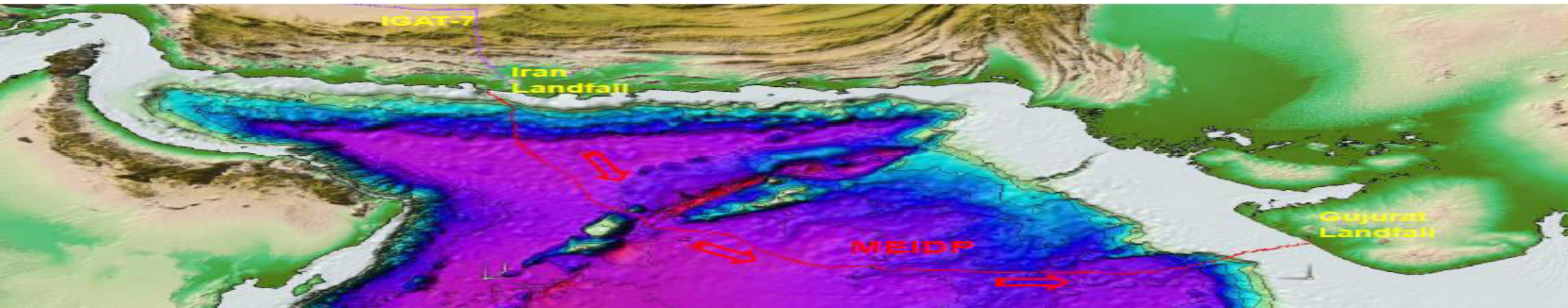


## ANNUAL CONFERENCE ON GUJARAT - A GAS BASED ECONOMY



**INDIA'S ENERGY SECURITY AND ROLE OF TRANSNATIONAL NATURAL GAS  
PIPELINES**

**[MIDDLE EAST TO INDIA DEEPWATER PIPELINE (MEIDP)]**

**SAGE**  
Middle East to India  
Deepwater Gas Pipeline

**Mr. Raj Kishore,  
Deputy General Manager (Pipelines)**

**29<sup>th</sup> Mar, 2018**

## A. BACKGROUND

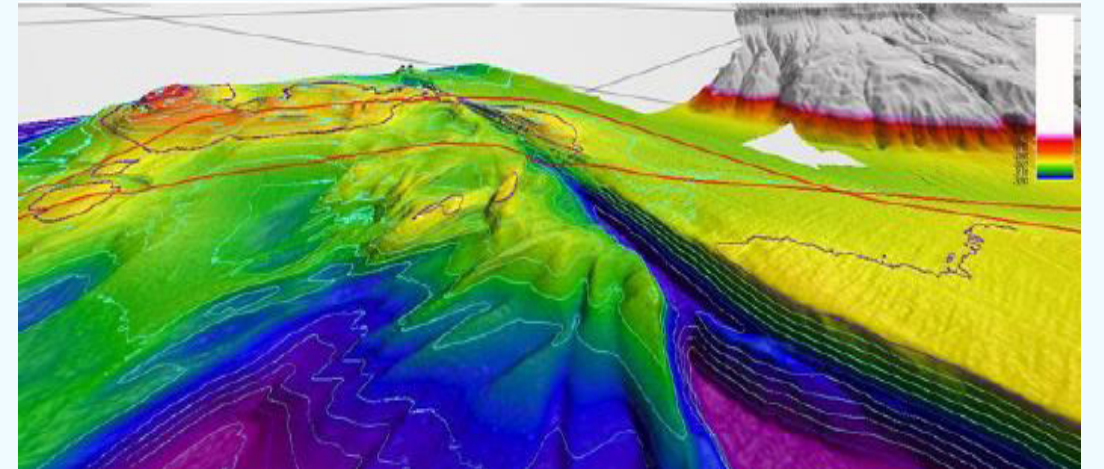
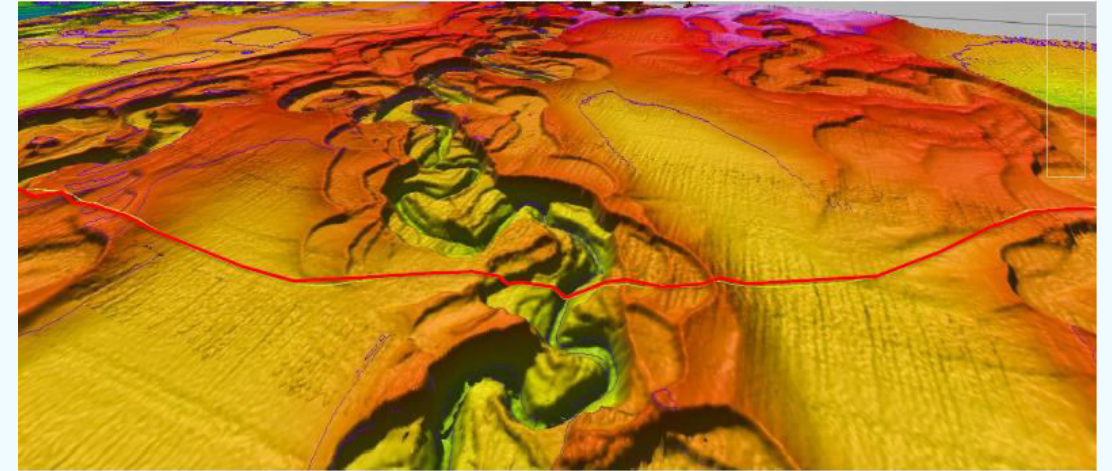
- DEMAND SUPPLY GAP
- GUJARAT ENERGY MIX
- GAS PIPELINE NETWORK

## B. ROLE OF TRANSNATIONAL PIPELINES

## C. MEIDP- PROJECT OVERVIEW

- SAGE PROJECT VISION
- WORKING IN PARTNERSHIP
- MEIDP PROJECT FEATURES
- MEIDP ROUTE TO INDIA
- ALTERNATE ROUTE TO INDIA (VIA OMAN)
- PIPE MILL CAPABILITY
- CAPABLE PIPE LAY VESSELS
- TECHNOLOGICAL FEASIBILITY

## D. SUMMARY & CONCLUSION



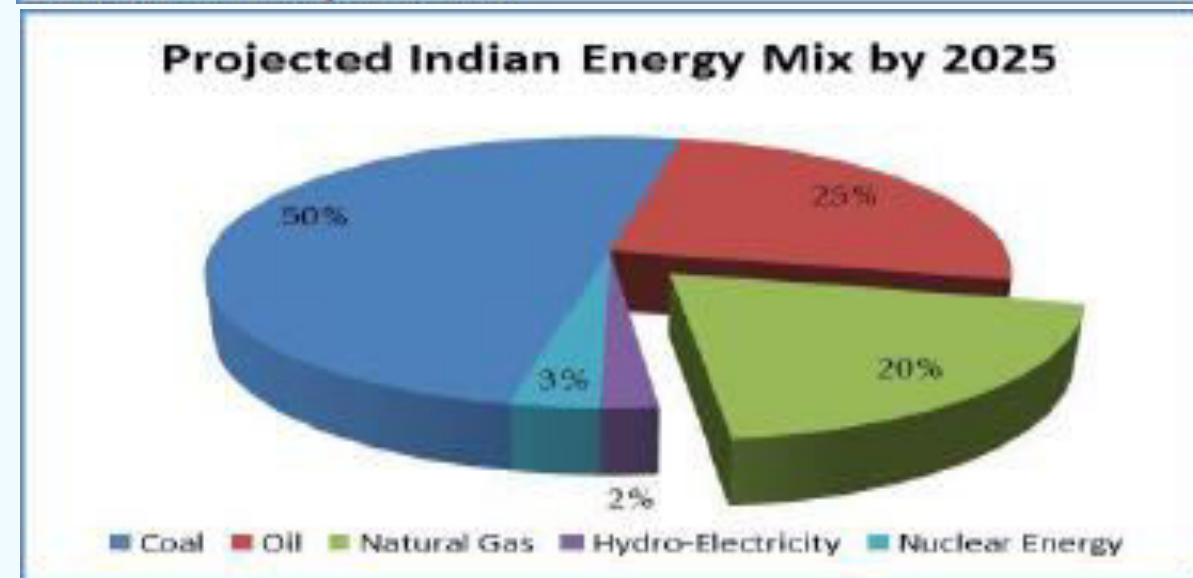
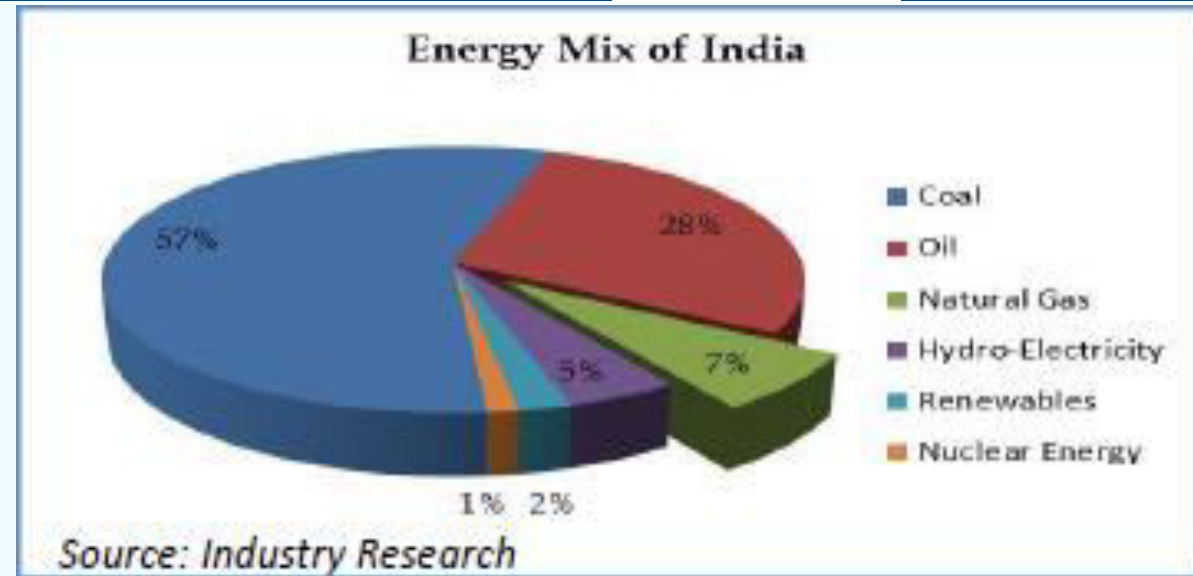
# GUJARAT STATE



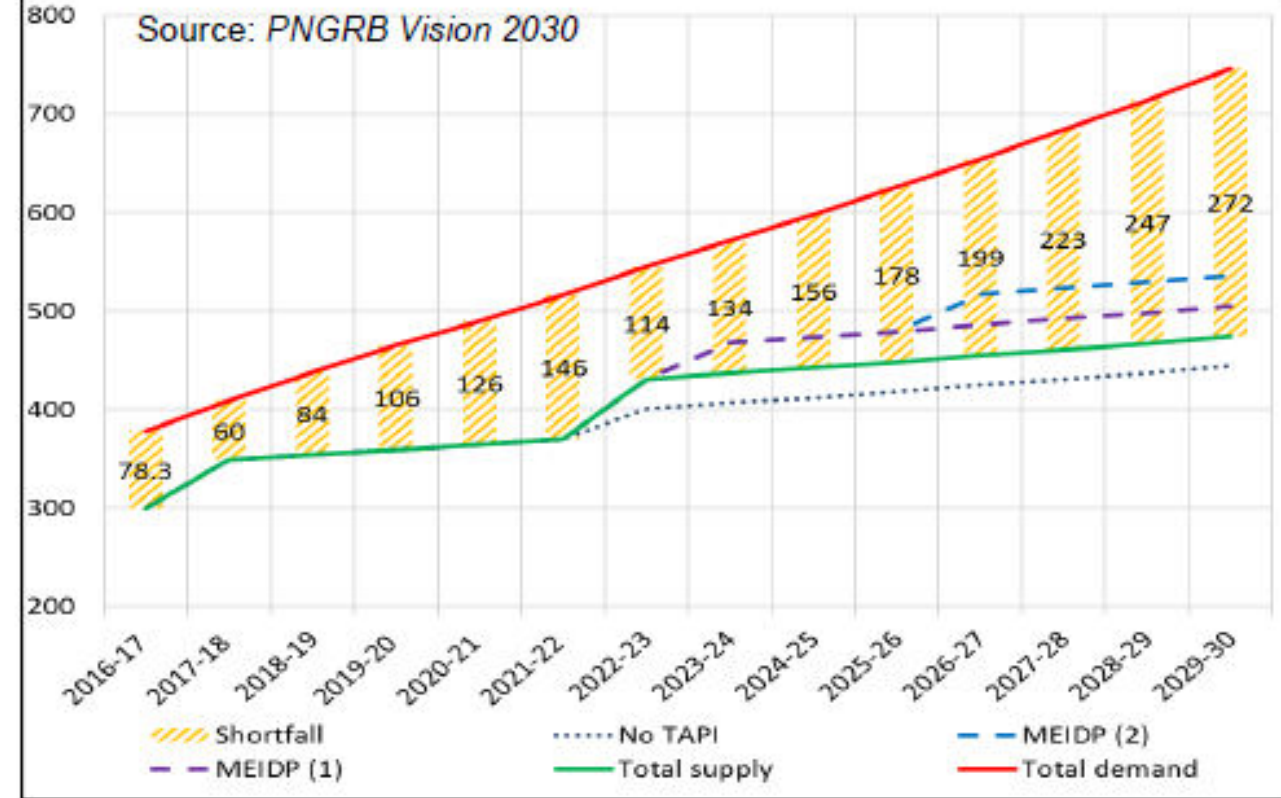
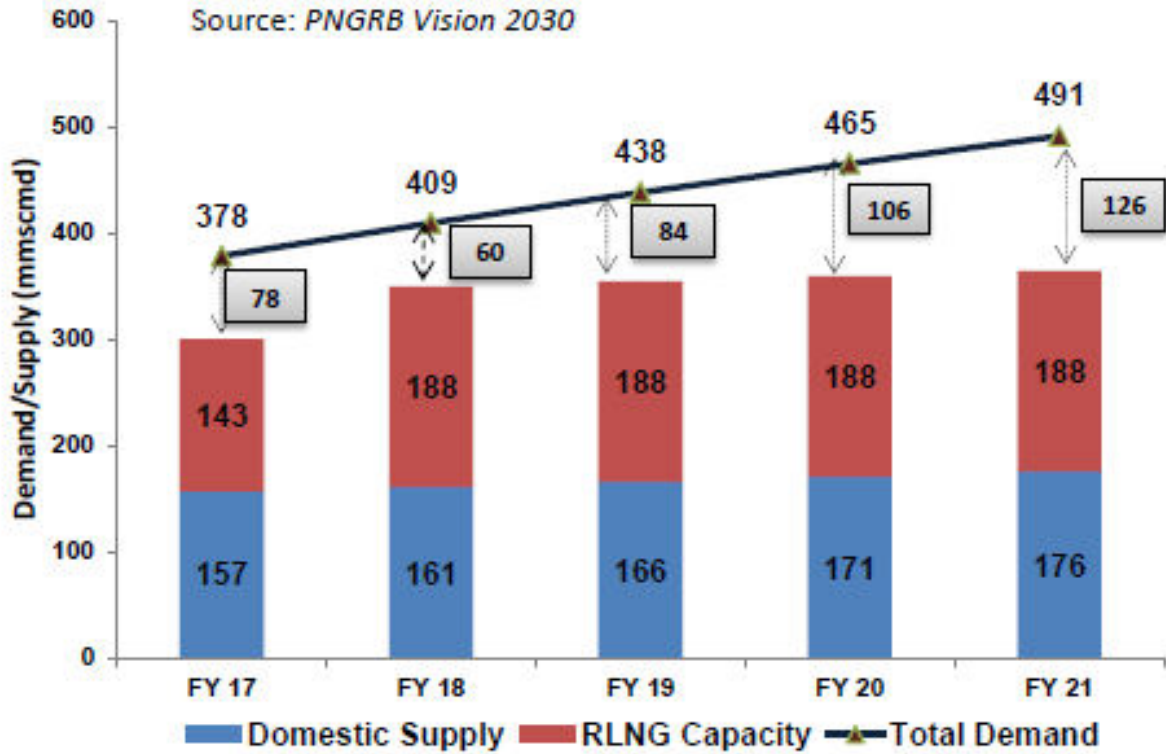
- Currently India is the **4<sup>th</sup> largest energy consumer** in the world. (Natural Gas constitutes only 7% as compared to 22% w.r.t. global scenario)
- Major chunk of energy comes from fossil fuels, **primarily from coal (57%)**.
- Energy demand to grow with GDP; Indian economy projected **growth rate is 7.4% for 2018 (IMF)**
- **Natural Gas expected to constitute 20%** of India's energy basket by 2025 PNGRB Vision-2030.

However, India has **limited sources** of gas supply:

1. **Domestic Source:** NOC's, Private Fields, CBM; Declining/ lower than expected production.
2. **R-LNG:** Limited Capacity & affordability



# DEMAND SUPPLY GAP-REALISTIC DEMAND



- According to MoPNG, the **total realistic demand for natural gas** is expected to increase at a **CAGR of 6.5%** to around **491 mmscmd by 2020-21**.
- Gap between demand and supply of domestic natural gas is expected to widen.
- Shortfall of gas supply can be met by a mix of sources viz. **LNG/RLNG**, **Transnational Gas Pipelines** subject to affordability.

# GUJARAT ENERGY MIX

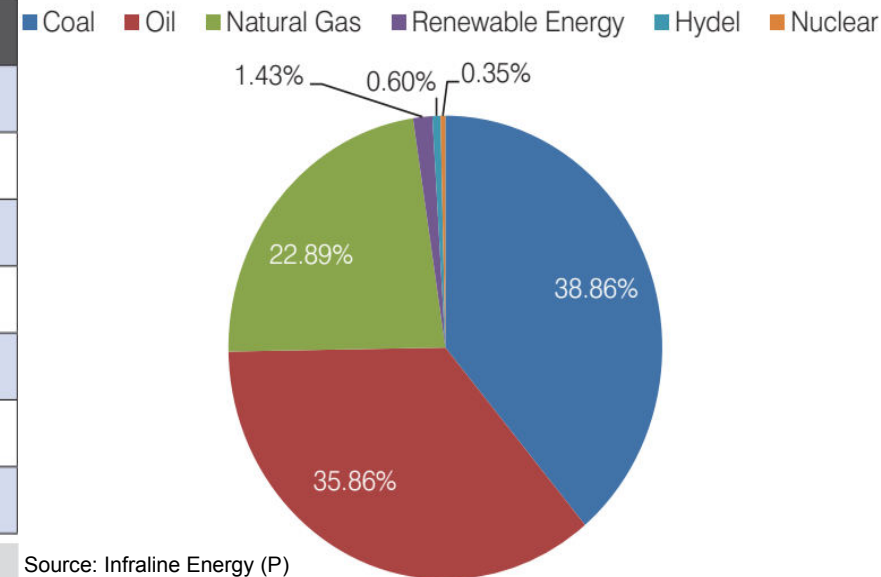


- Demand of Natural gas in Gujarat during 2016-17 was 68 mmscmd. GIDB's projected NG requirement is 146 mmscmd by 2020
- Gujarat having two LNG import facilities i.e. **Hazira (Shell-Total)** and **Dahej (PLL)**
- Gujarat is having gas **pipeline network of more than 2870 km**.  
[Capacity of GSPL network is 43 mmscmd]

## Sector wise natural gas consumption in Gujarat

Sector	Gas consumption in MMSCMD			
	2013-14	2014-15	2015-16	2016-17
Power	3.44	3.78	6.46	5.08
Fertilizer	7.83	8.51	9.5	8.19
CGD	7.95	8.37	10.1	12.4
Refineries	4.15	4.3	4.98	5.6
Sponge Iron	1.59	1.11	1.37	1.48
I/C in P/L	0.05	0.04	0.05	0.06
Total	25.01	26.11	32.46	32.81

Gujarat Energy Mix: Percentage Share (2016-17)



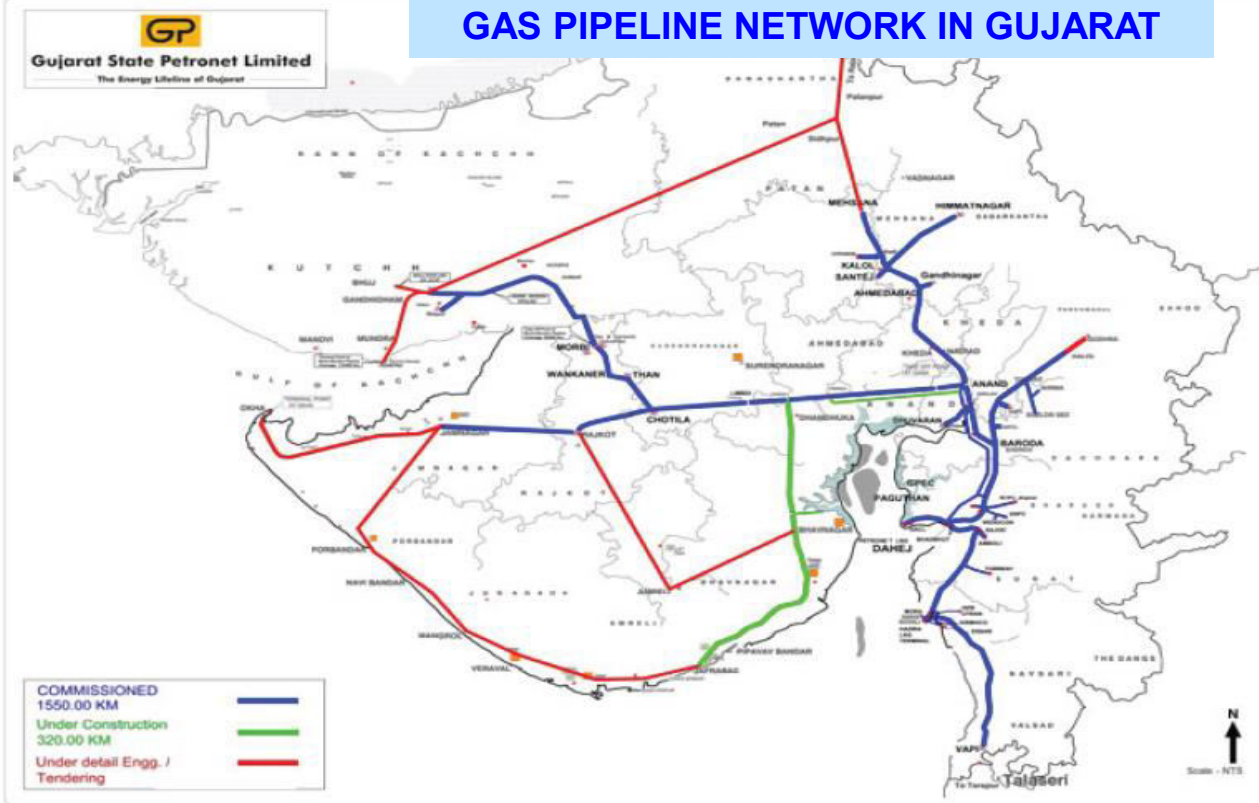
Source: Infraline Energy (P)

Source: Infraline Energy

# GAS PIPELINE NETWORK



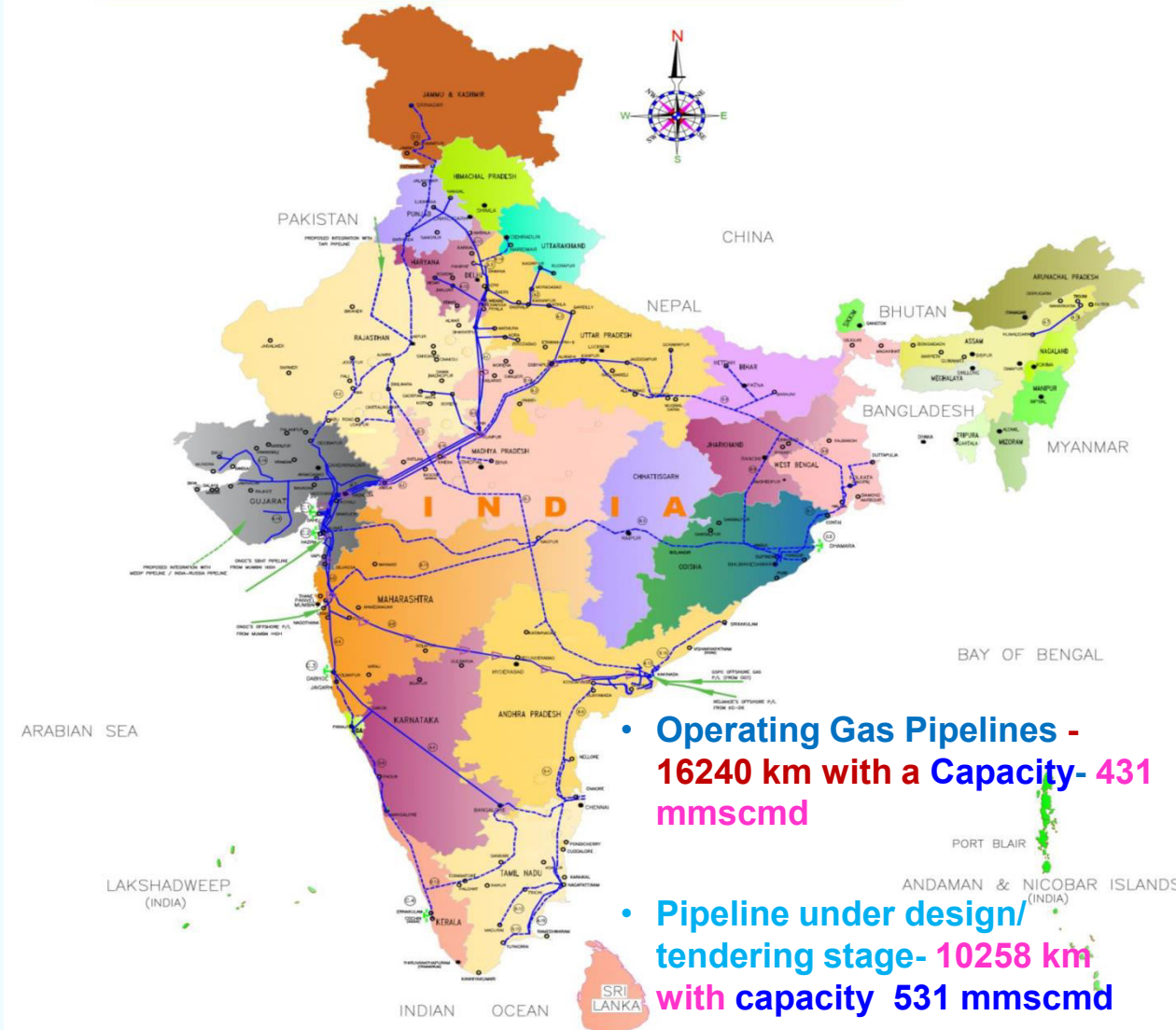
## GAS PIPELINE NETWORK IN GUJARAT



Source: GSPL

- Interstate Pipeline Network is operated by **GAIL** and **GSPL**. **GAIL- 670 km + GSPL-2190km + GGCL-2700 km.**
- **GSPL Operational network is 1550 km + 640km is under construction/ tendering stage**

## GAS PIPELINE INFRASTRUCTURE OF INDIA

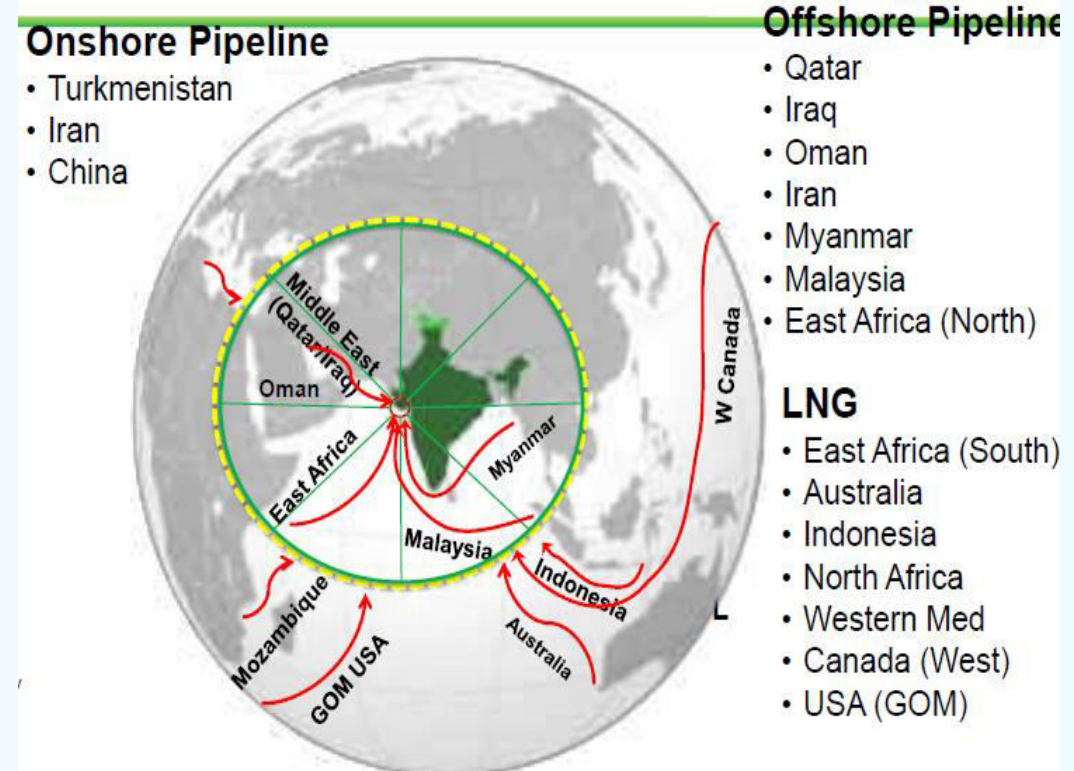


# ROLE OF TRANSNATIONAL PIPELINES



- India's gas demand expected to rise to **746 mmscmd in 2030** and total supply from all sources **474 mmscmd**, leaving a **gap of 272 mmscmd (PNGRB Vision-2030)**
- To meet the energy requirements of India; **adequate supply of Natural Gas is the only option.**
- Natural Gas is a clean fuel and it is being seen as the **fuel for 21<sup>st</sup> century.**
- Considering its proven reserves, **various developed economies such EU, USA** etc are trusting NG as fuel for sustainable growth.
- To ensure adequate availability of **domestic** as well as **imported gas**, the **transnational pipelines are the 'Need Of Hour'** for importing gas from the nearby countries.
- Transnational gas pipelines** are expected to **increase the share of natural gas from 7% to 20%** in the Indian Energy Mix by **2025.**
- It is high time for India to **realize at least one transnational natural gas pipeline** in the next few years, in order to generate confidence of the investors and **fast-track Industrial growth of the country.**

## Competitiveness of pipelines



**Economic Limit of Pipeline Gas to India is ~ 2000/ 2500 km**



# MEIDP- PROJECT OVERVIEW



## □ SAGE

- South Asia Gas Enterprise Pvt. Ltd (SAGE), a joint venture lead by the Indian Siddhomal group, is actively considering building a **Deepwater, transnational, natural gas** pipeline system from the **Middle East to India**.

## □ India needs gas

- Over **2,000 TCF** of natural gas reserves are held by countries with which India has a traditional trading relationship i.e. **Qatar, Iran and Turkmenistan**.
- Iran** having over **1000 TCF** reserves is eager to export gas and looking forward for export solutions.
- The **Deepwater route** across the Arabian Sea is the **shortest secure distance** between middle east reserves and the rapidly developing industry of India.

## □ A pipeline across the Arabian Sea

- The current work builds on the extensive study of the deepwater route of the **Oman to India Pipeline** that was carried out in the **early Nineties**.
- SAGE with expertise of M/s Peritus (UK based Project Consultant), who is having extensive Deepwater engineering experience (knowhow), have undertaken feasibility studies for this Project.

## BUILDING ON PREVIOUS EXPERIENCE

ISSUES	Oman-India	MEIDP	Comments
Availability Of Pipe Mills	Upgrade in Capability required	Capability exists for the required size and thickness.	Welspun; Jindal SAW; Tata(CORUS) steel, JFE, PCK and Europipe are capable vendors
Lay Vessel	No Ultra Deep water vessel capability	Ultra Deep water vessels with adequate capability are available.	Pioneering Spirit, Casterone, Aegir and S7000 are already available in the field. JSD 6000 is still being considered.
Deep water repair system	No qualified deepwater pipeline repair system was available	Deepwater pipeline repair systems are now available and accessed by Repair "Clubs"	Diverless Subsea pipeline repair System have been developed for Deep water application by Saipem. Saipem currently has work class ROV rated to 4000m depth.

# SAGE PROJECT VISION



- MEIDP 1 will be the first in a series of pipelines supplying gas to the Gujarat coast of India, from the vast available resources in the Middle east, by the **safest, most economic** and **reliable** means.
- Pipeline will be laid on “**Common Carrier**” basis whereby SAGE will be the Gas Transporter and will be paid a Tariff for pipeline use.
- Gas Buyers and the Gas seller will negotiate the Long Term Gas Supply Contract themselves [under the aegis of SAGE in a **Tri-partite Framework Agreement**].
- Fueling India’s “**Make In India**” plans and **Gas Based Economy** vision by this path breaking **infrastructure project** for higher economic growth.
- MEIDP will provide an **economically competitive** method of gas supply to the Western coast of India and enhances the **energy security and diversity of energy supply** for Indian subcontinent.

## PRIME MINISTER’S VISION

Government of India’s  
Initiative

“MAKE IN INDIA”

Steel Pipe = 1.0 million MT

Pipe Manufacturers

- Welspun Corp. Ltd, Gujarat
- Jindal Saw Ltd, Gujarat

# WORKING IN PARTNERSHIP



MOUs and Agreements to Co-operate in developing MEIDP have been signed with:

Pipe Mills	Installation Contractors	Suppliers & Takers	Engineering & Consultancy
<ul style="list-style-type: none"> <li>▪ <b>Welspun, Gujarat (India)</b></li> <li>▪ <b>Jindal SAW, Gujarat (India)</b></li> <li>▪ Tata Corus (UK)</li> <li>▪ PCK (China)</li> <li>▪ JFE (Japan)</li> <li>▪ Europipe (Germany)</li> <li>▪ Bao Steel (China)</li> </ul>	<ul style="list-style-type: none"> <li>▪ Allseas, Switzerland</li> <li>▪ Saipem SpA, Italy</li> <li>▪ HMC, Netherlands</li> </ul>	<ul style="list-style-type: none"> <li>▪ NIGEC (Iran)</li> <li>▪ IOCL</li> <li>▪ GAIL</li> <li>▪ GSPC</li> <li>▪ Oman Ministry of Oil &amp; Gas</li> </ul>	<ul style="list-style-type: none"> <li>▪ Peritus International Ltd. (UK)</li> <li>▪ Engineers India Ltd.</li> <li>▪ Intecsea</li> <li>▪ FUGRO</li> <li>▪ SBI Caps</li> <li>▪ Ernst &amp; Young (EY)</li> </ul>
	<b>Certification Bodies</b>		
	<ul style="list-style-type: none"> <li>▪ DNV-GL, Norway</li> </ul>		

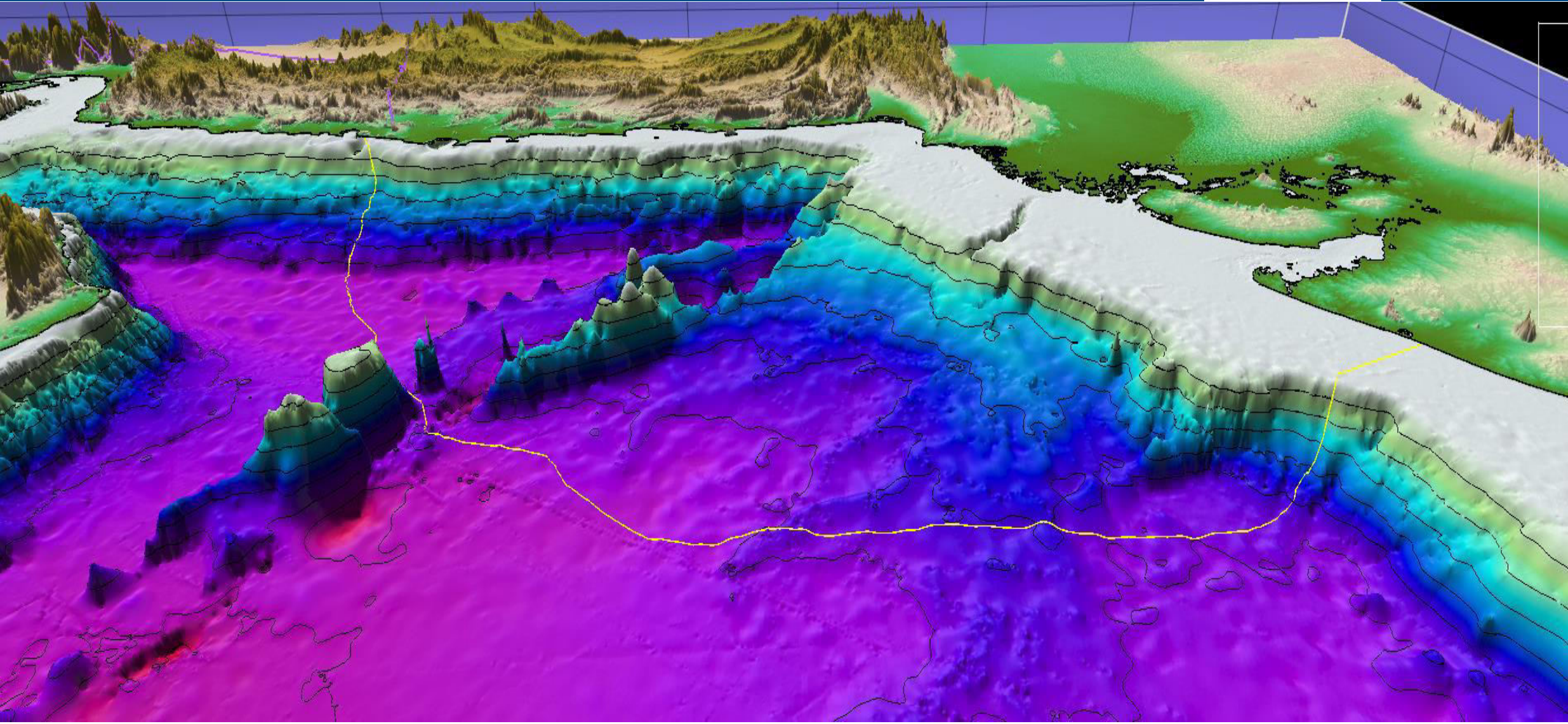
# MEIDP PROJECT FEATURES



- Potential Start Point : Chabahar, Iran
- End Point : Near Porbandar (Gujarat), India
- Pipe ID/OD & Thk : 24"/27.2" & (32.9 mm to 40.5 mm)
- Pipe Manufacturing Process : UOE/JCOE
- External Pipe Coating : Three Layer Polypropylene (3LPP)
- Design Pressure & Flow Rate : 400 bar (g) & 1.0 BSCFD (31.1 MMSCMD)
- Maximum Water Depth : 3450 meters
- Offshore Length : 1300 kilometers
- Total Steel Tonnage : 1.0 million MT (Approx.)
- Total Project Duration : 5 year (Fast Track)  
(including 2 years construction)
- Project cost (approx.) : 5.0 billion USD

# MEIDP ROUTE TO INDIA

**SAGE**  
Middle East to India  
Deepwater Gas Pipeline



# ALTERNATE ROUTE TO INDIA (Via Oman)



## Pipe Mills capable of making MEIDP Line pipe

S. No.	Pipe Manufacturer	Manufacturing Process
1.	Welspun, Gujarat (India)	JCOE
2.	Jindal SAW, Gujarat (India)	JCOE
3.	PCK (China)	JCOE
4.	JFE (Japan)	JUOE (Neo Press)
5.	Europipe (Germany)	UOE
6.	Tata Corus (UK)	UOE
7.	Bao Steel (China)	UOE (Under Review)



# MEIDP - CAPABLE PIPELAY VESSELS





# MEIDP-TECHNOLOGICAL FEASIBILITY



- **State of Art technology** is available for the implementation of Deepwater Pipeline Projects.
- **Several pipe mills** can manufacture the **pipes** to meet MEIDP requirements, **particularly in India**.
- New generation, pipe **laying vessels are available** & **can lay the pipeline @ 3500 m Water Depth**.
- Better **positioning capabilities are now available** during pipe laying to avoid seabed hazards.
- New **Testing and commissioning philosophies** developed by SAGE with DNV-GL for MEIDP.
- Deepwater **pipeline repair system** are now available.
- DNV-GL has also studied the project in detail and issued a **Statement of Feasibility** of the Middle East to India Deepwater pipeline (**MEIDP**) Project

DNV-GL

## STATEMENT OF FEASIBILITY

Statement No.: 2017-0553

This is to state that

### Middle East to India Deepwater Pipeline

has been evaluated in accordance with DNVGL-RP-A203 /1/ as reported in DNV GL Technical Report 2017-0553 /3/. DNV GL considers the technology required to successfully execute the project to be feasible as defined in DNVGL-SE-0160 /2/ and thereby the project is suitable for further development and qualification.

Owner: South Asia Gas Enterprise PVT. LTD.

Description: Deepwater Pipeline from Middle East to India

Involvement: DNV GL has been involved in the qualification process as required in /2/ and has facilitated and documented the technology qualification process as described in /3/.

Limitations: The statement of feasibility is limited to this projects and its qualification basis.

Reference documents: /1/ DNVGL-RP-A203, Technology Qualification, June 2017

/2/ DNVGL-SE-0160, Technology qualification management and verification, 2015

/3/ DNV GL Report no. 2017-0553, Technology Qualification of Middle East to India Deepwater Pipeline

The qualification process is in progress and new sources of uncertainty might be discovered as qualification progresses. Attention is drawn to the iterative nature of the technology qualification process /2/.

Issued at Høvik on 2017-09-11

for DNV GL AS

Olav Aamlid  
Senior Principal Specialist

Olav Fyrileiv  
Technology Leader

# SUMMARY & CONCLUSION



- **MEIDP can bridge the gap in gas shortfall.**
- Provides an **economically competitive** method of gas supply to the Western coast of India and it will complement to LNG.
- **Exclusive benefit to Gujarat's** industry through MEIDP as **first gas landing in Porbandar.** (Power / fertilizer plants, CGD etc)
- Long Term contracts and **surety of supply**, will facilitate **new projects in India** which utilise the Gas (eg., **Power / Fertilizer Plants**).
- Project will **contribute significantly** towards the implementation of **sustainable developmental strategies** of an **integrated energy plan** for the Indian Subcontinent.

## COST COMPETITIVENESS- MEIDP vs RLNG

### RLNG and Transnational Gas Pipelines

- Transnational Gas Pipelines aid in development of a permanent International Gas Transport Corridor
  - Tariff based on Target Return on Project works to **~USD 1.97/mmbtu**
- Additional Cost Component attributable to Imported LNG include:
  - Liquefaction, Regasification & Transportation of gas: **~ USD 4-4.50/mmbtu**

(USD/mmbtu)

MEIDP Pipeline Tariff		Contracted LNG	
Particulars	Pipeline Tariff	Particulars	Contracted Tariff
Price of Natural Gas	2.00-2.50	Price of Natural Gas*	2.00-2.50
Pipeline Tariff^	1.97	Liquefaction Charges	2.50
		Transportation Charges	0.75
Ex-Port Price	3.97-4.47	Regasification Charges	0.80
Custom Duty	0.21	Custom Duty	0.30
Landfall Price	4.18-4.68	Landfall Price	6.35-6.85

**Natural Gas through MEIDP Pipeline is expected to be cheaper by USD 2-2.25/mmbtu viz. R-LNG**

\* Based on the Price given by Iranian Companies & on assumption that Contracted LNG price & MEIDP inlet price are same

^Final Pipeline Tariff will vary based on the route, sharing of cost b/w Oman & India, Tariff Methodology and Project Return

# GUJARAT - FACTS



**Economic Growth:**  
GDP expanded at a CAGR of 17.9% from 2004 to 2013 vis-à-vis 15.6% of other states.

**Gas Based economy:**  
➤ Gujarat accounts for ~8% of the total energy consumption of India.  
➤ Gas consumption in 2016-17 was 32.81 MMSCMD, 25% of total consumption in India.

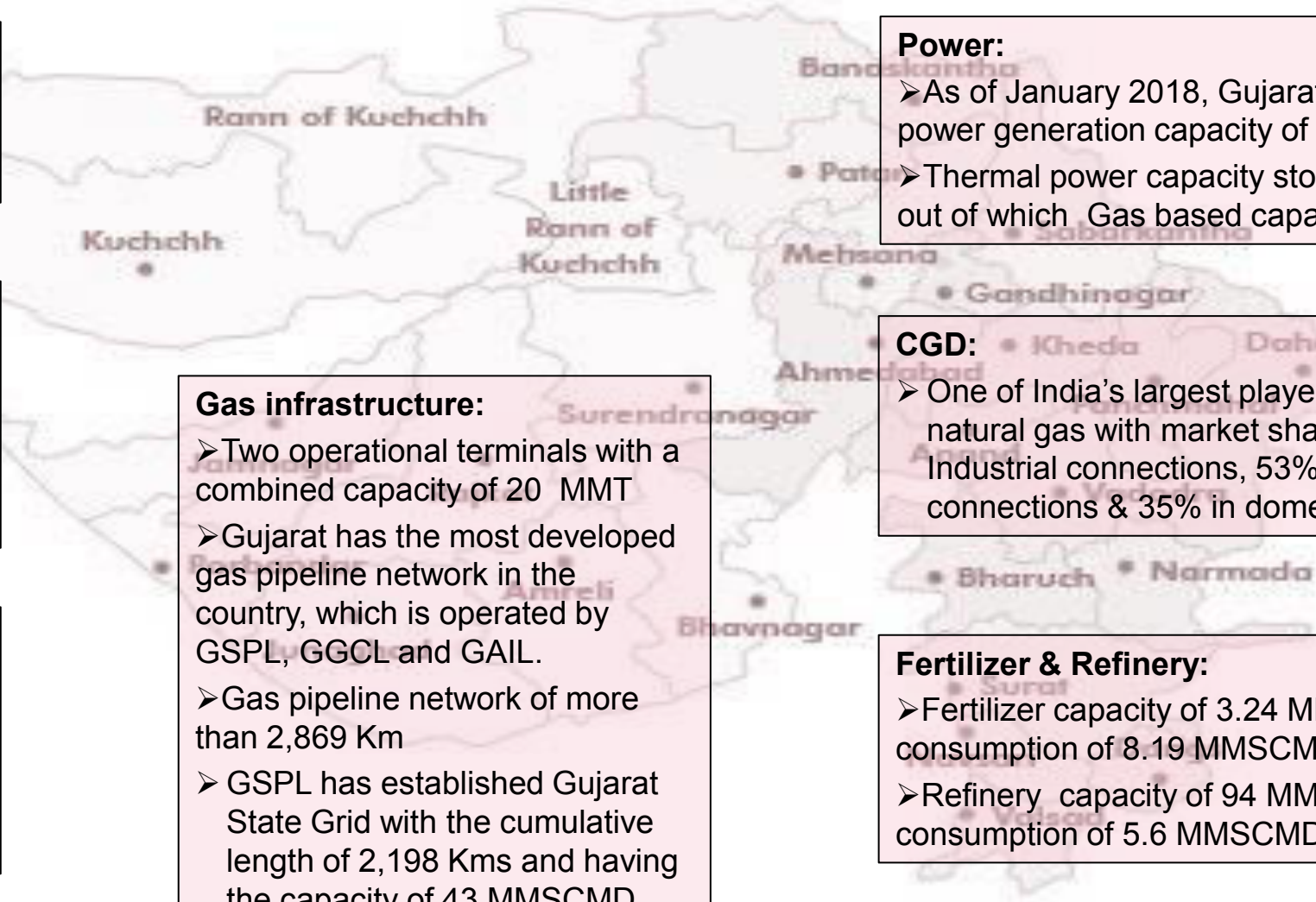
**Physical Infrastructure-Ports:**  
➤ Gujarat has 42 ports with 1600 km coastline  
➤ Offer transportation facilities of Natural Gas, Crude & Petro products

**Gas infrastructure:**  
➤ Two operational terminals with a combined capacity of 20 MMT  
➤ Gujarat has the most developed gas pipeline network in the country, which is operated by GSPL, GGCL and GAIL.  
➤ Gas pipeline network of more than 2,869 Km  
➤ GSPL has established Gujarat State Grid with the cumulative length of 2,198 Kms and having the capacity of 43 MMSCMD

**Power:**  
➤ As of January 2018, Gujarat had an installed power generation capacity of 30,394.29 MW  
➤ Thermal power capacity stood at 22,089 MW, out of which Gas based capacity is 4910 MW

**CGD:**  
➤ One of India's largest players in distribution of natural gas with market share of 47% in Industrial connections, 53% in commercial connections & 35% in domestic connections

**Fertilizer & Refinery:**  
➤ Fertilizer capacity of 3.24 MMTPA with a gas consumption of 8.19 MMSCMD.  
➤ Refinery capacity of 94 MMTPA with a gas consumption of 5.6 MMSCMD.



# MEIDP Project – Promote Economic Development in Gujarat



- Project will support the growing demand of gas in the State with the provision of long term & affordable solution to India's increasing gas demand
- The existing infrastructure of gas can be utilised for transportation of Gas both for interstate & intrastate gas transmission of MEIDP Gas
- Most of the Gas based power plants in Gujarat are operating at a low PLF,
  - ✓ MEIDP Gas will provide affordable gas to these Power plants with gas requirement of ~ 30 MMSCMD
- Gujarat has fertilizer production capacity of 3.24 MMTPA
  - ✓ Gas requirement of these plants is ~8.19 MMSCMD
  - ✓ MEIDP Pipeline can provide cheaper gas (viz. RLNG) to these plants which will lead to savings in subsidy by Govt of India to Fertilizer sector
- The Project will also add to the economic development of state
  - ✓ Local procurement of materials and services
  - ✓ Steel requirement of around 1.05 MMT required for manufacturing of Pipeline can give a boost to "Make in India" campaign
  - ✓ Employment opportunities to local workforce



# THANK YOU



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