

Intelligent Energy Management: An Innovative Emerging Field

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Abstract— Today's globalized world is changing day by day. In the fast changing digital world, innovations are always in demand. Intelligent Energy Management (IEM) is one of the innovative emerging fields. IEM is an integral part of a smart grid that can potentially provide immediate solutions to the problems like energy problem in long term, consumers and business need effective and affordable solutions for managing their energy consumption and cost. More importantly it also provides a strong foundation to build tomorrow's smarter innovative energy infrastructure which opens the new vista for gaining profitable markets in undiscovered areas of energy management. The paper presents this innovative concept in Indian context and the objective of this paper is to create awareness among the consumers for optimal utilization of energy management in an intelligent manner.

Key words: C+I USERS, IEM, SMART GRID

I. INTRODUCTION

A. Present Scenario:-

Intelligent energy management is a newer, innovative and emerging concept in India. India is a wide country with a population of crores. In this wide country, there is always a necessity of power management, as India is continuously facing various problems regarding power consumption habits and its usage. Although we are moving towards Digital India but still there are various villages in India, where they are getting power (electricity) for only few hours. On the contrary, there are various users who are getting ample electricity but not utilizing it properly and wasting it. Apart from it, there are many cases of power theft. There is an uneven distribution of power supply seen in various sectors like farming, Industries and other sectors. Also there is uneven distribution in various places like Metro cities, smaller cities and Villages. So, all these things lead to huge energy problem which should have some smart remedy. IEM is one of the smart solutions for this.

B. What is Intelligent Energy Management? :-

IEM knows as the solution to the complex energy problems to meet today's market demand and shapes the future by reaching them to the bottom line and operational benefits for various different utilities. It is helpful for commercial and industrial(C+I) area as well residential consumers also.

IEM technology can provide immediate solution to the problems like energy problem in long term, consumers and business energy problem for managing their energy consumption and cost. It offers a new class of solution to the complex energy problem of smart grid.

Smart grid is a modernized electricity network using digital technology for metering and communication- further complicates the energy problem. With Intelligent energy management, providers and users have the insight they need to make informed decisions about energy consumption. Utilities can reduce problems with load management and peak demand. Commercial and industries users can reduce electricity waste, lower expenses and increase marketability to increasing green minded customers. Finally, homeowners will have consistent data on their energy consumption which they can use to save energy and reduce their power expenses. Properly implemented IEM can not only help cut energy use, spending and emissions but also provide a solid foundation to build tomorrow's smarter energy infrastructure.¹

II. DRIVERS FOR CHANGE

A. Need for Change:-

As discussed earlier globalized digital innovation are always in demand. The world is facing energy problems like business and residential consumers for energy consumption and their costs for long term etc.

Recently, the concept of energy audit and load management has emerged and its being applied throughout the world.² Thus the time has come to utilize the available energy efficiently, optimally for the mutual benefits of consumer and suppliers.³ Optimal energy saving which will thus help in increasing the reliability of the electric supply and provide a considerable amount of saving in electricity charges.⁴

B. Need for Change in India:-

India's power sector is transforming in terms of reliability and affordability, according to Steve Bolze, President and chief executive of GE power, the power generation division of US based General Electric.

"It is an incredibly dynamic time in the power market right now. Everyone in the world needs more affordable, more accessible, reliable and sustainable power. About 13% of the new power generation orders in the world are going to India. India is a major source of what is happening. It is fairly diversified from new stream to gas turbine to one of the biggest single renewable players in the world." Bolze told a conference on the future of electricity organized by Mint and General Electric Company on Tuesday.

The GE power president stressed five key areas for technology adoption- supply side efficiency, mainstream renewable, gas based power, digital and energy access.

As per an international energy agency report India's installed capacity will surge from 290 gig watt (GW) at present to nearly 1100 GW in 2040, which is about the same as Europe's current capacity. Nearly half of the net increase in coal fired generation capacity worldwide would occur in India, where coal is set to remain a key source of power.

Bolze highlighted digital technology as one of the most exciting area in the transformation of the power market not just in India but across the world. This probability will have the single biggest transformational impact on India as well as the world power market in the next 20 years.⁵

C. Drivers for Changes:-

I have already discussed in 2.2 and 2.1 drivers for change but in sum-up manner if I will say, following issues drive the need for intelligent energy management solutions:-

- Peak demand challenges
- Aging infrastructure
- Rising price and Rising demand
- Legislative Impact
- Increased use of Renewable Energy
- Coming age of Plug in vehicles

III. ENERGY PROBLEM SOLUTION: IN INDIAN CONTEXT

There are some suggestions as follows:-

A. Today's scenario for energy problems in India

In present situation, there are various barriers to energy management. Still consumers are on one way communication for energy problem. There should be two- way communication with power providers that will solve energy problem in many ways. It will make them educate about the appropriate consumption of energy.

B. IEM'S Implication Factors in India

There are various factors in India, which are helpful in applying Intelligent Energy Management.

They are as follows:-

1) Two-Way Communication:-

A two way communication should be there between utilities and consumers to enhance the service. It will provide a platform with a real time insight, analysis, deep inspection and control, which will be execute by the integration of expansion of smart grid infrastructure and with the support of the consumer.

2) For Energy Control in Better and Smart Manners:-

By the use of above mentioned two way communication technologies all the users, whether they are house holders or C+I consumers ,will set operation times for energy using devices, automatic temperature signal responses etc to do energy management in intelligent manner.

A home energy management (HEM) system is an integral part of a smart grid that can potentially enable demand response applications for residential customers. It manages households loads according to their preset priority and guarantees the total household power consumption below certain levels.⁶

3) Predict Energy Load:-

In India, it is very common scene that most of the people are misusing the energy. For that radio-signal based digital control of air conditioner, water heater and other devices can help avoid energy load peaks. There should be various means to switch-off non-essential lights or turn to a backup generator to reduce energy consumption. It must be applicable on household consumers and C+I consumers. Especially, these kinds of steps should be taken in summer, where demand of electricity is more than supply.

4) Cost reduction: -

In India, people are not paying more attention to energy saving or energy management. If they will do so, it will lead to cost reduction.

5) Bridging to the promise of the smart grid: -

Through a direct interface with residential or C+I users utilities can support renewable energy programmes and make adjustments to meet consumer's ever developing energy needs. ¹

IV. INTELLIGENT ENERGY MANAGEMENT: SOLUTION COMPONENTS

IEM has various solution components, which are also known as core business process. They are essential for delivering and supporting any exhaustive energy management program. IEM provides customers with single platform and dashboard to provide comprehensive support from customer attainment to program optimization. The components are as follows

- Acquire new customers
- Manage operations
- Control events
- Measure results
- Analyze trends
- Optimize programs through demand forecasting and performance modeling

V. CONCLUSION

In today rapid changing globalised world where everything is changing, there is always a need for new inventions. In the field of energy in India it is a necessity for the country to develop an energy management project, which will be helpful in fighting with various traditional energy problems. IEM is an innovative, emerging and integrating management program to face the challenges of digital globalised world. It is a very new concept for the world especially for India. There are some projects running well in India for IEM like India- Sweden Innovations Accelerator program, NETRACK enclosures, intelligent power distribution tools etc. So the understanding of this concept will create awareness among the people and consumers (Residential and C+I users), and it will ultimately lead towards the energy management in an intelligent and optimal manner and will develop a green infrastructure that are instrumented, interconnected and enabled by Intelligent Energy Management.

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