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FEASIBLE STUDY OF CONVERSION OF FURNACE OIL TO LNG IN PETRO CHEMICAL BOILERS

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ABSTRACT

Feasibility study was to analysis the possible way to replaced existing methods to new methods. The feasibility study on change occurred when the furnace oil in PD boilers and replace it with liquefied natural gas. During the feasibility study, itself it is understood that this conversion is brought because of the major factor, that is high cost and lack of availability of the furnace oil. So conversion of furnace oil to RLNG is now getting popular in many of the industries for production purpose. Conversion of furnace oil to RLNG will be helpful to avoid the current situation of the lack of availability of furnace oil, and also the efficiency of the RLNG is much better compared to the furnace oil.

This research does not mean that the furnace oil is totally replaced with the RLNG. Even if in future a situation occurs like the less availability of RLNG furnace oil can be used. Through this research it is possible to use both the RLNG and furnace oil separately according to the availability. The boiler properties are maintained or study to achieve this.

Keywords—Petro-chemical division, Liquefied Natural Gas, Re- gasified Liquefied Natural Gas

I. INTRODUCTION

By using feasibility study here deals with the changes that the PD boilers require when it is converted from furnace oil to RLNG [1,2]. Here the different parts of the boilers are being taken in consideration to minimize the cost as well as the efficiency during the conversion to RLNG and also due to the important factor that the less availability of the furnace oil in the market [3,5].

So here to do a study of changes occurs during the above performances occurred in the PD boiler (LNG conversion).

II. BOILER DETAILS

From the above table the important Boiler parameters were identified. By this parameters can be used for Feasibility study.

Table 1, Boiler Parameters

Main steam flow	60TPH
Main steam pressure	110Kg/Sqcm (g)
Main steam temperature	520Deg.c
Boiler feed water temperature	183Deg.c

The details of the boiler and burner fitting are given below:

Table 2, Details of the Boiler Fitting

EQUIPMENT AND PARAMETER	DESCRIPTION VALUES
No of boilers	3VU boilers (60THP)
Furnace width	4877mm
Furnace depth	6401mm
Draft type	Forced draft

The above details shown are the all details about the Boiler.

III. PROBLEM ANALYSIS

The plant produces required power on its own by means of steam generating boilers and a turbo generator. The steam is not only for power production but also for the heat requirements in process plant. This unit cost of power production by plant is about Rs.12, where from Kerala state electricity board coast Rs.6.00. the main reason neglecting state power is the fluctuation in load and for uninterrupted power supply.so the plant produces the required power by using furnace oil. Since the cost of furnace oil is high,(about 11 USD/mmBTU in 2013) the production cost is high. So as to avoid this situation of high production cost, NG can be used instead of furnace oil which is comparatively lesser cost, (about 3.5 USD/mmBTU in 2013).

1kg furnace oil = 10500 .k.calory

1kilocalory = 3.96825Btu

Therefore 1 ton

furnace oil = 10500 x103 x3.96825/1000000

= 41.67mmbtu

1ton.furnace oil = Rs 42000

From the above calculation it is clear that the cost of furnace oil is high.

IV. MODIFICATION

Existing system (Using furnace oil)

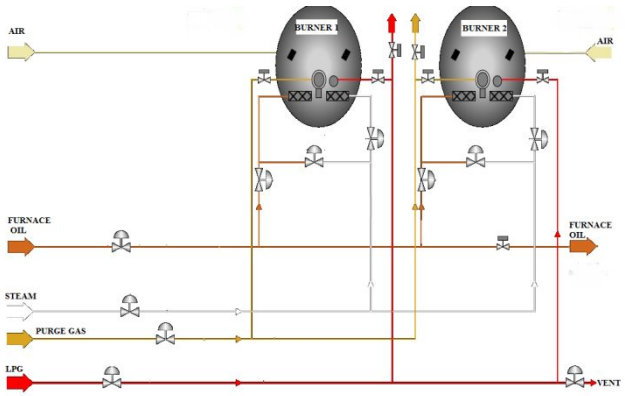


Figure 1, Schematic layout of existing burner system

Modified system (Using LNG)

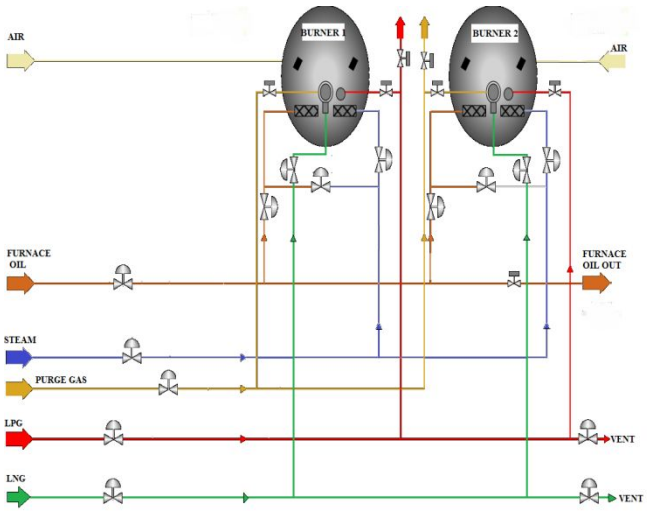


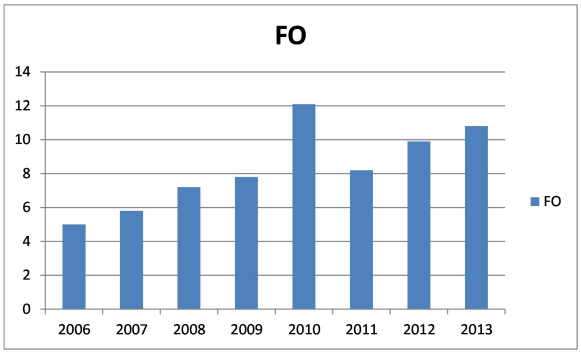
Figure 2, Schematic layout of modified burner system

Due to high cost of the furnace oil do a modification on the boilers for the change of furnace oil to LNG. But not to remove the furnace oil line because of future plan if any demand on LNG or raise the cost of LNG again the furnace oil can be used for the same boilers.

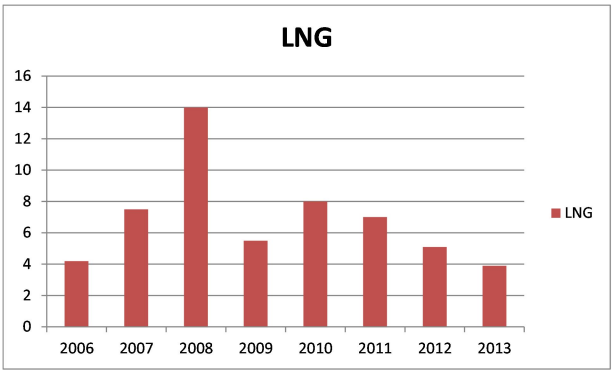
V. RESULT

From the case studies and calculations above, it is clearly understood that the usage of furnace oil as the fuel in boilers is much expensive and less profitable when compared to that when LNG is used as the fuel in the boilers. Also the availability of the furnace oil is one another important drawback in the usage of furnace oil.

COST ANALYSIS

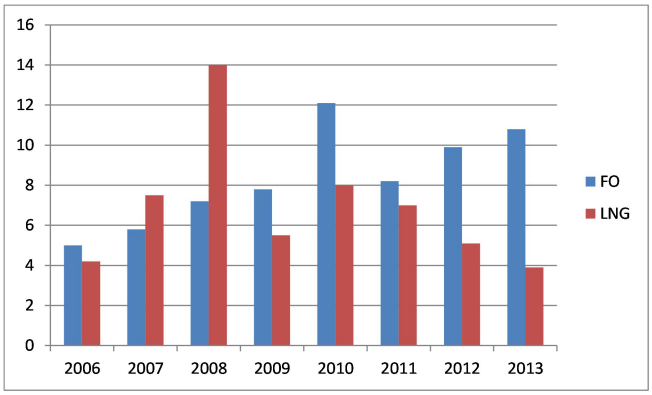


Graph 1, Representing the yearly price of FO.



Graph 2, Representing the yearly price of LNG.

COMPARISON BETWEEN FO AND LNG PRICE



Graph 3, Representing the comparison of FO & LNG prices.

The following graph represents the variation of prices of FO and LNG during the years 2006-2013.the X axis represents the year and y axis represents the cost in USD/mmBTU (US dollars/million metric British Thermal Unit).It is clearly evident from the graph that the price of FO in the year 2006 was high compared to LNG .And in the year 2007 converse was the case. In the year 2008 displayed the maximum price of LNG, and from the year

onwards LNG always showed reduced price compared to that of FO.And the price raise of FO was its peak during the year 2010.

From the year 2010 onwards LNG price was found constantly decreasing where as that of FO was constantly increasing. Keeping an insight of above facts we have arrived at a conclusion that the usage of LNG is more economical compared to FO.

VI. CONCLUSION

From the research undergone it is observed that it is feasible to fire the RLNG in the existing boilers of the PD plant. The LNG flow rate at the peak load, the amount of air required at MCR, gross calorific value of the LNG, the required amount of heat for producing steam, LNG flow rate at MCR load, and finally FD fan capacity has been calculated and if the operation is carried out as per the calculated values, the wear and tear of the pipes and the valves get minimised on the usage of LNG.

It is found that that the LNG is available abundantly than the furnace oil. It is also found that high quality LNG is available in cheaper amount as that of the furnace oil of the same quality. From the statistics shown it is evidently found that the cost of furnace oil is about three times higher than that of the LNG. Taking the recent values for an example: in 2013 the rate of the furnace oil was 10.8USD/mmBTU and of LNG is 3.9USD/mmBTU. From all of the above observations and calculations it is evidently found that the production of energy is more feasible while using LNG than the furnace oil.

VII. REFERENCES

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