TATHASTU ICS

DAILY CURRENT AFFAIRS

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KK/AJ

CAN SMRS HELP INDIA ACHIEVE NET ZERO?

SOURCE: TH

SYLLABUS: GS III ENVIRONMENT AND SCIENCE & TECH.

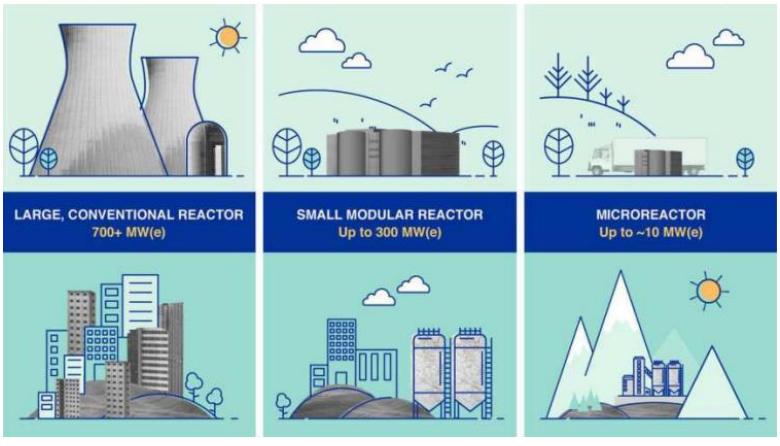
BACKGROUND:

The global focus on decarbonization, guided by the **UN Sustainable Development Goal 7,** emphasizes affordable and reliable energy access. With fossil fuels still dominating 82% of energy supply, decarbonizing the power sector is crucial, especially as electricity's share in final energy consumption is expected to rise significantly by 2050. The need for reliable low-carbon electricity, evident from coal consumption rise in Europe despite solar and wind growth, highlights the importance of **small modular reactors (SMRs)** – a type of nuclear reactor – in aiding India's pursuit of deep decarbonization, grid stability, and energy security.

WHAT ARE THE CHALLENGES OF DECARBONISATION?

- Policymakers agree solar and wind alone can't provide affordable energy.
- Incorporating firm power-generating technology in renewable-heavy grids enhances reliability and reduces costs.
- International Energy Agency predicts up to 3.5x rise in demand for critical minerals (like lithium, cobalt) by 2030 for clean energy.
- Challenges include major investments in new mines, processing facilities for required minerals.
- Top mineral-producing nations controlling 50-100% of extraction capacities pose geopolitical risks.

WHAT ARE THE ISSUES WITH NUCLEAR POWER?



- Nuclear disaster risks from **radiation leaks** can cause genetic defects and mutations.
- **Costs of clean-up** for disasters like Fukushima exceed US$ 600 billion.
- Nuclear power plant construction often faces **cost overruns**, as seen in the V.C. Summer project.
- Some proposed foreign reactors, like VVER and AP1000 designs, have **operational issues**.
- Fukushima accident led to **local protests** against new reactors like the Mithivirdi project.
- Solar and wind energy emerge as **cheaper alternatives**, while nuclear costs remain higher.
- Incompatibility between India's liability law and international conventions hampers foreign research.

- **India's absence from Nuclear Supplier group and Non-Proliferation treaty** limits technology access.

WHAT ARE THE ADVANTAGES OF SMRS?

- SMRs offer **lower core damage** frequency and radioactive contamination risks.
- Enhanced seismic isolation and passive safety features **increase safety**.
- SMRs have **simpler designs**, reducing potential radioactive material releases.
- SMRs require **less storage** space for spent nuclear fuel compared to conventional plants.
- SMRs **can be safely operated at brownfield sites** with **less stringent zoning requirements.**
- Transitioning to SMRs **improves energy security** and takes India closer to net-zero.
- SMRs typically **use low-enriched uranium** from countries with uranium mines and facilities.
- Factory manufacturing and on-site assembly **reduce time and cost overruns**.
- SMRs have a levelized cost of electricity around $60-90 per MWh, expected to drop further.
- International cooperation and reputable companies manufacturing SMRs contribute to cost reduction.

THE ROLE OF NUCLEAR ENERGY IN THE GLOBAL TRANSITION TO CLEAN ENERGY

- Energy transition involves rapidly introducing low-emission energy technologies and incorporating non-fossil energy sources into the primary energy mix on a global scale.
- The **International Atomic Energy Agency (IAEA)** reports that there are currently 413 operational nuclear power reactors worldwide with a combined net installed capacity of 368 GW(e) as of April 2023. This capacity is expected to double to 871 GW by 2050.
- Nuclear power contributes nearly 10% of the global electricity mix.
- According to the IAEA, nuclear power has prevented the release of 70 Gt of CO_2 emissions over the last five decades and continues to prevent about 1 Gt of CO_2 emissions annually.
- The **International Energy Agency (IEA) recognizes the significance of nuclear energy in the energy transition.**
- The United Nations Economic Commission for Europe (UNECE) acknowledges nuclear power as an essential tool in achieving the Sustainable Development Goals (SDGs).

WAY FORWARD:

- **Advancement of Technology:** Ongoing research and development efforts are imperative to enhance and perfect SMR designs.
- **Cost Efficiency and Standardization:** Ensuring cost competitiveness is crucial for the widespread adoption of SMRs.
- **Regulatory Alignment and Safety Evaluation:** Safety assessment methodologies should be updated to consider multi-module designs and emergency planning zones.
- **Skilled Workforce Formation:** Developing a skilled workforce across the SMR value chain, from development to operation, is critical.
- **Collaborative Partnerships:** Collaboration between national labs, research institutions, private companies, and government bodies is vital for technology advancement, safety assessment, regulatory coordination, and research alignment.
- **Building Consensus and Engaging Stakeholders:** Transparent communication and participatory processes with communities, environmental groups, and industry representatives are essential to garner acceptance and support for SMR projects.

THE GRAMMAR OF COMMERCE IN A NEW AGE OF GEOPOLITICS

SOURCE: TH

SYLLABUS: INTERNATIONAL RELATIONS, ECONOMY

WHY IN NEWS?

There seems to be a new financial architecture, where currencies of the South are ready to replace the hegemonic and exploitative order enjoyed by currencies and economies of the North.

SHIFT TOWARDS LOCAL CURRENCY TRANSACTIONS:

• Since 2018, 23 advanced and developing countries have agreed to have currency swap arrangements with India.
• Extension of credits in transactions is due to India's potential as a large market.

RUPEE'S INTERNATIONAL PAYMENT USAGE:

• Ukraine-Russia war in early 2022 triggered a greater shift in using Indian rupee for international transactions.
• United States and European Union imposed sanctions on Russia, affecting Russian financial institutions.
• India, a significant market for Russian exports, faced challenges due to the sanctions.
• Alternative approach: Settling India-Russia trade payments in Indian rupees.

MODALITIES OF RUPEE-BASED PAYMENTS:

• Payments from India and Russia channelled to Rupee Vostro accounts in Russian banks by authorized Indian banks.
• Indian importers pay rupees to Rupee Vostro account against invoices from Russian suppliers.
• Accounts used for payments related to mineral fuels, crude oil, air defense systems, and more.
• Exports from India also settled in rupees through corresponding Russian bank.

CHALLENGES IN THE RUPEE PAYMENT SYSTEM:

- **Bilateral Trade Imbalance:** Countries with higher exports to India than imports might not be interested in trading in rupees. The Vostro account mechanism works well when trade is balanced, but trade surplus for one country can lead to limited benefits.
- **Limited Applicability:** Rupee-based trade settlements might be feasible for nations like Russia, Iran, and Sri Lanka due to sanctions or economic challenges. However, India's share in global trade is relatively small, and countries may not prefer rupee invoicing unless it aligns with their interests.
- **Bilateral Exchange Rate:** Trade between countries depends on multiple factors, including economic relations, product quality, pricing, and exchange rates. Exchange rates influence import costs.
- **Trade Protectionism:** In a climate of global trade protectionism and geopolitical tensions, nations aim to boost exports and decrease imports. Settling trade in rupees instead of the US Dollar could impact India's relationship with the US and its service sector reliant on developed markets.

HISTORICAL AGREEMENTS AND CONCERNS:

• The concerns highlighted above bring back memories of similar bilateral trade and clearing arrangements that India had initiated in the 1950s.
• Use of rupee for merchandise and credit transactions between India and Soviet Union was a major tool.
• Similar concerns emerged earlier with the Soviet Union's consistent trade surpluses.
• 1971's floating of the dollar and the rouble's devaluation complicated matters.

GEO-ECONOMIC SHIFTS IN LOCAL CURRENCY TRANSACTIONS:

• **Current scenario involves rupee, rouble, yuan, dirham, and rupiah in local currency transactions.**
• South-South trade and settlements avoid reliance on advanced economies' hegemonic currencies.
• New financial architecture emerging, minimizing dependence on institutions like IMF and World Bank.
• Geo-economic trends may outweigh geopolitical challenges.

COCLUSION: A NEW FINANCIAL ARCHITECTURE

- **Geo-economic and Political Shift**: A noticeable change is occurring in the strategies of global South countries, both in terms of economic and political aspects.
- **Prioritizing Trade and Payments:** These nations are giving priority to trade and payment settlements that do not rely on dominant currencies from economically advanced nations in the global North.
- **Local Currency Usage:** This trend is evident in the inclination of countries like India, Russia, China, the UAE, and Indonesia to use their own local currencies in transactions.
- **Reducing Dependency:** As a result, these countries are aiming to decrease their reliance on institutions from advanced nations, such as the IMF and World Bank, as well as private capital, to facilitate settlements.
- **Emerging Financial Framework:** This shift could potentially give rise to a fresh financial framework that is more inclusive and less exploitative, creating a different financial landscape.

LEARNING FROM THE CHIPS ACT OF THE U.S.

SOURCE: TH

SYLLABUS: **ECONOMY AND INTERNATIONAL RELATIONS**

WHY IN NEWS?

The CHIPS Act of the United States, which allocates significant funding for five years to enhance its semiconductor sector, marks its first year since enactment.

THE CHIPS ACT:

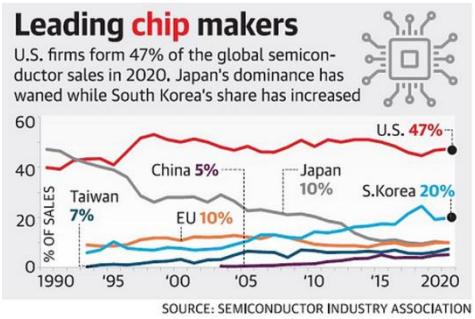
• **United States' Creating Helpful Incentives to Produce Semiconductors and Science Act of 2022 (CHIPS Act)** completes one year as a law.

• Authorizes $52.7 billion over five years to enhance American competitiveness, innovation, and national security in semiconductors.

• CHIPS Act offers insights into implementing industrial policies and Four lessons are highlighted to improve India's semiconductor strategy.

CASE WITH INDIA:

• **India's semiconductor policy** primarily managed by Ministry of Electronics and Information Technology (**MeitY**) and its divisions.



• The schemes for manufacturing, assembly, displays and compound semiconductors are assigned to an independent division called - **India Semiconductor Mission (ISM)** within a non-profit company set up by **MeitY**.

• The policy for chip design is being administered by C-DAC, an R&D organisation again under the **MeitY**.

• Need for whole-of-government approach for long-term strategy success along the lines of the CHIPS Act.

INDIA SEMICONDUCTOR MISSION:

ABOUT:

- Launched in 2021, the ISM has a financial outlay of Rs76,000 crore and operates under the Ministry of Electronics and IT (MeitY).
- The main objective of the program is to offer financial assistance to companies involved in semiconductors, display manufacturing, and design ecosystem.
- Led by global experts in the semiconductor and display industry, the ISM will act as the central agency to ensure efficient and coherent implementation of the schemes.

COMPONENTS:

Scheme for Semiconductor Fabs:

- Provides fiscal support to eligible applicants aiming to establish semiconductor wafer fabrication facilities in India.
- Aims to attract significant investments for setting up these facilities in the country.

Scheme for Display Fabs:

- Provides fiscal support to eligible applicants intending to establish TFT LCD / AMOLED based display fabrication facilities in India.
- Aims to attract substantial investments for setting up display fabs in the country.

Scheme for Compound Semiconductors / Silicon Photonics / Sensors Fab and Semiconductor Assembly, Testing, Marking and Packaging (ATMP) / OSAT facilities:

- Offers fiscal support of 30% of the Capital Expenditure to eligible applicants establishing Compound Semiconductors / Silicon Photonics (SiPh) / Sensors Fab and Semiconductor ATMP / OSAT facilities in India.

Design Linked Incentive (DLI) Scheme:

- Provides financial incentives and design infrastructure support for semiconductor design at various stages of development and deployment.
- Covers Integrated Circuits (ICs), Chipsets, System on Chips (SoCs), Systems & IP Cores, and semiconductor linked design.

STRUCTURING ACCOUNTABILITY AND TRANSPARENCY:

• CHIPS Act establishes CHIPS Program Office (CPO) for financial viability assessment.

• CPO recruits Investment Principals and Financial Structuring Directors to attract private investments.

• India needs more transparency in assessing proposal viability.

• Regular progress reports can manage expectations and boost confidence.

RESEARCH AND FUTURE TECHNOLOGIES:

• CHIPS Act invests $11 billion in future research, including advanced packaging.

• National Advanced Packaging Manufacturing Program (NAPMP) focuses on advanced packaging for competitive advantage.

• India's semiconductor strategy lacks emphasis on advanced manufacturing and packaging research.

• Need for India to invest in future technology research.

INDUSTRIAL POLICY TAKEAWAYS:

• CHIPS Act offers a template for effective industrial policy in semiconductors.

• Administrative capacity and institutionalization ensure policy continuity.

• India urged to study positives and drawbacks of CHIPS Act for effective policy implementation.

• Effective implementation crucial for successful industrial policy

WAY FORWARD: INDIAN PERSPECTIVE

- Semiconductors and displays are crucial for modern electronics, powering the digital transformation in **Industry 4.0**.
- **India's Public Sector Enterprises (PSEs)**, like Bharat Electronics Ltd and Hindustan Aeronautics Ltd, could **collaborate with global majors** to establish semiconductor fab foundries.
- The **India Semiconductor Mission's** recent move to offer subsidies to global small and medium-sized enterprises in the upstream supply chain is commendable, especially for existing facilities like the SCL.
- To achieve the goals in the next five years, the SCL requires a full-time director with prior experience in "**More than Moore**" foundries, rather than a career scientist from the Department of Space, as is the current situation.
- This is because the semiconductor market requires a multifaceted approach to be effectively served.