Indicators, evaluating and scaling up programmes

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Link between training content and objectives

- How to make the case for industrial energy efficiency policy
- How to select and design the best measures
- How to implement
- How to evaluate and scale-up

Develop your skills & knowledge to deliver industrial energy efficiency policies & programmes
Learning outcomes

This session will focus on developing your capabilities to:

• Understand energy efficiency indicators and how they can be used

• Plan, implement and supervise industrial energy efficiency programme evaluations

• Differentiate between different types of programme impacts

• Draw conclusions from evaluations and communicate the results

• Use evaluation to inform options to expand the scale and reach of successful programmes
Data and indicators underpin policy evaluation

- Establish metrics to track progress and evaluate effectiveness
- Allow for objective judgement of policy/programme
- Data required should be established at start of programme
- Structured collection process is necessary
  - Company reporting is essential
- Provides evidence of policy benefits for other countries
Indicators can be developed at different levels

GDP - Gross Domestic Product
GVA – Gross Value Added
Global energy demand rose by over 2% in 2018, the fastest rise this decade, driven by economic growth and continuing changes in consumer behaviour.
Primary energy intensity improvements are slowing since 2015.
What factors are influencing energy demand

Global energy efficiency is improving, but its impact is being overwhelmed by factors that create more demand for energy.

Decomposition of final energy use in the world’s major economies, 2000-17

Notes: Major economies are IEA member countries plus China, India, Brazil, Indonesia, Russia, South Africa and Argentina.
What sectors are contributing to efficiency gains?

Sectoral contributions to energy savings from improvements in energy efficiency

Industry

Buildings

Transport

Notes: Other major economies are China, India, Brazil, Indonesia, Russia, South Africa and Argentina.

Major emerging economies are Brazil, China, India, Indonesia, Mexico and South Africa

Industry has made the largest contribution to historical efficiency gains
What does a more efficient world look like?

• The world is missing opportunities to improve energy efficiency, policy is not delivering the full potential gains that are available with current technology.

• What is possible with greater efforts on energy efficiency? The IEA’s new Efficient World Scenario answers the question:

*What would happen by 2040 if countries realised all the economically viable energy efficiency potential that is available today?*

The Economy  
The Energy System  
The Environment
The Efficient World Scenario also fully delivers the energy efficiency target (Target 7.3) of the UN Sustainable Development Goals.
There is significant cost-effective potential in every sector

The majority of energy efficiency potential across all sectors is realised in the Efficient World Scenario.
Energy efficiency improvements are possible across all sub-sectors. Light industry (e.g. food beverage and textile manufacturing) represent the bulk (70%) of savings.
## Opportunities and policy actions for industry

<table>
<thead>
<tr>
<th>What is possible by 2040</th>
<th>Key policy actions</th>
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<tbody>
<tr>
<td></td>
<td>• Expanded and strengthened standards for key industrial equipment, including electric heat pumps and motors.</td>
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<td></td>
<td>• Incentives to encourage the adoption of energy management systems.</td>
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<td>• Mechanisms such as industry networks, training and case studies to enhance awareness and capacity.</td>
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- Value-added per unit of energy could double.
- Less energy-intensive industry offers 70% of potential savings.
Opportunities created when more data is available

1. What data on industrial energy efficiency do we have available today?

2. What data would we ideally like?

3. Why would these data be useful?

4. How could we get better data in the future?
The IEA energy balance provides sectoral energy data...

The IEA energy balance enables us to see how broad sectors perform in energy terms. But due to the complex nature of industrial production, more detailed data is needed to assess energy efficiency.
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External data sources can provide additional details...

Thermal energy per tonne of clinker in 2016

Using data from other data sources can provide more detail. However, for industry there are often limitations with this data as well.
…but this data also has limitations.

Using data from other data sources can provide more detail. However, for industry there are often limitations with this data as well.
Better data could provide multiple benefits

• Improved energy efficiency benchmarking, which enables:
  - Identifying best performers and sharing best practices
  - Setting regulatory targets
  - Identifying opportunities for improvement and pushing for better performance

• Tracking progress

• Energy modelling and analysis, for understanding future CO2 trajectories

• Additional sectors in particular in the less intensive sectors will be key to unlock most of the savings.
There are several possible paths to better data

- Collection directly from countries (for example, hosted by the IEA):
  - Could be incorporated into existing or new IEA data collection

- Better support from countries for reporting to industry associations:
  - Could improve coverage of existing data sets
  - Could help resolve confidentiality concerns and enable more data to be made publicly available
What is an evaluation

• A systematic and **objective** assessment of an ongoing or completed project, programme or policy, its design, implementation and results

• The **aim** is to determine the relevance and fulfilment of **objectives, efficiency, effectiveness, impact** and **sustainability**
Why evaluate?

• Document and report results and benefits
  − Meet requirements
  − Gain support for programme continuation or expansion
  − Get more companies to participate in the programme

• Identify ways to improve current and future policies or programmes

• Support energy demand forecasting and resource planning
Types of evaluation

- Impact evaluation asks the question: “what happened?”
  - Includes direct and indirect benefits, energy and demand savings, multiple benefits

- Process evaluation asks the questions: “what was done and how did we do”
  - Includes operations and scope for improvements, satisfaction levels, participation

- Cost effectiveness evaluation asks: “what impact did we have relative to our investment?”

- Market evaluation asks the question "what happened in the market?"
  - Including how supply of energy efficiency technologies and services has been affected

Typically evaluations combine impact + process + cost effectiveness.
Steps in an evaluation

Secure resources (should be done at the outset of the programme)

1. Set the objective and review needs
   - Which audience(s)
   - What are the evaluation questions
   - What do we know
   - What do we need to find out
   - How will we source data

2. Terms of reference

3. Select who will carry out the evaluation

4. Manage the development of the evaluation design
   - Methodologies
   - Scope, boundaries

5. Manage the development of the evaluation work plan

6. Manage the implementation of the work plan, including the production of report(s)
   - Data collection, analysis, synthesis, interpretation

7. Use results, disseminate report and support use of the evaluation
### Evaluation examples – assessing net benefits

<table>
<thead>
<tr>
<th>Ireland SME programme 2007 - 2010</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Participants</td>
<td>1470</td>
</tr>
<tr>
<td>Public budget</td>
<td>USD 1.3 million</td>
</tr>
<tr>
<td>Average energy reduction per company</td>
<td>10%</td>
</tr>
<tr>
<td>Cost per kWh saved to 2020</td>
<td>USD 0.020</td>
</tr>
<tr>
<td>Cost per kWh saved to 2030</td>
<td>USD 0.008</td>
</tr>
<tr>
<td>Value emission abatement to 2020</td>
<td>USD 44 million</td>
</tr>
<tr>
<td>Value of emission abatement to 2030</td>
<td>More than USD 88 million</td>
</tr>
<tr>
<td>Emissions abated to 2030</td>
<td>Almost 1800 ktCO₂</td>
</tr>
<tr>
<td>Net benefit to society in 2020</td>
<td>USD 178 million</td>
</tr>
<tr>
<td>Net benefit to society in 2030</td>
<td>USD 425 million</td>
</tr>
<tr>
<td>Net benefit per USD 1 spent by authority to 2020</td>
<td>USD 16.5</td>
</tr>
<tr>
<td>Net benefit per USD 1 spent by authority to 2030</td>
<td>USD 36</td>
</tr>
</tbody>
</table>
### Evaluation examples – Small incentives big results

<table>
<thead>
<tr>
<th>Swedish energy management programme 2004-2009</th>
<th></th>
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<tbody>
<tr>
<td>Participants</td>
<td>100</td>
</tr>
<tr>
<td>Tax exemption value</td>
<td>EUR 15 million/year</td>
</tr>
<tr>
<td>Expected annual electricity savings</td>
<td>0.6 TWh</td>
</tr>
<tr>
<td>Achieved annual electricity savings</td>
<td>1.45 TWh</td>
</tr>
<tr>
<td>Measures implemented</td>
<td>1247</td>
</tr>
<tr>
<td>Private investment</td>
<td>EUR 70 million</td>
</tr>
<tr>
<td>Value of electricity saved per year</td>
<td>EUR 70 million</td>
</tr>
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After the evaluation – scaling up

Your evaluation shows that your pilot programme is successful and cost effective. You have covered 32 companies and 8% of national industrial energy use. What will you do next?
Scaling up

What does scaling up mean?

• Same sector more companies
• Same companies more implementation
• Same approach different sector
• Same approach more companies
• Using lessons learned to develop new approach to reach more companies and get more implementation
• New and innovative approaches for bigger coverage & greater efficiency

What is the end goal?

• Mainstreaming industrial energy efficiency - to business as usual – and no need for industrial energy efficiency programmes
Perform, Achieve, Trade (PAT) in India

• During first programme cycle, all sectors over-achieved their targets
  - 400 companies from 8 sectors
  - Energy use reduced by 5.3%, target was 4.1%

• Based on results PAT programme now being expanded for 2nd cycle
  - More companies and sectors (621 corporations from 11 sectors)
  - Financial support to encourage greater implementation
## PAT programme results

### Targets and achievements in the first cycle of the PAT Programme, 2012-15
(BEE, 2017)

<table>
<thead>
<tr>
<th>Sector</th>
<th>Target (million toe)</th>
<th>Achievements (million toe)</th>
<th>% above target</th>
<th>% over achievement</th>
<th>Number of ESCerts (millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power (thermal)</td>
<td>3.21</td>
<td>3.06</td>
<td>-5%</td>
<td>-5%</td>
<td></td>
</tr>
<tr>
<td>Iron and steel</td>
<td>1.49</td>
<td>2.10</td>
<td>29%</td>
<td>41%</td>
<td></td>
</tr>
<tr>
<td>Cement</td>
<td>0.82</td>
<td>1.44</td>
<td>43%</td>
<td>76%</td>
<td></td>
</tr>
<tr>
<td>Aluminium</td>
<td>0.46</td>
<td>0.73</td>
<td>38%</td>
<td>59%</td>
<td></td>
</tr>
<tr>
<td>Fertiliser</td>
<td>0.49</td>
<td>0.83</td>
<td>42%</td>
<td>73%</td>
<td></td>
</tr>
<tr>
<td>Paper and pulp</td>
<td>0.12</td>
<td>0.26</td>
<td>54%</td>
<td>117%</td>
<td></td>
</tr>
<tr>
<td>Textile</td>
<td>0.07</td>
<td>0.12</td>
<td>45%</td>
<td>71%</td>
<td></td>
</tr>
<tr>
<td>Chlor-alkali</td>
<td>0.05</td>
<td>0.13</td>
<td>58%</td>
<td>100%</td>
<td></td>
</tr>
<tr>
<td>Total industry</td>
<td>6.68</td>
<td>8.67</td>
<td>23%</td>
<td>30%</td>
<td>3.8</td>
</tr>
</tbody>
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Upscaling or new approaches to scale up savings

- Standardised projects and solutions
- Integrated programmes
- Streamline admin.
- Energy management for SMEs
- Energy efficiency networks
- Build on successes and expand
- Regulatory approaches - limits, targets
- Remove regulatory barriers
- Make it mandatory
- Project portfolios for investors
- Risk sharing mechanisms
- Energy service companies
- Innovative finance mechanisms
- New business models
- Services instead of energy
- Long term industry technology roadmaps
- Industrial ecology, eco-industrial parks
- Information Communication Technologies
- Promote structural change

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