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Energy Conservation Technology in Industries

KEYWORDS

Scope of the paper is about adoption of energy conservation technologies in industries, Residential consumers, Utilities, Agriculture and Power system etc.

Vivek Sangwan

M.Tech, Electrical and Electronic Engineering-Power System, Maharshi Dayanand University, Rohtak

ABSTRACT

Electricity is one of the main sources of energy for the development of any industry. Industries play very important role for economic development of any country. From previous word we can say development of any country depend on growth of Industries which totally depend on electricity energy So, future economic growth crucially depends on the long term availability of energy from source.

Electrical energy is universally accepted as part of human beings growth and to meet them it is necessary to assumes critical importance of energy. Electricity generation from any source of energy, (wind, solar, thermal, waste etc.), needs huge investments to meet them. For reducing cost and increase efficiency, it is need to focus on energy conservation and adoption of different technologies to achieve this.

To achieve this objective need to apply effective energy management within organization and this can be done by maintain optimum energy utilization to minimize energy cost without affecting production and quality.

Energy audit is necessary may be by third party or by member of organization because this is systematic approach for decision making and to minimize environmental effects.

Introduction: As we want to define energy conservation; Energy neither be create nor be destroyed but it can change from one work to another. Energy generates or comes in different forms some of them are heat, radiation, mechanical, electrical, chemical, wind, waste etc. Any things that have ability to do work is called energy. In the last many years, we have consumed 65% of Non-renewable source of energy (Coal, Oil and gas).

Energy can be classified into various types are:

Primary and Secondary energy: Primary energy source either found or stored in nature like coal, oil, natural gas radioactive substance, thermal energy etc. Secondary source of energy derived from primary source of energy; are suitable for transportation, distribution and control like electricity generate using coal, oil etc.

Renewable Energy: Renewable energy source like solar energy, wind power, geothermal energy, tidal energy etc that id unlimited source of energy, we can't utilized 100% because it is endless and better as environment point of view. Renewable energy has been an important component of India's energy planning process since quite some time. The importance of renewable energy sources in the transition to a sustainable energy base was recognized in the early 1970s. At the Government level, political commitment to renewable energy manifested itself in the establishment of the first Department of Non-Conventional Energy Sources in 1982, which was then upgraded to a full-fledged Ministry of Non-Conventional Energy Sources (MNES) in 1992 subsequently renamed as Ministry of New and Renewable Energy (MNRE). This is the only such Ministry in the world.

Non- Renewable Energy: Non-renewable source is the conventional fossil fuels such as coal, Oil and gas, which are likely to deplete with time.

Energy Scenario: The International Energy Agency (IEA) forecasts that world primary energy demand between now and 2030 will increase by 1.5% per year. Developing Asian countries are the main drivers of this growth, followed by Middle East. India's substantial and sustained economic growth is placing enormous demand on its energy resources. India imports about 80% of its oil. There is a threat of these increasing further, creating serious problems for India's future energy security.

India ranks tenth in the world in total energy consumption as per "Ministry of New And Renewable Energy- Strategic plan for the period 2011-17" and need to accelerate the development of the sector to meet its growth aspirations.

Why need to focus on Energy Conservation?

We know that we have limited fossil fuel, like coal, oil, stock up to 60 to 100 years only. In last 100 year we have consumed 50% of all resources. If we will not focus than fossil fuel on the verge of depletion before time period so, for sustainable development we need to adopt different energy conservation technology especially in industrial sector because total 36% of energy is utilized to develop country.

Latest energy conducted by Ministry of Power reveled that there is requirement on improvement in energy generation efficiency, Transmission and distribution system. Energy conservation and use of Renewable Energy are prime focus of our Government.

True meaning of Energy Conservation:

In simple term, everything in world is in form of energy like our body is the combination of different form of energy so that we can put our hand to do different work in many direction so that we transfer our body energy in form of respective work i.e. Energy is the ability to do a work and work is transformation of energy from one form to another form and also energy can neither be create nor be destroyed.

Let we discuss some examples- Shut light off when no need, Always use energy efficient light, open curtains day time, Utilized P-3R (Prevent, Reduce, Reuse, Recycle) system, use public transportation etc.

Energy Conservation Technologies:

The conservation of energy through the efficiency improvement of existing end-uses and the development of new technologies to replace less efficient system is an important component of the overall effort to reduce greenhouse gasses which my contribute to global climate change.

Energy conservation is an important issue directly connected with solving worldwide problems such as extending the life of fossil fuels and reducing CO2 emissions. In addition, reducing the amount of energy needed for manufacturing and developing energy efficient products also contribute to improve the technological level of Indian industrial technologies. In this sense, the introduction of new energy and the development of energy conservation technology are driving components.

In the realm of industrial energy conservation technology, India has something that makes it a world leader. Compared to other developing countries, the amount of energy consumed per product is not low. For example, Indian car makers, like Maruti, are building vehicles that is not excellent fuel consumption so there is need to

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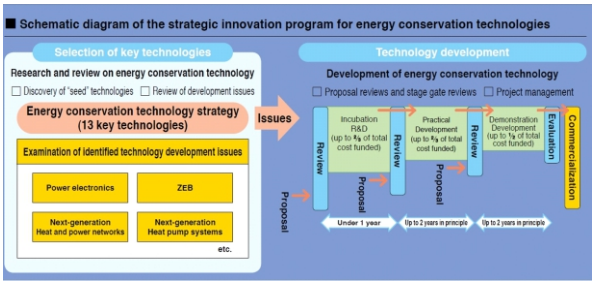
focus on hybrid technology that have excellent fuel consumption.
In the midst of a diverse range of energy conservation development efforts, NEDO (New Energy and Industrial Technology Development Organization in Japan, NEDO has total seven oversea offices and one of that in New Delhi, India) has taken into consideration the potential impact of energy conservation technologies and in 2011 put together a "Strategy for Energy Efficiency Technologies" that designates thirteen key technologies from the consumer, industry, and transportation sectors, as well as the intersection of those sectors. With a focus on these key technology areas, they are providing support through the "Strategic Innovation Program for Energy Conservation Technologies." Within these sectors, they have designated four technologies as

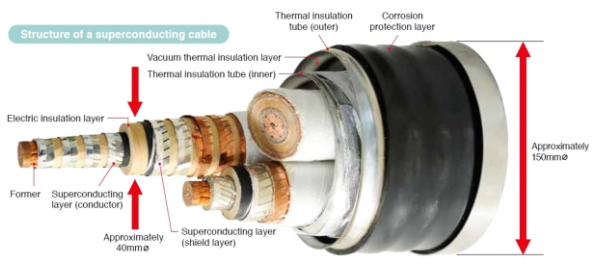
"Special Technological Development Themes" where we anticipate high energy saving effects. These four include ZEB and ZEH (zero emissions buildings and homes); next generation heat pump systems; power electronics; and next-generation heat and power networks (cogeneration).



Energy conservation Technology in Superconductor:
Superconductivity is a phenomenon that occurs when certain materials such as metals are cooled to very low temperatures causing their electrical resistance to become zero. By using this phenomenon, transmission losses can approach close to zero even over long distances. Moreover, it is possible to create a strong magnetic field by passing a large current through superconductors, leading to the possibility of applications in various fields other than power. For this reason, superconductivity is called a "dream technology", and it has attracted great expectations so far.

Superconductivity was first discovered by a Dutch physicist over 100 years ago in 1911. Currently, in order to achieve a superconductive state with metallic-type superconductors it is necessary to cool the material down close to absolute zero (-273oC) using high-cost liquid helium. For this reason, although superconductors have been used in medical equipment such as MRI machines, cost has proven to be a large barrier to their use in industry.

In 1986 ceramic-based high-temperature superconductors were discovered, and in the following year materials that enter a superconducting state when cooled by liquid nitrogen (-196oC) were also discovered. This led to a worldwide boom in the development of high-temperature superconductivity and accelerated research and development even more. Since it became possible to maintain a superconducting state using liquid nitrogen at a lower cost than liquid helium, the range of possible applications for superconductors in the industrial world has increased dramatically.



Superconductors are an important technology to contribute to energy conservation society and the global need for them is growing.

Energy conservation Technology in Transformer:
Best method to reduce load loss in transformer by use thick conductors so that resistance of conductor reduces and loss also reduce. We can say that by improvisation in design and Material of transformer energy can save.

By proper Location of Transformer preferably close to the load center, considering other features like centralized control, operational flexibility etc. This will bring down the distribution loss in cables. Under fluctuating load condition more than one transformer is used in Parallel Operation of Transformers to share the load & can be operated close to the maximum efficiency range

Most energy loss in dry-type transformers occurs through heat or vibration from the core. The new high-efficiency transformers minimize losses occurring in conventional type transformers. The conventional transformer is made up of a silicon alloyed iron (grain oriented) core. The iron loss of any transformer depends on the type of core used in the transformer. However the latest technology is to use amorphous material - a metallic glass alloy for the core and it can reduces energy losses over conventional (Si Fe core) transformers is roughly around 70%, which is quite significant and we can achieve maximum efficiency at low load also.

Energy conservation Technology in Motors:
Almost all the industrial total 70% of electrical energy consumed by only electric motors so that it is necessary to focus Energy conservation Technology in Motors.

Improving power supply quality: Maintaining the voltage level within the BIS standards i.e. with tolerance of +/-6%and frequency with tolerance of +/-3% motor performance improves and also life

Proper selection of the rating of the motor will reduce the power consumption. If the motor is operating at less than 50% of loading (η<50%) significant power saving can be obtained by replacing with properly sized high efficiency motors. If the motor is operating at loads below 40% of its capacity, an inexpensive and effective measure might be to operate in star mode.

By use of Soft Starter: Soft starters are essentially stator voltage controllers; helps to overcome above problem. It helps to restrict starting current and also provide smooth start and stop operation.

By improving power factor: For improving power factor connect the capacitor bank, which will improve the power factor of the system from installation to generating station. Maximum improvement in overall system efficiency is achieved, which also reduces Max. Demand of the system and that will reflect in energy bill. Use of high efficiency or Energy efficient motors

Energy Conservation in Light system:
Good lighting is required to improve the quality of work, to reduce human fatigue, to reduce accidents, to protect his eyes and nervous system. In industry it improves production, and quality of products / work.

Energy can be conserve by optimum use of natural light, Replacing Compact Fluorescent Lamps (CFL's) by Light Emitting Diode (LED's), Replacement of conventional ballast by Electronic ballast: Installation of high frequency (28-32 MHz) electronic ballast in place of conventional ballasts helps to reduce power consumption up to 35%.

Installation of separate transformer for lighting: In most of the industries, the net lighting load varies between 2 to 10%. If power load and lighting load fed by same transformer, switching operation and load variation causes voltage fluctuations. This also affects the performance of neighboring power load apparatus; lighting load

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equipment's and also reduces lamps. Hence, the lighting equipment has to be isolated from the power feeders. This will reduce the voltage related problems, which in turn provides a better voltage regulation for the lighting this also increases the efficiency of the lighting system.

Occupancy Sensors, Daylight inked Control are commonly used in commercial buildings, malls, offices, where more no. Of lights are to be controlled as per operational hours microprocessor based Light control circuits are used. As a single control unit it can be programmed to switch on /off as per the month wise, year wise and even season wise working schedule.

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