per year. This is the range.

Increased electrification reduces emissions only if the power comes from non fossil sources.

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Fossil fuel share of electricity generation declines from 63% to 22% in the next 30 years.

This is the strong median result of 89 pathways.

The non-biomass renewables offset the decline of fossil fuel generation in most of the increased supply. Over the 30 years, their supply increases from 25 exajules to 137 exajules, an average annual growth rate of 5.9%.

In most 1.5°C pathways, nuclear power contributes to the decarbonisation of the electricity supply over the next 30 years.

1:31

Based on, again, the median results of these 89 pathways, nuclear power increases from 11 hexajules in 2020 to 23 in 2050, an average annual growth rate of 2.5%.

There are large variations, however, in nuclear power between models and across pathways.

The pathway with minimum nuclear power assumption anticipates output of only 3 hexajules in 2050 - about 30% of the 2020 output, while the pathway with maximum reliance on nuclear power estimates 116 hexajules of nuclear power that year, a tenfold increase from 2020.

1:32

One reason for this large variation is that the future development of nuclear can be constrained by societal preferences, assuming that narratives underly the pathways.

The second reason for the variation is the technological assumptions built into the models. For example, only 7 of 21 models we analysed include a vast small modular reactor designs as possible technologies.

In addition to electricity generation, nuclear energy contributes to mitigation of other GHG emissions in many pathways. Nuclear process (?) is an option in 6 of the 21 models used to generate the emissions pathways.

Clearly, 1.5° pathways are consistent with everything from negligible nuclear power to a tenfold increase in nuclear power over the next 3 decades.

1:33

The opportunity exists. The challenge is, how much of the opportunity will you be able to capture? Time is critical, so the share of the opportunity you capture will depend on the speed at which nuclear technology can be deployed.

In summary, human activity has already led to 1°C increase in global average temperature.

It is still possible though, but challenging, to limit the global average temperature increase to 1.5°C, the goal of the Paris Agreement.

To meet that goal will require that global net anthropogenic emissions be reduced to net zero by 2050, and that human induced emissions of other GHGs be reduced to zero shortly thereafter. The strategies for reducing emissions are robust and well known: very ambitions efficiency improvements, increased electrification, and decarbonisation of electricity supply. The available models indicate that this can be done using widely different mixes of technologies including pathways with much greater and with very limited use of nuclear power.

In short, there's considerable potential as well as uncertainty for nuclear power.

Obviously, we don't and cannot know what technologies will be available over the next 30 years and how they will perform. The challenge to nuclear power is to be a cost effective alternative to other non-fossil technologies and to deploy nuclear power much faster than in the past.

1:35

I wish you success in meeting these challenges because the climate needs all the help it can get.