PETROCHEMICAL INDUSTRY IN INDIA: VISION 2025 & BEYOND

INDIACHEM 2018

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PRESENTATION OUTLINE

- About SABIC
- Indian Chemical Industry
- Feedstock Challenges
- PCPIR: An Enabling Concept
- Collaboration & Partnership as Way Forward
SABIC AT-A-GLANCE

1976
Company established

34,000
Employees around the world

50
Countries of operations

3rd
Largest global chemical company*

120th
Largest public company in the world*

4
Core businesses

86
US$ B**
Total assets

4.9
US$ B**
Net income

39.9
US$ B**
Annual revenue

≈ 150
New products each year

11,534
Global patent filings

64
World-class plants worldwide

*Forbes 2018  **Billion
SABIC IN INDIA - 25 YEARS JOURNEY

SABIC FOR INDIA MANUFACTURING/VADODARA

- Total Area: 29 Acre
- Compounding Plant
  - Plant Start up: Q4 1993
  - Product Capability: Advanced engineering compounded thermoplastics
- Sheet Plant
  - Plant Start up: Q4 2009
  - Product Capability: Roofing, Skylight, Cladding, Sound Barrier

SABIC WORLDWIDE BROUGHT TO INDIA SABIC INDIA PVT LTD, GURGAON

- Chemicals Business:
  - Olefins, Aromatics & Chlor Alkali, Glycols and Oxygenates, OXO alcohols, Linear Alpha Olefins (LAO)
- Polymers Business:
  - PP, LDPE, HDPE, LLDPE, PVC, PS, PET and range of Engineering Thermoplastics
- Agri-Nutrients Business:
  - AMMONIA, UREA & DAP

SABIC FOR THE WORLD SABIC TECHNOLOGY CENTER BENGALURU

- Land Area: 46 Acre
- Investment: > USD 100 Million
- Inaugurated in October 2013
- More than 360 research scientists & engineers
- 4 STAR GRIHA rating by ADaRSH LEED India - Gold certified/100% Export Oriented Unit for captive SABIC Research

VADODARA MANUFACTURING SITE

JUBAIL

GELEEN

BENGALURU RESEARCH CENTER
INDIAN CHEMICAL INDUSTRY
CHEMICALS : TOUCHING OUR LIVES

BIOTECHNOLOGY
AGRO CHEMICALS
PHARMACEUTICAL CHEMICALS
FINE CHEMICALS
PERFORMANCE CHEMICALS
SPECIALTY CHEMICALS
BULK INTERMEDIATES
BASIC CHEMICALS

TEXTILES
CONSUMER
APPLIANCES/ELECTRONICS
AUTOMOBILE INDUSTRY
ELECTRONICS
AGROCHEMICALS
PHARMACEUTICALS
MASS TRANSPORTATION
CONSTRUCTION
FRAGRANCES
FLAVOURS
AGRI-NUTRIENTS
Global Chemicals Market is expected to grow at CAGR ~4% from USD 4Tn Now to USD 6.7 Tn in 2030

Indian Chemical Industry expected to grow to US$300 billion (2025) at CAGR ~9%

Sources: IHS Markit, CEFIC, GOI website
Ethylene deficit to grow though current capacity addition may bring some respite for the next 2-3 years but urbanization will drive the demand in the long term.

Indicator: India’s urbanization will add another 315 million people to our cities; which is current population of US thus boosting demand by 2040

Source: IHS: Ethylene Chemical Economics Handbook, 31 May 2017
Ethylene demand growing with 11% CAGR and will crosses to 13 million metric tons by 2030. PE accounted for 66% of total ethylene demand, followed by EO (15%) and EDC (6.2%).

Source: IHS: Ethylene Chemical Economics Handbook, 31 May 2017
C2: ETHYLENE DEMAND (2018), INDIA

**Ethylene Prod. by Feedstock**
- Naphtha: 49%
- Ethane: 39%
- Propane: 9%
- Butane: 1%
- Others: 2%

**Global Ethylene Capacity**
- Total ~165 MMT
- NE Asia: 26%
- SE Asia: 7%
- N.America: 22%
- S.America: 3%
- Europe & CIS: 17%
- Africa: 1%
- M.East: 20%
- INS: 4%
- N.America: 22%
- NE Asia: 26%
- SE Asia: 7%
- M.East: 20%
- INS: 4%

Source: IHS: Ethylene Chemical Economics Handbook, 31 May 2017

Approx. 80% is consumed to make Polymers.
Propylene deficit to grow as the current capacity is likely to get absorbed in the long term.

PP accounted for more than 95% of the total propylene demand.

Source: IHS: Propylene Chemical Economics Handbook, 31 May 2017
C3: PROPYLENE DEMAND (2017), INDIA

Propylene demand by end use
Demand: 5.2 MMT

- Polyprolylene, 96%
- Butanols, 0.35%
- Isopropanol, 1.00%
- Oligomers, 0.30%
- PO, 1.00%
- 2 EH, 1.00%
- Cumene, 0.30%
- Others, 0.20%

Propylene by Process

- Steam Cracker, 34%
- Refinery Grade, 48%
- On purpose, 18%

Global Propylene Capacity
Total 124 MMT

- N.America
- S. America
- Europe & CIS
- Africa
- M.East
- INS
- NE Asia
- SE Asia

>95% percent propylene was consumed for polypropylene production.

Source: IHS: Propylene Chemical Economics Handbook, 31 May 2017
FEEDSTOCK CHALLENGES
### DEMAND-SUPPLY GAP PROJECTIONS FOR PRODUCTS

<table>
<thead>
<tr>
<th>Product</th>
<th>Capacity over 2017</th>
<th>Demand over 2017</th>
<th>Surplus/Deficit over 2017</th>
<th>Capacity over 2030</th>
<th>Demand over 2030</th>
<th>Surplus/Deficit over 2030</th>
<th>Capacity over 2040</th>
<th>Demand over 2040</th>
<th>Surplus/Deficit over 2040</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ethylene (Derived Demand)</td>
<td>6.26</td>
<td>5.25</td>
<td>1.10</td>
<td>12.96</td>
<td>(6.71)</td>
<td>24.88</td>
<td>(18.62)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Propylene (Derived Demand)</td>
<td>5.24</td>
<td>4.46</td>
<td>0.77</td>
<td>9.11</td>
<td>(3.88)</td>
<td>14.30</td>
<td>(9.06)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Styrene</td>
<td>-</td>
<td>0.69</td>
<td>(0.69)</td>
<td>1.23</td>
<td>(1.23)</td>
<td>1.73</td>
<td>(1.73)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Butadiene</td>
<td>0.56</td>
<td>0.28</td>
<td>0.29</td>
<td>0.75</td>
<td>(0.18)</td>
<td>1.42</td>
<td>(0.85)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Benzene</td>
<td>1.99</td>
<td>0.45</td>
<td>1.53</td>
<td>1.68</td>
<td>0.30</td>
<td>2.57</td>
<td>(0.58)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Methanol</td>
<td>0.27</td>
<td>1.97</td>
<td>(1.69)</td>
<td>3.64</td>
<td>(3.37)</td>
<td>5.54</td>
<td>(5.27)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

India needs continuous investments to avoid huge deficits over next 10-20 years.

Source: CPMA
FEEDSTOCK : STRATEGIC OPTIONS FOR INDIA

<table>
<thead>
<tr>
<th>NAPHTHA</th>
<th>ETHANE</th>
<th>COAL</th>
<th>INTERMEDIATES IMPORTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Naphtha constitutes for &gt;60% of feedstock for chemicals in India</td>
<td>US Ethane glut offer attractive opportunity as there is low cost feedstock.</td>
<td>Coal to Olefins is attractive option to monetize low cost coal.</td>
<td>Intermediates imports is a viable option for specialty chemicals due to its high value addition in the end stage</td>
</tr>
<tr>
<td>Naphtha has challenges of quality, pooling and fuel value</td>
<td>Requires large investments in gasification terminals, shipping, pipelines etc.</td>
<td>China is a leader in harnessing the potential to monetize low quality coal.</td>
<td>This is a practical and viable option and is recommended for India. The country has naturally adopted this route as it is a practical and viable option</td>
</tr>
<tr>
<td>Integrated refinery with HPFCC, naphtha availability will be challenge</td>
<td>Transportation is a challenge as compared to naphtha.</td>
<td>Established syngas route technologies to produce high purity ethylene &amp; propylene.</td>
<td></td>
</tr>
<tr>
<td>Small crackers by specialty chemicals industry is a possibility</td>
<td>Ethane based cracker offers less building blocks diversity.</td>
<td>Capital intensive; carbon footprints, low quality coal dampens the profits.</td>
<td></td>
</tr>
</tbody>
</table>

Incremental refinery expansion will not result in sufficient naphtha for total petrochemicals demand.
PCPIRs
PCPIR: AN ENABLING CONCEPT

- PCPIR envisioned in 2007 to harness benefits of co-siting, networking & greater efficiencies through common infrastructure and support services.
- Each PCPIR specifically delineated region has area of ~ 250 sq. km; 40% for processing.

**Dahej PCPIR**
- Anchor Tenant: ONGC Petro additions Limited
- Investment (made/committed): Rs. 85,928 crore
- Employment Generation: 1.32 lakh persons

**AP PCPIR**
- Draft Master Plan, EIA completed
- Investment (made/committed) Rs. 43,744 crore
- Employment Generation potential: 1.11 lakh persons

**Tamilnadu PCPIR**
- Investment (made/committed) Rs. 2100 crore
- Employment Generation: 13950 persons

**Paradeep PCPIR**
- Anchor Tenant: Indian Oil Corporation Limited
- Investment (made/committed): Rs. 45000 crore
- Employment Generation: 38000 persons

Note: PCPIR- Petroleum, Chemicals & Petrochemicals Investment Regions

1 sq. km = 247.1 acres
POLICY SUPPORT FOR PCPIR REALIZATION

Despite Strategic location; 100% FDI in chemicals sector PCPIR still need to reach full potential.

Opportunities
• Availability of **adequate land** with excellent connectivity
• Institutional mechanism for management & implementation.
• **Deregulated industry** and promotion of 100% FDI.
• Ready availability of technical and skilled manpower.
• Opportunities for investment through PPP mode and consortium with Indian partners.
• Investment in utilities and services.

Enablers
• Diligently planned land mapping in a **Master Plan** is advocated for the success of concept.
• Infrastructure and utilities/tank farms mapping & planning for Independent operators.
• **Single Environment Clearance** for whole PCPIR to eliminate long processing time.
• Key infrastructure for to be brought under the ambit of government.
  • Roads, airways, railways siding, Ports, desalinization units; Customs etc.
COLLABORATIONS & PARTNERSHIPS AS A WAY FORWARD
SUCCESSFUL PARTNERSHIPS: STRATEGIC DRIVERS & ENABLERS

- Secured feedstock at competitive prices
- Feedstock
- Infrastructure
- Modern infrastructure & efficient logistic network required across India
- Utilities
- Reliable utility supply & good infrastructure available in PCPIRs
- Market
- Good market access for locally produced & imported chemical products
- Partnership
- ‘Win-win’ & reliable partnerships with leading Indian Partners
- Policies
- Clear & simplified policies and approval systems for major petrochemical investments
- Successful Partnerships in India
- Good market access for locally produced & imported chemical products
- ‘Win-win’ & reliable partnerships with leading Indian Partners
- Clear & simplified policies and approval systems for major petrochemical investments
- Modern infrastructure & efficient logistic network required across India
- Reliable utility supply & good infrastructure available in PCPIRs
THANK YOU