IGM Session

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Category: Politics & Global Affairs | **Tag(s):** Nuclear, Science

The Future of Energy: A Nuclear-Free World?

Article

The world is still grappling with the challenge of transitioning away from the use of fossil fuels to mitigate climate change. While nuclear energy has been introduced since the 1950s, it remains controversial due to dangerous weapons and accidents associated with it, high plant construction costs, and nuclear waste. Conversely, the benefits of nuclear energy are that it is clean, can decarbonize quickly, and has a low impact on public health compared to non-renewable energy sources.

Currently, approximately 10% of the global energy demand is obtained from nuclear energy, with 439 nuclear plants worldwide. France leads other countries in relying on nuclear power for 70% of its electricity production. Nuclear power has only had three significant accidents that raised alarm in almost 70 years of existence, making it generally safer than fossil fuels. Although nuclear waste is a considerable disadvantage, 90% of nuclear waste can be recycled.

Moreover, a fusion experiment in the United States National Ignition Facility (NIF) achieved "net energy gain," implying that it produced more energy than was invested in it. Fusion energy offers the potential for long-lasting carbon-free energy for everyone on earth, with insignificant radioactive waste and no risks of meltdown. While fusion power is yet to be a commercial reality, the possibility of having a clean source of energy for the long term has set a virtuous cycle of development in motion.

Small modular reactors (SMRs) are an alternative to traditional nuclear power plants. They allow for savings in cost and construction time and can be situated in areas that are unsuitable for larger nuclear power plants. The inherent safety characteristics of SMR designs make them safer than traditional nuclear reactors. SMRs are currently being developed worldwide, with over 70 commercial designs being tested for different applications.

Conversely, many countries and environmentalists advocate for a nuclear-free future to prevent proliferation and reduce the risk of nuclear accidents. Non-renewable energy sources like wind, hydropower, and solar are becoming increasingly affordable, provide clean energy, and create job opportunities. Besides, energy efficiency measures and changes in consumption patterns can reduce energy demand.

The debate on the future of energy is multifaceted, and valid opinions exist on both sides. While technological advancements may allow for a mix of energy sources to meet global energy demand, attention should be given to safety and cost factors. As such, more research and an open conversation should be encouraged to identify the most sustainable and efficient future energy mix.

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Agenda

Fossil fuels

- Non-renewable resources, such as coal, oil, and gas, that are extracted from the earth and burned to produce energy

- *"Many countries are working on reducing their dependence on fossil fuels and transitioning to cleaner sources of energy."*

Decarbonize

- The process of reducing or eliminating carbon dioxide emissions

- *"The government has announced ambitious plans to decarbonize the economy by investing in renewable energy and improving energy efficiency."*

Nuclear energy

- Energy produced from nuclear reactions, usually in the form of electricity

- *"France relies heavily on nuclear energy, producing 70% of its electricity from nuclear power."*

Non-renewable energy sources

- Energy sources that are finite and cannot be replenished, such as coal, oil, and gas

- *"The transition to renewable energy sources is crucial for reducing emissions and mitigating climate change."*

Renewable energy sources

- Energy sources that are replenished naturally and can be used repeatedly, such as solar, wind, and hydropower

- *"Renewable energy sources are becoming increasingly popular as they offer a sustainable and clean source of energy."*

Proliferation

- The spread or increase of something, such as nuclear weapons or technology

- *"Many countries are concerned about nuclear proliferation and are working together to prevent the spread of nuclear weapons."*

Energy efficiency

- The ability to use less energy to perform the same task or achieve the same result

- *"Improving energy efficiency in homes and buildings can help to reduce energy consumption and lower greenhouse gas emissions."*

Meltdown

- A severe nuclear reactor accident in which the reactor's core melts and releases radioactive material

- *"The Fukushima Daiichi nuclear disaster in 2011 was caused by a tsunami, which led to a meltdown of the reactor."*

Small modular reactors (SMRs)

- Small nuclear reactors that are designed to be less expensive and easier to build than traditional nuclear power plants

- *"SMRs are being developed worldwide and have the potential to provide a clean and safe source of energy."*

Fusion energy

- Energy that is produced by combining atomic nuclei, producing a large amount of energy in the process

- *"Fusion energy offers the potential for long-lasting carbon-free energy and could revolutionize the global energy industry."*

Discussion

1. What role should nuclear energy play in a sustainable and efficient global energy mix? How can safety concerns and the issue of nuclear waste be addressed?

2. With the rise of renewable energy sources, should we continue investing in nuclear energy, or should we transition away from it entirely? What factors should be considered when making this decision?

3. What role can small modular reactors (SMRs) play in the future of energy production, and how do they compare to traditional nuclear power plants and renewable energy sources? How can SMRs be integrated into an efficient and sustainable global energy mix?