Warm Welcome
To
Presentation
On
Natural Gas
Scenario & its Uses

Delhi 29.09.2012

Spreading the Green Energy

Outline

- GAIL : Journey So Far
- Natural Gas : Business Outlook
- Natural Gas : Uses & Benefits
- An Over view of Gail's Gas Business in Rajasthan
- Existing Pipeline Network In Rajasthan
- Future outlook of Gas Business in Rajasthan

GAIL : Journey so far..

GAIL an Integral part of India's growth story ....

- 75% of India's gas travels through GAIL's network
- More than half of India's natural gas is traded by GAIL
- Operate more than 2/3rd of country's CNG stations through JVs
- Produce 21% of India's total poly-ethylene
- Every 10th LPG cylinder in the country produced by GAIL

PRESENT BUSINESS PORTFOLIO

Transmission

- NG Transport Capacity 175 MMSCMD (~9500 Kms.)
- LPG Transport Capacity 3.24 MMTPA (~2050 Kms.)

Trading

- Gas Marketing with volume of 87 MMSCMD
- Covering 16 States across the Country

Petrochemicals

- Significant Player (~ 20%)
- Capacity 410 KTA Polymers
- Upgradation upto 900 KTA
- 70% stake in BCPL (280 KTA) with 100% Marketing rights
- 17% stake in OPAL, 1400 KTA of polymers

LHC

- Sizeable contribution
- 7 Plant across India
- Capacity ~1.4 MMTPA
- LPG Capacity ~1.1 MMTPA

PRESENT BUSINESS PORTFOLIO

E&P

- Securing Gas Supply or Equity Oil / Gas
- 29 Domestic Blocks
- 2 Overseas (2Myanmar)
- 20% working interest in Shale Gas Asset in U.S.A

Diversification

- PLL - LNG
  Dahej-10 MMT
  Kochi-2.5 MMT
- Dabhol-5 MMT
- Renewables (wind-118 MW, Solar-5 MW)
- RGPPL – Power (2184 MW)
- GSEG – Power (156 MW)

Retail

- High Growth Area
- 8 JVs
- Incorporated wholly owned subsidiary, GAIL Gas Ltd.
  (Meerut, Dewas, Kota, Sonepat)

GAILTel

- Leveraging OFC
- Countrywide Presence
- Carriers Carrier Service Provider
- 13000 KM – OFC Network

SUBSIDIARIES AND JVS

GAIL

Subsidiaries (4)

- GAIL Gas
- BCPL
- GAIL Global Singapore
- GAIL Global U.S.

JVs (12)

- IGL
- MGL
- Aavantika Gas
- BGL
- Central UP Gas
- Green Gas Ltd.
- MNGL
- Tripura NG Co Ltd

- Opal
- PLL
- RGPPL
- GAIL CHINA Gas Energy Holding

Affiliates (5)

- SEAGPL, Myanmar
- GSEG
- Fayum Gas, Egypt
- NATGAS , Egypt
- China Gas

… having Subsidiaries & Joint Ventures …

***GAIL Global Singapore* Pte. Ltd**

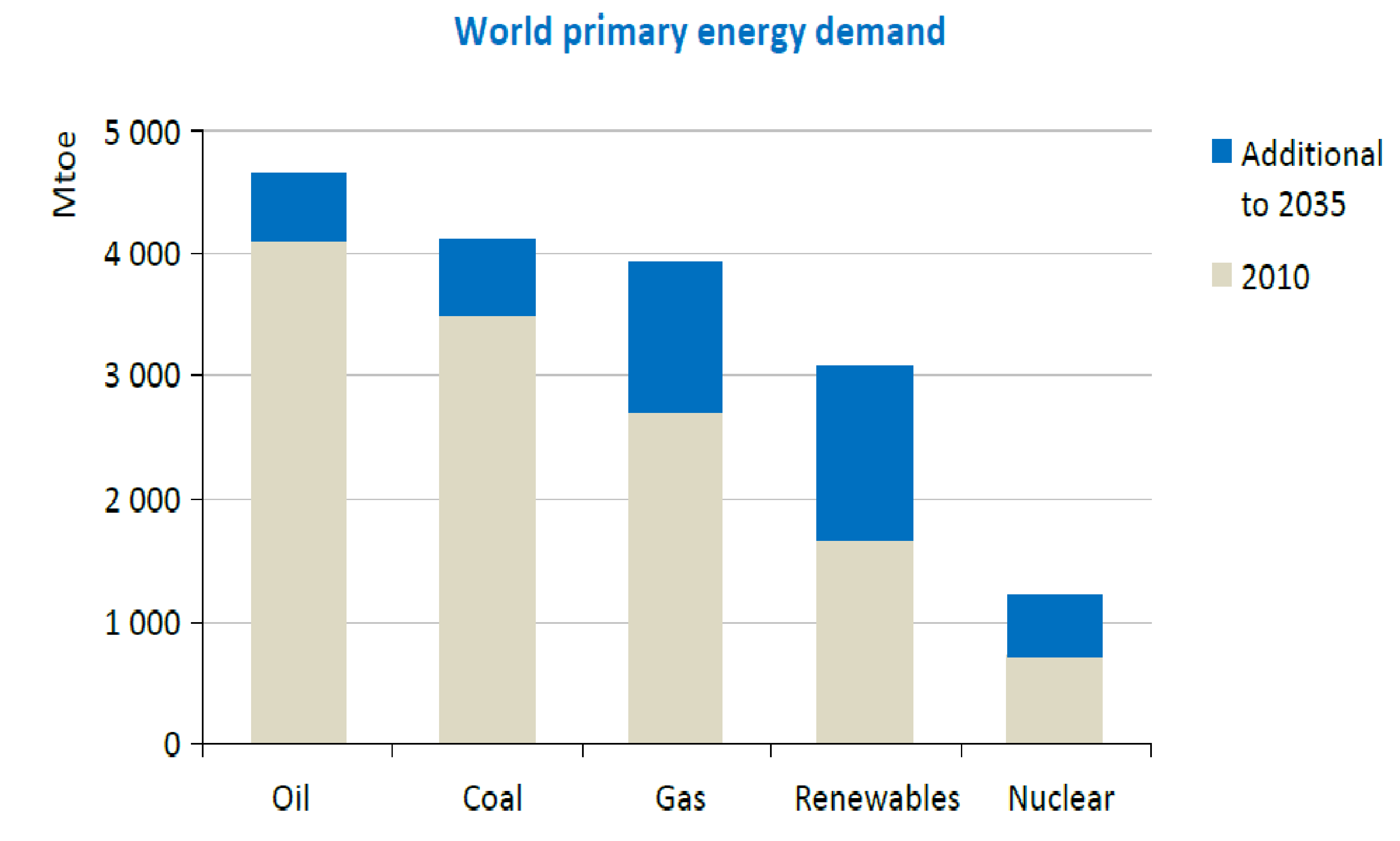
South East Asia Gas Pipeline Company Ltd

GLOBAL FOOTPRINTS

<u>Egypt</u> ❑ Equity in 2 Retail Gas Companies **<u>Myanmar</u>** ❑ Partner in A1, A3 E&P Blocks ❑ Participation in Myanmar-China Gas Pipeline **<u>United States of America</u>** ❑ GAIL Global U.S. holds 20% stake in producing Shale Asset in Eagle ford	**<u>China</u>** ❑ Equity Partner in China Gas (Retail Gas Company) ❑ 50:50 JV With China Gas **<u>Singapore</u>** ❑ 100% Subsidiary – GAIL Global (Singapore) Pte. Limited – Overseas investment & Trading / Sourcing arm

ENERGY OUTLOOK

WORLD ENERGY DEMAND

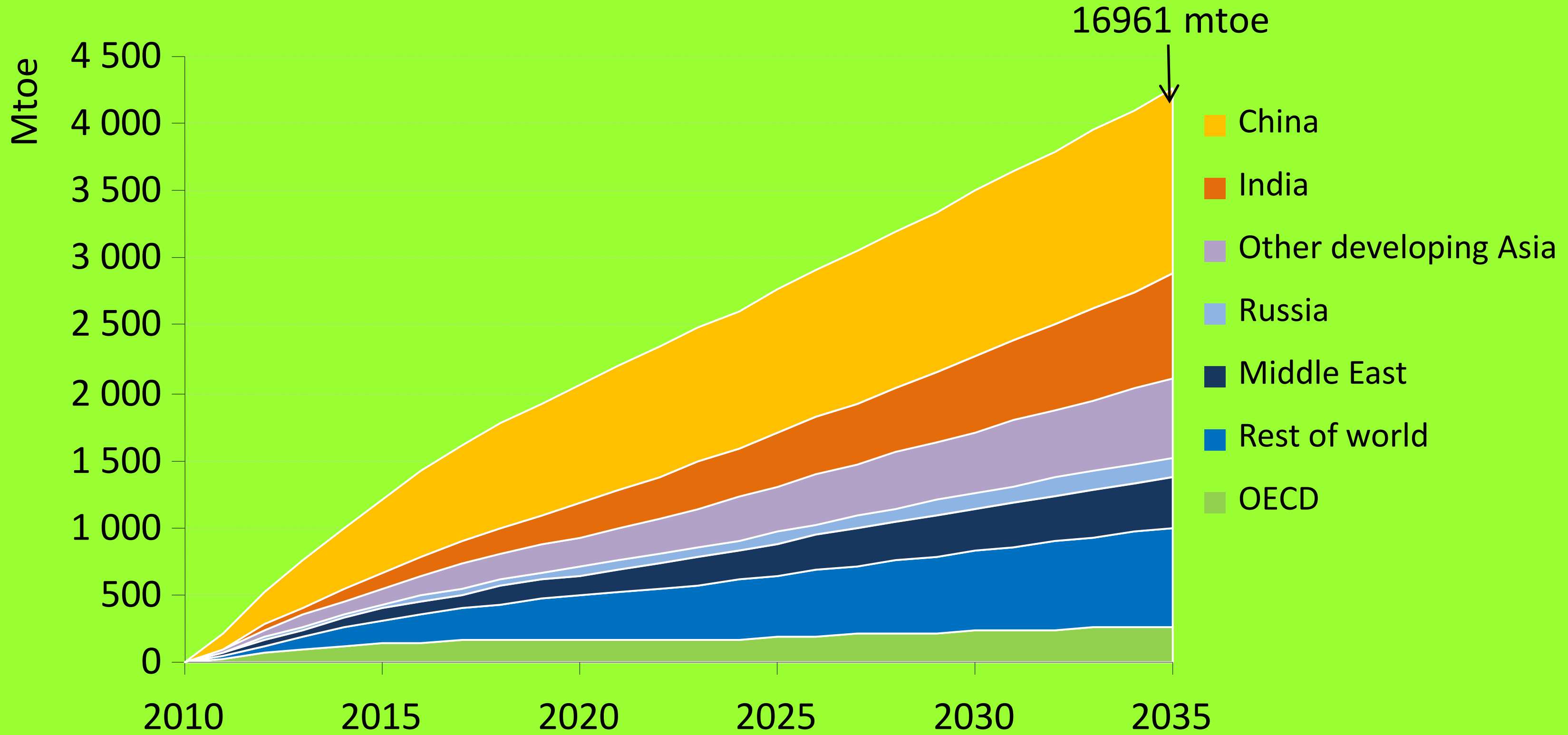


Renewables & natural gas collectively meet almost two-thirds of incremental energy demand in 2010-2035

Source: IEA

EMERGING ECONOMIES TO DRIVE GLOBAL ENERGY DEMAND

Growth in primary energy demand - by region



- **Global energy demand increases by one-third from 2010 to 2035**

Source: IEA

INDIAN ENERGY SECTOR: AN OVERVIEW

	World	Asia Pacific	India
Energy Consumption (MTOE)	12000	3981	527 4th Largest Energy Consumer
Energy Mix (%)			
Coal	29%	51%	51%
Oil	35%	29%	31%
Natural gas	24%	11%	11%
Nuclear	5.5%	3%	1%
Hydro	6.4%	5.3%	6%
Oil & Gas Imports (MTOE)	3245	1097	180 (US$ 80billion)
Annual Compounded Growth in Energy (10 yrs)			
Total Primary Energy	2.1%	4.0%	4.8%
Natural Gas	2.5%	6.5%	6.6%

INDIA – A FAST GROWING ENERGY MARKET

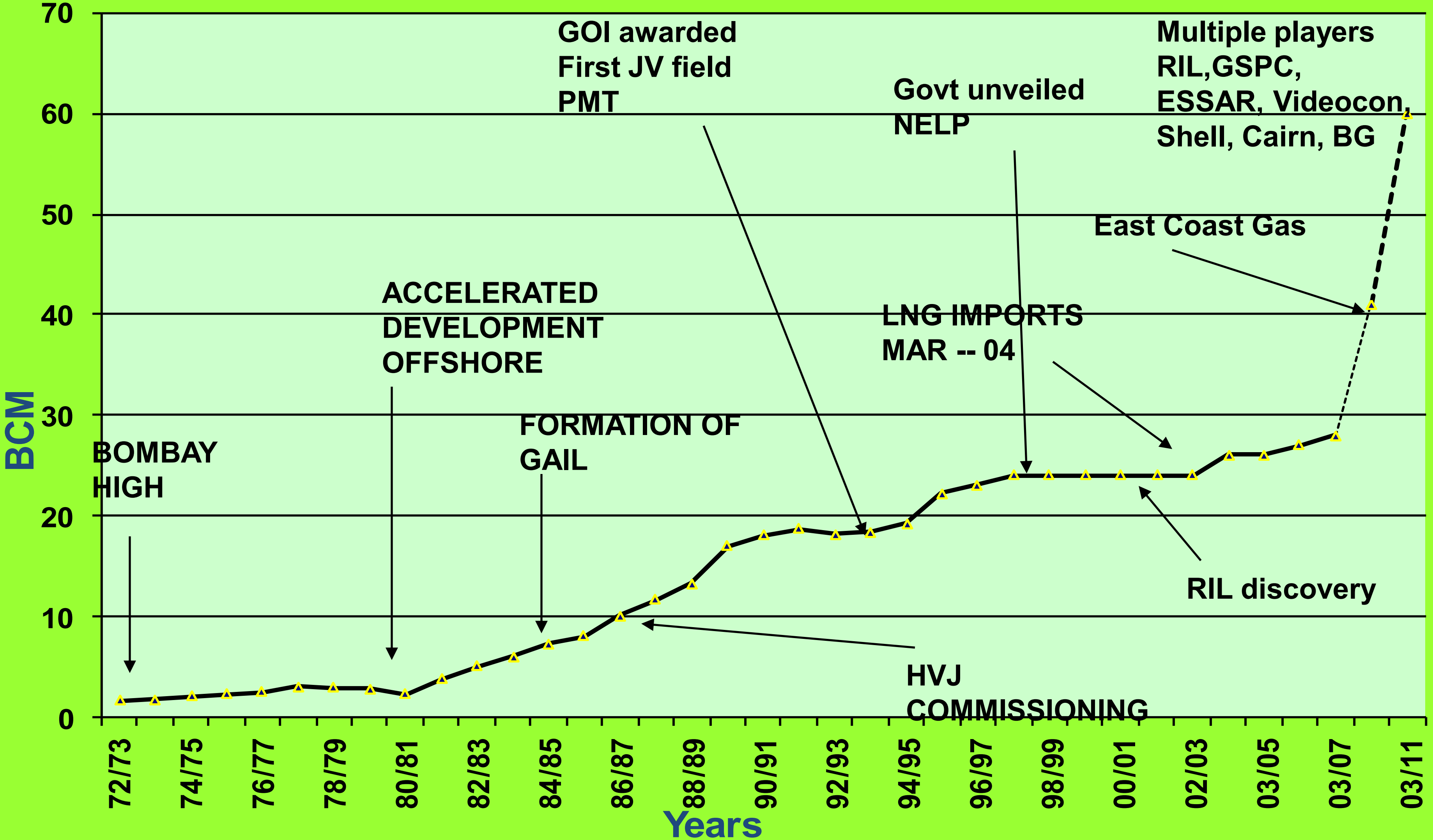
Source : BP Statistical Review of World Energy 2011

DEMAND FOR ENERGY IN INDIA

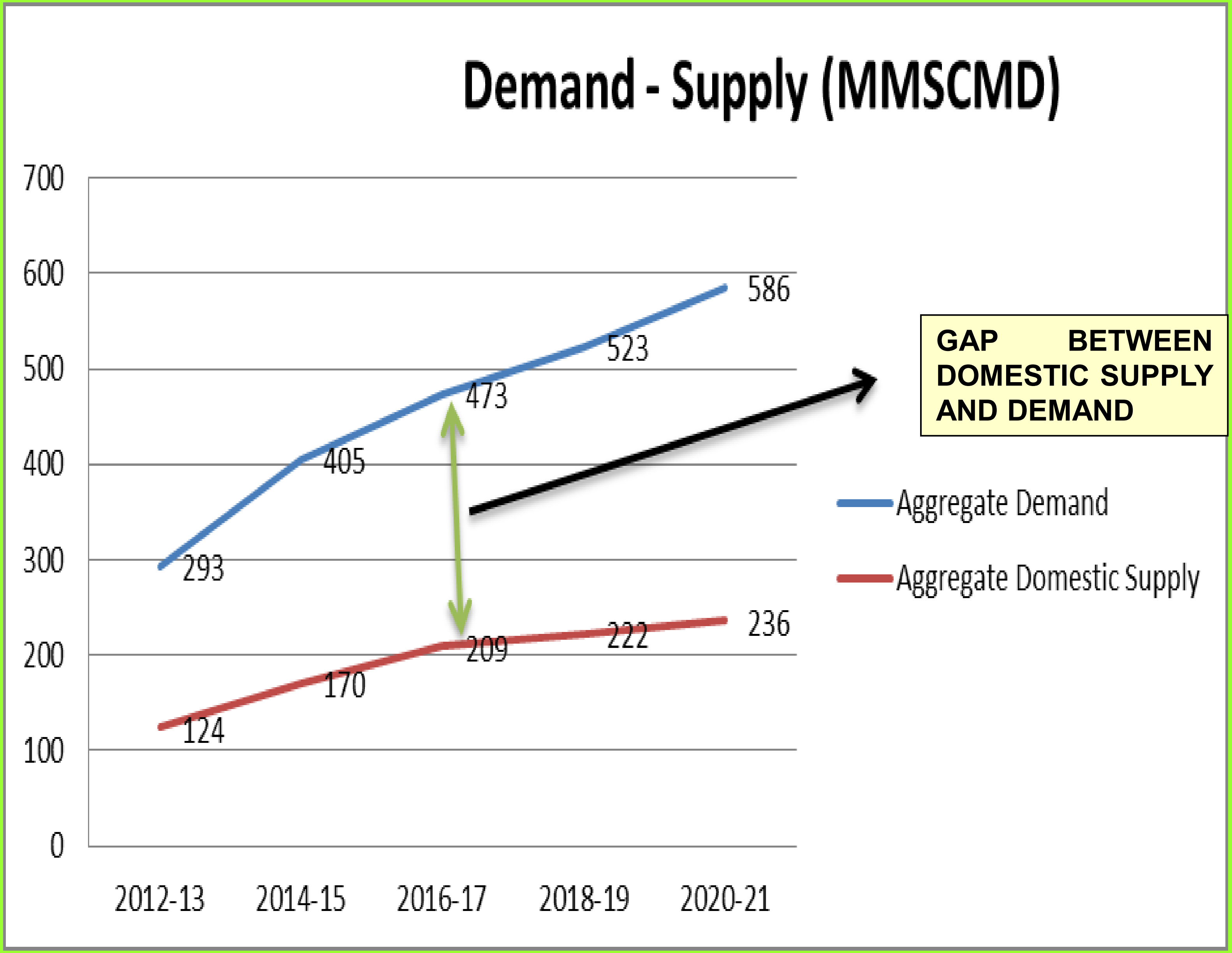
- 4th largest economy in the world, projected to be 2nd largest by 2050.
- Over $1.4 Tn nominal GDP ($4.5 Tn on Purchasing Power Parity) targeted to grow @8-9%+ in the medium term .
- Primary energy demand will increase at 7% p.a to achieve this growth.
- Requires more than 2 times energy supply within next decade.
- Gas ~ 11% of India's primary energy consumption.
- Due to environmental considerations gas consumption may grow at much faster rate than anticipated replacing other forms of fuel.

INDIAN GAS SECTOR OVERVIEW

GAS INDUSTRY EVOLUTION IN INDIA



GAP BETWEEN DOMESTIC SUPPLY AND DEMAND



Price Comparison

S.No	Fuel	Price $/MMbtu
1	RLNG	17
2	FO	21
3	PROPANE	24
4	LPG	24.5
5	DIESEL	19-20

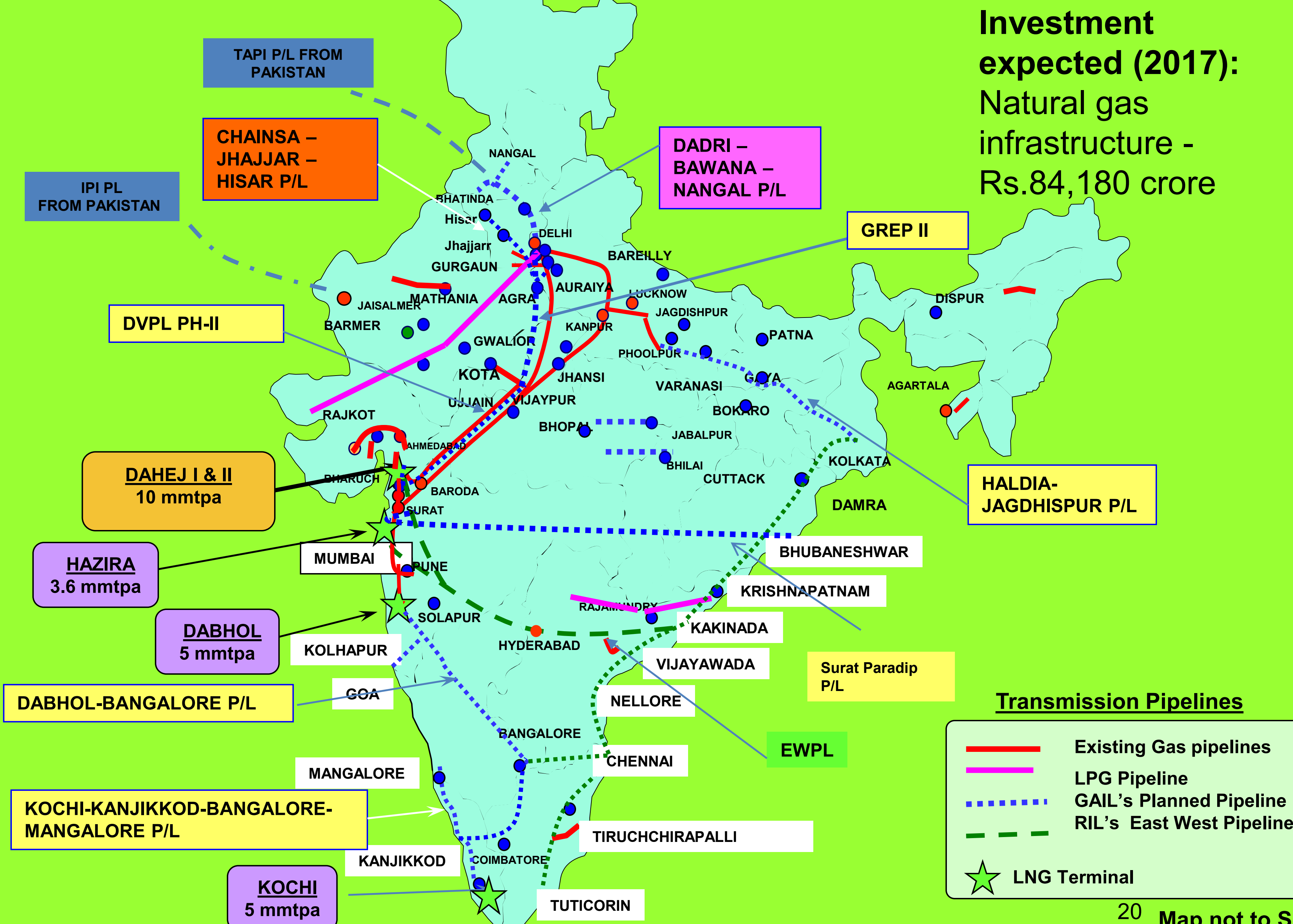
EXISTING PIPELINE INFRASTRUCTURE

PLAYER	TYPE OF NETWORK	DESIGN CAPACITY (MMSCMD)	Length(Kms) including spurline	AVG PRESENT FLOW (MMSCMD)
GAIL	Trunk line & Regional	175	9,500	120
GSPL	Regional	28	2000	35
AGCL/OIL	Regional	8	500	5
RGTIL	EWPL Trunkline	80	1400	-
TOTAL		291	13,400	165

Source: Secondary Information

NATURAL GAS INFRASTRUCTURE

Investment expected (2017):
Natural gas infrastructure - Rs.84,180 crore



Map not to Scale

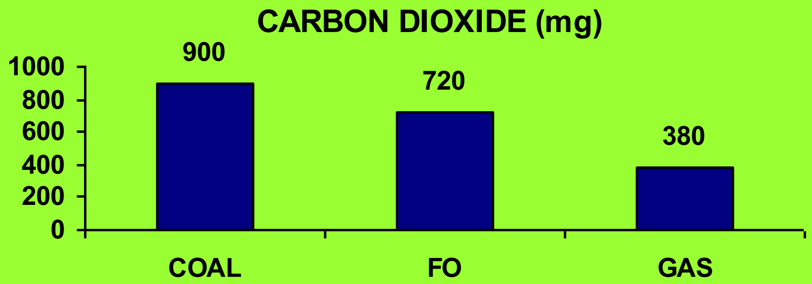
ADDITIONAL UPCOMING PIPELINE INFRASTRUCTURE- INDIA

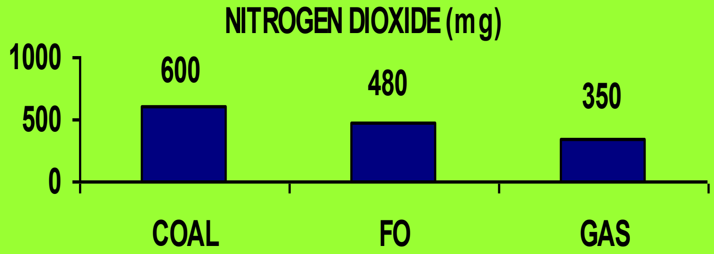
PLAYER	TYPE OF NETWORK	DESIGN CAPACITY (MMSCMD)	LENGTH(KMS) INCLUDING SPURLINE
GAIL	Trunk lines & Distribution networks	145	5500
RGTIL	Distribution Networks	30-40	2200
GSPC	Distribution networks	40-50	2600
IOCL	Dadri- Panipat P/I	10	133
OIL/AGCL	Regional networks	6.0	300
TOTAL		**231-251**	**10,733**

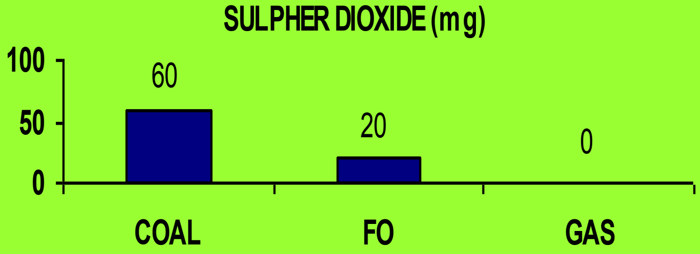
Source: Secondary Information

Natural Gas : Uses & Benefits

NATURAL GAS – THE CLEANEST FOSSIL FUEL







19th CENTURY - COAL

20th CENTURY - OIL

21ST CENTURY - GAS

SOLID PARTICULATES

COAL – VERY LARGE
FO – TRACES
GAS – NIL

NATURAL GAS : PREFERRED FUEL WORLD OVER

- ✓ Efficient
- ✓ Clean : No SULPHUR
- ✓ No Pollution
- ✓ Uniform Quality
- ✓ Zero Inventory
- ✓ No Pilferage and stock loss
- ✓ Offers compact plant size
- ✓ Lower Capital & Operation Cost
- ✓ Longer equipment Life

- ✓ Fine control
- ✓ No Burner Maintenance
- ✓ No Wastage
- ✓ Low Fuel Consumption
- ✓ Min scale loss
- ✓ Min excess air
- ✓ No atomization
- ✓ Higher Combustion efficiency

Summary of Additional Cost

Costs Loss Category	Additional Costs, %
Oil Storage	0.60
Oil Heating	0.78*
Oil Additives	0.80
Oil Pumping	0.32
Oil Atomization	1.88
Soot Blowing	0.43
Makeup Water	0.22**

*This figure does not include the energy lost through tank heat loss. However, this is a significant cost which will increase the overall advantage for natural gas. The same is true for maintenance.

** This figure includes the cost of makeup water, treatment and heating.

ROAD MAP FOR GAS SUPPLY

1. Registration of Customer wise Intent for Gas Supply from GAIL through *PD format*

2. Assessment of Customer’s gas demand

3. Techno- Commercial Evaluation by GAIL

4. Signing of Gas Sales Agreement/Gas Transmission Agreement

Estimating the Gas Demand

Estimate Your Own Gas Requirement

$$= \frac{\text{Daily Consumption of Fuel in kg x GCV of Fuel (kcal/kg)}}{\text{GCV of R-LNG (@9880 KCAL/SCM)}}$$

Steps

1.Workout Daily consumption of Existing Fuel.

2.Standard Conversions for in Gas Industry

1 SCM = 9880 Kcal, 1 MMBTU = 25.5 SCM

3 Calculate the Equivalent GAS requirement in SCM /Day

- *Note NCV of R-LNG is around 8500 Kcal/SCM*

Comparison of Different Fuels w.r.t. NG

S No	Fuel / Energy Source	CV	Units	Equivalent NG
1	Natural Gas	9880	Kcal/m3	1.00000
2	Furnace Oil (Ltr)	9360	Kcal/litre	0.95510
3	Diesel (Ltr)	9786.5	Kcal/litre	0.99862
4	Coal	4000	Kcal/kg	0.40816
5	LDO	8650	Kcal/kg	0.88265
6	LPG	11300	Kcal/kg	1.15306
7	Wood	4750	Kcal/kg	0.48469
8	Propane	12000	Kcal/kg	1.22449
9	Rice husk/bagasse	3600	Kcal/kg	0.36735
10 (a)	Power	1	MW	4500
10 (b)	Power	1	KWh	0.188
11	Bio-gas	5500	Kcal/m3	0.56122

NATURAL GAS ESTIMATION

S.No	Type of Fuel	Quantity of Fuel (Per Day)	Equivalent SCMD of Natural Gas
1	FO	1000 Ltrs	1000
2	PROPANE	1000 KG	1225
3	LPG	1000 KG	1150
4	DIESEL	1000 Ltrs	9986

An Overview of GAIL's Gas Business in Rajasthan

MARKETING SET UP OF GAIL IN RAJASTHAN

- Business Unit - Jaipur Zonal Office
  Vidyadhar Nagar, Jaipur

Area Covered - State Of Rajasthan

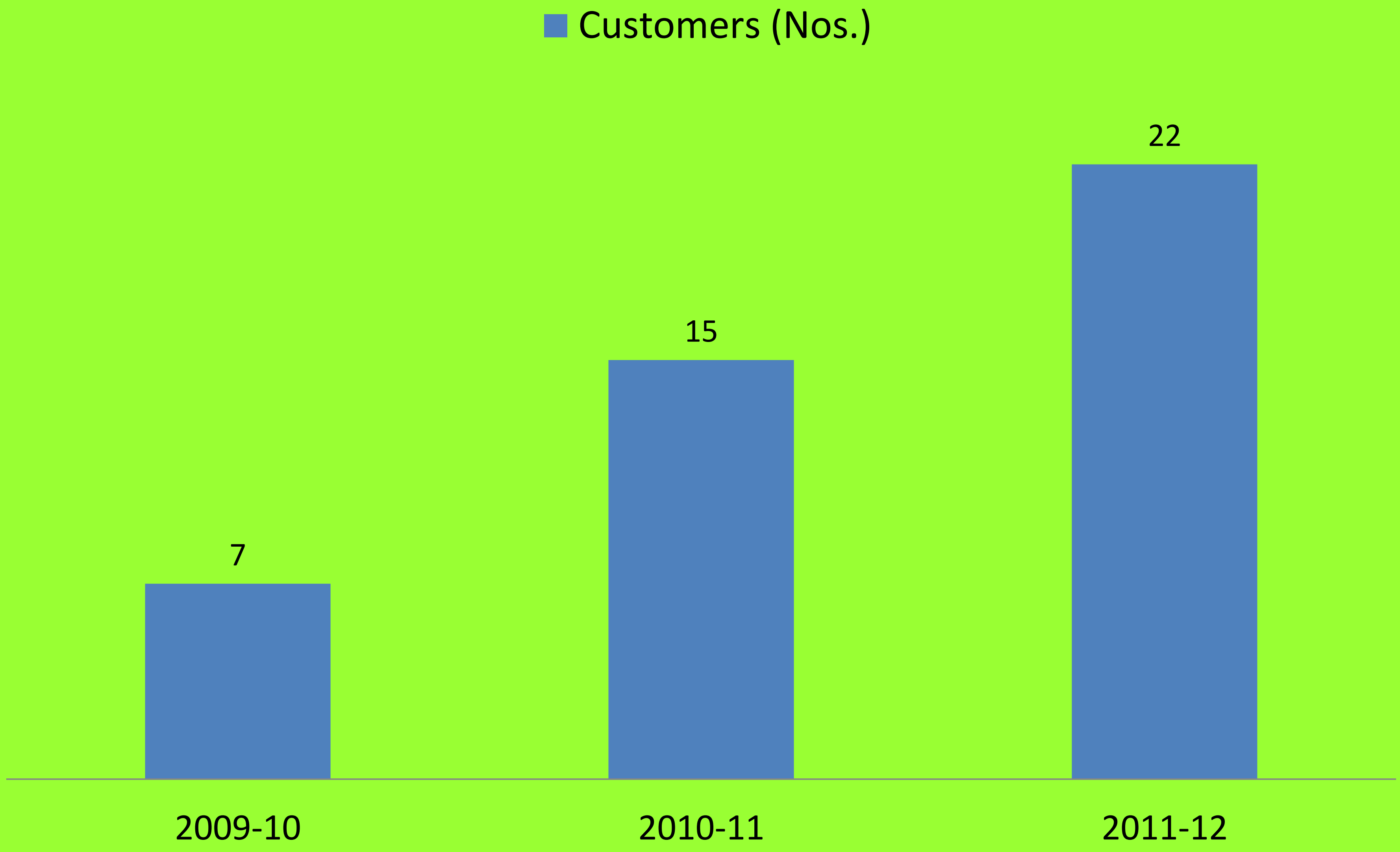
- <u>Marketing Activities :</u>

Natural Gas Marketing

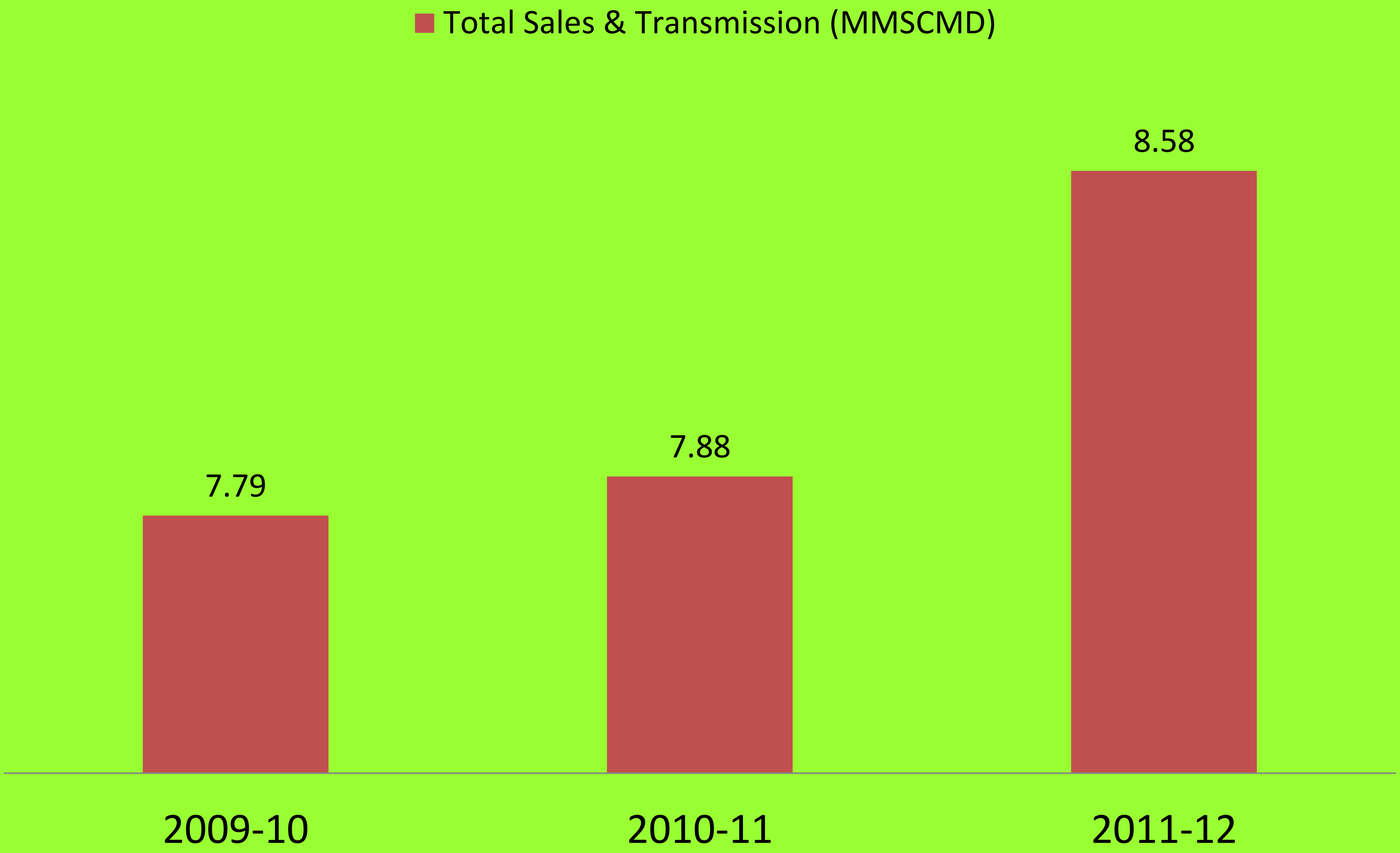
Polymer Marketing

Retail/LHC Marketing

Customer Base



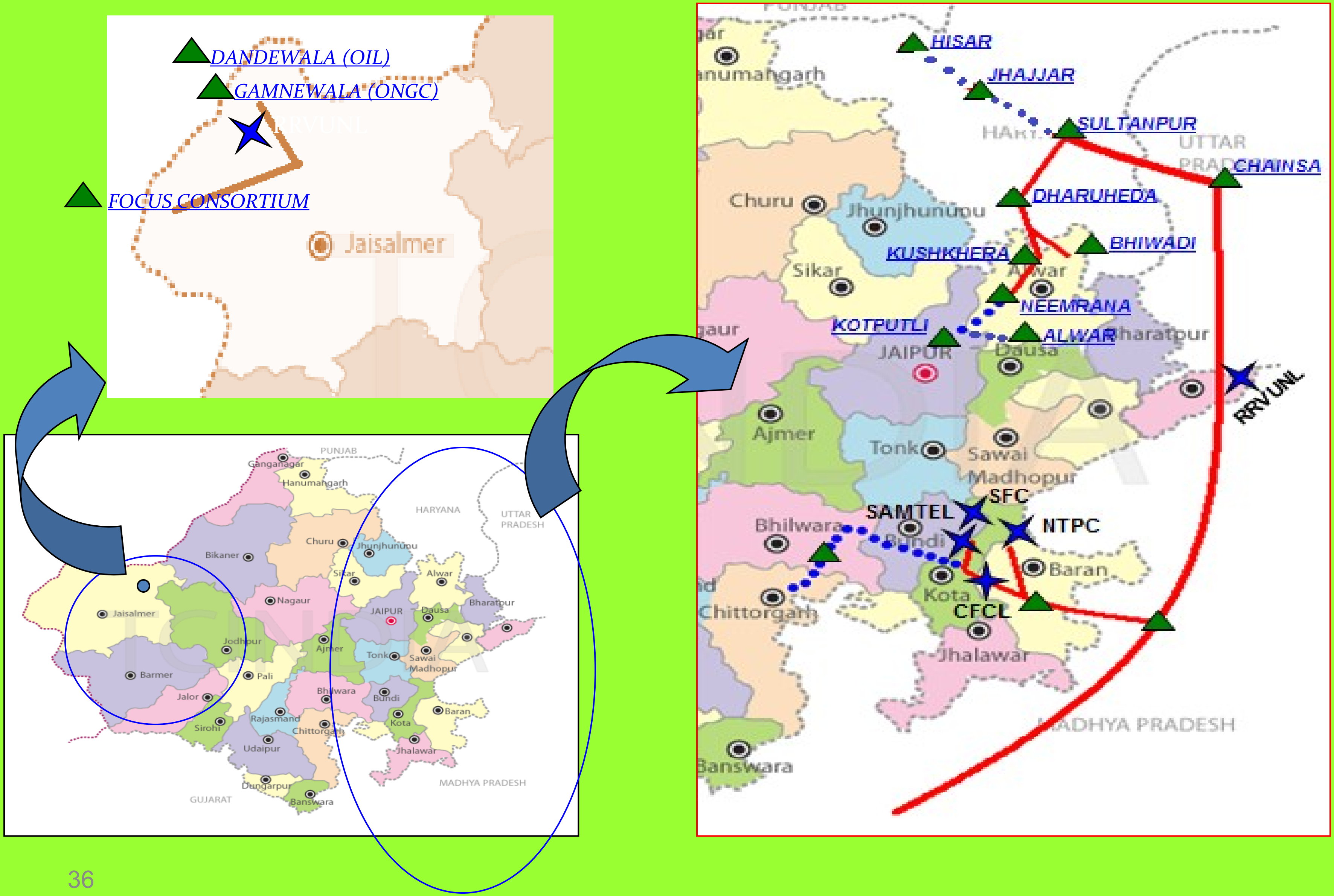
Gas Sales & Transmission



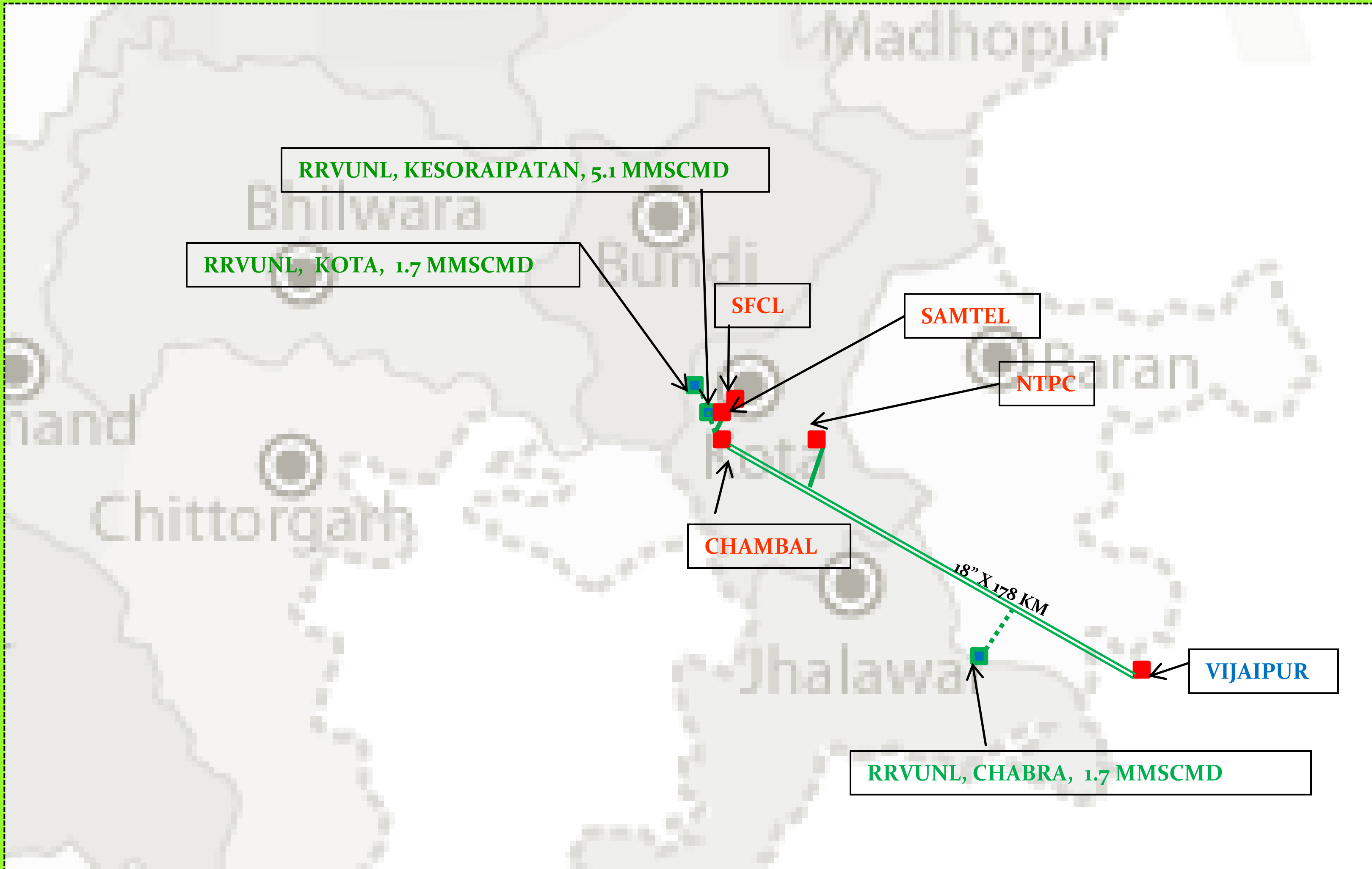
Existing Pipeline Network In Rajasthan

Rajasthan Pipelines Overview

ISOLATED FIELDS IN JAISALMER



VIJAIPUR – KOTA P/L (VKPL)



Legends:-

EXSITING CUST/TERMINAL

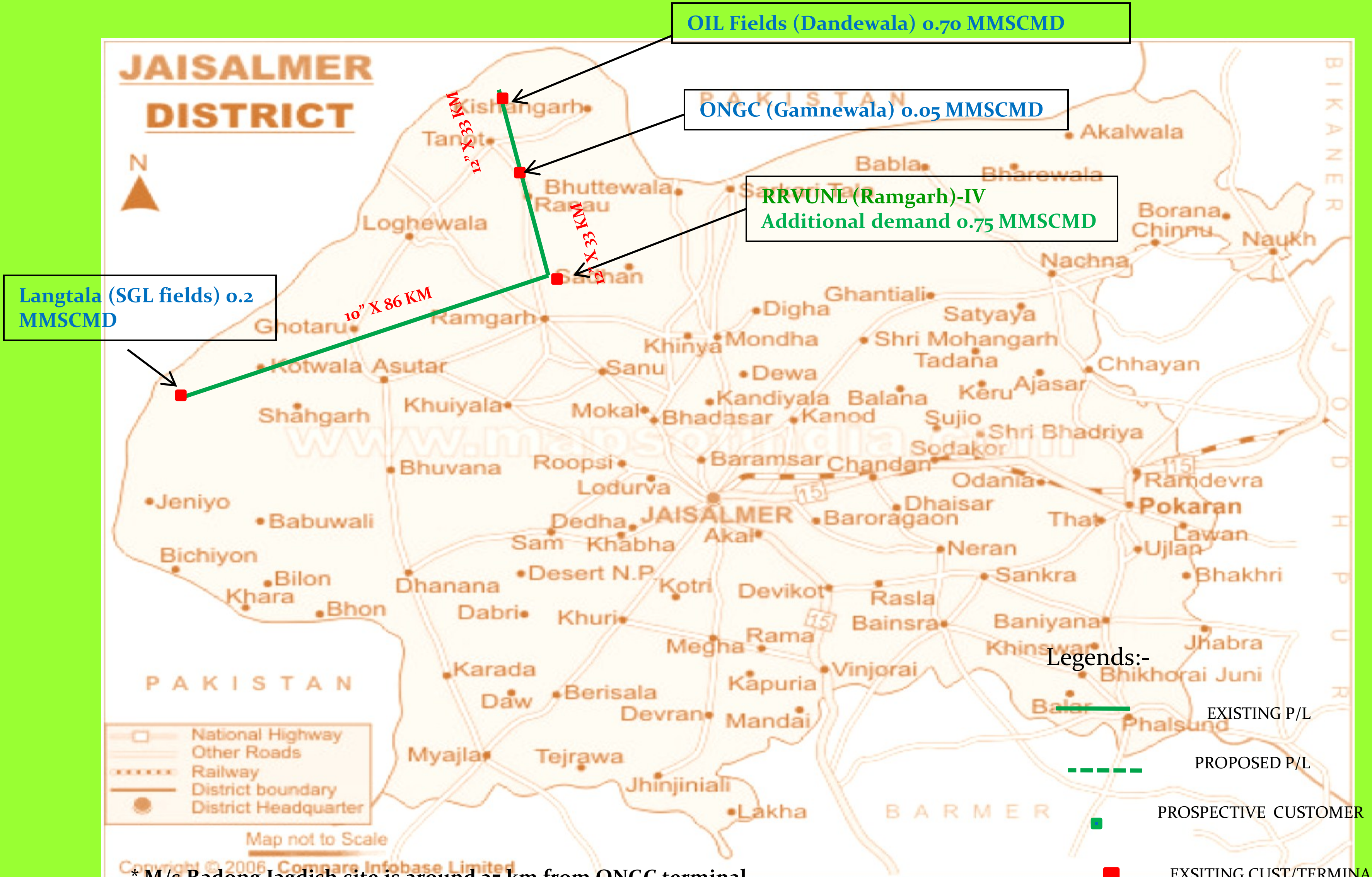
DEMAND AREA FROM TEXTILE, CEMENT ETC.

EXISTING P/L

PROPOSED P/L

PROSPECTIVE CUSTOMER

ISOLATED FIELDS OF JAISALMER

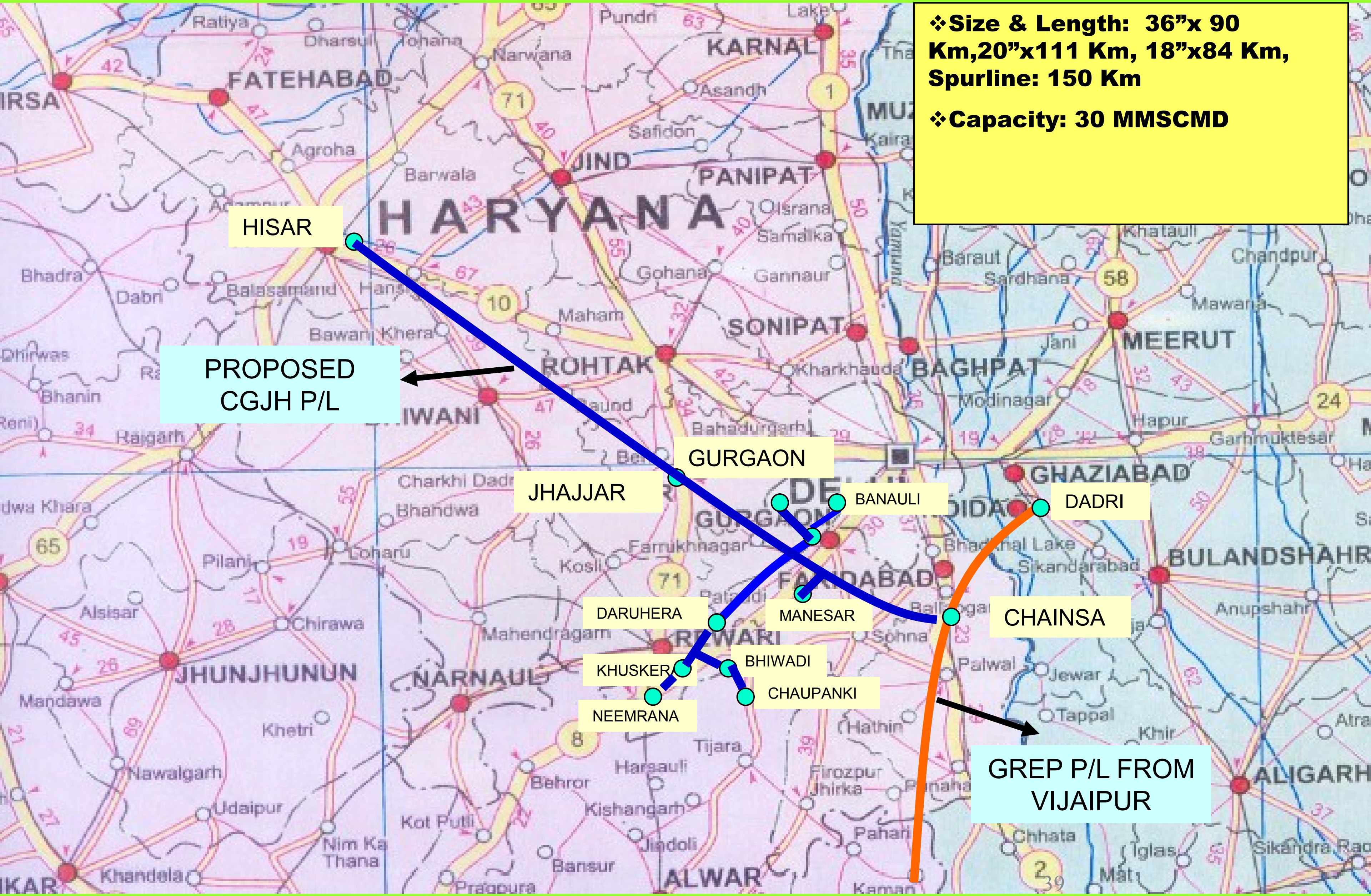


* M/s Radong Jagdish site is around 25 km from ONGC terminal, 10 km from RRVUNL

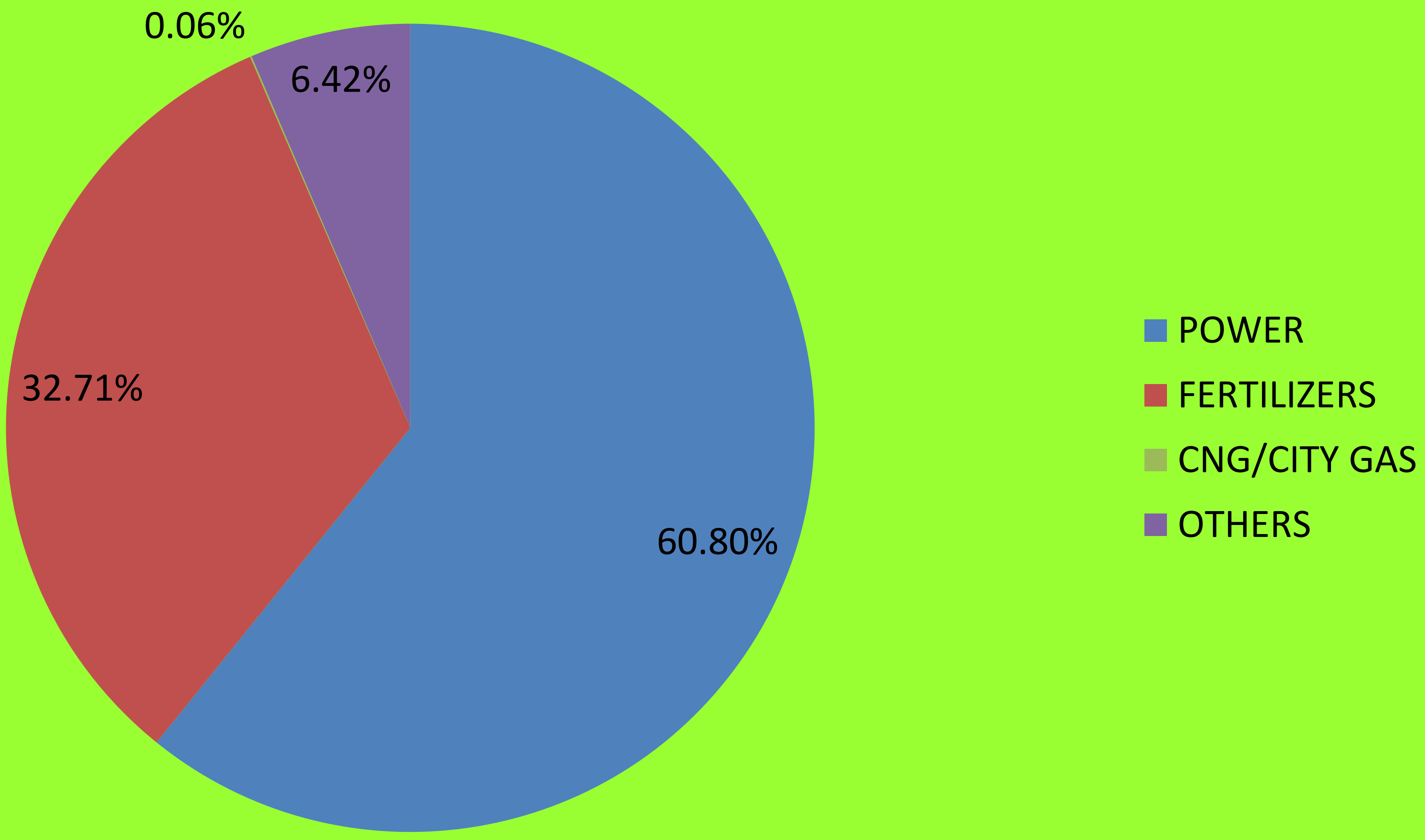
ROUTE MAP FOR CHAINSA-GURGAON-JHAJJAR-HISSAR PIPELINE

❖**Size & Length: 36”x 90 Km,20”x111 Km, 18”x84 Km, Spurline: 150 Km**

❖**Capacity: 30 MMSCMD**



Sector Wise Gas Sales



GAIL : Future Outlook of Gas Business in Rajasthan

GAIL Up-coming projects in Rajasthan

Extension of Vijaipur-Kota (VKPL) to Chittorgarh & Bhilwara:

- 110 km loop line from Viajipur to Borari
- 123 Km pipeline from Kota to Bhilwara.
- 40 km pipeline from Bhilwara (tap-off in spurline of Bhilwara) to Chittorgarh and connectivity to consumers
- The total length of the proposed pipeline system is 273 km.

Extension of Sultanpur Neemrana (SNPL) to Giloth

To meet the gas requirement of State Government’s prestigious Ceramic Hub.


thank you !

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