



GREAT EASTERN ENERGY CORPORATION LTD.

17 May 2013

# Shale Gas – Cost And Technology Perspective

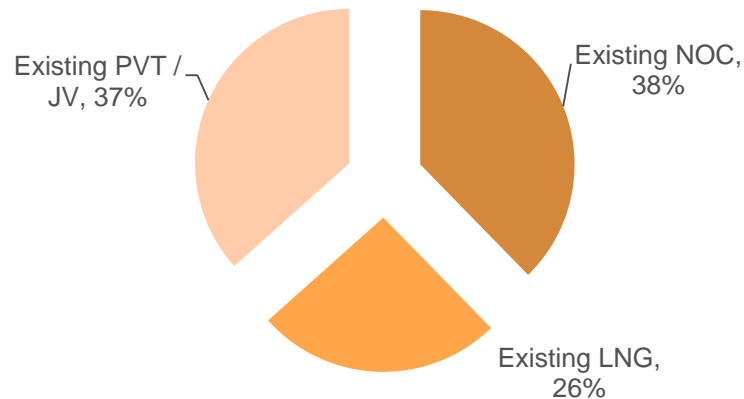


Kolkata

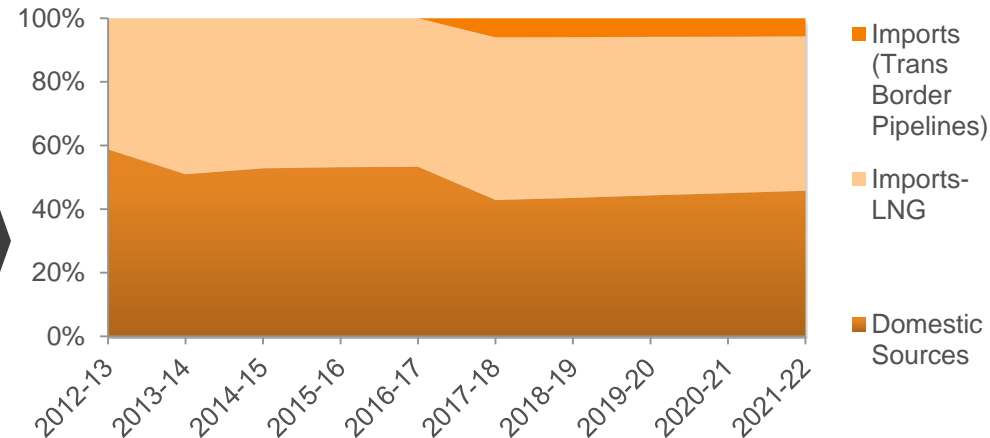
# Supply / Demand Dynamics For Indian Gas

AN ATTRACTIVE MARKET FOR YEARS TO COME

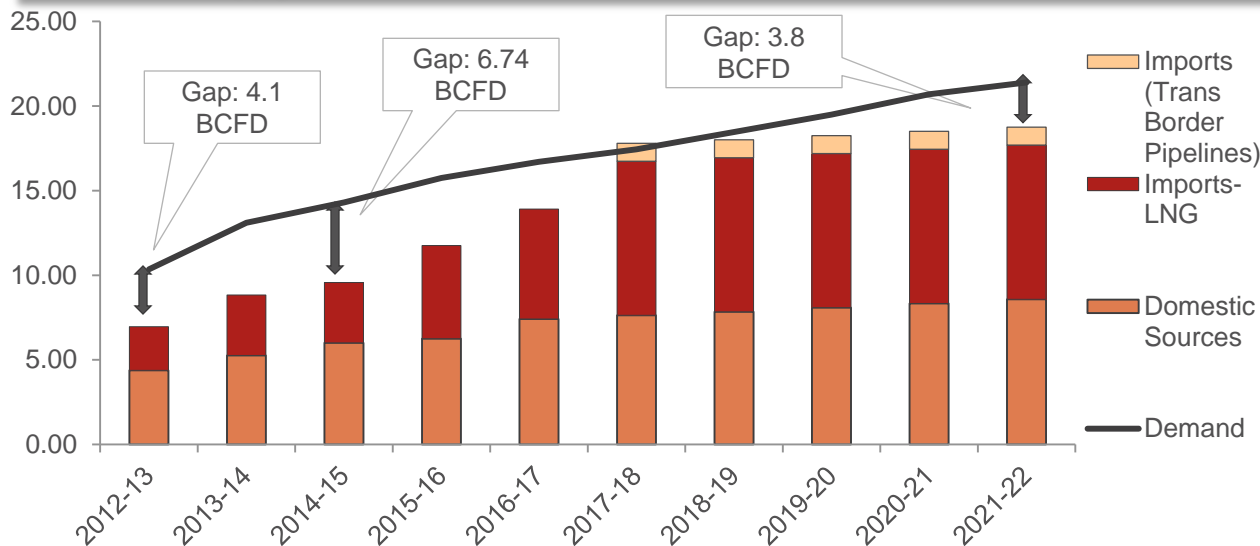
Current gas supply by source



Gas Supply Projections (BCFD)



Demand - Supply Deficit



Gas Supply- demand deficit to continue to rise

No major new domestic field with sizeable commercial production in near future

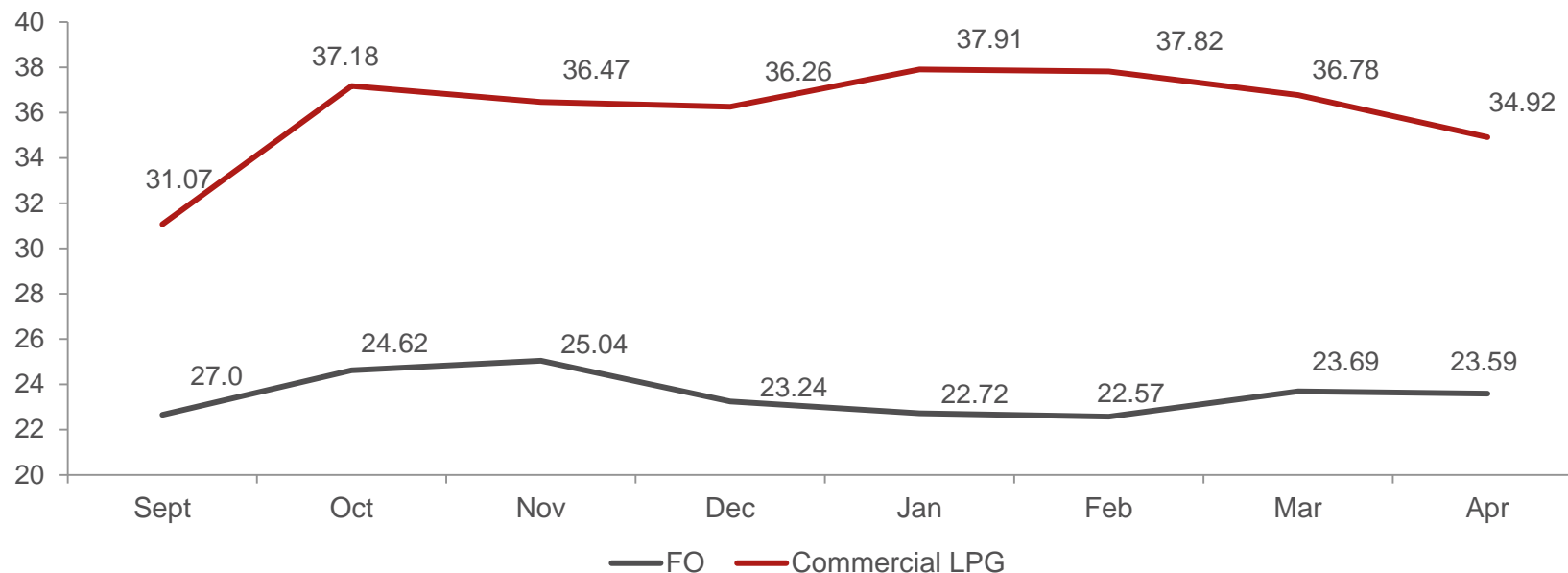
Source: MOPNG



# Pricing Environment

TRENDING UPWARDS

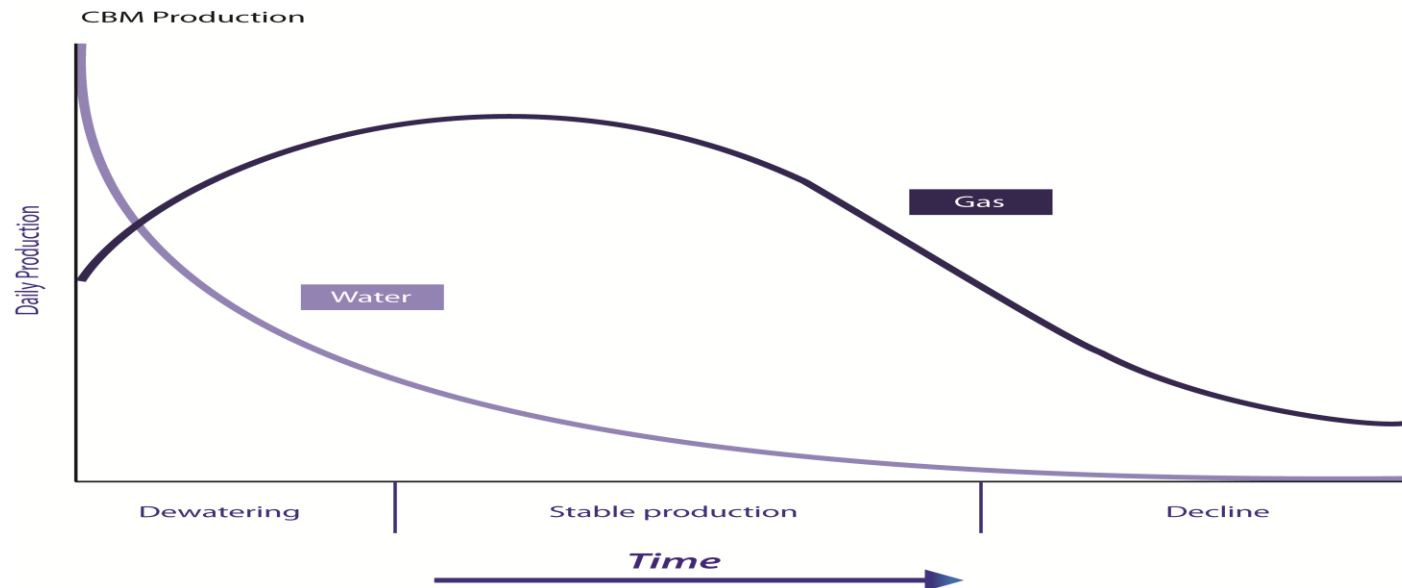
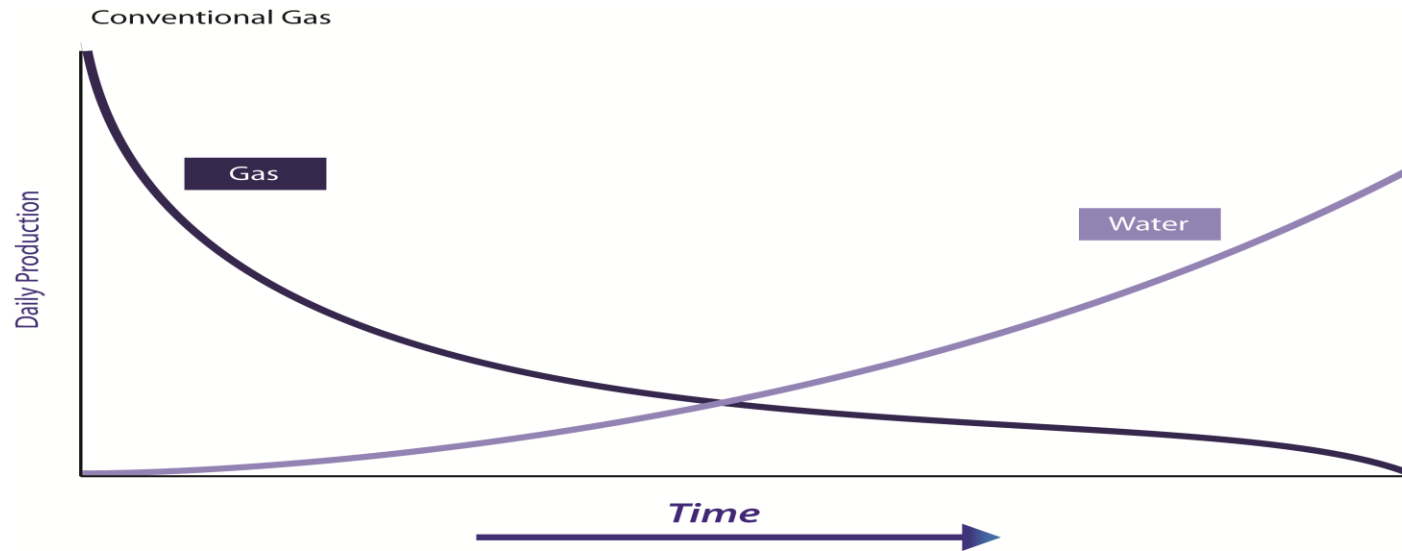
## Liquid Fuel Price (\$/MMBTU)



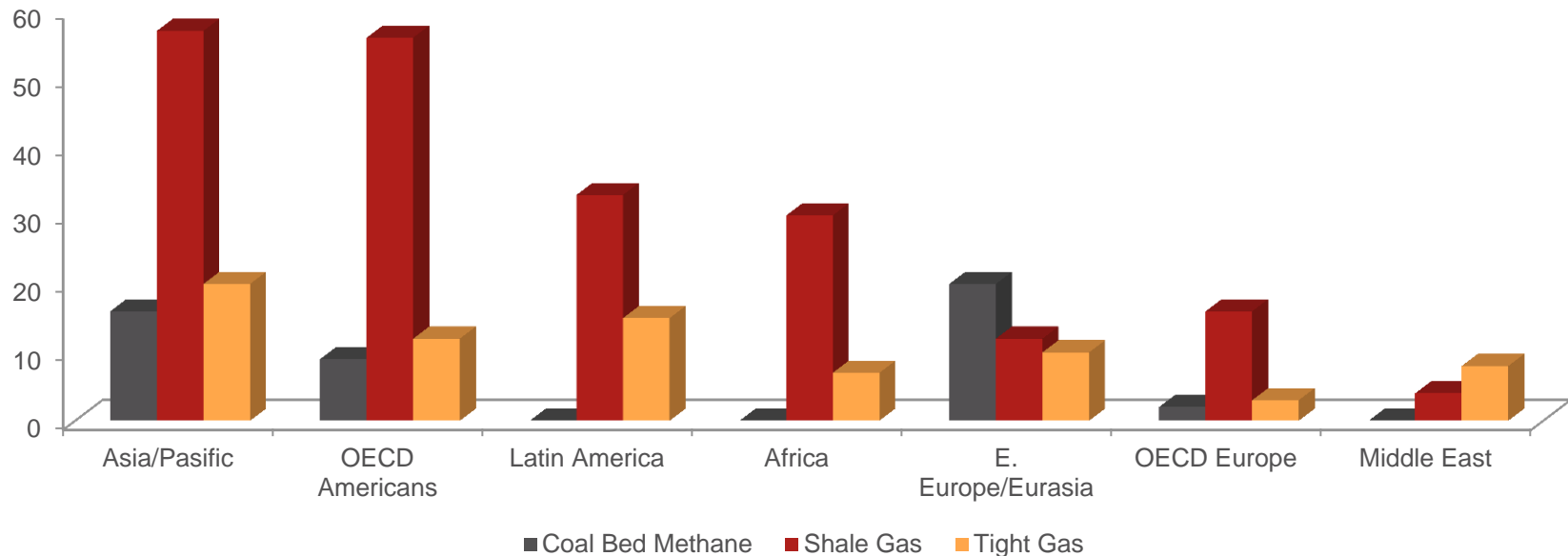
- Andhra Pradesh power producers paid up to \$30 / mmbtu for delivered LNG in March 2013
- GAIL recently imported an LNG cargo at \$18.20 / mmbtu
- Delivered price LNG will be \$13 – \$19 / mmbtu (Contracts with US, and Australia)
- India aims to double its LNG imports from Qatar to 15 million tonnes a year
- At present, the country has an LNG re-gasification capacity of 13.6 MMTPA, which is expected to increase to 50.0 MMTPA by 2016-17 as new terminals are commissioned



# Unconventional Well vs Conventional Gas Well



# Unconventional Gas Resources



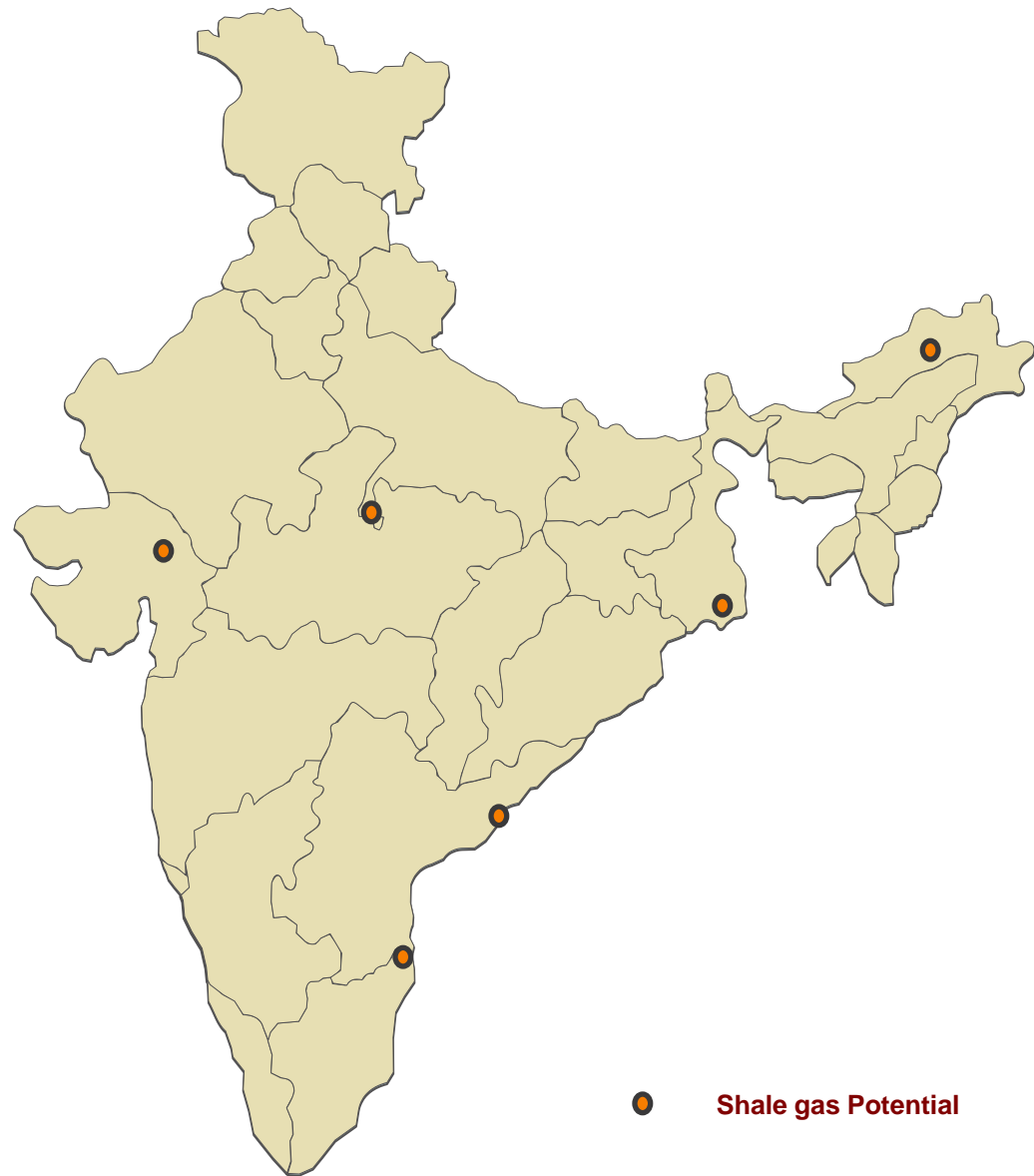
- World production of unconventional, expected to increase from around 470 bcm per year in 2010 to more than 1.6 tcm per year in 2035
- World share of unconventional gas in total gas output expected to rise from 14% in 2010 to 32% in 2035
- India would be 5<sup>th</sup> largest unconventional gas producer in 2035
- India's unconventional gas supply would be 90 bcm per year in 2035 (80% of total gas output)

Source: IEA report



# Unconventional Potential Gas in India: Shale Gas

SHALE GAS BLOCKS BIDDING EXPECTED IN END-2013



- Government of India has identified six basins for Shale Gas:
  - ✓ Cambay
  - ✓ Assam-Arakan
  - ✓ Damodar
  - ✓ KG onshore
  - ✓ Cauvery onshore
  - ✓ Indo-Gangetic basins
- India's first Shale Gas reserve found near Damodar Basin in January 2011
- As per ONGC, Shale gas reserves in Damodar are estimated at close to 50 TCF
- Schlumberger has made an initial gas-in-place estimate of 600-2100 TCF in Indian Shale gas
- Draft Shale gas policy; Royalty and PLP based

Source: DGH, GOI, Media



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# Shale Gas Development

- Scale of Reserves
  - ✓ Reserves should be significantly large to be economically viable
- Geography
  - ✓ Reservoir requires appropriate distribution of well density for better field development and ease of land access
- Drilling
  - ✓ Use of horizontal drilling techniques to maximize yield from a single location
- Fracturing
  - ✓ Requires high pressure multistage frac and perforation
- Infrastructure Cost
  - ✓ Requires main trunk pipeline to be in place prior to production



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# Economic Impact of Shale Gas

- **1 TCF can:**
  - Generate about 100 billion kilowatt hours of electricity for one year
  - Fuel 12 million CNG vehicles for one year
- **Royalty and Tax**
  - ✓ Will generate royalty and tax revenues for the state
  - ✓ Generate indirect revenue from various additional economic activity and output
- **Attract more investment and create more Job opportunities**
- **Clean fuel to the Industry (replace existing polluting fuels)**
- **Local economy advances**





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# Challenges in Unconventional Gas

- Land Acquisition
  - ✓ Land is a sensitive subject all over the world for the Government
  - ✓ Best course is for private sector to directly negotiate with land owners
- Technology
  - ✓ Scarcity of service providers for Shale operations in Asia
- Infrastructure
  - ✓ Pipeline network should be in place before gas production starts
  - ✓ Limited City Gas Distribution network



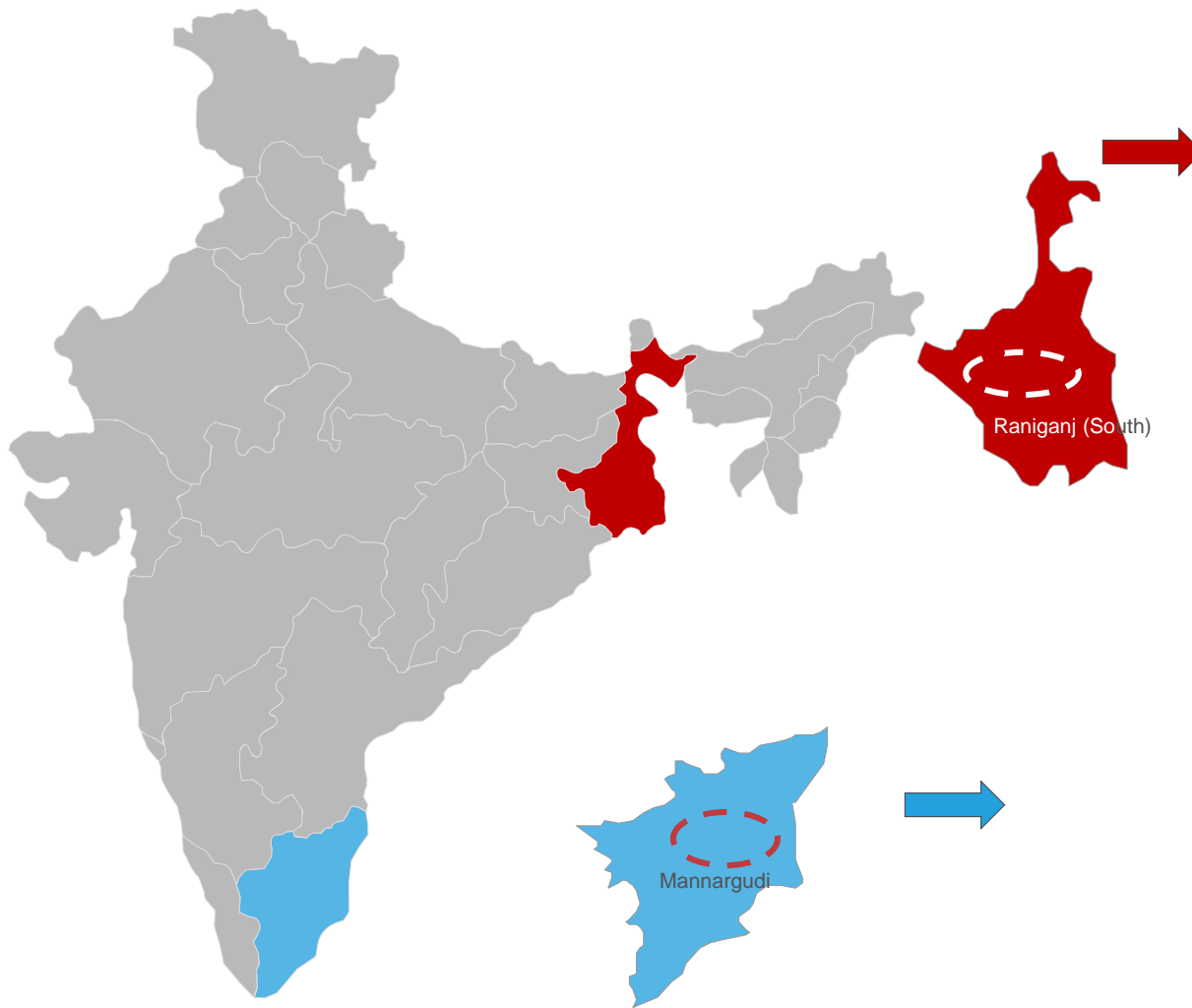
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## Way Ahead for Unconventional Gas Industry

- Investor friendly regulatory environment
- **“Arms Length Free Market Pricing”** as announced at time of bidding should be strictly maintained
- No reservation / allocation to any sectors / consumers as that is against the basic principle of Free market
- All clearances should be in place at the time of signing of the PSC / Contracts



# Our Coal Bed Methane (CBM) Blocks



## Raniganj (South) block

- License area 210 Sq KM
- Estimated Gas in Place 2.40 TCF
- Situated in West Bengal's industrial belt
- Area is a hub various SME's

## Mannargudi block

- License area 667 Sq KM
- 0.98 TCF Gas in Place as per DGH
- Existing Pipeline Infrastructure



# Great Eastern Energy Corporation Ltd.

FIRST COMPANY IN INDIA TO START COMMERCIAL PRODUCTION OF CBM IN 2007

## Overview

- Two CBM Blocks in India; One at Raniganj (South) in West Bengal and other at Mannargudi in Tamil Nadu
- Listed on the Main board of the London Stock Exchange (LSE)

## Upstream

- Raniganj (South) Block, West Bengal
  - 2.40 TCF of Gas in Place
  - 144 wells drilled; 127 fraced; 45 deviated wells successfully drilled
  - Production 14.73 mmscfd as on 31 Dec 2012
  - 156 wells to be drilled; Total 300 wells
- Mannargudi Block, Tamil Nadu
  - Approvals are expected to be in place the near future; Work expected to commence soon thereafter

## Midstream

- Gas Gathering capacity increased from 15 mmscfd to 31.95 mmscfd, a 113% increase

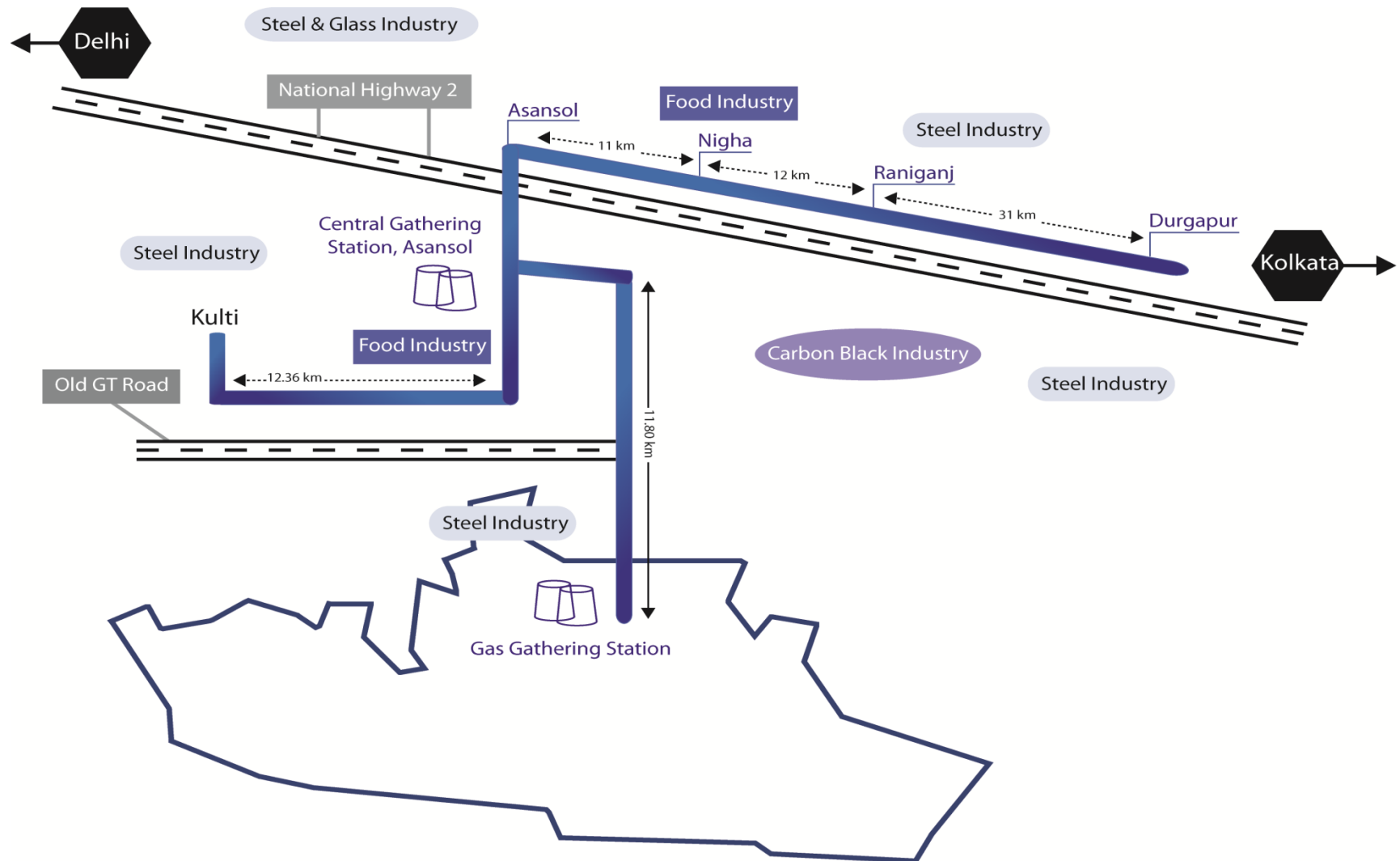
## Downstream

- CNG supply agreement with Indian Oil and Bharat Petroleum



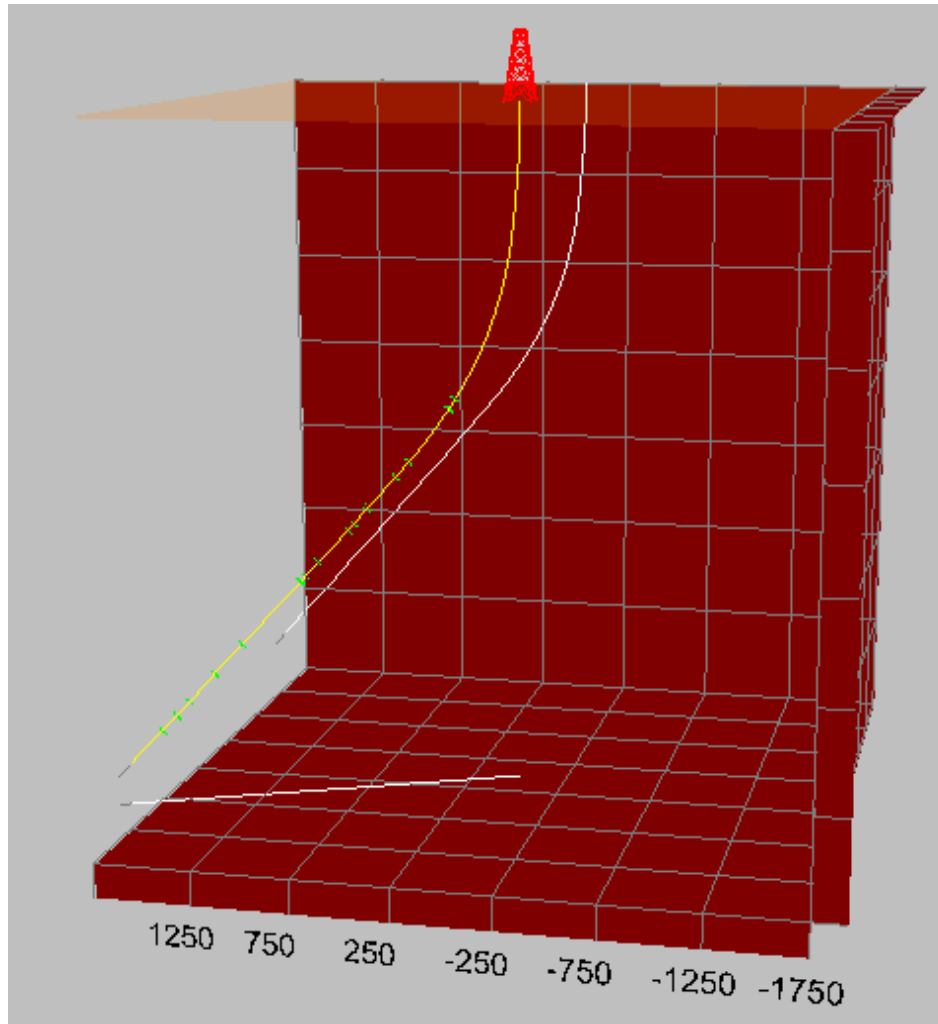
# Developing Customer Relationships – Raniganj (South) Block

## CONTINUING TO LEVERAGE OUR DEDICATED INFRASTRUCTURE ADVANTAGE



# Raniganj (South) : Deviated Drilling

45 DEVIATED WELLS HAVE BEEN SUCCESSFULLY DRILLED



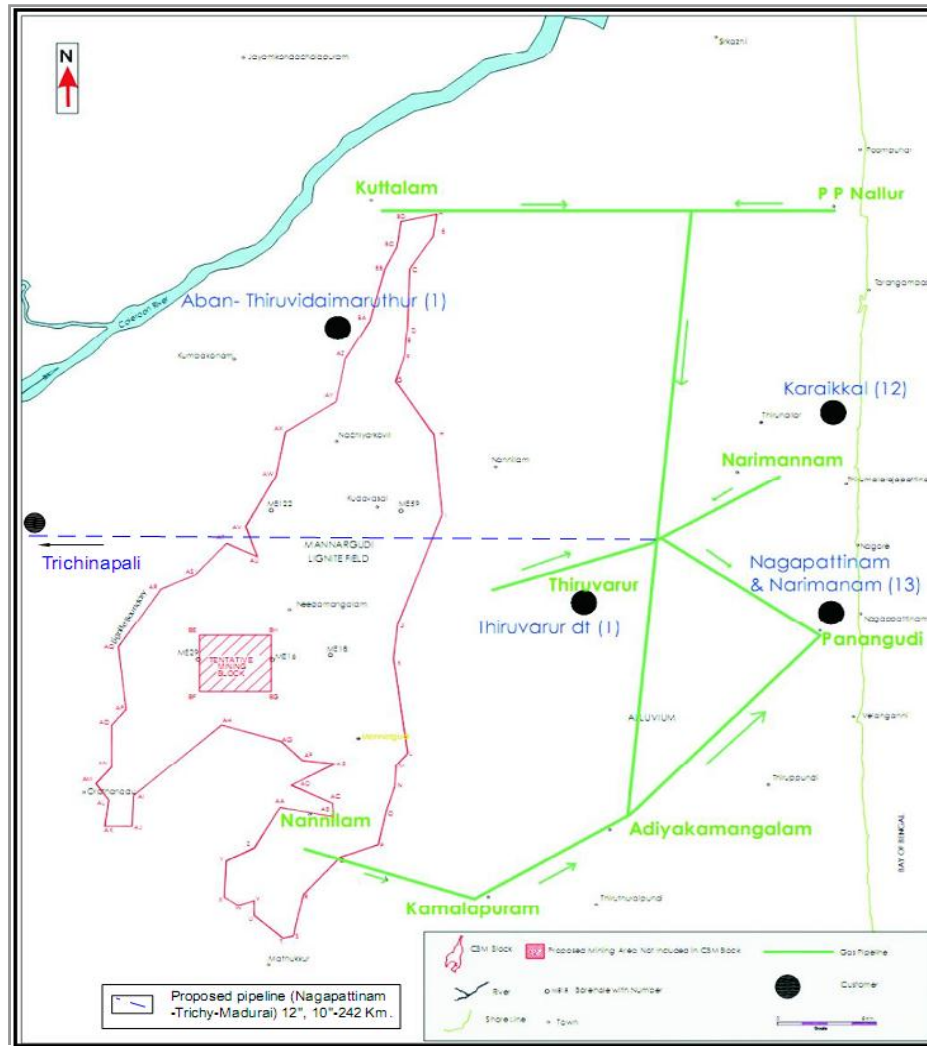
## Accelerated Production At Lower Cost

- Multiple wells from the same geographic location
- Inter-location movement is not needed between wells
  - Equipment rig up/down in a few hours, not a few days
  - Results in faster completion and saving in costs
- Reduces internal pipeline infrastructure connecting the wells to the Gas Gathering Station
- Reduced on-site infrastructure facilities otherwise required for each well separately



# Mannargudi Block

NEXT BUILDING BLOCK OF LONG-TERM GROWTH



## Attractive Asset With Strong Potential

- 667 square kilometres
- 0.98 TCF gas in place as per DGH
- Single seam of upto 80 m
- High permeability expected
- Geological characteristics expected to be similar to Powder River Basin in US
- Existing Pipeline infrastructure
- IOCL intends to lay a new pipeline

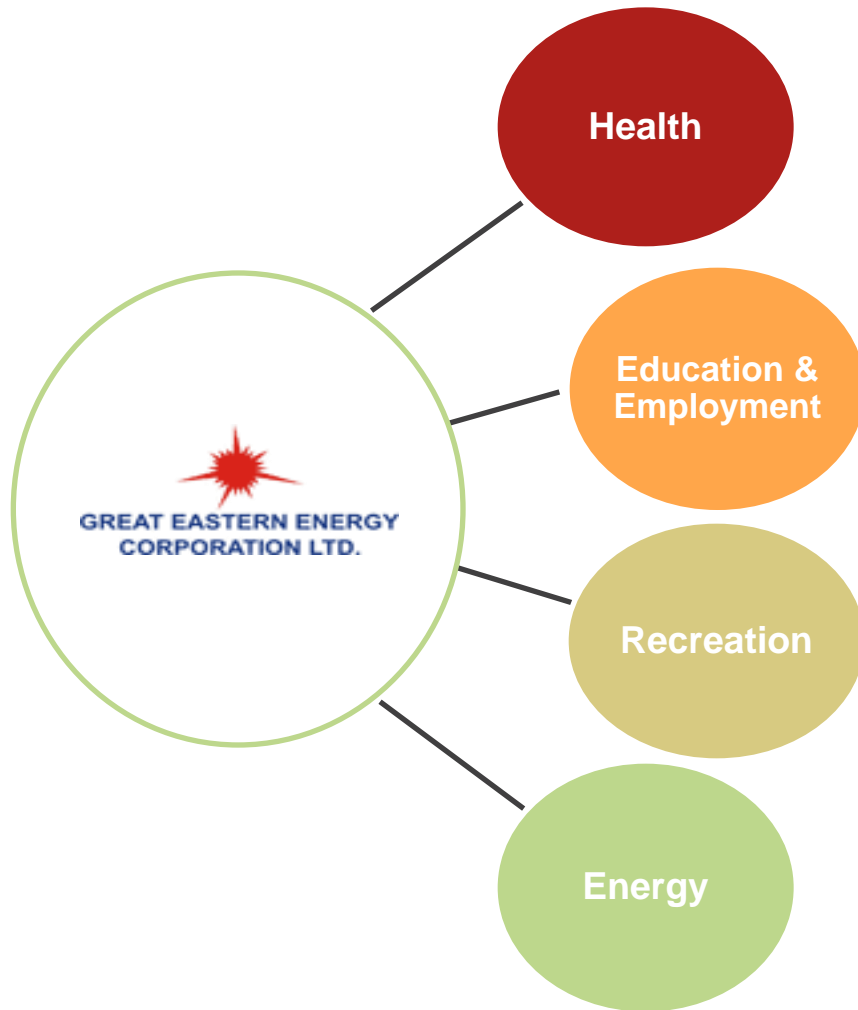
## Progress

- Petroleum Exploration Licence (PEL) executed
- Approvals are expected soon
- Environmental clearance received; Consent to Establish in progress
- 50 core holes and 30 pilot production wells within 5 years of executing PEL



# A Responsible Partner To Our Local Communities

WE REMAIN COMMITTED TO CORPORATE SOCIAL RESPONSIBILITY



- Medical Camps
- Blood donation Camps
- Health Awareness Program

- Built Study centre & distribution of books
- Arrange evening classes for senior citizens in remote areas
- Training / skills development for local community
- Provide sponsorship to students

- Sponsorship of state level swimming competition, football, cricket, kabbadi tournaments
- Organized and sponsored Rock climbing training course & Marathon race “Asansol Marathon-2012”
- Blanket distribution to poor tribal

- Access to sustainable sources of clean, reliable and affordable energy in coal dependent region
- Mitigation of climate changes





# A Responsible Partner To Our Local Communities

ECONOMIC TIMES AWARD FOR CORPORATE SOCIAL RESPONSIBILITY





# A Responsible Partner To Our Local Communities

## IMPROVING WELL-BEING WHERE WE OPERATE





