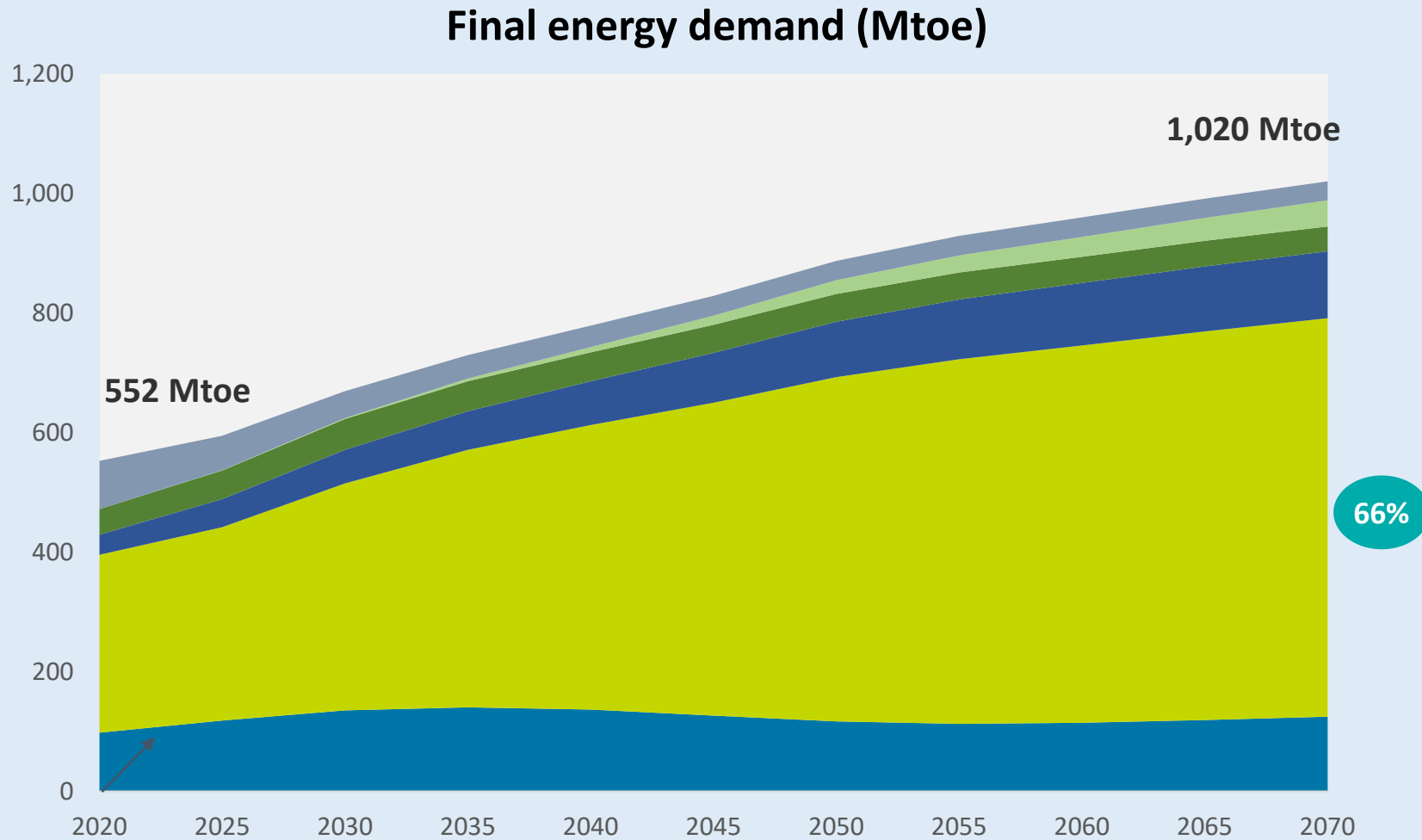


India: Low-Carbon Energy Programmatic DPO

Surbhi Goyal
Senior Energy Specialist
The World Bank

May 9, 2024

The Industrial Sector is the Main Driver for Future Growth of Energy and Emissions in India



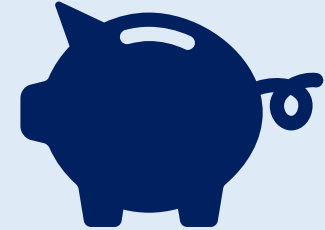
Green Hydrogen is a Promising Solution, but there are Several Barriers



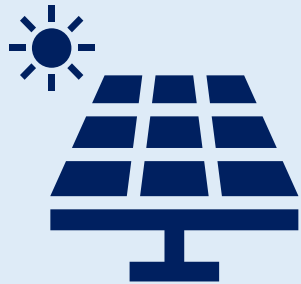
High Cost



Storage and Transportation



Commercial Financing



**Competing Demand
for RE**

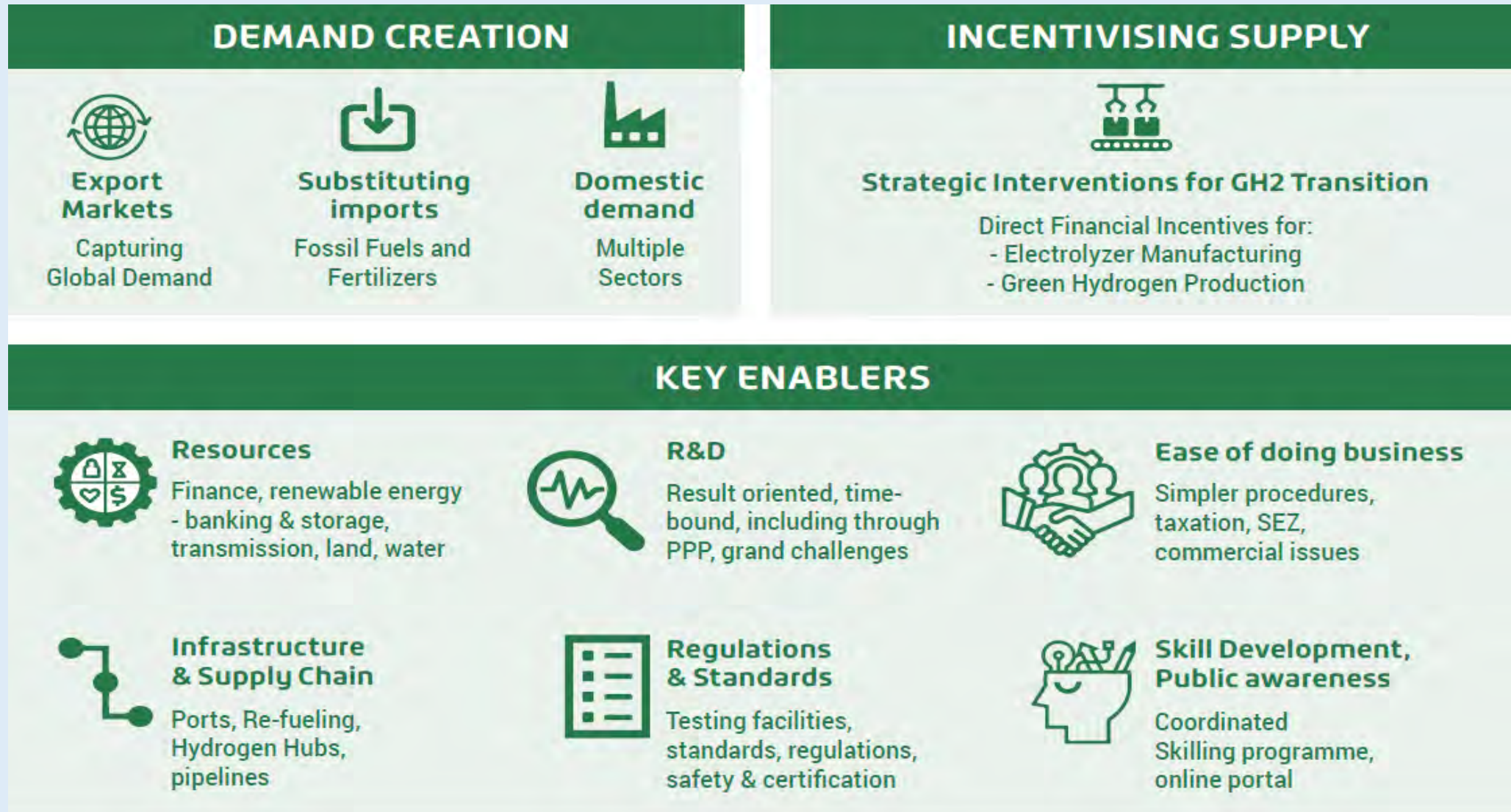


Safety

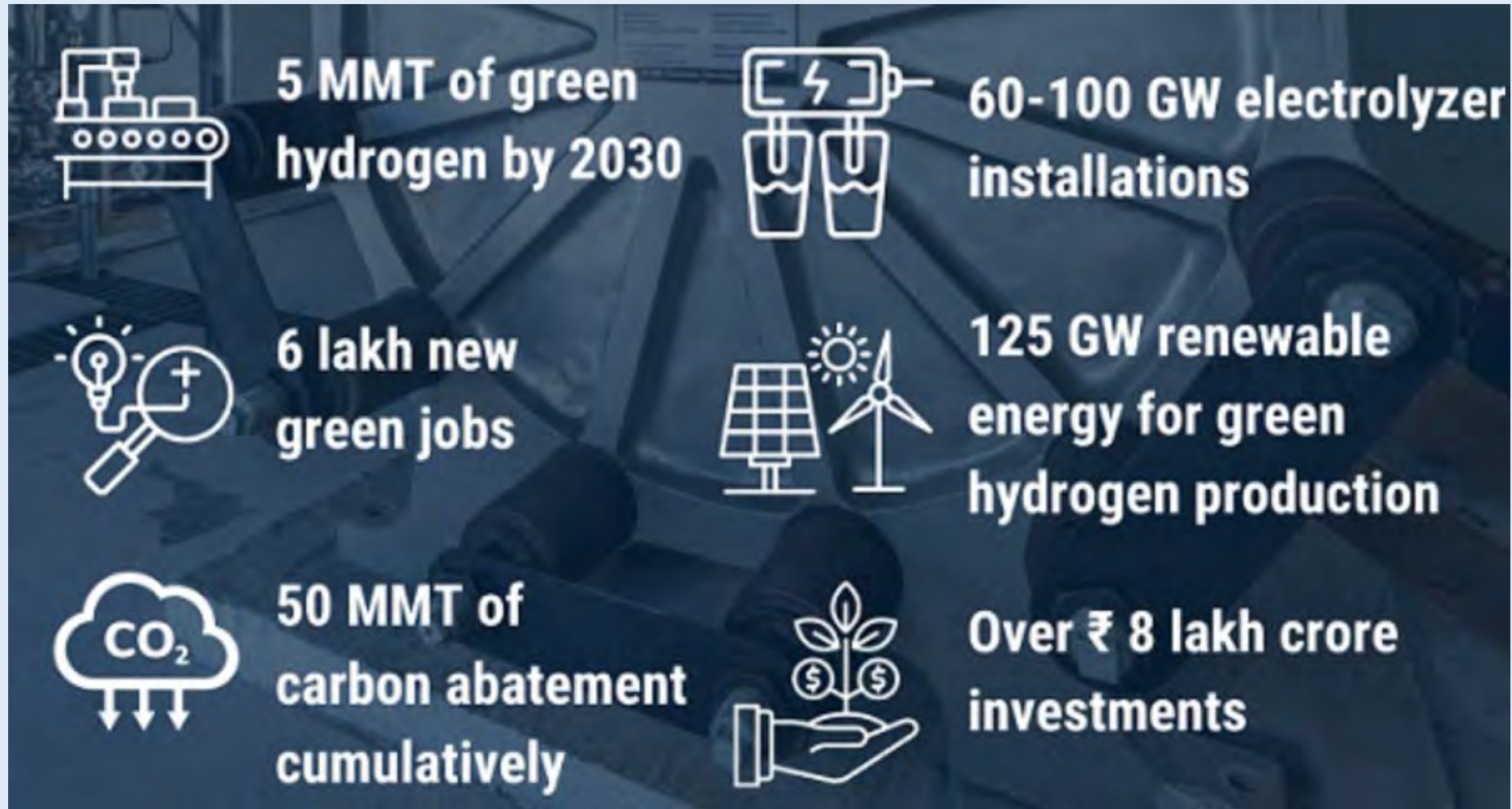


Skilled People

India issued US\$2.4 bn National Green Hydrogen Mission (NGHM) in January 2023

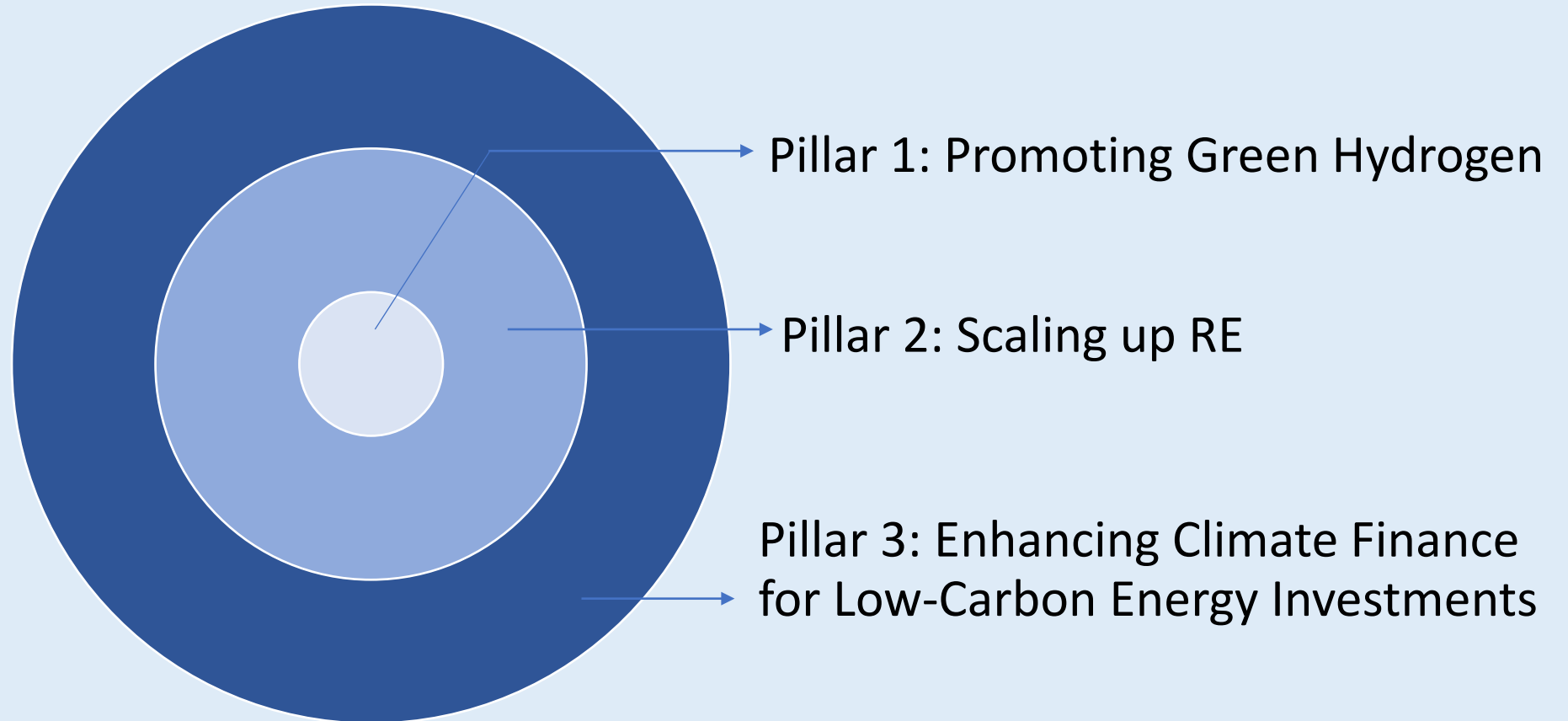


NGHM Targets to Achieve:



India Low-Carbon Energy Programmatic DPO: US\$3 Bn Support

Objective: To accelerate the development of low-carbon energy in India



Results: 75 GW of RE enabled, 450,000 tons of GH incentivized, and 40 million tons of GHG emissions avoided

India Low-Carbon Energy DPO-1: Prior Actions

Pillar 1: Promoting Green Hydrogen

- PA1: The Borrower has approved the **NGHM**
- PA2: The Borrower has issued GH safety regulations, **standards, codes**, best practices, and procedures
- PA3: The Borrower has notified extension of the waiver of the inter-state **transmission charges** towards RE for GH

Pillar 2: Scaling Up Renewable Energy

- PA4: The Borrower has issued a government order on RE Purchase **Obligations** and Energy Storage Obligations
- PA5: The Borrower has issued and notified the **Ancillary Services** Regulations
- PA6: The Borrower has issued a regulation to guide the **bidding of 50 GW of RE** capacity each year FY23-28
- PA7: The Borrower has adopted an **offshore wind** strategy; and has extended the waiver of the inter-state transmission charges for offshore wind
- PA8: The Borrower has issued a policy to provide production-linked incentives to **high-efficiency solar PV**

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

- PA9: The Borrower has amended the Energy Conservation Act that provide the legal framework for the launch of a **national carbon market**
- PA10: The Borrower has issued amendments to the existing regulatory framework for **Green Debt Securities** issuance
- PA11: The Borrower has issued a transparent Sovereign **Green Bond Framework**

India Low-Carbon Energy DPO-2: Prior Actions

Pillar 1: Promoting Green Hydrogen

- PA1: The Borrower has notified the *incentive schemes for GH production and electrolyzer manufacturing*, and appointed SECI as the implementing agency to manage the incentive schemes
- PA2: The Borrower has issued guidelines for transparent and competitive bidding process on the *demand aggregation model* to increase the domestic consumption of GH and green ammonia in key demand sectors
- PA3: The Borrower has notified a *GH standard*

Pillar 2: Scaling Up Renewable Energy

- PA4: The Borrower has amended the Indian Electricity *Grid Code*
- PA5: The Borrower has approved an incentive scheme for *battery* energy storage system

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

- PA6: The Borrower has notified the *Carbon Credit Trading Scheme*
- PA7: The Borrower has issued a regulatory framework for *Environment, Social and Governance* Disclosures, Ratings, and Investing

What Led to this DPO?

World Bank's Early Engagement and Strong Analytical Base

National Level

- **Deep Dive into five sectors and identifying early points for investment**
- **Bridging the Gap between Grey and Green Hydrogen** - in partnership with Global Green Growth Institute (GGGI)
- **Green Hydrogen Hubs:**
 - Geospatial mapping of GH hubs
 - Support to MNRE in drafting GH Hub Policy
- **Skill Development**
 - Developing job roles, training content, Training the Trainers,
- **Desalination of Water and its Possible applications in GH**

Central (Utility) Level

- **Damodar Valley Corp (DVC)** – potential installation of GH plant in one of its old (to be retired) TPS.
- **Steel Authority of India Limited (SAIL)** – an assessment of H2DRI application in its Alloy Steel Plant
- **Petroleum and Natural Gas Regulatory Board (PNGRB)** – Assessment of regulatory, technical and commercial implications on blending of H2 in the existing pipelines and plan for 100% H2 pipelines.

State Level

- **Kerala** – potential support to GH Hubs
- **Himachal Pradesh** – Inclusion of GH in the state's Energy Policy; Roadmap for GH economy in the state

- Working with other GPs especially transport (on maritime/ports) and environment (on green coastal zone management).
- Working with IFC (technical experts reviewed the deliverables; financing options) and MIGA (on financing options)

Efforts of the GOI are Showing Results Now..

SECI's Hydrogen Tender For Selection of Electrolyser Manufacturers Based on Any Stack Technology Under SIGHT Program (Bucket-I): Auction Results

MERCOM
INDIA RESEARCH

Bidder/Developer	Capacity	Maximum Incentive Allocation	
	(MW/annum)	(₹ Billion)	(~\$ Million)
Reliance Electrolyser Manufacturing	300	4.44	53.60
Ohmium Operations	137	2.03	24.51
John Cockerill Greenko Hydrogen Solutions	300	4.44	53.60
Advait Infratech (Consortium with Rajesh Power Service)	100	1.48	17.87
Jindal India	300	4.44	53.60
L&T Electrolysers	63	0.93	11.26
Total	1,200		

Note: \$1 = ₹82.81

* NOTE - L&T Electrolysers won 63 MW/annum out of the 300 MW/annum capacity quoted

...as Evident from the Tender Results

SECI's 410,000 MT Green Hydrogen Production under SIGHT Program Tranche 1 : **MERCOM** Auction Results (Bucket I)

INDIA RESEARCH

Bidder/Developer	Capacity	Average Incentive	
	MT	(₹/kg)	(~\$/kg)
UPL Limited	10,000	0.00	0.000
CESC Projects	10,500	0.00	0.000
Reliance Green Hydrogen and Green Chemicals	90,000	18.90	0.227
Welspun New Energy	20,000	20.00	0.240
HHP Two	75,000	25.04	0.301
Torrent Power	18,000	28.89	0.347
Acme Cleantech Solutions	90,000	30.00	0.360
Greenko ZeroC	90,000	30.00	0.360
JSW Neo Energy	6,500	34.66	0.416
Total	410,000		

Note: \$1 = ₹83.31

* NOTE - JSW Neo Energy won 6,500 MT out of the 10,000 MT capacity quoted

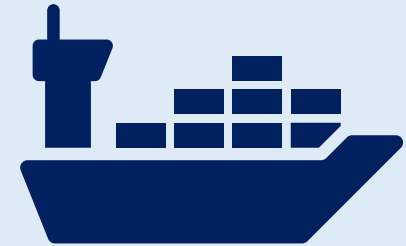
Scheme Guidelines Issued to Promote Demand, Pilot Projects in:



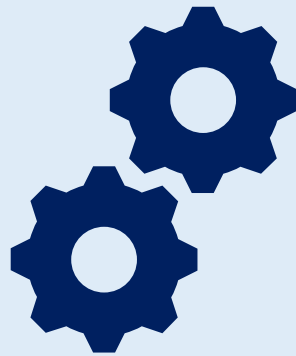
Fertilizers



Refineries



Shipping

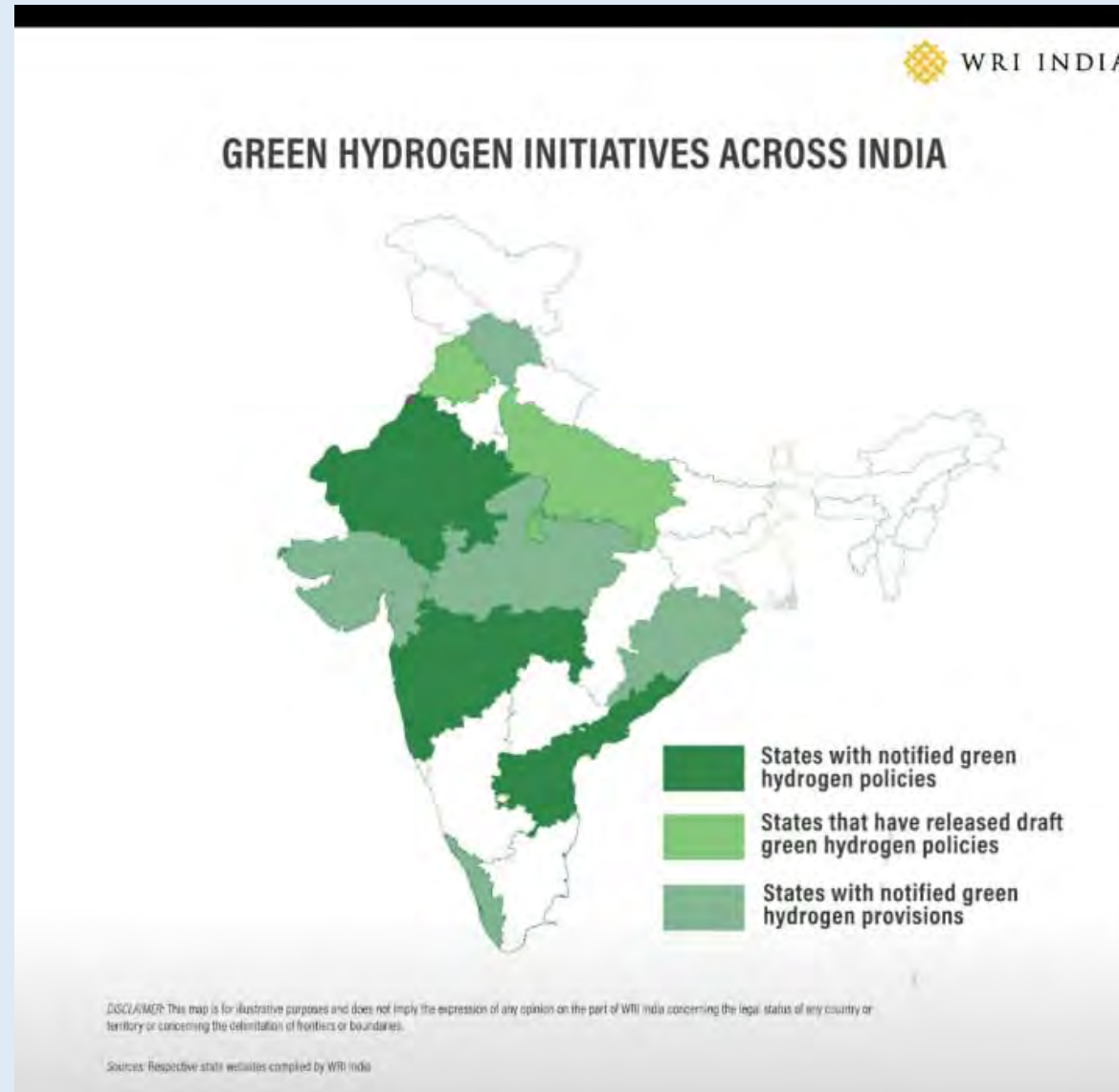


Steel



Transport

In addition to the Central Level Interventions, the States have also come forward





Thank You!

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