

Construction

Construction of nuclear power plants

Introduction

Recognition of the vital role that nuclear energy plays in combating climate change is gradually spreading. As safety and quality standards for nuclear power plants regularly evolve to match best practices, the costs to construct such facilities are also changing. The capital costs and long construction times historically present when building conventional nuclear plants mean that it is essential that the nuclear industry and governments around the globe make strides towards cutting the costs of new builds and support public and private long-term investments in new nuclear capacity.

Nuclear power plants have a key role to play as countries work hard to reduce their reliance on fossil fuels. According to a recent report by the United Nations Economic Commission for Europe (UNECE), nuclear power currently generates about 10% of the world's electricity, which represents more than a quarter of all low-carbon electricity. Its reliable, 24/7 operation helps mitigate energy fuel price volatility and improves the reliability and resilience of electrical grids with high shares of variable renewables. Therefore, construction of new nuclear power plants alongside other clean energy sources can help deliver on both the Paris Agreement and the 2030 Agenda for Sustainable Development.

Economic perspective

Commercial nuclear power plants not only provide over 50% of the clean electricity in the United States, but also provide economic benefits to workers, local communities, and the nation as a whole. On average, workers in the nuclear industry earn \$39 per hour, have a high union rate of participation, and have a large amount of opportunities for veteran employment—all of which are the highest amongst zero-carbon emitting energy technologies. These nuclear jobs are typically permanent and are over 30% higher than average salaries in the area. Nuclear facilities also provide millions of dollars in direct local and state tax revenue and other indirect benefits. Construction of advanced nuclear reactors could help revive domestic manufacturing supply chains and revitalize export of US technology and manufactured goods.

The materials, fuels, and services procured for nuclear projects have the potential to involve all 50 states and international partners. Initial investments in nuclear projects would stimulate demand for industries like pumps and valve manufacturers, steel and concrete producers, and create opportunities for skilled trade workers including electricians, welders, and steel workers. Internationally, every export of \$1 billion would also create an additional 5,000 jobs to support nuclear projects abroad, stimulating local economies across the globe.



Environmental and sustainability perspective

Over 400 nuclear reactors operating worldwide today avoid annual emissions of nearly two billion tonnes of greenhouse gases; hydrogen production; cogeneration; local environmental aspects.

Over the past five decades according to data published by the IAEA, electricity generation has seen an exponential growth in producing greenhouse gas emissions. Representing a significant share of energy related emissions, fossil fuels are still the primary source of electricity globally. Today, nuclear energy produces the same amount of carbon emissions as wind, proving to be a safe source of energy and the essential tool for combating climate change and meeting the 1.5°C pledge in the next few decades.

Today, construction companies face rapidly evolving challenges, including the threat of global climate change. The aim to reduce climate change consequences and help communities and biodiversity to survive and adapt is at the heart of the building industry. The nuclear industry does its best to apply the environmental standards within which industry can operate, such as protecting and improving the quality of air, land, and water. In addition, materials used during the construction of nuclear power plants are not in short supply and most are readily recyclable, which minimizes construction's impact on the environment and any doubts concerning its sustainability.



Nuclear construction around the globe

The unprecedented volatility on the 2021 fossil fuel market—creating conditions that led to a gas crisis in Europe – clearly demonstrates the need for a backup energy source resilient to price shocks. It is equally clear that such a source is nuclear energy, which is not exposed to such fluctuations in fuel prices. Thus, the world needs a stable pipeline of new nuclear build projects to ensure that its energy demand is properly met.

Today, there are 51 nuclear power reactors under construction worldwide, 14 of which are in China. A positive sign is that there have been many nuclear newcomers in recent years; 2020 saw the first-ever commercial reactors in the UAE and Belarus connected to the grid. In 2023, Turkey and Bangladesh are expected to launch their first nuclear units at the Akkuyu and Rooppur plants, respectively. Egypt plans to start construction of its first El-Dabaa plant next year. All this indicates how more and more countries are opting for nuclear energy as a part of their generating mix.

Despite these good indicators, the World Nuclear Association's Harmony programme maintains that, to achieve a 1.5°C target, new nuclear build projects need to be increased to an annual connection rate of 33 GWe over the next decade. Estimates place the average plant construction period at six years, not counting preliminary work—mainly of a regulatory nature—that can span years. This means that both vendors and governments must strategically reduce the time and cost of construction, in part through innovation and adoption of best practices.

Specifically, this could be achieved by further strengthening international networks working to develop a unified regulatory and financial approach. The combined efforts of the industry and government to increase the pace of nuclear construction around the globe can ensure that decarbonisation deadlines are met on time.

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