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Flexible Nuclear Energy for Clean Energy Systems

7th Annual Meeting of Innovation for Cool Earth Forum 2020

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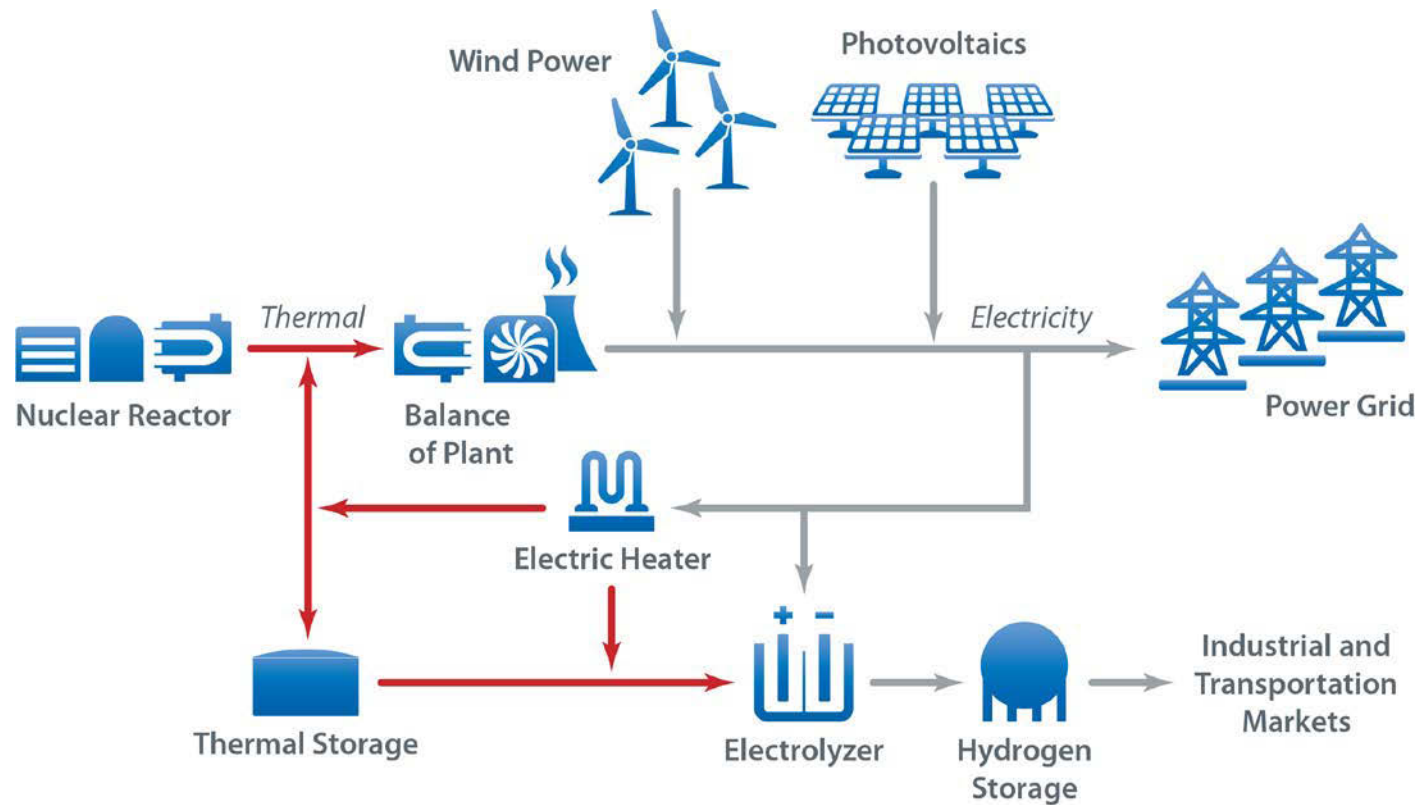


NICE Future

Nuclear Innovation: Clean Energy Future

An Initiative of the Clean Energy Ministerial

Renewable-nuclear hybrid energy solutions



International Efforts for Clean Energy—Nuclear Innovation: Clean Energy Future (NICE Future), an initiative of the Clean Energy Ministerial

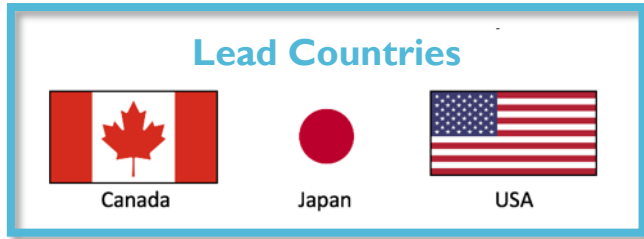


The NICE Future initiative explores the potential for nuclear energy uses, innovations, and greater systems integration to accelerate progress toward clean energy goals. The initiative recognizes there is **no one-size-fits-all solution** to energy and fosters collaboration among clean energy supporters in exploring diverse solutions.



External Partners

- International Energy Agency
- OECD Nuclear Energy Agency
- International Atomic Energy Agency
- International Framework for Nuclear Energy Cooperation
- Generation IV International Forum
- ClearPath
- Third Way
- Energy for Humanity
- Energy Options Network
- Women in Nuclear Global
- International Youth Nuclear Congress
- Nuclear Industry Council
- Nuclear Energy Institute
- World Nuclear Association
- American Nuclear Society
- Electricité de France



Focus Areas

Exploring innovative applications for advanced nuclear systems both electric and non-electric.

Pooling experience on economics, including valuation, markets structure, and ability to finance.

Engaging policy makers and stakeholders regarding energy choices for the future.

Communicating nuclear energy's role in clean integrated energy systems and developing the nuclear workforce of the future.

Participant Countries

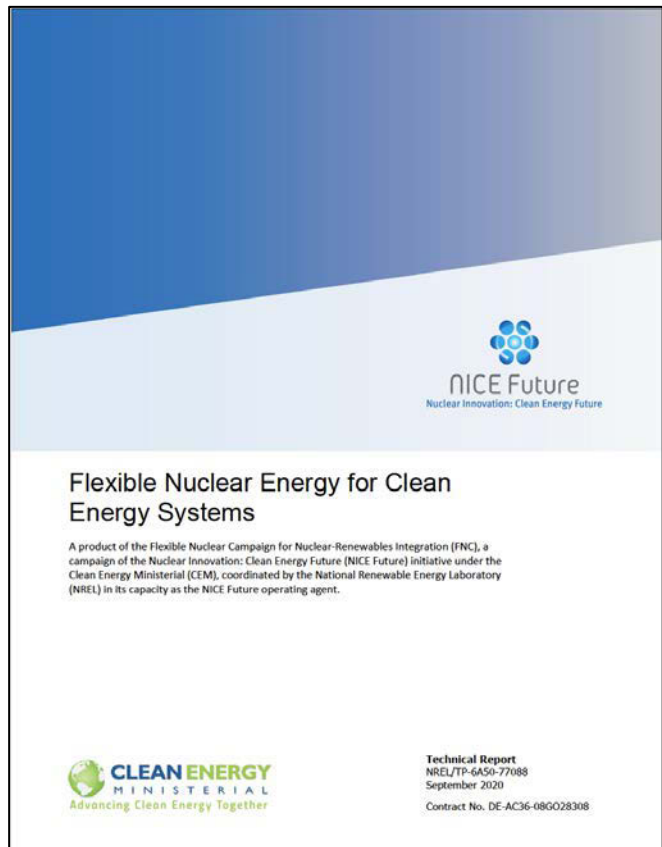


For more information, visit nice-future.org.



FLEXIBLE NUCLEAR CAMPAIGN
FOR NUCLEAR-RENEWABLES INTEGRATION

A CAMPAIGN OF THE CLEAN ENERGY MINISTERIAL



- The purpose of the NICE Future initiative and Flexible Nuclear Campaign is to pool international experience with continued advancements in nuclear technologies and share this experience with the broader CEM community.
- The Flexible Nuclear Campaign is an exploration of the potential for nuclear to fit into an energy system to create a clean-energy future that will sustain the planet and allow its citizens to thrive.
- Development of a technical report engaged experts from nine ministries, five multi-governmental organizations, and 14 other organizations.



- Full report available at <https://www.nice-future.org/flexible-nuclear-energy-clean-energy-systems>

Contributions from a diverse set of authors and advisors



- Natural Resources Canada
- UK Dept for Business, Energy and Industrial Strategy
- US DOE and Dept of State
- Agency for Natural Resources and Energy, Ministry of Economy, Trade and Industry of Japan
- ClearPath
- Energy for Humanity
- Canadian Nuclear Association
- Canadian Nuclear Laboratories
- Japan Atomic Energy Agency
- Japan Atomic Industrial Forum
- Kenya Nuclear Power & Energy Agency
- UK Nuclear Industry Association
- UK Nuclear Innovation and Research Office
- Gen IV International Forum
- International Atomic Energy Agency
- International Energy Agency
- OECD Nuclear Energy Agency
- World Nuclear Association
- Electricite de France
- Exelon Generation
- Nuclear Energy Institute
- Idaho National Laboratory
- Massachusetts Institute of Technology
- National Renewable Energy Laboratory
- Tokyo Institute of Technology
- American Nuclear Society
- International Framework for Nuclear Energy Cooperation
- International Framework for Nuclear Energy Cooperation
- LucidCatalyst
- U.S. Nuclear Industry Council

“ We are excited about the innovative systems that are being explored to power our future. By harnessing nuclear energy innovation through closer global co-operation, the world will be cleaner, healthier, and more prosperous.”

*Dr. Rita Baranwal
Assistant Secretary for Nuclear Energy
U.S. Department of Energy (DOE)*

*Mallie Johnson
Assistant Deputy Minister
Low Carbon Energy Sector
Natural Resources Canada (NRCAN)*

*Kihara Shinichi
Deputy Commissioner for International Affairs
Agency for Natural Resources and Energy (ANRE)
Ministry of Economy, Trade and Industry (METI), Japan*

*Stephen Speed
Director for Civil Nuclear
UK Department for Business, Energy
and Industrial Strategy (BEIS)*



Key Findings: Flexible Nuclear Energy for Clean Energy Systems



- Flexibility: *“The ability of nuclear energy generation to economically provide energy services at the time and location they are needed by end-users. These energy services can include both electric and non-electric applications utilizing both traditional and advanced nuclear power plants and integrated systems.”*
- **Operational flexibility:** There is an established body of knowledge surrounding current sources of flexible nuclear energy and its constraints.
- **Product flexibility:** Innovation can increase the flexibility of existing nuclear reactors to produce both clean electricity and beneficial non-electric products.
- **Deployment flexibility:** Advanced reactors will present even more opportunities for flexibility in nuclear systems at various scales.

Nuclear flexibility can enable other clean energy generators.

<https://www.nice-future.org/flexible-nuclear-energy-clean-energy-systems>



FLEXIBLE NUCLEAR CAMPAIGN
FOR NUCLEAR-RENEWABLES INTEGRATION

A CAMPAIGN OF THE CLEAN ENERGY MINISTERIAL

Nuclear is evolving into **a more flexible energy source** that can work alongside chemical plants and renewable generators to create integrated energy systems.

THE FLEXIBILITY OF NUCLEAR

energy.gov/ne

Reimagining Nuclear-Renewable Systems with Innovation



Integrated nuclear-renewables

Desalination for drinking water

Process heat

Flexible electricity grids

Hydrogen production and energy storage

Advanced smart designs (SMRs/Gen IV)

Nuclear waste reduction

Thank you!

NREL/PR-6A50-77960

www.nice-future.org

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