

Nuclear Energy in the U.S. and Worldwide

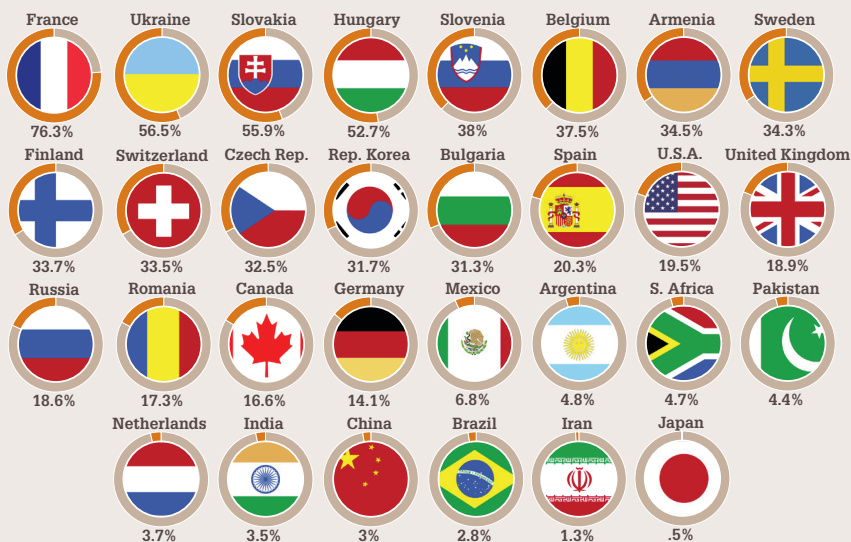
Worldwide Electricity Generated by Commercial Nuclear Power

Nuclear technology was first developed in the 1940s initially for producing weapons, but President Dwight Eisenhower's Atoms for Peace program shifted the focus to power generation, scientific research, and the production of medical and industrial isotopes. Today, nuclear technology is global, and nuclear-generated power is a part of the worldwide energy portfolio.

As of June 2016, there were 445 operating reactors in 30 countries with a total installed capacity of 387,441 megawatts electric (MWe). In addition, two nuclear power plants were in long-term shutdown and 64 were under construction. Based on preliminary data from 2015, France had the highest portion (76 percent) of total domestic energy generated by nuclear power. (Figure 6: Nuclear Share of Electricity Generated by Country).

See Appendix R for the number of nuclear power reactor units by nation and Appendix S for nuclear power reactor units by reactor type, worldwide.

Figure 6. Nuclear Share of Electricity Generated by Country



Note: The country's short-form name is used.

Source: IAEA, Power Reactor Information System database, as of May 2016

In addition to generating electricity, nuclear materials and technology are used worldwide for many other peaceful purposes, such as:

- Radioactive isotopes diagnose and treat medical conditions.
- Irradiation makes food safer and last longer and assists in making pest-resistant seed varieties with higher yields.
- Nuclear gauges maintain quality control in industry.
- Radioactive isotopes date objects and identify elements.

The NRC engages in international activities to exchange regulatory information related to the safe and secure civilian use of nuclear materials and technologies.

International Activities

The NRC aims its international efforts to meet needs identified by the Commission. The Office of International Programs oversees the regulatory framework for licensing exports and imports of nuclear materials and equipment. It also facilitates cooperation and assistance programs for other countries. Many NRC international activities are required by U.S. law, including international conventions and treaties.

The NRC works with multinational organizations, such as the International Atomic Energy Agency (IAEA), and directly with regulators in other countries through research and cooperation agreements.

See Appendices X, Y, and Z for lists of international activities.

These activities allow the NRC to share and learn the best regulatory safety and security practices. Joint research projects also give the NRC access to research facilities not available in the United States.

Conventions and Treaties

Several conventions and treaties address nuclear safety and security. All countries that ratify such conventions and treaties must take action to implement them. These international agreements help ensure high levels of safety and security are given proper attention. The Treaty on the Non-Proliferation of Nuclear Weapons is one of the most important treaties obligating the U.S. Government to cooperate with and provide assistance to other treaty parties that seek the benefits of peaceful uses of nuclear energy.

NUCLEAR ENERGY IN THE U.S. AND WORLDWIDE

The NRC works with other U.S. agencies to implement conventions and treaties by establishing and enforcing rules, regulations, and policies that address the following issues:

- nuclear nonproliferation
- export and import licensing
- safety
- international safeguards
- physical protection
- emergency notification and assistance
- spent fuel and waste management
- liability

The NRC participates in international meetings related to conventions, and at these meetings, the U.S. Government presents national reports detailing how the United States meets its obligations. Each report is peer reviewed by participating nations with the goal of encouraging all countries to enhance their regulatory programs.

Export and Import Licensing

The NRC conducts reviews to license exports and imports of nuclear materials and equipment. The NRC must determine that such exports and imports will not undermine common defense

and security and will not pose an unreasonable risk to U.S. public health and safety. The NRC's export and import regulations are found in 10 CFR Part 110, "Export and Import of Nuclear Equipment and Material." The NRC participates in meetings of the Nuclear Suppliers Group, and the Code of Conduct on the Safety and Security of Radioactive Sources (see the Web Link Index for the Code of Conduct) to ensure that U.S. export and import controls are appropriate.

See Appendix Z for a web link to a list of export and import licenses.



Photo courtesy of IAEA

The NRC participates in the annual General Conference for the International Atomic Energy Agency in Vienna, Austria.

Bilateral Cooperation and Assistance

The NRC has information-sharing agreements with other countries, including Taiwan, and the European Atomic Energy Community (see Appendix Y for the list of countries that have bilateral information exchange and cooperation agreements with the NRC).

Cooperation

There are a wide range of programs that enhance the safety and security of peaceful nuclear activities worldwide. With countries that have mature nuclear power or radioactive materials programs, the NRC focuses on sharing information and best practices. With countries that have new programs, the NRC focuses on helping develop and improve their regulatory activities.

See Appendix Y for a list of the NRC's participation with multilateral organizations and a list of countries with bilateral information exchange and cooperation agreements with the NRC.

Some of the benefits of consulting with other countries include:

- awareness of reactor construction activities that could apply to new reactors being built in the United States
- prompt notification to foreign partners of U.S. safety issues
- sharing safety and security information

The NRC's Advisory Committee on Reactor Safeguards (ACRS) also works with advisory committees in other countries. The ACRS exchanges information with these committees through annual working group meetings. It holds plenary meetings every 4 years.

Assistance

The NRC offers training, workshops, and peer review of regulatory documents to assist other countries as they develop or enhance their national nuclear regulatory infrastructures and programs. The agency also supports and participates in regional working group meetings to exchange technical information among specialists. If asked, the NRC will respond directly to countries looking for help to improve their controls of radioactive material.

Foreign Assignee Program

The NRC provides on-the-job training to foreign nationals at NRC Headquarters and the regional offices. The NRC's Foreign Assignee Program allows the NRC staff to exchange information with regulators from around the world. This helps both agencies better understand the other's regulatory programs, capabilities, and commitments. It also helps enhance the expertise of both foreign assignees and the NRC staff. The program also fosters relationships between the NRC and key officials in other countries.

Multilateral Cooperation and Assistance

The NRC plays an active role in the different programs and committee work of global organizations. The agency works with multiple regulatory counterparts through the IAEA, the Organisation for Economic Co-operation and Development's Nuclear Energy Agency, and other multilateral organizations on issues related to:

- safety research
- radiation protection
- risk assessment
- emergency preparedness
- waste management
- transportation
- safeguards
- physical protection
- security
- standards development
- training
- technical assistance
- communications

International Cooperative Research

The NRC participates in international cooperative research programs to share U.S. operating experience and to learn from the experiences of other countries. The NRC also participates in international efforts to improve the security of radioactive materials and the management of radioactive wastes.

The NRC participates in cooperative research programs with many countries and Taiwan. This helps leverage access to foreign test facilities otherwise unavailable to the United States.



NRC Chairman Stephen Burns, representing U.S. Secretary of State John Kerry, attends the 2015 Nuclear Non-Proliferation Treaty Review Conference in the Council Chamber of the United Nations in New York.