

Report
on
**Zonal study on LPG pipeline:
Potential new LPG pipelines to be Bid Out**

**Prepared For Petroleum And Natural Gas Regulatory Board (PNGRB)
By Deloitte Touche Tohmatsu India LLP (DTTILLP)**

July 2024

Context of the Study

PNGRB is assessing potential LPG pipelines options that will improve connectivity, supply security and reduce the cost of transportation to LPG bottling plants

CONTEXT

PNGRB is evaluating the need for additional LPG pipelines to connect the remaining LPG bottling plants in India.

The objective of enhancing the LPG transmission network is to decrease the overall cost of transportation of LPG and improve LPG supply chain reliability and safety.

With this objective, the study evaluates the potential LPG demand and the potential routes for LPG pipelines that will connect the remaining LPG bottling plants and LPG sources

Scope of Work for each of the Modules

1 **Module 1 – Overview of LPG Market**

- LPG market overview in India
- Driver and inhibitors of LPG demand and projection of LPG demand with and without impact of alternate fuels
- Status of LPG Infrastructure
- Regulatory overview

2 **Module 2 – LPG Pipeline Requirement Analysis**

- Benefits of Pipelines
- Approach and Methodology for Determining Requirement of LPG Pipelines
- Current status of bottling plant connectivity and existing status of LPG pipelines
- Proposed routes for LPG pipelines
- Details and benefits of proposed LPG pipelines

3 **Module 3 – Next Steps**

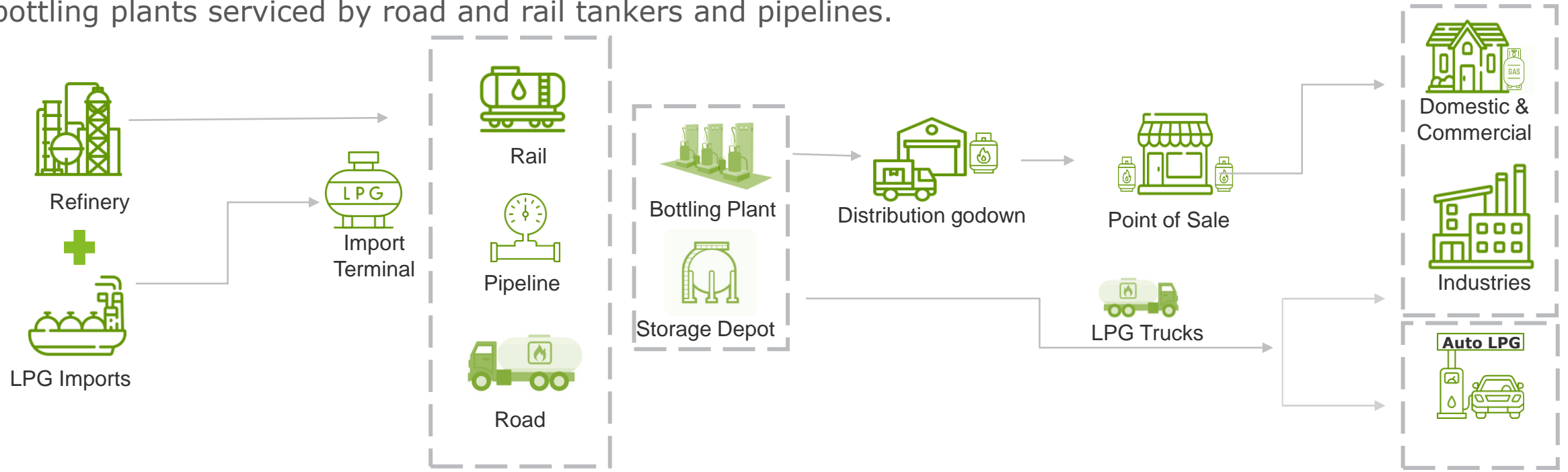
- Next steps on proposed LPG pipeline routes

Overview of LPG Market

1

LPG Value Chain

The LPG value chain for this analysis starts with supply from refinery and import terminals and ends with bottling plants serviced by road and rail tankers and pipelines.



Import Terminal & Refinery

Midstream (Transportation & Storage)

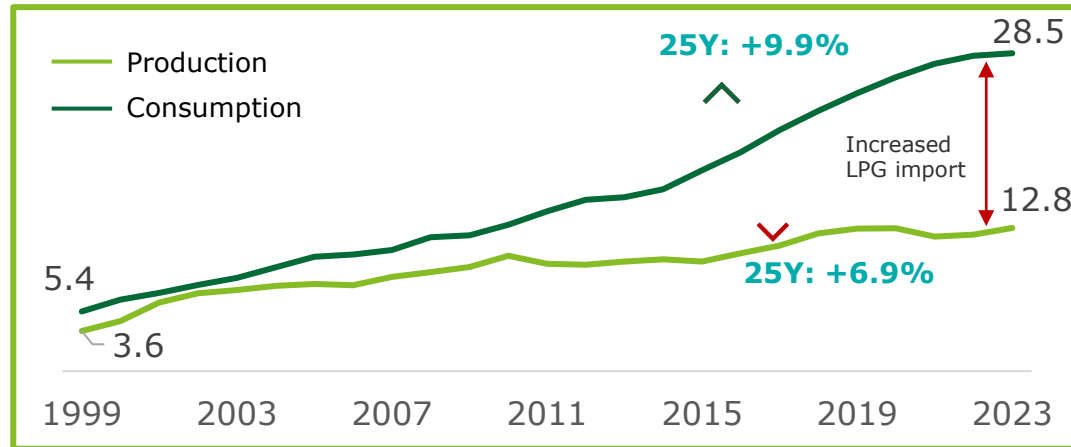
Downstream (Bottling Plant)

Public													
Private													

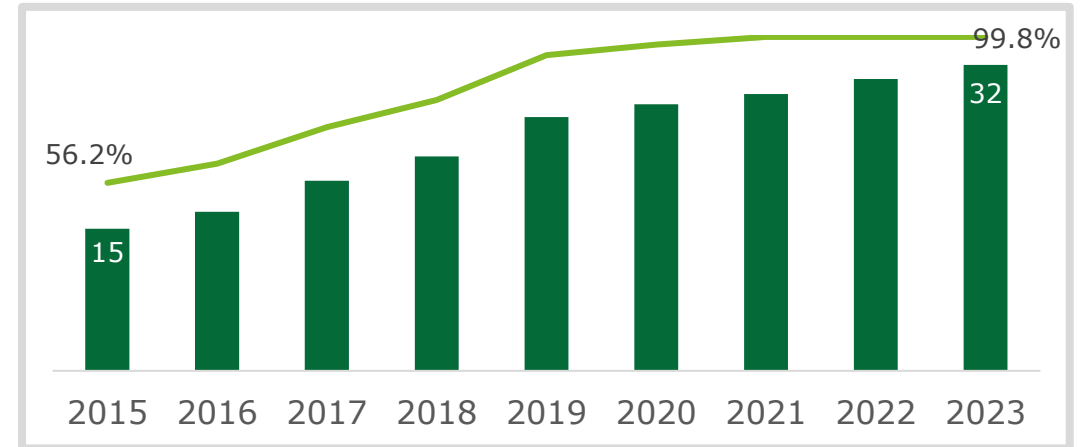
LPG | Indian Market Overview

The domestic production of LPG from refineries and fractionators has increased at a slower rate by 1.3x, requiring a massive increase in imports of 2.9x jumping from 6.1 MMT to 17.8 MMT. Indian refineries was producing only 4.8 percent of total crude processing capacity in 2022-23²

LPG Production and Consumption (MMT)



LPG Domestic Active Connections (Cr.)



■ Domestic LPG Connections (Cr.) — Domestic LPG Coverage %

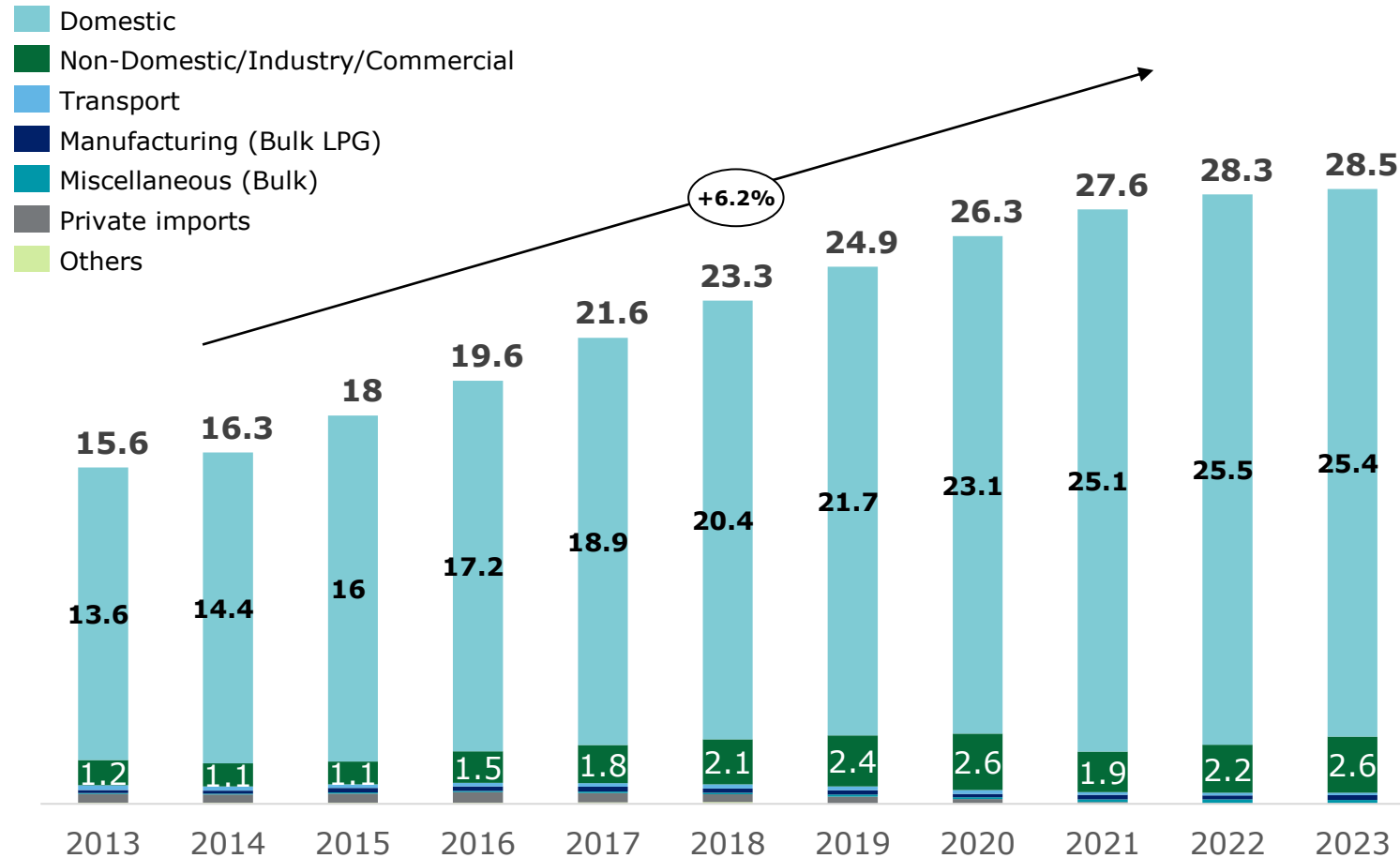
- There has been a difference between the rise in production and consumption, attributed to increasing consumption trend.
- With the surge in LPG usage driven by government initiatives such as PMUY, there has been a notable push towards reliance on imported LPG.
- Presently, India imports 64% of its LPG consumption.¹
- A total of 9.59 crore PMUY beneficiaries have been covered under Ujjwala scheme 1.0 & 2.0 as on April 2023.

- The expansion of domestic LPG connections has achieved a CAGR of 8.7%, primarily driven by the PMUY initiative.
- Although domestic connection penetration reaching 99%, growth is anticipated to plateau due to diminishing demand due to PNG in authorized areas.
- Dependency on industrial LPG is expected to decrease as PNG is becoming fuel of choice.
- Domestic LPG customers in India has surged to approximately 31.4 crores in Q4 2023, marking a significant increase from the 14.9 crore customers recorded in 2015

LPG | Sector wise Consumption

LPG consumption is primarily driven by domestic sector (89%), followed by non-domestic sector at 9% and bulk sector at 1.3%. Auto LPG is on a declining trend accounting for only 0.4% of total consumption

Sector Wise LPG Consumption (MMT)



Domestic demand has been key driver of growth due to

- **Increased penetration** of LPG due to government push (PMUY)
- **Rapid growth in population** thereby increasing number of households
- **Development of LPG supply chain** in India



Non-domestic/I&C demand growth has been relatively slow but steadily driven by

- **Favorable cost economics of LPG** in industrial and commercial segments compared to diesel, petrol and other fuels.
- Regulations to phase out other polluting fuels

LPG | Drivers/Inhibitors for LPG demand

LPG consumption trend has pickup after PMUY with 14.8 cr. connection in 2015 to 32 cr. connections in by end of 2023



Increase in number of households

- LPG adoption has reached its peak in terms of reach, however there is potential in non-domestic and industrial segments.
- Urban migration has led to a significant increase in the adoption of LPG connections.



Expansion of manufacturing activity

- LPG is being used in diverse range of application like Heat treatment, forging, Surface coating, Baking, glass manufacturing, spray dyeing and sterilization.



Regulations favoring cleaner fuels

- State PCB are acting proactively on banning polluting fuels and adoption of cleaner fuel.
- Recent letters by Rajasthan PCB has clearly mentioned to ban on FO and polluting fuels.



Government push for adoption of LPG

- Government has planned to launch PMUY 2.0 to outreach the LPG connection to 100% population. 5Kg LPG cylinder has been introduced to BPL families.



Expansion of CGD Network

- CGD Infra is growing at tremendous pace & PNG has greater penetration in Tier-3 cities.¹
- Policy push has given PNG adoption new direction.
- PNG is cheaper than Non-subsidized LPG cylinder.



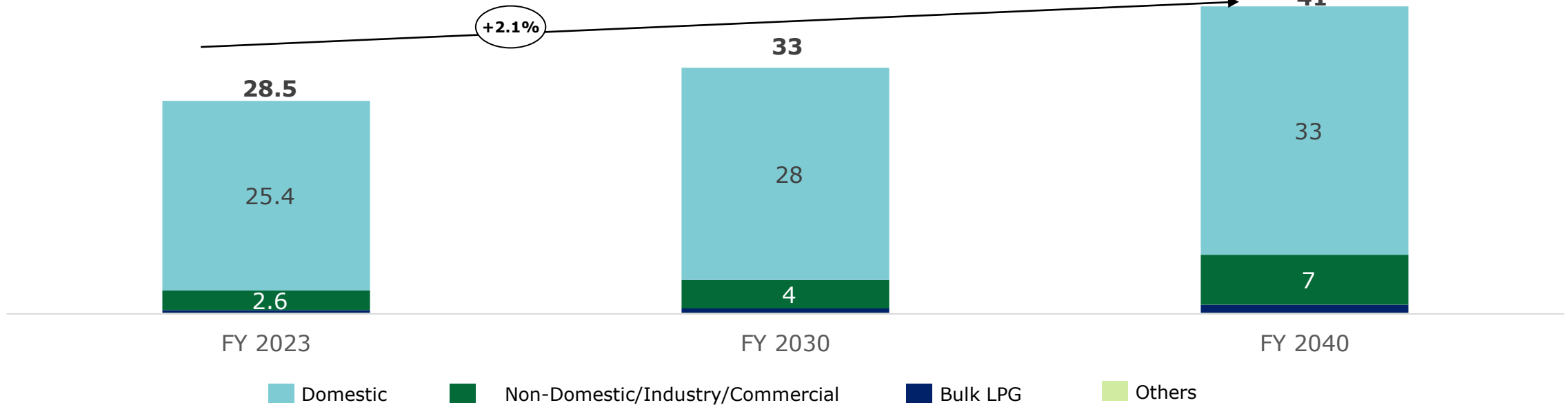
Energy transition

- LPG is among least polluting fuel, however not a probable candidate for Net Zero.
- In some developed countries, households are switching from gas/propane to electric induction cook tops for domestic use.

LPG | Net Projected Demand Pre-Erosion

LPG consumption trend has picked up after PMUY with 14.86 cr connection in 2014 to 32 cr connections in 2023 encompassing 99% of population

Sector Wise Projected LPG Consumption (MMT)



Domestic

- Domestic LPG has already reached a high penetration (>99%)
- Future dom. LPG growth projected via past decadal (2011-2021) HH growth rate

Non-Domestic/Industry/Commercial

- Non dom. LPG is 9.1% of total LPG demand.
- Future growth projected via growth rate of gross value added of ~5.7% of the hotels segment (FY 2012-2022)

Bulk

- Bulk LPG is 1.3% of total LPG demand.
- Future growth projected via growth rate of ~6.6% of Gross Value Added of the manufacturing segment (FY 2012-2022)

Others

- Demand in others segment consist of transport, others, etc. with a small base and these segment have not shown any growth
- Future growth is assumed flat

LPG | Demand Erosion

LPG demand projection will be eroded by ~ 5.5MMT by 2030 due to uptake of CGD, primarily in the domestic segment

Hydrogen

- Hydrogen is a future candidate fuel especially in the industrial segment but current costs for producing green hydrogen are very high and infrastructure is lacking
- Bulk segment and industrial segment LPG demand is a small % of overall LPG demand and hence the funnel for erosion in future is even smaller.

Electric Vehicles

- Auto LPG is on the declining trend (-6% CAGR) and has a low demand base of 107 TMT
- As such EVs will not compete with LPG in the transport sector and impact will be insignificant for this analysis

Projected LPG Demand:
2030: 33 MMT
2040: 41 MMT

Projected LPG Demand (Post erosion):
2030: 28 MMT
2040: 33 MMT

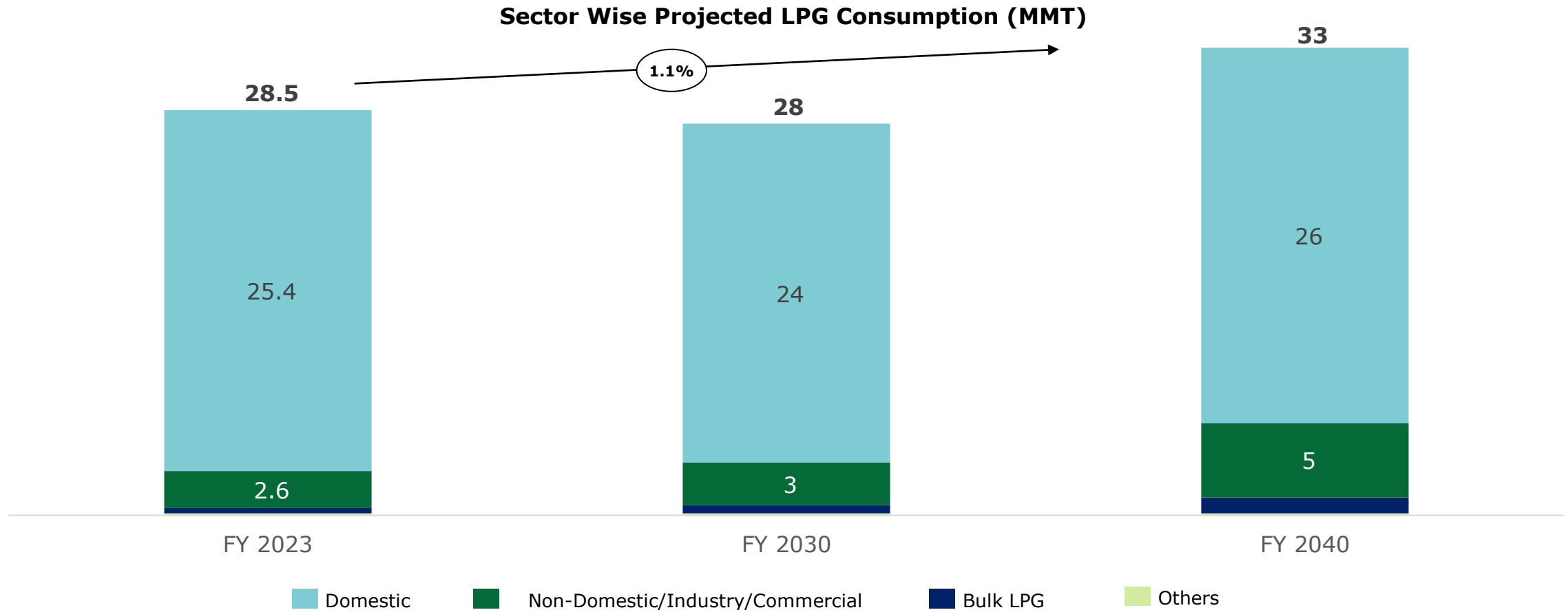
LPG Demand Erosion from CGD:
2030: -5.4 MMT
2040: -8 MMT

City Gas Distribution Sector

- As CGD sector grows, it will be the key factor that will erode LPG demand
- With conclusion of 12th round, entire landmass of India is under CGD authorization
- Demand erosion will be prominent in domestic segment as PNG – domestic & commercial is cheaper than LPG
- By 2032, as per PNGRB's MWP target domestic connections should reach 12.5 Cr, ~10x of current DPNG connections

LPG | Net Projected Demand Post Erosion

LPG consumption will reach 28 MMT and 33 MMT in FY2030 and FY2040 respectively due to erosion from CGD sector



Note: Net demand projection in domestic segment is based on realization of PNG targets.

Sources: PPAC, Internal analysis

LPG Infrastructure (1/2)

To enhance the supply, distribution, and reach of LPG, additional pipelines with a capacity of 9 MMT are currently under construction

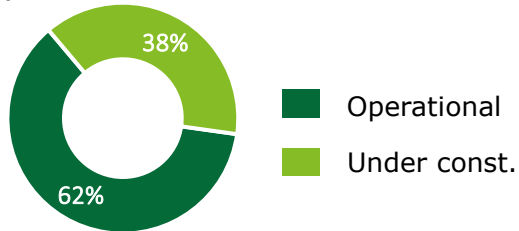
LPG Pipelines

LPG PPL Length (%) Operation Vs Under construction

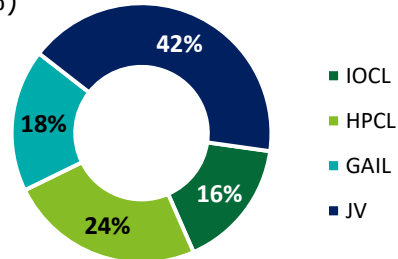


The country has a limited set of pipelines with 5,120 km under operation. Additional 3,234 km is under construction primarily as KGPL and KESPL which will significantly improve connectivity with the bottling plants.

LPG PPL Capacity Status (%)



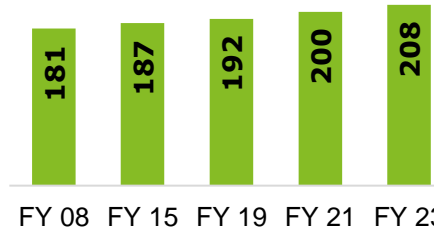
LPG PPL Capacity by players (%)



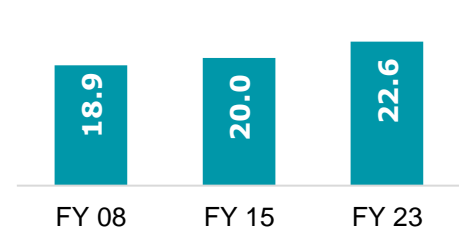
- The capacity of pipelines will increase from 16 MMT to 26 MMT with the commissioning of KGPL & KESPL by 2025
- While existing pipelines were operated individually by PSU entities, latest pipelines under construction follow the JV model
- HPCL will own 1/3rd capacity after commissioning of KGPL

LPG Bottling Plant

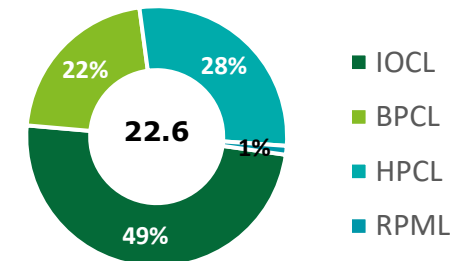
LPG Bottling Plants Growth (No.s)



LPG Bottling Plants Growth (No's)



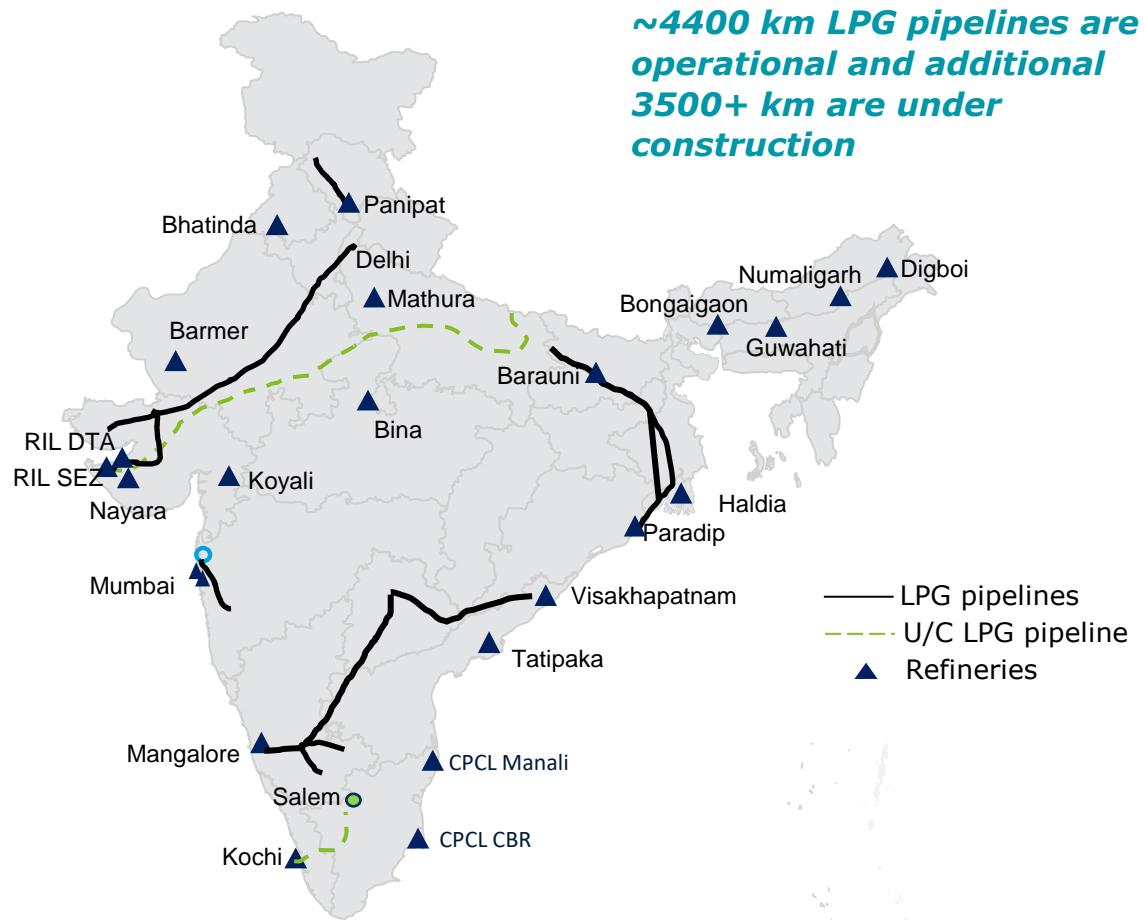
LPG Bottling Plant Capacity by players (MMT)



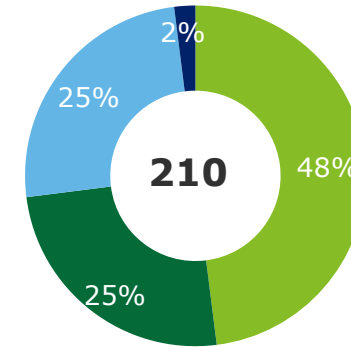
- IOCL leads other OMCs in both the number of bottling plants and overall capacity.
- Post 2015, HPCL and BPCL have significantly accelerated the addition of new bottling plants and capacity, surpassing the growth rate of IOCL in these areas.
- LPG consumption has surged by 58% since FY 2015, while bottling plant capacity has only increased by 12%, indicating significant under-capacity and rising demand outpacing supply.

LPG Infrastructure (2/2)

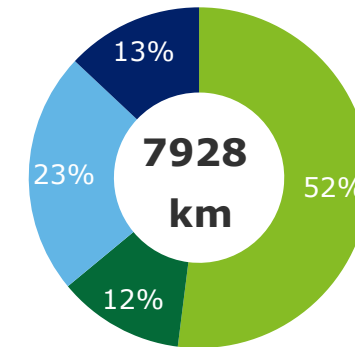
The continuous timid growth in demand for LPG products will require optimizing and enhancing the infrastructure to develop a sustainable supply chain



Bottling Plants



LPG Pipeline Length



■ IOCL ■ BPCL ■ HPCL ■ Others

IOCL has the largest LPG infrastructure comprising of bottling plants and pipelines in India

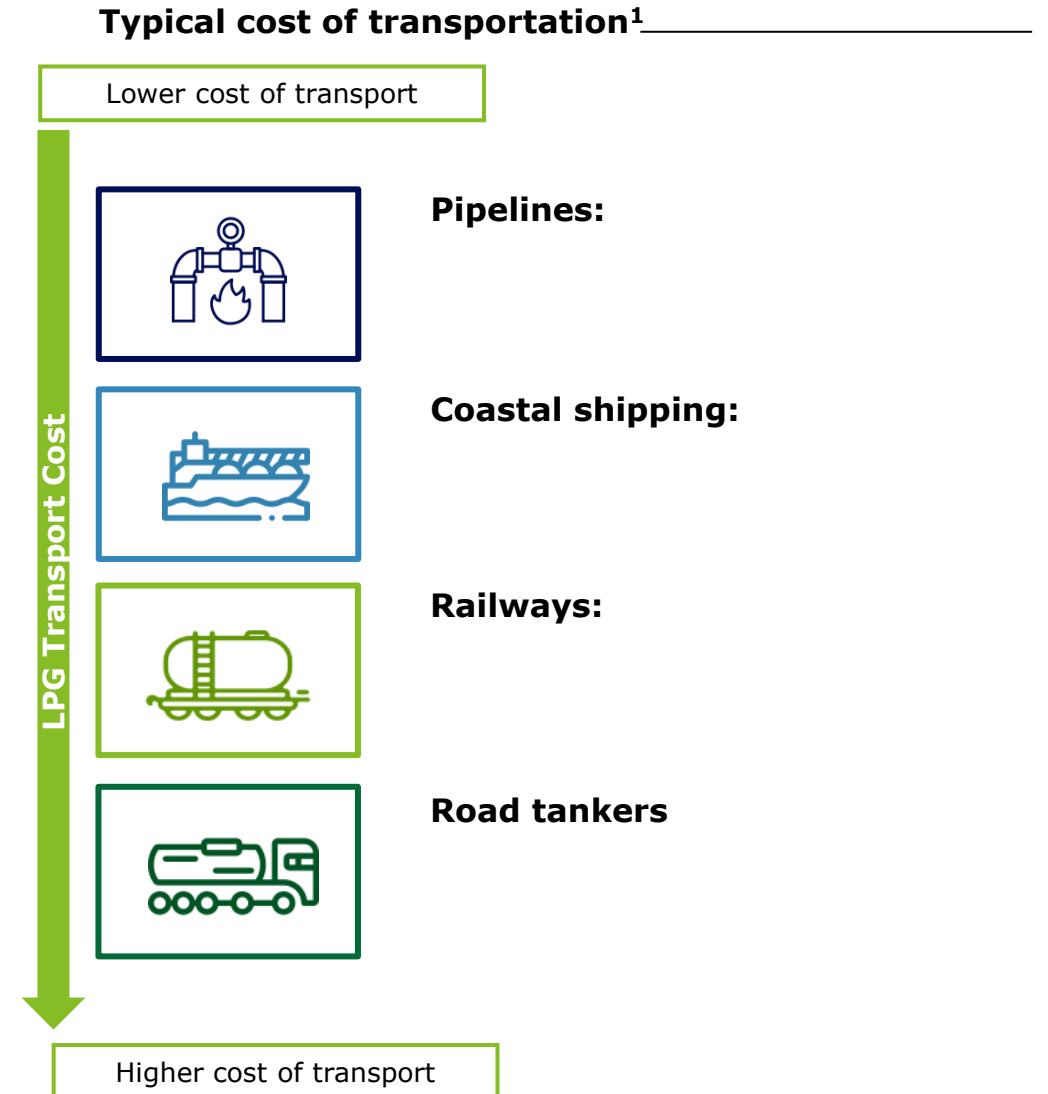
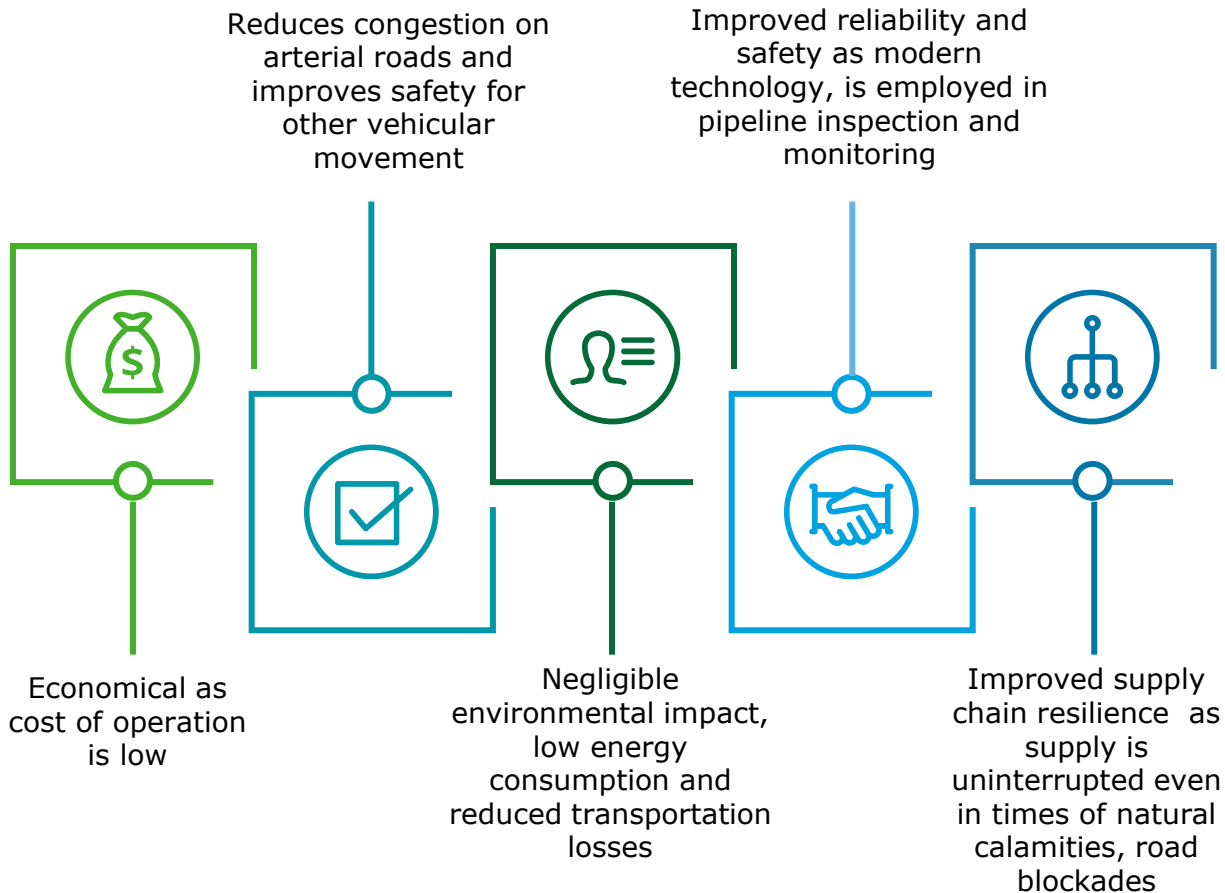
Notes: The map shown above captures major LPG pipeline, Map is illustrative and is not to scale
 Sources: 1. MoPNG, PNGRB, PPAC, Gati Shakti, OMC Websites,

LPG Pipeline Requirement Analysis

2

Benefit of Pipeline Transport

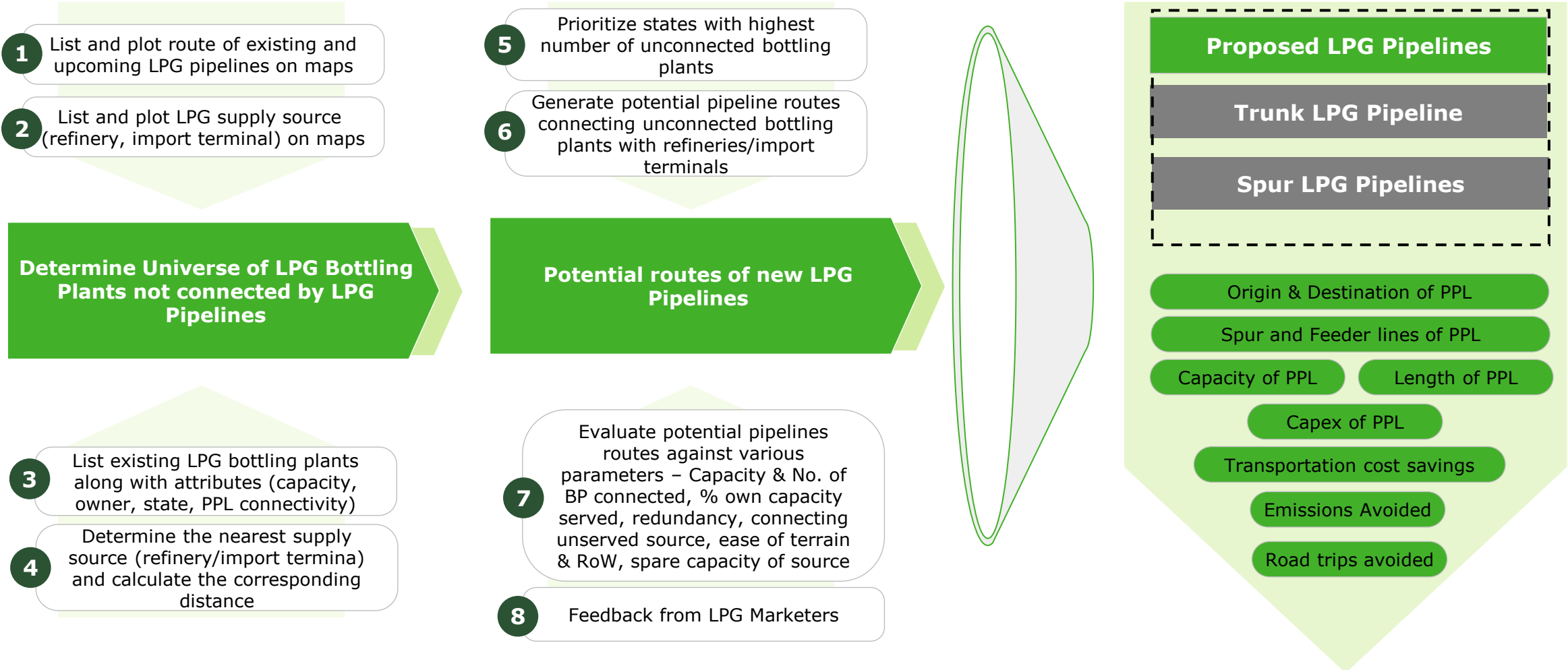
Movement of bulk LPG through pipelines over long distances instead by road through LPG bullet tankers offers a host of benefits making the former a preferred option.



Notes: 1. Ranking based on discussions with industry stakeholders.
Sources: 1. IOCL, Deloitte Analysis

Detailed Approach & Methodology for Determining LPG Pipeline Infrastructure

Approach and Methodology combines qualitative and quantitative analysis of data and visual representation on maps to determine the most feasible and beneficial pipelines

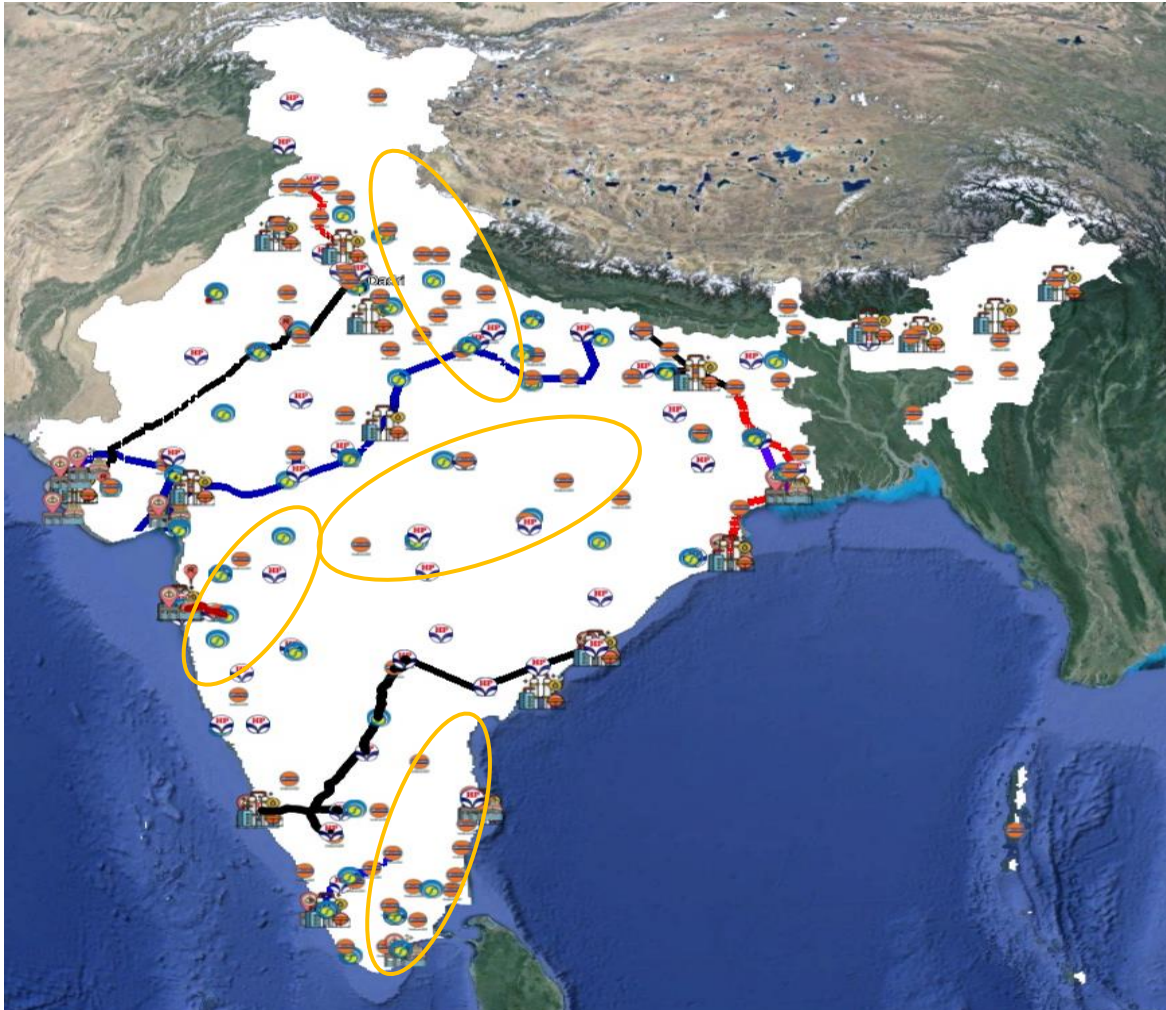


Notes: 1. Pipeline routes analyzed basis available data and within the ambit of the methodology. Detailed feasibility to be carried out for each proposed pipeline.

Sources: 1. Deloitte Analysis

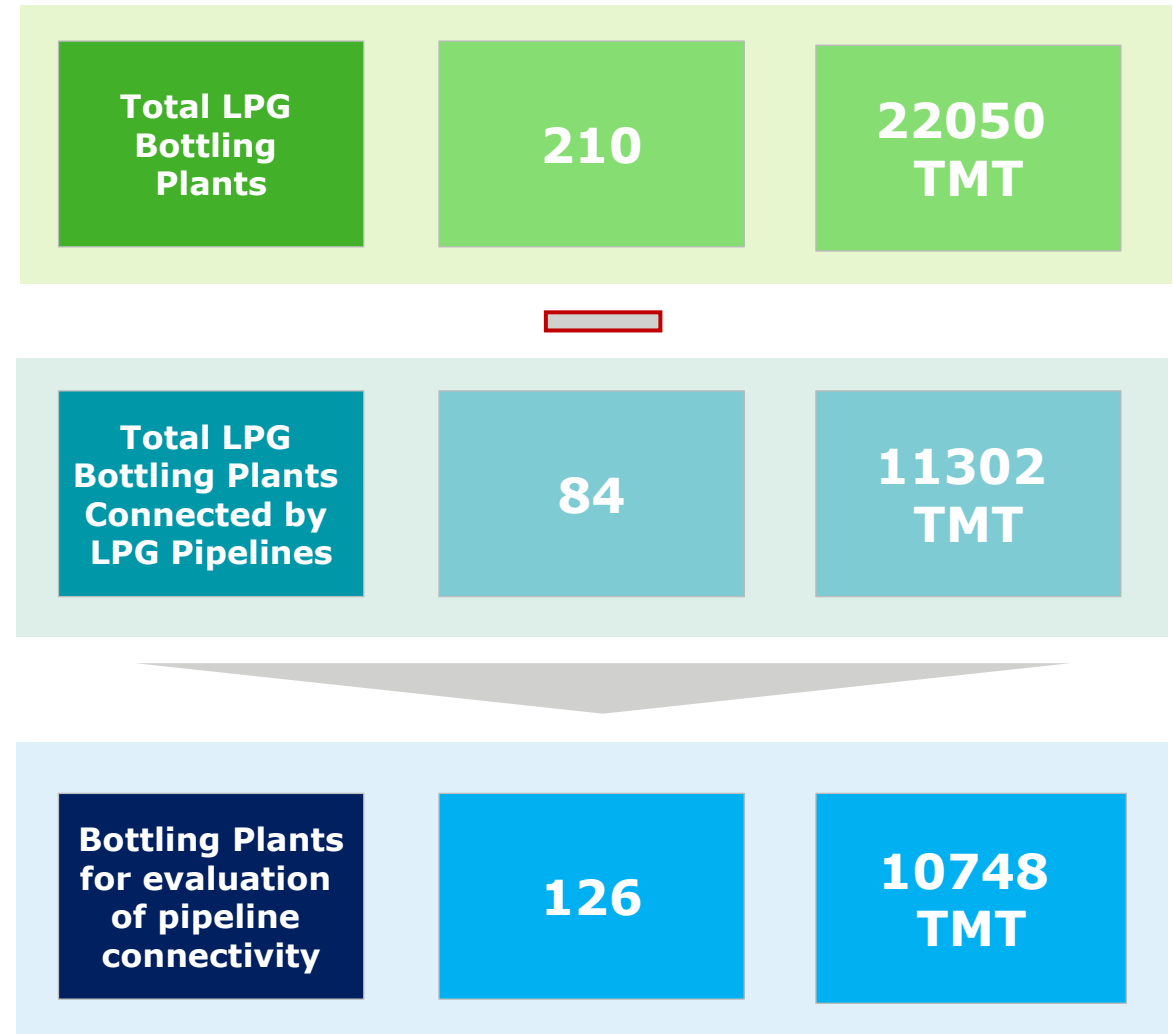
LPG | Current Bottling Plants and Pipelines

Post completion of the three under-construction LPG pipelines, 120 bottling plants will remain unconnected by direct pipelines, forming the basis for evaluation of potential pipeline routes



Notes: 1. Based on existing and under-construction LPG pipelines

Sources: 1. Gati Shakti Portal, Deloitte Analysis



LPG | Current and Upcoming Pipeline Infrastructure

About 90 bottling plants will be connected via existing and the three under construction LPG pipelines, leaving more than 50% of bottling plants open for consideration for connection via pipelines

S. No	LPG Pipelines	Owner	Length (km)	Capacity (MMT)	Status	Bottling Plants Connected by Pipelines				
						BPCL	HPCL	IOCL	RPML	Grand Total
1	Hassan-Cherlapalli LPG Pipeline	HPCL	650	2.2	Operational	1	1	1		3
2	Jamnagar-Loni pipeline	GAIL	1414	2.5	Operational	4	2	4	1	11
3	Kochi Refinery (Part of Kochi Salem)				Operational	1	1			2
4	Mangalore-Hassan-Mysore Bangalore Pipeline	HPCL	356	3.1	Operational	1	3	1		5
5	Mumbai-Uran pipeline	HPCL	28	.8	Operational	1	1			2
6	Panipat-Jalandhar pipeline	IOCL	280	.7	Operational			3		3
7	Paradip Haldia Barauni Motihari pipeline	IOCL	1468	3.5	Operational	3	2	9		14
8	Uran-Chakan-Shikrapur LPG Pipeline	HPCL	169	1	Operational	1	1	1		3
9	Vizag-Secunderabad pipeline	GAIL	609	1.3	Operational	2	4	4		10
10	GAIL Vijaipur Fractionation Plant Pipeline	GAIL	20	.1	Operational			1		1
	Total Operational					14	15	24	1	54
11	Haldia-Panagarh LPG Pipeline	IOCL	215	1.45	Under construction		2			2
12	Kochi-Salem LPG Pipeline	IOCL + BPCL	429	1.49	Under construction	1	1	4		6
13	Kandla-Gorakhpur LPG pipeline	IHB	2805	8.25	Under construction	8	6	8		22
	Grand Total (Operational + Under construction)					23	24	36	1	84

Notes: 1. Based on FY 23 data

Sources: 1. PNG Statistics, Data from OMCs & PNGRB, Deloitte Analysis

Proposed Routes of New LPG Pipelines

LPG Pipelines have been proposed by prioritizing group of bottling plants not served by existing LPG pipelines and requiring large movement of LPG by alternate modes

1 Trunk Pipeline

Connecting large unserved areas and LPG sources

- a Cherlapally – Nagpur LPG Pipeline
- b Shikrapur – Hubli – Goa LPG Pipeline
- c Mumbai - Jalgaon – Aurangabad LPG P/L
- d Paradip Raipur LPG Pipeline
- e Gwalior – Haldwani LPG Pipeline
- f Jalandhar Jammu LPG Pipeline
- g Ennore – Pondicherry LPG Pipeline
- h CPCL CBR – Trichy – Madurai LPG Pipeline



2

Spur / Interconnections Pipelines

Leveraging existing network and create redundancy

- a Panipat - Jalandhar Spur P/L to Bathinda
- b Bina Jabalpur Spur
- c Deoria - Bettiah - Motihari (KGPL - Haldia Motihari Interconnection)
- d JLPL – Salempur LPG Spur
- e HPCL Yediyur - BPCL Bangalore Spur.

INTERCONNECTION PIPELINES WILL AIM TO CREATE REDUNDANCY IN THE LPG NETWORK.

SPUR PIPELINES WILL LEVERAGE EXISTING PIPELINE INFRASTRUCTURE TO EXTEND PPL CONNECTIVITY

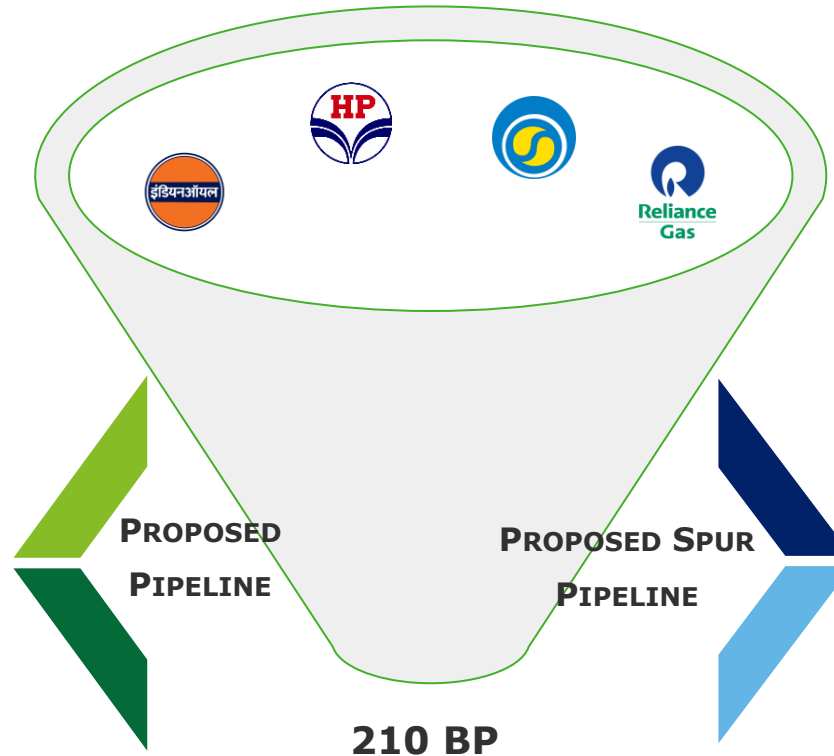
Tentative

Notes: 1. CPCL CBR Refinery is under - construction
Sources: 1. Deloitte Analysis

Coverage of Additional Bottling Plants

If proposed pipelines are implemented, it will reduce the unserved bottling plants to 68 (60)¹

210 BP
CONNECTED : 84
NON- CONNECTED : 126



BOTTLING PLANTS CONNECTED: 50

1. Cherlapally – Nagpur LPG PL (6)
2. Shikrapur – Hubli – Goa PL (7)
3. Mumbai Aurangabad Jalgaon (6)
4. Paradip - Raipur LPG PL (6)
5. Gwalior – Haldwani LPG PL (7)
6. Jalandhar Jammu (4)
7. Ennore – Pondicherry (6)
8. CPCL CBR – Trichy – Madurai (8)

BOTTLING PLANTS CONNECTED: 8

1. Panipat - Jalandhar Spur P/L to Bathinda (2)
2. Bina Jabalpur Spur (3)
3. Deoria - Bettiah - Motihari (KGPL- Haldia Motihari interconnection)(0)
4. HPCL Yediyur - BPCL Bangalore (1)
5. JLPL – Salempur (2)

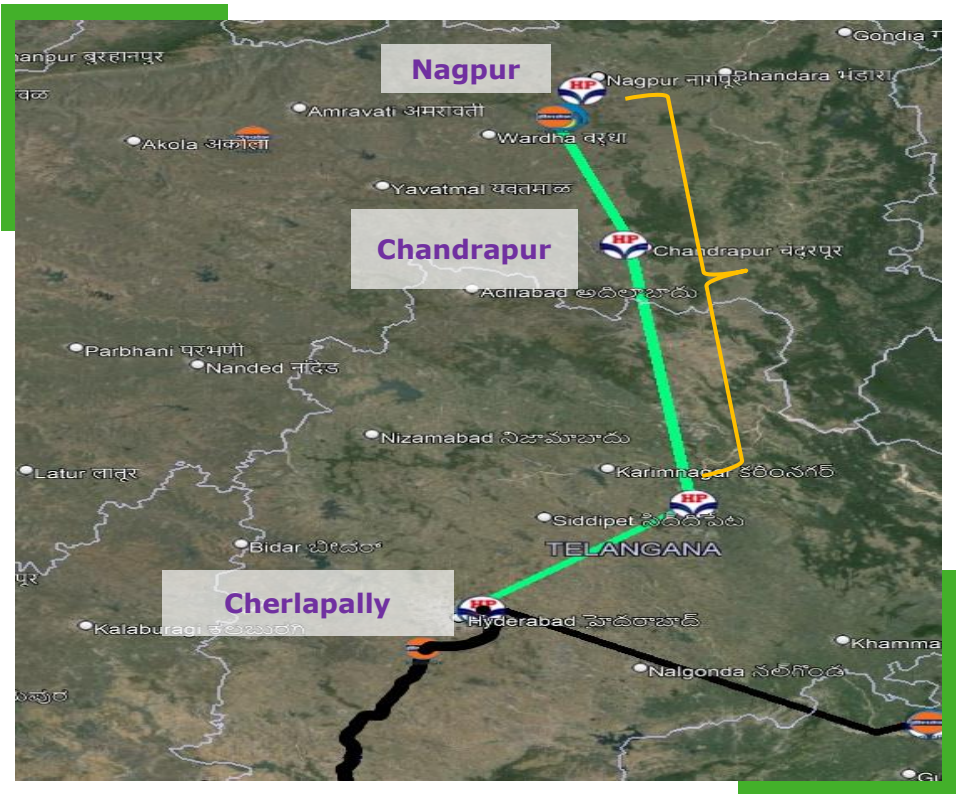
Notes: 1. Assuming proposed spur pipelines are also implemented


Sources: 1. Deloitte Analysis


Proposed Pipeline | Cherlapally – Nagpur | Overview


Cherlapally – Nagpur pipeline aims to evacuate the LPG from existing Hassan Cherlapally and move the product towards Nagpur in the north via Chandrapur

This pipeline will originate from Cherlapally from existing LPG pipelines (Hassan-Cherlapally) with the northern arm connecting 6 BPs towards Nagpur.





453 km
 LPG Pipeline Length


510 TMT
 Capacity of Bottling Plant Served



1585 INR cr.
 Estimated capex

6 Bottling Plants Connected

 **1**
 **4**
 **1**


Source

- Hassan Cherlapally pipeline.
- Vizag Secunderabad Pipeline


Route: Cherlapally – HPCL Warangal – HPCL Chandrapur - HPCL Nagpur.

Spur

- No Spur

Emissions avoided:
 0.9 Mn tonnes of CO2




Notes: 1. Proposed route is tentative. Map is not to scale. 2. Estimated Capex is based on KGPL capex
 Sources: 1. Deloitte Analysis

Proposed Pipeline | Shikrapur – Goa - Hubli| Overview

Shikrapur – Goa - Hubli pipeline aims to evacuate the LPG from existing Uran Chakan Shikrapur pipeline and move the product towards in the Hinterlands of Maharashtra and North Karnataka

This pipeline will originate from existing UCSPL with the product moving to hinterlands of Maharashtra and Northern Karnataka connecting 5 Bottling Plant in main pipeline and 2 Bottling Plant in the Northern Karnataka Spur line.



	508 km LPG Pipeline Length		630 TMT Capacity of Bottling Plant Served		1778 INR cr. Estimated capex
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07	Bottling Plants Connected Via PPL	 1	 2	 3	 1
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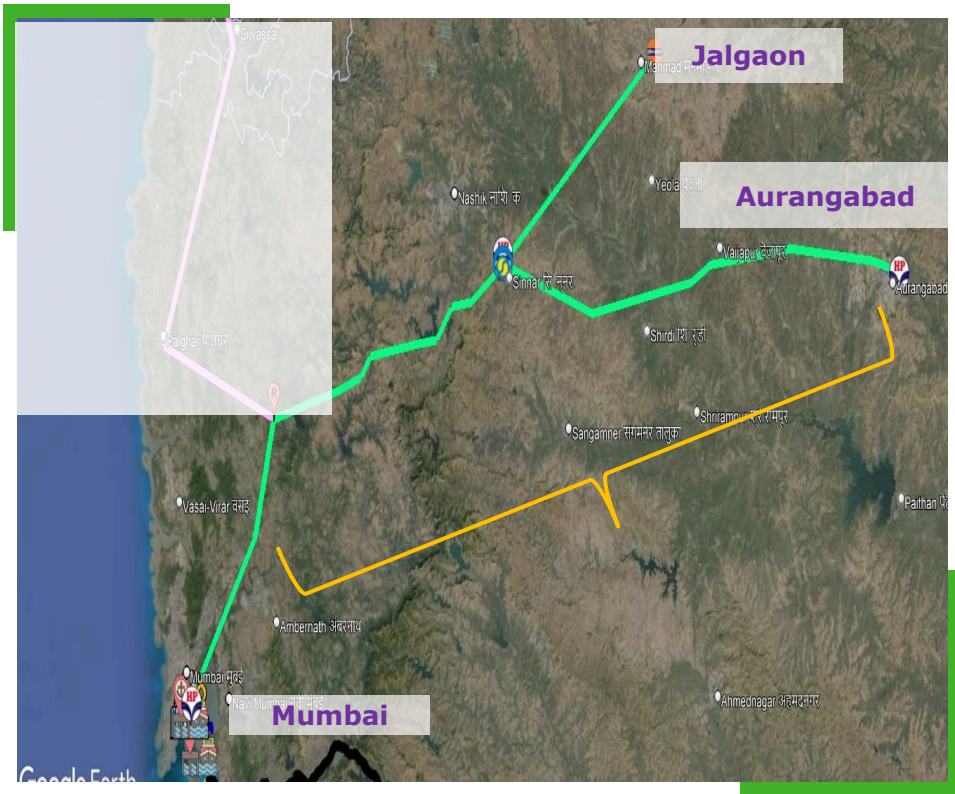
<p>Source</p> <ul style="list-style-type: none"> Uran Chakan Shikrapur pipeline. 	<p>Route: Shikrapur– Wai – Hazarwadi – Belgaum - HPCL Hazarwadi- HPCL Hubli- BPCL Goa.</p>
<p>Spur</p> <ul style="list-style-type: none"> Belgaum to Dharwad 	<p>Emissions avoided:</p> <p>1.4 Mn tonnes of CO2</p>


Notes: 1. Proposed route is tentative. Map is not to scale. 2. Estimated Capex is based on KGPL capex
Sources: 1. Deloitte Analysis


Proposed Pipeline | Mumbai- Jalgaon – Aurangabad | Overview


The Mumbai-Jalgaon-Aurangabad pipeline aims to connect bottling plants in Maharashtra's hinterland, reducing road tanker traffic and alleviating congestion issues originating from Mumbai and onwards

This pipeline will evacuate product from HPCL and BPCL Refineries and Aegis LPG Import terminal in Mumbai and will connect the bottling plants in the hinterlands of Maharashtra in Nashik, Jalgaon and Aurangabad districts.





521 km
 LPG Pipeline Length


510 TMT
 Capacity of Bottling Plant Served



1823 INR cr.
 Estimated capex

6 Bottling Plants Connected

 **1**
 **2**
 **2**
 **1**


Source

- HPCL Mumbai
- BPCL Mumbai
- Aegis Terminal


Route: Mumbai– Nashik- IOCL Manmad- BPCL Jalgaon – HPCL Aurangabad

Spur

- Nashik to Aurangabad

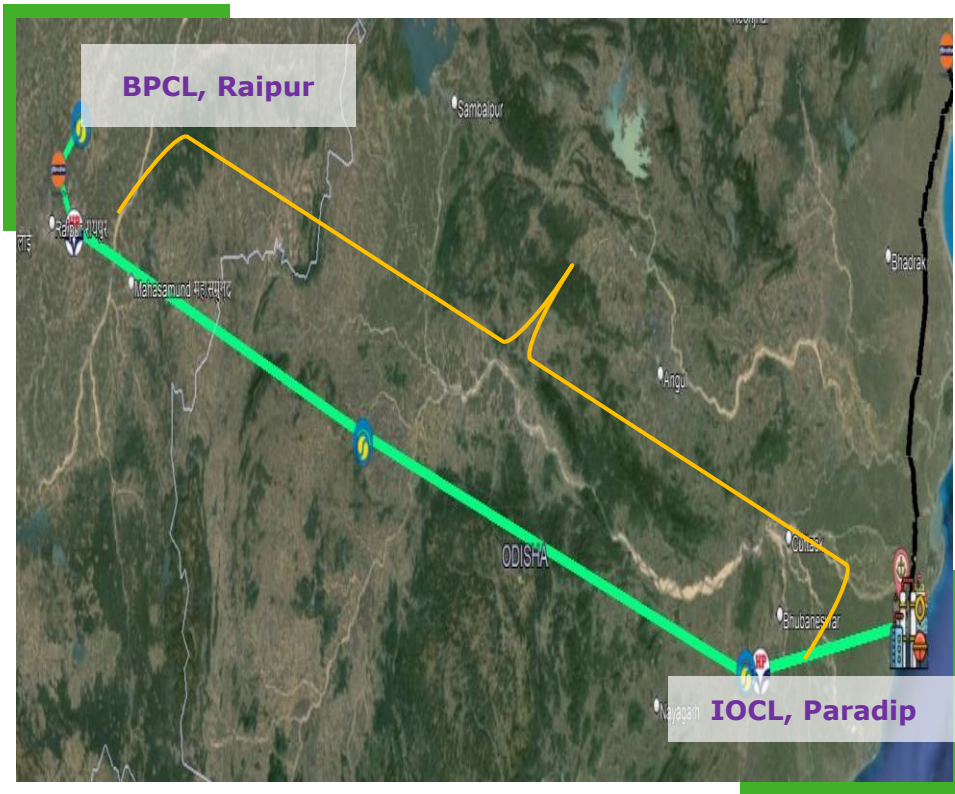
Emissions avoided: 0.7 Mn tonnes of CO2


Notes: 1. Proposed route is tentative. Map is not to scale. 2. Estimated Capex is based on KGPL capex. 3. The pipeline can be connected to Vadhavan Port once port is established


Proposed Pipeline | Paradip Raipur LPG | Overview


Paradip Raipur LPG Pipeline aims to evacuate LPG from IOCL's Paradip refinery and import terminal and serve the bottling plants in the hinterland of Orissa and Chhattisgarh

This 555 KM pipeline will evacuate LPG from IOCL's refinery and LPG import terminal to interior areas of Orissa and Chhattisgarh till Raipur.





555 km
 LPG Pipeline Length


540 TMT
 Capacity of Bottling Plant Served



1940 INR cr.
 Estimated capex

6 Bottling Plants Connected

 **1**
 **0**
 **3**
 **2**


Source

- IOCL Refinery, Paradip


Route: IOCL Paradip Refinery –HPCL Jatni- BPCl Khurda- BPCl Raipur

Spur

- No Spur

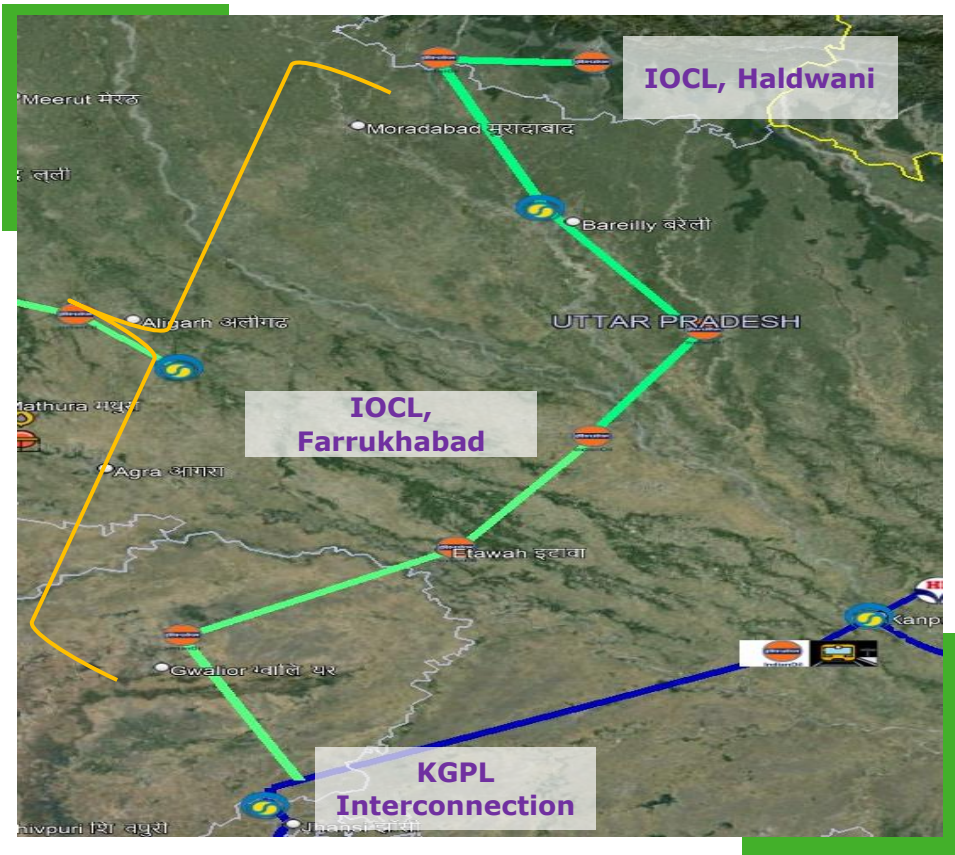
Emissions evaded:
 0.93 Mn tonnes of CO2


Notes: 1. Proposed route is tentative. Map is not to scale. 2. Estimated Capex is based on KGPL capex.
 Sources: 1. Deloitte Analysis


Proposed Pipeline | Gwalior – Haldwani (Sitarganj)| Overview


Gwalior - Haldwani pipeline aims to create network along the Northern plains and serve BPs in Uttar Pradesh & Uttarakhand. LPG evacuation is planned mainly from KGPL and traverse through hinterland of UP

This pipeline will connect bottling plants in the hinterland of Uttar Pradesh and Uttarakhand with the upcoming KGPL pipeline. This pipeline will evacuate the product in Gwalior, Etawah, Bareilly, Uttar Pradesh and in Haldwani (Sitarganj), Uttarakhand.





531 km
 LPG Pipeline Length


510 TMT
 Capacity of Bottling Plant Served



980 INR cr.
 Estimated capex

07 Bottling Plants Connected

 **5**
 **0**
 **2**


Source

- Kandla Gorakhpur Pipeline
- Panipat refinery
- Mathura Refinery


Route: KGPL Interconnection – IOCL Gwalior- IOCL Etawah - IOCL Farrukhabad- BPCL Bareilly- IOCL Pattikalan – IOCL Sitarganj.

Spur

- No Spurs

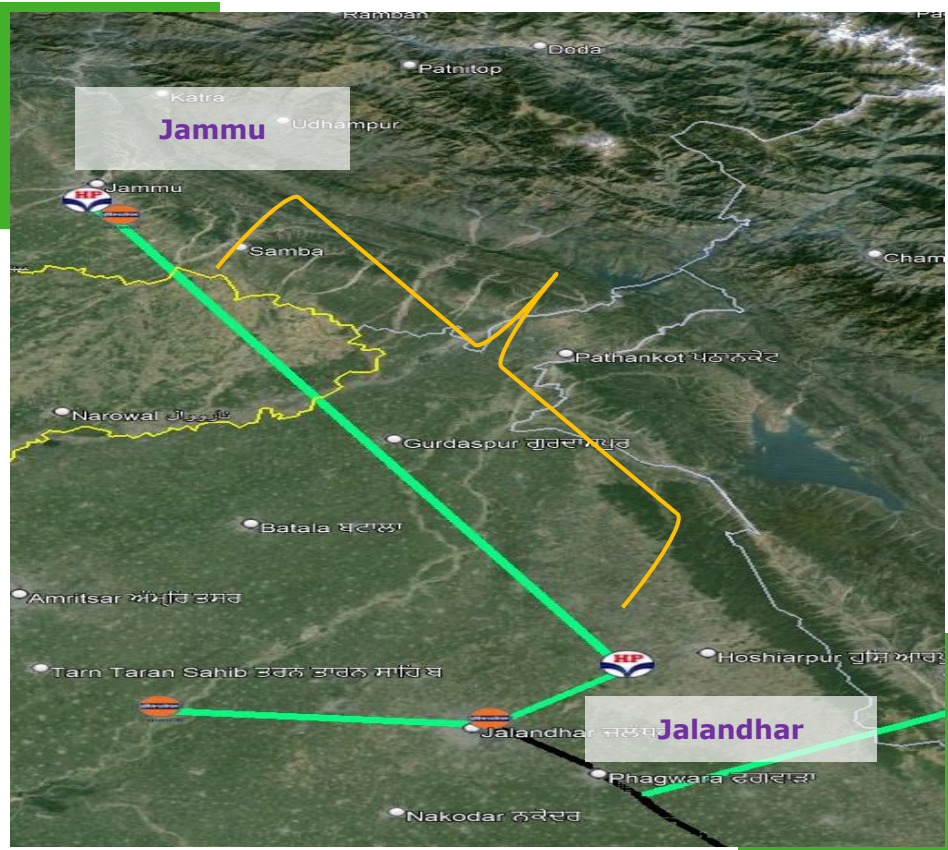
Emissions evaded:
 0.9 Mn tonnes of CO2


Notes: 1. Proposed route is tentative. Map is not to scale. 2. Estimated Capex is based on KGPL capex.
 Sources: 1. Deloitte Analysis


Proposed Pipeline | Jalandhar - Jammu | Overview


Jalandhar Jammu LPG Pipeline is an extension of Panipat Jalandhar pipeline which aims to transport LPG in the hinterland of Jammu

This pipeline will be an extension of existing Panipat Jalandhar pipeline. It will evacuate the LPG from Panipat refinery and connect the bottling plants in Jammu.




237 km
 LPG Pipeline Length


300 TMT
 Capacity of Bottling Plant Served



830 INR cr.
 Estimated capex

04 Bottling Plants Connected



2


2


0


Source

- Panipat Jalandhar pipeline


Route: Panipat Jalandhar- HPCL Jammu

Spur

- Panipat Jalandhar – IOCL Goindwal Sahib

Emissions evaded:
 0.42 Mn tonnes of CO2







Notes: 1. Proposed route is tentative. Map is not to scale. 2. Estimated Capex is based on KGPL capex.
 Sources: 1. Deloitte Analysis

Proposed Pipeline | Ennore – Pondicherry | Overview

Ennore – Pondicherry pipeline aims to evacuate the LPG from CPCL refinery and IPPL Ennore and push towards down south along the coast connecting 04 bottling plants

This pipeline will originate from CPCL refinery and IPPL Ennore LPG import terminal and aims to connect bottling plants on the coastal belt of northern Tamil Nadu. A small spur will run in northwest direction connecting bottling plants at Chennai and Gummidipoondi



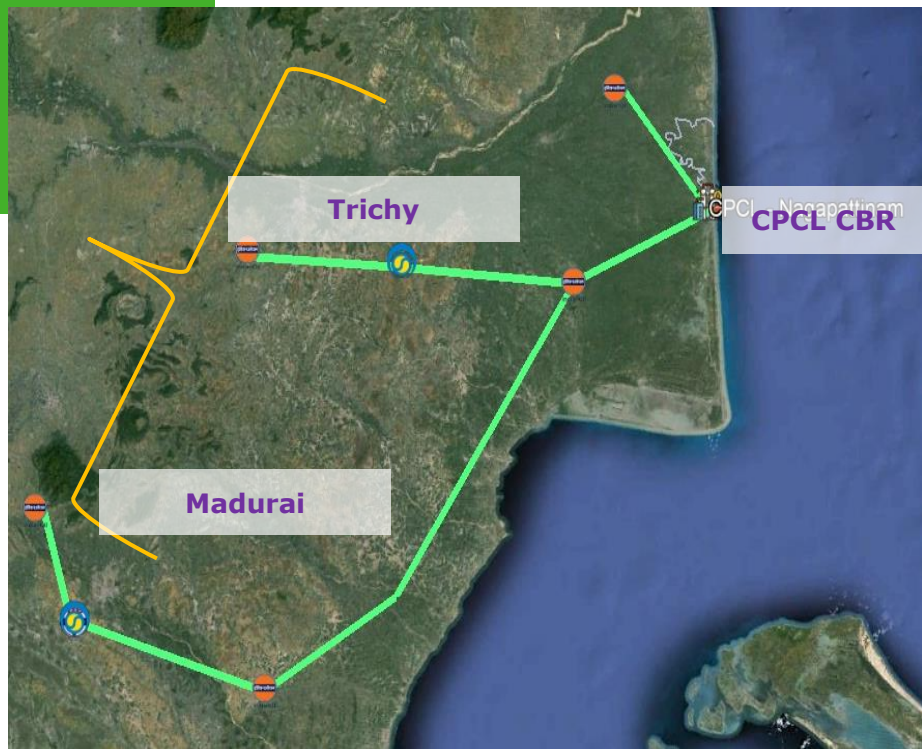
 <p>192 km LPG Pipeline Length</p>	 <p>780 TMT Capacity of Bottling Plant Served</p>	 <p>672 INR cr. Estimated capex</p>	
<p>06 Bottling Plants Connected</p>	 4	 1	 1
<p>Source</p> <ul style="list-style-type: none"> • CPCL Ennore refinery • IPPL Ennore 	<p>Route: BPCL Chennai - IPPL Ennore terminal – CPCL Ennore Refinery - IOCL Ennore- IOCL Chengelpet - IOCL Pondicherry</p>		
<p>Spur</p> <ul style="list-style-type: none"> • IPPL Ennore - BPCL Chennai – HPCL Gummidipoondi 		<p>Emissions evaded: 0.2 Mn tonnes of CO2</p>	


Notes: 1. Proposed route is tentative. Map is not to scale. 2. Estimated Capex is based on KGPL capex
Sources: 1. Deloitte Analysis


Proposed Pipeline | CPCL CBR – Trichy – Madurai | Overview


CPCL CBR – Trichy – Madurai pipeline aims to evacuate the LPG from upcoming CPCL CBR refinery and push LPG towards Trichy and Madurai and connecting eight bottling plants along the way

This pipeline will originate from CPCL CBR refinery and will have two major arms – one arm will connect bottling plants towards Trichy and the other arm will connect bottling plants towards Madurai. A small north-western spur will also connect bottling plant at Mayiladuthurai




431 km
 LPG Pipeline Length


510 TMT
 Capacity of Bottling Plant Served



1500 INR cr.
 Estimated capex

8 Bottling Plants Connected


 **5**

 **1**

 **2**


Source

- CPCL CBR refinery


Route: CPCL CBR Refinery – IOCL Mayiladuthurai- IOCL Mannargudi - IOCL Trichy – IOCL Madurai

Spur

- CPCL CBR to IOCL Mayiladuthurai
- IOCL Mannargudi - IOCL Trichy

Emissions evaded:
 0.40 Mn tonnes of CO2

Notes: 1. Proposed route is tentative. Map is not to scale. 2. Estimated Capex is based on KGPL capex
 Sources: 1. Deloitte Analysis

Summary of Proposed LPG Pipelines

Proposed key LPG pipelines will connect additional 59 bottling plants of capacity 5.4 MMT, leading to savings of INR 4,243 cr. and avoided road trips and emissions of 7.4 Mn. And 6 Mn.tonnes of CO2 respectively

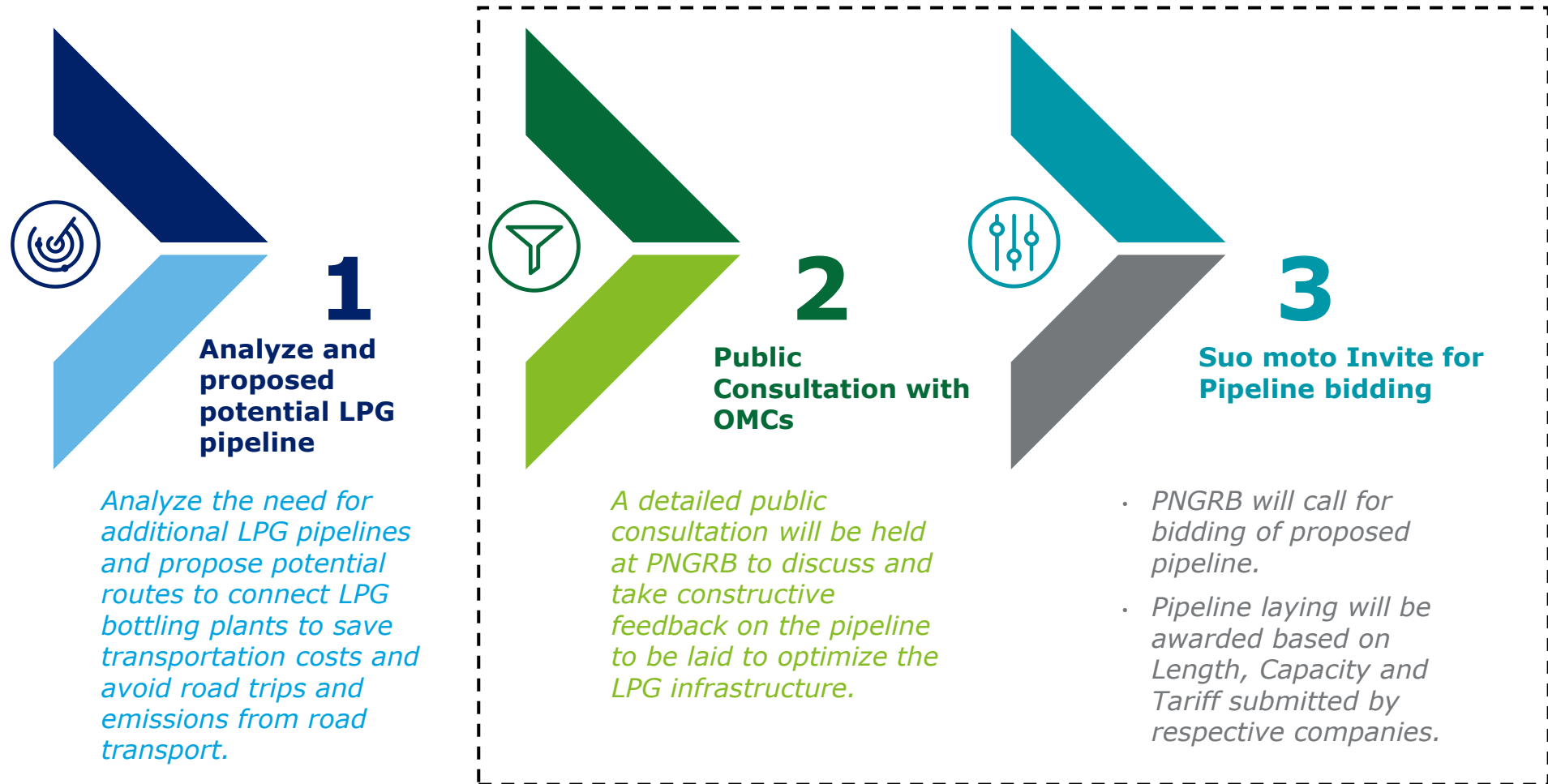
CATEGORY	BP CONNECTED	BP SERVED (TMTPA)	NPV (INR CR.) ¹	TRIPS AVOIDED (MN) ²	EMISSION SAVED (IN MN) ²
Cherlapally - Nagpur	6	510	470	1.01	0.9
Shikrapur - Hubli - Goa	7	630	1030	0.8	1.4
Mumbai - Aurangabad - Jalgaon	6	510	459	0.8	0.7
Paradip - Raipur	6	540	633	0.8	0.9
Gwalior - Haldwani	7	510	507	1.8	0.9
Jalandhar - Jammu	4	300	231	0.4	0.4
Ennore - Pondicherry	6	780	119	1.2	0.2
CPCL CBR - Madurai	8	510	179	0.8	0.4
Total	50	4290	3628	7.61	5.8

Notes: 1. NPV calculated in the year FY 2029. 2. Total road trips and emissions estimated from FY 2029 to FY 2053

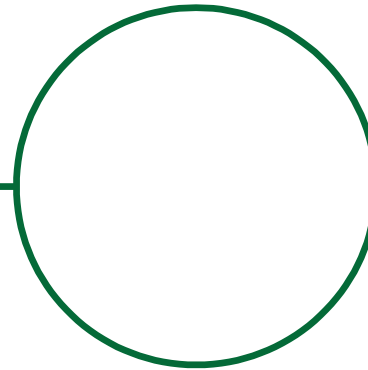
Sources: 1. Deloitte Analysis

Next steps

A three-step approach is utilized to determine the potential LPG laying entities.



End of the Report



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