Presentation on

“Supply Chain Management of LPG in India”

By: V Lakshminarayanan
Chief Manager (LPG–Operations)
Indian Oil Corporation
Contents

- Demand & Supply
- Sourcing of Product
- Storage & Bottling
- Transportation & Logistics
- Secondary Distribution Networks
- Future Plans
- Issues and Constraints
LPG SUPPLY CHAIN

**Bulk Movement**

- IMPORTS
- REFINERIES / FRACTIONATORS

**Packed Cylinder Movement**
LPG Distribution Network

- 22 Refineries (9.8 MMTPA)
- 10 Gas Fractionators (2.1 MMTPA)
- 14 Import Terminals (12.1 MMTPA)

<table>
<thead>
<tr>
<th>IOCL</th>
<th>BPCL</th>
<th>HPCL</th>
</tr>
</thead>
<tbody>
<tr>
<td>191 Bottling Plant</td>
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<tr>
<td>91</td>
<td>51</td>
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<table>
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<td>9911</td>
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<table>
<thead>
<tr>
<th>256.7 Million Customer</th>
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<tbody>
<tr>
<td>124.3</td>
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Contents

- Demand & Supply
  - Sourcing of Product
  - Storage & Bottling
  - Transportation & Logistics
  - Distribution Networks
  - Future Plans
  - Issues and Constraints
Year 2016 is declared as Year of LPG by Government of India.
Till 01.01.2016, the LPG penetration was only 56% of the population of the country.
There was a total of 148.6 Million customers.
As on 01.01.2019, the LPG penetration is 89% of population.
Today there is 256.7 Million customers.
Key growth drivers are
- Govt thrust to provide clean cooking fuel.
- Ease of availability.
- Increase in awareness level.
✓ About 4.5 Million cylinders bottled and delivered to customers house everyday

✓ 256.7 Million customers serviced by 22654 distributors across the country in 9088 markets

✓ 28 Million connections released during 2017-18 including 1.6 Crores PMUY connections

✓ 23.02 MMT LPG consumed during 2017-18 which included 20.3 MMT in domestic sector (88%)

✓ LPG constitutes about 11% of the Petroleum Product consumption in 2017-18
**Segments of Indian LPG Industry – 2018-19 (p)**

- **Domestic cooking fuel**
  - ✓ 14.2 Kg & 5 Kg Cylinders, home delivered through distributors.

- **Commercial usage**
  - 5 Kg, 19 Kg, 35 Kg, 47.5 Kg & 425 Kg delivered supply through distributors.

- **Industrial**
  - ✓ Delivered to Storage Tanks of Customers in bulk Tank Trucks.

- **Transport (Auto LPG)**
  - ✓ Through Retail Outlets Standalone or along with Gasoline/Diesel.
LPG Supply Demand – Last 10 Years

Increase in Demand: - 94.5%
Increase in Indigenous Production: -23%
Increase in Import: -378%

Increase in Demand
Increase in Indigenous Production
Increase in Import

Production
Demand
Imports

Fig in Million MTs

<table>
<thead>
<tr>
<th>Year</th>
<th>Production</th>
<th>Demand</th>
<th>Imports</th>
</tr>
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<tbody>
<tr>
<td>2009-10</td>
<td>10.30</td>
<td>-</td>
<td>2.53</td>
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<tr>
<td>2010-11</td>
<td>9.49</td>
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<tr>
<td>2011-12</td>
<td>9.44</td>
<td>-</td>
<td>5.50</td>
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<tr>
<td>2012-13</td>
<td>9.82</td>
<td>-</td>
<td>5.85</td>
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<td>2013-14</td>
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<tr>
<td>2014-15</td>
<td>9.72</td>
<td>-</td>
<td>8.27</td>
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<tr>
<td>2015-16</td>
<td>10.45</td>
<td>-</td>
<td>8.76</td>
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<td>2016-17</td>
<td>11.00</td>
<td>-</td>
<td>10.24</td>
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<tr>
<td>2017-18</td>
<td>12.30</td>
<td>-</td>
<td>11.10</td>
</tr>
<tr>
<td>2018-19</td>
<td>12.70</td>
<td>-</td>
<td>12.10</td>
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</tbody>
</table>

(P)
LPG Demand and Production – Projected

Demand increase projected by 26%
Production increase projected by 39%

Demand increase projected by 37%
Production increase projected by 3.5%

Almost 50% demand to be met by Imports
LPG Import - Projected

2018-19 to 2039-40
Import projected to increase by 98%
Segments of Indian LPG Industry

**2018-19**
- Domestic: 88%
- Non-Domestic: 9%
- Industry: 2%
- Transport: 0.9%

**2031-32**
- Domestic: 91.2%
- Non-Domestic: 5.5%
- Industry: 2.6%
- Transport: 0.7%

**Segment-wise Constant Growth**
Contents

- Demand & Supply
- Sourcing of Product
  - Storage & Bottling
  - Transportation & Logistics
  - Distribution Networks
- Future Plans
- Issues and Constraints
Bulk LPG Sources

- Indigenous Supplies from 23 Refineries & 11 Gas Fractionators
- Propane, Butane (50:50) & LPG Mix from Imports received at 11 Import Locations
- Road/Rail/Pipelines modes for moving bulk LPG from sources to Plants
- 747 TMT imported by Private Marketers in 2017-18 (6.4% of OMC imports)
<table>
<thead>
<tr>
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<th>Location</th>
<th>Capacity</th>
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<td>Barauni</td>
<td>0.37</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>Koyali</td>
<td>0.44</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td>Haldia</td>
<td>0.26</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>Mathura</td>
<td>0.38</td>
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<tr>
<td>5</td>
<td></td>
<td>Panipat</td>
<td>0.72</td>
</tr>
<tr>
<td>6</td>
<td></td>
<td>Guwahati</td>
<td>0.05</td>
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<td>7</td>
<td></td>
<td>Digboi</td>
<td>0.02</td>
</tr>
<tr>
<td>8</td>
<td></td>
<td>Bongaigaon</td>
<td>0.06</td>
</tr>
<tr>
<td>9</td>
<td></td>
<td>Paradip</td>
<td>0.9</td>
</tr>
<tr>
<td>10</td>
<td></td>
<td>Mumbai</td>
<td>3.3</td>
</tr>
<tr>
<td>11</td>
<td>HPC</td>
<td>Vizag</td>
<td>0.40</td>
</tr>
<tr>
<td>12</td>
<td></td>
<td>Bhatinda</td>
<td>0.88</td>
</tr>
<tr>
<td>13</td>
<td>BPC</td>
<td>Mumbai</td>
<td>0.38</td>
</tr>
<tr>
<td>14</td>
<td></td>
<td>Kochi</td>
<td>0.99</td>
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<td>15</td>
<td></td>
<td>Bina</td>
<td>0.22</td>
</tr>
<tr>
<td>16</td>
<td>CPCL(IOC)</td>
<td>Manali</td>
<td>0.34</td>
</tr>
<tr>
<td>17</td>
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<td>18</td>
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<td>Numaligarh</td>
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<td>19</td>
<td>ONGC</td>
<td>Tatipaka</td>
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<td>PSU Refineries</td>
<td>Jamnagar (DTA)</td>
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<td>21</td>
<td></td>
<td>Jamnagar (SEZ)</td>
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<tr>
<td>22</td>
<td>Private Refineries</td>
<td>Vadinar</td>
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<tr>
<td></td>
<td></td>
<td>All India</td>
<td>9.8</td>
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</table>
LPG Import Terminals (Existing & Upcoming)

Exiting Capacity = 10.70 MMTPA
Proposed Capacity = 4.96 MMTPA
Total Capacity = 15.66 MMTPA (by 2020-21)

- **IOC, Kandla** – 1.20
- **RIL, Jamnagar** – 0.48
- **SHV, Porbandar** – 0.36
- **Aegis, Pipavav** – 0.36
- **GCPTL, Dahej** – 0.24
- **Aegis, Mumbai** – 0.14
- **BPC, JNPT** – 0.60
- **Total, M’lore** – 0.36
- **HPC, M’lore** – 1.32
- **IOC, Cochin** – 0.6 (2020-21)
- **Adani, Mundra** – 1.36 (2019-20)
- **RIL, Jamnagar** – 0.48
- **SHV, Porbandar** – 0.36
- **IPPL, Haldia** – 1.70
- **IPPL, Vizag** – 0.50
- **IPPL, Ennore** – 1.32
- **BPC, Haldia** – 1.0
- **SA LPG, Vizag** – 1.0
- **EIPL, Vizag** – 0.50
- **IPPL, Ennore** – 1.32
- **SHV, Tuticorin** – 0.12
- **Aegis, Mumbai** – 0.14
- **BPC, JNPT** – 0.60
- **Aegis, Haldia** – 1.0
- **IOC, Paradip** – 2.0 (2020-21)
- **SHV, Porbandar** – 0.36
- **Aegis, Pipavav** – 0.36
- Only Butane imports till 2004-05
- Butane availability constraints and cheaper Propane compelled for Propane imports
- Optimization of available infrastructure in the Supply Chain
  - Propane import increased to more than 40%.
  - VLGC handling increased to approximately 65%.
## LPG Import Capacity

### Year

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<tr>
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<td>14.6</td>
<td>15.8</td>
<td>16.8</td>
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<tr>
<td>Import capacity</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>West: Total</td>
<td>4.7</td>
<td>5.1</td>
<td>7.44</td>
<td>8.94</td>
<td>8.94</td>
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<tr>
<td>South: Total</td>
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<td>4.8</td>
<td>5.4</td>
<td>5.4</td>
<td>5.4</td>
<td>5.4</td>
<td>5.4</td>
<td>5.4</td>
<td>5.4</td>
<td>5.4</td>
</tr>
<tr>
<td>East: Total</td>
<td>2.8</td>
<td>3.8</td>
<td>5.8</td>
<td>5.8</td>
<td>5.8</td>
<td>5.8</td>
<td>5.8</td>
<td>5.8</td>
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<td>5.8</td>
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<tr>
<td>Import Capacity Surplus</td>
<td>0.0</td>
<td>0.80</td>
<td>4.04</td>
<td>4.34</td>
<td>3.34</td>
<td>4.24</td>
<td>5.54</td>
<td>5.84</td>
<td>5.34</td>
<td>4.64</td>
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</tbody>
</table>

### All Nos. in MMTPA

- 2018-19: 12.9
- 2019-20: 14.6
- 2020-21: 15.8
- 2021-22: 16.8
- 2022-23: 15.9
- 2023-24: 14.6
- 2024-25: 14.3
- 2025-26: 14.8
- 2026-27: 15.5

### Import Capacity Surplus

- 2018-19: 0.80
- 2019-20: 4.04
- 2020-21: 4.34
- 2021-22: 3.34
- 2023-24: 5.54
- 2024-25: 5.84
- 2025-26: 5.34
- 2026-27: 4.64

**Adequate LPG Import Capacity**
Contents

- Demand & Supply
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Bottling Infrastructure

Total Bottling Capacity - 17.43 MMTPA

- BPCL, 3.97
- HPCL, 4.19
- IOCL, 9.27

91 Plants (55%)
52 Plants (23%)
48 Plants (22%)

- Bottling Plants planned and constructed nearer to demand centres & on logistic considerations.
- Excess capacity planned in the initial stage itself & cap. augmentation as per market demand / growth.
- Packed assistance from other PSU OMCs and private Bottlers on economic considerations.
- 2.8 MMTPA bottling capacity under construction by OMCs and PMs to come up by 2019-29.
- Bottling capacity of about 950 TMTPA (4% of OMC) by Private Marketers (PM).
LPG Bottling Infrastructure

As on 01.01.2019
Bottling Capacity in MMTPA

- IOC: 9.269
- BPC: 3.972
- HPC: 4.197

Total: 17.43

As on 01.04.2021
Bottling Capacity in MMTPA

- IOC: 14.020
- BPC: 6.514
- HPC: 5.247

Total: 25.78

54% Bottling Capacity Addition
Storage Infrastructure

Total LPG Tankage is 880 TMT

- Average bottling of 55 TMT/day.
- Average of 16 days coverage from Total Tankage.
- Average of 7 days coverage at Bottling Plants.
- About 33 TMT Augmentation undertaken at Bottling Plants.
LPG Storage Infrastructure

**LPG Tankage as on 01.01.2019**

- **880 TMT**
  - Plants: 363 TMT
  - Sources: 247 TMT
  - Import Terminals: 271 TMT

**LPG Tankage as on 01.04.2021**

- **980 TMT**
  - Plants: 404 TMT
  - Sources: 250 TMT
  - Import Terminals: 334 TMT

*Average 7 days cover at Bottling Plants & 7 days import tankage at import terminals*
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Modes of Transportation of Bulk LPG (2017-18)

- 14.2 MMT moved through trucks of different capacities (18MT / 7MT / 21MT / 12 MT)
- 1.5 MMT transported through Railway wagons.
- 9.5 MMT transported through pipelines of about 2000 KM length.
- New pipelines planned to increase the pipeline utilization to 60% by 2021-22.
- > 20000 trucks of different capacities (300/306/450/525) running on contract for packed LPG movement.
### LPG PIPELINES

#### Existing Pipelines

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<thead>
<tr>
<th>SN</th>
<th>Pipelines</th>
<th>OMC</th>
<th>Length (KMs)</th>
<th>Rated Capacity (MMTPA)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Jamnagar – Loni</td>
<td>GAIL</td>
<td>1201</td>
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<tr>
<td>2</td>
<td>Visakapatnam – Secunderabad</td>
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<tr>
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<td>Panipat – Jallundhar</td>
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<tr>
<td>4</td>
<td>Mangalore-Hassan – Mysore</td>
<td>HPC</td>
<td>356</td>
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<td>5</td>
<td>Paradip-Haldia-Durgapur</td>
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#### Under Implementation Pipelines:

<table>
<thead>
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<th>Pipelines</th>
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<th>Length (KMs)</th>
<th>Rated Capacity (MMTPA)</th>
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<tbody>
<tr>
<td>1</td>
<td>Durgapur – Barauni – Patna – Muzzafarpur</td>
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<td>568</td>
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<td>2</td>
<td>Uran – Chakan</td>
<td>HPC</td>
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<td>1.00</td>
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<td>3</td>
<td>Kochi – Coimbatore – Erobe – Salem</td>
<td>IOC &amp; BPC JV</td>
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<td>1.53</td>
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<td>4</td>
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<td>IOC/HPC/BPC JV</td>
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#### Proposed Pipelines:

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<td>5</td>
<td>Mundra – Kandla</td>
<td>IOC/HPC/BPC JV</td>
<td>90</td>
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<td>6</td>
<td>Hassan – Cherlapally</td>
<td>HPC</td>
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<td>7</td>
<td>Ennore – Trichy – Madurai</td>
<td>IOC</td>
<td>615</td>
<td>0.90</td>
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</tbody>
</table>
Contents

- Demand & Supply
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- Future Plans
- Issues and Constraints
LPG secondary Distribution

- Packed Cylinders – Domestic & Non-Domestic
  - Delivered through Distributors appointed by OMCs
  - LPG retailers for exclusive non-domestic cylinders
  - Business associates

- Bulk LPG to Commercial & Industrial Customers
  - Directly by the OMCs or through Business Associates.

- Automotive LPG
  - Through existing Retail outlets
Contents

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**Future Plans**

**Major Ongoing Projects:**

- ✓ Up-gradation of Refineries for improving yield of LPG
- ✓ Greenfield LPG Import Facilities at Kochi (0.6 MMTPA), Paradip (2.0 MMTPA), Haldia (2.0 MMTPA) & Mundra (1.36 MMTPA)
- ✓ Brownfield expansion of Kandla LPG Import facilities from 0.6 to 2.5 MMTPA
- ✓ >1500 TMTPA new Bottling capacity added at 25 locations – ready by 2019-20
- ✓ Close to 33000 MT additional storage capacity coming up in 21 bottling plants
- ✓ 2000 KM Central India LPG Pipeline Plan from Kandla / Mundra to Gorakhpur
- ✓ Study in Progress for Feasibility of Strategic Storage under PPP Model for maintaining at least 15 Day’s LPG Cover on Industry basis.
Contents

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- Issues and Constraints
Issues & Constraints

✓ Actual Demand vary with Forecast

✓ Feast and Famine situations at times
  ▪ Unplanned shutdowns at sources
  ▪ Surplus product availability from Refineries
  ▪ Port congestion at Import locations
  ▪ Disruptions in road movements due to strike, bandh, etc.

✓ Difficulty in last mile connectivity
  ▪ Hilly and Far Flung areas.
  ▪ Islands – Cost of delivery

✓ Rapid growth in demand – Rural penetration through Govt. initiatives

✓ Long gestation period for LPG infrastructure development
### Opportunities for the World

<table>
<thead>
<tr>
<th>Action Plan</th>
</tr>
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<tbody>
<tr>
<td>Export of Butane, Propane and LPG-Mix</td>
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<tr>
<td>Construction of Import Terminal</td>
</tr>
<tr>
<td>LPG Terminalling and Storage</td>
</tr>
<tr>
<td>Collaboration with OMCs / Port Authorities for Development of LPG Jetty</td>
</tr>
<tr>
<td>Development of LPG Pipelines and other transport networks</td>
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</table>
Thank You