



IEA Energy Efficiency In Emerging Economies Training Week

Industry Stream: Indicators, evaluation & scaling up

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 #energyefficientworld

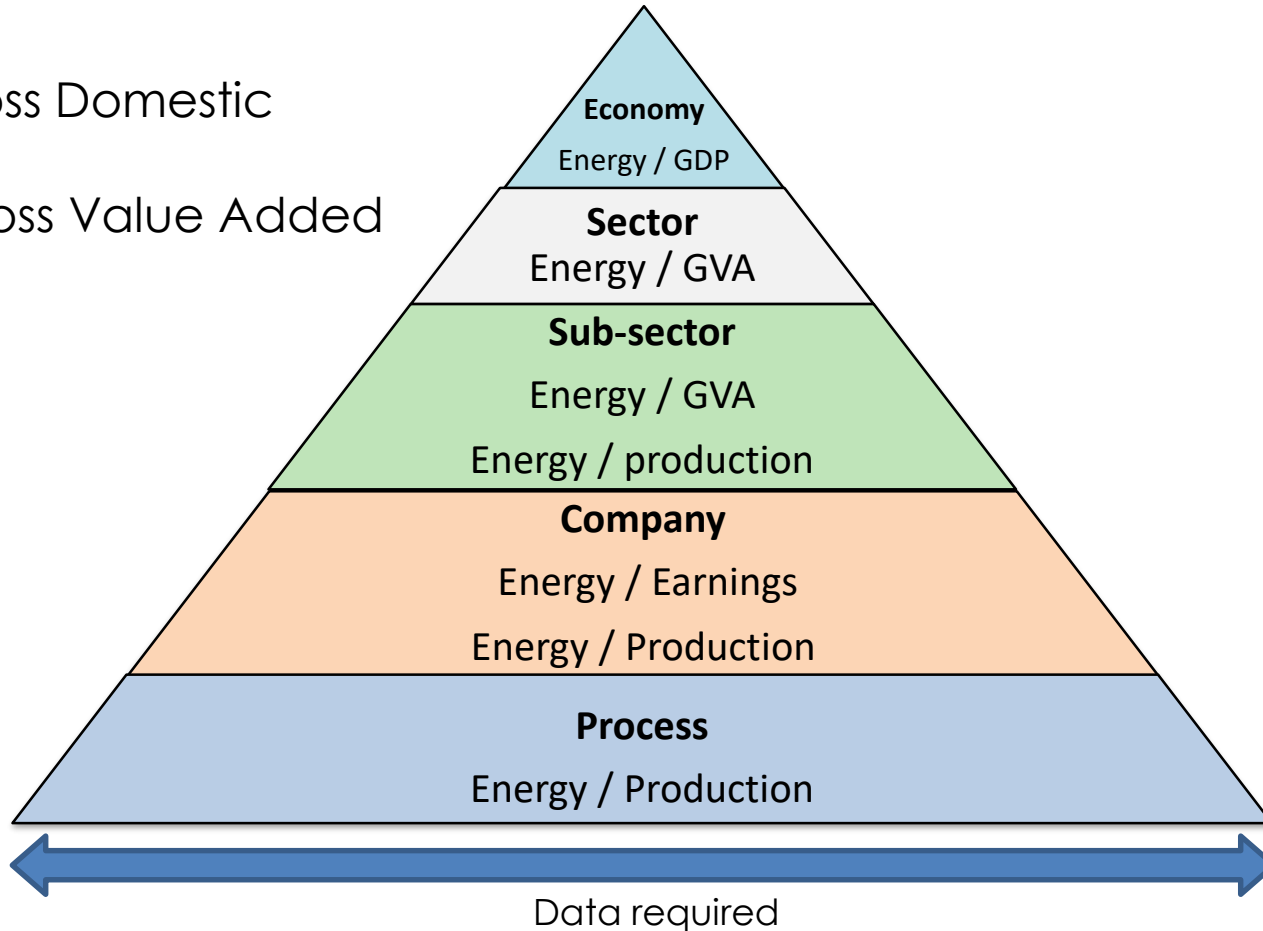
This session will focus on developing your capabilities to:

- 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

- 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



1. Form a group of 4-5 people
2. Review the data that is provided to you
3. Prepare a brief presentation to describe:
 - What 'level' these indicators are on the 'industry sector indicators pyramid'
 - Which stakeholders will be most interested in these indicators
 - What do the indicators tell you about changes in industrial energy efficiency performance
 - What are the limitations of the data set?



- 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**

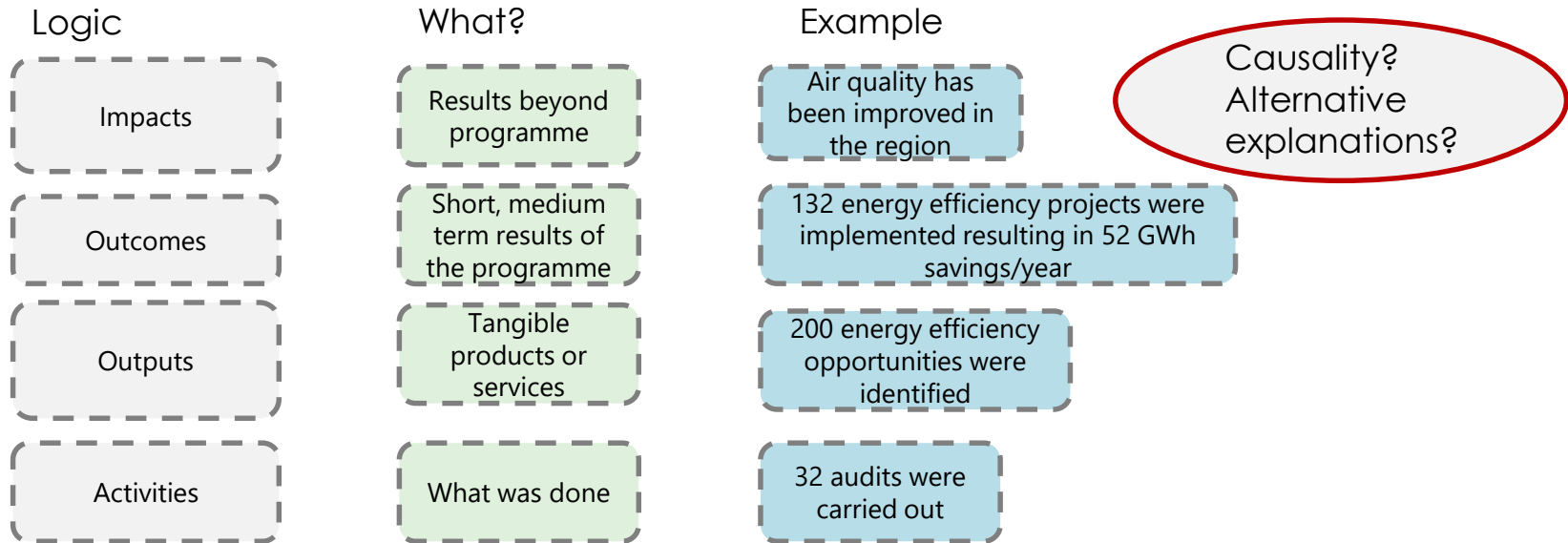
- Document and report results and benefits
 - Meet requirements
 - Gain support for programme continuation or expansion
 - Get more companies to participate in the programme
- Identify ways to improve current and future policies or programmes
- Support energy demand forecasting and resource planning

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

- 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, participatio
- 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.



- Data to gather - examples
 - Changes in energy use
 - Value of multiple benefits (quantified when possible)
 - Investments in energy efficiency projects
 - Profitability of projects (payback periods)
 - Number of energy efficiency opportunities identified
 - % of projects implemented
 - Case studies



Challenge: cannot directly measure savings and benefits need to compare with counterfactual (situation without the programme) or at least baseline

Estimates of gross energy (and/or demand) savings
Estimates of net energy (and/or demand) savings – separating out impacts resulting from other factors

Challenge: Production and other factors fluctuate

What data to gather?

- Changes in energy use
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Estimates of gross energy (and/or demand) savings

Estimates of net energy (and/or demand) savings – separating out impacts resulting from other factors

Challenge: Production and other factors fluctuate

- **Counterfactual** - situation without programme
- Or changes compared to **baseline** (measurements or assessments at outset or before programme)
- but consider changes during the programme period

Normalisation for:

- ✓ Weather
- ✓ Wider economy
- ✓ **Production levels**
- ✓ Product portfolio changes
- ✓ Other key factors?

For net results consider:

Free riders: Companies that would have done energy efficiency irrespective of programme

Rebound: Savings from energy are invested in processes that increase energy demand

Rebound can be seen as a **positive effect (multiple benefits)**

Costs:

- Administration costs
- Costs for participating companies

Benefits:

- Benefits for companies
- Benefits for utilities/government
- Benefits for society
- Benefits for energy efficiency market

Issues to consider

- Discount rates - costs upfront, benefits later
- Lifetime of benefits

Think about:

Investment cost vs
value of energy savings
over lifetime

Calculating cost effectiveness

| Method | + | - |
|--------------------------------------|--------------------------------|---|
| Desktop review e.g. audit reports | Relatively cheap | Depends on quality of documents |
| Surveys | Relatively cheap | Low response rates |
| Interviews | Deeper insights | Resource intensive, not always representative |
| Focus group | More comprehensive discussion | Might be difficult to organise |
| Case studies | Deep insights into one company | Bias towards successful cases |
| Experimental approaches | Insights into impacts | Expensive, difficult in real world setting |

- What combination will provide you with the information you need?
- What can you afford?

| Ireland SME programme 2007 - 2010 | |
|--|-------------------------------|
| Participants | 1470 |
| Public budget | USD 1.3 million |
| Average energy reduction per company | 10% |
| Cost per kWh saved to 2020 | USD 0.020 |
| Cost per kWh saved to 2030 | USD 0.008 |
| Value emission abatement to 2020 | USD 44 million |
| Value of emission abatement to 2030 | More than USD 88 million |
| Emissions abated to 2030 | Almost 1800 ktCO ₂ |
| Net benefit to society in 2020 | USD 178 million |
| Net benefit to society in 2030 | USD 425 million |
| Net benefit per USD 1 spent by authority to 2020 | USD 16.5 |
| Net benefit per USD 1 spent by authority to 2030 | USD 36 |



Ireland



| Swedish energy management programme 2004-2009 | |
|---|---------------------|
| Participants | 100 |
| Tax exemption value | EUR 15 million/year |
| Expected annual electricity savings | 0.6 TWh |
| Achieved annual electricity savings | 1.45 TWh |
| Measures implemented | 1247 |
| Private investment | EUR 70 million |
| Value of electricity saved per year | EUR 70 million |



Sweden



For whom?

- Government
- Funders
- Yourselfs
- Partners
- General public
- Media
- Participating companies
- Companies not yet participating
- Others?

Think about

- What is your objective?
- What is the audience interested in?
- Level of technical expertise
- Using appropriate language
- What are the key messages?

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?



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

- 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



India



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

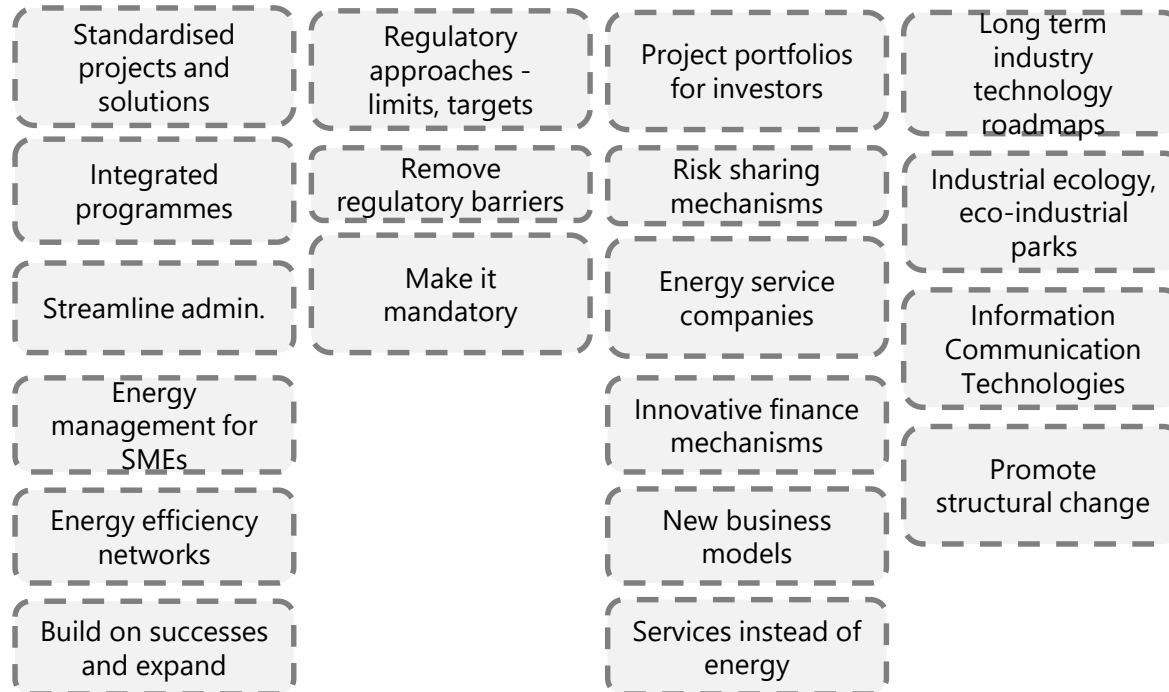
| Sector | Target (million toe) | Achievements (million toe) | % above target | % over achievement | Number of ESCerts (millions) |
|-----------------------|-------------------------|-------------------------------|----------------|-----------------------|---------------------------------|
| Power (thermal) | 3.21 | 3.06 | -5% | -5% | 3.8 |
| Iron and steel | 1.49 | 2.10 | 29% | 41% | |
| Cement | 0.82 | 1.44 | 43% | 76% | |
| Aluminium | 0.46 | 0.73 | 38% | 59% | |
| Fertiliser | 0.49 | 0.83 | 42% | 73% | |
| Paper and pulp | 0.12 | 0.26 | 54% | 117% | |
| Textile | 0.07 | 0.12 | 45% | 71% | |
| Chlor-alkali | 0.05 | 0.13 | 58% | 100% | |
| Total industry | 6.68 | 8.67 | 23% | 30% | |



India



Upscaling or new approaches to scale up savings





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