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DSM Power Plant in India ☆

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ABSTRACT

India is facing acute energy shortage that is likely to affect its economic development. There are severe supply side constraints in term of coal and gas shortages that are likely to continue in the near future. Hence, in its current focus to solving the energy shortage problem and sustaining the development trajectory, the country should aim at a balance between supply side and demand side measures. Energy Efficiency in end use is increasingly gaining importance as one of the most cost effective options for achieving short to medium term energy savings. India has initiated the National Mission for Enhanced Energy Efficiency under National Action Plan for Climate Change which addresses various aspects of energy efficiency such as technology, financing, fiscal incentive and also creation of energy efficiency as a market instrument. However, even though energy efficiency has substantial scope in the Indian subcontinent, the market for energy efficiency has been limited. This paper discusses the concept of mega Demand Side Management projects as a DSM Power Plant. A DSM Power Plant acts as an umbrella with multiple energy efficiency schemes under its ambit aimed at transforming energy efficiency into a business by providing a push to the scale of operation as well as financial sustenance to energy efficiency projects. This paper expounds on the various aspects of DSM Power Plant in terms of its policy and institutional mechanism for the large scale implementation of energy efficiency in India. This paper provides an illustration of the concept of DSM Power Plant model through a case study in one of the states (Rajasthan) of India. Further, a comparative analysis of the cost of generation from DSM Power Plant and a representative conventional power plant (CPP) in Rajasthan has been undertaken and the DSM Power Plant comes out to be a more cost effective option. The concept of DSM Power Plant will not only address the issue of energy shortages but will also help the financially thwarted utilities to reduce their revenue deficit in the near future.

Contents

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1. Introduction

Sustainable economic development, environmental concerns, energy security are some of the important drivers for improving energy efficiency in India. India's economy has been growing rapidly over the last decades and is projected to grow at a much faster rate than that of Europe or the United States during the coming four decades [1]. In order to sustain this high growth India faces a formidable challenge in meeting its energy needs especially electricity.

Although the Indian Power sector has considerably improved its generating capacity, it still has difficulty in meeting demand and there are persistent power shortages which constraint its economic growth. According to the International Energy Agency, in 2008, more than 400 million people did not have access to electricity in India [2]. In 2011–12, overall energy shortage and peak power shortage in the country stood at 8.5% and 10.6% respectively [3]. Shortages in power supply are due to consistent shortfalls in the capacity addition achieved vis-à-vis the targets in every Plan period [4].

In this context, the Government of India (GoI) has taken several steps to move along a path of higher energy efficiency. The GoI institutionalized energy efficiency through the Energy Conservation Act, 2001 (EC Act, 2001) under which a statutory authority; the Bureau of Energy Efficiency (BEE) was formed. At the central level, BEE is responsible for implementation and coordination of energy conservation activities in the country as per the provisions of EC Act, 2001. The aim of the BEE has been to institutionalize energy efficiency services by developing policies and strategies with a thrust on self-regulation and market principles, within the overall framework of the EC Act, 2001, in all sectors of the country in order to reduce energy intensity in the economy. Besides, this, the EC Act 2001 has also mandated the state government to designate an agency in the state to carry out activities of energy conservation at the state level as per the provisions of the Act. The state designated agency, designated by the state government is responsible for coordinating, enforcing and regulating matters related to the implementation of the EC Act, 2001. Further, Section 61 (C) of Electricity Act 2003 requires state electricity regulatory commissions (SERC's) to set tariff by considering factors which encourage competition, efficiency, economical use of resources, good performance, and optimum investments within the state. Under this provision, SERC's can direct the electricity utilities to undertake demand side management (DSM) activities. Further, National Electricity Policy and National Tariff Policy have also provided impetus to promotion of energy efficiency.

The policy umbrella for energy efficiency in India has been widened with the introduction of National Mission for Enhanced Energy Efficiency (NMEEE) under the National Action Plan on Climate Change. NMEEE laid emphasis on taking up four new initiatives, which include market-based mechanisms to enhance cost effectiveness, accelerating the shift to energy-efficient appliances, financing demand side management programmes in all sectors by capturing future energy savings, and developing fiscal instruments to promote energy efficiency [5]. As a result of the implementation of this mission, it is expected that over the five year time period about 23 million tons of oil equivalent of fuel savings in coal, gas and petroleum products will be achieved along with an expected avoided capacity addition of over 19,000 MW. As a consequence carbon dioxide emission reduction is estimated to be 98.55 million tons annually [6].

As per the Integrated Energy Policy of the Planning Commission, the electricity saving potential of demand side on India is about 15% of the total electricity demand.The study undertaken by National Productivity Council for Bureau of Energy Efficiency in 2009–10 highlighted a combined saving potential of 75.4 billion kWh per year in various sectors which was more than the overall annual energy deficit of 73.1 billion kWh reported during 2007–08. As per this study, the estimated annual potential of energy efficiency in various sectors is provided in Table 1 [7].

2. Synergy of energy efficiency with renewable energy (RE)

The efforts to promote energy efficiency have also become important for increased penetration of RE in the country. There lies a significant potential of RE in India and to harness this potential several initiatives has been undertaken by the GoI. The Electricity Act 2003, National Electricity Policy and National Tariff Policy have placed special emphasis on the promotion of RE. Further, National Action Plan on Climate Change (NAPCC) set the

Table 1
Sector wise annual energy efficiency potential in India.

Sector	Potential (%)
Agricultural pumping	30
Commercial buildings/Establishments with connected load > 500 kW	20
Municipalities	23
Domestic	20
Industry (including SMEs)	7
All India	15