



# ANIL: Green Hydrogen Ecosystem

Investor Field Tour to Mundra organized by CLSA

Nov 2022



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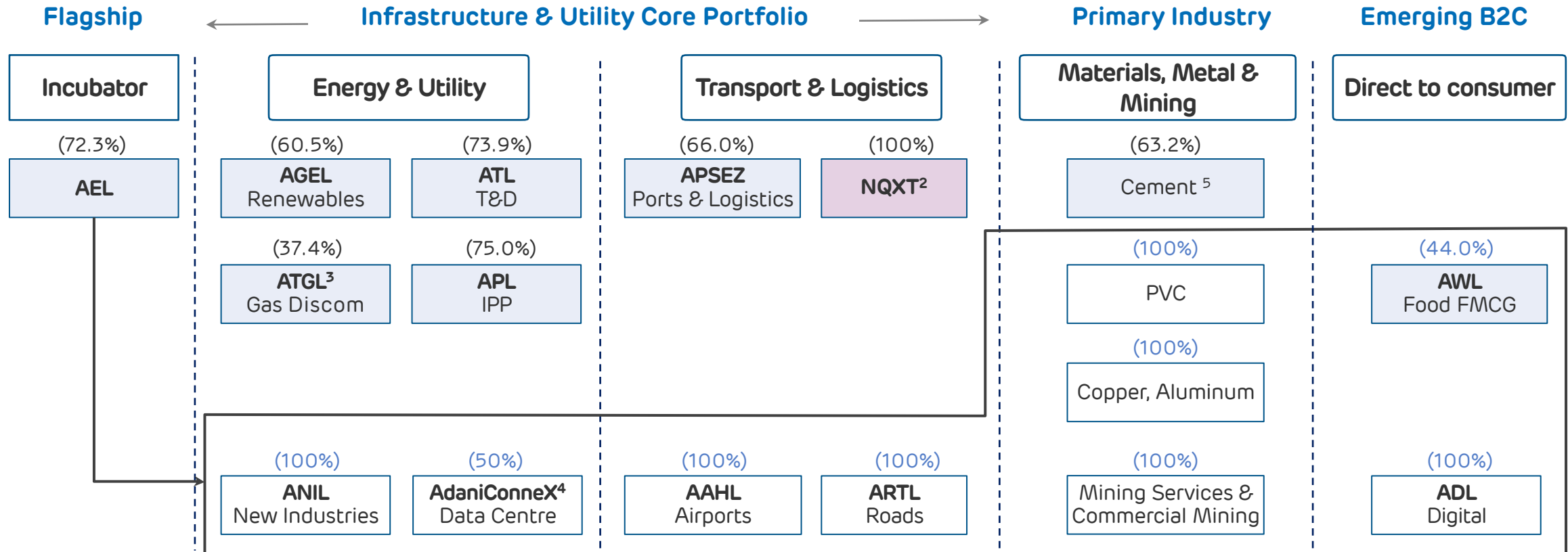
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Adani Portfolio Overview

# Adani: A World Class Infrastructure & Utility Portfolio

**adani** ~USD 240 bn<sup>1</sup> Combined Market Cap



(%): Promoter equity stake in Adani Portfolio companies (%) : AEL equity stake in its subsidiaries

- Represents public traded listed verticals

## A multi-decade story of high growth centered around infrastructure & utility core

1. Combined market cap of all listed entities as on Sep 30, 2022, USD/INR – 81.55 | 2. NQXT: North Queensland Export Terminal | 3. ATGL: Adani Total Gas Ltd, JV with Total Energies | 4. Data center, JV with EdgeConnex, AEL: Adani Enterprises Limited; APSEZ: Adani Ports and Special Economic Zone Limited; ATL: Adani Transmission Limited; T&D: Transmission & Distribution; APL: Adani Power Limited; AGEL: Adani Green Energy Limited; AAHL: Adani Airport Holdings Limited; ARTL: Adani Roads Transport Limited; ANIL: Adani New Industries Limited; AWL: Adani Wilmar Limited; ADL: Adani Digital Limited; IPP: Independent Power Producer  
5. Cement business includes 63.15% stake in Ambuja Cement which in turn owns 50.05% in ACC Limited. Adani directly owns 6.64% stake in ACC Limited. Ambuja and ACC together have a capacity of 66 MTPA, which makes it the second largest cement manufacturer in India.

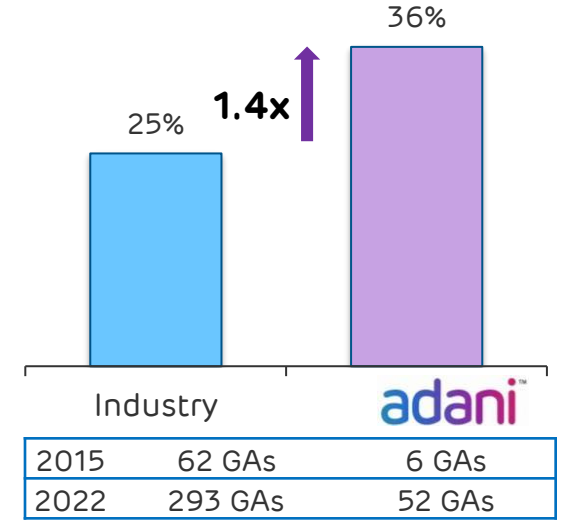
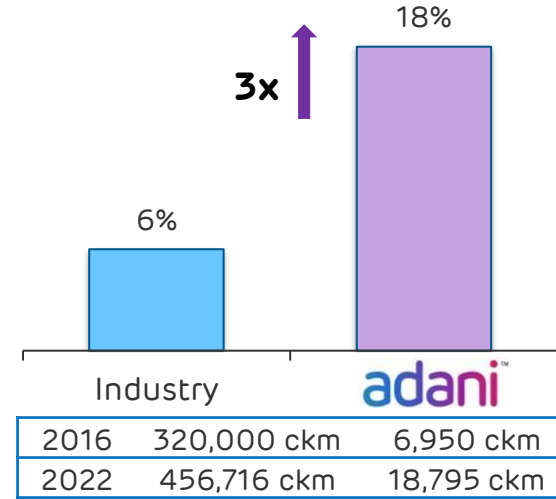
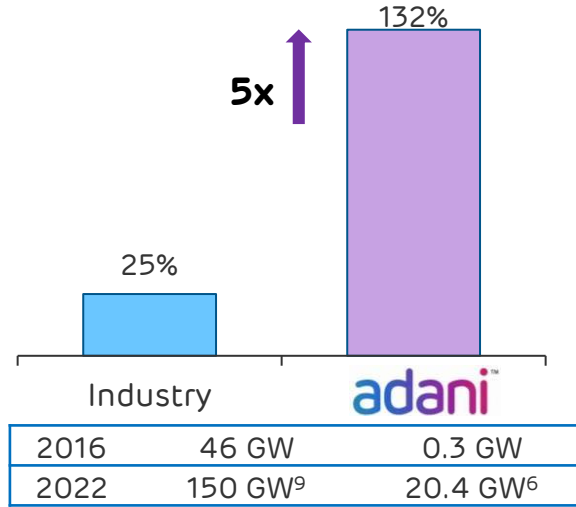
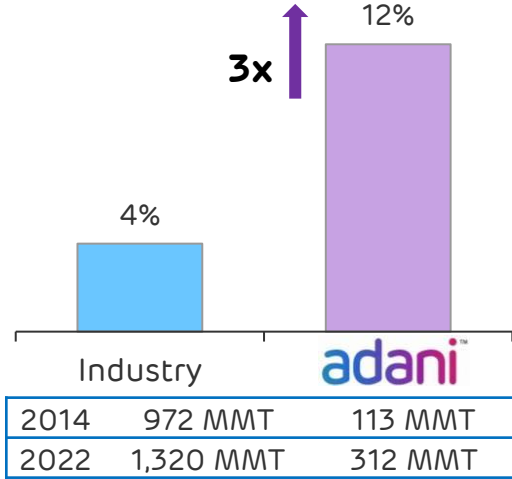
# Adani Portfolio: Decades long track record of industry best growth rates across sectors

Port Cargo Throughput (MMT)

Renewable Capacity (GW)

Transmission Network (ckm)

CGD<sup>7</sup> (GAs<sup>8</sup> covered)



## APSEZ

Highest Margin among Peers globally  
**EBITDA margin: 70%**<sup>1,2</sup>  
 Next best peer margin: 55%



## AGEL

World's largest developer  
**EBITDA margin: 92%**<sup>1,4</sup>  
 Among the best in Industry



## ATL

Highest availability among Peers  
**EBITDA margin: 92%**<sup>1,3,5</sup>  
 Next best peer margin: 89%



## ATGL

India's Largest private CGD business  
**EBITDA margin: 41%**<sup>10</sup>  
 Among the best in industry

**Transformative model driving scale, growth and free cashflow**

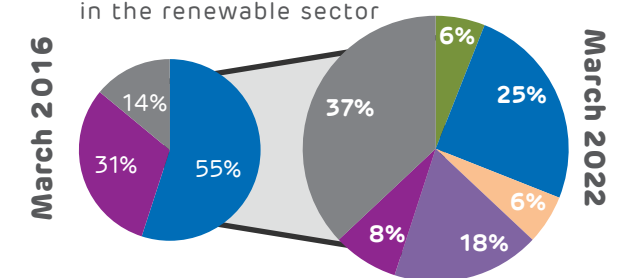
Note: 1. Data for FY22; 2. Margin for ports business only, Excludes forex gains/losses; 3. EBITDA = PBT + Depreciation + Net Finance Costs – Other Income; 4. EBITDA Margin represents EBITDA earned from power supply; 5. Operating EBITDA margin of transmission business only, does not include distribution business. 6. Contracted & awarded capacity 7. CGD: City Gas distribution 8. GAs - Geographical Areas - Including JV | Industry data is from market intelligence 9. This includes 17GW of renewable capacity where PPA has been signed and the capacity is under various stages of implementation and 29GW of capacity where PPA is yet to be signed' 10. Data for FY21

# Adani Portfolio: Repeatable, robust & proven transformative model of investment



	Origination	Site Development	Construction	Operation	Capital Mgmt
Activity	<ul style="list-style-type: none"> <li>Analysis &amp; market intelligence</li> <li>Viability analysis</li> <li><b>Strategic value</b></li> </ul>	<ul style="list-style-type: none"> <li>Site acquisition</li> <li>Concessions &amp; regulatory agreements</li> <li><b>Investment case development</b></li> </ul>	<ul style="list-style-type: none"> <li>Engineering &amp; design</li> <li>Sourcing &amp; quality levels</li> <li><b>Equity &amp; debt funding at project</b></li> </ul>	<ul style="list-style-type: none"> <li><b>Life cycle O&amp;M planning</b></li> <li>Asset Management plan</li> </ul>	<ul style="list-style-type: none"> <li>Redesigning <b>capital structure</b> of assets</li> <li><b>Operational phase funding consistent with asset life</b></li> </ul>

Performance	<p>India's Largest Commercial Port (at Mundra)</p> <p>▼</p> <p>Highest Margin among Peers</p>	<p>Longest Private HVDC Line in Asia (Mundra - Mohindergarh)</p> <p>▼</p> <p>Highest line availability</p>	<p>648 MW Ultra Mega Solar Power Plant (at Kamuthi, TamilNadu)</p> <p>▼</p> <p>Constructed and Commissioned in nine months</p>	<p>Energy Network Operation Center (ENOC)</p> <p>▼</p> <p>Centralized continuous monitoring of plants across India on a single cloud based platform</p>	<ul style="list-style-type: none"> <li>First ever GMTN of USD 2 bn by an energy utility player in India - an SLB in line with COP26 goals - at AEML</li> <li>AGEL's tied up "Diversified Growth Capital" with revolving facility of USD 1.35 bn - will fully fund its entire project pipeline</li> <li>Issuance of 20- &amp; 10-years dual tranche bond of USD 750 mn - APSEZ the only infrastructure company to do so</li> <li>Green bond issuance of USD 750 mn establishes AGEL as India's leading credit in the renewable sector</li> </ul>
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O&M: Operations & Maintenance, HVDC: High voltage, direct current, PSU: Public Sector Undertaking (Public Banks in India), GMTN: Global Medium-Term Notes SLB: Sustainability Linked Bonds, AEML: Adani Electricity Mumbai Ltd. IG: Investment Grade, LC: Letter of Credit, DII: Domestic Institutional Investors, COP26: 2021 United Nations Climate Change Conference; AGEL: Adani Green Energy Ltd.

# ANIL: Emulating Adani's Business Philosophy



# 02

ANIL Introduction and Overview



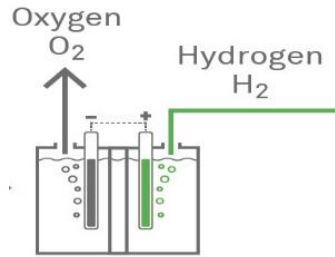
# Introduction to Green Hydrogen (GH2)

Green H2 is made from electrolysis of water using RE and can substitute fossil fuel in the form of H2 or derivatives such as Ammonia, Methanol, etc.

## Renewable Energy



## Green H2 plant



(58 Kwh/Kg-H2)

## Manufacturing ecosystem



## Green H2 & Derivatives



Ammonia (NH<sub>3</sub>) Synthesis  
(0.18 t-H<sub>2</sub>/ t-NH<sub>3</sub>)



Methanol (CH<sub>3</sub>OH) Synthesis  
(0.18 t-H<sub>2</sub>/ t-CH<sub>3</sub>OH)

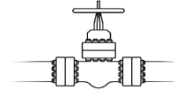


Others

## Green H2 Applications



Mobility – Fuel Cells  
(H<sub>2</sub> as fuel: Tracks & Buses)



City Gas Distribution  
(Up to 15% H<sub>2</sub> blending in CGD)



Refinery  
(Hydrocracking, Desulphurization)



Green Fertilizers  
(Urea, DAP)



Diesel Blending  
(Methanol Blending)



Green Steel  
(Iron ore reduction)



Marine Fuel  
(Ammonia, Methanol)



Industries  
(Chemical Feedstock)

Green H2 Form  
H<sub>2</sub>

H<sub>2</sub>

H<sub>2</sub>

NH<sub>3</sub>

CH<sub>3</sub>OH

H<sub>2</sub>

NH<sub>3</sub> & CH<sub>3</sub>OH

Application  
Dependent

### Key

20 GW RE

generates

1 Mtpa H2

generates

5.6 Mtpa  
Ammonia

OR

10 Mtpa  
Urea

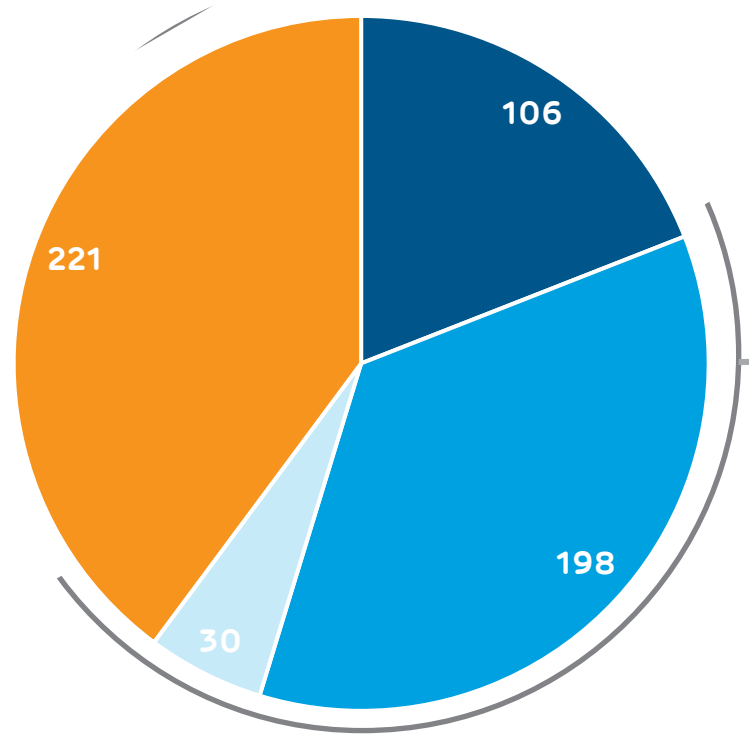
OR

5.3 Mtpa  
Methanol

# Why Green Hydrogen – India Story

MtOe

India's Final Energy Consumption



■ Electricity ■ Crude/Oil Products ■ Gas ■ Coal

## Green H2 – Moving from Greening the Grid to Greening Industry and Mobility

~53% of Gas and ~85% of Oil imported for a net import bill of USD 113 Bn in FY22

Green H2 and derivatives can substitute use of fossil fuels in industry thus reducing import requirements

Green H2 and derivatives are also an option for hard to abate sectors such as fertilizers, steel and refineries

Source: MOSPI (Ministry of Statistics and Program Implementation) report on Energy Statistic – FY21 (P)

MTOE: Million Tonnes of Oil Equivalent; 1 MTOE is equivalent to 0.35 Million tonnes of Hydrogen on Lower Heating Value (LHV) basis | RE: Renewable Energy

# Why Green Hydrogen – India Story

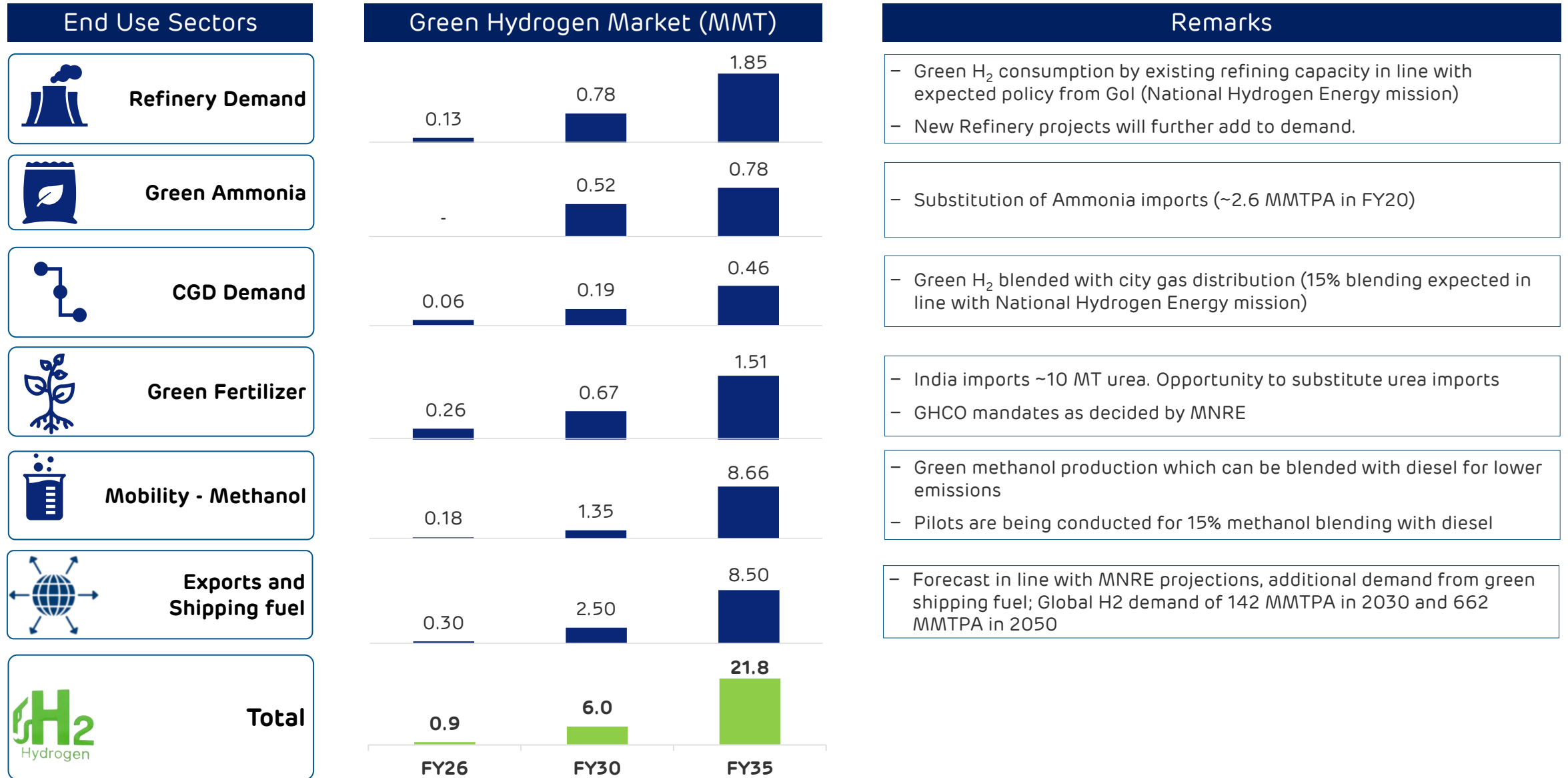
## Decarbonization: “Panchamrit” strategy (COP26)

- 1 500 GW non-fossil energy capacity by 2030
- 2 50% of India’s energy requirements from RE by 2030
- 3 Reduction in total projected carbon emissions by 1 Bn Tons between 2022 & 2030
- 4 Reduction in carbon intensity of the economy by 45% by 2030, over 2005 levels
- 5 Target of net zero emissions by 2070

## Supportive policy environment

- 1 National Green Hydrogen Mission Phase-1 launched on 17<sup>th</sup> Feb 2022
- 2 Phase 1 included supply side incentives such as ISTS charges waiver, banking
- 3 Green Hydrogen Consumption Obligations (GHCO) for end-use sectors
- 4 Support for value chain through PLI e.g., for Solar and possibly electrolyzers
- 5 Other measures such as ALMM, BCD

# Green Hydrogen – Massive potential to decarbonize industries



# About Adani New Industries Limited (ANIL): Designed to win in the Green H2 market

## What it takes to win

### 1 Lowest cost Green Electron



- Input power cost accounts for ~70% of cost of Green Hydrogen
- Economies of scale to facilitate lowest per unit cost infrastructure such as pipelines

### 2 End-to-end supply chain and resource control



- Execution Risk mitigated by full integration of supply chain
- Tighter control on cost and resources

### 3 Integrated Green H2 ecosystem



- Integrated development across the value chain – pipelines/transport options, storage facilities, port facilities and terminals



## How we are delivering it

### Large scale with high quality resources

- Investment of **USD 50 bn** by 2030 in Green H<sub>2</sub> ecosystem
- 20 GW+ high quality co-located wind and solar at first location in Gujarat, near Mundra

### Mine to module manufacturing ecosystem

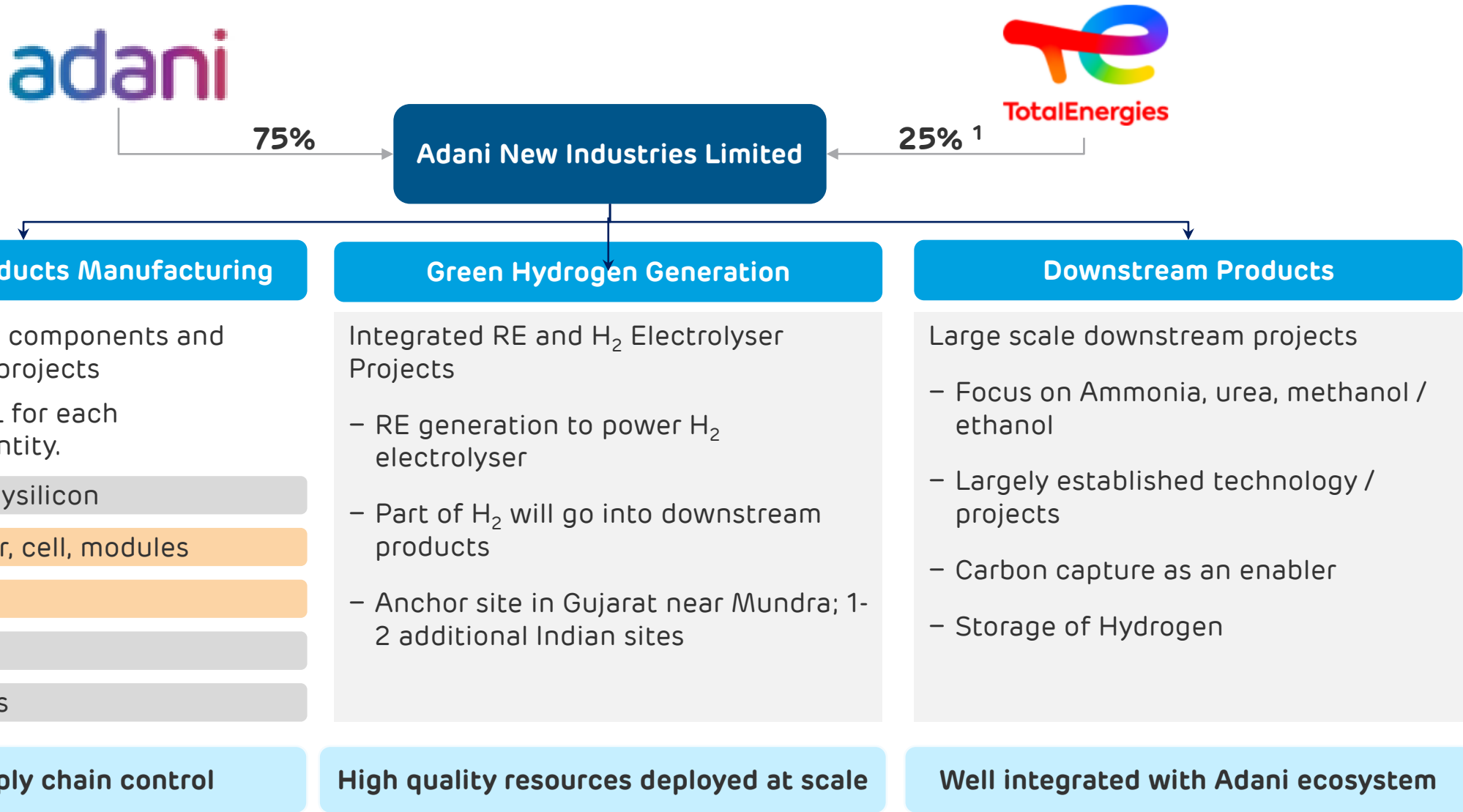
- All key components of Green H<sub>2</sub> projects within ANIL – Solar, wind, electrolyzers
- More than 85% of value of modules within Mundra ecosystem

### Leveraging broader Adani ecosystem – RE, Ports, Logistics, Gas

- Green H<sub>2</sub> consumption and industrial hub at Mundra, Gujarat
- Plug and play infrastructure at Mundra along with potential off-takers




**Decarbonize and deliver the lowest cost green molecule to transform India's energy landscape**

# ANIL: Structure Business Segments



1. Adani Enterprises Ltd (AEL) and Total Energies of France have entered into a binding arrangement for partnership to jointly create the world's largest green hydrogen ecosystem.

# Manufacturing footprint: Focus on key inputs to the Hydrogen value chain

Manufacturing Businesses	Capacities by 2025	Key Highlights
 <p><b>Solar Modules</b></p>	<p><b>MG Silica: 35 KTPA</b>  <b>Poly: 30 KTPA</b>  <b>Ingot/Wafer: 10 GW</b>  <b>Cells: 10 GW</b>  <b>Modules: 10 GW</b></p>	<ul style="list-style-type: none"> <li>- Existing 2 GW of cell and module manufacturing facility; Additionally upgrading 1.5 GW to 2 GW TOPCon</li> <li>- More than 5+ years of experience in cell and module manufacturing</li> <li>- <b>Full backward integration starting from silicon till modules</b></li> </ul>
 <p><b>WTG</b></p>	<p><b>WTG Mfg.: 3 GW</b></p>	<ul style="list-style-type: none"> <li>- <b>Prototype deployed</b></li> <li>- <b>Manufacturing Turbine, Nacelle &amp; Rotor Blades</b></li> <li>- Technology partnership with well known global player</li> </ul>
 <p><b>Electrolyser</b></p>	<p><b>Electrolyser Mfg.: 5 GW</b></p>	<ul style="list-style-type: none"> <li>- <b>Backward integration for supply assurance and cost efficiency</b></li> <li>- Focus on reduction in stack &amp; BOP cost through indigenization and scale</li> <li>- Manufacturing will cover multiple technologies such as Alkaline and PEM</li> </ul>

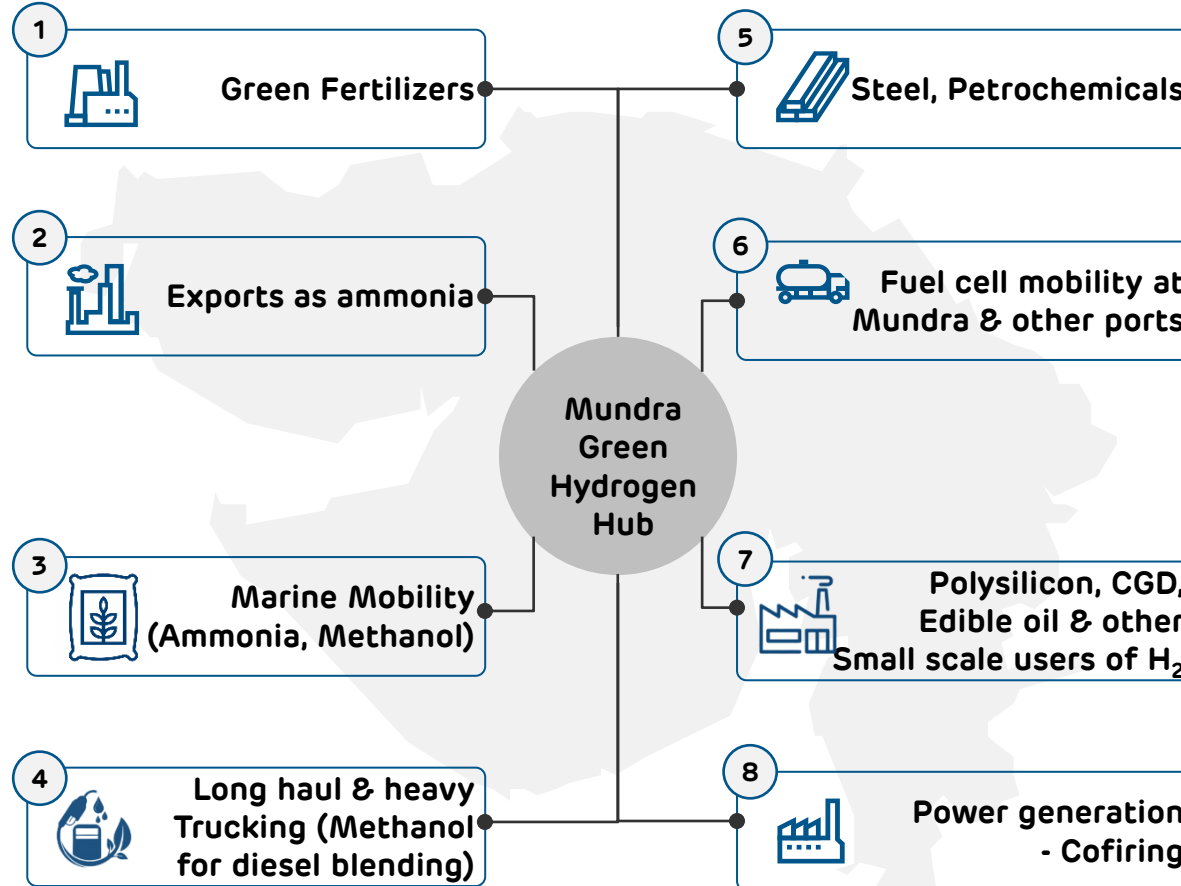
**ANIL:** Adani New Industries Limited; **AGEL:** Adani Green Energy Limited; **TOPCon:** Tunnel oxide passivated contact technology; **HJT:** Heterojunction technology; **WTG:** Wind Turbine Generator; **PEM:** Polymer electrolyte membrane; **KTPA:** kilo ton per annum; **RE:** Renewable Energy;

# Ecosystem: The largest integrated Green Hydrogen Hub in the world at Mundra SEZ

## Full suite of Hydrogen offerings ...

RE capacity directly connected	~50 GW
Green Hydrogen	Upto 2.5 MMTPA
Green Ammonia	Upto 7.5 MMTPA
Green Methanol	Upto ~1.7 MMTPA
Hydrogen Compression & Storage	Supports 1.5 MMTPA ecosystem
Other technologies (LH <sub>2</sub> , LOHC)	Available as required

## ... For multiple end uses including substantial captive use in Adani Portfolio businesses ...



## ... And backed by credible action on ground



**Only Hydrogen Hub developed by a player with**

- Renewable and Port infrastructure expertise
- Downstream demand



**Backed by ongoing investments**

- Polysilicon capacity (30 KMTA by FY25)
- MOU with POSCO for integrated Green Steel plant



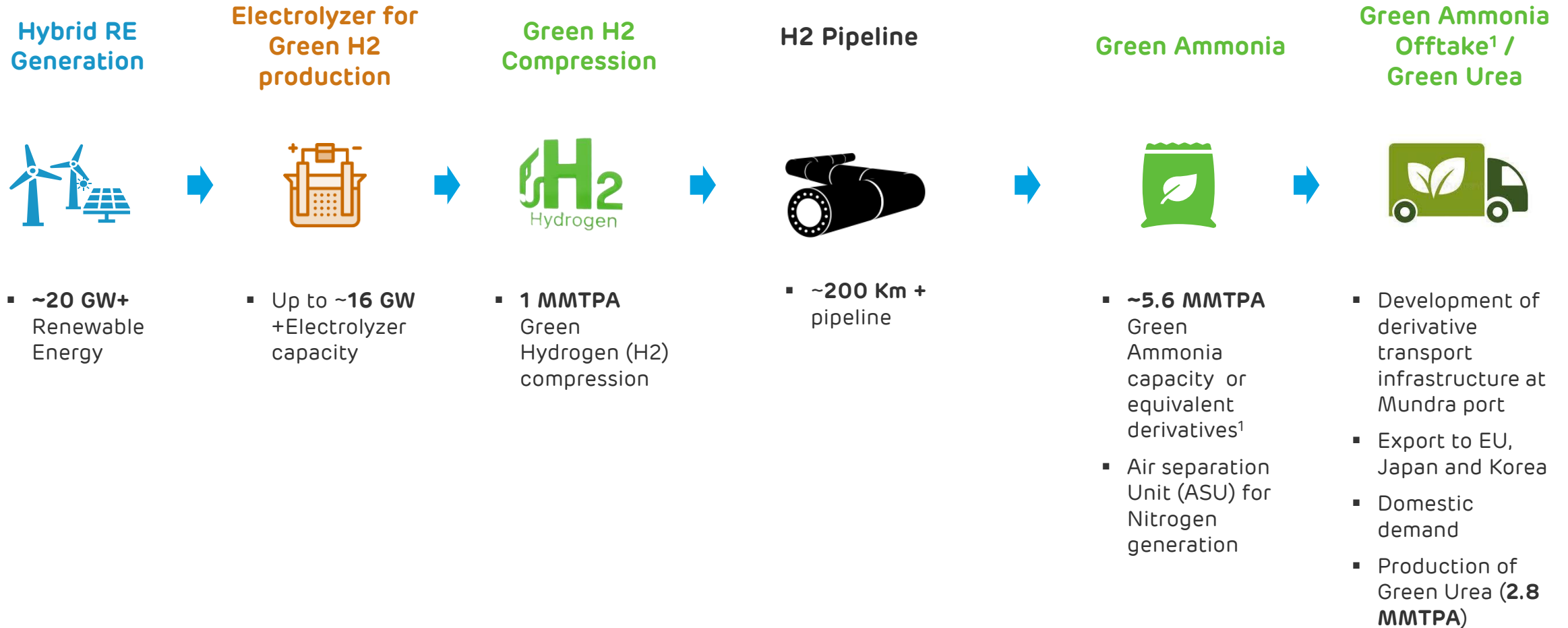
**Enabling infrastructure in place**

- Logistics network to North India hinterland
- Handling of Methanol / fuels, RE and power
- Demand from edible oil



# ANIL: Green Hydrogen Ecosystem for First phase of 1.0 MMTPA

Key components of the project which is to be executed for 1.0 MMTPA Green H2 ecosystem include:



1. We will also look at methanol production or LH2 possibilities as per Carbon Dioxide (CO2) availability and market study

**Thank You**