## 1.0 EXECUTIVE SUMMARY

Indian Farmers Fertiliser Co-operative Limited (IFFCO) is a national level cooperative society engaged in the manufacture and marketing of various fertilizers including the training to the farmers for skill development related to agro-based requirement through the country. The Society, registered as an autonomous cooperative under the Multi State Cooperative Societies Act, 2002, was born out of the Indian farming community's initiative along with the Government of India on 3rd November, 1967.

IFFCO Kalol Unit (An ISO 9001 & 14001 certified Co-operative Society was commissioned in 1974-75. Initially IFFCO Kalol Unit was designed for production of a 910 MTPD gas-based Ammonia Plant and 1200 MTPD Urea Plant. In 1997, capacities of both Ammonia and Urea Plants were enhanced to 1100 MTPD and 1650 MTPD respectively, for a total investment of Rs.150 crores, utilizing largely the available design margins in the original equipment with minor additions / modifications in the Plant. A naphtha Pre-reformer was installed as an add-on unit in Ammonia Plant to provide flexibility to use naphtha as mixed-feed along with gas, keeping in view the constraints in supply of natural gas from the Mehsana gas fields.

Naphtha pre-reformer unit of IFFCO Kalol is not in line since April 2009. The Ministry of Chemical & Fertilisers, Department of fertilizer (DOF), Government of India vide notification No 12012/3//2006-FPP dated 8th March 2007 asked all the naphtha and LSHS/FO based fertilizer units to get converted to NG/LNG within a period of 3 years. Now, Kalol Unit is in operation with 100% RNLG. Presently, Kalol Unit produces Urea at the rate of 1780 Metric Tons per day (MTPD) capacity and Ammonia (Intermediate Product) at the rate of 1140 MTPD to meet the annual target. As per Consent to Operate issued by GSPCB, IFFCO Kalol Unit has been allowed to produce 6,02,000 MT of urea per annum.

IFFCO Kalol unit is committed to use the energy in the most efficient way. "Energy Saving" is one of the major objectives of IFFCO. This has enabled to run the old vintage Ammonia and Urea Plants with better performance level even after 40 years of operation. IFFCO Kalol has been continuously improving its performance by implementing several modifications and by adopting best operating philosophy under scientifically based emerging technology. IFFCO Kalol Unit is reluctantlessly striving to be prove itself as the lowest energy consumer in the fertilizer industry. To achieve its

goal, a number of energy conservation schemes have been identified, planned and implemented in stages under Energy Saving Projects (ESP).

Production of Ammonia is an energy intensive process. Ammonia production accounts about 80-90% of total energy consumption in Ammonia-Urea Complex. Energy is a major factor in the cost of Ammonia & Urea production and hence, there has always been a big scope for energy conservation efforts in Ammonia – Urea Plants.

IFFCO proposes the energy saving project to implement the latest available proven technological solution to meet the target of substantial reduction in energy consumption at its Kalol Complex. With implementation of energy saving project, around 10% increase in Ammonia and urea production has been envisaged.

IFFCO has engaged Projects & Development India Ltd (PDIL) as consultant for preparation of Pre Feasibility Report. PDIL has prepared the PFR on the basis of site visit and data / documents provided by IFFCO officials.

## 1.1 PROJECT LOCATION

IFFCO Kalol fertilizer complex is located near village Saij in Gandhinagar District of Gujrat State. IFFCO Kalol Unit is spread over an area of about 96 Hectares of land. Kalol Unit is located near the State Highway No. 41 (connecting Ahmedabad-Mehsana), 25 Kms North-east of Ahmedabad city and about 4 km from Kalol town. The nearest railway station is Kalol, which is on Ahmedabad-Mehsana section and about 4 km north from the site. Geographically the fertilizer complex is located at Longitude 23º 12’ 44” N and Latitude 72º 31’ 22” E at an elevation of 60 to 65 m above mean sea level (MSL). Location map has been presented in Plate-1 & 2.

## 1.2 SCOPE OF ENERGY SAVING PROJECT

The scope of Feasibility Study has been aimed at to reduce the Urea specific energy consumption by about 0.221 Gcal per MT of Urea at Kalol Fertiliser Complex. To achieve the target, the following energy saving schemes have been considered.

### 1.2.1 Schemes to be Implemented in Kalol

Following schemes have been envisaged in ESP:

**(A) Ammonia**

**Table-1.1**
**Schemes Considered for Ammonia Plant**

| Sr.No. | Schemes under consideration |
|---|---|
| 1. | Installation of New single steam turbine for Synthesis gas Compressor |
| 2. | New air burner for Secondary Reformer |
| 3. | Installation of saturated coil at suction of ID fan. |
| 4. | Installation of Fuel gas Expander with preheaters and bypass arrangement |
| 5. | Hot desulphurization of feed gas in place of activated carbon |
| 6. | New additional MP Boiler in between Ammonia Converters |
| 7. | Ammonia Recovery from Synthesis Loop LP Purge Gases |
| 8. | Installation of MP Stripper for Process Condensate Stripping |
| 9. | Installation of New Methanator Feed/ Effluent Heat Exchanger |
| 10. | Installation of New Trim Heater at the exit of HTS (For Methanator Temperature Control) |
| 11. | Installation of new BFW Pre Heater at exit of HTS (in place of existing 104C) |
| 12. | Replacement of Ammonia Converter BFW Pre Heater 123C |
| 13. | Saturated MP Steam Export from Synthesis Loop to Urea Plant |
| 14. | Reduction in Steam to Carbon Ratio from 3.3 to 3.0 |

**(B) Urea**

**Table-1.2**
**Schemes Considered for Urea Plant**

| | |
|---|---|
| 1. | VAM for cooling of CO2 Compressor Suction Chilling |
| 2. | High Efficiency Trays in Urea Reactor |
| 3. | HP Split Flow Configuration Ejector and new HPCC |
| 4. | Replacement of Second Evaporator Heat Exchanger |
| 5. | Installation of HP Ammonia Pre Heater |

### 1.2.2 Scope of Work of Engineering Consultant

M/s CASALE would prepare basic engineering design package (BEDP) for the proposed project as under:

(i) Design basis

(ii) Material balance, cooling water and steam & condensate balance

(iii) Process flow diagram for all section of the plants. The PFD shall be prepared for design condition

(iv) Equipment list of new and modified equipments

(v) Engineering Process Specifications and data sheet for new and modified equipments

(vi) Details of Tie-in points for taking tapping in plant turn-around marked on PIDs

(vii) Engineering specification for piping with reference to existing piping specifications

(viii) Preliminary equipment arrangement for new and modified equipments

(ix) Electrical motors specification with emergency power requirement for new and modified equipments

(x) First edition of P&I diagrams for all new and modified sections of the plants
The P&I diagrams shall show nominal diameters and medium symbols, walls and instrumentation, i.e., control loops and measuring points, control logic and analyzers, etc. Details of changes and modifications to the safety inter-lock trip systems for new and modified parts shall be shown in separate diagrams.

(xi) Line list for new and modified piping based on existing pipings class specifications.

(xii) Insulation requirement, if any.

(xiii) Slope requirements of lines, if any.

(xiv) Proposed modified plot plan showing the general layout for all new and modified section of the plant

(xv) Marked up existing plot plan showing the available area for the new equipments

(xvi) Layout of the equipments and space required.

(xvii) Trip interlock logic diagram of new and modified sections showing trip set points, alarm annunciation and set points & delay time and manual reset.

(xviii) Data sheet for new and modified control valves and new safety valves

(xix) Typical Hook-up drawing for new and modified instruments loops

(xx) Functional instrument diagrams and loop diagrams for documenting very complicated loops

(xxi) HAZOP study for new installations and modifications

(xxii) Operating Manual / guidelines for the new installations and their integration in existing plants, highlighting normal operations, start-up and shut-down operations which are modified after revamping.

## 1.3 RAW MATERIAL AND UTILITIES

Basic purpose of implementation of energy saving schemes at each unit is to conserve the raw materials i.e. natural gas and water. There will be over all saving of natural gas of 13360 $Sm^3$/day and 200 $m^3$/day water in Kalol Unit. No additional raw materials will be required for the proposed project.

## 1.4 PROJECT IMPLEMENTATION PLAN & TIME SCHEDULE

The ESP will be implemented in two Phases. Energy savings schemes which required short lead time will be implemented during year 2016 turnaround and energy savings schemes which required long lead time will be implemented during year 2017 turnaround.

## 1.5 ESTIMATED PROJECT CAPITAL COST

The estimated capital cost of ESP is as under (Rs. Crore):

**Table-1.4**
**Estimated Cost**

| Sr No | Units | Equipment Cost (including 3% Contingency) | BEDP | DEDP | Total |
|---|---|---|---|---|---|
| 1. | Kalol | 192 | 17 | 4 | 213 |
| 2. | TOTAL | 192 | 17 | 4 | 213 |

BEDP : Basic Engineering Design Package
DEDP : Detailed Engineering Design Package

## 1.6 FINANCIAL ANALYSIS OF PROJECT

The overall saving in Urea specific energy at each Unit and the financial analysis will be as under:

**Table-1.5**
**Financial Analysis**

| **ESP** | **UNIT** | Kalol |
|---|---|---|
| Urea Production | MTPD | 1780 |
| Total Energy Saving | Gcal | 393 |
| Energy Saving | Gcal/MT | 0.221 |
| Estimated Investment | Rs. Crore | 213 |
| Energy Cost | Rs./Gcal | 2900 |
| Monetary Savings /Year | Rs Crore | 42 |
| **Payback** | **Years** | 5.1 |

## 1.6 SAVINGS OF RAW MATERIAL OF PROJECT

The present raw material consumption is as under:

**Table-1.6**
**Raw Material Consumption**

| **Particulars** | **Unit** | **Kalol** |
|---|---|---|
| Urea Production | MTPD | 1780 |
| Total gas consumption | $SM^3$/day | 1190901 |
| Feed gas in Ammonia | $SM^3$/day | 684461 |
| Fuel gas in Ammonia | $SM^3$/day | 373997 |
| Fuel to Steam generation | $SM^3$/day | 132443 |
| Power (imported from State grid) | MWH/day | 159.8 |
| Urea Energy | Gcal/MT | 5.573 |

Savings of raw material after ESP is as under:

**Table-1.7**
**Savings on Raw Material**

| Particulars | Unit | Raw Material Consumption | | |
|---|---|---|---|---|
| | | Existing | Proposed | Saving |
| Total NG | SM3/day | 1190901 | 1177541 | 13360 |
| Water | $m^3$/day | 14,000 | 13800 | 200 |

## 1.7 NEED & JUSTIFICATION

The need and justification of the proposed project is summarized as under:

- It will reduce overall energy consumption leading to a substantial reduction in pollution load.
- It will decrease the dependency of IFFCO, Kalol unit over GSEB grid
- ***It will reduce the consumption of natural resources viz. water (approx. 200 $m^3$/d) & NG (13360 $Sm^3$/day) ) which in turn will have positive impact on environment***
- It will impose positive impact on the consumption pattern of electricity in near-by area
- ***It will reduce the subsidy burden of Government of India (GOI).***
- It will maintain the profitability of IFFCO.
- It will maintain stability in indigenous / domestic market for Urea.
- It will check the import possibility of fertilizers to some extent and yield national savings
- There will be temporary employment generation during construction period.
- It will ease the availability of chemical fertilizers to farmers.
- Adoption of proven long lasting emerging technology will produce the intangible effect to reduce the present stress of environment.
- It will fulfill the aims and objective of EIA related to continual improvement in the field of Energy Saving by adopting emerging technology.
- The reduction of green house gas emissions from the stack will contribute to INTENDED NATIONALLY DETERMINED CONTRIBUTION (INDC) under UNEPCCC.
- ESP is a complement to ***"India's Low Carbon Strategy"*** to meet the target of carbon reduction equivalent to 20-25% of GDP by 2020 against the base of 2005.

## 1.8 Conclusion

As energy cost is increasing with passage of time, it is prudent to take the measures to save the energy at each location of IFFCO Plants. It is always the endeavour of IFFCO's top management to adopt the latest available and proven technology for improving the productivity of the Society. With the efforts taken by IFFCO management in the past, the IFFCO Plants are running at comparable energy consumption with global benchmarks. The proposed Energy Saving Project (ESP) will further reduce the energy consumption at all the nitrogenous fertiliser units. With implementation of the proposed Energy Saving Project (ESP), the overall urea specific energy will be reduced by about 0.221 Gcal per MT of Urea with payback of 5.1 Years. Thus, there will be reduction in the emission levels with implementation of Energy saving project due to reduction in consumption of natural gas, imported power and water.

The ESP is simply a change-over scheme without any change in production rate. For this type of project, EIA Notification 2006 is also silent on preparation of EIA report and issuance of EC. ***Further, it would not be out of place to mention here that the area around IFFCO Kalol Unit has never been identified as "CRITICALLY POLLUTED AREA / ZONE" by CPCB.*** Further, the ESP fulfills the IFFCO policy related to protection & safe guard of environment and measures for energy conservation. It also fulfills the aims & objective of EIA.

Considering the above facts, it requires a critical review with due diligence regarding exemption of Public Hearing and preparation of EIA report in generic form for grant of EC on priority basis.

# 2.0 INTRODUCTION

## 2.1 Identification of the Project

All the units of IFFCO including Kalol unit are committed to use the energy in the most efficient way. "Energy Conservation" is a major objective for IFFCO as such, and more so, for Kalol Unit. This has enabled to run the 1975 vintage Ammonia Plant with better performance level even after 40 years of its operation. IFFCO Kalol Unit has been continuously improving its performance by implementing several modifications and by adopting best operating philosophy. IFFCO Kalol Unit is continually striving to be the one of the lowest energy consumers in the fertilizer industry. To achieve its goal, a number of energy conservation schemes have been identified, planned and implemented in various stages under different Energy Saving Projects (ESP).

Production of Ammonia is an energy intensive process. Ammonia production accounts about 80-90% of total energy consumption in Ammonia-Urea Complex. IFFCO proposes the energy saving project to implement the latest available proven technological solution. To meet the target of substantial reduction in energy consumption at Kalol Unit, M/s Casale, Switzerland has been appointed as Process Consultant for the Energy Saving Project (ESP). The status of production before and after revamp at IFFCO Kalol, will be same as follows:

**Table- 2.1**

**Status of Production at IFFCO, Kalol Unit**

| Production before & after ESP | Unit | Present | After implementation of ESP Project, around 10% increase in Ammonia & urea production has been envisaged. |
|---|---|---|---|
| Urea Production | MTPD | 1780 | |
| Ammonia Production | MTPD | 1140 | |

### 2.2.2 Proposed Schemes

#### 2.2.2.1 Schemes to be Implemented in Kalol Unit

Following schemes have been envisaged in ESP:

**Table- 2.2**

**Proposed Schemes for Ammonia Plant**

| Sr. No. | Schemes under consideration |
|---|---|
| 1. | Installation of New single steam turbine for Synthesis gas Compressor |
| 2. | New air burner for Secondary Reformer |
| 3. | Installation of saturated coil at suction of ID fan. |
| 4. | Installation of Fuel gas Expander with preheaters and bypass arrangement |
| 5. | Hot desulphurization of feed gas in place of activated carbon |
| 6. | New additional MP Boiler in between Ammonia Converters |
| 7. | Ammonia Recovery from Synthesis Loop LP Purge Gases |
| 8. | Installation of MP Stripper for Process Condensate Stripping |
| 9. | Installation of New Methanator Feed/ Effluent Heat Exchanger |
| 10. | Installation of New Trim Heater at the exit of HTS (For Methanator Temperature Control) |
| 11. | Installation of new BFW Pre Heater at exit of HTS (in place of existing 104C) |

| | |
|---|---|
| 12. | Replacement of Ammonia Converter BFW Pre Heater 123C |
| 13. | Saturated MP Steam Export from Synthesis Loop to Urea Plant |
| 14. | Reduction in Steam to Carbon Ratio from 3.3 to 3.0 |

**Table- 2.3**

**Proposed Schemes for Urea Plant**

| | |
|---|---|
| 1. | VAM for cooling of CO2 Compressor Suction Chilling |
| 2. | High Efficiency Trays in Urea Reactor |
| 3. | HP Split Flow Configuration Ejector and new HPCC |
| 4. | Replacement of Second Evaporator Heat Exchanger |
| 5. | Installation of HP Ammonia Pre Heater |

## 2.3 Project Proponent

Indian Farmers Fertiliser Co-operative Limited (IFFCO) is a national level cooperative society engaged in the manufacture and marketing of various fertilizers. The Society, registered as an autonomous cooperative under the Multi State Cooperative Societies Act, 2002, was born out of the Indian farming community's initiative along with the Government of India on 3rd November, 1967 for making available much-needed fertilizer at the farmer's doorstep from plants owned by them through their own distribution channels.

The Society has grown steadily in strength and stature from a modest membership of 57 cooperative societies and a seed equity capital of Rs.6 lakhs in 1967 to the present staggering membership of about 40,000 cooperatives with more than 55 million farmers as members, having a share capital of Rs.423.93 crores, which is now fully-owned by the member cooperative societies, having repatriated the entire equity contribution of the Government of India. Through its exemplary performance over the years, IFFCO has today emerged as a unique cooperative of the farmers, for the farmers and by the farmers.

IFFCO Kalol Unit having installed capacity of 910 MTPD gas-based Ammonia Plant and 1200 MTPD Urea Plant was commissioned in the year 1975. In 1997, capacities of both Ammonia and Urea Plants were enhanced to 1100 MTPD and 1650 MTPD respectively, for a total investment of Rs.150 crores, utilizing largely the available design margins in the original equipment with minor additions / modifications in the

Plant. As on date, IFFCO Kalol Unit is producing 1780 MTPD of Urea and 1140 MTPD of Ammonia. As per Consent to Operate issued by GSPCB, IFFCO Kalol Unit has been allowed to produce 6,02,000 MT of urea per annum.

The IFFCO Kalol Unit has all the required associated offsite and utility facilities. The present requirement of fresh water is about 12000-14000 $m^3$/day. Fresh water consumption will not be exceeded after the project completion and operating the modified unit rather it will marginally reduce the demand of water by 200 $m^3$/day approximately. Presently the raw water is being supplied from nearby Narmada canal and gas is available through Gujarat State Petroleum Corporation (GSPC) gas network at plant battery limit. On implementation of the proposed scheme, the consumption of natural gas will reduce by 13360 Sm3/day. Presently, the power demand of the complex is being met through import from Gujarat State Electricity grid through two feeders. Final prilled urea product is being transported through rail network and also by road to the final destination as per Government of India despatch plan. Therefore, it is envisaged that the existing infrastructure is able to meet the requirement of the project.

IFFCO Kalol Unit has always put its best efforts for conserving water. The effluent generated in the plant is recycled back after treatment in ETP. Even the sewage water generated in the township is reused after treatment in sewage treatment plant. IFFCO Kalol Unit is running on the concept of zero effluent discharge. The present specific water consumption is one of the lowest among the fertiliser industry in the country. Plant and its township have ISO 14001 certification which speaks volumes about its environmental commitment. IFFCO Kalol Unit has won a number of awards for its environmental efforts and adopting best safety practices.

Energy Conservation Commitment and Policy

As energy contributes more than 80% of cost of production and sharp rise in energy cost, energy conservation receives top priority at IFFCO Kalol Unit.

Due to stringent efforts, IFFCO Kalol has bagged a number of awards in receipt as detailed below:

**(a) National Energy Conservation Awards**

- National Energy Conservation Award – 2008, Second Prize in Fertilizer Sector by Govt. of India, Ministry of Power

- National Energy Conservation Award – 2006, First Prize in Fertilizer Sector by Govt. of India, Ministry of Power

**(b) Fertilizer Association of India (FAI) Awards**

- First Prize for "Environmental Protection" in the nitrogenous fertilizer category for the year 2012-2013 (First time in the history of Kalol Unit)
- First Prize for Best Overall Performance (Joint Winner with Phullphur-I Unit) of an operating nitrogenous unit for 2010-2011.

**(c) Vishwakarma Rashtriya Puraskar**

- Vishwakarma Rashtriya Award -2006 in Secondary Category was awarded to two employees of Kalol Unit by Ministry of Labour & Welfare, Govt.of India.

**(d) Award for Suggestion Schemes**

- "Maximum Participation Award" for 2013-14 (Jointly with Kalol Unit) from Indian National Suggestion Scheme Association (INSAAN)
- "Rajya Shram Shree Award" in 2011-12

**(e) National Safety Award**

- 12th Annual Greentech Safety Award 2013 in Silver Category in Fertilizer Sector
- Gujarat State Safety Award 2012

**ACCREDITATION AND CERTIFICATION:**

a) Environment Management System (ISO 14001: 2004 Accreditation):
IFFCO Kalol has established and implemented Environment Management System as per International Organization for Standardization. The system has been audited by BVQI (Bureau Veritus Quality International) and the unit has been accredited with ISO 14001 Certification in August 2000.

b) At present, Kalol Unit has adopted Integrated Management System (IMS) covering Quality Management system (ISO 9001: 2008), Environment Management System (ISO 14001: 2004) and Occupational Health & safety Management System (OHSAS 18001:2007) and certified by Bureau Veritas Certification (India) and is valid upto 4.4.2016

## 2.4 DESCRIPTION OF PROJECT

The project will reduce fuel (NG) consumption thereby resulting in reduction in generation of solid and liquid waste.

Overall energy savings for above schemes has been envisaged as 0.221 GCal/MT.

Raw Material Consumption

The existing consumption of raw material in Kalol Unit is as under:

**Table- 2.5**

**Consumption of Raw Material**

| Particulars | Unit | Kalol |
|---|---|---|
| Urea Production | MTPD | 1780 |
| Total gas consumption | $SM^3$/day | 1190901 |
| Feed gas in Ammonia | $SM^3$/day | 684461 |
| Fuel gas in Ammonia | $SM^3$/day | 373997 |
| Fuel to Steam generation | $SM^3$/day | 132443 |
| Power (imported from State grid) | MWH/day | 159.8 |
| Urea Energy | Gcal/MT | 5.573 |

Savings of raw material after ESP shall be as under:

**Table- 2.6**

**Savings of Raw Materials**

| Particulars | Unit | Raw Material Consumption | | |
|---|---|---|---|---|
| | | Existing | Proposed | Saving |
| Total NG | SM3/day | 1190901 | 1177542 | 13360 |
| Water | $m^3$/day | 14,000 | 13800 | 200 |

The water consumption after completion of the project, will be met by existing sources i.e. from Dolkha branch of main Narmada Canal. The present requirement of fresh water is about 12000-14000 $m^3$/day. Fresh water consumption will reduce by about 200 $m^3$/day.

### 2.4.1 Estimated Project Capital Cost

Estimated capital cost of ESP is as under (Rs. Crore):

**Table- 2.7**

**Capital Cost of ESP**

| Sr. No | Unit | Equipment Cost (including 3% Contingency) | BEDP | DEDP | Total |
|---|---|---|---|---|---|
| 1. | Kalol | 192 | 17 | 4 | 213 |
| 2 | **TOTAL** | 192 | 17 | 4 | 213 |

**BEDP :** Basic Engineering Design Package

**DEDP :** Detailed Engineering Design Package

## 2.5 NEED & JUSTIFICATION

The need and justification of the proposed project is summarized as under:

- It will reduce overall energy consumption leading to a substantial reduction in pollution load.
- It will decrease the dependency of IFFCO, Kalol unit over GSEB grid
- ***It will reduce the consumption of natural resources viz. water (approx. 200 $m^3$/d) & NG (13360 $Sm^3$/day) ) which in turn will have positive impact on environment***
- It will impose positive impact on the consumption pattern of electricity in near-by area
- ***It will reduce the subsidy burden of Government of India (GOI).***
- It will maintain the profitability of IFFCO.
- It will maintain stability in indigenous / domestic market for Urea.
- It will check the import possibility of fertilizers to some extent and yield national savings
- There will be temporary employment generation during construction period.
- It will ease the availability of chemical fertilizers to farmers.
- Adoption of proven long lasting emerging technology will produce the intangible effect to reduce the present stress of environment.
- It will fulfill the aims and objective of EIA related to continual improvement in the field of Energy Saving by adopting emerging technology.

- The reduction of green house gas emissions from the stack will contribute to INTENDED NATIONALLY DETERMINED CONTRIBUTION (INDC) under UNEPCCC.
- ESP is a complement to ***"India's Low Carbon Strategy"*** to meet the target of carbon reduction equivalent to 20-25% of GDP by 2020 against the base of 2005.

## 2.6 MARKET SURVEY

### 2.6.1 Estimated Demand of Fertilizer

All-India demand forecast of fertilizer nutrients and product urea during Eleventh Plan based on Multiple Regression method are shown below.

**Table-2.8**

**Demand Estimates for Fertilizer Nutrients**

('000 tonnes)

| Year | Urea Demand |
|---|---|
| 2007-08 | 25360 |
| 2008-09 | 26275 |
| 2009-10 | 27135 |
| 2010-11 | 27945 |
| 2011-12 | 28755 |
| 2012-13 | 29733 |
| 2013-14 | 30744 |
| 2014-15 | 31789 |
| 2015-16 | 32870 |
| 2016-17 | 33987 |

To ensure uninterrupted supply in the eventuality of break down and unforeseen demand, buffer stock up to a limit of 5% of the seasonal requirement of the State is to be maintained. Also taking into consideration 10% of the supply in the pipeline, projected production capacity should be 15% above the projected demand of Urea as indicated in Table above.

### 2.6.2 Future Supply Estimates

#### 2.6.2.1 Indigenous Supply

No new urea plant was commissioned during the Tenth Five Year Plan except for a small addition to the capacity of Namrup II unit of the Brahmaputra Valley Fertilizer

Corporation after its revamp. The reassessed indigenous production capacity of urea in the Country as on 1-11-2007 was 207.93 lakh tones.

#### 2.6.2.2 Additional Capacity

Around 2.560 million tonnes of additional capacities through de-bottlenecking or revamp, which are under implementation or proposals by urea manufacturers, are under consideration with the Government.

### 2.6.3 Projected Demand-Supply Gap

The following Table-1.8 gives scenario of the demand-supply gaps that are likely to emerge by the end of 2016-17.

**Table-2.9**
**Projected Demand Supply Gap for Urea**

('000 tonnes of material)

| tem | 2011-12 | 2012-13 | 2014-15 | 2015-16 | 2016-17 |
|---|---|---|---|---|---|
| **Demand Estimates (FAI)** | 28755 | 29733 | 31789 | 32870 | 33987 |
| **Supply Estimates** | | | | | |
| • Plants under Operation | 20000 | 20000 | 20000 | 20000 | 20000 |
| • OMIFCO | 1652 | 1652 | 1652 | 1652 | 1652 |
| • Revamp/ Debottlenecking | 2560 | 2560 | 2560 | 2560 | 2560 |
| **Total Supply** | **24212** | **24212** | **24212** | **24212** | **24212** |

There is almost 3-4 lakh tones of urea demand per annum for manufacturing of complex fertilizers and for exports to neighbouring countries like Nepal, Myanmar etc. This will increase the projected deficit level of urea further.

The projected deficit level of about 46 lakh tonnes of urea by 2011-12 is based on certain assumptions on the demand as well as supply side. On the supply side, a critical assumption is that the existing installed capacity is not only retained in good working condition but is also able to maintain the high capacity utilization levels. As much as 35 lakh tonnes of urea capacity is from plants based on costlier feedstock such as naphtha/ fuel oil. It would call for change over of feedstock, if the Country were to continue to have this much capacity available for production. Even the gas based plants commissioned in 1980's and thereafter would call for timely revamping and retrofitting to ensure that they are able to maintain present operating rates and low energy consumption.

### 2.6.4 Import of Urea

The quantity of urea available for international trade is limited. The analysis of past 15 years data reveal that increase and decrease in the world export supply or import demand by 10 million tonnes has led to violent fluctuations in the prices from US$ 70 to US$ 600 per tonne of urea. This variation in prices is basically due to changes in the output by either 'low cost exporters' or 'swing producers' who account for about 6 million tonnes of world trade. Low cost producers are export oriented facilities based on low cost gas. Swing producers are primarily domestic suppliers who either (i) enter the export market when prices are high even ignoring domestic supplies, or (ii) stop even domestic supplies when prices are low. Manufacturers in free markets like USA fall under this category.

When the demand is strong, it is the demand-supply balance which would determine the price level that the market can sustain at that particular point of time. It has no relation to manufacturing costs.

When market is weak, it is the cost profiles of the producers and more specifically their cash costs which would determine the price levels. Low cost exporters do not normally reduce their export volumes and prefer to maximize sales volumes even when prices are dropping so long as they recover their cash costs. Generally, the swing producers have higher manufacturing costs and they would start exiting the market as prices drop, thereby reducing exports to balance the reduction in import demand and maintain prices.

From the above discussions, it is apparent that urea is a strategic commodity and capacity of international market is rather limited to meet significant increases in demand. An additional demand of even 1-2 million tonnes would cause serious imbalance and prices would shoot up. Higher levels of demand could result in a situation when urea would not be available in spot markets at any price.

Therefore, it would not be prudent to depend on imports for more than 5-6 lakh tones of urea. This in other words means that Country shall be required to have in place additional domestic capacity of urea for indigenous consumption and to make the Country export hub for urea. To reduce the demand-supply balance during eleventh and subsequent Plan periods, a number of new and expansion projects are under consideration.

### 2.6.5 Export Possibility / Domestic & Export Market

The project proposal includes implementation of energy saving schemes in Ammonia & Urea Plant. The project will reduce raw material (NG & Water) consumption. There would not be any change in the production capacity of finished products. Hence, the option with respect to export of urea does not appear to be relevant.

### 2.6.6 Employment Generation (Direct & Indirect)

The proposed project is an Energy Saving Project (ESP). It would not enhance the production capacity of IFFCO Kalol Unit. The existing manpower is sufficient to take care of the establishment proposed ESP. Hence, employment generation (direct and indirect) is not envisaged.

## 3.0 PROJECT DESCRIPTION

### 3.1 TYPE OF PROJECT

The proposed project is a modernization project without any change in production rate with an aim to reduce the energy consumption per tonne of production by adopting the modern proven, fail-safe technology through replacement of steam turbines to gas turbines. The project fulfills the aims and objective of environment by reduction in energy and natural resources like NG, Power & water.

**3.1.1** The proposed project is an independent project and not interlinked with any other project. The project will be implemented in Ammonia and Urea Plants of Kalol Unit. The project will yield energy saving of 0.221 Gcal/MT of urea and estimated savings of about 42 Crores per year. The natural resources savings equivalent to 0.013 MMSCMD of NG and approximately 200 $m^3$/day of water has been estimated after implementation of the project with a pay-back period of 5.1 years.

### 3.2 LOCATION OF THE PROJECT

The project will be implemented within IFFCO Kalol Unit, which is spread over an area of about 96 Ha of land. The location of the IFFCO, Kalol Unit in Google Map has been presented in Plate - 1.1. The location of the Kalol Unit in Geographical Map has been presented in Plate - 1.2.

### 3.2.1 Co-ordinates of the project

Geographically the fertilizer complex is located at Longitude 23º 12’ 44” N and Latitude 72º 31’ 22” E at an elevation of 60 to 65 m above mean sea level (MSL).

## 3.3 DETAILS OF SITE

The project shall be centrally located within the battery limit of the complex. As regards consideration of environmental protection, it is envisaged that there would be substantial reduction of pollution load due to reduction in NG & water consumption.

## 3.3 SIZE & MAGNITUDE

The proposed project is limited to implementation of energy schemes in Ammonia & Urea Plant for reduction of energy in urea as 0.221 Gcal/MT of urea produced. With implementation of ESP Project, around 10% increase in Ammonia & urea production has been envisaged.

## 3.4 PROJECT DETAILS

The energy saving that involves schemes related to replacement / revamping of the existing compressors & turbines and modification of $CO_2$ removal section are targeted. With regard to execution of the project, energy saving scheme, license and basic engineering package is required. M/s CASALE, SA Switzerland has provided the scope of work as mentioned below:

### 3.4.1 Preparation of Basic Engineering Design Package (BEDP)

M/s CASALE would prepare basic engineering design package for the proposed project as under:

(i) Design basis

(ii) Mater balance, cooling tower and steam & condensate balance

(iii) Process flow diagram for all section of the plants. The PFD shall be prepared for design condition

(iv) Equipment list of new and modified equipments

(v) Engineering Process Specifications and data sheet for new and modified equipments

(vi) Details of Tie-in points for taking tapping in plant turn-around marled on PIDs

(vii) Engineering specification for piping with reference to existing piping specifications

(viii) Preliminary equipment arrangement for new and modified equipments

(ix) Electrical motors specification with emergency power requirement for new and modified equipments

(x) First edition of P&I diagrams for all new and modified sections of the plants
The P&I diagrams shall show nominal diameters and medium symbols, walls and instrumentation, i.e., control loops and measuring points, control logic and analyzers, etc. Details of changes and modifications to the safety inter-lock trip systems for new and modified parts shall be shown in separate diagrams.

(xi) Line list for new and modified piping based on existing pipings class specifications.

(xii) Insulation requirement, if any.

(xiii) Slope requirements of lines, if any.

(xiv) Proposed modified plot plan showing the general layout for all new and modified section of the plant

(xv) Marked up existing plot plan showing the available area for the new equipments

(xvi) Layout of the equipments and space required.

(xvii) Trip interlock logic diagram of new and modified sections showing trip set points, alarm annunciation and set points & delay time and manual reset.

(xviii) Data sheet for new and modified control valves and new safety valves

(xix) Typical Hook-up drawing for new and modified instruments loops

(xx) Functional instrument diagrams and loop diagrams for documenting very complicated loops

(xxi) HAZOP study for new installations and modifications

(xxii) Operating Manual / guidelines for the new installations and their integration in existing plants, highlighting normal operations, start-up and shut-down operations were modified after revamping.

## 3.5 RAW MATERIAL

Existing consumption of raw materials for production of 1750 MTPD of urea are briefed as under:

**Table – 3.1**
**Raw Material Consumption**

| Particulars | Unit | Kalol |
|---|---|---|
| Urea Production | MTPD | 1780 |
| Total gas consumption | $SM^3$/day | 1190901 |
| Feed gas in Ammonia | $SM^3$/day | 684461 |
| Fuel gas in Ammonia | $SM^3$/day | 373997 |
| Fuel to Steam generation | $SM^3$/day | 132443 |
| Power (imported from State grid) | MWH/day | 159.8 |
| Urea Energy | Gcal/MT | 5.573 |

Savings of raw material after ESP is as under:

**Table – 3.2**
**Savings of Raw Material**

| Particulars | Kalol Complex |
|---|---|
| Natural Gas | 0.013 MMSCMD |
| Water | 200 $m^3$/day |

Natural Gas is available through Gujarat State Petroleum Corporation (GSPC) gas network at plant battery limit. The raw water is being supplied from nearby Dholka branch of Narmada main canal. However, water consumption shall reduce by ~~1000~~ 200 m3/day after implementation of proposed project.

The project does not require any facility for transportation of raw material and finished products. The production profile of Kalol Unit shall remain same.

### 3.5.1 RESOURCE RECYCLING/ RESUSE

The proposed project envisages resource recycling and reuse. The entire amount of effluent is treated efficiently and reused either in plant or in gardening of green belt areas. Zero Discharge Concept is being adopted in IFFCO Kalol Unit. However, there will be reduction in consumption of natural resources like NG, Power and Water.

### 3.5.2 AVAILABILITY OF WATER, ENERGY & POWER

The project proposal does not envisage any additional requirement of water. The present source of water is nearby Dholka branch of Narmada main Canal and water consumption will reduce from 14,000 $m^3$/day to 13,800 $m^3$/day. Similary, there will reduction in Energy consumption by 0.221Gcal/MT of Urea

### 3.5.3 QUANTITY OF WASTE (SOLID & LIQUID)

The project proposal is limited to implementation of energy saving schemes in Ammonia & Urea Plants. The project will reduce fuel (NG & Water) consumption thereby resulting in reduction in generation of solid and liquid waste.

## 4.0 SITE ANALYSIS

IFFCO Kalol has been commissioned in the year 1975 with installed capacity of 910 MTPD and 1200 MTPD of Urea. In the year 1997 an expansion scheme was implemented and the production capacity of Ammonia Plant was increased from 910 MTPD to 1100 MTPD and capacity of Urea Plant was increased from 1200 MTPD to 1650 MTPD and running successfully since then. Several modernization schemes have been implemented successfully in the past. The prime factor with respect to connectivity plays an important role in successful implementation of the project as per schedule.

IFFCO Kalol is located near Saij Village of Gandhinagar district of Gujrat State. The site is located at a distance of 25 km North-east of Ahmedabad city on the Gujrat state Highway no. 41 connecting Ahmedabad to Mehsana, and about 4 km north from the site Kalol fertilizer complex is spread over an area of about 96 Ha of land. The ownership of the land is with Indian Farmers Fertiliser Co-operative Limited (IFFCO), a national level cooperative society engaged in the manufacture and marketing of various fertilizers. The proposed project shall be established within plant premises of existing Kalol Unit

Since the project shall be implemented within existing plant premises, there would no change in existing land use pattern.

### 4.1 Eco-sensitive Areas

There will be reduction in natural resource and energy per capita of finished production.

Wild Life Sanctuary, National Park and Reserved Forest have not been identified in the vicinity of Kalol fertilizer complex.

### 4.2 Topography

The site has natural gradient from north to south. A part of the low lying area will be used for the proposed expansion, therefore some filling and grading will be required for the project. The site area is not prone to inundation. However, pile foundation may be required for major equipment and structure foundations. The depth of piles and the related aspects will be decided appropriately based on soil investigations. However, the area is predominantly covered with fine clay soil, which is compact and non-porous in nature.

## 4.3 Ground Table & Hydrology

Geologically the Gandhinagar district is covered with quaternary alluvium formation of Cambay basin. Rocky area is not found in this district. The alluvial formation is made up of multi-layer sand, silt and clay formation. Alluvium thickness is more in western side of the district, while less in eastern side. Silt, clay dominates alluvium found in the northwest side while coarse-grained sand with gravels is common in the eastern part. Tertiary clay (Blue clay) occurs at different depths in the area. It demarcates the potable water boundary, below which water quality deteriorates. In the eastern part it occurs at very shallow depth i.e at 40 to 50 mts restricting drilling depth up to that depth.

Ground water occurs in semi-confined to confined and in un-confined conditions. Total depth of the bore in east side of the study area is ranging from 50 to 180 Mts., while in northwest side, depth of the bore varies from 200 to 350 Mts. Presently village water supply schemes are mainly based on ground water through tube-wells. Water level of the district is depleting very fast due to less recharge and un-controlled withdrawal

## 4.4 Existing Facilities

IFFCO Kalol Unit is a well established fertilizer complex spread over an area of 96 Hectares of land owned by IFFCO Management. IFFCO Kalol Unit was commissioned in the year 1975 having 910 MTPD of Ammonia and 1200 MTPD of Urea Plants. In the year 1997 the capacities of Ammonia and Urea Plants were enhanced from 910 to 1100 MTPD of Ammonia Plant and from 1200 to 1650 MTPD of Urea Plants. In addition to industrial activities, there exists residential area for providing accommodation to its employees. The residential accommodations are well furnished and well connected with metallic road with water supply and electricity. Water is being supplied to the residential colony through underground pipelines. Source of power is import from State Electricity grid All the other infrastructural facilities like school, play grounds etc are well maintained. In addition to above facilities, IFFCO has established CORDET (Cooperative Rural Development Trust) to provide training to the farmers and best uses of fertilizers. The colony has a good sewerage system and the township sewage are treated in a dedicated Sewage Treatment Plant. The treated sewage is recycled and used as irrigational / horticultural /gardening purpose.

## 4.4 Ambient Air Quality Around IFFCO Kalol

Ambient air quality in around IFFCO Kalol Unit is quite receptive. The concentration of air pollutants namely, SPM, RSPM, SO2, NOX and NH3 are within the limits prescribed under National Ambient Air Quality Standard 2009. As per available data from secondary source, the over-all baseline ambient air quality around Kalol Unit is summarized as under:

**Table-3.3**

**Ambient Air Quality Data in and around IFFCO Kalol**

| Location | SPM | RSPM | SO2 | NOx | NH3 |
|---|---|---|---|---|---|
| Plant Site | 183.5 | 90.2 | 14.0 | 31.3 | 14.0 |
| Saij Village | 178.9 | 73.6 | 12.0 | 24.9 | 11.5 |
| Shertha Village | 175.0 | 52.8 | 11.0 | 25.2 | 10.9 |
| Dhanaj Village | 183.0 | 75.2 | 13.4 | 30.2 | 13.0 |
| IFFCO Colony | 177.2 | 74.5 | 13.1 | 32.2 | 16.0 |
| Kalol City | 191.0 | 89.9 | 12.1 | 30.1 | 8.8 |
| Palsana Village | 146.5 | 72.1 | 11.2 | 23.5 | 8.0 |
| Tintora Village | 143.3 | 57.3 | 10.6 | 26.5 | 8.0 |

## 4.5 Water Quality of Narmada Canal

Water requirement of IFFCO Kalol Unit is met from nearby Narmada Canal, located at a distance of about 5 km from fertilizer complex. As per available secondary data, physic-chemical characteristics of some of the important parameters of Narmada Canal is as under:

**Table-3.4**

**Water Quality of Narmada Canal**

| | |
|---|---|
| pH | 8.1 to 8.5 |
| TDS, mg/l | 205 |
| Alkalinity as CaCO3, mg/l | 110 |
| Total Hardness as CaCO3, mg/l | 108 |
| Chloride as Cl, mg/l | 34 |
| Sulphate as SO4, mg/l | 10 |
| Iron as Fe, mg/l | BDL |

All the parameters are within the limits prescribed under Drinking Water Standard IS:10500.

## 4.4 Soil Texture

Soil texture is an important soil characteristic that could influence water retention capacity, aeration, drainage, and susceptibility to erosion which drives crop production and management. The textual class of soil is determined by the percentage of sand, silt and clay. Soils can be classified into one of four major textural classes including sands, silts, loams and clays. Broadly speaking, three textural classes are identified in the state. Clayey and loamy types are predominant in the state under fine and medium textured soilsAlluvial sandy loam to sandy clay soils are found in the Kheda, Gandhinagar, Ahmadabad district of Gujrat. These soils are the most productive soils in the state and contains fairly good amount of potassium.

The soil of the area is having low organic content. The N, P & K content also does not support high crop yields and therefore, low agricultural productivity will be anticipated in the impact zone. However, the analyses of heavy metals indicate that the soil is free from any chemical contamination.

The pH of soil is slightly alkaline having pH around 7.5 to 7.9. The porosity varies from 47 to 56%. The bulk density varies from 1.4 to 1.6 g/cc of soil.

## 4.5 Climate of Kalol

Kalol has a monsoon climate with three main seasons: summer, monsoon and winter. The climate is generally dry and hot outside of the monsoon season. The weather is hot to severely hot from March to June when the maximum temperature stays in the range of 36 to 42 °C (97 to 108 °F), and the minimum in the range of 19 to 27 °C (66 to 81 °F). It is warm from December to February, the average maximum temperature is around 29 °C (84 °F), the average minimum is 14 °C (57 °F), and the climate is extremely dry. The southwest monsoon brings a humid climate from mid-June to mid-September.[8] The average annual rainfall is around 803.4 mm (31.63 in).

## 4.6 Social Infrastructure

### 4.6.1 Demography

As per 2011 India census,[1] Kalol (N.G) had a population of 112013 Males constitute 53% of the population and females 47%. Kalol (N.G) has an average literacy rate of 68%, higher

than the national average of 59.5%: male literacy is 79%, and female literacy is 56%. In Kalol (N.G), 13% of the population is under 6 years of age. The city is going to become an important suburb of Ahmedabad.

There are total 70 to 71 villages are located within Kalol city.

Kalolis is divided into three major areas:

1. Kalol East
2. Kalol center
3. Kalol West

In East side there are some industry like sintex(plastic industry),Bharat Vijaya Mill and other industries and has also residency area. And in Center and West side ,this both are totally residency area. Center and West area is most developed area of Kalol. In Center , Shreenagar area and near Garden area , Vardhmannagar area is developed area of Kalol. Currently, West Panchwati area is developing area. The Cost of residence area is very high in Center area and West area of Kalol. Malls are also situated in center area. Shree Sardar Patel Garden is very well known garden of Kalol.

### 4.6.2 Transportation

Kalol lies between following three Cities:

1) Ahmedabad (largest city Of Gujarat)

2) Gandhinagar(Capital & Green City of Gujarat)

3) Mehsana ( Mega City of Gujarat). So, Kalol is a very important city for Transportation.

Air Transportation

Nearest Domestic & International Airport is Sardar Vallabhbhai Patel International Airport in nearby Ahmedabad i30 km away from Kalol and provides connectivity with domestic flights to the Metropolitan and other major cities of India. It also provides a many International flights from Ahmedabad to across the world.

Rail Network

Kalol lies on the main railway line connecting Ahmedabad to Jaipur, Marwad, Abu road, New Delhi and other North Indian states. Kalol Railway Station is on the Western Railways:Ahmedabad-Mehsana line. The main train connections include Ranakpur Express, Ahmedabad-Delhi Mail, Aravalli Express and Ahmedabad-Patan Passenger.

Road Network

Kalol is connected to Surat, Mumbai, and Navi Mumbai through National Highway 8A. It is connected to Ahmedabad, Jaipur, Udaipur, New Delhi & Chandigarh through the National Highway 8C. Highway also connecting to Abu Road - Ambaji also passes through the town.

Local Transport

The Gujarat State Road Transport Corporation (GSRTC) buses are available for all major cities of Gujarat. State Road Transport Corporation (GSRTC) facility is available at two bus stands in Kalol. 1) City Bus Stand , 2) Ambica bus stand at Kalol is convenient to get transport for anywhere in Gujarat. CNG auto-rickshaws are available for local transport.

### 4.6.3 Sports

Cricket is the most popular sport in Kalol. There are several grounds in the city like Vakhariya Ground etc. The Sardar Patel Stadium, Motera located in the nearby city of Ahmedabad is one of the Test cricket grounds in India and is a venue for International cricket matches. Other sports such as football, hockey, basketball, tennis and badminton are also popular in the city.

### 4.6.4 Education

Schools in Kalol are affiliated with the Gujarat Secondary and Higher Secondary Education Board. Under the (10+2 Plan), students complete ten years of schooling, and then enroll in Higher Secondary School, where they choose from one of three streams: Arts, Commerce or Science. Which is then followed by either a general degree course in a chosen field of study, or a professional degree course, such as Law, engineering, medicine etc. Maximum Institutes are Available within Kalol. Education is available up to Master degree. Schools are there for both Gujarati and English medium of instructions.

### 4.6.5 Culture

The folk dances of Gujarat, Garba, Raas, and Dandiya have been successful in breaking the confinements of locality, and the festival of Navratri brings together the whole of India. Special dancing competitions and lavish feasts are organized during the holy festival of Navratri. During the prominent festival of Navratri many forms of dances are performed; raas is one of them. Raas is a very energetic and colourful dance in which body language, eye contact, expressions and rhythm play a major part. Two circles

formed by men and women revolve clockwise and anticlockwise following the rhythm of the music, while clanging their dandias with their respective partners.

## 5.0 PLANNING BRIEF

### 5.1 Planning Concept

IFFCO Kalol Unit is continually striving to be the lowest energy consumer in the fertilizer industry. To achieve the goal several energy saving schemes have been adopted earlier like change-over of naphtha feed to natural gas. After 2006, a number of energy conservation schemes have been identified and planned to implement in stages under the Energy Saving Project (ESP). Planning to meet any unforeseen requirement for the proposed project is under consideration.

The concept of present ESP has been conceived by IFFCO management in search of best available technology for reduction of energy and natural resources like NG, Coal & water.

The consultant has been searched on global basis in consultation with Projects & Development India Ltd (PDIL). Globally renowned consultant related to energy schemes has been identified. IFFCO will make responsible M/s Casale for preparation of basic and detailed engineering package for ESP project and identification of necessary modifications for optimization of ESP project as stated above.

IFFCO has appointed PDIL for preparation of feasibility report, filling & online submission of Form-I and necessary formalities related to environmental clearance. After EC the job allotted to M/s Casale will be executed under schedule fixed by Casale and IFFCO. Necessary equipments shall be procured after review of basic & detailed engineering package, which will include replace of old machineries & equipment for optimization of energy consumption. The scheduled completion of project shall be within 36 months after award of EC.

### 5.2 Population Projection

There would be minor influx of population during construction phase. However, it is envisaged that local workers of adjoining villages shall be engaged during construction period to check the influx of population in the area. The visit of super specialists during

construction period cannot be ruled out. They will be accommodated in IFFCO Guest House /near-by facilities.

As there will be no influx of population from outside area and no new appointments are envisaged under the scope of ESP project, no population project has been envisaged in the proposed project. Details related to demography has been presented in Section 4.6.1 as per Census 2011.

## 5.3 Land Use Planning

The details of facilities are as under:

| Sr No | Description | Area Sq.M |
|---|---|---|
| 1. | Bulk Urea storage building | 9835 |
| 2. | Ammonia Plant | 6930 |
| 3. | Effluent Treatment Plant | 1014 |
| 4. | Cooling Towers & CW Pumps | 3558 |
| 5. | Urea Plant | 2700 |
| 6. | Water Treatment Plant | 1638 |
| 7. | Electrical Workshop | 1220 |
| 8. | Administration Building | 1500 |
| 9. | Empty Bag storage | 1381 |
| 10. | Bagging and Rly.Platforms | 3750 |
| 11 | New ammonia storage tank (T 3001) & refrigeration system | 551 |
| 12. | New Ammonia Storage Tank (T 3501) | 930 |
| 13. | Ammonia storage Tank-T3101 | 940 |
| 14. | Workshop & Maintenance office | 1800 |
| 15. | Ware House | 3200 |
| 16 | Training Center | 982 |
| 17. | Hostel | 1650 |
| 18 | 66 KV Sub station | 2750 |
| 19 | Guest House | 800 |
| 20 | Steam Generation Plant | 1260 |
| 21 | Technical Building | 700 |
| 22 | Mobile & Air Conditioning Equipment shop | 560 |
| 23 | Instrument & Inspection Building | 582 |
| 24 | Water storage tank | 1349 |
| 25 | Diesel oil storage tank | 763 |
| 26 | MCC-15 & 16 | 628 |
| 27 | Guard Pond | 10435 |
| 28 | Off Specification Pond | 15700 |
| | Total | 78106 |

### 5.3.1 Green Belt Development :

The land provided for the factory and township was originally “USAR” land and was lying unutilized from long time. IFFCO had taken a challenge to reclaim this usar land and it has been converted into a green land. 50 to 200 m wide green belt has been developed around the complex. Today, the entire area is full of trees and vegetation.

About 3.0 Lakh trees of wide variety of about 30 species including some of medicinal species imparts scenic beauty besides providing suitable habitat for birds and other flora and fauna. The greenery and the scenic beauty of Sanjivani Vatika, Buddha Vihar, Nandan Udyan, Saras Kunj, etc. are remarkable and imparts healthy environment. The species of plants planted are Peepal, Neem Shesham, Pakad, Jamun, Guava, Arjun, Amla, Bel, Kanji, Ashok, Casurina, Gulmohar, Amaltas, Harre, Bahera, Karenj, Bottlebrush etc.

### 5.3.2 Environment and Safety

IFFCO Kalol Unit is totally committed for maintaining an eco-friendly environment. For controlling air pollution, plants have been provided with Electro Static Precipitators, Dust Extraction Systems, etc. A lush green belt with about 2 lakh trees has been developed all around the factory premises which is a natural means of air purification. There is a full fledge Environment & Safety Department which runs under dedicated experienced specialist of the field.

The Safety Department runs as per OHSAS: 18001 guidelines and maintains the safety norms and MSDS guidelines precaution of chemicals and materials used & procured. It provided all the safety items to the workers and provides necessary training related to safety and prevention of accidents. The instances of accidents and risk are identified and reported to the higher authorities. Fire Fighting system is under the control of safety department.

IFFCO has a well established Environment Department which runs under experienced specialist of the field. The department works as per guidelines of IS 14001, 9001. The departmental head is responsible for implementation of guidelines related to environment issued by CPCB, SPCB, MoEF&CC. The department is responsible for

making compliance against the condition and enquiry made by statutory and non-statutory bodies.

### 5.4 Assessment of Infrastructure Demand

The existing infrastructural facilities available at IFFCO Kalol are having all the basic requirements and are updated from time to time. Hence, there shall be no demand of infrastructure during establishment of proposed project.

### 5.5 Amenities/ Facilities

IFFCO Kalol is having all the required amenities and facilities. Safety, healthy, environmental, social, cultural requirements are periodically assessed and updated as per requirements.

## 6.0 Proposed Infrastructure

The existing infrastructure of IFFCO Kalol with respect to residential colony, green belt, Social infrastructure, road and rail facilities, supply of water, sewerage facilities, power requirement etc. are readily available and are working efficiently. In view of the size and magnitude of proposed project, no additional infrastructure is envisaged.

## 7.0 Rehabilitation & Resettlement Plan

IFFCO Kalol fertilizer complex is spread over an area of 96 Ha of land. The total area of land is in possession of IFFCO Management. The proposed project shall be established within plant premises of existing Kalol Fertilizer Complex. Hence, any planning with respect to rehabilitation & resettlement is not applicable.

## 8.0 Project Schedule & Cost Estimates

### 8.1 Project Schedule

Basic Engineering of Energy Saving Project has been provided by M/s Casale and ESP shall be implemented in two phases. First phase will be in 2016 turnaround and other will be in 2017 turnaround. The likely date of start of construction shall commence after getting Environmental Clearance (EC) from MoEF. The project is scheduled to be completed within 24 months after issuance of EC.

## 8.2 Cost Estimates

The estimated cost of the proposed ESP is summarized as under:

**Table-8.1**

**Estimated Cost of Project**

| Sr. No | Unit | Equipment Cost (including 3% Contingency) | BEDP | DEDP | Total |
|---|---|---|---|---|---|
| 1. | Kalol | 192 | 17 | 4 | 213 |
| 2 | **TOTAL** | **192** | **17** | **4** | **213** |

**BEDP :** Basic Engineering Design Package

**DEDP :** Detailed Engineering Design Package

## 8.3 Financial Analysis

The financial analysis of project will be as under:

The overall saving in Urea specific energy at each Unit and the financial analysis is as under:

**Table-8.1**

**Overall Savings of ESP**

| **ESP** | **UNIT** | Kalol |
|---|---|---|
| Urea Plant Capacity | MTPD | 1780 |
| Energy Saving | Gcal | ~~675~~ 393 |
| Energy Saving | Gcal/MT | ~~0.379~~ 0.221 |
| Estimated Investment | Rs. Crore | 213 |
| Energy Cost | Rs./Gcal | 2900 |
| Monetary Savings /Year | Rs Crore | 42 |
| **Payback** | **Years** | 5.1 |

## 9.0 ANALYSIS OF PROPOSAL (FINAL RECOMMENDATIONS)

IFFCO, Kalol Unit has embarked on energy saving of Ammonia-Urea Plants in a big way. It is prudent on the part of fertiliser manufacture to reduce the energy consumption as the energy cost is continuously increasing with the passage of time.

As energy cost is increasing with passage of time, it is prudent to take the measures to save the energy at IFFCO Kalol Unit. It is always the endeavour of IFFCO's top management to adopt the latest available and proven technology for improving the productivity of the Society. With the efforts taken by IFFCO management in the past, the IFFCO Kalol Unit plants are running at comparable energy consumption with global benchmarks. The proposed Energy Saving Project (ESP) will further reduce the energy consumption at IFFCO Kalol. With implementation of Energy Saving Project (ESP) the over-all urea specific energy will be reduced by about 0.221 Gcal per MT of Urea with payback of 5.1 Years.

The Energy Saving Project of IFFCO Kalol is limited to modernization with any change in production profile. The ESP project fulfils the requirement of Corporate Environmental Policy and it will reduce the subsidy burden of Government of India under Fertilizer Control Policy. The proposed project will also check the price rise of chemical fertilizer and the product cost of urea will be compatible with imported fertilizer.

It is concluded that the over-all energy consumption of 5.573 Gcal/MT shall come down to 5.352 after implementation of proposed ESP with a pay-back of 5.1 years. Thus, there will be reduction in the emission levels from each plant with implementation of Energy

Saving Project due to reduction in consumption of natural gas (0.013 MMSCMD), Water (200 $m^3$/day).

The ESP is simply a change-over scheme without any change in production rate. For this type of project, EIA Notification 2006 is also silent on preparation of EIA report and issuance of EC. ***Further, it would not be out of place to mention that the area around IFFCO Kalol has never been identified as "CRITICALLY POLLUTED AREA/ ZONE" by CPCB.*** Further, the ESP fulfills the IFFCO policy related to protection & safe guard of environment and measures for energy conservation. It fulfills the aims & objective of EIA.

Considering the above facts, the Environmental Clearance (EC) for the proposed ESP requires a critical review of Application Form-I with due diligence regarding exemption of Public Hearing and guidelines for preparation of EIA report on priority basis.

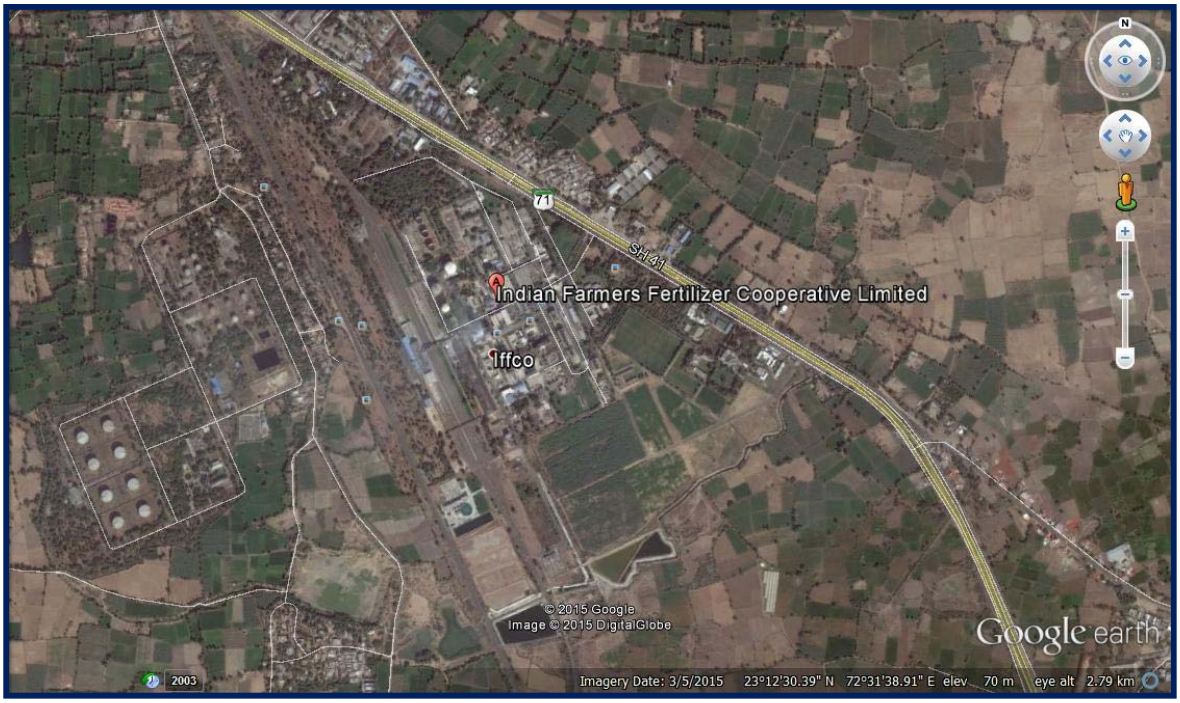


**Plate-1.1**

**Location of IFFCO, Kalol Complex on Google Map**


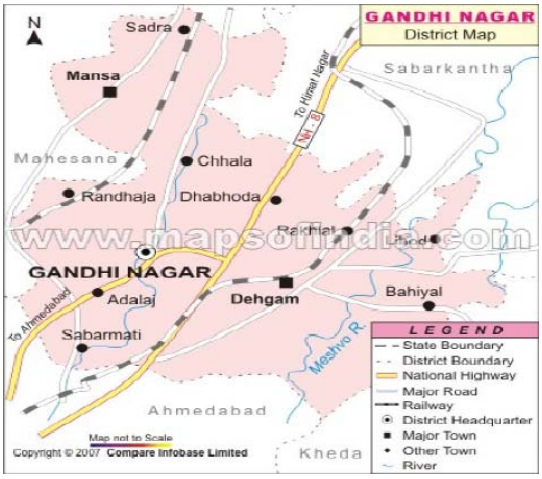



**Plate-1.2**

**Location of IFFCO, Kalol Complex on Geographical Map**

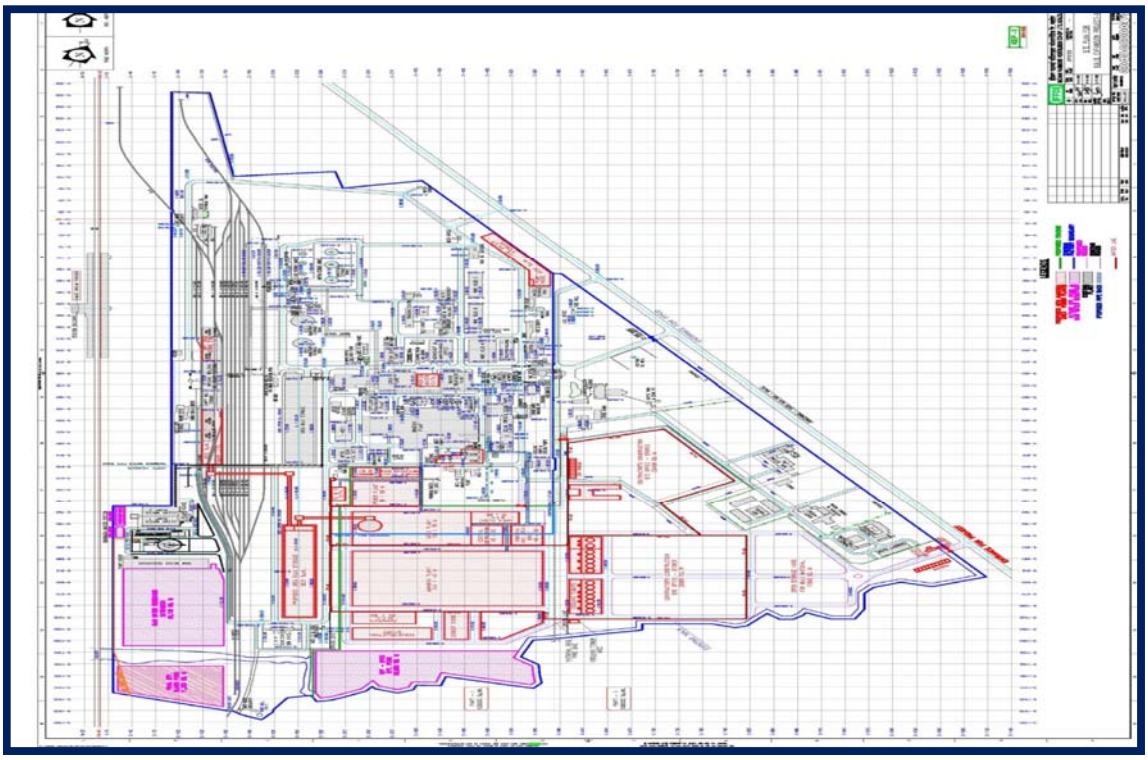

**PLATE-1.3**
**FACTORY LAYOUT OF IFFCO KALOL UNIT**