GAIL (INDIA) LIMITED
Vijaipur, Guna (Madhya Pradesh)

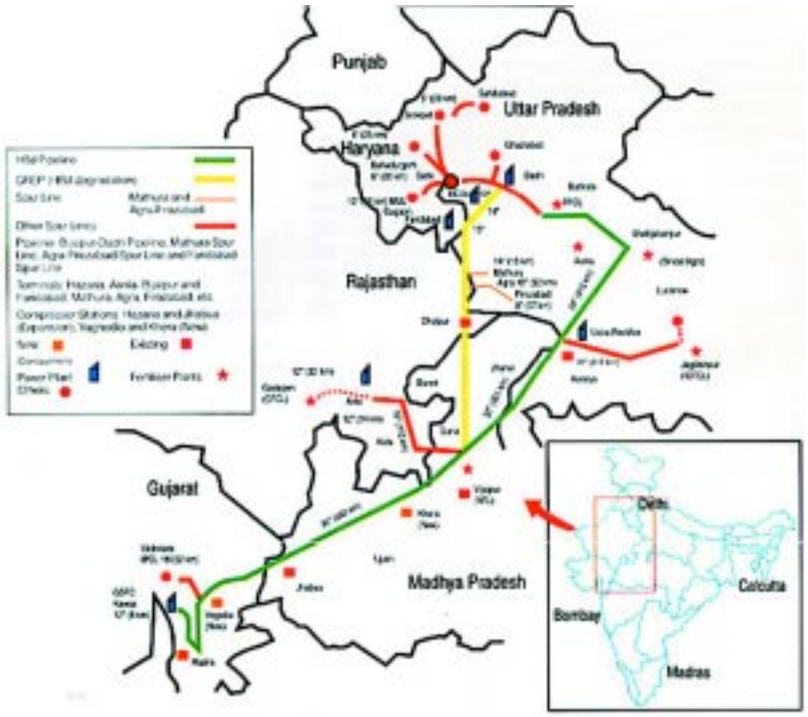
Unit Profile

GAIL (India) Ltd (Erstwhile Gas Authority of India Ltd), India's principal gas transmission and marketing company, was set up by the Government of India in August 1984 to create gas sector infrastructure for sustained development of gas market in the country. Today GAIL has expanded into Gas Processing, Petrochemicals, Liquefied Petroleum Gas Transmission and Telecommunications. The company has also extended its presence in Power, Liquefied Natural Gas re-gasification, City Gas Distribution and Exploration & Production through equity and joint ventures participations. GAIL (India) has the largest high pressure pipe line in India.i.e the HVJ pipe line system which is described below.
HVJ PIPE LINE.

The HVJ pipeline system consist of six compressor stations Hazira, Vaghodia, Jhabua, Kheda, Vijaipur, Auraiya. These compressor stations boost the pressure of natural gas for efficient transmission and for meeting the contractual pressure requirements of different consumers. The compressor stations are main consumers of Energy, their scheduling of operation is of utmost importance from energy efficiency point of view. These compressors are Gas turbine driven equipments. Due care has been taken at the time of selection of these machines from the energy consumption point of view & suitable capitalization clause has been applied during evaluation of technology.

Details of Compressor Stations along the HVJ Pipeline

Sr. No	Station Name	Compressor Details		Capacity /Compressor (SCMH)	Pressure (kg/cm2)	
		No. of Comp.	Make		Suc.	Disc.
1	Hazira 2+0	7+3 RR-RB211	RR-Allison 688750	94791	46	93
2	Vaghodia	2+1	RR-RB211	658333	50	93
3	Jhabua	5+2 2+1	RR-Allison NP	150033 351375	58.5 54	93 93
4	Khera	2+1	RR-RB211	615833	46	93
5	Vijaipur	4+1 2+1 2+1	RR-Allison RR-Allison Solar-Titan	122916 81250 350000	54.2 42.2 53	93 69 92
6	Auraiya 2+0	2+1 EGT	RR-Allison 375000	175000 70	46.7 93	70



HVJ PIPE LINE SYSTEM IN INDIA

Energy Management Policy

At GAIL, we are committed to minimize the Specific Energy Consumptions for our products to International Standards,

THROUGH

1. Maximizing the Capacity Utilization.

2. Fine tuning our Operations and Maintenance continuously to achieve the above Goal.

3. Technology Up-gradation with energy efficient processes and equipments.

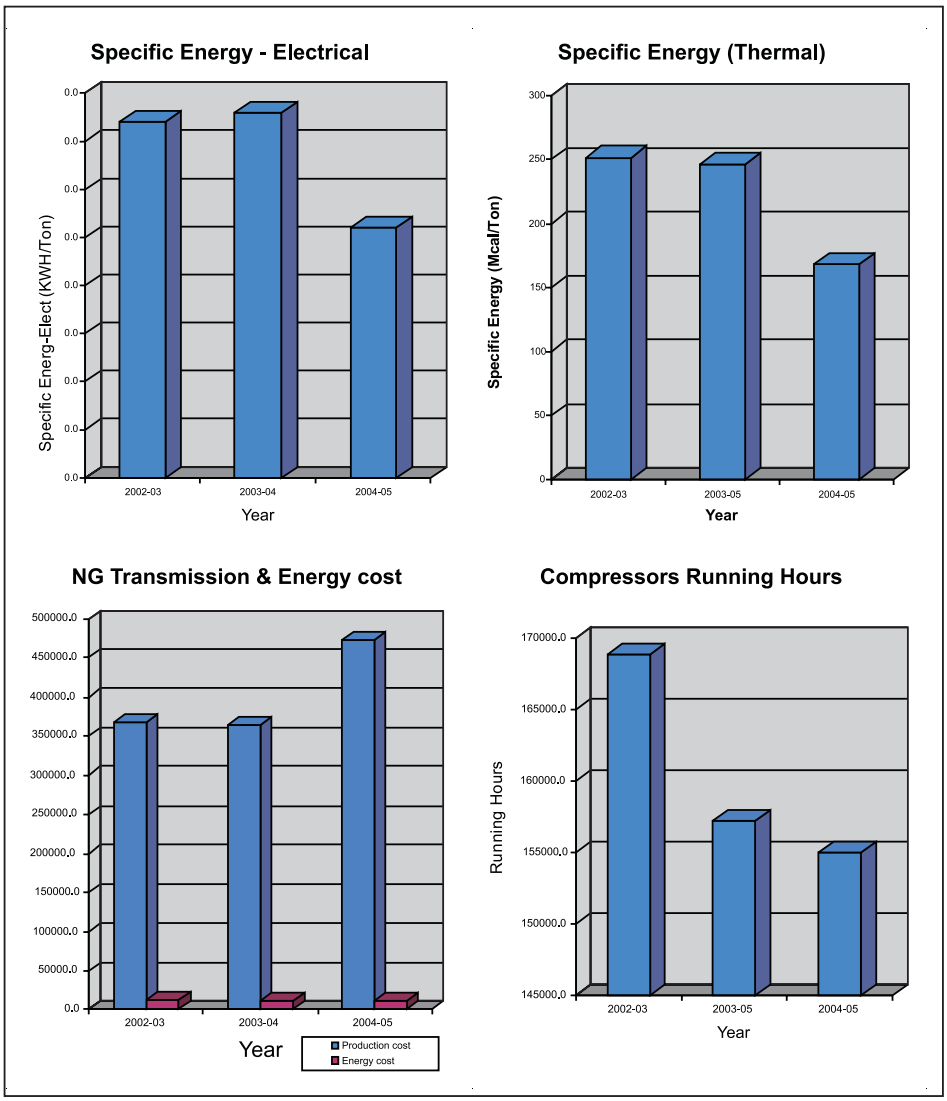
4. Motivating, Training and Encouraging our employees to achieve a target of reducing specific energy consumption.

5. Promoting the use of renewable natural resources for sustainable development, safeguard the society and protecting the Environment.

ENERGY CONSUMPTION

Year	Gas transmission (MMSCM)	Capacity Utilisation in %	Energy Consumption		NG Transmission Cost in Rs. (Lakhs)	Energy
			Electrical Lakh KWH	Thermal MKcal		
2002-03	12081.87	99.10	448.78	3045017.58	367781.92	12351.66
2003-04	11793.4	96.734	447.45	2906029.92	364296.15	11441.39
2004-05	16387	103.4	421.12	2761241.72	473383.00	10951.42

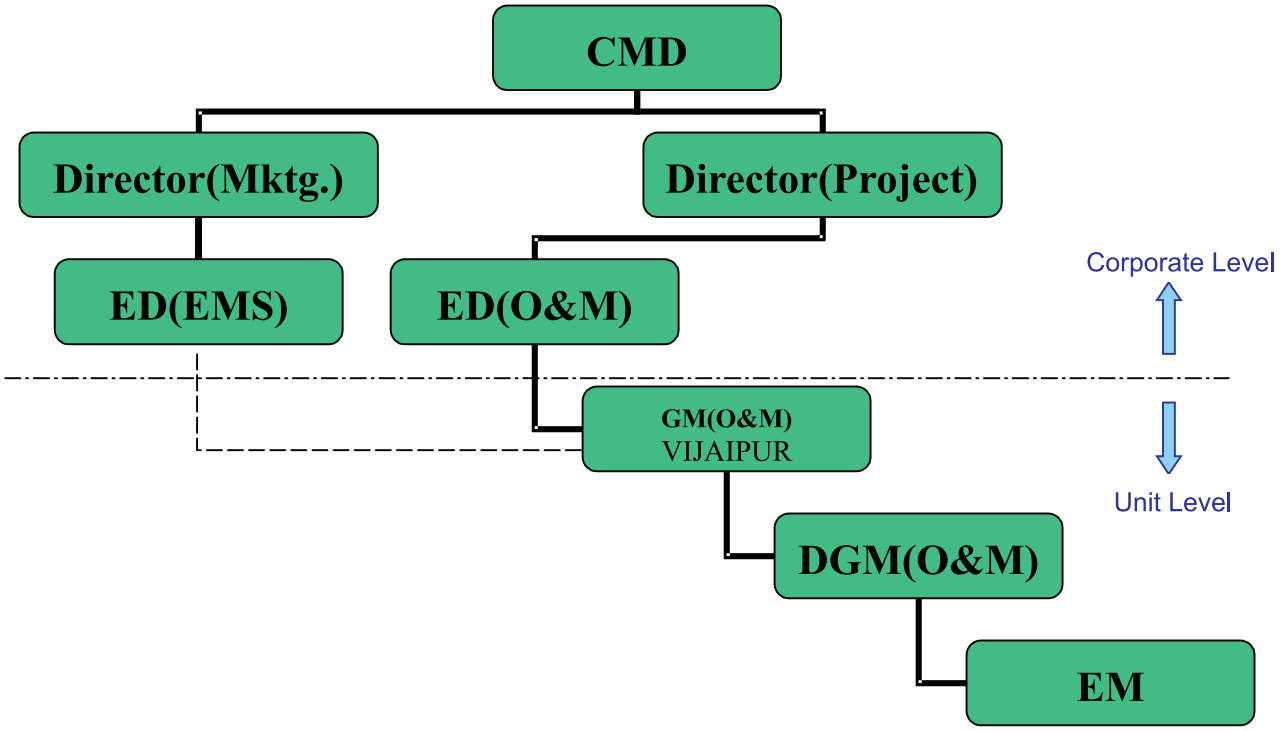
GRAPHICAL PRESENTATION



Energy Conservation Commitment Policy and Set Up

The Organization has Energy Conservation Cell at Corporate office, headed by Executive Director (EMS) assisted by his Team at corporate level for disseminating information related to energy conservation not only within GAIL but also to our valued customers. Being from running Organization in Natural gas Business the GAIL has also instituted gas conservation Award. The Institution of this award reflects commitment of top management towards conservation of energy.

ENERGY CONSERVATION CELL STRUCTURE.



CONSERVATION OF ENERGY IN HVJ - PIPE LINE SYSTEM:

Conservation of energy is a consistent endeavor in every department at GAIL, with this spirit in mind, during the period year 2004-2005 following schemes have been implemented at GAIL, for conservation of energy which have resulted in considerable amount of saving for the company: The major projects which will have indelible effect on the energy consumption of this plant are given below:-

1. MODIFICATION IN DAMPERS OF THE GTC ENCLOSURE BLOWERS:

The GTC'S are having two numbers of Enclosure blowers with dampers. Normally both blowers were running for cooling the enclosure. The matter was deliberated & concluded that it is due to improper alignment of the damper system with enclosure. The suitable dampers were developed indigenously for this imported machine. The new damper has been developed in house & installed in the turbine. This is

one of the developmental projects of indigenization of import substitute of the spares. For cooling purpose the additional water spray was being done. With this improved damper design & modified sealing system the turbines are running with single blower without water curtain.

TOTAL SAVING OF POWER PER ANNUM = 2.64 LAKH KWH / GTC.
AMOUNT SAVING PER ANNUM =RS.36.35LAKH
AMOUNT OF INVESTMENT =RS. 2.0 LAKH

2. OPTIMIZATION OF RUNNING OF HVAC COMPRESSORS:-

The HVAC compressors & its auxiliaries were running through-out the year with full load irrespective of variation in surrounding temperature. The running of HVAC compressors are optimized with respect to the variation in the surrounding temperature.

TOTAL SAVING OF POWER PER ANNUM = 4.8 LAKH KWH
AMOUNT SAVING PER ANNUM = RS 23.66 LAKH
AMOUNT OF INVESTMENT = NIL

3. OPTIMIZATION OF GAS CONDITIONING HEATER OF GAS TURBINES:

The Gas Conditioning heaters are required to run for conditioning the fuel gas. As per the data sheet of the compressor the fuel gas conditioning temperature should be within the 8 0C to 40 0C. The temperature setting of the heater was set at 40 0C the set point has been modified to 35 0C. Details of savings are given below

TOTAL SAVING OF POWER PER ANNUM = 1.2LAKH KWH
AMOUNT SAVING PER ANNUM = RS.5.92LAKH
AMOUNT OF INVESTMENT = NIL

4. INSTALLATION OF NEW UPS

At Vijaipur compressor station the old UPS was Thyristor based having low efficiency. Now the it has been replaced with the new IGBT based UPS having more efficiency than the old UPS. Details are given below:-

TOTAL SAVING OF POWER PER ANNUM=1.46LAKH KWH
AMOUNT SAVING PER ANNUM = RS.7.20LAKH
AMOUNT OF INVESTMENT = RS.24.4LAKH

NEW UPS

5. OPTIMIZATION OF IA PLANT:

There are two numbers of IA compressors for catering the instrument/plant air requirement in the HVJ compressor station at Vijaipur. After the completion of the DVPL compressor station at Vijaipur it was calculated that the DVPL IA compressor can supply Instrumentation/Plant air requirements to both the DVPL & HVJ compressor station. After this hook-up work was done between the DVPL & HVJ Instrument air compressors. By doing this modification HVJ Instrument air plant was completely stopped. The savings achieved are given below-

TOTAL SAVING OF POWER PER/ANNUM = 6.57LAKH KWH
AMMOUNT SAVING PER ANNUM = RS.36.35LAKH
AMOUNT OF INVESMENT = NIL

IA COMPRESSOR STOPPED

6. PIGGING OF PIPELINE:-

"Pigs" were originally developed and utilized to remove the debris or material build-up which obstructed or restricted flow through a pipeline. Pipeline "pigging" is the propelling of a scrapper cleaning tool (the pig) through a pipeline to scrap / collect and push the dirt / pipeline deposits out. Pigging is utilized to flush out debris, scrape and clean the interior pipe walls. Pigging is also used to "batch" various products through the same piping system. The on line instrumented pigging (intelligent) on the HVJ line has been started for assessing the integrity of pipeline & accordingly take remedial measures.

HVJ pipeline is a high pressure line, as six compressor stations are there to boost pressure at intermediate distances. Due to operation of compressors, a small amount of compressor lube / seal oil ingress into the pipeline which along with pipeline dirt deposit on pipeline internal walls and affect pipeline efficiency. It has been seen that cleaning of pipelines by pigging improves gas transport efficiency resulting in reduction in pressure drop which in turn contributes in lesser compression work at downstream compressor stations. On conservative basis, improvement in compression ratio by 1% results in fuel

saving of 5% (considering a base thermal efficiency of 20% in gas compression) and pigging in gas lines contribute atleast 0.2% improvement in pipeline hydraulics.

On these lines, pigging could be considered to reduce fuel costs by 1% amounting to about Rs 1.0 Crore per annum against the cost of pigging of entire section of about Rs 25 Lakhs(annualised).

PRELIMINARY ACTIVITIES

PIG LAUNCHING

PIG RECEIVING

7. OPTIMIZATION OF COMPRESSION:

HVJ pipeline is a trunk-line for transporting natural gas from Hazira to various consumer locations along its route right up to Delhi/Haryana at different consumer pressure and flow requirements. In order to maintain delivery pressure and quantity commitments, intermediate compressor stations (at Six locations) are operated in such a way to meet the customer requirements at the best possible pipeline hydraulics. Maintaining optimal hydraulics of the pipeline involve operating right number & capacity of compressor trains at each of the compressor stations. This activity is one of the main functions of the Master Control Centre at Vijaipur which manages the entire pipeline network.

GAIL has initiated certain measures including.

- Close monitoring of pressure profiles

- Dynamic compressor train configuration
- Maintaining optimal level of pipeline pack.

The above measures directly translates into great savings in fuel. This is evident from the trend of cumulative run-hours of compressor trains across all the compressor stations.

Year	Cumulative Run-hours (All stations)	Reduction from base year	Amount Saving in Lakh
2002-03	168893.3	-	Base Year
2003-04	157191.4	11701.9	842.536
2004-05	155010.3	13883	999.57

Average running cost of compressor is Rs.7200/hour. From the above and base fuel costs, a saving of Rs. 18.42 Crores has been achieved in two years 2003-04 & 2004-05 on the base year 2002-03.

Solar Gas Turbine Compressor
RR Allison Gas turbine compressor

PROJECTS IMPLEMENTED DURING 2003-04.

1) Photocell control for lighting.
2) Electronic chokes in place of conventional chokes.
3) Switching off lights, fans, ACs, by individuals whenever offices are not occupied.
4) We have implemented the 5s' system (short, set in order, shine, standardize & sustain) for good & clean environment. Kaizens system has been implemented for improvement.

Energy Conservation Plans and Targets

Energy Conservation Measures (Planned)	Anticipated savings In		Approx. investment	Project Rs. Lakhs
	Energy Value (Lakh KWH)/MKcal	Rs. Lakhs		
1) Vapour Absorption Refrigeration at Vijaipur	11.48Lakh KWH	54.53	70	2005-2006/2006-2007
2) Installation of MEEFOG System at Hazira.	28382 M Kcal	110.0	250	2005-2006/2006-2007
3) Enclosure vent fan / Damper work at other stations	13.2LAKH KWH	181.7	10	2005-2006/2006-2007
4) RR Power switching to State Grid at more locations	3782.15MKCAL	13.76	16	2005-2006/2006-2007
5) UPS Upgradation	5LAKH KWH	23.75	30	2005-2006/2006-2007
6) Cleaning Pigging Operation	25727.63MKACAL	100	25	2005-2006/2006-2007
7) Conversion of Analog Fuel Management system to Digital system	27612.41mkcal	100.45	100	2007-2008/2007-2008

Safety and Environment

GAIL attaches great importance to Safety, Health and Environment in its plants, pipeline systems and work centres as also in the community and its work environment. The Company follows the guidelines and stipulations issued by the concerned Indian Statutory Agencies and Regulatory Bodies like the Central Pollution Control Board and the State Pollution Control Boards with regards to environment. For enforcing the safety of international standard, the international repute organization are being called for safety audits e.g

- Germinscher Lloyd, U.K.
- British Safety Council, U.K.