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INTERNATIONAL BANK FOR RECONSTRUCTION AND DEVELOPMENT AND
INTERNATIONAL DEVELOPMENT ASSOCIATION

PROGRAM DOCUMENT FOR

A PROPOSED DEVELOPMENT POLICY LOAN

IN THE AMOUNT OF US$1,443,430,000

AND

A PROPOSED NON-CONCESSIONAL CREDIT
IN THE AMOUNT OF US$56,570,000 TO

INDIA

FOR THE

First Low-Carbon Energy Programmatic Development Policy Operation

June 2, 2023

Energy & Extractives Global Practice
Macroeconomics, Trade and Investment Global Practice
South Asia Region

Public Disclosure Authorized

GOVERNMENT FISCAL YEAR

April 1 – March 31

CURRENCY EQUIVALENTS

(Exchange Rate Effective as of June 5, 2023)

Currency Unit

US$ 1.00 = INR 82.87

ABBREVIATIONS AND ACRONYMS

ADB	Asian Development Bank	INR	Indian Rupee
BAU	Business As Usual	IBRD	International Bank for Reconstruction and Development
BEE	Bureau of Energy Efficiency	IDA	International Development Association
BESS	Battery Energy Storage System	ISTS	Inter-State Transmission System
CEA	Central Electricity Authority	kW	Kilowatt
CCS	Carbon Capture and Storage	kWh	Kilowatt-hour
CCTS	Carbon Credit Trading Scheme	MNRE	Ministry of New and Renewable Energy
CERC	Central Electricity Regulatory Commission	MoEFCC	Ministry of Environment, Forestry, and Climate Change
CO2e	Carbon dioxide equivalent	MoF	Ministry of Finance
Discoms	Distribution companies	MoP	Ministry of Power
DPO	Development Policy Operation	MSME	Micro, Small, and Medium Enterprise
EE	Energy Efficiency	NDC	Nationally Determined Contribution
EIB	European Investment Bank	NGHM	National Green Hydrogen Mission
ESG	Environment, Social and Governance	PA	Prior Action
ESO	Energy Storage Obligations	PAT	Perform, Achieve, and Trade
EU	European Union	PDO	Project Development Objective
FDI	Foreign Direct Investments	PLI	Production-Linked Incentive
FY	Fiscal Year	PSIA	Poverty and Social Impact Assessment
GDP	Gross Domestic Product	PSH	Pumped Storage Hydropower
GDS	Green Debt Security	PV	Photovoltaic
GH	Green Hydrogen	RBI	Reserve Bank of India
GHG	Greenhouse Gas	RE	Renewable Energy
GoI	Government of India	RPO	Renewable Purchase Obligation
GRS	Grievance Redress Service	SEBI	Securities and Exchange Board of India
GW	Gigawatt	SECI	Solar Energy Corporation of India Limited
GWh	Gigawatt-hour	TA	Technical Assistance
H4D	Hydrogen-for-Development	VRE	Variable Renewable Energy
IFC	International Finance Corporation	WB	World Bank
IMF	International Monetary Fund	WBG	World Bank Group

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INDIA
FIRST LOW-CARBON ENERGY PROGRAMMATIC DEVELOPMENT POLICY OPERATION
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SUMMARY OF PROPOSED FINANCING AND PROGRAM

BASIC INFORMATION

Project ID	Programmatic	If programmatic, position in series
P181032	Yes	1st 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)

SUMMARY

Total Financing	**1,500.00**

DETAILS

International Bank for Reconstruction and Development (IBRD)	1,443.43
International Development Association (IDA)	56.57
IDA Credit	56.57

INSTITUTIONAL DATA

Climate Change and Disaster Screening

This operation has been screened for short and long-term climate change and disaster risks

Overall Risk Rating

Substantial

Results

Indicator Name	Baseline (2023)	Target (2026)
Pillar 1: Promoting green hydrogen		
Green hydrogen production capacity incentivized (million tons)	0	3
Domestic electrolyzer manufacturing capacity incentivized (gigawatt, GW)	0	3
Number of additional green hydrogen safety standards notified	0	10
Pillar 2: Scaling up renewable energy		
Share of renewable energy in power consumption (percentage)	25	33
Share of solar/wind with/through energy storage in total power consumption (percentage)	0	2
Additional bids for renewable energy capacity issued (GW)	0	75
Greenhouse gas emissions avoided (million tons per annum)	0	40
Off-shore wind sites awarded (equivalent to power capacity GW)	0	4
Capacity for domestic manufacturing of high-efficiency solar photovoltaic cells and modules added (GW)	0	48
Pillar 3: Enhancing climate finance for low-carbon energy investment		
Launch of a national carbon market	No carbon market exists	GHG Emission Intensity Targets allocated and carbon trading operational
Increase in issuance of cumulative onshore green debt securities (percentage)	0	30
Sovereign green bonds issued (cumulative, US$ billion)	2.3	6.0

IBRD PROGRAM DOCUMENT FOR A PROPOSED LOAN TO INDIA

1. INTRODUCTION AND COUNTRY CONTEXT

1.1. SUMMARY OF PROPOSED FINANCING AND PROGRAM

1. **This US$1.5 billion program will be the first operation in a series of two Development Policy Operations (DPOs), supporting India's low-carbon energy development.** The Program Development Objective (PDO) is to accelerate the development of low-carbon energy in India. The operation consists of three pillars: (a) promoting green hydrogen (GH); (b) scaling up renewable energy (RE); and (c) enhancing climate finance for low-carbon energy investments. Pillar 1 aims to strengthen the enabling policies and regulations for GH to reduce costs and increase market demand to facilitate the decarbonization of the hard-to-abate industrial sectors. Since GH needs additional RE power supply, Pillar 2 aims to scale up RE penetration in India, reduce RE costs, improve RE grid integration to contribute to the decarbonization of the power sector in line with India's Long-Term Low-Carbon Development Strategy. To meet the large investment needs of GH and RE and to increase green financing, Pillar 3 aims to support the launch of India's carbon market and to enable private sector investments in low-carbon energy. These three pillars are inter-linked: the proposed operation aims to promote GH in India under Pillar 1, scale up additional RE to produce GH and green the power mix under Pillar 2, and ensure sufficient climate financing to meet the large investment needs of GH and RE under Pillar 3.

1.2. COUNTRY AND SECTORAL CONTEXT

2. **India's economy has been one of the fastest growing major economies in recent years and is poised to continue on this path, with low emissions per capita at only one third of the global average.** However, the development efforts and aspirations of the people for a better quality of life necessitates industrialization and allied activities which will add to these emissions. Energy demand is expected to grow rapidly in the future. At the moment, India relies on coal to meet much of its energy demand. Coal meets 45 percent of India's primary energy demand, followed by 25 percent from petroleum, 20 percent from traditional biomass, 6 percent from natural gas, 3 percent from RE (including hydro)[1] and 1 percent from nuclear. Energy-consuming sectors (power, industry, transport, and buildings) contribute to three quarters of the annual GHG emission of 2.7 gigatons carbon dioxide equivalent (CO2e) in India.[2] In the power sector, coal represents about 50 percent of the 405 GW of the country's installed power capacity and 75 percent of the total power generation of 1,570 terawatt hours, while RE has grown quickly to represent 40 percent of the installed capacity but about 20 percent of the power generation. Accelerating the development of low-carbon energy that will eventually allow the phase down of fossil fuels is, therefore, essential to bend the greenhouse gas (GHG) emission curve, which is important for not only India but also the world.

3. **India will play a key role in reaching global climate change targets, and the Government of India (GoI) has made strong commitments to low-carbon long-term development and has already taken significant steps in this regard.** The GoI has announced a long-term goal of achieving net zero emissions by 2070, and short-term targets by 2030 under the Nationally Determined Contributions (NDCs): (a) 50 percent of power capacity from non-fossil fuels; (b) a reduction of carbon intensity by 45 percent from 2005 to 2030; and (c) the creation of an additional cumulative carbon sink of 2.5 to 3 billion tons of CO2e through additional forest and tree cover.

[1] https://www.iea.org/countries/india
[2] The World Bank 2022

4. **While there are uncertainties over energy modeling over a 50-year timeframe, the future trend is clear: the industrial sector will be the main driver of future growth in energy demand and GHG emissions**. Internal World Bank analysis on decarbonization pathways for India to achieve net zero by 2070 show that the final energy demand is expected to double from now to 2070 to fuel an economy with an expected 11-fold increase in GDP (Gross Domestic Product) over the same period. Economic growth can be decoupled from energy and emissions growth largely through improved energy efficiency (EE) and switching from fossil fuels to low-carbon energy.

5. **Achieving net zero by 2070 would require: (a) electrifying the end-user sectors (particularly the transport and building sectors); (b) greening the power sector with RE; and (c) bringing the hard-to-abate industrial sectors onto a low-carbon path with GH and carbon capture and storage (CCS).** To green the power sector, RE—solar, wind, hydropower (both domestic and imported from neighboring countries)—will need to become mainstream power supply sources. Improving RE grid integration, particularly energy storage—both pumped storage hydropower (PSH) and battery energy storage systems (BESS)—would become increasingly important. Unlike most developed countries that are transitioning from coal to natural gas as an intermediate step, and then to renewables, India is developing policies to move from coal to low-carbon energy directly, given its limited natural gas resources. While this poses considerable challenges, it could potentially have an important demonstration effect for other countries on a similar decarbonization path. As per World Bank analysis, to bring the fast-growing industrial sector onto a low-carbon path, GH and CCS are essential—GH primarily for fertilizer and methanol production, refinery, iron and steel, and chemical industries, and CCS primarily for cement industries.

6. **The GoI's low-carbon energy strategy is to accelerate RE development to meet fast-growing energy demand, while eventually allowing the "phase-down" of fossil fuels.** India's energy consumption per capita is only one-third of the global average, but energy demand is expected to grow rapidly in the future. The GoI has implemented a number of EE policies, including the successful Perform, Achieve, and Trade scheme to improve EE. It has also implemented a series of RE policies that has led to a paradigm shift toward RE in the power sector, with annual additions of renewable capacity having outpaced those from coal power since 2017. Measures to mitigate the social and environmental impacts of coal phase down will be needed. India is the second largest coal producer and consumer in the world. The coal mining sector significantly contributes to employment—with at least three million people directly or indirectly involved in the sector[3]—and the coal industry supports economic activity in various states across India. The Indian coal sector is currently undertaking significant coal mine closures and consolidation. Coal India Limited, which owns and operates 80 percent of the coal mines and production in India, has closed 50 mines from 2018 to 2022.[4] On the coal demand side, the annual new coal power capacity additions have fallen sharply from 19 GW in 2015 to 6 GW in 2021; over the past two decades, 14 GW of coal power capacity has been retired.[5]

7. **Despite the unprecedented growth of RE, some challenges remain.** First, even though the GoI has undertaken several rounds of reforms over the past decades, most of the public distribution companies (Discoms) that purchase RE are financially stressed, with US$6.5 billion in yearly debt accumulation.[6] Second, given the large share of variable RE (VRE) and coal power plants in the power mix, measures to support RE grid integration are becoming increasingly important. Finally, further scale-up of RE requires reducing costs and removing supply chain constraints. India has experienced dramatic reductions in solar photovoltaic (PV) costs over the past decade, from about US¢ 22/kilowatt-hour (kWh) to about US¢ 3/kWh. However, the costs

[3] https://india.mongabay.com/2021/07/about-40-percent-of-indias-districts-have-some-form-of-coal-dependency/
[4] Coal India Limited Annual Reports (https://www.coalindia.in/performance/financial/)
[5] CEA, 2022
[6] https://www.pfcapps.com/PFC_INTERFACE/AnnualRating/11th_Integrated_Rating.pdf

of PV have again been rising in India over the past year, and further cost reduction in RE is needed, especially when considering RE as an input to GH production. GoI has adopted a policy of a 40 percent basic customs duty on imported solar PV[7] to incentivize domestic manufacturing of solar PV.

8. **India needs GH to bring the hard-to-abate industrial sectors onto a low-carbon path and achieve its net zero target. The country wants to build upon global momentum in the development of a GH industry to build jobs, increase energy security, and meet its net zero commitments**. The GoI announced the National Green Hydrogen Mission (NGHM) in January 2023, with a total budget of US$2.4 billion to bridge the viability cost gap and promote public and private investments in GH. According to a World Bank internal analysis, in order to meet India's net zero target, GH would need to meet about 30 percent of final energy demand by 2070 and would have the single largest contribution (about one-third) to emission reductions between the net zero target scenario and the baseline scenario. India also imports 85 percent of oil and would become mostly energy independent with RE and GH under the net zero scenario. The important role that GH is likely to play is accepted globally, not just in India. All the major economies in the world have already enacted public policies to develop their GH industries. For example, the US government has committed US$25 billion to incentivize GH under the Inflation Reduction Act (2022), while the European Union has committed €34 billion[8] and launched the Hydrogen Bank in March 2023.[9]

9. **As an emerging technology, GH has not yet reached commercial viability and faces several barriers,** including technology uncertainties, high cost of GH production, high cost of storage and transportation infrastructure and logistics, limited domestic market demand due to high costs, safety, and other environmental and social concerns**.** Reducing GH costs will largely rely upon reducing the cost of RE and electrolyzers. As of now, RE costs account for about 60 percent of the total GH costs, while electrolyzer costs make up the remaining balance. Based on the cost curves for electrolyzers over the past two decades, it would require US$25 billion investment globally to bring down the cost of electrolyzers from the current US$700/kilowatt (kW) to US$400/kW[10].

10. **The World Bank has been deeply engaged in GH in India over the past two years through a series of analytical studies and technical assistance (TA) that have provided inputs to the National Green Hydrogen Roadmap, the NGHM, and the analytical underpinning for this proposed operation.** World Bank analytical studies note that the first step of GH utilization is to replace existing grey hydrogen produced from natural gas in the fertilizer and refinery sectors. Each sector accounts for about half of the current 6 million tons of grey hydrogen production annually in India. The viability gap between green and grey hydrogen is narrowing—the cost of grey hydrogen is now US$3.5/kg due to the high natural gas prices in India, compared to US$4-5/kg for green hydrogen, and expected to reach cost parity around 2030. World Bank analysis further notes that GH can also play an important role in reducing emissions in the iron and steel industries and with adequate con pricing could reach cost parity with coking coal-based steel production around 2028 or around 2032 without carbon pricing. In addition, the World Bank's analytical work also identified the policy and regulatory constraints and mitigation measures for GH adoption in these sectors, mapped out demand and supply centers to identify GH hubs, and developed a roadmap for GH adoption by selected states. World Bank analytical work also shows the importance of addressing the issue of additionality so that GH production and power generation are not competing for RE.

[7] https://ieefa.org/resources/how-import-restrictions-modules-will-push-solar-energy-tariffs-india
[8] https://single-market-economy.ec.europa.eu/industry/strategy/hydrogen/funding-guide/eu-programmes-funds_en
[9] https://energy.ec.europa.eu/news/commission-outlines-european-hydrogen-bank-boost-renewable-hydrogen-2023-03-16_en
[10] Glenk et al (2022).

11. **The proposed operation is aligned with the World Bank's current global engagement on GH.** The World Bank launched a global Hydrogen-for-Development initiative (H4D) at the 27th Conference of the Parties to the United Nations Framework Conventions on Climate Change, which aims to provide global knowledge, TA, and financing for GH in the developing world. H4D aims to bring together the partner countries to enable capacity building, exchange knowledge on regulatory solutions, business models and technologies, to allow adoption of GH. The World Bank is supporting GH financing in Chile, Romania, Turkiye, and Morocco, and is providing TA in Tunisia, Kenya, Brazil, Uzbekistan, Colombia, and Costa Rica.

12. **This proposed operation is complemented by the World Bank's support to the GoI's broader energy transition program**. At the request of the GoI, the World Bank has been providing significant technical and financing support for:

- Scaling up RE and its supporting infrastructure, particularly supporting ongoing projects for solar PV (solar parks, roof-top solar, and floating solar), and operations under preparation for battery storage and transformative e-mobility, RE hybrid, and offshore wind;
- Reforming the electricity distribution sector by supporting reforms for Discoms at both state and national levels, through past and ongoing projects, and an operation under preparation;
- Improving demand side energy efficiency, particularly supporting private and public-sector Energy Service Companies;
- Decarbonizing the hard-to-abate industrial and transport sectors through potential support for GH, e-mobility, and bio-gas market development; and
- Mitigating the impact of energy transition and coal phase down: Based on global experience, early preparation is key to ensure that energy transition is just and fair for all stakeholders. The World Bank is involved in discussions with the Ministry of Power (MoP) and Ministry of Coal to identify potential projects to create economic opportunities for workers and communities as India implements its energy transition through coal phase down in regions that may be impacted.

2. MACROECONOMIC POLICY FRAMEWORK

2.1. RECENT ECONOMIC DEVELOPMENTS

13. **The Indian economy was one of the fastest growing major economies in 2021 and 2022.** Real GDP grew at 9.1 percent in FY21-22, after contracting the previous fiscal year. Despite challenging global conditions such as surging inflation, tightening monetary policy, and massive outflows of portfolio capital from Emerging Market Economies (EMEs), real GDP is estimated to have grown at 6.9 percent in FY22-23. Growth in private consumption offset a contraction in government consumption caused by fiscal consolidation and the gradual withdrawal of pandemic-related stimulus. Investment growth remained robust on the back of the government's capital expenditure push, expanding by 13 percent year-on-year in the first three quarters of FY22-23. The central government's capital expenditure[11] (excluding loans) grew by 18 percent year-on-year, with much of this spending going to building infrastructure such as roads, ports, and railways. Investment activity strengthened in the fourth quarter of FY22-23 as evidenced by robust growth of nearly 10 percent y-o-y in the capital goods sub-index of the Index of Industrial Production and around 12 percent growth in capital goods imports.

[11] In this section, "central government" refers to the federal government and general government refers to combined federal and state-level governments.

14. **Headline inflation has recently declined but core inflation has remained persistent.** After averaging 6.7 percent year-on-year in FY22-23, headline inflation eased to an 18-month low of 4.7 percent in April 2023, below the upper bound of the tolerance range of the Central Bank (the Reserve Bank of India, RBI), which is 2-6 percent. However, core inflation has remained above 5 percent for more than two years now and averaged 6.1 percent year-on-year in FY22-23. The persistent underlying inflationary pressures have primarily been driven by demand for services and elevated input prices.

15. **The RBI remains focused on managing inflation, but monetary policy rate hikes have paused.** The RBI has hiked the policy interest rate six times since May 2022, raising the repo rate by 250 basis points cumulatively to reduce inflationary pressures and keep inflation expectations anchored. At the April 2023 Monetary Policy Committee meeting the RBI paused further hikes in the policy interest rate as price pressures eased and the effects of previous hikes begin to take effect.

16. **Financial sector vulnerabilities have declined, and credit growth has been strong.** The performance of banks, particularly public sector banks, has improved significantly with the gross Non-Performing Asset ratio for all banks declining to a seven-year low of 5 percent (6.5 percent for public sector banks) in September 2022 from over 9 percent in March 2021. The RBI's latest Financial Stability Report shows that banks are well-capitalized and capable of absorbing macroeconomic shocks under adverse stress situations. Nonetheless, there are some challenges on the horizon—distress persists among the micro, small, and medium enterprises (MSMEs) that availed credit under the emergency credit lending guarantee scheme that was introduced during the pandemic. One-sixth of these loans have turned delinquent;[12] however, their share in total assets is relatively small, at less than 3 percent of total outstanding credit from commercial banks.

17. **The current account deficit narrowed in the second half of the year as commodity prices eased and service exports expanded.** The current account deficit narrowed to 2.2 percent of GDP in the third quarter of FY22-23 from 3.3 percent in the first half of the year on the back of easing global commodity prices and robust growth in services exports. While merchandise imports have continued to increase on the back of resilient domestic demand, merchandise export growth has softened due to slower global growth. Nonetheless, service exports have remained strong. The current account deficit is estimated to be 3.0 percent of GDP for the whole of FY22-23.

18. **India's external position remained strong despite a small decline in international reserves.** India's US$578 billion foreign exchange reserves provide an adequate buffer against external shocks. The current account deficit is partly financed by stable Foreign Direct Investment (FDI) flows—around 1.0 percent of GDP in the first half of FY22-23. Heightened global uncertainty and a narrowing interest rate differential with the US precipitated large net portfolio capital outflows—amounting to 0.2 percent of GDP—between April 2022 and January 2023, but these have reversed over recent months. From their peak of US$640 billion in August 2021, foreign exchange reserves fell by more than US$100 billion by October 2022 and have partially recovered since then (to US$578 billion by March 2023). India's total external debt (public and private) is moderate at around 19.4 percent of GDP, and rollover risks are limited.

19. **The general government fiscal deficit and public debt-to-GDP ratio are estimated to have declined in FY22-23.** The general government deficit is estimated to have declined to 9.4 percent of GDP in FY22-23 from a peak of 13.3 percent in FY20-21. Public debt is estimated to have declined to 83 percent of GDP in FY22-23 from 87.5 percent in FY20-21. The fiscal consolidation was led by strong revenue growth, particularly in goods and services tax revenues, and a withdrawal of most pandemic-related stimulus measures, which

[12] RBI Financial Stability Report December 2022

has led to a reduction of current spending as a share of GDP. Fiscal consolidation was moderated by a sharp increase in public investment aimed at supporting growth and crowding in private investment.

2.2. MACROECONOMIC OUTLOOK AND DEBT SUSTAINABILITY

20. **India's real GDP growth is expected to be marginally lower in FY23-24 compared to the previous year, showing resilience to the expected slowdown in global growth.** Real GDP growth is projected to moderate to 6.3 percent in FY23-24, from 6.9 percent in FY22-23. Domestic demand is expected to moderate amid rising borrowing costs and heightened global growth uncertainty. The income prospects of low-income groups remain subdued due to the impact of the pandemic and elevated food and fuel prices weighing on their consumer spending. Government consumption as a share of GDP is expected to decline with continued reduction in current spending as a share of GDP. Domestic conditions are conducive for private investment growth as improved balance sheets of firms and banks will buoy investment despite elevated input costs and reduced risk appetite. Investment will also be supported by the GoI's push to increase capital spending. Net exports will also be less of a drag on growth due to strong service export growth and a gradual decline in the import bill on account of moderating domestic consumption growth. On the supply-side, contact-intensive services are expected to recover to pre-pandemic levels and strong growth momentum in construction will boost industrial growth. Beyond FY23-24, growth is projected to gradually increase to 6.5 percent as global conditions improve.

21. **Headline inflation is projected to stay below the 6 percent upper bound of the Central Bank's prudential window in FY23-24.** Moderating global oil prices and easing input costs will contain inflationary pressure. Core inflation is expected to decline gradually as the effects of monetary policy tightening start to take hold from mid-FY23-24. While easing global oil prices will push transportation costs down, inflation in services is expected to ease with moderating domestic demand. The RBI is likely to maintain its policy stance and continue with the withdrawal of accommodation to anchor inflation expectations.

22. **The current account deficit is expected to narrow in FY23-24 and continue to be adequately financed by stable investment flows.** From 3 percent of GDP in FY22-23 the current-account deficit will narrow to 2.1 percent in FY23-24. While soft global growth will weigh on merchandise exports, the merchandise import bill will decline faster due to easing commodity prices and moderating domestic demand. Information technologies and professional services exports are likely to remain robust despite the global slowdown due to their essential nature and an increased impetus to offshoring. Portfolio capital flows will stabilize on the back of India's relatively strong macroeconomic fundamentals compared with other emerging market economies. FDI inflows will also be buoyant, driven by structural reforms and crowding-in effects of infrastructure investment. Overall, the current account deficit will be adequately financed by foreign capital flows and external borrowing; and India's external position will continue to be supported by substantial foreign exchange reserves which provide seven months of import cover.[13]

23. **The FY23-24 Union Budget affirms the central government's commitment to continued and gradual fiscal consolidation and reorientating public spending toward higher capital spending.** The FY23-24 budget projects further consolidation in the central government fiscal deficit to 5.9 percent of GDP, from 6.5 percent in FY22-23. The share of capital spending is projected to increase from 14 percent of total spending to about 19 percent. The budget deficit and debt repayments will largely be financed through domestic bond issuances. The central government has projected gross market borrowing of over US$200 billion and borrowing from other domestic sources such as the National Small Savings Fund and State Provident Funds, of about US$66 billion. Despite the increase in domestic market borrowings over the last three years, yields

[13] World Bank staff estimate based on projected imports of goods and services in FY23-24.

on government securities have not increased significantly. Bond issuances are typically either fully subscribed or purchased by primary dealers at the cutoff yield. In addition, the central government has budgeted for gross external borrowing of US$10.4 billion, of which US$6.6 billion would be from IFIs. In net terms, the Union budget envisages net borrowing of 5.8 percent of GDP from domestic sources compared with 6.3 percent in FY22-23 and stable net borrowing of about 0.1 percent from external sources.

24. **On aggregate, the fiscal situation for states has improved but some states are vulnerable to fiscal risks, particularly from the power distribution sector.** All states taken together have experienced an improvement in their fiscal outlook with the combined fiscal deficit projected to decline from 4.1 percent in FY20-21 to about 3 percent in FY23-24, and the public debt-to-GDP ratio projected to decline from 31.1 percent in FY21 to around 27 percent in FY23-24. However, the public debt level is more than 40 percent of state GDP in some states such as Punjab, Andhra Pradesh, Kerala, and Himachal Pradesh and this will require stronger fiscal consolidation efforts to keep their debt trajectory on a sustainable path. Some states have significant levels of contingent liabilities and off-budget borrowing,[14] a large share of which are due to the power distribution companies (Discoms). The central government introduced the Revamped Distribution Sector Scheme in 2021 to reduce losses and improve the financial performance of Discoms. Aggregate technical and commercial (AT&C) losses fell from 21.5 percent in FY20-21 to 16.5 percent in FY21-22, states increased subsidy disbursement and the Discoms' financial deficit[15] basis nearly halved, leading to a slower pace of debt addition. The central government controls the annual borrowing limit for states and has recently made efforts to identify off-budget borrowing at the state-level and adjust the states' borrowing limits to reflect public debt levels more accurately. In FY23-24's Union Budget, the GoI lowered the borrowing limit for states to 3.5 percent of GDP, out of which 0.5 percent is conditional on the adoption of power sector reforms by the states.

25. **The general government deficit is projected to narrow over the next three years.** The general government deficit is projected at 8.7 percent of GDP in FY23-24, down from 9.4 percent in FY22-23. The consolidation will be driven by robust revenue growth in both direct and indirect taxes and lower current spending, mainly attributable to a withdrawal of COVID-19 related food subsidy entitlements and lower fertilizer and fuel subsidies. The general government fiscal deficit is projected to narrow to 8.2 percent of GDP by FY25-26. The deficit will continue to be financed largely through domestic bond issuances.

26. **The public debt-to-GDP ratio is high but stable and on a sustainable path in the medium term. However, it remains subject to risks from macroeconomic and global uncertainties and contingent liabilities.** Under the baseline scenario, the debt-to-GDP ratio stabilizes around 83-84 percent over the next three years, and debt dynamics remain favorable in the medium term. In a combined macro-fiscal shock scenario, the debt to GDP ratio would increase sharply to nearly 96 percent.[16] Contingent liabilities, aside from the explicit guarantees extended by central and state governments,[17] have also increased substantially over the past two years as the central government announced credit guarantee programs amounting to over 4.5 percent of GDP to support vulnerable sectors like MSMEs. The combined debt of the power distribution sector has also increased rapidly, to about 2.2 percent of GDP at the end of FY21-22 and state governments have in the past assumed a share of these liabilities to improve the financial position of highly indebted Discoms. Debt sustainability risks are mitigated by the structure of India's public debt since it is: (a) mostly

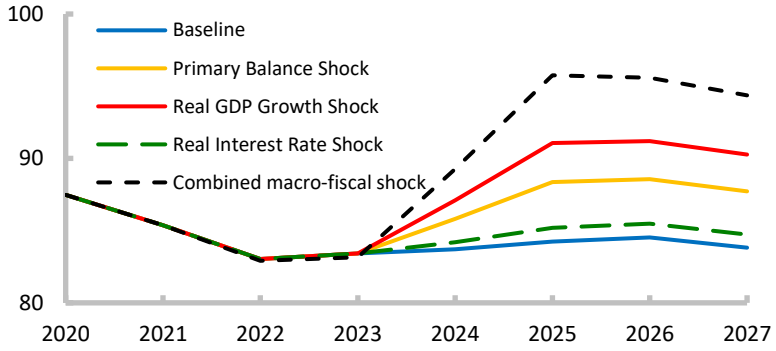
[14] Off-budget borrowing are loans taken by state-owned enterprises or state agencies but fully serviced by the state government.
[15] Cash-adjusted gap between expenditure and income. 11th Annual Integrated Rating and Ranking of Power Distribution Utilities.
[16] The baseline scenario assumes growth in line with World Bank staff forecasts, as shown in Table 1. The alternate scenarios assume changes in macroeconomic variables as shown in Figure 1.
[17] Explicit guarantees given by the central and state governments are estimated to be around 4.5-5 percent of GDP. Data limitations do not allow for quantifying the total size of explicit and implicit contingent liabilities in India.

domestic (only around 3 percent of public debt is external); (b) almost entirely held by residents; and (c) of medium—or long-term maturity—according to the International Monetary Fund (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. At the end of 2022, less than 30 percent of central government debt securities were maturing within five years. The composition of debt is unlikely to change significantly over the projection period and the bulk of the financing needs will be met by domestic market issuances of medium- and long-term debt. In the long term, both fiscal discipline and structural reforms that lift India's growth potential are needed to meaningfully reduce debt as a share of GDP.

27. **India faces a high debt servicing cost, but the central government is making a concerted effort to reduce debt servicing costs and free up resources for spending on public investments.** The general government debt servicing burden has risen over the last three years to about 5.4 percent of GDP (compared with 3.3 percent for major emerging market economies). As part of the debt management strategy, the central government has been trying to reduce the cost of borrowing by switching or buying back securities and lengthening the maturities of new issuances. Interest rates offered on one of the main sources of financing—savings instruments under the National Small Savings Fund (which is administered by the central government)—have been reduced and aligned with market rates. The central government has increased budgetary support for public sector enterprises such as the National Highways Authority of India and the Indian Railways, to increase public investment in infrastructure and take advantage of the central government's lower borrowing cost. This will also contribute to reducing debt servicing costs for the public sector.

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

(General government debt-to-GDP ratio, percent)



Source: World Bank projections.

Note: The combined macro-fiscal shock is the combined impact of the real-GDP growth shock (a decline of 4 percentage points in FY23-24 and FY24-25), fiscal shock (a 1.9 percentage point increase in FY23-24 and FY24-25) and interest rate shock (an increase by 2 percentage points throughout the forecast period).

28. **India's macroeconomic policy framework is considered adequate for Development Policy Financing.** Despite the deteriorating global outlook, the Indian economy remains resilient and is projected to be one of the fastest growing major economies in FY23-24. The outlook for domestic activity has been clouded by weakening external demand, but the risks are mitigated by strong economic fundamentals and a robust policy framework. Global uncertainty and consequent risks have also heightened due to recent financial sector turmoil in the US and Europe. However, they are unlikely to markedly impact the outlook for India. First, the financial sector turmoil seems to have been adequately addressed by the financial authorities in the US and Europe. Second, India's financial sector is well-capitalized and asset quality has improved. At the macro level, India's monetary policy framework has been strengthened and, although India is not immune to external financial developments, high reserve levels, a floating exchange rate and limited external

financing needs provide adequate buffers. In support of recovery, the central government has used existing fiscal space prudently, accompanied by structural reforms. Public debt remains sustainable (and relatively resilient to different shocks) despite the large increase of public debt in FY20-21 in response to the pandemic.

Table 1. India: Selected Economic Indicators FY16/17–FY25/26

Key Macroeconomic Indicators	FY16/17	FY17/18	FY18/19	FY19/20	FY20/21	FY21/22	FY22/23	FY23/24	FY24/25	FY25/26
	Actual	Actual	Actual	Actual	Actual	Actual	Estimate	Forecast	Forecast	Forecast
Real Economy	(Annual percentage change unless otherwise Indicated)									
Nominal GDP (local currency)	11.8	11.0	10.6	6.4	-1.4	18.4	16.1	11.2	10.8	10.0
Real GDP	8.3	6.8	6.5	3.9	-5.8	9.1	6.9	6.3	6.4	6.5
Contributions to growth (percentage points)										
Consumption	5.2	4.7	4.7	3.3	-3.1	7.1	5.0	4.0	3.9	3.8
Investment	2.6	2.4	3.5	0.4	-2.3	4.6	3.3	3.1	2.5	2.4
Net exports	0.1	-2.8	0.3	-0.5	1.4	0.9	-1.9	-0.9	0.0	0.2
CPI average	4.5	3.6	3.4	4.8	6.2	5.5	6.7	5.2	4.7	4.1
Fiscal accounts (General government)	(Percent of GDP)									
Overall balance	-6.9	-5.8	-5.8	-7.2	-13.3	-10.5	-9.4	-8.7	-8.5	-8.2
Total Liabilities	68.8	69.8	68.6	73.6	87.5	85.4	83.0	83.4	83.7	84.2
Selected monetary accounts	(Annual percentage change unless otherwise indicated)									
Interest rate (Repo rate and period average)	6.4	6.1	6.3	5.4	4.0	4.0	5.6	5.5	5.0	5.0
Balance of payments	(Percent of GDP, unless otherwise indicated)									
Current account balance	-0.6	-1.8	-2.1	-0.9	0.9	-1.2	-3.0	-2.1	-1.1	-0.8
Imports	21.3	22.1	23.8	21.4	19.3	24.3	25.4	25.7	25.1	24.3
Exports	19.4	19.0	20.2	18.8	18.8	21.7	21.2	21.8	21.8	21.4
Foreign direct investment (net)	1.6	1.1	1.1	1.5	1.6	1.2	1.2	1.6	1.6	1.6
Gross reserves (in US$ billion, end of period)	370.0	424.5	412.9	477.8	576.9	607.3	578.4	603.8	645.8	705.9
In months of next year's imports	7.6	7.9	8.2	11.1	9.0	8.4	7.1	6.9	6.9	--
External debt	20.0	20.1	19.9	20.9	21.2	19.9	—	—	--	--
Other memo items										
Nominal GDP in Rs. (trillions)	153.9	170.9	189.0	201.0	198.3	234.7	272.6	303.0	335.8	369.5

Source: India National Statistics Office, Reserve Bank of India, and Staff calculations.

Table 2. India: Selected Fiscal Indicators FY16–FY25

Key Fiscal Indicators	FY17/18	FY18/19	FY19/20	FY20/21	FY21/22	FY22/23	FY23/24	FY24/25	FY25/26
(Percent of GDP)	Actual	Actual	Actual	Actual	Actual	Estimate	Forecast	Forecast	Forecast
Central government									
Overall balance	-3.5	-3.4	-4.6	-9.2	-6.8	-6.5	-5.9	-5.5	-5.2
Primary balance	−0.4	−0.4	-1.6	-5.7	-3.3	-3.0	-2.3	-2.0	-1.6
Total Receipts	*13.0*	*12.8*	*12.0*	*11.6*	*13.3*	*12.5*	*12.4*	*12.5*	*12.5*
Tax revenues, *in which*	11.2	11.0	10.0	10.2	11.5	11.2	11.1	11.2	11.2
Taxes on goods and services	*4.1*	*4.3*	*4.2*	*4.7*	*4.6*	*4.3*	*4.3*	*4.4*	*4.4*
Taxes on income and profits	*5.8*	*6.0*	*5.2*	*4.8*	*6.0*	*6.0*	*6.0*	*6.0*	*6.0*
Non-tax revenues	1.1	1.2	1.6	1.0	1.5	1.0	1.0	1.1	1.1
Expenditures	*16.5*	*16.2*	*16.6*	*20.7*	*20.0*	*18.9*	*18.3*	*18.0*	*17.8*
Current expenditures, *in which*	15.0	14.7	14.9	18.6	17.5	16.2	15.0	14.8	14.8
Interest payments	3.1	3.1	3.0	3.4	3.4	3.5	3.6	3.5	3.6
Others (salaries, supplies)	7.9	7.5	8.7	12.3	10.2	9.2	8.0	7.9	7.8
Tax transfers to states	4.0	4.0	3.2	3.0	3.9	3.5	3.4	3.4	3.4

Key Fiscal Indicators	FY17/18	FY18/19	FY19/20	FY20/21	FY21/22	FY22/23	FY23/24	FY24/25	FY25/26
(Percent of GDP)	Actual	Actual	Actual	Actual	Actual	Estimate	Forecast	Forecast	Forecast
Capital expenditures	1.5	1.6	1.7	2.1	2.5	2.7	3.3	3.2	3.0
Central government Financing	3.5	3.4	4.6	9.2	6.8	6.5	5.9	5.5	5.2
External (net)	0.0	0.0	0.0	0.4	0.1	0.2	0.1	0.1	0.1
Domestic (net)	3.5	3.4	4.6	8.8	6.7	6.3	5.8	5.4	5.1
State governments									
Overall balance	-2.4	-2.5	-2.6	-4.1	-3.7	-2.9	-2.8	-3.0	-3.0
Revenues	13.8	14.1	13.6	13.2	14.3	15.0	15.1	15.0	15.0
Expenditures and net lending	16.2	16.6	16.2	17.3	18.0	17.9	17.9	18.0	18.0
Total Liabilities									
General government	69.8	68.6	73.6	87.5	85.4	83.0	83.4	83.7	84.2

Source: India National Statistics Office, Ministry of Finance, Reserve Bank of India and Staff calculations.

Table 3. India: BOP and external financing requirements

External financing requirements	FY17/18	FY18/19	FY19/20	FY20/21	FY21/22	FY22/23	FY23/24	FY24/25	FY25/26
	Actual	Actual	Actual	Actual	Actual	Estimate	Forecast	Forecast	Forecast
(In percent of GDP)									
1. Financing Requirements (i-ii)	1.8	2.1	0.9	-0.9	1.2	3.0	2.1	1.1	0.8
i. Current Account Deficit*	1.8	2.1	0.9	-0.9	1.2	3.0	2.1	1.1	0.8
ii. Net Errors and Omissions	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2. Financing Sources (i+ii)	1.8	2.1	0.9	0.8	-0.9	1.2	3.0	2.1	1.1
i. Capital Account Balance (a+b+c)	3.4	2.0	2.9	2.9	2.4	2.7	2.0	2.9	2.2
a. Net Foreign Direct Investment	1.1	1.1	1.5	1.5	1.6	1.2	1.2	1.6	1.6
b. Net Portfolio Investment	0.8	-0.1	0.0	0.0	1.4	-0.5	-0.2	0.2	0.2
c. Net All Other Flows**	1.5	1.0	1.4	1.4	-0.6	2.0	1.0	1.1	0.4
ii. Change in reserve assets (1-2.i)	-1.6	0.1	-2.1	-2.1	-3.3	-1.5	1.0	-0.8	-1.1
3. External Financing Gap (1-2)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Source: Reserve Bank of India and 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

29. **The IMF does not have an active lending program in India.** However, it carries out macroeconomic supervision and Article IV consultations annually. The World Bank and IMF teams regularly exchange views and information. The most recent 2022 Article IV consultation report was completed on December 23, 2022. It commended the Indian authorities for responding to commodity price increases and elevated inflation with fiscal policy measures to support vulnerable groups and front-load monetary policy tightening. While acknowledging that world-class public digital infrastructure is facilitating innovation, productivity improvements and access to services, the report calls for further structural reforms, including to address the adverse impact of climate change to secure strong and sustainable growth. Since the finalization of the last Article IV Staff report, the IMF has lowered the growth forecast for FY23-24 from 6.1 percent to 5.9 percent, and from 6.8 percent to 6.3 percent for FY24-25. The overall staff appraisal of the last Article IV remains valid.

3. GOVERNMENT PROGRAM

3.1 THE GOVERNMENT'S RENEWABLE ENERGY MISSIONS AND POWER MARKET REFORMS

30. **The GoI has adopted a series of RE policies to mobilize significant private sector investments in RE,** which have led to exponential growth of the RE market over the past decade. Such RE policies include: (a) fiscal incentives that have brought down solar PV costs; (b) a waiver of inter-state transmission system (ISTS) charges for RE power generators; (c) support for large-scale grid-connected Solar Parks; (d) renewable purchase obligations (RPOs) for distribution utilities; (e) must-run status for RE power plants to ensure grid integration; (f) production-linked incentives (PLIs) for solar cells and modules; (g) the KUSUM scheme to promote solar pumps in rural areas; (h) development of offshore wind; (i) UJALA scheme to promote efficient use of energy at the residential level through facilitating higher uptake of LED lights; and, (j) incentives to adopt electric and hybrid vehicles through FAME Scheme - I & II (Faster Adoption and Manufacturing of Electric and Hybrid Vehicles) in India.

31. **With increasing share of RE in the power system, the GoI has also adopted a series of policies to improve RE grid integration including promoting the National Battery Storage and Transformative e-Mobility Mission, expanding transmission networks, and increasing power generation flexibility**. In FY23, the GoI's budget provided viability gap funding for 4 GWh (or 1 GW capacity) BESS that will boost the RE deployment pace in India. In December 2022, the Central Electricity Authority (CEA) issued a comprehensive Transmission Plan for integration of the targeted 500 GW of RE into the grids by 2030.[18] In February 2023, the CEA issued a regulation to promote flexible operation of thermal power plants that reduce the minimum power levels of thermal power plants from 55 percent of rated capacity to 40 percent, under certain provisions, to increase the flexibility and reduce coal consumption of coal power plants.[19]

32. **Deepening the power market reforms has also aided the RE grid integration**. The power market was expanded to include a real-time market in June 2020, a green-day ahead market in August 2020 and a green-term ahead market in October 2021. These market developments aim to encourage RE participation in the power markets, improve RE grid integration, and provide transparency on prices of RE.

3.2 THE GOVERNMENT'S NATIONAL GREEN HYDROGEN MISSION (NGHM)

33. **The NGHM[20] will support three objectives: (i) creating demand through pilot projects and policies; (ii) providing incentives for domestic production of electrolyzers and GH; and (iii) building an enabling ecosystem to scale up GH markets.** The first phase (FY24-26) of the NGHM will focus on creating demand while enabling adequate supply by increasing the domestic electrolyzer manufacturing capacity. The first phase will also lay the foundation for future energy transitions in other hard-to-abate sectors by creating the required Research and Development impetus. The second phase (FY26-30) will continue to provide incentives for domestic manufacturing of electrolyzers and GH production, and to leverage large-scale commercial investments. The incentive program will span the period up to 2030.

34. **The NGHM will also support the implementation of a series of key policy initiatives to create market demand for GH and reduce RE costs:** (i) demand side interventions; (ii) RE consumption in GH production under RPO; (iii) waiver of ISTS charges to reduce RE costs; and (iv) GH demand aggregation. Promoting GH involves multiple ministries and stakeholders, and the NGHM has set up a governance structure to coordinate various stakeholders and implement the NGHM. This governance structure will be

[18] CEA's Transmission System for Integration of over 500 GW RE Capacity by 2030 (https://cea.nic.in/wp-content/uploads/notification/2022/12/CEA_Tx_Plan_for_500GW_Non_fossil_capacity_by_2030.pdf)
[19] CEA's regulation on Flexible Operation of Coal based Thermal Power Generating Units issued on January 25, 2023 (https://cea.nic.in/wp-content/uploads/regulations_cpt/2023/01/Gazette_Flexible_operation.pdf)
[20] National Green Hydrogen Mission approved on January 4, 2023 (https://mnre.gov.in/img/documents/uploads/file_f-1673581748609.pdf)

overseen by an Empowered Group and chaired by the Cabinet Secretary. The Ministry of New and Renewable Energy (MNRE) will be the nodal agency responsible for managing the Secretariat activities and coordinating with all the relevant ministries and departments which are instrumental in executing the NGHM.

35. **By 2030, the NGHM is expected to result in**: (a) producing 5 million tons of GH annually; (b) catalyzing 125 GW of additional RE; (c) leveraging US$100 billion of private investments; (d) creating more than 600,000 new jobs; and (e) avoiding 50 million tons of annual GHG emissions.

3.3 FINANCING RE AND GH

36. **The GoI has allocated public resources and put in place enabling policies to stimulate private sector investments in RE and GH:** (i) US$560 million in Tranche I and US$2.4 billion in Tranche II as PLI for solar PV; (ii) US$2.3 billion as PLI for BESS and a budget for viability gap funding for 4 GWh (or 1 GW capacity); (iii) US$2.4 billion including incentives for GH. The GoI has also adopted a framework for the issuance of sovereign green bonds and created a separate reserve/corpus fund titled Sovereign Green Fund in the public account of India to provide complete transparency in terms of use of sovereign green bonds proceeds for financing green projects. In addition, India plans to launch a carbon market to accelerate and enhance the energy transition. Securities and Exchange Board of India (SEBI) has been periodically issuing circulars for Green Debt Securities to strengthen the disclosure requirements for issuance and listing of green debt securities. Strengthened governance of green debt securities will help stimulate private sector investments.

4. PROPOSED OPERATION

4.1. LINK TO GOVERNMENT PROGRAM AND OPERATION DESCRIPTION

37. **The PDO of the proposed DPO is to accelerate the development of low-carbon energy in India.** The operation supports the GoI's reform program in three pillars: (i) promoting GH; (ii) scaling up RE; and (iii) enhancing climate finance for low-carbon energy investments. These three pillars are interlinked: the proposed operation aims to promote GH in India under Pillar 1, scale up additional RE to produce GH and green the power mix under Pillar 2, and ensure sufficient climate financing to meet the large investment needs of GH and RE under Pillar 3.

38. **The GoI requested a multi-billion programmatic DPO to support low-carbon energy transition; this operation is the first of a series of two DPOs**. While India has made good progress on low-carbon energy, it still needs to take deeper reform measures to increase the production and use of RE and GH, especially in the hard-to-abate sectors. These policy actions will have a transformational impact on the transition to a low-carbon economy in India.

39. **Scaling up low-carbon energy will take time. A series of two DPO operations and follow-on engagements, TA, and possible operations beyond the DPO series will allow the World Bank to have a longer-term engagement with the GoI to continue supporting more ambitious policy actions and investments to accelerate low-carbon energy.** Based on NGHM, the GoI plans to issue, within one year from the issuance of NGHM, concrete implementation policies and regulations to reduce technology costs and increase market demand for GH. Between DPO-1 and DPO-2, the World Bank will continue supporting ongoing policy dialogue, analytical work, and TA, to provide inputs to the GoI's low-carbon energy transition agenda and ambitious policy actions under DPO-2. Beyond the DPO series, the World Bank will remain engaged through policy dialogue, analytical work, TA, and possible follow-on operations to support India's low-carbon energy agenda.

4.2. PRIOR ACTIONS, RESULTS AND ANALYTICAL UNDERPINNINGS

Pillar 1: Promoting green hydrogen

40. **This pillar aims to strengthen the enabling policies and regulations for GH to reduce costs and increase market demand to mobilize significant private sector investments.** The World Bank has been working closely with IFC on the overall operation including the linked analytical activities as well as on the enabling policy actions to unlock private sector investments.

Prior Action (PA) #1: The Borrower, through its Union Cabinet, has approved the NGHM,[21] which will facilitate demand and includes incentives for electrolyzer manufacturing, and GH production. *[Achieved]*

41. **The NGHM aims to bridge the viability cost gap of green hydrogen, reduce costs, create market demand, and mobilize significant private sector investments**. The NGHM, approved by the Union Cabinet, promotes GH technology by promoting pilot GH projects in priority sectors such as refineries, fertilizer production, iron and steel, long-haul trucking, and shipping industries; supporting research and development; promoting competitive procurement by aggregating demand; and providing viability gap funding for electrolyzer manufacturing and GH production. These are important policy measures required to create market demand for green hydrogen, push fossil fuel alternatives, bring down the costs of green hydrogen, and establish India as a leading GH production hub in the world. To create demand and lower the off-taker risks, MNRE will frame model guidelines for transparent competitive bidding for procurement of GH and its derivatives and develop a suitable regulatory framework for certification of GH and its derivatives as having been produced from RE.

Trigger #1: The Borrower shall: (i) notify the incentive schemes for GH production and electrolyzer manufacturing, which define the detailed incentives, specify the eligibility criteria for recipients, and outline the framework for selection through a transparent and competitive process, and (ii) appoint the implementing agency(ies) which will manage the incentive schemes. *[On track]*

42. **This detailed implementation regulation for the GH incentive scheme is a key policy measure to reduce GH technology costs, ensure successful commencement and implementation of the NGHM, and enable significant private sector investments**. Such schemes will define levels and form incentives for both, pilot GH projects on the demand side as well as for electrolyzers and GH manufacturing on the supply side, specify the eligibility criteria for the recipients, outline the framework for competitive and transparent selection of the recipients, and appoint the implementing agency which will manage the incentive scheme. The MNRE is finalizing these schemes, which are expected to be issued in the second half of 2023.

Trigger #2: The Borrower shall select certain sectors and promote the use of green hydrogen/its derivatives in these sectors. *[On track]*

43. **The GoI would promote use of GH and its derivatives in selected industries**, for example, the fertilizers and refinery industries, to substitute grey hydrogen and particularly imported grey ammonia with green hydrogen and ammonia for new investments. During market consultations, a lack of domestic market demand was considered as one of the key barriers to increase GH market in India. In 2021, India imported urea, di-ammonium phosphate, and ammonia for a total import value of US$6 billion. As the cost of GH decreases, it may become viable to replace imported ammonia in fertilizers industry and other potential user

[21] National Green Hydrogen Mission approved on January 4, 2023 (https://mnre.gov.in/img/documents/uploads/file_f-1673581748609.pdf)

industries. A stakeholder consensus is required from the relevant industrial ministries and departments to boost the utilization of GH domestically.

Trigger #3: The Borrower, through the MNRE, shall issue a guideline for transparent and competitive bidding for bulk procurement of GH and its derivatives. *[On track]*

44. **This important regulation aims to lower the off-taker and demand risks and reduce technology costs through economies of scale to enable private sector investments in GH.** The biggest risks to private sector investments in GH and its derivatives (such as green ammonia) are demand and off-take. Unless demand is assured, investments in GH production will remain small. The aggregation of demand of GH and its derivatives will provide a clear certainty of the demand and off-take to the GH producers, allow for economies of scale, optimize production and associated transportation facilities and, most importantly, attract private sector investments to the sector. The MNRE plans to issue the demand aggregation regulation in the next few months; hence, this trigger is on track. Further, the World Bank Group and the Global Green Growth Institute are working together to develop an aggregator model and other financing mechanisms to bridge the gap between the cost of the grey and green hydrogen.

Trigger #4: The Borrower shall notify a GH standard that defines the eligibility criteria for consideration as "green" hydrogen. *[On track]*

45. **This important regulation is critical to define eligible "green" hydrogen under the NGHM.** The MNRE is finalizing GH standards that define what RE sources are eligible for GH, and the achievement of 125 GW additional RE capacity will be needed. This will be another key policy to ensure the successful implementation of the NGHM, as the GH projects must meet the GH standards to be eligible for GoI incentives. The MNRE has developed draft GH standards which are under consultation and finalization. It is expected that the GH standards will be issued in the second half of 2023.

46. **Expected Results:** (a) GH production capacity incentivized (million tons); and (b) domestic electrolyzer manufacturing capacity incentivized (GW). The GoI plans to approve incentives for domestic manufacturing of electrolyzers of 3 GW and GH production of 3 million tons by 2026, accounting for half of the current 6 million tons of grey hydrogen production and 60 percent of the NGHM's target of 5 million tons of GH production by 2030. This would lead to an investment of US$54 billion.[22]

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; (b) GH safe storage and handling; and (c) GH utilization in the mobility sector. [*Achieved***]**

47. **These GH safety standards aim to reduce the biggest environmental and human risks to ensure safe production, transportation, and utilization of green hydrogen**. Since hydrogen is a flammable gas, the MNRE, in consultation with industry and relevant stakeholders, has developed a series of safety standards and regulation frameworks for GH production; GH transportation and storage; and GH utilization in the mobility sector. On May 8, 2023, the MNRE issued a notification on these regulation frameworks that include a long list of GH safety standards to be issued, priorities, methodology to adapt international GH safety standards to India wherever applicable, and draft Indian GH standards to other relevant ministries such as the Petroleum and Explosive Safety Organization, Ministry of Petroleum and Natural Gas, Ministry of Road, Transport and Highways, and the Bureau of Indian Standards. These ministries will undertake the respective

[22] This is estimated based on the assumption that producing 3 million tons of GH would require 60 GW of RE investments at $600/kW and 30 GW of electrolyzers investments (of which 3 GW would be domestically manufactured) at $600/kW.

public consultation and approve and issue these safety standards. This is expected to happen by the end of the calendar year.

48. **Expected Result**: Number of additional GH safety standards notified.

PA #3: The Borrower, through the 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. *[Achieved]*

49. **Extending the waiver of ISTS charges RE power supply to produce GH from the current 2025 to 2030 will be instrumental in reducing GH costs by 60 Indian Rupees (INR)/kg (US$0.75/kg) and enabling private sector investments.** In August 2020, MoP waived the ISTS charges and losses on all solar and wind projects commissioned before June 30, 2023. Subsequently, in June 2021, the MoP announced an extension of the waiver up to June 30, 2025. Further, on February 17, 2022, the MoP notified that GH and green ammonia plants, commissioned up to July 30, 2025, would also receive ISTS charge waivers for the first eight years of their operation. On April 5, 2023, the MNRE issued an amendment to the MoP's notification of February 17, 2022: GH and green ammonia plants commissioned up to December 31, 2030, will receive the ISTS waiver for 25 years. The sources of RE include solar, wind, hydro including PSH and BESS, and any hybrid combination of these technologies. Since production of 1 kg of GH requires 55-60 kWh of RE and ISTS charges are usually around INR 1-2/kWh depending on the location, a waiver of the ISTS charges would reduce delivered costs of RE by INR 1/kWh, which in turn would reduce the costs of GH by INR 60/kg, or 17 percent of GH production costs. This PA will contribute to achieving result indicator #1.

Pillar 2: Scaling up RE

50. **This pillar aims to scale up RE, reduce costs, and improve RE grid integration to enable private sector investments in RE**.

PA #4: The Borrower, through the MoP, has issued a government order on: (a) RPOs; and (b) Energy Storage Obligations (ESOs) that mandate the purchase of a minimum specified share of power consumption from RE and energy storage, respectively, for all electricity distribution utilities.[23] *[Achieved]*

51. **This critical regulation will further scale up RE penetration and improve RE grid integration.** Compared to the previous RPO regulations, the recently issued RPO by the MoP has (a) widened the obligation coverage from only solar PV to wind and hydro RPOs; and (b) for the first time, added ESO, which must be procured with RE resources and can include both BESS and PSH. These new features are critical to increase RE penetration in the country, achieve India's Nationally Determined Contribution (NDC) target, and produce GH. In addition, the energy storage obligations are critical to improve grid integration of VRE. With energy storage solutions becoming increasingly affordable, such obligations will further increase the uptake of low-carbon energy generation not only for greening the power mix but also for producing GH, and lead to cost reduction for GH as these are dependent upon load hours of electrolyzers. Increased RPO and ESO on the distribution utilities will enable these utilities to purchase a higher share of RE and energy storage from private and public developers.

PA #5: The Borrower: (a) through the Central Electricity Regulatory Commission (CERC), has issued and notified the CERC (Ancillary Services) Regulations 2022, that provide a market-based mechanism to

[23] MoP issued RPO and Energy Storage Obligation Trajectory till 2029-30 on July 22, 2022 (https://powermin.gov.in/sites/default/files/Renewable_Purchase_Obligation_and_Energy_Storage_Obligation_Trajectory_till_2029_30.pdf)

remunerate provision of energy storage services,[24] and (b) through the MoP, has issued the guidelines on PSH.[25] *[Achieved]*

52. **The ancillary service regulation has provided the much-needed pricing signal to remunerate energy storage services especially for storage of variable RE and has been instrumental in launching the energy storage market and enabling private sector investments in energy storage**. Pricing mechanisms and revenue streams are key to remunerating energy storage services to kick-start the energy storage market. While all energy storage sources can participate in the ancillary service market, the regulation inherently prioritizes resources with fast ramping up capability such as BESS. The ancillary service market is currently operated by the grid operator as a single buyer under an auction model and is expected to evolve into a market-based approach over time. This regulation will be instrumental in enabling private sector investments in BESS.

53. **The PSH regulation is important to kick-start the PSH market, which is critical to improve RE grid integration.** PSH, as an important energy storage solution to store VRE and address its variability, is a high priority for the GoI. India would require 27 GW of PSH by 2032 as critical infrastructure to improve RE grid integration. The MoP issued the guidelines for promoting PSH on April 10, 2023. These guidelines clearly categorize PSH as an energy storage technology rather than a hydropower project, allow it to participate in all the market segments, and access long-term loans (20-25 years) to promote large-scale deployment, and remove barriers to PSH.

Trigger #5: The Borrower, through the CERC, shall issue the amended Indian Electricity Grid Code regulation to improve RE grid integration. *[On track]*

54. **The Electricity Grid Code is an important technical standard that sets requirements for the grids with specific technical features to accommodate high share of RE penetration.** The Grid Code is a set of technical and commercial rules to be followed by various power sector stakeholders that are connected to ISTS. The original Grid Code was essentially developed for thermal power generation. Given the targeted 500 GW of RE capacity by 2030, the Grid Code is being revamped to cover the following features: (a) a resource planning code that promotes demand forecasting, generation resource planning, energy storage systems, etc.; (b) a newly added protection code that ensures stability of the power grid system; (c) an operating code that promotes availability of system reserves and frequency control mechanisms such as ancillary services, providing for inertia for grid stability, etc.; and (d) a schedule and dispatch code that introduces the framework for the nation-wide optimization of the security constrained economic dispatch by the generators in the real-time market.

55. **Expected Results:** (a) Share of RE in power consumption (percentage); and (b) Share of solar/wind with/through energy storage in total power consumption (percentage).

PA #6: The Borrower, through the MNRE, has issued an implementation regulation to guide the bidding of 50 GW of RE capacity, including solar PV, wind, and firm power from RE and energy storage, each year from FY23-24 to FY27-28.[26] *[Achieved]*

[24] CERC's amendment to the Ancillary Service Regulations issued in April 2023 (https://cercind.gov.in/2023/orders/6-SM-2023.pdf)
[25] MoP's Guidelines to Promote Development of Pump Storage Projects issued on April 10, 2023 (https://powermin.gov.in/sites/default/files/webform/notices/Guidelines_to_Promote_Development_of_Pump_Storage_Projects.pdf)
[26] MNRE's Bidding Trajectory for RE Power Projects issued on March 31, 2023 (https://mnre.gov.in/img/documents/uploads/file_f-1680367776122.pdf)

56. **This regulation is instrumental for India to reach its committed 500 GW of RE capacity by 2030 and mobilize significant private sector investments.** RE capacity (including hydro) in India has been steadily increasing from 80 GW in March 2015 to 172 GW in March 2023, with an average of 11.5 GW newly added RE capacity each year over the past eight years. Under a Business-As-Usual (BAU) case to follow the past RE growth trend, RE capacity would have been only around 250 GW by 2030. To ensure that the target of 500 GW of RE by 2030 will be achieved, the MNRE has adopted a regulation to issue bids for RE capacity of 50 GW each year from FY23-24 to FY27-28, to gain an additional 250 GW of RE over the next five years. This includes solar, wind, and solar-wind hybrids, and round-the-clock RE and energy storage projects. The bulk procurement of firm power from RE and energy storage, where a government agency—such as the Solar Energy Corporation of India Limited (SECI)—is the off-taker, will help reduce the off-taker risks for private sector investors. This kind of bulk procurement can also reach economies of scale to bring down the costs of RE and energy storage. Such an auction program provides market certainty, enabling prospective bidders to get ready to participate in these auctions. This regulation is welcomed by private sector investors who foresee that such a large RE auction program will force the resolution of several bottlenecks, such as the GoI's industrial policies of customs duty on solar PV which are currently slowing down RE development.

57. **Expected Results:** (a) Additional bids for RE capacity issued (GW); and (b) GHG emission avoided (million tons per annum). Issuing 75 GW[27] of RE capacity over the next three years, compared to the BAU case of 35 GW in three years, would avoid GHG emissions of 40 million tons per annum.[28] This would enable private sector investments of US$45 billion, assuming US$600/kW of RE investments.

PA #7: The Borrower, (a) through the MNRE, has adopted a strategy for competitive bidding for allocation of offshore wind sites[29]; and (b) through the MoP, has extended the waiver of the ISTS charges toward offshore wind until December 31, 2032. *[Achieved]*

58. **This prior action set out detailed strategy for the models of competitive auction for offshore wind in Gujarat and Tamil Nadu**. The GoI notified the National Offshore Wind Energy Policy-2015 in October 2015 for the development of offshore wind power in the country. India has limited land to deploy the massive scale of solar PV and on-shore wind needed to meet the net zero target; therefore, offshore wind development is important. The MNRE is the Nodal Ministry, and the National Institute of Wind Energy is the Nodal Agency for the development of offshore wind energy in India. Gujarat and Tamil Nadu were identified as potential offshore wind energy zones for a total potential of 195 GW, with an expected utilization factor of 50-55 percent. The strategy allowed the MNRE's announced launch of two tenders for offshore wind in September and December 2022, respectively, for 4 GW and 1 GW capacities off Tamil Nadu and Gujarat. The first commissioning is expected in December 2026.

59. **Offshore wind is an emerging advanced technology at the nascent stage in India, and PA 7 (b) has enabled cost reduction and private sector investments in offshore wind.** Currently, offshore wind costs almost three times of onshore wind and solar PV. The GoI plans to launch offshore wind auctions as many domestic and international private sector players have expressed interest. However, the main concerns are the high costs and the resulting tariffs. In June 2021, the MoP announced an extension of the waiver of the ISTS charges up to June 30, 2025. Since most of the offshore wind projects will not be commissioned until

[27] While the government plans to issue bids for 50 GW of RE capacity each year, it is assumed that at least 75 GW out of the 150 GW bids issued from now to 2026 would reach financial closure.
[28] This is estimated based on the assumption of carbon intensity of Indian grid of 650 kg CO2e per MWh and the RE plant has a capacity factor of 1500 hours per year.
[29] MNRE's Strategy Paper for Establishment of Offshore Wind Energy Projects (https://mnre.gov.in/img/documents/uploads/file_f-1657274400252.pdf)

2027-2028, the extension of the ISTS waiver up to 2032, coupled with the carbon credit, will help to attract private sector investments and to narrow the financial viability gap for offshore wind.

60. **Expected Result:** Offshore wind sites awarded (equivalent to power capacity GW).

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.[30] *[Achieved]*

61. **The PLI policy for solar PV aims to remove supply chain bottlenecks and reduce costs of solar PV to further scale up low-carbon energy, mobilize private investments in solar PV manufacturing, and lower the costs of green hydrogen.** The competitive auctions and large-scale solar parks that drive down the costs of renewables have led to large-scale deployment of solar PV across India. Further cost reduction of solar PV is needed to reach the RE targets and reduce the costs of GH. Achieving the GoI's NDC targets of 500 GW of RE by 2030 would require a robust supply chain which is currently being supported by the "National Program on High Efficiency Solar PV Modules". Under this program, the GoI has carried out bidding under PLI Scheme to promote domestic manufacturing of high efficiency solar PV modules, thereby removing supply chain bottlenecks and reducing costs. In the second tranche of the auctions for the PLI Scheme, that concluded in March 2023, almost 39.5 GW of capacity to manufacture solar modules has been awarded to multiple players, primarily in the private sector.[31] The scheme allocated INR195 billion (US$2.4 billion) in Tranche II (in addition to INR45 billion (US$560 million) in Tranche I) and would be implemented by the MNRE with SECI as the implementing agency. In addition, the National Program on High Efficiency Solar PV modules targets the creation of direct employment for 195,000 people and indirect employment for around 780,000 people,[32] including job opportunities for women.

62. **Expected Result:** Capacity of domestic manufacturing of high-efficiency solar PV cells and modules added (48 GW), which is expected to result in US$11.3 billion of private investments in solar PV manufacturing.

Pillar 3: Enhancing climate finance for low-carbon energy investments

63. **This pillar aims to stimulate climate/green financing and enable private sector investments for GH and low-carbon energy.**

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, Forestry, and Climate Change (MoEFCC), has approved GHG mitigation activities, including green hydrogen, green ammonia, RE with storage, and offshore wind, to be eligible for international carbon market to mobilize international financing under the Paris Agreement. *[Achieved]*

64. **A national carbon market is essential to provide a level playing field between low-carbon energy and fossil fuels.** It will result in earlier cost parity of GH and fossil fuels. The amendment to the Energy Conservation Act, 2001, provides the legal framework and empowers the central government to specify carbon credit trading scheme and issue carbon credit certificates to registered entities. This is a significant step toward the launch of an Indian carbon market. In addition, the amended Act also provides the legal basis for the GoI to specify a minimum share of consumption of non-fossil fuel by designated consumers, which

[30] MNRE's PLI *Scheme (Tranche II) under "National program on High Efficiency Solar PV modules" issued on September 30, 2022* (https://mnre.gov.in/img/documents/uploads/file_f-1664601098820.pdf)
[31] www.mercomindia.com, media article dated March 28, 2023.
[32] Press Information Bureau (PIB) release dated September 21, 2022.

includes industries such as steel, cement, textiles, chemicals, and petrochemicals; the transport sector including Railways; and commercial buildings, as specified in the schedule. This will increase RE penetration.

65. **The technologies approved by the MoEFCC paved the way for RE and GH activities to be eligible in international carbon market trading to mobilize international financing under the Paris Agreement Article 6.2.** Currently, the GHG-mitigation activities include: (a) RE with storage (only stored component); (b) solar thermal power plants; (c) offshore wind; (d) green hydrogen; e) compressed bio-gas; (f) emerging mobility solutions like fuel cells; (g) high-end technology for energy efficiency; (h) sustainable aviation fuel; (i) best available technologies for process improvement in hard to abate sectors; (j) tidal energy, ocean thermal energy, ocean salt gradient energy, ocean wave energy and ocean current energy; (k) high voltage direct current transmission in conjunction with the renewable energy projects; green ammonia under alternate materials; and CCUS under removal activity.

Trigger #6: The Borrower, through the MoP, shall issue a national carbon credit trading scheme notification that specifies the governance structure, trading rules, and regulations. *[On track]*

66. **The detailed carbon market design regulation is key to ensuring successful commencement and implementation of the national carbon market.** The Energy Conservation Amendment Bill has authorized the MoP and the Bureau of Energy Efficiency (BEE) to lead the design and operation of the national carbon market, building on the extensive experience of BEE which has been running the successful energy efficiency (EE) Perform, Achieve, and Trade (PAT) scheme on large industries and power generators over the past decade. The MoP and BEE have been designing India's carbon market. The planned Carbon Credit Trading Scheme (CCTS) under this trigger is the overarching regulation that outlines the detailed governance structure which will administer and regulate India's carbon market and establishes the detailed rules and requirements for carbon trading. The carbon market will be a mandatory market to begin with. This regulation specifies that for "the compliance mechanism, the central government shall notify Obligated entries covered under compliance mechanism, including designated consumers, and the obligated entities shall be required to reduce GHG emission intensity in terms of tons of carbon dioxide equivalent per unit of product as notified by GoI. The draft CCTS regulation is under stakeholder consultation before it is issued in late 2023.

67. **The GoI plans to issue a series of implementation notifications, including the compliance mechanism, that sets the rules on how the GHG emission intensity targets will be determined, and to allocate the GHG emission intensity targets on the obligated entities.** The carbon market design requires that the existing obligated parties of select large industries and power generators under the BEE's EE PAT scheme be converted to a mandatory CCTS. The initial mandatory GHG emission intensity targets will be allocated and imposed on the existing obligated parties under the PAT scheme when their EE targets under the PAT scheme expires. In addition, the non-obligated parties can also purchase carbon credits in the carbon market. The GoI plans to issue a series of implementation regulations including the detailed procedures and the compliance mechanism, to launch the national carbon market by December 2023. .

68. **Expected Results:** GHG emission intensity targets allocated and carbon trading operational.

PA #10: The Borrower, through the Securities and Exchange Board of India (SEBI), has issued amendments to the existing regulatory framework for Green Debt Security (GDS) issuance, to specify the taxonomy and definition of GDS to include the emerging areas of sustainable financing and improve the information disclosure standards. *[Achieved]*

69. **A sovereign green bond market and enhanced disclosures on Environment, Social, and Governance (ESG) parameters are expected to play an important role in catalyzing green finance. The amendment of**

the regulatory framework for GDS would (a) specify the taxonomy and definition of GDS to include the emerging areas of sustainable financing; and (b) improve the information disclosure standards, especially to curtail the greenwashing issue while keeping the compliance cost for issuers and investors of GDS low. This must be complemented by improvement in disclosures and reporting on key ESG parameters that have a direct impact on a company's ability to attract investors, including for green projects, as set in Trigger #9.

70. **The expanded definition of the GSD bonds will increase the number and size of private sector projects that have mitigation as a main objective.** This new regulatory framework aims at allowing firms to issue bonds to finance project in the following domains: material circularity, RE, transition from grey to low-carbon energy for specific industries (coal-fired power generation, steel, cement, chemical, and paper making, construction, etc.). Discussions with potential issuers indicate that the future GSD bonds will almost all be allocated to climate mitigation projects.

Trigger #7: The Borrower, through SEBI, shall issue a regulatory framework for Environment, Social, and Governance Disclosures, Ratings, and Investing, to enhance the green and sustainable finance market in India. *[On track]*

71. **This trigger is important because it:** (a) avoids greenwashing; (b) ensures ESG disclosures for value chains of listed companies; (c) establishes a regulatory framework for ESG rating providers; and (d) augments investors' confidence. It was approved by the SEBI Board and will be notified soon.

72. **Expected Result**: Increase in assurance of cumulative onshore green debt securities (percentage).

PA #11: The Borrower, through the Ministry of Finance (MoF), has issued a transparent Sovereign Green Bond Framework for evaluating, selecting, and financing green public spending, including on green hydrogen, solar and wind energy, pursuant to which a separate reserve/corpus fund titled 'Sovereign Green Fund' has been created. . *[Achieved]*

73. **The RE sector needs high levels of public investment, and the adoption of a sovereign green bond framework will help prioritize financing of green public spending.** According to the GoI's own estimates, investment up to US$30-33 billion is needed every year to reach 500 GW of installed RE capacity by 2030. The public investments by the GoI and the MNRE and the policy reforms supported by this DPO will help mobilize the much larger private financing needed in RE. A governance framework for sovereign green bonds was adopted in November 2022 and India's first sovereign green bonds were issued in January 2023. The framework established a clear definition of eligible projects and a separate reserve/corpus fund titled Sovereign Green Fund has been created in the Public Account of India to provide transparency in use of sovereign green bonds proceeds for financing green projects to ensure transparent and clear accounting and allocation of proceeds from sovereign green bonds. The green bonds were issued at lower yields than comparable government bonds. The issuance of sovereign green bonds under a transparent and well-established framework will also generate more dedicated financing for green spending, including RE, and, in the medium term, lower debt servicing costs on sovereign green bonds will also free up more resources for green spending.

74. **The green eligible project categories in the sovereign green bond framework have climate change mitigation as a main objective** (RE, EE, clean transportation, etc.). As part of the budget for FY23-24, funds from the Sovereign Green Fund account (which is funded by the proceeds of the sovereign green bonds) have been allocated almost completely to climate mitigation, including RE (MNRE) and clean transportation. Given that most of the eligible expenditures in the sovereign green bond framework are on climate mitigation, future issuances are also likely to focus on funding mitigation efforts.

75. **Expected Results:** Sovereign green bond issued (cumulative, US$ billion).

Table 4. DPO PAs and Analytical Underpinnings

PA	Analytical Underpinnings
Operations Pillar 1: Promoting green hydrogen	
PA #1 **PA #2** **PA #3**	WB: *GH Opportunities and Roadmap for India* (2023) WB: *Geographic Information System mapping of demand and supply centers for GH hubs in India* (2023) WB: *Developing financing mechanisms to bridge the cost gap between grey and GH in India* (2023) MoEFCC, GoI: India's Long-Term Low-Carbon Development Strategy (2022) Key findings: Identified early-mover industries and potential green hydrogen demand and supply hubs, and recommended policy measures to bridge the gap between grey and green hydrogen
Operations Pillar 2: Scaling up RE	
PA #4	WB: *Battery Storage Assessment at Intra-State Transmission and Distribution Network* (2021) WB: *Addressing Development Challenges in India's Hydropower Sector* (2022) WB: *Unlocking Floating Solar Potential* (2023) WB: *Stocktaking of Solar Park Scheme* (2023) Key findings: Identified business models for BESS, technical standards for floating solar, and recommended policy measures to support the deployment of BESS, floating solar, and hydropower
PA #5	WB: *A Roadmap for Developing Wholesale Power Market in India* (2021) MoP, GoI: *Report of the Group on Development of Electricity Market in India* (2023) Key findings: Recommended policy measures to strengthen the wholesale electricity market
PA #6	WB: *Report on India Energy Transition to meet Net Zero 2070* (2023) Key findings: Identified pathways and technical solutions to integrate higher RE capacities in the grid
PA #7	WB: *Offshore Wind Roadmap in India* (2023) Key findings: Recommended policy measures to deploy offshore wind
Operations Pillar 3. Enhancing climate finance for low-carbon energy investments	
PA #9	WB: Designing carbon market in India through technical assistance on partnership for market readiness BEE, MoP, GoI: Draft CCTS Key findings: Supported BEE in designing the carbon market in India
PA #10	WB: Technical assistance under *Private and Financial Sector Equitable Growth* (P177285) Key findings: Supported SEBI to amend the existing regulations
PA #11	WB: Technical assistance under *Private and Financial Sector Equitable Growth* (P177285) Key findings: Supported the MoF on the design of the Sovereign Green Bond Framework

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

76. **The program is aligned with the Country Partnership Framework (CPF) FY18-22 discussed by the World Bank Group (WBG) Board of Executive Directors on September 20, 2018 (Report No. 126667-IN).**[33] In particular, the program is linked with two focus areas: (a) promoting resource-efficient growth and (b) enhancing competitiveness and enabling job creation. Through the first focus area, the WBG has committed to supporting the sectors and areas that are critical for facilitating growth and poverty reduction while promoting greater resource efficiency and increase in access to sustainable energy. Through the second focus area, the WBG is aspiring to strengthen key enablers for job creation and to improve competitiveness through better business and policy environments, strengthened workforce skills, and increased firm capabilities. The DPO series is also fully aligned with the WBG Green, Resilient and Inclusive Development framework, and the WBG Climate Change Action Plan 2021–2025. The operation is also fully aligned with the WBG Global Crisis Response Framework (GCRF), where all the prior actions support the adoption of "climate

[33] The CPF for India expired at the end of FY22. The World Bank is currently preparing a Performance and Learning Review, which will seek to extend the CPF through mid-FY24.

smart policies and incentives" under the broad theme of strengthening policies, institutions and investments for rebuilding better (Pillar 4 of the GCRF framework).

77. **Climate co-benefits.** This program aims to address India's vulnerability to climate change by scaling up investments in greening the energy transition and enable the development of necessary policy and institutional framework which can accelerate and sustain this low-carbon transition. A Climate Change Technical Note was developed to provide details on climate adaptation and mitigation actions.

4.4. CONSULTATIONS AND COLLABORATION WITH DEVELOPMENT PARTNERS

78. **Stakeholder engagement and consultations**. Stakeholder consultations were carried out with the government (MNRE), private sector (RE developers and GH technology providers), and think tanks (the Council on Energy, Environment and Water and The Energy and Resources Institute). The GoI conducted extensive consultations on the draft NGHM, including on environmental and social aspects. Consultations for the Poverty and Social Impact Assessment (PSIA) indicated that while India's efforts to back GH are noteworthy, the country is at the early stages of development of the technology and its commercialization efforts. Currently, GoI reforms only focus on an enabling policy space for facilitating GH production and consumption. It will take a few years before India's GH market fully takes off and produces any real impact on jobs. Therefore, it may be too early to project the impacts of GH expansion on employment in India.

79. **The United Kingdom Foreign, Commonwealth, and Development Office has expressed interest in extending a guarantee (UK Guarantee) for the loan for a principal amount of US$1 billion**. This guarantee is proposed to be extended under the green projects guarantee facility agreed with the UK. In the event the UK Guarantee is agreed upon, it would be signed and delivered prior to or around the time of approval of the DPO. If the UK Guarantee does not materialize for this operation, then the World Bank Country Management Unit for India will seek to apply the UK Guarantee to other upcoming green projects in India.

80. **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.** In particular, 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 proposed EIB program can complement the proposed World Bank Program. The Asian Infrastructure Investment Bank has expressed interest in providing complementary financing to this programmatic DPO. The Bank and the Asian Infrastructure Investment Bank will further explore complementary financing options under DPO-2. The ADB is also helping the MNRE to develop some key policy interventions, such as the PLI scheme for GH. IFC is also in active consultations with potential investors in the GH space. The World Bank has been collaborating with development partners during the preparation and implementation of the program.

5. OTHER DESIGN AND APPRAISAL ISSUES

5.1. POVERTY AND SOCIAL IMPACT

81. **The DPO's overall impact on poverty is expected to be neutral to positive.** Promoting GH (Pillar 1) and scaling up RE (Pillar 2) could expand households' employment opportunities in the RE sector and secondary labor markets. The transition to GH and RE could mitigate households' health costs from air pollution and reduce their exposure and vulnerability to heat waves and other climate-related risks.

82. **Some risks could lower the poverty-reduction impacts of the PAs.** In the immediate term, the main risks to poverty reduction are disruptions to local economies and employment losses during the transition from grey hydrogen and fossil-based industries. Ultimately, the magnitude and distribution of potential welfare and equity gains will critically depend on leveraging spill-over effects from GH and RE sectors to boost local economies and create inclusive labor opportunities; facilitating the technological and skills transition of workers and firms; and protecting workers and households from impoverishment and potential losses during the transition.

83. **There are substantial risks associated with land acquisition, involuntary resettlement, occupational and community health and safety, and reduction of freshwater availability related to GH production.** Interviews with private sector investors during the PSIA suggested that most private industries investing in GH prefer to place hubs closer to the demand centers, as the cost of transport and storage of GH is going to be high. But these centers are also highly urbanized, with water demands. Unless the GH projects are co-located in existing industrial corridors, there is some risk related to new land acquisition.

84. **The World Bank will undertake a TA program for the proposed DPO to build the capacity of the MNRE and various stakeholders for GH.** The Ministry of Skill Development and Entrepreneurship has developed initiatives targeting engineers and researchers to 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. The World Bank will provide TA to bring in global best practices on GH production and use and mitigating the environmental and social risks to build institutional capacity both at the federal and state level.

5.2. ENVIRONMENTAL, FORESTS, AND OTHER NATURAL RESOURCE ASPECTS

85. **The PAs supported through this DPO are likely, in aggregate, to have a positive impact on India's environment, forests, or other natural resources.** The proposed DPO will also provide a range of co-benefits for public health from cleaner air to reduced water and solid waste pollution in addition to the targeted GHG reduction. There are no short or long-term climate change or geo-hazard risks relevant to this operation. The assessment is based on a review of the program, including the description of each PA, evidence from the literature, legal evidence, and a comparative analysis between existing and proposed actions—in particular, PA#2 intends to address the key environmental risks to GH production and utilization.

86. **At the same time, given that all PAs target large-scale sector development, there are significant risks that could stretch the capacity of the relevant institutions to avoid or minimize risks to ecological resources, forests, or other natural resources.** Future sector development under three of the PAs (1, 5, 6, 7, and 8) supported by the operation may result in potential negative environmental effects. The national legal and regulatory framework incorporates some of the mitigation measures to adequately manage these potential effects and provides the basis for establishing the needed regulatory frameworks. Some potential impacts cannot be fully managed through the current regulatory framework and will need TA to develop strategic alternatives to manage impacts that might arise in the medium-term (see details in Annex 4).

87. **India has a well-developed environmental legal and regulatory framework.** Current environmental legislation in India, along with the regulations and standards approved by the central government/line ministry, create a favorable legal framework for environmental protection. They also enforce the rights of citizens to environmental safety, access to environmental information, recourse to compensation from any environmental/safety disaster under several laws including the Public Liability Insurance Act, 1991. In particular, the Environment (Protection) Act, 1985, defines environmental emergencies and ecological

disasters and prescribes the order of actions in such situations, defines the obligations of officials and enterprises to prevent occurrences and eliminate consequences, and the liabilities of persons or organizations that damage the environment.

88. **The MoEFCC is the national regulatory entity in charge of formulating, implementing, and enforcing environmental policies and regulations of industrial projects; however, a substantial portion of the regulatory responsibilities are delegated to the MNRE for RE projects.** The environmental regulation for projects such as PSH requires environmental assessments, permits, and compliance monitoring systems including voluntary disclosure of information on compliance to applicable environmental regulations. However, such assessments, permits and compliance monitoring 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 institutions (the MNRE in this case) will develop and enforce the required standards and norms. In some cases, the permits required from state government authorities are expected to enforce the required standards and norms. There will be a thorough gap analysis of and building on the existing legal, regulatory and institutional frameworks (which are already robust in a number of areas as described in para 85 above) which would inform the Bank's follow-on engagements (outside the proposed DPO series), including TAs, to assist India in adequately addressing any new/additional E&S risks posed by GH and the scaled-up RE.

5.3. PFM, DISBURSEMENT AND AUDITING ASPECTS

89. **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.** A Public Expenditure and Financial Assessment, 2010, was conducted in India by the National Institute of Public Finance and Policy with support from the World Bank, and concluded that PFM systems were working adequately, and the Country fiduciary risk was moderate. Subsequent assessments and technical work have been undertaken by the World Bank at the Union level in several areas such as Planning, Budgeting (program), Financial Reporting, Public Investment Management, Chart of Accounts, Government of Finance Statistics and Financial/Performance Auditing. In addition, The World Bank has been actively engaged with the 15th Finance Commission, Department of Expenditure and the Department of Economic Affairs, to help develop the next steps in PFM reform.

90. **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. World Bank internal analyses show 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. Use of e-procurement is mandatory for all procurement valued above INR5 lakhs.

91. **Foreign Exchange Controls**. The World 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 so far. As part of the preparation for this operation, the RBI's audit report and published annual financial statements for the three financial years (FY19-20, FY20-21, and FY21-22), were reviewed by the World Bank. The audit reports have a clean and unqualified opinion and were conducted by private firms of chartered accountants.

92. **Disbursement.** The proposed operation will follow the World Bank's disbursement procedures for Development Policy Financing in the World Bank, and country systems. 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 through the system *ClientConnection*. The

World Bank will disburse the proceeds of the IBRD loan and IDA credit 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. The IBRD loan and IDA credit 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). If any amount of the proceeds is used to finance excluded expenditures, the legal agreements will authorize the World Bank to require India to refund the amount, which shall be cancelled from the loan and the credit.

5.4. MONITORING, EVALUATION AND ACCOUNTABILITY

93. **This DPO, including development of the program objectives and results indicators, has been prepared through intensive policy dialogue with the GoI**. The MNRE is leading and coordinating the preparation and implementation of the DPO. The operation is also supported and coordinated by the MoF/Department of Economic Affairs. The MNRE will be responsible for the monitoring and evaluation.

94. **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

95. **The overall risk of the operation is assessed as Substantial,** based on the risk ratings shown in Table 5.

96. **Sector Strategies and Policies risk rating is Substantial**. GH is still at a nascent stage and involves multiple ministries and stakeholders. Creating domestic market demand for GH requires consensus from the affected industries, beyond MNRE. The proposed DPO intends to enhance the GH and RE policies and regulations, such as the bulk procurement for GH to increase demand and reduce off-taker risk.

97. **Technical Design risk rating is Substantial**. There are still uncertainties around GH technologies and costs, electrolyzer manufacturing capacities, and storage and transportation of hydrogen. However, given the important role that GH will play in low-carbon pathways, the proposed operation will absorb the front-end risks associated with a nascent, yet promising technology of GH. The proposed DPO aims to incentivize GH production and consumption to kick-start the market, pilot the technologies, bring down the costs, and reduce the technology risks through learning-by-doing.

98. **Environmental and Social risk rating is Substantial.**[34] The entire DPO is aiming to replace the use of fossil fuels and reduce air pollutants and GHG emissions. Yet, some environmental and social residual risks need to be addressed. On the social aspects, some of the PAs may trigger upstream impacts linked to RE/GH development, such as land acquisition resulting in loss of livelihood and source of livelihood, involuntary resettlement, labor issues, and occupational and community health and safety issues as well as reduced freshwater availability. On the environmental aspects, large upstream 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 will provide TA to mitigate environmental and social risks, including GIS mapping to identify GH hubs that will exclude environmentally and socially sensitive areas, and an assessment on desalination of water for GH production.

99. **Stakeholders risk rating is Substantial**. During consultations, stakeholders such as policy makers, RE developers, electrolyzer manufacturers, GH producers, GH users, industries, and gas pipeline companies, at both central and state levels, highlighted the high costs of green hydrogen as a major constraint, raising concerns about industry competitiveness and increased end-user costs. This proposed operation supports government programs which will provide a substantial amount of government incentives to bring down the costs of GH to mitigate this risk.

Table 5: Summary Risk Ratings

Risk Categories	Rating
1. Political and Governance	Moderate
2. Macroeconomic	Moderate
3. Sector Strategies and Policies	Substantial
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	Substantial
9. Other	
Overall	Substantial

[34] There are allegations of forced labor in the production of solar panels and components. This DPF focuses on policies and institutional reforms in India. DPO proceeds are not earmarked to any specific purpose such as the manufacturing or procurement of solar panels or components.

ANNEX 1: POLICY AND RESULTS MATRIX

The PDO of the operation is to accelerate the development of low-carbon energy in India.

Prior Actions and Triggers		Results		
Prior Actions under DPF 1	**Triggers for DPF 2**	**Indicator Name**	**Baseline (2022)**	**Target (2026)**
Pillar 1: Promoting green hydrogen				
Prior Action #1: The Borrower, through its Union Cabinet, has approved the NGHM, which will facilitate demand and includes incentives for electrolyzer manufacturing, and GH production. *[Achieved]*	**Trigger #1:** The Borrower shall: (i) notify the incentive schemes for GH production and electrolyzer manufacturing, which define the detailed incentives, specify the eligibility criteria for recipients, and outline the framework for selection through a transparent and competitive process, and (ii) appoint the implementing agency(ies) which will manage the incentive schemes. *[On track]*	**Results Indicator #1**: GH production capacity incentivized (million tons)	0	3
	Trigger #2: The Borrower shall select certain sectors and promote the use of green hydrogen/its derivatives in these sectors. *[On track]*	**Results Indicator #2:** Domestic electrolyzer manufacturing capacity incentivized (GW)	0	3
	Trigger #3: The Borrower, through the MNRE, shall issue a guideline for transparent and competitive bidding for bulk procurement of GH and its derivatives. *[On track]*			

	Trigger #4: The Borrower shall notify a GH standard that defines the eligibility criteria for consideration as "green" hydrogen. *[On track]*			
Prior Action #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; (b) GH safe storage and handling; and (c) GH utilization in the mobility sector. [*Achieved*].		**Results Indicator #3:** Number of additional GH safety standards notified	0	10
Prior Action #3: The Borrower, through the 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. *[Achieved]*				
Pillar 2: Scaling Up Renewable Energy				
Prior Action #4: The Borrower, through the MoP, has issued a government order on: (a) RPOs; and (b) ESOs that mandate the purchase of a minimum specified share of power consumption from RE and energy storage, respectively, for all electricity distribution utilities. *[Achieved]*		**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

Prior Action #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 PSH. *[Achieved]*	**Trigger #5**: The Borrower, through the CERC, shall issue the amended Indian Electricity Grid Code regulation to improve RE grid integration. *[On track]*			
Prior Action #6: The Borrower, through the MNRE, has issued an implementation regulation to guide the bidding of 50 GW of RE capacity, including solar PV, wind, and firm power from RE and energy storage, each year from FY23-24 to FY27-28. *[Achieved]*		**Result Indicator #6:** Additional bids for RE capacity issued (GW) **Result Indicator #7:** GHG emissions avoided (million tons per annum)	0 0	75 40
Prior Action #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. *[Achieved]*		**Result indicator #8:** Offshore wind sites awarded (equivalent to power capacity GW)	0	4
Prior Action #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. *[Achieved]*		**Results Indicator #9:** Capacity for domestic manufacturing of high-efficiency solar PV cells and modules added (GW)	0	48
Pillar 3: Enhancing climate finance for low-carbon energy investments				

Prior action #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 MoEFCC, has approved GHG mitigation activities, including green hydrogen, green ammonia, RE with storage, and offshore wind to be eligible for international carbon market to mobilize international financing under the Paris Agreement. *[Achieved]*	**Trigger #6**: The Borrower, through the MoP, shall issue a national carbon credit trading scheme notification and regulation that specifies the governance structure, trading rules, and regulations. *[On track]*	**Results Indicator #10**: Launch of a national carbon Market	No carbon market exists	GHG Emission Intensity Targets allocated and carbon trading operational
Prior Action #10: The Borrower, through SEBI, has issued amendments to the existing regulatory framework for GDS issuance, to specify the taxonomy and definition of GDS to include the emerging areas of sustainable financing and improve the information disclosure standards. *[Achieved]*	**Trigger #7:** The Borrower, through SEBI, shall issue a regulatory framework for Environment, Social and Governance Disclosures, Ratings, and Investing, to enhance the green and sustainable finance market in India. *[On track]*	**Result Indicator #11:** Increase in assurance of cumulative onshore GDS (percentage)	0	30
Prior Action #11: The Borrower, through the MoF, has issued a transparent Sovereign Green Bond Framework for evaluating, selecting, and financing green public spending, including on green hydrogen, solar and wind energy, pursuant to which a separate reserve/corpus fund titled 'Sovereign Green Fund' has been created. *[Achieved]*		**Results Indicator #12:** Sovereign green bonds issued (cumulative) (US$ billion)	2.3	6.0

ANNEX 2: FUND RELATIONS ANNEX

PRESS RELEASE

PR22/444

IMF Executive Board Concludes 2022 Article IV Consultation with India

FOR IMMEDIATE RELEASE

Washington, DC – December 22, 2022: On November 28, The Executive Board of the International Monetary Fund (IMF) concluded the Article IV consultation[1] with India.

The economy has rebounded from the deep pandemic-related downturn. Real GDP grew by 8.7 percent in FY2021/22, bringing total output above pre-pandemic levels. Growth has continued this fiscal year, supported by a recovery in the labor market and increasing credit to the private sector. New COVID cases have fallen to low levels, supported by high vaccination rates. The free administration of booster shots and broader booster eligibility criteria should help improve vaccine coverage.

Policies are addressing new economic headwinds. These include inflation pressures, tighter global financial conditions, the fallout from the war in Ukraine and associated sanctions on Russia, and significantly slower growth in China and advanced economies. The authorities have responded with fiscal policy measures to support vulnerable groups and to mitigate the impact of high commodity prices on inflation. Monetary policy accommodation has been gradually withdrawn and the main policy rate has been increased by 190 basis points so far in 2022.

Growth is expected to moderate reflecting the less favorable outlook and tighter financial conditions. Real GDP is projected to grow at 6.8 percent and 6.1 percent in FY2022/23 and FY2023/24 respectively. Reflecting broad-based price pressures, inflation is projected at 6.9 percent in FY2022/2023 and is expected to moderate only gradually over the next year. The current account deficit is expected to increase to 3.5 percent of GDP in FY2022/23 as a result of both higher commodity prices and strengthening import demand.

Uncertainty around the outlook is high, with risks tilted to the downside. A sharp global growth slowdown in the near term would affect India through trade and financial channels. Intensifying spillovers from the war in Ukraine can cause disruptions in the global food and energy markets, with significant impact on India. Over the medium term, reduced international cooperation can further disrupt trade and increase financial markets volatility. Domestically, rising inflation can further dampen domestic demand and impact vulnerable groups. On the upside, however, successful implementation of wide-ranging reforms or greater than expected dividends from the remarkable advances in digitalization could increase India's medium-term growth potential.

[1] 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.

700 19th Street NW
Washington, DC 20431
USA

Executive Board Assessment[2]

Executive Directors concurred that the authorities have appropriately responded to post-pandemic economic shocks with fiscal policy measures to support vulnerable groups and with front-loaded monetary policy tightening to address elevated inflation. They generally noted that while public debt sustainability risks have increased, these risks are mitigated given the debt characteristics. Directors encouraged a more ambitious and well-communicated medium-term fiscal consolidation, anchored on stronger revenue mobilization and further improvement in expenditure efficiency, while high-quality spending on infrastructure, education and health is protected. They also observed that further improvements in public financial management, fiscal institutions and transparency would support consolidation efforts.

Directors noted that additional monetary policy tightening should be carefully calibrated and clearly communicated to balance inflationary objectives and impact on economic activity. Noting that India's external position was broadly in equilibrium, Directors observed that the exchange rate should continue to act as a shock absorber with foreign exchange intervention limited to addressing disorderly market conditions. Directors welcomed the authorities' plans to introduce a central bank digital currency.

While noting the improvement in corporate and financial sector balance sheets, Directors encouraged additional measures to counter risks stemming from tightening financial conditions. They observed that banks should be encouraged to build additional capital buffers and recognize problem loans and noted that targeted prudential tools could strengthen the banking system's resilience to rising interest rate risks. Directors encouraged the authorities to make further progress on financial sector reforms.

Directors commended the authorities for the remarkable achievements in digitalization. Digital public infrastructure has enabled the rapid deployment of support during the pandemic, and digital advances have facilitated efficient payments and increased financial inclusion. Narrowing the digital divide through improved access and literacy would further support productivity gains.

Directors encouraged the authorities to make additional progress on the structural reform agenda. Increasing female labor force participation, reducing youth unemployment and reducing informality remain critical to sustaining strong and inclusive growth. Strengthening governance and the regulatory framework would foster transparency and safeguard public accountability. Directors welcomed new trade agreements and observed that additional tariff reduction could help deepen India's integration in global value chains and support growth.

Directors noted India's important progress in implementing its climate agenda, including through increasing the share of renewables in energy production and improving energy efficiency. Directors observed that additional efforts would be needed to meet the authorities' net zero objective.

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[2] 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 summings up can be found here: http://www.IMF.org/external/np/sec/misc/qualifiers.htm.

India: Selected Economic and Financial Indicators, 2018/19-2023/24 1/

	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24
				Est.	Projections	
Growth (in percent)						
Real GDP (at market prices)	6.5	3.7	-6.6	8.7	6.8	6.1
Prices (percent change, period average)						
Consumer prices - Combined	3.4	4.8	6.2	5.5	6.9	5.1
Saving and investment (percent of GDP)						
Gross saving 2/	30.2	29.4	28.8	30.0	29.4	30.1
Gross investment 2/	32.3	30.2	27.9	31.2	32.8	33.0
Fiscal position (percent of GDP) 3/						
Central government overall balance	-3.9	-4.8	-8.6	-6.7	-6.5	-6.2
General government overall balance	-6.4	-7.5	-12.8	-10.0	-9.9	-9.0
General government debt 4/	70.4	75.1	89.2	84.2	83.5	83.9
Cyclically adjusted balance (% of potential GDP)	-6.8	-7.4	-8.7	-8.3	-8.5	-8.3
Cyclically adjusted primary balance (% of potential GDP)	-2.0	-2.6	-3.8	-3.3	-3.2	-2.7
Money and credit (y/y percent change, end-period)						
Broad money	10.5	8.9	12.2	8.8	8.9	9.0
Domestic Credit	11.8	8.3	9.5	9.0	13.6	11.4
Financial indicators (percent, end-period)						
91-day treasury bill yield (end-period)	6.1	4.4	3.3	3.8	...	...
10-year government bond yield (end-period)	7.4	6.1	6.2	6.8	...	...
Stock market (y/y percent change, end-period)	17.3	-23.8	68.0	18.3	...	...
External trade (on balance of payments basis)						
Merchandise exports (in billions of U.S. dollars)	337.2	320.4	296.3	429.2	450.3	462.8
(Annual percent change)	9.1	-5.0	-7.5	44.8	4.9	2.8
Merchandise imports (in billions of U.S. dollars)	517.5	477.9	398.5	618.6	737.7	769.6
(Annual percent change)	10.3	-7.6	-16.6	55.3	19.2	4.3
Terms of trade (G&S, annual percent change)	-1.8	1.5	1.6	-8.1	-2.8	2.2
Balance of payments (in billions of U.S. dollars)						
Current account balance	-57.2	-24.5	24.0	-38.7	-118.3	-109.7
(In percent of GDP)	-2.1	-0.9	0.9	-1.2	-3.5	-2.9
Foreign direct investment, net ("-" signifies inflow)	-30.7	-43.0	-44.0	-38.6	-47.7	-52.6
Portfolio investment, net (equity and debt, "-" = inflow)	2.4	-1.4	-36.1	16.8	-8.2	-18.0
Overall balance ("+" signifies balance of payments surplus)	-3.3	59.5	87.3	47.5	-20.1	17.8
External indicators						
Gross reserves (in billions of U.S. dollars, end-period)	412.9	477.8	577.0	607.3	540.5	558.3
(In months of next year's imports (goods and services))	8.2	11.1	9.0	7.9	6.7	6.5
External debt (in billions of U.S. dollars, end-period)	543.1	558.4	573.7	619.6	669.1	742.5
External debt (percent of GDP, end-period)	20.1	19.7	21.5	19.5	19.6	19.8
Of which: Short-term debt	8.7	8.4	8.8	8.6	8.6	8.9
Ratio of gross reserves to short-term debt (end-period)	1.8	2.0	2.4	2.2	1.8	1.7
Real effective exchange rate (annual avg. percent change)	-4.7	3.0	-0.9	0.3	...	...
Exchange rate (rupee/U.S. dollar, end-period)	69.2	75.4	73.5	75.8	...	...
Memorandum item (in percent of GDP)						
Fiscal balance under authorities' definition	-3.4	-4.7	-9.2	-6.7	-6.4	-6.2

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.

ANNEX 3: LETTER OF DEVELOPMENT POLICY

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

सत्यमेव जयते

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

D.O. No 13/2/2023-FB.V

May 31, 2023

Dear President,

I would like to thank you and the World Bank Group for your support to the Government of India, in its efforts to strengthen the enabling policy framework, to promote low-carbon energy supply and use. The proposed Development Policy Financing (DPF) will help in promoting Green Hydrogen, scaling up renewable energy (RE), and in enhancing climate finance for low-carbon energy investments.

2. This DPF is aligned with India's Nationally Determined Contributions and theLong-Term Low-Carbon Development Strategy, which was unveiled at the CoP27. Specifically, the DPF is aligned with our commitment to achieve 50 percent cumulative electric power installed capacity from non-fossil fuel-based energy resources by 2030 and reduce Emissions Intensity of India's GDP by 45 percent by 2030, from 2005 level. It is also in line with the announcement to achieve 500 Gigawatts (GW) of non-fossil fuel based energy resources by 2030.

3. Government of India has launched a series of policies to meet these targets and its vision of achieving net-zero emissions by 2070. These include the National Solar Mission, National Mission for Enhanced Energy Efficiency, and the National Mission on Transformative Mobility and Battery Storage. The Government of India has adopted a series of enabling policies to mobilize significant private sector investments in RE, including but not limited to: (a) policy measures that have brought down the solar photovoltaic (PV) costs from about INR 18/kWh to about INR 2.5 /kWh in a decade; (b) waiver of Inter-State Transmission (ISTS) charges for RE generators; (c) large-scale grid-connected Solar Parks scheme providing a plug and play model for deployment of solar PV capacities; (d) Renewable Purchase Obligation (RPO) mandating that the distribution utilities purchase a minimum share of RE; (e) must-run status for RE generation plants; and (f) Production-Linked Incentive scheme for solar PV to reduce costs and ensure supply. The amendment made to the Energy Conservation Act, 2001, has laid the foundation for development of a national carbon market.

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4. The Government of India has recently announced the National Green Hydrogen Mission (NGHM) in January 2023. The interventions under the Mission aim to: (a) bring down the costs through incentives to make green hydrogen produced in India competitive for exports as well as for domestic market; (b) support pilot projects on various aspects of green hydrogen; (c) build an enabling ecosystem to support scale-up; and (d) support research and development to position India as a global leader in green hydrogen. A budgetary allocation of US$ 2.4 billion was allocated to the NGHM for FY2023 to FY2030 as well.

5. India's low-carbon energy strategy has been translated into several initiatives/national programs. It has been backed with budgetary allocations to ensure that India achieves success in its low-carbon strategy. Some of them are: viability gap funding for energy storage systems and for coastal shipping, investments in inter-state energy evacuation of RE from Ladakh, support to biogas plants, and scrapping of old fossil-fuelled government vehicles. The budget allocation to the Ministry of New and Renewable Energy (MNRE) was increased by 45 percent compared to FY2023, and an increase in budget earmarked for green energy corridor scheme for evacuation of RE power (from INR 2500 Million in FY 2022-23 to INR 5000 Million in FY 2023-24).

6. This proposed DPF will assist India to achieve its stated ambition to emerge as a global leader in Green Hydrogen. This DPF supports three important pillars of our low-carbon energy development strategy. The first pillar is to promote green hydrogen. The NGHM aims to bring down the costs of green hydrogen, increase market demand, mobilize private sector investments, and reduce greenhouse gas emissions. The second pillar supported by this DPF is our strategy to continue scaling up RE. In this regard, the Government has issued a series of policies and regulations, with budget allocation and to remove the barriers to further scaling-up of RE. The third pillar supports the government's reforms to attract capital to low-carbon energy investments, including by developing a national carbon market.

7. The Government has established a framework for Sovereign Green Bonds (SGB) and issued two tranches of SGBs in January and February 2023. Furthermore, a Sovereign Green Fund in the public account has been established to allocate the proceeds of the SGBs to green spending, including for RE, in FY2024. Going forward, the government is also taking steps for: (a) adopting a national carbon market notification and regulation

specifying governance structure, trading rules and regulations; and (b) issuing a regulatory framework for Environment, Social and Governance Disclosures, Ratings and (c) enhancing the green and sustainable finance market in India.

8. Let me reiterate that the Government is fully committed to implementing the required policies and regulatory reforms in a timely manner to maximize the impact of this DPF operation. I see this DPF as a first step in a long-term engagement with the World Bank on our low-carbon energy journey. I look forward to the World Bank Group's continued support in our efforts to achieve the ambitious climate and developmental targets.

With regards,

Yours sincerely,

(Ajay Seth)

The 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		
Prior Action #1: The Borrower, through its Union Cabinet, has approved the NGHM, which will facilitate demand and includes incentives for electrolyzer manufacturing, and GH production.	**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 sector of the economy. Even if in the initial years, GH only replaces conventional energy use of the manufacturing of steel and fertilizers, or used in running of a select number of trains – this will reduce GHG emissions and improved (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. **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 125 GW of energy (from 5 million tons of green hydrogen, and domestic manufacturing of electrolyzers). Given the huge scope of sector development, environmental impacts of each of the value chain segment 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	**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 upstream risks associated with both acquisition and involuntary resettlement. This will require plans to minimize and / or mitigate any adverse impact. GH production relies on the use of fresh water. Based on this estimate, water requirements for electrolysis would consume at most around 0.05 percent of India's water supply. While at an aggregate level, water consumption for electrolysis appears to be a minor issue, 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. India's experience with land acquisition for RE projects suggests that there are substantial upstream risks associated with both land acquisition and involuntary

Prior Action	Significant positive or negative environmental effects	Significant poverty, social or distributional effects positive or negative
	development strategy that includes promotion of GH hubs. These hubs are 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 World Bank will discuss with the GoI on potential technical assistance to mitigate some of the E&S risks, for example, handling of desalination of water and developing relevant capacity building actions to identify, monitor, and manage direct, indirect, and cumulative impacts from the larger sector development targeted by these PAs.	resettlement. This will require plans to minimize and / or mitigate any adverse impact. GH production relies on the use of fresh water. Based on this estimate, water requirements for electrolysis would consume at most around 0.05 percent of India's water supply. While at an aggregate level, water consumption for electrolysis appears to be a minor issue, it will be important to plan facilities in areas which do not already suffer from water stress.
Prior Action #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; (b) GH safe storage and handling; and (c) GH utilization in the mobility sector	**Positive impact**. Adequate and appropriate standards and norms are being specified for production and transportation of green hydrogen, especially relevant to safety aspects. These standards and norms will help the development of the sector in the best possible manner, minimizing safety risks to third parties and communities.	No foreseen adverse poverty and social impacts.
Prior Action #3: The Borrower, through the MoP, has notified extension of the waiver of	**Positive impact**. By facilitating easier transmission of GH this policy action will facilitate replacing generation from	No foreseen adverse poverty and social impacts.

Prior Action	Significant positive or negative environmental effects	Significant poverty, social or distributional effects positive or negative
the ISTS charges towards consumption of RE for GH and its derivatives production for projects to be commissioned until December 31, 2030.	non-renewable sources otherwise required to meet the energy demand. Therefore, similar to PA #1, this PA will reduce GHG emissions, improve (local) air quality, reduce water pollution and generation of solid wastes — all to provide substantial environmental benefits. With respect to potential expansion of the GH transmission pipelines, the current environmental impact assessment regulations are adequate to manage the potential environmental impacts.	
Pillar 2: Scaling Up Renewable Energy		
Prior Action #4: The Borrower, through the MoP, has issued a government order on: (a) RPOs; and (b) ESOs that mandate the purchase of a minimum specified share of power consumption from RE and energy storage, respectively, for all electricity distribution utilities.	**Positive impact**. As above, the GoI plan is to establish 500 GW of renewables by 2030, avoiding the need for an equal capacity of non-renewable power generation. All RE purchase agreements facilitate the GoI plan to increasingly transition away from use of conventional energy. The RPO and the Energy Storage Obligation will help to achieve the targets for generation and use of renewable power, consequently avoiding the huge possible GHG emission, pollution, impacts on forests and biodiversity.	**Neutral poverty impacts foreseen in the short-term.** Potential spill-over gains in the long term, as the PA contributes to strengthen the business and regulatory environment for inclusive green growth. The adoption of and Energy Storage Obligation will have a positive health impact.
Prior Action #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 PSH.	**Positive impact.** This will help expansion of BESS in India. The BESS can significantly lower environmental impacts compared to conventional simultaneous generation, transmission and use 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. Similar to Policy Action 3, this will also help in achieving the overall RE generation and use targets, and thereby avoid the possible pollution and damage to the natural resources and biodiversity if non-renewable generations were to be expanded.	**Neutral poverty impacts foreseen in the short-term.** Potential spill-over gains in the long term, as the PA contributes to strengthen the business and regulatory environment for inclusive green growth. BESS will result in additional employment opportunities. This will also have a positive impact on health as there will be reduced pollution. **Potential Concern**: BESS may lead to both land acquisition and involuntary resettlement.

Prior Action	Significant positive or negative environmental effects	Significant poverty, social or distributional effects positive or negative
	Country systems and institutional capacities will need to be strengthened. The huge scope of BESS might create local environmental impacts based on location and size of each individual storage facilities. Avoidance or minimization of such local impacts on forests, natural resources, biodiversity is currently covered under the applicable regulations. 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 adequate 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 World Bank and the GoI will discuss potential technical assistance to mitigate some of the E&S risks, for example, handling of disposal sites in the country for the end-of-life disposal of solar panels given the potential largescale development of solar PV.	
Prior Action #6: The Borrower, through the MNRE, has issued an implementation regulation to guide the bidding of 50 GW of RE capacity, including solar PV, wind, and firm power from RE and energy storage,	The World Bank and the GoI will discuss potential technical assistance to mitigate some of the E&S risks, for example, handling of disposal sites in the country for the end-of-life disposal of solar panels given the potential largescale development of solar PV.	**Potential Concern**: large scale solar PV/wind may lead to both land acquisition and involuntary resettlement.

Prior Action	Significant positive or negative environmental effects	Significant poverty, social or distributional effects positive or negative
each year from FY23-24 to FY27-28.		
Prior Action #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 towards offshore wind until December 31, 2032	**Positive impact**. India has a huge potential for offshore wind power generation. The MNRE has identified the priority blocks of 37 GW and 36 GW, respectively in Gujarat and Tamil Nadu. These priority blocks are consistent with the strategic environmental assessment completed by the National Centre for Sustainable Coastal management (of the MoEFCC) that delineated priority offshore wind energy blocks that avoid flight routes of migratory birds, avoid impacts on corals, mangroves, and other important coastal and marine biodiversity hotspots. Development of these priority offshore wind energy blocks will help to achieve the overall RE targets in India by 2030, same as in the case of PA #1, and consequently avoid the possible pollution and damage to the natural resources and biodiversity if non-renewable generations were to be established. On the other hand, even if the National wind Policy (2015) guides the offshore wind energy projects (of which 4 GW is expected to be bid out by 2025) to obtain regulatory approvals for environmental impact assessment, the current relevant environmental impact assessment regulations do not mandate any such regulatory clearances for these projects. Depending on the actual landfall of the power transmission facilities, such projects will need regulatory clearance under the Coastal Zone Management regulations, and therefore are likely to avoid significant impact impacts on mangroves and other protected forests and ecological resources.	**Positive impact on poverty reduction and inclusive growth.** This action can generate employment opportunities and boost growth in the wind power sector, conditional on addressing financial and non-financial barriers to RE technologies, and losses of livelihoods during the transition. In the long-term, boosting REs can generate health and productivity co-benefits of clean air.

Prior Action	Significant positive or negative environmental effects	Significant poverty, social or distributional effects positive or negative
Prior Action #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.	**Positive Impact:** India has already established more than 64 GW of solar power capacity (as part of the 169 GW of RE already in place) and an additional 60 GW solar power projects are in various stages of implementation. More solar power generation is expected as part of the GoI's plan for production of a total of 240 GW solar power (as part of the overall plan for establishing 500 GW of RE) by 2030. The already installed solar PV projects are successfully operated, and have reduced GHG emission successfully, and going forward additional Solar PV generation will reduce GHG emission further. This policy action will facilitate achieving the larger target of generation and use of RE, thus replacing the need for non-renewables, and consequently avoiding the possible pollution and damage to the natural resources and biodiversity if non-renewable generations were to be established. The World Bank and the GoI will discuss potential technical assistance to mitigate some of the E&S risks, for example, handling of disposal sites in the country for the end-of-life disposal of solar panels given the potential largescale development of solar PV	**Positive Impact on poverty reduction and inclusive growth.** This action can generate employment opportunities and boost growth in the solar power sector, conditional on addressing financial and non-financial barriers to RE technologies, and losses of livelihoods during the transition. In the long-term, boosting REs can generate health and productivity co-benefits of clean air **Potential Concern**: large scale solar PV may lead to both land acquisition and involuntary resettlement
Pillar 3: Enhancing climate finance for low-carbon energy investments		
Prior action #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 MoEFCC, has approved GHG mitigation	**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. The potential for market for carbon credits in India will continue to grow, given that global carbon market is also growing. As the largest exporter of carbon credits, India's	**Neutral poverty impacts foreseen in the short-term.** Potential spill-over gains in the long term, as the PA contributes to strengthen the business and regulatory environment for green growth.

Prior Action	Significant positive or negative environmental effects	Significant poverty, social or distributional effects positive or negative
activities, including green hydrogen, green ammonia, RE with storage, and offshore wind to be eligible for international carbon market to mobilize international financing under the Paris Agreement.	own uniform national carbon market is expected to bring in a large finance avenue for energy transition projects and emission reduction.	
Prior Action #10: The Borrower, through SEBI, has issued amendments to the existing regulatory framework for GDS issuance, to specify the taxonomy and definition of GDS to include the emerging areas of sustainable financing and improve the information disclosure standards.	**Positive impacts**. Green bonds will eventually encourage public and private 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 impacts foreseen in the short-term.** Potential spill-over gains in the long term, as the PA contributes to strengthening the business and regulatory environment for green growth.
Prior Action #11: The Borrower, through the MoF, has issued a transparent Sovereign Green Bond Framework for evaluating, selecting, and financing green public spending, including on green hydrogen, solar and wind energy, pursuant to which a separate reserve/corpus fund titled 'Sovereign Green Fund' has been created.	**Positive Impact:** This policy action will facilitate achieving the larger target of generation and use of RE through incentivizing creation of adequate energy storage systems, and thus replacing the need for non-renewables, consequently avoiding the possible pollution and damage to the natural resources and biodiversity if non-renewable generations were to be established. The current regulatory framework and institutional capacities to manage impacts on natural resources, ecology and environment from pumped storage projects are adequate.	**Neutral poverty impacts foreseen in the short-term.** Potential spill-over gains in the long term, as the PA contributes to strengthening sustainable financing for green growth.