Nuclear Energy

Why in news?

Recently Brussels, Belgium hosted the first-ever Nuclear Energy Summit highlighting the role of nuclear energy in addressing climate change.

What are the key highlights of the nuclear summit?

- **Organised by- International Atomic Energy Agency (IAEA) and Belgium.**

- **Aim-** To tackle global challenges such as reducing fossil fuel usage, enhancing energy security, and boosting economic development.
- **COP 28**- The summit followed the triple nuclear pledge by 2050 and historic inclusion of nuclear energy in the Global Stocktake agreed upon at UN Climate Change Conference (COP 28) in Dubai.

  The agreement called for accelerating the deployment of nuclear energy alongside other low-carbon energy sources.

- **Atoms4NetZero -** The summit coincided with the launch of the IAEA's Atoms4NetZero initiative, emphasizing the importance of nuclear energy in the transition to clean energy.
- **Atoms4Climate -** The summit also aligns with IAEA's initiative which focuses on the safe and peaceful uses of nuclear energy and science for climate change mitigation and adaptation
- **Capacity building-** The summit emphasized the importance of capacity building for project execution in countries embarking on nuclear energy development, ensuring efficient use of resources and support for nuclear projects.
- **Project bankability-** Strategies to increase bankability include minimizing project costs, reducing the cost of capital and supporting adequate revenue models.
- **Nuclear non-proliferation**- The Treaty on the Non-Proliferation of Nuclear Weapons (NPT) is central to global efforts to prevent the spread of nuclear weapons and promote peaceful uses of nuclear energy.
- **International collaboration on licensing**- There is a growing demand for international collaboration to establish a unified licensing framework across different countries which would facilitate new build and increase deployment speed.
- **Spent nuclear fuel management**- Managing spent nulear fuel is a critical step in the nuclear fuel cycle, with most fuel stored until a decision on the end-point strategy is made

1/3rd of the global spent fuel is reprocessed while the rest awaits processing or disposal.

- **Workforce development**-Effective human resource management is essential, ranging from education and training to continual performance improvement.

How nuclear energy can promote clean energy transition?

- **Clean energy**- Nuclear power emits 4 times less carbon than solar farms or other renewable sources such as wind, hydropower, and geothermal energy.
- **Combat climate change**- It is a low carbon source of energy, because unlike coal, oil or gas power plants nuclear power plants practically do not produce CO2 during their operation.
- **Energy security-** It has huge potential and can provide the country long term energy security in a sustainable manner.

SDG 7 goal is to "Ensure access to affordable, reliable, sustainable and modern energy for all".

- **Life cycle emissions**- Even considering the full life cycle, nuclear energy's greenhouse gas emissions are significantly lower than those of coal, and generally less than solar and wind.
- **Perennial availability**- Unlike solar or wind, nuclear energy can provide a constant supply of electricity, making it suitable for baseload generation.
- **Decarbonisation**- Intergovernmental Panel on Climate Change (IPCC) has proposed inclusion of nuclear energy in decarbonisation strategies, it has already helped avoid over 1 billion tonnes of CO2 emissions annually.
- **Risk management**- The advancements in nuclear technology such as reactor technology, regulatory frameworks and waste management practices addresses the concerns regarding safety and risk associated with nuclear energy.

To know about the need of nuclear waste click here

India's role in nuclear energy
• India, which currently has 23 operational nuclear reactors, does acknowledge the role of nuclear energy in its decarbonisation plan • **Net Zero Emissions**- India commits to achieving Net Zero emissions by ***2070***, as announced at COP26 in Glasgow. • **Nuclear power growth**-It plans to triple nuclear power generation by 2030 and significant share in electricity mix by 2047. • **Tarapur Atomic Power Station**- It is the oldest nuclear power plant located in Maharashtra which offers energy at competitive rates. • **Kudankulam Nuclear Power Plant-** It is situated in Tamil Nadu that provides electricity at tariffs comparable to coal-fired plants

What are the challenges with nuclear energy?

- **Safety concerns-** Incidents like the Fukushima disaster, 2011 have heightened safety concerns, impacting public perception and investment in nuclear energy.
- **Limited growth-** The decrease in the number of operational nuclear reactors over the past two decades indicates the lack of significant growth in nuclear energy sector.
- **High costs**- Nuclear power requires significant upfront investment and has high operational costs compared to other forms of electricity generation.
- **Fund deficit**- Multilateral Development Banks (MDBs) and private investors have not made any significant contribution to the industry.
- **Regulatory cholesterol-** The nuclear sector is heavily regulated, which can slow down the construction and operation of new reactors.
- **Technological hurdles**- Unlike renewable energy sources, nuclear technology has not seen breakthroughs that significantly lower costs or speed up deployment.
- **Concerns with SMRs**- While Small Modular Reactors are promising, they are not yet widely adopted and face barriers to deployment.

What lies ahead?

- The need of the hour is technological innovation and financial investment for the large scale adoption of nuclear energy.
- International funding models such as *Mankala* in *Finland* must be adopted which have been successful in supporting nuclear energy projects.

References

1. Indian Express- Nuclear energy as climate solution
2. The Hindu- Nuclear energy fixing finance