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Report No: PGD465

INTERNATIONAL BANK FOR RECONSTRUCTION AND DEVELOPMENT AND
INTERNATIONAL DEVELOPMENT ASSOCIATION

PROGRAM DOCUMENT FOR A

PROPOSED DEVELOPMENT POLICY LOAN
IN THE AMOUNT OF US$1,468.5 MILLION

AND

A PROPOSED NON-CONCESSIONAL CREDIT
IN THE AMOUNT OF US$31.5 MILLION TO

INDIA

FOR THE

Second Low-Carbon Energy Programmatic Development Policy Financing
June 6, 2024

Macroeconomics, Trade and Investment
Energy and Extractives
South Asia

India

GOVERNMENT FISCAL YEAR

April, 1 – March, 31

CURRENCY EQUIVALENTS

(Exchange Rate Effective as of April 30, 2024)

Currency Unit = INR/US$

US$1.00 = INR83.5

ABBREVIATIONS AND ACRONYMS

BEE	Bureau of Energy Efficiency	MNRE	Ministry of New and Renewable Energy
BESS	Battery Energy Storage System	MoF	Ministry of Finance
BRSR	Business Responsibility and Sustainability Reporting	MoP	Ministry of Power
CAD	Current Account Deficit	MoPNG	Ministry of Petroleum and Natural Gas
CCTS	Carbon Credit Trading Scheme	MoSPI	Ministry of Statistics and Programme Implementation
CERC	Central Electricity Regulatory Commission	MTPA	Million Tons Per Annum
CO_2	Carbon Dioxide	MW	Megawatt
CPF	Country Partnership Framework	MWh	Megawatt Hour
Discom	Distribution Company	NDC	Nationally Determined Contributions
DPO	Development Policy Operation	NGHM	National Green Hydrogen Mission
E&S	Environmental and Social	NIPFP	National Institute of Public Finance and Policy
EE	Energy Efficiency	PA	Prior Action
EIB	European Investment Bank	PAT	Perform, Achieve and Trade
ESG	Environment, Social and Governance	PDO	Program Development Objective
FY	Fiscal Year	PFM	Public Financial Management
GCRF	Global Crisis Response Framework	PLI	Production-Linked Incentive
GDP	Gross Domestic Product	PSH	Pumped Storage Hydropower
GH	Green Hydrogen	PV	Photovoltaic
GHG	Greenhouse Gas	RBI	Reserve Bank of India
GoI	Government of India	RE	Renewable Energy
GW	Gigawatt	RPO	Renewable Purchase Obligation
IBRD	International Bank for Reconstruction and Development	SEBI	Securities and Exchange Board of India
IFC	International Finance Corporation	SECI	Solar Energy Corporation of India Limited
IFI	International Financial Institution	SIGHT	Strategic Interventions for Green Hydrogen Transition
IMF	International Monetary Fund	SOE	State-owned Enterprise
INR	Indian Rupee	TA	Technical Assistance
ISTS	Inter-State Transmission System	US¢	United States Cents
kg	Kilogram	US$	United States Dollars
kW	Kilowatt	VGF	Viability Gap Funding
kWh	Kilowatt Hour	WB	World Bank

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INDIA

Second Low-Carbon Energy Programmatic Development Policy Financing

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SUMMARY OF PROPOSED FINANCING AND PROGRAM

BASIC INFORMATION

Operation ID	Programmatic	If programmatic, position in series
P181195	Yes	2nd in a series of 2

Proposed Development Objective(s)

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

Organizations

Borrower:	India
Implementing Agency:	Ministry of New and Renewable Energy

PROJECT FINANCING DATA (US$, Millions)

Maximizing Finance for Development

Is this an MFD-Enabling Project (MFD-EP)?

Is this project Private Capital Enabling (PCE)?

SUMMARY

Total Financing	**1,500.00**

DETAILS

World Bank Group Financing

International Development Association (IDA)	31.50
of which IDA Recommitted	31.50
IDA Credit	31.50
International Bank for Reconstruction and Development (IBRD)	1,468.50

IDA Resources (US$, Millions)

	Credit Amount	Grant Amount	SML Amount	Guarantee Amount	Total Amount
National Performance-Based Allocations (PBA)	31.50	0.00	0.00	0.00	31.50
Total	**31.50**	**0.00**	**0.00**	**0.00**	**31.50**

PRACTICE AREA(S)

Practice Area (Lead)

Macroeconomics, Trade and Investment

Contributing Practice Areas

Climate Change; Energy & Extractives; Finance, Competitiveness and Innovation

CLIMATE

Climate Change and Disaster Screening

Yes, it has been screened and the results are discussed in the Operation Document

OVERALL RISK RATING

Overall Risk	Substantial

IBRD AND IDA PROGRAM DOCUMENT FOR A PROPOSED LOAN AND CREDIT TO INDIA

1. INTRODUCTION AND COUNTRY CONTEXT

1. **India has made very significant development progress in recent decades and is expected to remain on an ascendent trajectory: its aspirations to become a high-income economy by 2047 would require it to elevate its rate of growth even further.** From 1991 to today, the size of the economy has multiplied more than ten times, and gross domestic product (GDP) per capita seven times. From 1993-2022, the extreme poverty rate declined from 48 percent to 12.9 percent, reducing the number of extreme poor people by about 262 million. India's past achievements set the tone for its future ambitions, notably the target to reach high income by 2047, which will require the economy to grow at 8 percent per annum on average over the next two decades.

2. **Given India's size and growth aspirations, it will play a critical part in the world's drive to reach global climate change targets.** On the one hand, rapid economic growth will imply increased energy needs; India's final energy demand is expected to double by 2070 (from a low starting point of 1,000 kWh per capita, which is one-third of the global average). On the other hand, the Government of India (GoI) is committed to low emissions long-term development, with an overarching goal to achieve net zero emissions by 2070 and Nationally Determined Contributions (NDC) goals by 2030,[1] including (a) reaching 50 percent of cumulative installed power capacity from non-fossil fuels-based energy resources; (b) reducing emission intensity of GDP by 45 percent by 2030 from 2005 level; and (c) creating an additional carbon sink of 2.5 to 3 billion tons of carbon dioxide (CO_2) equivalent, through additional forest and tree cover.

3. **To reconcile high growth ambition with decisive climate action, a multi-pronged approach is required.** Decoupling economic growth from energy consumption and emissions growth will require: (a) improving energy efficiency (EE); (b) electrifying end-user sectors (industries, transport, and construction); (c) greening the power sector with renewable energy (RE); and (d) bringing hard-to-abate industrial sectors onto a low-carbon path, including green hydrogen (GH). The actions in this proposed operation focus principally on (c) and (d), while parallel engagements address (a), (b), and (c).

4. **To green the power sector, RE (solar, wind, and hydropower) will need to become a mainstream power source.** The GoI has already taken decisive action to accelerate RE development and switch the fuel mix in the energy sector. With increasing shares of RE in the power mix, it becomes critical to integrate RE into the grid, particularly through energy storage—both battery energy storage systems (BESS) and pumped storage hydropower (PSH). Unlike in developed economies, India is moving away from coal directly toward low-carbon energy, without recourse to a transitional fuel. This entails considerable challenges, but if successful will have a demonstration effect for other developing economies on similar low-carbon trajectories.

5. **Despite the unprecedented growth of RE in India, some challenges remain.** Scaling up RE further would require reducing costs and removing supply chain constraints. The costs of solar photovoltaic (PV) have fallen dramatically over the past decade, from about US¢ 22/kilowatt hour (kWh) to about US¢ 3/kWh. However, the imposition of a 40 percent basic custom duty on imported solar PVs—to incentivize domestic production—has increased their price in the short run. And since RE accounts for 55 to 60 percent of GH production costs, this is also having a significant downstream impact. In addition, most of the public distribution companies (Discoms) that purchase RE are financially stressed.

6. **GH is essential to bring the rapidly growing industrial sector onto a low-carbon path.** The cost gap between grey

[1] India's Nationally Determined Contributions (NDCs)

hydrogen (produced from natural gas) and GH has narrowed in recent years, due to the simultaneous decline in GH costs and increase in natural gas costs. In the short term, GH can start replacing grey hydrogen in the fertilizer and refinery industries (currently, these sectors jointly use about 6 million tons of grey hydrogen annually). In the medium and long term, GH will also play a major role in reducing carbon emissions in the steel industry, long-haul trucking, and shipping. To position India as a global leader in the GH space, and develop the nascent market for this frontier technology, the GoI launched the National Green Hydrogen Mission (NGHM) in January 2023. The NGHM's mandate is to foster a reduction in the cost of GH production, increase market demand for GH, and promote public and private investments in GH.

7. **The World Bank has been a partner to the GoI on its GH agenda.** The Bank has conducted analytical studies and technical assistance (TA) that have informed the articulation of the NGHM's mandate, and the rollout of its agenda. Bank-supported analytical studies have established that the most promising avenue to deploy GH in the short term is to replace existing grey ammonia and grey hydrogen in the fertilizer and refinery sectors, respectively. The Bank's analytical support also helped identify the main policy and regulatory constraints to GH adoption in these sectors, and map out demand and supply centers, to identify potential locations for GH hubs. In addition, the Bank has engaged with selected states to help them develop roadmaps for RE and GH adoption.

8. **The proposed operation is aligned with the World Bank Group's global engagement on GH.** The global *Hydrogen for Development* initiative, launched by the Bank at the 27th Conference of the Parties to the United Nations Framework Conventions on Climate Change, aims to provide global knowledge, TA, and financing for GH in the developing world. The Bank is providing such TA in Tunisia, Kenya, Brazil, Uzbekistan, Colombia, and Costa Rica, and financing in Chile, Romania, Türkiye, and Morocco. The International Finance Corporation (IFC) has been actively engaged with the private sector in assessing and developing GH and green ammonia investment opportunities in emerging markets, including in India, Chile, Brazil, Egypt, South Africa, and Oman, in upstream advisory, market assessments, policy and regulatory support, and potential investments.

9. **The operation complements the Bank's broader support to the GoI's energy transition program.** At the request of the GoI, the Bank has been providing significant technical and financing support for its initiatives on (a) scaling up RE and supportive infrastructure; (b) reforming the electricity distribution sector and Discoms at national and state levels; (c) improving demand-side EE; (d) reducing carbon emissions in hard-to-abate industrial and transport sectors; and (e) ensuring a people-centered, orderly, and equitable energy transition.

10. **The actions supported under the proposed operation reflect India's resolute and pragmatic approach to addressing climate change challenges.** India's policymakers are attempting to strike a complex balance between multiple objectives that entail inherent tradeoffs: boosting growth and innovation, including through targeted industrial policies; achieving energy security; and, contributing to global climate change objectives. Providing secure and affordable energy supply is a top priority for the GoI, with coal remaining the cheapest baseload supply available. The GoI's drive to promote domestic manufacturing through "Make in India" will boost domestic productive capacity in RE, but it pushes up RE costs in the short-to-medium term, potentially delaying the large-scale adoption of RE. India's policymakers are also trying to maximize the leveraging of public spending to crowd in the private sector and domestic commercial financing resources by providing just enough support to elicit private sector interest and drive down the cost curves, while optimizing the use of public resources.

11. **The proposed US$1.5 billion operation is the second in a series of two Development Policy Operations[2] (DPOs).**

[2] DPO-1 (US$1.5 billion) was approved by the World Bank Board on June 29, 2023.

The Program Development Objective (PDO) is to accelerate the development of low-carbon energy in India. The operation supports reforms in three areas: (a) promoting GH; (b) scaling up RE; and (c) enhancing finance for low-carbon energy investments. 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 increase the share of RE in the energy mix and improve the integration of RE into the grid. 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.

2. MACROECONOMIC POLICY FRAMEWORK

2.1. RECENT ECONOMIC DEVELOPMENTS

12. **India's growth is estimated to have accelerated to 8.2 percent in fiscal year (FY) 23/24, from 7.0 percent in FY22/23.**[3] Private consumption growth moderated, as post-pandemic catch-up spending tapered off and public consumption remained level, in line with the GoI's consolidation objectives. Net exports also contributed negatively. However, this was more than offset by high public and private investment growth. On the supply side, growth was driven by buoyant services and industrial activity, especially construction and manufacturing.

13. **Despite volatility in food and fuel prices, inflation moderated in FY23/24.** From an average of 6.7 percent year-on-year in FY22/23, inflation moderated to an average of 5.4 percent in FY23/24[4]. While abnormal monsoon rainfall led to a significant increase in food prices in July-August 2023 and as a result headline inflation increased to over 7 percent, food prices normalized thereafter and inflation moderated to 4.8 percent by April 2024. Highlighting the transient nature of inflationary pressures and the moderation in core inflation,[5] the RBI kept the policy rate unchanged.

14. **India's financial sector is in much better health than it was pre-COVID-19.** The gross non-performing assets ratio of banks fell to a decade low of 3.2 percent[6] in September 2023 (compared with over 11 percent in March 2018). Banks are adequately capitalized—with the capital-to-risk-weighted-asset ratio remaining high at 16.8 percent—and able to withstand severe macroeconomic shocks. The improvement in the balance sheets of banks and the corporate sector has enabled an acceleration in credit growth to over 20 percent in February 2024 (compared with 15.5 percent in February 2023), driven by credit to the services sector and for personal loans.

15. **The current account deficit (CAD) is estimated to have narrowed to 1.1 percent of GDP in FY23/24.** Between April and December 2023, the CAD narrowed to 1.2 percent of GDP, from 2.6 percent in the same period in 2022. Easing global commodity prices and softening demand in key export markets caused a simultaneous decline in goods imports and exports. However, India's services exports continued to grow rapidly, as did remittance inflows, while net inflows of foreign portfolio and direct investment were positive. As a result, foreign exchange reserves grew to over US$645 billion, equivalent to about eight months of imports cover[7].

[3] World Bank staff calculations based on MoSPI data
[4] World Bank staff calculations based on MoSPI data
[5] to 3.2 percent by March 2024 from around 6 percent a year before.
[6] The steep decline in NPLs is attributable to (i) one-time restructuring measures by RBI for both corporate and MSME accounts to mitigate the impact of COVID-19, (ii) improvement in the performance of state-owned banks, and (iii) tighter credit appraisal standards and supervision after COVID-19. Data from Financial Stability Report, December 2023, RBI
[7] World Bank staff calculations based on RBI data

16. **The fiscal deficit has narrowed and public debt as a share of GDP is expected to decline over the medium term.** The general government deficit is estimated to have declined to 8.6 percent of GDP in FY23/24, from 9.6 percent in FY22/23[8]. Fiscal consolidation was driven by strong revenue growth, particularly in goods and services tax revenues, and the gradual withdrawal of most pandemic-related stimulus measures. Higher-than-expected revenues and stable recurrent spending allowed capital spending to grow, including investments in infrastructure aimed at crowding in private investment.

2.2. MACROECONOMIC OUTLOOK AND DEBT SUSTAINABILITY

17. **Growth is expected to moderate to 6.6 percent in FY24/25 and converge to 6.8 percent over the medium term.**[9] Domestic consumption growth is expected to stabilize, as the post-pandemic rebound in private consumption dissipates and the government remains appropriately focused on fiscal consolidation. External demand is projected to remain subdued as global growth is expected to slow to 2.4 percent in 2024 (from 2.6 percent and 3 percent in 2023 and 2022, respectively). However, public and private investment growth is projected to remain robust. The GoI is expected to continue to prioritize public investments in infrastructure, which should crowd in private investments. On the supply side, strong momentum in construction, manufacturing and services activity will continue to drive growth, while agriculture recovers.

18. **Headline inflation is projected to decline to 4 percent over the medium term.** Core inflation should remain relatively modest, with headline inflation moderating to 4.7 percent in FY24/25 and gradually converging to the RBI's 4 percent inflation target over the medium term. The RBI has signaled its intention to maintain a disinflationary monetary policy until the inflation target is met.

19. **The CAD is expected to widen to 1.4 percent in FY24/25 but continue to be well below past trend, and adequately financed by stable investment flows.** Weak global growth will weigh on merchandise exports, while relatively buoyant domestic activity will imply stronger import growth. However, the merchandise deficit will be partially offset by a robust trade surplus in services, and stable remittances. Overall, the CAD is expected to be adequately financed by foreign capital flows, and India's reserves position to remain robust at over eight months of import cover.

20. **In the FY24/25 interim budget, the authorities reaffirmed their commitment to further consolidation over the medium term.** As per the budget, the government is targeting further consolidation in the central government's fiscal deficit to 5.1 percent of GDP, from an estimated deficit of 5.6 percent in FY23/24[10] notwithstanding a significant 17 percent y-o-y increase in capital spending. The budget deficit and debt repayments will be financed largely through domestic bond issuances.[11] In net terms, the Union Budget envisages domestic borrowings of 5.1 percent of GDP (compared with 5.9 percent in FY23/24) and external borrowing of about 0.05 percent of GDP.

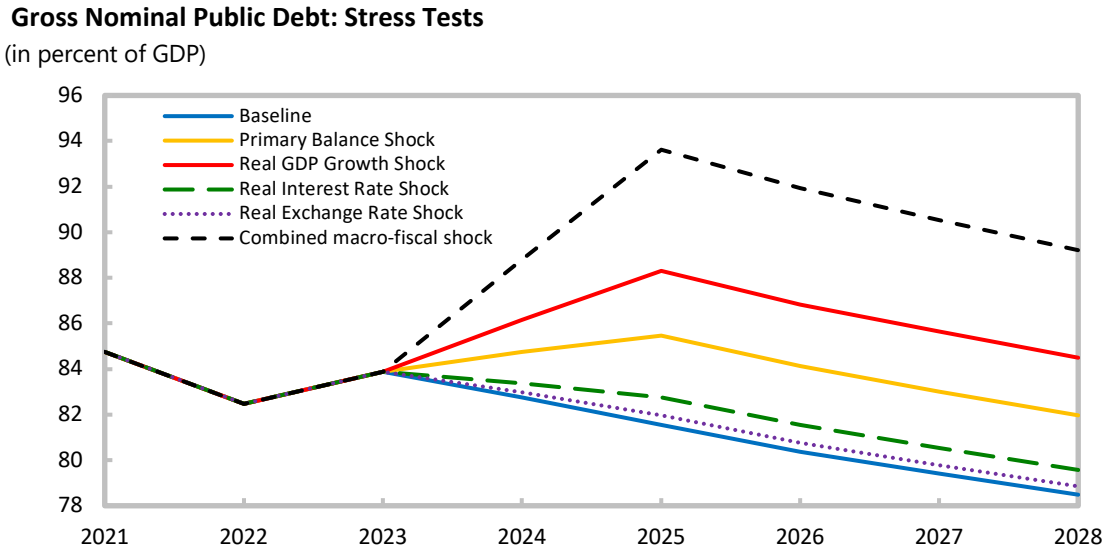
21. **Overall, the fiscal situation of states has improved.** The combined fiscal deficit of states is estimated to have

[8] World Bank staff calculations based on Union Budget and RBI data
[9] All projections in this section are World Bank estimates, unless otherwise specified.
[10] The reduction in the fiscal deficit is expected to be driven by a large dividend transfer from the central bank and a 0.7 percentage point decline in recurrent spending with: (i) a 0.2 percentage point decline in subsidies; and (ii) slower growth in recurrent spending relative to projected nominal GDP growth (10.5 percent), particularly on defense and central government pensions.
[11] The government has projected gross market borrowing of around US$170 billion and borrowing from other domestic sources such as the National Small Savings Fund and State Provident Funds, of about US$65 billion. The government has also budgeted for gross external borrowing of US$11.4 billion, of which US$7.1 billion would be from International Financial Institutions (IFIs).

declined from 4.1 percent in FY20/21 to 3.1 percent in FY23/24, and their public debt-to-GDP ratio from 31.1 percent in FY20/21 to around 27 percent in FY23/24. However, some states have public debt-to-GDP levels of over 40 percent. Some states also have significant levels of contingent liabilities and off-budget borrowing,[12] most of which are from the power Discoms. To reduce losses and improve the financial performance of Discoms, the central government introduced the Revamped Distribution Sector Scheme in 2021. Aggregate technical and commercial losses fell from 21.5 percent in FY20/21 to 15.4 percent in FY22/23, thanks to improvements in operational efficiency and collection of user charges. In addition, state governments increased subsidy disbursements and reduced payment arrears to Discoms, to help nearly halve Discoms' financial deficit[13] and slow the pace of debt accumulation. The central government controls the annual borrowing of states. It has recently improved its monitoring of off-budget borrowing of the states and adjusted the states' borrowing limits to reflect off-budget borrowing.

22. **The public debt-to-GDP ratio is high but stable and sustainable.** Under a baseline scenario, the debt-to-GDP ratio is projected to decline to 80.6 percent over the next three years. In a combined macro-fiscal shock scenario (see Figure 1 Note), the debt-to-GDP ratio would increase sharply to nearly 94 percent. However, debt sustainability risks are mitigated by the structure of India's public debt which is: (a) mostly domestically issued (only around 3 percent of public debt is external); (b) almost entirely held by residents; and (c) of medium- or long-term maturity.[14] The composition of debt is unlikely to change significantly over the projection period (2023–2028) and the bulk of the financing needs will be met by domestic market issuances of medium- and long-term debt.

Figure 1. India Public Debt: Baseline and Stress-Test Scenarios



Source: RBI and World Bank staff calculations

Note: The combined macro-fiscal shock is the combined impact of the real-GDP growth shock (a decline of 4.4 percentage points in FY24/25 and FY25/26), fiscal shock (a 2 percentage point increase in FY24/25 and FY25/26) and interest rate shock (an increase by 0.85 percentage points in FY24/25 and FY25/26).

23. **Risks include slower-than-expected global growth, higher oil prices, and more persistent inflationary pressures.**

[12] Off-budget borrowing refers to loans taken by state-owned enterprises (SOEs) or state agencies but fully serviced by the state government.
[13] Cash-adjusted gap between expenditure and income.
[14] According to the IMF Fiscal Monitor, in 2022, average term to maturity for government securities was 9.8 years, compared with an average of 7.5 for emerging market countries.

Weaker global growth would weigh on external demand for India's exports. Higher oil prices due to geopolitical tensions would lead to an increase in the merchandise trade deficit and external financing needs. Higher oil prices and inflationary pressures (such as from domestic food prices) could constrain monetary policy, with ripple effects on domestic demand. However, the risks remain manageable given India's large and diversified economic base and significant foreign reserve buffers.

24. **The proposed policy financing is integral to India's overall development financing strategy.** The GoI is making systematic efforts to reduce its debt servicing costs to free up space for public investment. The debt servicing burden of the general government has risen to about 5.2 percent of GDP (compared with 3.3 percent for major emerging market economies)[15]. As part of its debt management strategy, the central government has been seeking to reduce the cost of borrowing by exchanging or buying back securities and lengthening the maturities of new issuances. The GoI has reduced and aligned with market rates the interest rates offered on savings instruments under the National Small Savings Fund (administered by the central government). The government has also increased direct transfers from the budget for investments undertaken by public sector enterprises (such as the National Highways Authority of India and the Indian Railways) to take advantage of the central government's lower borrowing cost and reduce debt servicing costs for the public sector. As part of this broad strategy, the government has also sought to tap into external sources of financing, with gross external borrowing budgeted at US$11.3 billion in FY24/25, of which US$7.1 billion from IFIs. This Development Policy Loan is a critical component of the government's overall development financing strategy.

25. **India's macroeconomic policy framework is adequate for development policy financing.** India's growth prospects are robust, and the country has built and maintained a track record of sound fiscal and monetary policies. After relaxing the fiscal stance during COVID-19, the authorities have emphasized fiscal consolidation by moderating current spending growth to make space for higher public investment. In response to inflationary pressures, the RBI has front-loaded interest rate hikes and reaffirmed its commitment to price stability. India is not immune to adverse external financial developments or terms-of-trade shocks, but high levels of reserves, a flexible exchange rate, and manageable external financing needs provide adequate buffers. Public debt is high but sustainable and relatively resilient to different shocks.

Table 1. Selected Economic and Financial Indicators

	FY20/21	FY21/22	FY22/23	FY23/24	FY24/25	FY25/26	FY26/27
	Actual	Actual	Actual	Estimate	Forecast	Forecast	Forecast
	Annual percentage change, unless otherwise indicated						
National Accounts							
GDP at constant prices (%)	-5.8	9.7	7	8.2	6.6	6.7	6.8
Consumption	-4.6	9.8	7.1	3.8	5.1	6.3	6.8
Investment	-7.1	17.5	6.6	9	9.7	7.6	7.4
Exports of goods and services	-7	29.6	13.4	2.6	4.5	7.2	8.2
Imports of goods and services	-12.6	22.1	10.6	10.9	4.9	7.1	8.5
Sectoral contribution to growth							
Agriculture (ppts)	0.6	0.8	0.7	0.2	0.3	0.5	0.5
Industry (ppts)	-0.1	3.8	0.7	2.9	2.1	2	2
Services (ppts)	-4.6	4.9	5.3	4.1	3.6	3.7	3.7

[15] World Bank staff calculations based on RBI data

Inflation							
GDP deflator	4.8	8.4	6.7	1.3	5.2	4.7	4.6
Consumer prices (average)	6.2	5.5	6.7	5.4	4.7	4.1	4
Selected Monetary Accounts							
Banks' credit	5.6	8.6	15	-	-	-	-
Broad money (M2)	16.1	10.7	6.9				
External sector							
Exports fob	-7.5	44.8	6.3	-8.4	8	8	8
Imports fob	-16.6	55.3	16.6	-4.5	9.3	9.3	9.3
Terms of trade	4.7	-14.3	-5.1	14	-5.5	-0.2	0
	Percent of GDP, unless otherwise indicated						
Current account balance (incl. grants)	0.9	-1.2	-2	-1.1	-1.4	-1.5	-1.5
Foreign Direct Investment	-1.6	-1.2	-0.8	-0.8	-1.2	-1.4	-1.5
Debt							
Public debt (external and domestic)	89.3	84.8	82.5	83.3[16]	82.8	81.5	80.4
External government debt	3.1	3.5	2.8	2.7	2.5	2.3	2.1
Debt service	5.3	5.2	5.2	5.2	5.1	5.1	5.1
Fiscal Accounts							
Total revenue and grants	18.9	20.6	19.2	19.6	20.2	20.4	20.4
Total expenditure and net lending	32	30.1	28.8	28.2	28.1	27.9	27.8
Overall fiscal balance (with grants)	-13.1	-9.5	-9.6	-8.6	-8	-7.5	-7.4
Memorandum items							
GDP per capita (%)	-6.7	8.8	5.9	7.2	5.7	5.8	5.9
Gross reserves (US$ millions, EOP)	576983.9	607309.1	578449.2	645583.0	715799.1	799209.8	886249.9
In months of next year's imports)	9	8.1	7.9	7.9	8	8	-
Nominal GDP (INR, trillions)	198.54	235.97	269.5	295.36	331.39	370.16	413.47
Nominal GDP (US$, billions)	2675.7	3166.9	3352.3	3624	3998.78	4400.34	4842.23

Source: Ministry of Statistics and Programme Implementation (MoSPI), RBI, Ministry of Finance (MoF), CEIC and World Bank staff estimates

Notes: ppts=percentage points; EOP=End of period

Table 2. Key Fiscal Indicators (Percent of GDP)

(General government, percent of GDP)	FY20/21	FY21/22	FY22/23	FY23/24	FY24/25	FY25/26	FY26/27
Total revenue	18.9	20.6	19.2	19.6	20.2	20.4	20.4
Tax revenue	16.1	17.6	16.7	17.1	17.5	17.7	17.7
Direct taxes	5.6	6.5	6.2	6.4	6.7	6.7	6.7
Indirect taxes	10	10.1	10.6	10.3	10.5	10.6	10.7

[16] Based on the latest Provisional Estimates data; using Budget Estimate nominal GDP, this figure is 81.6

Taxes on goods and services	9.8	10.3	9.7	9.8	10.0	10.1	10.2
Taxes on international trade	0.7	0.8	0.8	0.8	0.9	0.9	0.9
Non-tax revenue	2.5	2.8	2.3	2.4	2.4	2.4	2.4
Other Revenues (disinvestment)	0.3	0.2	0.2	0.2	0.2	0.2	0.2
Total expenditures	32.0	30.1	28.8	28.2	28.1	27.9	27.8
Current expenditures	26.1	23.6	23.6	22.4	22.3	22.0	21.8
Wages and salaries	1.2	1.1	1.0	1.0	1.0	1.0	1.0
Goods and services	19.6	17.3	16.5	16.1	16.1	15.9	15.7
Interest on debt	5.3	5.2	5.2	5.2	5.1	5.1	5.1
Capital expenditure	4.3	4.8	5.2	5.4	5.4	5.5	5.5
Overall fiscal balance	-13.1	-9.5	-9.6	-8.6	-8.0	-7.5	-7.4
Primary balance	-7.8	-4.2	-4.4	-3.4	-2.8	-2.4	-2.3
Financing	13.1	9.5	9.6	8.6	8.0	7.5	7.4
Central government							
Overall balance	-9.2	-6.8	-6.4	-5.6	-5.1	-4.5	-4.4
Revenues	11.6	13.3	12.5	13.3	13.2	13.2	13.2
Expenditures and net lending	20.7	20.0	18.9	18.9	18.3	17.7	17.6
State governments							
Overall balance	-4.1	-2.7	-3.2	-3.1	-2.8	-3.0	-3.0
Revenues	13.2	14.3	14.6	14.8	15	15	15
Expenditures and net lending	17.3	17	17.8	17.9	18	18	18
General government liabilities	89.3	84.8	82.5	83.9	82.8	81.5	80.4

Source: MoSPI, RBI, MoF, CEIC and World Bank staff estimates

Table 3. Central Government and Government Guaranteed Debt Stock and Debt Service

	Debt Stock (end of period)			Debt Service			
	FY22/23			FY23/24	FY24/25	FY23/24	FY24/25
	US$ million	Percent of Total	Percent of GDP	US$ million		Percent of GDP	
Total Debt	1883145	100	56.8				
Domestic Debt	1792035	95.2	54.1				
Treasury bills	126192	6.7	3.8	100160		3	
Treasury bonds	1112072	59.1	33.6	53561	49822	1.6	1.3
Others	553771	29.4	16.7				
External Debt	91110	4.8	2.7	8700	9600	0.3	0.3
Multilateral creditors	63500	3.4	1.9	6400	7500	0.2	0.2
Bilateral creditors	27600	1.5	0.8	2300	2100	0.1	0.1
Paris Club	27600	1.5	0.8	2300	2100	0.1	0.1
Non-Paris Club	0	0	0	0	0	0	0
Commercial creditors	0	0	0	0	0	0	0
Memo items							
SOE guaranteed external debt	11000	0.6	0				
External arrears	-	-	-				

INR per US$: Official (EOP)	82.2

Source: MoF, World Bank staff calculations

Note: Based on available data for the central government; consolidated general government data has not been published

Table 4. External Financing Needs (percent of GDP)

	FY20/21	FY21/22	FY22/23	FY23/24	FY24/25	FY25/26	FY25/26
1. Financing Requirements (i-ii)	-0.9	1.2	2	1.1	1.4	1.5	1.5
i. Current account deficit*	-0.9	1.2	2	1.1	1.4	1.5	1.5
ii. Net errors and omissions	0	0	0	0	0	0	0
2. Financing Sources (i+ii)	-0.9	1.2	2	1.1	1.4	1.5	1.5
i. Capital account balance (a+b+c)	2.1	2.6	1.5	2.3	3.3	3.4	3.4
a. Net foreign direct investment	1.6	1.2	0.8	0.8	1.2	1.4	1.5
b. Net portfolio investment	1.4	-0.5	-0.2	0.5	1	0.9	0.9
c. Net all other flows**	-0.9	1.9	0.9	1	1.1	1.1	1
ii. Change in reserve assets (1-2.i)	3	1.4	-0.5	1.2	1.9	1.9	1.9
3. External Financing Gap (1-2)	0	0	0	0	0	0	0

Source: RBI and World Bank staff calculations.

Note: *Includes merchandise and invisibles. **All other flows include short- and long-term debt flows (external assistance, commercial borrowings, and trade credits) and banking capital. Positive change in reserves indicates a decline.

2.3. IMF RELATIONS

26. **The International Monetary Fund (IMF) does not have an active program in India but conducts supervision and Article IV consultations annually.** The 2023 Article IV Consultation was concluded by the IMF's Executive Board of Directors on November 20, 2023. The consultation[17] highlighted India's strong economic performance guided by prudent fiscal policy, and monetary policy that is effectively addressing inflationary pressures. It underscored that India's significant potential, including from its demographic dividend, can be realized if accompanied by comprehensive structural reforms, including continued progress in implementing climate policies.

3. GOVERNMENT PROGRAM

27. **Since 2010, the GoI has been resolutely promoting a transition in India's power mix, from fossil fuel to RE.** It has adopted policies and programs to unlock private investments in the RE sector, especially in solar (for which installed capacity grew from a modest 2.6 gigawatt (GW) in 2014 to more than 73 GW in December 2023). For example, the National Solar Mission (2010) adopted specific targets for installed solar capacity to be achieved through several interventions, such as a Renewable Purchase Obligation (RPO), which mandates that all electricity distribution licensees should purchase or produce a minimum specified quantity of their requirements from renewable sources. Other notable interventions include: the Solar Park Scheme (2014), which seeks to promote commercial investments in large-scale grid-connected RE projects; Production-Linked Incentives (PLI) (2021) to incentivize the manufacturing of high-efficiency solar PV modules;

[17] IMF. *2023 Article IV Consultation* https://www.imf.org/en/Publications/CR/Issues/2023/12/18/India-2023-Article-IV-Consultation-Press-Release-Staff-Report-and-Statement-by-the-542605

Green Energy Open Access Rules (2022) to promote generation, purchase, and consumption of green energy through open access; and waivers on Inter-State Transmission System (ISTS) charges for RE and GH projects (2023). As a result of these initiatives, the RE market has grown significantly over the past decade, even if challenges remain.

28. **In addition, the GoI has launched policies to improve the integration of RE into the grid.** With higher penetration of RE in the grid, it became important to address the issues of variability and unpredictability inherent in renewable sources, as well as transmission constraints. In this regard, the GoI has rolled out the National Battery Storage and Transformative e-Mobility Mission (2019); developed a transmission system plan for integrating 537 GW of planned RE (2023); made viability gap funding (VGF) available for BESS (2023); and notified the new Indian Electricity Grid Code to promote system flexibility on the supply side (2023).

29. **However, reducing emissions in the power sector alone will not be sufficient to reach net zero.** The industrial sector will eventually become the most important driver of growth in energy demand and greenhouse gas (GHG) emissions in India. GH will play a critical role in reducing emissions in the industrial sector.

30. **To develop a domestic GH ecosystem and position India as an early mover, the GoI has created the NGHM with three main objectives:** (i) create demand through pilot projects and policies; (ii) provide incentives for domestic manufacturing of electrolyzers and production of GH; and (iii) build an enabling ecosystem to scale up GH markets. The NGHM has set the target to achieve 5 million tons of GH produced per annum by 2030, which is expected to result in (a) 125 GW of additional RE catalyzed; (b) US$100 billion of private investments leveraged; (c) more than 600,000 new jobs created; and (d) 50 million tons of GHG emissions avoided per annum. These are ambitious objectives, which rest on the assumption that latent private interest exists and can be unleashed with relatively modest levels of public support, as cost curves decline steeply and swiftly. DPO1 supported the NGHM, the waiver of ISTS charges for consumption of RE toward GH production (to reduce RE and GH costs), and the issuance of GH safety standards and codes. DPO1 also supported the RPO, the implementation regulation for the planned bidding of 50 GW of RE capacity each year for the next five years, and offshore wind to scale up RE; energy storage purchase obligation and ancillary service regulation to improve RE grid integration; and the PLI scheme for high-efficiency solar PV (to promote domestic manufacturing of solar PV).

31. **Since the approval of DPO1 in June 2023, the government has introduced the *Strategic Interventions for Green Hydrogen Transition* (SIGHT) scheme that provides financial incentives for local manufacturing of electrolyzers and GH production, and appointed the Solar Energy Corporation of India Limited (SECI) as its implementing agency.** SECI has issued three tenders: two for domestic manufacturing of electrolyzer of 1,500 MW each and one for GH production of 450,000 tons, with output-based incentives over the first three years of production. The main goal of these tenders is to help domestic production achieve scale and reduce costs quickly. These incentives are in addition to the RE ISTS waiver for GH production, which reduces GH costs by INR60 per kilogram (kg) (US$0.75/kg).[18] To ring-fence eligibility for the financial incentives under SIGHT, the GoI also issued a GH standard that specifies hydrogen can only be considered "green" if it is produced with RE (including biomass). Finally, the GoI has issued a roadmap to promote research and development in GH and has classified the projects across three verticals: GH production; storage and transportation; and end-use applications.

32. **To ensure that GH development contributes to greening the domestic power mix, the government has finalized plans to issue large-scale bulk procurement tenders for green ammonia (in the fertilizers industry) and GH (in refineries).**

[18] Source: Office Memorandum on 'Waiver of ISTS Charges for Green Hydrogen and its Derivatives', MNRE, dated April 5, 2023.

The tenders issued under SIGHT (Component II, mode 1) for GH production are not tied to any specific use and it is expected that a significant share of the produced GH will be exported. To ensure that domestic demand also picks up, the SIGHT scheme has been expanded to include a demand aggregation model (Component II, mode 2). Under this program (i) the Department of Fertilizers and the Ministry of Petroleum and Natural Gas will assess aggregated demand in their respective sectors; and (ii) bulk procurement tenders will be issued to match this aggregated demand with domestic supply. Tenders for green ammonia (for fertilizers) will be launched by SECI, while tenders for GH (for refineries) will be launched by oil and gas companies and the Centre for High Technology.

33. **The Ministry of New and Renewable Energy (MNRE) has also issued a GH Hub Policy (a cluster-based approach to bring GH supply close to GH demand centers) and intends to issue a global tender for investments in GH hubs.** The Ministry of Ports, Shipping, and Waterways has already launched a tender to establish three major ports—Kandla, Paradip, and Tuticorin—as GH hubs and received expressions of interest from over 20 potential bidders. The Ministry of Steel has also set up 13 task forces to develop a roadmap to promote "green steel", including to introduce GH in the steel-making process. Many pilot projects have been commissioned since the launch of NGHM. For instance, in May 2024, the Gas Authority of India Limited (GAIL) commissioned its first GH plant at Vijaipur in Madhya Pradesh, under the NGHM. The plant will produce 4.3 tons per day using 10 MW of electrolyser, initially to feed its own consumption and then later to distribute it to retail consumers in the vicinity.

34. **In addition to the central government, many states have issued policies and incentives to promote GH and its derivatives.** The state of Andhra Pradesh has issued a GH and green ammonia policy[19] with the objectives, by 2028, of (i) producing GH (up to 0.5 million tons per annum, MTPA) or green ammonia (up to 2 MTPA); and (ii) creating 6,000 jobs. The state has extended incentives for GH and green ammonia projects for five years from their commissioning date, including full reimbursement of applicable State Goods and Service Tax, full exemption of electricity duty on the power consumed, reimbursement of cross-subsidy charges, and reimbursement of 25 percent of intra-state transmission charges (with a cap). The state of Maharashtra has also issued a policy for RE and GH and green ammonia with similar incentives and allocated a budget of about US$1 billion to implement it. The state has a current demand of 0.5 MTPA of GH, which is expected to triple by 2030. The state of Kerala has mobilized a budgetary allocation of about US$25 million in FY23/24 to advance GH and announced that Kochi and Thiruvananthapuram would become GH hubs. Other states have integrated the promotion of GH and green ammonia in their RE policies. Rajasthan, Maharashtra, West Bengal, and Uttar Pradesh have issued Green Hydrogen policies. Odisha has an industrial policy framework that is conducive to investments in GH in the state.

35. **Finally, the GoI has adopted policies to increase the flow of finance to green projects.** To boost green financing, it rolled out a framework for the issuance of sovereign green bonds and created a separate reserve fund (the "Sovereign Green Fund") in the public account of India to ensure transparency on the uses of sovereign green bonds. In addition, measures have been taken to advance the development of a national carbon market, starting with the amendment of the Energy Conservation Act 2001 to establish the necessary legal framework, followed by the notification of the Carbon Credit Trading Scheme (CCTS) and its amendment, which will cater to both compliance and domestic offset markets.

4. PROPOSED OPERATION

4.1. LINK TO GOVERNMENT PROGRAM AND OPERATION DESCRIPTION

[19] Government of Andhra Pradesh, 2023. *Andhra Pradesh Green Hydrogen & Green Ammonia Policy – 2023.*

36. **The PDO of the proposed DPO is to accelerate the development of low-carbon energy in India.** The operation supports reforms in three areas: (a) promoting GH; (b) scaling up RE; and (c) enhancing finance for low-carbon energy investments. 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.

37. **The proposed operation is fully aligned with the government's program to boost RE penetration and position India as an early mover in the GH space.** Beyond the DPO series, the World Bank is comprehensively engaged in supporting India's low-carbon energy agenda through policy dialogue, analytical work, TA, and complementary operations.

38. **Climate Co-benefits and Paris Alignment.** The actions under this DPO contribute directly to India's mitigation agenda by helping to accelerate India's low-carbon transition and scale-up investments in greening the energy mix. This operation is aligned with the goals of the Paris Agreement. It is consistent with India's climate commitments, outlined in the NDCs, the National Action Plan on Climate Change, and the National Clean Air Program. No prior action (PA) is expected to cause a significant increase in GHG emissions or any persistent barriers to transition to low-GHG emissions. Thus, PAs of the proposed operation are aligned with the mitigation goals of the Paris Agreement. Risks from climate hazards are not likely to adversely affect the PAs' contribution to the PDO for any PA. Thus, all PAs of the proposed operation are aligned with the adaptation and resilience goals of the Paris Agreement.

4.2. PRIOR ACTIONS, RESULTS AND ANALYTICAL UNDERPINNINGS

Pillar 1: Promoting green hydrogen

39. **As a new technology, GH is costlier to produce than carbon-intensive alternatives; to overcome this barrier and unlock investments, policy coordination and financial incentives are required.** Under DPO1, the GoI launched the NGHM with the overarching objective to "make India the global hub for production, usage and export of GH and its derivatives." (PA1, DPO1). The MNRE also issued recommendations to select ministries to update the relevant regulations, standards, and codes, including with respect to safety in GH production, storage and transportation, and utilization in the mobility sector (PA2, DPO1). Further, the Ministry of Power (MoP) extended a waiver of ISTS charges for RE consumption by GH/derivatives production facilities to be commissioned by the end of 2030 (PA3, DPO1). PAs 1–3 under the proposed operation (DPO2) seek to further operationalize the NGHM by bridging the viability gap for GH production, promoting domestic market demand, and ensuring that financial incentives follow high environmental standards (by defining what can be considered "green hydrogen.")

PA#1: To increase the domestic production of GH and local manufacturing of electrolyzers, the Borrower, through the MNRE, has (i) notified the incentive schemes for GH production and electrolyzer manufacturing, which specify the detailed incentives and eligibility criteria for recipients, and outline the framework for bidder selection through a transparent and competitive process, and (ii) appointed SECI as the implementing agency to manage the incentive schemes, as evidenced by (i) MNRE's Sanction for the Scheme Guidelines for implementation of SIGHT Programme - Component I: Incentive Scheme for Electrolyzer Manufacturing, dated June 28, 2023; and (ii) MNRE's Sanction for the Scheme Guidelines for implementation of SIGHT Programme - Component I: Incentive Scheme for Green Hydrogen Production, dated June 28, 2023.

40. **To incentivize GH production and help domestic producers reach scale, the MNRE has issued production-based**

financial incentives under the SIGHT scheme and appointed SECI as the implementing agency. The SIGHT scheme covers the domestic manufacturing of electrolyzers[20] (Component I) and production of GH (Component II, mode 1). Under these components, successive rounds of bidding will take place, with interested producers bidding for the lowest subsidy amount (to leverage public resources optimally); thereafter, the selected bidders will receive multi-year output-based financial incentives, once production begins (from FY25/26 onwards). The goal is to scale up the domestic production of GH and its derivatives (underpinned by electrolyzers capacity), in order to improve the cost competitiveness of GH and catalyze further private investments. To implement the SIGHT program, the government has appointed SECI, which is responsible for issuing competitive tenders and selecting beneficiaries based on specific eligibility criteria. Two tenders were issued in July 2023: one for 450,000 tons of GH production, and another for 1.5 GW of electrolyzers. Both tenders were significantly oversubscribed, which resulted in significantly lower than anticipated subsidy requirements and suggests high investor interest and potential to leverage public support. Subsequently, in March 2024, SECI floated a second tender for electrolyser manufacturing of 1.5 GW capacity. SECI intends to launch additional tenders for GH production, including under the demand aggregation model (see below).

Table 5. SIGHT scheme incentives

Component	Production	Year 1	Year 2	Year 3	Year 4	Year 5
Electrolyzer Manufacturing	INR/kW	4,440*	3,700	2,960	2,220	1,480
	US$/kW	55	46	37	28	18
GH Production (Component II Mode 1)	INR/kg	50**	40	30	-	-
	US$/kg	0.6	0.5	0.4	-	

Note: * about 8 percent of electrolyzer production costs; ** about 15 percent of GH production costs

PA#2: To increase the consumption of green hydrogen and ammonia in key demand sectors, the Borrower, through MNRE, has issued guidelines for transparent and competitive bidding process on the demand aggregation model, as evidenced by: (i) MNRE's Sanction for the Scheme Guidelines for implementation of SIGHT Programme- Component II: Incentive for Procurement of Green Ammonia Production (under mode-2A), dated January 16, 2024; and (ii) MNRE's Sanction for the Scheme Guidelines for implementation of SIGHT Programme- Component II: Incentive for Procurement of Green Hydrogen Production (under mode-2B), dated January 16, 2024.

41. **To spur the development of a viable domestic market for green ammonia and GH, under Component 2 of the SIGHT scheme, the government has developed a framework for aggregating demand and extending domestic demand-linked production incentives.** To gauge the extent of latent domestic demand, the MNRE has requested the Ministries of Petroleum and Natural Gas (MoPNG, for refineries); Fertilizers;[21] Road, Transport and Highways; Steel; and Ports, Shipping and Waterways to estimate their respective trajectories for demand of GH and its derivatives. Based on the positive feedback and estimated demand for green ammonia in the fertilizer industry, and GH in the refinery industry, the MNRE adopted a demand aggregation approach to create scale on the demand side and demonstrate the existence of a viable domestic market to potential producers. This demand aggregation model is explicitly provided for under SIGHT as "mode 2" of Component 2. To operationalize it, the MNRE has developed guidelines that effectively provide the financial and

[20] This accounts for about 40 percent of GH production costs.
[21] In 2021, India was importing urea, di-ammonium phosphate, and ammonia, for a total amount of US$6 billion.

operational roadmap for demand aggregation and bulk procurement for GH and green ammonia, respectively. The guidelines include (a) the budgetary provisions for the scheme; (b) the implementing agencies for demand aggregation; (c) the level of the subsidy, (d) the targeted volumes for the first tranche of tendering (550,000 tons of green ammonia and 200,000 tons of GH per year); (e) the standards for GH to be considered green; and (f) the framework for transparent and competitive bid issuances and bidder selection. SECI will be responsible for aggregating demand for green ammonia in the fertilizer industry, and the Department of Fertilizers may provide additional incentives to cover the remaining cost difference between green and grey ammonia. For refineries, oil and gas companies and/or the Centre for High Technology will issue tenders to procure GH, and the former may absorb the eventual additional cost between green and grey hydrogen.

PA#3: To ensure that the incentives scheme under SIGHT and bulk procurement benefit only green hydrogen projects, the Borrower, through the MNRE, has notified a GH standard that defines the eligibility criteria for consideration as green hydrogen, as evidenced by the Office Memorandum No. 353/35/2022-NT issued by the MNRE under the National Green Hydrogen Mission, dated August 18, 2023.

42. **The MNRE has issued a Green Hydrogen Standard, which specifies RE (including biomass) as the only eligible energy source for producing GH.** To ensure that the incentives scheme under SIGHT and bulk procurement benefit only green projects, they must follow clear definitions and standards for what constitutes GH. The Green Hydrogen Standard stipulates that to be considered green, the GH production process shall result in non-biogenic GHG emissions of less than 2 kg CO_2/kg, on average for 12 months. This means only hydrogen produced with RE, including biomass, will be eligible for the green label. A detailed methodology for measuring, reporting, monitoring, verifying onsite and certifying GH and its derivatives will be issued by the MNRE. The Bureau of Energy Efficiency (BEE) has been tasked to accredit agencies for monitoring, verifying, and certifying GH production projects.

43. **Expected results:** Actions under Pillar 1 are expected to catalyze domestic production of GH and electrolyzers, with a target of incentivizing production of at least 450,000 metric tons of GH and 1,500 MW of electrolyzers per annum from FY25/26 onwards. Once the GH cost is reduced, it is expected that incentives will no longer be needed to reach the GH targets for 2030, as set forth under NGHM.

Pillar 2: Scaling up renewable energy

44. **Pillar 2 seeks to increase the share of RE in the energy mix and improve the integration of RE into the grid.** Under DPO1, the government took measures to (i) mandate electricity distribution utilities to increase their use of RE and energy storage (PA4, DPO1); (ii) develop an ancillary service market to remunerate energy storage services and promote the use of PSH (PA5, DPO1); (iii) issue the bidding trajectory to scale up RE generation capacity (PA6 DPO1); (iv) adopt a strategy for allocating offshore wind sites and extend ISTS waivers (PA7 DPO1); and (v) promote the local production of solar PV through PLIs (PA8 DPO1). DPO2 seeks to extend these measures by ensuring RE sources are better integrated into the grid. Because of its inherent variability, the integration of RE into the grid needs to be supported, including through energy storage.

PA #4: To improve RE grid integration, the Borrower, through the Ministry of Power ("MoP") has notified the Electricity (Amendment) Rules, 2023 as evidenced by its publication in the Official Gazette (Gazette No. 377) dated May 29, 2023 and through the Central Electricity Regulatory Commission ("CERC") has notified the Indian Electricity Grid Code, as evidenced by its publication in the Official Gazette (Gazette No. 488) dated July 11, 2023.

45. **The Indian Electricity Grid Code has incorporated provisions to improve the integration of RE into the grid.** Grid integration is a significant challenge due to the variable nature of RE, leading to unpredictability, as well as frequency and voltage issues. Also, congestion in the transmission network and its lack of availability can lead to curtailment of RE, even when RE is a "must-run" power plant in India. Technical solutions[22] are required, which needs to be incorporated and specified in the electricity grid code. Therefore, India has notified its new Indian Electricity Grid Code and updated the technical and commercial rules for power market participants connected to the ISTS. Specifically, the changes include (i) the addition of a resource planning code that supports demand forecasting, generation resource planning, and transmission resource planning; (ii) amendments to the connection code to make it consistent with General Network Access rules and open access of ISTS network; (iii) a new protection code, which ensures uniform protection protocols across the users; (iv) a new operating code that promotes the availability of system reserves and frequency control mechanisms, such as ancillary services (to ensure reliability), thereby providing for inertia (to give system support in the event of power loss due to a failed generator) and grid stability; and (v) a new schedule and dispatch code introducing a framework for nationwide optimization of security-constrained economic dispatch[23] by generator in the real-time market.

PA#5: To reduce costs for battery energy storage systems and thereby promote integration of RE into the grid, the Borrower, through its Cabinet, has approved an incentive scheme for BESS, as evidenced by the Press Information Bureau's press release on the Cabinet's approval of the Scheme titled 'Viability Gap Funding for development of BESS', dated September 6, 2023.

46. **The BESS incentive scheme will reduce costs for BESS, and thereby promote integration of RE into the grid and bring RE-plus-BESS closer to cost parity with coal power, over time.** To reduce the cost of BESS, India's Cabinet has approved a scheme providing VGF of up to 40 percent of the capital costs of BESS, for 4,000 megawatt hour (MWh) of BESS by 2030-31. The scheme has an initial outlay of US1.1 billion and provides for competitive awards of the VGF. The deployment of BESS will improve RE integration into the grid and offer an additional avenue to defer investments in expanding transmission and distribution lines[24]. The scheme will help reduce the cost of BESS and make it commercially viable, over time.

47. **The actions under Pillar 2 of the series are expected to result, between 2023 and 2026, in:** an increase in the share of RE in power consumption (from 25 to 33 percent); an increase from 0 to 2 percent in the share of solar and wind power consumed through energy storage in total power consumption; an increase from 0 to 1,000 MWh in the capacity of BESS installed; additional bids issued for 75 GW of RE capacity (RE capacity enabled - CRI); the avoidance of 40 MTPA of GHG emissions; awards of offshore wind sites cumulatively worth of 4 GW power capacity and an additional 48 GW capacity for domestic manufacturing of high-efficiency solar PV cells and modules.

Pillar 3: Enhancing finance for low-carbon energy investments

[22] Technical solutions cover "must run" status for RE, provisions for reserves to bring the system to normal state in case of emergency, recognition of energy storage systems and demand response to provide ancillary services, provision of reactive power and inertia maximizing generation from the lower variable cost generation source, especially RE, and resource adequacy planning to ensure adequate planning by the load serving entities to meet the demand reliably across all the time horizons.

[23] Security-constrained economic dispatch is a mathematical model to generate the most economic generation dispatch while considering key system operation constraints, such as power balance constraint, reserve requirement constraints, transmission security constraints, as well as generation limitations, such as ramp rates, minimum and maximum output.

[24] While building new transmission lines can take years for planning, approving, acquiring the right-of-way, and construction, BESS can be much easier and faster to develop and install.

48. **Pillar 3 aims to stimulate financing for private investments in GH and low-carbon energy.** Under the first DPO, the government put in place the legal framework for carbon trading (PA9, DPO1) and upgraded the regulatory framework for green debt issuances (PAs 10–11, DPO1). DPO 2 extends reforms in both areas.

PA #6: To facilitate tracking and trading of carbon credits, the Borrower, through the MoP, has notified the Carbon Credit Trading Scheme (CCTS), 2023 that sets forth the governance structure and functions of the CCTS, as evidenced by MoP's notification, published in the Official Gazette (Gazette No. 2702) dated June 28, 2023.

49. **The CCTS includes two notable features:** (a) provisions for both compliance and voluntary markets; and (b) emission intensity targets (tons of CO_2 equivalent per unit of output/production) in the identified obligated entities and sectors. It builds on the existing Perform Achieve Trade (PAT) Scheme, which provides for capping energy intensity of production and trading Energy Saving Certificates (ESCerts) of large industries (including power generators). The CCTS also delineates institutional responsibilities: the BEE will be the administrator, including for determining the accredited carbon verification agencies; Grid Controller of India Limited will be the registry; and CERC will be the regulator of the Indian Carbon Market (including for registering the power exchanges, where the carbon credits can be traded). With these provisions under the CCTS, the Indian Carbon Market will have a solid foundation to incentivize investment in sustainable green technologies. The target setting for obligated entities and the carbon trading market are expected to be launched by end of 2024. All sectors identified under the PAT Scheme, barring a few exceptions, will migrate to CCTS in a phased manner.

PA #7: To promote green finance while preventing greenwashing, the Borrower, through SEBI, has issued a regulatory framework for Environment, Social and Governance (ESG) Disclosures, Ratings, and Investing, as evidenced by (i) SEBI Master Circular for Environmental, Social and Governance Rating Providers dated July 12, 2023; (ii) SEBI Circular on ESG Mutual Fund Schemes dated July 20, 2023 and (iii) SEBI (Credit Rating Agencies) (Amendment) Regulations 2023 published in the Official Gazette (Gazette No. 465) dated July 3, 2023.

50. **Enhancing the flow of green finance, while preventing greenwashing, requires an enabling regulatory framework on ESG ratings, disclosure, and labelled products.** In July 2023, the Securities and Exchange Board of India (SEBI) introduced several complementary regulatory guidelines on ESG ratings, disclosures, and funds, which are expected to significantly improve the allocation and monitoring of green finance instruments and funds in India. First, it introduced a comprehensive regulatory framework for ESG rating providers to address the concern that previously unregulated ESG ratings had limited comparability and could lead to greenwashing. ESG rating providers are now required to register with SEBI and disclose their rating methodologies. SEBI also introduced more stringent ESG disclosure requirements for the largest listed firms, as well as external validation requirements. Second, SEBI introduced the Business Responsibility and Sustainability Reporting (BRSR) Core reporting format. The BRSR Core format requires the largest listed entities to ensure reasonable assurance through external verification of data reported on nine key areas, including GHG emissions and energy use. These large firms will also be required to make similar disclosures for their value chain, covering at least 75 percent of their total purchases or sales. Third, to enable differentiated strategies in ESG investments, SEBI allowed mutual funds to introduce multiple ESG-themed funds, compared to a single ESG fund previously. Also, the investment guidelines for ESG funds have been aligned with BRSR core and other guidelines.

51. **Even though the changes cover broad ESG ratings and funds, the major focus is on green financing.** This is evident from the circular on ESG funds, which mentions in paragraph 1 that the increased need for green financing is one of the

major motivations for expanding the scope of ESG funds. Also, the scope of green debt securities has been expanded in 2023 to include funding for more green projects, while no such expansion has been done by SEBI for bonds in the social sector. Finally, of the nine Key Performance Indicators for the BRSR Core disclosure, four are on environmental disclosures.

52. **Pillar 3 is expected to result in:** the launch and operationalization of a carbon trading market with specified GHG emissions targets; scale-up in onshore green debt securities, which are expected to increase by at least 30 percent between 2023 and 2026; and cumulative sovereign green bonds issued increasing from US$2.3 billion in 2023 to US$6.0 billion in 2026.

53. **Reflecting the dynamic nature of the policymaking process and dialogue with the authorities, some changes were made to the indicative triggers and results indicators initially considered under DPO1**. The proposed changes are summarized in Table 6. They do not affect the development objectives of the series.

Table 6. Proposed Changes to the Indicative Triggers and Results Indicators in DPO1

Original Pillars, Indicative Triggers, and Indicators at DPO1 Approval	Proposed Updates / Changes	Comments
PILLAR 1: Promoting green hydrogen - changes to indicative triggers 2 and 3		
Trigger #2: The Borrower shall select certain sectors and promote the use of green hydrogen/its derivatives in these sectors. Trigger #3: The Borrower, through the MNRE, shall issue a guideline for transparent and competitive bidding for bulk procurement of GH and its derivatives.	Replaced by PA#2: To increase the consumption of green hydrogen and ammonia in key demand sectors, the Borrower, through MNRE, has issued guidelines for transparent and competitive bidding process on the demand aggregation model.	Indicative Triggers 2 and 3 were consolidated in the reformulated PA that addresses both objectives of actualizing latent demand through aggregation at the industry level and ensuring a competitive process to allocate the subsidies.
PILLAR 1: Promoting green hydrogen - Changes to RI1 and RI2		
Results Indicator #1: GH production capacity incentivized (million tons) Target: [3] [2026]	Target changed to 450,000 tons	These targets have been adjusted from DPO1 to reflect the team's updated understanding that the incentives will be disbursed at the time of production rather than the time of award (i.e., 3 years later). However, the GoI's GH and electrolyzers production targets for 2030 are still expected to be achievable.
Results Indicator #2: Domestic electrolyzer manufacturing capacity incentivized (GW) Target: [3] [2026]	Target changed to 1,500MW	
PILLAR 2: Scaling p renewable energy – PA#6 added		
Indicative Trigger: NA	**PA # 5 added**	

Original Pillars, Indicative Triggers, and Indicators at DPO1 Approval	Proposed Updates / Changes	Comments
	"To reduce costs for battery energy storage systems and thereby promote integration of RE into the grid, the Borrower, through its Cabinet, has approved an incentive scheme for BESS."	The newly added PA5 supports incentives for the deployment and use of BESS. This is a breakthrough development that will help bring down the costs of battery storage. It is a key step toward bringing RE-plus-storage closer to cost parity with coal power, over time.

Table 7: DPF Prior Actions and Analytical Underpinnings

Analytical Underpinnings	
Operation Pillar 1: Promoting green hydrogen	
WB: Green Hydrogen Opportunities and Roadmap for India (2023) WB: Geographic Information System (GIS) mapping of demand and supply centers for green hydrogen hubs in India (2023) WB: Developing financing mechanisms to bridge the cost gap between grey and green hydrogen in India (2023) MoEFCC: India's Long-Term Low-Carbon Development Strategy (2022) WB: Support to MNRE in developing GH Hub Policy WB: Study on Desalination of Water and its use in GH (ongoing) WB: Technical Support for Development of Skill Training Modules for India's NGHM (ongoing)	The studies identified the main off-taker industries for green hydrogen and the potential of green hydrogen to replace fossil fuels in refineries, fertilizers, steel, methanol, and long-haul trucking. They also analyzed cost differentials between grey and green hydrogen and the incentives required to promote GH in India. Thus, they provided critical analytical underpinning to formulate the NGHM and its incentives to GH both on the supply and demand sides. The GIS mapping helped inform the early version of the GOI's GH hub policy, including the identification of infrastructure facilities.
Operation Pillar 2: Scaling up renewable energy	
WB: Battery Storage Assessment at Intra-State Transmission and Distribution Network (2021) WB: A Roadmap for Developing Wholesale Power Market in India (2021) MoP: Report of the Group on Development of Electricity Market in India (2023) WB: Report on India Energy Transition to meet Net Zero 2070 (2023) MoP: National Framework for Promoting Energy Storage Systems (2023)	These studies demonstrated that the industrial sector will play a critical role in driving India's future energy and emissions growth. Hence, green electricity and GH would make significant contributions to the country's Net Zero targets. Energy storage is critical for high penetration of RE. The studies analyzed viability gaps for battery storage, and therefore informed the design of the battery storage incentive policy. Further, the power market study recommended to deepen wholesale electricity markets and notify the grid code, to improve RE grid integration.
Operation Pillar 3: Enhancing finance for low-carbon energy investments	

WB: Technical assistance under Private and Financial Sector Equitable Growth WB: Designing carbon market in India through technical assistance on partnership for market readiness/ implementation	The studies supported the Ministry of Environment, Forests and Climate Change (MoEFCC), GoI in developing a blueprint of the necessary infrastructural and institutional mechanisms to develop a well-designed domestic carbon market, which can also be linked with international markets (CORSIA, EU-ETS, Article 6). The studies highlighted the need for comprehensive and holistic guidelines on ESG disclosures, ESG ratings and reasonable assurance, and ESG themed funds which invest in firms complying with detailed ESG disclosures, with external verification.

4.3. LINK TO CPF, OTHER BANK OPERATIONS AND THE WBG STRATEGY

54. **The proposed operation is consistent with the Country Partnership Framework (CPF) FY18/22 discussed by the World Bank Board of Executive Directors on September 20, 2018 (Report No. 126667-IN) and extended to FY25 by the corresponding Performance Learning Review dated (October 23, 2023)**. It supports two of the CPF's focus areas: (a) "promoting resource-efficient growth;" and (b) "enhancing competitiveness and enabling job creation." The DPO series is also fully aligned with the Bank's Green, Resilient and Inclusive Development framework; Climate Change Action Plan 2021–2025; and, Global Crisis Response Framework (GCRF), insofar as all PAs support the adoption of "climate smart policies and incentives" (Pillar 4 of the GCRF framework).

4.4. CONSULTATIONS AND COLLABORATION WITH DEVELOPMENT PARTNERS

55. **Consultations.** The MNRE regularly carries out consultations with private sector stakeholders (RE developers and GH technology providers) and think tanks to calibrate the interventions proposed under the NGHM. In addition, the findings of the Poverty and Social Impact Assessment conducted for DPO1 on potential risks around freshwater availability, skilling requirements for GH value chains, safety risks, risks around land acquisition for GH hubs, and domestic demand for GH were shared with the authorities and discussed by them in the consultations with relevant ministries, the private sector, think tanks and end-user industries. The authorities have been proactively seeking to address some of the risks identified, including with support from the Bank. The Bank team has been consulting closely with the MNRE, the nodal agency for the NGHM, and the various stakeholders on GH and the reforms supported by the DPO series.

56. **Collaboration.** The GOI and the Bank team have coordinated closely with the United Kingdom's Foreign, Commonwealth, and Development Office, which has extended a guarantee for a principal amount of US$1 billion under the first operation, as well as with other development partners active in the GH space in India. IFC is actively consulting with potential investors. The Deutsche Gesellschaft für Internationale Zusammenarbeit, the Kreditanstalt für Wiederaufbau, the European Investment Bank (EIB), and the Indo-German Energy Forum are active in the GH space in India. The EIB plans to invest US$1 billion in GH in India, to provide debt financing of up to 50 percent of the project costs for both GH and RE investments in the public sector. The Asian Development Bank is also helping the MNRE to develop some key policy interventions on GH.

5. OTHER DESIGN AND APPRAISAL ISSUES

57. **This operation aligns with the mitigation and adaptation and resilience goals of the Paris Agreement.** The DPO reform program is consistent with the country's climate commitments and the Bank's climate analysis. Regarding mitigation goals, all PAs seek to remove significant and persistent barriers to the country's transition to a low-GHG emissions development pathway. Regarding adaptation and resilience goals, the contributions of the PAs to the PDO are unlikely to be at risk from climate hazards.

5.1. POVERTY AND SOCIAL IMPACT

58. **The shifts supported by the operation 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 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 because of any individual PA). The magnitude and distribution of 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 GoI is well equipped to address these challenges and has sought and obtained Bank TA[25] support (ongoing) to develop educational and training programs to accommodate the skills requirements for both the GH supply and demand ecosystems.[26] In the longer term, moreover, the transition to cleaner sources of energy will generate welfare and equity gains, via health co-benefits, increased worker productivity, and reduced exposure and vulnerability to climate and environmental hazards.

59. **GH production and related activities may entail substantial risks related to land acquisition, involuntary resettlement, and occupational and community health and safety.** The rapid rollout of GH production is likely to result in substantial downstream risks associated with land acquisition, resettlement, and stress on freshwater availability. With respect to land acquisition and resettlement, the GoI has established processes and institutions that can mitigate the risks, although the government's attempts to amend the Land Acquisition Act, 2013, and some states already exempting "strategic development projects" from the need of conducting social impact assessments, indicate a shift in favor of investors (for low carbon-related projects). This can have adverse implications for involuntarily relocated households in terms of food security, fair compensation for the land appropriated, and costs borne while relocating to other areas to find alternative livelihoods. To help mitigate some of these risks, the World Bank is in active dialogue with relevant institutions to advance a TA program.[27] With respect to possible stress on freshwater availability, the GoI is attempting to address concerns through the development of a GH Hubs Policy, which may include desalination plants under common infrastructure facilities in the proposed hubs. The Bank is supporting the development of the policy, undertaking a geographic information system mapping exercise (applying freshwater availability and biodiversity risk filters to identify

[25] The Ministry of Skill Development and Entrepreneurship has developed initiatives targeting engineers and researchers to help them better understand the basics of GH production. The Bank will help design the detailed programs educating engineers and technicians on design, engineering, operations and maintenance, and storage and transportation, and on-the-ground training on safe handling of hydrogen supply and end-use systems.
[26] The program covers knowledge of electrolyzers, fuel cells, hydrogen storage, compression and distribution, the design, manufacturing, installation, operational and maintenance aspects, and the safe handling and transportation of GH.
27 The Bank's TA support to the Ministry of Skill Development and Entrepreneurship will involve development of training material on storage and transportation, and on-the-ground training for safe handling of hydrogen supply and end-use systems. The TA will also create knowledge on best practices on how to address social and environmental risks, such as those around land acquisition and resettlement, and water management and managing the environmental footprint of electrolyzers and related processes, respectively.

suitable sites), and assessing potential applications of desalination for GH production. Concerning safety risks, the NGHM plans to specify standards and norms for the production and transportation of GH, with particular attention to safety aspects, and the Bank's TA is supporting the development of skilling modules to train technicians associated with GH chains in safety protocols.

5.2. ENVIRONMENTAL ASPECTS

60. **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.** It will also provide a range of co-benefits for public health (from cleaner air and reduced water and solid waste pollution).

61. **However, there are risks to the environment, forests, and other natural resources.** Future large-scale downstream development of GH hubs, electrolyzers manufacturing hubs, and BESS facilities may result in significant risks related to the environment and other natural resources. India has the requisite capacity to mitigate these risks. The national environmental legal and regulatory framework is comprehensive and incorporates mitigation measures to adequately manage most of these potential risks, with some caveats. For instance, environmental assessments for large projects that fall under the ambit of the Ministry of Environment, Forest, and Climate Change are not currently needed for a range of investments in solar PV, GH production, or manufacturing of electrolyzers, where it is expected that the relevant GoI agencies will develop and enforce the required standards and norms. To ensure such gaps are adequately addressed, the Bank will carry out a thorough gap analysis of the existing legal, regulatory, and institutional frameworks to inform follow-on engagements (outside the proposed DPO series); and provide TA to help India adequately address any new or additional environmental and social (E&S) risk identified to be posed by GH and scaled-up RE.

5.3. PFM, DISBURSEMENT AND AUDITING ASPECTS

62. **The fiduciary risk of the proposed operation is moderate based on the status of public financial management (PFM) systems, procurement systems, and foreign exchange control environment.** Assessments conducted by the National Institute of Public Finance and Policy (NIPFP) and the Bank concluded that the PFM systems are adequate. Subsequent assessments and technical work have been undertaken by the World Bank at the Union level in several areas such as Planning, Budgeting, Financial Reporting, Public Investment Management, Chart of Accounts, Government of Finance Statistics, and Financial and Performance Auditing. Public procurement is decentralized to ministries, states, and public sector undertakings and is governed by General Financial Rules 2017 at the central level and by the Public Financial Rules of the respective states at the state level. The World Bank has carried out a country procurement assessment and concluded that India has a moderately well-functioning public procurement system with islands of excellence. Over 80 percent of procurement is carried out through open competition procedures and e-procurement is mandatory for all procurement valued above INR 500,000.

63. **The Bank has reasonable assurance that the control environment for foreign exchange in the RBI is satisfactory for the purposes of this DPO.** The IMF has not carried out a Safeguard Assessment of the RBI. As part of the preparation for this operation, the World Bank has reviewed the RBI's audit report and published annual financial statements for the three financial years (FY20/21, FY21/22, and FY22/23). The audit reports conducted by private firms of chartered accountants have a clean and unqualified opinion.

64. **Disbursement.** Upon effectiveness, the Borrower, represented by the Department of Economic Affairs through

the office of the Controller of Aid Accounts and Audits, will submit a withdrawal application to the World Bank, based on which the Bank will disburse the proceeds of the IBRD loan to the government account at the RBI. This account is part of the GoI's general foreign exchange reserves. Once the amount is credited, it will be added to the consolidated fund of the GoI and will be available as part of the general budget proceeds, which will be confirmed by the government within 30 days of receipt. The IBRD loan–proceeds for this operation–may be used for any general purpose, other than for financing excluded expenditures (as defined in the legal agreements for the operation).

5.4. MONITORING, EVALUATION AND ACCOUNTABILITY

65. **The GoI has robust institutional arrangements to monitor the implementation of program-supported reforms.** The MNRE is leading the preparation and implementation of the DPO and coordinating across all relevant GoI agencies and stakeholders. As such, it is 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 Department of Economic Affairs will provide an additional layer of oversight at the operational level.

66. **Grievance Redress.** Communities and individuals who believe that they are adversely affected by specific country policies supported as Prior Actions or tranche release conditions under a World Bank Development Policy Financing may submit complaints to the responsible country authorities, appropriate local/national grievance mechanisms, or the Bank's Grievance Redress Service (GRS). The GRS ensures that complaints received are promptly reviewed in order to address pertinent concerns. Project affected communities and individuals may submit their complaint to the Bank's independent Accountability Mechanism (AM). The AM houses the Inspection Panel, which determines whether harm occurred, or could occur, as a result of Bank non-compliance with its policies and procedures, and the Dispute Resolution Service, which provides communities and borrowers with the opportunity to address complaints through dispute resolution. Complaints may be submitted at any time after concerns have been brought directly to the World Bank's attention, and Bank Management has been given an opportunity to respond. For information on how to submit complaints to the World Bank's corporate Grievance Redress Service (GRS), please visit http://www.worldbank.org/GRS. For information on how to submit complaints to the Bank's Accountability Mechanism, please visit https://accountability.worldbank.org.

6. SUMMARY OF RISKS AND MITIGATION

67. **The overall residual risk rating for the operation is Substantial.** Table 8 presents the residual risk ratings by category. The categories of "Technical Design" and "Environment and Social" carry substantial risks to the achievement of the PDO. A description of these risks and their respective mitigation measures is provided below.

68. **Technical Design risk is Substantial**. There are still significant uncertainties around GH technologies (electrolyzer technology and GH-based technologies in the offtake industries are still not fully mature) as well as cost curves (which will evolve with the technology as well as speed and scale of their deployment). Thus, it is particularly difficult to design incentive policies that are well-targeted, and there is significant uncertainty over the viability of the market in the absence of policy support. However, given India's clear ambition to become a pioneer in GH and the potential sizeable payoffs for India and globally, it makes sense for the GoI to absorb the front-end risks associated with a nascent yet promising GH technology and for the World Bank to accept significant residual risks to the achievement of the development objectives.

Further, MNRE has also issued an R&D roadmap, which will help improve the commercial aspects of GH technology, as well as mitigate some of the current technical constraints.

69. **Environment and Social risks are Substantial.** 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) are only partly covered by the existing legal and regulatory frameworks on minimizing or avoiding impacts on natural resources, environment, and biodiversity. The World Bank has an extensive TA to mitigate some of these risks. The Bank has done a geospatial mapping of GH hubs to avoid potential sensitive areas (such as, protected forests), critical zones for underground water, land and 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 also engaged in developing skill training modules for the selected job roles under the NGHM to enhance the skills in GH technology.

Table 8: Summary Risk Ratings

Risk Categories	Rating
1. Political and Governance	Moderate
2. Macroeconomic	Moderate
3. Sector Strategies and Policies	Moderate
4. Technical Design of Project or Program	Substantial
5. Institutional Capacity for Implementation and Sustainability	Moderate
6. Fiduciary	Moderate
7. Environment and Social	Substantial
8. Stakeholders	Moderate
9. Other	
Overall	Substantial

ANNEX 1: POLICY AND RESULTS MATRIX

Prior Actions		Results		
Prior Actions under DPO1	**Prior Actions under DPO2**	**Indicator Name**	**Baseline (June 30, 2023)**	**Target (June 30, 2026)**
Pillar 1: Promoting green hydrogen				
PA #1: The Borrower, through its Union Cabinet, has approved the NGHM, which will facilitate demand and includes incentives for electrolyzer manufacturing, and GH production.	**PA #1:** To increase the domestic production of GH and local manufacturing of electrolyzers, the Borrower, through the MNRE, has (i) notified the incentive schemes for GH production and electrolyzer manufacturing, which specify the detailed incentives and eligibility criteria for recipients, and outline the framework for bidder selection through a transparent and competitive process, and (ii) appointed SECI as the implementing agency to manage the incentive schemes, as evidenced by (i) MNRE's Sanction for the Scheme Guidelines for implementation of SIGHT Programme - Component I: Incentive Scheme for Electrolyzer Manufacturing, dated June 28, 2023; and (ii) MNRE's Sanction for the Scheme Guidelines for implementation of SIGHT Programme - Component I: Incentive Scheme for Green Hydrogen Production, dated June 28, 2023. .	**Results Indicator #1**: GH production capacity incentivized (tons) **Results Indicator #2**: Domestic electrolyzer manufacturing capacity incentivized (MW)	0 0	450,000 1,500

Prior Actions		Results		
	PA #2: To increase the consumption of green hydrogen and ammonia in key demand sectors, the Borrower, through MNRE, has issued guidelines for transparent and competitive bidding process on the demand aggregation model, as evidenced by: (i) MNRE's Sanction for the Scheme Guidelines for implementation of SIGHT Programme- Component II: Incentive for Procurement of Green Ammonia Production (under mode-2A), dated January 16, 2024; and (ii) MNRE's Sanction for the Scheme Guidelines for implementation of 'SIGHT Programme - Component II: Incentive for Procurement of GH Production (under mode-2B)', dated January 16, 2024. **PA #3**: To ensure that the incentives scheme under SIGHT and bulk procurement benefit only green hydrogen projects, the Borrower, through the MNRE, has notified a GH standard that defines the eligibility criteria for consideration as green hydrogen, as evidenced by the Office Memorandum No. 353/35/2022-NT issued by the MNRE under the National Green Hydrogen Mission, dated August 18, 2023.			
PA #2: The Borrower, through the MNRE, has issued recommendations to the relevant ministries on the adoption of relevant regulations, standards, codes, best practices, and procedures related to safety aspects of: (a) GH production;		**Results Indicator #3:** Number of additional GH safety standards notified	0	10

Prior Actions		Results		
(b) GH safe storage and handling; and (c) GH utilization in the mobility sector.				
PA #3: The Borrower, through the Ministry of Power (MoP), has notified extension of the waiver of the ISTS charges towards consumption of RE for GH and its derivatives production for projects to be commissioned until December 31, 2030.				
Pillar 2: Scaling up renewable energy				
PA #4: The Borrower, through the MoP, has issued a government order on: (a) renewable purchase obligations (RPO); and (b) energy storage obligations that mandate the purchase of a minimum specified share of power consumption from RE and energy storage, respectively, for all electricity distribution utilities.	**PA #4**: To improve RE grid integration, the Borrower, through the Ministry of Power ("MoP") has notified the Electricity (Amendment) Rules, 2023 as evidenced by its publication in the Official Gazette (Gazette No. 377) dated May 29, 2023 and through the Central Electricity Regulatory Commission ("CERC") has notified the Indian Electricity Grid Code, as evidenced by its publication in the Official Gazette (Gazette No. 488) dated July 11, 2023.	**Results Indicator #4**: Share of RE in power consumption (percentage) **Results Indicator #5**: Share of solar/wind with/through energy storage in total power consumption (percentage)	25 0	33 2
PA #5: The Borrower: (a) through the CERC, has issued and notified the CERC (Ancillary Services) Regulations 2022, that provide a market-based mechanism to remunerate provision of energy storage services, and (b) through the MoP, has issued the guidelines on pumped storage hydropower.	**PA #5:** To reduce costs for battery energy storage systems and thereby promote integration of RE into the grid, the Borrower, through its Cabinet, has approved an incentive scheme for BESS, as evidenced by the Press Information Bureau's press release on the Cabinet's approval of the Scheme titled 'Viability Gap Funding for development of BESS', dated September 6, 2023.	**Results Indicator #6:** BESS installed (MWh)	0	1,000

Prior Actions		Results		
PA #6: The Borrower, through the MNRE, has issued an implementation regulation to guide the bidding of 50 GW of RE capacity, including solar photvoltaic, wind, and firm power from RE and energy storage, each year from FY23/24 to FY27/28.		**Result Indicator #7:** Renewable Energy capacity enabled (MW) (CRI) (additional bids issued) **Result Indicator #8:** GHG emissions avoided (million tons per annum)	0 0	75,000 50
PA #7: The Borrower: (a) through the MNRE, has adopted a strategy for competitive bidding for allocation of offshore wind sites; and (b) through the MoP, has extended the waiver of the ISTS charges toward offshore wind until December 31, 2032.		**Results Indicator #9:** Offshore wind sites awarded (equivalent power capacity)	0	4
PA #8: The Borrower, through the MNRE, has issued an updated policy to provide PLIs to high-efficiency solar PV to remove the supply chain bottlenecks and reduce the costs of solar PV.		**Results Indicator #10:** Capacity for domestic manufacturing of high-efficiency solar PV cells and modules added (GW)	0	48
Pillar 3: Enhancing finance for low-carbon energy investments				
PA #9: The Borrower: (a) through the Parliament, has approved amendments to the Energy Conservation Act, 2001 that provide the legal framework for the launch of a national carbon market; and (b) through the Ministry of Environment, Forest and Climate Change, has approved	**PA #6:** To facilitate tracking and trading of carbon credits, the Borrower, through the MoP, has notified the Carbon Credit Trading Scheme (CCTS), 2023 that sets forth the governance structure and functions of the CCTS, as evidenced by MOP's notification, published in the Official Gazette (Gazette No. 2702) dated June 28, 2023.	**Results Indicator #11:** Launch of a national carbon market	No carbon market exists	GHG emission intensity targets allocated and carbon trading operational

Prior Actions		Results		
GHG mitigation activities, including GH, green ammonia, RE with storage, and offshore wind to be eligible for international carbon market to mobilize international financing under the Paris Agreement.				
PA #10: The Borrower, through the SEBI, has issued amendments to the existing regulatory framework for green debt security issuance, to specify the taxonomy and definition of green debt securities to include the emerging areas of sustainable financing and improve the information disclosure standards.	**PA #7**: To promote green finance while preventing greenwashing, the Borrower, through SEBI, has issued a regulatory framework for Environment, Social and Governance (ESG) Disclosures, Ratings, and Investing, as evidenced by (i) SEBI Master Circular for ESG Rating Providers dated July 12, 2023; (ii) SEBI Circular on ESG Mutual Fund Schemes dated July 20, 2023 and (iii) SEBI (Credit Rating Agencies) (Amendment) Regulations 2023 published in the Official Gazette (Gazette No. 465) dated July 3, 2023.	**Result Indicator #12:** Cumulative additional issuance of onshore green debt securities (corresponding to 30 percent increase from INR 45.4 bn baseline) (INR billion)	0	13.6
PA #11: The Borrower, through the Ministry of Finance, has issued a transparent Sovereign Green Bond Framework for evaluating, selecting, and financing green public spending, including on GH, solar and wind energy, pursuant to which a separate reserve/corpus fund titled 'Sovereign Green Fund' has been created.		**Results Indicator #13:** Sovereign green bonds issued (cumulative) (US$ billion)	2.3	6.0

DETAILED RESULTS FRAMEWORK

RESULTS INDICATORS BY PILLAR

Baseline	Closing Period
Pillar 1: Promoting green hydrogen	
GH production capacity incentivized (Metric ton)	
May/2023	May/2026
0	450000
Domestic electrolyzer manufacturing capacity incentivized (Megawatt)	
May/2023	May/2026
0	1500
Additional GH safety standards notified (Number)	
May/2023	May/2026
0	10
Pillar 2: Scaling up renewable energy	
Share of RE in power consumption (Percentage)	
May/2023	May/2026
25	33
Share of solar/wind with/through energy storage in total power consumption (Percentage)	
May/2023	May/2026
0	2
BESS installed (Megawatt hour(MWh))	
May/2023	May/2026
0	1000
GHG emissions avoided (Tones/year)	
May/2023	May/2026
0	50,000,000
Capacity for domestic manufacturing of high-efficiency solar PV cells and modules added (Gigawatt)	
May/2023	May/2026
0	48
Offshore wind sites awarded (equivalent power capacity) (Gigawatt)	
May/2023	May/2026

0	4
Renewable energy capacity enabled (Megawatt) [CRI]	
May/2023	May/2026
0	75,000
Pillar 3: Enhancing finance for low-carbon energy investments	
Launch of a national carbon market (Yes/No)	
May/2023	May/2026
No carbon market exists	GHG emission intensity targets allocated and carbon trading operational
Cumulative additional issuance of onshore green debt securities (corresponding to 30 percent increase from INR 45.4 bn baseline) (INR billion) (Number)	
May/2023	May/2026
0	13.6
Sovereign green bonds issued (cumulative) (Amount(USD))	
May/2023	May/2026
2,300,000,000	6,000,000,000

ANNEX 2: FUND RELATIONS ANNEX

PRESS RELEASE NO. 23/458

IMF Executive Board Concludes 2023 Article IV Consultation with India

December 18, 2023

Washington, DC: The Executive Board of the International Monetary Fund (IMF) concluded the Article IV consultation [1] (file://data2/COM/COM/MR/Press%20Releases/2023/PR23458%20-%20India%20-.docx#_ftn1) with India.

India's economy showed robust growth over the past year. Headline inflation has, on average, moderated although it remains volatile. Employment has surpassed the pre pandemic level and, while the informal sector continues to dominate, formalization has progressed. The financial sector has been resilient—strongest in several years—and largely unaffected by global financial stress in early 2023. The current account deficit in FY2022/23 widened as the post-pandemic recovery of domestic demand and transitory external shocks outweighed the impact of robust services exports and proactive diversification of critical oil imports. While the budget deficit has eased, public debt remains elevated and fiscal buffers need to be rebuilt. Globally, India's 2023 G20 presidency has demonstrated the country's important role in advancing multilateral policy priorities.

Growth is expected to remain strong, supported by macroeconomic and financial stability. Real GDP is projected to grow at 6.3 percent in FY2023/24 and FY2024/25. Headline inflation is expected to gradually decline to the target although it remains volatile due to food price shocks. The current account deficit is expected to improve to 1.8 percent of GDP in FY2023/24 as a result of resilient services exports and, to a lesser extent, lower oil import costs. Going forward, the country's foundational digital public infrastructure and a strong government infrastructure program will continue to sustain growth. India has potential for even higher growth, with greater contributions from labor and human capital, if comprehensive reforms are implemented.

Risks to the outlook are balanced. A sharp global growth slowdown in the near term would affect India through trade and financial channels. Further global supply disruptions could cause recurrent commodity price volatility, increasing fiscal pressures for India. Domestically, weather shocks could reignite inflationary pressures and prompt further food export restrictions. On the upside, stronger than expected consumer demand and private investment would raise growth. Further liberalization of foreign investment could increase India's role in global value chains, boosting exports. Implementation of labor market reforms could raise employment and growth.

Executive Board Assessment[2] (file://data2/COM/COM/MR/Press%20Releases/2023/PR23458%20-%20India%20-.docx#_ftn2)

Executive Directors broadly agreed with the thrust of the staff appraisal. They commended the Indian authorities for their prudent macroeconomic policies and reforms that resulted in the economy's strong economic performance, resilience, and financial stability, while also facing continued global headwinds. Noting that India is one of the fastest growing economies globally, Directors called for continued appropriate policies to sustain economic stability and for further progress in key structural reforms to unleash India's significant potential.

Directors welcomed the authorities' near-term fiscal policy, which focuses on accelerating capital spending while tightening the fiscal stance. While acknowledging that India's debt composition helps mitigate debt sustainability risks, Directors recommended ambitious medium-term consolidation efforts given elevated public debt levels and contingent liability risks. In that context, improving

revenue mobilization and spending efficiency would allow for continued improvements in digital and physical infrastructure and targeted social support. Directors also encouraged the authorities to put in place a sound medium-term fiscal framework to promote transparency and accountability and align policies with India's development goals.

Directors commended the Reserve Bank of India's (RBI) proactive monetary policy actions and strong commitment to price stability. They agreed that the current neutral monetary policy stance, anchored on a data dependent approach, is appropriate and should gradually bring inflation back to target. Directors agreed that exchange rate flexibility should remain the first line of defense in absorbing external shocks, with foreign exchange interventions limited to addressing disorderly market conditions. Regarding staff's recent reclassification of India's de facto exchange rate regime for the period December 2022 to October 2023, many Directors noted the divergence of authorities' views with that of staff and encouraged continued staff engagement on this issue, with a few Directors encouraging staff and the authorities to resolve these differences. A few Directors explicitly supported the authorities' view that exchange rate stability reflects improvements in India's external position and that foreign exchange interventions have been used to avoid excessive volatility not warranted by fundamentals.

Directors welcomed that the financial sector remains stable and resilient, as reflected in sustained growth in bank credit, low levels of non-performing assets, and adequate capital and liquidity buffers. While acknowledging declining systemic financial risks, Directors broadly called for continued supervision and the use of prudential tools to preserve financial stability and manage emerging vulnerabilities, including rapid growth in unsecured personal loans. They advised further strengthening of regulatory and supervisory standards and encouraged public banks to continue building capital buffers.

Directors noted that continuing with comprehensive structural reforms can help further leverage India's favorable demographics and encouraged the authorities to promote job-rich, inclusive, and greener growth. They emphasized that improving labor market functioning, increasing female labor force participation, and making progress on health, education, land, and agricultural reforms remain critical to sustaining strong and inclusive growth. Directors also agreed that strengthening governance and the regulatory framework would foster transparency and safeguard public accountability further. Continued progress on designing and implementing climate policies is also critical to meet the authorities' net zero emissions target date.

Directors acknowledged the authorities' continued efforts to foster new bilateral trade agreements and India's strong leadership during the 2023 G20 Presidency. They broadly stressed that recent restrictive trade policies should be phased out and encouraged further liberalizing the FDI regime and improving the investment climate.

Table 1. India: Selected Social and Economic Indicators, 2019/20-2024/25 1/

	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25
				Est.		Projections
Growth (in percent)						
Real GDP (at market prices)	3.9	-5.8	9.1	7.2	6.3	6.3
Prices (percent change, period average)						
Consumer prices - Combined	4.8	6.2	5.5	6.7	5.4	4.6
Saving and investment (percent of GDP)						
Gross saving 2/	29.2	29.7	30.0	29.1	29.9	30.0
Gross investment 2/	30.1	28.8	31.2	31.0	31.7	31.9
Fiscal position (percent of GDP) 3/						

Central government overall balance	-4.8	-8.6	-6.8	-6.5	-6.0	-5.8
General government overall balance	-7.7	-12.9	-9.6	-9.2	-8.8	-8.5
General government debt 4/	75.0	88.5	83.8	81.0	82.0	82.4
Cyclically adjusted balance (% of potential GDP)	-7.6	-9.1	-8.7	-9.3	-8.8	-8.5
Cyclically adjusted primary balance (% of potential GDP)	-2.9	-3.8	-3.6	-4.1	-3.4	-2.8
Money and credit (y/y percent change, end-period)						
Broad money	8.9	12.2	8.8	9.0	10.8	7.8
Domestic Credit	8.3	9.5	9.0	13.1	12.9	9.8
Financial indicators (percent, end-period)						
91-day treasury bill yield (end-period)	4.2	3.3	3.8	6.9	...	...
10-year government bond yield (end-period)	6.1	6.2	6.8	7.3	...	...
Stock market (y/y percent change, end-period)	-23.8	68.0	18.3	0.7	...	...
External trade (on balance of payments basis)						
Merchandise exports (in billions of U.S. dollars)	320.4	296.3	429.2	456.1	436.1	460.6
(Annual percent change)	-5.0	-7.5	44.8	6.3	-4.4	5.6
Merchandise imports (in billions of U.S. dollars)	477.9	398.5	618.6	721.4	701.1	751.7
(Annual percent change)	-7.6	-16.6	55.3	16.6	-2.8	7.2
Terms of trade (G&S, annual percent change)	2.1	2.0	-8.1	-2.8	3.1	0.3
Balance of payments (in billions of U.S. dollars)						
Current account balance	-24.6	24.0	-38.7	-67.0	-65.5	-73.0
(In percent of GDP)	-0.9	0.9	-1.2	-2.0	-1.8	-1.8
Foreign direct investment, net ("-" signifies inflow)	-43.0	-44.0	-38.6	-28.0	-32.8	-44.4

Portfolio investment, net (equity and debt, "-" = inflow)	-1.4	-36.1	16.8	5.2	-30.6	-33.9
Overall balance ("+" signifies balance of payments surplus)	59.5	87.3	47.5	-9.1	40.8	54.7
External indicators						
Gross reserves (in billions of U.S. dollars, end-period)	477.8	577.0	607.3	578.4	619.2	673.9
(In months of next year's imports (goods and services))	11.1	9.0	8.1	7.8	7.7	7.9
External debt (in billions of U.S. dollars, end-period)	558.4	573.4	619.1	624.3	681.1	748.3
External debt (percent of GDP, end-period)	19.7	21.5	19.7	18.4	18.7	18.5
*Of which:*Short-term debt	8.3	9.5	8.5	8.1	8.1	8.1
Ratio of gross reserves to short-term debt (end-period)	2.0	2.3	2.3	2.1	2.1	2.1
Real effective exchange rate (annual avg. percent change)	3.1	-0.8	0.3	-0.4	...	...
Memorandum item (in percent of GDP)						
Fiscal balance under authorities' definition	-4.6	-9.2	-6.8	-6.4	-5.9	-5.6

Sources: Data provided by the Indian authorities; Haver Analytics; CEIC Data Company Ltd; Bloomberg L.P.; World Bank, World Development Indicators; and IMF staff estimates and projections.

1/ Data are for April–March fiscal years.

2/ Differs from official data, calculated with gross investment and current account. Gross investment includes errors and omissions.

3/ Divestment and license auction proceeds treated as below-the-line financing.

4/ Includes combined domestic liabilities of the center and the states, and external debt at year-end exchange rates.

[1] (file://data2/COM/COM/MR/Press%20Releases/2023/PR23458%20-%20India%20-.docx#_ftnref1) Under Article IV of the IMF's Articles of Agreement, the IMF holds bilateral discussions with members, usually every year. A staff team visits the country, collects economic and financial information, and discusses with officials the country's economic developments and policies. On return to headquarters, the staff prepares a report, which forms the basis for discussion by the Executive Board.

[2] (file://data2/COM/COM/MR/Press%20Releases/2023/PR23458%20-%20India%20-.docx#_ftnref2) At the conclusion of the discussion, the Managing Director, as Chairman of the Board, summarizes the views of Executive Directors, and this summary is transmitted to the country's authorities. An explanation of any qualifiers used in summing up can be found here: http://www.IMF.org/external/np/sec/misc/qualifiers.htm.

IMF Communications Department

MEDIA RELATIONS

ANNEX 3: LETTER OF DEVELOPMENT POLICY

अजय सेठ, भा. प्र. से.
सचिव
Ajay Seth, IAS
Secretary

आर्थिक कार्य विभाग
वित्त मंत्रालय
भारत सरकार
Department of Economic Affairs
Ministry of Finance
Government of India

D.O. No 13/2/2023-FB.V-Part(1)

5th June, 2024

Dear Mr. Banga,

I would like to thank you and the World Bank Group for support to the Government of India's green growth agenda. The proposed Development Policy Operation (DPO) will support India's drive to accelerate green hydrogen production and its uptake, scale-up renewable energy, and enhance finance for low-carbon energy investments.

2. This DPO is aligned with India's Nationally Determined Contributions (NDC) and Long-Term Low-Carbon Development Strategy. India has already taken steps in this respect including with actions to position itself at the forefront of the green hydrogen development, to simultaneously accelerate the transition to a greener model of economic growth, achieve energy security while following a low carbon development pathway. Since the launch of *the National Green Hydrogen Mission* (NGHM) in January 2023, a comprehensive policy framework has been developed to strengthen the green hydrogen ecosystem as well as to strengthen standards and procedures related to safety in GH production, storage, handling and utilization. Our low-carbon energy strategy has received direct and significant budgetary support.

3. This DPO in continuity with DPO1 supports the three major pillars of our low-carbon energy development strategy:

(i) The first pillar is to promote green hydrogen. The proposed operation supports effective implementation of the NGHM including through the roll out of incentive scheme for green hydrogen production to drive down costs and demand aggregation to boost domestic uptake. A first round of tenders was already completed and the response was very encouraging. We also issued guidelines to stimulate and aggregate domestic demand for green ammonia and green hydrogen to reduce emissions in domestic industries, and plan to launch follow-on tenders in 2024. In addition, the Government of India adopted a definition of what constitutes green hydrogen bringing our standards on par with those available globally. We are also working closely with the concerned ministries towards bringing potential industries/sectors under the folds of NGHM and committed to promoting commercial investments to ensure we meet the target of producing 5 million tons of GH annually by 2030.

(ii) The second pillar promotes renewable energy, which is vital for green hydrogen production as well as for meeting India's NDC target. The actions supported by this operation aim to address the critical issue of renewable energy grid integration and

Contd...

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energy storage, with the provision of significant incentives for battery energy storage systems.

(iii) The third pillar seeks to incentivize and unlock finance flows toward low-carbon energy investments. This operation effectively supports the Government's initiatives to operationalize a carbon market, strengthen the regulatory framework for Environment, Social and Governance Disclosures, and issue of sovereign green bonds.

4. The Government of India is fully committed to the agenda supported by this DPO series and implementing the required policies and reforms in a timely manner to maximize the impact of this DPO series. Further, I look forward to the World Bank Group's continued support to our efforts to achieve our ambitious climate and development targets.

With regards,

Yours sincerely,

(Ajay Seth)

Mr. Ajay Banga
President, World Bank Group
Washington DC
USA

ANNEX 4: ENVIRONMENT AND POVERTY/SOCIAL ANALYSIS TABLE

Prior Action	Significant positive or negative environmental effects	Significant poverty, social or distributional effects positive or negative
Pillar 1: Promoting green hydrogen		
PA #1: To increase the domestic production of GH and local manufacturing of electrolyzers, the Borrower, through the MNRE, has (i) notified the incentive schemes for GH production and electrolyzer manufacturing, which specify the detailed incentives and eligibility criteria for recipients, and outline the framework for bidder selection through a transparent and competitive process, and (ii) appointed SECI as the implementing agency to manage the incentive schemes, as evidenced by (i) MNRE's Sanction for the Scheme Guidelines for implementation of SIGHT Programme - Component I: Incentive Scheme for Electrolyzer Manufacturing, dated June 28, 2023; and (ii) MNRE's Sanction for the Scheme Guidelines for implementation of SIGHT Programme - Component I: Incentive Scheme for Green Hydrogen Production, dated June 28, 2023.	**Positive impact.** A positive impact on the environment is expected due to cross-sectoral actions and deployment of more efficient and cleaner technologies across the various sectors of the economy. Even if in the initial years, GH only replaces conventional energy use of the manufacturing of steel and fertilizers, this will reduce GHG emissions and improve (local) air quality (by replacing the need for conventional energy generation), reduce water pollution associated with thermal power plants, reduce solid waste generation (given replacement of conventional thermal energy which generates huge wastes such as fly ash) – all of which are substantially positive environmental gains. Along with PA#3 (Green Hydrogen Standard) this PA#1 will help the development of the sector in the best possible manner, minimizing risks to third parties and communities. **Country systems will be stretched to manage the potential adverse impacts from the large sector development plans.** The NGHM sets up an ambitious target of producing 5 million tons of green hydrogen (from 125 GW of RE and domestic manufacturing of electrolyzers). Given the huge scope of sector development, environmental impacts of each of the value chain segments could be substantial. While the relevant legislations and regulations are there to avoid location of such facilities within protected natural habitats and sensitive ecological settings, the indirect and cumulative impacts will need to be managed adequately. A part of the potential issues would be managed through a sector development strategy that includes promotion of GH Hubs. These hubs are	**Neutral to positive impacts on households**. With growth in the GH sector, workers and households could observe expanded employment opportunities in the sector and throughout the value chain, as well as spill-over effects on the local economy. **Potential Concerns**: India's experience with land acquisition for RE projects suggests that there are substantial downstream risks associated with both acquisition and involuntary resettlement. Further, GH production relies on the use of fresh water. While at an aggregate level, water requirements for electrolysis are expected to be at most around 0.05 percent of India's water supply, it will be important to plan facilities in areas which do not already suffer from water stress. Workers employed in the carbon economy could require assistance if faced with lay-offs and income losses during the transition, and skilling support so they can transition to green jobs.

Prior Action	Significant positive or negative environmental effects	Significant poverty, social or distributional effects positive or negative
	expected to be away from the ecologically sensitive areas (reserved forests, protected areas, significant wetlands). In the early phases of sector development, the production facilities are also likely to be set up close to the demand centers (ports, steel plants, fertilizer plants) to be sited within existing industrial/commercial areas. However, the capacity of the institutions involved in managing or facilitating decisions on siting and subsequent control of pollution is limited. Substantial capacity building will be required to minimize and/or manage impacts on natural resources and the environment. Once sector development starts, the relevant regulatory framework to manage such impacts will also need to be put in place. The Bank is either undertaking or has undertaken analyses to provide technical advice on: (i) choice of appropriate technology and locations to minimize environmental impacts of desalination of water that would especially be relevant for locating the GH hubs along the coast; and (ii) determination of most suitable locations for GH hubs to avoid or minimize ecological impacts – both of which will help the government to mitigate some of the E&S risks, and developing relevant capacity building actions to identify, monitor, and manage direct, indirect, and cumulative impacts from the larger sector development targeted by the PA.	
Prior Action #2: To increase the consumption of green hydrogen and ammonia in key demand sectors, the Borrower, through MNRE, has issued guidelines for transparent and competitive bidding process on the demand aggregation model, as evidenced by: (i) MNRE's Sanction for the Scheme Guidelines for implementation of SIGHT Programme- Component II:	**Positive impact.** Flowing from PA#1, a positive impact on the environment is expected due to deployment of more efficient and cleaner technologies in the manufacturing of steel and production of fertilizers, or similar other priority industrial users of conventional energy. The country systems are robust with respect to the steel, fertilizer and similar large industries which would transition to the use of GH; and specific licensing protocols are in	**Positive impact:** A key risk identified in DPO1 was that the high price of GH (at least in the short term), would prove to be a disincentive for industries like fertilizers to shift from grey hydrogen given that farmgate prices of fertilizers are regulated to serve poor farmers. However, the positive feedback received from the Department of Fertilizer is to shift to green ammonia, by providing additional incentives to cover the remaining cost difference

Prior Action	Significant positive or negative environmental effects	Significant poverty, social or distributional effects positive or negative
Incentive for Procurement of Green Ammonia Production (under mode-2A), dated January 16, 2024; and (ii) MNRE's Sanction for the Scheme Guidelines for implementation of 'SIGHT Programme - Component II: Incentive for Procurement of GH Production (under mode-2B)', dated January 16, 2024.	place for such industries (including mainly industries which are in operation and already complying with environmental regulations) to install facilities needed for receiving, distributing, and using GH.	between green and grey ammonia, and MNRE's stance of issuing guidelines for demand aggregation instead of issuing compulsory mandates for use of GH, which may have been distortionary, is expected to result in SOEs in the fertilizer sector to shift to greener alternatives. This will ultimately have beneficial impacts, both on the environment and the farmers, who will be able to shift to viable, greener, yet cheap fertilizers with no long-term harm to soil productivity.
Prior Action #3: To ensure that the incentives scheme under SIGHT and bulk procurement benefit only green hydrogen projects, the Borrower, through the MNRE, has notified a GH standard that defines the eligibility criteria for consideration as green hydrogen, as evidenced by the Office Memorandum No. 353/35/2022-NT issued by the MNRE under the National Green Hydrogen Mission, dated August 18, 2023.	**Positive impact**. Following from PA#1, the NGHM has now defined "green hydrogen", which makes it distinct from grey or other forms of hydrogen generation.	No foreseen adverse poverty and social impacts.
Pillar 2: Scaling Up Renewable Energy		
Prior Action #4: To improve RE grid integration, the Borrower, through the Ministry of Power ("MoP") has notified the Electricity (Amendment) Rules, 2023 as evidenced by its publication in the Official Gazette (Gazette No. 377) dated May 29, 2023 and through the Central Electricity Regulatory Commission ("CERC") has notified the Indian Electricity Grid Code, as evidenced by its publication in the Official Gazette (Gazette No. 488) dated July 11, 2023.	**Positive impact.** By mandating improved transmission from energy generated from RE sources, this PA will facilitate further generation of RE and replacement of conventional energy, thereby lowering environmental impacts when compared to generation, transmission and use of conventional energy when RE is not entirely integrated in the transmission grid, by reducing GHG emission, emission of fine particulate matters, photochemical ozone formation, and terrestrial acidification – all of which are beneficial from a climate change and air pollution perspective.	**No significant poverty or social impacts are expected.**

Prior Action	Significant positive or negative environmental effects	Significant poverty, social or distributional effects positive or negative
Prior Action #5: To reduce costs for battery energy storage systems and thereby promote integration of RE into the grid, the Borrower, through its Cabinet, has approved an incentive scheme for BESS, as evidenced by the Press Information Bureau's press release on the Cabinet's approval of the Scheme titled 'Viability Gap Funding for development of BESS', dated September 6, 2023.	**Positive impact.** By incentivizing energy storage, this PA will facilitate further generation of RE and replacement of conventional energy. Such expansion of RE replacing generation of conventional energy can significantly lower environmental impacts when compared to generation, transmission and use of conventional energy by reducing GHG emission, emission of fine particulate matters, photochemical ozone formation, and terrestrial acidification – all of which are beneficial from a climate change and air pollution perspective. **Country systems and institutional capacities will need to be strengthened.** The huge scope of energy storage infrastructure that is needed might create local environmental impacts based on location and size of each individual storage facility. Avoidance or minimization of such local impacts on forests, natural resources, biodiversity is currently covered under the applicable regulations. However, the regulatory framework and institutional capacities for minimizing or managing indirect and cumulative impacts on forests and biodiversity will need to be strengthened. The recent national Battery Waste Management Rules (2022) provides an initial regulatory framework for producers and other entities involved in collection, segregation, transportation, refurbishment, and recycling of waste battery. In the initial years, the end-of-life disposal volume will be managed through recycling and reuse. However, given the scale of potential BEES industry, eventually the need for disposal will exceed the capacity of the currently designated disposal sites; and there will be a need to expand the network of engineered disposal sites in the country. The Bank and the government will discuss potential TA to mitigate some of the E&S risks, for example, handling of disposal sites in the country for	**Positive poverty and social impacts.** BESS will result in additional employment opportunities. Positive health impacts are also expected from reduced local pollution. **Potential Concern**: The installation of BESS may carry land acquisition and involuntary resettlement risks. However BESS recycling rules issued by the GOI will help avoid waste, and reduce demand for new battery production, thereby lowering the risks of fresh land acquisition for new systems.

Prior Action	Significant positive or negative environmental effects	Significant poverty, social or distributional effects positive or negative
	the end-of-life disposal of solar panels given the potential large-scale development of solar PV.	
Pillar 3: Enhancing finance for low-carbon energy investments		
Prior Action #6: To facilitate tracking and trading of carbon credits, the Borrower, through the MoP, has notified the Carbon Credit Trading Scheme (CCTS), 2023 that sets forth the governance structure and functions of the CCTS, as evidenced by MOP's notification, published in the Official Gazette (Gazette No. 2702) dated June 28, 2023.	**Positive impact**. Between 2010 and June 2022, India issued 35.94 million carbon credits or nearly 17 percent of all voluntary carbon market credits issued globally.[28] The potential for market for carbon credits in India will continue to grow, given that global carbon market is also growing. India's own national carbon market (both voluntary and compliance), initiated through the CCTS Notification, 2023 is expected to facilitate significant financing for energy transition projects and emission reduction.	**Neutral poverty or social impacts**
Prior Action #7: To promote green finance while preventing greenwashing, the Borrower, through SEBI, has issued a regulatory framework for Environment, Social and Governance (ESG) Disclosures, Ratings, and Investing, as evidenced by (i) SEBI Master Circular for ESG Rating Providers dated July 12, 2023; (ii) SEBI Circular on ESG Mutual Fund Schemes dated July 20, 2023 and (iii) SEBI (Credit Rating Agencies) (Amendment) Regulations 2023 published in the Official Gazette (Gazette No. 465) dated July 3, 2023.	**Positive impacts.** Regulatory guidelines for ESG rating will eventually encourage private and institutional investment in such economic activities, infrastructure, and assets that, in addition to reduced GHG emissions, will also allow reduced pollution, enhanced energy and resource efficiency, and prevention of the loss of biodiversity and ecosystem services. This policy action will mitigate the residual risks of projects prone to greenwashing. An expanded framework to include circular economy projects will have long-lasting positive environmental impacts.	**Neutral poverty or social impacts**

[28] Economic Times, May 28, 2023

ANNEX 5: PARIS ALIGNMENT ASSESSMENT

<table>
<tr><td colspan="2">Program Development Objective: To accelerate the development of low-carbon energy in India.</td></tr>
<tr><td>Step 1: Is the operation consistent with India’s climate commitments, outlined in the country’s National Determined Contribution?</td><td>Yes. The following PAs support policy actions to:
(i) provide incentives for developing and attracting investment in RE resources with low lifecycle GHG emissions and enabling technologies (PAs 1, 2, 5);
(ii) establish or strengthen grid codes (PA 4);
(iii) define carbon market rules and regulations (PA 6);
(iv) foster market competition, transparency, and good governance practices (PAs 3, 7).</td></tr>
<tr><td colspan="2">Assessment of Mitigation Criteria (GHG emissions risks)</td></tr>
<tr><td colspan="2"><u>Pillar 1: Promoting green hydrogen</u>

Prior Action 1: To increase the domestic production of GH and local manufacturing of electrolyzers, the Borrower, through the MNRE, has (i) notified the incentive schemes for GH production and electrolyzer manufacturing, which specify the detailed incentives and eligibility criteria for recipients, and outline the framework for bidder selection through a transparent and competitive process, and (ii) appointed SECI as the implementing agency to manage the incentive schemes, as evidenced by (i) MNRE’s Sanction for the Scheme Guidelines for implementation of SIGHT Programme - Component I: Incentive Scheme for Electrolyzer Manufacturing, dated June 28, 2023; and (ii) MNRE’s Sanction for the Scheme Guidelines for implementation of SIGHT Programme - Component I: Incentive Scheme for Green Hydrogen Production, dated June 28, 2023.

Prior Action 2: To increase the consumption of green hydrogen and ammonia in key demand sectors, the Borrower, through MNRE, has issued guidelines for transparent and competitive bidding process on the demand aggregation model, as evidenced by: (i) MNRE’s Sanction for the Scheme Guidelines for implementation of SIGHT Programme- Component II: Incentive for Procurement of Green Ammonia Production (under mode-2A), dated January 16, 2024; and (ii) MNRE’s Sanction for the Scheme Guidelines for implementation of ‘SIGHT Programme - Component II: Incentive for Procurement of GH Production (under mode-2B)’, dated January 16, 2024.</td></tr>
<tr><td>Step M2.1: As the PAs likely to cause a significant increase in GHG emissions?</td><td>No. Both PAs support policies that promote green hydrogen, a technology with negligible GHG emissions.</td></tr>
<tr><td>Step M2.2: Are the PAs likely to introduce or reinforce significant and persistent barriers to transition to the country’s low-GHG emissions development pathways?</td><td>N/A</td></tr>
<tr><td>Step M3: Are the risks of the PAs introducing or reinforcing significant and persistent barriers being reduced to low after mitigation measures have been implemented?</td><td>N/A</td></tr>
<tr><td colspan="2">Conclusion for PAs 1 and 2: PAs 1 and 2 are not expected to pose material mitigation risks.</td></tr>
</table>

Prior Action 3: To ensure that the incentives scheme under SIGHT and bulk procurement benefit only green hydrogen projects, the Borrower, through the MNRE, has notified a GH standard that defines the eligibility criteria for consideration as green hydrogen, as evidenced by the Office Memorandum No. 353/35/2022-NT issued by the MNRE under the National Green Hydrogen Mission, dated August 18, 2023.	
Step M2.1: Is the Prior Action likely to cause a significant increase in GHG emissions?	PA 3 is promoting transparency and good governance practices for green investments and are unlikely to cause a significant increase in GHG emissions.
Step M2.2: Is the Prior Action likely to introduce or reinforce significant and persistent barriers to transition to the country's low-GHG emissions development pathways?	N/A
Step M3: Is the risk of the Prior Action introducing or reinforcing significant and persistent barriers being reduced to low after mitigation measures have been implemented?	N/A
Conclusion for Prior Action 3: Prior Action 3 is not expected to pose material mitigation risks.	
Pillar 2: Scaling up renewable energy **Prior Action 4**: To improve RE grid integration, the Borrower, through the Ministry of Power ("MoP") has notified the Electricity (Amendment) Rules, 2023 as evidenced by its publication in the Official Gazette (Gazette No. 377) dated May 29, 2023 and through the Central Electricity Regulatory Commission ("CERC") has notified the Indian Electricity Grid Code, as evidenced by its publication in the Official Gazette (Gazette No. 488) dated July 11, 2023.	
Step M2.1: Is the Prior Action likely to cause a significant increase in GHG emissions?	No. Policies to establish or strengthen grid codes pose insignificant mitigation risk. Further, improving RE grid integration will help to achieve the targets for generation and use of renewable power and to produce green hydrogen at lower costs, and consequently to curtail GHG emissions.
Step M2.2: Is the Prior Action likely to introduce or reinforce significant and persistent barriers to transition to the country's low-GHG emissions development pathways?	N/A
Step M3: Is the risk of the Prior Action introducing or reinforcing significant and persistent barriers being reduced to low after mitigation measures have been implemented?	N/A
Conclusion for Prior Action 4: PA 4 is not expected to pose material mitigation risks.	
Prior Action 5: To reduce costs for battery energy storage systems and thereby promote integration of RE into the grid, the Borrower, through its Cabinet, has approved an incentive scheme for BESS, as evidenced by the	

Press Information Bureau's press release on the Cabinet's approval of the Scheme titled 'Viability Gap Funding for development of BESS', dated September 6, 2023.	
Step M2.1: Is the Prior Action likely to cause a significant increase in GHG emissions?	No. Policies that provide incentives to invest in energy storage are unlikely to substantially increase GHG emissions. Further, investment in energy storage is considered is considered aligned as it promotes a higher RE penetration in long run.
Step M2.2: Is the Prior Action likely to introduce or reinforce significant and persistent barriers to transition to the country's low-GHG emissions development pathways?	M/A
Step M3: Is the risk of the Prior Action introducing or reinforcing significant and persistent barriers being reduced to low after mitigation measures have been implemented?	N/A.
Conclusion for Prior Action 5: PA 5 is not expected to pose material mitigation risks.	
Pillar 3: Enhancing finance for low-carbon energy investments. **Prior Action 6:** To facilitate tracking and trading of carbon credits, the Borrower, through the MoP, has notified the Carbon Credit Trading Scheme (CCTS), 2023 that sets forth the governance structure and functions of the CCTS, as evidenced by MOP's notification, published in the Official Gazette (Gazette No. 2702) dated June 28, 2023.	
Step M2.1: Is the Prior Action likely to cause a significant increase in GHG emissions?	No. The CCTS is designed to reduce GHG emissions by incentivizing low carbon technologies and practices.
Step M2.2: Is the Prior Action likely to introduce or reinforce significant and persistent barriers to transition to the country's low-GHG emissions development pathways?	N/A
Step M3: Is the risk of the Prior Action introducing or reinforcing significant and persistent barriers being reduced to low after mitigation measures have been implemented?	N/A
Conclusion for Prior Action 6: PA 6 is not expected to pose material mitigation risks.	
Pillar 3: Enhancing finance for low-carbon energy investments **Prior Action 7:** To promote green finance while preventing greenwashing, the Borrower, through SEBI, has issued a regulatory framework for Environment, Social and Governance (ESG) Disclosures, Ratings, and Investing, as evidenced by (i) SEBI Master Circular for ESG Rating Providers dated July 12, 2023; (ii) SEBI Circular	

on ESG Mutual Fund Schemes dated July 20, 2023 and (iii) SEBI (Credit Rating Agencies) (Amendment) Regulations 2023 published in the Official Gazette (Gazette No. 465) dated July 3, 2023.	
Step M2.1: Is the Prior Action likely to cause a significant increase in GHG emissions?	No. Policies that promote transparency, good governance practices for green investment are unlikely to cause a significant increase in GHG emissions.
Step M2.2: Is the Prior Action likely to introduce or reinforce significant and persistent barriers to transition to the country's low-GHG emissions development pathways?	N/A
Step M3: Is the risk of the Prior Action introducing or reinforcing significant and persistent barriers being reduced to low after mitigation measures have been implemented?	N/A
Conclusion for Prior Action 7: PA 7 is not expected to pose material mitigation risks.	
Assessment of Adaptation Criteria (physical climate risks)	
Pillar 1: Promoting green hydrogen **Prior Action 1:** To increase the domestic production of GH and local manufacturing of electrolyzers, the Borrower, through the MNRE, has (i) notified the incentive schemes for GH production and electrolyzer manufacturing, which specify the detailed incentives and eligibility criteria for recipients, and outline the framework for bidder selection through a transparent and competitive process, and (ii) appointed SECI as the implementing agency to manage the incentive schemes, as evidenced by (i) MNRE's Sanction for the Scheme Guidelines for implementation of SIGHT Programme - Component I: Incentive Scheme for Electrolyzer Manufacturing, dated June 28, 2023; and (ii) MNRE's Sanction for the Scheme Guidelines for implementation of SIGHT Programme - Component I: Incentive Scheme for Green Hydrogen Production, dated June 28, 2023. **Prior Action 2:** To increase the consumption of green hydrogen and ammonia in key demand sectors, the Borrower, through MNRE, has issued guidelines for transparent and competitive bidding process on the demand aggregation model, as evidenced by: (i) MNRE's Sanction for the Scheme Guidelines for implementation of SIGHT Programme- Component II: Incentive for Procurement of Green Ammonia Production (under mode-2A), dated January 16, 2024; and (ii) MNRE's Sanction for the Scheme Guidelines for implementation of 'SIGHT Programme - Component II: Incentive for Procurement of GH Production (under mode-2B)', dated January 16, 2024.	
Step A2: Are risks from climate hazards likely to have an adverse effect on the PAs' contribution to the development objective?	No. The risk that the PAs' contribution to the development objective would be adversely affected by climate hazards is low. No further action is required.
Step A3: Does the design of the PAs reduce the risk from climate hazards to an acceptable level, considering climate adaptation good practices applicable to the country context?	N/A

Conclusion for PAs 1 and 2: PAs 1 and 2 are not expected to pose material adaptation risks.	
Prior Action 3: To ensure that the incentives scheme under SIGHT and bulk procurement benefit only green hydrogen projects, the Borrower, through the MNRE, has notified a GH standard that defines the eligibility criteria for consideration as green hydrogen, as evidenced by the Office Memorandum No. 353/35/2022-NT issued by the MNRE under the National Green Hydrogen Mission, dated August 18, 2023.	
Step A2: Are risks from climate hazards likely to have an adverse effect on the Prior Action's contribution to the development objective?	No. The risk that the PA's contribution to the development objective would be adversely affected by climate hazards is low. No further action is required.
Step A3: Does the design of the Prior Action reduce the risk from climate hazards to an acceptable level, considering climate adaptation good practices applicable to the country context?	N/A
Conclusion for PAs 3: PA 3 is not expected to pose material adaptation risks.	
<u>Pillar 2: Scaling up renewable energy</u> **Prior Action 4**: To improve RE grid integration, the Borrower, through the Ministry of Power ("MoP") has notified the Electricity (Amendment) Rules, 2023 as evidenced by its publication in the Official Gazette (Gazette No. 377) dated May 29, 2023 and through the Central Electricity Regulatory Commission ("CERC") has notified the Indian Electricity Grid Code, as evidenced by its publication in the Official Gazette (Gazette No. 488) dated July 11, 2023.	
Step A2: Are risks from climate hazards likely to have an adverse effect on the Prior Action's contribution to the development objective?	No. The risk that the Prior Action's contribution to the development objective would be adversely affected by climate hazards is low. Policies to establish or strengthen grid codes pose insignificant adaptation risk. No further action is required.
Step A3: Does the design of the Prior Action reduce the risk from climate hazards to an acceptable level, considering climate adaptation good practices applicable to the country context?	N/A
Conclusion for Prior Action 4: PA 4 is not expected to pose material adaptation risks.	
Prior Action 5: To reduce costs for battery energy storage systems and thereby promote integration of RE into the grid, the Borrower, through its Cabinet, has approved an incentive scheme for BESS, as evidenced by the Press Information Bureau's press release on the Cabinet's approval of the Scheme titled 'Viability Gap Funding for development of BESS', dated September 6, 2023.	
Step A2: Are risks from climate hazards likely to have an adverse effect on the Prior Action's contribution to the development objective?	No. The risk that the PA's contribution to the development objective would be adversely affected by climate hazards is low. Policies that provide incentives to invest in energy storage involve insignificant adaptation risks. No further action is required.

Step A3: Does the design of the Prior Action reduce the risk from climate hazards to an acceptable level, considering climate adaptation good practices applicable to the country context?	N/A
Conclusion for Prior Action 5: PA 5 is not expected to pose material adaptation risks.	
Pillar 3: Enhancing finance for low-carbon energy investments **Prior Action 6:** To facilitate tracking and trading of carbon credits, the Borrower, through the MoP, has notified the Carbon Credit Trading Scheme (CCTS), 2023 that sets forth the governance structure and functions of the CCTS, as evidenced by MOP's notification, published in the Official Gazette (Gazette No. 2702) dated June 28, 2023.	
Step A2: Are risks from climate hazards likely to have an adverse effect on the Prior Action's contribution to the development objective?	No. The risk that the Prior Action's contribution to the development objective would be adversely affected by climate hazards is low. Establishing a carbon market involves insignificant adaptation risks. No further action is required.
Step A3: Does the design of the Prior Action reduce the risk from climate hazards to an acceptable level, considering climate adaptation good practices applicable to the country context?	N/A
Conclusion for Prior Action 6: PA 6 is not expected to pose material adaptation risks.	
Pillar 3: Enhancing finance for low-carbon energy investments **Prior Action 7:** To promote green finance while preventing greenwashing, the Borrower, through SEBI, has issued a regulatory framework for Environment, Social and Governance (ESG) Disclosures, Ratings, and Investing, as evidenced by (i) SEBI Master Circular for ESG Rating Providers dated July 12, 2023; (ii) SEBI Circular on ESG Mutual Fund Schemes dated July 20, 2023 and (iii) SEBI (Credit Rating Agencies) (Amendment) Regulations 2023 published in the Official Gazette (Gazette No. 465) dated July 3, 2023.	
Step A2: Are risks from climate hazards likely to have an adverse effect on the Prior Action's contribution to the development objective?	No. Establishing competitive and transparent market practices involves insignificant adaptation risks. Moreover, the corporate green bond program regulated under the ESG guidelines explicitly supports activities targeting climate change adaptation, pollution prevention and control, and sustainable water management. As a result, climate hazards are unlikely to impact the Prior Action's contribution to the development objective. No further action is required.
Step A3: Does the design of the Prior Action reduce the risk from climate hazards to an acceptable level, considering climate adaptation good practices applicable to the country context?	N/A

Conclusion for Prior Action 7: PA 7 is not expected to pose material adaptation risks.

Conclusion for the Mitigation and Adaptation Criteria Assessment:

No Prior Action is expected to lead to an increase in GHG emission, to reduce carbon sinks or be significantly impacted by current or future physical climate risk.

The country is vulnerable to climate hazards such as extreme temperatures, floods, precipitations, rising sea levels that can impact the green energy investment financed by the green bonds. However, India has robust legislative and policy frameworks, and operational procedures which support all phases in the disaster risk management cycle, from preparedness to mitigation, response, and recovery. In this respect, the India's 2005 Disaster Risk Management Act mandates both central and state governments with a wide range of disaster management functions under the coordination of the National Disaster Risk Management Authority.

As no Prior Action poses material mitigation or adaptation risks, they are considered aligned. There is no need for a more detailed assessment.

The operation is aligned with the mitigation and adaption goals of the Paris Agreement.