Energy Conservation Measure implemented in 2007-2008
(To be filled up separately for each Energy Conservation Measure)

ID to be filled by BEE	**Title of the measure** ***HEATING OF METHANATOR CATALYST IN AMMONIA-I PLANT OF VIJAIPUR-I WITH SYNTHESIS GAS FROM AMMONIA-II PLANT OF VIJAIPUR-II***	Sector: **FERTILIZERS**
Year to be filled by BEE		Technology: In house

Description of the energy conservation measure:

a-1 Introduction:-

The Ammonia Plant of Vijaipur-I, based on M/s. HTAS's steam reforming of NG was commissioned in March 1987. Though the plant has been consistently running on 100% capacity and energy efficiently ever since commissioning, constant endeavour is always made to optimize and improve upon the present systems for achievement of further reduction in the energy consumption by introducing modifications and monitoring and evaluation of the plant performance. One such modification of heating of methanator catalyst with synthesis gas from Ammonia Plant of Vijaipur-II during start-up of Ammonia Plant of Vijaipur-I has been carried out. This has resulted in reduction of unproductive energy consumption by way of reduction in the start-up time of Ammonia-I Plant.

a-2 The System:

Final purification of the process gas is done by converting the oxides of carbon into methane in the presence of Nickel based catalyst in the methanator. During start up of the plant, for heating of the Methanator catalyst, decarbonated process gas coming from the up stream Benfield section is used. This gas is first heated in a Hot and Cold Heat Exchanger (E-2) by heat exchange against the Methanator exit gas. It is then further heated in a Trim heater (E-1) by heat exchange against the HT Shift Converter exit gas. The temperature of the Methanator inlet gas is controlled by a Temperature Control Valve (TCV), which by passes some of the cold gas across E-1 and E-2.

Methanator exit gas is first cooled in E-2 by exchanging heat with the incoming cold gas and further cooled to 35-40^{0}C in another cooler (E-3) by exchanging heat with Cooling Water. The cold process gas, after separation of condensate in the Separator B, is sent to the Synthesis Gas Compressor for further processing and the condensate is sent to the Process Condensate Stripper. At the up stream of the Syn Gas Compressor, an interconnection exists for sending or receiving Synthesis gas to or from Ammonia-II Plant. Also, provision has been made to send surplus synthesis gas from the exit of E-2 to Reformer for burning as fuel.

a-3 Problem faced:

In the Trim Heater E-1, leakage of dry process gas followed by fire at the Tube sheet- Dome joint was experienced a no of times during the Methanator catalyst heating period. In this Heat Exchanger, gradual and even heating of the shell and tube side is not possible and due to fast and uneven heating, leakage of gas takes place at the Tube sheet/ dome flange joint.

After a long shut down, heating of the Methanator Catalyst from room temperature up to a temperature of 290^0C takes 5-6 hours. During this period, a lot of process gas is flared along with occurrence of various other unproductive energy consumptions.

a-4 Modification carried out:

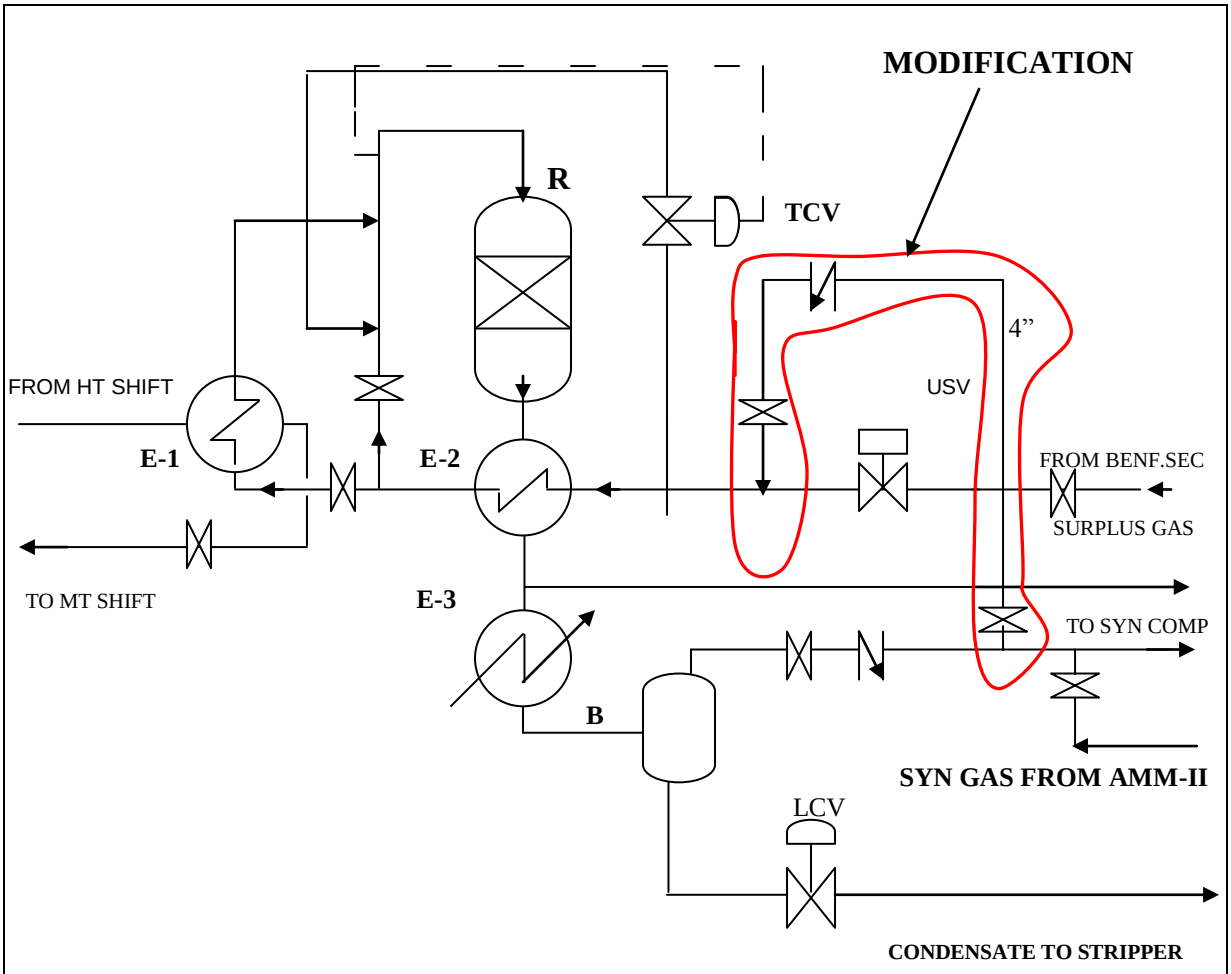
In order to solve the problem and also to reduce the unproductive energy consumption during the start up of the plant, a modification has been carried out to heat the Methanator catalyst by using Synthesis gas from the Ammonia-II plant much before the gas is cleared from the Benfield Section.. The schemetic diagram has been shown below. Heating of Methanator catalyst can be started as soon as the HT shift Converter exit temperature reaches to about 170-180^0C. About 8000 Nm^3/ h synthesis gas is used for heating of the catalyst bed and after heating, it is used as fuel in the primary reformer through the surplus synthesis gas route. The modification has resulted in slow and uniform heating of the shell and tube side of the Trim heater (E-1) and avoidance of leakage in the Heat Exchanger. Moreover, due to advance heating, Methanator heating and line up time could be reduced by 4 hours.

2. Investment: - The scheme has been implemented at a cost of Rs 1.00 Lac only.

3. Savings: - Considering one long shut down and one short shut down in a year, there will be saving of 328 Mkcal energy/year, which corresponds, to Rs 11.15 Lakhs/year.

4. Other benefits**: -** Gas leakage problem at the Tube sheet-Dome flange joint in the Trim Heater (E-1) could be solved permanently.

5. Payback period**: -** Less than a month.



R: METHANATOR
E-1: TRIM HEATER
E-2: HOT & COLD HEAT EXCHANGER
E-3: COOLING WATER COOLER
B: CONDENSATE SEPARATOR

Agency that executed the project (with complete address and email): In house			
Total investment, Rs.: 1.0 Lakh		Year of implementation: 2007-08	
First year energy cost savings (annual): Rs.: 11.15 Lakhs			
First year other savings, Rs.:			
On annual basis	kWh 000’	Gas Nm^3	Naphtha (kL)
Energy consumption before	-	-	-
Energy consumption after	-	-	-
Savings due to the project	-	-	44.23
Energy tariff, Rs/ kL	-	-	25204.45 (for the year 2007-08)
The saving in energy due to the implementation of above project is 328.47 Gcal/Annum. In view of NG limitation from M/s GAIL, we had been forced to use Naphtha. Hence, above energy saving has been shown in terms of equivalent Naphtha.			

Company complete address: National Fertilizers Limited, Vijaipur, Dist: GUNA (M.P) Pin code: 473111 Contact person who could be contacted for more information: Name: S.N. Sinha Design. Chief. Mgr. (PE) (Energy Manager & Certified Energy Auditor) Mobile No.: 09425310392	We authorize Bureau to use this information for dissemination Signature Date

Energy Conservation Measure implemented in 2007-2008
(To be filled up separately for each Energy Conservation Measure)

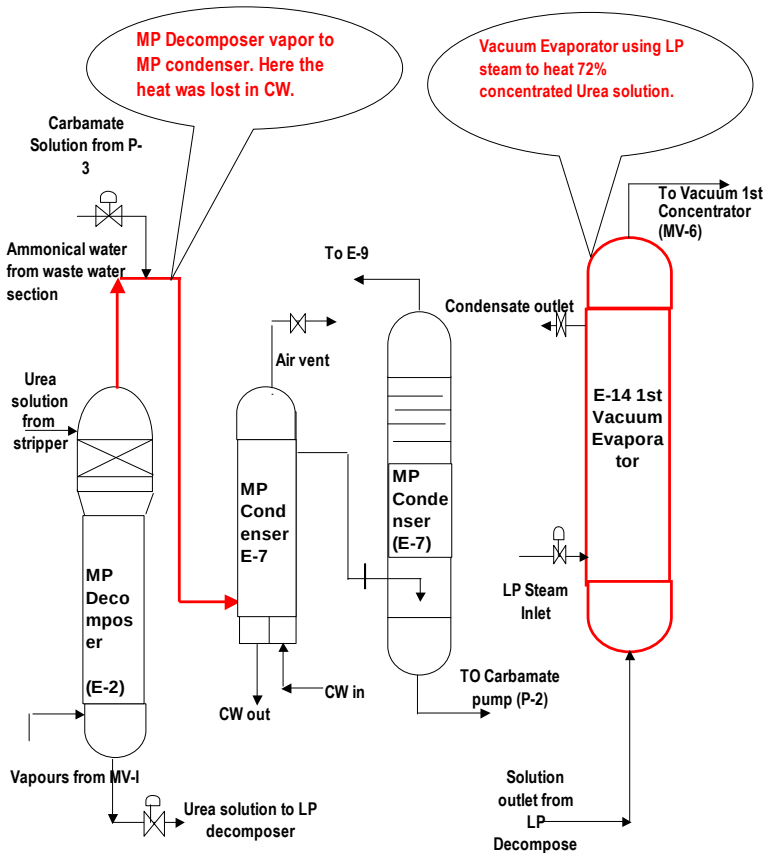
ID to be filled by BEE	Title of the measure **Heat Recovery from MP Decomposer vapours in Urea Plant by installation of Pre-concentrator.**	Sector: **FERTILIZERS**
Year to be filled by BEE		Technology: M/s CASALE.

Description of the energy conservation measure:

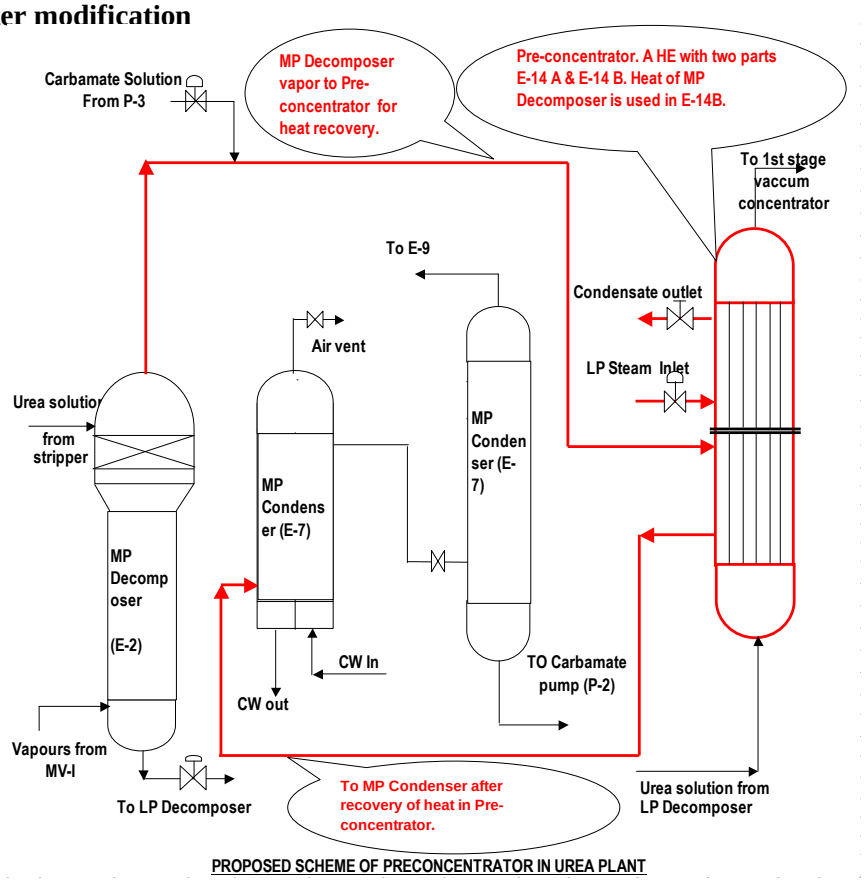
In Urea Plant the vapour from MP Decomposer was earlier cooled from 120ºC to 75ºC & condensed in MP condenser before recycling back to the reactor. In the process the useful heat of condensation of 9.396 Gcal/h was being lost in Cooling Water.

By installation of Pre-concentrator, it has been possible to recover 60% of the useful heat. The vacuum concentrator, as per CASALE design, has been installed in 11 stream of Urea Plant. Pre-concentrator is an additional vacuum stage utilizing heat of condensation of Carbamate vapours coming from Medium Pressure. In this scheme, the first vacuum concentrator has been replaced with modified Heat Exchanger in which, in the lower part, heat of condensation of Carbamate vapour coming from the MP decomposer is used for heating Urea solution & in the upper part, Low Pressure steam is being used. LP steam saving to the tune of 210 kg/MT steam, against guaranteed saving of 195 kg/MT Urea, has been achieved. Moreover, Prill quality of urea has also improved.

Drawing before modification



Drawing after modification



PROPOSED SCHEME OF PRECONCENTRATOR IN UREA PLANT

Agency that executed the project (with complete address and email): In house

Total investment, Rs.: 450.00 Lakhs	Year of implementation: 2007-08

First year energy cost savings (annual): Rs.: 1814 Lakhs

First year other savings, Rs.:

On annual basis	kWh 000'	Gas Nm^3	Naphtha (kL)
Energy consumption before	-	-	-
Energy consumption after	-	-	
Savings due to the project	-	-	7197.43
Energy tariff, Rs/ kL	-	-	25204.45 (for the year 2006-07)

The saving in energy due to the implementation of above project is 53449.75 Gcal/Annum. In view of NG limitation from M/s GAIL, we had been forced to use Naphtha. Hence, above energy saving has been shown in terms of equivalent Naphtha.

Company complete address:	We authorize Bureau to use this information for dissemination
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Contact person who could be contacted for more information: Name: S.N. Sinha Design.: Chief Mgr. (PE) (Energy Manager & Certified Energy Auditor) Mobile No.: 09425310392	Signature Date: