

Iran-Oman to India Gas Pipeline Presentation

January, 2018

Middle-East to India Deepwater Natural Gas Pipeline (MEIDP)

Project Route to India

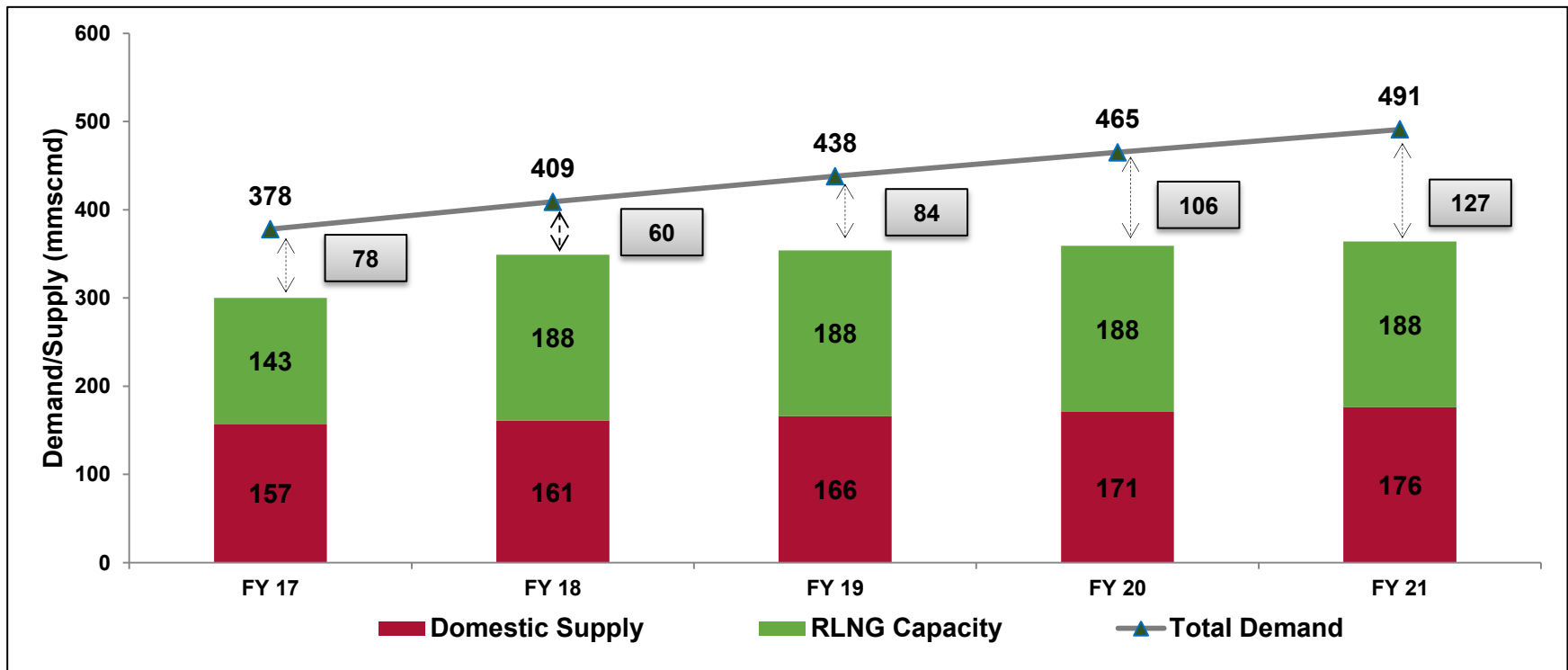


MEIDP Project Features

- Potential Start Points:
 - Chabahar, Iran
 - Sohar / Ras al Jafan, Oman
- End Point: Near Porbandar (South Gujarat), India
- Diameter: 24" I.D. (27.2" O.D.)
- Wall Thickness: 32.9-40.5mm WT (DNV OS-F101)
- Flowrate: 1.1BSCFD (31.1mmscmd)
- Maximum Depth: 3,450 meters
- Length: 1,300- 1,400 kilometers
- Project Duration: 5 years (as Fast Track Project)
- Pipeline Construction: 2 years
- Project Cost: USD 5.2 Billion

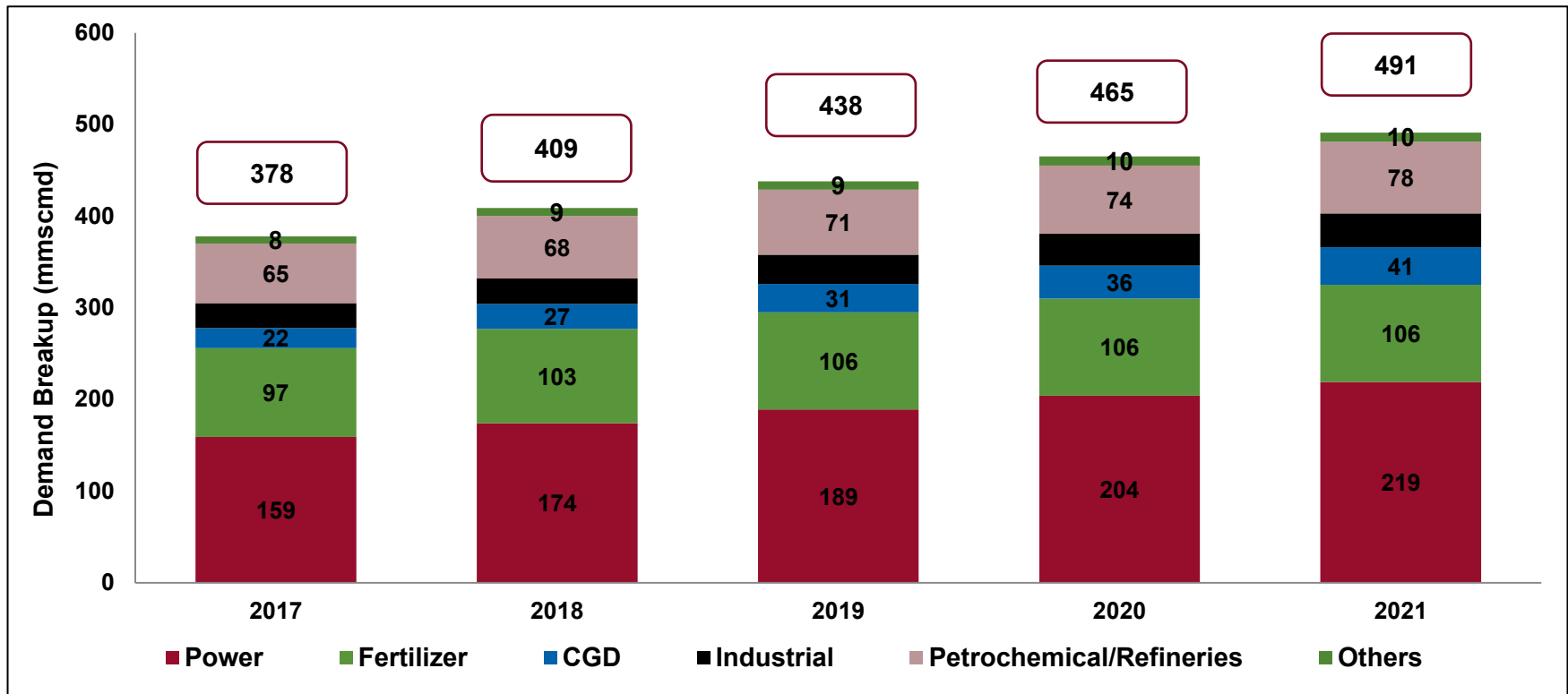
Project	Middle East to India Deep- Water Gas Pipeline Project (MEIDP)
Sponsor	South Asia Gas Enterprise Pvt Ltd (SAGE)
Proposal	Development of an Energy Corridor for transportation of gas from Middle East to India by the safest, most economic & reliable means
Proposed Route	Iran via Oman to India through Arabian Sea
Common Carrier	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
Tri- Partite Agreement	Gas Buyers & Gas Seller will negotiate the Long Term Gas Supply Contract along with SAGE in a Tri-partite Framework Agreement
Global Consortium	SAGE has been working on the Project with Global Consortium for last 6 years

Demand Supply Gap: Realistic Demand



- According to the Indian Ministry of Petroleum and Natural Gas, the total realistic demand for natural gas is expected to increase at a CAGR of 6.5% to around 491 MMSCMD by 2020-21
- The gap between demand & supply of domestic natural gas is expected to widen going forward
- The shortfall in Gas Supply can be met by a mix of sources viz. LNG/RLNG, Transnational Gas Pipelines subject to affordability

Projected Sector Specific Demand



- Majority of this incremental demand shall be from Power, Fertilizer and City Gas Distribution (CGD) sector.
- Gas based power generation is expected to contribute the highest to the overall demand, in the range of 42% to 45%
- Demand from Fertilizer & CGD sector is expected to follow with a contribution of around 25% to 30% in the total demand

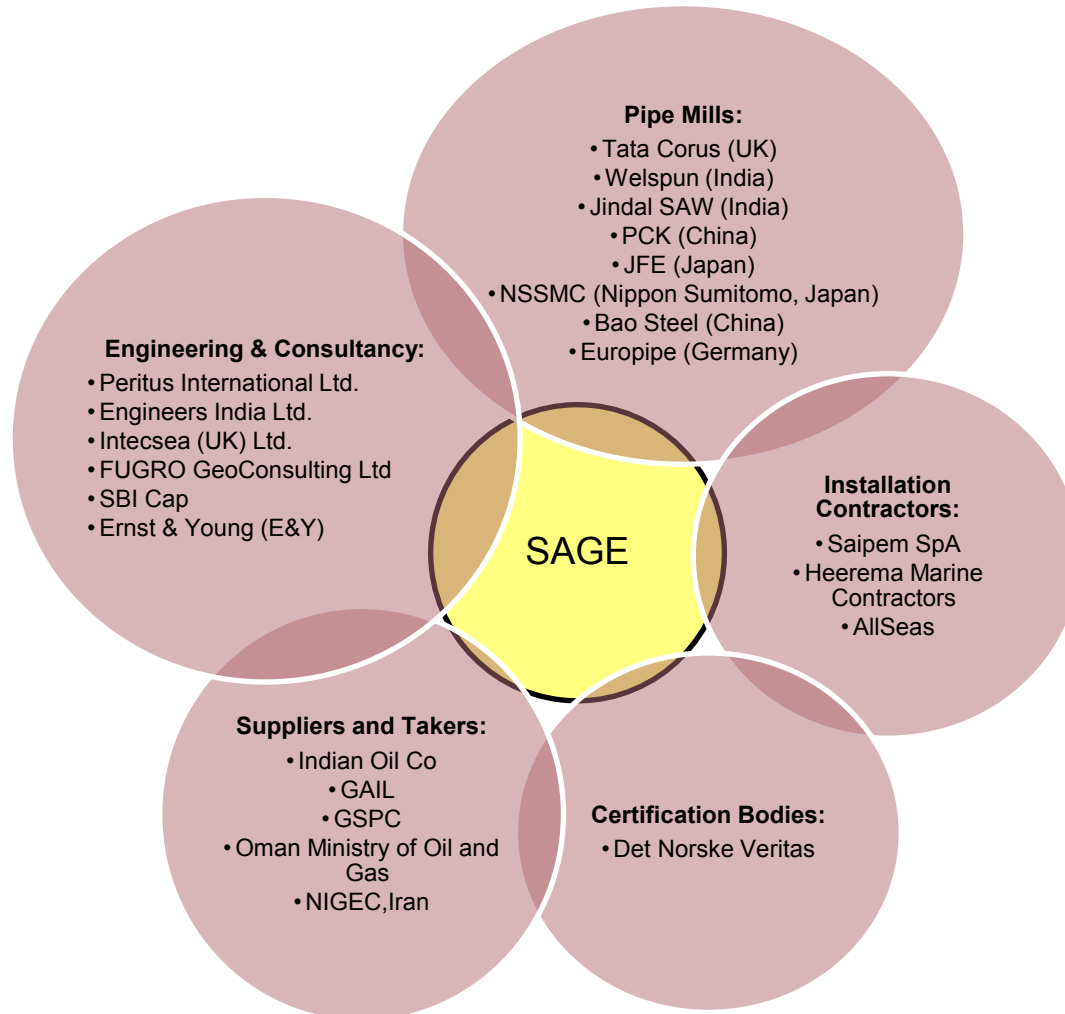
International Supply of Gas to India

- Over 2,000 TCF of natural gas reserves are held by countries with which India has a traditional trading relationship, including Qatar, Iran and Turkmenistan
- Iran is looking for export solutions for its vast reserves of Natural Gas
- MEIDP is the only option for India for affordable price Gas
- Pipeline can bring Turkmenistan Gas to India by Sea Route.
- Onshore Pipelines such as IPI and TAPI have significant security and supply issues
- MEIDP can bring recent OVL discovered Gas in Farzad B Block in Iran to India

Table 9. World proved natural gas reserves by country as of 1st January 2014 (trillion cubic feet)
(BP Statistical Review of World Energy June 2014)

Country	Reserves (Trillion cubic feet)	Percent of world total
World	6557.8	100.0
Top 20 countries	5904.8	90.0
Russia	1103.6	16.8
Iran	1192.9	18.2
Qatar	871.5	13.3
Saudi Arabia	290.8	4.4
United States	330.0	5.0
Turkmenistan	617.3	9.4
United Arab Emirates	215.1	3.3
Venezuela	196.8	3.0
Nigeria	179.4	2.7
Algeria	159.1	2.4
China	115.6	1.8
Iraq	126.7	1.9
Indonesia	103.3	1.6
Kazakhstan	53.9	0.8
Malaysia	38.5	0.6
Egypt	65.2	1.0
Norway	72.4	1.1
Canada	71.4	1.1
Uzbekistan	38.3	0.6
Kuwait	63.0	1.0
Rest of World	653.0	10.0

MOUs & Agreements to Co-operate in developing this project have been signed with



MEIDP Key Team Members

Mr T.N.R Rao	Former Petroleum Secretary, Govt of India Architect of Oman-India Pipeline Chairman of SAGE Advisory Board
Mr Subodh Jain	Director South Asia Gas Enterprise PVT Ltd. Director Siddho Mal & Sons and Director INOX Air Products Ltd. Former Senior Advisor to Oman-India Pipeline
Mr Peter Roberts	Former Director South Asia Gas Enterprise PVT Ltd. Director Verderg Ltd. Former Project Director of Oman-India Pipeline
Dr Herman Franssen	Member of the SAGE Advisory Board and Senior Consultant to SAGE President, International Energy Associates, USA Former Advisor to Oman-India Pipeline & Former Economic Advisor to the Sultanate of Oman, MoP
Mr Ian Nash	Manging Director, Peritus International (UK) Ltd. and Senior Technical Consultant to SAGE PM for Detailed Design of Europipe 2 Gas Trunkline and BP Block 31 ultra deep flowlines PM for MedGaz FEED Ultra Deep Trunklines and EM for Canyon Express Ultra Deep development

Dr Alastair Walker	Member of the SAGE Advisory Board and Senior Consultant to SAGE Leading International Expert on Marine Pipeline Engineering Professor Emeritus, University of Surrey UK & Visiting Professor, University College London
Dr Roberto Bruschi	Senior Vice President Saipem SpA, Milan, Italy
Dr Ping Liu	Operations Director, Intecsea BV, Netherlands
Mr Marco Monopoli	Offshore Commercial Manager Saipem SpA, Milan, Italy
Mr Johan Drost	Allseas International, Delft, Netherlands
SBI Capital Markets Ltd	Financial Advisory Services
Engineers India Ltd	Leading Onshore Pipeline and Facilities Engineering SAGE Indian Design Consultants
Ernst & Young	Financial Advisory Services

INDICATIVE PROJECT COST BREAKUP

- “As Built” Project Cost (Indicative): ~USD 5.2 Billion

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
Total Hard Cost	3,811.3	22.4	19.1	665.0	382.3	4,900.3
Contingency Dewatering	57.2					57.2
Total Project Cost *	3868.5	22.4	19.1	665.0	382.3	4957.4

* Excluding IDC & Margin Money

CAPEX BENCHMARKING WITH SIMILAR PROJECTS

Project	Length (KM)	Capacity (BCM)	No. -	Diameter (inch)	Depth (Meter)	Cost (m' US\$)	Unit Cost (US\$ /Inc h/m)	Unit Cost (US\$ m'/km)
Medgaz	210	8	1	24	2165	806	160	3.8
South Stream	925	63	4	32	2200	12800	108	3.5
Nord Stream	1222	55	2	48	210	11264	96	4.6
ITGI	217	10	1	32	1800	640	92	2.9
Blue Stream	396	16	2	24	2200	1700	89	2.2
Europipe 1	670	18	1	40	70	3400	140	5.1
Europipe 2	642	24	1	42	354	1690	63	2.6
Franpipe	840	19	1	42	70	1866	53	2.2
Langeled	1166	24.5	1	44	385	2720	53	2.3
MEIDP	1300	10.3	1	27.2	3450	5000	141	3.9

Project Cost of the SAGE Pipeline is in line with other projects of similar nature

PROPOSED FINANCING PLAN

- **Project Cost: ~USD 5.2 Billion**
- **Proposed Funding Structure: D/E - 2.33:1**
- **Debt: ~USD 3.70 Billion**
 - **A mix of Long Term Debt of 15-20 years is proposed comprising of:**
 - **Rupee Term Lending (RTL) - From Indian Banks**
 - **Export Credit Agency (ECAs) – From Countries of material supplying Companies/EPC**
 - **External Commercial Borrowing (ECBs) – Foreign Banks/FIs**
 - **Multi-lateral Agency- Fund long term infrastructure projects**
- **Equity: ~USD 1.50 Billion**
 - **SAGE & Associates**
 - **Strategic investment by Gas Suppliers/Gas Off-takers**
 - **Investment by EPC Contractors involved in Project Implementation**
 - **Other Financial Investors**

- **Current Equity Raise Amount: USD 50-60 Million for FEED Study**
- **SAGE and its Technology Partners have spent over USD 15 Million to develop this project so far**

TARIFF CALCULATION MECHANISM

Fixed Return method has been proposed based on the : Target Project IRR

- **Tariff calculated based on a Project IRR (Post Tax) of 13%**
- **Tariff works around at USD/ MMBtu 2.50**

Project IRR	Tariff (USD/MMBtu)
Base Case	
13.00%	2.50
Alternate Cases	
12.00%	2.31
14.00%	2.68
15.00%	2.90

Final Tariff will be decided based on discussion between various stakeholders

Cost Competitiveness : MEIDP (Pipelines) vs RLNG

- 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

Specifications

Specification/Case	Base Case	Alternative Case	
Route	Iran-India	Iran-Oman	Oman-India
Project Cost (approx.)	USD 4.5 Bn	USD 1.65 Bn	USD 4.26 Bn
Length	~1357 km	175 km (offshore) + 469 km (onshore)	~1249 km
Diameter	24" I.D.	~36-48 O.D.	24" I.D.
Flow Rate*	31.1 MMSCMD	56.1 MMSCMD	31.1 MMSCMD
Max Depth	~ 3500 meters		

Project Implementation Timeline

- Project Duration: 5 years



- The Gas Tariff for the two routes based on different methodologies are detailed below:

(USD/mmbtu)

Case 1 : 50% Fixed slope w.r.t Crude Price and 50% Fixed Price with escalation

Particulars/Year	Iran-India	Iran-Oman	Oman-India
1	1.62	0.34	1.54
2	1.66	0.35	1.58
3	1.70	0.36	1.61
4	1.74	0.36	1.65
5	1.79	0.37	1.69

Case 2: Levelised Tariff

Particulars/Year	Iran-India	Iran-Oman	Oman-India
1	1.97	0.41	1.86
2	1.97	0.41	1.86
3	1.97	0.41	1.86
4	1.97	0.41	1.86
5	1.97	0.41	1.86

****Tariff based on Project IRR of 12%***



- Engagement of DnV, Norway as a Technical Consultant
- Feasibility Study completed- by Peritus International Ltd
- Financial Advisory Services- by SBICAP
- Indian Gas Market Assessment- by CRISIL
- Reconnaissance Survey- by FUGRO
- Significant amount invested by SAGE
- Significant investments in R&D by Pipe Manufacturers
 - Successful Qualification Trials conducted in Indian Pipe Mills
- Ongoing discussions with Gas Suppliers
- Presentations made to MoEA, MoPNG- GoI
- MoUs signed b/w SAGE and agencies like NIGEC, SAIPEM, WELSPUN, EIL, GAIL .

- **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 (Indian Mills)**
- **Reconnaissance Survey (Oman-India) Completed**
- **Landfall point identification in India**

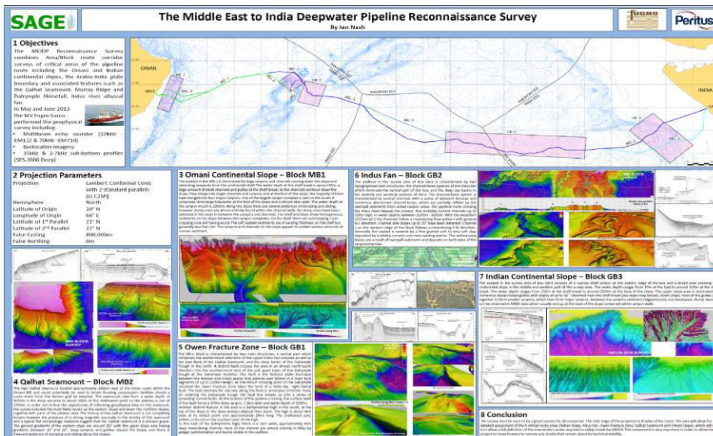
MEIDP Route Map



Capable Pipelay Vessels

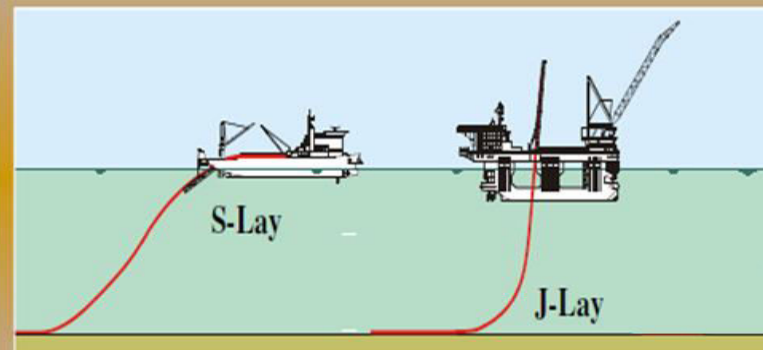


MEIDP Reconnaissance Survey Done In Arabian Sea



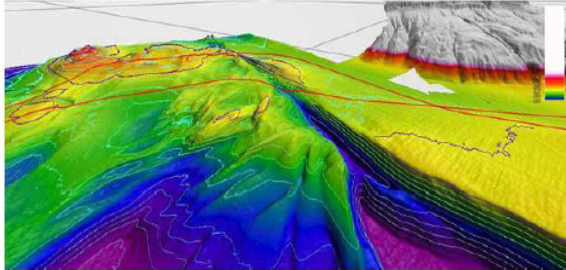
Methods of Pipeline Installation

General Methods of Pipeline Installation:



Owen Fracture Zone

Owen Fracture Zone Characteristics



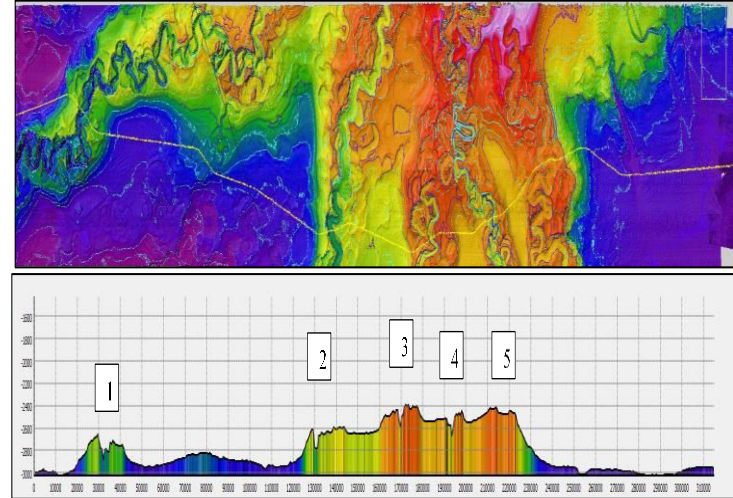
At the MEIDP Crossing the Owen Fracture Zone is characterized by two main structures:

- The deep basins of the Dalrymple Trough and horsetail in the North
- An arch formed bathymetrical high in the South

The Owen Fracture zone stretches for more than 1200km with the Dalrymple Trough forming the last 350km at its Northeastern end and reaching a depth in excess of 4000m.

The bathymetric high is about 6km wide and approx. 19km long, rising to 2630m water depth at its shallowest part.

Indus Fan Characteristics



MEIDP Line Pipe Manufacturing



a) "J-ing" Stage b) "C-ing" Stage c) "O-ing" Stage
JCOE Pipe Forming at JindalSAW, India (2012)

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



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



Oman Business News

25 Sep 2017

Oman, Iran, India discuss gas pipeline at trilateral meeting in New York



Oman, Iran, India discuss gas pipeline at trilateral meeting in New York

www.businessgateways.com

Yousuf bin Alawi bin Abdullah, Minister Responsible for Foreign Affairs met at the premises of the Sultanate's permanent mission in New York with **Mohammad Javad Zarif, Iran's Foreign Minister** and **Sushma Swaraj, Minister of External Affairs of India.**

The meeting aimed to enhance the relations among the three countries in **economic field** mainly in **energy sector**.

Iran's foreign minister reaffirmed that the meeting has discussed the development of the relations and cooperation among the three countries, particularly that the three countries have solid relations with each other.

He also hoped that the three countries meet the **energy needs** of one another through **import and export**.

Yousuf bin Alawi stated that the meeting exchanged views on the ways of utilising and benefiting from Iran's gas and the cooperation mechanisms to overcome the crossing of gas and oil pipelines through the deep waters in the Sea of Oman and the Indian Ocean.

Responding to a question on the nuclear deal and the stance of the **US president**, Iran's foreign minister said that the US president has taken a decision on the nuclear deal but has not revealed the same, however, all countries have agreed that the said nuclear deal represented a global achievement and not a bilateral one as it has been agreed upon by the **UN Security Council** and the international community.

Source Link: <http://timesofoman.com/article/117889/Oman/Oman-Iran-India-discuss-undersea-gas-pipeline-Iran-nuclear-deal-at-trilateral-meeting-in-New-York>



Iran, Oman's Top Diplomats Meet in Muscat

News ID: 1534467 Service: Politics

October, 02, 2017 - 13:28



TEHRAN (Tasnim) – Iranian Foreign Minister Mohammad Javad Zarif met his Omani counterpart in Muscat on Monday for political talks.

The top Iranian diplomat arrived in Oman on Monday morning for a one-day visit and held a meeting with the sultanate's

Foreign Minister Yusuf bin Alawi bin Abdullah.

Zarif is going to have more high-profile meetings with Omani officials to discuss the latest regional developments, as in Iraq, Syria, Yemen and the Persian Gulf region.

The two sides will also explore avenues for the enhancement of Tehran-Muscat ties and cooperation in the field of energy, **including gas transfer from Iran to India.**

Zarif is scheduled to pay a visit to Qatar following his trip to Oman.

Back in September, the foreign ministers of Iran, Oman, and India held a meeting in New York to discuss closer relations among the three Asian nations, with the focus on cooperation in the energy sector.

Zarif, his Indian counterpart Sushma Swaraj, and Oman's bin Alawi met on September 23, on the sidelines of the 72nd regular session of the United Nations General Assembly.

<https://www.tasnimnews.com/en/news/2017/10/02/1534467/iran-oman-s-top-diplomats-meet-in-muscat>

Delegation Meetings Photographs



Delegation Meetings Photographs



SAGE Delegation Members Meeting with Senior Officials of NIGEC on 25th July 16



SAGE Delegation visit to DNV GL, Norway



GAIL Representatives in CastorOne, Singapore during October, 2011



SAGE Deligates Visit to Nippon Steel & Sumitomo Metal Corporation at Tokyo, Japan on 0n 01-12-16

- Indian gas demand and supply balance **shortfall** continues to increase from 100 mmscmd in 2014 to **270 mmscmd in 2030** as per PNGRB vision 2030 study.
- Iran is willing to supply 31 mmscmd gas for MEIDP. Iran is also willing to consider supplying gas for a **2nd SAGE Pipeline**.
- Project will add to energy **security by diversification**.
- Provides an **economically competitive** method of gas supply and **promotes completion** in Indian energy markets.
- The **technology** to design and lay deep sea pipeline is available **now**.
- The project is **financially** and **technically viable**.
- Long Term contracts and surety of supply, will facilitate **existing** projects in India which utilizes the Gas (Example: Power / Fertilizer Plants).
- Project needs **strong diplomatic & political** support from Iranian and Indian Governments
- Long Term contracts and surety of supply, will facilitate new greenfield projects in India especially
 - **Power & Fertilizer Sectors**.
- Turkmenistan Gas & OVL Farzad B Gas can also come to India through SAGE Pipeline route.