Studying the NEXUS Presentation

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The Energy-Climate-Security Nexus

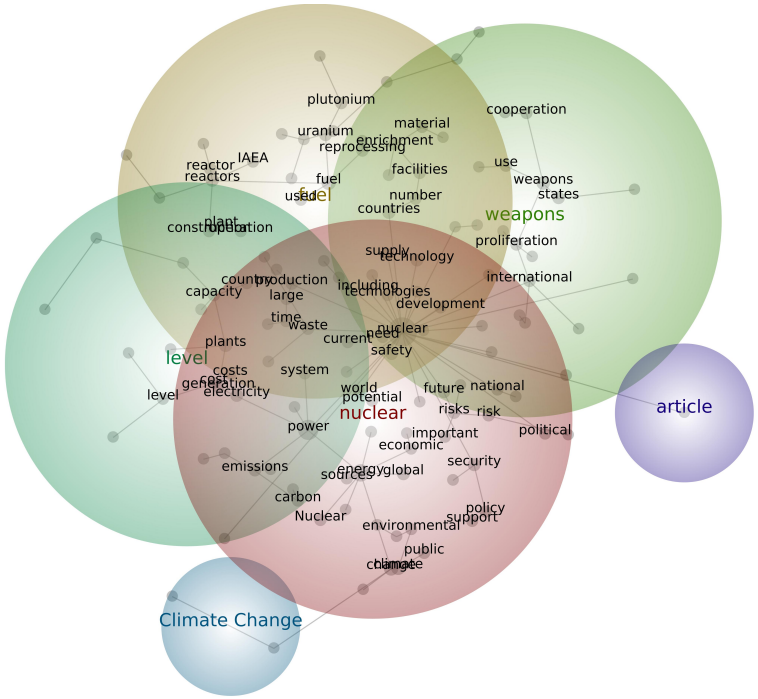
- Climate change necessitates a shift toward sustainable energy sources.
- Nuclear energy is positioned as a **low-carbon solution** but introduces geopolitical and security risks.
- This research examines the interplay between **clean energy, security, and global climate policies**.

Research Approach

- **Comprehensive Literature Review**: Peer-reviewed journals, government reports, and academic papers.
- **Historical Scope**: Research limited to time of this study (2022).
- **Leximancer Analysis**: Concept mapping to identify thematic connections.

Concept Mapping: Leximancer Analysis

- Identified **key themes**:
  - **Nuclear Energy** as a central policy issue.
  - Connections between **energy policy, climate mitigation, and security**.
  - Geopolitical influences from **Russia, China, and the U.S.**.



Nuclear Energy: A Decarbonization Tool

- Nuclear power is a **stable, low-carbon** energy source.
- Supports renewable energy by **balancing intermittency** in the grid.
- Small Modular Reactors (**SMRs**) are promising but face economic hurdles Duffey [2005].

Challenges to Nuclear Expansion

- **Economic Barriers**: High capital investment, long construction timelines Kessides [2012].
- **Public Opposition**: Safety concerns, nuclear waste storage, and disaster risk Corner et al. [2011].
- **Competing Renewable Costs**: Wind and solar prices continue to fall, challenging nuclear's viability Lovins [2022].

Geopolitical Considerations

- Civilian nuclear programs create **dependency** on supplier states.
- Russia and China **dominate nuclear exports**, leveraging contracts for geopolitical influence Nguyen [2019].
- The U.S. faces declining influence in the global nuclear market.

Proliferation Risks

- **Dual-use technology**: Civilian programs can serve as cover for weapons development.
- Nuclear expansion increases risk of **covert weapons proliferation**.
- Strengthening **IAEA and NPT** safeguards is critical Goldschmidt [2010].

Public Opinion on Nuclear Energy

- **Public opinion is divided**: Nuclear is viewed as both a solution and a risk.
- Safety, trust, and **media framing** influence policy support Doyle [2011].
- Historical opposition shapes national nuclear policies.

Strengthening Governance

- **Strengthen IAEA oversight**: Improve global nuclear monitoring.
- **Fuel Security**: Develop **multinational** fuel-cycle initiatives to mitigate risks.
- **Investment in Advanced Reactors**: Focus on **proliferation-resistant** designs.
- **Public Engagement**: Increase transparency to build public trust.

Key Takeaways

- Nuclear power offers **low-carbon energy**, but governance is essential.
- Proliferation risks and **geopolitical complexities** influence expansion.
- Policy decisions will determine if nuclear energy advances decarbonization without increasing security risks.

References I

Adam Corner, David Venables, Alexa Spence, Wouter Poortinga, Christina Demski, and Nick Pidgeon. Public attitudes toward nuclear power and climate change: Conditional acceptability? *Public Understanding of Science*, 20: 4823–4836, 2011.

Julie Doyle. Framing nuclear power as a climate solution: Media narratives and policy shifts in the uk. *Environmental Politics*, 20:851–858, 2011.

Romney B. Duffey. Energy: The real choices in the 21st century. *Progress in Nuclear Energy*, 47(1-4):535–542, 2005.

Pierre Goldschmidt. Multilateral nuclear approaches: Lessons from history. *Nonproliferation Review*, 17:801–809, 2010.

References II

Ioannis N. Kessides. The future of the nuclear industry reconsidered: Risks, uncertainties, and continued promise. *Energy Policy*, 48:185–208, 2012.

Amory B. Lovins. Nuclear energy and climate mitigation: Overstated claims and real opportunities. *Renewable and Sustainable Energy Reviews*, 154:107122, 2022.

Hoang Nguyen. The geopolitics of nuclear energy: Russia, china, and global supply chains. *Journal of Energy Security*, 29: 67–85, 2019.

Thank You!
Questions?