Energy sovereignty of India

Mains: *GS III – Infrastructure: Energy, Ports, Roads, Airports, Railways etc.*

Why in News?

Recently, Russia has emerged as the India's single largest supplier of oil, accounting for roughly 35%-40% of total crude imports in 2024-25 — up from barely 2% before the Ukraine war.

What is the issue?

- **Heavy crude oil imports** – India imports over 85% of its crude oil and more than 50% of its natural gas.
- **Heavy reliance** – The discounted barrels from Russia have offered temporary relief to the import bill.
- But the heavy concentration also underscores the vulnerability of relying too much on one geopolitical partner.
- Diversification, not substitution, is the real currency of sovereignty
- **Outflow of Forex reserves** – In FY2023-24, India's merchandise imports stood at $677 billion. Of this, crude oil and natural gas alone accounted for nearly $170 billion, or over 25% of the total import bill.
- This outflow of foreign exchange pressures the rupee, inflates the trade deficit, and compromises macroeconomic stability
- **Israel-Iran tensions** – In June 2025, the world narrowly avoided a full-blown regional conflict following tensions between Israel and Iran.
- Had that flashpoint ignited, over 20 million barrels a day of global oil flows would have been threatened.
- Brent crude prices, already sensitive, could have breached the $103 a barrel mark within days.
- The war did not begin, but the world came close enough to remember the fragility of its energy lifelines.

What are the defining moments of global energy security?

- **The 1973 oil crisis** - The Arab oil embargo against the United States and allied nations caused crude prices to quadruple, and exposed the West's overdependence on the Organization of the Petroleum Exporting Countries. But it catalysed the creation of strategic petroleum reserves, efficiency mandates, and diversified sourcing strategies.
- **Fukushima nuclear disaster 2011** – A tsunami-induced nuclear meltdown in Japan triggered a global crisis of confidence in nuclear power.

- However, with emissions rising due to increased coal and gas use, nuclear energy is again regaining favour.
- **Texas Freeze 2021** – Extreme cold froze gas pipelines and disabled wind turbines in energy-rich Texas.
- The event underscored the limits of systems built for cost efficiency rather than resilience and the importance of diversified and weather-hardened infrastructure.
- **Russia-Ukraine war 2022** – Europe's reliance on Russia for over 40% of its gas ended abruptly when Russia weaponised energy.
- The continent faced record liquefied natural gas prices and a coal revival.
- It was a stark lesson: no energy strategy is sovereign if it is single-sourced.
- **Iberian Peninsula Blackout 2025** – Spain and Portugal suffered a grid collapse due to over-reliance on intermittent renewables without sufficient dispatchable backup.
- The lack of inertia in the grid exposed the risks of phasing out conventional capacity too rapidly.

Global Energy Situation
• **Dominance of fossil fuel** – Fossil fuels still meet over 80% of global primary energy demand. • **Hydrocarbons** – More than 90% of transportation runs on hydrocarbons. • **Renewable energy** – Solar and wind, though scaling fast, are still under 10% of the global energy mix. • **Investments** – Exploration investments in oil and gas have fallen sharply even as demand remains high. • The result is a structurally tight supply that is vulnerable to even minor shocks.

What India should do?

- India must now decisively move toward an energy sovereignty doctrine that is anchored in domestic capacity, diversified technology, and resilient systems.
- It has **five foundational pillars**
- **Coal gasification**– India has over 150 billion tonnes of coal reserves. For decades, high ash content made them unattractive.
- But with technological advances in gasification and carbon capture, this domestic resource must be leveraged to produce syngas, methanol, hydrogen and fertilizers. We must overcome the ash barrier with innovation.
- **Biofuels** – The ethanol blending programme has already reduced crude imports and transferred over ₹92,000 crore to farmers.
- It has also delivered substantial savings in foreign exchange savings. With E20 on the horizon, annual income to the rural economy may grow further.
- Through the Sustainable Alternative Towards Affordable Transportation (SATAT) scheme, hundreds of compressed biogas (CBG) plants are generating clean fuel and producing bio-manure rich in 20%-25% organic carbon.
- This can restore North India's degraded soils, where organic carbon has fallen to 0.5%, versus a healthy level of 2.5%.
- Improving soil health also enhances water and fertilizer retention, reducing runoff and pollution.
- **Nuclear energy** – India's nuclear footprint has remained stagnant at 8.8 GW for too

long.

- We must revive the thorium road map, secure uranium partnerships and localise Small Modular Reactor technologies.
- In a grid dominated by renewables, nuclear provides the dispatchable backbone.
- **Green hydrogen** – India's target of 5 million metric tonnes a year by 2030 must be matched by localised electrolyser manufacturing, catalyst development and storage systems. The goal is not just green hydrogen. It is sovereign hydrogen.
- **Pumped hydro storage** – Pumped hydro is durable, proven, and essential for grid balancing.
- It complements renewable energy and provides the inertia missing in wind and solar-heavy systems. India must use its topography to create the storage infrastructure of the future.

What lies ahead?

- India must lead with energy realism not as a fallback but as the foundation of resilience and sovereignty.
- India's strategy must blend ambition with realism. The five pillars — coal gasification, biofuels, nuclear, green hydrogen and pumped hydropower are its sovereign spine.

Reference

[The Hindu |Energy Sovereignty of India]

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