



Optimizing Energy Conservation and Renewable Energy Initiatives towards Effective Pollution Control

ASHOK G. MATANI¹, S. K. DOIFODE²

¹Associate Professor - Mechanical Engineering, Government College of Engineering, AMRAVATI 444 604 (M.S.) India,

²Associate Professor – Chemistry, Government College of Engineering, AMRAVATI 444604(M.S.) India, Corresponding author: shamal.doifode@yahoo.com

Abstract

Energy conservation and pollution reduction go hand-in-hand, as the power plants that generate electricity often release arsenic, mercury, other metals and acid gases that threaten human health and the environment. Putting into practice a few simple, convenient ways to conserve energy will also helps to trim utility bills. Not only does energy efficiency reduce or avoid greenhouse emissions, but it can also increase productivity and sustainability through the delivery of energy savings, and support social development by increasing employment and energy security.

Keywords: Consumption of energy, carbon polluting country, carbon emissions, national energy security, eco-friendly appliances

Present Status of CO₂ Emissions from the Consumption of Energy

Table: 1- Total Carbon Dioxide Emissions from the Consumption of Energy (Million Metric Tons) [Some selected data]

Name of the Region	Details for the year 2012
North America	6,276.454
Central & South America	1,399.469
Europe	4,262.526
Eurasia	2,657.049
Middle East	2,039.824
Africa	1,205.703
Asia & Oceania	14,882.184
World	32,723.209

Effective Techniques to be Implemented

Here are some of the effective techniques and strategies to be implemented for achieving desired results.

- * Choosing eco-friendly appliances
- * Cutting heating and cooling expenditures



- * Switching to renewal energy sources
- * Adopting reduce, reuse, recycle principle
- * Expanding and modernizing the electric grid
- * Cutting energy waste in homes, businesses, and factories
- * Establishing a new goal for energy efficiency standards [Saidur R., Islam M.R., Rahim N.A.]

Some Novel Initiatives

Producing renewable fuels and chemicals from biogas and natural gas in Houston

Houston, Texas based Waste Management (NYSE: WM) Waste Management's East Oak site in Oklahoma has formed a joint venture company to produce renewable fuels and chemicals from biogas and natural gas using smaller-scale Gas-to-Liquids (GTL) technology. [Masanet, Eric R., Richard E. Brown, Arman Shehabi, Jonathan G. Koomey, and Bruce Nordman]

Waste wood pyrolysis plant to produce bio-oil in Finland

Finnish sustainable energy company, Fortum had commissioned in Joensuu in Finland a new facility fast pyrolysis technology, in which wood biomass is rapidly heated in oxygen-free conditions produce around 50,000 tonnes per year of bio-oil from waste wood. As a result the biomass decomposes and forms gases that are then condensed into oil. This facility is the first of its type in the world, and has been integrated into its Joensuu combined heat and power plant. [Wang Lijun]

Effective Techniques to be Implemented

Choosing eco-friendly appliances

The Energy Star program to label products, such as appliances and electronics that utilize significantly less energy, while offering comparable quality to similar products. If the product costs more than non-Energy Star products, savings on energy bill typically make up for the price difference. Purchasing appliances with the Energy Star label will help to cut your energy costs and the pollution that accompanies high energy use.

Cutting heating and cooling expenditures

Sealing heat ducts can shave an additional 20 percent off on energy bill. Keeping the thermostat set at moderate temperatures in unused rooms, focusing heating and cooling expenditures on the rooms used the most effective option. In the summer, before switching on the air conditioning, using ceiling fans, window fans or open windows to keep cool while using less energy.

Switching to renewal energy sources

Increasingly, homeowners have the opportunity to purchase all or part of their electricity from a supplier that uses green or renewal energy sources, such as solar or wind.



Adopting reduce, reuse, recycle principle

Recycling also saves energy and reduces pollution. Recycling also diminishes the need for harvesting or mining virgin materials, activities that can damage the environment and cause pollution

Expanding and modernizing the electric grid

Upgrading the country's electric grid is critical to our efforts to make electricity more reliable, save consumers money on their energy bills, and promote clean energy sources.

Cutting energy waste in homes, businesses, and factories

Energy efficiency is one of the clearest and most cost-effective opportunities to save families money, make businesses more competitive, and reduce greenhouse gas emissions.

Establishing a new goal for energy efficiency standards

In U.S., the Department of Energy had established new minimum efficiency standards for dishwashers, refrigerators, and many other products. Through 2030, these standards will cut consumers' electricity bills by hundreds of billions of dollars and save enough electricity to power more than 85 million homes for two years.

Conclusions

With the growth of energy consumption, energy-related environmental pollution has become increasingly serious, which in turn causes enormous economic loss because of public health damage, corrosion of materials, crop yield reduction, and other factors. Various effective strategies to be implemented includes implementing national policies and measures for promoting electricity generation with renewable energy, reducing transport demand and shifting transport modes, reducing process-related emissions from industry, and advancing sustainable agriculture. The need of the day is to effectively utilize the most efficient techniques towards environment protection. This paper attempts to discuss various techniques and strategies for controlling energy related environmental pollution in industries in different parts of the world.

References

- [1] Doifode, S K , Matani A.G., Advanced Environment Protection Techniques by Industries: Potential for Corporate Social Responsibility Activities, International Journal of Civil Engineering, 7(2), 2013, 14-18.
- [2] Hari, O.S., Nepal, M.S.Aryo, and N.Singh, Combined Effect of Waste of Distillery and Sugar Mill on Seed Germination, Seeding Growth and Biomass of Okra , Journal of Environmental Biology, 3(15), 1994, 171-175.
- [3] Ijas, A., M.T. Kuitunen and K. Jalava, Developing the RIAM Method (Rapid Impact Assessment Matrix) in the Context of Impact Significance Assessment, Environmental Impact Assessment Review, 30, 2010, 82-99.



- [4] John Pichte , Waste Management Practices: Municipal, Hazardous, and Industrial, Second Edition , CRC Press, 2014 edition, 12- 21
- [5] Kuitunen, M., K. Jalava and K. Hirvonen, Testing the Usability of the Rapid Impact Assessment Matrix (RIAM) Method for Comparison of EIA and SEA Results, Environmental Impact Assessment Review, 28, 2008, 312-320.
- [6] Morrissey, A.J. and J. Browne, Waste Management Models and Their Application to Sustainable Waste Management, Waste Management, 24(3), 2004, 297-308.
- [7] Matani A.G., Managing New Product Innovations, Industrial Engineering Journal, 4(1), 1999, 21-23.
- [8] Matani, A.G., Effective Energy Conservation Techniques in Industries, International Journal of Mechanical Engineering & Technology (IJMET) 4(1),2013, 74-78.
- [9] Masanet, Eric R., Richard E. Brown, Arman Shehabi, Jonathan G. Koomey, and Bruce Nordman , Estimating the Energy Use and Efficiency Potential of U.S. Data Centers" Proceedings of the IEEE , 99(8),2011, 3-7.
- [10] Mourshed M. The Impact of the Projected Changes in Temperature on Heating and Cooling Requirements in Buildings in Dhaka, Bangladesh, Applied Energy ,88(11), 2011, 3737–3746.
- [11] Mondal, M.K., Rashmi and B.V. Dasgupta, EIA of Municipal Solid Waste Disposal Site in Varanasi Using RIAM Analysis Resources. Conservation and Recycling, 54, 2010, 541-546.
- [12] Nirmal Kumar C. Nair, Garimella Niraj , Battery Energy Storage Systems: Assessment for Small-Scale Renewable Energy Integration, Energy and Buildings, 42(11), 2010, 2124-2130.
- [13] Noori, J., R. Nabi Zadeh, K. Nadafi, M. Farzad Kia, Sh. Omid, A. Kolivand and M. Binavapour, Investigating The Quality and Quantity of Industrial Waste; Case Study Bouali Sina Industrial State, Journal of Environmental Sciences and Technology, 11(4), 2009, 215-218.
- [14] Pilli-Sihvola K, Aatola P, Ollikainen M, Tuomenvirta H. , Climate and Electricity Consumption Witnessing Increasing or Decreasing Use and Costs, Energy Policy, 38, 2010, 2409–2419.
- [15] Ramachandra, T.S., Shruthi B.V., Spatial Mapping of Renewable Energy Potential, Renewable and Sustainable Energy Reviews, 11(7), 2007, 1460-1480.
- [16] Saidur R., Islam M.R. , Rahim N.A., Solang K.H. , A Review on Global Wind Energy Policy, Renewable and Sustainable Energy Reviews, 9(1), 2010, 1744-1762.



- [17] Simpi Basavaraja, Hiremath S.M., Murthy KNS, , Analysis of Water Quality Using Physio - Chemical Parameters Hosahalli Tank in Shimoga District, Karnataka, India, Global Journal of Science Frontier Research, 11(3),2011, 18-28.
- [18] Subhadra Bobban G. , Macro-level integrated renewable energy production schemes for sustainable development, Energy Policy, 39(4), 2011, 2193-2196.
- [19] Soldo B. Forecasting Natural Gas Consumption. Applied Energy, 92(1), 2012, 26–37.
- [20] Sarak H. The Degree-day Method to Estimate the Residential Heating Natural Gas Consumption in Turkey: A case study. Energy, 28(9), 2010, 929–939.
- [21] Various reports published by Ministry of Environment and Forests, Government of India, New Delhi .
- [22] Various reports published in The Times of India, Mumbai edition.
- [23] Wang Lijun, Energy Efficiency and Management in Food Processing Facilities, CRC Press, , 2008, 120-138.