



Samudra Manthan Scheme Expands India's Deepwater Hydrocarbon Exploration to Strengthen Energy Security and Reduce Import Dependence

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Recent Developments:

- The Union Cabinet approved **Samudra Manthan — National Offshore Exploration Scheme** on **31 July 2026** as a Central Sector Scheme of the **Ministry of Petroleum and Natural Gas**, with an approved Phase-I outlay of **₹84,084 crore up to FY 2030–31**.
- The scheme represents a shift from mainly policy-led upstream reforms towards **mission-mode offshore exploration**, combining seismic data acquisition, deepwater drilling, shared infrastructure and domestic manufacturing.
- On **25 July 2026**, before the Cabinet approval was announced, drilling began for the first appraisal well **MN-DWN18-1-HD** in the Mahanadi Offshore Basin; it is the first of four planned deepwater appraisal wells in the basin.
- Recent reporting identifies the principal operational focus as the **Mahanadi, Andaman-Nicobar, Krishna-Godavari, Cauvery and Kutch-Mumbai offshore regions**, reflecting a combination of frontier and relatively established offshore provinces.

Samudra Manthan: Objectives and Design:

Core Purpose:

- **Samudra Manthan** seeks to accelerate exploration in India's **deepwater and ultra-deepwater offshore areas**, where high geological uncertainty, expensive drilling and inadequate infrastructure have historically constrained exploration.
- The scheme aims to add **more than 600 MMTOE of hydrocarbon reserves**, increase annual domestic oil and gas production from around **62 MMTOE to 80 MMTOE**, and potentially reduce crude-oil import expenditure by nearly **₹1 lakh crore annually**, subject to exploration and commercial-production success.
- The broader objective is to strengthen **energy security, domestic resource mobilisation, technological capability and supply-chain localisation** rather than relying exclusively on imported hydrocarbons.

Why Offshore Hydrocarbon Exploration Matters:

- India is the **world's third-largest consumer of crude oil** and has an annual crude-oil import bill of nearly **US\$144 billion**, or approximately **₹13 lakh crore**, according to the government's 2026 assessment.
- India's eastern and western offshore sedimentary basins extend to water depths of up to **3,000 metres** and are estimated to contain **more than 5,600 MMTOE of hydrocarbon potential**; this figure represents geological potential and should not be treated as equivalent to proven recoverable reserves.
- Existing mature fields experience natural production declines of around **6–7% annually**, making continuing exploration important even for maintaining present production levels.

Major Components and Financial Architecture:

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Seismic Data and Geological Mapping:

- **₹28,534 crore** is allocated for large-scale offshore **2D and 3D seismic surveys, data processing and geological interpretation**, including **₹12,000 crore for 2D acquisition, ₹12,534 crore for 3D acquisition and related techniques, and ₹4,000 crore for National Data Repository re-processing and Artificial Intelligence tools**.
- Seismic surveys use reflected sound waves to map subsurface geological structures, helping identify formations that may contain hydrocarbons before costly drilling begins.
- The scheme therefore seeks to reduce the **information-risk component** of exploration by improving the quality and interpretation of subsurface data.

Deepwater and Ultra-Deepwater Drilling:

- **₹43,200 crore** is allocated for **60 deepwater and ultra-deepwater exploration wells**, with government support of up to **50% of eligible drilling cost or ₹675 crore per well, whichever is lower**.
- The support mechanism is designed as **risk sharing**, reducing the financial barrier created by high exploration costs and uncertain discovery outcomes.
- The scheme is open to **public and private Exploration and Production operators**, thereby seeking broader participation in high-risk offshore exploration.

Common Offshore Infrastructure:

- **₹10,000 crore** is earmarked for **common offshore production and evacuation infrastructure**, particularly important where individually discovered fields are too small or isolated to justify separate pipelines and processing facilities.
- Shared infrastructure can reduce per-field development costs by allowing multiple discoveries to use common production, collection and evacuation systems.
- This addresses the “**stranded discovery**” **problem**, in which a geological discovery does not automatically become a commercially producible reserve because development infrastructure is economically unviable.

Domestic Manufacturing and Services:

- **₹2,000 crore** is allocated for **oil and gas manufacturing and services zones** to promote domestic production, repair, engineering, warehousing and specialised offshore services.
- A further **₹350 crore** supports monitoring, digital interventions, evaluation, human-resource development, awareness and related programme activities.
- This component links offshore exploration with **Make in India and supply-chain resilience**, reducing exposure to imported equipment and specialised services.

Geographical Focus and Emerging Offshore Frontiers:

Mahanadi Offshore Basin:

- The **Mahanadi Offshore Basin** is an immediate operational focus because drilling of the appraisal well **MN-DWN18-1-HD** began on **25 July 2026** as part of a four-well deepwater appraisal programme.
- Appraisal drilling is conducted to determine the **extent, quality and commercial potential** of previously identified hydrocarbon accumulations.
- The basin is also relevant to the infrastructure component of Samudra Manthan because the government specifically identifies Mahanadi among the areas where common infrastructure can improve the commercial viability of discoveries.

Andaman-Nicobar Basin:

- The **Andaman-Nicobar region** represents a major frontier because exploration involves difficult deepwater and ultra-deepwater conditions and requires advanced drilling technology.
- A 2017 assessment estimated the Andaman basin's total prognosticated hydrocarbon resource at **371 MMTOE**, including a large undiscovered component; this is an older resource assessment and should not be confused with proven reserves.
- **ONGC and Oil India** have conducted ultra-deepwater exploration targeting depths of up to **5,000 metres**; the **ANDW-7** well in the East Andaman Back-Arc encountered traces of light crude and condensate, heavy hydrocarbons in trip gases and reservoir-quality facies, providing evidence of an active **thermogenic petroleum system**.
- Such geological indications demonstrate petroleum-system activity but do not by themselves establish a commercially recoverable field.

Krishna-Godavari, Cauvery and Western Offshore Areas:

- The **Krishna-Godavari and Cauvery basins** combine established exploration experience with opportunities for expansion into deeper offshore acreage, while the **Kutch-Mumbai western offshore belt** requires economically efficient evacuation and development infrastructure.
- These regions illustrate the different objectives of the scheme, including **frontier exploration, deeper exploration of known provinces and commercialisation of discoveries through shared infrastructure**.

Policy Evolution: From NELP to Samudra Manthan:

Upstream Hydrocarbon Reform Architecture:

- India's upstream sector evolved from the **New Exploration Licensing Policy regime and Production Sharing Contracts** towards the **Hydrocarbon Exploration and Licensing Policy**, which was notified in 2016 and operationalised with the Open Acreage Licensing Policy and National Data Repository framework.
- **HELP** introduced a shift from the earlier Production Sharing Contract model towards **Revenue Sharing Contracts**, reduced regulatory intervention, a unified hydrocarbon licence and greater operational flexibility.
- **OALP** permits investors to identify and seek blocks based on available geological information instead of waiting exclusively for government-identified acreage rounds; the system is supported by the **National Data Repository**.
- Samudra Manthan builds upon this policy architecture by adding **direct financial risk sharing, scientific data generation and common infrastructure** to accelerate actual exploration and production.

Expansion of Offshore Exploration Acreage:

- Government policy has reduced previously restricted **"No-Go" offshore areas by about 99%**, making approximately **1 million square kilometres of India's Exclusive Economic Zone available for exploration**.
- The significance of this reform is that Samudra Manthan operates within a much larger exploration geography created by earlier regulatory and security-related changes.

Key Challenges in Deepwater Exploration:

Technology, Cost and Time:

- A deepwater exploratory well can cost approximately **US\$125–150 million**, while the transition from an exploration block to commercial production can typically take **5–10 years**.
- Operations require specialised drillships, subsea equipment, advanced seismic imaging, high-pressure systems and sophisticated offshore logistics, increasing both capital requirements and technological risk.

Commercial Viability of Discoveries:

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- A discovery becomes economically useful only after **appraisal, reserve estimation, development planning, processing arrangements and evacuation infrastructure** are established.
- Isolated offshore discoveries may remain stranded when dedicated pipelines, platforms and processing facilities cost more than the expected value of production.

Environmental and Operational Risks:

- Offshore drilling requires management of **marine ecological risks, cyclone exposure, severe weather, high-pressure formations, underwater currents and accident-response requirements**.
- The expansion of offshore exploration therefore requires simultaneous attention to **energy security, environmental safeguards, maritime safety and regulatory compliance**.

Strategic Significance for India:

Energy Security and External Vulnerability:

- Greater domestic production can reduce exposure to **international crude-price volatility, geopolitical disruptions, shipping risks and foreign-exchange pressure**, although domestic production alone cannot eliminate import dependence.
- The scheme therefore supports a broader strategy of **diversifying energy sources while expanding indigenous hydrocarbon supply**.

Technology and Industrial Capability:

- Large-scale deepwater activity can stimulate domestic capability in **subsea engineering, geophysics, drilling services, offshore fabrication, marine logistics and specialised equipment manufacturing**.
- Collaboration with experienced international operators can complement domestic capabilities where advanced deepwater and ultra-deepwater technologies are required.

Way Forward:

Making the Scheme Commercially Effective:

- Prioritise **common offshore infrastructure** in clusters where multiple discoveries can share pipelines, processing facilities and evacuation systems, thereby lowering unit development costs.
- Strengthen the **National Data Repository** through high-quality seismic acquisition, legacy-data re-processing, Artificial Intelligence-assisted interpretation and open technical access for qualified investors.
- Maintain transparent and predictable **environmental, safety and regulatory procedures** so that exploration does not create avoidable delays while ensuring ecological safeguards.
- Develop indigenous capacity in **subsea equipment, drilling services, offshore fabrication and intervention technology**, reducing dependence on imported specialised systems.
- Combine offshore hydrocarbon expansion with the long-term development of **renewable energy, energy efficiency, strategic reserves and cleaner fuels**, because energy security requires diversification rather than reliance on a single resource.

Value Addition for UPSC:

Prelims Pointers:

- **Samudra Manthan ? National Offshore Exploration Scheme**
- **Ministry ? Ministry of Petroleum and Natural Gas**
- **Nature ? Central Sector Scheme**
- **Approved outlay ? ₹84,084 crore**
- **Implementation ? FY 2030–31**

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- Exploration wells ? 60
- Seismic allocation ? ?28,534 crore
- Drilling allocation ? ?43,200 crore
- Common infrastructure ? ?10,000 crore
- Manufacturing and services zones ? ?2,000 crore
- Monitoring and support ? ?350 crore
- Targeted additional reserves ? More than 600 MMTOE
- Targeted domestic production ? 80 MMTOE annually
- Offshore potential ? More than 5,600 MMTOE
- Key frontier areas ? Mahanadi, Andaman-Nicobar, Krishna-Godavari, Cauvery and western offshore regions.

Mains Linkage:

- Samudra Manthan can be used to analyse the relationship between **energy security, import dependence, frontier-resource exploration, technological capability, infrastructure economics and environmental governance.**
- A strong answer should distinguish **geological resource potential, discovered resources and proven recoverable reserves**, because these categories are not interchangeable.
- The scheme also illustrates the policy shift from merely **licensing exploration acreage** to actively addressing the three major constraints of frontier exploration: **data risk, drilling risk and infrastructure risk.**