Chapter-4
PROFILE OF SELECTED ORGANISATIONS IN HAZIRA AREA

4.1 KRISHAK BHARATI COOPERATIVE LIMITED:
4.1.1 Introduction:
KRIBHCO is a national level cooperative society based on the principles of cooperation which sufficiently stress on the importance of members’ education and concern for community. Since Primary Agricultural Cooperative Societies (PACS) are direct members of KRIBHCO and farmers are members of PACS, they indirectly become our members. Our six mobile soil testing vans have analyzed more than 4 lakh soil samples. Recently KRIBHCO has started a Krishi Pramarsh Kendra at NOIDA. The centre is providing farm technology transfer through full range of soil testing including micronutrients, irrigation water, etc. More than 4000 samples each for zinc, copper, manganese and iron have been analysed till date.

4.1.2 COMPANY’S PROFILE:
KRISHAK BHARATI COOPERATIVE LIMITED (KRIBHCO) a multi-state cooperative society was incorporated on April 17, 1980. KRIBHCO was incorporated to manufacture and distribute fertiliser and allied farm inputs through
cooperative and institutional channels. KRIBHCO has fully imbibed the cooperative philosophy and has made sustained efforts towards promoting the cause of modern agriculture and cooperative in the country. A cooperative thrives on the trust and goodwill of its members. Its membership are 6044 cooperative societies at village, district, state and the national level. KRIBHCO has setup a Fertilizer Complex to manufacture Urea, Ammonia & Bio-fertilizers at Hazira in the State of Gujarat, on the bank of river Tapti, 15 Kms from Surat city on Surat – Hazira State Highway. Late Smt. Indira Gandhi, former Prime Minister of India laid the Foundation Stone on February 5, 1982.

Hazira Plant

Hazira Fertiliser Complex has 2 Streams of Ammonia Plant and 4 Streams of Urea Plant. Annual re-assessed capacity for Urea and Ammonia is 1.729 million MT and 1.003 million MT respectively, the total Project cost was `890 crores as against the estimated cost of `957 crores. This shows a saving of `67 crores (approximately 7%) in Capital Cost of the Project.
The trial production commenced from November, 1985 and within a very short time of 3 months, the commercial production commenced from March 01, 1986. Since then, it has excelled in performance in all areas of its operations. Biofertilizer plant of 100 MT per year capacity was commissioned at Hazira in August, 1995. KRIBHCO has also completed the installation of an expansion of the Bio-Fertiliser plant with an additional capacity of 150 MT and the same was commissioned in December, 1998.

KRIBHCO ammonia-urea complex is situated at Hazira near Surat in Gujarat, having four streams of urea plant. The energy consumption for production of ammonia is lowest compared to similar gas based plants, resulting in low cost of production and lowest dependence on subsidy from Govt. of India. KRIBHCO urea plants in 19th year of commercial operation have produced 18.06 lakh mt of urea and 10.92 lakh mt of ammonia in the year 2004-05 which corresponds to 104.41% and 108.9% of reassessed capacity of urea and ammonia respectively. The cumulative urea and ammonia production since inception crossed 32 million mt and 19 million mt respectively during the year. The society has occupied the first position in the country for similar plants. The seed production programme initiated by KRIBHCO in 1990-91 to provide quality certified seeds of main crops to the farmers in 7 states. The seeds are being made available to the farmers through Krishak Bharati Sewa Kendras (KBSKs), Cooperative societies and State Cooperative Federations. The main crops taken under seed production are paddy, wheat, gram, pea, arhar, urd, moong, lentil, soybean, castor, cotton, hybrid bajra and jute. In order to provide quality seed, KRIBHCO has set up ten most modern seed processing plants located at Abohar (Punjab), Aligarh, Jangipur, Moth and Shahjahanpur (U.P.), Ajmer (Rajasthan), Dewas (M.P.), Godhra (Guj.), Hisar
(Har.) and Nizamabad (A.P.). During the financial year 2004-05, the society has produced 1.54 lakh quintals and sold 1.48 lakh quintals of seed worth `15.40 crores.

The society has been producing and marketing biofertiliser since 1995 being eco-friendly and cost effective fertilisers. During the year 2004-05 society has produced 560 mt and sold 611 mt biofertilisers. The society has been continuously promoting use of biofertiliser by educating farmers and making them aware about its benefits through field demonstrations, farmer meetings, crop seminars, kisan melas, exhibitions and free distribution of literature on biofertiliser application etc. Awards were given by National Productivity Council and FAI for production and popularising biofertiliser amongst farmers. The society continues to provide services to the farming community by providing various agro-inputs and technical services under “Single Window Approach” through its 61 Krishak Bharati Sewa Kendras.

Gramin Vikas Trust was established by KRIBHCO and Government of India as an independent legal entity to implement two Rural Development Projects, namely, Eastern India Rainfed Farming Project (EIRFP) and Western India Rainfed Farming Project (WIRFP) funded by Department of International Development (DFID) U.K. The projects have been working for the enhancement of sustainable livelihoods for the tribal and rural population of Rainfed regions for alleviation of poverty through farming systems, development and research, institution building and beneficiary participation.

The trust is operating Western India Rainfed Farming Project for M.P., Rajasthan and Gujarat and Eastern India Rainfed Farming Project for Orissa, Jharkhand and West Bengal where hardly any government support is received. The project are
spread over 202 core villages and 550 proximal villages. DFID funding for EIRFP ended on 31st March, 2005 and project is sustaining through KRIBHCO’s support with a budget of `115 lakhs for the year 2005-06.

4.1.3 Growth of Fertilizer Industry
According to Fertilizer Association of India One of the most significant achievement of the post Independence period of our Country has been the ability to achieve self-sufficiency in food grain production. This achievement is due to the rapid growth and improvement of Fertilizer industry. The Fertilizer industry is growing at the rate of 4% for the last 10 years and has been contributing a significant part of G.D.P. The growth and importance of Fertilizer industry in India can be divided into three distinct phases, these are given below.

1. Pro Green Revolution Period:
This period is described in 1952-1953 era where increased growth of food grains took place however this increased production in food grains took place due to increased irrigation methods. In this phase the land under agriculture was made more, during this period about 80% of the country's population was involved in Agriculture either directly or indirectly. During this period the fertilizer's which were manufactured were Super Phosphate & Ammonium Sulphate.

2. Green Revolution Period:
During this phase Government stated the programme aimed at making our country self-sufficient in Food Products. This was the period between the years 1959-1960. This plan laid the emphasis on production of High Yielding Varieties. To make this plan a success there was a high need to make soil fertile by providing it with nutrients like Phosphorus, Nitrogen and Potassium. During this phase Fertilizer
industry tried to play a vital role, became one of the most important part of our economy.

3. The Post Green Revolution Period:
The world's population along with Indian population has kept on growing at an alarming rate; the fertilizer companies all over India are trying to expand their scale of operations in order to increase the production rate. The current demand of fertilizers in India is 18 million tonnes.

1. Public Sector
   ➢ The Fertilizer And Chemicals Travancore Ltd. (FACT)
   ➢ Hindustan Fertilizer Corporation Ltd. (HFC)
   ➢ Madras Fertilizer Ltd. (MFL)
   ➢ Hindustan Copper Ltd. (HCL)
   ➢ Naively Lignite Corporation Ltd. (NLC)
   ➢ Pyrites, Phosphates And Chemicals Ltd. (PPCL)
   ➢ Rashtriya Chemicals And Fertilizers Ltd. (RCFL)

2. Co-Operative Sector
   There are only two fertilizer manufacturing societies in Co-operative sector.
   ➢ Indian Farmers Fertilizers Co-Operative Ltd. (IFFCO)
   ➢ Krishak Bharti Co-Operative Ltd. (KRIBHCO)

3. Private Sector
   Fertilizer producing company in private sector.
   ➢ Gujarat Narmada Valley Fertilizer Co. Ltd. (GNFC)
   ➢ Hindustan Lever Ltd. (HLL)
   ➢ Hari Fertilizer
   ➢ ICI India Ltd.
> Indo Gulf Fertilizers & Chemicals Corporation Ltd.
> Mangalore Chemicals & Fertilizers Ltd. (MCFL)
> Southern Petro Chemicals Industries Corporations Ltd.
> Nagarjuna Fertilizer & Chemical Ltd. (NFCL)
> Shri Ram Fertilizer & Chemicals Ltd.
> Tuticorian Alkali Chemicals & Fertilizer Ltd.
> Zuari Agro Chemicals Ltd.
> Bindali Agro Chemicals Ltd.
> Chambal Fertilizer & Petrochemical Corporations Ltd. (DEPCL)
> Gujarat State Fertilizer Company (GSFC)

### 4.1.4 MEMBERSHIP:

A cooperative thrives on the trust of its members. Membership of “KRIBHCO” is open to government of India, national state and district and village level cooperative society. At the initial stage, way back in June, 1981 the total membership in ”KRIBHCO” was only 221 cooperative societies which rose significantly to 6044 cooperative societies as on March 31, 2005 as against 5790 as on March 31, 2004. Phenomenal progress made by the society becomes a testimony to the ever-increasing membership over the years.

The total membership in KRIBHCO as on March 31, 2013 was 7374 Cooperative Societies (including Government of India and other Institutions) as against 7349 as on March 31, 2012. The paid-up share capital of the Society was \`390.18 Crore as on March 31, 2013.
OBJECTIVES: -

a) To undertake the activities for the rural upliftment and agriculture development.

b) To promote economic interest of its members by undertaking manufacturing of chemical fertilizer & allied product.

In furtherance of these objectives “KRIBHCO” may undertake one or more of the following activities: -

(I) To undertake production processing, manufacture, sale distribution, marketing, import export and to otherwise deal in agriculture production requisites.

(II) To set up storage units for storing fertilizer and other goods by itself or in collaboration with other agency.

(III) To act as warehousing agency under the warehousing act and own go downs or hire go downs for the storage of fertilizers and other goods.

AWARDS:

The excellence performance of the society has brought a number of laurels from various organizations. The awards received during year were as follows:

- KRIBHCO receives gold star award of Excellence from Institute of Economic studies for its overall excellent performance.

- KRIBHCO receives the Rajshabha Award from Honble Minister of Chemical and Fertilizers for 2002-03, 2003-04 and 2004-05.

- KRIBHCO was awarded First Prize for Production, Promotion and marketing of Bio Fertilizers for the year 2004-05 on 1st December 05 by FAI.

4.1.5 MILE STONES: -

(I) Project zero Date : 31/03/1981
(II) Foundation stone laid by Smt. Indira Gandhi : 5/02/1982
(III) Project completion : 31/03/1985
(IV) Plan completion : 26/11/1985
(V) Commercial production : 1/3/1986
(VI) Percent capacity utilization : Urea 99%
                              Ammonia 95%
(VII) Plant ready of production : January/September 1985
(VIII) Gas available by ONGC : PHASE 1 & PHASE 2
                               18-9-85  6-11-85
(IX) Trial production Ammonia : PHASE 1 & PHASE 2
                              Urea (stream 11/31)
                              Ammonia (stream 21/41)
                              14-11-85  30-11-85
                              26-11-85  13-12-85
                              31-12-85  01-12-85
(X) ISO certificate
    (I) KRIBHCO Plant
        ISO 9001-2000
    (II) KRIBHCO Plant
        ISO 14001
    (III) KRIBHCO Mktg Office
        ISO 9001-2000

4.1.6 DEPARTMENT AND MANPOWERS AT “KRIBHCO”
Financing & Accounting  62
Personnel & administration  82
HRD  09
Security  101
Material  55
Medical  32
Management of KRIBHCO, Hazira plant is committed to operate and maintain its fertilizer manufacturing complex through quality assurance, environmental protection and to the satisfaction of customers.

KRIBHCO, Hazira plant shall achieve this quality policy through following objectives:

1. Continually upgrading technology to improve plant efficiency & reliability.
3. Improving the skills & knowledge of personnel.
4. Continuously improving the quality Management system.

4.1.8 Human Resource Department

‘KRIBHCO’ considers its human resources as a the greatest assets. It invests time and money to develop its employees through various HRD mechanisms. Regular
in-house training programs sponsorship to outside training institution, brainstorming, problem solving workshops etc. are conducted for employees at all level.

**Structure:**

Chief Manager (N. Bhatta)  
Senior Manager (D. K. Mandal) Manager (H. D. Desai)  
Deputy Manager (P.T. Solanki)  
Sr. Assistant Manager (S. N. Purabia)  
Assistant Manager (M. N. Patel)  
Junior Manager (K. S. Mohanan)

viz. urea, Ammonia, Bio-fertilizer, 30 mega watt power plant operation & maintained of heavy water plant of department of atomic energy, But KРИBКО is having urea as its main product.

They use Ammonia as raw material & main input of urea & sale the excess production to other non-fertilizer industries.
4.1.9 Product mix of KRIBHCO

<table>
<thead>
<tr>
<th>Product mix of KRIBHCO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Urea</td>
</tr>
<tr>
<td>Bio-Fertilizer</td>
</tr>
<tr>
<td>Seeds</td>
</tr>
<tr>
<td>- Wheat</td>
</tr>
<tr>
<td>I Azotobacter</td>
</tr>
<tr>
<td>- Paddy</td>
</tr>
<tr>
<td>II Azospirillum</td>
</tr>
<tr>
<td>- Pulses</td>
</tr>
<tr>
<td>III Rhizobium</td>
</tr>
<tr>
<td>1.gram</td>
</tr>
<tr>
<td>IV Phosphorus Solubilising</td>
</tr>
<tr>
<td>2.pea</td>
</tr>
<tr>
<td>Miro-organism (P S M)</td>
</tr>
<tr>
<td>3.arthian</td>
</tr>
<tr>
<td>4. Urd</td>
</tr>
<tr>
<td>5. lentils</td>
</tr>
<tr>
<td>6. moog</td>
</tr>
<tr>
<td>- oil-seeds</td>
</tr>
<tr>
<td>1. mustard</td>
</tr>
<tr>
<td>2. soyabean</td>
</tr>
<tr>
<td>3. castors</td>
</tr>
</tbody>
</table>

4.1.9.1 Features of products:

**Urea:**
1. Urea is colorless odorless white crystalline chemical substance. Generally in the form of crystals. Urea is soluble in water, alcohols and liquid ammonia
when heated under vacuum. It sublimes at around 120 Deg.c - 130 Deg.c temperatures. At 160 Deg.c it decomposes to ammonia and carbon dioxide. Urea in the fact is the diamide of carbonic acid with a chemical representation: \( \text{NH}_2\text{CONH}_2 \).

2. The principle field of application of urea is for agriculture purpose as a nitrogenous fertilizer. Fertilizer grade urea is generally marketed in the form of prills due of its free flowing characteristics. A certain quantity of urea is also used for mixed fertilizer like NP or NPK of different grades. A part from its use as a nitrogenous fertilizer urea is a also used for purpose of animal feed as a protein supplement in some of the advance countries.

3. Another important application of urea is for the manufacture of thermosetting etc. further urea is also used for manufacture of several other chemicals and pharmaceuticals etc.

Table 4.1 Kribhco urea production and sales
<table>
<thead>
<tr>
<th>Year</th>
<th>Productions (Lakh MT)</th>
<th>Sales (Lakh MT)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006-07</td>
<td>17.14</td>
<td>34.63</td>
</tr>
<tr>
<td>2007-08</td>
<td>17.40</td>
<td>36.26</td>
</tr>
<tr>
<td>2008-09</td>
<td>17.43</td>
<td>37.76</td>
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<tr>
<td>2009-10</td>
<td>17.80</td>
<td>38.47</td>
</tr>
<tr>
<td>2010-11</td>
<td>18.41</td>
<td>38.23</td>
</tr>
<tr>
<td>2011-12</td>
<td>-</td>
<td>34.93</td>
</tr>
<tr>
<td>2012-13</td>
<td>-</td>
<td>40.03</td>
</tr>
</tbody>
</table>

(Source: Annual Reports of Company)

**Bio-fertilizer:**

1. **Azotobacter:**

Azotobacter Bio-fertilizer contains billions of Azotobacter Chrococcum species of bacteria and is very useful microbial inoculants for nitrogen mobilization. The microorganisms of Azotobacter live in the rhizo share of root system of the plant. They consume organic carbon present in the soil and fix atmospheric nitrogen. Azotobacters are free-living microorganisms, which are active nitrogen fixers. They contain an enzyme known as nitrogenous which converts/fixes atmospheric nitrogen into ammonia. This ammonia is excreted by the microorganisms in to the soil, which is consumed by the plant for protein synthesis. Azotobacter chrococcum has a potential of fixing 50kg of nitrogen per hectare.
2. Azospirillum:
Azospirillum Bio-fertilizer contains billions of Azosirillum Brasilense species of bacteria and is very useful microbial inoculants for nitrogen mobilization. The microorganisms of Azospirillum are associative in nature i.e. they are present in the rhizosphere and rizoplane of the plants they use nutrients and source of energy from the root exudation and fix atmospheric nitrogen. Azospirillum are associative microorganisms, which are active nitrogen fixers. They contain an enzyme known as nitrogenous which converts/fixes atmospheric nitrogen in the ammonia and the plants use this ammonia. Azospirillum brasilense has a potential of fixing 20-40kg of nitrogen per hectar.

3. Rhizobium:
Rhizobium variety of Bio-fertilizer contains billions of Rhizobium species of bacteria. These bacteria form nodules on the roots of leguminous crops. Rhizobium is symbiotic in the nature, while other verities such as Azotobacter, P.S.M and Azospirillum are free living. Rhizobium is crop specific unlike Azotobacter, P.S.M, and Azospirillum, which can be used for all crops. The leguminous seeds when treated with Rhizobium, the roots hairs are attacked by Rhizobium during germination and give rise to the formation of nodules. This nodule contains billions of bacteria and seats of nitrogen fixation. Greater the number of nodules formed on the roots, greater is the quality of nitrogen fixed. Rhizobium has potential of fixing nitrogen varying from 50kgs to 200kgs nitrogen per hectare depending upon the variety of leguminous crops.

4. Phosphorus Solubilising Micro-organism (P. S. M.):
P. S. M. variety of Bio-fertilizer contains billions of phosphate solubilising microorganisms, which are capable of solubilising insoluble phosphate already available in the soil. Of the total phosphatic fertilizers applied to the crops, only a
meager quantity of 25% is available to the plants in soluble forms, while rest of the phosphates get fixed in the soil in the form of insoluble phosphates, such as aluminum phosphate, iron phosphate, tri calcium phosphate etc. these phosphates get accumulated in soil and remain unused under normal soil conditions. the phosphate solubilising micro-organisms are free living and present in the rhizosphere of the root system of the plant. Phosphate solublising microorganisms haves potential of solubilising about 40kg phosphorus $p_{205}$ per hectare.

<table>
<thead>
<tr>
<th>Year</th>
<th>Production (MT)</th>
<th>Sales (MT)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2002-03</td>
<td>296</td>
<td>351</td>
</tr>
<tr>
<td>2003-04</td>
<td>603</td>
<td>516</td>
</tr>
<tr>
<td>2004-05</td>
<td>560</td>
<td>611</td>
</tr>
<tr>
<td>2005-06</td>
<td>632</td>
<td>637</td>
</tr>
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<td>2006-07</td>
<td>738</td>
<td>784</td>
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<td>2007-08</td>
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<td>2010-11</td>
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<td>944</td>
</tr>
<tr>
<td>2011-12</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2012-13</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 4.2 Kribhco bio-fertilizer Production and Sales
(Source: Annual Reports of Company)

**Table 4.3 Kribhco Ammonia Production**

<table>
<thead>
<tr>
<th>Year</th>
<th>Production (Lakh MT)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2002-03</td>
<td>9.92</td>
</tr>
<tr>
<td>2003-04</td>
<td>11.17</td>
</tr>
<tr>
<td>2004-05</td>
<td>10.92</td>
</tr>
<tr>
<td>2005-06</td>
<td>10.12</td>
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<tr>
<td>2006-07</td>
<td>10.38</td>
</tr>
<tr>
<td>2007-08</td>
<td>10.36</td>
</tr>
<tr>
<td>2008-09</td>
<td>10.85</td>
</tr>
<tr>
<td>2009-10</td>
<td>11.10</td>
</tr>
<tr>
<td>2010-11</td>
<td>11.58</td>
</tr>
<tr>
<td>2011-12</td>
<td></td>
</tr>
<tr>
<td>2012-13</td>
<td></td>
</tr>
</tbody>
</table>

(Source: Annual Reports of Company)

**Table 4.4 Kribhco Seeds Production and Sales**

<table>
<thead>
<tr>
<th>Year</th>
<th>Production (Quintals)</th>
<th>Sales (Quintals)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2002-03</td>
<td>108</td>
<td>106</td>
</tr>
<tr>
<td>2003-04</td>
<td>121</td>
<td>111</td>
</tr>
<tr>
<td>Year</td>
<td>Production (Quintals)</td>
<td>Sales (Quintals)</td>
</tr>
<tr>
<td>---------</td>
<td>-----------------------</td>
<td>------------------</td>
</tr>
<tr>
<td>2004-05</td>
<td>154</td>
<td>149</td>
</tr>
<tr>
<td>2005-06</td>
<td>145</td>
<td>142</td>
</tr>
<tr>
<td>2006-07</td>
<td>118</td>
<td>151</td>
</tr>
<tr>
<td>2007-08</td>
<td>168</td>
<td>167</td>
</tr>
<tr>
<td>2008-09</td>
<td>198</td>
<td>186</td>
</tr>
<tr>
<td>2009-10</td>
<td>229</td>
<td>222</td>
</tr>
<tr>
<td>2010-11</td>
<td>248</td>
<td>247</td>
</tr>
<tr>
<td>2011-12</td>
<td>314</td>
<td>272</td>
</tr>
<tr>
<td>2012-13</td>
<td>322</td>
<td>376</td>
</tr>
</tbody>
</table>

(Source: Annual Reports of Company)

4.1.9.2 Product Planning:
Product planning is the process to plan for marketing a particular product or product line of the company in a particular industrial or geographical market. General Manager of production is consulting with G.M of marketing considering following factors:
1. Capacity of plant
2. Availability of raw material
3. Demand in the marketing
4. Environmental factors
5. Activities of competitors
6. Availability of stock in a country
7. Availability of storage and warehouses
8. E. S. C. allocation given by Agri-minister like rain prigation, cropping pattern etc.

Depending up on the above factors first yearly target is desired & month wise target is also decided.

### Information regarding process route for each plant / product:

**Name of Plants / Product** | **Ammonia** | **Urea**
--- | --- | ---
1. Name & sources of Raw material | natural gas from Bombay Ammonia & CO₂ | 
   | high / south bassein after Sweetening, LPG extraction | 
   | And c2-c3 extraction (at IPCL Gandhar from Jun ‘2002) | 
   | Through M/S GAIL | 

2. Name & sources of Utilities:
   - **Steam (***)** Internal generation with Backup from SGP
     - Electricity power from captive power
     - Backup from Plant with backup from G.E.B
     - Water Through canal from kakrapar weir (***)
   - I) name of process steam reforming of N.G Ammonia stripping
   - II) Plant designer MW Kellogg Co. USA
     - snamprogetti Italy.
(*) Steam generation boilers were converted on dual fuel (Natural gas & natural gas liquid)

(**) in view of Gujarat irrigation department’s notice for stopping the supply of water through canal from April’92, an alternate source of water supply i.e. supply through pipeline from kakrapar weir is also installed.

<table>
<thead>
<tr>
<th>Plant-1</th>
<th>Plant-2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ammonia</td>
<td>1520 MTPD</td>
</tr>
<tr>
<td>Urea</td>
<td>1310 MTPD</td>
</tr>
<tr>
<td>Bio-fertilizer</td>
<td>-</td>
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<td></td>
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</tr>
</tbody>
</table>

**PLANT DETAIL:**

![Ammonia plant image]
Chart 4.1 Ammonia Plant Layout

Natural Gas →

De-Sulphurisation → Primary Reformer → Secondary Reformer → HT&LT Shift Conversion

Steam

Ammonia Synthesis → Syn Gas Compressor

Ammonia Chilling → Ammonia Separation

Unconverted Syn gas

Excess NH$_3$ to Storage

Ammonia

CO$_2$ Stripping

CO$_2$

Ammonia

UREA PLANT
Process description – Ammonia plant:

1. Main section

The steam reforming Ammonia process involves the following basic steps:
1. Desulphurization
2. Steam reforming
3. Shift conversion
4. Carbon Dioxide removal
5. Methanation
6. Ammonia synthesis
7. Refrigeration system

I. Desulphurization
1. The purpose of desulphurization is to remove sulphur from the natural gas. Sulphur is poisonous for the catalyst used in Ammonia plant and hence its removal is essential.
2. Desulphurization is accomplished in reactor by sending natural gas mixed with a small quantity of hydrogen (from make up gas) at a temp. Of 395 c over bed of comox (cobalt and molybdenum) catalyst and two beds of zinc oxide catalyst.
3. The chemical reactions involved are:
   i. RSH+H$_2$ = H$_2$S + RH (COMOX bed)
   ii. H$_2$S + ZnO= ZnS + H$_2$O (zinc oxide bed)
4. Thus over a period of time the entire amount of zinc oxide catalyst will get converted to zinc sulphide and a new catalyst has to be charged.
5. The sulphur content of natural gas is thus reduced from 10 ppm to less than 0.25 ppm.

II. Steam reforming
1. The steam reforming of hydrocarbon feedback to syn gas production is carried out in two catalyst reactions stages. The first stage, called primary
reforming, produces a partially reformed gas containing approximately 10 % by vol. Of methane (dry basis) and in the secondary reformer this gas is further processed to achieve to methane content desirable for syn gas production approximately 0.3% by vol. (dry basis).

2. Desulphurised natural gas is mixed with steam in the ratio of 3.45: 1 and the mixed gas is then heated in the convection section of primary reformer to a temperature of 460c before entering the catalyst tubes (containing Nickel catalyst) in the radiant section of the primary reformer.

3. Hydrocarbons in the natural gas (methane above 90% ethane, propane, butane etc.) react with steam to give hydrogen, carbon monoxide, carbon dioxide according to the following reactions:
   
   i. \( \text{CH}_4 + \text{H}_2\text{O} = \text{CO} + 3\text{H}_2 \) Endothermic (heat require)
   
   ii. \( \text{CH}_4 + 2\text{H}_2\text{O} = \text{CO} + 4\text{H}_2 \)

4. Since these reactions are endothermic, the heat required is supplied by burning a mixture of natural gas and purge gas from the synthesis loop in a series of burners installed at the roof and walls of the radiant section.

5. The outlet gases from the primary reformer with a methane content of about 10% in enter the secondary reformer at a temperature of 800 c.

6. In the secondary reformer these gases are mixed with the stochiometric quantity of air (sources of nitrogen), which supplies oxygen for the combustion of partially reformed gas.

7. The combustion heat utilized to complete the reforming reaction over the nickel catalyst bed in the secondary reformer. Thus the methane content of the gases is reduced to 0.3 % and the temperature increased to about 985 c.

**III. Shift Conversion**
1. Carbon Monoxide is converted into carbon dioxide in two-section i.e. HT shift conversion and LT shift conversion.

2. The gases coming out of the secondary reformer at a temperature of about 985 c are cooled in Waste Heat Boiler (which produce most of the steam require for the Ammonia plant) and enter high temperature shift converter at a temperature of 350c. In the presence of iron chromia catalyst carbon monoxide reacts with the steam to form carbon dioxide and the hydrogen according to the following reaction.

   i. \[ \text{CO} + \text{H}_2\text{O} = \text{CO}_2 + \text{H}_2 \] Exothermic (Heat liberated).

3. The reaction being exothermic, the temperature of the gases increases to 405c. The gases are cooled to 203c to generate high-pressure steam in a waste heat boiler, to heat the methanator feed and preheat boiler fed water in separate heat exchanger. The gases are then introduced in low temperature shift converter containing and copper zinc catalyst. The same reaction as about takes place and about 99.7% of carbon monoxide is converted to carbon dioxide.

4. Two different reactors and temperature levels are used to take maximum advantage of higher reaction rate at higher temperature and higher conversion at lower temperature.

IV. Carbon Dioxide Removal

1. Carbon Dioxide, the raw materials for urea is removed in this section and sends to the urea plant.

2. The gases leaving L.T. shift converter at around 221c are cooled to 94c and the unreacted steam is condensed and removed.

3. The process use for removal of carbon dioxide is low heat Ben field process with the following features:
Absorption is accomplished in two stages with lean, semi lean Ben field solutions consisting of potassium carbonate and diethanolamine as the main absorbent and vanadium pent oxide as a corrosion inhibitor. The gases leaving absorber at the temperature of about 70°C contain a maximum of 0.1% carbon dioxide on dry basis.

Rich Benfield solution from the bottom of the absorber at a pressure of about 28 kg/cm² is sent to the top of CO₂ stripper through hydraulic turbines which are coupled to semi lean solution pumps their by reducing the power consumption for semi lean solution pump drivers. Rich Ben field solution is flashed of at stripper top thus yielding a pure CO₂ product.

As in the case of absorber, the stripper design is also based on operation in two stages. In the upper section, rich Ben field solution is partially stripped of the dissolved CO₂ by up flowing vapor and a major portion of semi lean solution is withdrawn from the middle point of the stripper and is pumped to the middle of absorber.

The balance of semi lean solution comes down to the bottom of stripper and the further stripped by the up flowing vapors processed in solution regenerator. The lean solution withdrawn from the bottom of stripper is cooled and pumped back to the top of absorber.

V. Methanation
1. The gases leaving CO2 absorber contains traces of carbon monoxide and carbon dioxide which are highly poisonous to synthesis catalyst in amm converter and hence these are converted to methane in methanator in the presence of Nickel catalyst at a temperature 285 to 305c.

2. The reaction that occurs is:

   \[
   \text{CO} + 3\text{H}_2 = \text{CH}_4 + \text{H}_2\text{O} \quad \text{Exothermic}
   \]

   \[
   \text{CO}_2 + 4\text{H}_2 = \text{CH}_4 + 2\text{H}_2\text{O} \quad \text{Exothermic}
   \]

At exit of methanator pure synthesis gas containing N\textsubscript{2} and H\textsubscript{2} in the ratio of 1:3 has a CO+CO\textsubscript{2} contain of less than 1 PPM

**VI. Ammonia Synthesis**

The synthesis gas containing nitrogen and hydrogen in the volumetric ratio of 1:3 is compressed in a turbine driven centrifugal compressor from 28.5 kg/cm\textsuperscript{2} to 185kg/cm\textsuperscript{2}.

The compressed gas is preheated by heat exchange with converter effluent and is passed over iron oxide catalyst where about 17% ammonia is formed. The unconverted gases are mixed with makeup synthesis gas and after removal of ammonia product are recycled over the ammonia converter containing the iron oxide catalyst. The ammonia formed in this section is chilled and separated.

**VII. Refrigeration System**

1. A four-stage ammonia refrigeration system provides refrigeration for ammonia condensation in the synthesis loop and the ammonia vapors generated in the ammonia storage tank due to normal heat leak.
2. The refrigeration compressor consist of two cases centrifugal compressor with inter coolers, a refrigerant condenser, a refrigerant receiver and four flash drums.

3. The refrigeration system is designed to deliver the ammonia product as liquid at –33c. This temperature is chosen because it permits the storage of liquid ammonia at atmospheric pressure.
4.1.9.3 PROCESS DESCRIPTION

1. Main Sections

i. The production of urea by ammonia stripping process involved the following steps.

- Synthesis
- Purification and Recirculation
- Concentration and Prilling

ii. The stripping process for production of urea is based on Henry’s laws. According to this law the concentration of component in the solution while in equilibrium with the vapor phase is directly proportional to the partial pressure of that component in the vapor phase. The increase in partial pressure of ammonia over the ammonium carbonate solution reduces the partial pressure of carbon dioxide and hence ammonium carbonate solution decomposes to increase the partial pressure of carbon dioxide in vapor phase to approach equilibrium concentration.

2. Synthesis

Urea is produced by synthesis of liquid ammonia and gaseous carbon dioxide at a temperature of about 190deg. C and pressure of 160kg/cm2.

\[ 2\text{NH}_4 + \text{CO}_2 = \text{NH}_2 \text{COO NH}_4 \text{ Exothermic (Heat Liberated)} \]

Ammonium Carbamate

\[ \text{NH}_2 \text{COO NH}_4 = \text{NH}_2 \text{ CO NH}_2 +\text{H}_2\text{O} \text{ (Slightly Endothermic)} \]

Urea
1. Liquid Ammonia from ammonia plant is pressurized to 240 kg/cm² and is used as a driving fluid in the Carbamate ejector for recycling the unconverted ammonium Carbamate into the synthesis reactor. Carbon dioxide is also compressed to synthesis pressure in a centrifugal compressor and fed to synthesis reactor.

2. In the synthesis reactor ammonia and carbon dioxide react to form ammonium Carbamate, urea and water as shown above. Although the first reaction is spontaneous and complete, the conversion of ammonia carbonate to urea is only partial (about 60%) thus leaving unconverted ammonium Carbamate, urea and water at the reactor outlet.

3. The effluents from the reactors enter the stripper, which operates at the same pressure as the reactors. Here the ammonia stripping process achieves the decomposition of ammonium Carbamate into ammonia and carbon dioxide and the heat of decomposition is supplied by steam.

4. The overhead gases (ammonia, carbon dioxide and water vapor) from stripper are condensed in the weak Carbamate solution in the Carbamate condenser at synthesis pressure. The heat of condensation is utilized to produce low-pressure steam in the sell side of the condenser. The Carbamate solution so formed is recycled to the synthesis reactor through Carbamate ejector.

3. Purification and Recirculation

5. The purification of urea and further circulation of unconverted ammonium Carbamate take place in two stages operating at 16kg/cm² and 4.5kg/cm² respectively.
6. Each stage consists of a decomposer where further decomposition take place on account of pressure reduction, a separator where the gases and urea solution are separated and condenser where gases are dissolved in the weaker Carbamate solution from the subsequent stage.

7. The society has also installed pre-concentrator and pre-decomposer to reduce the energy consumption and to reduce the vacuum load.

8. The concentration of urea is thus increased to about 80% and almost the entire quantity of converted ammonia and carbon dioxide is recycled back.

4. Concentration and Prilling

9. The urea solution is further concentrated to 99.75% in two vacuum concentrators operating at 0.3kg/cm² abs and 0.03kg/cm² abs pressure.

The concentrated urea solution is pumped to the top of Prilling tower from where it is sprayed in to the Prilling tower through a Prilling bucket. The drops of urea encounter by cold airflow and get solidified in to prills. The urea prills are sent to the bagging plant or at urea silo by belt conveyors.

4.1.10 Swot Analysis

**Strength**

- Kribhco is having Sound financial position.
- The Management of Kribhco is very professional.
- Kribhco has larger proportion of reserves and surplus and further it has no debt capital.
✔ Kribhco has long standing reputation in the Indian Fertilizer Market.
✔ Staff of Kribhco is very co-operative and hard working.
✔ Kribhco is having skilled employees staff.
✔ Good cooperation between employees.
✔ Kribhco is having own Training Centre for training of employees as well as apprentice students of different discipline.
✔ It is having a full support of the Government of India.
✔ Kribhco having strong and wide marketing network towards country.
✔ High Production capacity of Kribhco leads to low production cost.
✔ Savings in Production cost because Kribhco is having own Nitrogen and Ammonia Plant.
✔ Capacity Utilization more than 100%.
✔ Still the starting of production, Kribhco plant has no major break down in Plant.
✔ Kribhco has extra land and fully developed infrastructure facilities so it can be further developed.

Thus, we can say that the position of Kribhco in the Fertilizer Market is Satisfactory.

**Weaknesses**

✔ Government interference in the management is more comparatively private units.
✔ Due to Government’s interference it takes longer time in decision making. So the decisions delayed and thus sometimes bias decision are also taken.
✔ Kribhco is having overstaffing.
✓ Kribhco is having demotivated employees because of job security and safety.
✓ Kribhco is having no debt capital so the advantage leverage cannot be taken.

Thus, we can say that the Kribhco will must be careful regarding its staff and to government also.

**Opportunities**
✓ Investment in Oman Project will raise the profit of Kribhco.
✓ Expansion of existing plant at Hazira.
✓ Look for newer Market with diversified product.
✓ Diversifying the business.

**Threats**
✓ The price of the Row material, i.e. Natural Gas, is increasing continuously.
✓ There is a chance of sharp reduction in Government subsidy in near future.
✓ Kribhco is having very little market share.
✓ In the era of Free Trade, the import of fertilizers may affect the business of the Kribhco.

**4.1.11 Corporate Social Responsibility**
In line with the corporate philosophy of KRIBHCO, the plant organization at Hazira has been undertaking various community development activities in and around Surat District of Gujarat. This has not only enable us in enriching the socio-
industrial culture but has earned the reputation of being an organization supporting the social cause.

Under the Community Development Schemes / Social responsibility programme, the Society has been sponsoring:

1. **Drinking Water:** The society is providing drinking water, in the neighbouring villages i.e., Kawas and Ichhapore. In addition, construction of check-dams were also sponsored in the districts of Dharampur and Olpad.

2. **Health:** The society has been organizing Medical Check-up and Eye Camps for the benefit of tribal farmers in the villages in Vyara, Songadh, Dharmapur, Vansda etc.

3. **Education:** With a view to promote education in rural and tribal areas, the society has been supporting educational institutes by way of construction of Class-rooms, Sanitation Blocks, providing furniture, books and book-shelves for Libraries, Laboratory instruments, distribution of Uniform and education kits consisting books and stationary items etc. The society has also supported for construction of village public library.

4. **Infrastructure:** The society has been supporting the local administration in creation and maintenance of infrastructure. Construction of Village approach roads at Kawas, Kakrapara, Malgama and other villages were aided so that village connectivity can be maintained during monsoon. Bus-stand sheds were also constructed.
5. **Environment Preservation:** The society continually supports the programmes that sensitize Environment Protection and Enrichment by way of organizing Tree-Plantation™ campaigns and participating in Agriculture Fairs/Exhibitions etc.

6. **HR Overview:** Kribhco has been a front runner in the fertilizer sector which has been possible through the thrust on human resources development. The Management of KRIBHCO considers its employees as a valuable resource and asset. Paramount importance is assigned to employees’ related matters. Continuous and untiring efforts are made towards maintaining cordial and harmonious inter-personal relations which have been key factor(s) in achieving all round improved performance of the Society.

Kribhco offers a host of exciting career opportunities to qualified and dynamic young individuals in the field of Production / Maintenance/ Technical /Marketing/ Fin & A/c s /Materials and Human Relations. The developmental needs of the employees are taken care of by a well laid out training plan for continuous updation of knowledge, skills, competency and capacity building.

Human resources department in Kribhco plays the role of taking care of this human capital of the society. It develops the procedures and tools for the Management to manage as well as for smooth conduct of human resources related issues. This department also enables the creation of an environment in the organisation wherein employees feel pride in working and sense of belongingness to the Society.
Through its multifarious activities the HR department in Kribhco also takes care of employees’ physical, economical and developmental needs. This concern for its employees is reflected through the efforts in the area of health, safety and welfare of its employees. Kribhco not only meets the statutory obligations towards the employees, but also undertakes voluntary measures beyond the statutory requirement. It endeavours to provide hospital/medical facilities, canteen, recreation club, housing facilities, schools and safe working environment to its employees.

HR department facilitates development of an environment whereby employees’ are inspired to give their best to the society since the organisation is taking utmost care of all his and his family’s needs. It helps in enabling the maximization of employee capabilities through its employee oriented policies and practices which in turn gives it the competitive edge in its trail blazing success in the fertiliser industry as well as in its efforts towards diversification and expansion ventures.

Employees’ Relations in the Society have all through remained cordial and peaceful. An atmosphere of mutual trust, confidence and goodwill has prevailed between the Management and the employees. Kribhco Management maintains an open-door policy with fair and transparent approach while dealing with the employees.
LARSEN & TOUBRO LIMITED:

It's all about Imagineering

Type Public

Traded as NSE: LT
BSE: 500510
BSE SENSEX Constituent

Industry Conglomerate

Founded Bombay Presidency, British India (1938)

Founder(s) Henning Holck Larsen
Soren Kristian Toubro

Headquarters L&T House, Ballard Estate, Maharashtra, Mumbai,
India

**Area served**
India, Middle East, East Asia and Southeast Asia

**Key people**
K. Venkataramanan (CEO & MD)
A. M. Naik (Executive Chairman)

**Products**
Construction, Heavy equipment, Electrical Equipment, Power, Shipbuilding, Financial Services, IT Services

**Revenue**
▲ US$ 13.6 Billion (2013)

**Operating income**
▼ US$ 1.39774 Billion (2013)

**Net income**
▲ US$ 952.638 Million (2013)

**Total assets**
▲ US$ 26.188 Billion (2013)

**Total equity**

**Employees**
54,092 (Mar 2013)

**Divisions**
Technology, Engineering, Construction, Manufacturing

**4.2 INTRODUCTION:**
Larsen & Toubro was founded by two Danish engineers, Late H Holck Larsen and Late Soren Toubro in 1938. It was converted to a private limited company in 1946 and has been a public limited company since 1950. Since then it has grown in to a professionally managed, large engineering conglomerate and has acquired leadership position in all the areas of its activities. With yearly sales of over `11,000 crores and its presence in country’s core sectors, L&T foresees itself as a key player in engineering sector. It has a vision to become a professionally
managed Indian Multinational. Its tag line – “We make the things that makes India proud” is quite popular with media and public.

4.2.1 L & T – Heavy Engineering Division

Company has set up world-class heavy engineering facilities at Hazira, near Surat, on the coastal belt of western India. The unit is engaged in design and manufacture of hi tech fabricated equipment for core sectors such as Oil & Gas, Refineries, Petrochemicals, Fertilizers, Nuclear and Aerospace for our customers in India and abroad. Facilities set up on 200 acres of land on the bank of river Tapi, houses several well equipped shops, open yards for fabrication of large equipment and off shore platforms and private jetties for marine transportation of large and heavy equipment.

Hazira works has established numerous Benchmarks and has several firsts to its credit. E.g., largest FCC (Fluidized Catalyst Cracking) Regenerator in the world, first hydro cracker, first CrMoV reactor, established global benchmark in early delivery for 500 MWe End Shields, critical equipment for nuclear power plants etc.

Larsen & Toubro Ltd (L&T) is a technology, engineering, construction and manufacturing company. The company is one of the largest and most respected companies in India's private sector. The company operates in three segments Engineering & Construction Segment, Electrical & Electronics segment, Machinery & Industrial Products, and others. The company's Engineering, Construction & Contracts Division (ECCD) undertakes engineering, design and construction of infrastructure, buildings, factories, water supply, and metallurgical & material handling projects covering civil, mechanical, electrical and
instrumentation engineering disciplines. Their Engineering & Construction Division designs, engineering and executes projects for hydrocarbon sector with front-end design. Its heavy engineering division is organized into two independent companies: Heavy Engineering Independent Company and Ship Building Independent Company. Their Electrical & Electronics division comprises Electrical and Automation Independent Company and Medical Equipment and Systems business. L&T has an international presence, with a global spread of offices. A thrust on international business has seen overseas earnings grow significantly. It continues to grow its overseas manufacturing footprint, with facilities in China and the Gulf region. The company's businesses are supported by a wide marketing and distribution network, and have established a reputation for strong customer support. Larsen & Toubro Ltd was incorporated in the year 1946 as a private limited company. Earlier, the company was established as a partnership firm founded by two Danish engineers Henning Holk Larsen with Soren Kristian Toubro Mumbai. In December 1950, the company became a Public Company with a paid-up capital of ₹2 million. They executed prestigious orders during this period which includes the Amul Dairy at Anand and Blast Furnaces at Rourkela Steel Plant. During the year 1981-82, the company acquired 2 bulk shipping carriers from Japan. During the year 1983-84, they started one cement plant with capacity of 1 MTPA at Maharashtra. In the year 1997, the company formed a joint venture company with Deere Pvt Ltd to manufacture agricultural tractors namely L&T-John Deere Pvt Ltd. In April 1, 2003, the company transferred their cement business to Ultra Tech Cement Ltd. The company received a host of awards, medals and trophies for their continuous efforts. They received Environmental Excellence Gold award from Greentech Foundation during the years 2003-04 and 2004-05. Engineering Export Promotion Council (EEPC) offered a trophy for high exports. The Ministry of Power conferred the first prize in
National Energy Conservation for the year 2005. In July 2005, the company approved the divestment of their stake in L&T-John Deere Pvt Ltd. In August 2005, the company entered into a MOU with Datar Switchgear Ltd (DSL) to merge the company with L&T. As on October 2005, the company totally exited from the packaging business by sale of their Glass Containers Business to ACE Glass. In the year 2006, the company amalgamated two of their own folds, the L&T Power Investments Pvt Ltd (LTPL) amalgamated with India Infrastructure Developers Ltd (IIDL). During the year 2006-07, A Wall Street Journal survey featured L & T among Asia's 'Most Admired Companies' and ranked the company No.1 for quality of products and for overall reputation. In April 2007, the company and theirs associate Audco India Ltd (AIL) invested `35 crore in the Coimbatore (TN) switchboard and valve unit. Larsen & Toubro made a tie up with Japan's Toshiba Corporation and Mitsubishi Heavy Industries for setting up manufacturing facilities for super-critical turbines and boilers used in coal-fired power generation plants. During the year 2008-09, the company transferred their entire 100% stake in L&T Infrastructure Finance Company Ltd, L&T Finance Ltd and India Infrastructure Developers Ltd to L&T Capital Holdings Ltd (LTCHL). In March 31, 2009, the company acquired 50% stake in L&T-Demag Plastics Machinery Ltd from the joint venture partner Sumitomo (SHI) Demag Plastics Machinery GmbH. Accordingly, L&T-Demag Plastics Machinery Ltd became a wholly owned subsidiary of the company with effect from March 31, 2009. In April 2010, the company and Rolls-Royce, the global power systems company, signed an MOU for cooperation to effectively address the projected need for light water reactors in India and internationally. Also, the company won a critical offshore platform contract from Gujarat State Petroleum Corporation (GSPC) valued at `1060 crore. In May 2010, the company and Howden signed a joint venture to design, engineer, manufacture and supply axial fans and air preheaters to Indian thermal power
plants ranging between 100 MW to 1200 MW. The joint venture will invest around `100 crore for setting up of the industrial facility and related infrastructure. The manufacturing unit will be setup in Hazira, Gujarat. In June 2010, the company secured orders aggregating `747 crore from various customers like Coal India, India bulls Power Ltd and Hindalco Industries Ltd. Also, they secured orders aggregating to INR1440 crores (INR14.40 billion) for the construction of residential towers, township and factory building. The Thermal Power Plant Construction business unit secured two orders aggregating `827 crore from GVK Power for their Gautami Combined Cycle Power Plant Expansion and from SEPCO-I for Talwandi Sabo Power Plant in Punjab. In July 2010, the company won an offshore rig refurbishment contract from Oil and Natural Gas Corporation valued at `376 crore. In August 2010, the company's Building & Factories Operating Company (B&F-OC), secured orders aggregating to `10.25 billion for the construction of two hospital building, residential projects in Mumbai and a cement plant from a major cement manufacturer. Also, the company received two projects worth `1195 crore from ONGC to set up additional processing units at its gas processing complexes at Hazira and Uran. In September 2010, the company and Befula Investments (South Africa) signed a share holders agreement to incorporate Larsen & Toubro T&D SA (Pty) Ltd in South Africa to capitalize on the power transmission and distribution opportunities in south Africa. In October 2010, the company received an order valued at `1449 crore from DB Power Ltd promoted by the Bhaskar Group. In December 2010, they secured two orders amounting `415 crore from Hindalco and Sepco-I. The Hindalco order worth `253 crores is for carrying out structural steel works for the 6x150 MW captive power plants in Orissa. The Sepco-I order valued at `162 crore is for the erection of boilers for their 2x660 MW Talwandi Sabo Power plant, developed by Sterlite Energy Ltd in Punjab. In January 2011, the company secured orders aggregating
1103 crore from various power plant developers for construction of merry go round systems, construction of dedicated railway lines to link power plant sites to the main line rail network. The company Kobe Steel Ltd entered into a joint venture (JV) for the manufacture of internal mixers and twin screw roller head extruders for the tire & rubber industry for global markets, including India. The JV aims to provide customers with products for the tyre industry. In February 2011, the company secured an order valued over 1,100 crore from Gujarat State Electricity Corporation Ltd (GSECL), a government of Gujarat company, to set up a 1 x 375 MW gas based power plant at Dhuvaran, near Baroda in Gujarat, on EPC basis. In May 2011, the company received an order valued over 3500 crore from PPN Power Generating Company Ltd based in Chennai, for setting up a 3 x 360 MW gas based power plant at Village Pillaiperumalnallur in Nagpattinam District of Tamil Nadu State, on EPC basis. They won a process platform contract from Gujarat State Corporation (GSPC) valued at 14.50 billion. In July 2011, the company bagged a major international EPC order valued at 1210 crore from Qatar General Electricity & Water Corporation (KAHRAMAA) for supply and construction of thirteen extra high voltage (EHV) substations in Qatar. In August 2011, the company bagged international orders valued at USD 889 million in the hydrocarbon sector. One order is from Abu Dhabi Gas Industries Limited (GASCO) for its Habshan-Ruwais-Shuweihat (52'/48' dia) Gas Pipeline Project. Valued at around USD 189 million, it involves EPC installation & commissioning of 123 KM of the pipeline to be commissioned in 24 to 26 months. The other order is a USD 450 million EPCI project awarded to L&T Hydrocarbon's Upstream Business Group from ADMA-OPCO, a subsidiary of ADNOC and a major producer of Oil & Gas for the UAE. In August 2011, the company secured new orders worth 1340 crore in the Building & Factories segment for the construction of commercial & residential buildings including add-on orders from ongoing
projects. In September 2011, they received a project order valued around `700 crore from the Petroleum Development Oman LLC (PDO). The order is for setting up a green field project planned to treat an average of 3 MMSCMD of gas. In November 2011, they bagged new orders worth `1629 crore in the building and factories segment. In December 2011, the company bagged a major order valued at `21.64 billion in their Infrastructure Segment from GMR Infrastructure. The order is for construction of stretches consisting of six laning of Kishangarh Udaipur Ahmedabad Highway. The development would be executed on EPC (Engineering, Procurement & Construction) basis.

### 4.2.2 Larsen & Toubro: Hazira Manufacturing Complex (HZMC)

**An Overview:**

Hazira near Surat on the mouth of river Tapti was selected as a location as it provided ready waterfront for transportation of large and heavy equipment. Production commenced at this location in November 1987.

L&T Hazira Manufacturing Complex (HZMC) is now emerging as major growth centre with expansions in new business lines namely main power plant equipments, forging unit, power plant auxiliaries in addition to heavy engineering, oil & gas equipments and ship building facilities. L&T HZMC manufactures extremely diverse range of products, is in the business of design and manufacture of hi-tech fabricated equipment for core sectors and process industries for a wide range of customers in India and abroad. Hazira Manufacturing Complex (HZMC), a jewel in the crown of L&T group of companies, has made its own contribution in enhancing the brand image among its stakeholders and the society. The underlining tagline “We make things that make L&T proud”.
L & T is highly committed to professionalism, quality and service to customers and has been enjoying the reputation of being a leading engineering conglomerate and a good corporate role model underlining its tagline “We make things that make India proud”. Society today expects more from business. The terms of contract between business and society have undoubtedly become more extensive and complex. Social pressures are on the rise. But instead of viewing them as obstacles, at L&T we look at them as untapped opportunities to make a difference. We seek to lead rather than just to react to the ongoing debate.

We view our large geographical footprint as an advantage that allows us to make a larger contribution to society and touch more lives. L&T has a dedicated Corporate Initiatives department that engages with local community, identifies their needs and implements efficient high impact programs leveraging local participation.

Employees along with their families are encouraged to engage in social development. Active support is lent to employee participation in public policy formulation and networking with NGOs, government agencies, chamber of commerce and academic institutes for effective knowledge sharing.

Social pressures often indicate the existence of unmet social needs or consumer preferences. Ongoing close interaction with society helps us develop symbiotic solutions. A social perspective to our business enables us to harness long term opportunities, win the trust of stakeholders, accelerate our investments in innovation and explore new growth vistas.
A social perspective to our business enables us to harness long term opportunities, win the trust of stakeholders, accelerate our investments in innovation and explore new growth vistas. L&T has been a front runner among the Indian corporate in the CSR activities and Hazira Manufacturing Complex (HZMC) has been active since inception in paying back its due to the society and stakeholders in a range of initiatives spanning areas like Education, Rural Health Care and Community Services around its Works.

Primary Health Care the main focus areas are Family Planning Camps and HIV / AIDS awareness and voluntary testing facilities. A noteworthy effort is in the form of Swayam, an L&T ladies club runs initiative for HIV positive women for helping them to be self-reliant and bringing them back to the mainstream of the society. The journey made so far in the area of family planning is not in small steps but in quantum leaps. L&T Hazira Manufacturing Complex (HZMC) conducts family planning camps in remote tribal areas such as Ahwa, Dang, Songadh, Vyara, Nizar, Mandvi, Mahuva, Zankhvav and Surat District where many other NGOs found it difficult to access. In the year 2007-08 L&T - HZW displaced a 30-year old record held by Govt. of Gujarat for the largest no. of Male Vasectomy (NSV) in a single day, by carrying out 231 operations in a day.

L&T is amongst the first corporate to have a policy on HIV/AIDS that clearly shows our commitment at all levels towards the disease & the community at large. The main objectives are to build awareness on HIV/AIDS, prevention, and effective treatment management and support systems for the effected people. The employees have formed a voluntary group called “Jagruti Social Welfare Group” to work in this area with the welfare and medical team. L & T has its own HIV - Voluntary Counseling &Testing Centre (VCTC) where HIV/AIDS awareness
programmes, Pretest counseling, free HIV/AIDS testing, Post-test counseling are provided to contract labour and L & T employees. To take this challenge ahead, “PRAYAS” the L&T Ladies Club, in parallel to the efforts of L&T VCTC, is running a centre called SWAYAM – A Rehabilitation & Training Centre for the HIV+ women, for helping them to be self-reliant and bringing them back to the mainstream of the society.

HZMC is continuously engaged in promoting general health and well-being of the community. L&T Welfare Centre in Surat City provides free medical facilities to community at large, constructed and maintained Primary Health Centre at Mora Village, with full Amenities. L&T HZMC being keen to upgrade Health related facilities in interior Tribal area of Surat, Tapi and Ahwa & Dang Districts, provided Life Saving Medical Equipments to various Government PHCs & CHCs. Weekly clinics, counseling sessions, Weekly clinics, Counseling sessions, Health camps are regularly held by L&T HZMC.

L&T Hazira Manufacturing Complex (HZMC) is actively engaged in the promotional activities of Primary Education – Education too has been a primary focus area and a number of initiatives have been taken by ways of constructing & adopting school, constructing class rooms, renovation works, providing educational equipments, conducting developmental activities for children, distributing education kits etc.

L & T has deep concern for providing the Services to the Community around its works & the city like tree plantation in nearby villages, adopted Bhatlai village to promote the concept of Clean Gujarat - Clean Bhatlai, financial aid and support to
the events like Special Olympics, Gujarat – for Mentally Challenged children, to the trusts assisting specially abled, to the Senior Citizens by way of providing various facilities to Old age Homes, need based projects like relief work during the crisis - natural calamities like Surat flood, Gujarat earth quack, Bihar flood etc.

Community services also cover the employment to locals. Even though, the Hazira Manufacturing Complex (HZMC) unit is set up in government waste land and there are no land looser families, Hazira Manufacturing Complex (HZMC) makes conscious efforts to recruit local talents at various levels. The company encourages a comprehensive Preventive medical examination to ensure the wellbeing of all its employees. This help in arresting/pre empting occupational illness. Since inception there is no occupation-related disease reported at L&T-HZMC. Because Hazira Manufacturing Complex (HZMC) rigorously follows the legal requirements, there is no incident of child or forced labour reported by statutory authority till date at HZW. As a hallmark of L&T’s presence in the city & as a responsible corporate citizen, HZMC has also contributed in beautification of the city by way of constructing traffic islands and their maintenance. A Community Welfare Section maintains constant relations with the members of the local Panchayat & community to identify their needs, prepare proposals, get management approval and implement them.

**EMPLOYEES:**
As on 31 March 2013, the company (excluding its subsidiaries) had 54062 permanent employees, out of which 2,635 were women (4.87%) and 74 were employees with disabilities (0.14%). During the FY 2012-13, the company incurred INR 44.36 billion for employee benefit, including salaries. The Harvard Business
Review in its January–February 2013 edition named L&T's Executive Chairman, A.M. Naik, as the 32nd Best Performing CEO in the world.

ENGINEERING AND CONSTRUCTION:
In this, L&T's technology capabilities include a strategic mix of in-house strengths and the expertise of its joint venture partners. Engineering Centres at Mumbai, Vadodara and Delhi carry out process design and simulation, analysis of computational fluid dynamics, mechanical design, failure analysis and trouble shooting.

L&T has set up an engineering and project management centre in Abu Dhabi, to undertake oil and gas related projects as well as engineering and consultancy services. An engineering centre in Sharjah is an extended arm in the Gulf. This is supplemented through collaborations with key partners: L&T–Valdel for engineering services in the upstream hydrocarbon sector, L&T–Chiyoda for the mid and downstream sectors and L&T Sargent & Lundy for the power sector. The engineering services provided by L&T’s Engineering Design Research Centres at Chennai and Kolkata include feasibility studies, project reports, system engineering, architectural, structural and civil design for infrastructure development projects.

L&T–Ramboll Consulting Engineers provides civil engineering and consultancy services for a wide range of projects in the transportation sector – ports, airports, highways and bridges.

MANUFACTURING
L&T’s design & engineering capabilities in manufacturing enable it to set new benchmarks in terms of scale, sophistication and speed. The company has dedicated
engineering centres at the manufacturing locations. Two “Technology Development Centres” have been set up to develop new products and manufacturing technologies. L&T also collaborates with the organisations like ISRO to bolster its capabilities in the strategic sectors of aerospace, defence and nuclear power.

L&T’s Electrical & Electronics Division is a pioneer in the design of switchgear and switchboards that are engineered for tropical conditions. It has built further on this experience and has leveraged its R&D strengths to develop a host of new products and features.

In 2008-2009, the division filed applications for over 100 patents, improving its previous year’s score for 101 patents. Cumulatively L&T’s Electrical and Electronics Division has applied for and secured 409 patents – a landmark for an Indian company. Patent applications cover innovations made on a variety of low voltage indigenously developed switchgear products like the Air Circuit Breakers (ACBs) and Molded Case Circuit Breakers (MCBs), medical products, petroleum dispensing pumps, tooling solutions and switchboards.

TECHNOLOGY SERVICES
L&T provides its global clients with the winning edge through the development of optimal solutions. L&T's e-engineering services leverage the Company's own engineering heritage and experience. The Embedded Systems unit provides technological assistance across a broad spectrum - design, maintenance, re-engineering, testing, prototyping and industrial design.

ENVIRONMENT AND SAFETY
L&T Hazira works is the first organization in India for receiving the certification for ISO 14001 for Environment management system and OHSAS 18001 for Occupational Health and Safety management together in the year 2000. Recertification of this integrated EHS System was done in the year 2003 by DNV.

The system guided us to make continual improvements to protect environment and to conserve natural resources water, oil and power in particular.

Treated water from Septic tank is used for gardening. This resulted in improving greenery with monetary saving `4.14 Lacs per annum. Canteen waste is recycled to generate biogas, which is used for cooking. Waste coolant oil is disposed in form of cakes to ‘Common waste disposal site’ after water is evaporated in Solar evaporation pit.

Preference for use of recyclable material for stationary like folders, visiting cards, season greetings etc. L&T Hazira Works has own buses as well as contract buses for transporting our employees to work and
back home. As an environment friendly measure, all buses including contract buses have been converted from diesel to CNG operations during the year. Incidentally, one of these buses was the FIRST BUS IN THE STATE OF GUJARAT TO BE CONVERTED IN TO A CNG BUS. This will reduce the cost of fuel as well as help in cleaner environment.

Furnace and D.G. sets emissions are monitored strictly as per GPCB norms. L&T Hazira Works is the member of Common waste disposal site for hazardous waste as well as for biomedical waste. All our manufacturing processes are clean and do not generate any disposal of hazardous effluent.

L&T Hazira works has strong commitment towards industrial health and safety. There are management programmes and operational control procedures in existence to eliminate or reduce the risk to the acceptable level. L&T Hazira Works received prestigious international award from British Safety Council London for the year 2000 and 2002.

4.2.3 Larsen & Toubro Limited Hazira Works:

[A] CNG Based power generator:
A 250 KVA natural Gas Based generator has been
Installed to replace conventional Diesel generator.

**Previous situation:**
Diesel generators are used for power generation.

**Investment:** `16 Lacs

**Savings:** `7.5 lacs per annum due to lower cost of natural gas.

**Other benefits:** In line with unit’s EHS (Environment Health & Safety) policy of cleaner fuels

**[B] VVVF drives for Electrical Operated Travel [EOT] Cranes:**

EOT cranes in our shops consume more power. To reduce this power consumption, Variable Voltage Variable Frequency [VVVF] drives were installed in these cranes.

**Previous Situation:** Rotor resistance type arrangement for start up and speed reduction of motor.

**Investment:** `3.6 Lacs

**Saving:** `0.91 Lacs per annum

**Other advantages:**
1. Very low starting currents are required for these drives
2. Elimination of rotor resistance hence elimination of wastage of power.
3. Smoother operations of the cranes
4. Reduction in the component failures, hence lower maintenance costs.

**[C] New Generation welding sets:**
Instead of conventional MMAW welding machines, 25 numbers of microprocessor based Inverter welding machines were procured.

Previous Situation: MMAW thyristorised welding machines consumes more power during welding as well as during no load.  

**Investment:** `17 Lacs

**Saving:** `7.94 Lacs per annum

**Other advantages:**
1. Lower operating costs and no load currents
2. Compact design with lighter weights
3. Better welding quality to eliminate rework and repairs resulting in to savings of energy

**[D] Automatic Temperature controls and recording system:**

An automatic temperature controls and recording system was designed in house and installed for pre and post heat treatment processes.
Previous Situation: Undue increases in the temperatures resulting in high consumption of natural gas. Uneven temperature control of shell being heated.

Investment: `2.9 Lacs

Saving: `1 Lac per annum

Other advantages:
Since designed in-house, the import of such equipment could be avoided which saved one time investment of `20 Lacs.

[E] Water Conservation:
To conserve water and to avoid pumping to save energy, following steps are taken:

✓ Use of treated water from Septic tank for gardening. This resulted in saving of fresh water and its pumping of worth `4.14 Lacs per annum.

✓ Reuse of backwash water coming from water treatment plant resulted in saving of `3.2 Lacs per annum The water is stored in water tank and due to its high-pressure head; the flow of water was very high whenever one opens the tap. Introduced orifice in all the tapes to reduce the pressure and flow resulted into saving of `3.3 Lacs per annum.

✓ Subsoil drip irrigation for lawns also resulted saving in water.

[F] Modified air conditioning system in SKODA horizontal borer panel:
The air conditioning system in our CNC SKODA Boring machine was modified to reduce power consumption. This very large machine has a separate cabinet housing critical electronic components. This cabinet was attached to the machine and hence needed more power to maintain its temperatures through the air conditioning system. This cabinet has been provided AC fixed directly on it without ducting pipe hence it is consuming less power now.

[G] Implementation of SON-T Plus lamps for outdoor lighting:
These lamps are having more lumens output for same power consumption. No. of light fittings were reduced while compared to SON-T lamp.

[H] Installation of chopper drives for Battery operated truck:
Battery operated trucks were having resistive control for speed control operation. This was giving lot of maintenance problem as well as energy was lost due to heat up. Chopper drive is installed in all the trucks, which gives smooth control of speed and saves energy.

[I] Vacuum Packaging System for electrodes eliminated baking activity:
A high tech vacuum packaging system is installed for electrodes consumed in our yards. This system has eliminated the need to store these electrodes in baking ovens. Elimination of these baking ovens has resulted in to substantial savings of electrical power.

[J] Modular partition for our heat treatment furnace saves energy during heat treatment of smaller jobs:
A large size gas fired heat treatment furnace was installed to accommodate largest possible jobs that are manufactured. Same furnace is used for the smaller jobs also
thus resulting in to loss of fuels as the entire furnace is sealed and heated for uniform heating even for a small job. To eliminate this waste, the furnace was designed and developed with a modular partition. This partition enables the furnace operators to utilize only the minimum required area for heat treatment for a specific job.

[K] Conversion of Diesel operated buses to CNG:
L&T Hazira Works has own buses as well as contract buses for transporting our employees to work and back home. As an environment friendly measure, all buses including contract buses have been converted from diesel to CNG operations during the year. Incidentally, one of these buses was the FIRST BUS IN THE STATE OF GUJARAT TO BE CONVERToED IN TO A CNG BUS. This will reduce the cost of fuel as well as help in cleaner environment.

First ever Reactor built in India

**India’s first Hydrocracker Reactor**

- **Dim:** Ø 3.35 m x 21 m LG x 232 mm Thk
- **Weight:** 430 T, **Year:** 1991

**First ever DHDT Reactor built in India**

- **Weight:** 130 T, **Year:** 2000
I-MNTW Deck for ONGC

Size: 29Mx22Mx21M, Weight: 3060MT (4 Nos), Year: 1993/94

Product Splitter for Saudi Polyolefins, Saudi Arabia

Dim: Ø 8 m x 103 m LG x 28 mm Thk

Weight: 720 T, Year: 2002

Largest FCC Regenerator in the world for RPL, Dim: Ø 16.3 m x 42 m LG x 48
L&T in Aerospace

We make the things that make India Proud

World's largest FCC Regenerator made by HZW for RIL, Jamnagar (98-99)
4.3 RELIANCE INDUSTRIES LIMITED:

**Type**  
Public company

**Traded as**  
BSE: 500325, NSE: RELIANCE, LSE: RIGD  
BSE SENSEX Constituent  
CNX Nifty Constituent

**Industry**  
Conglomerate

**Predecessor(s)**  
Reliance Commercial Corporation

**Founded**  
1966

**Founder(s)**  
Dhirubhai Ambani

**Headquarters**  
Mumbai, Maharashtra, India

**Area served**  
Worldwide

**Key people**  
Mukesh Ambani  
(Chairman and MD)

**Products**  
Crude oil, natural gas, petrochemicals, petroleum, polyester, textiles, retail, telecom

**Revenue**  
▲ US$ 73.10 billion (2013)

**Operating income**  
▲ US$ 7.14 billion (2013)
**Net income** ▲ US$ 3.86 billion (2013)  
**Total assets** ▲ US$58.67 billion (2013)  
**Total equity** ▲ US$31.66 billion (2013)  
**Employees** 23,519 (2013)  
**Website** RIL.com

### 4.3.1 INTRODUCTION

The Reliance Group, founded by Dhirubhai H. Ambani (1932-2002), Reliance Industries Limited (RIL) is India’s largest private sector company with businesses in the energy and materials value chain. RIL is the first private sector company from India to feature in Fortune Global 500 list of ‘World’s Largest Corporations’ and ‘World’s Top 100 companies’, ranking 99th in terms of revenues and 130th in terms of profits in 2012.

The Reliance Industries Hazira complex near Surat in Gujarat is situated on approximately 1000 acres land near the banks of river Tapi and manufactures a wide range of Polymers, Polyesters, Fibre Intermediates and Petrochemicals. The site provides an easy access for bringing raw materials through sea and lies in the center of the consumer intensive western region.

### 4.3.2 Manufacturing Facilities at Hazira

Naphtha is cracked at high temperature to produce ethylene and propylene. Benzene and toluene are extracted from the cracked products. Ethylene is polymerized to LLDPE/HDPE in the polyethylene plant. Propylene is polymerized to PP in the polypropylene plant. Ethylene is chlorinated to ethylene-di-chloride,
which is cracked to vinyl chloride and, in turn, polymerized to PVC in the PVC plant. Ethylene is oxidized to ethylene oxide, which is hydrolyzed to MEG in the Mono Ethylene Glycol plant. Paraxylene is oxidized to produce PTA. MEG and PTA are reacted in polycondensation lines to make POY, PSF, Polyester Fibre Fill and PET. The complex has 250 MW of captive power generation capacity based on gas and naphtha.

Hazira has its own jetties and a single buoy mooring five km. off the coast for the large tankers to transfer the main raw materials Naphtha and Paraxylene directly to the tank farms. The Hazira complex uses advanced process control systems and the complex operates on a Computer Integrated Manufacturing (CIM) system. Planning the database for the business decision is governed by the vision to use the world class ERP-SAP system uniformly across the reliance for capturing the data at source, for availability of information online, real time to the users for data security and for smooth data transfer interfaces.

Hazira Manufacturing process is supported by process control system by ABB, Siemens Advance process control, real time optimizer and IP-21 (Info plus) systems allow plant operating data access from anywhere in the world. The first phase of the complex, commissioned in 1991-92 to generate power/utility and to manufacture Ethylene oxide (EO), Mono - Ethylene Glycol (MEG), Vinyl Chloride Monomer (VCM), Poly Vinyl Chloride (PVC) and High Density Polyethylene (HDPE). A jetty was built for loading and unloading operation of raw material and final products.

In the second phase of projects, started in 1995, involved commissioning of the Polyester Complex (POY & PSF) and continued in full backward integration with
commissioning of the new Polypropylene (PP), Naphtha Cracker, Purified Terephthalic Acid (PTA) plants and expansion of existing phase 1 plants.

4.3.3 Total Investment
Over three billion US dollar investment has been done at RIL, Hazira.

4.3.4 Plants and Capacities

<table>
<thead>
<tr>
<th>Plants</th>
<th>Licensor Technology</th>
<th>Startup</th>
<th>Capacity (KTA) Installed</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPP &amp; U</td>
<td></td>
<td>May 1991</td>
<td>60 MW</td>
</tr>
<tr>
<td>MEG 1</td>
<td>Shell</td>
<td>Sep. 1991</td>
<td>100</td>
</tr>
<tr>
<td>PVC</td>
<td>Geon</td>
<td>Dec. 1991</td>
<td>160</td>
</tr>
<tr>
<td>VCM</td>
<td>Geon</td>
<td>Apr. 1992</td>
<td>160</td>
</tr>
<tr>
<td>PE 1</td>
<td>Du Pont</td>
<td>Jul. 1992</td>
<td>160</td>
</tr>
<tr>
<td>POY</td>
<td>Du Pont</td>
<td>Dec. 1995</td>
<td>120</td>
</tr>
<tr>
<td>PP</td>
<td>UCC</td>
<td>Sep. 1996</td>
<td>360</td>
</tr>
<tr>
<td>PSF</td>
<td>Du Pont</td>
<td>Sep. 1996</td>
<td>160</td>
</tr>
<tr>
<td>PTA 1</td>
<td>ICI</td>
<td>Jan. 1997</td>
<td>350</td>
</tr>
<tr>
<td>CPP 2</td>
<td></td>
<td>1996-1998</td>
<td>190 MW</td>
</tr>
<tr>
<td>Cracker</td>
<td>S &amp; W</td>
<td>Mar. 1997</td>
<td>750</td>
</tr>
<tr>
<td>Aromatics</td>
<td>HRI/Mobil</td>
<td>Mar. 1997</td>
<td>350</td>
</tr>
<tr>
<td>Plants</td>
<td>Licensor Technology</td>
<td>Startup</td>
<td>Capacity (KTA) Installed</td>
</tr>
<tr>
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</tr>
<tr>
<td>MEG 2</td>
<td>Shell</td>
<td>Mar. 1997</td>
<td>120</td>
</tr>
<tr>
<td>PE 2</td>
<td>Nova</td>
<td>May 1997</td>
<td>200</td>
</tr>
<tr>
<td>PET</td>
<td>Sinco</td>
<td>Oct. 1997</td>
<td>80</td>
</tr>
<tr>
<td>PFF</td>
<td>Du Pont</td>
<td>Oct. 1997</td>
<td>30</td>
</tr>
<tr>
<td>MEG 3</td>
<td>Shell</td>
<td>Oct. 1997</td>
<td>120</td>
</tr>
<tr>
<td>PTA 2</td>
<td>ICI</td>
<td>Nov. 1997</td>
<td>350</td>
</tr>
</tbody>
</table>

### 4.3.5 HR Transformation

RIL is focused on building what would be the best "To Be" Organisation over the next 18 to 24 months. In order to achieve this objective, RIL focused on following initiatives:

1. **People**: Energising and engaging the existing work force, building a pipeline for the future and creating an exciting work place.
2. **HR Processes**: To ensure that RIL continues to have the world's best practice and processes, existing processes are being reengineered and new processes are being introduced.
3. **Policies**: The focus in FY-11 was to make the policies employee friendly keeping in view employee specific needs. The HR policies are being reviewed and benchmarked with world class organisations.
4. **HR Shared Service Centre**: The Centre was established last year to ensure efficient and effective delivery of HR services to RIL employees.
4.3.6 Milestones
1. Starting as a small textile company, Reliance has in its journey crossed several milestones to become a Fortune 500 company in less than 3 decades.
2. Reliance continues to cross newer & bigger milestones in its quest for what is known as "Growth is Life".

4.3.7 Products & Brands
The Company expanded into textiles in 1975. Since its initial public offering in 1977, the Company has expanded rapidly and integrated backwards into other industry sectors, most notably the production of petrochemicals and the refining of crude oil.

The Company from time to time seeks to further diversify into other industries. The Company now has operations that span from the exploration and production of oil and gas to the manufacture of petroleum products, polyester products, polyester intermediates, plastics, polymer intermediates, chemicals and synthetic textiles and fabrics.

The Company's major products and brands, from oil and gas to textiles are tightly integrated and benefit from synergies across the Company. Central to the Company's operations is its vertical backward integration strategy; raw materials such as PTA, MEG, ethylene, propylene and normal paraffin that were previously imported at a higher cost and subject to import duties are now sourced from within the Company. This has had a positive effect on the Company's operating margins and interest costs and decreased the Company's exposure to the cyclicality of markets and raw material prices. The Company believes that this strategy is also
important in maintaining a domestic market leadership position in its major product lines and in providing a competitive advantage.

The Company's operations can be classified into four segments namely:
1. Petroleum Refining and Marketing business
2. Petrochemicals business
3. Oil and Gas Exploration & Production business
4. Others

The Company has the largest refining capacity at any single location.

The Company is:
1. Largest producer of Polyester Fibre and Yarn
2. 5th largest producer of Paraxylene (PX)
3. 5th largest producer of Polypropylene (PP)
4. 8th largest producer of Purified Terephthalic Acid (PTA) and Mono Ethylene Glycol (MEG)
5. Manufacturing Facilities
7. Allahabad Manufacturing Division is located in Allahabad, Uttar Pradesh. It is equipped with batch polymerization and continuous polymerization facilities.
8. Barabanki Manufacturing Division is located near Lucknow, Uttar Pradesh. It manufactures Black Fibre.
9. Dahej Manufacturing Division is located near Bharuch, Gujarat. It comprises of an ethane / propane recovery unit, a gas cracker, a caustic chlorine plant and 4 downstream plants, which manufacture polymers and fibre intermediates.

10. Hoshiarpur Manufacturing Division is located in Hoshiarpur, Punjab. It manufactures a wide range of PSF, PFF, POY and polyester chips.

11. Hazira Manufacturing Division is located near Surat, Gujarat. It comprises of a Naptha cracker feeding downstream fibre intermediates, plastics and polyester plants.

12. Jamnagar Manufacturing Division is located near Jamnagar. It comprises of a petroleum refineries and associated petrochemical plants. The refineries are equipped to refine various types of crude oil (sour crude, sweet crude or a mixture of both) and manufactures various grades of fuel from motor gasoline to Aviation Turbine Fuel (ATF). The petrochemicals plants produces plastics and fibre intermediates.

13. Nagothane Manufacturing Division is located in Raigad, Maharashtra. It comprises of an ethane and propane gas cracker and five downstream plants for the manufacture of polymers, fibre intermediates and chemicals.

14. Nagpur Manufacturing Division is located in Nagpur, Maharashtra. It manufactures polyester filament yarn, dope-dyed specialty products of different ranges, fully drawn yarn and polyester chips.

15. Naroda Manufacturing Division is located near Ahmedabad, Gujarat, is RIL’s first manufacturing facility. This synthetic textiles and fabrics manufacturing facility manufactures and markets woven and knitted fabrics for home textiles, synthetic and worsted suiting and shirting, ready to wear garments and automotive fabrics.
16. Patalganga Manufacturing Division is located near Mumbai, Maharashtra. It comprises of polyester, fibre intermediates and linear alkyl benzene manufacturing plants.

17. Silvassa Manufacturing Division is located in the Union Territory of Dadra and Nagar Haveli. It manufactures a wide range of specialty products such as Recron Stretch, Linen Like, Melange, Thick-n-thin and Bi-shrinkage yarns.

18. Vadodara Manufacturing Division is located in Vadodara, Gujarat. It comprises of a Naptha cracker and 15 downstream plants for the manufacture of polymers, fibres, fibre intermediates and chemicals.

19. Each of these complexes has world class manufacturing facilities.

20. **Financial Highlights**

   Table 4.5 Financial Highlights of Reliance (in crore)

<table>
<thead>
<tr>
<th></th>
<th>$ Mn</th>
<th>2012-13</th>
<th>2011-12</th>
<th>2010-11</th>
<th>09-10</th>
<th>08-09</th>
<th>07-08</th>
<th>06-07</th>
<th>05-06</th>
<th>04-05</th>
<th>03-04</th>
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<tbody>
<tr>
<td>Revenue From Operations</td>
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<td></td>
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<tr>
<td></td>
<td>68,365</td>
<td>3,71,119</td>
<td>3,39,792</td>
<td>2,58,651</td>
<td>200,400</td>
<td>146,328</td>
<td>139,269</td>
<td>118,354</td>
<td>89,124</td>
<td>73,164</td>
<td>56,247</td>
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<td>Total Income</td>
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<td>3,45,984</td>
<td>2,61,703</td>
<td>202,860</td>
<td>148,388</td>
<td>144,898</td>
<td>118,832</td>
<td>89,807</td>
<td>74,614</td>
<td>57,385</td>
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<td>Earnings Before</td>
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<td></td>
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<tr>
<td>Depreciation, Interest</td>
<td>7,145</td>
<td>38,785</td>
<td>39,811</td>
<td>41,178</td>
<td>33,041</td>
<td>25,374</td>
<td>28,935</td>
<td>20,525</td>
<td>14,982</td>
<td>14,261</td>
<td>10,983</td>
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<td>and Tax (EBDIT)</td>
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<td>Depreciation &amp;</td>
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<td>11,394</td>
<td>13,608</td>
<td>33,041</td>
<td>5,195</td>
<td>4,847</td>
<td>4,815</td>
<td>3,401</td>
<td>3,724</td>
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<td>Amortisation</td>
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<td>Exceptional Items</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>(370)</td>
<td>4,733</td>
<td>-</td>
<td>-</td>
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<td>-</td>
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<tr>
<td>Profit For the Year</td>
<td>3,869</td>
<td>21,003</td>
<td>20,040</td>
<td>20,286</td>
<td>16,236</td>
<td>15,309</td>
<td>19,458</td>
<td>11,943</td>
<td>9,069</td>
<td>7,572</td>
<td>5,160</td>
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<td></td>
<td>$ Mn</td>
<td>2012-13</td>
<td>2011-12</td>
<td>2010-11</td>
<td>09-10</td>
<td>08-09</td>
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<tr>
<td>Equity Dividend %*</td>
<td>90</td>
<td>85</td>
<td>80</td>
<td>70</td>
<td>130</td>
<td>130</td>
<td>110</td>
<td>100</td>
<td>75</td>
<td>52.5</td>
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<tr>
<td>Dividend Payout</td>
<td>487</td>
<td>2,643</td>
<td>2,531</td>
<td>2,385</td>
<td>2,084</td>
<td>1,897</td>
<td>1,631</td>
<td>1,440</td>
<td>1,393</td>
<td>1,045</td>
<td>733</td>
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<tr>
<td>Equity Share Capital</td>
<td>595</td>
<td>3,229</td>
<td>3,271</td>
<td>3,273</td>
<td>3,270</td>
<td>1,574</td>
<td>1,454</td>
<td>1,393</td>
<td>1,393</td>
<td>1,393</td>
<td>1,396</td>
</tr>
<tr>
<td>Equity Share Suspense Account</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>69</td>
<td>-</td>
<td>60</td>
<td>-</td>
<td>-</td>
<td>-</td>
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<tr>
<td>Equity Share Warrants</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
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<td>-</td>
<td>1,682</td>
<td>-</td>
<td>-</td>
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</tr>
<tr>
<td>Reserves and Surplus</td>
<td>32,563</td>
<td>1,76,766</td>
<td>1,62,825</td>
<td>1,48,267</td>
<td>133,901</td>
<td>124,730</td>
<td>78,313</td>
<td>62,514</td>
<td>48,411</td>
<td>39,010</td>
<td>33,057</td>
</tr>
<tr>
<td>Net Worth</td>
<td>33,157</td>
<td>1,79,995</td>
<td>1,66,096</td>
<td>1,51,540</td>
<td>137,171</td>
<td>126,373</td>
<td>81,449</td>
<td>63,967</td>
<td>49,804</td>
<td>40,403</td>
<td>34,453</td>
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<tr>
<td>Gross Fixed Assets</td>
<td>42,787</td>
<td>2,32,270</td>
<td>2,05,493</td>
<td>2,21,252</td>
<td>228,004</td>
<td>218,673</td>
<td>127,235</td>
<td>107,061</td>
<td>91,928</td>
<td>59,955</td>
<td>56,860</td>
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<tr>
<td>Net Fixed Assets</td>
<td>23,738</td>
<td>1,28,864</td>
<td>1,21,477</td>
<td>1,55,526</td>
<td>165,399</td>
<td>169,387</td>
<td>84,889</td>
<td>71,189</td>
<td>62,675</td>
<td>35,082</td>
<td>35,146</td>
</tr>
<tr>
<td>Total Assets</td>
<td>58,674</td>
<td>3,18,511</td>
<td>2,95,140</td>
<td>2,84,719</td>
<td>251,006</td>
<td>245,706</td>
<td>149,792</td>
<td>117,353</td>
<td>93,095</td>
<td>80,586</td>
<td>71,157</td>
</tr>
<tr>
<td>Market Capitalisation</td>
<td>46,017</td>
<td>2,49,802</td>
<td>2,44,757</td>
<td>3,42,984</td>
<td>351,320</td>
<td>239,721</td>
<td>329,179</td>
<td>198,905</td>
<td>110,958</td>
<td>76,079</td>
<td>75,132</td>
</tr>
<tr>
<td>Number of Employees</td>
<td>23,519</td>
<td>23,166</td>
<td>22,661</td>
<td>23,365</td>
<td>24,679</td>
<td>25,487</td>
<td>24,696</td>
<td>12,540</td>
<td>12,113</td>
<td>11,358</td>
<td></td>
</tr>
<tr>
<td>Contribution to National Exchequer</td>
<td>5,333</td>
<td>28,950</td>
<td>28,197</td>
<td>28,719</td>
<td>17,972</td>
<td>11,574</td>
<td>13,696</td>
<td>15,344</td>
<td>15,950</td>
<td>13,972</td>
<td>12,903</td>
</tr>
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</table>

(Source: Annual Reports of Company)
## 21. Key Indicators

**Table 4.6 Key Indicators of Reliance**

<table>
<thead>
<tr>
<th></th>
<th>$</th>
<th>2012-13</th>
<th>2011-12</th>
<th>2010-11</th>
<th>09-10</th>
<th>08-09</th>
<th>07-08</th>
<th>06-07</th>
<th>05-06</th>
<th>04-05</th>
<th>03-04</th>
</tr>
</thead>
<tbody>
<tr>
<td>Earnings Per Share [excluding Exceptional item]</td>
<td>1.2</td>
<td>64.8</td>
<td>61.2</td>
<td>62.0</td>
<td>49.7</td>
<td>49.7</td>
<td>105.3</td>
<td>82.2</td>
<td>65.1</td>
<td>54.2</td>
<td>36.8</td>
</tr>
<tr>
<td>Turnover Per Share</td>
<td>21.2</td>
<td>1,149.50</td>
<td>1,037.8</td>
<td>790.5</td>
<td>612.9</td>
<td>464.9</td>
<td>958.1</td>
<td>814.2</td>
<td>639.6</td>
<td>525.0</td>
<td>402.8</td>
</tr>
<tr>
<td>Book Value Per Share</td>
<td>10.3</td>
<td>557.5</td>
<td>507.3</td>
<td>463.2</td>
<td>419.5</td>
<td>401.5</td>
<td>560.3</td>
<td>440.0</td>
<td>357.4</td>
<td>289.9</td>
<td>246.7</td>
</tr>
<tr>
<td>Debt : Equity Ratio</td>
<td>-</td>
<td>0.40:1</td>
<td>0.41:1</td>
<td>0.44:1</td>
<td>0.46:1</td>
<td>0.63:1</td>
<td>0.45:1</td>
<td>0.44:1</td>
<td>0.44:1</td>
<td>0.46:1</td>
<td>0.56:1</td>
</tr>
<tr>
<td>EBDIT / Gross Turnover %</td>
<td>10.5</td>
<td>10.5</td>
<td>11.7</td>
<td>15.9</td>
<td>16.5</td>
<td>17.3</td>
<td>20.8</td>
<td>17.3</td>
<td>16.8</td>
<td>19.5</td>
<td>19.5</td>
</tr>
<tr>
<td>Net Profit Margin %</td>
<td>5.7</td>
<td>5.7</td>
<td>5.9</td>
<td>7.8</td>
<td>8.1</td>
<td>10.5</td>
<td>14.0</td>
<td>10.1</td>
<td>10.2</td>
<td>10.3</td>
<td>9.2</td>
</tr>
<tr>
<td>RONW %*</td>
<td>12.8</td>
<td>12.8</td>
<td>13.4</td>
<td>15.5</td>
<td>16.4</td>
<td>21.6</td>
<td>28.8</td>
<td>23.5</td>
<td>22.7</td>
<td>21.9</td>
<td>17.0</td>
</tr>
<tr>
<td>ROCE %*</td>
<td>11.2</td>
<td>11.2</td>
<td>11.6</td>
<td>13.2</td>
<td>13.9</td>
<td>20.3</td>
<td>20.3</td>
<td>20.5</td>
<td>20.5</td>
<td>21.3</td>
<td>14.0</td>
</tr>
</tbody>
</table>

(Source: Annual Reports of Company)

In this Annual Report $ denotes US$

1US$ = *54.285 (Exchange rate as on 31.03.2013)
Employees as on 31 March 2013, the company had 23,519 employees of which 1,159 were women and 82 were employees with disabilities. It also had 29,462 temporary employees on the same date. As per its Sustainability Report for 2011–12, the attrition rate was 7.57%.

In its 39th Annual General Meeting, its Chairman informed the shareholders of the investment plans of the company of about `1500 billion (US$24 billion) in next three years. This would be accompanied by increasing the staff strength in Retail division from existing strength of 35,000 to 120,000 in next three years and increasing employees in Telecom division from existing 3,000 to 10,000 in 12 months.

4.3.8 Environment and Safety:
Reliance employs proven technologies from world-class licensers to ensure minimum quantity of waste generation, low emissions and low noise pollution. Hazira was the first petrochemical complex in India to be awarded ISO 14001 certificates for an entire site and continual improvement in the environment performance is aimed at and achieved.

Reliance seeks to make all its plants safe places to work, to protect the interests of employees and stakeholders. Safety overrides production targets at Reliance. Hazira has its own fire brigade to respond within seconds to any incident of fire. World-class occupational health surveillance systems with periodical health monitoring confirming to OSHA standards are practiced for prevention of work related health hazards.
4.3.9 Four Tier Energy Management System is followed at Hazira

- The **Apex Group** comprises of primarily the top management at RIL Hazira. The Executive Director (Hazira Site) heads this group.

- Energy Cell is headed by Vice president. He has 4 engineers working with him. This is the **Core Group**.

- Each of the plants has a designated Energy Co-coordinator. The Energy coordinator of Individual plant along with a technical service engineer and a electrical engineer of the same plant forms the **Working Group**.

- **Small Group Activity** is the new initiative to involve shop floor people in the energy conservation. All the plants have nominated members for the SGA and the training for the group was organized through Confederation of Indian Industries. The groups have started regular meetings for brainstorming and developing ideas in their working area.
4.4 ESSAR LIMITED:

4.4.1 INTRODUCTION:

<table>
<thead>
<tr>
<th>Type</th>
<th>Private</th>
</tr>
</thead>
<tbody>
<tr>
<td>Industry</td>
<td>Conglomerate</td>
</tr>
<tr>
<td>Founded</td>
<td>1969</td>
</tr>
<tr>
<td>Founder(s)</td>
<td>Shashi Ruia, Ravi Ruia</td>
</tr>
<tr>
<td>Headquarters</td>
<td>Mumbai, Maharashtra, India</td>
</tr>
<tr>
<td>Area served</td>
<td>Worldwide</td>
</tr>
<tr>
<td>Key people</td>
<td>Shashi Ruia (Chairman), Ravi Ruia (Vice-Chairman), Prashant Ruia (Group CEO)</td>
</tr>
<tr>
<td>Products</td>
<td>Steel, Oil &amp; Gas, Power, Communications, Shipping, Ports and Logistics, Projects, Mineral, Real Estates</td>
</tr>
<tr>
<td>Revenue</td>
<td>▲ US$ 39 billion (2013)</td>
</tr>
<tr>
<td>Employees</td>
<td>73,000 (2013)</td>
</tr>
</tbody>
</table>

Subsidiaries: Essar Steel, Essar Steel Algoma, Essar Oil, Essar Shipping, Essar Hyper mart, The Mobile Store
Essar Gujarat Limited was incorporated in 1976 as Essar Construction Limited. The Company undertook specialised marine construction activity, offshore installations, drilling for oil and gas and manufacture of hot briquetted sponge iron. The Company is a part of Essar Group of Companies and is a subsidiary of Essar Investments Ltd.

The Company is divided into 4 divisions as (i) Essar Offshore - It undertakes laying of submarine oil and gas pipelines, submarine outfalls, underwater rock drilling and blasting and dredging activities. (ii) Essar Energy - This unit is the first of its kind in the private sector to own and operate super-deep land drilling and rigs. The division was awarded the World Bank aided contract for operating 4 mobile rigs for drilling oil. (iii) Essar Construction - The division specialises in breakwater construction, ore and oil berths, Wharfwalls, overground and underground storage silos etc. and (iv) Essar Steel - The division manufactures hot briquetted sponge iron.

Essar began as a construction company in 1969 and has diversified into manufacturing, services and retail over the years since then. Over the last decade, it has grown through strategic global acquisitions and partnerships, or through Greenfield and Brownfield development projects, capturing new markets and discovering new raw material sources. Essar Global Fund (EGFL) is a diversified global investment fund, whose investee companies operate in 29 countries on five continents, with more than 80,000 employees. It has a diversified portfolio of investments in over 20 countries, invested across the sectors of energy, metals &
mining, infrastructure and services. Today, Essar continues to expand its global footprint, focusing on markets in Asia, Africa, Europe, the Americas and Australia. Essar invests significantly in the latest technology to drive forward and backward integration in its businesses, and on leveraging synergies between these businesses. It also focuses on in-house research and innovation to be a low-cost manufacturer with high-quality products and innovative customer offerings.

The company is also actively undertaking climate change initiatives to reduce its carbon footprint. This includes several Clean Development Mechanism (CDM) projects that earn the company 'Certified Emission Reduction' credits. A growing number of its businesses with new businesses joining the list every year – are certified to international environment standards, including ISO 9001 /14001, and health and safety standards, such as OHSAS 18001.

**Essar Project** is the second largest Engineering, Procurement and Construction (EPC) company in India. It operates under sectors of steel, oil, gas, power, ports and terminals.

**4.4.2.A VISION OF THE ORGANIZATION**

“To be respected as global entrepreneur through the power of Positive Actions.”

**People**- Nurture our people with care.

**Progress**- Responsive with new opportunities

**Power**- Synergy through global presence

**Passion**- Winning spirit in everything we do

**4.4.2.B MISSION:**
➢ Be responsive to Customer needs, deliver optimal solutions and value added services.
➢ To achieve excellence in project execution, quality, reliability, safety, and operational efficiency.
➢ Ensure sustainable growth and professional excellence using state-of-the-art technology, process driven approach, eco-friendly solutions and IT enabled tools.
➢ Foster a culture of mutual trust and employee empowerment to provide a conducive atmosphere to work.
➢ Adhere to fair, transparent and ethical practices in interactions with all shareholders and be a good corporate citizen.
➢ Be flexible and agile to continually adapt to changing business environment.
➢ To improve the lives of local community in all our projects.
➢ To be a partner in nation building and contribute towards the India’s economic growth.

4.4.3 ACHIEVEMENTS OF THE COMPANY

➢ India’s 1st new generation, independent power plant in Hazira.
➢ Growing portfolio of gas, coal and liquid fuel-based power plants
➢ Owns about 800 million tons of coal reserves and resources in blocks spread across four continents and One of the lowest cost power producers
➢ Expanding in the transmission sector; first private power company to get a transmission license

4.4.4 BEYOND BUSINESS

Essar Foundation: Essar Foundation is leading CSR efforts across Essar business and locations in India. The thrust of the efforts is education, entrepreneurship,
health and environment through institutional partnerships and employees volunteering programs.

- **Education**: Community outreach initiatives, Essar International School, AVID’s school of continuous learning
- **Entrepreneurship**: Tie-ups with premier educational institutions, Sponsoring entrepreneurship events, Knowledge sharing expert sessions.
- **Environment**: HSE practice on par with global standard, Climate change initiatives, Model village concept.

4.4.5 BUSINESS AREAS OF ESSAR:

1. **Essar Steel Limited (Erstwhile Essar Gujarat Limited)**

Essar first took the opportunity provided by the gas pipeline to start a very successful sponge iron business and then, with the gradual opening up of the steel sector, had the vision to set up a world-class integrated steel plant. Essar established its flagship company named Essar Gujarat Limited which was later rechristened to Essar Steel Limited (EStL). It manufactures hot-briquette iron (HBI) which is a superior variant of sponge iron and hot-rolled coils (HRC) using the electric arc furnace method at Hazira near Surat in Gujarat. EGS was the first in India to set up the world's largest gas-based sponge iron plant. Its `800 crore HBI project was planned with a capacity of 1.32 mtpa, which was later increased, to 1.76 mtpa.

EGL was initially planned as 100% EOU with an 8 lakh-tpa plant. Later on Ruias decided to expand the capacity to 10 lakh tonnes when the government allowed EOUs to set up large capacities. Again, when the government deregulated the steel industry in the wake of liberalisation, the plant capacity was doubled to cater also to the domestic market. Currently HRC unit has a capacity of 2 mtpa. The project
was delayed, which increased the cost by 109% from `3350 crore in 1992 to `6,998 crore. ESL set-up iron ore pelletisation plant at Vizag with a 3.3-mtpa capacity to become a world class fully integrated steel company. The plant was scheduled to be operational by the end of 1995, with a 240-kilometer slurry pipeline to pump iron ore fines in the form of slurry from Bailladilla of Vizag, where it was to be palletized. However, the `775 crore projects was commissioned in Vishakapatnam in 1996 and commenced production in November 1997. It was planned to supply 1 mtpa high grade iron ore pellets to EGL and the surplus was to be sold in the domestic and international markets. But later on it increased it supplies to 60 percent of its production to the Hazira plant. Essar Steel (EstL) planned to increase its pelletisation capacity by 4.7 million tonnes at the cost of `500 crore.

Essar Steel’s hot rolled (HR) coils plant project cost increased by 109 percent to `6,998 crore from the earlier estimate of `3,350 crore in 1992. The cost increased due to additions like a pellet plant and delay in completing the project. EstL planned to set up a mini blast furnace and use the hot metal for energy conservation. This work is currently under progress in mid 1999. EstL invested `340 crore in 11 companies that were expected to buy 40 percent HRC output of EstL. It set up downstream facilities to produce value-added products. A downstream complex with a plate line capacity of 400,000 tonnes was commissioned.

EstL is highly quality conscious so rejections are quite minimal. It has the highest operating margins and cash margins in the Indian steel industry. Its labour costs (according to Paribas Asia Equity) are $5 per tonne as compared to $49 per tonne for SAIL and $ 76 per tonne for TISCO, and its energy costs per tonne are half that of SAIL and TISCO. EstL’s variable cost of production has been found to be
amongst the lowest 17-percentile cost of production in the world as confirmed by Beddows & Co. report. This makes it one of the lowest cost producers of steel in the world. This is possible due to the high level of integration leading to high value addition and utilisation of the most efficient technology and international management practices.

The group faced severe cash crunch in 1995-96. ES had invested `217 crore in greenfield power and oil projects. Later on ESL spun off its 100 percent subsidiary, Essar Power (EP), which involved an outlay of `1, 845 crore to Prime Hazira Ltd. of Mauritius. This was done after it successfully closed the power purchase agreement with the Gujarat State Electricity Board, which would draw 300 MW of EP's 515 MW capacity. Essar Investments had acquired Sterling Computers for `213 crore through ES' loan of `255 crore.

The paid up capital of the Company on March 31, 1998 was `330.35 Crore and the net worth stands at `2414.09 crore. The company had a total outstanding debt of `5114 crore of which $250 million was due for repayment in July 1999. Essar also acquired a 32% stake for $ 80million in Sesa Goa Ltd's (SGL) parent company Ilva Laminati Piani (ILP) manufacturing cold rolled steel. The Ruias had tried to acquire SGL earlier in 1990s but failed to do so. Essar will run SGL and also develop the Southeast Asian markets for Riva a 52% partner in ILP.

2. Essar Power
When government of India liberalised the power sector and encouraged private sector to bridge the huge demand-supply gap of electric power in the country, Essar took this opportunity to set up a 215 MW captive power plant for its steel unit in Hazira. There was an element of synergy in the above move because
Electric Arc Furnace technology used in HRC steel project was highly dependent on consistent and cheap power supply. Later on Essar decided to increase the planned power plant capacity to 515 MW for selling surplus power to GSEB. With the successful commissioning of the power plant in 1995, Essar became the 1st Independent Power Producer. Essar Power Ltd (EPL) finally achieved financial closure in March 1998. EPL had a cost overrun of `469.89 crore due to the delay, taking the final cost of the project to `2314.89 crore. The cost overrun has been partly financed by the promoters through unsecured loans of `244.87 crore and bank loans of `150 crore. Repayment on the rupee term loans, which was started by April 1, 1998, started from April 1, 1999.

Essar used liquid Naphtha as the fuel for its plant. The power plant was 1st of its kind in the world to use liquid naphtha as the fuel. The choice of using liquid naphtha was prudent because of its surplus availability. It was also daring on the part of Essar because never before this type of technology was used anywhere in the world. In line with their corporate vision Ruias planned an aggressive expansion strategy for power sector. Their objective was to have "2000 MW by Year 2000". Essar purchased equity in new upcoming power projects and also decided to set up `1, 350 crore 330 megawatt unit at Bhandar in MP and a captive power plant with a capacity of 600 mw for their oil refinery in Vadinar. However, the groups worsening fortunes had a toll on their power plans. Essar suffered a severe cash crisis and Bhandar project could not take off. The captive project at Vadinar is in a very bad shape. Ruias started to negotiate for selling their power company to American Marathon group in June.

The company was then floated as a separate company with Prime Hazira of Mauritius, a privately held concern of Ruias, as its main promoter and shareholder.
with 49% equity. This hiving off of power plant raised controversy about Ruias intentions of shareholder value. The Ruias generated the funds from internal resources and later on diverted them to companies in which they had substantial holding. This sullied the Ruias reputation as an investor friendly transparent group.

3. Essar Oil
Incorporated in 1989, Essar Oil was started as a fully owned subsidiary of Essar Gujarat limited. Essar oil Limited (EOL) was later hived off as a separate company. EOL has three main divisions - energy, offshore exploration and petroleum products, in addition to the new refinery being set up at Jamnagar. Its offshore division undertakes construction related to the oil industry for extraction of oil and gas reserves.

EOL decided to set up world's largest 9 million TPA grassroots refinery at Vadinar in Gujarat. The refinery is designed to process crude oil from the Middle East and a variety of other crudes to manufacture petroleum products. Essar will also have access to the Kandla-Bhatinda pipeline, which is under implementation by IOC. The company will derive synergy through Essar Shipping’s fleet of tankers, the largest in the Indian private sector. The initial project cost of `5,350 crore was to be financed with a debt-equity ratio of 1:1. The project was to be financed by `2,900 crore equity and `2,430 crore debt. The promoters' including Essar Shipping, SISCO, Essar Steel Ltd and the Chandarias have a stake of 45 percent at present while public holds remaining 45 percent. The promoters' contribution to equity is `600 crore. Essar Oil refinery project in Gujarat faced cost overruns of `465 crores to `5815 crores. The project financial structure then had a debt component of `3,531 crore and equity component of `2,284 crore. The project capacity was increased from 9 M tonnes/y to 10.5 M tonnes/y to increase profitability at an
investment of `1, 000 crore. Due to loans taken from financial institutions during 1996-97, the interest coverage ratio stood at 3.35.

The oil division owned 12 rigs with a drilling ship 'Essar Discoverer. When government of India allowed the private sector to exploit developed minor oilfields and explore new ones, Essar, by then one of the largest drilling contractors in the Gulf, was quick to bid. EOL signed production-sharing contracts with 2 exploration blocks in Rajasthan and 1 in offshore Saurashtra. Essar has got approval for the development contract for the Ratna and R-Series oil fields.

4. Essar Shipping
In 1969, the Ruias established a shipping company under the name of Essar-Bulk Cargo Carriers (EBCL). The company exported iron ore from Madras. This company was later merged with Karnataka Shipping Corporation in 1983. In December 1984, the company was rechristened Essar Shipping Limited (ESL). ESL's main business is ship chartering and ship trading. ESL's capacity increased to dead wt 394 million tonnes by 1987. After 1987, when government liberalised shipping, Essar went on aggressively expanding its fleet. By 1992 Essar shipping had a turnover `355 crores and a dead wt capacity of 1.24 million tonne (314% increase since 1987). Essar made an open offer for South India Shipping Corporation (SISCO), and acquired it in 1992. SISCO's merger with Essar began by establishing ESSMCO (Essar -SISCO Ship management co.), managed by Prashant Ruia. In 1992, SISCO owned 14 ships.

Industry reacted differently to Essar's aggressive buying spree because of fundamental cyclic nature of shipping business. A Bombay based researcher commented "In a business characterised by a cyclical pattern of troughs and crests
that could lead to serious problems". Essar had borrowed heavily to finance its purchases. ESL's gearing was high as reflected in its debt to equity ratio as stood on 31st March 1993, at 3.6:1. Ruias however underplayed the suggestions given by industry and justified their business as insulated from market conditions. ESSMCO's managing director Prashant said "India's international business is already growing and we have to be ready for the opportunities".

However Essar started consolidating its shipping business and merged SISCO in ESL in 1996. ESL applied brakes on its buying spree and started selling. Essar made a considerable amount of money by buying ships when the prices were low and selling them when they were in demand following standard international practices. Its fleet size was reduced from a high of 52 ships to 38 by 1999. The debt to equity ratio of ESL came down to 0.69:1 in 1998. In 1999 ESL is the second largest shipping company in terms of capacity (38 vessels, 1.42 million tonnes dwt). Essar has a diversified shipping fleet consisting of bulk carriers, tankers, multisport activities and offshore support activities. Tankers account for more than 70% of ESL tonnage and contribute a major portion of the revenue. It also owns several bulk carriers; most of the mini bulk carriers are employed mainly on coastal transport in both Indian and international waters. The fleet is the youngest in India, with an average age of seven years. A majority of the vessels are employed on long-and medium-term time charters, enabling stability of revenue generation even during the shipping downcycle. Essar had a comfortable position in the oil tanker cargo because of deployment on a cost plus basis. However with the disbanding of Administered Price mechanism (APM) in the oil sector, the cost-plus formula for crude tankers on Indian sector was withdrawn from 1st April 1998.
Essar Shipping has negotiated a $97-million loan from GE capital corporation (GECC), USA, one of the largest and with the longest maturity periods ever raised in the Indian shipping industry. In fact, the second tranche of the loan was disbursed recently after Essar Steel defaulted on its FRNS, testifying to the soundness of its shipping business.

5. Essar Telecom
When government opened up telecommunication in 1994 with new telecom policy, Essar saw a great opportunity and bid for various circles for providing basic and cellular services. In January 1995 the Essar entered into joint venture with Bell Atlantic, USA to bid for both cellular and basic services tenders floated by the Department of Telecommunications (DOT). Essar Gujarat group entered into an alliance with Sterling Cellular Limited, cellular licensee of Delhi in May 1995 and used their brand name Essar Cell phone to promote SCL’s service. The Essar Group then launched its Essar Cell phone services in Rajasthan, Haryana and Uttar Pradesh (East) telecom circles.

In January 1996, Essar Telecom planned to tie up with JT Mobile Telecom Ltd, which had licences to operate cellular service in Punjab, Andhra Pradesh and Karnataka. Essar bagged the licences to operate basic telephone service in Punjab and the alliance was done to provide the synergy in operating both the basic and cellular services together. In October 1996 Essar Cell phone planned to invest US$457.14 million in its cellular ventures in India and expand its subscriber base to one million by the year 2002. "Our plans are quite simply focused on becoming north India's leading cellular network," Essar Cell phone's CEO Jan Erik Boers said. In October 1997, Essar Cell phone (EC) planned to launch an overseas debt offering of $240 million. In February 1998, The Essar Group floated a special
purpose vehicle (SPV); a new investment company named Asia Pacific Infrastructure Ltd (APIL) in Mauritius, to route foreign equity investments into Essar Commvision Ltd (ECL). In January 1998, The Foreign Investment Promotion Board (FIPB) approved Ruias' bid to sell 24 percent stake in Sterling Computers (SC) in favour of a group of overseas corporate bodies. In March 1998, Swiss Telecom (Swisscom) acquired 49 percent stake in Sterling Cellular, its Indian joint venture. It also planned a financial restructuring programme for the joint venture.

6. Essar Minerals owns a growing portfolio of iron ore and coal mines in India, Indonesia, Mozambique and the USA. It also has an iron ore prospecting license in Brazil and various states in India. The company has access to over 1.6 billion tonnes of iron ore reserves and 450 million tonnes of coal reserves.

7. Essar Ports is one of the largest owners and operators of ports in India. The company has an existing aggregate capacity of 88MMTPA across two facilities located at Vadinar (58MMTPA) and Hazira (30MMTPA) in the state of Gujarat, on the west coast of India. It is currently in the process of increasing its aggregate ports capacity to 158MMTPA at a number of locations across India.

8. Essar Projects is the second largest engineering, procurement and construction (EPC) companies in India. Its EPC capabilities have helped build all of Essar's industrial assets in India in the sectors of steel, oil and gas, power, and ports and terminals. The company is increasingly using its expertise to execute large external projects across the world.
9. **Essar Communications** is a global player in the communications sector with a presence in telecom services, consumer durables and IT retail. Yu, its GSM-based mobile services network in Kenya, has more than a million subscribers; in the telecom retail space, the Mobile Store is the largest telecom retailer within the organized sector (over 900 outlets across India).

4.4.6 **HUMAN RESOURCE:**

At the **Essar Group**, we believe that excellent individuals build excellent companies. And by transforming each employee into a highly motivated, satisfied and productive team member, we will create an outstanding organisation. We also understand that each individual has unique talents and expectations from the organization. Based on those principles, human resources development at **Essar** is customised, flexible and well planned. Every Essar employee is meticulously selected and given the freedom to be innovative, within a work culture that is non-bureaucratic and result-oriented. We work with employees to develop personalised and flexible individual plans for career growth, retention and compensation within a carefully structured work framework. Through extensive career mapping, we offer a choice of career paths that could include job rotations across functions and Group Companies. Essar's wide range of businesses and exciting pace of growth presents a range of opportunities and exposure that only a few others can match. **The Group** has a very serious commitment to continuous training and development. Our Essar Learning Centre provides year-round training. Thus, a career with Essar will offer you a unique opportunity to unlock your own potential and realise excellence.

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4.4.7 CORPORATE SOCIAL RESPONSIBILITY AT ESSAR

1. Livelihoods and entrepreneurship:
   The Essar Foundation is helping rural communities become self-sufficient and sustainable by providing training in self-employment and supporting entrepreneurship. The need for skill development programs that address the requirements of a rapidly growing economy is keenly felt in India. About 60 per cent of India's 1.2 billion people are in the working age group. The nation's continued economic success requires this huge potential resource to be able to compete in the global workforce over the coming years. It is for this reason that the Indian government, along with large business houses, are gearing up for a skilling revolution' designed to secure India's future.

2. Women empowerment:
   The Essar Foundation is driving social change in rural areas by empowering women through education and training. To ensure the holistic empowerment of women, social, economic and political aspects that influence women's lives must be addressed. An analysis of the status of women in India reflects a disappointing scenario in almost all important human development indicators. The lack of adequate schools, health centers, drinking water, sanitation and hygiene facilities hinders a large section of women, inhibiting their social and economic development.
3. **Education:**

The Essar Foundation is empowering children and adults by bringing quality education to remote rural areas. The projects aim to nurture students' curiosity by using alternative and more practical methods of teaching. In addition to providing books, learning aids, utilities and basic infrastructure to schools in rural areas, the Foundation also builds schools in isolated areas. So far four schools have been established (at Tungi village in Maharashtra; Mahan in Madhya Pradesh; Chatro in Jharkhand; and Paradipin Odisha), and over 3,000 students enrolled. As a result, people are better able to participate in and contribute to their community’s development and progress. To date, more than 10,000 students have been supported by the Essar Education Program.

4. **Infrastructure:**

The Essar Foundation is investing in rural infrastructure to make basic amenities available to India's villages. With more than 60 per cent of India's people living in villages, rural areas are critical to the nation's growth. While there has been some progress in recent years, much remains to be done. Since public resources are limited, private participation becomes essential. The Essar Foundation, for its part, works closely with the government and other elected representatives, to provide basic amenities in rural areas near its operations.

5. **Environment:**

The Essar Foundation is promoting environmentally responsible living among India’s rural and tribal communities. the Essar Foundation works closely with communities living near its facilities to protect the environment. The Foundation pays special attention to preserving natural ecologies. It ensures
that the environmental balance is maintained by blending the traditional knowledge of local communities with contemporary technology.

6. **Health:**

Essar actively seeks to improve the health and happiness of people in communities close to its operations. Typically, the rural areas near Essar facilities tend to have low accessibility and thus very limited availability of healthcare services. The Essar Foundation provides healthcare services to more than 100,000 families. It also offers specialized services such as eye and dental care to more than 250,000 people.