

<b>Setting</b>	
Country	India
Location	Site 1- Kalol Plant, City-Gandhinagar, Gujarat Site 2- Phulpur Plant, City-Allahabad, Uttar Pradesh Site 3- Aonla Plant, City-Bareilly, Uttar Pradesh
Project start date	November 2004
Project end date	November 2019 (Expected 15 years of operational life)
Technology keywords	Energy management, Gas cleaning systems, Heat recovery & storage, Industrial technologies
Host sector	Private Entity - Farmers Cooperative - IFFCO

<b>Technical summary of the project</b>	
Objective of the project	The upgrade of existing plant equipment through the use of new technology alternatives, retrofits, new design and waste heat recovery in order to reduce the Specific Steam Consumption Ratio (SSCR) of the Ammonia plant of Urea fertilizer units
<b>Project description</b>	
<p>Following process profile analysis of their Ammonia Urea fertilizer operations, IFFCO plans to upgrade their existing plants in three separate site locations with specific energy saving process technologies. 8 specific technologies are to be employed throughout the three plants that ultimately will contribute to a reduction in Specific Steam Consumption Ratio (SSCR), thereby reducing overall plant specific steam consumption of the plant, hence resulting in a reduction in the fossil fuel requirement which is fed to the boilers.</p> <p>The 8 technological upgrades being employed include:</p> <ol style="list-style-type: none"> <li><b>1. New Low Temperature (LT) shift guard, Boiler Feed Water (BFW) pre-heater:</b> Introduction of a new shift guard before the low-temperature shift converter can reduce carbon-monoxide slippage from the section. This results in additional ammonia production. With the Ammonia production being kept constant a corresponding reduction in the feed (fossil fuel) results. Furthermore, the pressure drop across the converter can be further reduced by concurrently installing a new boiler feedwater pre-heater. This systems is to be employed in Aonla unit I &amp; II , Phulpur unit I &amp; II, and Kalol Plant.</li> <li><b>2. Installation of S-50 radial flow Synthesis Converter and High Pressure (HP) / Medium Pressure (MP) Boiler:</b> The new S-50 converter reduces the recycled load of synthesis gas on the compressor, thereby reducing the steam requirements for compressor operations. Units Aonla-I, Aonla-II and Phulpur-II, would also see a new waste heat HP boiler installed to capture reaction heat from the converter. Similarly in Phulpur-I and Kalol , a new MP waste heat boiler would be installed downstream of S-50 converter for waste heat utilisation.</li> <li><b>3. Installation of Make-up Gas Chiller:</b> Installation of new chiller units at Aonla unit I &amp; II, Phulpur unit I &amp; II, prior to the gas compressor will cool make-up gas to 6-8°C. The lower inlet temperature results in greater volumetric efficiency of the compressor, which in turn leads to a reduction in steam consumption in the gas compressor.</li> <li><b>4. Synthesis Gas Compressor LP &amp; HP case Internal Replacement:</b> The compression efficiency in both the LP and HP gas compressors at Kalol Plant and Phulpur Unit - I will be improved by replacing the LP and HP shell internals with more modern components.</li> </ol>	

- 5. Drying of Make-up Gas and Synthesis Loop Re-piping:** Re-piping of the synthesis loop at Phulpur unit I & Kalol Plant would enable make-up gas to be fed directly to the converter thereby avoiding complete chilling of the entire gas stream and reducing the energy consumption.
- 6. Complete revamping of CO<sub>2</sub> removal system to a modern two-stage GV process:** The installation of a new LP stripper in the CO<sub>2</sub> absorption process at Aonla-I would allow for regenerative flashing instead of steam heating, thus reducing the steam load.
- 7. Complete revamping of CO<sub>2</sub> removal system to a modern 2-stage GV process:** As per Item 6 above, but installed at Phulpur - I with additional CO<sub>2</sub> blower on LP stripper outlet.
- 8. Revamping of CO<sub>2</sub> removal system to 2-stage a-MDEA process:** A new lean and semi lean absorption unit at Kalol plant with the inclusion of LP and HP flash vessels enabling regenerative flashing instead of steam heating, thus reducing the steam load.

The energy efficient technologies have been developed by both IFFCO and M/s Haldor Topsøe (HTAS) Denmark, a world leader in ammonia plant technology. M/s HTAS will mainly be in charge of the design engineering, procurement services, equipment inspections, expediting as well as providing oversight and assistance during the construction, pre-commissioning and commissioning of the critical components. M/s Projects & Development India Ltd. (PDIL)- will be the Indian Engineering Consultant for the project activity.

### Environmental and social benefits

<b>(Estimate of) Greenhouse Gases abated</b> (in metric tons of CO <sub>2</sub> -equivalent)	Annual: Up to and including 2012: 1,771,848 tCO <sub>2</sub> -equivalent Up to a period of 10 years: 2,953,080 tCO <sub>2</sub> -equivalent Up to a period of 15 years: NA
<b>Number of reduction units</b> (EAU, CER, ERU, AAU)	2,953,080 tCO <sub>2</sub> -equivalent over 10 years
<b>Socio-economic aspects</b> What social and economic effects can be attributed to the project and which would not have occurred in a comparable situation without that project?	Through use of efficient ammonia plant technology, the project reduces process steam consumption and thereby the fossil fuel consumption (coal, natural gas, naphtha, Low Sulphur Heavy Stock (LSHS)).  Despite the variety of the fuel mix used, the Government of India's Urea Pricing Policy provides for reimbursement of implementation cost of such energy efficiency measures on the basis of the basic cost of cheapest fuel used ("cost excluding tax and transportation") instead of cost of actual fuel saved in that particular plant.  Marginal increases in semi-skilled labour, skilled labour and professional employment would result due to the project activity in addition to providing business opportunities for local supplier and contractors, thereby having a positive impact on the local economy and well-being of the community.  There also exists the benefit of capacity building of local employees in the utilisation and familiarisation with the newer technologies. As well, the greater promotion of such efficiencies as best practice within the fertilizer sector.
<b>Methodology used</b> (if applicable: approved baseline methodology or study done - refer to this; and monitoring organisation)	Baseline methodology for steam optimization systems Reference: AM0018, version 01 6th December 2004

### *Economic data*

Capital costs	~ US\$ 90 million
Financing scheme	No public funding is available from Annex - I parties
Financing organisation (if third party)	Japan Carbon Finance, Ltd.

### *Project developer*

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### *Host organisation*

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### *Technology provider*

Name of Technology provider	M/s Haldor Topsøe (HTAS) Denmark
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Contact person	Not provided in PDD