INSTALLATION OF FITCH FUEL CATALYST

Ankleshwar Chemical Cluster

Cluster Brief:

Gujarat is a major contributor in the production of basic chemicals as well as petro-chemicals with 54% and 59% share of the country's production, respectively. Also, chemicals /petro-chemicals and pharmaceutical sectors contribute to about 60% in the entire manufacturing output of Gujarat. About 50% of the total chemical production in Gujarat is contributed by industries in Ankleshwar. Ankleshwar and Panoli industrial areas has more than 1,200 industries, manufacturing diverse range of chemicals, pesticides, pharmaceuticals, bulk drugs, petroleum products, engineering, textiles, plastics, rubber, and packaging. Out of these 1,200 units, more than 600 are MSME units manufacturing various types of chemicals, like dyes, pigments, insecticides, specialty chemicals, petrochemicals, pharmaceuticals, and paints. Varieties of basic chemicals are used as raw materials to manufacture major chemical products. These basic chemicals, used as raw materials, are classified according to a variety of features:

- ✔ Based on their chemical composition (organic and inorganic),
- ✔ Based on their origin (mineral, vegetative, and animal), and
- ✔ Based on their state of aggregation (solid, liquid, and gaseous).

Majority of the industries located in Ankleshwar and Panoli . The processing units requires high amounts of thermal energy in the form of steam and thermic-fluid and electrical energy. The sector is unorganized in nature, mostly using old and inefficient technologies. There is a significant potential to make these units energy efficient and cost competitive, through accelerated adoption of energy efficient technologies in the cluster.

Existing practice:

Majority of the chemical industries uses NG fired boilers and NG fired furnaces in the manufacturing process of chemicals. Specific fuel consumption of the boiler and furnace depend upon the capacity and loading. The boilers in the cluster are in the range of 0.5 TPH to 3 TPH range . Significant energy can be saved by optimizing the combustion efficiency.

Hydrocarbon fuels are not perfect or uniform. Fuel is a mixture of about 40 primary and as many as a thousand secondary species of hydrocarbon molecules. The short chain types of molecules present are too short and light and the asphalt types of molecules are too long & heavy. Refineries cannot remove many of the poorly performing molecules and once fuel leaves the refinery or is stored, it is subject to attack by Oxygen, Ozone & Microorganisms (Bacteria, yeast & mold) that grow in the fuel. All these processes degrade the fuel. This poor fuel does not combust completely in furnace and does not yield the maximum potential energy. Some of it forms carbon deposits & gums, and some enters as un-burnt hydrocarbons into the exhaust. It is recommended to install a Fitch fuel catalyst in the fuel line to ensure optimum combustion efficiency and reduced energy consumption.

Proposed technology:

As the name indicates, the Fitch fuel catalyst (FFC) is a catalyst. By definition, a catalyst is a substance that initiates or accelerates a chemical reaction without itself being affected. Accordingly, the FFC is not a fuel additive / consumable, but a special alloy that does not dissolve in the fuel. The FFC is effective on all hydrocarbon fuels (both Oil & Gas), and contains no moving parts so there is no breakdown due to wear and tear. The FFC reverses any degradation that may have occurred prior to the fuel being introduced to the furnace. It reformulates the fuel to a state that is capable of a more complete combustion.

Justification of technology selection:

The Use of the FFC in an furnace/ Boiler results in:

a. Fuel savings in the range 5-12%
b. Reduced Toxic Emissions
c. Complete combustion
d. Reduced bacteria growth in stored fuel

Estimated Energy & monitoring saving:

In order to consider the cost benefit analysis through installation of the system, let us consider a unit having a 1 TPH boiler:

Table 4: Cost benefit analysis for fuel catalyst (Furnace)

Parameter	Units	As is	To be
Technology			Fitch Fuel Catalyst
Rated capacity of boiler	TPH	1	1
Operating hours	h/d	22	22
Operating days	Day/m	300	300
NG Supply of Pipe Size	inch	2	2
NG consumption	SCM/day	800	
Flow Rate of NG	SCM/hour	36.36	35.27
Annual NG consumption	SCM/year	240,000	232,800
Annual NG saving	SCM/year		7,200
Cost of NG	Rs/SCM	64	
Annual monetary saving due to energy saving	Rs Lakh/y	4.6	
Cost of equipment	Rs Lakh	4.00	
Payback	y	0.9	

* extracts of calculation provided

The benefits can be summarized as:

- ✓ 5-7 % reduction in specific fuel consumption
- ✓ Reduced pollution

Replication Potential:

The technology of fuel catalyst is applicable for replication in both fuel fired furnaces and boilers. The replication potential for the technology has been established based on the following:

- ✓ Survey of 100 units in Ankleshwar
- ✓ Energy audits in 8 units in Ankleshwar
- ✓ Discussion with units and industry associations.

Considering the survey results, the technology has potential in 25 units. Considering 25% penetration, the technology has a replication potential.

Considering replication in 25 units, the impact of the technology is as follows:

Table 5: Impact of replication of technology

Parameter	UoM	Value
Annual thermal energy saving (one unit)	SCM/y	7,200
Annual thermal saving (considering 25units)	SCM/y	180,000
Annual energy saving (considering 25 units)	MJ/y	7,163,334
Annual CO2 emission saving (one unit)	tCO2/y	13.03
Annual CO2 emission saving (considering 25 units)	tCO2/y	325.75
Estimated investment in technology (one unit)	Rs Lakh	3.2
Estimated investment in technology considering 25 units (assuming price down due to demand aggregation)	Rs Lakh	80
Total Investment	Mn USD	0.110
Total energy savings (in 10 years)	TJ	71633
Annual CO2 emission saving (in 10 years)	tCO2	3,258

Barrier for implementation:

Although the technology has been successfully proven; there has been limited replication of the technology in the cluster. The barriers identified for limited penetration of the technology in the cluster are as follows:

- ✓ **Lack of after-sales service:** The technology penetration has been limited due to the lack of after sales service. The delay in such services forces the units to bypass the system. The annual maintenance contract and warranty, which has been inbuilt in the present model, is expected to take care of the issue.
- ✓ **Risk related to implementation:** The units lacks confidence related to performance of the technology. The risk of performance has been covered under the project.
- ✓ **Lack of monitoring instruments:** Not clear about their existing level of operations and efficiency, due to lack of instrumentation & non availability of consumption data
- ✓ **Narrow focus on energy:** The units have much interest in production figures and committed for target production
- ✓ **Limited manpower:** Implementation of new technology in unit may require skilled man

Availability of technology supplier:

The technology of Fitch fuel catalyst is imported and distributed

The technology of Fitch fuel is well established. This is US patented technology. Technology suppliers have local offices / representative at Pune and nearby. In addition to the established names, a large number of smaller system integrators are also involved in the supply of this technology. The technology supplied by:

- KPK Impex Co.