



DO MSMEs PRACTICE ENERGY CONSERVATION PRINCIPLE: A CASE OF GUJARAT

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KEYWORDS

Energy Conservation, Energy Policy and Practices, Energy Conservation Act, 2001, Micro, Small & Medium Enterprises (MSMEs)

ABSTRACT: The present paper attempts to study the current policy framework of Government in India and specifically in Gujarat with regard to energy conservation practices among MSMEs. In context of the present policy environment, it attempts to study measures adopted by various selected MSMEs in different districts in the state of Gujarat. The paper attempts to study the extent of various energy conservation practices adopted by MSMEs in Gujarat to be more efficient and competitive. The results are the outcomes of extensive qualitative research, as researchers conducted survey with the help of structure questionnaire with 53 MSMEs. The study is on energy conservation that is why; researchers intentionally used information available on website of Ministry of Power, Government of India on several occasions and put up detailed discussion in the body of paper. Additionally, various research papers, articles, news articles, reports from several organizations were broadly used to make it comprehensive study.

1. INTRODUCTION

The Indian economy is poised for higher economic growth rate in years to come. However this can be realized if overall efficiency is increased across all the sectors in the economy. The advancement in energy conservation and improvement in energy efficiency practices are going to play an important role in furthering productivity and efficiency in resource utilization in the economy. These improvements need to be embraced in all the sectors of the economy. Thus, primary, secondary as well as tertiary sectors require improvements in efficiency and productivity. Imbibing and institutionalizing energy conservation practices by an organization continuously helps a great deal in improving

efficiency of resource utilization and reducing cost.

Small and medium scale foundry industry is vital in the Indian industries and would keep on playing an important part in the Indian economy later on (Patange & Khond, 2016). In order to sustain growth with employment generation, it is imperative that manufacturing activities get a fillip in the economy. The government of India has kept an ambitious target of increasing manufacturing production to 25 per cent of GDP instead of 16 per cent of GDP at present (Sathyadevi & Nisha, 2016). If India has to achieve this target of production in manufacturing sector then MSMEs will have to contribute significantly to this. The growth and extent of success of MSMEs will depend largely on how successfully and efficiently energy

conservation practices are adopted and implemented by them among other measures of cutting cost and increasing productivity.

The issue related to energy conservation is creating a different mind-set amongst the MSMEs also. The present paper attempts to study the current policy framework of Government in India and specifically in Gujarat with regard to energy conservation practices among MSMEs. In context of the present policy environment, it attempts to study measures adopted by various selected MSMEs in different districts in the state of Gujarat.

2. SIGNIFICANCE OF MSMEs

Nearly 13 million such enterprises, spread all over India, produce over 40 per cent of the country's manufacturing output and employ an estimated 40 million people (SDC, 2010). MSMEs not only play crucial role in providing large employment opportunities at comparatively lower capital cost than large industries but also help in industrialization of rural and backward areas, thereby, reducing regional imbalances, assuring more equitable distribution of national income and wealth while providing employment in rural and backward areas of the economy (KPMG & CII, 2015).

The micro and small enterprises are unorganized and lack sufficient resources to develop and use clean and energy efficient technologies. With little access to new or improved technologies, they continue to use low efficiency technologies resulting in wastage of fuels and poor working conditions (SDC, 2010). The MSMEs in India contribute 8 per cent to its GDP, creating 100 million jobs through the 46 million units from the rural and the urban areas across of the Country. They also contribute to 90 per cent of the total Industrial output and 45 per cent of the Manufacturing output of India and come out with 6000+ products across the spectrum. MSMEs are credited in contributing to 36 per cent of the Total Value of exports from the Country and the sector has recorded a constant year on year growth of over 10 per cent thereby making this sector as the backbone of Country's economy (KPMG & CII, 2015).

Small-and medium-scale industries (SMI) industries are found in all major manufacturing sub-sectors (food processing (tea and desiccated

coconut), textile, foundry, brick and ceramic, etc. and constitute about 85 per cent of the total number of manufacturing establishments in Asia. SMI also considered as engines for economic growth and development and contributes in employment generation (Visvanathan & Kumar, 1991) (Thiruchelvam, Kumar, & Visvanathan, 2003). India's GDP is expected to touch 8.5 per cent, with the country likely to be a USD 5 trillion economy by 2025. The MSME opportunity is to develop entrepreneurship and support growth led by innovation over the next decade by significantly increasing the share of MSME contribution to GDP from the current 8 per cent to 15 per cent by 2020 ;generate employment levels to the extent of 50 per cent of the overall employment, more than doubling the current MSME workforce of 106 million across agricultural, manufacturing and services sectors; and increasing the share of MSME contribution across key public and private industry sectors fulfilling increasing domestic demand, growth in exports, indigenization and import substitution (KPMG & CII, 2015).

Considering all facts and figures, it clearly indicates that MSMEs have been contributing a in the Indian economy for long and the need of the hour is that contribution should reach to the next level to make India as manufacturing hub in days to come.

3. MSME SCENARIO IN GUJARAT

Gujarat has registered an impressive industrial development since its formation as a separate state in 1960. The industrial sector at present comprises of over 1200 large industries and over 4,00,000 micro, small and medium industries. As per the results of the Annual Survey of Industry (ASI), 2009-10 carried out by the Central Statistical Organization (CSO), Gujarat accounts for 18 per cent of fixed capital investment, 17.22 per cent of gross output and 15.20 per cent of net value added in industrial sector in India (Solanki, 2013). Thus, Gujarat has large number of MSMEs. However, there is little indication of acceptance of increase in energy conservation and increased energy efficiency among MSME sector. This can be attributed to mainly three reasons, first the limited time available to the entrepreneur to identify contract and finance energy efficiency opportunities in addition to the

many other tasks that call for his time; secondly the limited availability of local service providers who can support entrepreneurs in project development, financing & implementation; and thirdly, a complete lack of investment in the development and deployment of new energy-efficient technologies that are suitable for MSMEs and can be adopted easily by such players in a seamless manner (Himanshu & Dhingra, 2015). The MSMEs being located in nook and corners of the country, lack awareness regarding various technological advancements in energy conservation practices. The efforts by government are half hearted and inadequate to help and aid MSMEs in provision of finance, make them aware of advancement of technology including that of energy conservation practices, which help them, become efficient and match the best internationally. Thus, it is imperative that energy productivity enhancement processes have to be standardized and demonstrated so as to enable MSMEs to adopt them without much hassles and difficulty. This will mean that transaction costs are minimized and efficiency be maximised for MSMEs. This will lead to greater profitability for entrepreneurs, local service providers, technology suppliers and financial institutions facilitating further adoption of such technologies. However, in India and Gujarat as well, adoption and deployment of such energy efficient technologies and conservation practices has been very less specially among MSMEs due to a variety of constraints faced by them.

4. POLICY FRAMEWORK FOR ENERGY CONSERVATION

Indian industry has not paid much attention to energy savings. The high-energy consumption in the Indian industries is due to three main reasons, the foremost as the most of the manufacturing units still depend on old machinery, secondly; the cost of machine is higher as compared to European / U.S standards and last but not the least; uncertainty about the long-term growth of the particular industrial sector (Matani, 2013).

The majority of Small and Medium Enterprises SMEs have confidence in their own production technologies and do not believe in investing

on energy efficient and environment saving techniques (E3ST) as it involves incurring additional cost and entrepreneurs do not want to take any risk in matters unknown to them. Energy efficiency and environment protection have a low priority as compared to expansion for SME even though the project viability may be sound. (Thiruchelvam, Kumar, & Visvanathan, 2003). Any effort made to conserve energy not only reduces cost of production for an enterprise but also leaves more energy for other economic activities in the country. It therefore allows whole of the economy to operate more efficiently. With economic development it is obvious that energy demand is bound to rise during coming years and decades. The primary energy demand in India has grown from about 450 million tons of oil equivalent (toe) in 2000 to about 770 million toe in 2012. This is expected to increase to about 1250 (estimated by International Energy Agency) to 1500 (estimated in the Integrated Energy Policy Report) million toe in 2030. This increase in energy demand in India is driven by a number of factors, like increasing incomes and economic growth which leads to higher demand for energy in the form of lighting, cooking, space cooling, mobility, industrial production, office automation, household demand, greater electrification of rural areas, etc. (MoP, GOI, 2016).

This likely future increase in energy demand is also owing to the current very low level of energy supply in India: the average annual energy supply in India in 2011 was only 0.6 toe per capita; whereas the global average has been 1.88 toe per capita. It may also be noted that no country in the world has been able to achieve a Human Development Index of 0.9 or more without an annual energy supply of at least 4 toe per capita. Consequently, there is a large latent demand for energy services that needs to be fulfilled in order for people to have reasonable incomes and a decent quality of life (MoP, 2016).

India is a signatory to various international conventions and treaties related to energy conservations and environment protection. Accordingly efforts are being made in India to adhere to its international obligations through formulation of appropriate policy and its implementation. In pursuance of this the

Government of India has undertaken a two pronged strategy to fulfil the energy demand needs of its citizens while ensuring check in CO₂ emissions, so that the global emissions do not lead to an irreversible damage to the earth system. On one hand, the government is gradually promoting greater use of renewable energy in the form of energy mix like solar and wind and selectively promoting advanced and more sophisticated technologies for coal based power plants. On the other hand, efficient use of energy management practices through various innovative policy measure initiatives under the overall ambit of Energy Conservation Act 2001(MoP, 2016).

The Energy Conservation Act (EC Act) was enacted in 2001 with the goal of reducing energy intensity of Indian economy. Bureau of Energy Efficiency (BEE) was set up as the statutory body on 1st March 2002 at the centre for facilitating implementation of this Energy Conservation Act. This Act provides for establishing regulations for first, standards and labelling of equipment and appliances, second, energy conservation building codes for commercial buildings and third energy consumption norms for energy intensive industries. In addition, the Act orders and directs the Central Government and the Bureau of energy efficiency to take steps to facilitate and promote energy efficiency in all sectors of the economy. The Act also directs states to designate agencies for implementing the Act and promote energy efficiency in each of the state. The EC Act (MoP, 2016) was amended in 2010 and the principal changes brought about to the Act are as below:

Firstly, it states that the Central Government may issue the energy savings certificate to designated consumers whose energy consumption is less than the prescribed norms and standards in accordance with the procedure, secondly, the designated consumer whose energy consumption is more than the prescribed norms and standards shall be required and entitled to purchase energy savings certificate to comply with prescribed norms and standards, thirdly, the Central Government may, in consultation with the Bureau of energy conservation, prescribe the value of per metric ton of oil equivalent of energy consumed, fourthly, Commercial buildings which are having

a connected load of 100 kW or contract demand of 120 kVA and above come under the purview of ECBC under EC Act.

Ministry of Power, through Bureau of Energy Efficiency (BEE), has initiated a number of energy efficiency initiatives in the areas of household lighting, commercial buildings, standards and labelling of appliances, demand side management in agriculture/municipalities, SME's and large industries including the initiation of the process for development of energy consumption norms for industrial sub sectors, capacity building of SDA's etc. The target of energy savings against these schemes during the XI plan period was kept 10,000 MW of avoided generation capacity. These initiatives have resulted in an avoided capacity generation of 10836 MW during the XI plan period (MoP, 2016).

The Government of India has taken many initiatives as a result of enactment of EC Act in 2001 and its amendment in the year 2010. Various steps taken include scheme to promote energy conservation and energy efficiency include standards and labelling, energy conservation and building codes (ECBC), demand side management scheme- for agriculture, municipalities, capacity building for electricity distribution companies (DISCOMs) and energy efficiency in small and medium enterprises, strengthening institutional capacity of states- strengthening of state designated agency (SDAs), contribution to state energy conservation fund (SECF) scheme, school education programme, human resource development (HRD) and national mission for enhanced energy efficiency (NMEEE) (MoP, 2016).

During the 11th Plan period institutional and regulatory infrastructure has been created in the country. In order to implement NMEEE a framework was prepared after extensive stakeholders consultation and considering their view points, with relevant Ministries of Government of India, Central Electricity Regulatory Commission (CERC), State Governments, Industry associations such as Federation of Indian Chambers of Commerce and Industry (FICCI), Confederation of Indian Industry (CII), and other stakeholders like

independent experts from academia such as IITs, research organizations, public and private financial institutions, NGOs etc. The NMEEE spelt out four initiatives to enhance energy efficiency in energy intensive industries like perform achieve and trade (PAT), market transformation for energy efficiency (MTEE), energy efficiency financing platform (EEFP) and framework for energy efficient economic development (FEEED). Under these programmes and schemes energy efficient initiatives and solutions have been implemented to affect all sectors of the economy. These are likely to bring about all round improvement in energy efficiency and conservation practices in the economy (MoP, 2016).

The government has setup a Bureau of Energy Efficiency under Energy Conservation Act of 2001. It was established on March 1st 2001 with objectives to reduce energy intensity in various sectors in the economy, to create awareness with regard to energy conservation, to provide professional certification and accreditation to various entities and to give its expert inputs and facilitate formulation of effective energy efficiency policy in the country. The functions as provided in the act include recommending the Government regarding energy consumption standards, to prescribe guidelines for energy conservation in buildings, to create awareness on energy conservation and disseminate information for efficient use of energy and its conservation among various users and stakeholders, to promote research and development in the field of energy conservation, to develop testing and certification procedures related to efficient energy use and conservation for various sectors. Further it is entrusted to formulate and facilitate implementation of pilot projects and promote use of energy efficient equipment, processes, devices and systems. The Bureau of Energy Efficiency acts as a nodal agency and organization to achieve desired objectives related to energy conservation in the economy. The Bureau is also responsible and entrusted with the task of promoting innovation, provide financial assistance to the institutes, maintain a list of accredited energy auditors, specify qualifications for the accredited energy auditors, specify manner and intervals of energy audit, specify certification procedure for energy

managers, prepare educational curriculum for institutions and implement international co-operation programs among various institutions to coordinate efforts in energy conservation most efficiently (BEE, 2015) (MoP, 2016).

To encourage the energy efficient technologies and operational practices in SME sectors in India, BEE has initiated the energy efficiency interventions in selected 25 SMEs clusters during the XI plan. A study was conducted to assess energy use and technology gap at unit level, development of the cluster specific energy efficiency manuals, preparation of Detailed Project Reports (DPRs) on energy efficient technologies and capacity building and knowledge enhancement of man-force involved in SMEs. During the XII plan, implementations of 100 technology demonstration projects in 5 SME sectors are envisaged to facilitate large scale replication (BEE, 2015).

Hence, beginning of 21st century marked some important institutional setup coming into being in India for addressing issues of energy efficiency and conservation in various sectors and economic activity. Many crucial amendments have been brought about in the year 2010 as well, indicating seriousness of efforts undertaken in India. However; institutional performance requires high degree of transparency and commitment to achieve the stated objectives.

5. ENERGY CONSERVATION PRACTICES IN MSMEs IN GUJARAT

Energy Conservation offers a practical means of achieving development goals. It enhances the international competitiveness of industry in world markets by reducing the cost of production (Singh & Sharma, 2012). Economic development needs energy but large-scale energy consumption leads to negative environmental impacts such as GHG emission, deforestation, loss of biodiversity, resource depletion, emissions to water and soil, and waste disposal. One option to minimize/eliminate these negative impacts is by the use of energy efficient and environmentally sound technologies (E3ST). Due to strong financial back up, large industries could easily adapt E3ST and benefit financially, SMI are still reluctant to adapt them due to their inherent

characteristics and resistance to change (Thiruchelvam, Kumar, & Visvanathan, 2003). Energy conservation is a decentralized issue and largely depends on the individual unlike decisions of energy supply which are highly centralized (Singh & Sharma, 2012).

Rao. and Apparao (2012) study analyzed that the performance of MSMEs in recent decade and also examined that the financial obstacles faced by MSMEs. Financial obstacles of great concern to owners/managers of MSMEs are as follows: namely; inability to obtain external financing, inability to obtain internal financing, insufficient capital, start-up costs, expensive raw materials, high wholesale price, large losses due to scrap rate, sabotage, breakage and crime, decline in sales volume, bad debts and write offs, heavy equipment and maintenance costs, government tax, Value added tax and customs duty, payroll, rent and utilities, transportation and petrol costs, high interest rates on loans, ability to meet financial obligation, insurance costs and delay in account receivables payment.

Kumar (2014) concluded that increasing number of MSMEs and their fixed assets will enhance their gross output if the government provides support such as infrastructure, skill development, technology up gradation, supplying low cost of capital and marketing facility. Expanding MSMEs will enhance employment, exports and GDP of the Indian economy. The Study analyzed that growth and performance of MSMEs in India. Researcher found that the contribution of MSMEs is increased from 5.77 percent in the year 2001-02 to 11 percent in 2010-11 and expected to increase to the extent of 22 percent in 2011-12. Therefore MSMEs are facing stiff competition from global players and large scale domestic firms of India. The contribution of MSMEs is commendable and significant to the growth of Indian economy.

Afroz (2014) studied that the closely analyses the growth and development of the Indian MSME sector since opening of the economy in 1991. The study also looks into the present scenario of MSMEs and the challenges they faced like lending, marketing, and license raj issues. MSMEs as a major contributor towards growth of domestic economy and employment

generation, should also obtained adequate support for its growth and development in terms of policy framework, incentives and other relevance aids and supports like providing good infrastructural facilities, developing various industrial parks and technology incubators under MSME cluster development programmes, creating networks of organisations which help to provide training to the skilled workforce to improve productivity, encourage entrepreneurship and competency in management, funding R&D investments, technology advancement may work for the betterment of the sector.

Das (2014) examined the performance of MSMEs in the development of socio-economic condition of rural poor. The study revealed that there is a continuous growth of number of MSME units. The growth story of these sectors enhances production, employment and exports of the state as well as in our country. The State Odisha inherent to its location, natural resources has tremendous potentialities to create ample opportunities in small businesses in various sectors. Entrepreneurship development is considered as a key factor to fight against unemployment, poverty and achieve overall socio-economic growth in our state. Last but not the least, growth rate of MSMEs is very good and healthy sign towards progress and prosperity of Odisha.

On the basis of the above mentioned literature, we propose to study the MSME, more specifically focussing on energy conservation.

6. METHODOLOGY

The energy efficiency and conservation efforts for sustainable development help a firm in adoption of best practices in business. Successful energy conservation will lead to reduction in cost and allow production process to be more efficient, thereby increasing profits for a firm. However, it is a general belief that MSMEs are reluctant and slow to adopt energy conservation practices due to a variety of reasons and constraints faced by them including lack of finance, lack of awareness regarding technological changes and other implementation related issues. An attempt has been made to study energy conservation practices adopted by MSMEs in Gujarat. A total

of 53 firms were conveniently chosen for eliciting information on a variety of conservation practices adopted by these MSME firms from across industries and across districts of Gujarat. The distribution of firms according to size is as shown in table 1 below.

TABLE 1: Sample Distribution

Scale of Firm	Frequency	Percent	Valid Percent	Cumulative Percent
Medium	30	56.6	56.6	56.6
Small	14	26.4	26.4	83.0
Micro	9	17.0	17.0	100.0
Total	53	100.0	100.0	

7. RESULTS

The sample firms were asked regarding steps taken to protect and restore environment sustainability with products, process and activities during last years, e.g. measures to control pollution, install solar and LED lights etc. the responses are shown in table 2 below. It is clear from table that a large proportion of firms have always or usually taken steps for this purpose. Only a handful of firms are not taking steps for protecting environment sustainability. The top five measures adopted for this purpose by firms are detailed in table 3 below.

TABLE 2: Steps Taken to Protect Environment Sustainability

Frequency	Frequency	Percent	Valid Percent	Cumulative Percent
Always	31	58.5	58.5	58.5
Usually	16	30.2	30.2	88.7
About Half the time	4	7.5	7.5	96.2
Seldom	1	1.9	1.9	98.1
Never	1	1.9	1.9	100.0
Total	53	100.0	100.0	

TABLE 3: Measures Adopted for Sustainability by Firms

Measures	Responses	Percent of Firms	Percent of Response
Tree Plantation	30	56.6	25.6
LED Lights and Energy efficient devices	17	32.1	14.5
Transport vehicle pollution reduction	25	47.2	21.4
save water and reduce polluting methods of Production	25	47.2	21.4
Safe disposal of solid and liquid waste	20	37.7	17.1
Total	117		100.0

It can be discerned from table 3 above that almost 56 per cent firms undertook tree plantation as one of the step for promoting steps for sustainability, 47 per cent firms took steps for reduction in pollution from transport vehicles as well as save water and reduce polluting methods. A total of 20 firms constituting of thirty seven per cent of firms use safe disposal of solid and liquid waste while 32 per cent of the firm have been LED lights and energy efficient devices in their premises. Thus it can be inferred that various steps for sustainability are adopted by most of the firms although all the firms are not using all measures for sustainability of business and environment among selected MSMEs in Gujarat.

The need for energy conservation cannot be over emphasized for any organization, due to its obvious benefits in reduced cost for firm as well as for society as a whole. Further, energy conservation helps in sustainable development too. The energy conservation practices related to computers and equipment, adopted by sample firms in Gujarat are presented in table 4 below. A perusal of table 4 reveals that among selected MSMEs 38 per cent to 83 per cent firms adopt various energy conservation practices on their premises. There is therefore, a greater need for further widespread adoption of energy conservation related to computers and equipment among MSMEs in Gujarat.

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The sample firms were also probed for energy conservation practices adopted by them relating to heating and cooling procedures during production processes. The responses received from them are presented in table 5 below. A perusal of table 5 reveals that various energy conservation practices related to heating and cooling are adopted by selected firms to an extent of as high as 79 per cent firms and too low of 24 per cent of selected firms in Gujarat. This clearly indicates that practicing energy conservation related to heating and cooling is prevalent only to a limited extent only.

The table 6 below presents data on use of energy conservation practices in firms with regard to lighting in its plant and premises area. A perusal of table 6 reveals that lighting related energy conservation practices are being practiced by a maximum of 78 per cent firms and a lowest of 36 per cent firms among sample MSMEs in Gujarat. Use of daylight and skylight instead of electrical light is the practice most popular option exercised by firms. On the other hand, task lighting option is least popular among firms and only 36 per cent firm used it. Thus, in case of various steps for energy conservation for lighting purpose as well, overall, a majority of firms are

found wanting in terms of adoption of such conservation practices.

The sample firms were further explored regarding other miscellaneous steps undertaken by them for energy conservation. The data pertaining to these other steps is given in following table 7. A perusal of table 7 shows that the firms are engaged in other energy conservation practices as well like safe disposal of recyclable material, switching power off of other appliances and specialty equipment in the firm and conserving water, etc. However, it is clear that a majority of MSMEs firms are partially and sparingly using energy conservation steps in their production process in Gujarat and only a small proportion of firms are found to be using these energy conservation practices to drive their business to greater efficiency, reduce cost, achieve faster growth and be competitive.

Table 4: Use of Energy Conservation Practices in Firms (Computers and Equipment)

Energy Conservation Practices	Responses	Percent of Response	Percent of Firms
Computer & Personal Items-Turn off all personal appliances including fans, radios and desk lamps	39	34.5	83.0
Turn off all office equipment including computers, monitors, printers, plotters, facsimile machines, shredders, typewriter and overhead task lights	29	25.7	61.7
Turn off all equipment in computer labs. if you can't turn off the whole computer, turn off the monitor and the printer	18	15.9	38.3
When purchasing any office equipment, be sure to consider energy star models that 'power down' after a specified period of inactivity	27	23.9	57.4
Total	113	100.0	

TABLE 5: Use of Energy Conservation Practices in Firms (Heating and Cooling)

Energy Conservation Practices	Responses	Percent of Response	Percent of Firms
Set local thermostats to low or off, in case of a programmable thermostat and use it by setting an energy conservation code at optimum.	15	17.0	30.6
Manual control of thermostat, set the heating point to no greater than 68 degrees C/154 degree F and cooling to no less the 25 degrees C/78 degree F.	12	13.6	24.5
Keep windows and exterior doors closed in heated or air conditioned areas.	39	44.3	79.6
Portable electric heaters and fans not used, unless medically necessary or due to failure of the building heating, ventilation or air conditioning system.	22	25.0	44.9
Total	88	100.0	

TABLE 6: Use of Energy Conservation Practices in Firms (Lighting)

Energy Conservation Practices	Responses	Percent of Response	Percent of Firms
Use day lighting from windows or skylights, instead of electrical lighting whenever possible.	39	36.8	78.0
Replace incandescent lamps with the lower watt compact fluorescent lamps whenever possible. Compact fluorescents (CF's) and LEDs help to reduce unwanted heat gain during hot summer months still provide equivalent lighting.	22	20.8	44.0
Try task lighting to reduce overhead lighting.	18	17.0	36.0
Turn off all unnecessary lights, including: overhead lighting, lighting in unoccupied rooms, equipment and storage areas. Reduce overhead lighting, decorative lighting, signage and other lighting inside and outside not necessary for security and safety. Maintain security and safety lighting at the lowest acceptable levels.	27	25.5	54.0
Total	106	100.0	

TABLE 7: Use of Energy Conservation Practices in Firms (Miscellaneous)

	Responses	Percent of Response	Percent of Firms
Turn off all office and kitchen/lunch room appliances including copiers, printers, microwave, toaster ovens, and coffee pots every night and weekend.	33	33.3	70.2
Turn off all specialty equipment that will not be used over the weekend and holidays. Use hot water sparingly. Conserve water. Turn off water taps when not in use. Don't use tap water for "single pass" cooling.	33	33.3	70.2
Recycling. Please dispose of recyclable materials to the appropriate recycling receptacles provided throughout the campus and building locations.	23	23.2	48.9
Please go to the recycling link on our Home page.	10	10.1	21.3
Total	99	100.0	

8. DISCUSSION AND CONCLUSIONS

Successful implementation of energy conservation opportunities requires commitment of top management towards energy conservation, well defined programs and responsibilities of every stakeholder, availability of sufficient resources for planning and implementation of policies and strategies, utilization of latest techniques for operation and maintenance of machines and motors, pay back calculations and return on investment savings calculations and close interaction between top management, operating staff and maintenance staff (Matani, 2013). In a study and project by Swiss Agency for Development and Cooperation (SDC) suggested steps for lasting results and for disseminating new energy solutions are as generating trust, pooling expertise and talent; demonstrating economic viability and developing a host of complementing capabilities, services and instruments; Encouraging replication, adaptation and innovation; creating an enabling environment (SDC, 2010). Energy conservation of course is the need of the hour as it has several advantages in terms of cost saving and environment friendly. Energy conservation can be nicely executed through energy audit as well.

Energy audit is vital tool in identifying and perusing a complete energy management program. A care full audit may give the industry an idea about managing energy at minimum cost (Patel & Panchal, 2015). Energy audit comprises of acquaintance with energy systems of the factory; information collection regarding energy

utilization, production, etc. to base these energy balance; planning and execution of energy measurements; and information collection regarding the energy systems development to serve as a base for drawing up energy saving measure (Pathak, 1999)

The energy conservation practices are gaining importance in an era of globalization and competition. In order to remain efficient and socially accountable it is imperative for every firm to operate in a responsible manner. Keeping pace with international norms and need to be at par with other modern economies in India as well Energy Conservation act has come into being in the year 2001. This Act has been modified and amended in the year 2010 again to incorporate other required changes and fine tune it according to needs of Indian economy. In accordance with EC Act 2001, the required institutional and infrastructure changes in Gujarat has been undertaken to fulfill its objectives. However, it can be stated that a lot of efforts in terms of implementation of EC Act are required to be made to ensure that energy conservation is universally accepted and adopted by a majority of entities in the economy.

The study reveals that a considerable proportion of MSMEs are practicing energy conservation in one form or the other form in Gujarat, but at present they are practicing this only in a piecemeal and fragmented manner. Hence, in order to ensure that energy conservation becomes a norm and culture among producers

in the country a lot of efforts are required to be undertaken on part of all the stakeholders.

9. LIMITATION AND SCOPE OF FUTURE STUDY

Any research is having certain restrictions which act as hindrance in carry out quality research work. This research is not untouched with obstacles. One of the limitations was to convince the MSMEs to cooperate in the research. Secondly, existing several obligations and protocols in the organization made authors to keep determination alive as competent authority at the organization were not available to respond, even after prior appointment. Such approach of the individual indeed delayed the overall research work.

The present study is based on only 53 MSMEs only, which is not as much of number of available MSMEs. Better sample size can be considered for the future course of study. Additionally, study can be conducted in other states of India which may include highly developed and underdeveloped state as overall practices adopted by MSMEs are highly influences by the state of the development.

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