

Nuclear energy offers the best bang for the buck

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While the capital cost of establishing nuclear power plants may seem high, the combined capital and operation and management costs make nuclear energy the most economic option.



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Our knowledge of nuclear energy is clouded. The specters of Fukushima and Chernobyl, visions of a mushroom cloud, and desolate fallout loom large over our heads. Mass media has kept our attention divided by focusing more on the challenges and threats of nuclear energy. This does not allow us to weigh the pros and cons of nuclear energy in a fair manner. It is no wonder then that we have failed to appreciate the benefits of nuclear energy which greatly outweigh the relative threats. The environmental and economic advantages of adopting nuclear energy are many, including overcoming the climate emergency. Nuclear power has been touted as an expensive form of energy. However, nuclear energy provides greater bang for the buck than all existing energy sources, including renewable energy.

While the capital cost of establishing nuclear power plants may seem high, the combined capital and operation and management costs make nuclear energy the most economic option. The technology and framework required for harnessing nuclear energy is available unlike in the case of renewable energy. Research is being undertaken for developing next- generation nuclear plants that will soon reduce the large up-front cost of nuclear energy. According to the US Energy Information Administration (EIA), energy-related carbon dioxide emissions will continue to increase through 2050 in a business-as-usual scenario. The US EIA projects that renewables may become the primary source for new electricity generation in the coming decades. However, it warns that fossil fuels along with batteries will continue to be used to meet rising energy demand and provide grid reliability.

In developing economics especially in the Asian region, oil and natural gas production is projected to increase in the coming decades. If alternatives to fossil fuels are not made available immediately, the transition to a green economy will remain a distant dream. Nuclear energy is a source of clean, reliable, and affordable energy and is a major alternative. There are currently over 400 nuclear reactors for generating electricity located in over 30 countries worldwide. Twenty per cent of generated electricity in the United States is based on nuclear power. France has the highest percentage of nuclear energy dependence amounting to over 71 per cent. Other European nations like Hungary, Belgium and Sweden are also drawing the benefit of nuclear energy over several decades. Around 10 per cent of the world's electricity is based on nuclear energy which is a time-tested alternative to fossil fuels.

The contribution of nuclear energy to combating climate change has, however, remained elusive and needs to be mainstreamed. The International Atomic Energy Agency (IAEA) estimates that between 1971 and 2018, nuclear power avoided the emissions of 74 gigatons of carbon dioxide, a potent greenhouse gas which contributes to global warming. This is equivalent to cumulative emissions from the entire power sector for six years from 2013 to 2018. In the report titled, *Climate Change and Nuclear Power 2020*, the IAEA Director General R.M. Grossi observed that nuclear energy is reducing carbon dioxide emissions equivalent to taking 400 million cars off the road every year. We are at a stage in our civilization where deep decarbonization, at any cost, is the need of the hour. Nuclear energy has already been playing its part in a cost-effective manner.

The levelized cost of electricity (LCOE) generation varies in different countries according to policies and resource availability. The LCOE can be divided into capital cost of constructing power plants and their operation & maintenance costs. According to the International Energy Agency, the capital costs of coal power plants is much less than that of nuclear power plants and renewables. However, coal power plants have such high operation and maintenance costs that their overall LCOE, based on assumptions of the IEA, is much higher than that of nuclear energy or renewable energy. Further, the capital costs of nuclear power plants are comparable with renewables like solar. This is due to the declining costs of photovoltaic cells. However, considerable research and innovation

is required for greater integration and adoption of solar energy. Unfortunately, we have run out of time and need to urgently shift away from fossil fuel-based electricity generation.

Nuclear energy has been providing low carbon-based electricity for several decades. It can play an important role today in clean energy transition and its contribution to climate change mitigation must be recognized. Nuclear energy can easily replace fossil fuels and the only limiting factor, nuclear waste, is relatively easily manageable as compared to emissions from fossil fuels. In the long run, when renewable energy-related technologies improve, nuclear energy-based electricity generation can help limit temporal fluctuations in output from renewables like wind and solar and provide grid stability. All these attributes make nuclear energy an excellent investment option for meeting the clean energy needs of today and tomorrow.

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