ANIL: Green Hydrogen Ecosystem
Investor Field Tour to Mundra organized by CLSA
Nov 2022
<table>
<thead>
<tr>
<th></th>
<th>Contents</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Adani Portfolio Overview</td>
</tr>
<tr>
<td>2</td>
<td>ANIL Introduction and Overview</td>
</tr>
</tbody>
</table>
Adani: A World Class Infrastructure & Utility Portfolio

Flagship
- Incubator
  - AEL
  - (72.3%)

Infrastructure & Utility Core Portfolio
- Energy & Utility
  - AGEL Renewables
    - (60.5%)
  - ATL T&D
    - (73.9%)
  - ATGL3
    - Gas Discom
    - (37.4%)
  - APL IPP
    - (75.0%)

- Transport & Logistics
  - APSEZ Ports & Logistics
    - (66.0%)
  - NQXT
    - (100%)

- Primary Industry
  - Materials, Metal & Mining
    - (63.2%)
  - Cement
    - (100%)
  - PVC
    - (100%)
  - Copper, Aluminum
    - (100%)
  -采矿服务及商业采矿
    - (100%)

- Emerging B2C
  - Direct to consumer
    - (44.0%)
  - AWL
    - 食品快速消费品
    - (100%)
  - ADL
    - 数字
    - (100%)

( %): 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

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

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

**Port Cargo Throughput (MMT)**
- Industry 2014: 972 MMT, 2022: 1,320 MMT
- Adani 2014: 113 MMT, 2022: 312 MMT

**Renewable Capacity (GW)**
- Industry 2016: 46 GW, 2022: 150 GW
- Adani 2016: 0.3 GW, 2022: 20.4 GW

**Transmission Network (ckm)**
- Industry 2016: 320,000 ckm, 2022: 456,716 ckm
- Adani 2016: 6,950 ckm, 2022: 18,795 ckm

**CGD\(^7\) (GAs\(^8\) covered)**
- Industry 2015: 62 GAs, 2022: 293 GAs
- Adani 2015: 6 GAs, 2022: 52 GAs

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

**Phases**
- **Origination**
  - Analysis & market intelligence
  - Viability analysis
  - Strategic value
- **Site Development**
  - Site acquisition
  - Concessions & regulatory agreements
  - Investment case development
- **Construction**
  - Engineering & design
  - Sourcing & quality levels
  - Equity & debt funding at project
- **Operation**
  - Life cycle O&M planning
  - Asset Management plan
- **Capital Mgmt**
  - Redesigning capital structure of assets
  - Operational phase funding consistent with asset life

**Performance**
- **India’s Largest Commercial Port** (at Mundra)
  - Highest Margin among Peers
- **Longest Private HVDC Line in Asia** (Mundra - Mohindergarh)
  - Highest line availability
- **648 MW Ultra Mega Solar Power Plant** (at Kamuthi, Tamil Nadu)
  - Constructed and Commissioned in nine months
- **Energy Network Operation Center (ENOC)**
  - Centralized continuous monitoring of plants across India on a single cloud based platform

**Notes**

**March 2016**
- PSU
- Pvt. Banks
- Bonds
- DII
- Global Int. Banks
- PSU – Capex LC

---

- First ever GMTN of USD 2 bn by an energy utility player in India - an SLB in line with COP26 goals - at AEML
- AGEL’s tied up ‘Diversified Growth Capital’ with revolving facility of USD 1.35 bn - will fully fund its entire project pipeline
- Issuance of 20- & 10-years dual tranche bond of USD 750 mn - APSEZ the only infrastructure company to do so
- Green bond issuance of USD 750 mn establishes AGEL as India’s leading credit in the renewable sector
ANIL: Emulating Adani’s Business Philosophy

**Development**

- **Large Integrated Platform**
  - Platform uniquely positioned to offer scale and high efficiencies
  - Integrated platform -> Lowest cost of energy -> Lowest cost for all products in value chain

- **Energy Infrastructure Expertise**
  - Adani expertise in building and operating energy infrastructure assets across entire value chain

- **Regulatory Framework**
  - National Green Hydrogen Mission launched
  - Several production linked and capex linked incentives for Green H₂ ecosystem

**Operations**

- **De-risking Capex**
  - Next generation technologies to stay ahead of the curve
  - Integrated Manufacturing
  - Partnership with industry leading technology partners

- **Adopting Global Standards**
  - Adopting Global Green Hydrogen standard making it ready to export
  - Globally accepted Highest manufacturing quality standards

- **Efficient Capital Management**
  - Capital management plan in line with underlying business philosophy
  - Diversification of funding sources

**Value Creation**

- **Strategic Location**
  - Mundra SEZ: Integrated Green H₂ Hub
    - Land availability, supporting infrastructure, large existing industry cluster
  - Khavda: Green H₂ Generation Hub

- **Technology enabled Operations**
  - ENOC
    - Analytics driven O&M with AI based technology to maximize generation and perform predictive maintenance

- **Sustainability Focus**
  - Several environmental and social activities undertaken at Mundra: Water conservation, afforestation, community, health and education infrastructure for local communities

H₂: Hydrogen; RE: Renewable Energy; GW: Gigawatt; ENOC: Energy Network Operation Centre; AI: Artificial Intelligence; O&M: Operation & Maintenance; SEZ: Special Economic Zone
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

- **Oxygen (O2)**
- **Hydrogen (H2)**

(58 Kwh/Kg-H2)

Manufacturing ecosystem

**Green H2 & Derivatives**

- Ammonia (NH3) Synthesis
  - (0.18 t-H2/ t-NH3)

- Methanol (CH3OH) Synthesis
  - (0.18 t-H2/ t-CH3OH)

- Others

**Green H2 Applications**

- Mobility – Fuel Cells
  - (H2 as fuel: Tracks & Buses)
- City Gas Distribution
  - (Up to 15% H2 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**

- H2
- NH3
- CH3OH

**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

India's Final Energy Consumption

- Electricity: 221 MtOE
- Crude/Oil Products: 106 MtOE
- Gas: 198 MtOE
- Coal: 30 MtOE

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 17th 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

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
Green Hydrogen – Massive potential to decarbonize industries

<table>
<thead>
<tr>
<th>End Use Sectors</th>
<th>Green Hydrogen Market (MMT)</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Refinery Demand</td>
<td>0.13 0.78 1.85</td>
<td>- Green H₂ consumption by existing refining capacity in line with expected policy from GoI (National Hydrogen Energy mission)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- New Refinery projects will further add to demand.</td>
</tr>
<tr>
<td>Green Ammonia</td>
<td>- 0.52 0.78</td>
<td>- Substitution of Ammonia imports (~2.6 MMTPA in FY20)</td>
</tr>
<tr>
<td>CGD Demand</td>
<td>0.06 0.19 0.46</td>
<td>- Green H₂ blended with city gas distribution (15% blending expected in line with National Hydrogen Energy mission)</td>
</tr>
<tr>
<td>Green Fertilizer</td>
<td>0.26 0.67 1.51</td>
<td>- India imports ~10 MT urea. Opportunity to substitute urea imports</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- GHCO mandates as decided by MNRE</td>
</tr>
<tr>
<td>Mobility - Methanol</td>
<td>0.18 1.35 8.66</td>
<td>- Green methanol production which can be blended with diesel for lower emissions</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Pilots are being conducted for 15% methanol blending with diesel</td>
</tr>
<tr>
<td>Exports and Shipping fuel</td>
<td>0.30 2.50 8.50</td>
<td>- Forecast in line with MNRE projections, additional demand from green shipping fuel; Global H₂ demand of 142 MMTPA in 2030 and 662 MMTPA in 2050</td>
</tr>
<tr>
<td>Total</td>
<td>0.9 6.0 21.8</td>
<td></td>
</tr>
</tbody>
</table>

GHCO: Green Hydrogen Consumption Obligation; CGD: City Gas Distribution; MMT: Million Metric Tons; MT: Metric Tons; MNRE: Ministry of New & Renewable Energy; H₂: Hydrogen; GoI: Government of India
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 H2 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 H2 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 H2 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
Adani New Industries Limited

**Supply Chain Products Manufacturing**
- Manufacture key components and materials for RE projects
- Independent P&L for each manufacturing entity.

- Solar – MG and Polysilicon
- Solar – Ingot, wafer, cell, modules
- WTG
- Electrolysers
- Battery & Fuel cells

**Green Hydrogen Generation**
- Integrated RE and H₂ Electrolyser Projects
  - RE generation to power H₂ electrolyser
  - Part of H₂ will go into downstream products
  - Anchor site in Gujarat near Mundra; 1-2 additional Indian sites

**Downstream Products**
- Large scale downstream projects
  - Focus on Ammonia, urea, methanol / ethanol
  - Largely established technology / projects
  - Carbon capture as an enabler
  - Storage of Hydrogen

End-end supply chain control
High quality resources deployed at scale
Well integrated with Adani ecosystem

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

<table>
<thead>
<tr>
<th>Manufacturing Businesses</th>
<th>Capacities by 2025</th>
<th>Key Highlights</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solar Modules</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MG Silica:</td>
<td>35 KTPA</td>
<td>– Existing 2 GW of cell and module manufacturing facility; Additionally upgrading 1.5 GW to 2 GW TOPCon</td>
</tr>
<tr>
<td>Poly:</td>
<td>30 KTPA</td>
<td>– More than 5+ years of experience in cell and module manufacturing</td>
</tr>
<tr>
<td>Ingot/Wafer:</td>
<td>10 GW</td>
<td>– Full backward integration starting from silicon till modules</td>
</tr>
<tr>
<td>Cells:</td>
<td>10 GW</td>
<td></td>
</tr>
<tr>
<td>Modules:</td>
<td>10 GW</td>
<td></td>
</tr>
<tr>
<td>WTG Mfg.:</td>
<td>3 GW</td>
<td>– Prototype deployed</td>
</tr>
<tr>
<td></td>
<td></td>
<td>– Manufacturing Turbine, Nacelle &amp; Rotor Blades</td>
</tr>
<tr>
<td></td>
<td></td>
<td>– Technology partnership with well known global player</td>
</tr>
<tr>
<td>Electrolyser Mfg.:</td>
<td>5 GW</td>
<td>– Backward integration for supply assurance and cost efficiency</td>
</tr>
<tr>
<td></td>
<td></td>
<td>– Focus on reduction in stack &amp; BOP cost through indigenization and scale</td>
</tr>
<tr>
<td></td>
<td></td>
<td>– Manufacturing will cover multiple technologies such as Alkaline and PEM</td>
</tr>
</tbody>
</table>

**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 (LH2, LOHC): Available as required

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

1. Green Fertilizers
2. Exports as ammonia
3. Marine Mobility (Ammonia, Methanol)
4. Long haul & heavy Trucking (Methanol for diesel blending)
5. Steel, Petrochemicals
6. Fuel cell mobility at Mundra & other ports
7. Polysilicon, CGD, Edible oil & other Small scale users of H2
8. Power generation - Cofiring

... 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 KMTPA 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

RE: Renewable Energy; PVC: Polyvinyl chloride; MMTPA: Million Metric Tons Per Annum; LH2: Liquid Hydrogen; LOHC: Liquid Organic Hydrogen Carrier; CGD: City Gas Distribution; KMTPA: Kilo Metric Tons Per Annum; GW: Gigawatt; MOU: Memorandum of Understanding; SEZ: Special Economic Zone
Key components of the project which is to be executed for 1.0 MMTPA Green H2 ecosystem include:

- **Hybrid RE Generation**
- **Electrolyzer for Green H2 production**
- **Green H2 Compression**
- **Green Ammonia Offtake**
- **Green Urea**

- ~20 GW+ Renewable Energy
- Up to ~16 GW Electrolyzer capacity
- 1 MMTPA Green Hydrogen (H2) compression
- ~200 Km + pipeline
- ~5.6 MMTPA Green Ammonia capacity or equivalent derivatives
- Development of derivative transport infrastructure at Mundra port
- Export to EU, Japan and Korea
- Domestic demand
- Production of Green Urea (2.8 MMTPA)

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