



# Energy Security

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**For Prelims:** Current Account Deficit (CAD), Pradhan Mantri Sahaj Bijli Har Ghar Yojana (SAUBHAGYA), Green Energy Corridor (GEC), National Solar Mission (NSM), National Biofuels Policy and SATAT.

**For Mains:** Major Concerns Related to India's Energy Security, Initiatives Shaping India's Energy Transition.

## What is Energy Security?

### ▪ About:

- Energy security is **defined as the uninterrupted availability of energy sources at an affordable price.**
  - **Energy security = availability + affordability + accessibility**
- **Long-term energy security** deals with timely investments to supply energy in line with economic developments and environmental needs.
- **Short-term energy security** focuses on the ability of the energy system to respond promptly to sudden changes in the supply-demand balance.

### ▪ Significance

- India aims to become **leading global economic power which will fuel energy** needs for providing infrastructure, provisioning of basic necessities, developing human skill, employment generation and manufacturing abilities.
- India's economic fortunes continue to be tied to the sharply fluctuating international price of oil.

## What are the Challenges Regarding India's Energy Security?

### ▪ Policy Challenges:

- **Failure to attract international investment** in domestic hydrocarbon exploration e.g., **[New Exploration Licensing Policy \(NELP\)](#)** failed to attract the interest of large international energy corporations.
- Major investments will have to be made to acquire hydrocarbon reserves abroad.
- **Coal mining** in India suffers from delays due to regulatory and environmental clearances.
- The **[Indo-US nuclear deal](#)** helped fuel domestic power plants and give India access to critical technologies in strategic areas but deal did not lead to India setting up **foreign-built reactors.**

### ▪ Accessibility Challenge:

- The household sector is **one of the largest consumers of energy in India.** It is responsible for about 45% of the total primary energy use. In rural areas, biomass accounts for **90% of total primary fuel consumption for cooking.** This has serious health impacts on rural people.

### ▪ Infrastructure and Skill Related Challenges:

- **Lack of skilled manpower** and poorly developed infrastructure for developing

**conventional** and unconventional energy.

- India **lacks transportation infrastructure** for making energy accessible e.g., pipelines can be a useful way to boost the total supply of gas in the country. **Gas** will play a major role in Indian energy mix because it **can be used effectively in several demand sectors**.

▪ **Economic Challenges:**

- **Coal**, oil and natural gas are the **most important sources of primary energy** in India. **Inadequate domestic supplies** of these **hydrocarbons** are forcing the country to increase its import bill.
- **Rising fuel subsidies**, and rising **Current Account Deficit (CAD)** create difficult conditions for the economy.

▪ **External Challenges:**

- India's fragile energy security is **under severe pressure from its rising dependence on imported oil**, regulatory uncertainty, international monopolies and opaque natural gas pricing policies
- India seeks to achieve its energy security through multiple partners e.g. Indo-USA nuclear deal, Oil import from the Middle East etc.
  - However, in recent times due to conflict among India's energy partners e.g. **USA and Iran**; India had to reduce oil import from Iran.
- In wake of its difficult geographic location in South-Asia, India faces strategic challenge to meet its energy needs.
- China's **One Belt One Road initiative** can give China definitive advantage if any conflict ensues between countries, **by disturbing India's access to energy**.
- Failure to get onboard all interested parties in IPI (Iran-Pakistan-India) gas pipeline and **TAPI (Turkmenistan, Afghanistan, Pakistan and India)** gas pipeline for assured supply of natural gas.

## What are Measures taken to Enhance Energy Security?

▪ **Increasing Accessibility to Clean Energy:**

- India has already committed to bring **electricity to every household by 2022**. An even more ambitious goal would be to provide electricity to all households on a 24x7 basis.
- To bring clean fuel in rural areas the **Pradhan Mantri Ujjawala Yojana**, should be complemented by:
  - Setting up of biomass pelletising units; and distribution of 'efficient biomass chullahs'.
- On the agricultural front, **solar irrigation pump distribution** target must be stepped up and financed through credit support from **National Bank for Agriculture and Rural Development (NABARD)** and government subsidies.
- Potential **non-conventional energy sources** must be explored and researched to make them technologically economical and accessible, like **geothermal energy, tidal energy** etc.

▪ **Enhancing Efficiency:**

- The **National Mission for Enhanced Energy Efficiency (NMEEE)** should conduct a thorough cost-benefit analysis of the available energy-efficient technologies and products across all sectors, especially agriculture, housing and transportation.
- At the institutional level, **the national and state designated agencies working in the area of energy efficiency** should be strengthened.
- To enhance vehicle fuel efficiency gains, the auto fuel quality should be upgraded to **BS VI norms** for nation wide launch in 2020.

▪ **Policy Changes:**

- Around three-quarters of our power comes from coal powered plants. It is important that **India increases its domestic coal to reduce its dependence on imports**. There is a need to fast-track the regulatory clearances, improve labour productivity, increase coal production and enhance the efficiency of distribution.
- **Hydrocarbon Exploration and Licensing Policy (HELP)** intends to minimise the government's discretion in decision making, reduce disputes, reduce administrative delays and introduce concept of revenue sharing, freedom of marketing to stimulate growth in the oil and gas sector in India.

- The **tax structure should be rationalised** in import and sale of energy on thermal value basis with a view to enhance the competitiveness of the economy.
- The **India Energy Security Scenarios, 2047 (IESS)** has been developed as an energy scenario-building tool. The guiding ambition of this is to develop energy pathways leading up to the year 2047, comprising of likely energy demand and supply scenarios.
  - **NITI Aayog** launched the India Energy Security Scenarios 2047 calculator (IESS 2047), as an **open-source web-based tool**.
  - The tool aims to **explore a range of potential future energy** scenarios for India, for diverse energy demand and supply sectors leading up to 2047.
  - It explores India's possible energy scenarios across energy supply sectors such as **solar**, wind, **biofuels**, oil, gas, coal and **nuclear** and energy demand sectors such as transport, industry, agriculture, cooking and lighting appliances.
    - The model allows users to interactively make energy choices, and explore a range of outcomes for the country-from **carbon dioxide emissions** and import dependence to land use.

#### ▪ **Infrastructure:**

- **Augment refining and distribution** of oil and gas. India should sustain its export capacity of refined products by setting up new refineries.
- At present, 31 companies are developing **City Gas Distribution (CGD)** networks in 21 states for transportation or distribution of natural gas to consumers in domestic, commercial or industrial and transport sectors through a network of pipelines.
- For the **hydro projects**, the government will need to make efforts to expedite progress on capacity under construction through satisfactory Rehabilitation & Resettlement implementation.
- India has also built its **strategic petroleum reserves** in order to meet any supply shocks due to any external exigencies like wars, natural disasters etc. **Indian Strategic Petroleum Reserves** Ltd, a special purpose vehicle under the Oil and Gas Ministry, has constructed three strategic petroleum reserves in huge underground rock caverns at **Visakhapatnam on the East Coast, and at Mangaluru and Padur on the West Coast**.
- These facilities, with total capacity of 5.33 million tonnes, can meet about 10 days of India's crude oil requirements. India now plans to build another 6.5 million tonnes of storage at **Padur and Chandikhol in Odisha** which will augment its supply to 22 days.

#### ▪ **India's Energy Diplomacy:**

- India is setting up a **web of energy relationships in the extended neighborhood** covering Myanmar, Vietnam in the east, with Central Asian countries like Kazakhstan and Gulf countries in the west.
- **Indo-US Nuclear deal opened new vistas for India in field of Nuclear energy** facilitating cutting-edge technology and nuclear fuel. India has started to engage with China, Kazakhstan and Australia for nuclear fuel.
- India's **Shanghai Cooperation Organization (SCO)** membership could now play a bigger role in ensuring greater energy cooperation between energy producers and consumers by linking Central Asia and South Asia.

#### ▪ **Promotion of Renewable Energy:**

- At present, India's installed **Renewable Energy (RE) capacity stands at 150.54 GW**. It includes Solar Energy 48.55 GW, Wind Energy 40.03 GW, Small Hydro Power 4.83 GW, Bio-Power 10.62 GW, and Large Hydro 46.51 GW while its nuclear energy based installed electricity capacity is 6.78 GW.
  - As a result, **the total non-fossil fuel based installed energy capacity to 157.32 GW which is 40.1% of the total installed electricity capacity of 392.01 GW**.
  - According to **REN21's Renewables 2022 Global Status Report (GSR 2022)**, India was ranked **third in wind power, fourth in solar power and third in renewable power installed capacity in 2021**.

- **Solar Energy Corporation of India Limited (SECI)** should develop storage solutions within next three years to **help bring down prices through demand aggregation of both household and grid scale batteries.**

## What are the Initiatives Shaping India's Energy Transition?

- [Pradhan Mantri Sahaj Bijli Har Ghar Yojana \(SAUBHAGYA\)](#)
- [Green Energy Corridor \(GEC\)](#)
- [National Solar Mission \(NSM\)](#)
- [National Biofuels Policy and SATAT](#)
- [Small Hydro Power \(SHP\)](#)
- [International Solar Alliance \(ISA\)](#)

## What can be the Way Forward?

- **Legislative Action:** The government can pass an Act (possibly) captioned "The Energy Responsibility and Security Act."
  - This Act should elevate the significance of energy by granting it constitutional sanctity; it should embed in law, India's responsibility to provide citizens access to secure, affordable and clean energy and in that context, it should lay out measurable metrics for monitoring the progress towards the achievement of energy independence, energy security, energy efficiency and "green" energy.
  - In essence, the Act **should provide the constitutional mandate** and frame for the formulation and execution of an integrated energy policy.
- **Institutional Action:** The government should redesign the existing architecture of decision-making for energy. Preference can be given for the creation of an omnibus **Ministry of Energy** to oversee the currently siloed verticals of the ministries of petroleum, coal, renewables and power.
  - Such a ministry did **exist in the early 1980s** (albeit without petroleum). The minister-in-charge should rank on equal footing with the ministers of defence, finance, home and external affairs.
  - An executive department within the PMO can also be established. It could be referred to as the **"Department of Energy Resources, Security, and Sustainability"**.
  - The objective would be to **identify and handle all of the issues that currently fall between the cracks created by the existing structure.** It would be to formulate and execute an integrated energy policy, to leverage the weight of **"India Energy Inc"** and maximise India's competitiveness in its dealing with the international energy community.
- **Fiscal Actions:** There should be easy access to finance and the government should incubate clean energy R&D and innovation.
- **Raise Public Awareness:** It would be to coordinate and implement the communication strategy to raise public awareness about existing and emergent energy-related issues, especially global warming.
  - The department would have a narrower remit than the other energy departments but by virtue of its location within the PMO, it would, de facto, be the most powerful executive body with ultimate responsibility for navigating the **"green transition"**.

## Conclusion

- Major transformations are underway in the global energy sector, from growing electrification to the expansion of renewable energy, upheavals in oil production and globalization of natural gas markets. India needs to build its capacity in research and skills building to **deal with these transformations in energy sector.**
- Challenges like carbon emissions, air pollution, and energy access outlines different possible future scenario for the energy security. The dynamic scenarios foreseen by IESS, 2047 **should guide the policy makers in Energy sector.**
- India needs to **ensure long term planning** to ensure universal energy access and meeting its commitment under [Paris Agreement](#) to ensure sustainable and inclusive growth.



## UPSC Civil Services Examination Previous Year's Question (PYQs)

**Q.** The question of India's Energy Security constitutes the most important part of India's economic progress. Analyse India's energy policy cooperation with West Asian countries. **(2017)**

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