

1.0 EXECUTIVE SUMMARY

IFFCO, Aonla Unit is one of the largest urea producing unit of Indian Farmers Fertiliser Co-operative Limited (IFFCO). IFFCO was registered as a multi unit co-operative society under the Co-operative Societies Act on 3rd November, 1967. IFFCO, a pioneer in the co-operative sector, has been making a steady progress in the field of fertilizer production, capacity utilization and rendering services to the farming community.

Presently IFFCO Aonla produces 1980000 MTPA of Urea and 1138500 MTPA of Ammonia. It was commission in the year 1988 with best available technology for production of ammonia and urea. IFFCO Aonla has acquired ISO 9001, ISO 14001, OHSAS 18001, ISO 50001 and ISO 26000 Certifications. IFFCO Aonla has bagged a number of appreciation and awards from a number of government and non-government agencies for its excellent performances in the field of environment and safety.

The Aonla fertilizer complex of IFFCO was setup in 1988 at Aonla near Bareilly Town of Uttar Pradesh, based on natural gas supplied through the HBJ Gas Pipeline. Aonla Unit consisted of a 1350 MTPD Ammonia Plant with twin-stream Urea Plants, each of 1100 MTPD capacity along with other associated facilities, built for a total investment of Rs.652 crores. Aonla Unit added another feather in its cap by undertaking an ambitious expansion project (Unit-II) consisting of a 1350 MTPD Ammonia plant and twin 1100 MTPD Urea Plants. This expansion project was completed in a record time of 36 months. The commercial production from this unit was started in Dec.' 1996. Capacity enhancement/ Debottlenecking of IFFCO Aonla Unit was done in year 2008 with the increased capacity of 3450 MTPD Ammonia & 6000 MTPD Urea production. Both the units are producing urea at their rated capacity with remarkable achievements in the field of energy conservation, environment protection, safety, etc.

IFFCO Aonla unit is inherently committed to use the energy in the most efficient way. "Energy Saving" is one of the major objectives of Aonla Unit. This effort has enabled to run the old Ammonia and Urea Plants with better performance level even after 27 years of operation. IFFCO Aonla has been continuously improving its performance by implementing several modifications and by adopting best operating philosophy under scientifically based emerging technology. IFFCO Aonla Unit is reluctantly striving to prove itself as one of 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 various Energy Saving Projects (ESPs) implemented from time to time. IFFCO actively participates with **“India Low Carbon Strategy”** by adopting energy efficiency projects, automatization of technology and economical use of energy.

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 in any Nitrogenous fertilizer Plant. Hence there has always been a big scope for energy conservation efforts in Ammonia Plants. Modernization of our old Plants i.e. installation of new energy efficient equipments /modification of existing system, will certainly help to reduce the energy consumption in IFFCO Aonla Unit. Energy saving in ammonia manufacturing process has resulted in to reduction in steam & fuel consumption. Reduced fuel consumption means burning of lesser quantity of fossil fuel and corresponding reduction in CO₂ and SO₂ emission. Reduced steam consumption means reduced consumption of fresh water, regeneration chemicals i.e. Hydrochloric Acid and Sodium Hydroxide. This also reduces the quantity of regeneration effluent.

Since beginning IFFCO Aonla had been actively involved in development of the Unit. It has continuously participated in implementation of various schemes in the past, under Capacity Enhancement Project. Now, in pursuit of continuous growth and development, IFFCO has envisaged further reduction in specific energy consumption under Energy Saving Project.

1.1 PROJECT LOCATION

IFFCO Aonla fertilizer complex is located under Aonla Tehsil in Bareilly District of Uttar Pradesh State. IFFCO Aonla Unit is spread over an area of about 1273 Acres of land owned by IFFCO Management. Aonla Unit is at a distance of about 7 kms from State Highway No. 33 (connecting Bareilly to Badayun) on Lucknow Delhi Highway Aonla, which is tehsil headquarter, is at a distance of about 11 km and Bareilly town is at a distance of about 28 kms from Aonla fertilizer complex. Aonla railway station is at a distance of about 14 kms and Bareilly railway station is at a distance of about 27 km from Aonla fertilizer complex. Aonla Unit is at a distance of about 280 kms from State Capital Lucknow and 260 kms from National Capital New Delhi. Geographically Aonla fertilizer complex is located at Longitude 28° 13' 34.87" N and Latitude 79° 14' 50.63" E

at an elevation of 165 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 0.358 Gcal per MT of Urea at Aonla-I and about 0.396 Gcal per MT of Urea at Aonla-II Fertiliser Complex. To achieve the target, the following high payback energy saving schemes have been considered. All the project activities are limited only in the existing fertilizer complex.

1.2.1 Schemes to be Implemented in Aonla

Following schemes have been envisaged in proposed ESP:

(A) Aonla-I

(i) Ammonia-I

Table-1.1
Schemes Considered for Ammonia Plant (Aonla – I)

1	Reduction in S/C Ratio in Reforming Section from 3.30 to 3.00
2	CO2 removal swap from GV to OASE
3	HP boiler downstream HTS replaced with new steam superheater
4	Ammonia wash (syn gas drying) in compressor interstage & loop reversal
5	Removal of sweet cooling water system
6	Revamp of Syn Gas Compressor
7	New electric motor drive for BFW pump
8	Replacement of existing combustion Air type preheater with new plate type exchanger in Ammonia-I.
9	Fuel gas expander with power generator

(ii) **Urea-I**

Table-1.2
Schemes Considered for Urea Plant (Aonla – I)

1	Replacement of existing CO ₂ Compressors
2	Casale High Efficiency Trays (HET) in existing Urea Reactors
3	Ammonia Preheaters installation.

(B) Aonla-II

(i) **Ammonia-II**

Table-1.3
Schemes Considered for Ammonia Plant (Aonla – II)

1	Reduction in S/C Ratio in Reforming Section from 3.30 to 3.00
2	CO ₂ removal swap from GV to OASE
3	Ammonia wash (syn gas drying) in compressor interstage & loop reversal
4	Revamp of Synthesis Gas Compressor
5	VAM on Process Air Compressor suction
6	Replacement of one Semi-Lean Pump condensing turbine with new motor
7	Running of one BFW pump with motor in place of turbine whereas another BFW pump shall be run by turbine
8	Replacement of existing combustion Air type preheater with new plate type exchanger
9	Fuel gas expander with power generator

(ii) **Urea-II**

Table-1.4
Schemes Considered for Urea Plant (Aonla – II)

1	Replacement of existing CO ₂ Compressors
2	Insatallation of VAM of CO ₂ suction chilling
3	Casale High Efficiency Trays (HET) in existing Urea Reactors
4	Ammonia Preheaters Installation

One of the purposes of implementation of energy saving schemes at Aonla Unit is to conserve the raw materials i.e natural gas and related utilities. There will be over all saving of natural gas in IFFCO Aonla Unit. No additional raw materials will be required.

Overall energy savings for above schemes has been envisaged as 0.358 GCal/MT Urea and 0.396 GCal/MT urea for Aonla-I and Aonla-II plants respectively.

1.2.2 Scope of Work of Engineering Consultant

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

- (i) Design basis
- (ii) Mater balance, cooling tower and steam & condessate 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 interlock 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.

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 279,000 Sm³/day and 500 m³/day water in Aonla Unit.

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 proposed Energy Saving Project is as under (Rs. Crore):

**Table-1.5
Estimated Cost**

Sr. No	Units	Equipment Cost (including 3% Contingency)	BEDP	DEDP	Total
1.	Aonla-I	373	16	4	393
2.	Aonla-II	345	16	4	365
3.	TOTAL	718	32	8	758

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 is as under:

**Table-1.6
Financial Analysis**

ESP	UNIT	Aonla-I	Aonla-II
Urea Plant Capacity	MTPD	3000	3000
Energy Saving	Gcal/MT	0.358	0.396
Estimated Investment	Rs. Crore	393	365
Monetary Savings /Year	Rs Crore	90	99
Payback	Years	4.4	3.7

1.7 RAW MATERIAL

1.7.1 Raw Materials Consumption

The present raw material consumption in both Aonla-I & Aonla-II units are as under:

Table-1.7
Raw Material Consumption

Particulars	Unit	Aonla-I	Aonla-II
Urea Production	MTPD	3000	3000
Feed NG to Ammonia plant	Sm ³ /day	1056529	1052734
Fuel NG to Ammonia plant	Sm ³ /day	430340	673059
Fuel to SG	Sm ³ /day	108791	
Fuel to CPP-I + CPP-II	Sm ³ /day	463469	
Purchased power	MW	0.65	
Ammonia energy	Gcal/MT ammonia	7.859	7.575
Urea energy	Gcal/MT urea	5.529	5.527

1.7.2 Raw Materials Saving

After implementation of proposed ESP, Savings of raw material such as natural gas and water after ESP shall be as under:

Table-1.8
Savings on Raw Material

Particulars	UNIT	Aonla Complex
Natural Gas @ LCV of 8772.6 kcal/sm ³	MMSCMD	0.279
Water	m ³ /day	500

The water requirement of IFFCO Aonla is met by existing sources i.e. from deep bore well. The present requirement of water is about 34200 m³/day. Fresh water consumption will reduce by about 500m³/day after the project completion and operating the modified unit.

1.7.3 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 reduce the consumption of natural resources viz. water (approx. 500 m³/d) & NG (279,000 Sm³/day)) which in turn will have positive impact on environment***
- ***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 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) at IFFCO Aonla Unit, the overall urea specific energy will be reduced by about 0.358 Gcal per MT of Urea with payback of 4.4 Years at Aonla-I and about 0.396 Gcal per MT of Urea with payback of 3.7 Years at Aonla-II. Thus, there will be reduction in the emission levels from IFFCO Aonla Unit with implementation of Energy saving project due to reduction in consumption of natural gas 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 Aonla 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 Aonla 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 Aonla Unit. This has enabled to run the 1988 Ammonia Plant with better performance level even after 27 years of its operation. IFFCO Aonla Unit has been continuously improving its performance by implementing several modifications and by adopting best operating philosophy. IFFCO Aonla Unit is continually striving to be the the lowest energy consumers in the fertilizer industry of India. 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 Aonla 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 Aonla, will be same as follows:

Table- 2.1
Status of Production at IFFCO, Aonla Unit

Production before & after ESP	Unit	Aonla-I	Aonla-II
Urea Production	MTPD	3000	3000
Ammonia Production	MTPD	1725	1725

2.2.2 Proposed Schemes

2.2.2.1 Schemes to be implemented in Aonla-I Unit

2.2.2.1.1 Ammonia-I

Following schemes have been envisaged in ESP:

Table- 2.2
Proposed Schemes for Ammonia-I Plant

1	Reduction in S/C Ratio in Reforming Section from 3.30 to 3.00
2	CO ₂ removal swap from GV to OASE
3	HP boiler downstream HTS replaced with new steam superheater
4	Ammonia wash (syn gas drying) in compressor interstage & loop reversal
5	Removal of sweet cooling water system
6	Revamp of Syn Gas Compressor
7	New electric motor drive for BFW pump
8	Replacement of existing combustion Air type preheater with new plate type exchanger in Ammonia-I.
9	Fuel gas expander with power generator

2.2.2.1.2 Urea-I

Following schemes have been envisaged in Urea-I plant:

Table- 2.3
Proposed Schemes for Urea-I Plant

1.	Replacement of existing CO ₂ Compressors
2.	Casale High Efficiency Trays (HET) in existing Urea Reactors
3.	Ammonia Preheaters installation.

2.2.2.2 Schemes to be implemented in Aonla-II Unit

2.2.2.2.1 Scheme for Ammonia-II

Following schemes have been envisaged in Ammonia-II plant:

Table- 2.4
Proposed Schemes for Ammonia-II Plant

1	Reduction in S/C Ratio in Reforming Section from 3.30 to 3.00
2	CO ₂ removal swap from GV to OASE
3	Ammonia wash (syn gas drying) in compressor interstage & loop reversal
4	Revamp of Syn Gas Compressor
5	VAM on Process Air Compressor suction
6	Replacement of one Semi-Lean Pump condensing turbine with new motor
7	Running of one BFW pump with motor in place of turbine whereas another BFW pump shall be run by turbine
8	Replacement of existing combustion Air type preheater with new plate type exchanger
9	Fuel gas expander with power generator

2.2.2.2.2 Scheme for Urea-II

Following schemes have been envisaged in Urea-II plant:

Table- 2.5
Proposed Schemes for Ammonia-II Plant

1	Replacement of existing CO ₂ Compressors
2	Insatallation of VAM of CO ₂ suction chilling
3	Casale High Efficiency Trays (HET) in existing Urea Reactors
4	Ammonia Preheaters Installation

One of the purposes of implementation of energy saving schemes at Aonla Units is to conserve the raw materials i.e natural gas and water. There will be over all saving of energy in both the units of Aonla. The overall energy savings from above schemes has been envisaged as 0.358 GCal/MTurea and 0.396 GCal/MT urea for Aonla-I and Aonla-II plants respectively. There would be savings of about 500 m³/day of fresh water.

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.

In 1988 IFFCO management set-up two units of Urea Plants of 1100 MTPD and one unit of 1350 MTPD of Ammonia Plant at Aonla Tehsil of district Bareilly in Uttar Pradesh. These units were named as Aonla-I Unit of IFFCO Aonla. All the above plants were running successfully at 100% capacity utilization.

Encouraged with its achievements in Aonla-I Unit, IFFCO Management decided to undertake an ambitious expansion project (Unit-II) in the year 1993 consisting of a 1350 MTPD Ammonia plant and twin 1100 MTPD Urea Plants. This expansion project was completed in a record time of 36 months. The commercial production from this unit was started in December 1996.

In year 2008 capacity enhancement/ Debottlenecking of IFFCO Aonla Unit was done with the increased capacity(Aonla-I & Aonla-II) of 3450 MTPD Ammonia & 6000 MTPD Urea production. Both the units are producing urea at their rated capacity with remarkable achievements in the field of energy conservation, environment protection, safety, etc.

The IFFCO Aonla Unit has all the required associated offsite and utility facilities. The present requirement of fresh water is about 34,200 m³/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 500 m³/day approximately. The raw water is met by deep tube wells located within the plant boundary and gas is made available through GAIL gas network at plant battery limit. On implementation of the proposed scheme, the consumption of natural gas will reduce by 279,000 Sm³/day.

IFFCO Aonla has its own power plant to ensure continuous electric supply to the process plants. In case of low generation the additional power requirement can be suitably met by the UPSEB grid. Most of the villages in the near-by area are electrified. As IFFCO Aonla has in-plant power generating facility and power from UPSEB is utilized only in case of emergency, thus the plants power requirement are not having any negative impact on the consumption pattern of electricity in the near-by area.

IFFCO Aonla Unit has always put its best efforts for conserving water. The effluent generated in the plant is recycled back after treatment in ETP. Sewage water generated in the township is reused after treatment in Sewage Rreatment Plant. The present specific water consumption is one of the lowest among the fertiliser industry in the country. IFFCO Aonla has ISO 14001 certification which speaks volumes about its environmental commitment. IFFCO Aonla 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 Aonla Unit.

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

AWARDS RECEIVED DURING THE LAST 3 YEARS

IFFCO Aonla Unit has won number of national and international awards in the field of Environment, Safety, Energy conservation, HR Management, IT & Suggestion Scheme as under.

Year 2014-15

- Best Production Performance Award-2014 (Runner up) for a Nitrogenous Fertiliser plant from The Fertiliser Association of India.
- Environment Protection Award-2014 (Runner up) for a Nitrogenous Fertiliser plant from The Fertiliser Association of India.
- Excellent Energy Efficient Unit Award for Aonla-II from 'CII' under 15th National Award for Excellence in Energy Management 2014.
- Most Innovative Project Award for Aonla-II from 'CII' under 15th National Award for Excellence in Energy Management 2014.
- Energy Efficient Unit Award for Aonla-I from 'CII' under 15th National Award for Excellence in Energy Management 2014.
- 15th Annual Greentech Environment Award-2014 (Gold Award) in Fertiliser sector from Greentech Foundation, New Delhi, for outstanding achievement in Environment Management.
- NSCI Safety Awards-2013 (Certificate of Appreciation) from National Safety Council of India in recognition of appreciable achievement in Occupational Safety & Health during the assessment period of three years - 2010 to 2012.
- Golden Peacock Award for Occupational Health and Safety-2014 in Fertiliser sector from Institute of Directors, New Delhi, for initiatives and achievements in the field of Occupational Health & Safety.
- 13th Annual Greentech Occupational Health and Safety Award-2014 (Gold Award) from Greentech foundation, New Delhi, for initiatives and achievements in the field of Occupational Health & Safety.
- 4th Annual Greentech CSR Award-2014 in Fertiliser sector from Greentech Foundation, New Delhi, for outstanding achievement in Corporate Social Responsibility.
- Enterprises Driving Growth and Excellence (EDGE) Award-2014 from INTEROP Mumbai, for Global Item Codification System in the category of Enterprise Application.

- Women Achiever in IT (Leader Award) has been awarded to Mrs. Seema Gaur, JGM (Systems), from INTEROP Mumbai.

Year 2013-14

- FAI Award for Best Production Performance (Winner) of an operating fertiliser unit for nitrogen (Ammonia and Urea) for Aonla-II for the year 2012-13 from The Fertiliser Association of India.
- National Energy Conservation Award (Second Prize) for Aonla-II from Government of India, Ministry of Power, in appreciation of the achievements in Energy Conservation in the Fertilisers Sector, for the year 2013.
- Most Innovative Environmental Project Award from Confederation of Indian Industry (CII) under CII Environmental Best Practices Award-2013, for Utilisation of Offgases from MP Inert Gas Wash Tower of Urea Plant-II in Primary Reformer of Ammonia Plant-II, as fuel.
- FAI Environmental Protection Award (Runner-up) in the nitrogenous fertiliser plants category for the year 2012-13 from The Fertiliser Association of India.
- 14th Annual Greentech Environment Gold Award-2013 from Greentech Foundation, New Delhi, for outstanding achievement in Environment Management.
- 12th Annual Greentech Safety Award-2013 (Gold Award) in Fertiliser sector from Greentech Foundation, New Delhi, for outstanding achievements in Safety Management.
- 3rd Greentech HR Award-2013 (Gold Award) from Greentech Foundation, New Delhi for outstanding achievement in Training Excellence.
- Champion - Progress Through Participation from the Managing Council of Indian National Suggestion Schemes' Association, Northern India Chapter (INSSAN-NIC) for continual improvement in employee involvement in Suggestion Scheme.
- CIO Next 100 Award-2013 to Mrs Seema Gaur, JGM (Systems) from 9 Dot 9 Media Group recognizing future CIOs (Chief Information Officers) of our country.

- 3rd Annual Greentech CSR Award-2013 (Certificate of Appreciation) from Greentech Foundation, New Delhi, in appreciation of efforts in Corporate Social Responsibility.

Year 2012-13:

- National Safety Award (winner award) under scheme-I&II for safety performance during years 2008 to 2010.
- Environment Protection Award for a Nitrogenous Fertiliser Plant - 2012 (Runner up) from Fertiliser Association of India (FAI), New Delhi
- 13th Annual Greentech Environment Award-2012 (Gold Award) in Fertiliser Sector, for outstanding achievement in Environment Management.
- Golden Peacock National Training Award (Winner Award) from Institute of Directors, New Delhi.
- 3rd Annual Greentech HR Award-2013 (Gold Award) from Greentech Foundation, New Delhi, in the category of Training Excellence.
- National Award for Innovative Training Practices 2011-12 (Certificate of Merit) from Indian Society for Training & Development, New Delhi, for innovative training practices at Aonla Unit.
- NSCI Safety Awards-2011 (Certification of Appreciation) from National Safety Council of India.
- IFFCO Corporate Rajbhasa Shield - 2011 (Protsahan Shield) for excellent performance in promoting use of Hindi in official work.

ACCREDITATION AND CERTIFICATION:

- a) Environment Management System (ISO 14001: 2004 Accreditation):
 - IFFCO Aonla has established and implemented Environment Management System as per International Organization for Standardization in the year 2000. The present EMS has been audited by Indian Representative M/s QS Zurich Certification Pvt Ltd, New Delhi and IFFCO Aonla has been accredited with ISO 14001:2004 Certification by Swiss Certifying Body M/s QS Zurich AG.
- b) IFFCO-Aonla Unit is an OHSAS-18001 (OHSMS), ISO 50001 (EnMS) & ISO 9001(QMS) and ISO 26000 (Corporate Social Responsibility) Certified Unit.

2.4 DESCRIPTION OF PROJECT

The project proposal includes implementation of ESP schemes to be executed in Ammonia and Urea Plants of Unit-I & Unit-II of IFFCO Aonla. The project will reduce fuel (NG) consumption thereby resulting in reduction in generation of green house gases. Reduced fuel consumption means burning of lesser quantity of fossil fuel and corresponding reduction in CO₂, SO₂, and NO_x emission. Reduced steam consumption means reduced consumption of fresh water, regeneration chemicals i.e. Hydrochloric Acid and Sodium Hydroxide. This also reduces the quantity of regeneration effluent.

Overall energy savings for above schemes has been estimated as 0.358 GCal/MT and 0.396 GCal/MT of Urea in Aonla-I and Aonla-II Units of IFFCO Aonla respectively.

2.4.1 Raw Material Consumption

The existing consumption of raw material in both units Aonla-I and Aonla-II of IFFCO Aonla are as under:

Table- 2.6
Consumption of Raw Material

Particulars	Unit	Aonla-I	Aonla-II
Urea Production	MTPD	3000	3000
Feed NG to Ammonia plant	Sm ³ /day	1056529	1052734
Fuel NG to Ammonia plant	Sm ³ /day	430340	673059
Fuel to SG	Sm ³ /day	108791	
Fuel to CPP-I + CPP-II	Sm ³ /day	463469	
Purchased power	MW	0.65	
Ammonia energy	Gcal/MT ammonia	7.859	7.575
Urea energy	Gcal/MT urea	5.529	5.527

2.4.2 Raw Material Saving

Savings of raw material after ESP shall be as under:

Table- 2.7
Savings of Raw Materials

Particulars	UNIT	Aonla Complex
Natural Gas @ LCV of 8772.6 kcal/sm ³	MMSCMD	0.279
Fresh Water	m ³ /day	500

The water consumption after completion of the project, will be met by existing sources i.e. from deep bore wells. The present requirement of fresh water is about 34,200 m³/day. Fresh water consumption will reduce by about 500 m³/day.

2.4.3 Estimated Project Capital Cost

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

Table- 2.8
Capital Cost of ESP

Sr. No	Units	Equipment Cost (including 3% Contingency)	BEDP	DEDP	Total
1.	Aonla-I	373	16	4	393
2.	Aonla-II	345	16	4	365
3.	TOTAL	718	32	8	758

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 reduce the consumption of natural resources viz. water (approx. 500 m³/d) & NG (279,000 Sm³/day)) which in turn will have positive impact on environment***
- ***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 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-2.9

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-2.10
Projected Demand Supply Gap for Urea

(‘000 tonnes of material)

Item	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

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 existing manpower is sufficient to take care of the establishment proposed ESP. Hence, employment generation (direct and indirect) is not envisaged. However temporary employment will be generated during construction phase.

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. The project fulfills the aims and objective of environment by reduction in energy and natural resources like NG & water. This is a part of “**India Low Carbon Strategy**” and INTENDED NATIONALLY DETERMINED CONTRIBUTION (INDC) under UNEPCCC Protocol.

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 Aonla Unit. The project will yield energy saving of 0.358 GCal/MTurea and 0.396 GCal/MT urea for Aonla-I and Aonla-II plants respectively and estimated savings of about 90 Crores and 99 cores per year for Aonla-I and Aonla-II respectively. The natural resources savings equivalent to 0.279 MMSCMD and approximately 500 m³/day of water has been estimated after implementation of the project with a pay-back period of 4.4 and 3.7 years.

3.2 LOCATION OF THE PROJECT

The proposed ESP project will be implemented within IFFCO Aonla Unit, which is spread over an area of about 1273 Acres of land. The location of the IFFCO, Aonla Unit in Google Map has been presented in Plate - 1.1. The location of the Aonla Unit in Geographical Map has been presented in Plate - 1.2.

3.2.1 Co-ordinates of the project

Geographically Aonla fertilizer complex is located at Longitude 28° 13' 34.87" N and Latitude 79° 14' 50.63" E at an elevation of 165 m above mean sea level (MSL).

3.3 DETAILS OF SITE

The choice for selection of alternate site is not open as the proposed energy saving project shall be implemented within plant premises of existing Aonla fertilizer complex. 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 energy consumption & water consumption.

3.3 SIZE & MAGNITUDE

The energy saving project is limited to implementation of different schemes in Ammonia-I, Urea-I of Aonla Unit and Ammonia-II & Urea-II of Aonla-II Unit. The project shall be implemented within existing plant premises which is spread over 1273 acres of land under the ownership of IFFCO.

3.4 PROJECT DETAILS

The energy saving that involves schemes related to replacement / revamping of the existing compressors & turbines and modification of CO₂ removal section are targeted. With regard to execution of the project, energy saving scheme, license and basic engineering package is required. The details of the project has been presented through Table-2.2 to Table-2.5 mentioned above. M/s CASALE, SA Switzerland has provided the scope of work as mentioned below:

3.4.1.1 Preparation of Basic & Detailed Engineering Design Package (BEDP & DEDP)

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

3.5.1 Raw Material Consumption

The existing consumption of raw material in both units Aonla-I and Aonla-II of IFFCO Aonla are as under:

Table – 3.1
Raw Material Consumption

Particulars	Unit	Aonla-I	Aonla-II
Urea Production	MTPD	3000	3000
Feed NG to Ammonia plant	Sm ³ /day	1056529	1052734
Fuel NG to Ammonia plant	Sm ³ /day	430340	673059
Fuel to SG	Sm ³ /day	108791	
Fuel to CPP-I + CPP-II	Sm ³ /day	463469	
Purchased power	MW	0.65	
Ammonia energy	Gcal/MT ammonia	7.859	7.575
Urea energy	Gcal/MT urea	5.529	5.527

3.5.2 Raw Material Savings

Savings of raw material after ESP is as under:

Table – 3.2
Savings of Raw Material

Particulars	Aonla Complex
Natural Gas	0.279 MMSCMD
Water	500 m ³ /day

Natural Gas is made available by GAIL through cross country HBJ gas pipeline network available at plant battery limit. The water requirement of IFFCO Aonla is met by a number of deep bore wells.

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

3.5.3 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.

3.5.4 AVAILABILITY OF WATER, ENERGY & POWER

Water

The project proposal does not envisage any additional requirement of water, energy and power. Water Consumption of IFFCO Aonla is about 34,200 m³/day and the source of water is a number of deep bore wells located within existing plant premises.

Energy

NG requirement of IFFCO Aonla is as under:

**Table – 3.3
Details of Natural Gas Requirement**

Particulars	Unit	Aonla-I	Aonla-II
Feed NG to Ammonia plant	Sm ³ /day	1056529	1052734
Fuel NG to Ammonia plant	Sm ³ /day	430340	673059
Fuel to SG	Sm ³ /day	108791	
Fuel to CPP-I + CPP-II	Sm ³ /day	463469	

NG is being supplied through HBJ pipeline network of GAIL (India) Ltd at plant boundary limit.

Power Requirement

IFFCO Aonla has their own power plant to ensure continuous electric supply to the process plants. In case of low generation the additional power requirement can be suitably met by the UPSEB grid. Most of the villages in the near-by area are electrified. As IFFCO Aonla has in-plant power generating facility and power from UPSEB is utilized only in case of emergency, thus the plants power requirement are not having any negative impact on the consumption pattern of electricity in the near-by area.

3.5.5 QUANTITY OF WASTE (SOLID & LIQUID)

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

4.0 SITE ANALYSIS

The first unit of IFFCO Aonla was commissioned in the year 1988 with installation of units of Urea Plants of 1100 MTPD and one unit of 1350 MTPD of Ammonia Plant. Encouraged with its achievements in Aonla-I Unit, IFFCO Management decided to undertake an ambitious expansion project (Unit-II) in the year 1993 consisting of a 1350 MTPD Ammonia plant and twin 1100 MTPD Urea Plants. This expansion project was completed in a record time of 36 months. The commercial production from this unit was started in December 1996. In year 2008 capacity enhancement/ Debottlenecking of IFFCO Aonla Unit was done with the increased capacity of 3450 MTPD Ammonia & 6000 MTPD Urea production. Both the units are producing urea at their rated capacity

with remarkable achievements in the field of energy conservation, environment protection, safety, etc.

IFFCO Aonla fertilizer complex is located under Aonla Tehsil in Bareilly District of Uttar Pradesh State. IFFCO Aonla Unit is spread over an area of about 1273 Acres of land owned by IFFCO Management. Aonla Unit is located at a distance of about 7 kms from State Highway No. 33 (connecting Bareilly to Badayun) on Lucknow Delhi Highway Aonla, which is tehsil headquarter, is at a distance of about 11 km and Bareilly town is at a distance of about 28 kms from Aonla fertilizer complex. Aonla railway station is at a distance of about 14 kms and Bareilly railway station is at a distance of about 27 km from Aonla fertilizer complex. The proposed energy saving schemes shall be implemented within plant premises of existing Aonla-I & II Units.

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

4.1 Eco-sensitive Areas

The project includes implementation of energy saving schemes in Ammonia & Urea Plants of Unit-I & II without any change in production profile. 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 Aonla fertilizer complex.

4.2 Topography

The site has natural gradient from north to south. The land within plant premises is almost flat. The soil of the project site is alkaline in nature with a pH value in the range of 8.0 to 9.0. The soil contains fine clay which is compact and non-porous. As water logging due to rain takes place in the area, grade levllng has been and adequate drainage facilities have been provided within plant premises.

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

There is no canal near Aonla fertilizer complex from where water could be drawn for fertilizer project. The only source of water in the area is ground water. Source of water is deep bore tube wells. A total of about 16 deep tube wells of 150 to 250 m³/hr capacity have been provided to meet water requirement of Aonla fertilizer complex. The ground water table is available at a depth of about 8.5m.

A hydrological study was conducting during debottlenecking project in the year 2008 for construction of additional tube wells. As per the study there is sufficient ground available in and around Aonla fertilizer complex.

4.4 Hydro Geology

The area around IFFCO Aonla Fertilizer complex forma a part of Gangetic Alluvial plains constituted by thick and extensive succession of unconsolidated alluvial sediments of Quaternary Age. The alluvium consists of various grades of sand, silt and clays in varying proportions with minor association of Kankars. Gravel and pebble beds at places. In general, medium sands with minor association of fine to coarse varieties are more predominant and form the principal aquifers.

Ground Water in the area occurs in the inter-granular pore spaces of alluvial sediments under water table and semi-confined conditions. In and around Aonla fertilizer complex there are irrigation tubes of the State Government and private farmers. The State Government tube wells are 90m deep and occasionally more deeper and water yield between 150 to 180 m³/hr for draw-down of four to five meters. The private tube wells are shallow and yield 25 to 50 m³/hr.

4.5 Existing Facilities

IFFCO Aonla Unit is a well established fertilizer complex spread over an area of 1273 Acres of land owned by IFFCO Management. IFFCO Aonla Unit was commissioned in the year 1988 with two units of Urea Plants of 1100 MTPD and one unit of 1350 MTPD of Ammonia Plant. In 1993 IFFCO took ambitious expansion program and installed a 1350 MTPD Ammonia plant and twin 1100 MTPD Urea Plants which were commissioned in the year 1996. In year 2008 capacity enhancement/ Debottlenecking of IFFCO Aonla Unit was done with the increased capacity of 3450 MTPD Ammonia & 6000 MTPD Urea production.

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 own power generation plant. All the other infrastructural facilities like school, play grounds etc are well maintained. The colony has a good sewerage system and the township sewage are treated in a dedicated Sewage Treatment Plant. The treated sewage is used as irrigational water.

4.6 Ambient Air Quality Around IFFCO Aonla

Ambient air quality in around IFFCO Aonla Unit is quite receptive. The concentration of air pollutants namely, PM₁₀, PM_{2.5}, SO₂, NO₂ 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 Aonla Unit is summarized as under:

Table-3.4
Ambient Air Quality Data in and around IFFCO Aonla

Name of Location	PM ₁₀ , µg/m ³	PM _{2.5} µg/m ³	SO ₂ , µg/m ³	NO _x , µg/m ³	NH ₃ , µg/m ³
Guest House	41-54	15-22	8-14	16-26	6-22
GET Hostel	44-57	12-19	7-11	12-23	10-22
Transport Office	52-74	24-28	15-19	30-34	24-38
Ammonia Storage Area	52-68	20-26	12-17	24-31	20-31

4.7 Ground Water Quality

Water requirement of IFFCO Aonla Unit is met from 16 nos. of deep tube wells, located within plant premises of fertilizer complex. As per available secondary data, all the parameters are within the limits prescribed under Drinking Water Standard IS:10500.

4.8 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 textural 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 soils.

The soil of the project area is clayey and the load bearing capacity of the soil in the area is about 8.0 t/m². The soil is alkaline in nature with pH value between 8 to 9. The soil contains fine clay which is compact and non-porous. 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 is anticipated in the impact zone. However, the analyses of heavy metals indicate that the soil is free from any chemical contamination.

4.9 Climate of Aonla

Bareilly has a [humid subtropical climate](#) with high variation between summer and winter temperatures. Summers are long, from early April to October, with the monsoon season in between. Winter starts in October and peaks in January and is notorious for its heavy fog. Extreme temperatures range from 4 °C to 44 °C. The annual mean temperature is 25 °C (77 °F), monthly mean temperatures range from 14 °C to 33 °C (58 °F to 92 °F). The mean annual normal rainfall is approximately 1000 mm and mean annual maximum rainfall is 1482 mm. Most of rainfall is received during monsoon in the months of July and August.

4.10 Social Infrastructure

4.10.1 Demography

According to the [2011 census](#) Bareilly district has a [population](#) of 4,465,344, roughly equal to the nation of [Croatia](#) or the US state of [Louisiana](#). This gives it a ranking of 39th in India (out of a total of [640](#)). The district has a population density of 1,084 inhabitants per square kilometre (2,810/sq mi). Its [population growth rate](#) over the decade 2001–2011 was 23.4%. Bareilly has a [sex ratio](#) of 883 [females](#) for every 1000 males, and a [literacy rate](#) of 60.52%.

According to the 2005 census report of the Government of India, the total population of Bareilly City Region (Bareilly Municipal Corporation and Bareilly Cantt.) is 875,165

having distribution as 53% males and 47% females nearly. The area under the city region is 123.46 km². The density of the population is among the highest in the country, almost 5000 per km².

Hindus form 62% of population. The main population consists of Kurmis (Jadauns and Gangwars, Patels), Mauryas, and other **castes** such as the **Baniyas**, others like Jatavs, Balmikis, **Thakurs**, **Kayasthas** & Punjabis.

Minority population is about 35% of the total population of the district. Bareilly is a category "A" district i.e. having socio-economic and basic amenities parameters below the national average.^[29]

Muslims contribute 26%, mainly **Ansari**, **Behna**, **Rohilla**, **Rayeen**, **Ranghar** and **Shaikh**) of the population. **Sikhs** form about 10% of population and rest are Jain, Buddhist and Christians.

Bareilly has an average literacy rate of 81% higher than the national average of 59.5%, with 88% of the males and 65% of females literate making it under top three districts in terms of literacy in Uttar Pradesh. The main languages spoken are **Hindi**, English, **Urdu**, **Punjabi**, and **Kumaoni**.

4.10.2 Transport & Communication

4.10.2.1 Transport

Air Transportation

Nearest Domestic & International Airport is Indra Gandhi International Airport in New Delhi 260 km away from Aonla and provides connectivity with domestic flights to the Metropolitan and other major cities of India.

Rail Network

Aonla railway station is at a distance of 14 km and Bareilly railway station is at a distance of about 27 km from Aonla fertilizer complex Aonla lies on the main railway line connecting Bareilly to New Delhi.

Road Network

Aonla Unit is located at a distance of about 7 kms from State Highway No. 33 (connecting Bareilly to Badayun) on Lucknow Delhi Highway.

4.10.2.1 Communication

The access roads needed by the workers, for transportation of equipment/machinery to plant site and also for raw material supply already exist. The vehicles may consist of cycle/ motorcycles for workers; cars, pickups, vans, for staff and public at large; while heavy machinery like trucks, cranes, rollers, dozers, etc. for machinery haulage and raw material supplies.

The increased traffic owing to proposed project not only boost to repair/spare shops to come up in the near-by area but also to restaurants and hotels for eating/drinking facilities to operating staff & local people and eventual inflow of income. The newer development has given chance to replace old equipment/appliances being used and newer sophisticated ones will come in the use.

4.10.3 Occupational Pattern

The major occupation of people in the area is agriculture. During the operational period, the IFFCO Aonla plant employed labours. There seems to be no additional employment opportunities generation through IFFCO after commissioning of this modernized project. However, there would be some employment generation during the construction phase at IFFCO Aonla Unit.

4.10.4 Medical and Public Health

The present infrastructure facilities with respect to health, power, sanitation, communication etc. are sufficient and the proposed project does not demand any additional changes in the existing facilities. Primary medical facilities are available to the plant personnel at the plant as IFFCO already has a very good hospital with well qualified staff and up to date medical facilities. There is no impact on the medical and public health status in near-by villages in the study areas as most of them have Primary health Centre, their own village dispensary/registered private practitioner to meet their requirements. Moreover, IFFCO's medical facilities are being utilized by nearby villages as and when required.

4.10.5 Socio-Economic Environment and Human Use Values

Demographically, there will be some labour force migration into the project complex or in the neighborhood due to anticipatory increase in the job opportunities. During the construction phase of Energy Saving Project, a substantial force of experts, technicians, other skilled and non-skilled labours will be required. Most of the villages in near-by area

are connected with metalled roads with fairly adequate bus services. The local villagers should have an opportunity for such direct/indirect employment to increase their income, while some precisely skilled labour force, technicians & experts will have to be brought from outside. The proposed project of IFFCO Aonla in such area, which is otherwise an almost silent land, will trigger the multiplier effect to promote infrastructural developments like transport, power/water supply, housing facilities besides educational / medical / health care, banking and public utilities. Thus, the proposed modernization project (Energy Saving Project) of IFFCO Aonla, is certainly expected to add more to the existing facilities which would not only benefit the industrial workers but local population also.

4.10.6 Appreciation of Immovable

The project has led to appreciation in values of immovables, be it a house, open plot or a cultivated land. The sale/purchase value of immovables has thus got appreciated owing to the impact of the project. The seller on getting bulk money in one stroke may coin the opportunity of investing that amount in another quick money generating business and thereby he gets a chance to get higher social status among villages and may even avail better share of amenities.

The people in neighboring areas have certainly taken advantage of higher rents of residential premises.

4.10.7 Education and Skill Up-gradation

The growing youths from neighboring villages are intending to go in for professional training like para-engineering, para-medical profession so as to enable themselves for an early entry into neighborhood project/factories like IFFCO or alternatively the project itself may make the facility of skill up-gradation to its own staff as well as apprenticeship to others in the vicinity of the project.

5.0 PLANNING BRIEF

5.1 Planning Concept

IFFCO Aonla Unit is continually striving to be the lowest energy consumer in the fertilizer industry. To achieve the goal, 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 24 months after award of EC.

IFFCO Aonla fertilizer complex is a well established unit having a modern township with all modern amenities like Park, Playgrounds, Schools, etc. The township also comprises a number of Temples, Community Halls etc. IFFCO takes special care of health to its employees and associated workers/ personnel and established a full-fledged hospital with modern diagnostic instruments. The basic amenities are modernized with scientific advancement and maintained as per requirement.

5.2 Population Projection

The project proposal includes implementation of various schemes in Ammonia and Urea Plants of Aonla-I and Aonla-II of IFFCO fertilizer complex. 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 have been presented in Section 4.6.1 as per Census 2011.

5.3 Land Use Planning

A total of 1273 Acres of land was acquired for establishment of Aonla fertilizer complex. The break-up of acquired land is as under:

Plant	: 450 Acres
Township	: 482 Acres
Green Belt	: 336 Acres*
Oxidation Pond	: 5 Acres
Total	: 1273 Acres

* Total area of Plantation in IFFCO Aonla Unit including Green Belt: 452 Acres

In addition to above, 110 Acres of land is used for Railway Siding. As the project proposal is limited to implementation of energy saving schemes only hence, additional land use planning is not envisaged.

5.3.1 Green Belt Development :

The land provided for the factory and township was originally “USAR” and Sodic 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 2.0 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 Aonla 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 2.0 lakh trees has been developed all around the factory premises which is a natural means of air purification.

Aonla Unit has always put its best efforts for conserving water. Around 70% effluent generated in the plant is recycled back after treatment in ETP. Sewage water generated in the township is reused after treatment in STP. The present specific water consumption is below the standard norms fixed for fertiliser industry in the country. IFFCO Aonla has ISO 14001 certification which speaks volumes about its environmental commitment. IFFCO Aonla Unit has won number of awards for its environment improvement efforts.

IFFCO Aonla Unit is an OHSAS-18001 Certified Unit. Annual safety targets like hazard identification and risk analysis, training to the employees and contractor labours, health check up of the employees to find any Occupational Disease of any employees etc. have

been covered under OHS Management System. All jobs are evaluated with respect to safety and a job safety analysis is being done for all important and critical jobs. All critical jobs have been described in job procedures including the special personnel protective equipments, which are always kept ready for the job. Relevant standards, codes of practices, work permit systems are being followed. Checking of Safety Relevant Components like Explosion Vents, Relief Valves, Rupture Discs, Relays and Trip systems etc. are done in every annual shutdown. Employees have been trained in all these aspects. Onsite and offsite emergency plan is well in place and mock drills are conducted regularly. All modification jobs of the plants shall be carried out after systematic HAZOP study and for proper documentation as per management of change under process safety management system.

5.4 Assessment of Infrastructure Demand

The existing infrastructural facilities available at IFFCO Aonla 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 Aonla 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 Aonla 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 Aonla fertilizer complex is spread over an area of 1273 Acres of land. The total area of land is under the administrative possession of IFFCO Management. The

proposed Energy Saving Schemes shall be implemented within plant premises of existing Aonla Fertilizer Complex. Hence, any planning with respect to rehabilitation & resettlement is not applicable.

8.0 Project Schedule & Cost Estimates

8.1 Project Schedule

M/s Casale has provided Energy Saving Project will be implemented in two phases. First phase will be 2016 turnaround and other will be 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.	Units	Equipment Cost (including 3% Contingency)	BEDP	DEDP	Total
1.	Aonla-I	373	16	4	393
2.	Aonla-II	345	16	4	365
3.	TOTAL	718	32	8	758

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 given below in Table-8.1::

Table-8.2
Overall Savings of ESP

ESP	UNIT	Aonla-I	Aonla-II
Urea Plant Capacity	MTPD	3000	3000
Energy Saving	Gcal/MT	0.358	0.396
Estimated Investment	Rs. Crore	393	365
Monetary Savings /Year	Rs Crore	90	99
Payback	Years	4.4	3.7

9.0 ANALYSIS OF PROPOSAL (FINAL RECOMMENDATIONS)

IFFCO, Aonla 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 both the units of IFFCO Aonla. 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 Aonla Unit plants (Unit-I & II) are running at comparable energy consumption with global benchmarks. The proposed Energy Saving Project (ESP) will further reduce the energy consumption at IFFCO Aonla. With implementation of Energy Saving Project (ESP) the over-all urea specific energy will be reduced by about 0.358 Gcal per MT of Urea with payback of 4.4 Years in Unit-I and about 0.396 Gcal per MT of Urea with payback of 3.7 Years in Unit-II of Aonla Fertilizer Complex.

The Energy Saving Project of IFFCO Aonla 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.

The proposed scheme would not only reduce the natural resources but also reduce the emission levels from each plant due to reduction in consumption of natural gas (279,000 Sm³/d) and Water (500 m³/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 Aonla 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.

The proposed project is a part of “**India Low Carbon Strategy**” and INTENDED NATIONALLY DETERMINED CONTRIBUTION (INDC) under UNEPCCC Protocol.

Considering the above facts, the Environmental Clear (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.

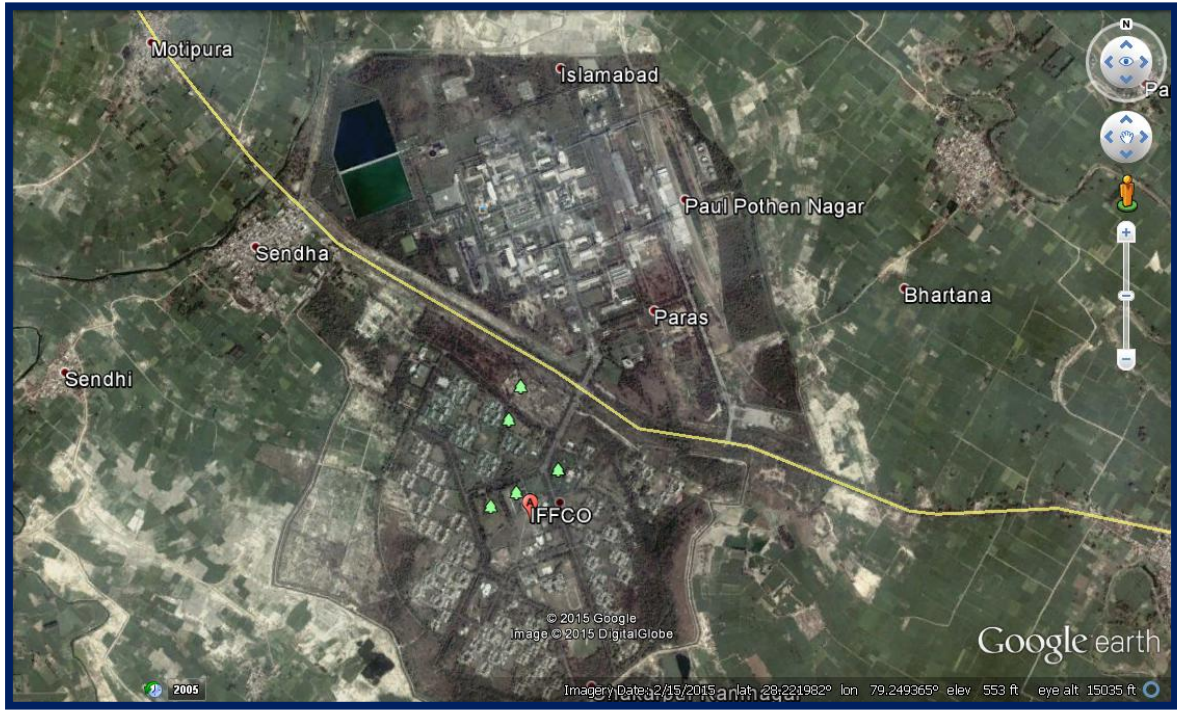


Plate-1
Location of IFFCO, Aonla Complex on Google Map

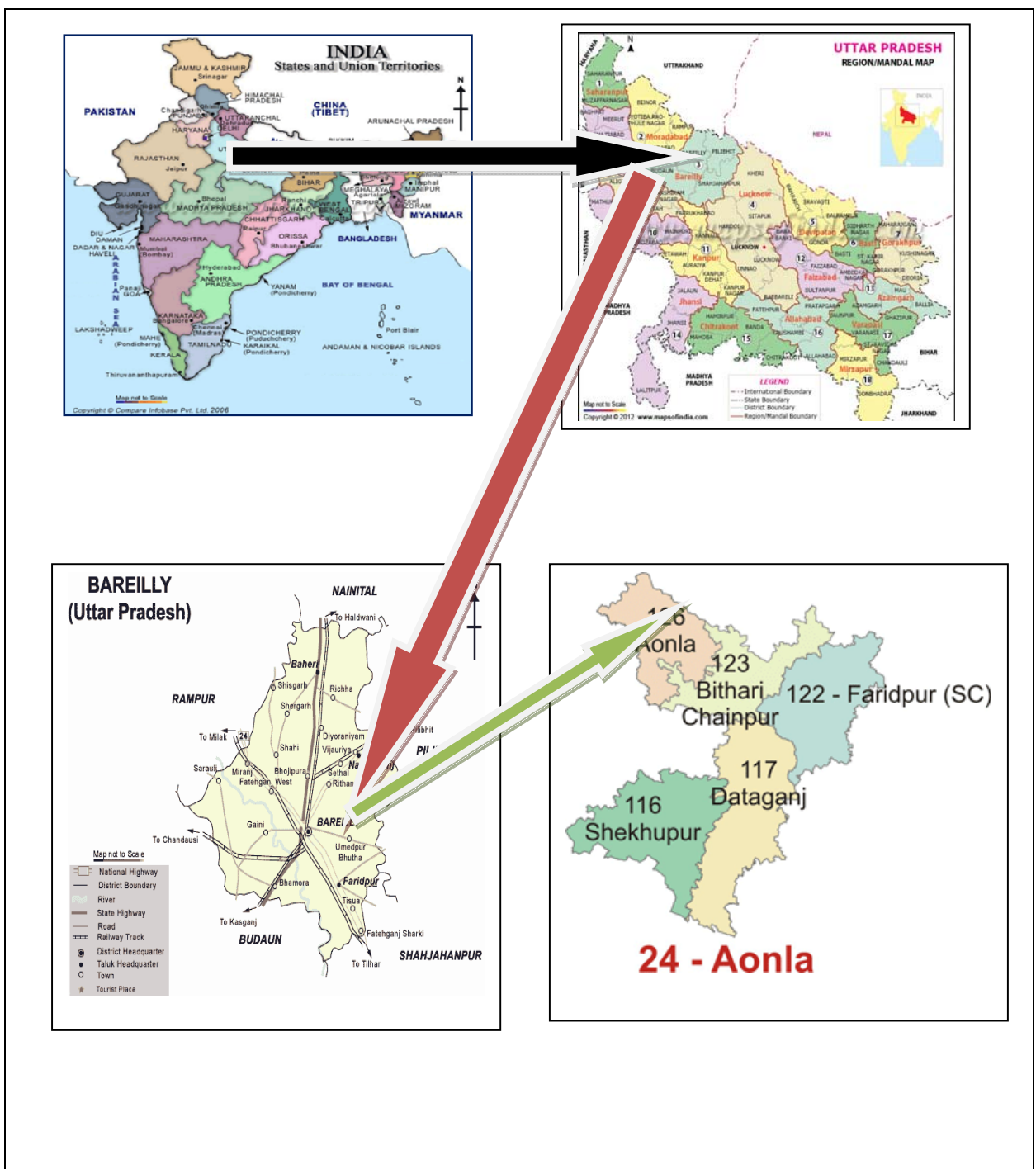


Plate-2
Location of IFFCO, Aonla Complex on Geographical Map

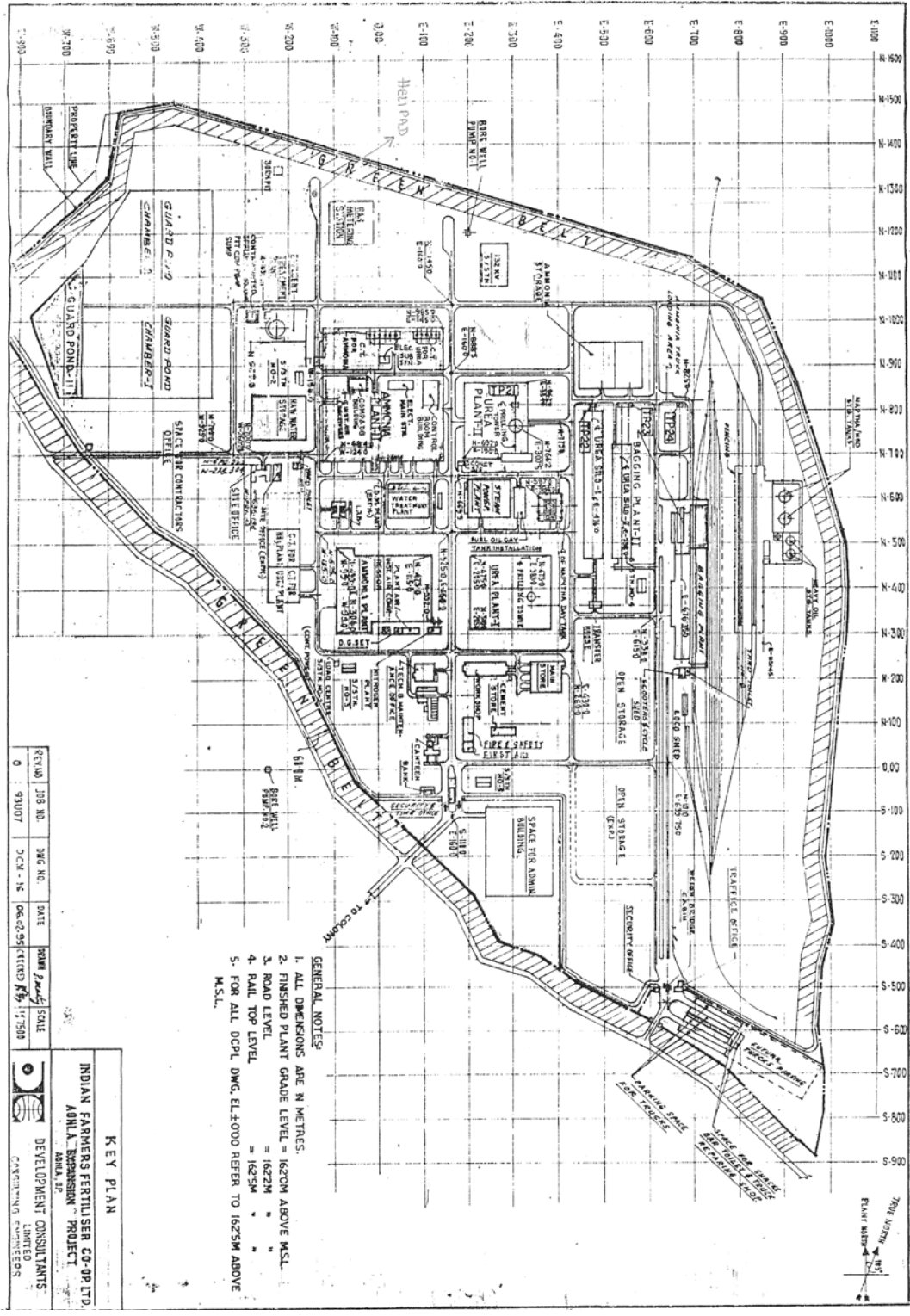


PLATE-3
FACTORY LAYOUT OF IFFCO AONLA UNIT

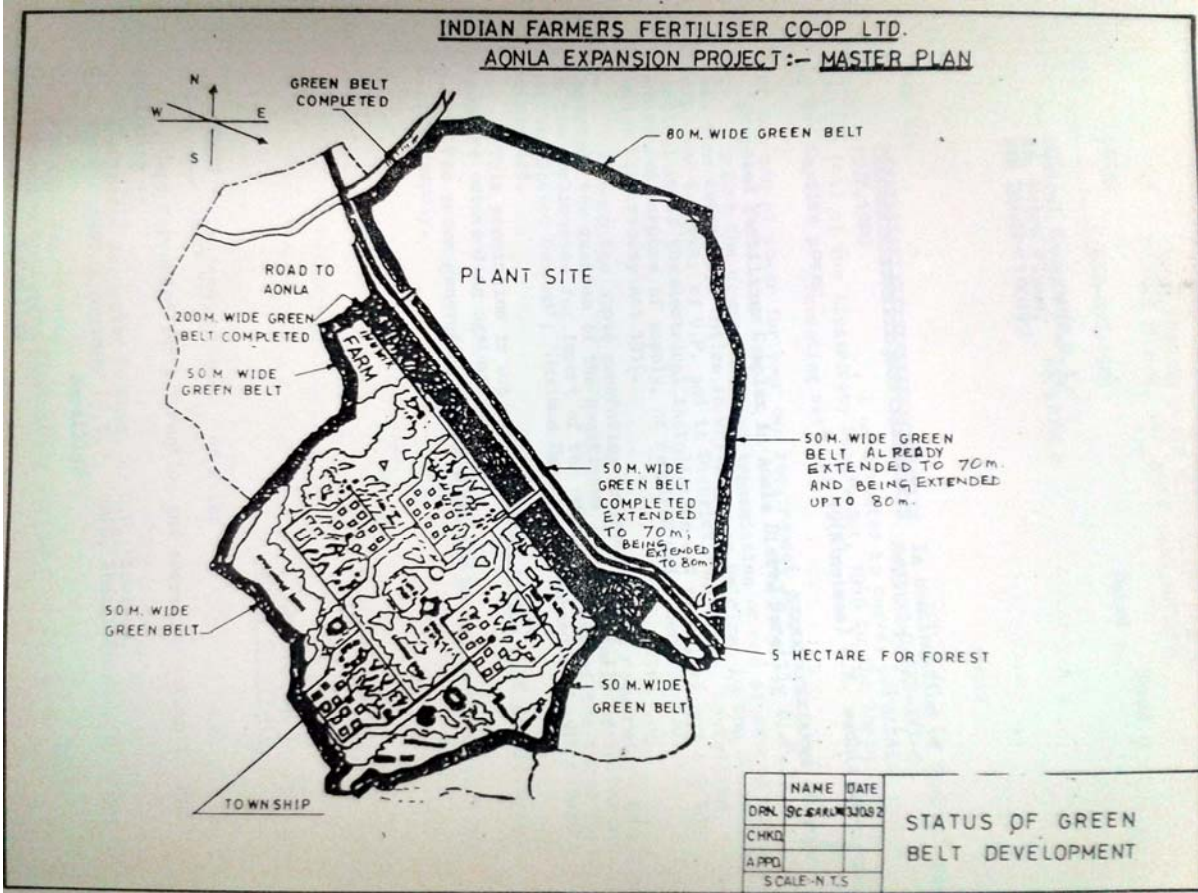


PLATE-1.4
GREEN BELT IFFCO AONLA