Navigating the Nexus: Climate Change, Clean Energy, and Nuclear Nonproliferation

Summary of the literature review studying the NEXUS of Clean Energy, Nuclear Nonproliferation, and Climate Change.

Executive Summary

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1 Executive Summary

Studying the existing literature of the Nexus of interest proved to be more challenging than expected. These three fields have become increasingly important over recent years, yet largely there's few research that links all three intersection in any comprehensive way. Early on it was evident that nuclear energy was in many ways the link between clean energy and nuclear nonproliferation. Initially themes related to fuel enrichment processes and end of fuel cycle activities were discussed as these steps in the nuclear generation process involve weapons usable fissile material that could be repurposed for nuclear weapons use. A few articles discussed the Articles discussing the safety of civilian nuclear programs and the associated risks of proliferation were readily available especially given the diffusion of nuclear technologies between countries and regions. The discussion of a multilateral enrichment facility program that would be overseen by an international government organization like the IAEA was talked on in multiple papers. This international agreement would lower the risk of nuclear proliferation by removing the weapons usable fuel development aspect of nuclear energy from the fuel process. There also comes the issue of nuclear technology diffusion, and whether states would develop covert nuclear weapons facility as opposed to their state departments public intention.

In recent years studies involving the impact of public perception on nuclear technologies have flooded the academic field, and prove to be relevant to the nexus of interest.

The global security implications of climate change is expected to result in unprecedented investments in alternative clean energy sources. Direct concerns of climate change include but are not limited to energy security, environmental migration, resource wars, and climate security [1]. Clean energy is a multifaceted issue, and it's not the case that the most environmentally friend energy source will be the main technologies used in climate change mitigation strategies across the globe.

Energy determinants involve political, economic, and even social aspects for consideration. The most probable future scenario of climate change mitigation strategies includes nuclear energy in the zero-carbon energy mix. It's currently the worlds second largest source of zero-carbon base load energy, and It's potential to improve energy security, provide economic growth, and reduce global emissions is unprecedented.

In 2021 Congress passed the bipartisan Infrastructure Investment and Jobs Act. The bill allocates 2.5 billion for R&D in the next generation of advanced nuclear reactors. The small reactors (SMR's) are designed to lower construction cost and increase operational safety. The Department of Energy anticipates the demand for these advanced technologies will reach a trillion dollars in term of market opportunities, proving the nuclear industry as being indispensable. The nuclear industry is not limited to just the energy sector, there are applications of nuclear technology in medical treatments, radiation processing, and the desalination of water. This is all to say nuclear technology is likely here to stay, even taking into consideration the risk of nuclear proliferation of weapons. This is why it is increasingly important for global security purposes to strategically prepare and understand how the increased use and advancement of nuclear technologies can have

adverse affects.

The aim of this literature review is to provide the existing literature studying the intersections of climate change, clean energy, and nuclear non-proliferation. The research provided in this review has proved to be very interdisciplinary. There's little research studying all intersections of these fields. It's for this reason the literature collection was separated into dyads, and overlaps were recorded.

References

[1] Jürgen Scheffran and Antonella Battaglini. "Climate and conflicts: the security risks of global warming". In: *Regional Environmental Change* 11.1 (2011), pp. 27–39.