ABC of Energy Efficiency – Concept, Approaches and Policies

Shaping the Discourse: Effective Energy Efficiency Storytelling

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Why energy efficiency

- Energy efficiency improvements are the cheapest and most effective way of reducing CO₂ emissions and mitigating climate change.
- According to the IEA (International Energy Agency), improving energy efficiency must account for more than 50% of the measures needed to win the battle against global warming.
Energy efficiency has an attractive payback

- Energy efficiency improvements required capital investment or manpower or both

- Payback period = \( \frac{\text{Capital required}}{\text{Annual savings}} \)

<table>
<thead>
<tr>
<th>Option</th>
<th>Payback, years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solar</td>
<td>7-8</td>
</tr>
<tr>
<td>Wind power</td>
<td>10-12</td>
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<tr>
<td>Energy efficient equipment</td>
<td>2-5</td>
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</tbody>
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Energy Consumption in Industry

- Large energy-intensive industries like fertiliser, cement, pulp and paper, textiles, iron and steel, aluminum, chemicals
- Many energy intensive small scale industries like glass, ceramics, forging, foundry, brick
- Parallel existence of newer state-of-the-art plants and older technologically obsolete plants
- 20-25% energy conservation potential
Adoption of energy-efficient options

- Process technologies
  - Melting/heating
  - Drying
  - Evaporation
  - Distillation

- Cross-cutting technologies
  - Pumps
  - Fans
  - Compressors
  - Air conditioning/refrigeration
  - Drive motors

- Fuel switch options
  - Natural gas
  - Biomass

- Recycling and use of secondary materials
Understanding of ‘areas’ and ‘levels’ of energy efficiency helps targeting efficiency improvements:

<table>
<thead>
<tr>
<th>Level 1: Efficient operation of the existing plant (good housekeeping measures)</th>
<th>Area 1: Energy production and distribution (plant auxiliaries)</th>
<th>Area 2: Energy usage within processes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Better maintenance (rewinding) practices</td>
<td>Variable speed drive for electric motor</td>
<td>Improved furnace insulation</td>
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<tr>
<th>Level 2: Major improvements in the existing plant (retrofits and revamps)</th>
<th>Area 1: Energy production and distribution (plant auxiliaries)</th>
<th>Area 2: Energy usage within processes</th>
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</thead>
<tbody>
<tr>
<td>New energy efficient electric motor</td>
<td>Variable speed drive for electric motor</td>
<td>Improved furnace insulation</td>
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</table>

<table>
<thead>
<tr>
<th>Level 3: New plant or process designs</th>
<th>Area 1: Energy production and distribution (plant auxiliaries)</th>
<th>Area 2: Energy usage within processes</th>
</tr>
</thead>
<tbody>
<tr>
<td>New energy efficient furnace</td>
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Energy audits and R & D are key tools for assessing and improving energy efficiency.
Approaches

- Training and awareness creation
- Energy audits and implementation of EE technologies and practices
- EE technology innovation
  - Technology demonstration vs Technological capacity through Research, Development, Demonstration and Dissemination (RDD&D) initiatives
- Policies (financial concessions, regulation etc.)
Documentation and awareness generation

- Process documentation for policy makers and funding organisations
- Dos and don’ts for industry
- Sharing of best practices through newsletters like SAMEEEKSHA
- Video films on energy efficient technologies and best operating practices
- Hands-on training programs for operators and supervisors
Case Study: Energy audit of municipal water pumping installations in Accra, Ghana

- Energy audits of pump-sets installed in water pumping installations
- Energy of about 18% of electricity bill identified through adoption of measures like:
  - Power factor improvement
  - Replacement of inefficient pumps with new ones
  - Retrofitting of pump internals like impellers, sleeves etc.
  - Relaying of header pipe line
- Measures would result in energy saving of $0.6 million with an investment of $1.2 million
- Simple payback period is below 2 years
Technology characteristics of energy-intensive SMEs

- Conventional technologies which have remained unchanged for decades
- Little R&D efforts
  - Underdeveloped support institutions and local service providers
  - Limited capacity to innovate
Glass making is very energy intensive – energy accounts for 40% of manufacturing cost

Considerable potential to reduce energy consumption and carbon emissions by adoption of energy efficient furnaces
Approach

- Involved international and local experts to develop (conduct R&D) on:
  - Better furnace construction
  - Burner design
  - Recuperator design
- Demonstrated the energy efficient furnace in one SME
Energy savings of 30-35% demonstrated

Conventional coal/NG fired Pot Furnace

Recuperative Natural Gas fired Pot Furnace
Disseminate

- Local service providers provided training

- Deployment
  - 86 units have adopted the new technology; about 90% of the cluster
  - Cumulative energy savings of 100,000 toe and CO2 savings of 300,000 tones
Energy Efficiency Policies – Key Recent Initiatives

- **Energy Conservation Act (ECA), 2001**
  - Bureau of Energy Efficiency (BEE), under the Ministry of Power, is the nodal agency for implementation of ECA
  - Modified in 2010 to provide legal mandate to PAT

- **National Action Plan on Climate Change (NAPCC), 2008**
  - Eight missions were set-up. National Mission for Enhanced Energy Efficiency (NMEEE) pertains to energy efficiency
  - Performance, Achieve, and Trade (PAT) mechanism was launched under the NMEEE in 2008
Perform Achieve Trade (PAT) scheme – salient features

- PAT is an innovative, market-based trading scheme
- Aim is to improve energy efficiency in industries by trading in energy efficiency certificates in energy-intensive sectors
- Mandatory specific energy consumption targets for larger, energy-intensive facilities (called Designated Consumers)
- Implemented in three phases-the first phase was from 2012-2015
- BEE is administering the PAT scheme
- Energy Efficiency Services Ltd (EESL) will administer the trading
Preparatory activities undertaken by BEE

- 5 years energy data from DCs collected though the notified format
- Baseline Energy Audits conducted in all DCs
- Data compiled & analyzed for arriving at baseline SEC
- PAT Consultation Document prepared
- Stakeholder workshops conducted with different Industry groups
- The methodology for M&V system, Issuance of ESCerts & Trading prepared
Thank You