

## CONFERENCE SECRETARIAT

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## LANGUAGE

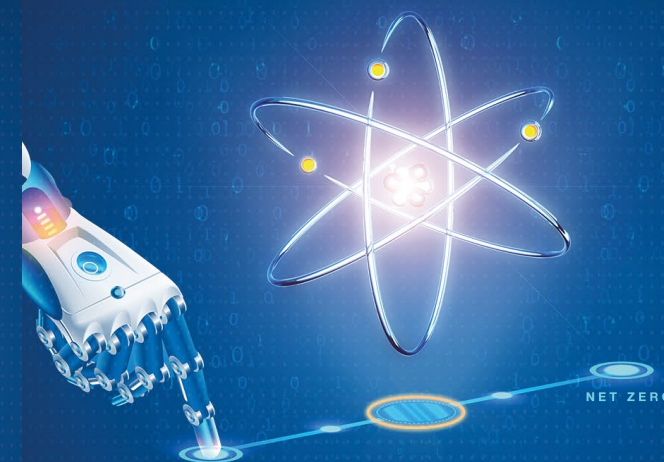
The working language of the Forum will be English.

## CONFERENCE WEB PAGE

Detailed information on administrative procedures including participation and registration is provided on the Forum website: [www.iaea.org/scientific-forum](http://www.iaea.org/scientific-forum)

**SCIENTIFIC FORUM**  
NUCLEAR ENERGY FOR CLIMATE

26–27 SEPTEMBER



## NUCLEAR INNOVATIONS FOR NET ZERO



VIENNA INTERNATIONAL CENTRE  
Board Room D / C Building / 4th Floor

#ScientificForum  
IAEA.ORG



2023

## BACKGROUND

Innovation is the bedrock of human development. In about two centuries, humanity, armed with technological innovations, has brought unimaginable transformation to the world. But development has also created challenges such as climate change and environmental pollution. Nuclear power, with a proven low carbon footprint and experience of safe, secure and stable operation over decades, provides an alternative to replace fossil energy-based plants quickly.

New nuclear plants will be small, modular, transportable, and dedicated to specific needs such as supplying backup power to the modern electricity grid, heating cities, towns or industries or producing hydrogen to decarbonize the transport sector. Microreactors could offer quick solutions for energy needs in remote areas or for dedicated industrial exploration needs. Developers worldwide are investigating exciting technologies based on concepts that would be inherently safe and reliable.

In four sessions over two days, leading experts from around the world will highlight the role of new nuclear reactors for energy production; explore the importance of innovations, such as artificial intelligence (AI), digitalization, robotics and advanced manufacturing, in supporting nuclear development; and showcase how nuclear technology can be used to avoid greenhouse gases in industrial applications and other areas.

## OPENING SESSION

IAEA Director General Rafael Mariano Grossi will open the Forum with high-level speakers and a keynote speaker. Together they will explore how innovations in nuclear technologies can help quickly replace fossil-based energy production with safe and reliable low-carbon nuclear power.

They will discuss how the nuclear sector is currently buzzing with innovations and how quickly these novel technologies can come online to enlarge the contribution of nuclear power in achieving net zero.

## SESSION 1

### New Nuclear Reactors for Energy Production

Current advanced reactor designs provide new options for use and include extensive built-in safety features. Small modular reactors increase flexibility in capacity thanks to integrated energy systems. Fast reactors, thorium reactors and other new technologies can provide novel fuel cycle solutions.

The first session will focus on new reactor concepts that have already been implemented and present visionary outlooks for future developments. It will showcase how innovative ideas for small and large reactors will shape our energy future.

## SESSION 2

### Innovative Solutions to Support Nuclear Development

The prospects of nuclear power do not depend only on innovations in reactor technologies. Digitalization improves performance and reliability while moderating human factors. Security of supply, availability of waste and spent fuel solutions, decommissioning preparedness and other factors play an essential role in the future of nuclear power and should also be adopted in reactor technology developments. There are already many cases of how innovations, such as AI, digitalization, robotics and advanced manufacturing, are paving the way for safe and sustainable solutions supporting nuclear development.

The second session will explore how innovative solutions — from front end to back end — will enable extended prospects of nuclear power. It will highlight innovations that have already been implemented and present outlooks for future solutions that will support NPP design and operation, fuel cycle and end of life activities.

## SESSION 3

### Nuclear Power Going Beyond Electricity Production

Today, high-emitting fossil fuels power most industrial processes, transport and building heating systems. The expanded use of nuclear power for industrial purposes, including district heating, desalination and industrial processes in remote locations, and new deployment models such as floating nuclear power plants, offer options to reduce emissions and increase the security of supply of the global energy system.

The third session will showcase how nuclear technology can be used to avoid greenhouse gases in new applications. Speakers will discuss how innovative concepts could contribute to resilient energy systems through a wide range of deployment options.

## CLOSING SESSION

### The way forward

The closing session will be a high-level panel underlining findings and drawing conclusions for Member States and the IAEA and discussing concrete steps to realize the full potential of nuclear power for net zero emissions.