



# Program Information Document (PID)

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Appraisal Stage | Date Prepared/Updated: 08-Dec-2023 | Report No: PIDA36928



**BASIC INFORMATION**

**A. Basic Project Data**

Country	Project ID	Project Name	Parent Project ID (if any)
India	P181195	Second Low-Carbon Energy Programmatic Development Policy Financing (P181195)	P181032
Region	Estimated Board Date	Practice Area (Lead)	Financing Instrument
SOUTH ASIA	23-Jan-2024	Macroeconomics, Trade and Investment	Development Policy Financing
Borrower(s)	Implementing Agency		
India	Ministry of New and Renewable Energy		

**Proposed Development Objective(s)**

To accelerate the development of low-carbon energy in India.

**Financing (in US\$, Millions)**

**SUMMARY**

<b>Total Financing</b>	1,500.00
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**DETAILS**

<b>Total World Bank Group Financing</b>	1,500.00
World Bank Lending	1,500.00

**Decision**

The review did authorize the team to appraise and negotiate

**B. Introduction and Context**

Country Context

**India has made very significant development progress in recent decades; fast demographic expansion and high aspirations mean it will need to continue to sustain high rates of growth going forward.** From 1991 to today, the size of the economy has multiplied over 10 times, and Gross Domestic Product (GDP) per capita by 7 times. Over 1993-



2022, the (extreme) poverty rate declined by 36 percentage points—from 47.6 percent to 11.3 percent—reducing the number of poor people in India by over 280 million. India’s past achievements set the tone for its future ambitions, notably the target to reach high-income by 2047. However, getting there will require the economy to grow at 8 percent per annum on average over the next two decades.

**Growth objectives will need to be reconciled with ambitious climate commitments.** India has set itself the goal of achieving net-zero emissions by 2070 and adopted ambitious short-term targets by 2030. To simultaneously achieve its decarbonization and economic growth objectives, it will need to meet its rapidly growing energy needs, while reducing emissions. Specifically, this will require: (a) electrifying end-user sectors (particularly transport, buildings and targeted industries); (b) greening the power sector with renewable energy (RE) and integrating RE in the grid; and (c) bringing hard-to-abate industries onto a low-carbon path.

**The government’s low-carbon energy strategy is to accelerate RE development and leverage green hydrogen (GH) to help meet fast-growing energy demand.** To that end, it has implemented a series of energy efficiency and RE policies, which have led to a paradigm shift toward RE in the power sector. As of end 2023 RE stood at 23 percent in the total generation mix (in billion units). Going forward, integrating higher levels of RE into the national electricity grid will require better integration of RE into the grid and scaling-up of storage solutions (such as large-scale batteries). Beyond the power sector, industry will be the main driver of future growth in GHG emissions: GH will be critical to decarbonize these hard-to-abate industrial sectors.

**GH has not yet reached full commercial viability and several uncertainties remain,** including technological challenges, high cost of production, transport and storage, and safety, environmental and social concerns. To overcome these obstacles and position India at the forefront of the GH development frontier, the government launched the National Green Hydrogen Mission (NGHM) in January 2023, with a total budget of US\$2.4 billion. Through the NGHM, the government is pursuing three avenues to develop GH, by: (a) creating demand and demonstrating viability through pilot projects; (b) incentivizing domestic production of electrolyzers and GH; and (c) building an enabling ecosystem for GH markets.

**The proposed US\$1.5 billion operation is the second in a series of two Development Policy Operations<sup>1</sup> (DPO)** aimed at supporting India’s efforts to: (a) promote GH; (b) scale-up RE; and (c) enhance climate finance for low-carbon energy investments. The engagement is structured around three key areas: Pillar 1 aims to strengthen the enabling policies and regulations for GH, reduce production costs and promote domestic market demand. Since GH will require additional RE power supply, Pillar 2 aims to improve integration of RE into the grid, which is key to decarbonizing the power sector. To meet the large investment needs of GH and RE and increase green financing, Pillar 3 supports the launch of India’s carbon market and reforms to boost private sector investments in low-carbon energy. This second operation in the series seeks to extend and operationalize some of the programs and policies supported under DPO1.

#### Relationship to CPF

**The program is aligned with the Country Partnership Framework (CPF)<sup>2</sup>.** Specifically, it is linked to the following two focus areas of the CPF: (a) promoting resource-efficient growth, and (b) enhancing competitiveness and enabling job creation. It is also fully aligned with the WBG Green, Resilient and Inclusive Development framework, the WBG Climate Change Action Plan 2021–2025 and the WBG Global Crisis Response Framework (GCRF Pillar 4).

<sup>1</sup> DPO-1 (US\$1.5 billion) was approved by the World Bank Board on June 29, 2023.

<sup>2</sup> India CPF FY18-22, extended to December 31, 2024



**The program aims to address India’s vulnerability to climate change** by scaling up investments in greening the energy transition and enable the development of necessary policy and institutional framework which can accelerate and sustain this low-carbon transition.

### C. Proposed Development Objective(s)

**The Program Development Objective of the proposed DPO is to accelerate the development of low-carbon energy in India.**

#### Key Results

**Key results from the proposed program include:** (i) a significant scale up in domestic GH and electrolyzer production capacity based on robust standards, (ii) an increase in the contribution of RE to the energy mix, in RE storage, and in manufacturing capacity for solar PV cells and modules, and (iii) the operationalization of a carbon market in India and the mainstreaming of green finance.

### D. Project Description

To achieve the PDO, the operation – the second in a programmatic series of two -- supports the government’s efforts to:

**Promote green hydrogen:** GH remains a frontier technology, the viability of which will hinge on developing the market to a critical scale. This requires coordinated policy and regulatory reforms to simultaneously stimulate production and demand. Under DPO1, the Ministry of New and Renewable Energy approved the NGHM, that provides an overarching framework for mobilizing private sector investments and creating market demand for GH. The prior actions under DPO2 seek to operationalize the NGHM through measures to bridge the viability gap for GH (by incentivizing production and market demand, as well as electrolyzer manufacturing), promoting the uptake of GH in targeted sectors, and facilitating procurement of GH, with a view to mobilizing private investment.

**Scale-up renewable energy:** Under DPO1, the government took measures to mandate increased use of RE by distribution utilities, remunerate the provision of storage services, incentivize a scale up in RE generation capacity, and boost the production of solar PV. DPO2 extends these measures by supporting updates to the Indian Electricity Grid Code to ensure RE sources are better integrated into the grid, and incentivizing battery storage systems to overcome RE’s inherent variability and support RE grid integration.

**Enhance climate finance for low-carbon energy investments.** Under the DPO1, the government had put in place the legal framework for carbon trading (PA 9 DPF1) and upgraded the regulatory framework for green debt issuances (PAs 10-11 DPF1). DPO 2 supports the operationalization of a carbon market in India and measures to facilitate green finance through more conducive regulation.

The three pillars are interlinked since additional RE is critical to making GH viable, and significant additional financing will be needed to meet the large investment needs of GH and RE.

### E. Implementation



## Institutional and Implementation Arrangements

**The MNRE is leading the preparation and implementation of the DPO and coordinating across all relevant GoI agencies and stakeholders.** As such, it will be primarily responsible for monitoring and evaluation. As per section 7.3 of the document establishing the NGHM, it is formally tasked to “develop guidelines and methodologies for monitoring and ensuring progress in respective sectors” while “The obligated corporate/public sector entities will submit periodic reports to the agency designated for monitoring” and “Technology interventions for online/real-time monitoring of targets will also be made for stringent monitoring and enforcement”. The MoF’s Department of Economic Affairs will provide an additional layer of oversight at the operational level.

## F. Poverty and Social Impacts, and Environmental, Forests, and Other Natural Resource Aspects

### Poverty and Social Impacts

**The shifts supported by the program will have redistributive implications.** The transition from fossil-fuel based energy to RE and from grey hydrogen to GH will create opportunities for some and challenges for others. New employment opportunities will be created in the RE and GH space and secondary labor markets. At the same time, localized employment losses may occur in the transition away from grey hydrogen and fossil-based industries (although not as a result of any individual PA). The magnitude and distribution of net impacts on poverty and livelihoods will depend on the ability of policies to (a) leverage and enable spill-over effects of the RE sector on local economies and labor markets, (b) facilitate the technological and skill transition of workers and firms to seize new economic opportunities, and (c) potentially compensate workers and firms with net losses during the transition. The Government of India is well equipped to address these challenges and the WB is providing Technical Assistance (TA) support (ongoing) to develop educational and trainings programs to accommodate the skills requirements for both the GH supply and demand ecosystems. In the longer-term, the transition to cleaner sources of energy can support welfare and equity gains, via health co-benefits, increased worker productivity, and reduced exposure and vulnerability to climate and environmental hazards.

**Setting up new production facilities for GH production could entail land acquisition and involuntary resettlement and can also pose new challenges of occupational and community health and safety.** The GoI has established processes and institutions that can mitigate the risks. Under the World Bank’s Technical Assistance support (ongoing) educational and training programs to accommodate the skills requirements for both the GH supply and demand ecosystems are being developed.

### Environmental, Forests, and Other Natural Resource Aspects

**The program supported by this DPO is likely to have an overall positive impact on India’s environment, forests, and other natural resources, by promoting a lower-carbon development pathway, and it will also provide a range of co-benefits for public health (from cleaner air and reduced water and solid waste pollution).** However, future large scale downstream development of GH hubs, electrolyzers manufacturing hubs, and BESS facilities could pose risks to the environment, forests, and other natural resources. The national environmental legal and regulatory framework is adequate and incorporates mitigation measures to adequately manage most of these potential effects; it also provides the basis for any further strengthening of standards needed for new and emerging sectors. regulatory frameworks needed. The Bank is also supporting, through an accompanying TA, the development of frameworks that will help identify GH hub sites in a manner that avoids negative impacts on the environment including water-stressed or biodiversity-rich areas.



## G. Risks and Mitigation

**The overall residual risk rating for the operation is substantial.** The following categories are assessed as carrying substantial risks to the achievement of the PDO.

Technical design: There are still significant uncertainties around GH technologies and costs, electrolyzer manufacturing capacities, and storage and transportation of hydrogen. Given India’s clear ambition to become a pioneer in GH and the potentially sizeable payoffs for India and globally, it makes sense for the GOI to absorb the front-end risks associated with a nascent yet promising technology of GH and for the World Bank to accept significant residual risks to the achievement of the development objectives. The World Bank is working with key public sector players such as Steel Authority of India Limited (SAIL) to explore (Green) Hydrogen Direct Reduction (H2DRI) technology. This will help ensure that the risks are assessed upfront and appropriate mitigation measures are factored in investment decisions.

Environmental and social: Some of the PAs may have significant social implications linked to RE and GH development, such as land acquisition resulting in loss of livelihood, involuntary resettlement, labor issues, occupational and community health and safety issues, and reduced freshwater availability. Large manufacturing activities are likely to have environmental and ecological impacts depending on the location of such activities, and GH and other RE sources (solar, wind, offshore wind). To mitigate risks, the World Bank has done a geospatial mapping of GH hubs that avoids the sensitive areas such as protected forests, critical zones for underground water, land use land cover layers amongst others. The World Bank is also working on an assessment of desalination of water and its possible applications in the context of GH and derivatives, including disposal of brine. Further, the World Bank is working to enhance the skills in this sector by developing training content for identified job roles. These shall inform the Government’s strategy in handling some of such risks.

### CONTACT POINT

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**APPROVAL**

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**Approved By**

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