SMRs & AMRs

for the sustainable development and its role in combating climate change

UK Perspective

The essential role of nuclear power in promoting achievement of the 17 UN Sustainable Development Goals and in combating climate change is now well understood. Until recently however, nuclear power plants have mainly delivered large quantities of low-carbon baseload electricity in areas where widespread grid capacity already exists.

The arrival of Small Modular Reactors (SMRs) and Advanced Modular Reactors (AMRs) is about to change that. By the end of this decade a new generation of nuclear reactors may introduce previously undreamed of flexibility to the way in which nuclear power contributes to greater energy security and affordability in all parts of the world. Reactors with a capacity of 300MW will be capable of being effectively deployed in places where grid connections have not yet been established.

The modular nature of these plants will also hold out the prospect of lower construction costs and reduced capital requirements. This will make nuclear power available to many more countries and regions.

The UK government recognises the potential benefits of SMRs and is actively supporting the development of the new technology which is needed. This is being done with the aim of reestablishing Britain as a significant supplier of nuclear equipment.

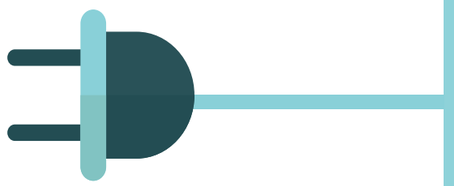
By extending the places where nuclear power can be delivered and by cutting the cost of new nuclear generation capacity SMRs and AMRs will enable nuclear to play an even bigger role in overcoming the threat of irreversible climate change.

European Perspective

Nuclear energy has significant potential to serve the world's energy needs while also decarbonising industrial processes and energy services. Evaluating sustainable development requires a more systemic view of the decarbonisation chain from energy resources to the services they provide, including sustaining rapidly growing electrification in many parts of the world. As such, there is an increasing need for nuclear power to help meet local and regional electricity demands and provide non-electricity power for industrial and residential use, as well as specialized uses such as water desalination.

While there is an ongoing demand for larger nuclear power plants in Europe, new SMRs will be optimal for many of these new market uses while also offering new and affordable investment opportunities.. Within Europe, SMRs also have a market niche in replacing fossil-fuelled generating plants and providing new decarbonised power to developments and industrial centres.

In due time, AMRs can further improve the sustainability of nuclear energy by reusing the spent fuel from older nuclear reactors and reducing our reliance on natural uranium resources. More integrated nuclear energy systems on a global level hold the promise to provide 365/24/7 sustainable energy to all while decarbonising our socio-industrial undertakings and reducing the amount of natural resources used and spent fuel to be managed in the long term.



US Perspective

SMRs and non-light water advanced reactors will be important technologies for combating climate change throughout the world. Companies in the United States are pursuing these technologies to meet growing domestic and global development needs.

To meet its own domestic commitments for decarbonization by 2050, the U.S. must work to minimize carbon emissions in its energy, transportation, and industrial sectors. Advanced nuclear energy, including SMRs, can play an important role by providing carbon-free electricity, clean hydrogen, and heat for industrial purposes.

The U.S. government and private developers, utilities and investors are currently working to demonstrate several advanced reactor technologies by the end of this decade. These demonstrations could pave the way for many new reactors to follow. Some of these reactors will add new capacity to the electrical grid, while others are set to replace fossil fuel generation.

In June 2021, one advanced nuclear developer, TerraPower, announced they would build their reactor, Natrium, in Wyoming at the site of a retiring coal plant. The project will provide carbon- free energy, and the project site allows the new reactor to access existing plant structures and transmission lines. The project will also promote economic stability and job growth for the local community once dependent on the coal plant.

YES TO NUCLEAR PERSPECTIVES I INDUSTRY PERSPECTIVE

Energy Security of SMRs and AMRs

SMRs and AMRs are fast becoming a viable energy option that will not only help steer the world towards its climate goals, but at the same time offer a reliable and green source of energy to remote communities where traditionally dirty and less dependable energy solutions were employed.

An SMR can provide a constant and reliable source of power, while at the same time providing energy security.

Remote communities, such as small islands and isolated regions, previously relied on fossil fuel burning power stations or hundreds of kilometres of power cables to meet their energy needs. This reliance came with many risks – supplies of fuel could be interrupted by bad weather or supply chain issues. Without these risks, communities are far better placed to deal with varying energy demands. A reliable power source can also keep services and industry running through naturally occurring events and disasters.

This energy security can also be used to the advantage of more developed and populated regions. Locally-sited SMRs can provide for the energy needs of heavy industry without placing a strain on national grids. Vital services, such as hospitals, can be assured of their energy supply without the risk of interruption while back up generators come online.

Viewpoint

by World Nuclear Association

World Nuclear Association is the international organization that represents the global nuclear industry and promotes a wider understanding of nuclear energy among the public and key decision makers.

For over 60 years, nuclear energy has provided much of the world with reliable and always-on low-carbon power from gigawatt-scale reactors. To this day, such large-scale reactors remain the only proven, reliable and cost-effective low-carbon technology ready to be deployed at the scale and in the timeframe required to meet the Paris Agreement goals. It is essential that their continued deployment is fast-tracked to meet the increasing global demand and need for clean and reliable electricity.

Meanwhile, a growing array of over 70 small modular reactor (SMR) designs are at various stages of development and hold great promise for the near future. The technologies, designed with modularity and factory fabrication in mind, are numerous and diverse. Due to their small size, the capital outlay per unit is lower, and the smaller overall size of projects may make financing more straightforward.

To balance diseconomies of scale, SMRs aim to foster economies of series through the creation of a global market, as already proven in other industries (e.g. shipbuilding, aircraft). Countries seeking to benefit from using SMRs in their energy mix should proactively work on streamlining international licensing and regulatory processes where possible.

As SMR designs reach commercial maturity, their role in decarbonization is expected to grow rapidly. They will complement large reactors, broadening the markets and applications of nuclear energy, providing process heat, hydrogen, or electricity where the use of large-scale units proves impractical. Working together, large and small nuclear plants will play a key role as humanity rises to the dual challenge of reducing harmful emissions, whilst providing more affordable clean energy to more people.

WORLD NUCLEAR ASSOCIATION

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