IndianOil

Contents

The gas play

India Gas Sector Survey 2016

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Preface

The relevance of gas to the energy sector and to economic growth is changing every day. The global gas industry developments are favourable to developing economies. At a time when the Indian landscape is being altered by the needs of global energy suppliers, who are paying serious attention to the nation, Indian policymakers have begun to take a constructive look at gas policy enablement.

The state of the sector at the time of the First Gas Conclave organised by Indian Oil Corporation Ltd was significantly different than it is at present. Stakeholders are expected to be at a different level of excitement when they assemble at the conclave and brainstorm on issues in the sector.

PwC is privileged to be the knowledge partner for this event.

Indian Oil Corporation has invited policymakers, regulators, investors and consumers to the conclave. The policymakers will pay attention to the stakeholder viewpoint in order to make the consultation process more holistic. To achieve this objective, PwC has put together this background paper titled 'The gas play: India Gas Sector Survey 2016'. The paper has been prepared on the basis of a survey of industry participants, which was designed to cover various aspects of the gas sector. The survey was conducted over about four weeks and concluded just before the conclave, on 11 March 2016. The response was very encouraging, and the survey results are fairly representative of the views of industry players.

Because the survey was anonymous, the views expressed can be taken to be a true reflection of industry sentiments, and can serve as constructive inputs for policymaking.

We sincerely hope that this paper also sets out the context for deliberations during the conclave.

PwC will assist Indian Oil Corporation Ltd in summarising the proceedings with the aim of documenting the suggestions of participants on actions expected. The proceedings of the second conclave will be a useful agenda to work on for various stakeholders.

I hope the conclave is a grand success.

Deepak Mahurkar
Leader, Oil and Gas
PricewaterhouseCoopers India Private Limited

Executive summary

In the present context, the gas sector in India can be said to be in a transition phase. Although gas was considered as the fuel of the twenty-first century, with the potential to displace widely used petroleum fuels in the country, the sector has failed to realise the coveted status it aspired to.

Following the success of KG-D6 gas discovery, the sector has witnessed its share of highs and lows. In 2002, a significant quantum of domestic gas finds in the east coast KG basin and the commissioning of LNG regasification terminals thereafter on the west coast around 2005 were significant milestones. This paved the way for growth in transportation infrastructure, provided gas to core sectors such as fertilisers and power, spurred the planning and growth of city gas distribution (CGD) and new gas-based industries and, most importantly, helped in reducing the carbon footprint. The sector has not been able to take off in India in the way it was expected to. With falling commodity prices, including crude oil, the demand pull factors weakened. The domestic gas supply situation worsened. LNG prices headed south following the global glut in gas supply, which dampened investor confidence in LNG-based capacities.

Natural gas is recognised as an environmentally friendly fuel and a nearly perfect substitute for coal and oil in many end-use applications owing to favourable economics, particularly when commodity prices are higher.

As the knowledge partner for the second edition of the IndianOil Gas Conclave, PricewaterhouseCoopers Pvt Ltd (PwC) conducted an India Gas Sector Survey, seeking views from a diverse set of stakeholders on 18 questions around five key sub-topics, namely gas supply, infrastructure development, policy regulatory reforms, developments in LNG and introducing sectoral reforms for accelerating gas usage. Over 100 responses were received from various stakeholders.

The analysis of the responses yielded valuable insights into the perceptions of stakeholders on multiple aspects of the gas sector development. Based on the survey results, stakeholder views are in line with those expressed in IEA's India Energy Outlook 2015, which pointed to a limited role of natural gas in India's energy mix in the future and was sceptical about the growth of the gas sector in the country in the long term. The respondents also provided their views on the role of India's unconventional hydrocarbon sources, primarily coal bed methane (CBM), in altering the domestic gas production landscape.

With regard to the development of gas transmission pipelines and LNG terminals in the country, a majority of the survey respondents felt that the gas sector should be developed on the basis of the 'carrier first, commodity later' principle, implying that infrastructure creation should precede demand creation. A sizeable percentage of the respondents are of the view that government support by way of public-private partnerships (PPP) and viability gap funding (VGF) will further infrastructure development across the country.

Strong views were expressed by stakeholders on the developments in LNG markets. Close to 50% of the survey respondents suggested that small-scale LNG holds the largest potential for meeting India's gas requirements. Also, a majority of the stakeholders felt that the time is right for investments into equity gas in view of the projection that LNG prices will remain low in the medium to long term.

The survey results reveal that the Indian gas market is yet to attain maturity for the unbundling of the gas transmission and gas distribution segments as well as for the determination of tariffs based on entry-exit structures.

Expeditious granting of permissions by authorities, government mandates and reforms in tariff regulations were cited by the survey respondents as the three most critical factors for CGD development. Reforms in anchor consumer sectors—namely the power and fertiliser sectors—are a must for accelerating growth in the gas sector. The survey respondents also indicated that a government mandate on the usage of natural gas in sectors is a must for switching over from alternative fuels.

Introduction

Natural gas has been widely acknowledged as the fuel of the twenty-first century. Currently, the gas sector is going through a unique and challenging phase. With its high macroeconomic growth prospects and billion plus population, India is confronted with concerns about energy security and environmental sustainability. Thus, the role of natural gas in shaping the nation's energy future assumes utmost importance. In this context, it is essential to take into account the views of various sets of stakeholders in the gas sector on multiple aspects such as domestic gas availability, affordability, infrastructure creation, pricing and regulations.

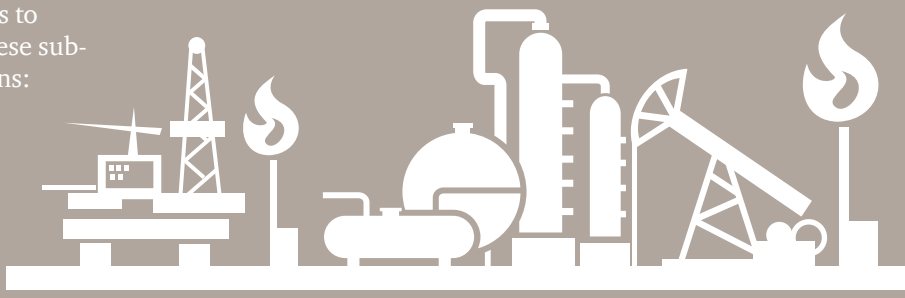
With these objective in mind, as the knowledge partner for the second edition of the IndianOil Gas Conclave, PwC undertook a survey of the views of sector specialists around the following themes:

1. Availability and affordability for sustainable gas use
2. Infrastructure: Impediments and resolutions
3. Nurturing natural gas: Policies and regulations

Survey questionnaire

The survey was divided into five different sub-topics to align with the themes of the conference. Each of these sub-topics (listed below) consisteed of eighteen questions:

1. Perspective on gas supply
2. Infrastructure development
3. Developments in liquefied natural gas (LNG)
4. Policy and regulatory reforms
5. End use sector-specific reforms



Survey design

The survey questionnaire was circulated widely to as many sector participants as possible in various business segments of the gas sector. For comprehensive coverage of respondents, survey responses were sought from (i) gas producers, (ii) gas infrastructure owners (cross-country, city gas distribution [CGD], LNG terminal owners), (iii) gas/LNG shippers, (iv) gas marketing companies, (v) gas consumers (fertiliser companies, power sector companies, steel, etc.), (vi) industry associations, (vii) policymakers, (viii) engineering companies and gas pipeline manufacturers, and (ix) LNG suppliers.

Over 100 responses were received from the various stakeholders and due care was taken to eliminate any bias during the analysis of survey responses by keeping the respondents' names and their company details completely confidential.

Methodology of analysis and presentation of survey results

The responses provide interesting insights into the key areas of the Indian gas sector. Regardless of the divergence in views, these insights will be useful to decision makers in the government, regulatory bodies and the companies to gauge and deliberate over the critical success factors underlying the development of vibrant gas markets in India. The stakeholder opinions can help trigger discussions on laying down a feasible roadmap to accelerate the growth of the gas sector.

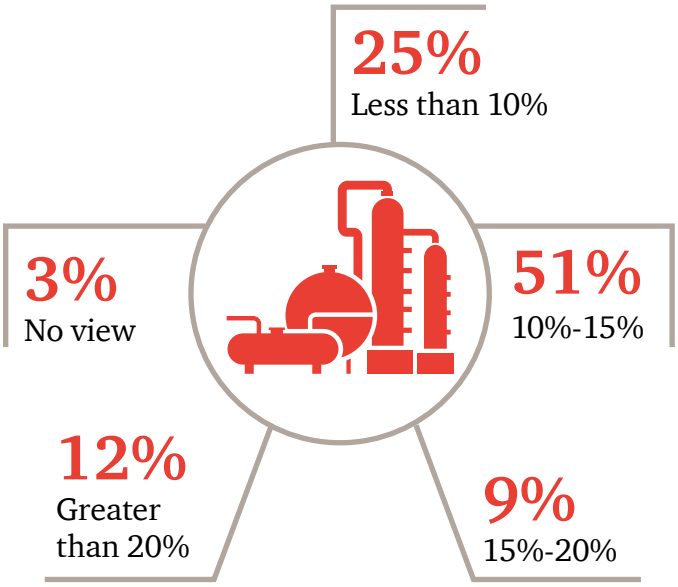
The sections that follow present the responses to each question and our analysis.

Perspectives on gas as the fuel of the future

Stakeholder views almost unanimously point towards an up to 15% contribution of natural gas in India's energy mix.

The International Energy Agency's (IEA) 2015 report, India Energy Outlook, projected that the share of natural gas will only increase marginally from 6% in 2013 to 8% in 2040. According to the report, 'Natural gas plays a relatively minor role in the Indian energy mix in the New Policies Scenario, compared with the world and non-OECD averages. Gas use is projected to make in-roads in many sectors, such as power generation and transport, while retaining an important role as a feedstock for the fertilizer industry. But, despite its versatility and low environmental footprint, compared with coal, its relatively high price does not allow it to displace other forms of energy more rapidly.'

Projected share of natural gas in the energy mix in 2040



Source: PwC India Gas Sector Survey

More than half of the survey respondents indicated that the share of natural gas will be in the range of 10–15%, while 25% agreed with IEA's view. This implies that a whopping 76% of the survey respondents are of the opinion that in the next 25 years, the gas sector will be restricted in growth owing to internal and external factors. Alternatively, they believe that with expected developments such as regulatory reforms and policies taking shape, infrastructure development, and markets becoming more mature, natural gas will play a limited role—i.e. an up to 15% contribution—in India's energy future. Thus, stakeholders have a pessimistic view of the ability of natural gas to substitute liquid fuels, and perhaps coal, in existing end-use applications and to create new avenues for growth. This finding must be viewed in the appropriate context: A mere 2% rise in the share by 2040 will entail the sourcing of a significantly large additional quantum and passing on that burden to consumers. This scenario suggests an effective CAAGR of 4.5%, which is a substantial increase, if considered in isolation.

These stakeholder views appear to be influenced by past developments. Even when domestic gas availability was expected to pick up, the new gas was not preferred as a replacement for liquid fuels owing to affordability and distribution issues. During the Bombay High discovery, offtake had to be ensured by new projects. Further, these views have been presented against the backdrop of limited indigenous gas production on the supply side and the weakening of demand pull-push factors. The easy availability of coal and oil in the country and cost competitiveness of coal and oil vis-à-vis gas dampen demand, making natural gas not the fuel of choice but one whose use has to be mandated. Cities with CGD networks have been observed to be enjoying only limited vehicles conversion to gas from liquids owing to perceived gas price uncertainty and inconvenient access at retail stations.

Optimistic views on the role of the gas sector in India's energy mix were expressed by 21% of the survey respondents. This set of stakeholders appears to believe that policy play can manifest itself in the way it is desired—i.e. the gas sector will incentivise gas producers, gas pipeline companies, marketers and consumers equally. The recent policy reforms introduced to boost the gas sector growth—such as the introduction of a uniform licensing policy for conventional and unconventional hydrocarbons, a new gas pricing policy and a government mandate to shift to gas in certain potential sectors—will provide a supply pull and demand push for the sector to grow. One of the respondents commented that the share of gas in the energy mix may even swing towards the higher side, with policymakers mulling over a separate exploration and production (E&P) policy for the northeast region, which has high reserves of hydrocarbon. Also, supply from neighbouring gas-rich nations such as Vietnam and Myanmar, along with LNG sourcing through long-term contracts with Australia and the Middle East, may lead to the percentage of gas exceeding expectations. The prospect of higher gas usage in the economy therefore seems to be viewed as a supply issue. Even in the current LNG situation,

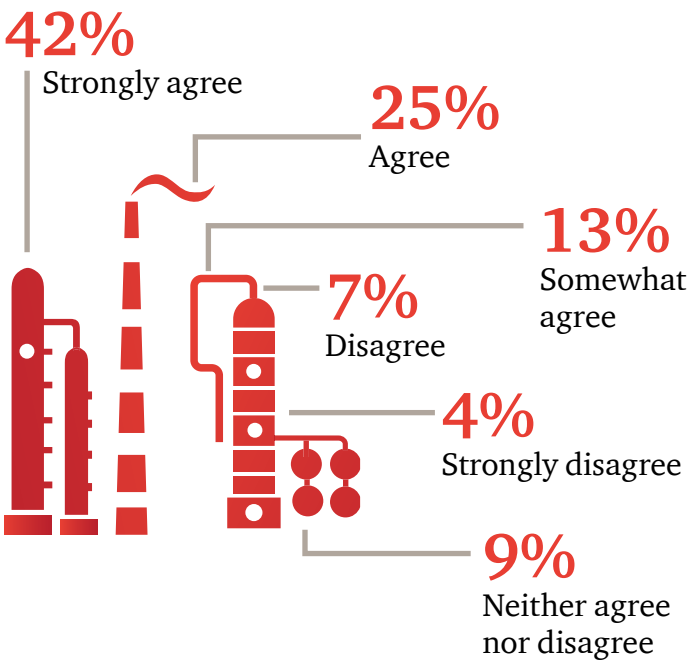
India's gas sector is unable to achieve its full potential because of infrastructure constraints and policies like gas swap, which are yet to mature. If a favourable scenario materialises, it may contradict the projections of lower play of gas in 2040.

IEA's view on the commercial development of India's unconventional hydrocarbon sources, primarily coal bed methane (CBM), is supported by a majority of the survey respondents.

To gauge stakeholders' views on whether the development of unconventional hydrocarbons could augment the domestic production of gas, they were asked to choose the extent to which they agreed with the following statement: 'Given the significant issues with developing CBM gas, the percentage of CBM production in India to total gas production is unlikely to cross 31% by 2040 as projected by IEA.'

In India Energy Outlook 2015, IEA acknowledges that as a country, India has large unconventional hydrocarbon resources, including CBM and shale gas. Although private companies such as RIL and Essar are already engaged in the development of CBM, commercial development is a long way ahead.

Percentage of CBM production in India to total gas production unlikely to cross 31% by 2040



Source: PwC India Gas Sector Survey

The report goes on to state that 'With the contribution from conventional onshore fields set to stagnate, the opportunities for substantial growth are first in the offshore basins, followed by onshore coal bed methane (CBM), which we assume to increase in the 2020s, and the possibility of shale gas output later in the projection period. Although resources are large, all of these sources of gas face substantial uncertainties: the disappointing production performance of Reliance's KG-D6 block has tempered expectations for offshore development. CBM projects have gotten off to a reasonable start, but development costs are still high.'

Over 80% of the survey respondents support IEA's view that CBM production in India is unlikely to cross 31% by 2040. Further, of this 80%, a staggering 42% strongly agreed with IEA's negative outlook on CBM as an indigenous source of gas. This scepticism may be attributed to technical, socio-economic, and policy and regulatory issues.

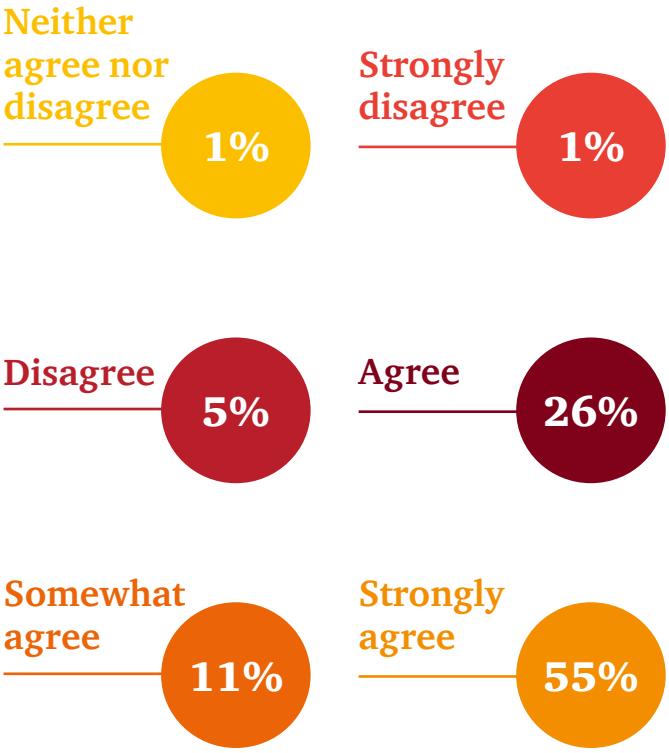
The technical issues are related to CBM technology, such as thickness of coal. Water disposal is also a critical issue. These issues are compounded by socio-economic challenges such as rehabilitation and resettlement (R&R) issues and land acquisition. On the policy and regulations front, there are hindrances such as inadequate infrastructure and multiple clearances. In some cases, CBM within already awarded oil and gas or coal blocks poses challenges to operators with respect to freedom to explore and produce.

Infrastructure development

The government must play an active role by creating infrastructure first, without a great emphasis on immediate demand. It should act as a facilitator and developer of infrastructure.

More than 90% of the survey respondents support the 'carrier first, commodity later' principle as the approach for gas sector development.

Should infrastructure development precede gas demand creation?



More than 90% of the survey respondents endorsed the view that infrastructure creation should precede gas demand creation—i.e. carrier first, commodity later. Thus, there is a general consensus that gas storage, transmission and distribution infrastructure development will spur gas demand and ensure accelerated monetisation of domestic and imported gas.

Develop pipeline infrastructure and remove obstacles.

The survey results suggest that the approach for gas market development should also be based on the 'carrier first, commodity later' principle. Globally, countries with well-developed gas markets are characterised by the creation of infrastructure such as LNG terminals and gas transmission pipelines. Infrastructure creation will de-risk gas importers, gas marketers and LNG terminal investors. Over time, the network will provide a push to setting up gas-based industries and promote the development of industrial zones, corridors and clusters. Most of the respondents have proposed the development of additional LNG terminals to supply regasified liquefied natural gas (RLNG) and equitable gas transmission pipeline infrastructure to cater to the shortfall/demand/new areas.

There are obvious reasons why 6% of the respondents disagree with the 'carrier first, commodity later', which, in India, has historically been the principle behind the growth of the gas market. The supply of gas as a commodity paved the way for infrastructure development, including gas pipelines and LNG storage-cum-regasification terminals. In fact, the infrastructure was created only to handle the existing gas supplies. Investors are sceptical about developing infrastructure first as there is a risk of this infrastructure remaining unutilised or underutilised in the absence of firm tie-ups both on the gas sourcing and gas offtake front. In the last two years, with the tapering of domestic gas production, the existing gas infrastructure is grossly underutilised. The LNG regasification terminals to be developed are the only hope for increasing the utilisation of these pipelines.

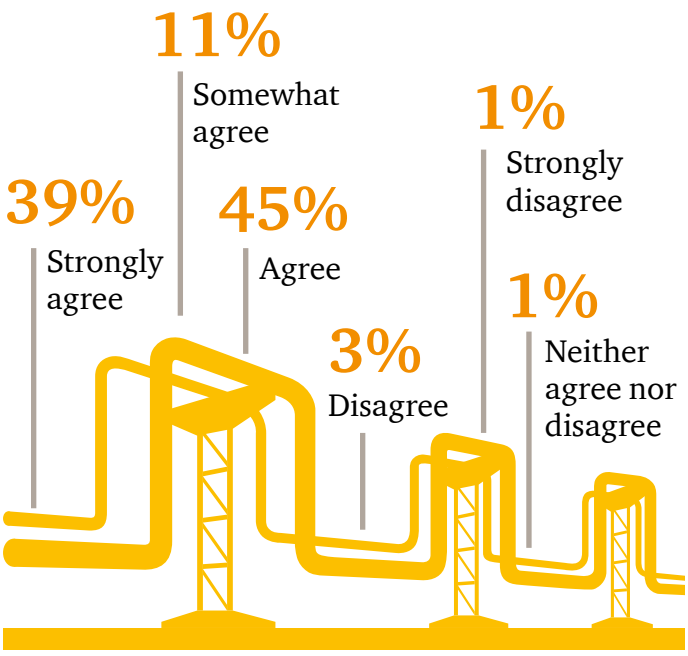
Gas infrastructure development and gas storage terminals are a must for development.

Over 90% of the survey respondents favour public private partnerships and viability gap funding (VGF) as a means for gas infrastructure development.

In Union Budget 2014, the government announced the construction of an additional 15,000 km of gas pipelines on a public-private partnership (PPP) basis along with VGF. Under the VGF scheme for gas pipeline projects to be developed on a PPP basis, the prospective private investor could receive financial support by way of a government grant to improve the commercial viability of projects.

In light of these developments, it is vital to obtain stakeholder views on PPP schemes as a means of financing gas infrastructure development.

Should PPP and VGF be explored for gas infrastucture development in the country?



More than 95% of the respondents have supported PPP schemes as a means of attracting private sector participation and investment for the development of capital-intensive gas transmission projects which have a long gestation period.

Energy infrastructure needs a big push through PPP government reforms.

Presently, transmission infrastructure dominates in only the western and northern parts of the country. The eastern part of the country is almost devoid of gas pipeline connectivity and is characterised by low pipeline density. To address the lopsided and inequitable infrastructure development, one pipeline project in east India was identified by the Government of India (GoI) for investment based on the PPP model. The project has not progressed significantly.

To make PPPs successful, based on the learnings from other sectors, the stakeholder expectations from converting the partnership and risk allocation framework into appropriate PPP structures and contractual arrangements ought to be clearly spelt out. The roles and responsibilities of various stakeholders, including the regulator, central and state governments, sponsoring authority and private investors need to be laid down and clearly defined. Equitable risk sharing will make the projects succeed.

The survey results suggest that the industry is focussed on a 'carrier first, commodity later' approach. The PPP and VGF models have the potential to make this a reality.

The PPP model can really boost capital infusion in the infrastructure vertical.

Developments in LNG

Close to 50% of the survey respondents feel that small-scale LNG holds the highest potential for meeting India's gas requirements.

To what extent do you agree with the statement that small-scale LNG holds the highest potential for meeting gas requirements?

- 14% Strongly agree
- 21% Somewhat agree
- 33% Agree
- 24% Disagree
- 3% Strongly disagree
- 5% Neither agree nor disagree

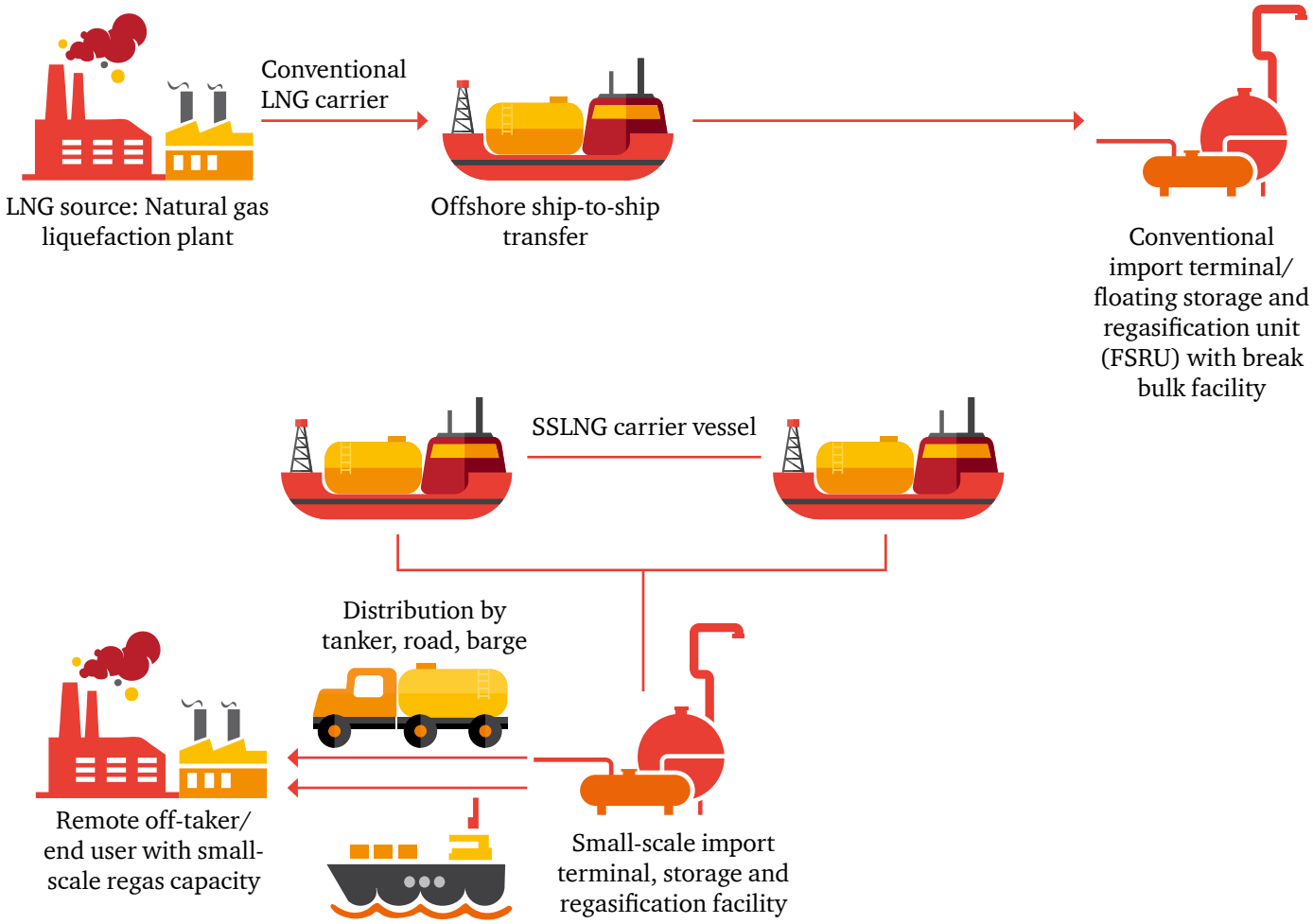
In recent years, India has witnessed a significant decline in domestic gas production. Moreover, exploratory activities to develop new fields have also largely been subdued in the absence of remunerative gas prices.

In this supply crunch scenario, India has been laying greater emphasis on LNG imports and investing heavily in related infrastructure. However, the capital-intensive nature and mammoth scale of such conventional projects lead to a long gap between the inception and start of commercial operations. Therefore, in a bid to explore quick turnaround projects that will ensure accelerated access to hydrocarbons, globally, small-scale LNG (SSLNG) is gradually becoming popular. Close to 50% of the survey respondents feel that SSLNG holds the largest potential for meeting India's gas requirements. SSLNG has some attractive benefits that help to justify this positive response from the industry. It's a convenient way to make natural gas available to energy users who are not currently connected to the pipeline network or have too small a demand to merit a pipeline extension. Infrastructure investments include building small-scale import terminals and low-capacity regasification facilities located near the end customers. The use of prefabricated equipment and pre-assembled modules reduces the commissioning time for infrastructure development considerably. The smaller scale is also attained by transporting liquid by road to small consumers, thereby obviating the need for pipeline connectivity.

In recent years, a number of gas-based power plants and gas-consuming industries have come up in India in anticipation of assured gas supplies due to planned pipeline infrastructure. However, pipeline project implementations have failed to keep pace with planned investments, leaving these power plants and industries stranded. Therefore, SSLNG can play a critical role in reviving such underutilised, gas-starved industries.

Like every new concept, SSLNG has to overcome certain challenges in order to become successful in India. Firstly, as the infrastructure will be owned largely by private parties and the contracts are short term, there will be a demand-supply dilemma in the initial stages. While consumers will wish for security of supply before committing to SSLNG, potential suppliers will need to secure a market to justify their investments. Also, close cooperation between strategic partners is necessary to design and operate elements of the supply chain in an effective manner. Lastly, sound safety regulations need to be developed for handling and operating procedures. However, if global practices are imbibed and investor-friendly policies and subsidies are rolled out, SSLNG can become a game changer in the Indian gas market.

SSLNG value chain



A majority of the stakeholders stated that it is the right time to scout for gas equity abroad as LNG prices are projected to remain low in the medium to long term.

To what extent do you agree with the statement that in view of the projections that LNG prices will remain low in the medium to long term, this is the right time to scout for gas equity abroad?

32% Strongly agree	8% Somewhat agree
45% Agree	5% Disagree
1% Strongly disagree	9% Neither agree nor disagree

India has been in the process of developing a domestic exploration and production policy. Energy security demands success on that front, or to make up for any weak growth, the country needs strong efforts to secure hydrocarbon sources. Until the LNG industry matured, investments in equity gas assets were not preferred, unlike the case of equity oil. The survey respondents have suggested that such investments also be looked into. In the current LNG availability situation, the country wants to take advantage by procuring spot and short-term LNG contracts. The respondents appear to have reflected on the gas equity proposition from the mid- and long-term perspective, when the possibility of commodity prices firming up cannot be ruled out.

India has 17% of the global population but less than 1% of the world's oil and gas reserves and 6.8% of coal reserves. India's import dependence to meet its energy demands has intensified concerns that without reliable, affordable energy, it will be unable to sustain high economic growth. Owning gas equity assets will help in dealing with price risk in a better manner.

Policies and regulatory reforms

Regulatory reforms are key to the seameless development of the gas sector.

'The Indian gas market is not yet mature enough for the gas transmission and gas distribution segments to be unbundled' is the view echoed by 82% of the survey respondents.

Response	%
Strongly agree	34%
Agree	43%
Somewhat agree	5%
Disagree	12%
Strongly disagree	4%
Neither agree nor disagree	1%

The experiences of developed gas markets globally, and particularly in the EU, have demonstrated that for gas markets to be competitive, gas transmission and distribution segments need to be unbundled. This will ensure non-discriminatory access to the network and deter vertically integrated companies from taking undue advantage of their monopolistic position, thus preventing conflicts of interest. Nevertheless, even in these countries, the prerequisite was a well-developed competitive liberalised gas market with mature regulatory regimes.

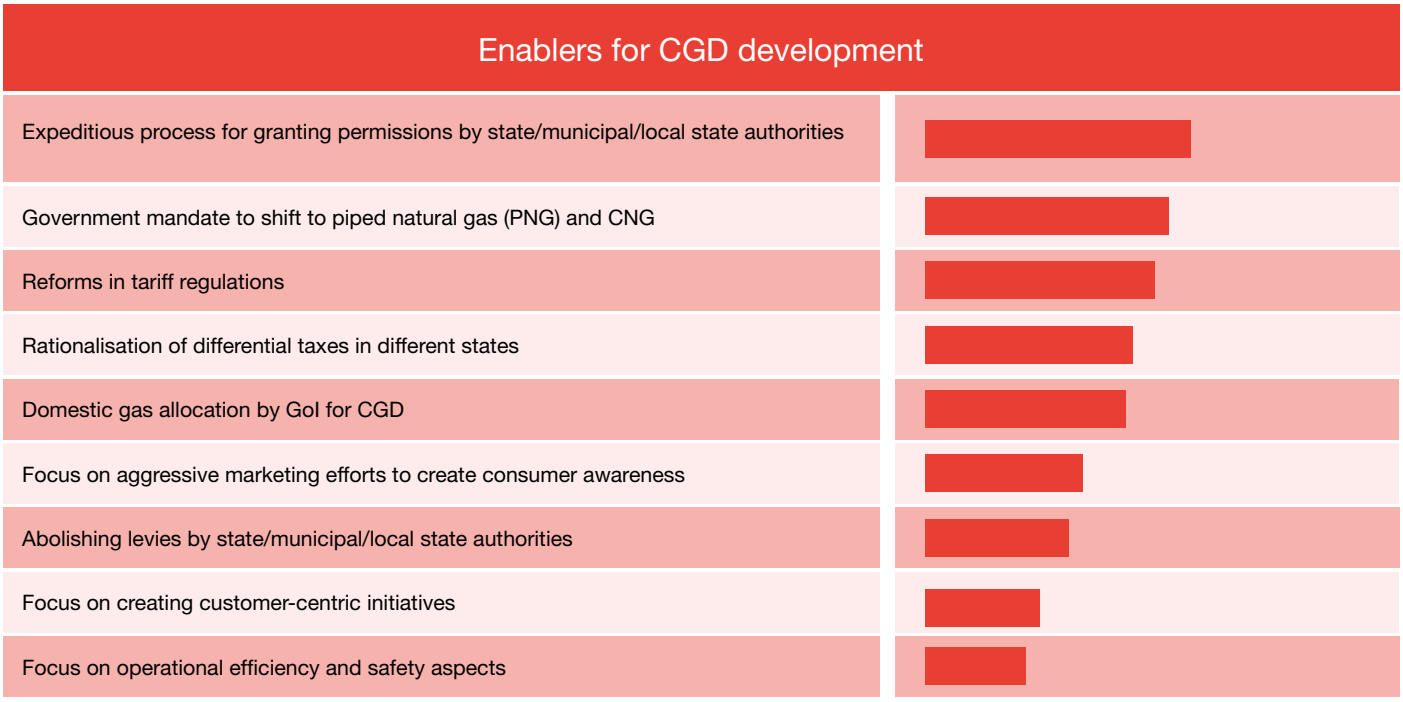
Unbundling of marketing and transportation will improve the environment for improved usage of gas.

In the current context, the gas markets in India are far from perfect. The number of participants in the gas market, including gas consumers, gas producers and shippers, is not large enough for competitive forces to set in. Gas prices are not market-driven, thus creating distortions and asymmetries in information and leading to incorrect market signals. The sector is still not free of government intervention. The infrastructure is inadequate and inequitable. The policies and regulatory reforms are still at a nascent stage and yet to take shape. Unless the markets attain maturity with regard to these basic building blocks, the primary objectives for which unbundling is required will not be met. Hence, the respondents seem to have accepted the governance and regulatory mechanism which provides for accounting unbundling to be effected, although they do not support legal unbundling. This will help competent and financially capable companies to participate in more than one segment while engaging in arm's length transactions in the interest of consumers.

It is also envisaged that the policy of freedom to market gas announced in March 2016 has the potential to bring more than one player into the value chain of marketing starting from the well head or import to end-consumer sale. The industry deliberations that follow these policy announcements will give shape to mature practices in future. To that extent, the role of policymakers again becomes significant in ensuring competition and preventing monopolistic behaviours.

Expeditious granting of permissions by authorities, government mandates and reforms in tariff regulations have been cited by the survey respondents as the three critical factors for CGD development.

Three critical factors for enabling the development of CGD



Most of the survey respondents have cited the following as the critical factors for CGD development:

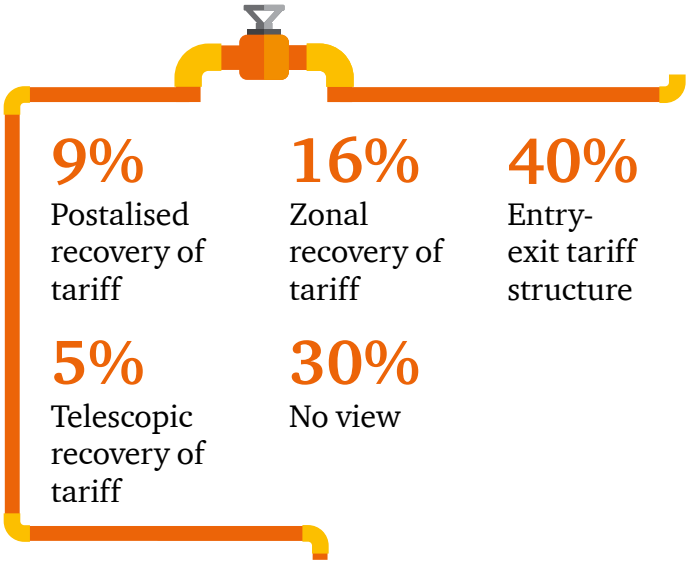
1. **Expediting the process of granting permissions by state/municipal/local state authorities:** Multiple clearances and permissions are required from many agencies—various departments of municipalities, railway authorities, highway authorities such as National Highway Authority of India (NHAI), Public Works Department (PWC), traffic police, state road transport departments, other local authorities, etc. These procedural delays tend to impact the pace of development of the CGD network. Providing single-window clearances for the CGD network is a key factor for the expeditious implementation of the CGD networks. Further, there is a need for a single-window mechanism at the district level.
2. **Government mandate to shift to PNG and CNG:** From an environmental sustainability standpoint, natural gas scores the highest among all competing fuels. However, in terms of affordability to end consumers, in the peak commodity cycle phases, natural gas may not be able to compete with alternative fuels on price. Also, consumer perception of uninterrupted availability of PNG or CNG is hard to build. Thus, a government mandate may be required to promote CNG and PNG usage. Past experience of CNG usage in cities such as Delhi and Mumbai suggests that penetration of natural gas as CNG has taken off only when it was mandated for public transport. The benefits offered by CNG and PNG, such as a cleaner environment and reducing health costs, are adequate drivers for GoI to mandate their use.
3. **Reforms in tariff regulations:** The criteria for tariff-based bidding for CGD need a relook. There have been instances of near-zero tariff bidding witnessed in bidding rounds. Also, respondents have suggested the reintroduction of cross-subsidies between the marketing margin and network tariff, which were recently scrapped with stringent implementation.

In addition to these three critical enablers for CGD development, the survey respondents have other enablers. There are variations in tax rates on different fuels across states. This leads to variation in fuel prices and thus differences in the affordability of gas vis-à-vis alternate fuels. In this regard, rationalisation of differential taxes across states is suggested. The industry is studying the 2016 budget provisions with respect to interstate gas sale. Additionally, abolition of municipal levies, continued allocation of domestic gas to CGD entities on priority, along with concerted focus by CGD companies on customer-centric initiatives, improved perception of safety, and operational aspects of gas distribution pipelines will further the development of CGD.

A quarter of the survey respondents prefer an exit-entry tariff structure as the basis of gas pipeline tariff determination.

We found that 40% of the survey respondents are in favour of entry-exit tariff structures; 16% prefer zonal recovery of tariff; and 9% support postalised recovery of tariff. Lastly, 30% of the respondents have no view.

Basis of tariff determination



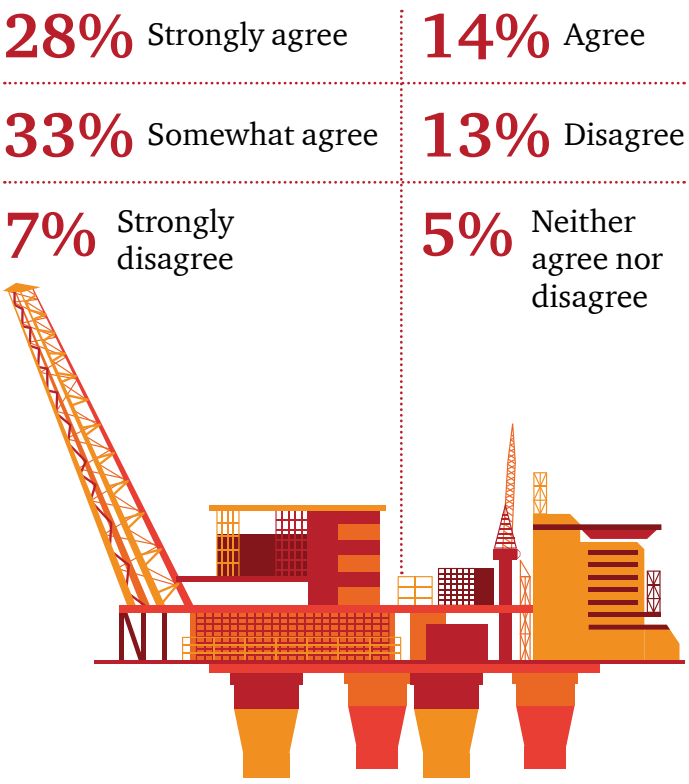
The respondents believe that an entry-exit tariff structure, though ideal, is too premature in India, since the gas grid is not developed fully. Till that time, the transmission tariff should be reasonable for the end consumer, irrespective of the mechanism of tariff determination. The policy of contractual path adds to cost and does not encourage gas swapping.

As postal tariff is uniform for all consumers, from the standpoint of consumers, the advantage is that there is no discrimination among them. However, consumers at a greater distance are in a relatively more advantageous position as compared to those at shorter distances. However, zonal tariffs do away with this disadvantage, thus creating differentiations amongst tariffs for consumers based on distance.

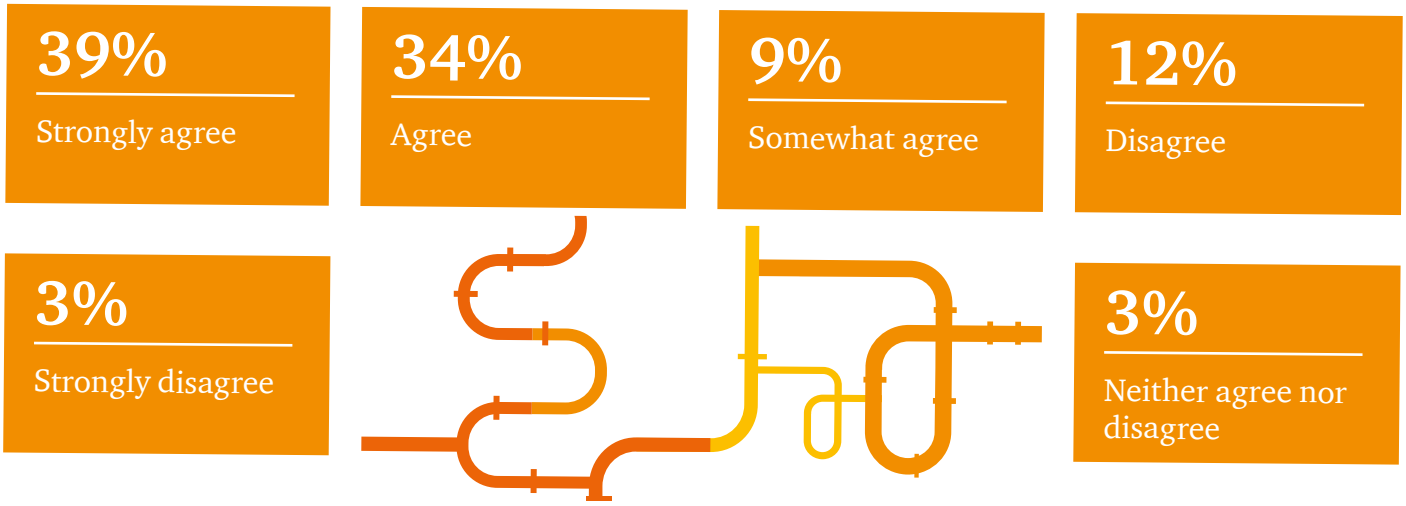
The present gas tariff structure is distance based and is expected to continue till the objective of equitable development of gas transmission infrastructure is achieved.

Close to two-thirds of the respondents feel that there exists a strong case for upward revisions in domestic gas prices; 73% agree to pricing freedom for marketing the discovered gas.

There is a need to revisit the domestic gas pricing through upward revisions in domestic gas prices in the country. To what extent do you agree with this statement?



There should be free market pricing of gas for marketing the discovered gas. To what extent do you agree with this statement?



For some time now, the Indian hydrocarbon industry has been demanding a higher remunerative price for domestic gas. This view resounded through our survey. Close to two-thirds of the respondents feel that there is a strong case for upward revisions in domestic gas prices.

Domestically produced gas is currently priced based on the average of gas prices in gas-surplus countries like the US, Russia and Canada. With declining domestic production and a rapid rise in imports, GoI is planning gas production from deep-water, ultra-deep-water and high-pressure and high-temperature areas in future. However, the industry strongly feels that the current price regime is not incentivising enough for domestic capital expenditure as the cost of new deep-water discoveries ranges between 6–7 USD per MMBTU on account of higher costs and higher risks. Close to two dozen discoveries of ONGC, RIL and GSPC in the Krishna Godavari (KG) basin alone lie suspended for want of a feasible price. The current gas price in India, 3.83 USD per MMBTU, is much lower than that in some of the other countries: 9 USD per MMBTU in China, 10.5 USD per MMBTU in the Philippines, 6.5 USD per MMBTU in Indonesia and 8 USD per MMBTU in Thailand and Malaysia.

The good news is that there have been some encouraging signs in the industry in the recent past. The March 2016 policy offers pricing freedom for gas discovered from deep, ultra-deep water and high-pressure and high-temperature areas that are yet to be developed for production.

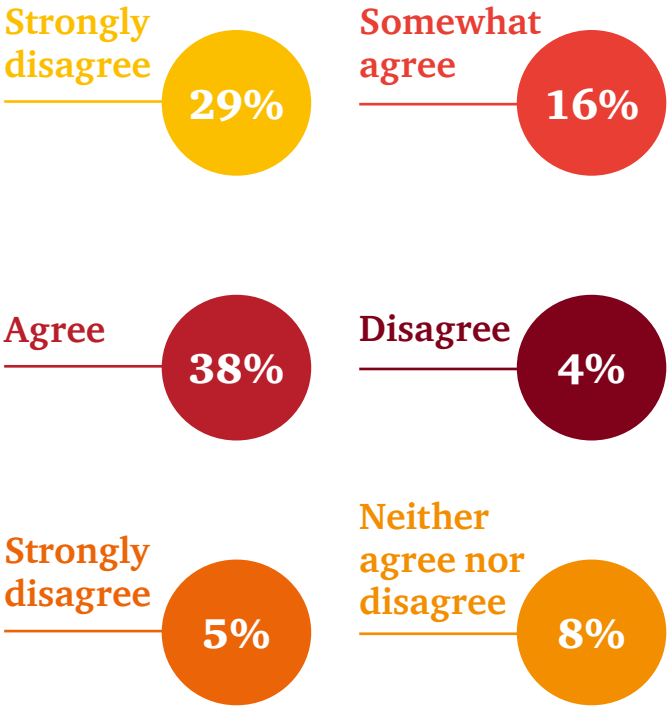
Importantly, the centre has taken steps towards pricing and marketing freedom for domestic gas. The initial response of stakeholders has been positive. The policy takes gas pricing almost to the decontrol stage. The price ceiling of the cost of alternative fuels is from the perspective of putting restrictions on marketers from exploiting the supply-constrained market. As the supplies grow, the natural competition from alternative fuels will come into effect.

The newly unveiled Marginal Fields Policy also allows producers to extract market price for their produce. However, it remains to be seen how this new regime will be defined and what policies will be implemented in future. Domestic gas producers would ideally like the newly announced incentives to be extended to the major existing fields as well.

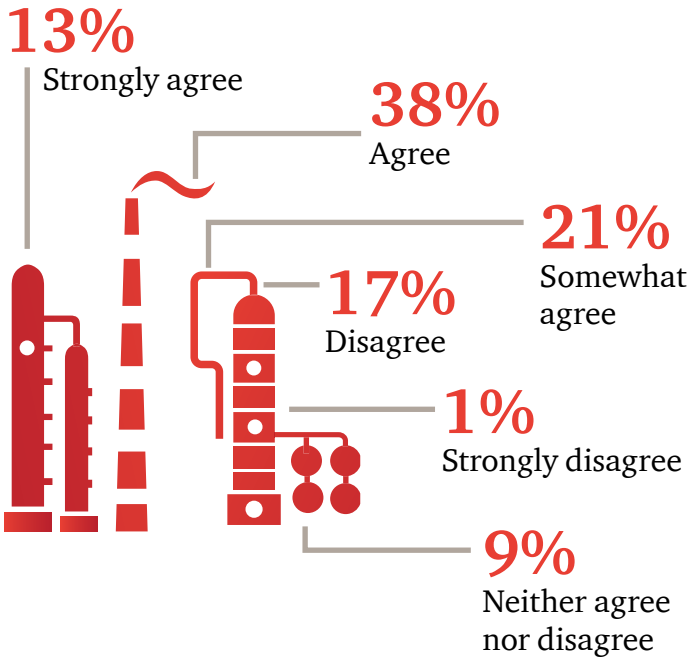
While the economic survey of 2016 has advocated pure market-determined arm's-length pricing for domestically produced gas, a more prudent option is to have in place a pricing regime that closely reflects the nuances of both producing and consuming nations. This shall ensure a fine balance that protects the interests of gas producers and consumers in India.

Mandatory third-party access in every part of the supply chain, including LNG terminals and the CGD network, was supported by a majority of survey respondents.

Third-party access should be mandated in every part of the supply chain, including LNG terminals. To what extent do you agree with this statement?



Proposed third-party access to CGD should provide access on a reasonable endeavour basis. To what extent do you agree with this statement?



In the formative days of sector development, LNG regasification terminal investors preferred operations without mandatory third-party access provisions. Flexibility in operations and freedom from regulatory oversight increase investor confidence.

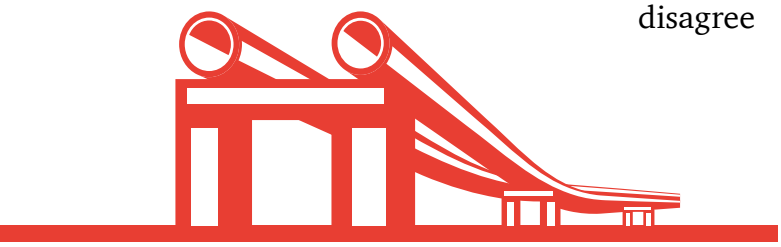
The business models of terminals in India are changing. The Dahej terminal started with regasification primarily for its equity partners, with LNG sourced by Petronet LNG Ltd (PLL) through long-term contracts. However, it has since started offering capacities to other marketeers like Gujarat State Petroleum Corporation (GSPC) in addition to its equity holders. Although the Kochi terminal has not been fully operational, it is likely to follow the model of Dahej. The Hazira LNG terminal regasified gas sourced by itself, by GSPC and by Reliance. The Dabhol terminal has thus far regasified cargoes brought in and marketed by its owner. The Kochi terminal has not been fully operational but is likely to follow the model of Dahej. These terminals may choose to change their model with respect to giving access to other companies in the time to come. However, the newer terminals appear to be based on different business models. The Mundra terminal which is under construction will follow suit. Similarly, the Jafrabad and Chhara terminals are expected to offer long-term capacity to the desired parties right up front. The Jaigarh import terminal is likely to offer a majority of its capacity under the tolling model.

Similarly, for CGD, the survey respondents have indicated that proposed third-party access be mandated in CGD, but that the access be provided on a reasonable endeavour basis.

Thirty-four per cent of the survey respondents chose 'somewhat agree' when asked if gas swapping has been successful in mitigating stressed assets.

To what extent do you agree with the statement that gas swapping has been successful in mitigating stressed assets?

- **12%** Strongly agree
- **34%** Somewhat agree
- **16%** Agree
- **8%** Disagree
- **8%** Strongly disagree
- **22%** Neither agree nor disagree



The respondents were reserved in their opinion on whether the gas swap policy has done what the industry wanted—i.e. irrespective of whose gas it is and from which source, the proximity of the source is leveraged and insistence on pipeline transportation is avoided. The tax and transportation tariff costs are consequently avoided, reducing the burden on consumers. The taxation issues involved and differences in the views of state governments and suppliers have hampered utilisation. The clarification in Union Budget 2016 on the matter of interstate sale is expected to provide concrete direction in this matter. Thus, this is an outstanding agenda for the industry until all challenges are ironed out.

Sectoral reforms for accelerating gas usage

A host of reforms are required in the power and fertiliser sectors to boost gas sector development.

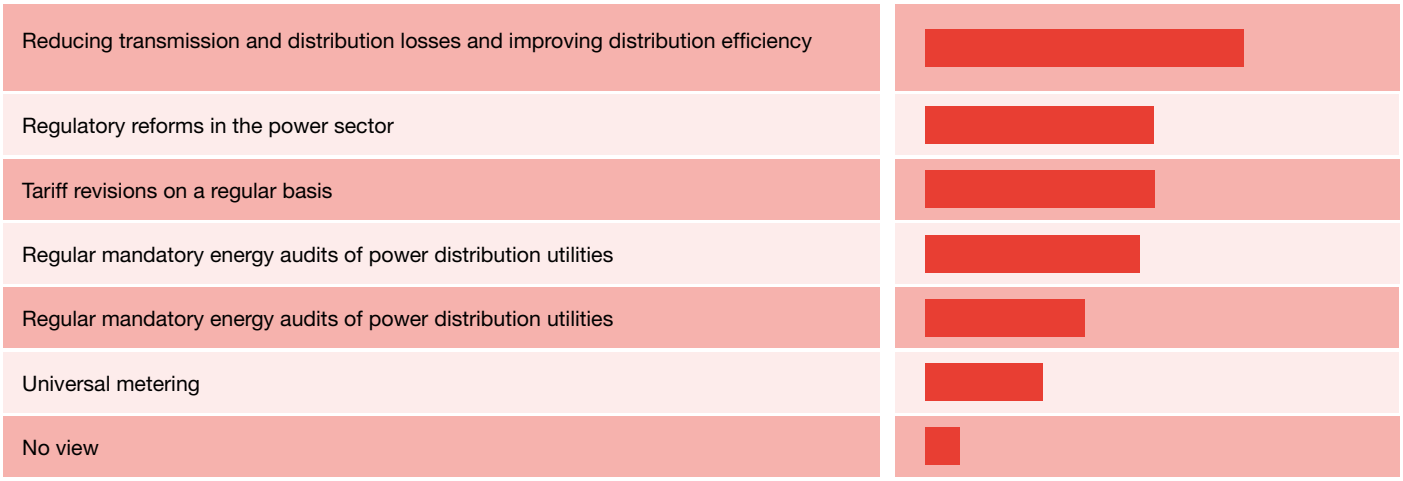
The maximum consumption of natural gas is in the fertiliser and power sectors, accounting for about 59% of gas consumption in 2014–15.

Hence, questions were posed on the type of reforms that would boost gas sector development in these anchor consumer sectors.

As mentioned in the table below, among the power sector reforms, most of the survey respondents are of the view that time of day (ToD) tariff is the need of the hour. This will enhance the affordability of gas as a fuel for the power sector. Transmission loss is another huge factor. If energy audits are done at regular intervals, timely feedback, which is critical, will become available on the terms of equipment efficiency and ways to improve.

The respondents have stated that as the power sector has been an anchor consumer in gas markets worldwide, sufficient domestic gas to match the country's full requirement of installed gas-based station capacity should be allocated to the power sector on top priority. Further, the respondents go on to state that to make RLNG viable for power generation, the generation utility/entity should be allowed to blend RLNG power with cheaper power from other sources like coal from its own portfolio.

In your view, which of the following reforms in the power sector are necessary to boost the gas sector development?



Suggestions were received on amending the prevailing Central Sales Tax (CST) Act, 1956, to avoid double taxation and allow commingling of gas in the pipeline for interstate sale and gas swapping. To make RLNG-based power generation viable, fiscal incentives like customs duty waiver, service tax waiver, state VAT/entry tax waiver should be made available. There is a suggestion from one of the survey respondents for Petroleum & Natural Gas Regulatory Board (PNGRB) to come out with model gas sales agreements (GSA) and gas transportation agreements (GTA).

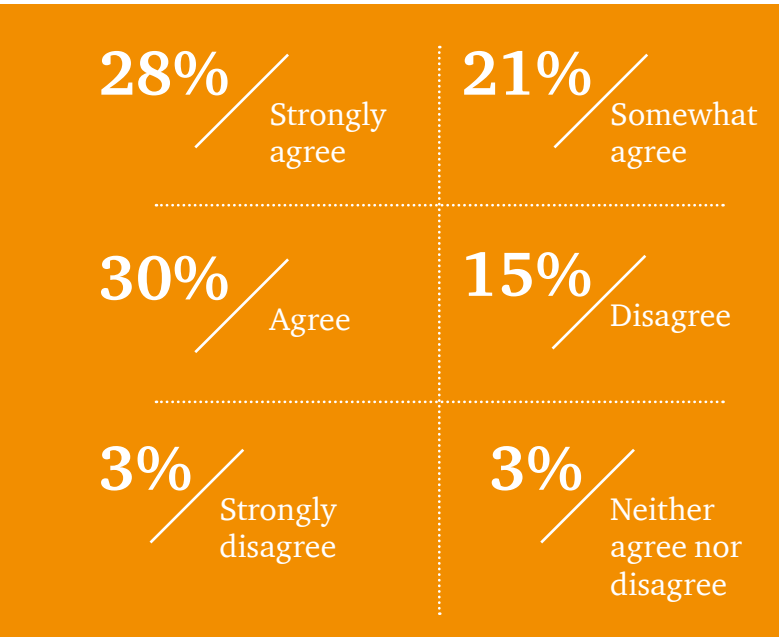
There is a strong requirement for the alignment/synchronisation of regulations in the energy area, especially the Central Electricity Regulatory Commission (CERC) and PNGRB. In the medium to long term, there should be an independent system operator (ISO) to administer pipeline networks and an open access mechanism. This will help in establishing gas market exchange (physical and financial).

In your view, which of the following reforms are necessary in the fertiliser sector to boost gas sector development?

Subsidy reforms in the fertiliser sector (direct subsidies to farmers)	
Decontrol of fertiliser prices, including urea prices	
Changes in policies and regulations governing the fertiliser sector	
No view	

In the fertiliser sector, direct subsidies to farmers and decontrol of fertiliser prices are considered as the most important reforms which could boost investment in the sector, thus providing growth opportunities to the gas sector too. The urea pricing policy creates working capital constraints which have hindered investments in gas-based urea capacities.

Should the government mandate sectors to switch over to natural gas?



Almost 57% of the survey respondents chose 'strongly agree' and 'agree' when asked whether the government should mandate the use of natural gas. The factors driving this mandate would be an increasing emphasis on curbing GHG emissions and natural gas as cleaner and energy-efficient alternative. The only challenge is that the economics of natural gas as a fuel varies across different sectors. There is a significant downturn in the prices of LNG worldwide and a government mandate is required to promote the use of natural gas in certain sectors.

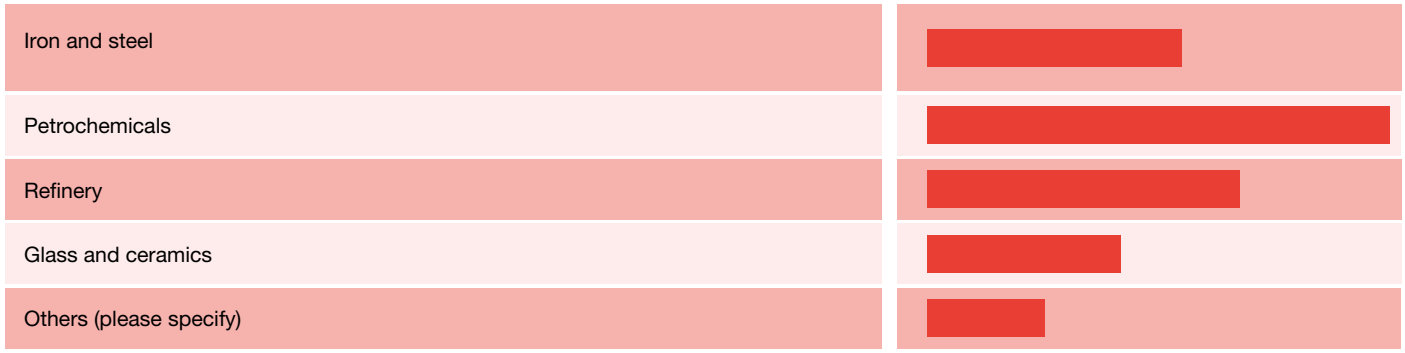
STAKEHOLDER VIEW

'In the past, the government has introduced renewable purchase obligations (RPOs) to boost the demand for renewable power in the country. It has also encouraged power buyers to create a mixed portfolio of power purchased by them. RPOs had a positive effect on the development of the renewable energy sector in the country. The government should similarly introduce gas purchase obligations (GPOs) to encourage companies using higher than a designated amount of non-conventional fuels to have a part of their fuel requirement fulfilled by natural gas. GPOs have the potential to address multiple issues for the government: (1) reduce pollution; (2) increase the development/acceptance of natural gas as a fuel; (3) boost the development of the natural gas pipeline network in the country; (4) with the natural gas demand already in place, it can boost the domestic production of natural gas; and (5) in the long run, with designated demand and supply of natural gas in place, GPOs can make the country move towards market-determined pricing of natural gas in the country. The pilot project can be started off with states like Gujarat, where the gas pipeline network is already in place, and then extended to areas with gas network availability. Conventional fuels like coal, briquettes and other liquid fuels cause a lot of pollution. Introduction of GPOs can help keep a check on the pollution released by each major fuel-consuming unit. The overall objective of increasing the share of natural gas in the energy basket of the country can also be achieved.'

In your view, which of the following sectors should switch over to natural gas?

Most of the survey respondents would like diesel-based power plants to switch over to natural gas, followed by petrochemicals, refineries, and glass and ceramics. Diesel-based power plants could switch to natural gas as a fuel owing to favourable economics in terms of fuel switching and achieving a payback period for investments in the changeover required. Petrochemicals and refineries could switch to natural gas in case economics dictate its usage vis-à-vis alternatives. The challenge with the iron and steel sector is the usage of coal and process-related challenges with respect to natural gas. Glass and ceramics can also switch over due to a low substitution possibility, but their average offtake is not large and hence connecting with pipelines is a challenge. Some of the respondents have commented that automobiles, pharmaceuticals, food products, the maritime industry and urban public transport sector should shift to natural gas.

'In addition to the fertiliser and power sectors, where the gas pooling mechanism is mandated, in your view, in which of the following sectors can a similar mandate be issued?'



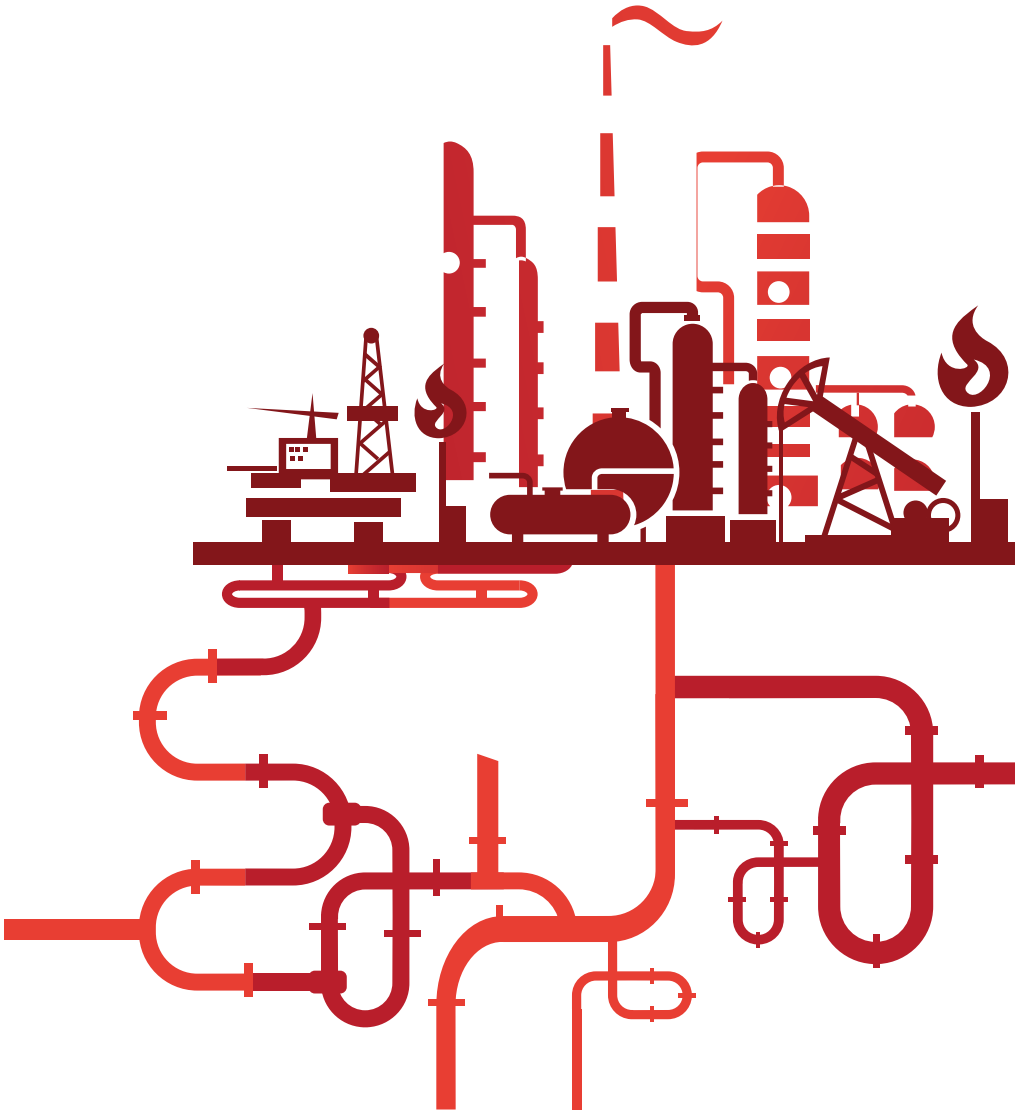
The survey respondents suggested that a price pooling mechanism could be mandated in the iron and steel, petrochemicals and refinery sectors. Undoubtedly, gas use has the highest scope in these sectors, but other important factors need to be considered for price pooling. Sectors where cheaper gas sources can be pooled with costly LNG imports and which have fewer units with high consumption are ideally suited. Also, the end products need to be less sensitive to the cost of fuel. Based on these factors, sectors such as sponge iron, petrochemicals, CGD and other pooling of small customers can be done at the gas supplier level. In the iron and steel sector, technical challenges exist due to the requirement of coal for processing. The respondents concur with the view that no gas pooling is required for unregulated sectors.

About Indian Oil Corporation Ltd.

Indian Oil Corporation (IndianOil) is India's largest commercial enterprise, with a sales turnover of 4,50,756 crore INR (73.7 billion USD) and profits of 5,273 crore INR for the year 2014-15. IndianOil is ranked 119th among the world's largest corporates (and first among Indian enterprises) in the prestigious Fortune Global 500 listing for the year 2015.

As India's flagship national oil company, with a 33,000-strong workforce currently, IndianOil has been meeting India's energy demands for over half a century. With a corporate vision to be 'the energy of India' and to become 'a globally admired company', IndianOil's business interests straddle the entire hydrocarbon value chain—from refining, pipeline transportation and marketing of petroleum products to exploration and production of crude oil and gas, marketing of natural gas and petrochemicals, besides forays into alternative energy and globalisation of downstream operations. Having set up subsidiaries in Sri Lanka, Mauritius and the UAE, the corporation is simultaneously scouting for new business opportunities in the energy markets of Asia and Africa. It has also formed about 20 joint ventures with reputed business partners from India and abroad to pursue diverse business interests.

IndianOil aims to become a major player in the domestic natural gas sector, with a significant presence in the entire supply chain, and has already taken steps to enhance its share in LNG sourcing, LNG import terminals, natural gas pipelines, city gas distribution networks and LNG supply by road tankers.



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Contacts

Deepak Mahurkar
Leader, Oil and Gas, PwC India
Phone: +91 124 3306027
Email: deepak.mahurkar@in.pwc.com

Contributors

Oil and Gas team

Deepak Mahurkar
Leader, Oil and Gas
deepak.mahurkar@in.pwc.com

Sakshi Marwah
Manager, Oil and Gas
sakshi.marwah@in.pwc.com

Muthu Narayanan
Senior Consultant, Oil and Gas
muthu.narayanan@in.pwc.com

Love Jain
Senior Consultant, Oil and Gas
love.jain@in.pwc.com

Aniket Dasgupta
Consultant, Oil and Gas
aniket.dasgupta@in.pwc.com

Sanveer Gosain
Sector Driver, Oil and Gas
sanveer.gosain@in.pwc.com

Editorial support

Dion D'Souza

Design support

Kirtika Saxena

pwc.in

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