Intelligent Load Management Strategy

By

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Load Management

- Load Management, today:
  - Monitoring activities of utilities that are intended to identify consumers pattern of electricity usage.
  - Traditional active management of consumer electrical usage for resource planning
“Intelligent” Load Management

- **Intelligent Load Management (ILM)**
  - A proactive predominantly software driven program consisting of planning, implementing, and monitoring activities of electric utilities that are designed to encourage consumers to modify their level and pattern of electricity usage
  - Identifying and Incorporation of consumer load modification as alternatives or additions to traditional resource planning
Present Power Scenario - India

- Only 44% rural households have access to electricity
- Transmission and Distribution (T & D) losses at 31% being one of the highest in the world
- Large scale theft of power
- Distorted tariff structure with high industrial tariffs adversely affecting competitiveness of Indian Industry
- Combined with high subsidies to agriculture; leading to wasteful usage of water and ground water depletion
- Reliable power not made available to agricultural sector; further, poor load management; leads to manipulation
- Lack of commercial viability of Utility and Distribution Companies
ILM – Macro perspective

- Load management at the house hold level is already economically feasible for specific regions and it will become feasible for increasingly large regions.

- Emerging advanced capabilities of information technology provides strategic opportunities for new intelligent distributed services on the power grid.

- Decentralised power load management at the customer side automatically carried out by a society of intelligent house hold, industrial and Utility equipment.
ILM – Macro perspective

- Implementation of Energy Management System, Advanced Meter Reading and emerging capabilities of information technology provide strategic opportunities for Intelligent Load Management and Demand Side Management by the Utilities and Industries alike to save power.

- Application can be modeled in terms of independent an intelligent agent that communicates and negotiate in a computational market economy with a joint role of achieving cost and energy savings.
The computational market approach offers a highly innovative way of looking at customer oriented load management introducing a new paradigm for decentralized control.

It exemplifies how to exploit the opportunities provided by advance information technology combining recent progress in telecommunication on the power grid, micro processing, software Engineering and artificial intelligence.
ILM - Essentials

- Energy Management System - provides secure access to real-time usage information, identifies and suggests improvement in the system and helps the utilities to manage the distribution network efficiently and effectively.

- Advanced Meter Reading - capable of both automated remote meter reading and time-of-use pricing - in real-time. Advanced meters allow hourly rate adjustments and can incorporate "automated demand response" software that automatically reduces or sheds electrical loads during peak load periods.
Demand Side Management - refers to "actions taken on the consumer's side of the meter to change the amount or timing of energy consumption. Electricity DSM strategies have the goal of maximising end-use efficiency to avoid or postpone the construction of new generating plants."

Load Response - programs operate in response to requests for peak load reductions with little, if any, discretion in compliance on the part of the consumer.
ILM – Implementation perspective

- Energy-Efficient lighting: Use of CFL (Compact Fluorescent Lights) for households and street lighting – 4 times more efficient & lasts longer 10 times, LED for street lighting – 80% more efficient and lasts 10 times CFL. Use of Load balancer and remote switching on/off of street lights based on sunrise and sunset.

- Energy-Efficient Water and Sewage Pumping: Use of Non-clog, high efficiency, circulation proof, self priming, and positive displacement pumps from reliable and standard manufacturers, replacement of old pumps with new pumps instead of rewound motors.
ILM – Implementation perspective

- Energy Labelling: Energy labelling is provision of energy related information on all electrical appliances in a form that is objective and easy to understand for customers.

- Use of Standard Appliances and building equipment: Use of star rated white goods, changing of white goods on a time bound period, use of standard and approved wires, MCBs and load saver by Consumers.

- Utility driven Load control
  - Remote disconnection/Reconnection, Demand Limiting.
ILM – Implementation perspective

- Power Factor Charges: Power factor charges can be implemented to discourage commercial and industrial utility consumers from partially loading their electrical equipment, as this requires the utility to generate extra current to cover the resulting system losses.

- Real-Time Pricing: Real-time pricing is where the electricity price varies continuously (or hour by hour) based on the utility's load and the different types of power plants that have to be operated to satisfy that demand.
Energy management control systems (EMCS) can be used to switch electrical equipment on or off for load levelling purposes. EMCS can also be used to invoke on-site generators, thereby reducing peak demand for grid electricity.

- **Time-of-Use Rates**: Time-of-use rates involve charging higher prices for peak electricity as a way to shift demand to off-peak periods. Interruptible rates offer discounts in exchange for a user commitment to reduce demand when requested by the utility.
Scenario - post ILM implementation

- A mere 5% AT & C loss reduction by ILM, will result in energy saving that can lighten up 57.8 million additional rural Households

- EMS with Automatic Meter reading effectively checks tamper detection and reverse rotation of meter. Commercial loss due to theft can be made practically zero

- AT & C loses are reduced, which helps business of utility commercially viable
Scenario - post ILM implementation

- ILM offers better load management; further, the incorporation of Time of Use (ToU) tariff can bring down the high industrial tariffs. This can boost industrial growth while still ensuring continued low tariffs to agricultural sector.

- Quality power is assured by incorporating effective load management; Automatic discrete metering with remote control is also incorporated through Automatic Meter Reading; Heavy losses owing to manipulation is checked effectively.
## Benefits of ILM

<table>
<thead>
<tr>
<th>Utility</th>
<th>Societal</th>
<th>Consumer</th>
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<tbody>
<tr>
<td>Improved operating efficiency</td>
<td>Reduce pollution</td>
<td>Quality power</td>
</tr>
<tr>
<td>Reduced capital needs</td>
<td>Protect global environment</td>
<td>Reduced per unit cost</td>
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<tr>
<td>Lower cost of service</td>
<td>Conserve Energy and resources</td>
<td>Improved value of service</td>
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<tr>
<td>Improve consumer service</td>
<td>Maximise consumer welfare</td>
<td>Maintain/Improve lifestyle &amp; productivity</td>
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About Speaker

Speaker: Sqn. Ldr. Mahesh S Iyer

Advisor
SPML Energy Limited

- Over 22 years of engineering and aeronautical experience; leadership positions in various multi-national organizations, across geographies.

- Post Graduate in Aeronautical Engineering; Served in the Indian Defence Services for over 12 years.
About SPML

- SPML Energy is a 100% subsidiary of Subhash Projects and Marketing Limited (SPML)
  - SPML - An ISO-9001:2000 certified company with over **25 years** of infrastructure development in **public and private domain** in Water, Energy, Environment and Infrastructure
  - A Public Limited Company - **Entered capital market in the year** 1983. Current Market Capitalization of over **Rs.15000 Mn; USD 400 Mn**
  - Developing infrastructure projects with Investments worth over **Rs.150 Bn; USD 4 Bn** on **BOOT/PPP Basis**
  - Rank 1- Fastest Growing Company of the year in the Large Category – Construction World & NICMAR – year 2007