



Studies and Surveys on Energy Efficient Approach in Chemical, Petroleum and Oil Sector

Dr. Sunil Jayant Kulkarni

Datta Meghe College of Engineering, Airoli, Navi Mumbai, Maharashtra, India

***Corresponding Author:** Dr. Sunil Jayant Kulkarni, *Datta Meghe College of Engineering, Airoli, Navi Mumbai, Maharashtra, India*

Abstract: *It is estimated that 31-35 percent energy is used in industrial sector. Bulk of this is used in petroleum related industries. It is well known fact that the opportunities for conservation also depend on the economic and technological outlook. With fast depletion of fossil fuel and development of new technology, the concept needs to be re defined. The efficient and effective use of energy is becoming difference between good technology and average technology. Energy consumption and emission parameters are become very important aspect of modern day technological advancements. Studies such as flue gas conditioning for reducing suspended particulate matter from thermal power stations are important and representative of importance of flue gas conditioning as they carry considerable heat and contains pollutant gases. Heat Recovery, regeneration and cogeneration studies are gaining more and more importance. In power plants waste heat recovery is widely implemented practice. In oil sector, re-refining can save cost of production of considerable amount of oil. Enhanced oil recovery, heat transfer enhancements, process intensification, energy retrofit studies are widely studied areas.*

Keywords: *Conservation, greenhouse gases, growth, stack gases.*

1. INTRODUCTION

Industrial processes are very diverse. So the physical conditions for energy conservation are also diverse. It is estimated that 31 percent energy is use in industrial sector. Bulk of this is used in petroleum related industries. The opportunities for conservation also depend on the economic and technological outlook. The demand and supply ratio of fuels is key to economy of any growing country. The energy consumption per capita was supposed to be indicator of growth. With fast depletion of fossil fuel and development of new technology, the concept needs to be re defined. The efficient and effective use of energy is becoming difference between good technology and average technology. Energy consumption and emission parameters are become very important aspect of modern day technological advancements. Studies such as flue gas conditioning for reducing suspended particulate matter from thermal power stations are important and representative of importance of flue gas conditioning as they carry considerable heat and contains pollutant gases [1]. Heat Recovery, regeneration and cogeneration studies is gaining more and more importance [2]. In power plants waste heat recovery is widely implemented practice [3,4,5]. In oil sector, re-refining can save cost of production of considerable amount of oil[6]. Enhanced oil recovery, heat transfer enhancements, process intensification, energy retrofit studies are becoming common terms nowadays with new possibilities and inventions in energy savings and waste treatment [7-10]. Many time flue gas treatment and waste recovery systems complement each other.

2. AN INSIGHT INTO RE-REFINING OF USED OIL

Sattari and Avami carried out Assessment of energy-saving opportunities of cement industry[11]. In their studies, they identified technological opportunities in order to decrease energy consumption of the relevant factories. According to them, there has been increasing interest in using energy analysis techniques for energy-utilization assessments. In their work, they estimated energy requirements based on the process knowledge and compared it with actual energy utilization data. Their studies indicated that energy consumption in Iran included 60 percent natural gas and 29 percent petroleum gas. They felt need to control inlet air, dust and stack gases can be used in pre-heater or other sections.

For cement industry, they advocated use of dry process as it consumes 30 percent less energy than wet process. According to Ross, energy consumption opportunities in each industry depends on economic and technological outlook of each industry [12]. He studied thermodynamic factors affecting energy use. Also they studied the structure and trends in use of energy. Energy consumptions amounting 81 or 77 percent of the manufacturing total, is in chemicals, primary metals, petroleum refining, paper, and stone, clay and glass industries. Also he discussed various determinants of energy uses. Their observation shows that the exothermic or weakly endothermic have very poor efficiency of energy utilization. He found that changes in operation, equipment and processes should be carefully carried out for energy efficient targets. Training, maintenance and awareness are basic components of energy efficient operation.

Parekh and Singh discussed various ways to make oil and gas sector more and more energy efficient [13]. According to their studies, 56.6% share in global energy is of this sector. Green House Gases (GHGs), according to them can be curbed by avoiding use of hydrocarbons. According to them taxation on crude oil extraction increases revenue rather than curbing emission. According to them there is large room for there is room for policy intervention through standardization of best practices. Also their study reveal that 5% of the global natural gas production is due to flaring. In few countries, a CO₂ tax has contributed to a reduction of flaring. According to this article, nearly half of all the energy consumed by the industry goes to oil refining. A research cum survey was carried out in U.S. for finding most energy intensive unit operations used in U.S. refineries [14]. Three measures of energy usage were quantified. First was Theoretical minimum energy (TME). It was energy consumed by a process under ideal conditions. Second parameter was Practical minimum energy (PME). This provides energy consumption in real and practical conditions, based on best practices and state-of-the-art technologies currently available in the marketplace. Last one, Current average energy, CAE is a measure of the energy consumed by a process carried out under actual plant conditions. Difference in PME and CAE is termed as bandwidth. Energy efficiencies studies in Denmark yielded some interesting results [15]. By 2020, Denmark has targeted 35 % renewable energy in final energy consumption. This policy was aimed at qualified guidance to countries in their implementation of Greenhouse Gas (GHG) reduction measures and low emission development strategies (LEDS). Government activities and initiatives are key in reduction of greenhouses gases and increasing energy awareness. Studies were carried out by Vanner on use of energy in offshore oil and gas production [16]. According to him, there is considerable potential for energy savings offshore. These studies highlighted the potential energy and carbon dioxide savings. There needs to be careful and detailed energy management from those within the industry.

Studies were carried out on energy integration in oil and refining sector by Bungener [17]. According to his studies, 31 percent energy consumption is due to Industrial sites and their associated energy systems. They carried out total data analysis and then mathematical formulation. A peaning, in his case study reported energy efficiency and management in Ghana's largest industrial sector [18]. For ensuring a sustainable industrial development, judicious use of energy by industries is key lever according to him. He emphasized that, both economic and social dividend can be obtained by cost effective application of energy management and energy efficiency measures. His study revealed that energy is poorly managed in the industrial area. The lack of government frameworks for industrial energy efficiency is one of the barriers in the sector. William et.al. carried out in detail studies on energy efficiency improvement in the united states petroleum refining industry [19]. They expressed need for careful analysis of the options and costs associated with efficiency measures. They explored that a 40% reduction in fuel consumption and a 2% reduction in electricity consumption is possible by cost effective energy consumption with almost accurate methods. This analysis provided a rigorous framework for evaluating energy consumption and efficiency improvement opportunities. Parekh and Singh discussed green growth strategies for oil and gas sector growth in India [20]. According to them this oil and gas sector needs to undertake investments in improving production efficiency. They also identified interventions that can be made by creating a policy framework to foster sustainability. Also they identified the chain of interventions.

In Singapore, manufacturing sector account for 60 percent of greenhouse emission [21]. In a report, it was noted Research, development, demonstration and deployment are keys to improving energy efficiency. The report states that 70%-75% of the industry sector's current annual energy consumption is in the sectors namely, petrochemical and chemicals, petroleum refining, semiconductors,

pharmaceuticals and generic technologies. According to this report 6.2%, and 14.2% reduction in emissions is possible by 2030 by using best possible technology. Worrell et.al., in their article discussed energy efficient solutions to energy problems[22].They discussed in detail research conducted to develop an energy guide for the petroleum refining industry. According to them, energy a major cost factor. It therefore provides an important opportunity for cost reduction. By using energy efficient practices, they found that about 20 percent economic improvement is possible in petroleum refining industry. This can be done even while maintaining the quality of the products.

3. CONCLUSION

It is well known fact that the opportunities for conservation also depend on the economic and technological outlook .With fast depletion of fossil fuel and development of new technology, the concept needs to be re defined. The efficient and effective use of energy is becoming difference between good technology and average technology. Energy consumption and emission parameters are become very important aspect of modern day technological advancements. Studies show that by using energy efficient practices, they found that about 20 percent economic improvement is possible in petroleum refining industry. This can be done even while maintaining the quality of the products.

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AUTHOR'S BIOGRAPHY



Dr. Sunil J. Kulkarni, has completed his Masters in Chemical Engineering from Tatyasaheb Kore Institute of Engineering and Technology, Warananagar in 2006. He has pursued his Ph.D in chemical engineering. He is working as Assistant Professor in Chemical Engineering Department of Datta Meghe College of Engineering, Airoli, Navi Mumbai, India. The author has 16 years of experience in teaching and research. He has published 200 international review and research papers and presented 15 research papers in international conferences. His area of research includes adsorption, environmental engineering and catalysis. He is editorial board member of more than 25 international journals and reviewed many international papers.

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