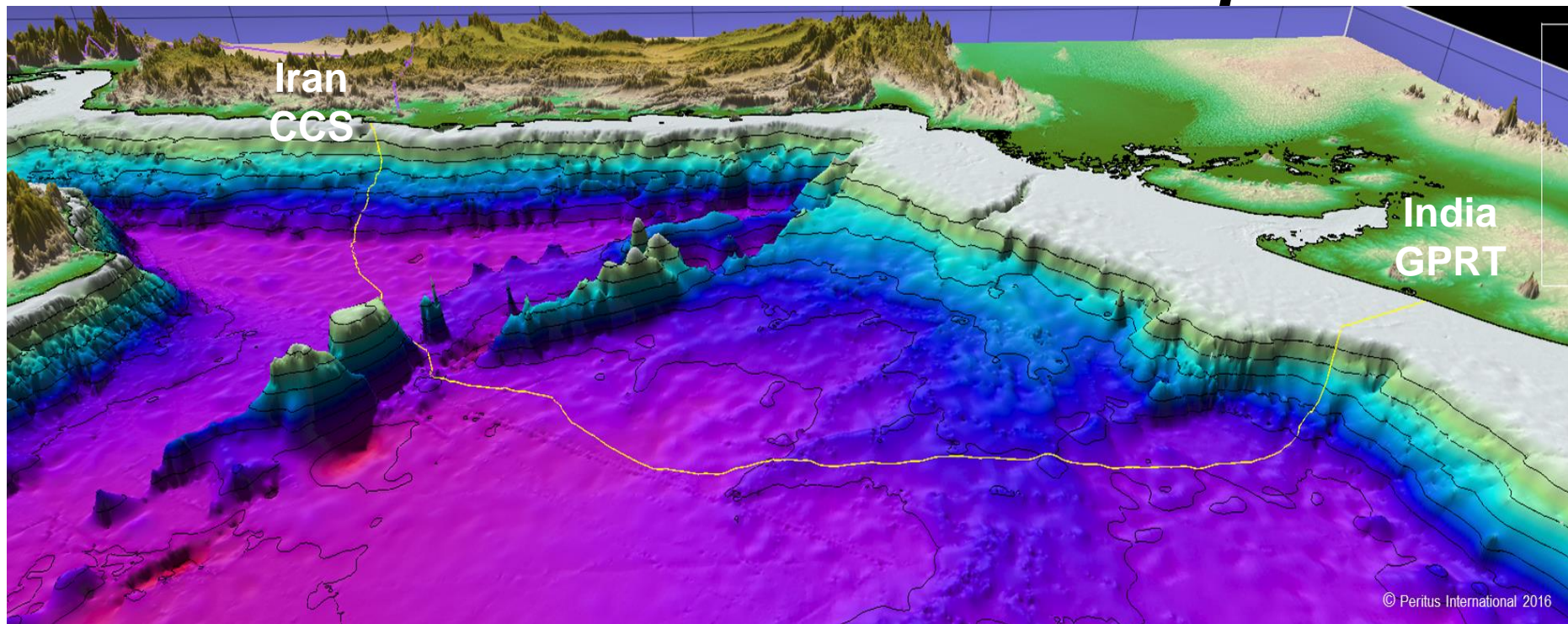


# ***The Middle East to India Gas Pipeline***



**Presentation to the Ministry of Petroleum & Natural Gas  
Govt. of India**

New Delhi, November 2016

Proprietary to South Asia Gas Enterprise PVT Ltd

# The SAGE Project Vision

## The MEIDP Project

The MEIDP Project is envisaged as transmission pipeline **Infrastructure project** allowing transportation of Middle East Gas to the West Coast of India

The pipeline will be laid as a “**Common Carrier**” pipeline whereby SAGE will be the Gas Transporter and will be paid a Tariff for pipeline use

The 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]

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

# Working in Partnership

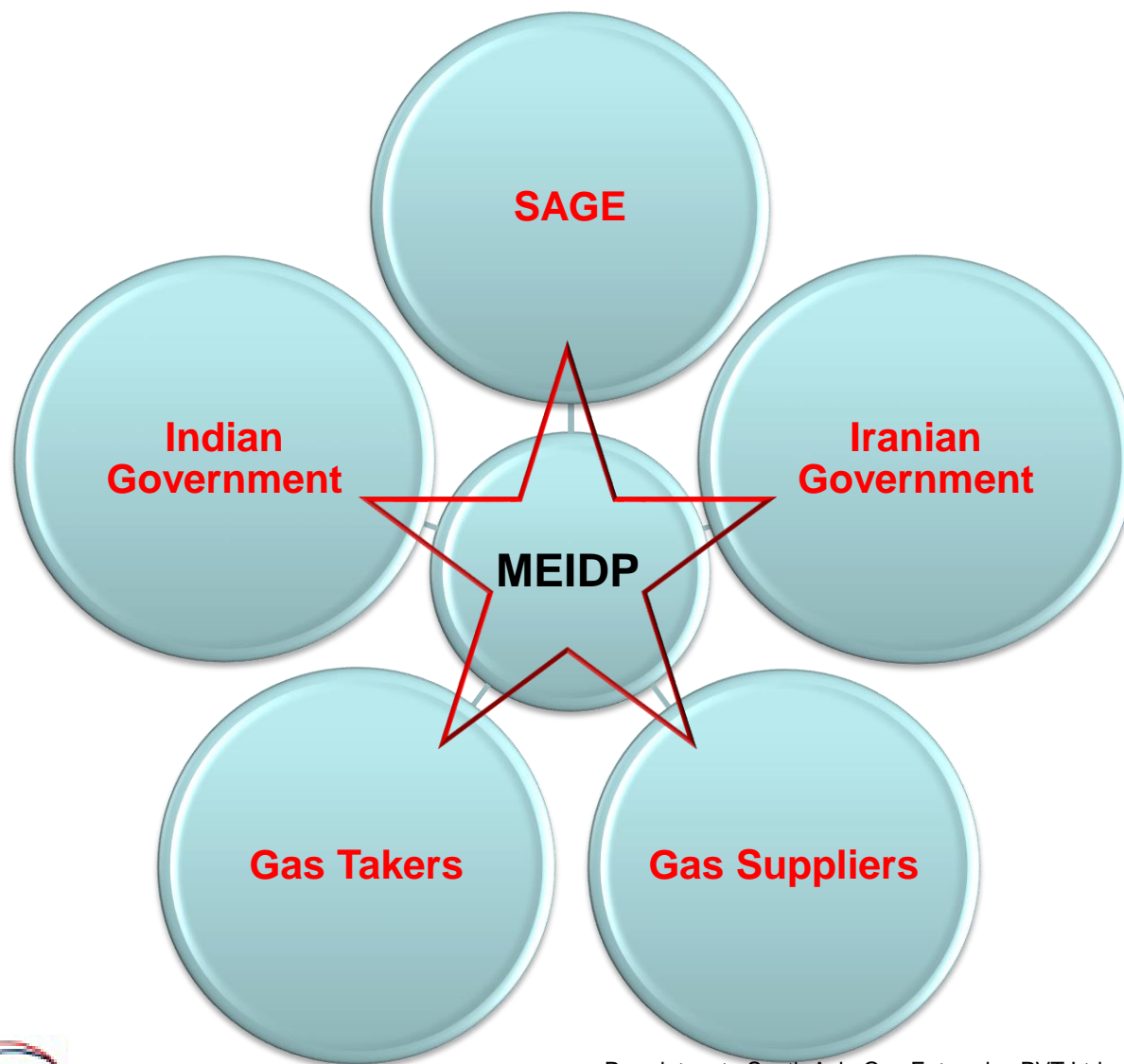
**MOUs and Agreements to Co-operate in developing MEIDP have been signed with:**

## SAGE

Pipe Mills	Installation Contractors	Certification Bodies	Suppliers and Takers	Engineering & Consultancy
<ul style="list-style-type: none"> <li>• Tata (CORUS) steel</li> <li>• Welspun</li> <li>• JindalSAW</li> </ul>	<ul style="list-style-type: none"> <li>• Saipem SpA</li> <li>• Heerema Marine Contractors</li> <li>• Allseas</li> </ul>	<ul style="list-style-type: none"> <li>• Det Norske Veritas</li> </ul>	<ul style="list-style-type: none"> <li>• Indian Oil Co</li> <li>• GAIL</li> <li>• GSPC</li> <li>• Oman Ministry of Oil and Gas</li> <li>• NIGEC</li> </ul>	<ul style="list-style-type: none"> <li>• Peritus International Ltd.</li> <li>• Engineers India Ltd.</li> <li>• Intecsea (UK) Ltd.</li> <li>• FUGRO GeoConsulting Ltd.</li> <li>• SBI Cap</li> </ul>

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# Stakeholders



All interest parties **must** be **stakeholders** for Large Infrastructure Projects

Governments **must** be **stakeholders** for Transnational Pipelines

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# India's Gas Partner

## *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 Iran, Qatar and Turkmenistan.
- **Iran** has over 1000 TCF reserves and is **eager to export gas**.
- The **deepwater route** across the Arabian Sea is the **shortest secure distance** between huge middle east reserves and the rapidly developing industrial heartland of India, and is **too short for LNG to be an economic** transportation option

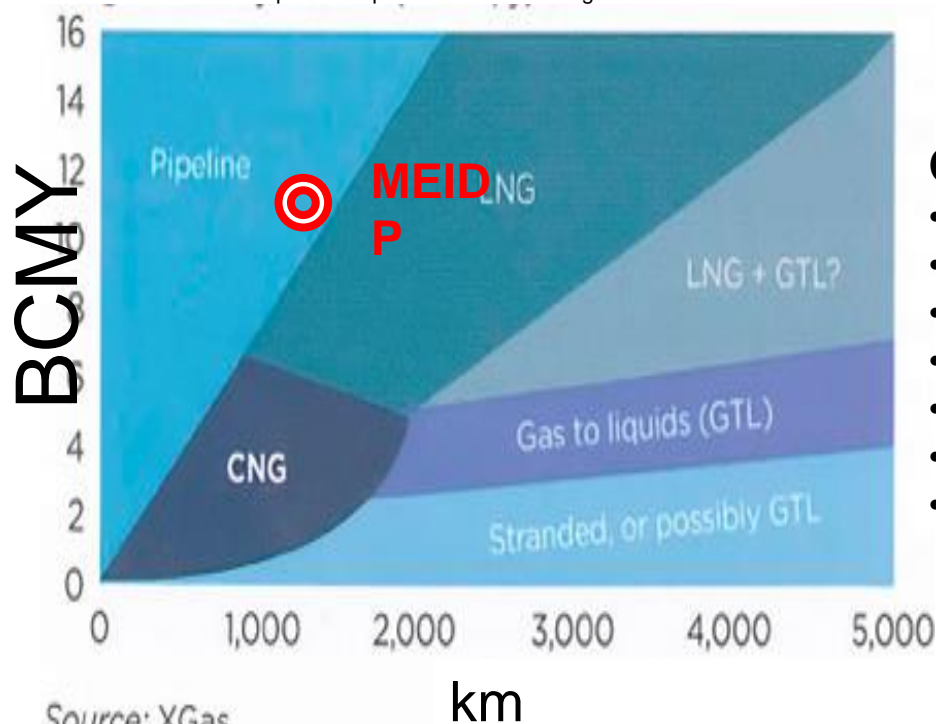
## *Iran has gas*

- Iran has always been a friendly neighbor to India
- Iran has expressed its willingness to supply Natural Gas and a Framework Agreement has been discussed with NIGEC [National Iranian Gas Export Company] for Pipeline Construction and Gas Supply through the SAGE Pipeline
- NIGEC has confirmed to SAGE that they are currently in a position to provide gas for **2 pipelines** from Iran to India



# Competitiveness of Pipelines

Ultradeepwater capabilities and Challenges Statoil R&D

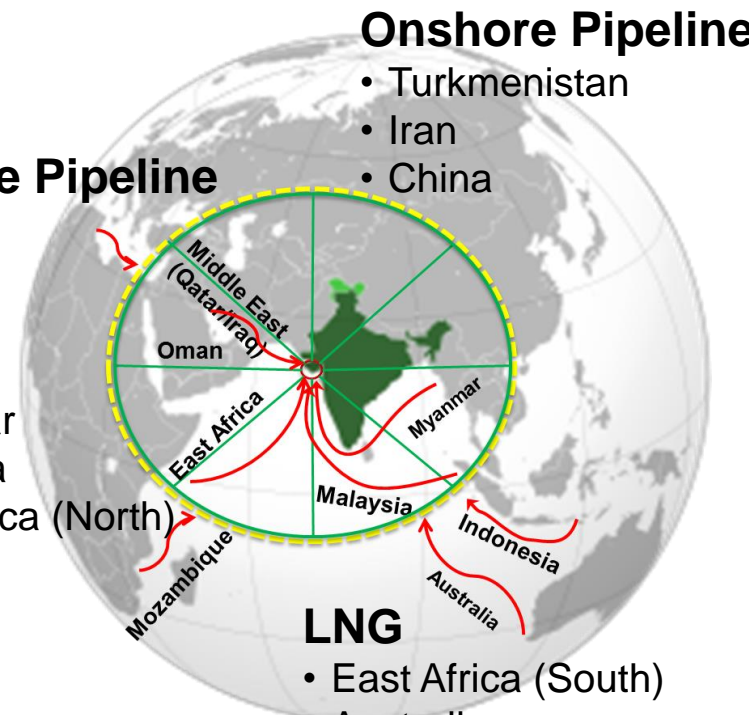


**Economic Limit of Pipeline Gas to India is ~2000km**

	Dry Gas Price	Liquefaction Cost	Shipping Tariff	Regasification	Total Cost
LNG	3-4	~4.0	0.3	0.5	7.8-8.8
Pipeline	3-4	-	2.5	-	5.5-6.5
Difference in landed gas price					2.3

## Offshore Pipeline

- Qatar
- Iraq
- Oman
- Iran
- Myanmar
- Malaysia
- East Africa (North)



## Onshore Pipeline

- Turkmenistan
- Iran
- China

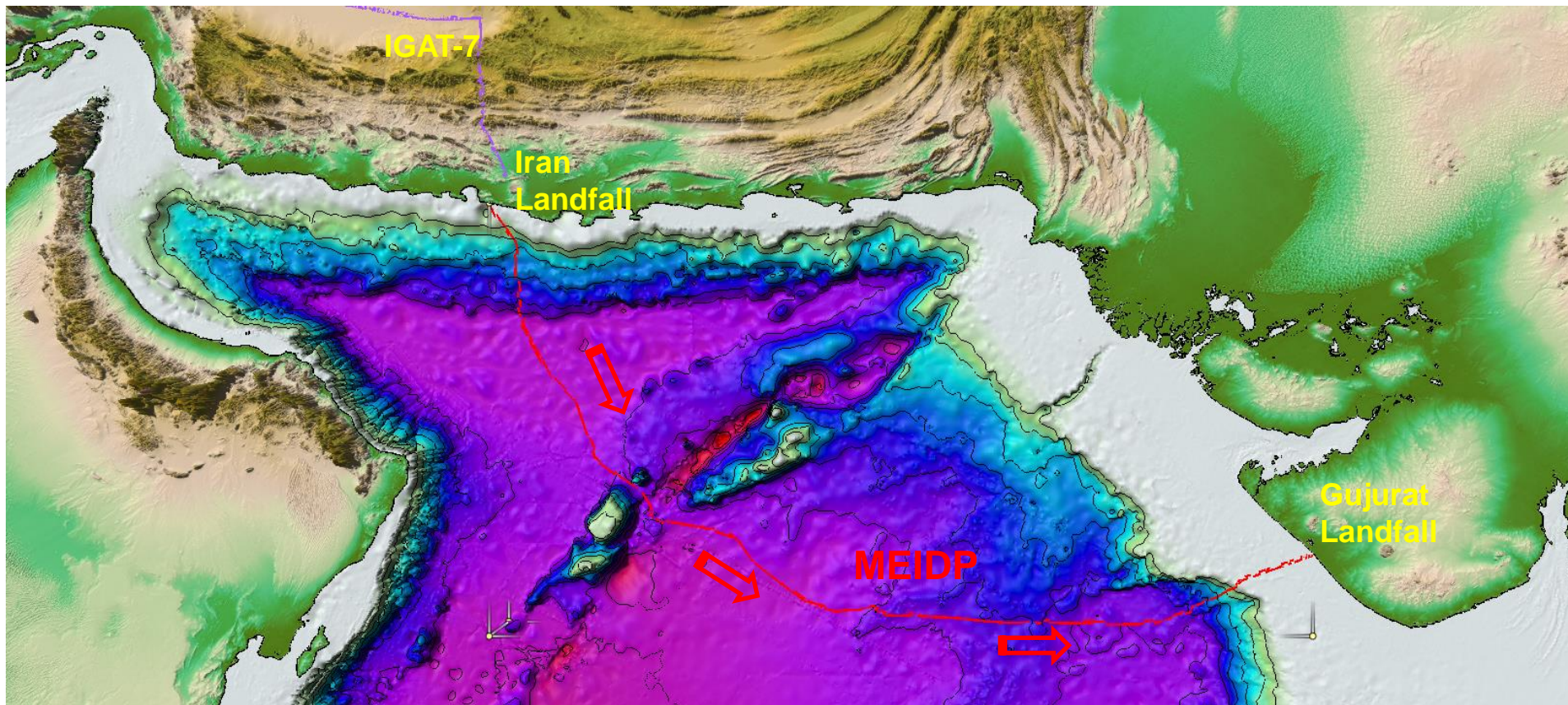
## LNG

- East Africa (South)
- Australia
- Indonesia
- North Africa
- Western Med

# Climate Change Gas Reality

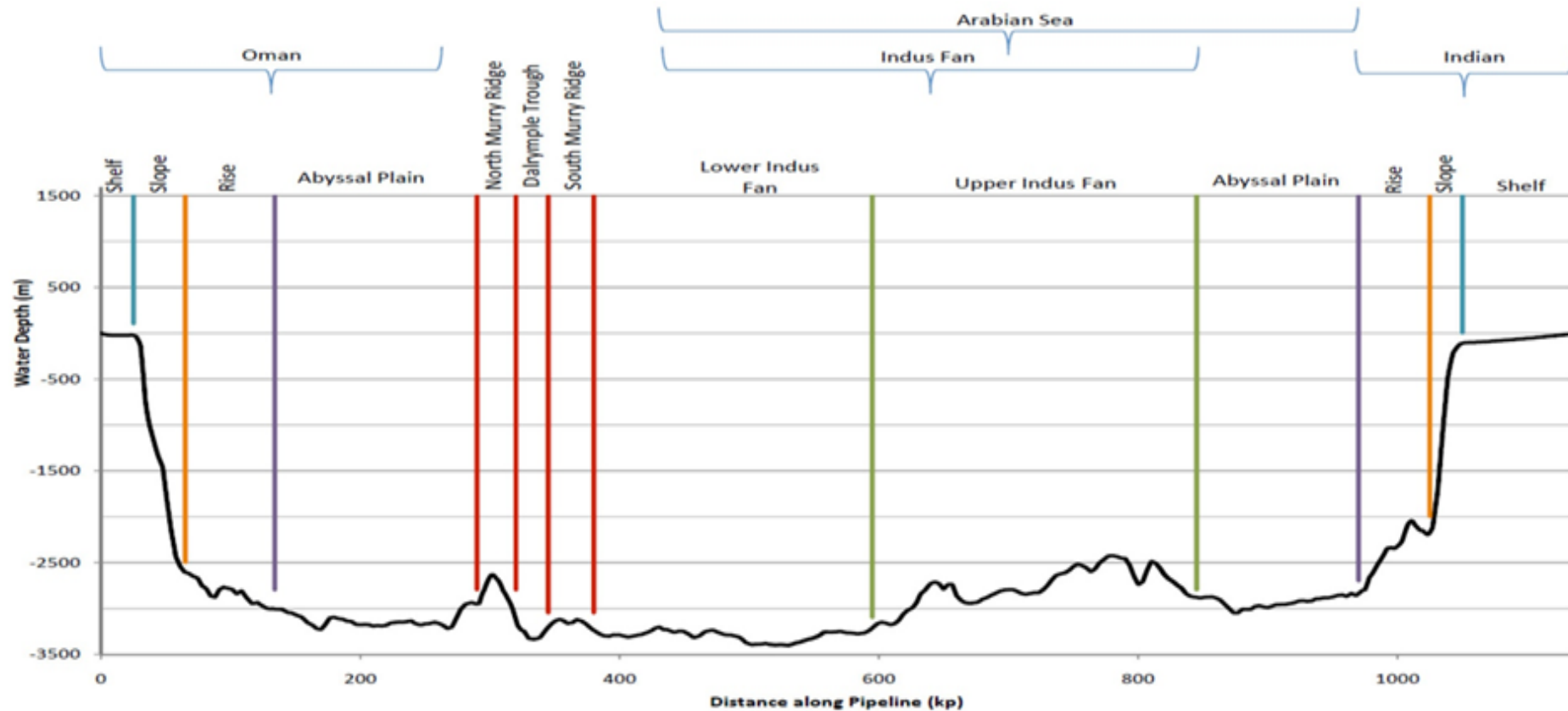
- The majority of India's power generation is by Coal fired Power stations
- Gas emits 54% of the CO<sub>2</sub> of an equivalent Coal facility
- Decommissioning “Dirty Coal” and replaced with CO<sub>2</sub> friendly alternative can only be achieved with Gas in the short to medium term.
- Gas power stations can be constructed in 3-4 years
- Climate Targets for CO<sub>2</sub> reduction need Gas in the short to Medium term to be the “Enabler”
- Outcome of Paris Climate Conference recommends increased use of Gas for power generation to meet short term CO<sub>2</sub> reduction targets
- India should focus on Gas based Power Generation

# MEIDP Route to India





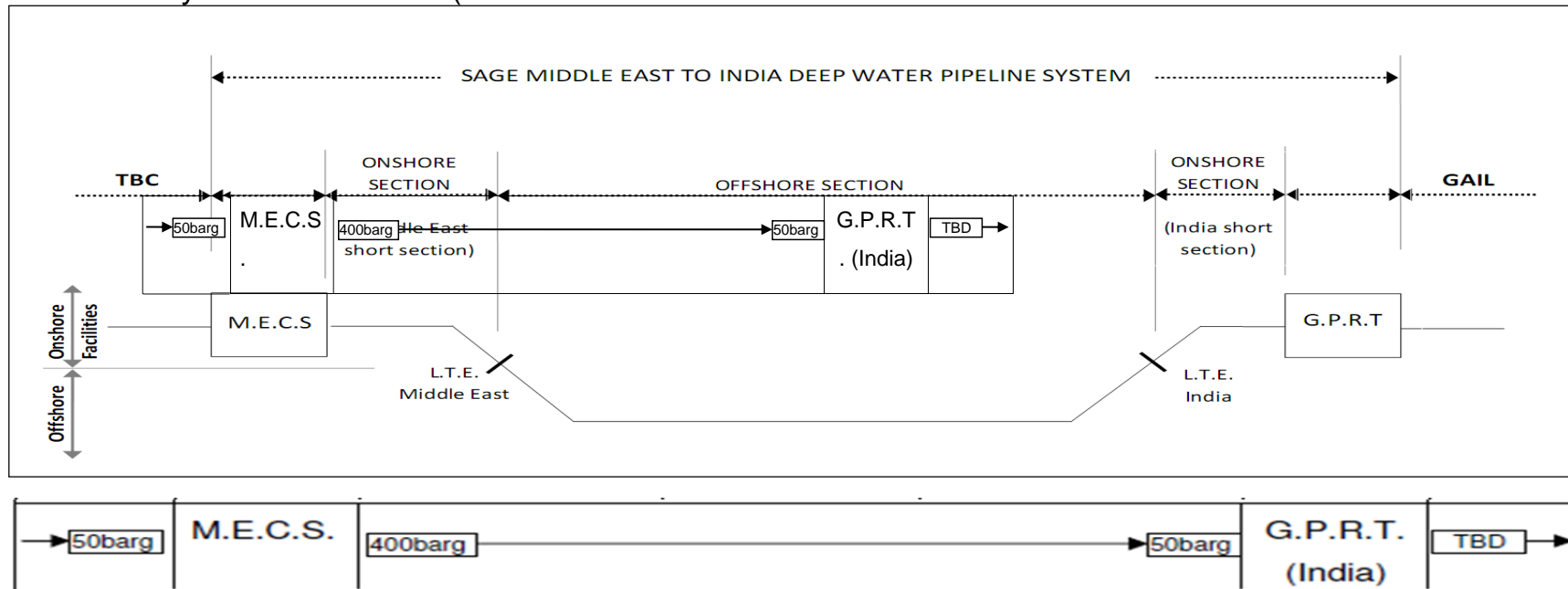
# MEIDP Route to India



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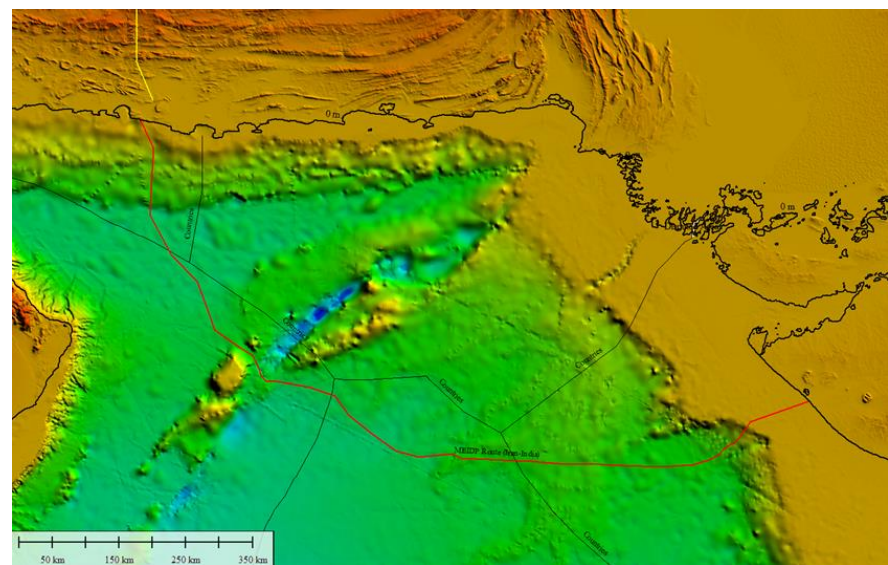
# MEIDP Battery Limits

## □ Battery Limits of MEIDP (Direct)

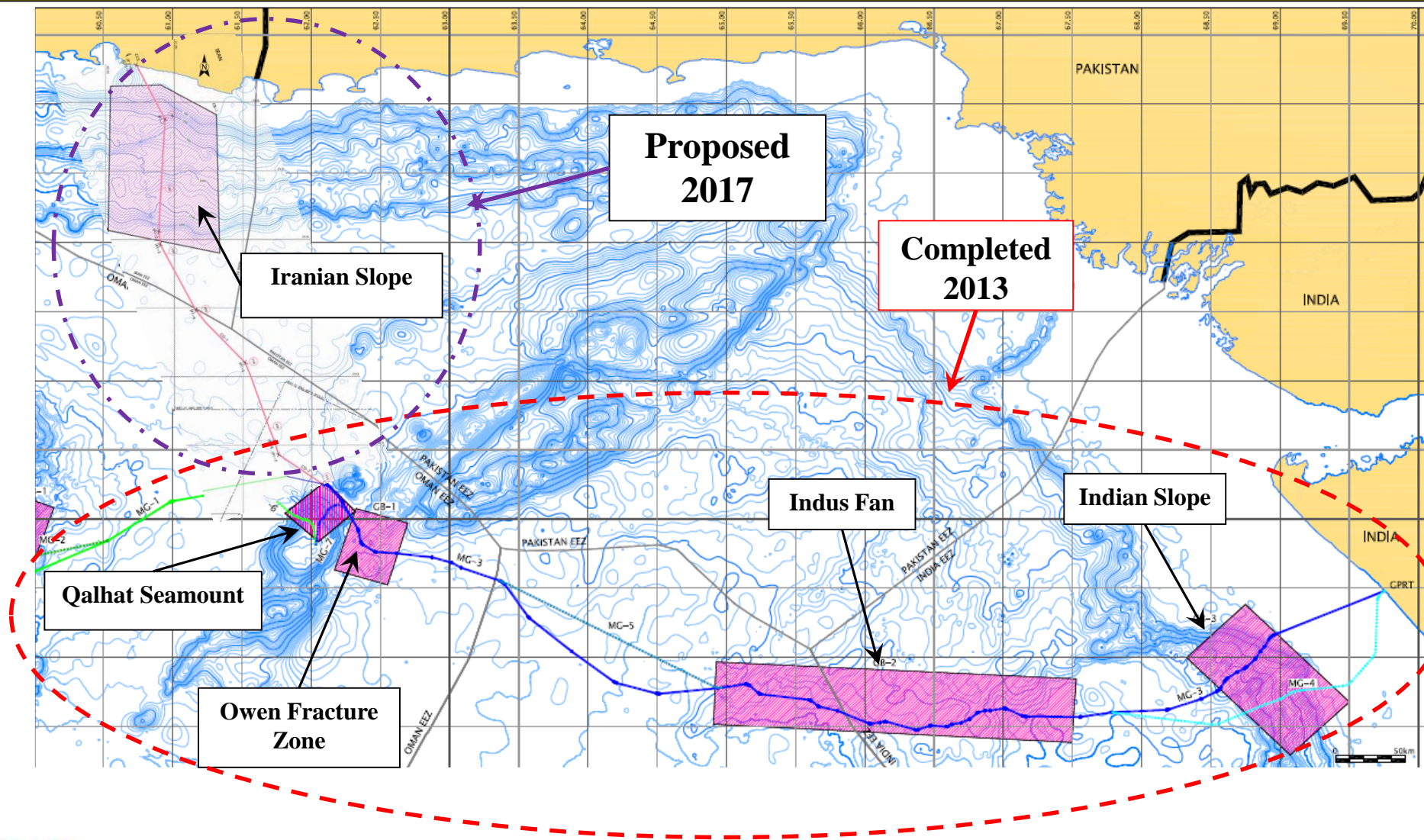


# MEIDP Project Features

- **Start Points:** - Chabahar, Iran
- **End Point:** - Near Porbandar (South Gujarat), India
- **Throughput:-** 10.3BSCM/yr
- **Inlet Pressure:-** 400barg
- **Diameter:-** 24" I.D. (27.2" O.D.)
- **Wall Thickness:-** 32.9-40.5mm WT (DNV OS-F101)
- **Steel Grade:** - DNV SAWL450 FDU
- **Maximum Depth:** - 3,450 meters
- **Length:** - 1,300 kilometers
- **Steel Tonnage:** - 800,000tonnes
- **Project Duration:** - 5years (as Fast Track Project)
- **Pipeline Construction:** - 2 years



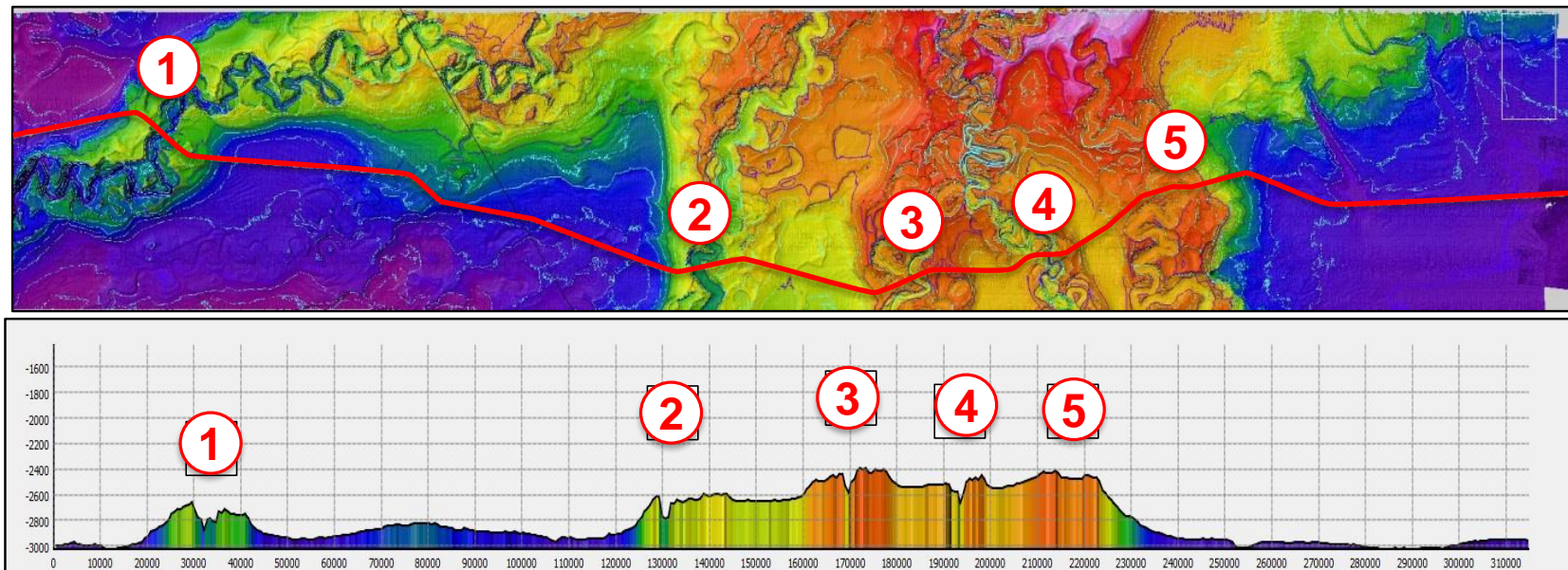
# MEIDP Recon Survey Route



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# Indus Fan Characteristics



## Indus River Abyssal Fan Route:-

- water depths between 2100m - 3200m
- crosses five turbidity current Channels
- Channels up to 200m deep with side slopes up to 35°
- channels follow a meandering flow pattern in N-S direction

# 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 and Europipe are capable vendors
Lay Vessel	No Ultra Deep water vessel capability	Ultra Deep water vessels with adequate capability are available.	Casterone and Aegir are already available in the field. Two more barges Pioneering Spirit and JSD 6000 are under construction.
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(SIRCOS) has been developed for Deep water application by Saipem. Saipem currently has work class ROV rated to 4000m depth.

# MEIDP Pipe Manufacture

## MEIDP Linepipe Requirement

- Requirement 796,500 tonnes
- Recommended number of Mills for pipe Supply -3

## Mills capable of making MEIDP Linepipe

- Welspun (India) - JCOE
- JindalSAW (India) – JCOE
- PCK (China) - JCOE
- Tata (UK) - UOE
- Europipe (Germany) - UOE
- JFE (Japan) - JUOE





# MEIDP Capable Pipelay Vessels

*Operational*



**CastorONE (Saipem)**

*Operational*



**Aegir (HMC)**

*Operational*



**Pioneering Spirit (Allseas)**

*Operational*



**S7000 (Saipem)**



# Emergency Pipeline Repair Systems

## Diverless Sealine Repair System SIRCOS

- SiRCoS is a pipeline repair system developed for deepwater application
- meeting requirements of TransMed (Tunisia – Sicily), Green Stream (Libya – Sicily), Blue Stream (across Black Sea)
- suited to pipeline size ranging from 20" to 32" in water depths up to 2200 m
- SiRCoS is available under a Service Contract Agreement



Saipem has stated that the system can be uprated to 3500m by change-out of buoyancy and control pod

Saipem currently has its Workclass ROV's rated to 4000m WD

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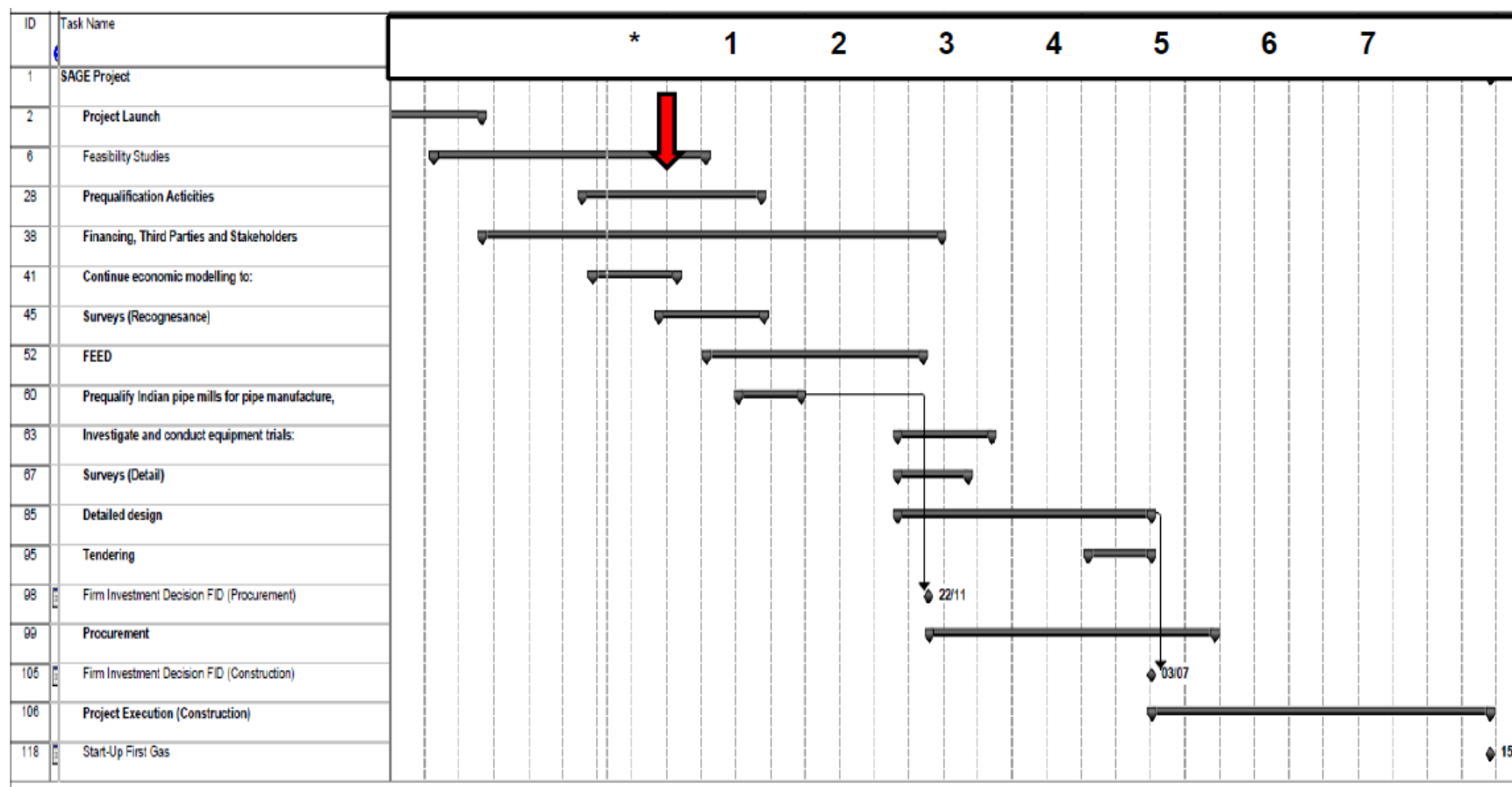
# MEIDP Completed Activities

- Design Basis definition
- Flow Assurance Studies
- Mechanical Design
- Onshore Compression Station
- Offshore Compression Station Definition & Review
- Receiving Terminal Definition
- Quantified Risk Assessment - OIP Update
- Geohazard and Fault Crossing Assessment
- Metocean data collection
- Emergency Repair Equipment
- GIS Data collection
- Riser and Subsea By-Pass definition
- Pipeline Intervention Review
- Vessel & Equipment Capabilities review
- Alternative Integrity Verification Phase 1 (Establish no hydrotest principle)
- Cost Estimate Update
- Reconnaissance Survey definition and scope of work
- Mill qualification and ring testing program
- Reconnaissance Survey Completed
- Landfall point identification in India

# Technical Highlights

- During 2011-13, SAGE/Peritus International have conducted a series of Qualification trials in Indian Pipe Mills (Welspun and Jindal Saw) which will enable both these Indian Mills to supply the required thicknesses steel pipe along with other international pipe mills
- After detailed study, it has been confirmed that the Pipeline can be laid at such depths using recommended pipe thickness from the latest Design Codes
- Indus Fan pipeline route has moved to the south to mitigate the worst of the deep channels and slopes and is now no more significant than continental slopes and Owen fracture zone

# Project Development Schedule



- ❑ Pre-FEED to 1<sup>st</sup> Gas is a 7yr undertaking
- ❑ On Fast Track FEED to 1<sup>st</sup> Gas can be 5yrs
- ❑ Offshore Construction Period 2 yrs



# Indicative Project Cost

- “As Built” Project Cost (*Indicative*): ~USD 5 Bn

- Project Cost Break up

(USD Mn)

Particulars	Offshore Segment	Iran Onshore Segment	India Onshore Segment	CCS*	GPRT#	Total
Material Procurement	960.6	2.2	1.3	202.6	100.0	1,266.6
Construction	1,708.2	7.1	5.6	196.7	118.2	2,035.9
Pre- Commissioning& Commissioning	89.8			8.1	5.3	103.1
Engineering & Project Management	120.2	7.8	7.8	50.6	40.0	226.4
Insurance and Certification	69.0	0.1	0.1	10.2	5.6	85.0
Contingency	863.6	5.1	4.4	196.9	113.3	1,183.4
<b>Total Hard Cost</b>	<b>3,811.3</b>	<b>22.4</b>	<b>19.1</b>	<b>665.0</b>	<b>382.3</b>	<b>4,900.3</b>
Contingency Dewatering	57.2					57.2
<b>Total Project Cost</b>	<b>3868.5</b>	<b>22.4</b>	<b>19.1</b>	<b>665.0</b>	<b>382.3</b>	<b>4957.4</b>

\*Chabahar Compression Station #Gujarat Port Receiving Terminal

Source: Based on the Project Cost Estimates provided by M/s Peritus International Ltd in 2016

# MEIDP Conclusions

- Indian gas demand and supply balance **shortfall** continues to increase from 100mmscmd in 2014 to **270 mmscmd in 2030** as per PNGRB vision 2030 study.
- Iran is willing to provide 31 mmscmd gas Gas. Available as planned for this pipeline. Iran is also willing to consider to provide Gas for a 2nd SAGE Pipeline.
- Project will add to energy **security by diversification** (do not put everything in the LNG basket).
- Provides an **economically competitive** method of gas supply significantly less than the cost of LNG .
- The **technology** to design and lay deep sea pipeline is available **now**.
- The project is financially and technically viable.
- The Project will provide billions of Dollars of opportunities to Indian Cos. to participate in the supply of equipment & services.
- Long Term contracts and surety of supply, will facilitate new projects in India which utilise the Gas (eg., Power / Fertilizer Plants).

# Action Plan

- Activities to be completed
  - Intervention assessments based on 2013 Survey Data
  - Updated Feasibility Study and Cost Estimate
  - Preparation for Onshore and Offshore FEED's
  - Metocean Survey Data Gathering
- Way Forward
  - Framework Agreement to be signed to get first mover advantage in view of probable upliftment of the sanctions
  - FEED and detailed Geo-Physical survey is to be completed
  - Other interrelated agreements like GSPA, GTA to be executed so as to finalize financing arrangement for the Project
  - Indian gas buyers need to work closely with SAGE

# *Thank You*

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