Partner Reflections and Perspectives Oil and Natural Gas Corporation Ltd

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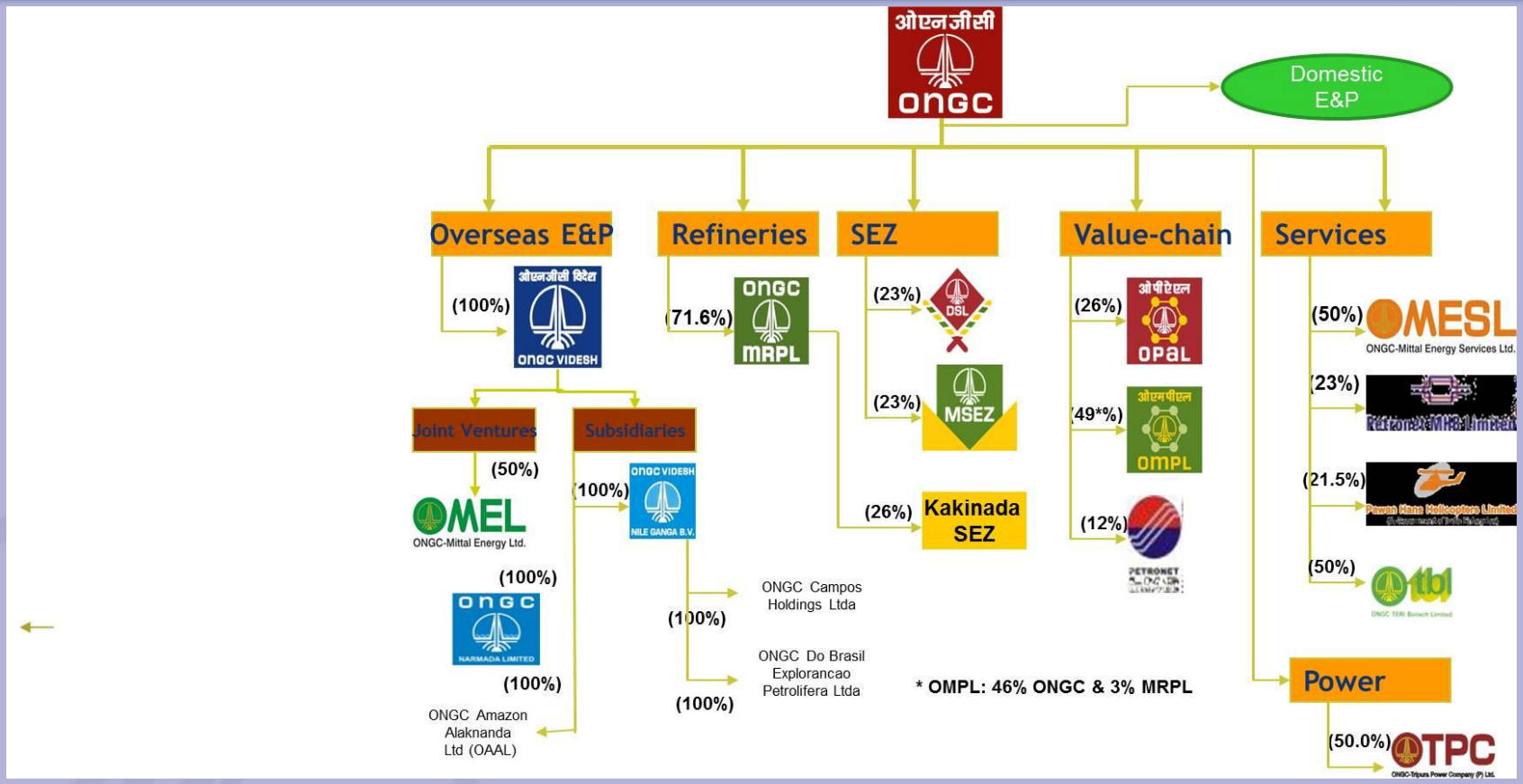
Presentation overview

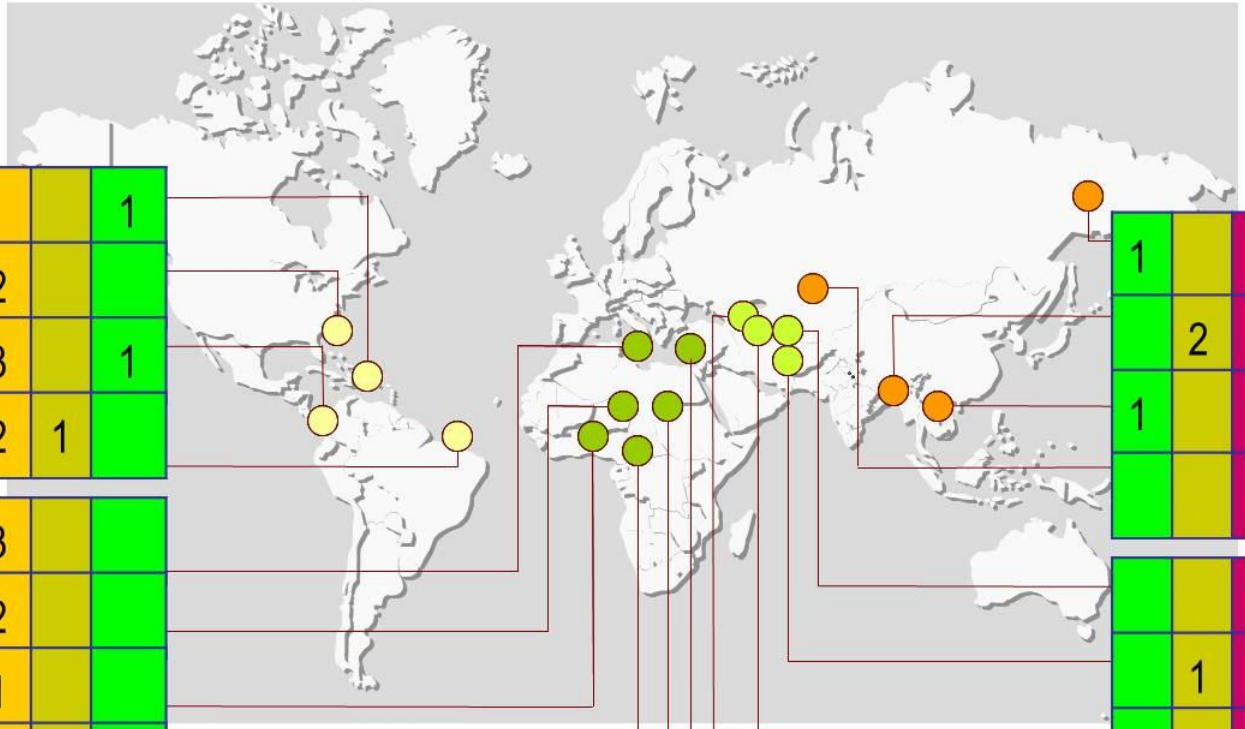
1. ONGC , GMI & Natural Gas STAR International
2. ONGC's Emission Reduction Projects:
   - Case Study 1: Methane Leak Detection and Quantification
   - Case Study 2: Vapor Recovery for Storage Tanks
   - Case Study 3: Snapshots of few projects
   - Case Study 4: Out reach campaign
3. Conclusions
4. Acknowledgements / Thank You / Questions

ONGC: The Company



ONGC- E&P Global Footprints

32 Projects in 16 Countries	14 Exploration	7 Development	11 Producing

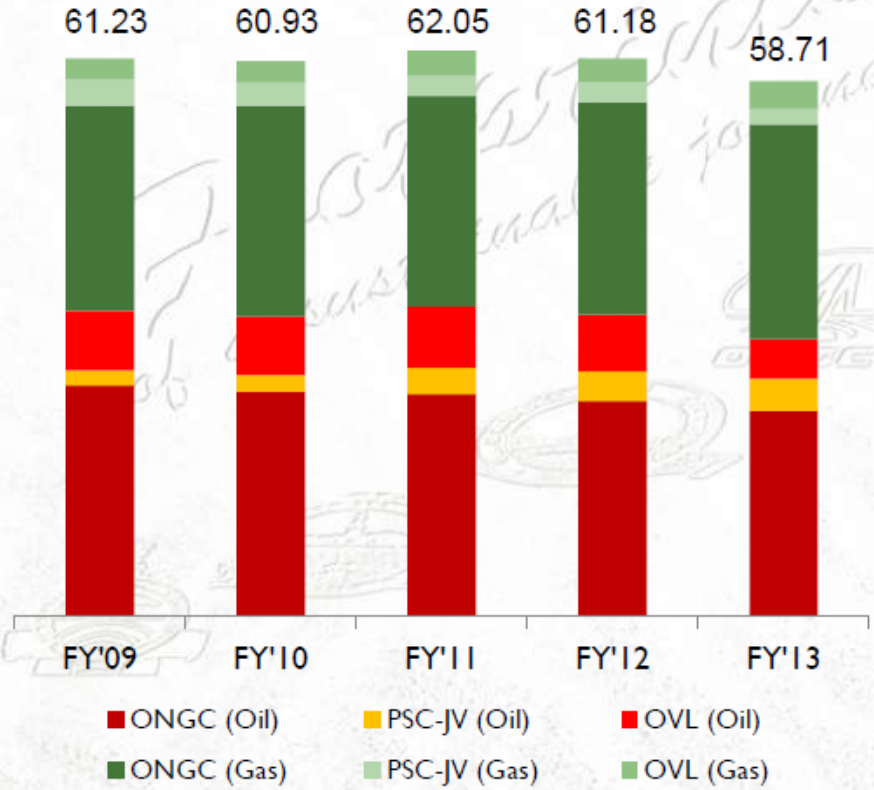


Venezuela			1
Cuba	2		
Colombia	3		1
Brazil	2	1	
Libya	3		
Nigeria	2		
Nigeria	1		
Congo Br	1		
Sudan	1		2
Egypt		2	

1			Russia
	2	3	Myanmar
1		2	Vietnam
		1	Turkmenistan
		1	Iran
	1		Qatar
		1	Iraq
1		1	Syria

ONGC Group: Production

- Lower production in FY'13 due to situations in Sudan & Syria and natural decline in domestic production.



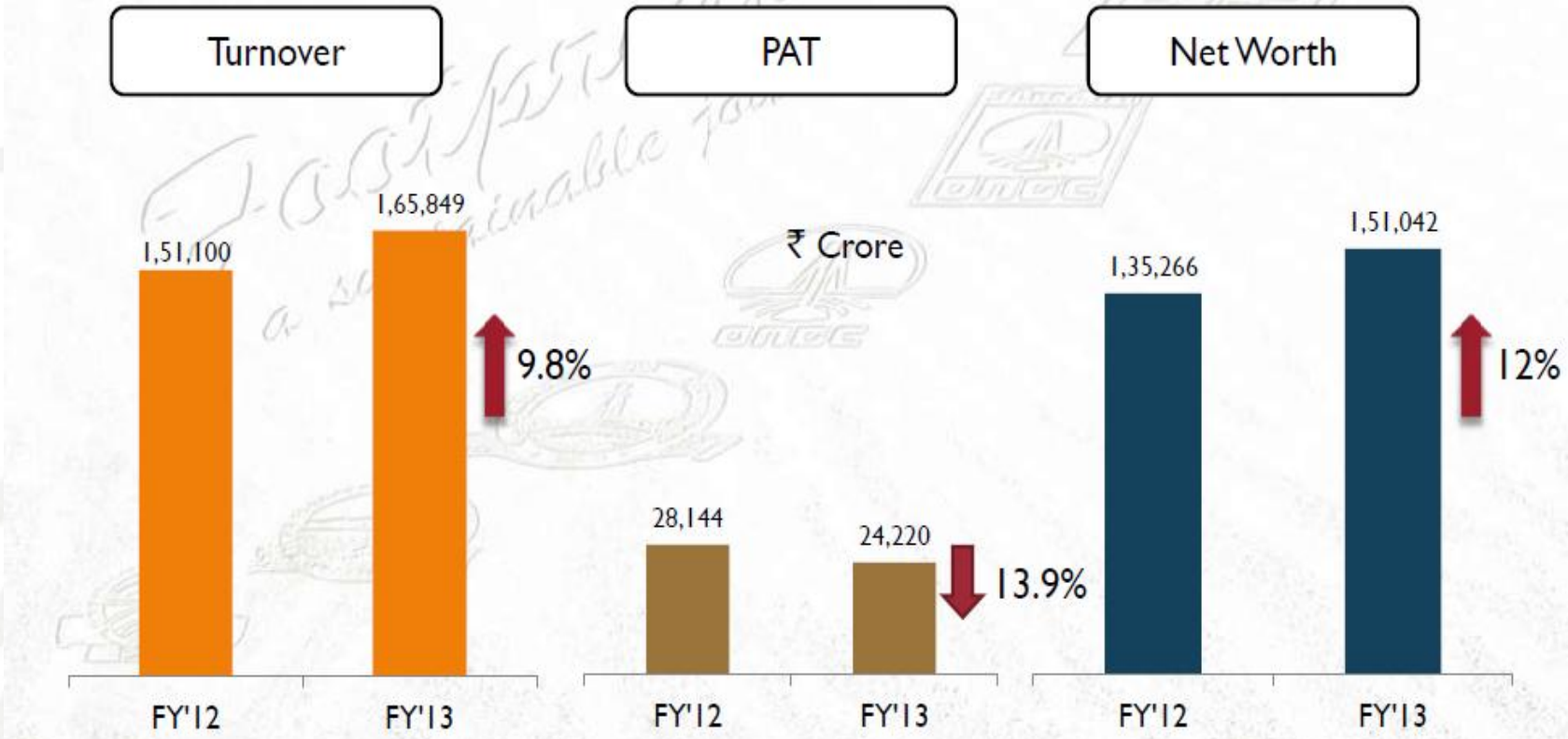
FY'13				
	ONGC	JV	OVL	Total
Oil	22.56	3.56	4.34	30.46
Gas	23.55	1.78	2.92	28.25
O+OEG	**46.11**	**5.34**	**7.26**	58.71

FY'12				
	ONGC	JV	OVL	Total
Oil	23.71	3.21	6.21	33.13
Gas	23.32	2.19	2.54	28.05
O+OEG	**47.03**	**5.40**	**8.75**	**61.18**

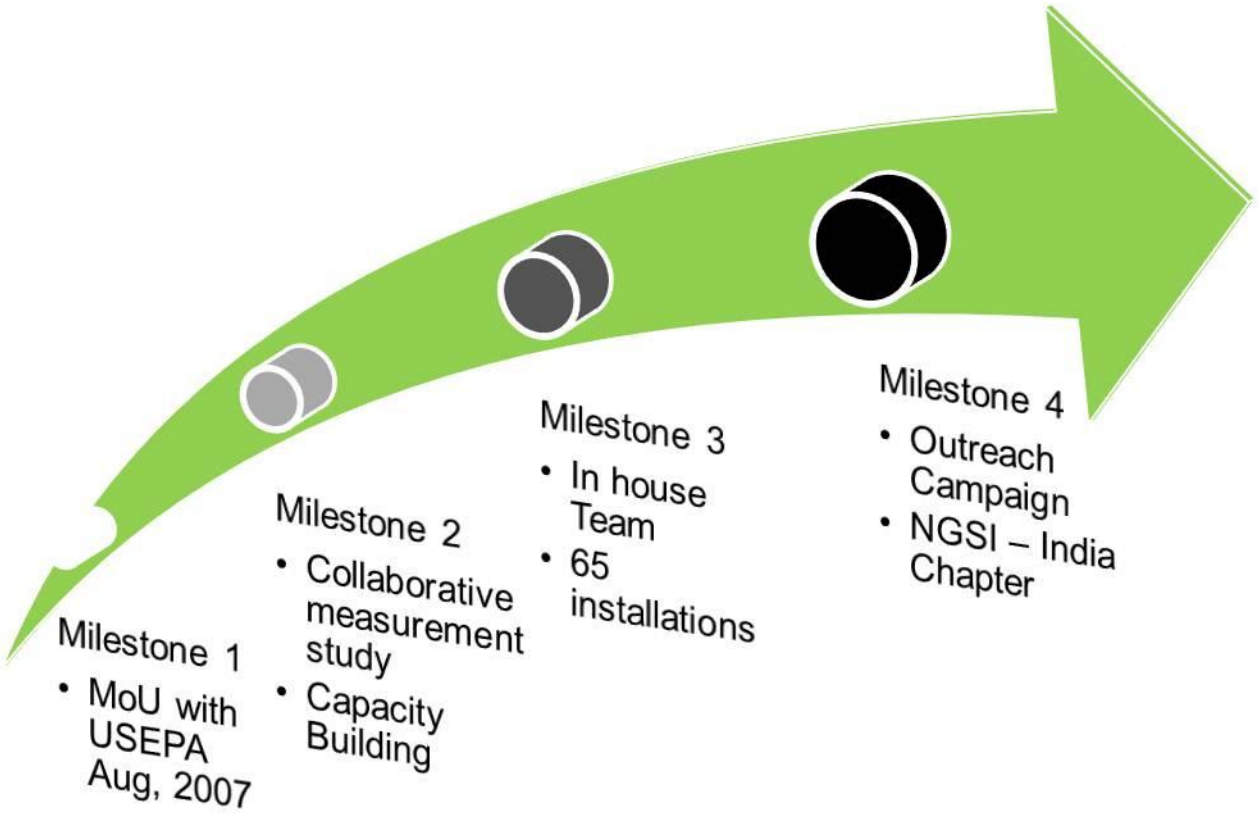
ONGC Group: Financial Performance

$ 27.5 billion company

- Highest-ever Turnover; up 9.8%



GMI: Journey in ONGC



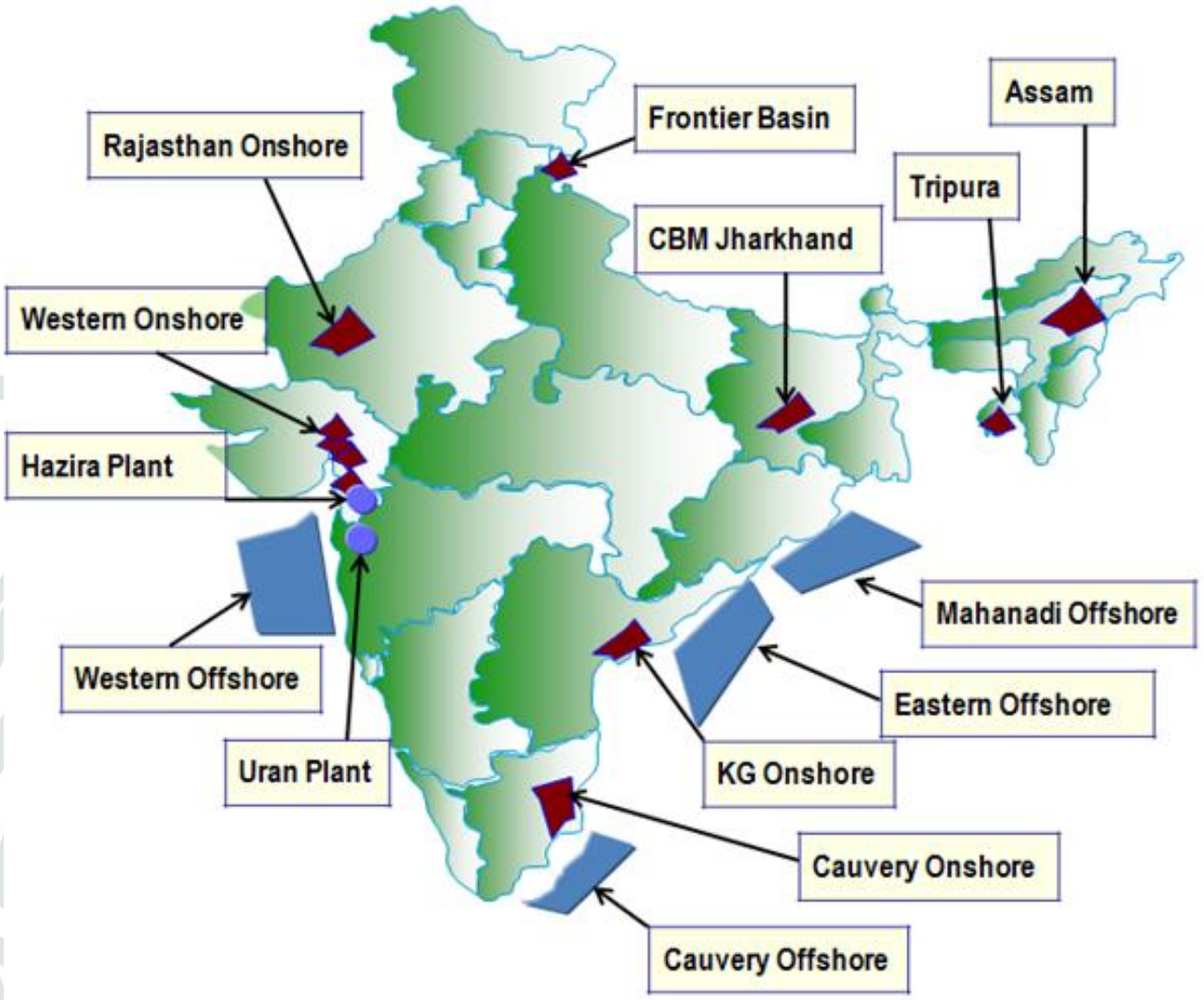
GMI - Natural Gas STAR International & ONGC

- Oil and Natural Gas Corporation Limited (ONGC): National Oil Company of India
- Gas STAR created in U.S. – 1993; expanded internationally in 2006
- Aug 2007: Signed Memorandum of Understanding (MOU) with US EPA and thereby joined the program in August 2007 through a MoU
- GMI is now an activity of ONGC's GHG Management Program.
- In the year 2012-13 we have reduced GHG by 5% from our domestic operation

ONGC India Operations





GMI - Natural Gas STAR International & ONGC

- May 2008 & Nov 2009: Seven onsite collaborative measurement studies
- Leak survey at 65 installations by ONGC in-house team
- Identified over 500 leaking points
- Quantified over 50 million m^3 (MMSCM) of fugitive hydrocarbons
- Reduced methane emissions over 14 MMSCM:

  - 2008-09 : 3.20 MMCM
  - 2009-10 : 4.72 MMCM
  - 2010-11 : 0.63 MMCM
  - 2011-12 : 1.99 MMCM
  - 2012-13 : 2.44 MMSCM
  - 2013-14 : (Under audit)

Environmental benefit: reductions over 185,000 tCO_2e

Emissions & Revenue Opportunities

Asset	No of Leaks & vents	Methane (MMSCM/Year)	Revenue Rs/ year
Ahmedabad	35	*0.86*	Approx. 17 crores (Gas value at Rs 8000/thousand m3)
Mehsana	38	*1.70*	
Ankleshwar	100	*10.65*	
Assam	88	*0.90*	
Cauvery	61	*0.85*	
Tripura	21	*0.14*	
Uran	12	*0.15*	
Mumbai Offshore	20	*1.80*	
Rajamundary	40	*1.50*	
Hazira	75	*2.10*	
Total	500	20.05	

Case Study 1: Methane Leak Detection

- ONGC benefitted substantially from identifying and repairing equipment leaks using directed inspection and maintenance (DI&M) at more than 60 of its facilities
- Total capital costs for a DI&M program included primarily equipment costs & man hour costs
- Annual costs include the labor and repair necessary to repair all leaks at each facility
- Taking into account capital and annual costs, this project yields a very good payback
- Since DI&M is an operating practice, continual surveys are necessary to maintain the benefits

Case Study 2: Vapor Recovery for Storage Tanks

- Initial finding - Avg 20000 SCMD of wet vapour from Twin Intermediate Tanks
- C1 component (CH_4) = 22.5%
- **Capex:** Approx. Rs 13 crores (***USD 2.8 million)***
- **Opex:** Rs 42 Lakhs/Annum – cost of electricity to run the compressors
  - ***Approx. USD 100000***
- Total Power required-120 KW
  - Power required to drive the TVRU compressor- 60 KW
  - Power required to compress gas in CSU off gas compressors - 60 KW
- Revenue from VAP INR 10 crores per/year (***USD 2.2 Million approx)***
- ***Payback -less than 2 years***

Existing TVRU – Uran Plant, ONGC

Case study 3: Servo Gas to Pneumatic

All the three projcts have compelling payback

- Replacement of servo gas system by instrument air at GCP Kallol

  Methane saving: *850 M3/Day*

- Replacement of servo gas system by instrument air at three installations of RJY Asset

  Methane saving: *Approx 1200 M3/Day*

- Tank Vapour Recovery by Ejector System at GCS Kuthalam

  Methane saving: *200 M3/Day*

Fiscal details of Implemented Projects

Project	Vapour /gas Recovered in SCMD	Methane Recovered in SCMD	Revenue Generated in INR/ Year	Capex in INR	Opex in INR/ Year	Pay back Period
TVRU, Uran	9000	2025	10 Crore	13 Crore	43 Lakh	< 2years
VRU-Ejector system, GCS Kuthalam	1000	200	30 Lakhs	5 Lakhs		< 1 year
Pneumatic system, GCS, Kallol	1035	850	20 Lakhs	5 Lakhs		< 1year
Pneumatic system, Rjy, Asset	1500	1200	34 Lakhs	81 Lakhs	20 Lakhs	2.4 year

ONGC outreach campaign: GMI Program

- Conducts regular programs at ONGC academy on ONGC GMI Program
- Disseminate the Program idea through structured forum like- Petrotech, Petrofed etc

- Recently conducted Leak Survey at Vijaipur Gas Processing complex of GAIL India Limited, the biggest gas utility of India

- Conducted the first ever NGSI India Meet towards creating a Natural Gas STAR community in India: All the major oil companies- ONGC, GAIL, Cairn India, PLL joined the campaign

ONGC GMI Team

ONGC USEPA Collaborative GMI Team

A glimpse of NGSI India Meet- 2013

A glimpse of NGSI India Meet- 2013

ONGC-GMI Program: Way Forward

- Strengthening ONGC GMI Program team
- Enhancement of infrastructure
- Relevant training to new team members
- Emission survey- Continuous survey
- Emission inventory
- Technology Interventions
- Corrective action thereof
- Yearly monitoring plan & reporting

Conclusion

Reduction of fugitive methane is

- Profitable
- Enhance Environmental performance
- Increase operational efficiency
- Challenging - Barrier exists

(technological, economic, lack of information, regulatory, focus, manpower, etc.)

Acknowledgements / Thank You / Questions

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