

Overview

Overview of the goal

7 AFFORDABLE AND CLEAN ENERGY



Nuclear power as a low-carbon energy source

World energy consumption is predicted to rise nearly 50 percent by 2050, with developing countries projected to become the largest electricity users. China alone is anticipated to account for over 40 percent of the global growth in demand for electricity by 2030.

The challenge is how to meet growing demand without substantially contributing to climate change. As a low-carbon electricity source, nuclear power can play an important role in limiting global emissions.

A nuclear power plant does not produce any carbon emissions during operation. Across the broader lifecycle of a power plant, there are indirect emissions from mining, fabricating fuel, manufacturing components, and constructing and decommissioning the facility. Nevertheless, a 2017 study examining future low-carbon power supply systems for 2050 found that nuclear power's lifecycle emissions ranged from 3.5 to 12 grams of carbon dioxide equivalent per kilowatt-hour of electricity generated, compared to 400 to 900 grams for fossil fuel plants, or approximately 100 grams for hydropower.

In 2018, 448 commercial nuclear power plants accounted for 10.1% of the world's total electricity generated. In terms of low-carbon sources, only hydropower ranked higher at 16.2%. Countries producing large percentages of nuclear power, like France and Sweden, have some of the lowest-emitting electric grids globally.

Looking to future decarbonization, the low-carbon and reliable performance of current nuclear reactors makes a strong case for expanding the share of global electricity generated by nuclear power. Many existing reactors may retire before 2050. New advanced reactor designs can meet the need for replacement power as well as expanding demand. These designs build on the benefits of the current fleet by supplying more flexible, scalable power output with smaller sizes and investment requirements that are well suited to serving emerging economies.

Nuclear power as a reliable energy source

The growing need to protect the energy supply from disruptions while reducing greenhouse gas emissions and contributing to sustainable development requires fresh consideration of the role of nuclear power in dealing with climate change. Nuclear power complements intermittent renewable energy sources because nuclear plants provide affordable and reliable low-carbon electricity able to meet 24-7 demand. Operating at a high capacity factor of 90%, they also contribute to grid stability and reliability.

A wide range of small modular reactors and advanced reactors is currently under development. Some are ready for near-term deployment and offer the prospect of enhanced reliability and flexibility. They will be suitable for decarbonizing a number of industries, boosting the sustainability of this energy source even further. Furthermore nuclear technologies are not only strengthening linkages across the clean energy sector but also more widely with non-energy sectors.

These technologies offer great opportunities for non-electricity applications, such as seawater desalination, hydrogen production and others outside the energy domain, including the provision of medicine, food and clean water. It is clear that the reliability of nuclear power has a far-reaching effect and that nuclear technologies will play a key role in the future decarbonized world and contribute to the achievement of all 17 UN Sustainable Development Goals.



Nuclear power as an affordable energy source

The world thrives on energy for basic needs such as food and heating as well as supporting the economic development and overall societal needs such as urbanisation and transport, all contributing to our well-being. Energy demand has been soaring since the 19th century with the exploding energy demand during the 20th century, hand-in-hand with economic development and generally also increasing well-being for humans, bringing us life-changing experiences while also bringing the first signs of our limits to growth. Energy supply security and energy independence objectives have accelerated the introduction of nuclear power in many of the industrially developed countries since the 1970s.

The extensive use of fossil fuels for energy generation, heating, transport and powering our economic development slowly but steadily created our main challenge for this 21st century and beyond, i.e. how to maintain our overall well-being while decouple economic development from the greenhouse gas (GHG) emissions that lead to climate change and increasingly expose us to potentially irreversible effects of such truly structural planetary changes.

Nuclear power, hardly emitting such greenhouse gases while also having an overall extremely small environmental impact in its supply chain and waste management, is part of the answer to a more sustainable energy supply for our planet. Energy demand management, switching to low-emission energy production technologies such as renewables and nuclear power and a better balance between generation and demand (including energy storage) are the answers propelling our planet onto a more sustainable trajectory.

A very distinctive feature of nuclear power is its overall affordability from such an integrated energy systems perspective. Nuclear power's high and stable return on energy invested can guarantee an overall high degree of competitiveness in a decarbonised energy system. Nuclear power is increasingly essential for overall energy system resilience while also lowering generation costs for the energy system as a whole, especially when renewable intermittent energy sources play a significant role in the energy system market. Thus nuclear power needs to further improve its capital investment requirements and especially further reduce the owners cost, thereby reducing its investment challenge.

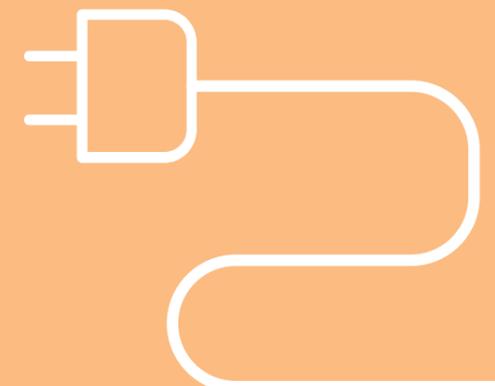
Nuclear power as a modern energy source

For at least the past decade global recognition of the scale and urgency of the threat of climate change has intensified dramatically. Doubts that modern economies, which are absolutely dependent on a continuous supply of electricity, can rely exclusively on intermittent renewable energy sources are gaining ground. This underlines the importance of the role nuclear can play in the future generation mix globally, as electricity use continues to grow.

Nuclear's unique features enable it not only to deliver low carbon, affordable and reliable energy but also to contribute to much needed improvements in air quality. In addition it has the means to decarbonize numerous industries while supporting the proper functioning of modern infrastructure.

At the same time progress is being made in developing the next generation of nuclear reactors, which will offer additional benefits beyond carbon-free electricity. Innovation will be important and it is widely recognized that a reliable supply of low-carbon energy is a prerequisite for the achievement of sustainable development goals. The nuclear industry is ready to play its part in the modern world to meet the challenges facing humanity.

Foremost among these challenges is climate change. The goals established in the Paris Agreement will be more easily met if nuclear power and the benefits of the synergies between nuclear and other low carbon energy sources and technologies are harnessed now.



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