Safety of Advanced Nuclear Energy

Summary

- **Advanced reactors build on the nuclear industry's modern record of safety with features that further reduce accident risks, including passive safety and reduced use of materials**
- **Nuclear energy is overseen by independent nuclear regulators. The U.S. Nuclear Regulatory Commission is considered a gold standard in excellence of nuclear regulation and safety**
- **To achieve widespread deployment, advanced reactors will have to demonstrate to independent safety regulators that they can provide adequate protection**

Overview

Advanced nuclear reactors build upon the experience and lessons learned from the existing fleet of nuclear reactors and incorporate additional innovations creating even safer products. Over the course of more than 15,000 reactor-years of operation globally, humanity has gained millions of person-years of experience with nuclear power plants. While there are public concerns about the safety of nuclear energy, nuclear energy remains one of the safest forms of energy production available globally. One key study estimated global nuclear energy production has historically prevented at least 1.75 million deaths related to air pollution and could prevent an additional 7 million more.

Based on operational experience and lessons, advanced reactors feature innovations that further reduce the risks and consequences of accidents. These include:

- Passive or inherent cooling technologies
- Reduced inventory of radioactive material
- Coolants or working fluids with improved thermochemical properties
- New and more robust forms of fuel, such as TRISO, molten salts, and metals
- Operating at reduced or atmospheric pressure
- Underground plant structures to limit operational and security risks

The U.S. Nuclear Regulatory Commission (NRC) provides strong independent regulatory oversight of operating and proposed nuclear power plants. Over the course of its existence, the NRC has protected the public interest and ensured that no member of the public has been harmed by the operation of U.S. nuclear power plants. Today, the NRC is considering and evaluating the merits of numerous different advanced reactor designs as well as different approaches for their deployment. Over the previous several years, the NRC has educated its staff and developed a roadmap to prepare for the licensing and review of advanced reactor designs, drawing upon new and innovative methods of review. These efforts, as well as the strong independent track record of the NRC, will allow the safety cases for numerous advanced reactor concepts to be thoroughly and appropriately vetted. The widespread deployment of advanced reactors will only occur for designs that receive regulatory approval. The careful and deliberate nature of the licensing process will ensure that nuclear power of the future is the safest possible fleet, enabling wide use to mitigate climate change.

For more information, please visit: https://nuclearinnovationalliance.org/safety