# SDG Perspective

## SDG6 Clean water and sanitation, SDG14 Life below water & SDG15 Life on land

## Nuclear desalination

**Interest in using nuclear energy for fresh water production has been growing worldwide for more than two decades. The problems of climate change and population growth are placing a greater pressure on access to fresh drinking water, which is becoming increasingly difficult to overcome in many parts of the world facing natural water shortages and increased fresh water demands.**

The world is facing critical limitations in the availability of fresh water for residential, agricultural, and industrial uses. There has been a growing support for seawater desalination using nuclear energy (called nuclear desalination), which offers a viable option to meet the growing demand for fresh water supply, especially in developing countries with many arid and semi-arid areas.

Nuclear desalination provides a clean, economic, safe, reliable, and readily available solution, and has the potential to become a major sustainable source of fresh drinking water. Furthermore, nuclear desalination is economically competitive with other desalination techniques driven by other sources of energy and does not require additional safety measures than those already in place for existing nuclear power plants.

Although fossil fuels still play a key role in water desalination projects, nuclear energy has recently gained more attention thanks to greater climate change concerns and recent technological advances in nuclear reactor design, such as small modular reactors.

Nearly all modern SMR designs, from Argentina's CAREM to the United States' NuScale, envisage the possibility of use in desalination. Floating SMR-based plants appear particularly promising for this purpose, as they are capable of operating in remote and inaccessible locations suffering from water scarcity. The list of floating projects worth noting includes the molten salt reactor being developed by the Danish startup Seaborg Technologies, Chinese-designed SMRs that are now under construction, and the currently operating Russian-designed "Akademik Lomonosov" and its next generation counterparts. Rosatom has already announced that two such RITM-200 reactor-equipped plants will be connected to the grid by the end of 2026.

In addition, proposals for integrated solutions and systems using multiple energy sources, including nuclear and renewable energy sources, have been introduced in the past decade to meet multiple energy-intensive needs, including water desalination, industrial process steam, district heating, hydrogen production, and electricity generation.

## Ocean acidification

**The carbon emissions from burning fossil fuels has multiple consequences of great concern, among which is ocean acidification (resulting from the carbon dioxide dissolving in and reducing the water's pH-level). For millions of years, the average ocean water pH has been around 8.2, while today's average of 8.1 represents a 25% increase in acidity in just two centuries.**

The implications of such acidification are manifold, but in large part relate to the reduced availability of carbonate ions in ocean water. Such carbonates are the building blocks for the bottom of our food chain. Phytoplankton, crabs, mussels, corals, and many other species experience a decreased capacity to make shells and skeletons, reducing their chances of survival and successful reproduction. Additionally, studies project that by the end of this century, rising water temperatures brought on by climate change will jeopardize ocean species in such a way that global seafood supply may decline by 50% on average, and economic systems that rely on fishing and tourism revenues may see a 90% decline in business value.

Given the building inertia of these global challenges, decarbonising our energy systems is more urgent than ever. Nuclear power can help to accomplish this now and in the future.

YES TO NUCLEAR PERSPECTIVES I SUSTAINABLE DEVELOPMENT GOALS PERSPECTIVE

## Clean water

**Though nuclear science is known by many as the basis for generating clean, carbon-free electricity, nuclear and isotopic techniques can be used to support the sustainable management of freshwater resources, to improve soil health, and to enhance farming practices and livestock health in support of food production and societal wellbeing.**

More than one third of global food production relies on irrigation, which frequently comes from unsustainable groundwater sources. As climate change disrupts weather patterns and global population growth brings about greater demand for freshwater resources, it will be increasingly important for regional water regulation and conservation efforts to be well informed by knowledge of groundwater activity. Isotope hydrology is a nuclear technique that uses radioactive isotopes to determine source, recharge methods, risk of saltwater intrusion or pollution, and management potential of groundwater.

Radioisotopes are also useful for measuring the quantities of nitrogen and phosphorus present in soil. This helps farmers better calculate the amount of new fertilizer needed to meet the demands of any given crop and maintain optimal soil health. It also prevents over fertilization of soil so that excess nutrients do not escape into the natural environment and pollute waterways and harm local biodiversity.

Nuclear techniques can also help with the sterilization of insects that may be harmful to crops and livestock. The sterilization technique helps to control the population of insects without use of pesticides that may present health risks to humans or the environment. These techniques help to sustainably increase crop productivity and livestock health.

## Biodiversity conservation

**Loss of biodiversity is caused by many factors, but two of the major causes are habitat degradation and loss. This is often caused by urbanisation, agriculture expansions, logging activities and pollution from industry, transport, and human populations.**

With growing interest and political eagerness to build out new clean energy it can be easy to overlook the impacts caused when large areas of land or sea are turned over to energy production. In some instances, generation facilities can be easily incorporated into an already disrupted landscape with minimal impact on biodiversity. However, the buildout of infrastructure on undeveloped land still has that potential to disrupt the natural environment. Thus, an important objective for biodiversity conservation must be to minimize this impact to the greatest degree possible.

Due to the sheer density of nuclear fuel, today's nuclear power plants require a relatively small land mass footprint to produce a similar amount of power as other clean energy sources. Additionally, advanced reactors such as a small modular reactor require a fraction of the area that even conventional plants occupy. Nuclear power can provide a constant, reliable, and clean source of energy, without having to sacrifice natural habitats or compromise biodiversity priorities.