Report
on
Rapid Assessment of "Pathways to Increase Share of Natural Gas from 6% to 15%"

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

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Study Context

This study report explores the potential for increasing the share of natural gas in India's energy mix

CONTEXT

This study explores the potential for increasing the share of natural gas in India's energy mix. It outlines the benefits, challenges, and policy interventions required to achieve this ambitious target. The study has been conducted to provide inputs to PNGRB on enablers to increase the share of natural gas in the primary energy mix of the country

Demand projection is based on internal analysis and is subject to unlocking of multiple levers and targets. The study lays down the potential sectors to fill up the demand funnel to achieve a 15% share and does not delve into the feasibility of the 15% target

Scope of Work for each of the Modules

1 **Overview of Status of Natural Gas and 2030 Goal**

- Goal of Gas Based Economy
- Projected Gas Consumption @15% Share in Energy Mix
- Sector Wise Consumption & Challenges Impeding Share of Gas in Energy Mix

2 **Projection of Natural Gas Demand & Sectoral Analysis**

- Coverage of section
- Global case studies on increase in share of natural gas
- Overall Approach
- Sector overview, projections and enablers of natural gas consumption (Power, Fertilizers, Refining, Steel, CGD, LNG transport, New initiatives and others)
- Additional analysis (Gas RE blend power price, comparison of alternate fuel pricing in refining sector, EV projections, Impact of GST on pricing of CNG)

3 ***Summary of Key Enablers***

Overview of Natural Gas in India

1

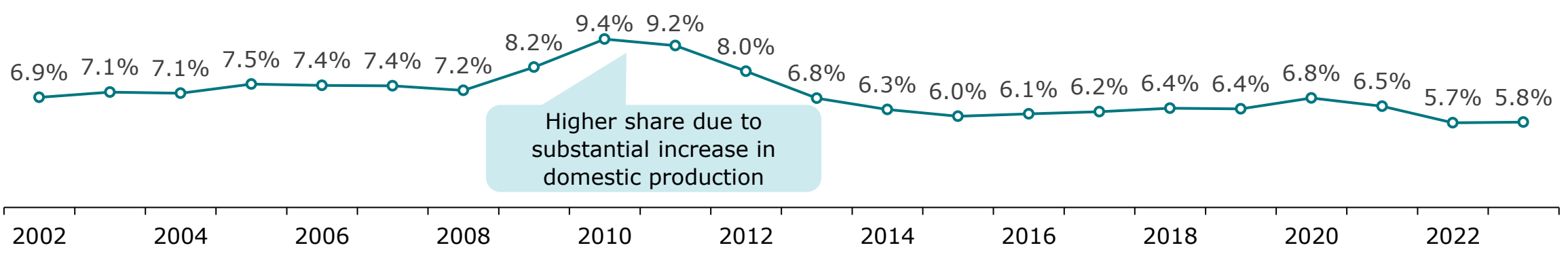
Goal of Gas Based Economy

With six years to go for meeting the 15% target, India faces a steep challenge to raise natural gas consumption whose share has fallen below 6% in 2022 & 2023 in PE mix due to increased gas prices

In 2016, the goal was announced to increase the share of natural gas in the energy mix from 6.3% to 15% by 2030

- Role as bridge fuel in power sector – NG emits ~50% less CO_2 emissions vs coal during combustion
- Improve air quality in urban areas through switch to CNG vehicles in transportation sector
- Critical role in grid balancing as high RE capacity expected to come online by 2030
- Diversify energy mix and stimulate investments in upstream gas exploration & production

Share of natural gas has stagnated at ~6% even after the announcement of 15% target, suggesting practical challenges in raising the gas consumption in various sectors

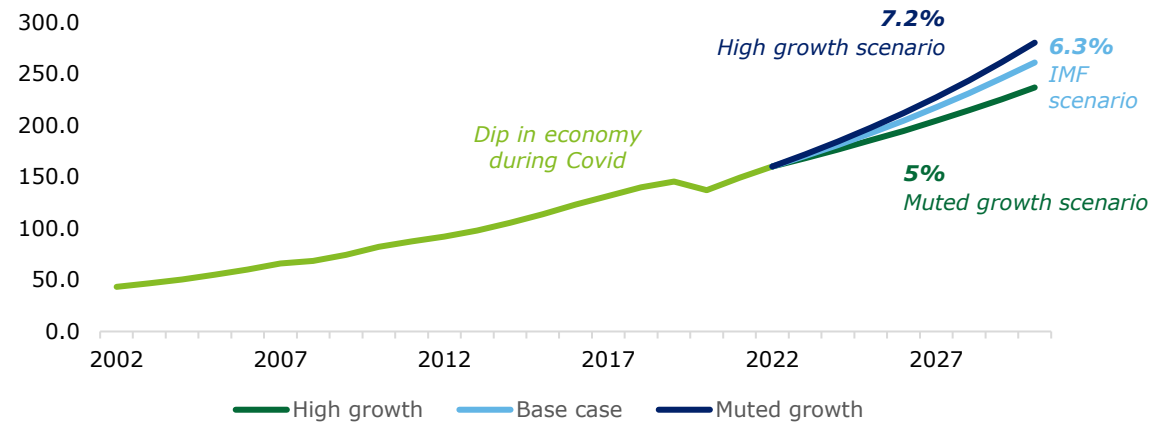


Sources: 1. BP Stats Review 2022, 2. ORF, 3. PIB press releases

Projected Gas Consumption @15% Share in Energy Mix

Growing economy is expected spur demand for energy. With focus on manufacturing and reducing emissions, demand for natural gas demand will go up

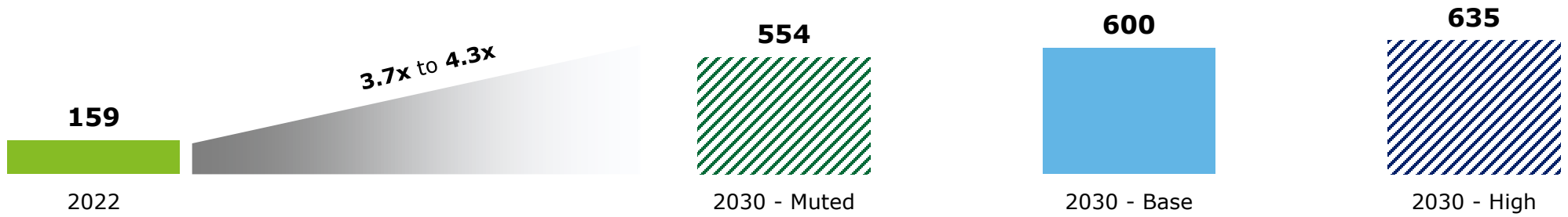
GDP projection (constant prices) INR trillion



- India is in a period of unprecedented opportunity, challenge and ambition in its development.
- Already the world's **third largest economy** in purchasing parity terms, India is expected to surpass Germany and Japan in this decade on nominal basis
- India's long-term GDP growth has become more stable, diversified, and resilient.
- Over the next few years, India is expected to grow at well over **6-8%** per year, with progress being buttressed by dynamic reforms in the macroeconomic, fiscal, tax and business environments.

To reach 15% share, it will require gas consumption to grow at a steep rate of ~17-19% each year to reach at least 600 mmscmd in 2030

Natural Gas Demand Projection @15% share mmscmd



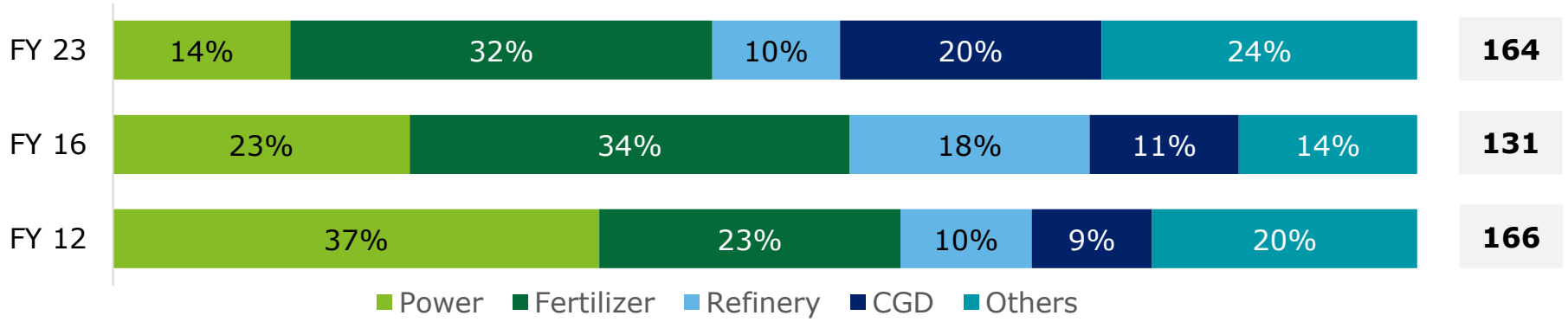
Notes: 1. BP Stats Review 2022, 2. Projected PE(J) based on co-relation with GDP, 3. PE co-related established with GDP. Three scenarios assumed for GDP projects (muted @5%, base @6.3% as per IMF and high growth @7.2%)

Sources: 1. BP Stats Review 2022, 2. ORF, 3. PIB press releases, 4. IMF

Sector Wise Consumption and Challenges Impeding Higher Share of Gas in Energy Mix

Natural gas has positioned itself as the preferred fuel for the transition to net zero, but challenges are on the horizon

Sector wise NG consumption (mmscmd)



- **Demand from fertilizer has remained strong**
- **CGD sector has benefited from allocation policy**
- **Power sector share has dropped due to lack of sufficient domestic gas**

Sector wise challenges

Power

- Declining domestic natural gas allocation
- Lower priority in gas allocation
- High gas price leading to higher power tariff and non dispatching of the plant

Fertilizer

- Volatile natural gas prices puts burden on fertilizer subsidy.
- Pricing of fertilizer is regulated and highly energy intensive process.

CGD

- Lower achievement of MWP targets
- Industrial and commercial consumers are dependent on LNG/deep water gas and are subject to market fluctuations leading to swings in demand/fuel switching by customers
- Litigations challenging regulations /authorizations have surfaced slowing infra development and competition

Refinery

- Dependence on imported LNG
- High cost of gas as feedstock for petchem products puts Indian players at disadvantage

Sources: 1. BP Stats Review 2022, 2. ORF, 3. PIB press releases

Sector Wise Projection of Natural Gas Demand

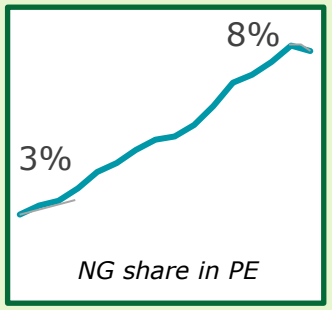
2

Case Study | How has Gas Share Increased in Other Countries?

Globally, increase in gas share has been largely driven by unlocking domestic reserves and market reforms. For India to achieve a higher share of NG, the domestic production needs to ramp up and next phase of reforms needs to kick-in

China

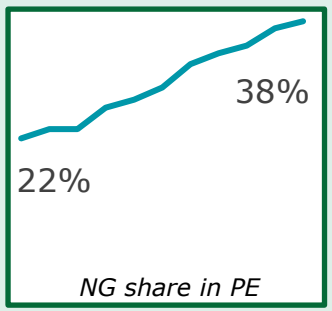
- China's government has incentivized the transition from coal to natural gas to reduce air pollution and meet emissions targets.
- NG consumption was encouraged by expanding gas PPL infrastructure
- Domestic production increased ~3.7x from 60 bcm to 209 bcm btw 2006-22
- LNG imports increased from 1 bcm to 93 bcm
- Period was associated with introduction of pricing reforms aimed at relaxing govt. controls on gas prices



Period: 2007 - 2022

UK

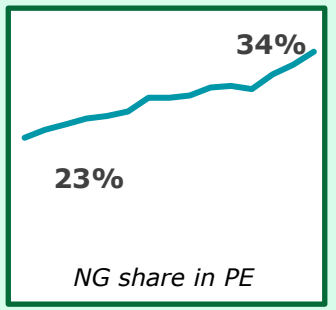
- Post discovery of large reserves of natural gas in North Sea, UK shifted to natural gas for heating in 1970s under govt. led program
- Due to 1973 oil crisis, investments poured into North Sea, tripling O&G production by 1979
- NG production 2.4x between 1990-2000
- Post 1990, NG share exceeded coal as gas fired power plants replaced coal-based power and central gas heating became popular in homes.
- This was aided by privatization of gas supply and opening up of gas markets



Period: 1990 - 2000

USA

- Fracking boom revered production declines post 2005 and has had a dramatic effect on gas supply and prices putting US on pole position
- NG production has nearly doubled (522 bcm to 979 bcm), and more than 100 coal power plants were replaced by gas after 2011, driven by stricter emission standards, low NG prices, and more efficient NG turbine technology
- State-level as well as federal-level environmental policies have pushed gas up in the energy mix while pushing out coal



Period: 2007 - 2022

Sources: 1. SP Global, BP Energy stats, Office of Budget Responsibility, TC Energy, EIA, Forbes

Overall Approach

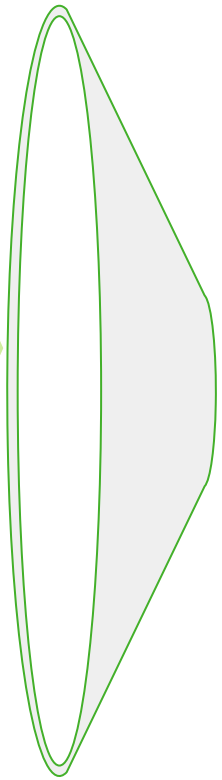
The approach employs quantitative analysis to calculate sector wise natural gas demand tempered with drivers and constraints

As-is sector-wise consumption of natural gas (FY 23)

Sector wise projection of natural gas demand in 2030 (base case, stretch case)

Top Bottom Assessment of Projected Natural Gas Demand @base scenario of economic growth

Bottom-up Assessment of Projected Natural Gas Demand



Sector wise stack-up of natural gas demand projection for 8% and 15% share

Enablers to increase sector natural gas consumption

Projection of natural gas @15% share in primary energy mix: Based on projection of primary energy linked to correlation with GDP forecasted under three different scenario (muted, base, high)

Sector wise **overview, growth drivers and constraints** to build assumptions for NG projection under both scenarios

BASE CASE @8% SHARE

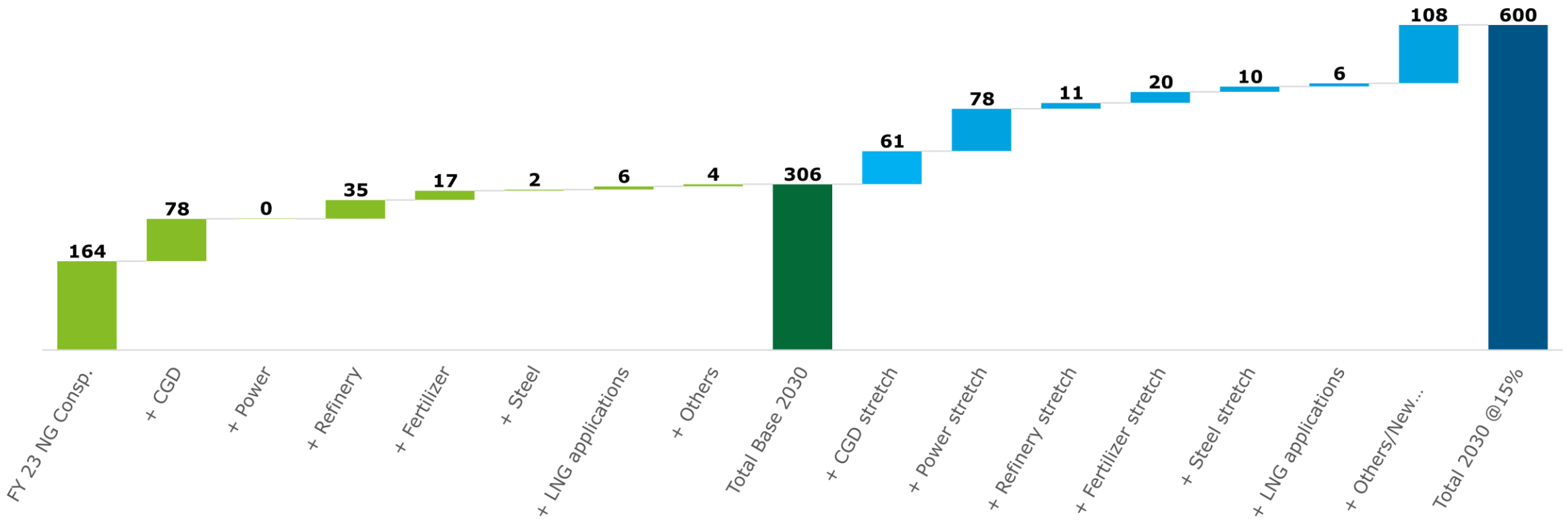
Business as usual scenario under which natural gas demand continues to grow as per existing constraints and drivers

STRETCH CASE @15% SHARE

Stretch scenario requiring additional initiatives and enablers to drive up consumption of natural gas

Projection of Sector-wise Natural Gas Demand @15% Share of Primary Energy Mix

Natural gas consumption is expected to reach ~306 mmscmd ~@8% share in the base scenario. To push the share of natural gas to the desired target of 15%, it will require additional measures and initiatives



Business As Usual (Base) Scenario @8% Share

Stretch Scenario to Target Higher Consumption @15% Share

Demand Projections by Others

Other India and global agencies have also projected a similar range of the natural gas demand by 2030 (FICCI ~300 mmscmd, EIA ~ 311 mmscmd and IEA ~ 315 mmscmd)

Note: 1. Demand projection is based on internal analysis and is subject to unlocking of multiple levers and targets. The study lays down the potential sectors to fill up the demand funnel to achieve a 15% target share

Overview of Natural Gas Consumption (1/2) - Power

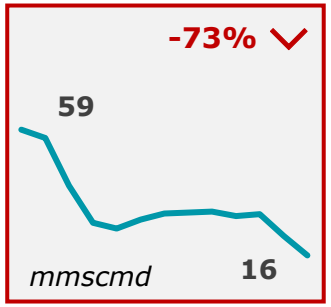
Power generation from gas-based power plants has dropped more than 70% since FY 11 due to challenges around gas availability, pricing and domestic gas allocation policy

Gas power sector in crisis

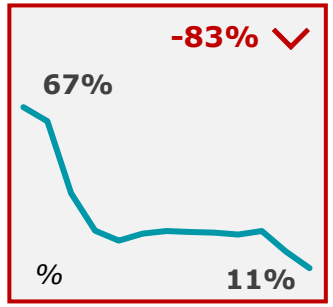
- Out of 23.8 GW installed capacity, 31 plants with 14.3 GW capacity are stranded
- In FY 23, the overall PLF was only 11.4% with 37 plants with 67% capacity share having a PLF of <5%[1]

- Isolated plants fared better with 58% generation share and a PLF of 54% due to better availability of gas and lack of competition
- Gas power plant capacity gas gone up by 43% but generation has reduced by 76% over the same period

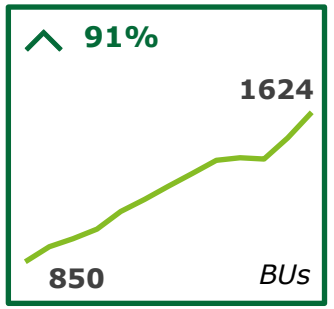
All India power production has increased by 91% (FY11- FY23), but gas sector has seen major reversals, with large drop in gas consumption and subsequently PLF. Gas received vs allotted gas has dropped from 90% to just 17%



Gas consumption - Power



Gas Power Plant PLF



All India Power Generation

Challenges faced by gas-based power plants

1. **Drop in domestic gas production:** Gas production declined drastically from peak of 2011, especially from RIL's KG D6 basin. Many gas plants which became stranded due to lack of gas leading to fall in gas-based power generation

2. **Change in gas allocation policy:** Domestic gas allocation policy was changed in promote CGD over power sector

3. **Increase in RE and coal-based capacity:** There was massive increase in coal and RE capacity which has inherent lower tariffs leading to gas plants losing out in the dispatching power

4. **Volatility in LNG price:** Due to declining availability of domestic gas, plants had to depend on LNG. However, higher prices of LNG coupled with volatility meant, LNG based power was not competitive

Sources: 1. CEA, PPAC

Projection and Enablers of Natural Gas Consumption (2/2) - Power

Gas consumption from power sector can increase 2x-4x if initiatives are taken to improve gas availability and dispatchability recognizing the value provided in integrating RE power and peaking power

Natural Gas Demand Projection in Power sector (mmscmd)

Enablers to increase gas consumption in power sector

1 Blending Gas Power with RE

- **Blend power** produced from domestic gas instead of R-LNG (whose prices will remain high) with renewable energy (solar/wind) as it will result ~ INR 5/unit tariff.
- This will improve utilization of gas power plants

2 Reduce allocation from refinery and fertilizer

- Increase **mandates** for fertilizer and refineries to **use green hydrogen** instead of grey hydrogen from NG
- The freed up domestic gas can be diverted to gas power plants to provide gas at cheaper rates and will help to improve PLF of existing plants.

3 Include emission factor in merit order of dispatch

- Gas power generation emits ~ 50% less CO_2 vs coal plants, however, this is not factored in while considering dispatching power as per Merit Order
- Introduce an **emission factor or a higher carbon tax** to improve ranking and PLF of gas power plants

4 Higher pricing for gas power

- Improve PLF of gas power by valuing the flexibility provided to grid through higher prices and mechanisms such as High Price Day Ahead Market (HP DAM), and higher offtake in peak months

5 Restrict unbated coal power generation

- There are 66 Cat. A and 72 Cat. B plants with 45 GW capacity as per MoEF&CC. Restrict coal power generation in plants closer to large population centres/ critically polluted areas and enforce installation of Flue-gas Desulfurization (FGD) systems as only 8% plants have installed it by end of 2023.

Notes: 1. Installed capacity of gas power plants assumed same as present (23845 MW), 2. Avg. 5Y PLF (FY19-23): 20%, 3. 5Y avg. gas consumption = 1601 MUs/mmscmd
Sources: 1. Deloitte Analysis, IEEFA, CEA, New articles, Ministry of External Affairs – Economic Diplomacy Division, PIB, Down to Earth

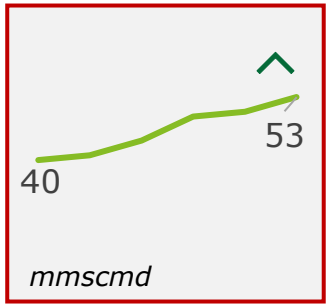
Overview of Natural Gas Consumption (1/2) - Fertilizer

Fertilizer generation from gas-based power plants is growing at a steady pace with the support of subsidies & Direct Benefits Transfer (DBT) and aim to reduce imports

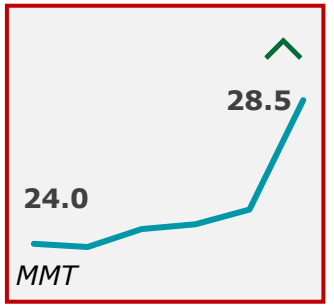
Fertilizer sector aims to increase production and cut on Imports

- Currently there are 36 Gas Based urea units with total capacity of 28.4 MMT.
- In FY 22, plants are running at average utilization of 96.3%, Newly revived plants are expected to curtail imports.[6]
- Revival of closed plants to boost indigenous production and will help in curtailing exports.
- The fertilizer sector faces critical challenges related to food security, harvest losses resulting from overuse of Fertilizers and the imperative of sustainable development.

PAN India Fertilizer production has risen by 65% (FY17- FY22), but lack of modern technology and limited availability of APM gas sector has witness moderate increase in gas consumption. However, with the focus on Indigenous production average capacity utilization of plants has reached 99%.



Gas consumption – Fertilizers (FY17-FY22)



All India Fertilizer Production (FY17-FY22)

Challenges faced by Gas based Fertilizer plants

1. **Subsidies has kept the Sector sailing:** Fertilizer sector growth is riding upon subsidies. Government bears subsidy for 26 fertilizers.
The subsidy bill has fluctuated (~3x between FY 20-23) a lot as per the volatility in prices in the global markets

2. **Highly subjected to price fluctuations of natural gas :** Energy accounts for 90% of the variable costs for ammonia production and NH_3 itself accounts for 80% of the energy production of urea leading to high dependence on prices of natural gas used to produce NH_3

3. **Changes in gas sourcing:** Due to declining domestic production, fertilizer companies have to resort to LNG and are thereby subject to pricing volatility. Under revised gas procurement rules, 40% of gas supplies are now subject to take or pay agreement. Although, it has allowed the companies to buy ~20% of gas through spot markets which will help to take advantage of lower prices.[2]

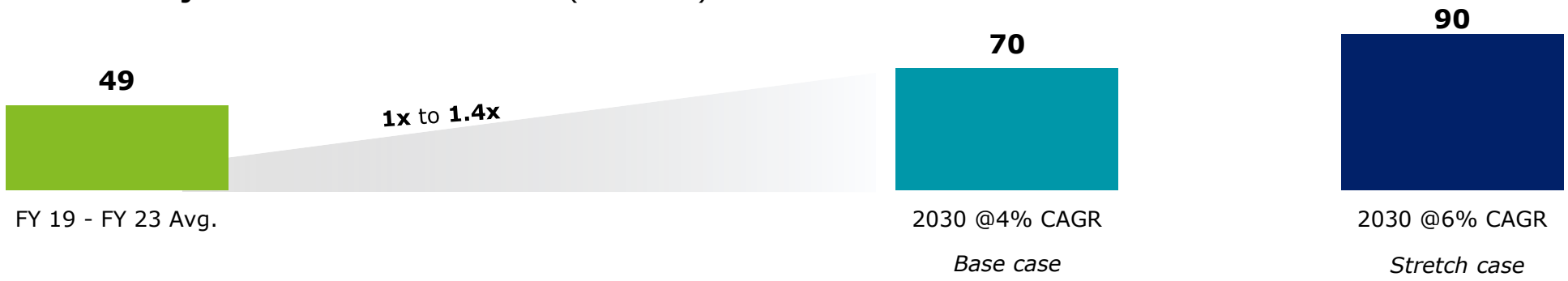
4. **Reduction of fertilizer use:** Introduction of nano urea will impact consumption of tradition urea fertilizers

Sources: 1. Sansad.in 2. Fert.nic.in, 3. Fertilizer Association Of India, 4. News articles, 5. CEEW

Projection and Enablers of Natural Gas Consumption (2/2) - Fertilizer

To reduce imports, revival of fertilizer plants should be expedited and green field capacity to be planned

Natural Gas Demand Projection in Fertiliser sector (mmscmd)



Enablers to increase gas consumption in Fertilizer sector

1 Revival of Gas power Fert. plants

- As per Govt. mandate, existing Plant revival shall be expediated on priority to curtail imports and focus on 'Aatmanirbhar Bharat' (Self-reliant India).
- Upgradation of technology and machinery will help achieve better capacity utilization and increased production.

2 Implementation of gas procurement policy

- Gas sourcing should be done seamlessly from IGX at competitive price.
- Joint sourcing of LNG by pooling gas requirement to reduce gas costs and negotiate as combined entity

3 Increased fertilizer demand from agricultural sector

- India's use of fertilizer is lower than other similar countries with large farming sector. India uses 177 Kg/Ha fertilizer whereas Brazil and China uses 298 Kg/Ha and 319Kg/Ha respectively.[6]
- To improve yield from agricultural land, there will be an increase in fertilizer use, leading to increased demand.
- Balance use of N:P:K. FY 23 ratio was 11.8:4.6:1. Ideal ratio 4:2:1

4 Subsidy allocation

Sufficient and continued budgetary allocation to fertilizer subsidies will ensure production and growth in future.

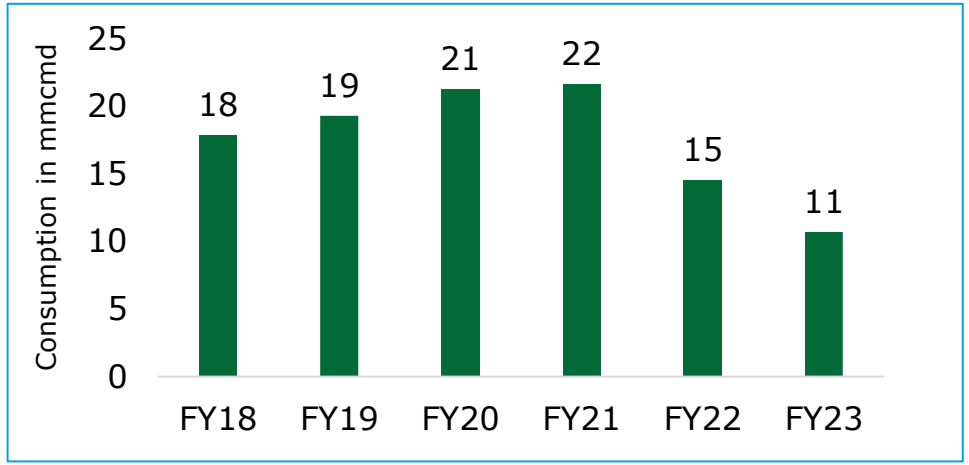
Sources: 1.Sansad.in, 2.Financial Express,3. Livemint, 4. MCF AR, 5.GNFC AR, 6.World Bank

Overview of Natural Gas Consumption (1/2) – Refinery & Petrochemicals

Natural Gas consumption from Refinery has decreased in last few years owing to price of volatile LNG prices

Refinery & Petrochemicals sector

- India has 257 MMTPA of installed capacity, but the total crude processed has been ~2% over its installed capacity i.e. 261.5 MMTPA for FY 23-24[1]
- The consumption of Natural gas has decreased for refinery from 22 to 17 MMSCMD for FY21-23[2]
- The sector is dependent on imported LNG and high volatility in the price of imported LNG contributed to the decline in natural gas by these sectors[3]. The availability of substitutes[4] at more certain price prospects also contributed to the reduction in natural gas consumption by the refining and petrochemicals segments



Challenges faced by the sector

1

Drop in gas sourcing at economical prices: As sector is dependent on imported LNG, high volatility in the price of imported LNG can contribute to the decline in natural gas use by this sector, as is evident in FY22 & FY 23

2

Availability of cheaper substitute: Refineries can increase internal consumption of naphtha, diesel, propane etc. as process fuel to reduce the need for expensive natural gas

3

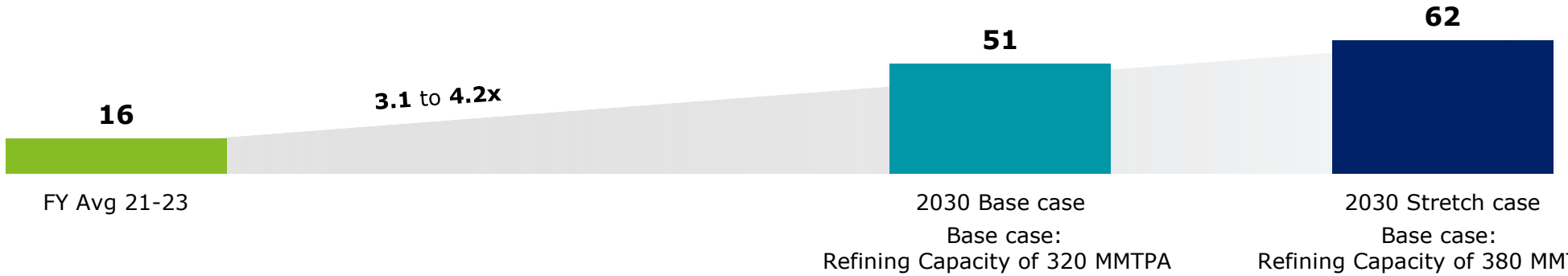
Infrastructure development challenges: Upcoming key projects have been marred by public opposition leading to delays in execution of the major projects like RRPCL, and NG pipeline projects

Sources: 1. PPAC Ready Reckoner March 2024, 2. MoPNG IPNG stats 2022-2023, 3,4. ORF orfonline.org , OMC Websites,

Projection and Enablers of Natural Gas Consumption (2/2) – Refinery & Petrochemicals

Capacity ramp-up primarily geared towards petrochemical integration and emission reductions will push up demand for natural gas in refinery & petrochemicals

Natural Gas Demand Projection in Refinery & Petchem (mmscmd)



Enablers to increase gas consumption in Refinery & Petrochemical sector

1 Target shift to NG by mandating Scope 1 emission targets

- Choice of fuel used in refineries is linked to economics and not emissions.
- Refinery can drive large increase in consumption, and this can be achieved through mandates on increased usage of NG through emission targets

2 Restrict usage of dirty fuels in refinery

- Restrict usage of heavy, residual components forcing switch to natural gas

3 Increase in refining and petchem capacity

- Refining capacity is expected to increase to 300-320 MMTPA by 2030 due to ongoing and announced refinery expansion projects and greenfield HRRL refinery
- Additional 60 MMTPA RRPCL refinery is also under planning

4 Economical Sourcing of Natural Gas

- Implement joint sourcing of gas to negotiate lower gas prices

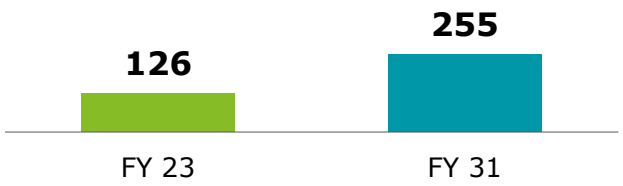
5 Creation of Gas Storages to tackle volatility

Evaluate feasibility of NG storage to cushion the volatility in LNG prices, thereby ensuring increased natural gas uptake

Overview of Natural Gas Consumption (1/2) - Steel

While there will be market for low carbon or green steel, cost economics of gas DRI are unfavorable vs coal

Crude Steel Production (MMT)

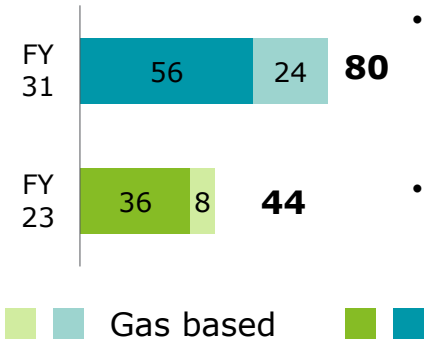


NSP 2017 targets a production of 255 MMT by 2030, an increase of 2x

Drivers

- Per capita consumption of India is lower than world avg. (76 kg vs 233 kg)
- Push on developing infrastructure and manufacturing & GoI schemes such as Gati Shakti, Make in India, Housing for All

Sponge Iron Production (MMT)



- India is **the largest producer** of Direct Reduced Iron (Sponge Iron) and is projected to grow to 80 MMT as per NSP
- Current Production is mainly via coal with **gas-based** production accounting **~ 20%**

Why is coal predominately used in making Sponge Iron in India ?

Coal based rotary kiln furnaces for production of DRI is predominantly found in India and no green field gas-based capacity has come up in India since 1994.

Advantages of Coal based DRI

- Relatively low capital investment costs and operate at smaller scale
- No requirement of coking coal. Non coking coal is used as fuel and as redundant
- Flexibility in location as non coking coal is widely available in India
- Cost advantage vs gas-based DRI process. Gas feed is at-least **1.5x to 3x expensive vs coal feed[1]**

Need for reduction on coal usage in steel making

- Steel sector contributes to ~12% CO_2 emissions of country with each tonne steel production leading to ~2.5 T CO_2 vs global avg. of ~1.9 T CO_2
- Demand for green steel will grow in future
- Regulations about sustainability in advanced countries and the EU are posing challenges for steel exports from India
- Natural gas-based route to desirable for transition to green DRI once green H_2 becomes available at economical rates.
- Coal based DRI plants are highly polluting having adverse impacts on local surroundings

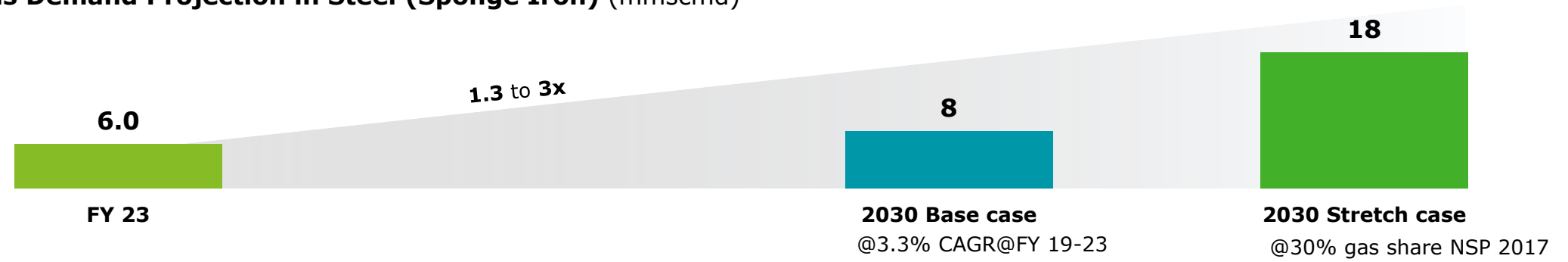
Note: 1. Assumption for 1 tonnes of DRI requires 280 scm of NG or 1100 kg of coal, Coal price ~INR 4500/T and gas price ranging from 7.3 USD/mmBtu for APM gas to 13 USD/mmBtu for LNG @80 USD/bbl

Sources: 1. Ministry of Steel Annual Report, National Steel Policy, Sponge Iron Manufacturers Association, Deloitte Thought Leadership

Projection and Enablers of Natural Gas Consumption (2/2) – Steel

Gas consumption is projected to grow to 8 mmscmd considering historical growth, however accelerated growth of 3x as per NSP 2017 can be targeted if greater emphasis is placed to cut down emissions

Natural Gas Demand Projection in Steel (Sponge Iron) (mmscmd)



Enablers to increase gas consumption in Steel Plants

1 Increased Availability of Domestic Gas for Steel

- MoPNG has to increase supply as production from gas-based plants has stagnated due to lack of domestic gas.
- Greater allocation of deep-water gas which gas higher calorific value

2 Set-up and scale up gas based DRI

- Urja Ganja NGPL (JHBDPL) has brought gas access to the iron & steel belt in JH, OD, WB
- Natural Gas based DRI can be eventually transitioned to green hydrogen to cater to low carbon/green steel emerging market
- Firm supply of natural gas is imperative to boost the confidence and investment in the gas-based steelmaking technology.

3 Reducing emission intensity & Enforcing pollution norms

- Replace LDO for initial start-up of cold kilns
- R&D efforts for technological solutions to substitute part of the coal by NG in existing coal based DRI
- Reducing coking coal usage in integrated plants by NG injection
- Enforcing pollutions norms on the unorganized MSME coal based DRI plants

4 Make price of natural gas economical for steel sector

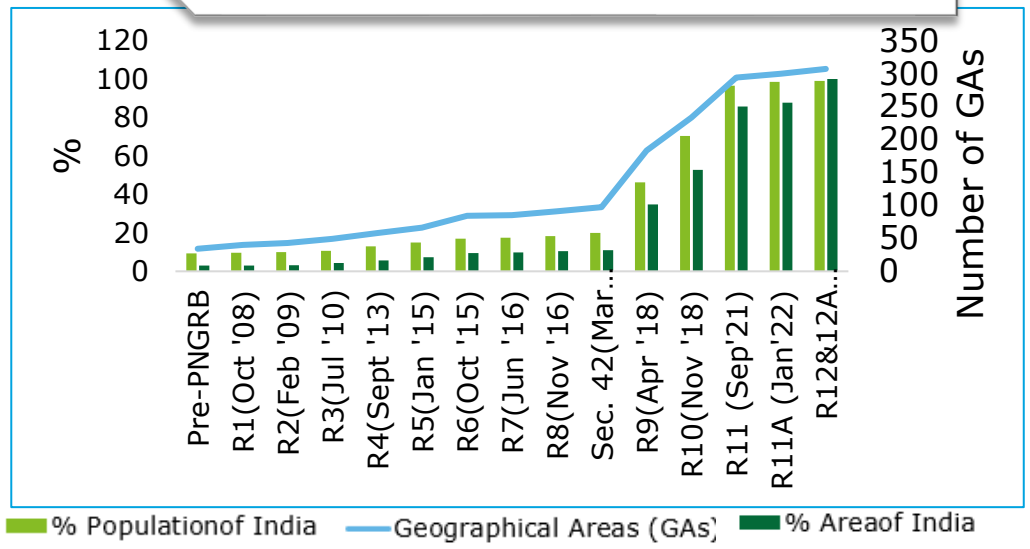
Supply NG at affordable rates ~USD 7/mmBtu, duty waiver on LNG and include NG in the ambit of GST

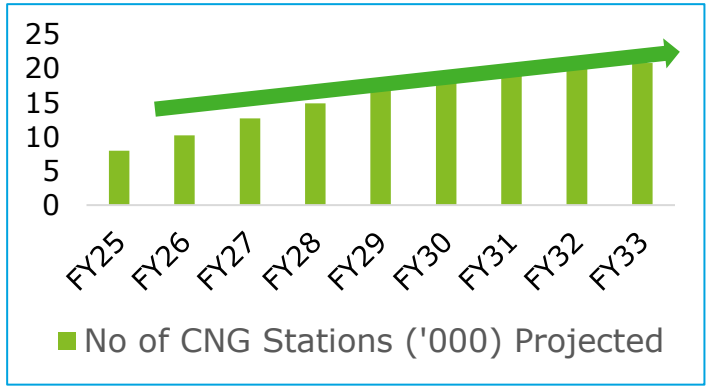
Sources: 1. National Steel Policy, Sponge Iron Manufacturers Association, Argus Media

Overview of Natural Gas Consumption (1/5) – CGD

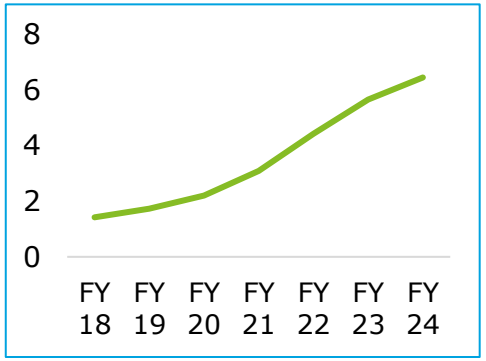
India has witnessed significant growth in authorizations, number of CNG stations, commercial and industrial connections FY 2018 onwards, fueling the demand for NG

Explosive Growth by 3x in Authorizations from 97 to 307 (FY18-FY24)[1]





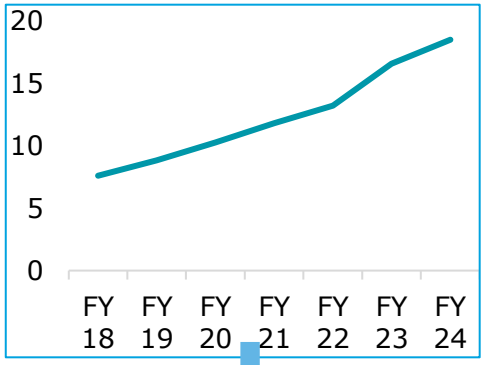
CNG Stations[2] ('000)



Significant Growth by 353% in number of CNG stations from 1424 to 6456 (FY18-FY24)

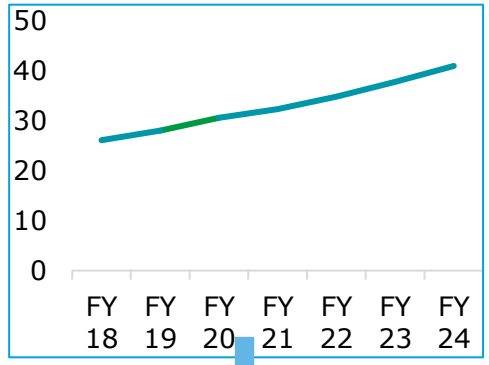
MWP target is set out for completion by 2032

Industrial Conn[2] ('000)



Increase by 108% in no. of Industrial connections from 7601 to 18500 (FY18-FY24)

Commercial Conn[2] ('000)



Increase by 56% in no. of Commercial connections from 26131 to 40,040 (FY18-FY24)

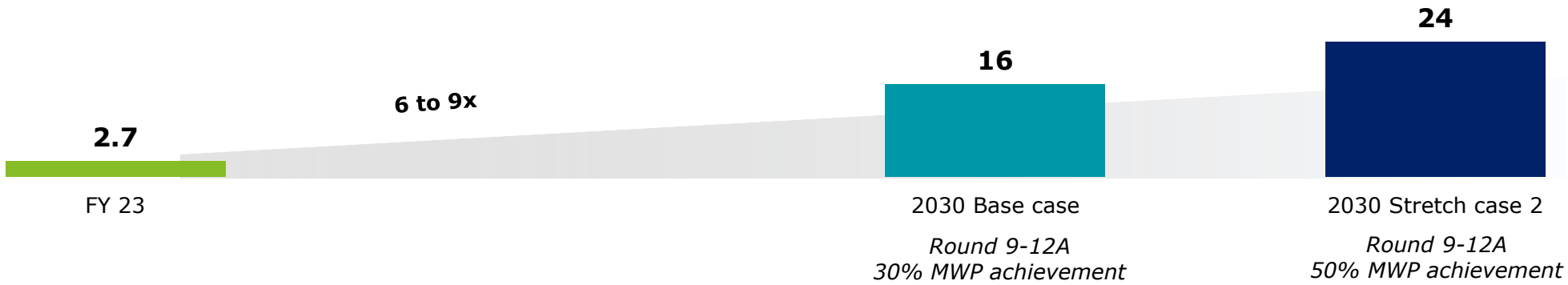
Notes: 1. Projects of CNG stations as per MWP target and growth

Sources: 1. PNGRB 12th CGD Bidding Round Roadshow, 2. IPNG Stats & PPAC Ready Reckoner March 2024

Projection and Enablers of Natural Gas Consumption (2/5) – CGD (PNG)

Increased focus on meeting MWP targets and favourable economics vs LPG should drive up adoption of PNG

Natural Gas Demand Projection in PNG segment (mmscmd)



Enablers to increase gas consumption in PNG segment

1 Focus on completion of MWP targets

- CGD companies are falling behind in meeting MWP targets
- Regulator to ensure CGD companies complete MWP targets within quoted timelines

2 Continuation of existing gas allocation and pricing policy

- Since 2014, D-PNG receives top-most **priority in allocation** of domestic gas
- Policy should be continued in future so that D-PNG receives cheaper domestic gas and is able to maintain pricing competitiveness vs. LPG

3 Mandate gas pipeline in new buildings and rationalize charges and timelines

- Involve central and state level Ministry of Urban Development Departments to mandate gas pipeline as a required utility for permitting new buildings in areas where CGD GA is already authorized or soon to be operational
- Rationalize CGD infra/RoU charges across local govt. bodies

4 Roll out of PNG adoption schemes.
Expedite PNG connections and increase PNG penetration through rollout of Prajwala scheme planned by MoPNG

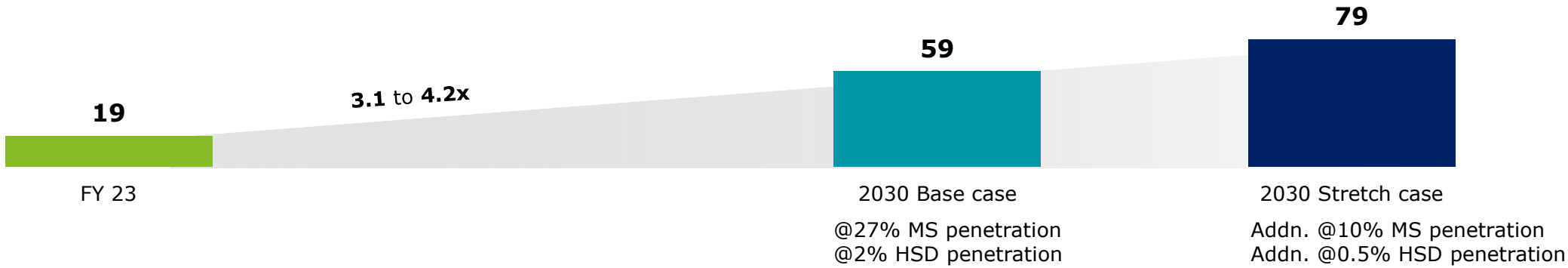
5 ROU Push Single Window Clearance for expediating ROU permissions.

Notes: 1. Avg. consumption 0.4 scmd per domestic connection for R9-12A, 2. MWP targets as quoted for each GA
Sources: 1. PNG statistics 2023, news articles,

Projection and Enablers of Natural Gas Consumption (3/5) – CGD (CNG)

Increased focus on reducing emissions, favorable TCO, and availability of inter-state infrastructure will push adoption of CNG fueled vehicles

Natural Gas Demand Projection in CNG segment (mmscmd)



Enablers to increase gas consumption in CNG segment

1 Continuation of existing gas allocation and pricing policy

- Since 2014, CNG receives top-most **priority in allocation** of domestic gas, Policy should be continued in future so that CNG receives cheaper domestic gas and is able to maintain pricing competitiveness against competing fuels

2 Expanding mandates for use of CNG vehicles

- Expand mandate for use of CNG in public transport across other cities/towns similar to Delhi and Mumbai
- To address pollution concerns, consider introduction of low emission zones which will exempt CNG & EVs and charge other MS/HSD vehicles

3 Reduction in taxes for CNG

- Natural gas in not under GST regime, it is subjected to multiple taxes.
- At present CNG is charged BED of 14% and sales tax as high as 25% in few states
- RSP Savings in range 1%-20% with an average 7% with implications of 18% GST

4 Reduction of GST on CNG vehicles

- Current GST rate of 28% on CNG vehicles is same MS and HSD fueled vehicles despite being a cleaner fuel and should be reduced one step above EV which are taxed at 5%

5 Penalize for non-achievement of MWP

Sources: 1. PNG statistics 2023, news articles,

Projection and Enablers of Natural Gas Consumption (4/5) – CGD (Commercial)

Coverage of CGD across India will enable access of natural gas to commercial users of LPG

Natural Gas Demand Projection in CGD Commercial segment (mmscmd)

Enablers to increase gas consumption in CGD Commercial segment

1 Extend domestic gas for commercial segment

- Demand from commercial segment is not large and availability of domestic gas will ensure lower price for small scale business owners spurring adoption of natural gas

2 Adoption Campaigns

- Marketing of multifaceted benefits - reduction of opportunity costs due to by supply delays, elimination of fuel storage space requirements, safe and reliable transition to commercial PNG connections, uninterrupted supply to sustain business operations

3 Leveraging Technology for Demand Aggregation

- Existing demand aggregation platform, who have commercial outlets listed, like food delivery apps can speed up the reach in each GAs prior to setting up infrastructure in that GA. Example- Commercial chains can lead to demand aggregation from multiple outlets

4 Application of Co-gen and Trigeneration Systems Co-gen and Tri-gen can help hotels, restaurants and hospitals enhance energy efficiency, slashing costs and reducing greenhouse gas emissions. Wider role of district cooling can be explored.

Sources: 1. PNG statistics 2023, news articles, 2. International Institute of Energy Conservation (IIEC)

Projection and Enablers of Natural Gas Consumption (5/5) – CGD (Industrial)

Industrial CGD segment consumption will grow through a combination of inherent conversion and through policy and regulatory measures

Natural Gas Demand Projection in CGD Industrial segment (mmscmd)

At different fuel conversion rates (HSD, LPG, LDO, LSHS, FO, Naphtha, Petcoke)

Enablers to increase gas consumption in CGD Industrial segment

1 Ban polluting fuels through legislation and policy

- Mandate compulsory use of natural gas and ban pollution fuels like (FO, LDO, Naphtha)
- Implement in phased manner targeting industrial clusters and urban areas with high levels of pollution

2 Include natural gas under GST

- Natural gas is outside GST ambit and is subjected to multiple taxes.
- Competing fuels are subject to lower taxes due to inclusion in GST regime

3 Expand infrastructure of CGD network

- Expand CGD transmission and distribution network to reach industrial customers

4 Flexible Contracts

Provision of flexible contracts for dual fuel arrangements can push the adoption and demand in Industrial segment

Notes: 1. HSD bulk sales assumed 12% of total HSD sales (PPAC data)
Sources: 1. PNG statistics 2023, News articles

Enablers Towards 15% Gas Share

3

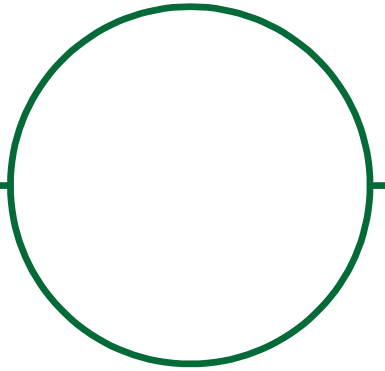
Summary of Key Enablers

Key area specific enablers working in tandem will pull the demand triggers in different segments

Imperatives for India	Levers...		Key Initiatives for 15% Share
Grid balancing with RE power	Pricing	Power	1 Blending Gas Power with RE for affordable pricing from gas-based power plants
		Fertilizer/ Refining	2 Joint sourcing of LNG by pooling gas requirement to negotiate as combined entity and source of gas from spot
		Steel	3 Supply NG at affordable rates to steel sector and consider duty waiver on LNG
Improve air quality	Infra	All Sectors	4 Creation of Gas Storage facilities to tackle LNG price volatility for import dependent sectors
		CGD	5 Meeting MWP targets for CGD will drive consumption in CNG, PNG, Ind. & Com.
			6 Expediting ROU permission & resolving hurdles in the ROW
Diversify energy mix	Consumption Policies	Power	7 Restrict unabated generation of coal power in high population centers and critically polluted zones
		Refining/Steel	8 Restricting emissions through targets and mandating use of natural gas
		CGD Ind	9 Ban polluting alternate fuels and allow flexible contracts to increase adoption of NG
Sourcing from domestic/ spot	Gas Sourcing	All Sectors	10 Use of spot market for sourcing of gas to take advantage of lower prices
			11 Continuation of preferential gas allocation and pricing policy for CGD sector
Adoption of transition fuels	Taxation Reforms	All Sectors	12 Bringing Natural gas in GST ambit
		CGD	13 Reduction of GST on CNG vehicles, keeping one step above EV

Sources: 1. PPAC, MoPNG, Gati Shakti, OMC Websites,

End of the Report



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