



# Indian Infrastructure 18<sup>th</sup> Annual Conference on City Gas Distribution in India

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**Session on**  
Cost Economics and New CGD  
Models

**February 14, 2023**



# Agenda

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Key costs for CGD projects

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Economics of CGD projects

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Financial performance of major incumbents

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Key takeaways

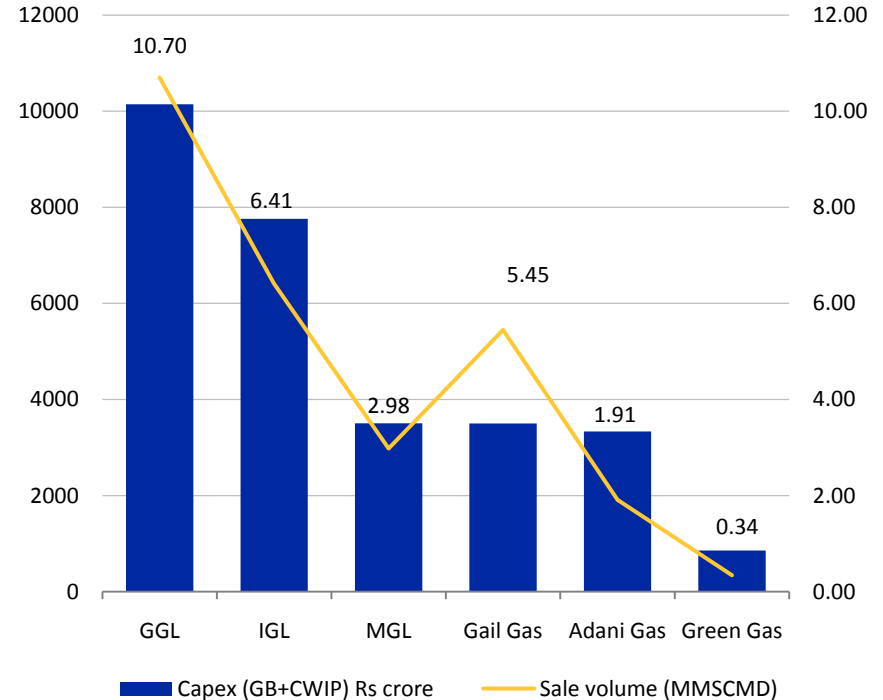
# Key Costs for CGD Projects

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- CGD business is characterised by high fixed capital intensity and low working capital intensity
  - Degree of operating leverage is high
  - Focus on high capacity utilisation is a must for healthy returns
- Capex is a function of
  - Geographical area served
  - Inch-Km of steel/PE pipelines laid
  - Consumer mix (Domestic, Vehicles, Industrial and Commercial)
  - Type of CNG stations (Own Vs Co-located, Mother Vs Online, Daughter, Daughter Booster)
  - Land ownership for CNG stations (Own vs lease)
  - Number of City gate stations
  - Redundancy in design (compression capacity vs dispensing capacity)
  - Statutory levies (municipality/corporation charges etc)
- Expansion in the scope of “geographical area” in new bidding rounds includes the entire district instead of cities till round 8, would further increase the capital intensity of the business and depress the return indicators in absence of adequate build up of volume

**Exhibit 1: Capital Intensity for Major Players: FY2022**



- **Opex comprises**

- Employee costs
- Power & Fuel
- Repair & Maintenance
- Insurance
- Selling and General Administration
- Other over heads

- **Opex is a function of**

- Consumer mix (CNG Vs PNG)
- Nature of CNG stations (Online Vs others)

- **Opex has varied in the band of Rs. 2-6/m<sup>3</sup> for major players – depends on the strategy employed – pipeline requirement in case of PNG/CNG and on line/cascading pumps for CNG**

- **Capital servicing costs (Interest & Depreciation) is a function of Capex, means of finance and depreciation rates followed**

## Key Risks for CGD Projects

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# Key issues affecting long term viability

- Lack of control over fuel economics
- Availability of cost competitive gas, esp for PNG (I) and PNG ©
- Forex fluctuations, esp INR Vs USD
- Consumer resistance for price hikes; time lags in pass through
- Availability of land for setting up CNG stations
- Statutory approvals and lack of requisite support from States
- Slow scale up in domestic demand and lack of adequate profit
- Long payback period and limited marketing exclusivity
- Lack of adequate market potential /balanced consumer mix in new cities
- Taxation issues
- Competition from 3<sup>rd</sup> party marketers post exclusivity period

# Key challenges from bid rounds 9 onwards

- In some instances, almost three or more districts have been clubbed making some GAs very large
- Sketchy market assessment data available to evaluate the market potential of GAs
- Mix of high moderate and low potential GAs
- Not providing specific tap-off points leading bidders to make different assumptions for gas connectivity
- Several new GAs do not offer adequate market potential and healthy consumer mix
- With 50% weightage to PNG(d) segment the regulations clearly shift the focus to higher penetration-however scale-up of volumes remains slow in PNG(d) segment and 50-60% customer penetration level is achieved only after nine to ten years
- PNG (d) will continue to be less profitable, although the industry will benefit from volume push of the Central Government



# Economics of CGD Projects

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# CNG cost competitive; other segments remain under pressure

Exhibit 3: Energy cost comparison with traditional fuels

Fuel	Traditional Fuels					City Gas				City Gas cheaper on energy terms by
	Selling Unit	Selling Price	Gross Calorific Value (GCV)	GCV Unit	Energy Cost (Rs/million Kcal)	Fuel	Selling Price	Selling Unit	Energy Cost (Rs/million Kcal)^	
MS	Rs./litre	96.7	8419	Kcal/litre	11489	CNG	79.56	Rs./kg	6314	45%
HSD	Rs./litre	89.6	9036	Kcal/litre	9919	CNG	79.56	Rs./Kg	6314	36%
Auto LPG	Rs./litre	62.8	10800	Kcal/kg	10773	CNG	79.56	Rs./Kg	6314	41%
Sub. LPG	Rs./Cylinder	1053.0	10800	Kcal/Kg	6866	PNG (d)	53.59	Rs./m3	5762	16%
Un-sub. LPG	Rs./Cylinder	1053.0	10800	Kcal/Kg	6866	PNG (d)	53.59	Rs./m3	5762	16%
Bulk LPG	Rs./Kg	91.8	10800	Kcal/Kg	8499	PNG ©	75.00	Rs./m3	8065	5%
LDO	Rs./litre	85.4	8800	Kcal/litre	9700	PNG (I)	68.00	Rs./m3	7312	25%
Furnace Oil	Rs./kg	46.7	10440	Kcal/Kg	4476	PNG (I)	68.00	Rs./m3	7312	-63%

**CNG and PNG (d) segments highly competitive due to domestic allocation; especially CNG PNG (i) to continue to face pressure due to low-competitiveness against liquid fuels**

Source: Prices from websites of IOC and BPCL at Delhi, ICRA analysis; Prices as on Feb 7, 2022  
 Note: (d): domestic, (I): industrial, ©: commercial. ^GCV of gas assumed at 9300 Kcal/m3.

# CNG economics, including conversion costs, remains competitive

	Running Costs (Rs/km)				Conversion Costs (Rs)	Break Even Km	Avg km/day	Break Even Months
	CNG	MS	HSD	LPG				
Car on MS	3.79	6.45			45,000	15,803	50	10.4
Car on Auto LPG	3.79			4.65	30,000	23,819	50	15.7
Bus	15.91		25.61		300,000	28,616	200	4.7
Auto	2.27	3.87			30,000	17,559	100	5.8

Cost of ownership calculations for 4-wheeler	Petrol	CNG	Diesel	Electric
<b>Purchase price</b>	787406	887018	944910	1349994
<b>Running &amp; Maintenance Cost</b>				
Fuel/Electricity Cost (Rs./L, Rs. Kg. Rs./unit)	96.7	79.6	89.6	5.0
Milage (Km/L, Km/kg or Km/Unit)	16	27	20	7
Cost per Km (Rs./Km)	6.05	2.91	4.48	0.71
Life of the vehicle (years)	10	10	10	10
Average distance travelled per year (Kms)	12000	12000	12000	12000
Running Cost (Rs.)	725400	349333	537720	85714
<b>Maintenance Cost per annum (Rs.)</b>	30000	30000	30000	30000
<b>Battery replacement cost (Rs.)</b>				514800
<b>Salvage Value after 10 years (Rs.)</b>	50000	35000	50000	200000
<b>Cost of vehicle over useful life</b>	<b>1762806</b>	<b>1501351</b>	<b>1732630</b>	<b>2050508</b>
CNG lower by, as against petrol		15%		
CNG lower by, as against diesel		13%		
CNG lower by, as against Electric Vehicle		27%		

Fuel	Retail Price in Sep 2022	Mileage (Km/litre)		
	Rs/Litre	Taxi/Car	Bus	Auto
<b>MS</b>	96.7	15.0		25.0
<b>HSD</b>	89.6	16.0	3.5	
<b>Auto LPG</b>	62.8	13.5	3.0	22.5

- CNG economics, including conversion costs, still remains competitive.
- However, the advantage for petrol and diesel has moderated from ~25-30% earlier to ~13-15% and further increase in gas prices may further erode the advantage.

- Laying pipelines remains a long-drawn process owing to multiple approvals.

- More economical/less capex to deploy SSLNG for locations that are distant from trunk pipelines.

- Coverage of several charge areas in GAs within timelines may not be possible owing to stretched contractors due to large number of projects being executed within the country.

- Attractiveness of LNG and CNG as a fuel vis-à-vis HSD especially for commercial vehicles.

- However, current high spot prices of LNG deter conversion though SSLNG enables rapid seeding of market.

## Exhibit : Economics of pipeline vs LNG/LCNG station

	Pipeline	LNG/LCNG
Capex Incurred	Rs 85-100 crore (for 50 km pipeline)	Rs 12-14 crore
Time Required	2-3 years	1 year

Source: ICRA Research

### Benefits of SSLNG:

- Faster access to market i.e., within 1 year as against 2-3 years for laying a steel pipeline
- Low capex vis-à-vis pipeline
- Fewer approvals / right of way issues leading to significant time saving

*...however, involves higher operating expenses and greater dependence on logistics provider*

## Exhibit : Pay-back period of LNG vs HSD Commercial Vehicle

	HSD	LNG	CNG
<b>Initial Cost</b>	Rs 40 lakh	Rs 52 lakh	Rs 46 lakh
<b>Maintenance Cost per year</b>	Rs 50000	Rs 60000	Rs 60000
<b>Distance Travelled per year (km)</b>	1,00,000	1,00,000	1,00,000
<b>Mileage</b>	3.3 km/liter	4 km/kg	4 km/kg
<b>Cost of Fuel</b>	Rs 89.6/liter*	Rs 82/kg	Rs 79.6/kg*
<b>Pay-back Period</b>	1.9 years (LNG) 0.9 year (CNG)		

### China's Experience:

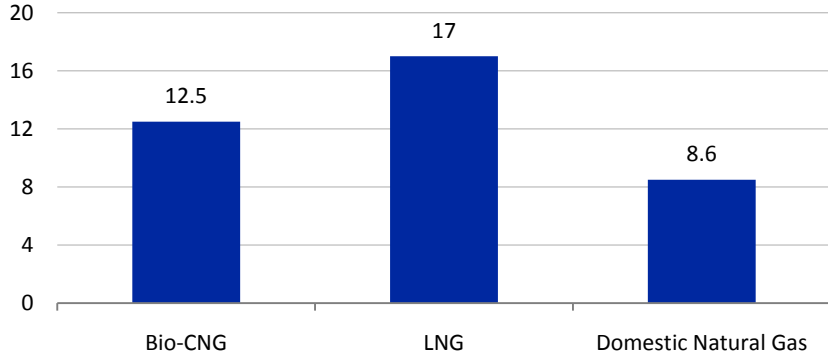
- At the end of 2020 about 5.8 lakh CV were on LNG, of which 2/3<sup>rd</sup> were heavy-duty trucks and the remaining were buses and coaches
- Sales of LNG trucks jumped 500% in 2017 owing to improved discount of LNG vs HSD as well as move to Euro-VI emission norms

### Preferred Fuel for Heavy Trucks:

- Higher energy density similar to HSD so higher distance for re-fueling and lower fuel tank volume
- Higher fuel injection pressure required in the cylinder which is more efficient for LNG than CNG

Source: ICRA Research, \* HSD and CNG price in Delhi as on February 7, 2023

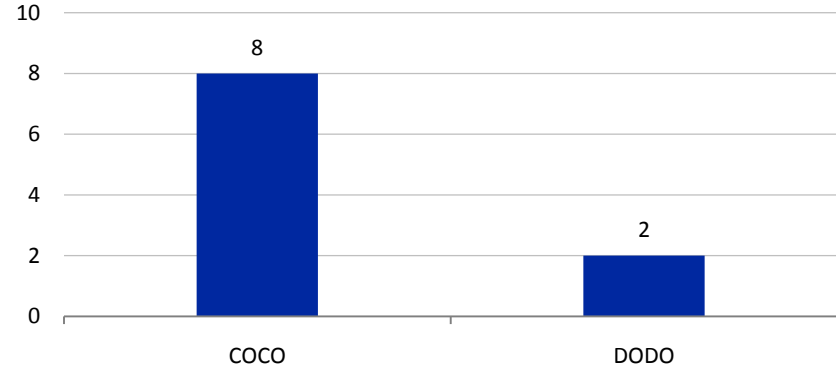
Exhibit : Prices (in \$/mmbtu)



Source: Industry, ICRA Research

- The SATAT scheme of GoI allows minimum price of CBG procurement by CGD industry at Rs. 56.7/kg (including GST) (~\$14.9/mmbtu)
- CBG is yet to scale up as IRR for CBG projects is estimated at 7-9%. SATAT scheme had a target of setting up 5000 plants till 2023 but less than 50 plants have been set up
- Budget of 2023-24 announced 5% CBG mandate will be introduced for all organizations marketing natural and bio gas

Exhibit : Cost (in Rs crore) of COCO and DODO model for CNG station



Source: Industry, ICRA Research

- Cost of setting up DODO stations is much lower than COCO station
- Bringing a DODO station online is faster owing to land-owners getting most of the approvals



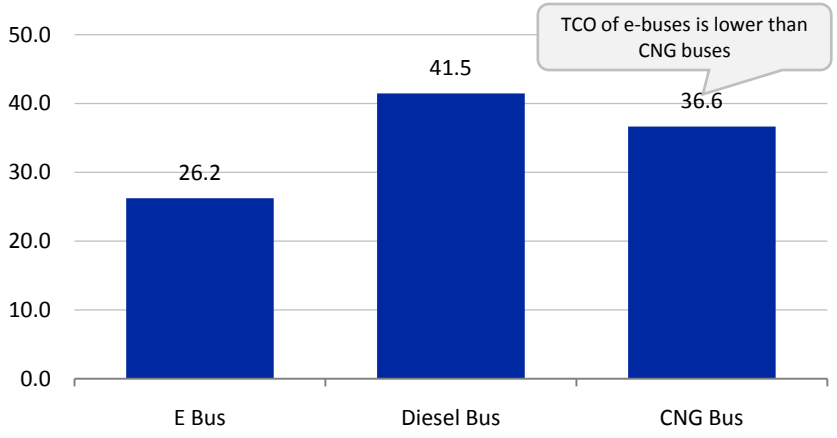
Currently two-wheelers and buses are prime targets for electrification. Wider penetration of EVs remains contingent upon battery cost, availability of charging infrastructure, range anxiety and resale value being addressed.

Currently 95% of the world's hydrogen is produced from natural gas. Natural gas spiked with hydrogen is being sold on test basis at some locations in the country. Wider adoption of hydrogen is contingent upon lower costs of green hydrogen.

There are some technical challenges that need to be overcome and costs that need to be lowered for meaningful penetration of alternate fuels/electric cars in developing countries. Most likely these technologies would impact substantially towards the end of this decade.

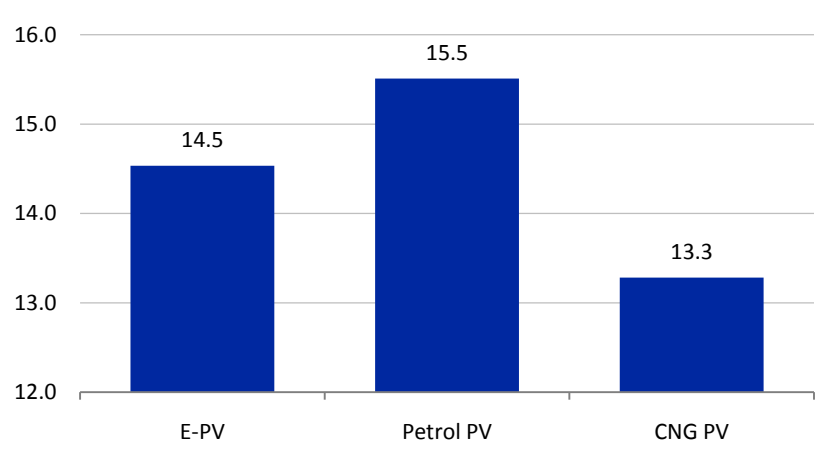
Many fuels could co-exist viz gas, LNG, hydrogen, liquid fuels besides EVs; however, growth patterns would be disrupted for traditional fuels.

**Exhibit: Total Cost of Ownership Comparison for Bus (Rs/km)**



Source: ICRA Research, Industry

**Exhibit: Total Cost of Ownership Comparison for PV (Rs/km)**

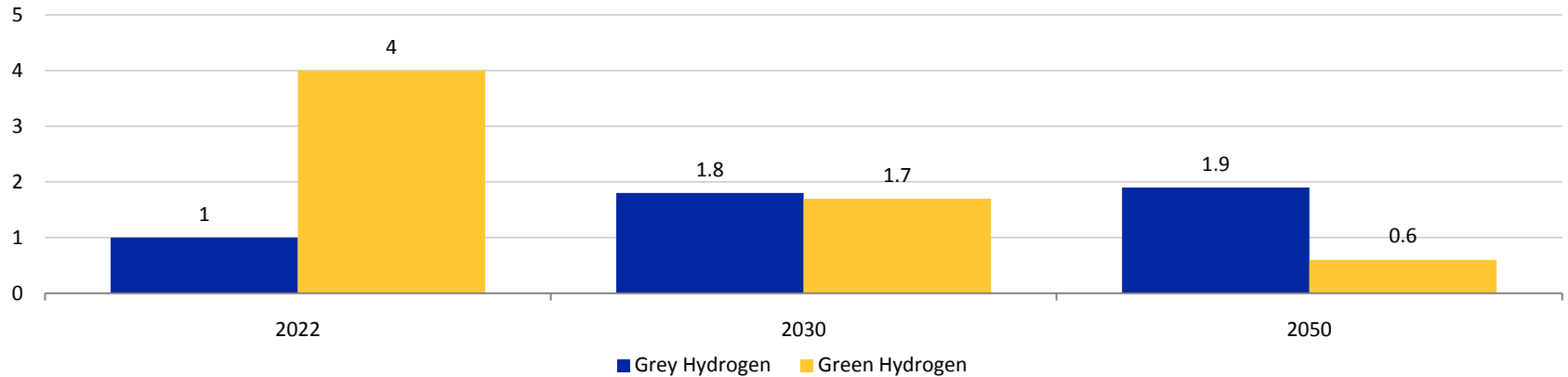


Source: ICRA Research, Industry

- The total cost of ownership of PV remains favourable for CNG , although it may come down for EV in the future with development of technology.
- The TCO of EV Buses, is lower to that of CNG and with increased Gov't push due to environmental concerns, the competition is expected to increase in the segment.



Exhibit : Costs (in \$/Kg)



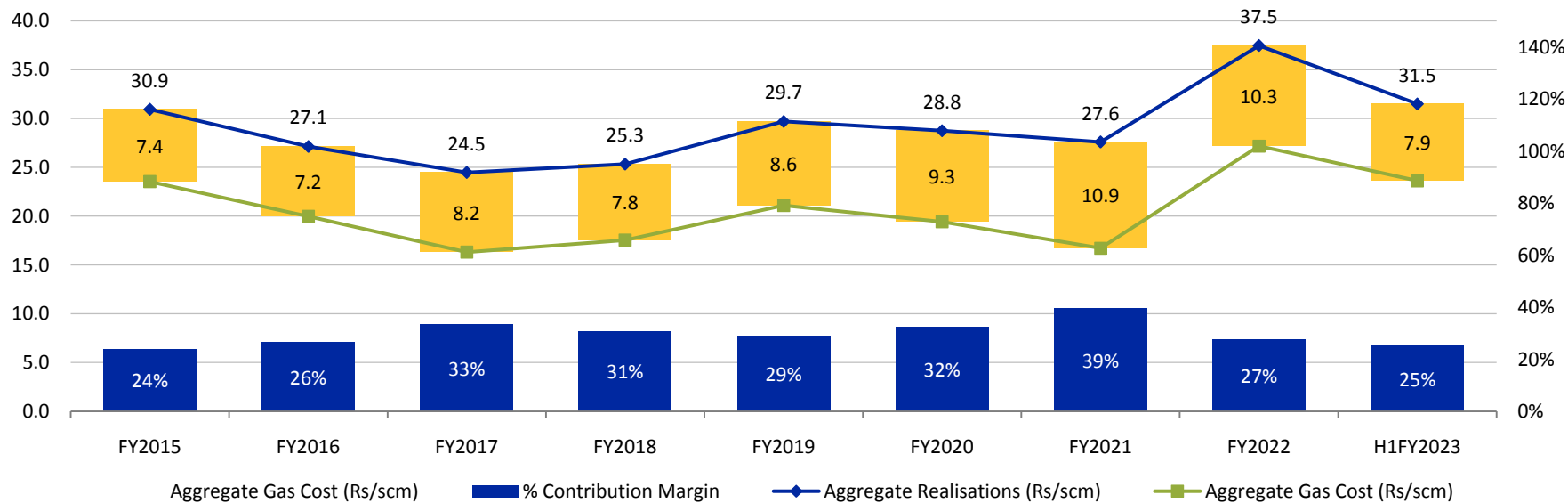
Source: Industry, ICRA Research

- At present, green hydrogen costs around US \$4-7/kg (\$32-56/mmbtu) compared to grey hydrogen cost of around US \$ 1-2.5/kg (\$8-20/mmbtu) mainly because of high cost of electrolyzers as well as renewable electricity (solar and wind). This high cost makes blending of natural gas with green hydrogen a little unviable and requires specific mandates as well as viability gap funding (VGF) in order to create demand.
- Going forward these costs are expected to moderate to around US \$1.7 – \$2.4 per kg by 2030 and to around US \$ 0.6 – \$1.2 while grey hydrogen prices will vary around US \$1.8 – \$2.7 per kg by 2030 and US \$1.9 – \$2.9 per kg by 2050. This will make green hydrogen highly viable and lead to gradual phasing out of grey hydrogen. The costs are expected to moderate in the future as the costs for electrolyzers and renewables will decrease to a great extent.

- KPC submitted its report to the government on November 30, 2022. For APM gas, the panel has recommended a floor price (US\$4/mmbtu) and a ceiling price (initially US\$6.5/mmbtu) for current gas production from the APM fields of ONGC and OINL. Further, it has recommended annual US\$0.5/mmbtu increase in ceiling price.
- The panel also has recommended liberalisation of APM price from Jan 2027, by removing floor/ceiling, and linking the price to ~10% of oil price slope. For HPHT gas, the panel has recommended removal of current ceiling price but only from Jan 2026 (so that most of current HPHT contracts are not impacted).
- In addition to the floor and ceiling and pricing mentioned above, the committee has recommended a 20% premium for production from a new well or well intervention in nominated fields. It has also suggested marketing freedom for this incremental gas.
- The benefit of the decrease in APM gas price is to be passed on to consumers. Government may advise PPAC to maintain a portal for monitoring of consumer prices with detailed break up. CGD entities may be asked to upload data on the portal. Hence, the margin of CGDs may not increase as a result of this reduction.
- The committee has retained priority for CNG and domestic PNG. However, it has also recommended that the Government develop a staggered plan for exiting priority allocation on the lines of exit from the crude oil allocation which has been done from 1 October 2022 onwards.
- The committee has also recommended bringing gas under the GST regime. As this requires consensus among the states. To obtain this, if need be, the states may be compensated for five years for any loss in revenue. Hence, till the time the GST regime is implemented, Government may consider moderating the Central Excise duty rate on CNG to reduce the burden of higher natural gas costs on the consumers.

- Financial Performance of Major Incumbents

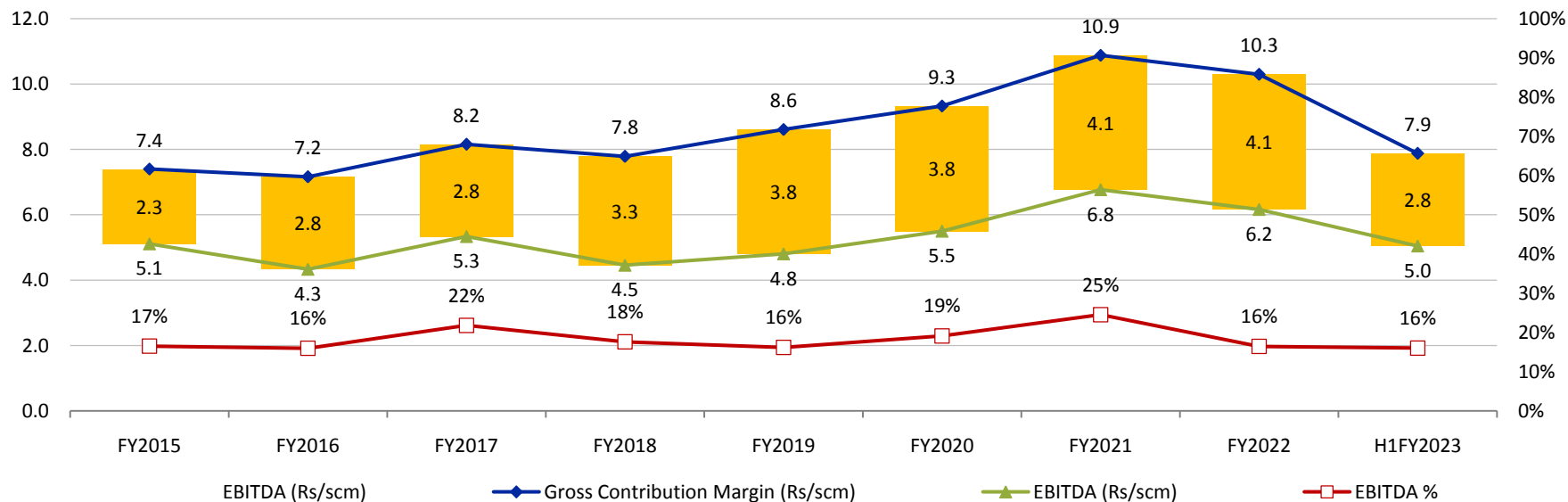
Exhibit 5: Contribution Margins



- Contribution margins have been healthy though these have declined in YTD FY2023
- Domestic gas allocation to CNG and PNG(d) segments a positive

# Opex has witnessed an increase

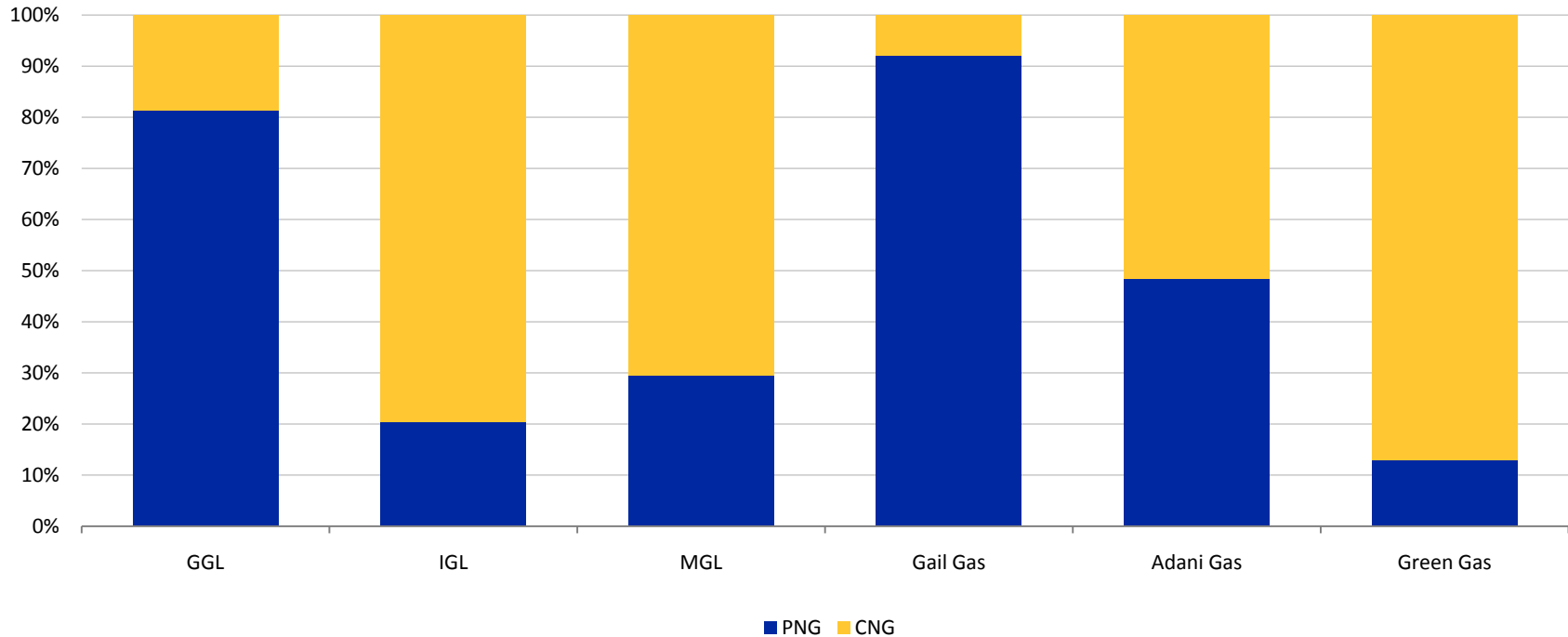
Exhibit 6: Opex and EBITDA trends



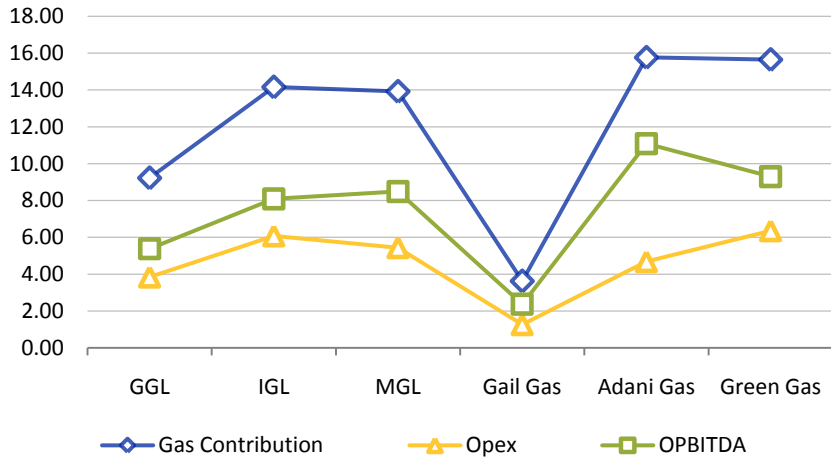
- Opex costs vary from Rs 2-6/scm
- Trend of EBITDA margins remains similar to contribution margins

# Sales mix: Depends on GA's level of industrialisation

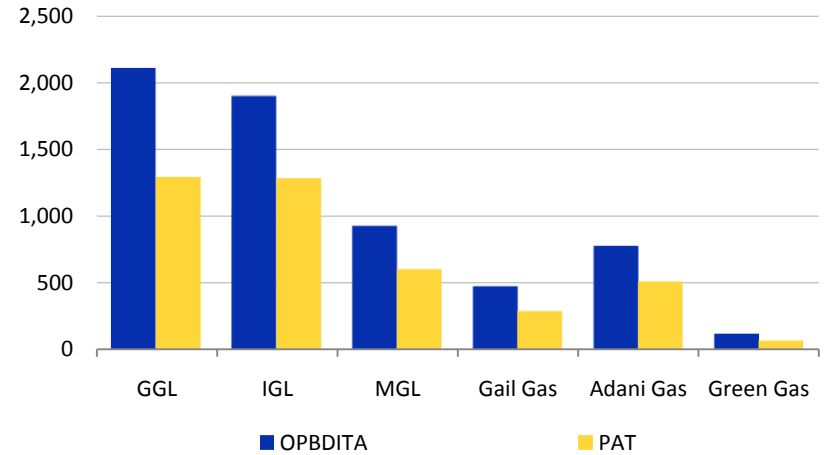
Exhibit 7: Sales Mix (%)



**Exhibit 8: Unit Margins (Rs/m3)**



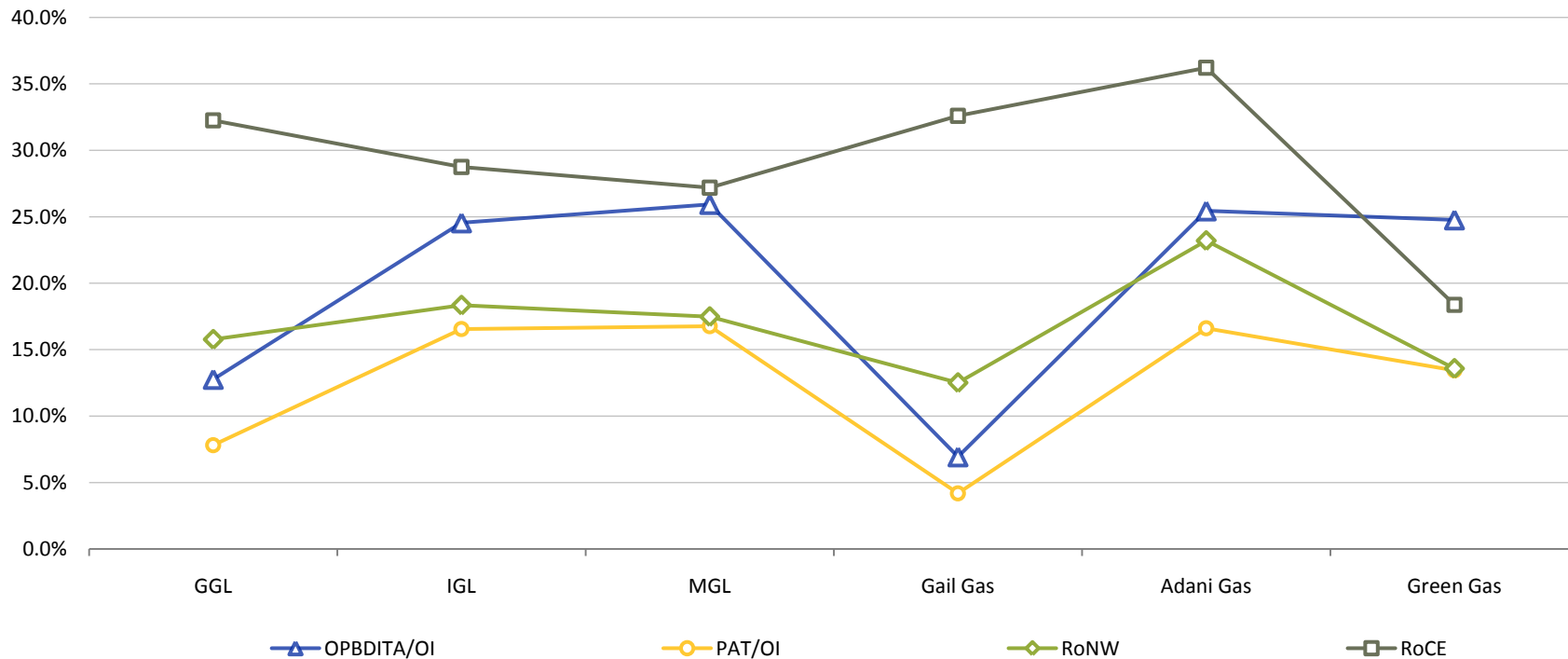
**Exhibit 9: Profits (in Rs Cr)**



- Unit margins have remained healthy in last 3 years supported by CNG. Cost push factors
  - Relatively higher cost of energy at existing R-LNG prices
  - INR depreciation vs USD
  - Weak industry demand and shift to alternate fuels wherever possible
- Competition from alternate fuels: Low MS/HSD and industrial fuel prices

# Margins display wide variance among companies

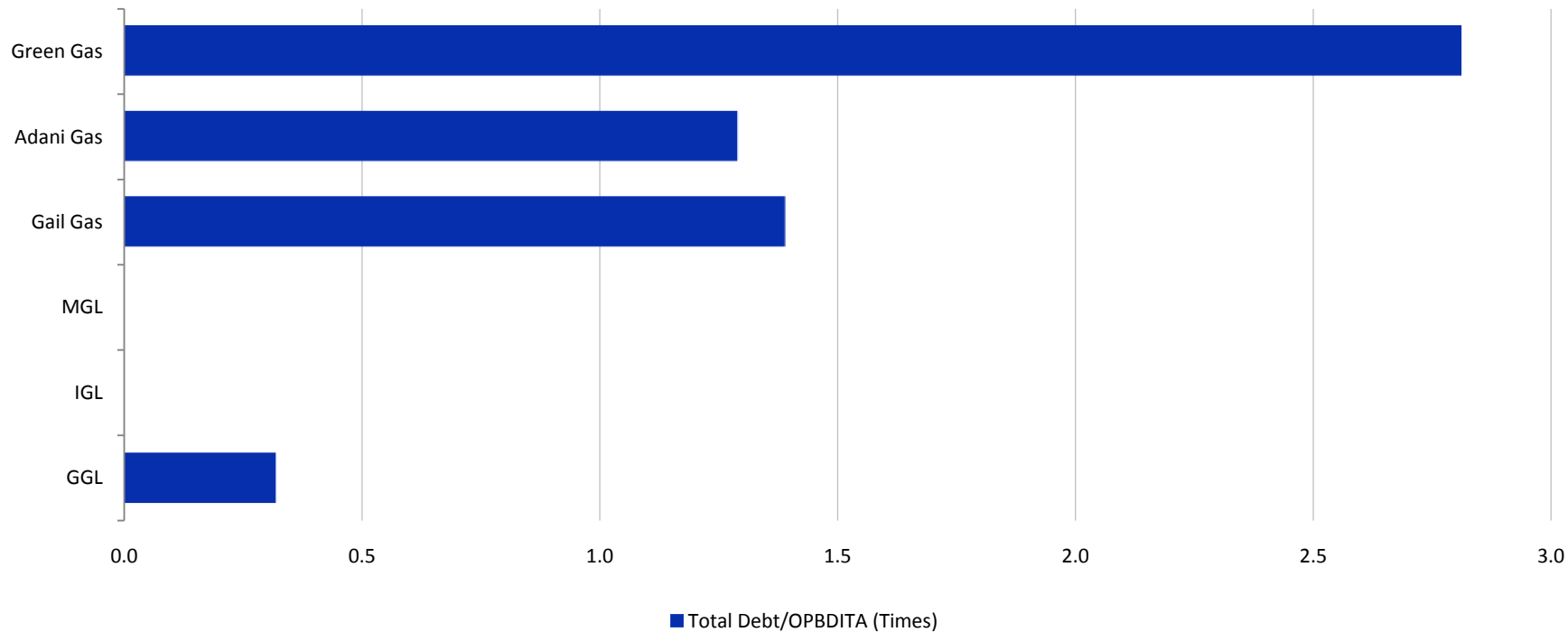
Exhibit 10: Profit and Return Metrics



Source: ICRA Research



Exhibit 11: Leverage - Total Debt/OPBDITA (Times)





## Key Takeaways

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- Economics of CNG and PNG (d) segments would depend upon Government policy on gas allocation and pricing; if prices are deregulated by 2027 and prices remain elevated Government might have to rethink on pricing
- High prices of R-LNG for PNG (I) segment could keep the unit margins subdued due to competition from competing fuels; PNG (c) segment is profitable though volumes remain low
- Profitability of players with high PNG sales %, has been under pressure on account of fluctuating fuel economics. However, co's with high CNG sales % continue to post healthy returns
- Aggressive bidding for new GAs poses risk from third party marketers after marketing exclusivity period; however, the quantum of penalties and PBG cap of Rs 50 crore are low
- Companies have shifted to DODO model to reduce capex and compress time to market
- Green hydrogen and CBG are not expected to contribute much to the volumes as economics remain weak
- Competition from EVs would critically depend upon Government push/subsidies for electrification



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