

Developing City Gas Distribution Project



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Over the years Natural Gas (NG) has emerged as a 'fuel of choice' across the world. Natural Gas has replaced traditional fossil fuels due to its environmentally friendly and economical characteristics. While Natural Gas is widely used as fuel for city energy needs worldwide, in India use of Natural Gas has been restricted to power and fertilizer sectors on account of limited availability of Gas and lack of clarity on regulatory issues with regard to local distribution companies.

However with expected increase in gas supply, changing regulatory scenario and growing concern over pollution in cities due to use of traditional fossil fuels city gas distribution projects present a tremendous investment opportunity to prospective investors.

The oil & gas practice of CRISIL Infrastructure Advisory has been intimately involved with the Gas sector and has extensive experience in policy regulation, strategy and transaction and risk management assignments. Through its experience in undertaking several viability projects CRISIL Infrastructure Advisory has developed a framework to analyze the feasibility of city gas distribution projects, which can be used by potential investors to evaluate investment opportunities in City Gas Distribution networks.

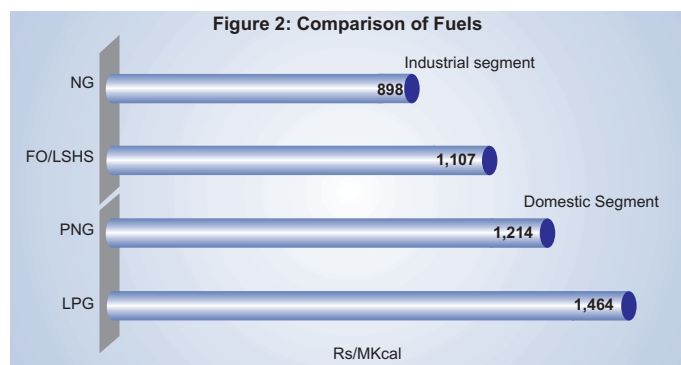
A clean and efficient fuel Natural Gas presents a viable substitute for traditional fossil fuels, namely oil and coal, as concerns over the environmental impact of their continued usage grows.

Natural Gas is the fuel of choice for city energy needs internationally. In OECD countries gas use for residential heating and cooking on average amounts to nearly 25% of the total consumption. Even in Pakistan, India's immediate neighbor, this figure is as high as 25%. By contrast in India city gas contributes a meager 3% of total Gas consumption while primarily being used in power & fertilizer sectors that together consume nearly 75% of all production.

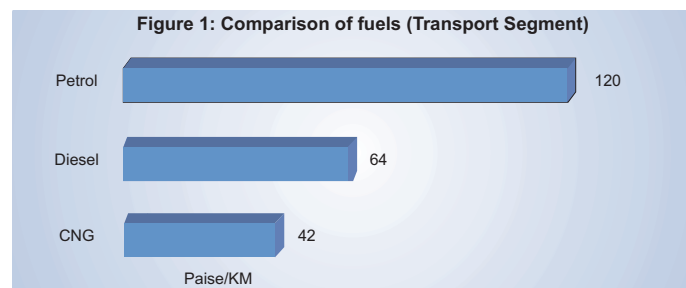
Why natural Gas?

The predominance of Natural Gas as a fuel for city energy purposes internationally is primarily due to three reasons. Firstly, Natural Gas is a more **economical** alternative. Comparing Natural Gas with fuels against which it will be competing in various customer segments within cities namely FO/LSHS for industrial segment, Petrol/Diesel for transport and LPG for

cost, CNG is almost three times as economical as the traditional fuels. For the Industrial, commercial and domestic segments the fuels are compared on the basis of total expenditure incurred to create one million Kilocalories of energy (Refer Figure 2). For industrial customers Natural Gas offers a 20% cost benefit in energy terms while for the domestic segment Piped Natural Gas



(PNG) presents a savings opportunity of almost 17% on the monthly bill. Secondly, Natural Gas is a 'clean' fuel. When Natural Gas burns it creates lesser pollutants as compared to traditional fossil fuels (Refer Table 1). The



commercial and domestic segments, this can be clearly bought out. In the transport segment (Refer Figure 1) the fuels are compared based on running

Table 1: Environmental Comparison of fuels

	Natural Gas	Diesel	Oil	Coal	Petrol
Carbon Dioxide	117000	135250	164000	208000	285700
Nitrogen Oxide	92	1632	448	457	4081
Sulphur Oxide	0.6	1121	1122	2591	204
Particulates	7	1021	8.4	2744	40.8

(Pounds of Air pollutants produced per Billion BTU of energy)
Source: Energy Information administration

fuel produces lower amount of CO₂ but the real difference lies in the amount of NO₂, SO₂ and particulates, which are almost one-tenth the amount

created by other fuels. And finally, natural gas as a fuel is **extremely efficient**. When the entire cycle of producing, processing, transporting and using energy is considered, natural gas is delivered to the consumer with a "total energy efficiency" of about 90 percent, compared with about 27 percent for electricity¹.

Potential of City Gas Networks in India

Natural Gas usage in Indian cities has been limited primarily due to the scarcity of supply. However this scenario is undergoing change with several LNG projects/transnational pipelines under implementation, which together with new domestic Gas finds are expected to shore up the supply deficit in the next few years. Meanwhile the market for city gas distribution is also set to grow at an accelerated pace. The CNG demand got a boost with the Supreme Court directive on pollution reduction in 12 major cities in India. The domestic segment is also expected to grow with the government's intentions to remove the subsidy on LPG cylinders in a phased manner in 3-5 years making piped gas even more economical. Illustrating with the example demand estimation of a representative city in India performed by CRISIL Infrastructure Advisory (Refer Table 2), we clearly see the tremendous **investment opportunity** offered by city gas.

Table2: Demand potential in a representative city in India

Segment	In MMSCMD
Transport	0.25
Domestic	0.20
Commercial	0.08
Industrial	0.64
Total	1.17

Critical aspects of City Gas Distribution projects

With a growing demand base and increasing supply options City Gas Distribution networks offer a tremendous investment opportunity. However in order to tap this opportunity the developers need to analyze several critical aspects of the project.

- Demand build-up - For a city gas distribution project the industrial segment provides the "base load" demand, which can be captured in a shorter time frame. In contrast, buildup of demand in the commercial, transport and residential segments provides better margins but has a higher gestation period. The project roll out must therefore be planned to capture an optimal mix of demand from these segments.
- Supply - Input gas price and its terms and conditions are critical for the viability of the city gas distribution project. Existence of Natural gas networks passing by or in proximity of the supply sources from the city limit enhances the project feasibility by reducing the capital and input gas costs.

- Pricing of delivered gas - The delivered gas must be priced in such a manner so as to secure a minimum level of profitability for the promoters; while providing adequate incentive to induce targeted customers to shift to Natural Gas. Keeping this in mind Gas should be priced using the 'alternate fuel linked pricing' methodology where Gas is priced at an appropriate discount to alternate fuel prices. For example in PNG the fuel should be priced at a discount to LPG so as to provide the customer with a payback period of less than three years on the expenditure on setting up the connection.
- Risk factors- The feasibility of a city gas project is highly sensitive to the demand the company is able to capture, and is thus exposed to **demand risk**. The project is also exposed to **price risk** due to the probable mismatch in the movement of input gas price and selling price. Moreover as the Indian Gas sector does not have a well-developed regulatory framework. Uncertainty exists over issues such as licensing for setting up distribution networks, exclusivity of operator within a distribution zone and role of regulator in pricing of gas. This exposes projects to **regulatory risk**. The project could also be exposed to the residual risk created by the difference in terms and conditions of contracts with the suppliers and the buyers.

Evaluation of Investment opportunity

CRISIL Infrastructure Advisory has undertaken several viability projects and has developed a framework to analyze the feasibility of city gas distribution projects (Refer Figure 3 overleaf).

The central point for this process is the **market size determination**, which clearly defines the realizable market at various price points for Natural Gas, customer segment wise. This is followed by **project cost estimation** where individual items of capital and operating costs are analyzed. The next step is to analyze the attractiveness of **supply options** for the project based on price, availability, details of the contract etc. Subsequently the **selling price** for each customer segment is determined based on alternate fuel prices with appropriate discounts. Next identifying various risk classes and the extent to which the project is exposed to these risks creates the **risk profile** of the project. Also ways to mitigate these risks are suggested. Finally the demand, price, cost and risk inputs are combined to undertake a base case **financial feasibility** of the project. Sensitivity analysis is then performed to test its stability.

CRISIL Infrastructure Advisory combines analytical rigour and in-depth understanding of the sector at each step of the process to provide the client with a workable solution.

Figure 3: Crisil Framework for Feasibility Analysis-City Gas Distribution Projects

Step 1: Determination of Realizable Market Size

