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ENERGY SCHEMES 2026 PRELIMS

The Union Government has significantly increased its focus on renewable energy for the **2025–2026** fiscal year, allocating over **₹26,500 crore** to the Ministry of New and Renewable Energy (MNRE). The following list highlights the primary energy-based schemes active during this period:

1. PM Surya Ghar: Muft Bijli Yojana

The **PM Surya Ghar: Muft Bijli Yojana** is a **Central Sector Scheme** launched by the Government of India in February 2024. It is considered a **flagship scheme** aimed at promoting rooftop solar (RTS) adoption to provide up to **300 units of free electricity** per month to **one crore (10 million) households** by March 2027.

Core Framework & Administration

- **Ministry:** Ministry of New and Renewable Energy (**MNRE**).
- **Implementing Agencies:**
  - **National Level:** National Programme Implementation Agency (**NPIA**).
  - **State Level:** State Implementation Agencies (**SIAs**), which are primarily local **DISCOMs** (Distribution Companies) or state energy departments.
- **Funding Mechanism:** Total outlay of **₹75,021 crore**. Funding is provided via:
  - **Central Financial Assistance (CFA):** Direct subsidies of up to **₹78,000** for systems up to 3 kW.
  - **Concessional Loans:** Collateral-free loans at attractive interest rates (approx. **5.75%–7%**).
  - **Incentives:** Specific allocations for DISCOMs, local bodies, and a **Payment Security Mechanism**.

Key Features

- **Zero Electricity Bills:** Targeted at households to reduce energy costs to zero for those consuming under 300 units.
- **Subsidy Structure:** 60% for systems up to 2 kW; 40% for the additional capacity between 2 kW and 3 kW.
- **Net Metering:** Households can export surplus power back to the grid.
- **Model Solar Villages:** A component to develop one "Model Solar Village" in every district.

Update (Status as of May 2026)

- **Budget Allocation:** For FY 2026–27, the scheme received a boosted allocation of **₹22,000 crore**.
- **Installations:** As of March 19, 2026, over **26.19 lakh (2.6 million)** rooftop solar systems have been installed.
- **Beneficiaries:** More than **31 lakh households** have benefitted, with approximately **₹17,967 crore** disbursed in subsidies.
- **Policy Shifts:** Introduction of the **Utility-Led Aggregation (ULA)** model, where DISCOMs lead bulk installations for low-income or technically challenging clusters.

Achievements & Criticism

Achievements	Criticisms & Challenges
Massive Scale: Reached 26% of its target within two years, becoming the world's largest residential solar program.	**Equity Issues:** Structurally unsuitable for low-income families living in rented, multi-story, or temporary shelters without roof ownership.
Financial Relief: Nearly 45% of participants have achieved "zero electricity bills".	**Regional Lag:** While states like Maharashtra and Gujarat lead, others like Arunachal Pradesh and Meghalaya have reported near-zero adoption.
Local Skilling: On track to create approx. **1 lakh jobs** for solar PV technicians.	**Technical Errors:** Subsidies are frequently denied if vendors use non-ALMM (Approved List of Models and Manufacturers) equipment.

2. PM-KUSUM (Kisan Urja Suraksha evam Utthaan Mahabhiyan)

PM-KUSUM (Pradhan Mantri Kisan Urja Suraksha evam Utthaan Mahabhiyan) is a flagship scheme of the Government of India aimed at ensuring energy and water security for farmers while promoting clean energy in the agricultural sector. Launched in 2019, it has been extended through **March 31, 2026**.

Core Details

- **Ministry:** Ministry of New and Renewable Energy (MNRE).
- **Implementing Agency:** Respective **State Implementing Agencies (SIAs)**, such as state power departments or renewable energy agencies, are responsible for beneficiary selection and ground-level execution.
- **Scheme Type:** It is a **Central Sector Scheme** with significant financial outlays from the central government, though it is implemented through state-level mechanisms.
- **Nature:** It is a **Flagship Scheme**.

Aims and Objectives

The primary goal is to **de-dieselise** the farm sector and provide a reliable, daytime power source for irrigation.

- **Energy Security:** Providing uninterrupted solar power for irrigation.
- **Income Enhancement:** Allowing farmers to sell surplus power back to the grid.
- **Environmental Impact:** Reducing carbon emissions by replacing diesel pumps with solar-powered alternatives.

Three Main Components

1. **Component A:** Setting up **10,000 MW** of decentralized grid-connected solar or other renewable energy power plants (0.5 MW to 2 MW) on barren or fallow land.
2. **Component B:** Installation of **14 lakh standalone solar pumps** in off-grid areas.
3. **Component C:** Solarization of **35 lakh grid-connected agriculture pumps**, including feeder-level solarization.

Funding Mechanism & Features

- **Subsidy Structure:** Generally, the Central Government provides a **30% subsidy**, the State Government provides a **30% subsidy**, and the farmer contributes **10%**.
- **Financing:** The remaining **30%** can be obtained through bank loans, often facilitated by inclusion under **Priority Sector Lending (PSL)**.
- **High Horsepower:** Central Financial Assistance (CFA) was expanded to support pumps up to **15 HP** in specific regions like the North-East and Hilly States.

Achievements as of 2026

- **Solar Capacity:** India's cumulative installed solar capacity reached **150.26 GW** by March 31, 2026, with the KUSUM and off-grid projects contributing approximately **14.10 GW**.
- **Beneficiaries:** Over **21.77 lakh farmers** have benefited from the scheme as of late 2025/early 2026.
- **Installations:** More than **10 lakh standalone solar pumps** have been installed, and over **13 lakh grid-connected pumps** have been solarized.
- **Phase II:** Plans for **PM-KUSUM 2.0** have begun following the conclusion of the current phase in March 2026.

Criticisms and Challenges

- **Target Shortfall:** Despite progress, the scheme has struggled to meet its original ambitious target of 34,800 MW by the 2026 deadline.
- **Financial Barriers:** High upfront costs and difficulties in securing low-cost financing for some farmers remain significant hurdles.
- **Grid Issues:** Weak grid infrastructure in rural areas has slowed the progress of grid-connected solarization (Component C).
- **Land Conversion:** The high cost and procedural difficulty of converting agricultural land to non-agricultural land for solar plants often deter farmers

3. National Green Hydrogen Mission (NGHM)

The **National Green Hydrogen Mission (NGHM)**, launched in January 2023, is India's **flagship umbrella scheme** aimed at establishing a global ecosystem for the production, use, and export of green hydrogen.

Core Details (As of 2026)

- **Ministry:** Ministry of New and Renewable Energy (MNRE).
- **Implementing Agency:** A dedicated **Mission Secretariat** headquartered within MNRE.
- **Scheme Type:** It is a **Central Sector Scheme**, with 100% funding and coordination from the Union Government.
- **Total Outlay:** ₹19,744 crore (until FY 2029-30).

Aims & Objectives (Targets by 2030)

- **Production:** Reach at least **5 Million Metric Tonnes (MMT)** of Green Hydrogen per annum.
- **Renewable Energy:** Add roughly **125 GW** of renewable energy capacity specifically for this purpose.
- **Economic Impact:** Attract over **₹8 lakh crore** in total investment and create **6 lakh jobs**.
- **Environmental:** Abate nearly **50 MMT** of annual CO2 emissions and reduce fossil fuel imports by over **₹1 lakh crore**.

Funding & Features (SIGHT Programme)

The mission's primary financial vehicle is the Strategic Interventions for Green Hydrogen Transition (SIGHT) programme, which has two main incentive tracks:

1. **Electrolyser Manufacturing:** Incentives to build domestic manufacturing capacity.
2. **Green Hydrogen Production:** Performance-based incentives for every kilogram of hydrogen produced.
3. **Other Features:** Development of **Green Hydrogen Hubs** (e.g., at Kandla, Paradip, and Tuticorin ports) and a waiver of **Inter-State Transmission System (ISTS)** charges for 25 years.

Achievements (Updated to 2026)

- **Commissioned Capacity:** As of February 2026, India has commissioned **8,000 tonnes per annum (TPA)** of production capacity.
- **Awards:** Contracts for **3,000 MW** of electrolyser manufacturing and **8.62 lakh tonnes** of annual hydrogen production have been awarded to various companies.
- **Innovation:** Launched the world's highest altitude hydrogen mobility project in **Leh** (3,650m) and initiated pilot projects for green steel and shipping.
- **Certification:** Established the Green Hydrogen Certification Scheme of India (GHCI) to standardise production metrics.

Criticism & Challenges

- **High Costs:** Green hydrogen remains significantly more expensive than "grey" hydrogen produced from fossil fuels, requiring sustained high subsidies.

- **Water Intensity:** Electrolysis requires large quantities of high-purity water, raising concerns in water-stressed regions.
- **Infrastructure Gaps:** Massive investment is still needed in storage and specialized pipelines for safe transportation.
- **Supply Chain Dependence:** While electrolyser manufacturing is being incentivised, India still depends on imports for critical components like membranes and catalysts

4. Production Linked Incentive (PLI) Scheme for Solar PV Modules

The **Production Linked Incentive (PLI) Scheme for High-Efficiency Solar PV Modules** is a **Central Sector Scheme** under the **Ministry of New and Renewable Energy (MNRE)**. It aims to reduce India's import dependence (primarily from China) by establishing a domestic manufacturing ecosystem for high-efficiency solar cells and modules.

Core Framework & Objectives

- **Aims & Objectives:** To achieve Giga Watt (GW) scale manufacturing capacity of high-efficiency modules, promote setting up of integrated plants (from polysilicon to modules), and develop a local supply chain for ancillary components.
- **Funding Mechanism:** The scheme has a total financial outlay of **₹24,000 crore**. Incentives are disbursed over **five years** post-commissioning, calculated based on sales volume, module efficiency, and the degree of local value addition.
- **Implementing Agencies:**
  - **Tranche-I** (₹4,500 cr): Indian Renewable Energy Development Agency (IREDA).
  - **Tranche-II** (₹19,500 cr): Solar Energy Corporation of India (SECI).
- **Scheme Type:** It is a **Central Sector Scheme** (100% funded by the Union Government) and is a **flagship initiative** under the *Atmanirbhar Bharat* (Self-Reliant India) programme.

Key Features

- **Two Tranches:** Implementation is split into Tranche-I (awarded in 2021) and Tranche-II (awarded in 2023).
- **Technology Agnostic:** It supports all high-efficiency technologies but incentivises those with better performance.
- **Integration Incentives:** Higher incentives are provided to manufacturers who integrate more stages of the value chain (e.g., polysilicon wafer cell module).

Status Update & Achievements (as of 2026)

- **Capacity Awarded:** Total manufacturing capacity of **48,337 MW** (approx. 48.3 GW) has been awarded across both tranches.

- **Production Progress:** As of March 2026, **8 out of 12** PLI-selected manufacturers have commenced production in various parts of the value chain.
- **Financials:** While ₹28,748 crore has been disbursed across *all* 14 PLI sectors, the Solar PV sector saw **zero disbursals** until February 2026. This is because incentives only trigger **one year after** a project is commissioned and meets performance targets.
- **Global Standing:** Bolstered by these manufacturing gains, India reached the **3rd position globally** in total renewable energy capacity by 2026.

Criticism & Challenges

- **High Import Reliance:** Despite the scheme, manufacturers still depend heavily on Chinese imports for raw materials like polysilicon, wafers, and manufacturing equipment.
- **Slow Commissioning:** By mid-2025, only about **31 GW** of the targeted 65 GW capacity had been commissioned.
- **Inadequate Incentive Levels:** Industry reports suggest incentives (₹1.5–2 per Wp) only cover 5–10% of production costs, which may be insufficient given global price volatility.
- **Policy Inconsistencies:** Frequent revisions to the Approved List of Models and Manufacturers (ALMM) and trade barriers (Basic Customs Duty) have sometimes increased project costs and created uncertainty for developers

5. National Bio Energy Programme: The **National Bioenergy Programme (NBP)** is an **umbrella scheme** launched by the Government of India to promote the sustainable use of biomass for energy production. Notified in November 2022, it covers the period from **FY 2021-22 to FY 2025-26** and is implemented in two phases.

Core Details

- **Ministry:** Ministry of New and Renewable Energy (MNRE).
- **Implementing Agency:** Indian Renewable Energy Development Agency (IREDA) acts as the primary agency for processing applications and monitoring performance.
- **Scheme Type:** It is a **Central Sector Scheme**, meaning it is 100% funded and implemented by the Central Government.
- **Total Budget Outlay:** ₹1,715 Crore for the entire period, with Phase-I recently hiked to **₹998 Crore** as of late 2025.

Aims and Objectives

- **Energy Generation:** Utilize surplus biomass, agricultural residue, and industrial/urban bio-waste to generate Bio-CNG, Power, and Biogas.
- **Environmental Protection:** Reduce open field burning of crop residues and mitigate greenhouse gas emissions to meet India's "Net Zero" 2070 goal.
- **Rural Livelihood:** Provide additional income for farmers and rural households through waste-to-wealth initiatives.
- **Resource Management:** Support sustainable urban and industrial waste management through energy recovery.

Sub-Schemes (The "Umbrella" Components)

1. **Waste to Energy Programme:** Focuses on large-scale Biogas, Bio-CNG, and Power plants using urban and industrial waste.
2. **Biomass Programme:** Supports manufacturing of briquettes and pellets and non-bagasse based cogeneration projects.
3. **Biogas Programme:** Promotes small and medium-sized biogas plants for rural households and Gaushalas.

Funding Mechanism & Features

- **Central Financial Assistance (CFA):** Direct subsidies are provided to project developers based on installed capacity (e.g., up to ₹10 Crore for Bio-CNG projects).
- **Bio-Urja Portal:** A single-window online platform for registration, application submission, and real-time tracking.
- **Revised Guidelines (2025-26):** Simplified paperwork, replaced long-term sale contracts with general agreements, and integrated **IoT-based monitoring** to replace expensive SCADA systems.

Achievements (Updated as of March 2026)

- **Emissions Reduction:** Biomass co-firing in thermal power plants has prevented approximately **5.7 million metric tonnes** of emissions since inception.
- **Capacity Growth:** Total installed biomass capacity reached **387.8 MW**, and Waste-to-Energy capacity reached **254.41 MW** by FY 2024-25.
- **Deployment:** Over **12,000 biogas plants** and **95 Bio-CNG projects** have been sanctioned or commissioned under the new guidelines.

Criticisms and Challenges

- **High Capital Cost:** Bioenergy projects require significantly higher investment per MW compared to solar or wind power.

- **Feedstock Supply Chain:** Ensuring the year-round availability and aggregation of biomass from fragmented rural sources remains a major hurdle.
- **Storage Issues:** Lack of adequate local storage infrastructure for agricultural residue leads to seasonal supply fluctuations.

6. Green Energy Corridor (GEC): The **Green Energy Corridor (GEC)** is India's flagship transmission program designed to integrate large-scale renewable energy (RE) into the national grid. As of **May 2026**, it is a critical component of India's goal to achieve **500 GW of non-fossil fuel capacity by 2030**.

Core Details

- **Ministry:** Ministry of New and Renewable Energy (MNRE).
- **Implementing Agencies:**
  - **Intra-State:** Respective **State Transmission Utilities (STUs)**.
  - **Inter-State:** Power Grid Corporation of India Limited (POWERGRID).
- **Scheme Type:** It is a **Central Sector Scheme**, as it is fully funded/coordinated by the central government via grants and loans, though implemented in partnership with states.
- **Classification:** It is a **Flagship Scheme** of the MNRE for power evacuation.

Aims and Objectives

- **Grid Synchronization:** To synchronize intermittent solar and wind power with conventional power stations in the grid.
- **Power Evacuation:** Evacuating approximately **44 GW** of renewable power across two main phases.
- **Energy Security:** Reducing carbon footprints to meet Paris Agreement and COP26 "Panchamrit" targets.

Funding Mechanism

Funding varies by project type, typically involving a mix of central grants and international loans:

- **Central Financial Assistance (CFA):** The MNRE provides a grant of **33% to 40%** of the project cost.
- **Debt/Loans:** Significant funding (up to 40-67%) comes from KfW Germany or domestic agencies like REC and PFC.
- **Equity:** The remaining **20%** is usually contributed by the respective State Transmission Utilities.

Status Update & Achievements (May 2026)

- **Capacity Integrated:** Approximately **26 GW** of renewable capacity has been integrated to date across GEC-I and GEC-II.
- **Phase I Completion:** Most Phase I projects are completed; states like Rajasthan, Karnataka, and Tamil Nadu have finished their work.

- **Phase II Progress:** Under implementation across 7 states (including Gujarat, UP, and Kerala) with a target to evacuate **20 GW** by 2026-27.
- **Ladakh GEC:** A massive **13 GW Inter-State Transmission System (ISTS)** in Ladakh is underway, expected to be completed by FY 2029-30.
- **Phase III & IV:** The government has introduced plans for next-gen phases targeting the evacuation of **150 GW**, with an estimated budget of **₹560 billion** for GEC-III.

Criticism and Challenges

- **Execution Delays:** Projects often face setbacks due to **Land Acquisition**, **Right of Way (RoW)** issues, and slow forest clearances.
- **Environmental Concerns:** High-voltage lines in Rajasthan and Gujarat have faced legal challenges due to their impact on the **Great Indian Bustard (GIB)**, leading to Supreme Court mandates for undergrounding in specific zones.
- **Technical Bottlenecks:** Despite new lines, **grid connectivity** remains the "principal constraint" for renewable deployment.
- **Financial Health:** The poor financial condition of state **DISCOMs** continues to threaten the bankability of large transmission projects

7. Reformed Linked Distribution Scheme (RDSS): The **Revamped Distribution Sector Scheme (RDSS)**, launched in July 2021, is a reforms-based and results-linked initiative designed to improve the operational efficiency and financial sustainability of state-owned Power Distribution Companies (DISCOMs).

Aims and Objectives

- **Reduce AT&C Losses**: Aiming for pan-India levels of **12–15%** by FY 2024-25.
- **Eliminate ACS-ARR Gap**: Reducing the gap between the Average Cost of Supply and Average Revenue Realised to **zero**.
- **Reliability**: Improving the quality and affordability of power supply through a robust, modernized distribution infrastructure.
- **24x7 Power**: Ensuring uninterrupted electricity for every household.

Governance and Funding

- **Ministry**: Functioning under the **Ministry of Power**.
- **Implementing Agencies**: **REC Limited** and **PFC Limited** serve as the Nodal Agencies.
- **Scheme Type**: It is a **Centrally Sponsored Scheme** and acts as an **Umbrella Scheme**, subsuming earlier initiatives like IPDS, DDUGJY, and Saubhagya.

- **Funding Mechanism**: Total outlay of **₹3,03,758 crore** over five years (FY 2021-22 to FY 2025-26). This includes a **Gross Budgetary Support (GBS)** of approximately ₹97,631 crore from the Central Government.
  - *Result-Linked*: Funds are disbursed only after DISCOMs meet pre-qualifying criteria and achieve specific performance benchmarks.

Key Features

- **Smart Metering (Part A)**: Installation of ~25 crore prepaid smart meters for consumers and system meters for feeders/transformers.
- **Infrastructure Upgrades**: Network strengthening through high-tension (HT) lines, feeder segregation for agriculture, and new substations.
- **Capacity Building (Part B)**: Focus on training, IT interventions, and institutional strengthening.
- **TOTEX Model**: Implementation of smart metering works via Public-Private Partnership in TOTEX (Capex + Opex) mode.

Update as of 2026

- **Sanctions**: As of March 2026, infrastructure and smart metering works worth **₹2.83 lakh crore** have been sanctioned.
- **Loss Reductions**: National AT&C losses reduced from **21.91% (FY21)** to **15.04% (FY25)**.
- **Meter Installation**: Approximately **4.69 crore smart meters** have been installed under the scheme by March 2026.
- **Extension**: The Ministry of Power has proposed extending the scheme until **2028** to ensure complete rollout of smart meters and completion of delayed reform works.

Achievements and Criticisms

Achievements	Criticisms and Challenges
Increased Revenue: Billing efficiency rose from 84.08% to 87.59% (FY21-FY25).	**Supply Chain**: Global semiconductor shortages have delayed smart meter production.
Financial Discipline: Collection efficiency improved to 97%.	**Data Privacy**: Concerns regarding consumer data security and transparency.
Modernization: Substantial progress in feeder segregation and aerial bunched (AB) cabling.	**High Costs**: Cash-strapped DISCOMs struggle to provide their share of project equity.

Last Mile Access: Over 2.93 lakh households electrified in remote/tribal areas under specialized programs like PM-JANMAN.

Consumer Resistance: Pushback against "prepaid-only" models in certain residential segments.

Waiver of ISTS Charges: Inter-state transmission system (ISTS) charges for solar and wind power are waived for projects commissioned by **June 30, 2025**

8**. Bharat Small Reactors (BSR)**:

Bharat Small Reactors (BSR) are the cornerstone of India's new Nuclear Energy Mission, representing a strategic shift to involve the private sector in nuclear power generation.

Core Identity & Administration

- **Ministry:** Under the Department of Atomic Energy (DAE), which reports directly to the Prime Minister.
- **Implementing Agencies:** A collaboration between the Bhabha Atomic Research Centre (BARC) and Nuclear Power Corporation of India Limited (NPCIL), with active participation from private industries.
- **Scheme Type:** It is a **Central Sector Scheme** under the broader **Nuclear Energy Mission** (a flagship initiative). It follows a unique business model where private entities provide land and capital, while NPCIL handles design, quality assurance, and operations.

Aims & Objectives

- **Decarbonization:** Act as captive power plants for energy-intensive sectors (steel, aluminum) to reach Net Zero by 2070.
- **Energy Security:** Repurpose retired coal-based thermal power sites and provide power to remote, off-grid locations.
- **Self-Reliance:** Develop at least **five indigenous SMRs by 2033** and contribute to a 100 GW nuclear capacity target by 2047.

Funding & Features

- **Funding:** The Union Budget 2025-26 allocated ₹20,000 crore specifically for the research, development, and deployment of SMRs/BSRs.
- **Key Features:**
  - **Proven Technology:** Based on India's successful 220 MWe Pressurized Heavy Water Reactor (PHWR) design.
  - **Modular Design:** Components are factory-built for rapid on-site assembly, reducing construction time to 60–72 months.

- **Enhanced Safety:** Smaller exclusion zones (~500m vs 1.5km for large plants) and passive safety features.

2026 Status Update & Achievements

- **BSMR-200 Progress:** As of March 2026, the **Bharat Small Modular Reactor (BSMR-200)** has received in-principle approval, with its financial sanction proposal cleared by the Atomic Energy Commission.
- **Criticality Milestones:** While BSRs are in the pre-construction/design phase, India's overall nuclear program reached a landmark in April 2026 with the **Prototype Fast Breeder Reactor (PFBR)** at Kalpakkam achieving "first criticality".
- **Legislative Support:** The **SHANTI Act, 2025** was introduced to modernize the legal framework, allowing private sector entry into nuclear R&D and deployment.

Criticisms & Challenges

- **Regulatory Hurdles:** Transitioning from a state-monopoly to private participation requires complex amendments to the Atomic Energy Act and Civil Liability for Nuclear Damage Act.
- **Initial Costs:** The first demonstration unit of BSMR-200 is estimated at ₹27 Cr/MWe, which is high compared to established technologies, though costs are expected to drop with standardization.
- **Site Management:** Finding suitable land and managing public apprehension regarding nuclear waste at smaller, decentralized sites remains a logistical challenge

9. Offshore Wind Energy VGF Scheme

The **Viability Gap Funding (VGF) scheme for Offshore Wind Energy** is a pivotal initiative approved by the Union Cabinet in June 2024 with a total outlay of **₹7,453 crore**. It serves as a financial catalyst to kickstart India's first-ever offshore wind projects, addressing the high initial costs associated with marine-based energy generation.

Aims and Objectives

- **National Policy Implementation:** Executes the **National Offshore Wind Energy Policy (2015)** to harness India’s vast potential within its Exclusive Economic Zone (EEZ).
- **Cost Reduction:** Lowers the cost of offshore wind power to make it viable for purchase by **DISCOMs** (Distribution Companies).
- **Infrastructure Development:** Upgrades port facilities to handle the heavy logistics of offshore turbines.
- **Energy Goals:** Contributes to India's commitment of reaching **500 GW of non-fossil fuel capacity by 2030**.

Key Features

- **Capacity Target:** Aims for **1 GW (1,000 MW)** of offshore wind capacity, split into two 500 MW projects off the coasts of **Gujarat** and **Tamil Nadu**.
- **Port Upgradation:** Includes a **₹600 crore grant** specifically for two ports to support logistics.
- **Infrastructure Responsibility:** While private players build the turbines, the **Power Grid Corporation of India Ltd (PGCIL)** constructs the offshore substations and evacuation infrastructure.
- **Financial Support:** Provides VGF grants to cover a portion of the project cost, ensuring developers can offer competitive power tariffs.

Operational Details

- **Ministry: Ministry of New and Renewable Energy (MNRE)**.
- **Implementing Agency: Solar Energy Corporation of India (SECI)**.
- **Scheme Type:** It is a **Central Sector Scheme**, meaning it is 100% funded by the Union Government.
- **Classification:** It is considered a **flagship scheme** under the broader VGF framework designed for capital-intensive infrastructure.

Status and Achievements (as of 2026)

- **Tendering Progress:** SECI has initiated international competitive bidding for the initial 1 GW capacity.
- **Site Identification:** Detailed wind resource mapping has been completed by the **National Institute of Wind Energy (NIWE)** for sites off Gujarat and Tamil Nadu.
- **Capacity Milestone:** Contributed to the overall growth of wind energy, which reached approximately **48.16 GW** by January 2025.
- **Timeline:** VGF support for these projects is structured to continue until **F.Y. 2031-32**.

Criticism and Challenges

- **Cost Competitiveness:** Despite VGF, offshore wind remains significantly more expensive than onshore wind and solar.
- **Logistical Complexity:** High dependence on specialized port infrastructure and marine logistics, which are still in early development stages in India.
- **Environmental Impact:** Concerns regarding the impact of underwater construction and noise on **marine biodiversity**.
- **Gestations Periods:** Long development cycles (typically 7–10 years) compared to onshore projects

10. PLI Scheme for High-Efficiency Solar PV Modules: The **Production Linked Incentive (PLI) Scheme for High-Efficiency Solar PV Modules**, officially known as the **National Programme on High Efficiency Solar PV Modules**, is a **Central Sector Scheme** aimed at making India a global hub for solar manufacturing.

Core Details

- **Ministry:** Ministry of New & Renewable Energy (MNRE).
- **Implementing Agencies:**
  - **Tranche-I:** Indian Renewable Energy Development Agency (**IREDA**).
  - **Tranche-II:** Solar Energy Corporation of India (**SECI**).
- **Scheme Type:** It is a **flagship scheme** under the "Atmanirbhar Bharat" initiative and is classified as a **Central Sector Scheme** (100% funded by the Central Government).
- **Total Outlay: ₹24,000 crore** (divided into Tranche-I: ₹4,500 crore and Tranche-II: ₹19,500 crore).

Aims and Objectives

- **Build Domestic Capacity:** Achieve GW-scale manufacturing capacity for high-efficiency solar modules.
- **Reduce Import Dependence:** Significantly lower reliance on imported solar cells and modules, primarily from China.
- **Technological Advancement:** Incentivise cutting-edge technology and encourage fully integrated plants (Polysilicon to Modules).
- **Employment:** Generate direct and indirect employment for over 1 lakh people.

Funding & Features

- **Funding Mechanism:** Incentives are calculated based on **incremental sales**, module **efficiency**, and **local value addition**.
- **Disbursal:** Incentives are disbursed over a **5-year period** post-commissioning of the manufacturing plant.
- **Selection:** Manufacturers are selected through a transparent **competitive bidding** process.

Status & Achievements (as of 2026)

- **Capacity Awarded:** Letters of Award have been issued for a total of **48,337 MW** of solar module manufacturing capacity.
- **Commissioning:** As of early 2026, around **30 GW** of module manufacturing capacity and **10.5 GW** of cell manufacturing capacity have been set up under the scheme.
- **Zero Disbursal (Feb 2026):** Despite the progress, no funds were released until February 2026 because the scheme requires a **one-year post-commissioning performance period** before the first payout.
- **Investment:** The scheme has already catalyzed significant private investment, with Tranche-II alone expected to bring in over **₹93,000 crore**.

Criticism and Challenges

- **Slow Disbursal:** Industry experts point to the long waiting period for actual cash flows as a strain on manufacturer liquidity.

- **Supply Chain Gaps:** While module and cell capacity are rising, India still lags in **upstream integration** like polysilicon and wafer production.
- **Global Price Volatility:** Sharp fluctuations in international prices (especially from China) sometimes make domestic production less competitive despite the incentives.
- **Technology Lock-in:** Concerns exist that by the time some plants are fully operational, the subsidized technology might be superseded by newer global advancements

11. Carbon Capture Utilisation and Storage (CCUS):

As of **May 2026**, the **Carbon Capture, Utilisation, and Storage (CCUS)** framework in India has evolved from a research initiative into a major industrial decarbonisation scheme following a landmark announcement in the **Union Budget 2026-27**.

Key Framework & Updates (2026)

- **Ministry:** Primary oversight is by the **Ministry of Science & Technology** (through the Department of Science and Technology - **DST**) for R&D, but the **Ministry of Power** has been allocated initial funds (₹500 crore) to commence sectoral programmes.
- **Implementing Agency: DST** remains the lead for technology roadmapping, supported by **National Centres of Excellence** at IIT Bombay and JNCASR, Bengaluru.
- **Scheme Type:** It is a **Central Sector Scheme** (funded 100% by the Union Government), integrated as a **Flagship** pillar of India's Net-Zero 2070 strategy.
- **Funding Mechanism:** A dedicated outlay of **₹20,000 crore** over five years (2026-2031) was earmarked in February 2026. It employs mechanisms like **Viability Gap Funding (VGF)** to offset high capital costs and incentivise private sector participation.

Aims, Objectives & Features

- **Primary Aim:** To move CCUS from the pilot phase to large-scale commercial deployment in **"hard-to-abate"** sectors—specifically **Steel, Cement, Power, Refineries, and Chemicals**.
- **Strategic Objectives:**
  - Achieve **750 million tonnes** of annual CO_2 capture by 2050.
  - Avoid international carbon taxes like the EU's **Carbon Border Adjustment Mechanism (CBAM)** by lowering the carbon footprint of Indian exports.
  - Establish **CCUS Hubs and Clusters** (e.g., in Gujarat and Odisha) where multiple industries share transport and storage infrastructure.
- **Key Features:** Focuses on **Post-combustion** (chemical solvents) and **Pre-combustion** (physical solvents) capture methods.

Achievements and Progress (2026)

- **Pilot Milestones: ONGC** initiated a critical CCUS pilot at the **Gandhar oil field** (Gujarat) in January 2026, using captured CO2 for Enhanced Oil Recovery (EOR).
- **National Roadmap:** The **"R&D Roadmap to enable India's Net Zero Targets"** was launched in December 2025, providing a phased scale-up plan until 2045.
- **Green Standards:** Establishment of the **Green Steel Taxonomy**, which grants ratings (3 to 5 stars) for steel produced using CCUS.

Criticisms and Challenges

- **Economic Viability:** High capital expenditure (CapEx) and operational costs remain a barrier; critics argue that without a clear **carbon pricing** mechanism, domestic demand for captured CO2 is weak.
- **Environmental Concerns:** Critics and NGOs (e.g., Down To Earth) worry that CCUS may prolong reliance on **fossil fuels** instead of accelerating the transition to renewables.
- **Policy Clarity:** There is perceived "blurring" between industrial CCUS funding and nature-based solutions like agriculture-based carbon credits, leading to calls for more distinct sectoral governance

Green Energy Corridors (GEC): Continued development of transmission infrastructure to integrate renewable energy into the national grid

12. Solar Manufacturing PLI:

The **Production Linked Incentive (PLI) Scheme for High Efficiency Solar PV Modules**, officially known as the **National Programme on High Efficiency Solar PV Modules**, is a cornerstone of India's Atmanirbhar Bharat initiative.

Core Framework

- **Ministry:** Ministry of New and Renewable Energy (MNRE).
- **Implementing Agency:** Indian Renewable Energy Development Agency (IREDA) for Tranche-I and Solar Energy Corporation of India (SECI) for Tranche-II.
- **Scheme Type:** It is a **Central Sector Scheme** (100% funded by the Union Government) and is a **flagship scheme** under the broader PLI umbrella covering 14 sectors.
- **Funding Mechanism:** Total outlay of **₹24,000 crore** (₹4,500 Cr in Tranche-I and ₹19,500 Cr in Tranche-II). Incentives are disbursed based on **incremental sales** of locally manufactured high-efficiency modules for five years post-commissioning.

Aims and Objectives

- **Build an Ecosystem:** Creating a domestic manufacturing base for high-efficiency solar PV modules.

- **Reduce Import Dependence:** Lowering reliance on imports, particularly from China, to enhance energy security.
- **Technological Advancement:** Bringing cutting-edge solar technologies (like TOPCon and HJT) to India.
- **Integration:** Encouraging fully integrated plants (from Polysilicon to Modules) to ensure quality control.

Key Features

- **Performance-Linked:** Rewards higher module efficiency and better temperature coefficients.
- **Local Content Requirement (LCR):** Higher incentives are provided for greater domestic value addition.
- **Selection Process:** Transparent competitive bidding selects manufacturers based on efficiency and integration extent.

Status & Achievements (as of May 2026)

- **Capacity Addition:** Approximately **48.3 GW** of fully/partially integrated manufacturing capacity has been awarded.
- **Operational Milestone:** As of February 2026, about **30 GW** of module capacity and **10.5 GW** of cell capacity have been set up.
- **Investments:** Committed investments have reached roughly **₹48,120 crore**.
- **Job Creation:** Generated nearly **38,500 direct jobs** as of mid-2025.
- **Import Impact:** Solar module imports decreased from over $3.3 billion in FY22 to approximately **$2.15 billion** in FY25.

Criticisms & Challenges

- **Disbursement Delays:** No funds were disbursed as of February 28, 2026, because the required one-year post-commissioning performance period had not been completed for most awarded projects.
- **Upstream Bottlenecks:** Progress in high-capital upstream segments like Polysilicon and Wafers remains slow compared to downstream module assembly.
- **Policy Uncertainty:** Frequent revisions to the Approved List of Models and Manufacturers (ALMM) and trade policy inconsistencies create hurdles for manufacturers.
- **Global Competition:** Indian manufacturers still struggle to match the cost-competitiveness of Chinese imports despite the Basic Customs Duty (BCD).

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TOTAL FEES STRUCTURE INCOME SLAB WISE

BELOW ₹1 LAKH PER ANUM	: ₹ 6000/-
BETWEEN ₹1 LAKH TO ₹ 2.5 LAKH PA	: ₹ 12,000/-
BETWEEN ₹2.5 LAKH TO ₹ 5 LAKH PA	: ₹ 24,000/-
BETWEEN ₹5 LAKH TO ₹ 7 LAKH PA	: ₹ 36,000/-
BETWEEN ₹7 LAKH TO ₹ 8 LAKH PA	: ₹ 50,000/-
BETWEEN ₹8 LAKH TO ₹ 10 LAKH PA	: ₹ 60,000/-
ABOVE ₹ 10 LAKH PA	: ₹ 80,000/-

COURSE INCLUDE

- INCLUDE ABOVE ALL ONLINE COURSE FEATURES
- REGULAR MAINS WRITING PRACTICE AND MOCK TEST
- REGULAR MOCK INTERVIEWS
- REGULAR INTENSIVE CURRENT AFFAIRS DISCUSSION
- SKILL DEVELOPMENT COURSE INCLUDE SPOKEN ENGLISH
- TOPIC WISE GROUP DISCUSSIONS
- ETHICS BASED LEADERS STAGE TALKS
- REAL TIME ONE TO ONE MENTOR SHIP
- REGULAR SUBJECT WISE SEMINARS
- ACCESS TO LIBRARY AND BOOKS

ONLINE COURSE DETAILS

DURATION : 12 MONTHS
MODE : ONLINE
TIMING: 9.00 P.M TO 10.30 P.M

TOTAL FEES STRUCTURE INCOME SLAB WISE

BELOW ₹1 LAKH PER ANUM	: ₹ 3000/-
BETWEEN ₹1 LAKH TO ₹ 2.5 LAKH PA	: ₹ 6000/-
BETWEEN ₹2.5 LAKH TO ₹ 5 LAKH PA	: ₹ 12,000/-
BETWEEN ₹5 LAKH TO ₹ 7 LAKH PA	: ₹ 24,000/-
BETWEEN ₹7 LAKH TO ₹ 8 LAKH PA	: ₹ 36,000/-
BETWEEN ₹8 LAKH TO ₹ 10 LAKH PA	: ₹ 50,000/-
ABOVE ₹ 10 LAKH PA	: ₹ 60,000/-

COURSE INCLUDE

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13. SIGHT Programme:

The **Strategic Interventions for Green Hydrogen Transition (SIGHT)** programme is the primary financial incentive mechanism under India's National Green Hydrogen Mission. As of **May 2026**, it serves as the engine for India's goal to become a global hub for green hydrogen.

Core Details

- **Aims & Objectives**:
  - To bolster domestic **electrolyser manufacturing**.
  - To maximize the production of **green hydrogen** and its derivatives.
  - To enhance the cost-competitiveness of green hydrogen against fossil-based "grey" hydrogen.
  - To encourage large-scale utilization and export of clean energy.
- **Funding Mechanism**: Direct financial incentives provided over a **5-year period**. The total outlay for SIGHT is **₹17,490 crore**.
- **Ministry**: Ministry of New and Renewable Energy (MNRE).
- **Implementing Agency**: Solar Energy Corporation of India (SECI).
- **Scheme Type**: It is a **Central Sector Scheme**, meaning it is 100% funded and implemented by the Central Government.
- **Classification**: It is a major **flagship sub-component** under the **umbrella** National Green Hydrogen Mission.

Programme Features (The Two Components)

1. **Component I: Electrolyser Manufacturing (₹4,440 crore)**: Incentivizes the domestic production of electrolysers to ensure a supply chain for hydrogen production.

2. **Component II: Green Hydrogen Production (₹13,050 crore)**: Provides incentives for the actual production of green hydrogen. It operates under multiple "modes," including competitive bidding (Mode 1) and demand aggregation (Mode 2).

Status & Achievements (as of 2026)

- **Production Benchmarking**: Through competitive bidding, the levelized cost of green hydrogen (LCOH) reached approximately **₹387–₹397 per kg** (including GST) for refinery supply.
- **Record Lows**: In August 2025, a record-low price of **₹55.75/kg for Green Ammonia** was achieved in a SECI auction.
- **Capacity Awards**: As of early 2026, cumulative annual production capacity of over **862,000 tonnes** of Green Hydrogen and **3,000 MW** of annual electrolyser manufacturing have been allocated to various firms.
- **Sectoral Expansion**: Launch of pilot projects in "hard-to-abate" sectors like **steel, shipping, and mobility**.

Criticism & Challenges

- **Incentive Duration**: Critics argue that the **3-year incentive window** for individual projects may be too short given the high capital expenditure required.
- **Infrastructure Gaps**: Reports indicate nearly **60% of existing hydrogen infrastructure** requires upgrades to handle green hydrogen.
- **High Input Costs**: The high cost of renewable energy storage systems (BESS) remains a hurdle for 24/7 green hydrogen production.
- **Global Competition**: While India is scaling up, it faces heavy competition from the US (Inflation Reduction Act) and the EU, which offer more aggressive subsidies

14. Green Hydrogen Hubs:

As of 2026, **Green Hydrogen Hubs** are a critical component of India's **National Green Hydrogen Mission (NGHM)**, designed to create integrated clusters for the production, use, and export of green hydrogen.

Core Identity & Governance

- **Ministry:** Ministry of New and Renewable Energy (**MNRE**).
- **Implementing Agency:** MNRE, in collaboration with designated Scheme Implementing Agencies (SIAs) and various ministries for specific sectors (e.g., Shipping, Steel).
- **Scheme Type: Central Sector Scheme**, as it is 100% funded and managed by the Central Government.
- **Classification:** It is an **Umbrella Scheme** (NGHM) that contains several sub-components like SIGHT and the Hubs project.

Aims, Objectives & Features

- **Primary Aim:** To establish large-scale integrated ecosystems that consolidate production, storage, transportation, and consumption within designated regions.
- **Key Objectives:**
  - **Cost Competitiveness:** Lower production and delivery costs through shared infrastructure.
  - **Export Leadership:** Position India as a global exporter of green hydrogen and derivatives (e.g., Green Ammonia).
  - **Decarbonisation:** Replace fossil fuels in "hard-to-abate" sectors like refineries, steel, and fertilizers.
- **Features:**
  - **Shared Infrastructure:** Common pipelines, storage, and water treatment facilities.
  - **Certification:** Implementation of the **Green Hydrogen Certification Scheme of India (GHCI)** to verify emission standards.
  - **Policy Support:** Waivers on interstate transmission charges (ISTS) and simplified open-access for renewable energy.

Funding Mechanism

- **Total Mission Outlay:** ₹19,744 crore until 2030.
- **Hub-Specific Funding:** ₹200 crore has been allocated specifically for core infrastructure development at these hubs up to **FY 2025-26**.
- **Disbursement:** Aligned with project milestones specified in the Call for Proposals (CfP).

Update as of 2026: Achievements & Progress

- **Recognised Hubs:** Three major ports—**Deendayal** (Gujarat), **V.O. Chidambaranar** (Tamil Nadu), and **Paradip** (Odisha)—have been officially designated as Green Hydrogen Hubs.
- **Incentive Awards:** Under the SIGHT programme, incentives have been awarded for **3,000 MW/year** of electrolyser manufacturing and over **8.6 lakh tonnes/year** of green hydrogen production.
- **Pilot Projects:** 37 hydrogen-powered vehicles across 10 routes are operational, alongside the world's highest altitude mobility project in Leh.
- **Workforce:** Over 5,600 personnel have been certified in hydrogen-related qualifications as part of the skill development component.

riticism & Challenges

- **High Initial Costs:** Despite subsidies, the production cost of green hydrogen remains significantly higher than conventional "grey" hydrogen.
- **Water Intensity:** Concerns regarding the massive amounts of purified water required for electrolysis in potentially water-stressed regions.

- **Infrastructure Gaps:** The transition requires massive upgrades in pipeline networks and storage technologies that are still in early stages.
- **Incentive Limitations:** Critics argue the ₹200 crore allocation for hubs is small relative to the multi-billion dollar private investments needed for full-scale operations

15. Ethanol Blending:

The **Ethanol Blended Petrol (EBP) Programme** is a **Central Sector Scheme** under the Ministry of Petroleum and Natural Gas (MoPNG). As of **April 2026**, the sale of **20% ethanol-blended petrol (E20)** is mandatory across all Indian states and Union Territories.

Overview (As of May 2026)

- **Ministry:** Ministry of Petroleum and Natural Gas (MoPNG).
- **Implementing Agency:** Public Sector **Oil Marketing Companies (OMCs)** like IOCL, BPCL, and HPCL.
- **Scheme Type: Central Sector Scheme**. It is considered a **flagship initiative** operating under the umbrella of the **National Policy on Biofuels (2018)**.

Aims & Objectives

- **Energy Security:** Reduce reliance on expensive crude oil imports to save foreign exchange.
- **Environmental Protection:** Lower greenhouse gas emissions and vehicular pollution.
- **Rural Prosperity:** Boost farmers' income by creating a dedicated market for agricultural produce like sugarcane and maize.

Funding & Features

- **Funding Mechanism:** The government uses an **Administered Price Mechanism** where OMCs procure ethanol at fixed, remunerative prices. It also provides **Interest Subvention Schemes** (via PM JI-VAN Yojana) to help entrepreneurs set up 2G and 3G distilleries.
- **Key Features:**
  - **Diversified Feedstock:** Ethanol is produced from sugarcane juice, molasses, maize, and damaged food grains.
  - **Tax Incentives:** Lowered GST of **5%** on ethanol intended for blending.
  - **Nationwide Mandate:** Mandatory 20% blending (E20) as of April 1, 2026.

Recent Achievements (2025–2026)

- **Target Met Early:** India achieved the **20% blending (E20) target in November 2025**, two months ahead of the April 2026 deadline.
- **Economic Impact:** Saved over **₹1.63 lakh crore** in foreign exchange and disbursed over **₹1.43 lakh crore** to farmers as of early 2026.
- **Emissions:** Reduced net emissions by approximately **832 lakh metric tonnes** over the last decade.

- **Capacity:** Total ethanol production capacity reached nearly **20 billion litres**, far exceeding the 11 billion litres needed for the E20 mandate.

Criticism & Challenges

- **Food vs. Fuel:** Diversion of food crops (maize and rice) has raised concerns about food security, inflation, and shortages for the poultry industry.
- **Water Intensity:** Producing one litre of ethanol can require up to **2,860 litres of water** (sugarcane) or over **10,000 litres** if using intensive rice crops, worsening water scarcity in states like Maharashtra.
- **Fuel Efficiency:** E20 fuel results in a marginal **reduction in mileage** (approx. 6–7%) compared to pure petrol due to ethanol's lower calorific value.
- **Vehicle Maintenance:** Concerns persist regarding corrosion and damage to rubber/plastic parts in older, non-compliant vehicle engines

16. Nuclear Energy Mission

The **Nuclear Energy Mission** (NEM), officially announced in the **Union Budget 2025-26**, is a cornerstone of India's "Viksit Bharat @2047" vision. It aims to transform the nation's energy landscape by positioning nuclear power as a primary baseload source to achieve **100 GW of capacity by 2047**.

Overview of the Nuclear Energy Mission (2026 Update)

Feature	Details
Aims & Objectives	**100 GW by 2047**: Reach significant nuclear capacity to support Net Zero 2070. **SMR Focus**: Research, design, and deploy at least **5 Small Modular Reactors (SMRs)** by 2033. **Energy Security**: Replace retiring coal plants and provide captive power for energy-intensive industries.
Ministry	**Department of Atomic Energy (DAE)**, which reports directly to the **Prime Minister's Office (PMO)**.
Implementing Agency	Primarily the **Nuclear Power Corporation of India Limited (NPCIL)** and **BHAVINI**, with **Bhabha Atomic Research Centre (BARC)** leading R&D.
Scheme Type	**Central Sector Scheme**: It is 100% funded and implemented by the Central Government via the DAE.

Classification	**Flagship Mission**: It serves as the primary "umbrella" for India's modern nuclear initiatives, including the BSR and BSMR programs.
Funding Mechanism	An initial allocation of **₹20,000 crore** was made in the 2025-26 budget specifically for SMR R&D and deployment.

Key Features

- **Indigenous Technology**: Development of the **Bharat Small Modular Reactor (BSMR-200)** and **SMR-55** for decentralised, scalable power.
- **Private Participation**: The **SHANTI Act (2025)** was enacted to amend the Atomic Energy Act (1962), allowing private sector investment and collaboration in nuclear projects for the first time.
- **Two-Pronged Strategy**: Simultaneous deployment of large-scale 700 MWe PHWRs and advanced imported reactors alongside new SMR technology.

Achievements (as of May 2026)

- **PFBR Criticality**: The 500 MWe **Prototype Fast Breeder Reactor (PFBR)** at Kalpakkam attained **first criticality on April 6, 2026**, making India only the second country (after Russia) to operate a commercial-level fast breeder reactor.
- **Capacity Growth**: India's installed capacity reached **~8,880 MW** by early 2025, with a verified trajectory toward the 2031-32 target of 22,480 MW.
- **Commercial Milestones**: Commercial operation of indigenous **Kakrapar Units 3 & 4** (700 MWe each) in FY 2023-24.
- **Uranium Security**: Discovery of new deposits at **Jaduguda Mines (2024)**, extending the mine's lifespan by 50 years.

Criticisms and Challenges

- **Civil Liability Concerns**: Despite the **SHANTI Act**, critics remain wary of the adequacy of compensation mechanisms and the legal "impasse" regarding global supplier liability.
- **Slow Gestation**: Nuclear projects in India have historically faced massive delays; the PFBR took decades to reach criticality.
- **Cost vs. Renewables**: Critics argue that despite the baseload benefits, nuclear energy remains more expensive per unit compared to rapidly falling solar and wind costs.
- **Waste & Safety**: Ongoing public and environmental concerns persist regarding long-term nuclear waste management and the safety of reactors in seismic zones

17. Smart Metering:

Smart Metering in India is primarily driven by the **Revamped Distribution Sector Scheme (RDSS)**, a flagship reform initiative launched in July 2021 to modernise the power distribution network.

Overview & Administrative Framework

- **Ministry:** Ministry of Power (MoP).
- **Implementing Agencies: PFC** (Power Finance Corporation) and **REC** (Rural Electrification Corporation) act as nodal agencies at the central level. **Energy Efficiency Services Limited (EESL)** is a major implementing agency for the rollout through a joint venture model.
- **Scheme Type:** It is a **Centrally Sponsored Scheme**.
- **Classification:** It is the **flagship** reform initiative under the broader **umbrella** of power sector reforms to improve DISCOM efficiency.

Aims and Objectives

The core objective is to improve the quality, reliability, and affordability of power.

- **Operational Efficiency:** Reduce **AT&C (Aggregate Technical & Commercial) losses** to 12-15% and eliminate the **ACS-ARR gap** (Average Cost of Supply vs. Average Revenue Realised) by 2024-25.
- **Financial Sustainability:** Enhance DISCOM revenue through precise billing and collection.
- **Consumer Empowerment:** Enable real-time tracking of electricity usage and prepaid options to help manage bills.

Key Features & Funding Mechanism

- **Prepaid Mode:** Approximately 97% of sanctioned meters are in **prepaid mode** to ensure upfront payment and reduce defaults.
- **TOTEX Model:** Implemented via a **Total Expenditure (TOTEX)** model involving Public-Private Partnerships (PPP).
- **Funding:** The scheme has a total outlay of **₹3,03,758 crore**.
  - The Centre provides a grant of **15%** for normal states and **22.5%** for special category states (NE, Hilly states, etc.).
  - The balance is funded through private investment via the **DBFOOT** (Design-Build-Finance-Own-Operate-Transfer) model.

2026 Status and Achievements (as of May 2026)

- **Installation Progress:** Over **6.7 crore smart meters** have been installed across India. Under RDSS specifically, 4.55 crore have been deployed.
- **Sanctions:** Roughly **22.23 crore** meters have been sanctioned nationwide.
- **Manufacturing:** India has reached a manufacturing capacity of **100 million smart meters per year**, supporting "Make in India" with a minimum 60% local content requirement.

- **Digitalization:** Implementation of SCADA and Real-Time Monitoring (DMS) has improved fault response and grid reliability.

Criticism and Challenges

- **Implementation Delays:** The scheme has a fixed **sunset date of March 31, 2026** for new sanctions, and progress in several states remains "dismal" relative to the 25-crore target.
- **Technological Hurdles:** Issues with **interoperability** between different vendors, poor communication signals (GPRS/RF), and integration with legacy billing systems.
- **Consumer Resistance:** Initial pushback due to a lack of awareness regarding prepaid benefits and concerns over billing accuracy.
- **Manpower Shortage:** A critical lack of dedicated IT teams and skilled professionals at the DISCOM level to manage Advanced Metering Infrastructure (AMI)

18. SHANTI Act :

The **Sustainable Harnessing and Advancement of Nuclear Energy for Transforming India (SHANTI) Act, 2025**, is a comprehensive legislative framework that overhauls India's nuclear energy sector to achieve long-term energy security and net-zero targets.

Overview of SHANTI Act, 2025

- **Aims & Objectives**:
  - **Scale up capacity**: Targetting **100 GW of nuclear power by 2047**.
  - **Modernization**: Consolidate and replace the outdated Atomic Energy Act, 1962 and Civil Liability for Nuclear Damage Act, 2010.
  - **Liberalization**: Enable private and foreign sector participation in building and operating nuclear plants for the first time.
- **Ministry & Agency**:
  - **Ministry**: Functionally under the Department of Atomic Energy (DAE).
  - **Implementing Agency**: The Atomic Energy Regulatory Board (AERB) has been granted **statutory status** as the primary regulatory body for safety oversight.
- **Scheme Type**: It is a **regulatory legislative framework** rather than a traditional central sector or centrally sponsored scheme. However, it supports the **Nuclear Mission**, which was launched with an initial allocation of **₹20,000 crore**.
- **Scheme Status**: It functions as an **umbrella legislative structure** for India's civil nuclear ecosystem.

Key Features

- **Private Participation**: Allows private Indian companies and joint ventures to build and operate nuclear facilities.

- **Reserved Strategic Activities**: The Central Government retains exclusive control over enrichment, spent fuel management, and heavy water production.
- **Revised Liability Regime**:
  - **Operator Liability**: Capped between **₹100 crore** (small reactors) to **₹3,000 crore** (large plants).
  - **Supplier Protection**: Removes "right of recourse" against suppliers for defects to align with international standards.
- **New Institutions**: Establishes the **Atomic Energy Redressal Advisory Council** and a **Nuclear Liability Fund (NLF)** for accident contingencies.

2026 Status & Achievements

- **Update (May 2026)**: As of early 2026, the government is currently **framing rules and regulations** for the Act's implementation.
- **Nuclear Mission**: Under this mission, five **Small Modular Reactors (SMRs)** are planned for 2033.
- **Tax Incentives**: Budget 2026-27 announced **customs duty exemptions** on input materials for nuclear plants until 2035.
- **Regulatory Independence**: The AERB's new statutory status has increased its enforcement powers and credibility.

Criticism & Challenges

- **Safety & Accountability**: Critics argue that removing supplier liability and capping operator liability may create **"moral hazard"** and reduce incentives for safety investments.
- **Victim Compensation**: Concerns that liability caps may be inadequate for a major incident, especially following the omission of Section 46 which limits victims' ability to seek remedies under other laws.
- **Grid Readiness**: Integrating 100 GW of baseload power requires massive upgrades to **transmission infrastructure** and grid balancing capabilities.
- **Regulatory Overlap**: Potential conflicts between the AERB and the new Redressal Advisory Council

19. Draft National Electricity Policy 2026

The **Draft National Electricity Policy (NEP) 2026** was released by the **Ministry of Power** on **January 20, 2026**, for public consultation. It is a comprehensive policy framework designed to replace the 2005 policy and align India's power sector with the **Viksit Bharat @2047** vision.

Key Objectives and Aims

The policy focuses on transitioning from a "capacity addition" mindset to a "system optimization" and "reliability" approach.

- **Reliability & Quality:** Ensuring a 24x7 reliable and quality power supply.

- **Financial Turnaround:** Achieving commercial viability for the sector, particularly DISCOMs.
- **Energy Transition:** Targeting net-zero by 2070 and increasing non-fossil fuel capacity.
- **Consumption Targets:** Boosting per capita electricity consumption to **2,000 kWh by 2030** and over **4,000 kWh by 2047**.
- **Economic Competitiveness:** Supplying electricity at competitive prices to support industrial growth.

Administrative Framework

- **Ministry:** Ministry of Power, Government of India.
- **Implementing/Nodal Agency:** The Central Electricity Authority (CEA) leads national coordination and demand forecasting. For specific rural access, the **Rural Electrification Corporation (REC)** remains a key nodal agency.
- **Scheme Type:** It is a **National Policy** rather than a specific "scheme". However, it acts as an **umbrella framework** that guides various central sector and centrally sponsored schemes.
- **Funding Mechanism:** Includes a mix of private investment, market-based mechanisms (like capacity markets), and government support through automatic tariff revision indices to ensure cost recovery.

Core Features

- **Resource Adequacy (RA) Plans:** Mandates DISCOMs to prepare utility-level RA plans to ensure long-term capacity.
- **Distribution System Operators (DSOs):** Introduces DSOs to manage local flows, rooftop solar, and EV charging.
- **Tariff Reforms:** Proposes automatic annual tariff revisions if state orders are delayed and links tariffs to actual cost of supply.
- **Nuclear Expansion:** Aims for an 11-fold increase in nuclear capacity to **100 GW by 2047**.
- **Grid Modernization:** Emphasizes energy storage (BESS and Pumped Storage), cybersecurity, and smart grids.

Current Status and Updates (May 2026)

- **Consultation Phase:** The draft was open for stakeholder comments until February 19, 2026.
- **Recent Achievement:** By early 2026, peak demand reached record levels (approx. 242 GW) with energy shortages reduced to a negligible **0.03%**.
- **Implementation:** DISCOMs have begun establishing benchmarks for the new performance-based tariff regimes.

Achievements and Criticisms

Achievements	Criticisms / Challenges

Universal electrification achieved (pre-2026 status).	**Financial Health:** DISCOMs still face chronic debt and accumulated losses.
Shift toward low-carbon energy sources.	**Tariff Sensitivity:** Automatic price hikes may face political and public resistance.
Enhanced grid stability via RA planning.	**Cross-Subsidies:** High industrial tariffs still hurt global competitiveness.
Rapid expansion of power exchanges.	**Implementation Gaps:** Regulatory delays at the state level often hinder national goals.

20. India Energy Stack (IES):

The **India Energy Stack (IES)** is a pioneering **Digital Public Infrastructure (DPI)** designed as a unified, secure, and interoperable digital backbone for the power sector. It is envisioned as the "UPI moment" for energy, standardising how different stakeholders exchange data and settle transactions.

Aims and Objectives

- **Unified Infrastructure:** To create a digital layer that connects disparate parts of the power system (Gencos, Transcos, Discoms, and consumers).
- **Renewable Integration:** To facilitate the seamless integration of distributed energy resources like rooftop solar and electric vehicles.
- **Operational Efficiency:** To enhance DISCOM efficiency and enable real-time coordination across the energy value chain.
- **Consumer Empowerment:** To deliver transparent, consumer-centric services like peer-to-peer energy trading and green tariffs.

Administration and Mechanism

- **Ministry: Ministry of Power** (MoP).
- **Implementing Agency: REC Limited** (formerly Rural Electrification Corporation) serves as the nodal agency, supported by **FSR Global** as the knowledge partner.
- **Funding:** The total allocated fund for development is **₹51.3 Crore**.
- **Scheme Type:** It is a **Central Sector** initiative (100% central funding for development), functioning as a **flagship umbrella framework** for the digitalization of the power sector.

Key Features

- **Five Building Blocks:** Built on **Identity** (unique IDs for assets/consumers), **Registries**, **Interaction Protocols**, **Energy Data Exchange**, and **Energy Credentials**.
- **Interoperability:** Uses open APIs and standardised protocols so disparate systems can communicate without replacing existing infrastructure.
- **Utility Intelligence Platform (UIP):** A platform to unlock data from IT/OT systems for real-time analytics.
- **Consent-Based Sharing:** Ensures secure, real-time sharing of energy data with user consent.

Updates and Achievements (as of 2026)

- **Framework Evolution:** Version **0.4** of the Strategy and Architecture documents was released in **March 2026**.
- **Pilot Implementation:** Pilots are underway in distribution utilities across **Delhi, Gujarat, Andhra Pradesh, Uttar Pradesh, and Mumbai** (scheduled for FY 2026-27 demonstration).
- **Milestone Target:** The project is on track for full completion of its foundational development by **July 2026**.
- **Integration:** Successful initial tests for peer-to-peer (P2P) energy exchange and DER visibility.

Criticism and Challenges

- **Legacy Issues:** The sector remains **digitally disjointed**; many utilities still operate in silos with non-uniform legacy systems that are difficult to bridge.
- **Data Security:** Concerns regarding the vulnerability of a unified digital layer to cyber-attacks given the critical nature of the power grid.
- **Privacy:** Critics highlight potential risks in real-time tracking of consumer energy usage without robust data protection laws specifically for energy data.
- **Adoption Speed:** The transition from central-centric (DISCOM-centric) patterns to a decentralised market is expected to face bureaucratic resistance from state utilities

21. Solar Park Scheme:

The **Scheme for Development of Solar Parks and Ultra Mega Solar Power Projects** is a key initiative by the **Ministry of New and Renewable Energy (MNRE)**. Originally launched in December 2014, the scheme has been extended to **March 31, 2026**, for new approvals, with a completion deadline for all approved parks stretching to **March 31, 2029**.

Core Framework

- **Aim & Objective:** To facilitate large-scale solar power generation by providing "plug-and-play" infrastructure. It aims to reduce risks for developers by offering pre-cleared land, transmission connectivity, and basic amenities like roads and water.
- **Ministry:** Ministry of New and Renewable Energy (MNRE).

- **Implementing Agency:** The **Solar Energy Corporation of India (SECI)** handles funds on behalf of the Central Government. The actual park development is carried out by **Solar Power Park Developers (SPPDs)**, which can be State Nodal Agencies, Joint Ventures between SECI and states, or private entrepreneurs.
- **Scheme Type:** It is a **Central Sector Scheme**, as it is fully funded and implemented through central financial assistance directly from the MNRE.
- **Classification:** It functions as a **Flagship Scheme** under the broader National Solar Mission (NSM) framework.

Funding Mechanism & Features

The scheme provides **Central Financial Assistance (CFA)** based on the following pattern:

- **Up to ₹25 lakh per park** for preparing the Detailed Project Report (DPR).
- **Up to ₹20 lakh per MW** (or 30% of the project cost, whichever is lower) for infrastructure development.
- **Infrastructure Splitting:** This funding is typically split: **₹12 lakh/MW** for internal infrastructure (roads, water, internal transmission) and **₹8 lakh/MW** for external transmission networks.

2026 Status & Achievements

- **Capacity Target:** The enhanced target is **40,000 MW (40 GW)** by 2026.
- **Sanctioned Parks:** As of late 2025/early 2026, **55 solar parks** with a combined sanctioned capacity of **39,973 MW** have been approved across 13 states.
- **Commissioned Capacity:** Over **14,922 MW** of solar projects have been fully installed within these parks, with the remainder in various implementation stages.
- **Extension:** The timeline for new approvals is officially capped at **March 2026**, but completion of the approved 40 GW capacity is now permitted until **March 2029**.

Criticism & Challenges

- **Land Acquisition:** Significant delays have occurred due to hurdles in acquiring land with clear titles and resolving local land-use conflicts.
- **Transmission Mismatch:** There is often a "mismatch" in timelines between completing solar plants and the readying of power evacuation (grid) infrastructure.
- **Environmental Concerns:** In states like Rajasthan and Gujarat, projects have faced legal hurdles for encroaching on the habitat of the **Great Indian Bustard**; the Supreme Court has directed the laying of expensive underground cables to protect the birds.
- **Delayed Infrastructure:** Critics note that some SPPDs wait for money from power developers before starting infrastructure work, undermining the intended "plug-and-play" model

22. Ethanol Blended Petrol (EBP) Programme:

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The **Ethanol Blended Petrol (EBP) Programme** is a strategic initiative launched in January 2003 to promote the use of renewable fuels in India. As of **May 2026**, the programme has successfully transformed India's energy landscape by making **20% ethanol blending (E20) mandatory** for all petrol sold across the country.

Core Framework

- **Ministry:** Ministry of Petroleum and Natural Gas (MoP&NG).
- **Implementing Agencies:** Public Sector Oil Marketing Companies (OMCs) like IOCL, BPCL, and HPCL, which procure ethanol directly from distilleries.
- **Scheme Type:** It is a **Central Sector Scheme**, as it is fully funded and regulated by the Central Government through OMCs and administered pricing.
- **Category:** It is a **Flagship Scheme** of the Government of India, operating under the broader **National Policy on Biofuels – 2018**.

Aims and Objectives

- **Energy Security:** To reduce the massive bill for imported crude oil.
- **Environmental Sustainability:** To lower greenhouse gas (GHG) emissions and urban air pollution.
- **Farmer Prosperity:** To provide a remunerative alternate market for agricultural surplus (sugarcane, maize, and damaged grains), helping clear farmer dues.
- **Foreign Exchange Savings:** To conserve forex by substituting imports with domestically produced biofuel.

Funding & Implementation Features

- **Administered Pricing:** The government fixes the price of ethanol derived from various feedstocks (B-heavy molasses, sugarcane juice, maize, etc.) to ensure predictable returns for producers.
- **Interest Subvention:** Financial assistance is provided through the **Department of Food and Public Distribution (DFPD)** to set up or expand distilleries.
- **Tax Incentives:** The GST rate on ethanol meant for the EBP programme was reduced from 18% to **5%**.
- **PM JI-VAN Yojana:** Provides viability gap funding for **Second Generation (2G)** ethanol projects using biomass like rice straw and corn stover.

2026 Status and Achievements

- **E20 Mandate:** As of April 1, 2026, all retail outlets in India dispense **E20 petrol**.
- **Blending Milestone:** India achieved the 20% blending target in **December 2025**, five years ahead of the original 2030 goal.
- **Production Surge:** Capacity has grown from under 2 billion litres in 2014 to nearly **20 billion litres** in 2026.
- **Economic Impact:** Over **₹1.63 lakh crore** in foreign exchange saved and **₹1.43 lakh crore** paid to farmers as of early 2026.

- **Emissions:** Approximately **832 lakh metric tonnes** of net CO2 reduction achieved.

Criticisms and Challenges

- **Food vs. Fuel Debate:** Diversion of food grains like maize and rice to fuel has raised concerns about domestic food inflation and security; in 2024-25, India became a **net importer of maize** to sustain blending.
- **Water Intensity:** Sugarcane, a primary feedstock, is highly water-intensive, leading to environmental strain in water-stressed regions.
- **Technical Limits:** Older vehicle engines (pre-2023) may face long-term wear and tear when using E20 fuel without modifications.
- **Underutilization:** Despite massive capacity expansion, some distilleries face economic stress due to fluctuating feedstock availability and 50% capacity underutilization in specific segments

23. **Production Linked Incentive (PLI) Scheme:**

The **Production Linked Incentive (PLI) Scheme** is a **Central Sector Scheme** designed to transform India into a global manufacturing hub by rewarding companies for incremental sales of products made in India. It is a **flagship initiative** under the "Make in India" campaign, acting as an **umbrella framework** that spans **14 strategic sectors**.

Core Objectives & Features

- **Primary Aims:** To boost domestic manufacturing, reduce import dependence, enhance global competitiveness, and generate large-scale employment.
- **Key Features:**
  - **Performance-Linked:** Financial incentives (typically **4% to 6%**, and up to **18%** in specific sectors) are paid only on **incremental sales** over a defined base year.
  - **Investment Thresholds:** Companies must meet minimum investment and production targets to qualify for disbursements.
  - **Inclusive Tenure:** Incentives are generally provided for **five to six years** (extending up to **FY 2026-27** for most sectors).

Governance & Funding

- **Ministry:** While the **Department for Promotion of Industry and Internal Trade (DPIIT)** acts as the central nodal authority, the scheme is implemented by **respective line ministries** (e.g., MeitY for electronics, Ministry of Textiles for clothing).
- **Implementing Agency:** Each sector appoints a **Project Management Agency (PMA)**—such as **SIDBI** or **IFCI**—to evaluate applications and verify incentive claims.

- **Funding Mechanism:** Financed entirely by the Central Government with a total initial outlay of approximately **₹1.97 lakh crore (US$ 26 billion)**.

2026 Update: Achievements & Status

As of early 2026, the scheme has shown significant traction across its 14 approved sectors:

- **Investment & Production:** Cumulative investment exceeded **₹2.16 lakh crore**, resulting in total sales/production of over **₹20.41 lakh crore**.
- **Exports:** Over **₹8.3 lakh crore** in cumulative exports have been recorded, particularly driven by mobile phones and pharmaceuticals.
- **Employment:** Generated more than **14.39 lakh jobs** (direct and indirect).
- **Disbursement:** Roughly **₹28,748 crore** has been disbursed to beneficiaries as of December 31, 2025.

Criticism & Challenges

- **Low Value Addition:** Critics argue that in sectors like electronics, the scheme has primarily encouraged "assembly" rather than deep-tier manufacturing or R&D.
- **Slow Disbursement:** Some sectors have faced delays in incentive payouts due to rigorous verification processes and companies failing to meet high incremental targets.
- **Import Reliance:** Despite increased local assembly, the reliance on imported raw materials and components (especially from China) remains high in several segments