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Flexible Nuclear Energy for Clean Energy Systems

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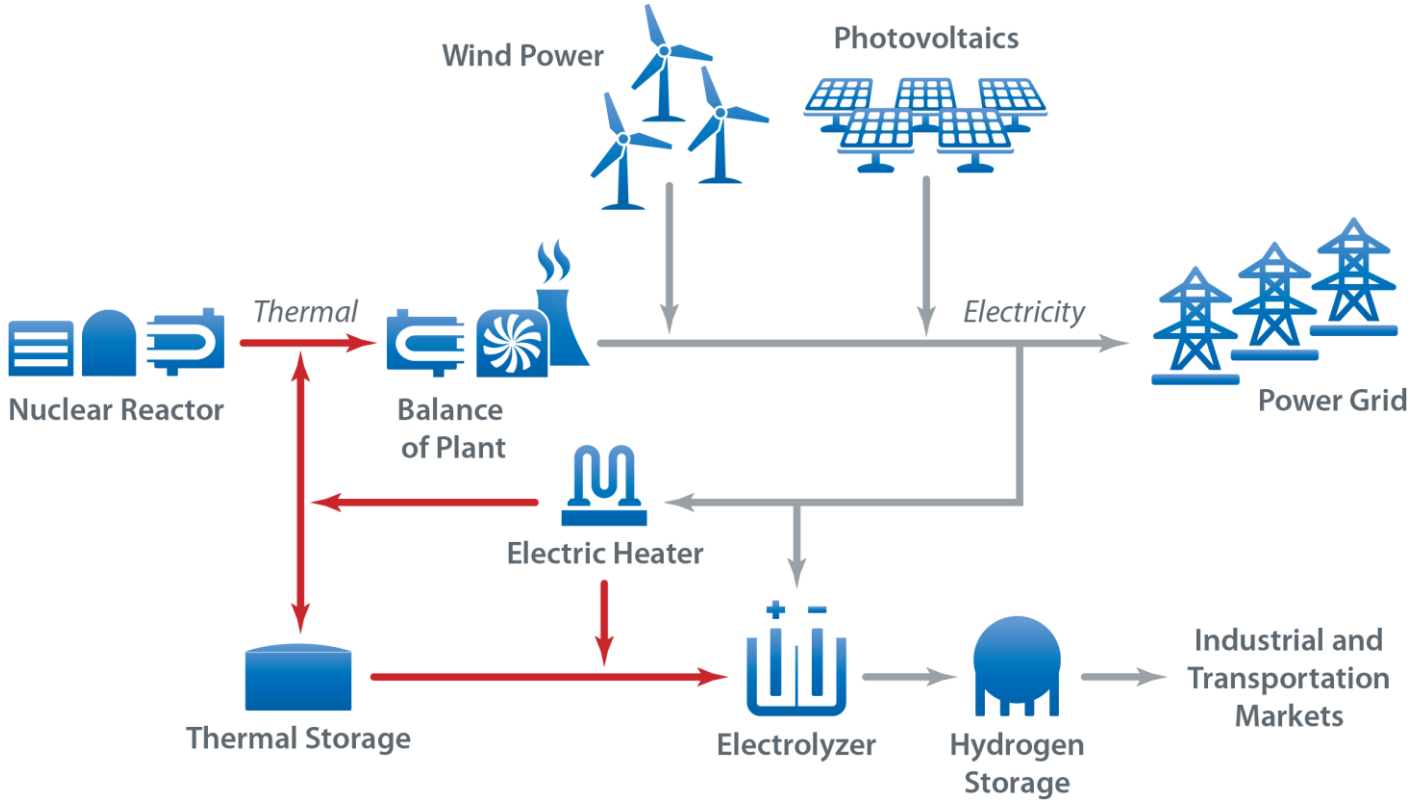
NICE Future
Nuclear Innovation: Clean Energy Future
An Initiative of the Clean Energy Ministerial

Renewable-nuclear hybrid energy solutions



Source: Ruth, Mark, et al, 2016. The Economic Potential of Two Nuclear-Renewable Hybrid Energy Systems, NREL/TP-6A50- 66073. https://www.nrel.gov/docs/fy16osti/66073.pdf

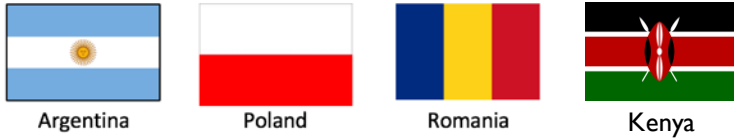
International Efforts for Clean Energy—Nuclear Innovation: Clean Energy Future (NICE Future), an initiative of the Clean Energy Ministerial

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.

Lead Countries

Canada Japan USA

Participant Countries



Argentina Poland Romania Kenya

Russia UAE UK Jordan

CLEAN ENERGY MINISTERIAL
Advancing Clean Energy Together

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.

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

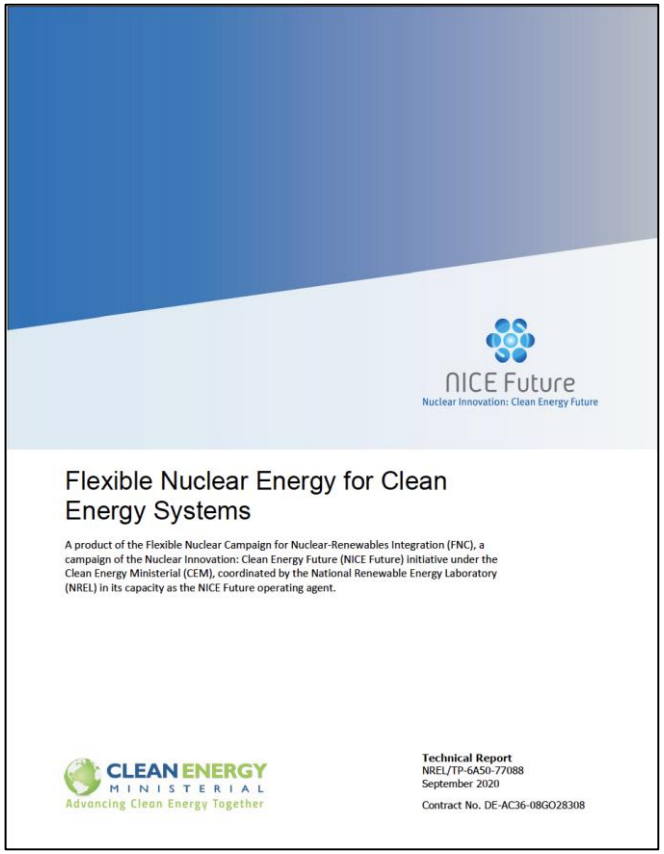
World Nuclear Association

American Nuclear Society

Electricité de France

For more information, visit **nice-future.org**.

Flexible Nuclear Energy for Clean Energy Systems Campaign



FNC 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

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

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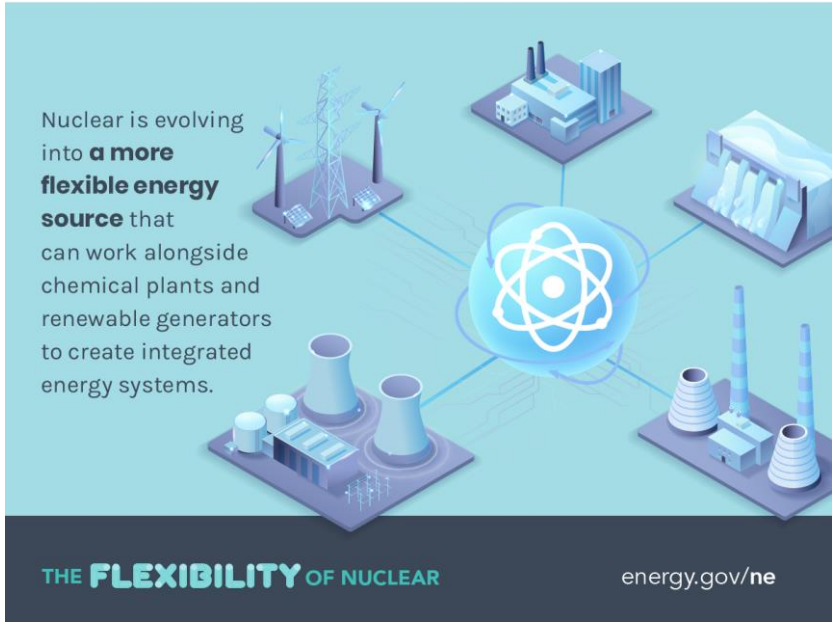

Reimagining Nuclear-Renewable Systems with Innovation

- 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

Images courtesy of GAIN and Third Way, inspired by the *Nuclear Energy Reimagined* concept led by INL.. Learn more at thirdway.org/blog/nuclear-reimagined

Thank you!

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www.nice-future.org

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