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# Analysis of Funds Allocated and Spent on Environmentally Sustainable Technology in India (2017–18 to 2025–26) and Structural Transformation through 2026

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**ABSTRACT**

India's transition towards environmentally sustainable technology has become an increasingly important component of economic policy, energy security, industrial development and climate strategy. Between 2017–18 and 2025–26, public expenditure supporting renewable energy, solar power, wind power, decentralized energy, green hydrogen, energy efficiency, electric mobility, sustainable manufacturing and associated infrastructure underwent substantial structural change. This Research examines the evolution of public financial allocation and expenditure on environmentally sustainable technology in India, with particular emphasis on the Ministry of New and Renewable Energy (MNRE), while situating the expenditure within the wider environmental and energy-policy framework. The analysis demonstrates that India's sustainable-technology transition has moved from a predominantly deployment-oriented renewable-energy model towards a broader industrial and technological transformation involving domestic manufacturing, distributed solar energy, green hydrogen, energy storage, electric mobility, grid modernization and low-carbon industrial systems. MNRE expenditure increased considerably over the Research period, although utilization has not always matched budgetary allocations. The Parliamentary Committee on Energy reported that MNRE utilization during 2020–21 was 86.23 percent of revised estimates, rising to 88.43 percent in 2021–22 and remaining at 81.70 percent in 2022–23; expenditure constraints were associated with the COVID-19 pandemic, delays in fund-flow procedures and insufficient proposals from some North-Eastern states. Digital Sansad The transformation became especially visible after 2022–23. The National Green Hydrogen Mission introduced an initial outlay of ₹19,744 crore, including ₹17,490 crore for the Strategic Interventions for Green Hydrogen Transition programme, while the mission also incorporated pilot projects, research and development and green-hydrogen hubs. Ministry of New and Renewable Energy By 2025–26, MNRE expenditure had reached ₹24,176.68 crore against a budget estimate of ₹26,549.38 crore and revised estimate of ₹25,301.22 crore, representing approximately 91.0 percent of the budget estimate and 95.5 percent of the revised estimate. Press Information Bureau At the physical level, the financial transformation has been accompanied by substantial growth in renewable-energy capacity. India's renewable-energy installed capacity excluding large hydro expanded strongly, with solar becoming the principal source of new renewable capacity. By March 2026, renewable-energy capacity had reached approximately 274.68 GW, including 150.26 GW of solar and 56.09 GW of wind capacity. Press Information Bureau The evidence therefore indicates a structural transformation in which public expenditure increasingly functions not merely as direct government spending but as a mechanism for mobilizing private investment, creating domestic manufacturing capacity, reducing technology costs and establishing new low-carbon industrial markets.....

**Keywords**: environmentally sustainable technology, renewable energy, public expenditure, MNRE, green hydrogen, green growth, energy transition

## 1. INTRODUCTION

The transition towards environmentally sustainable technology represents one of the most significant economic transformations occurring in India. Environmental sustainability is no longer restricted to conservation, pollution control or ecological protection. It increasingly encompasses the transformation of energy systems, industrial production, transport, agriculture, buildings, infrastructure and financial markets. Solar photovoltaic systems, wind turbines, battery storage, electric vehicles, green hydrogen, smart grids, energy-efficient equipment and low-carbon manufacturing are becoming important elements of India's development strategy. The period from 2017–18 to 2025–26 is particularly significant because it captures the transition from the earlier phase of renewable-energy deployment towards a more integrated green industrial strategy. In the initial years of the period, policy emphasis was strongly associated with increasing renewable-energy capacity and achieving ambitious solar and wind targets. Subsequently, the policy framework broadened to include domestic manufacturing, decentralized renewable energy, agricultural solarisation, rooftop solar, green hydrogen, battery technologies and new industrial applications. Public expenditure is central to this transformation, but the relationship between government expenditure and sustainable technology is complex. Government expenditure can directly finance infrastructure and subsidies, but it can also provide incentives that change private investment decisions. A rupee allocated to a renewable-energy programme may therefore generate an economic impact considerably larger than the direct government expenditure because it can leverage private capital, reduce technological risk and establish markets for emerging technologies. The Government of India's Budget documents provide annual information on budget estimates, revised estimates and actual expenditure. MNRE is the principal Union ministry responsible for renewable-energy deployment, although environmentally sustainable technology is also financed through other ministries and institutions. Consequently, a complete assessment requires distinguishing between the narrow budgetary expenditure of MNRE and the broader ecosystem of public support for sustainable technology. This article therefore uses MNRE expenditure as the principal comparable fiscal indicator while examining related policy developments across green hydrogen, solar energy, decentralized renewable energy, sustainable transport and environmental technology. The approach avoids treating the entire MNRE budget as purely "environmental technology expenditure", because some expenditure covers administration, institutions and programmes with broader objectives.

## 2. Conceptual Framework: Environmentally Sustainable Technology and Structural Transformation

Environmentally sustainable technology may be defined as technology that contributes to economic activity while reducing environmental damage, resource intensity or greenhouse-gas emissions over its life cycle. In the Indian context, the concept includes renewable electricity generation, energy storage, green hydrogen, electric mobility, energy efficiency, waste-to-energy, bioenergy, clean cooking technologies and technologies supporting climate-resilient infrastructure. The concept is broader than renewable energy alone. Renewable energy represents one major component of sustainable technology, but the transition also requires technologies that enable renewable energy to be integrated into the economy. Transmission infrastructure, storage, forecasting systems, digital grids, power electronics and flexible demand management are therefore important complementary technologies. Structural transformation refers to a sustained change in the composition of economic activity, productive capacity, employment, technology and investment. In the context of India's green transition, structural transformation can be observed when investment shifts from fossil-fuel-intensive activities towards renewable energy and associated manufacturing, when domestic firms develop capabilities in clean technologies, and when new markets emerge around green hydrogen, batteries, electric mobility and decentralized energy. The transformation can consequently be understood through four connected dimensions: financial transformation, technological transformation, industrial transformation and institutional transformation. Financial transformation occurs when public expenditure increases the availability of capital for sustainable technologies. Technological transformation occurs when new technologies move from demonstration to commercial deployment. Industrial transformation occurs when domestic manufacturing and supply chains develop around those technologies. Institutional transformation occurs when government regulations, procurement systems, financial markets and public institutions adapt to the new technological environment.

## 3. Methodology

This Research follows a secondary-data and policy-analysis approach. Government Budget documents, Parliamentary Committee reports, Ministry of New and Renewable Energy publications and official government releases constitute the principal sources. The fiscal analysis distinguishes among three concepts. The first is the Budget Estimate (BE), which represents the amount initially proposed for a financial year. The second is the Revised Estimate (RE), which reflects a revised assessment of expenditure during or near the end of the financial year. The third is actual expenditure, which represents expenditure reported after the financial year. This distinction is important because comparing BE in one year with actual expenditure in another can create a misleading interpretation. Therefore, utilization is assessed primarily as actual expenditure relative to RE where both are available, while BE-to-actual comparisons are also reported where useful. For 2025–26, the latest official information indicates actual MNRE expenditure of ₹24,176.68 crore against BE of ₹26,549.38 crore and RE of ₹25,301.22 crore. Press Information Bureau Physical transformation is evaluated through renewable-energy capacity, particularly solar and wind capacity. MNRE's official year-wise data provide annual capacity additions across wind, solar, small hydro, biomass and waste-to-energy. Ministry of New and Renewable Energy The Research period is 2017–18 through 2025–26, with developments through 2026 used to assess structural transformation.

## 4. Evolution of Public Financial Support, 2017–18 to 2025–26

The first phase of the period was characterized by relatively moderate allocations compared with the later years. Government support was concentrated on renewable-energy deployment, particularly solar and wind. The expenditure framework was primarily designed to accelerate capacity creation and support the country's renewable-energy targets. Available government data show that renewable-energy programme expenditure was ₹3,768.73 crore in 2017–18, ₹4,476.20 crore in 2018–19 and ₹3,542.76 crore in 2019–20. These figures represent actual expenditure for renewable-energy development reported by the Ministry. Digital Sansad The following table summarizes the fiscal trajectory using the available comparable figures and later MNRE budget information (Table 1).

**Table 1. Indicative Evolution of MNRE/Renewable-Energy Public Expenditure**

| Financial year | Budget/revised reference (₹ crore) | Actual expenditure (₹ crore) | Approximate utilization/observation |
|---|---|---|---|
| 2017–18 | 4,080.00 RE | 3,768.73 | 92.4% of RE |
| 2018–19 | 5,146.63 RE | 4,476.20 | 87.0% of RE |
| 2019–20 | 3,891.74 RE | 3,542.76 | 91.0% of RE |
| 2020–21 | 3,591.00 RE | 3,096.73 | 86.2% of RE |
| 2021–22 | 7,681.80 RE | 6,792.83 | 88.4% of RE |
| 2022–23 | 7,033.00 RE | 5,745.85 | 81.7% of RE |
| 2023–24 | 7,848.00 RE | 6,479.11 | 82.6% of RE |
| 2024–25 | 17,298.44 RE | 11,703.45* | 67.7%* |
| 2025–26 | 25,301.22 RE | 24,176.68 | 95.5% of RE |
| Ref: [1] | | | |

*2024–25 figure reported by the Parliamentary

Committee was expenditure up to 15 February 2025 and therefore should not be treated as final-year expenditure. The 2020–25 figures and utilization rates are reported by the Parliamentary Committee on Energy. Digital Sansad The 2017–20 expenditure figures are reported in a Rajya Sabha response. Digital Sansad The 2025–26 figures are reported by the Government of India after completion of the financial year. Press Information Bureau The table demonstrates a significant change in scale. Actual expenditure increased from ₹3,768.73 crore in 2017–18 to ₹24,176.68 crore in 2025–26. Although the categories and accounting frameworks are not perfectly identical across all years, the long-term direction is unmistakable: public financial support for renewable-energy deployment expanded substantially.

**5. Actual Renewable-Energy/MNRE Expenditure**

The following colour-coded graph provides a visual representation of the broad expenditure trajectory. The blocks are proportional indicators rather than a statistical chart with an independent vertical axis (Figure 1).

**Figure 1. Indicative Actual Expenditure Trend**

| Year | Expenditure | Visual scale |
|---|---|---|
| 2017–18 | ₹3,768.73 cr | ▨▨▨ |
| 2018–19 | ₹4,476.20 cr | ▨▨▨▨ |
| 2019–20 | ₹3,542.76 cr | ▨▨▨ |
| 2020–21 | ₹3,096.73 cr | ▨▨▨ |
| 2021–22 | ₹6,792.83 cr | ▨▨▨▨▨▨ |
| 2022–23 | ₹5,745.85 cr | ▨▨▨▨▨ |
| 2023–24 | ₹6,479.11 cr | ▨▨▨▨▨▨ |
| 2024–25 | ₹11,703.45 cr* | ▧▧▧▧▧▧▧▧▧ |
| 2025–26 | ₹24,176.68 cr | ▧▧▧▧▧▧▧▧▧▧▧▧<br>▧▧▧▧▧▧ |
| Ref: [2] | | |

**Legend:** ▨ lower/intermediate expenditure; ▨ pandemic-period contraction; ▧ accelerated later-stage expenditure. *2024–25 figure is not directly comparable with final-year actual expenditure because the Parliamentary Committee reported expenditure up to 15 February 2025. Digital Sansad The colour pattern highlights three periods. The first is the deployment phase before COVID-19, the second is the disruption and adjustment phase around 2020–21, and the third is the accelerated green-investment phase beginning around 2021–22 and becoming particularly strong after 2023–24.

## 6. 2017–18 to 2019–20: The Renewable Deployment Phase

During 2017–18 to 2019–20, the principal objective of public expenditure was to expand renewable-energy deployment. Solar energy was increasingly becoming commercially competitive, while wind energy remained an important component of India's renewable-energy portfolio. The actual expenditure of ₹3,768.73 crore in 2017–18 rose to ₹4,476.20 crore in 2018–19 before declining to ₹3,542.76 crore in 2019–20. Digital Sansad This variation does not necessarily indicate a reduction in government commitment. Renewable-energy programmes are affected by project pipelines, tendering schedules, project completion, central financial assistance claims and private-sector investment. During this period, the government's role increasingly shifted from directly financing all renewable-energy investment to creating an enabling framework. Solar parks, competitive bidding, transmission infrastructure and central financial assistance were designed to reduce barriers to private investment. The shift was economically important because renewable-energy infrastructure has high initial capital requirements but relatively low operating costs. Government support can therefore have a catalytic effect by reducing investment risk.

## 7. 2020–21: Pandemic Disruption and the Limits of Budget Utilization

The year 2020–21 represents an important interruption in the long-term trajectory. The COVID-19 pandemic affected project implementation, procurement, construction, logistics and financial disbursement. MNRE's revised estimate for 2020–21 was ₹3,591 crore and actual expenditure was ₹3,096.73 crore, corresponding to 86.23 percent utilization. The Ministry attributed lower utilization partly to COVID-19 and the non-receipt of adequate proposals from North-Eastern states. Digital Sansad The experience demonstrates why allocation alone cannot be treated as an indicator of actual technological transformation. A large budget does not automatically translate into installed capacity or technological capability. Implementation capacity, project readiness, land availability, transmission infrastructure, procurement systems and state-level participation influence the final outcome. The pandemic therefore exposed the importance of institutional capacity. It also demonstrated that public investment in sustainable technology is embedded within wider economic systems.

## 8. 2021–22 and 2022–23: Expansion and Institutional Reorganization

The fiscal scale increased substantially after the pandemic period. In 2021–22, MNRE had a revised estimate of ₹7,681.80 crore and actual expenditure of ₹6,792.83 crore, corresponding to 88.43 percent utilization. In 2022–23, revised expenditure was ₹7,033 crore and actual expenditure was ₹5,745.85 crore, corresponding to 81.70 percent utilization. Digital Sansad The Parliamentary Committee noted that the implementation of a revised procedure for the flow of funds for central-sector schemes from April 2022 contributed to delays. The new arrangement required central nodal agencies and central nodal accounts, and the Ministry indicated that establishing the necessary arrangements took several months. Digital Sansad. This illustrates an important feature of public investment in sustainable technology: financial administration can influence technological outcomes. Delays in fund flow can postpone procurement, construction and installation even when budgetary authorization exists. The period nevertheless marked a strategic transition. Renewable-energy expenditure increasingly moved beyond conventional solar and wind deployment towards decentralized energy, agricultural solarisation, rooftop systems, green hydrogen and domestic manufacturing.

## 9. 2023–24 to 2025–26: The Acceleration Phase

The most significant financial transformation occurred after 2023–24. MNRE's budgetary requirements expanded rapidly as India moved from conventional renewable deployment towards large-scale green industrial policy. The Parliamentary Committee reported an MNRE BE of ₹10,222 crore for 2023–24, revised expenditure of ₹7,848 crore and actual expenditure of ₹6,479.11 crore. For 2024–25, the BE increased sharply to ₹21,230 crore and the RE to ₹17,298.44 crore. Digital Sansad By 2025–26, the budget estimate reached ₹26,549.38 crore and the revised estimate was ₹25,301.22 crore. Actual expenditure reached ₹24,176.68 crore. Press Information Bureau This represents a major change in scale compared with the beginning of the Research period (Table 2).

**Table 2. Selected MNRE Fiscal Indicators, 2023–24 to 2025–26**

| Financial year | BE (₹ crore) | RE (₹ crore) | Actual expenditure (₹ crore) |
|---|---|---|---|
| 2023–24 | 10,222 | 7,848 | 6,479.11 |
| 2024–25 | 21,230 | 17,298.44 | 11,703.45* |
| 2025–26 | 26,549.38 | 25,301.22 | 24,176.68 |
| Ref: [3] | | | |

*Reported expenditure up to 15 February 2025 in the Parliamentary Committee document. Digital Sansad, 2025–26 final expenditure: Government of India. Press Information Bureau The 2025–26 utilization rate of 95.5 percent of revised estimates is particularly important. It indicates that the gap between budgeted resources and actual spending narrowed considerably relative to several earlier years. Press Information Bureau

## 10. Renewable-Energy Capacity as an Indicator of Structural Transformation

Financial expenditure needs to be evaluated against physical outcomes. MNRE's year-wise achievement data demonstrate substantial expansion of renewable-energy capacity. Solar power additions increased markedly over the Research period. The Ministry's year-wise data report annual solar additions of approximately 9.56 GW in 2017–18, 6.75 GW in 2018–19, 6.51 GW in 2019–20, 5.63 GW in 2020–21, 12.76 GW in 2021–22, 12.78 GW in 2022–23, 15.03 GW in 2023–24 and 23.83 GW in 2024–25. Ministry of New and Renewable Energy The acceleration after 2021–22 is especially significant. Solar became increasingly central to India's energy transformation because of falling technology costs, expanding manufacturing capacity, competitive procurement and policy support (Table 3) (Figure 2).

**Table 3. Selected Annual Renewable-Energy Capacity Additions**

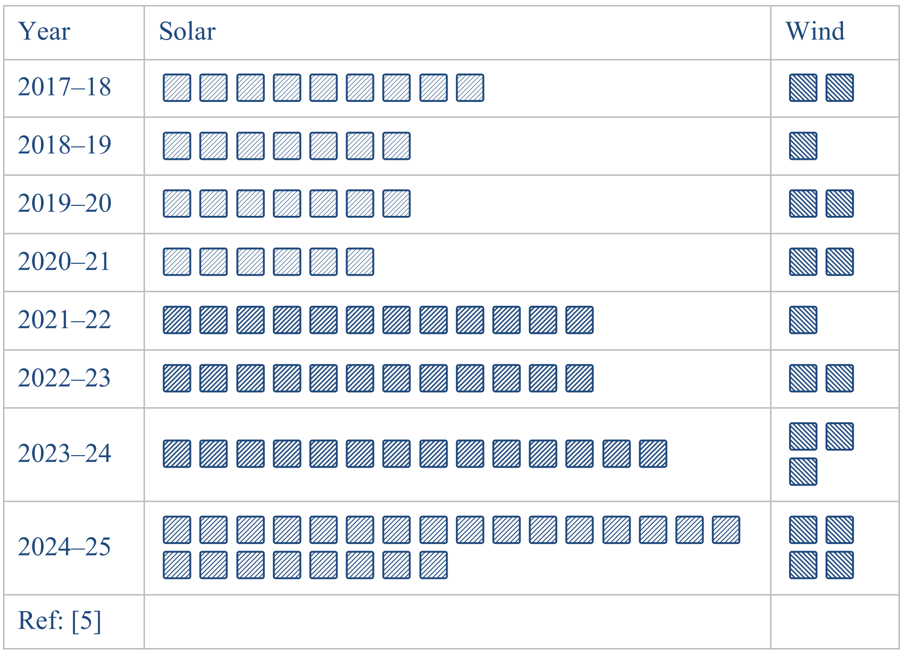
| Financial year | Solar (MW) | Wind (MW) |
|---|---|---|
| 2017–18 | 9,563.69 | 1,865.23 |
| 2018–19 | 6,750.97 | 1,480.97 |
| 2019–20 | 6,510.06 | 2,117.79 |
| 2020–21 | 5,628.80 | 1,503.30 |
| 2021–22 | 12,760.50 | 1,110.53 |
| 2022–23 | 12,783.80 | 2,275.55 |
| 2023–24 | 15,033.24 | 3,253.38 |
| 2024–25 | 23,832.87 | 4,151.31 |
| Ref: [4] | | |

Source: MNRE year-wise achievement data. Ministry of New and Renewable Energy

The relationship between expenditure and capacity should not be interpreted as a simple one-to-one causal relationship. Capacity additions also depend on private investment, technology costs, electricity-market conditions, land and transmission infrastructure. Nevertheless, the simultaneous growth of public support and renewable capacity indicates that public policy has operated within a broader investment ecosystem.

## 11. Colour Graph of Solar and Wind Transformation

**Figure 2. Annual Solar and Wind Capacity Additions**



**Yellow:** early deployment period; **green:** accelerated deployment; **orange:** high-growth solar deployment; **blue:** wind capacity. The graph illustrates the increasing dominance of solar in annual renewable-energy capacity additions.

## 12. Solar Energy and Distributed Renewable Energy

Solar technology has become one of the most important mechanisms through which India's sustainable-technology transition is reaching households, farms and small businesses. The transition is no longer restricted to large utility-scale solar parks. Rooftop solar, solar pumps, decentralized systems and agricultural solarisation are becoming increasingly important. The expansion of distributed renewable energy is particularly significant because it changes the relationship between consumers and the electricity system. Households and agricultural users can increasingly become electricity producers rather than purely electricity consumers. This transformation has implications for rural development, electricity access, agricultural costs and local economic activity. However, it also creates new requirements for distribution companies, grid management and tariff design. By 2025–26, distributed solar had become a major component of new renewable capacity. Government information indicates that 16.3 GW of distributed renewable solar capacity was added during 2025–26, accounting for approximately 36 percent of the 44.61 GW of solar capacity installed during that year. This included approximately 7.6 GW under PM-KUSUM and 8.7 GW from rooftop solar. Press Information Bureau This represents an important structural shift from centralized generation towards a more distributed energy economy.

## 13. PM-KUSUM and the Transformation of Agricultural Energy

Agriculture is an important area where sustainable technology intersects with rural economic transformation. Solar-powered agricultural pumps can reduce dependence on diesel and provide farmers with decentralized electricity. The PM-KUSUM programme has consequently become an important component of India's sustainable-technology strategy. It combines renewable energy with agricultural infrastructure and rural electricity. The importance of this programme extends beyond emissions reduction. Solar irrigation can potentially change the operating cost structure of agriculture, particularly where diesel-powered pumps remain important. At the same time, large-scale solarization must be accompanied by appropriate groundwater management. If electricity becomes effectively inexpensive while groundwater extraction remains unrestricted, environmental benefits can be undermined by increased groundwater depletion. Sustainable technology therefore requires complementary institutional policies.

## 14. Green Hydrogen and the Second Generation of India's Green Technology Strategy

The National Green Hydrogen Mission represents a major transition in India's sustainable-technology policy because it seeks to establish a new industrial ecosystem rather than simply deploy existing renewable-generation technologies. The mission's initial outlay is ₹19,744 crore. Of this, ₹17,490 crore is allocated to the Strategic Interventions for Green Hydrogen Transition programme, ₹1,466 crore to pilot projects, ₹400 crore to research and development and ₹388 crore to other mission components. Ministry of New and Renewable Energy The SIGHT programme contains two principal financial mechanisms: support for domestic electrolyser manufacturing and incentives for green-hydrogen production. The official mission framework assigns ₹4,440 crore to domestic electrolyser manufacturing and ₹13,050 crore to green-hydrogen production. National Green Highways Mission This represents a significant change in the nature of public expenditure. Earlier renewable-energy policy primarily sought to deploy generation capacity. Green-hydrogen policy additionally seeks to create manufacturing capability, technological knowledge and industrial markets. The mission therefore links environmental policy with industrial policy.

## 15. Green Hydrogen as an Instrument of Industrial Transformation

Green hydrogen has particular relevance to sectors that are difficult to electrify directly. These include parts of steelmaking, chemicals, fertilizers, shipping and heavy transport. The strategic importance of green hydrogen lies not only in replacing fossil fuels but also in developing domestic capabilities in electrolysers, storage, transport and associated engineering. The government has also provided for pilot projects in sectors including mobility and shipping. The mission framework identifies an outlay of ₹496 crore for mobility pilots and ₹115 crore for shipping pilots up to 2025–26, while ₹400 crore is identified for green-hydrogen hubs and other projects up to 2025–26. Ministry of New and Renewable Energy The emergence of green hydrogen therefore illustrates a transition from a renewable-electricity strategy towards a broader low-carbon industrial strategy.

## 16. Domestic Manufacturing and Technological Capability

One of the most important structural transformations during the Research period has been the expansion of India's clean-energy manufacturing capabilities. The Government of India reported that solar-module manufacturing capacity had reached approximately 172 GW by 31 March 2026, compared with approximately 2.3 GW in 2014. Wind-turbine manufacturing capacity increased to approximately 24 GW from around 10 GW in 2014. Press Information Bureau This transformation is economically significant because energy transition is not only about installing renewable capacity. It is also about who manufactures the equipment, controls the technology, develops the supply chains and captures the associated economic value. Domestic manufacturing can reduce exposure to international supply disruptions, create employment and establish export opportunities. However, it also requires continued investment in research, quality standards, supply-chain competitiveness and access to finance.

## 17. Energy Storage and Grid Transformation

The rapid expansion of variable renewable energy creates a corresponding need for energy storage and flexible electricity systems. Solar and wind generation varies with weather and time. Consequently, an electricity system with a high share of renewable energy requires transmission expansion, storage, forecasting, flexible generation and demand-side management. This means that sustainable technology expenditure should not be evaluated solely by looking at solar panels and wind turbines. Grid infrastructure is an enabling technology for renewable-energy integration. The structural transformation therefore involves a shift from a traditional electricity system based heavily on centralized dispatchable generation towards a more complex system incorporating variable renewable energy, storage, distributed generation and digital management.

**18. Electric Mobility and Sustainable Transport**

Transport is another major sector in which environmental technology can transform economic activity. Electric mobility combines battery technology, charging infrastructure, renewable electricity and digital services. Public expenditure and policy support for electric mobility have historically focused on reducing the cost gap between electric and conventional vehicles, developing charging infrastructure and creating domestic manufacturing capabilities. The transformation of transport is particularly important because India's petroleum consumption is closely associated with mobility. Electrification can therefore reduce fossil-fuel demand if electricity generation becomes progressively cleaner. However, the environmental benefits of electric mobility depend on the electricity mix, battery manufacturing, battery recycling and the lifecycle environmental impact of vehicles. The sustainable-technology transition should consequently be assessed across the entire value chain rather than at the point of vehicle use alone.

**19. Environmental Technology Beyond Renewable Energy**

The term "environmentally sustainable technology" also includes technologies associated with pollution control, waste management, water conservation, energy efficiency and ecological restoration. The Ministry of Environment, Forest and Climate Change plays an important role in these areas, although its expenditure profile differs from that of MNRE. Recent budget analysis indicates that the Ministry of Environment, Forest and Climate Change had a 2025–26 revised allocation of approximately ₹3,482 crore, compared with ₹2,220 crore in 2023–24 actual expenditure. PRS Legislative Research This demonstrates why MNRE expenditure should not be interpreted as the entire public expenditure on environmental sustainability. Renewable-energy spending represents one major part of a larger public environmental-finance ecosystem. The broader ecosystem includes pollution control, biodiversity, forests, climate adaptation, environmental research, waste management, water systems and ecological restoration.

**20. Public Expenditure Efficiency**

The difference between allocation and expenditure

provides an important indicator of implementation efficiency (Table 4).

The utilization pattern is summarized below.

**Table 4. MNRE Utilization Pattern**

| Year | RE (₹ crore) | Actual (₹ crore) | Utilization |
|---|---|---|---|
| 2020–21 | 3,591.00 | 3,096.73 | 86.23% |
| 2021–22 | 7,681.80 | 6,792.83 | 88.43% |
| 2022–23 | 7,033.00 | 5,745.85 | 81.70% |
| 2023–24 | 7,848.00 | 6,479.11 | 82.56% |
| 2024–25 | 17,298.44 | 11,703.45* | 67.66%* |
| 2025–26 | 25,301.22 | 24,176.68 | 95.5% |
| Ref: [6] | | | |

Source: Parliamentary Committee on Energy and Government of India. Digital Sansad+1

The increase to 95.5 percent utilization in 2025–26 is notable. It suggests that the implementation system was able to absorb substantially greater financial resources than in several preceding years. Nevertheless, utilization should not be treated as equivalent to efficiency. A programme may spend its entire budget without achieving the intended technological outcome, while another programme may achieve significant outcomes with lower expenditure because private capital provides substantial co-financing.

**21. Structural Reasons for Underutilization**

Several factors explain why actual expenditure may remain below budget allocations. First, renewable-energy projects require extensive preparation. Land acquisition, environmental clearances, grid connectivity and procurement can delay implementation. Second, public programmes frequently depend on state-level proposals and implementation agencies. Differences in administrative capacity can therefore produce different levels of expenditure across states. Third, changes in financial-management procedures can temporarily delay fund disbursement. The Parliamentary Committee specifically identified the implementation of the revised central-sector fund-flow mechanism as a reason for lower expenditure in 2022–23. Digital Sansad Fourth, technology markets change rapidly. Programme designs established several years earlier may become less attractive as technology costs fall. Fifth, private investment conditions matter. If interest rates, module prices, currency conditions or electricity-market conditions change, private project developers may delay investment, reducing the immediate demand for government support.

### 22. From Government Spending to Leveraged Investment

The most important conceptual issue is that public expenditure should not be evaluated solely by the amount spent. Government spending can create leverage through subsidies, viability-gap funding, tax incentives, concessional finance, guarantees, procurement commitments and infrastructure support. For example, public financial support for green hydrogen can help create an early market in which private producers subsequently invest in larger production facilities. Similarly, government support for rooftop solar can stimulate household and private-sector investment beyond the direct fiscal expenditure. Therefore, the economic impact of sustainable-technology policy depends on both the size and the design of expenditure. A smaller programme with strong private-sector leverage may have a larger long-term impact than a larger programme that mainly finances recurring administrative expenditure.

### 23. 2025–26 as a Turning Point

The 2025–26 financial year represents an important stage in India's sustainable-technology transition. Actual MNRE expenditure reached ₹24,176.68 crore, representing 91 percent of the budget estimate and 95.5 percent of the revised estimate. Press Information Bureau At the same time, India added 55.29 GW of non-fossil capacity during 2025–26, according to government-reported data, while renewable-energy capacity reached approximately 274.68 GW by March 2026. Press Information Bureau Solar capacity reached 150.26 GW and wind capacity reached 56.09 GW by March 2026. Press Information Bureau The simultaneous expansion of expenditure, installed capacity and manufacturing capability suggests that the green transition has moved beyond a policy-experiment stage into a major component of India's infrastructure and industrial strategy.

### 24. Structural Transformation through 2026

By 2026, India's sustainable-technology transition can be understood as a transformation across multiple layers. At the electricity-generation level, solar and wind capacity have expanded significantly. At the household level, rooftop solar has become increasingly important. At the agricultural level, solar pumps and feeder solarisation are changing the relationship between agriculture and energy. At the industrial level, green hydrogen and domestic clean-energy manufacturing are creating new markets. At the transport level, electric mobility is gradually transforming vehicle technology and energy demand. At the financial level, sustainable infrastructure is increasingly linked with green bonds, climate finance and private capital. At the institutional level, ministries and regulatory institutions increasingly coordinate energy, industrial, environmental and climate objectives. The transformation is therefore not simply a shift from coal to solar. It is a restructuring of the relationship between energy, technology, industry and finance.

### 25. The Role of Green Finance

Public expenditure alone cannot finance the scale of India's energy transition. Green bonds, commercial lending, development-finance institutions, foreign investment and corporate investment are therefore increasingly important. Government policy can reduce the risk associated with emerging technologies and thereby make them more attractive to private investors. The development of green financial instruments is especially relevant to capital-intensive technologies such as renewable energy, battery storage, hydrogen and grid infrastructure. The growth of public expenditure can therefore be interpreted as part of a larger attempt to mobilize a much larger pool of private capital.

### 26. Regional Dimensions of the Transition

The sustainable-technology transition is geographically uneven. States such as Rajasthan, Gujarat, Karnataka, Tamil Nadu and Andhra Pradesh have developed substantial renewable-energy capacity because of resource availability, land, transmission infrastructure and investment conditions. At the same time, North-Eastern states face distinctive geographical and infrastructure challenges. The Parliamentary Committee has noted that insufficient proposals from North-Eastern states affected MNRE expenditure utilization in earlier years. Digital Sansad Regional imbalance is therefore an important issue in evaluating sustainable technology. A national energy transition should not be assessed solely by aggregate capacity. It should also consider whether technological benefits reach less-developed regions, rural communities and geographically remote areas. Distributed renewable energy may be particularly important for such regions because it can reduce dependence on centralized infrastructure.

### 27. Employment and Industrial Development

Sustainable technology can generate employment through several channels. Construction and installation of renewable-energy projects create short- and medium-term employment. Manufacturing creates longer-term industrial employment. Research and development generates demand for engineers and scientists. Operation and maintenance creates technical service employment. The growth of domestic solar-module and wind-turbine manufacturing capacity by 2026 indicates the emergence of a more substantial domestic industrial ecosystem. Press Information Bureau However, the employment consequences depend on the degree of domestic value addition. If most equipment is imported, domestic employment effects may remain concentrated in installation and services. If manufacturing and component supply chains deepen, the employment and industrial-development effects can become larger.

### 28. Technology Learning and Falling Costs

One of the strongest economic arguments for sustained public support of emerging environmental technologies is technological learning. Solar photovoltaic technology provides an important example. Early government support helped create demand, which encouraged investment and enabled economies of scale. As production expanded and technology costs declined, solar became increasingly competitive. The same principle is now being applied to green hydrogen, electrolyser manufacturing, battery storage and other technologies. Public support therefore has the potential to produce dynamic rather than merely static benefits. The key policy question is whether government programmes can support technologies until they reach commercial viability without creating permanent dependence on subsidies.

## 29. Challenges Facing India's Sustainable Technology Transition

Despite substantial progress, several challenges remain. The first is grid integration. Rapid renewable deployment requires investment in transmission, storage and grid flexibility. The second is financing. Renewable and clean-technology projects are capital intensive, and financing costs can materially affect project economics. The third is domestic supply chains. Increasing domestic manufacturing capacity is important, but competitiveness requires access to raw materials, advanced technology and global markets. The fourth is energy storage. A high-renewable electricity system requires economically viable storage technologies. The fifth is technological research. Deployment without sufficient domestic research capability may leave India dependent on imported intellectual property and critical components. The sixth is environmental sustainability of the technologies themselves. Solar panels, batteries, wind turbines and electrolysers require materials whose extraction and processing have environmental consequences. The seventh is implementation capacity. The utilization pattern of MNRE demonstrates that increasing the budget is not sufficient; institutional capacity must expand simultaneously.

## 30. Policy Implications

India's sustainable-technology expenditure strategy should increasingly emphasize outcomes rather than expenditure alone. Budget programmes can be linked more systematically to measurable outcomes such as installed capacity, emissions avoided, domestic manufacturing capacity, electricity generated, technology costs, employment and private capital mobilized. Greater coordination among ministries is also necessary. Renewable energy, industry, transport, agriculture, finance and environment are increasingly interconnected. The green hydrogen experience illustrates the value of combining financial incentives with infrastructure, standards, research and market creation. Similarly, distributed solar requires coordination among MNRE, state governments, electricity distribution companies, financial institutions and consumers. The transition therefore requires an integrated governance model rather than isolated programmes.

## 31. Analytical Assessment of the 2017–2026 Transformation

The evidence from 2017–18 to 2025–26 shows three broad stages. The first stage was renewable-energy deployment. Public expenditure supported the expansion of solar and wind capacity. The second stage was institutional consolidation. Following the pandemic, the government expanded programmes while simultaneously adapting fund-flow and implementation mechanisms. The third stage was green industrial transformation. Expenditure expanded substantially and became associated with domestic manufacturing, rooftop solar, agricultural solarisation, green hydrogen and other emerging technologies. The fiscal increase was accompanied by a substantial increase in renewable capacity. Solar capacity, in particular, became the principal engine of renewable expansion. The transformation therefore represents more than an increase in government expenditure. It represents a change in the structure of energy investment and industrial policy (Figure 3).

## 32. Comparative Fiscal Graph: Allocation versus Actual Expenditure

**Figure 3. Allocation and Expenditure Pattern**

| Year | Allocation/RE | Actual | Gap |
|---|---|---|---|
| 2017–18 | ₹4,080 cr | ₹3,769 cr | |
| 2018–19 | ₹5,147 cr | ₹4,476 cr | |
| 2019–20 | ₹3,892 cr | ₹3,543 cr | |
| 2020–21 | ₹3,591 cr | ₹3,097 cr | |
| 2021–22 | ₹7,682 cr | ₹6,793 cr | |
| 2022–23 | ₹7,033 cr | ₹5,746 cr | |
| 2023–24 | ₹7,848 cr | ₹6,479 cr | |

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| | | | |
|---|---|---|---|
| 2024–25* | ₹17,298 cr | ₹11,703 cr | |
| 2025–26 | ₹25,301 cr | ₹24,177 cr | |
| Ref: [7-8] | | | |

**Colour interpretation:** relatively small gap; moderate gap; larger implementation gap; substantial reported gap. *2024–25 actual is the expenditure reported up to 15 February 2025 and should not be interpreted as final annual expenditure. Digital Sansad The 2025–26 data stand out because the actual expenditure was much closer to the revised estimate than in most earlier years.

## 33. Sustainable Technology and India's Development Model

India's sustainable-technology transition has implications beyond climate policy. Renewable energy can reduce exposure to imported fossil fuels. Domestic manufacturing can support industrial development. Distributed energy can support rural economic activity. Green hydrogen can create new industrial markets. Electric mobility can change petroleum demand. Energy efficiency can reduce the energy intensity of economic growth. These effects demonstrate why environmentally sustainable technology should be regarded as part of development policy rather than as a separate environmental sector. The central development question is increasingly whether India can achieve rapid economic growth while reducing the environmental intensity of that growth [9].

## 34. Future Direction after 2026

The post-2026 phase is likely to place increasing emphasis on the quality of expenditure rather than simply its quantity. As renewable capacity becomes larger, marginal investment will increasingly be required in transmission, storage and system flexibility. As solar manufacturing expands, policy attention will increasingly shift towards advanced components, materials and export competitiveness. As green hydrogen develops, the central challenge will move from demonstration towards commercially competitive production and demand creation. As electric mobility expands, battery recycling and charging infrastructure will become increasingly important. As distributed energy grows, electricity-distribution systems will need to adapt to two-way power flows. The next stage of India's green transition will therefore involve increasingly complex interactions between technology, finance and institutions [10-11].

## 35. Conclusions

The period from 2017–18 to 2025–26 represents a substantial transformation in India's public support for environmentally sustainable technology. At the beginning of the period, government expenditure was principally associated with renewable-energy deployment, particularly solar and wind. By 2026, the policy framework had expanded to include distributed solar, agricultural solarisation, green hydrogen, domestic manufacturing, energy storage, sustainable mobility and other components of a low-carbon industrial system. The fiscal evidence shows a pronounced increase in the scale of MNRE expenditure. Renewable-energy expenditure reported for 2017–18 was ₹3,768.73 crore, while actual MNRE expenditure reached ₹24,176.68 crore in 2025–26. Digital Sansad+1 The increase was accompanied by a major expansion of renewable-energy capacity. By March 2026, renewable-energy capacity had reached approximately 274.68 GW, with solar capacity at 150.26 GW and wind capacity at 56.09 GW. Press Information Bureau The fiscal trajectory was not completely linear. Utilization was affected by the COVID-19 pandemic, implementation constraints, state-level proposal requirements and changes in fund-flow procedures. The Parliamentary Committee documented utilization rates below 90 percent in several years. Digital Sansad The 2025–26 utilization rate of approximately 95.5 percent of the revised estimate nevertheless indicates a substantial improvement in the absorption of allocated resources. Press Information Bureau The most important transformation is qualitative rather than merely quantitative. India's policy framework has evolved from supporting renewable-energy deployment towards building a domestic green-technology ecosystem. The National Green Hydrogen Mission illustrates this transition particularly clearly, combining financial incentives for hydrogen production and electrolyser manufacturing with research, pilots, infrastructure and market-development measures. Ministry of New and Renewable Energy+1 The expansion of solar-module manufacturing capacity to approximately 172 GW and wind-turbine manufacturing capacity to approximately 24 GW by March 2026 demonstrates the increasing industrial dimension of the transition. Press Information Bureau Consequently, India's sustainable-technology transition should be understood as a process of structural transformation involving public finance, private investment, technological learning, industrial development and institutional change. Government expenditure remains important, but its greatest long-term contribution may be its ability to mobilize private capital, reduce technological risk, establish markets and create domestic technological capabilities. The evidence through 2026 indicates that environmentally sustainable technology has moved from the margins of public investment towards the centre of India's energy and industrial transformation. The next phase will require greater emphasis on grid integration, energy storage, technological research, domestic value addition, resource efficiency, recycling and equitable regional development. The effectiveness of India's green transformation will therefore depend not only on how much public money is allocated, but also on how efficiently it is converted into durable technological, industrial and environmental outcomes..

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