

**NATIONAL ENERGY CONSERVATION AWARD – 2007  
(LARGE/MEDIUM SCALE INDUSTRY)**

**20 A brief write up ( not more than 3-4 pages) about your unit as per the format given below alongwith a few photographs depicting specific equipment/locations where energy efficiency activities have been undertaken may please be attached (Please also submit the above matter in a CD with scanned photograph and mark the name of your unit with address). The write up submitted in the past schemes should not be repeated and also should not be more than 4 pages. The industrial units not adhering to this may loose certain weightage in the evaluation.**

**(i) Unit profile:**

Towards increasing the fertiliser production, the overall national planning for utilisation of natural gas available from Bombay high, Indian Farmers Fertiliser Cooperative Ltd. (IFFCO) was entrusted for setting up a urea fertiliser complex with annual capacity of 8.646 lakh tonnes of urea at Aonla, Bareilly. The site at Aonla is about 28 KM south west of Bareilly on Bareilly-Aonla road. In the year 1996 the production capacity was doubled with the commissioning of Aonla-II having urea production capacity of 8.646 lakh tonnes.

Aonla-I is IFFCO's fourth giant fertiliser complex having a 1520 MT per day ammonia plant and two urea plants with a total capacity of 2620 MT per day. Steam and power generation units, inert gas generation plant, water treatment plant, cooling towers, product handling plant, ammonia storage, urea silo etc. are the other auxiliary units of the fertiliser complex.

Right from the inception of the project, IFFCO-Aonla-I has achieved several milestones in record time. Aonla-I project was completed in a record time of 36 months and started commercial production in 42 months from the zero date. The implementation of Aonla-I project has been taken as a model for future fertiliser projects by Government of India. IFFCO Aonla-I has also bagged two prestigious national awards – one for best project implementation (second prize) from Ministry of Programme implementation, Govt. of India and other for technical film “New Horizons – Aonla project” from Fertiliser Association of India (FAI) in the year 1989.

**IFFCO-Aonla has received following recognitions/awards till date:**

- 1) Implementation of Aonla-I project has been taken as a model for future projects by Government of India.
- 2) National Award for best project implementation (second prize) by Ministry of Programme Implementation, Govt. of India.
- 3) Award for technical film “New Horizons – Aonla project ” by FAI.

- 4) ASCI, Hyderabad has adopted implementation of Aonla-I project as a model case study for their general management level courses.
- 5) Doordarshan, Lucknow and Delhi in its national network presented the story of the Aonla-I project highlighting project completion and its other social activities.
- 6) Adjudged first in the country for excellence in energy conservation and management by Ministry of Power (Fertiliser sector), Govt. of India for the year 1993.
- 7) Commendation certificate in appreciation of the efforts made in the field of energy conservation in fertilisers sector for the year 1995 from Ministry of Power, Govt. of India.
- 8) National productivity council has presented a certificate of merit in the year 1995 in recognition of the performance in productivity during the year 1993-94.
- 9) Certified for ISO-9002 & ISO-14001 by M/s KPMG & M/s BVQI respectively.
- 10) FAI Award for Excellence in Safety for the year 2001-2002.
- 11) NSCI Safety Award-2000 (Prasansa Puraskar) from National Safety Council of India.
- 12) National Energy Conservation Award, 2002 (Certificate of Merit) in fertiliser sector by Ministry of Power, Government of India.
- 13) Fertiliser Association of India has awarded the Best Article Award (3<sup>rd</sup> prize) for the article Maintenance and Inspection of a Modern Fertiliser Plant.
- 14) National Energy conservation Award-2003 (Certificate of Merit)
- 15) NSCI Safety Award-2002 (Prashansa Patra)
- 16) Corporate Environment Award 2002-03 (certificate of participation) from TERI in recognition of the efforts made towards environment management and sustainable initiative.
- 17) Golden Peacock Environment Management Award – 2005 (certification of commendation).
- 18) National Safety Award – 2004 (Runner under scheme-II).
- 19) ‘Yogyata Pramana Patra’ for the year 2004 by National Safety Council for developing and implementing effective occupational safety and health management system & Procedures.
- 20) ICQESMS 2005 Excellence Award for the paper presented in 4<sup>th</sup> Indian Congress on Quality, Environment, Energy and Safety Management System by Central Board of Workers Education, Ministry of Labour and Employment.
- 21) Rajiv Ratna National Award-2005 for excellence in Indian Industries by the journal ‘Public Sector Today’.
- 22) **National Energy Conservation Award 2006 (Second prize) from BEE.**
- 23) ICQESMS 2005 Excellence Award for the paper presented on ‘ Safety and Health in Chemical Industry’ and ‘ Hazard Identification & Risk Management’.
- 24) NSCI safety award-2006 (Prasansha Puraskar) from National Safety Council of India.
- 25) National Safety Award – 2005 (Runner under scheme-II) which was constituted by DGFASLI & Ministry Labour and employment.

ii) **Energy consumption**

Include information on total energy consumption (i.e. coal, oil, gas, electricity and money value). Information on energy consumption in terms of percentage of manufacturing cost should also be presented. Also, it should highlight the specific energy consumption for the period 2004-2005, 2005-2006 & 2006-2007. Good Computer Graphic Presentation related to Specific Energy Consumption may also be incorporated.

**Information on total energy consumption:**

S No	Description		Unit	Year		
	Raw Material	Details		2004-05	2005-06	2006-07
1.	Purchased Electricity	Quantity	Lakh Kwh	40.484	32.552	61.144
		Money Value	Rs Lakhs	217.48	163.14	286.86
2.	APMG	Quantity	Lakh SM <sup>3</sup>	5292.079	2696.672	2534.328
		Energy (GCV)	MKcal	4947834.553	2503047.445	2352654.444
		Money Value	Rs Lakhs	21572.79	12347.55	11585.05
3.	PMTG	Quantity	Lakh SM <sup>3</sup>	0.000	1199.170	1121.190
		Energy (GCV)	MKcal	0.000	1111703.979	1039985.460
		Money Value	Rs Lakhs	0.00	5800.59	5121.30
4.	RLNG	Quantity	Lakh SM <sup>3</sup>	411.279	1313.218	1161.052
		Energy (GCV)	MKcal	381231.039	1217710.281	1079865.671
		Money Value	Rs Lakhs	3097.92	9941.82	9418.78
5.	Spot RLNG (GAIL)	Quantity	Lakh SM <sup>3</sup>	0.000	0.000	56.182
		Energy (GCV)	MKcal	0.000	0.000	52435.222
		Money Value	Rs Lakhs	0.00	0.00	1025.20
6.	Spot RLNG (IOC)	Quantity	Lakh SM <sup>3</sup>	0.000	0.000	323.953
		Energy (GCV)	MKcal	0.000	0.000	301659.753
		Money Value	Rs Lakhs	0.00	0.00	6305.41
7.	Swap RLNG	Quantity	Lakh SM <sup>3</sup>	0.000	0.000	50.787
		Energy (GCV)	MKcal	0.000	0.000	47123.155
		Money Value	Rs Lakhs	0.00	0.00	412.00
8.	Overdrawn Gas	Quantity	Lakh SM <sup>3</sup>	0.000	106.09	33.366
		Energy (GCV)	MKcal	0.000	99181.769	30887.227
		Money Value	Rs Lakhs	0.00	803.16	350.41
9.	Naphtha	Quantity	MT	12061.017	37686.842	54016.367
		Energy (GCV)	MKcal	136776.733	426661.557	611826.212
		Money Value	Rs Lakhs	2426.11	9998.56	15411.12
10.	F. O.	Quantity	KL	1652.399	0.000	556.368

		Energy (GCV)	MKcal	16911.823	0.000	5071.21
		Money Value	Rs Lakhs	224.29	0.00	75.52
11.	Total	Electrical Energy	Lakh Kwh	40.484	32.552	61.144
		Thermal Energy	MKcal	5482754.148	5358305.032	5521508.35
		Money Value	Rs Lakhs	27538.59	37700.07	49704.788
<b>Energy consumption in terms of percentage of manufacturing cost</b>				<b>74.84</b>	<b>81.75</b>	<b>85.01</b>

IFFCO Aonla-I commenced ammonia production on 15<sup>th</sup> May, 1988, urea production on 18<sup>th</sup> May, 1988 and went into commercial production on 16<sup>th</sup> July, 1988. Since then IFFCO-Aonla-I has attained number of achievements and records to its credit. In the very first year (1988-89) of its operation, Aonla-I performed creditably by achieving a capacity utilisation of 94% and 98% for ammonia and urea plant respectively and the performance of Aonla-I has improved steadily over the years.

**During the year 2004-2005**, Aonla-I produced 8.647 lakh MT of urea against installed capacity of 8.646 lakh MT and 5.125 lakh MT of ammonia against installed capacity of 5.016 lakh MT. Ammonia plant achieved yearly average energy consumption (B.L.) of 7.9707 GCal/MT ammonia with a capacity utilisation of 102.18%. Yearly average energy consumption achieved in urea plant was 5.7381 GCal/MT with a capacity utilisation of 100.01%. **Lowest monthly B.L. specific energy consumption of 7.579 Gcal/MT for Ammonia has been achieved in the month of May, 2004. Lowest monthly overall specific energy consumption of 5.483 Gcal/MT for Urea has been achieved in the month of May, 2004.**

**During the year 2005-2006**, Aonla-I has created new records in specific energy consumption.

Description	New Record (Gcal/MT)
Monthly specific energy consumption per MT urea	5.466 (Feb, 2006)
Yearly specific energy consumption per MT ammonia	7.818
Yearly specific energy consumption per MT urea	5.618

**During the year 2006-2007**, Aonla-I has continued to create new records on production and energy front and achieved many milestones as shown below:

**Production:**

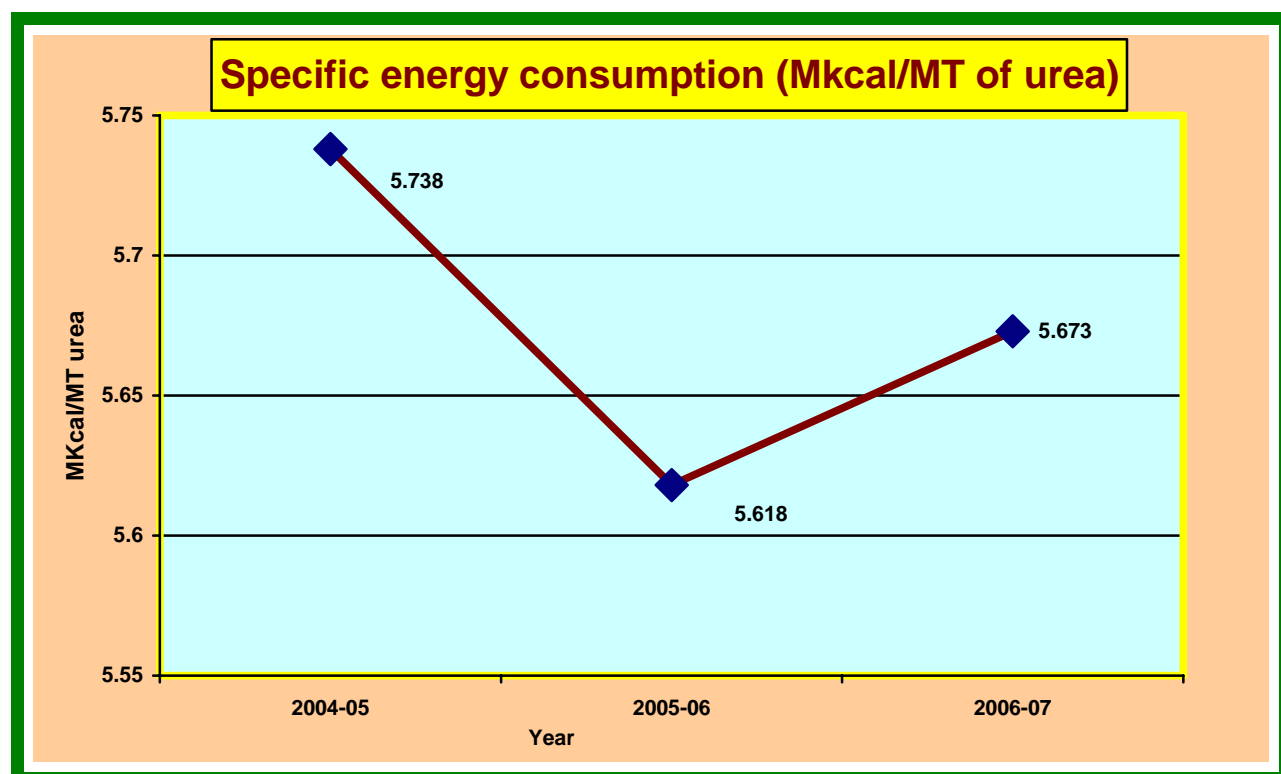
Description	New Record (MT)
Highest daily ammonia production	1748 (27.02.07)
Highest monthly ammonia production	51409 (Dec, 2006)
Highest monthly Urea production	90034 (Dec, 2006)

**Energy:**

Description	New Record (Gcal/MT)
Yearly specific energy consumption per MT ammonia	7.810

**Milestones:**

Description	Achieved On
9 Million MT of Urea Production	04.01.2007
15 Million MT of Urea Production	31.07.2006
15 Million MT Urea Despatch	01.08.2006



*Note: Energy in the Year 2006-07 is higher due to partial load operation / shutdown because of Natural Gas shortage from GAIL caused by floods in Hazira area.*

### **Energy conservation commitment, policy organisational and Organisational set-up:**

**(Please include photocopy of unit's Energy Conservation Policy, if decided)**

Energy conservation is a major corporate objective for IFFCO as such, and more so, for Aonla unit.

General Manager (Technical Services) coordinates the activities of energy conservation and cost reduction at IFFCO Aonla unit. Five different energy auditing, plant health and performance monitoring cells have been formed one each for ammonia, urea, product handling, offsites and power plant. Each cell consists of one person each from technical, respective production, maintenance and instrumentation sections with the person from technical as the coordinator of the cell. Persons selected for these cells are from middle management level having experience of about 15 years. These cells directly report to Senior General Manager. These cells have been made responsible for coordinating the various activities and its implementation so that no snowballing takes place for purpose of implementation.

Energy conservation & cost reduction measures have been classified broadly into three categories viz :

- I) Change in operating practices without any investment.
- II) Minor process modifications involving small investments.
- III) Incorporation of major energy saving retrofits involving large investments.

In addition to this, a number of plant performance and energy reports are prepared on daily, weekly, monthly and yearly basis by this group depicting the specific consumption of inputs, plant wise specific energy consumption etc. And their deviations from design figures are circulated among the plant operating personnel which help to a great extent in monitoring and optimising the plant performance. Equipments performance evaluation, steam balance etc. are also done periodically to find out the inefficiency in any section of plant and to take corrective action in advance.

The salient features of the strategy being followed at Aonla to reduce energy consumption are:

- A) Incorporation of proven energy conservation schemes involving large investments.
- B) In-house minor modifications for energy conservation schemes involving small investments.
- C) Utilisation of excess steam from one plant to another.
- D) Continuous efforts to reduce steam consumption of condensing turbines, thereby reducing heat loss to C.W. which is a major heat sink.
- E) Measures to reduce unproductive energy consumption during start up.
- F) Modifying some of the operational procedures to reduce energy consumption.
- G) Trimmed operation of cooling towers to achieve most optimum cooling water temperature.
- H) Good house keeping.
- I) Above all, sincere efforts to remove the bottlenecks which do not permit the operation of plant at design load on a continuous and sustained basis by way of minor modification or modifying operating practices.

**(iii) Energy conservation achievements;**

**Include one paragraph write up on each major energy conservation project implemented during the year 2006-2007 only**

At IFFCO-Aonla-I sincere efforts are always made for conception & implementation of energy conservation projects. Presently Energy Saving Project is under implementation which will result in reduction in specific energy consumption by 0.355 Gcal/MT Ammonia. The schemes under Phase-I were completed in the year 2005-06 and the schemes under Phase-II have been just completed in 2007-08.

The details of energy saving schemes which have been commissioned in Aonla-I in the year 2006-2007 are as given below:

**Scheme-1: Replacement of 160 W, MLL type lamp with energy efficient 50 W metal halide lamp**

We were using 160 W Mercury vapour lamps in ( 160 MLL) in urea silo .However, there had been rapid development in the field of illumination system in the recent past. Energy efficient metal halide lamp with longer average life & better colour rendering were introduced. To save energy as well as reducing maintenance cost, the existing 160 W MLL lamps were replaced with 50 W metal halide lamps in the silo in phase manner. This has resulted to following benefits:



Earlier energy consumption due to lighting in urea Silo was 35040 KWH. & now it has reduced to 10950 KWH for 25 lamps.

Average life of MLL Type Lamp was 5000 hrs. However, changing them with 50 W Metal Halide lamps (whose average life is 15000hrs) the maintenance cost has been reduced to 1/3 times.

**Scheme-2: Replacement of conventional ballast of flurosent tubelights with electronics ballast**

We were using conventional electromagnetic ballast for fluorescent tube light fixtures ( 4 feet , 36 w) . However, there had been rapid development in the field of illumination system in the recent past. Energy

efficient Electronic ballast with longer average life & less power losses were introduced. To save energy as well by reducing losses in the system, the existing conventional electromagnetic ballast were replaced with electronic ballast in phase manner. This has resulted to following benefits:



Earlier energy consumption due to conventional electromagnetic ballast for fluorescent tube fittings (4 feet, 36 W) was 21024 KWH. Now this has reduced to 6132 KWH due to replacement of 200 balasts.

To compensate flickering effect, electronic ballast were fixed in place of conventional ballast in existing fittings

**(iv) Energy Conservation Plans and Targets:**

For achieving reduction in energy consumption and increasing production capacity of plant following major projects are being implemented. The details of the projects are as given below:

**ENERGY SAVING PROJECT**

Phase-I of Energy Saving Project has been implemented in 2005-06.

The schemes being implemented under Phase-II of Energy Saving Project during the year 2007-08 are as given below:

S.No.	Phase-II (To be commissioned in annual turnaround in October, 2006)
1	Installation of S-50 Converter (Conversion of HTAS S-200 series Synthesis Converter to S-250 Series) alongwith new horizontal HP boiler and Steam Drum.
2	Scheme to reduce the suction temperature of Synthesis Gas Compressor to improve its efficiency.

Anticipated savings in		Approx. Investment (Rs. Lakhs)	Project commencement & completion year
Energy Value	Rs. lakhs		
0.143 Gcal/MT ammonia	2000	5040	Commencement: 2002-2003 Completion: 2007-2008

Energy targets fixed for the coming years is as below:

Year	Specific energy Consumption (Gcal/MT Urea)
2006-07 (Base year)	5.673
2007-08	5.65
2008-09	5.55

### Capacity Enhancement Project

The Capacity Enhancement Project (CEP) is being implemented for increasing the production capacity of Ammonia and Urea plants by around 15% and is expected to be completed in the year 2008. The present and enhanced capacities are given as under:

Plant	Unit	Present Capacity	Enhanced capacity
Ammonia plant	MTPD	1520	1740
Urea Plant	MTPD	2x1310	2x1515

### (vi) Environment and safety :

#### Safety aspect

Aonla unit has not lagged behind on safety front also. Several safety features are in built in the design of the plant. Longest continuous accident free running figures of 947 and 1080 days have been achieved which is equivalent to 15.6 and 13 million man-hours respectively. IFFCO Aonla has given an utmost importance for Safety Management and very much recognized & commended for its achievement by various National Bodies. Over the years the safety performance has been improved steadily and the weighted average accident frequency rate (WAFR) and severity rate are found to be negligible or nil. A detailed disaster management action plan has been prepared to overcome any unforeseen occurrence. Well laid fire hydrant network is available with water charged condition at pressure 9 Kg/cm<sup>2</sup>g to meet any type of eventuality. Fire alarm system network has been installed and commissioned throughout the factory, consisting of automatic fire detection system and manual call alarm system. IFFCO Aonla unit has been certified for OHSAS- 18001:1999 (Amendment-I 2002) by M/s NQA-QSR, New-Delhi. IFFCO Aonla has won FAI safety award for the year 2001-02, National Safety Award – for the years 2004&2005

(Runner under scheme-II) continuously constituted by Ministry Labour and employment and got prashansha patra from National Safety Council of India for the years 2000,2002,2004 & 2006.

IFFCO Aonla has won following awards in the field of Safety Practices, Management, and for its zero accident & frequency rate:

1. NSCI safety award-2000 (Prasansha Puraskar) from National Safety Council of India.
2. IFFCO Aonla unit has won the FAI award for excellence in safety for the year 2001-2002.
3. NSCI safety award-2002 (Prasansha Puraskar) from National Safety Council of India.
4. NSCI safety award-2004 (Prasansha Puraskar) from National Safety Council of India.
5. NSCI safety award-2006 (Prasansha Puraskar) from National Safety Council of India.
6. National Safety Award – 2004 (Runner under scheme-II) which was constituted by DGFASLI & Ministry Labour and employment.
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8. ICQESMS 2005 Excellence Award for the paper presented in 4<sup>th</sup> Indian Congress on Quality, Environment, Energy and Safety Management System by Central Board of Workers Education, Ministry of Labour and Employment.
9. ICQESMS 2007 Excellence Award for the paper presented in 4<sup>th</sup> Indian Congress on Quality, Environment, Energy and Safety Management System by Central Board of Workers Education, Ministry of Labour and Employment.

### **Environment management**

To keep pace with the stringent environmental regulations and to maintain ecological balance, zero effluent technology for Ammonia and Urea plants has been selected at the outset of plant inception. An expenditure of Rs.13 crores has been incurred on various effluent treatment schemes to meet statutory requirements. The quality of liquid effluents discharged from the factory is monitored continuously and always remains much lower than the norms prescribed by the U.P. Pollution Control Board and MINAS. The lagoons constructed to store the treated effluent attract a large number of migratory birds specially during winter seasons which speaks of high quality of the effluents. The air quality is also constantly monitored by providing high volume samples at different locations around the factory campus. 80 meters wide green belt (total area 452 acres) has been developed around the factory to keep the environment clean. Efforts are being made to achieve zero liquid effluent discharge from plant. A 10 Km pipeline has been laid around plant & township for using the effluent water for irrigation of green belt. IFFCO Aonla has won Awards in the field of environment as given below:

1. Certified for ISO 14001-2004, ISO:9001:2000 and OHSAS 18001: 1999 by M/s NQA-QSR, New Delhi.

2. Corporate Environment Award 2002-03 (Certificate of Participation) from TERI in recognition of the efforts made towards Environment Management and sustainable initiatives.
3. Golden Peacock Environment Award – 2005 (certificate of commendation).

**Carbon Dioxide Recovery Plant:**

IFFCO has always endeavored to use the cheapest available feed/fuel to reduce the cost of production and subsidy outgo of Government of India. Thus IFFCO has installed 450 MTPD Carbon dioxide Recovery (CDR) Unit at a cost of Rs. 58.8 Crores in Dec, 2006 to avoid the usage of costlier Naphtha to meet the shortfall of carbon dioxide (CO<sub>2</sub>). Carbon dioxide from the flue gases of Primary Reformer of Ammonia Plant is recovered and used for urea production. This has reduced 450 MT per day CO<sub>2</sub> emissions to the atmosphere.