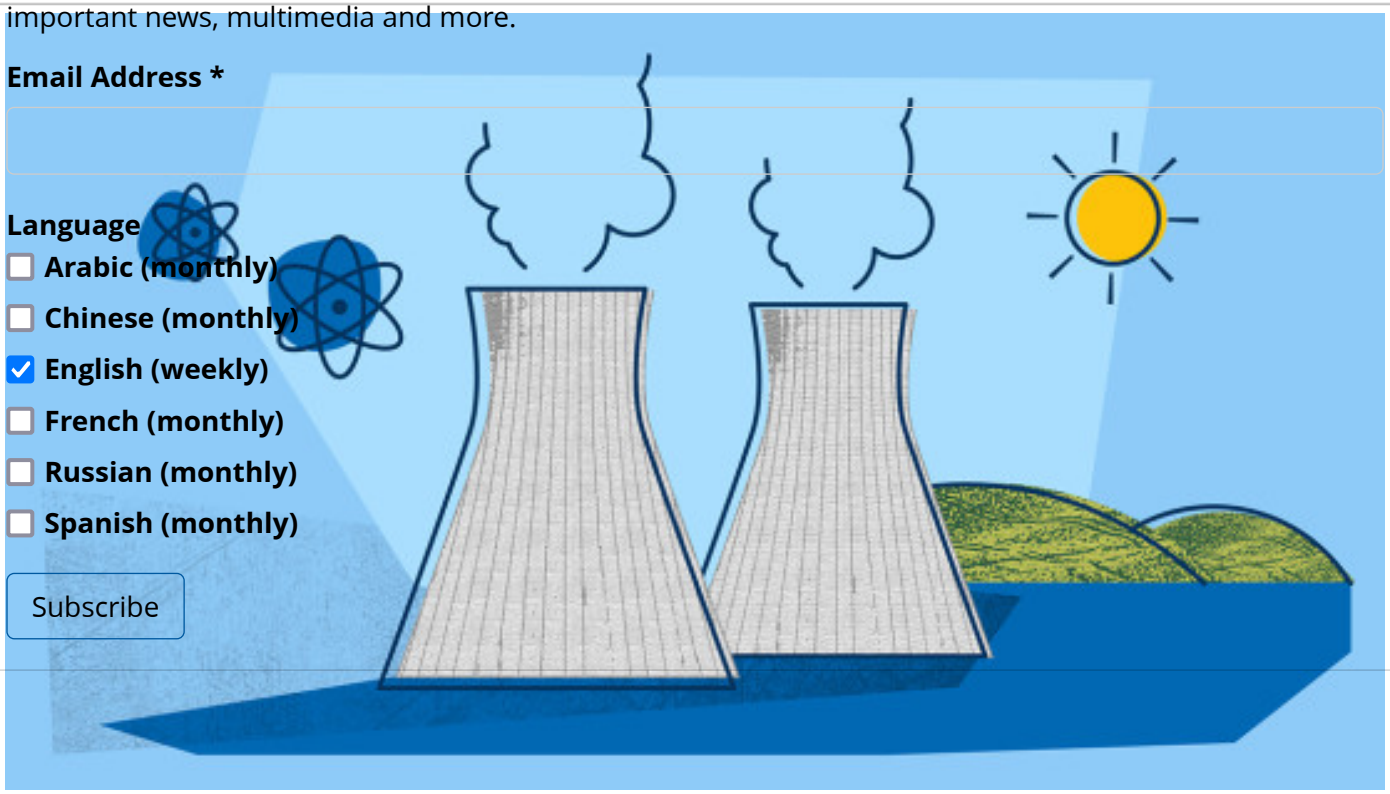
Andrea Galindo, IAEA Office of Public Information and Communication



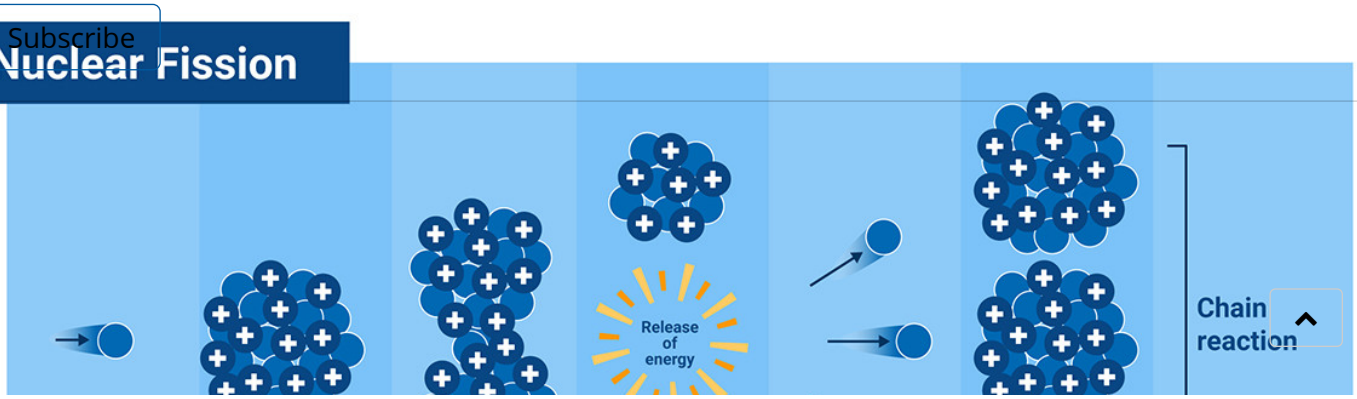
(https://www.iaea.org/sites/default/files/styles/original_image_size/public/nuclearpower2-1140x640.jpg?itok=0LnH1d8E)

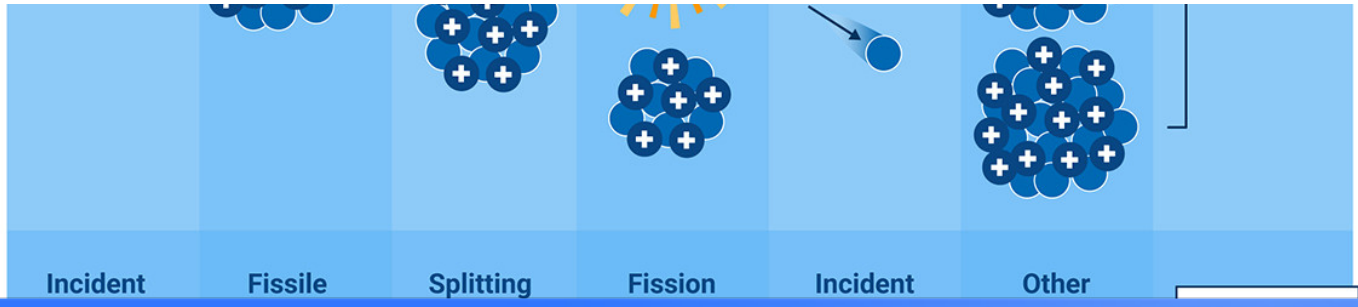
Nuclear energy is a form of energy released from the nucleus, the core of atoms, made up of protons and neutrons. This source of energy can be produced in two ways: fission – when nuclei of atoms split into several parts – or fusion – when nuclei fuse together.



For instance, when hit by a neutron, the nucleus of an atom of uranium-235 splits into two smaller nuclei, for example a barium nucleus and a krypton nucleus and two or three neutrons. These extra neutrons will hit other surrounding uranium-235 atoms, which will also split and generate additional neutrons in a multiplying effect, thus generating a chain reaction in a fraction of a second.

Each time the reaction occurs, there is a release of energy in the form of heat and radiation (/newscenter/news/what-is-radiation). The heat can be converted into electricity in a nuclear power plant, similarly to how heat from fossil fuels such as coal, gas and oil is used to generate electricity.





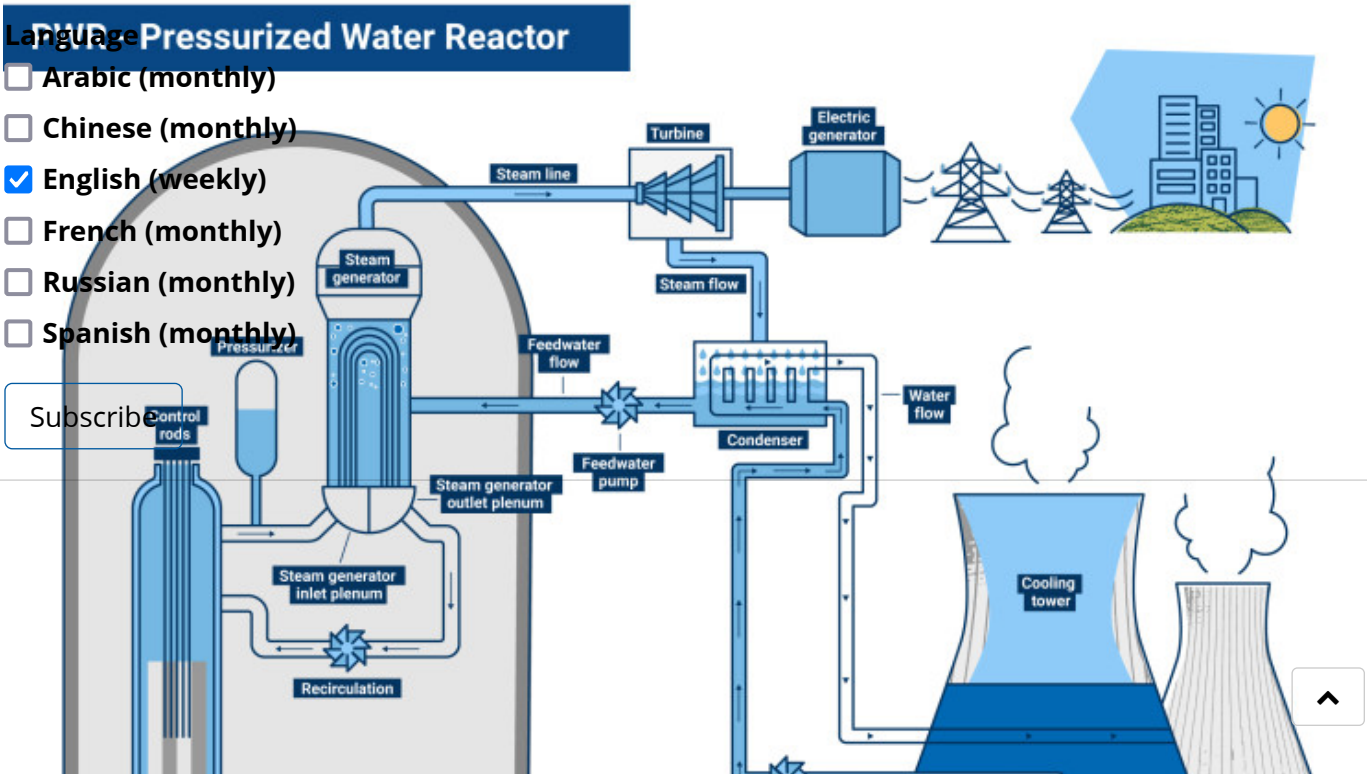


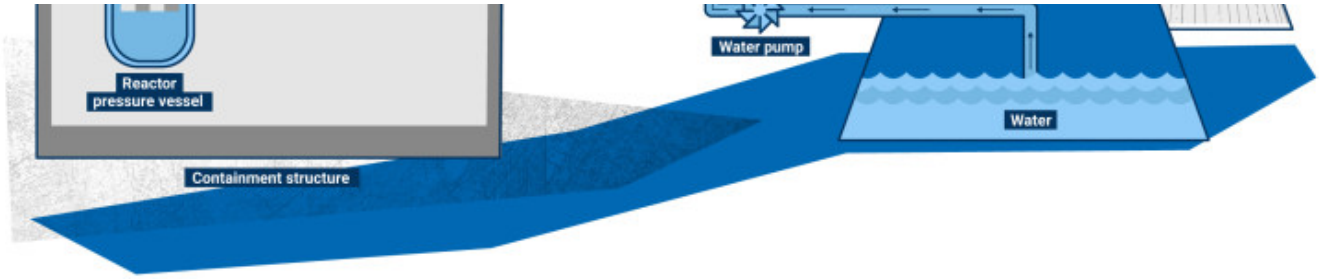

electric generator to create low-carbon electricity.

If you would like to learn more about the IAEA's work, sign up for our weekly updates containing our most important news, multimedia and more.

Find more details about the different types of nuclear power reactors on this page (/topics/nuclear-power-reactors).










uranium-235 can be used to produce energy by fission but constitutes less than 1 per cent of the world's uranium.

To make natural uranium more likely to undergo fission, it is necessary to increase the amount of uranium-235 in a given sample through a process called uranium enrichment. Once the uranium is enriched, it can be used effectively as nuclear fuel in power plants for three to five years, after which it is still radioactive and has to be disposed of following stringent guidelines to protect people and the environment. Used fuel, also referred to as spent fuel, can also be recycled into this type of fuel for use as new fuel in special nuclear power plants.

## What is the Nuclear Fuel Cycle?

The Nuclear Fuel Cycle



nuclear waste.

## Nuclear waste

The operation of nuclear power plants produces waste with varying levels of radioactivity. These are managed differently depending on their level of radioactivity and purpose. See the animation below to learn more about this topic.

### Radioactive Waste Management

Radioactive Waste



generate around 11 % of global electricity. This animation explains how radioactive waste is managed to protect people and the environment from radiation now and in the future.

The next generation of nuclear power plants, also called innovative advanced reactors (/nuclear-power-and-the-clean-energy-transition/advanced-reactors-help-pave-the-way-for-nuclear-power-to-meet-climate-goals), will generate much less nuclear waste (/newscenter/multimedia/videos/radioactive-waste-management) than today's reactors. It is expected that they could be under construction by 2030.

## Nuclear power and climate change

Nuclear power is a low-carbon source of energy, because unlike coal, oil or gas power plants, nuclear power plants practically do not produce $CO_2$ during their operation. Nuclear reactors generate close to one-third of the world's carbon free electricity and are crucial in meeting climate change goals.

To find out more about nuclear power and the clean energy transition, read this

edition of the IAEA Bulletin (/bulletin/61-3).

## What is the role of the IAEA?

- The IAEA establishes and promotes international standards (/resources/safety-standards) and guidance for the safe and secure use of nuclear energy to protect



nuclear energy: from the mining of uranium to the construction, maintenance and decommissioning of nuclear power plants and the management of nuclear waste.
- The IAEA administers a reserve of low enriched uranium (LEU (/topics/iaea-low-enriched-uranium-bank)) in Kazakhstan, which can be used as a last resort by countries that are in urgent need of LEU for peaceful purposes.

*This article was first published on iaea.org on 2 August 2021.*

## Related resources

- Energy (https://www.iaea.org/topics/energy)
- Nuclear power reactors (https://www.iaea.org/topics/nuclear-power-reactors)
- Energy, Electricity and Nuclear Power Estimates for the Period up to 2050 (https://www.iaea.org/publications/13591/energy-electricity-and-nuclear-power-estimates-for-the-period-up-to-2050)
- IAEA Projections for Nuclear Power Through 2050 (https://www.iaea.org/newscenter/multimedia/videos/iaea-projections-for-nuclear-power-through-2050)
- Nuclear Power: The Road to a Carbon Free Future (https://www.iaea.org/newscenter/multimedia/videos/nuclear-power-the-road-to-a-carbon-free-future)

Nuclear explained (https://www.iaea.org/newscenter/nuclear-explained)

## More

Last update: 18 Jun 2024