

# Impact of Shale Gas on Asian Gas Market Development- The Case of India



**Lausanne  
October 2<sup>nd</sup> 2012**

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# A TIMELINE OF SHALE GAS ACTIVISM (March -November 2011)

<i>March</i>	<i>April</i>	<i>May</i>	<i>June</i>	<i>July</i>	<i>Aug.</i>	<i>Sept.</i>	<i>Oct.</i>	<i>Nov.</i>
Cornell University Paper on GHG content of Shale Gas	Rebuttal of Cornell University paper	NETL workshop and clarification on US DoE view of GHG content of Shale Gas	NYT- Forbes Shale Gas Ponzi Scheme debate plays out in the open	IEA releases study: Golden Age of Gas with a detailed assesment of GHG content.			Media plays out the USGS resource assessment of 84 Tcf down from the EIA assessment of 411 Tcf. USGS issues clarification as the figure is a considerable uprating from the 2002 study which assessed resources at 2 Tcf.	
Moratorium or deferment of shale gas activity in South Africa, India, France, Canada and Maryland (US)		France announces a policy not to pursue Shale gas opportunities due to perceived uncertainties relating to safety and water contamination.	Poland announces US-Poland Energy Cooperation Initiative on Shale Gas			Further two legislations announced in France against Shale Gas Fracking irrespective of technical developments		

In addition to the voluminous press coverage a number of reputed institutions released their own reports on the subject of Shale Gas, a non-exhaustive list includes:

Chatham House, Kings College, MIT Gas Study, Atlantic Council, Gas Technology Institute, Cornell University, INGAA Foundation (ICF), Kennedy School of Government, Department of Energy and Climate Change UK, Department of Energy US, Global Warming Policy Foundation and The Post Carbon Institute as well as the EIA and the IEA.

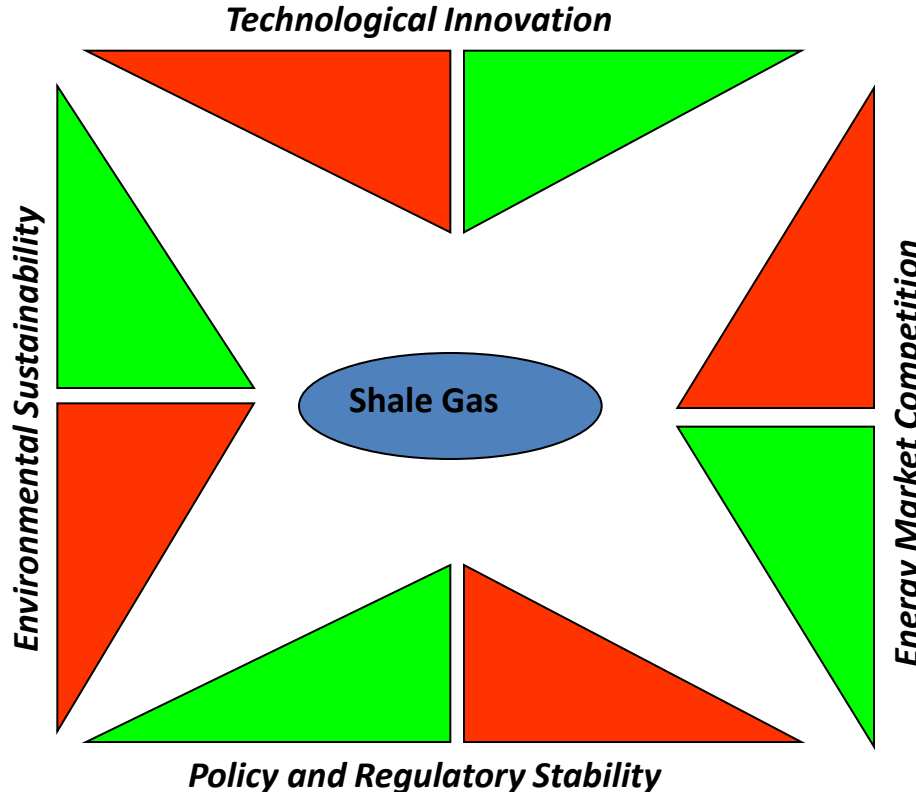
**In Summary, one could safely say that Shale gas has got a number of stakeholders in the global energy sector quite excited.**

# COUNTER BALANCING FORCES AT WORK IN SHALE GAS

■ Enabler  
■ Challenge

Know how driven innovation as opposed to technical breakthrough; high learning rates with continual assimilation of operating best practices

Number of concerns being raised as regards GHG content of shale, safety, possible groundwater contamination; however knowledge about environmental issues is getting established. Environmental performance is good and improving and safety record is good. Reported incidents relative to activity levels are low.



Shale gas developments enhance the already substantial recoverable gas reserves and to that extent provide a longer time window for new renewable technologies to mainstream. There are however only a small number of global specialists in shale gas and combination of high investment levels required, the intense competition for energy investments and relative lack of regulatory and policy precedent will lead to an uncertain uptake of shale gas by the energy industry.

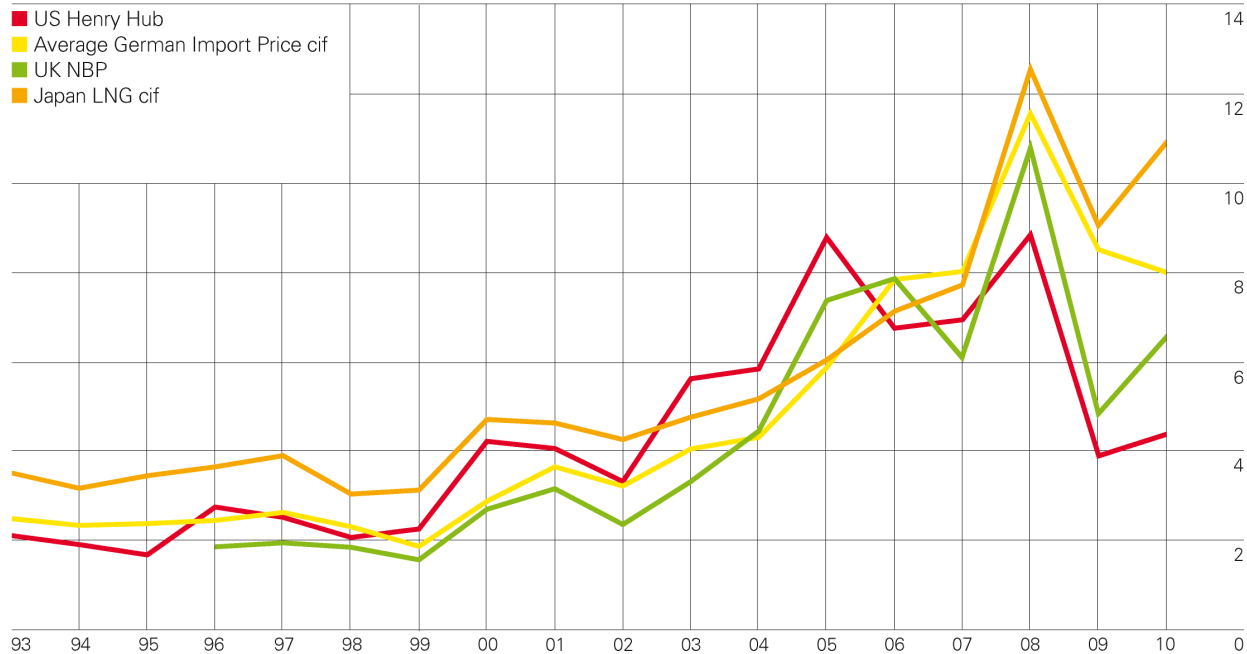
Increasing levels of transparency via mandatory and voluntary disclosure. Clarity at political level is hard to achieve due to relative novelty of the industry. Regulations outside US will take time to establish.

# IMPACT ON GLOBALISATION OF NATURAL GAS

*Will US Shale Gas emerge as the missing jigsaw piece that will make the gas industry truly global?*

## Prices

\$/Mmbtu



- Clear divergence now evident between US and RoW gas pricing.
- Expansion of Panama Canal will open US opportunities for Asia-Pacific LNG trade?
- How soon will US liquefaction be in place to capture Atlantic basin opportunities?

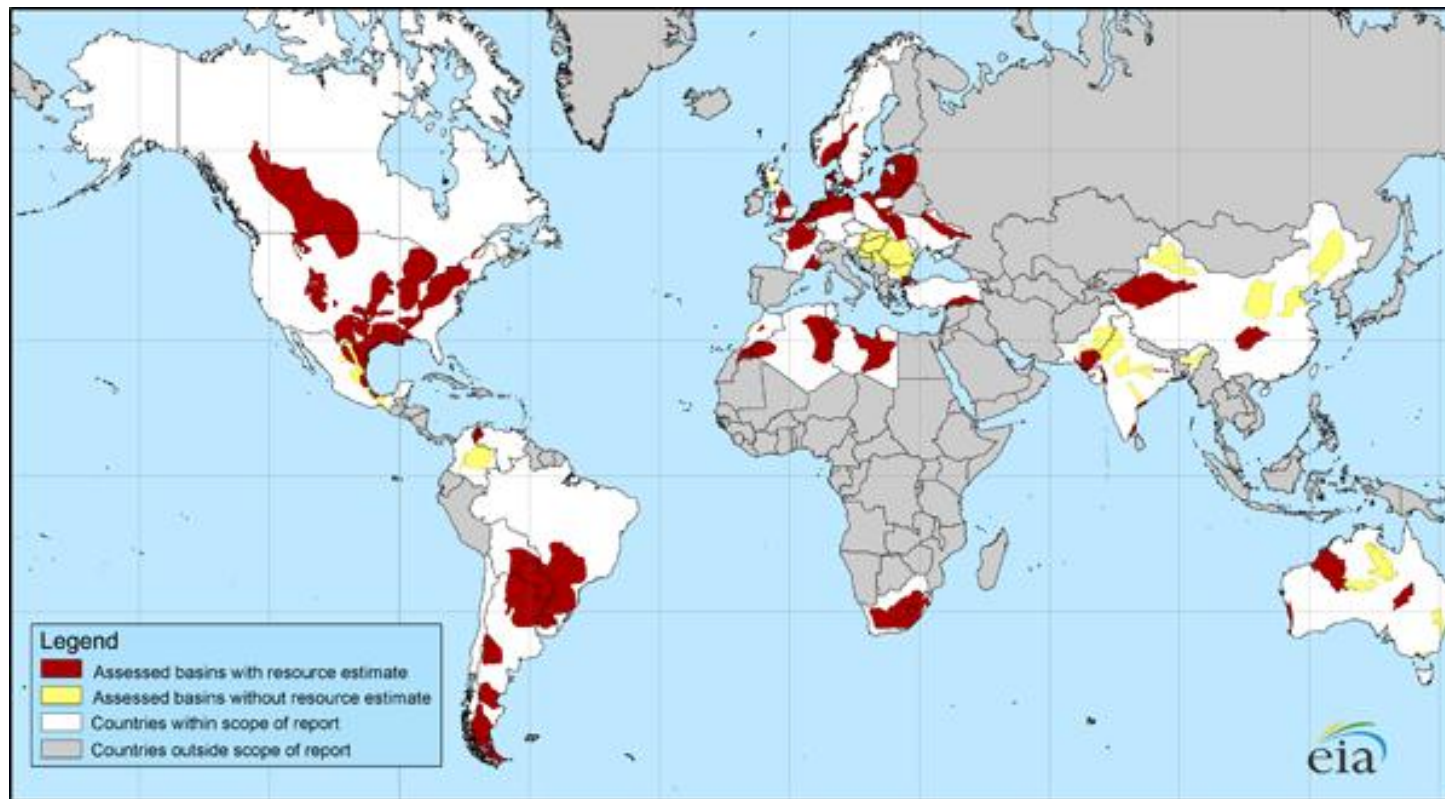
## KEY GLOBAL THEMES THAT SHALE GAS WILL HAVE TO CONFRONT

- Shale Gas –v/s – LNG : The Race for Market Access
- International Competition in the Gas Industry's most exciting frontier- ASIA
- US + Australia + Arctic Supply: Challenge to the established global order in Gas
- Shale Gas and Renewables: Friends or Foes?
- Challenge to Oil Indexed Pricing? How Real is it? And will the dynamics play out identically across the world?
- Finally Globalisation or Stabilised Gas Islands ?

## DISCUSSION ON INDIAN GAS ISSUES

- Can Unconventionals Fit in the Emerging Indian Fuel Mix and Growing Demand?
- Current Policies, Pricing and Activities in India
- Assessing Preparedness in India for Unconventional Plays
- Pricing Reforms- upside for Shale?
- Outlook and Challenges in the near term

# THE EMERGING WORLD SHALE GAS MAP



- Significant Shale resources identified in the Atlantic Basin destination areas.
- Large parts of traditional gas supply areas (Middle East, Russia) appear to not have been evaluated.

# INDIAN GAS DEMAND DYNAMICS

Natural Gas Consumption trends by industry sector  
MMSCMD

	2007-08	2008-09	2009-10	2010-11	2011-12
Power	79.70	91.20	102.70	114.20	126.57
Fertilizer	41.02	42.89	55.90	76.26	76.26
City Gas	12.08	12.93	13.83	14.80	15.83
Industrial	15.00	16.05	17.17	18.38	19.66
Petchem-Refinery	25.37	27.15	29.05	31.08	33.25
Sponge Iron	6.00	6.42	6.87	7.35	7.86
<b>Total</b>	<b>179.17</b>	<b>196.64</b>	<b>225.52</b>	<b>262.07</b>	<b>279.43</b>

Source: Working group report on petroleum and natural gas sector for the 11th plan period

\* e.g- Last week the Government of India announced a moratorium on gas fired power projects due to uncertain availability of gas going forward and emphasised rapid development of shale gas resources.

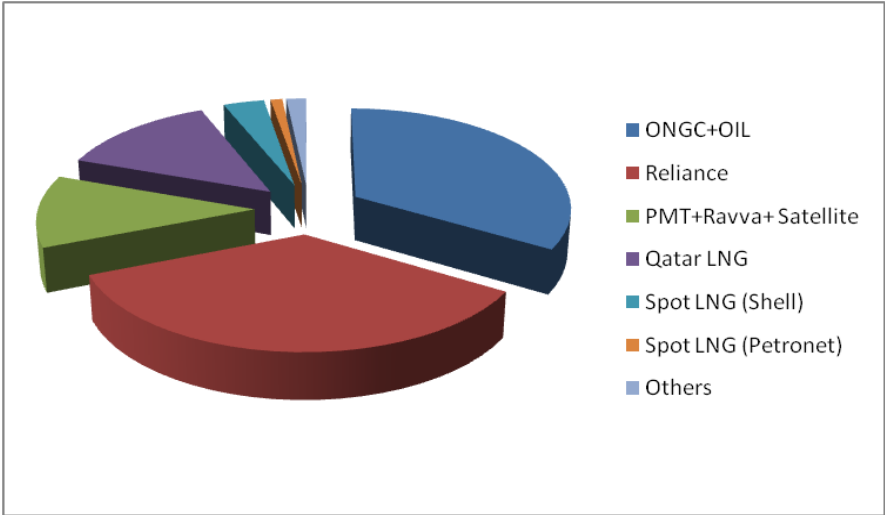
- Growth (CAGR): 11.4%
- Next five years indicate even greater growth in demand
- Major Driver: Power Generation
- However many elements of the growth trajectory still unclear\*



# INDIAN GAS SUPPLY DYNAMICS

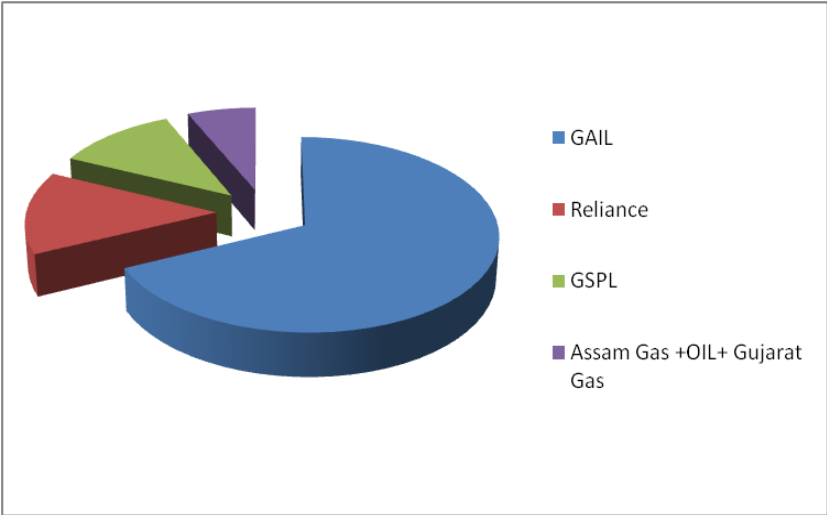
**Market Share of Production/Supply 2010-11**

100% = 161.15 mcm/d

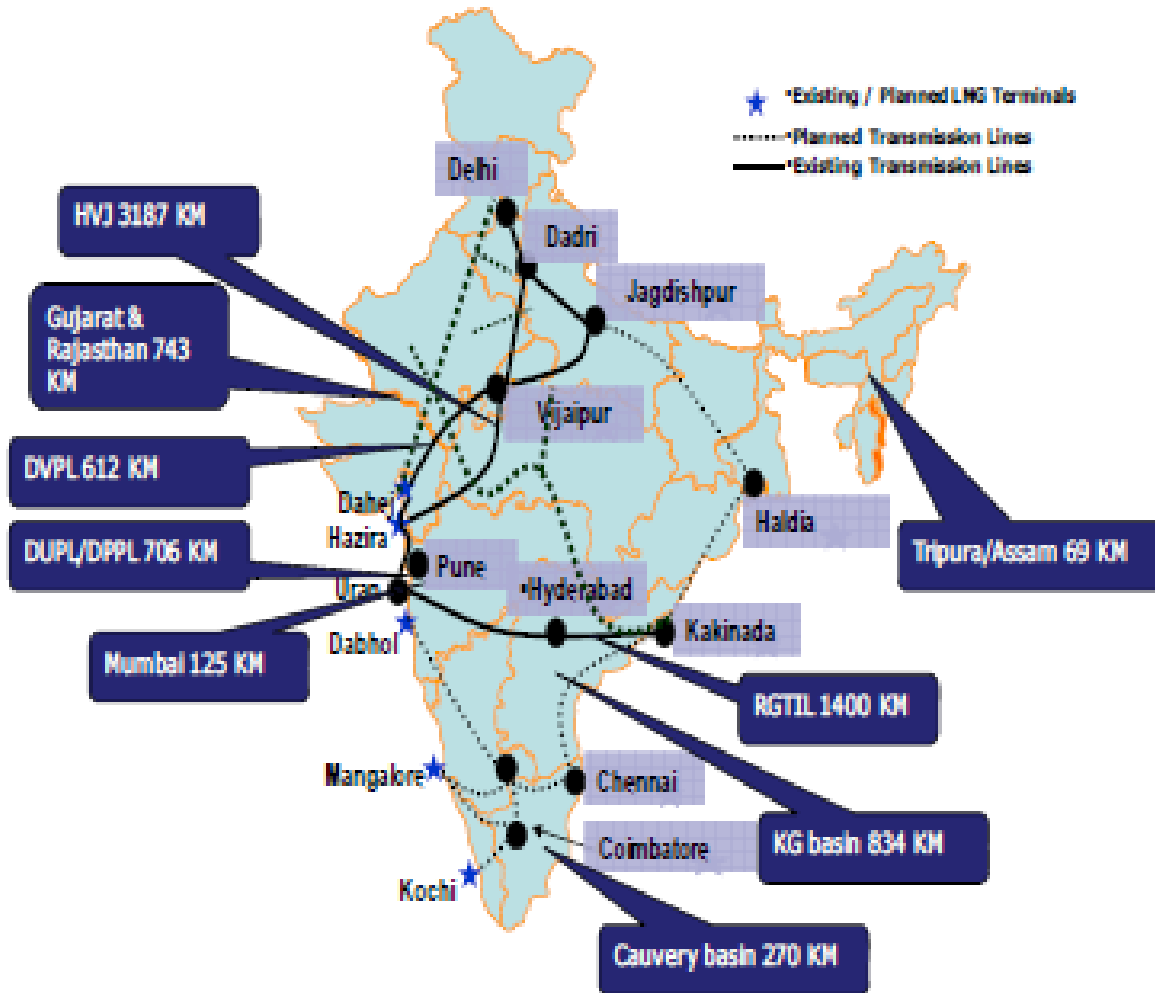


**Market Share of Gas Transportation 2010-11**

100% = 10,000 KM of pipe.



# GAS INFRASTRUCTURE AND CONSUMER CONNECTIVITY IS RAPIDLY GROWING

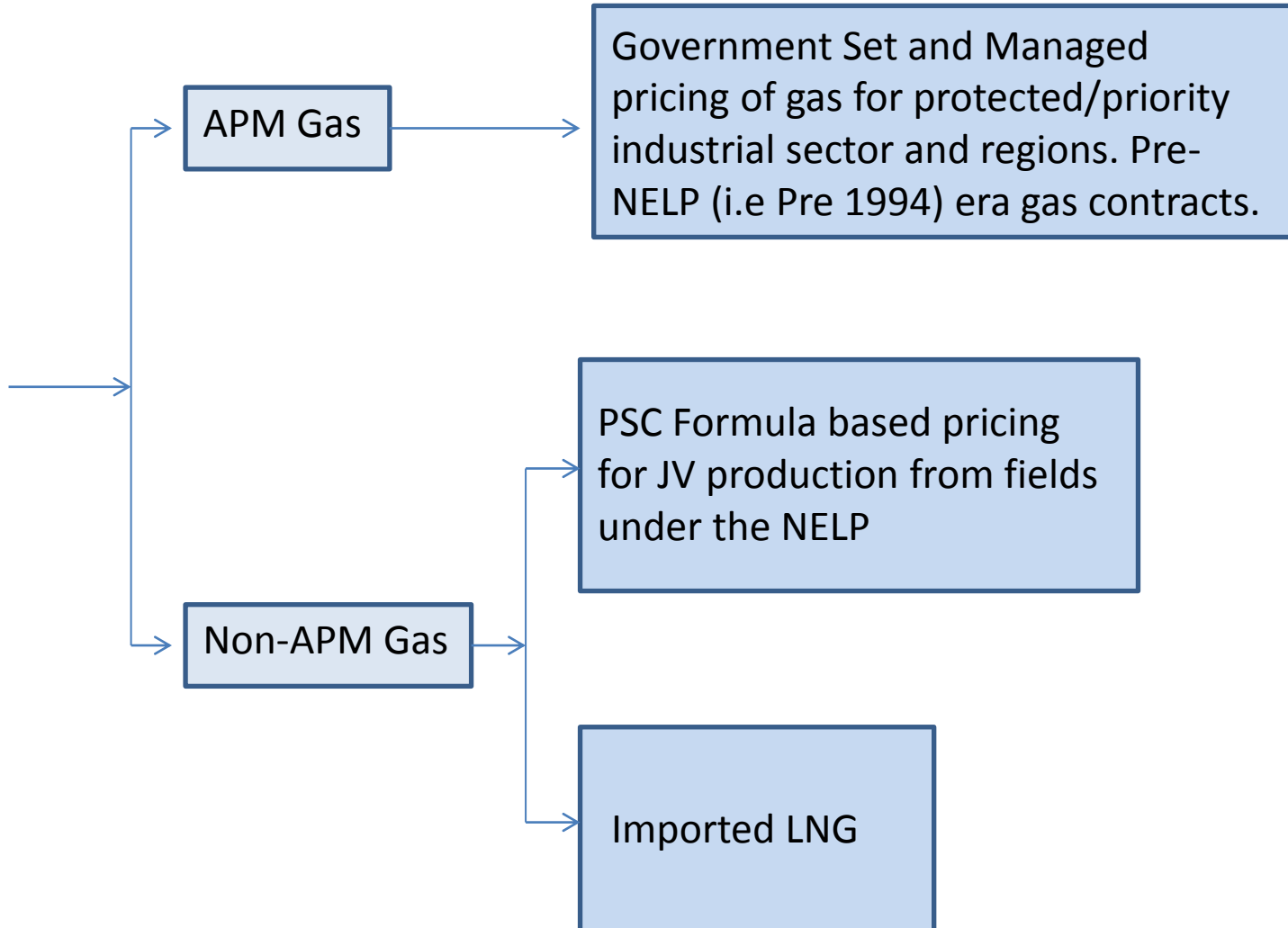


### Key Trends

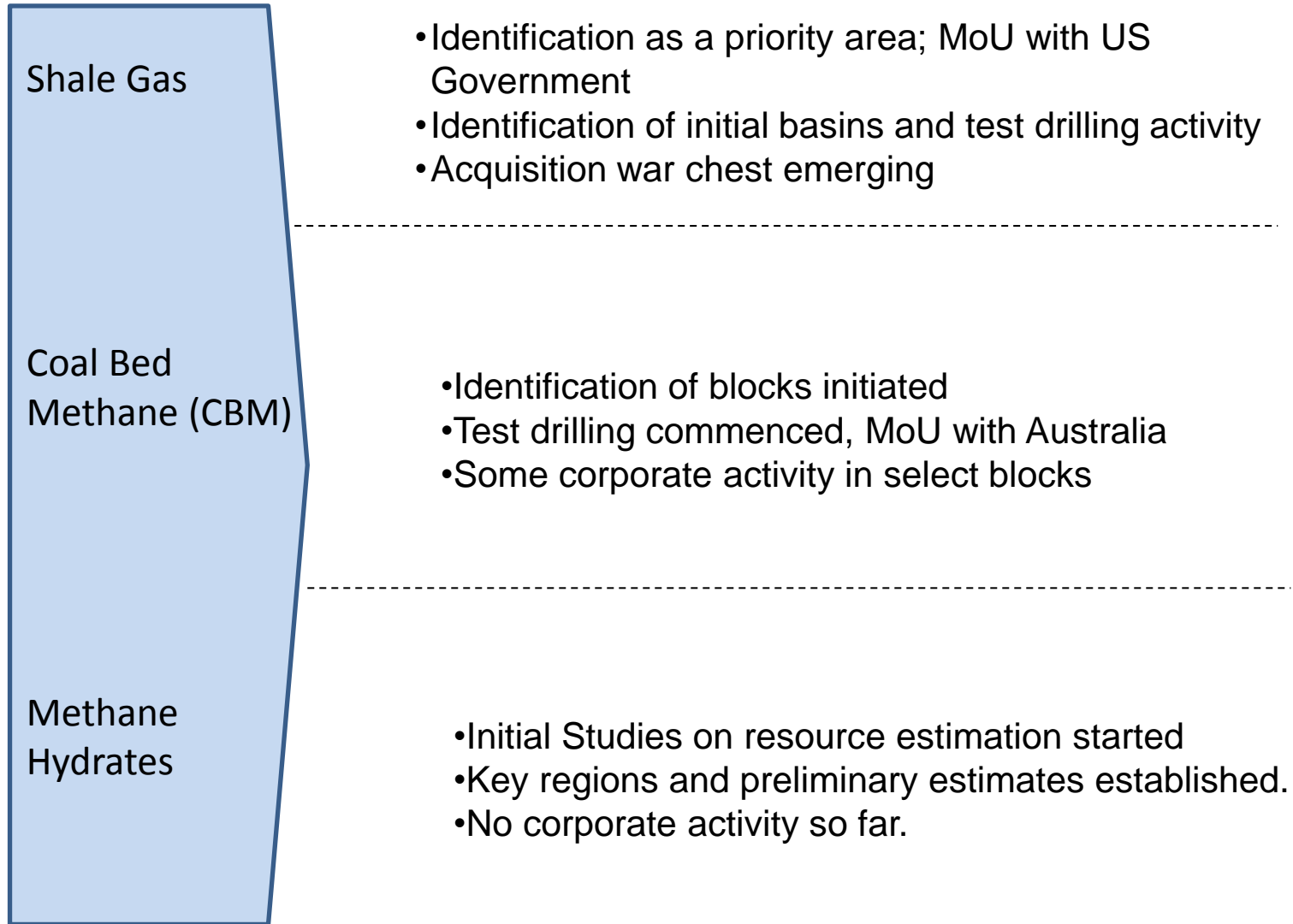
- Growing Re-gas Capacity
- Emerging Gas Grid
- City Gas distribution projects
- Corporate M&A Activity\*

\* BG Group proposed divestment, BP partnership with Reliance

# UNDERSTANDING GAS PRICING IN INDIA



# SNAPSHOT OF UNCONVENTIONAL ACTIVITY IN INDIA



# A TIMELINE OF SHALE GAS ACTIVITY IN INDIA

**October  
2010**

The Ministry of Petroleum and Natural Gas has signed a memorandum of understanding (MoU) with the USA on 6 October 2010 for assessment of shale gas resources in India, imparting training to Indian geo-scientists and engineers, and providing assistance in formulation of regulatory frameworks.

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**December  
2010**

A multi-organizational team (MOT) of DGH, Oil and Natural Gas Corporation (ONGC), Oil India Limited (OIL), and Gas Authority of India Limited (GAIL) has been formed by the government for analysing the existing data set and suggesting the methodology for shale gas development in India.

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**September  
2011**

India has identified several shale formations which seem to hold shale gas. These formations are spread over several sedimentary basins such as Cambay, Gondwana, Krishna-Godawari, and Cauvery. The Directorate General of Hydrocarbons (DGH) has initiated steps to identify prospective areas for shale gas exploration. First test wells identified and drilling started

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**March  
2012**

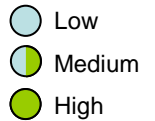
At Sarpi on the outskirts of Durgapur at a site spread over an area of 1250-1300 sq km, shale gas deposit is India's (and Asia's) first, and is the focal point in India's pursuit of unconventional gas. ONGC, which began its exploration of the Damodar Basin in September 2011 in India's first such experimental project, hit upon the gas source late on Monday, 19<sup>th</sup> March 2012 while drilling its first rig.



On 23<sup>rd</sup> March, the Indian Prime Minister announced Shale Gas licenses to be awarded via competitive bidding by end 2013.

# WHAT REALLY MATTERS IN SHALE GAS DEVELOPMENT

## *A Summary of Drivers assessed for India*



**Desirable Geo-technical characteristics**

ToC Content (>2%), Shale Thickness (40M), Shale Depth (1000-3500m), High proportion of non-clay minerals, Overpressure zones, Other Palaeographic and structural settings



**Infrastructure, Supply Chain and well log data**

Water Resource abundance, proximity to pipelines, rig availability, lower population density and legacy wells with geological logs and data



**Proven/ Experienced technical specialist players**

Developers with track record of shale gas experience and access to emerging operating best practice



**Political Will**

Self explanatory



**Stable energy policy and market framework**

Established exploration licensing regime, private ownership of mineral rights and existence of functioning gas market.



\* Preliminary Assessment

Source: Industry literature, research reports and expert interviews.

## OUTLOOK AND FUTURE CHALLENGES

- Stable development of a gas market and pricing regime
- Impact of Oil Pricing on Gas in India- Role of the marketing companies.
- Role in the Asia Pacific gas basin and in the Indo-Pacific gas battle ground
- Race off between Shale Gas and LNG?
- Unconventional Pricing = Conventional Pricing + X? OR Pricing based on intrinsic risks?

# MATTER OF TIME BEFORE EUROPEAN GAS ISSUES PLAY OUT IN ASIA?

## Contextual background to our proposed study

### European Gas/LNG Markets

- Oil Indexed gas contracts, whilst under pressure, remain the mainstay
- Growing gas-on-gas competition, liquidity at gas hubs
- Growing supply diversification and share of LNG, including spot LNG
- Growing bargaining power of gas buyers
- European Gas market now the most contested regional gas markets.

### Asia-Pacific Gas/LNG Markets

- Oil Indexation under similar pressure in AP Gas Basin—esp contracts in Japan and Korea. Outlook delicately poised...
- Emergence of Asian trading hubs possible in the short term? Alternative Oil indexation formulae given Asian fuel mix?
- New LNG gas delivery platforms and supply routes into Asia: timelines and cost escalations. Role for spot LNG?
- Is the Asia Pacific gas pricing premium sustainable even if it may be defensible?
- Given the size and growth rates in Asian gas, how long before a standardised contracting model emerges in Asia?



# **Natural Gas/LNG Contracting trends in Europe: Emerging Insights for Asia Pacific Gas Market**

***Would Oil Indexed Gas Contracts remain sustainable even if they may be defensible?***

## ***Key Issues our study will compare and contrast:***

- Structure and Strategic Conduct in European and Asia Pacific Gas Markets.
- Issues and Alternatives related to oil indexation in Gas/LNG contracts.
- Alternative price mechanisms, including role of trading hubs and gas-on-gas competition.
- Key lessons learnt for management teams of natural gas/LNG market participants.
- Relevance of Oil Indexation for financing new Asian LNG supply vis-à-vis Europe

## ***Who would benefit from this report?***

Strategic, commercial, business development and risk management functions in Energy Companies. A

Major gas buyers, EPC companies and International Banking and Financial Institutions – Energy companies in Australia, Japan and Korea already subscribed.

**The report will be available first /second week of November 2012.**

***We invite you to consider subscribing to our management report. Details below:  
For further information, please get in touch.***

**THANK YOU**

For further questions please contact:

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