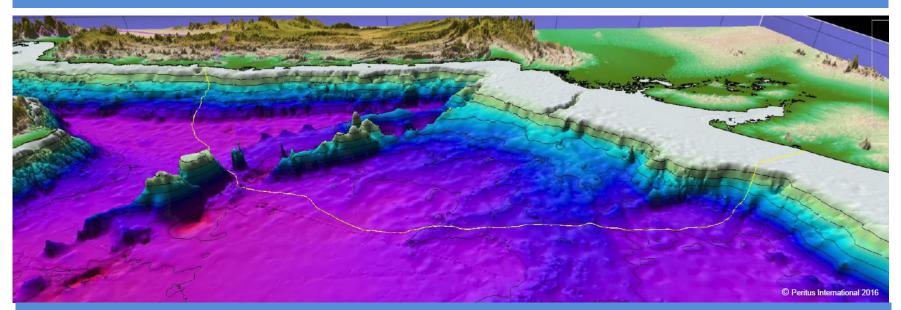




### MIDDLE EAST TO INDIA DEEP-WATER GAS PIPELINE PROJECT



### **PRICE COMPETITVENESS & AFFORDABILITY IN INDIAN MARKETS**

### Presentation to the Ministry of Petroleum, Iran

Tehran - 6th May 2017

By SBI Capital Markets

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### AGENDA

NATURAL GAS MARKET IN INDIA

PRICE COMPETITIVENESS & AFFORDABILITY OF NATURAL GAS

**MEIDP-** Long Term Solution of Affordable Gas

**TARIFF & GAS PRICING OPTIONS** 

**SUPPORT FROM IRAN** 

**NEXT STEPS** 





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#### NATURAL GAS MARKET IN INDIA

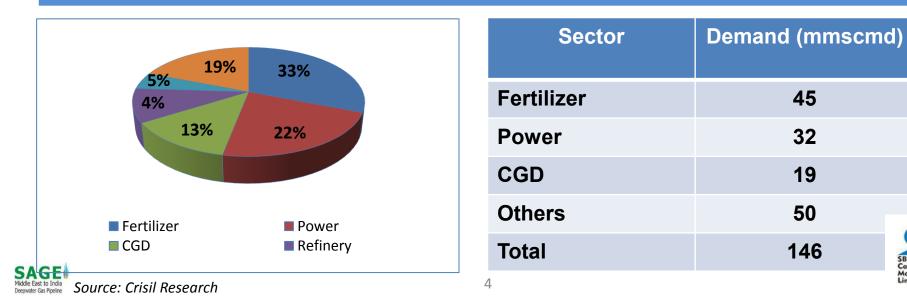




# NATURAL GAS MARKET IN INDIA

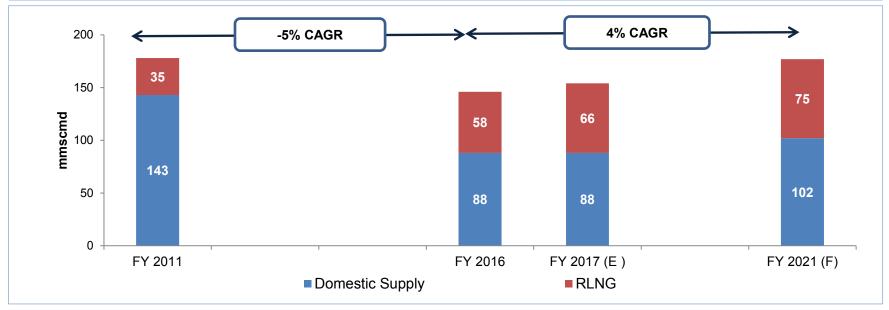
- NATURAL GAS is the third major fuel consumed in India
- > During FY 2016, total consumption for Natural Gas was 146 mmscmd in India
- Domestic Production of Natural Gas in India has declined in the recent years from 143 MMSCMD in FY2011 to 88 MMSCMD in FY2016
- Power(22%) , Fertilizer (31%) & CGD (13%) Sectors being price sensitive sectors constitute 66% of the total demand in FY 16. However they face challenges in terms of:
  - Decreasing supply of Domestic Natural Gas
  - Affordability of Gas (through Imported LNG)

#### Sector wise consumption of Natural Gas in FY 16



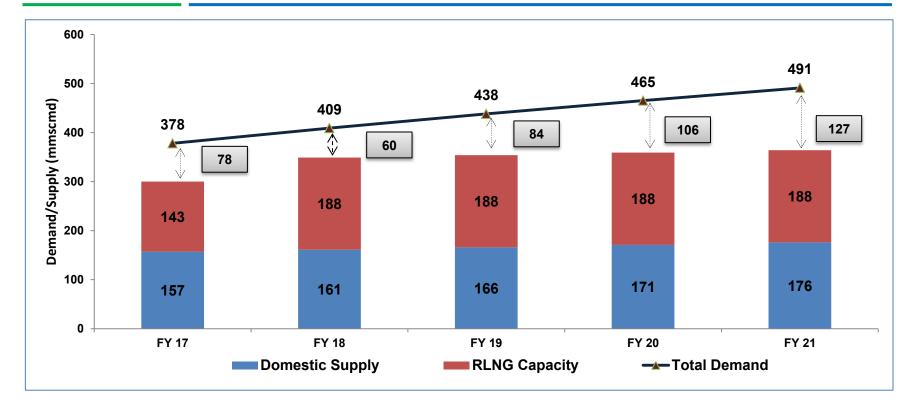
### DEMAND-SUPPLY GAP (BASED ON AFFORDABILITY)

#### Domestic Gas Supply and Demand Projections (based on Affordability)



- Based on Affordability, India's natural gas demand is projected to increase at a 4% CAGR over the next 5 years to 177 mmscmd in 2020-21,
  - ✓ The domestic natural gas production is expected to grow at 3%
- > Gap between demand and supply of domestic natural gas is expected to widen going forward
  - Subject to affordability, shortfall in Gas Supply can be met by a mix of sources viz.
    - LNG/RLNG ,
    - ✓ Transnational Gas Pipelines

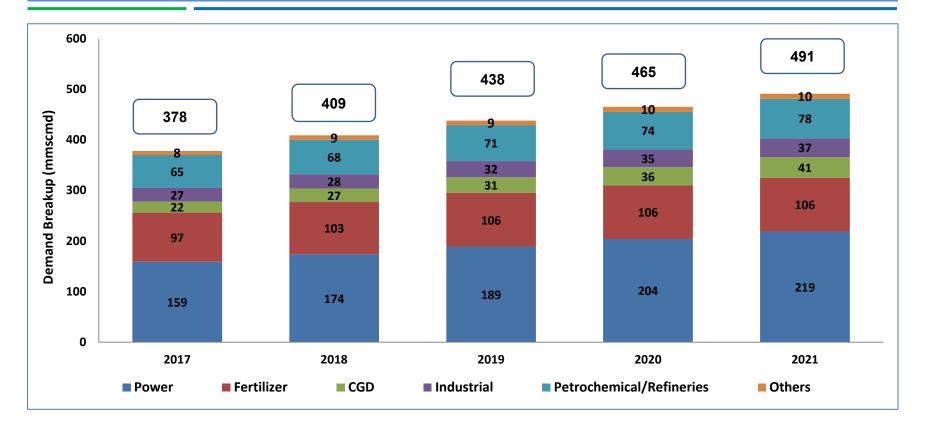
### DEMAND-SUPPLY GAP (POTENTIAL DEMAND)



- Total potential demand for natural gas is expected to increase to around 491 mmscmd by 2020-21 (CAGR ~ 6.5%)
- Gap between demand & supply of domestic natural gas is expected to widen going forward
  - Affordable Gas by Transnational Pipeline can act as a Long Term Solution to bridge this Gap



# **PROJECTED SECTOR WISE POTENTIAL DEMAND**



Majority of this incremental demand shall be from Power, Fertilizer and CGD sector.

- Gas based power generation is expected to contribute in the range of 42% to 45% to overall demand
- Demand from Fertilizer & CGD sector is expected to contribute of around 25% to 30% i the total demand



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#### PRICE COMPETITIVENESS & AFFORDABILITY OF NATURAL GAS





### Affordability of Natural Gas in India-Power Sector (1/2)

#### Power Sector: Competition with Power generated with Coal

- ✓ Lower cost of Power generation through coal and improving supply of Domestic Coal
- ✓ Gas based Power plants operated at a low PLF (average of 22.5% for FY 2016) due to shortage of Domestic Gas

#### Gas Based Power Plants

- Investment of ~ INR 1.20 Lacs Crore (\$ 18.46 Bn)\* has already been made in Gas based Power plants with a combined Power generation capacity of 24150 MW
- RLNG at prevailing prices not able to compete with Power generated by Coal based power plants. As a result:
  - Stranded Gas based power plants of 14,300 MW had Zero PLF during April 2014 to Jan 2015
  - Additionally about 9,845 MW of Gas based power plants which received domestic gas had average PLF of 32.2%

#### Availability of Domestic Gas for Power sector

- ✓ 23 mmscmd of Domestic Gas was available to Power sector in 2016
- Supply of domestic gas to Power sector is expected to remain stagnant over the medium term as domestic supply is constrained and there have been no major Gas discoveries

#### The total requirement of Gas for the existing Gas Based capacity is ~106 mmscmd.

### Affordability of Natural Gas in India-Power Sector (2/2)

- > Different source sf fuel of Power Generation in India include Coal, Renewable & Nuclear
- Power Generation companies sign PPAs with buyer at different Tariff
  - Power Tariff is based on the cost of generation of which the fuel cost constitutes a major component
  - ✓ Coal based power is most affordable owing to competitive pricing of Coal
- Coal Based Power plants constitute more than 60% of total installed capacity in India
- Cost of Power generation at Plant from Domestic Coal is ~Rs 2.98/KWh and Rs 3.20/Kwh for Blended Coal (30% Imported from Indonesia and 70% Domestic Coal) (<u>Annexure</u>)
- Coal as a fuel is the major competitor to Gas based Power
  - ✓ On account of Coal being more economical viz. Natural Gas
  - ✓ However Natural Gas is a greener source of Power Generation

Price of Natural Gas needs to be competitive for Power generation from Gas based Power Plants





### **Competitive Pricing of Affordable Gas with Hybrid of Renewable Energy & Coal**

- Cost of Power generation at Plant from Domestic Coal is ~Rs 2.98/KWh and Rs 3.20/Kwh for Blended Coal (30% Imported from Indonesia and 70% Domestic Coal)
- However, Power generated from Gas being a cleaner energy, the cost of Power generation from Gas should be a mix of Power generated from Coal & Renewable energy
- Renewable Power Tariffs are in the range of Rs 4.5-5/KWh
- The comparable Tariff for hybrid of Domestic Coal/Blended Coal & Renewable Power works to ~Rs 3.74/KWh & Rs 3.85/KWh
- Delivered price of gas (at burner tip) required for hybrid of Domestic Coal/Blended Coal & Renewable Power works to ~USD 4.26/mmbtu & USD 4.46/mmbtu respectively (<u>Annexure</u>)

Transnational Pipelines like MEIDP would provide an Energy Corridor to deliver Gas at affordable price





### Affordability of Natural Gas in India-Fertiliser Sector

#### Fertiliser sector

- Urea is the most widely used fertiliser in India, with a contribution of around 55%
- > Total 30 Urea units under operation.
  - ✓ 27 units are based on Natural Gas as feedstock and 3 on Naphtha as feedstock.
  - ✓ 5 new Gas based Urea units are coming up
- Total requirement of Gas from the existing Urea units is around 44 mmscmd
- With addition of new units the demand is likely to go up to 55 mmscmd
- Currently, out of total requirement of around 44 mmscmd, 55-60% is fulfilled through Domestic Gas and remaining amount is imported RLNG
  - ✓ Share of RLNG will increase significantly to around 50-55 % in the absence of any increase in production of Domestic Gas
- Availability of lower cost Transnational Gas in the country can be a major boost to cater to this demand





# Affordability of Natural Gas in India-CGD Sector

#### CGD Sector

- Gas for City Gas Distribution is a mix of Domestic Gas and LNG
- ✓ The total demand in this sector is expected to be 41 mmscmd by 2021 (CAGR ~8%)
  - 60 Geographical Areas are proposed to have a CGD network by 2021
- With increased focus on CGD and PNG sector and absence of incremental Domestic Gas will lead to increased reliance on imported LNG
  - Imported LNG makes CGD gas unattractive for industrial and commercial segments owing to availability of cheaper alternate fuel sources
- Therefore Affordable Gas through Transnational Pipeline to positively impact viability of CGD Companies and affordability of Gas in Industrial /Commercial sector.

### Consumption of Natural Gas in Anchor Sectors is governed by Availability & Affordability

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**MEIDP-***Long Term Solution to Supply of Affordable Gas* 





# MEIDP- SAGE Project Vision

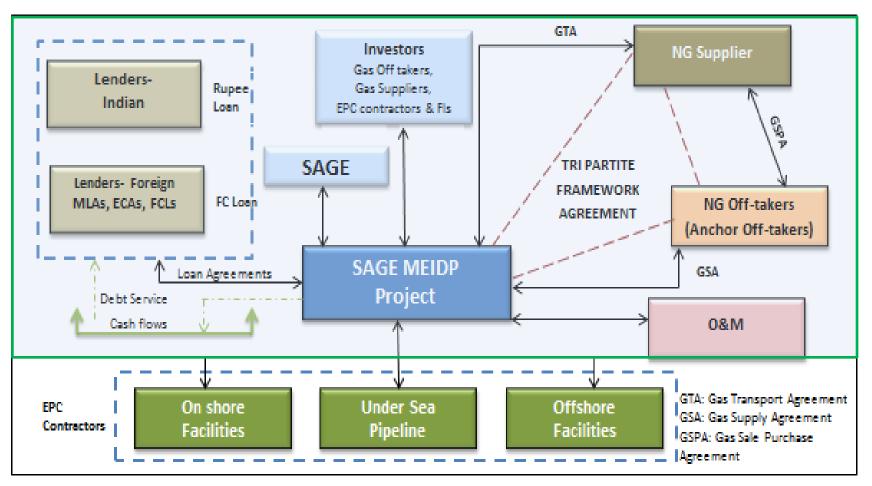
Project	Middle East to India Deep- Water Gas Pipeline Project
Sponsor	South Asia Gas Enterprise Pvt Ltd (SAGE)
Proposal	Development of an <b>Energy Corridor</b> for transportation of gas from <b>Middle</b> <b>East to India</b> by the <b>safest</b> , <b>most economic</b> & <b>reliable means</b>
Proposed Route	Middle East Port to Indian Port (Gujarat) in India, via Arabian Sea
Common Carrier	The pipeline will be laid as a " <b>Common Carrier</b> " 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 <b>Tri-partite Framework Agreement</b>
Global Consortium	SAGE has been working on the Project with Global Consortium for last 6 years





### **PROJECT STRUCTURE-** *Proposed*

#### Offshore SPV to be incorporated based on tax implications of different geographies in the world





### **MEIDP-** Specifications & Timeline

#### **Specifications**

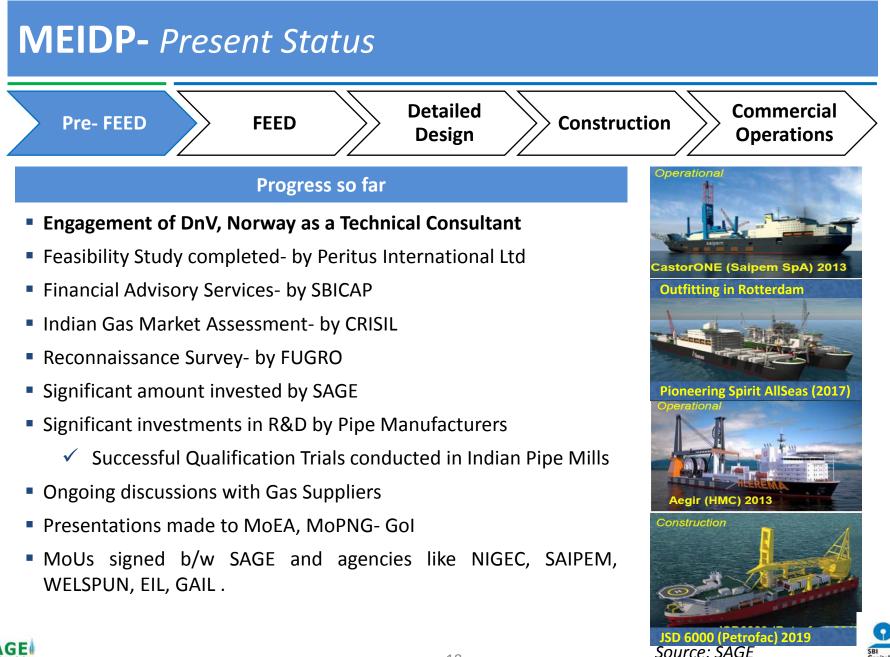
- Length: ~ 1300 km 1400 km (Base Case)
- Project Cost : ~ USD 5.20 Bn
- Max Depth: ~ 3500 meters
- Internal Diameter: 24" I.D.; Wall Thickness: 32.9 mm -40.5 mm WT(DNV OS-F101)
- Flow Rate: 1.1 BSCFD (31.1 MMSCMD)

#### **Project Implementation Timeline**

Project Duration: 5 years







## **MEIDP-** *Established Technical Feasibility*

#### Technical Viability Study conducted by Peritus International Limited (September 2016)

#### Availability of Pipeline Laying Vessels

- Five vessels are capable of installing the pipeline in the maximum water depth of the MEIDP Pipeline. These include:
  - Saipem's 7000 and HMC's Balder & Aegir are currently available
  - Allseas' Pioneering Spirit will be operational in 2017
  - Saipem's Castorone is available.

#### Availability of Pipelines

- Two pipe Mills (Jindal SAW, PCK) have manufactured pipeline specifically for SAGE to MEIDP Dimensions and Specification.
- ✓ JFE is about to embark on a similar production and testing trial.
- PCK (China) are currently undergoing a "Ring Collapse" test program, witnessed by SAGE.
  Preliminary results are successful.

#### Availability of Improved Design Methods

- Technologically superior design systems and Remotely Operated Vehicles are now rated to function at the depth of MEIDP
- Deepwater repair systems along with better survey and positioning capabilities are available





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#### **TARIFF & GAS PRICING OPTIONS**





# MEIDP-Tariff & Gas Price at inlet (1/2)

#### **Tariff Fixation Approach for MEIDP Project (August 2016)**

- During the last meeting with NIGEC held in Tehran in July 2016, NIGEC had confirmed their interest to supply Gas on long term basis to the MEIDP Project.
- > For the purpose of estimation of final Delivered price of Gas, it was proposed :
  - To devise a mechanism for fixation of Gas Price & Pipeline tariff
- An Approach paper for of devising the pricing methodology was shared with NIGEC in August 2016
  - ✓ To establish the purchase price of gas from Iran for MEIDP Project
- Purchase price was derived considering the following factors viz.
  - Commercial Viability of the MEIDP Project and
  - ✓ Affordability of imported gas in different sectors (Power, Fertilizer, CGD) viz. other alternate fuels.





# MEIDP-Tariff & Gas Price at inlet (2/2)

- > The Pipeline Tariff is estimated based on a specific Target Return of the Project.
- Final Gas price consists of two components viz. Gas Purchase Price & Pipeline Tariff
- Six options have been worked for the calculation of Pipeline Tariff

**Option 1:** Fixed at a Slope w.r.t Crude Price

**Option 2:** Fixed Tariff

**Option 3:** Fixed Tariff with escalation

**Option 4:** Gas Tariff with 50% component linked to slope w.r.t. Crude Price and 50% component linked to Fixed Gas Tariff with escalation

**Option 5:** Fixed at a Slope w.r.t LNG Price (Henry Hub)

**Option 6:** Linked to Crude price and Gas Volume

- Option 4 has been considered for discussion with a Target Project IRR of 14% on account of
  - The fixed component with escalation shall ensure a stability in the Tariff whereas the Floating Component would link the Tariff to ongoing Crude Prices.
- Based on the above, the Natural Gas Price at the inlet of the MEIDP Pipeline in Iran is estimated

#### Natural Gas Pricing based on its Affordability in India and Project Viability



# **MEIDP-** *Tariff Workings*

- The working of Natural Gas price at the inlet of Pipeline has been done based on the following broad assumptions viz.
  - Crude price based on Nymex Futures (dated August 2016)
  - Contract period of Gas supply assumed at 30 years
  - ✓ LNG Price Conversion Factor of 10%
  - Escalation in Tariff @3% p.a.
  - ✓ Discount on LNG price of USD 1.50/mmbtu

Particulars	Units	Mar-23	Mar-24	Mar-25	Mar-26	Mar-27
Crude Price	USD/BBL	54.84	55.66	55.99	57.11	58.25
LNG Price	USD/MMBTU	5.48	5.57	5.60	5.71	5.83
Regas Charges	USD/MMBTU	0.97	1.02	1.07	1.13	1.18
Effective LNG Price	USD/MMBTU	6.46	6.59	6.67	6.84	7.01
Discount on LNG price	USD/MMBTU	1.50	1.50	1.50	1.50	1.50
Affordable Gas Price in India						
(at Port)	USD/MMBTU	4.96	5.09	5.17	5.34	5.51
Less: Tariff	USD/MMBTU	2.29	2.34	2.39	2.45	2.51
Less: Custom Duty differential						
(LNG and Gas)	USD/MMBTU	-	-	-	-	-
Froposed Net Gas Price in Iran	USD/MMBTU	23 <b>2.66</b>	2,74	r Tariff Onti	ons working in	Annexure

### MEIDP Gas: Hybrid of Coal Based & Renewable Power (1/2)

- The Gas price should be in the range of \$4.26-\$4.46/mmbtu (at burner tip) to be competitive with the Pricing of Renewable & Coal based Power (working in <u>Annexure</u>)
- The calculated Gas price of \$4.96/mmbtu (at Indian Port) along with Custom duty and Inland cost will cost around \$5.70-5.80/mmbtu (at burner tip),
  - ✓ At this price the Gas will not be Affordable for the Power Sector
- Purchase price MEIDP Gas at Iran Port to compete with Power generated by Hybrid of Renewable Sources and Domestic /Blended Coal works in the range of USD 1.65-1.84/mmbtu(working in <u>Annexure</u>), Therefore ,
  - ✓ **Backward integration** is necessary to realise **Economic Synergy** from the Project
    - To ensure reduction in the Gas Supply Price in Iran making it affordable in India





### MEIDP Gas: Hybrid of Coal Based & Renewable Power (2/2)

- The following table highlights the working with revised Crude Pricing (based on Nymex Futures dated 02 May 2017).
- Discount on the LNG prices increased from \$1.50/mmbtu to \$1.75/mmbtu
  - To make the MEIDP Gas price comparable to the cost of Gas required for the generation of Gas based Power at competitive prices.

Particulars	Units	Mar-23	Mar-24	Mar-25	Mar-26	Mar-27
Affordable Gas Price	USD/MMBTU	4.46	4.61	4.74	4.90	5.06
Less: Tariff*	USD/MMBTU	1.92	1.96	2.01	2.06	2.11
Less: Custom Duty	USD/MMBTU	0.20	0.21	0.22	0.23	0.24
Less: Inland Cost	USD/MMBTU	0.50	0.50	0.50	0.50	0.50
Proposed Net Gas Price*	USD/MMBTU	1.84	1.93	2.01	2.12	2.22

\*Based on Project IRR of 12% (30 years)

Proposed Delivered Gas price (at Burner tip) needs to be in range of \$ 1.84-\$2.22/mmbtu to be affordable for Gas based Power generation





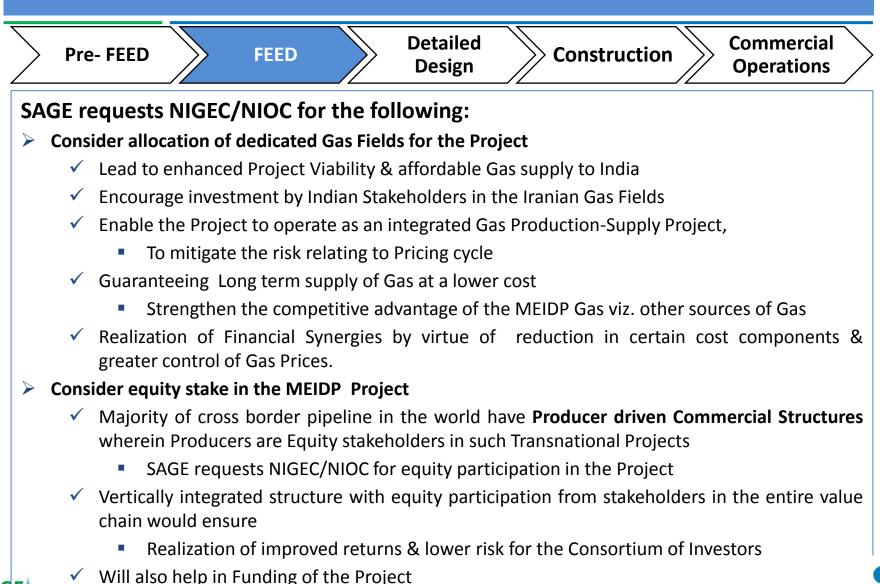
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SUPPORT FROM IRAN





### **MEIDP-** Support from Iran



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#### **NEXT STEPS**





# **NEXT STEPS**

# SAGE proposes the following steps for successful implementation of the Project

- Vetting of Tariff & Gas Supply Price workings
  - Finalization of Tariff & Gas Purchase Price between NIGEC & SAGE based on the Price & Tariff
    Options submitted to NIGEC
  - Submission of In-principle offer for Gas Supply Price to Govt. of India and Gas Off-takers for further discussions
- In-principle Offer for Equity Participation from NIGEC/NIOC
  - NIGEC/NIOC to associate with MEIDP Project as a Strategic Equity investor which will
    - Demonstrate commitment of Iran to Indian Gas Off-takers
    - Give additional business to Iranian Companies (Construction, EPC, etc.)
- Request Iranian Stakeholders to visit India
  - ✓ For discussions & meetings with Government of India & Gas-Off takers to deliberate on the various Geo-Political & Commercial aspects of the Project
- Explore options for Vertical Integration
  - Consider allocation of dedicated Gas Fields for this Project
    - Lead to Rationalization of the Delivered Price of Gas in India owing to the realization of the Economic Synergies











GROUP

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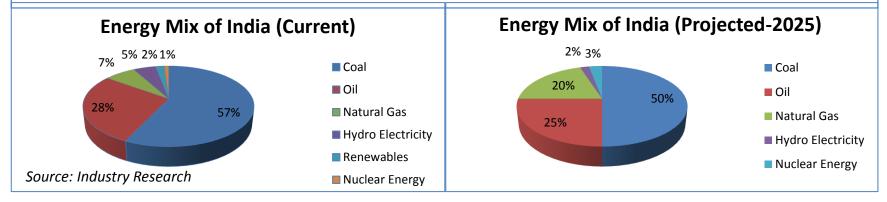
www.sage-india.com

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# **INDIA'S ENERGY SCENARIO (Annexure)**

- India is the 4<sup>th</sup> Largest Energy Consumer in the World (NG constitutes 7% of India's Energy Basket)
- Energy Demand to grow with GDP; Indian Economy projected to grow over 7% for FY 18 (IMF)
- Natural Gas expected to constitute 20% of India's Energy Basket by 2025 PNGRB Vision-2030



#### **Energy Sources in India**

COAL: Coal is the dominant energy source contributing 57% of the total energy consumption

CRUDE OIL: Second major fuel consumed in India; Import Dependency: 78% of Consumption

NATURAL GAS: Third major fuel consumed in India;

- Domestic Production of Natural Gas in India has declined in the recent years from 143 MMSCMD in FY2011 to 88 MMSCMD in FY2016
- ✓ India has Low reserves of Natural Gas (Proven Reserves of 1.4 TCM, 0.8% of World Reserves)



### **Competitive Pricing of Affordable Gas with Coal** (Annexure)

- Power generated from Domestic Gas is ~Rs 3.49/KWh, which is comparable to coal based power
- Cost of Power generation from Imported RLNG is ~Rs 6.47/Kwh, making imported LNG un-affordable
- In the absence of sufficient supply of Domestic Gas, an alternate source of affordable gas needs to be explored for Gas based power plants.

#### Delivered price of Affordable Gas compared with Power from various Coal sources

		In comparison to	
Particulars	Imported Coal	Domestic Coal	Blended Coal
Tariff(Rs./kW-h) (to match coal based Power)	4.46	2.98	3.20
SHR(in Kcal/KWh)	1900	1900	1900
Variable Tariff (Rs./kW-h)	2.96	1.48	1.70
Fixed tariff(Rs./kW-h)	1.50	1.50	1.50
Delivered Price (USD/mmbtu) in India at Burner Tip	5.63	2.82	3.24



Delivered Price for Affordable Gas should be in the range of \$3.24-\$5.63/mmbtu



### Competitive Pricing of Affordable Gas with Hybrid of Renewable Energy & Coal (Annexure)

#### Delivered price of Affordable Gas compared with Hybrid Power

	In comparison to Hybrid of				
Particulars	Domestic Coal & Renewable Blended Coal & Ren Power Power				
Total Tariff(Rs./kW-h)*	3.74	3.85			
SHR(in Kcal/KWh)	1900	1900			
Variable Tariff (Rs./kW-h)	2.24	2.35			
Fixed tariff(Rs./kW-h)	1.50	1.50			
Delivered Price (USD/mmbtu) in India at Burner Tip	4.26	4.46			

\*50% of the Renewable Power based Tariff Component (i.e. Rs 4.5 per kwh) and 50% of the Domestic/Blended Coal based Power Tariff Component (i.e. Rs 2.98/3.20 per kwh) has been used.





### Affordability of Natural Gas in India-Power Sector (Annexure)

#### Cost of Power Generation from different types of Coal

Particulars	Units	Imported Coal (Indonesia)*	Domestic Coal	30% Imported + 70% Domestic
Landed Price at Plant	USD/tonne	USD 76.23	USD 40.49	USD 51
Calorific value	Kcal/Kg	4,200	4,450	4,915
Station Heat Rate	Kcal/Kwh	2,400	2,400	2,400
Energy Value of 1 Unit	Rs./Kcal	0.00123	0.00062	0.00071
Variable Tariff	Rs./KW-h	2.96	1.48	1.70
Fixed tariff	Rs./KW-h	1.50	1.50	1.50
Total Tariff	Rs./KW-h	4.46	2.98	3.20

\*Indonesian coal considered as imported Coal. "F" grade coal considered as domestic coal.





# MEIDP- Tariff Workings (Annexure)

> The Tariff working for other Options (other than Option 4) are given in the table below

USD/mmbtu

Particulars	Mar-23	Mar-24	Mar-25	Mar-26	Mar-27
Option 1: Fixed at a Slope w.r.t					
Crude Price	2.39	2.43	2.44	2.49	2.54
<b>Option 2: Fixed Tariff</b>	2.68	2.68	2.68	2.68	2.68
<b>Option 3: Fixed Tariff with</b>					
escalation	2.20	2.26	2.33	2.40	2.47
Option 5: Fixed at a Slope w.r.t					
LNG Price (Henry Hub)	1.96	2.06	2.16	2.26	2.36
<b>Option 6:</b> <i>Linked to Crude price and</i>					
Gas Volume	1.87	1.96	2.03	2.13	2.24



### MEIDP Gas: Hybrid of Coal Based & Renewable Power (Annexure)

#### Price of Gas at inlet to compete with Power from various Coal Based & Renewable Sources

USD/mmbtu

		005/1111504	
Particulars	Domestic Coal & Renewable	Blended Coal & Renewable	
	Power	Power	
Delivered Price	4.26	4.46	
Less: Local Transport	0.50	0.50	
Less: Custom Duty	0.19	0.20	
Less: Pipeline Tariff*	1.92	1.92	
Gas Price at Inlet of MEIDP pipeline	1.65	1.84	

\* Considering As built cost of Project of ~USD 5.2 Bn & Project IRR of 12%





### **COST COMPETITIVENESS-** *MEIDP vs RLNG* (Annexure)

#### **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 2.00-2.50/mmbtu
- Additional Cost Component attributable to Imported LNG include:
  - Liquefaction, Regasification & Transportation of gas: ~ USD 3– 4/mmbtu

(USD/mmbtu)

MEIDP Pipeli	ne Tariff	Contracted LNG		
Particulars	Pipeline Tariff	Particulars	<b>Contracted Tariff</b>	
Price of Natural Gas	1.84	Price of Natural Gas*	1.84	
	1.92	Liquefaction Charges	2.50	
Pipeline Tariff		Transportation Charges	0.75	
Ex-Port Price	3.76	Regasification Charges	0.80	
Custom Duty	0.19	Custom Duty	0.30	
Landfall Price	3.96	Landfall Price	6.19	

\* Based on the assumption that Contracted LNG price & MEIDP inlet price are same

Potential for attractive Equity Returns as the Gas from MEIDP pipeline would be cheaper compared to LNG by around USD 2-2.5/mmbtu

### **MEIDP-** *Engagement with Gol & Other Stakeholders* (Annexure)

#### **Discussions with Gas Suppliers (NIGEC)**

#### NIGEC - July 2016

NIGEC confirmed availability of 31 MMSCMD of gas for long term agreement of 25-30 years. NIGEC proposed to have closer interaction with Indian Gas Buyers & finalization of Pipeline Tariff.

**Presentations/ Meetings with various Ministries/ Forums** 

Ministry of Power - March 2015

Presentation made to Secretary, Ministry of Power; Positive Outlook for the Project; Importance of certainty of affordable natural gas emphasized for energy security of India

Minister- MoPNG - May 2014

Presentation made to Hon'ble Minister- MoPNG; Positive Outlook for the Project with acceptability of technical & financial feasibility; SAGE was advised to pursue the Project further

Visit to Tehran for Finalization of Tripartite Agreement - December 2013

MOU Partners IOC/GSPC/GAIL along with SAGE & EIL visited Tehran to finalise Tripartite Framework Agreement for long term Gas supplies; OVL & Indian Embassy (Tehran) also participated.

Dr Kelkar Committee - August 2013

Project brief presented; Project was appreciated & SAGE was advised to pursue the project further.

Member (Energy) Planning Commission - June 2013

The forum agreed that project is technically feasible and needs to be pursued further .



