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## ALL INNOVATIVE LOW AND ZERO CARBON TECHNOLOGIES ARE REQUIRED TO DELIVER ON CLIMATE- TARGETS

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Research from the [United Nations Economic Commission Europe \(UNECE\)](#) has found that innovative energy technologies are key to reaching carbon neutrality. Next generation of nuclear power, hydrogen, and carbon capture, use, and storage (CCUS) are vital to achieving climate targets.

UNECE is supporting countries to scale-up action to attain carbon neutrality. Currently, over 80% of UNECE's primary energy supply is fossil fuel based. A [carbon neutrality toolkit](#) was launched at COP26 to support nations to cut and/or capture at least 90 gigatons of CO<sub>2</sub> by 2050 to reach the 1.5-2°C target.

An international group of professionals on clean energy solutions and modelling experts have found that improving systemic energy efficiency and decarbonizing energy supply are essential to meet the Paris Agreement targets. In 2050, modelling indicates that renewable energy, highly efficient fossil fuels with carbon capture, use, and storage (CCUS), nuclear power, and hydrogen will form part of the energy mix of the UNECE region.

Current actions targets set in the Paris Agreement and at COP26 fall short of delivering on carbon neutrality and limiting global warming to 1.5 – 2C. However, there are achievable pathways for governments to design and achieve a carbon-neutral energy system through technology interplay. Alongside a phase-out of conventional fossil fuels and deep electrification of all sectors with renewable energy, innovative technologies will play a key role. UNECE has published technology briefs on [hydrogen](#), [nuclear power](#), and [CCUS](#) to support policymakers scale-up climate mitigation efforts.

### Hydrogen

As an industry feedstock, energy carrier and storage medium, hydrogen offers the prospect to decarbonize the energy system and large sectors of the economy, such as transport, industry, power generation and municipal heating. It also opens interesting perspectives in hard-to-abate sectors, such as energy intensive industries or long-haul transport, where electrification is only partially possible. For hydrogen technologies to contribute to carbon neutrality, the current production of hydrogen needs to shift from fossil-fuel methods to fossil fuels with CCUS, renewable electricity, nuclear power or grid-connected electricity through electrolysis using low-carbon electricity. Green hydrogen production using renewable energy-powered electrolysis will also represent a future option as production costs will cease to be a major hurdle.

### Nuclear Power

For those countries who choose to implement this technology, nuclear power has the potential to increase its integration with other low-carbon energy sources in a future decarbonized energy mix. Large nuclear reactors are mature technologies that are commercially available today. Small modular reactors have designs rapidly approaching commercial deployment. As nuclear power plants produce both low-carbon electricity and heat, they also offer opportunities in the long-run to decarbonize energy intensive industries such as low or zero-carbon steel, hydrogen, and chemical production.

### CCUS

CCUS is essential to unlock the full potential of decarbonization and attain carbon neutrality. Large-scale deployment of CCUS technology in the UNECE region would allow countries to decarbonize the energy sector and hard-to-abate industrial sectors in the medium term to bridge the gap until next generation low-, zero-, or negative- carbon energy technologies become available.

In order to scale-up these technologies, nations must develop policy frameworks in support of all low and zero-carbon technologies to attain carbon neutrality. International cooperation is essential to support all countries in the UNECE region to build resilience of the energy system and to accelerate energy transition towards attaining carbon neutrality.

Later this summer, UNECE will be publishing a report on how Carbon Neutrality can be achieved by 2050 in North America, Europe and Central Asia.