

Did it Work?

Tracking progress & assessing the multiple benefits

Lighting, Appliances & Equipment: Session 9 Mark Ellis

Jakarta, July 2018

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The Minister wants to know how effective your programme has been

How do you go about answering this?

Group exercise



As a group, list the basic steps required to conduct an evaluation







Understanding Programme Objectives





- Why do we want to conduct the evaluation?
- What benefits will we obtain?
- How will we use the results?







https://www.iea.org/publications/freepublications/publication/capturing-the-multiple-benefits-of-energy-efficiency.html









Examples:

- GDP and TPES decoupling
- Job creation and innovation
- Improved energy access
- Improved trade balance
- Reduction in energy prices
- Improved energy intensity in industry (e.g. motors)
- Improved air quality
- Lower public health spending



Examples:

- Reduction in energy subsidies
- Reduction in utility debt
- Reduced pressure on scarce
 domestic resources
- Reduction in impact on environment (e.g. water)
- Increase in household disposable income to invest in economy
- Higher value assets (e.g. public procurement, public buildings)







Approaches to evaluation



Unfortunately it isn't possible to directly measure most of these indicators!

- They have to be estimated based on calculation using lots of different inputs and modelling
- Build up a picture using both.....

Process Evaluation

What the programme does e.g.....

- Number of labelled products
- Number of products subject to MEPS
- Number of registered models
- Correct display of labels in retail
- Consumer awareness levels
 - Administrative efficiency
 - Number of manufacturer claims checked

Impact Evaluation, e.g.:

- Tracking of sales-weighted efficiency trends
- Appliance price trends Determination of energy savings or other key objectives
- Influence of label on purchase decisions





Data Types and Sources



Data Type	Main Data Sources				
Customer and retailer knowledge, awareness and understanding	stailer Surveys of customers and retailers areness and				
	Sales data from manufacturers, trade associations or government (customs)				
Availability of Products	Web crawling and surveys of manufacturers and retailers				
	Mandatory registration database				
Prices for Efficient Products	Web crawling of websites of retailers and manufacturers				
	Surveys of customers, retailers and manufacturers				
Market Sales	Sales data from manufacturers, trade associations or government (customs)				
Marker Sales	Purchased from third party (e.g. GfK)				
	Manufacturer data				
Energy like	Independent laboratory data				
chergy use	Metered end-use data				
	Mandatory registration database				

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	Brunei	Cambodia	Indonesia	Lao PDR	Malaysia	Myanmar	Philippines	Singapore	Thailand	Viet Nam
Population (M)	0.4 M	15.6 M	257.6 M	6.8 M	30.3 M	53.9 M	100.7 M	5.5 M	68 M	91.7 M
Residential electrification	100%	34%	81%	87%	100%	32%	79%	100%	99%	97%
House: average light points	28	7	10	10	20	9	6	30	14	14
Installed Lamps (M)	3.8 M	14.7 M	596 M	10.5 M	271 M	46.6 M	171 M	97.4 M	449 M	372 M
linear fluorescent	54%	54%	20%	79%	43%	46%	36%	50%	58%	40%
CFL	33%	40%	65%	15%	39%	40%	49%	27%	29%	30%
LED	8%	4%	13%	1%	10%	7%	9%	11%	6%	17%
Inc/Hal	3%	1%	1%	4%	5%	7%	4%	10%	5%	11%
Other	3%	1%	1%	1%	2%	1%	2%	1%	2%	2%
Annual Sales (M)	?	7.5 M	100 M	2 M	50 M	31 M	113 M	25 M	97 M	150 M
linear fluorescent		50% \leftrightarrow	↓	65% \leftrightarrow	33%		23%	50%	46% \leftrightarrow	↓
CFL		34% 🕇	\leftrightarrow	30% 🕇	44%		71%	23%	29% 🕇	1
LED		1	1	1% 🕇					1	1
Inc/Hal		16% 🗸	↓	4% 🗸	16%		6%	27%	13% 🗸	\checkmark
Other				1% \leftrightarrow	7%				2%	

Example of performance indicator: ASEAN lamps



Statistics: Rated values and Efficacy

		LED lan	np MEPS	Other lamp MEPS or Labels				No lamp MEPS or Labels		
	ASEAN	Malaysia	Singapore	Indonesia	Philippines	Thailand	Vietnam	Cambodia	PDR Laos	Myanmar
Total no of models	240	30	20	30	30	30	30	30	24	16
Below efficacy	26	0	0	8	0	0	6	4	3	5
limit of										
65	11%	0%	0%	27%	0%	0%	20%	13%	13%	31%
Exceed rated	4	0	1	0	0	2	1	0	0	0
Power by										
110%	2%	0%	5%	0%	0%	7%	3%	0%	0%	0%
Below rated Power by 90%	92	11	5	12	9	5	14	15	8	13
	38%	37%	25%	40%	30%	17%	47%	50%	33%	81%
Exceed rated	38	4	4	2	6	14	5	3	0	0
lumens by 110%										
	16%	13%	20%	7%	20%	47%	17%	10%	0%	0%
Below rated	39	1	1	10	7	1	3	4	10	2
lumens by										
90%	16%	3%	5%	33%	23%	3%	10%	13%	42%	13%

Example indicator: EU Energy Label and Refrigerator Sales





topten.eu - Energy efficiency of White Goods in Europe: monitoring the market with sales data (2004-2014)

Example: Compliance of Refrigerators and Freezers in Germany



- 21 models selected for compliance verification
- 5 models failed



IEA energy efficiency indicators

- One source of data
- Over 10 years of developing energy efficiency indicators
- Based on statistics from members
- Detailed analysis
- Multiple publications
- <u>https://www.iea.org/topics/energ</u> yefficiency/statistics/



Background: Disaggregation of total energy consumption







Analysis: Impact of Refrigerator Standards: Energy Consumption in the USA





ACEEE, 2017. Energy-Saving States of America: How Every State Benefits from National Appliance Standards

Example: Improvements in Refrigerator and Freezer Efficiency in Australia 🛛 😡 🕻





AUS/NZ, Consultation Regulation Impact Statement – Household Refrigerators and Freezers, April 2017

Example: Monitoring the Sales of Lighting in Seven EU Countries 🙆 🥝

- Incandescent bulb sales fell by almost 2/3 in the same period = wide EU phase-out in 2012
- Halogen sales grew by 22% from 2008 to 2013, LED sales increased by 71%, CFLs almost unchanged
- In 2013, 308 million halogens were sold compared to only 22 million LEDs



IEA 4E Mapping and Benchmarking. EU Mapping Report, September 2014, mappingandbenchmarking.iea-4e.org





Reporting: Energy Star Label in the US

- Cumulative Savings since 1992 = > 3,300 TWh by 2016
- In 2015, global electricity generation = 23,816 TWh
- Brand awareness rose from 40% in 2000 to >85% in 2015











Impact analysis of the EU Ecodesign programme indicates that it will cut primary energy consumption by 18% by 2020 (890 TWh) – equivalent to 9% of total energy consumption in EU in 2010

IEA 4E, Achievements of appliance energy efficiency standards and labelling programs - A Global Assessment in 2016

Reporting: Multiple Benefits in Europe





European Commission, 2015 - https://ec.europa.eu/energy/sites/ener/files/documents/eep_infographic_en.pdf

Reporting: Energy Efficient Prosperity: India's Domestic Lighting Programme





Affordable:

The cost of the LED bulb is paid through the utility bill at 10 INR per month making energy efficiency affordable to everyone.

Employment:



UJALA provides temporary employment to more than 35,000 people in the distribution of the LED bulbs across the country. A total of about 700 million INR is paid in wages per month, providing significant benefits to local economies and families.

Help families save money:

UJALA has cut annual household electricity bills by about 15%, equivalent to saving one week's average wages per year. Total savings are over 16 billion INR every year equivalent to the GDP of Mumbai - which families can then spend on goods and services to improve their standard of living.



EESL'S investment in UJALA Is approxImately 2.3 INR per kWh saved while the cost of electricity generation from a coal power plant in India is about 5.2 INR per kWh generated.



Reducing air pollution:

Cutting CO₂ emissions by 3 million tonnes a year equivalent to removing 2.7 million cars from the road.

Helps manage growing energy demand:

The electricity savings achieved under UJALA are equivalent to the generation of a 500 MW coal fired power plant, which would cost 40 billion INR to build at current prices. In addition, these savings could help power at least an additional 1 million households.





http://www.eeslindia.org/writereaddata/Ujala%20Case%20study.pdf





Group exercise

As a group, list the reasons why evaluation is important?

- Plan evaluation from the start and budget ahead!
- Be clear about what the programme objectives are.
- Identify what information you will need to collect and how.
- If you have limited budget keep the goals simple and prioritise.
- Involve industry associations, utilities and other stakeholders where possible.
- Explain findings to secure funding and support from other ministries (e.g. health, environment).

IEA - Energy Efficiency Indicators – online courses

- Take you step-by-step and sector-by-sector through the fundamental aspects and theories of energy efficiency data.
- Self-paced and interactive.
- Provides the necessary knowledge to develop and use energy efficiency indicators in support of effective policy making.
- No set time limit to complete the course, so that it will easily fit into your professional and personal lives.

<u>https://edx.iea.org/</u>

Energy Efficiency Indicators Online Courses

on Statistics

ors: Fundamentals Energy Efficiency I Policy Making

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Energy Efficiency Indicators Online Courses: Expert Videos

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The IEA's Work on Energy Efficiency

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Data Collection Methods: An Overview

Bookmark this page

Welcome to lesson 3 of Module 3, where we will review the 4 key methods for data collection and how they can be applied in the context of the services sector.

*Please check your network firewall if the video does not load automatically.

IEA, 2014, Energy Efficiency Indicators: Fundamentals on Statistics

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Annex – extra examples, slides

- Kevin Lane
- Paris, May 2018
- #EnergyEfficientWorld

Examples of Evaluation Approaches

Country	Approach
China	Process – Survey on awareness and knowledge of the labeling program
Canada	Impact – Surveys by government (biannual) and Canadian Appliance Manufacturing Association (confidential – shipment data)
European Union	 Process – Survey to assess consumer attitudes and issues + interviews with manufacturers and retailers Impact – Survey to assess compliance + independent tests in consumer association laboratories to evaluate accuracy of manufacturer product-performance declarations
Thailand	Process – Behavior and attitudes of consumers with residential surveys (2,000 households) and influence on manufacturer decisions and market uptake (50 firms) Impact – Impact on energy demand savings (actual measurements refrigerators and air conditioners)
United States (Energy Star)	Process – Survey on awareness and purchasing decisions Impact – Energy savings + equipment sales

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• Benefits to Consumers:

- Electric Oven A+ can save €230 compared to D class
- Standby MEPS can save €40 per household per year
- Overall savings estimate at €465 per year per household by 2020

Benefits to Producers and Retailers:

- €55 billion extra revenue per year for European business
- Protect EU industry from low quality and low cost products
- Approximately 30% non-EU countries have adopted EU product regulations

Impact on Energy Security:

- Reduction in energy import of 65 million barrels of oil per year
- Last 5 years €100 billion saved
- Benefits for the Environment:
 - 166 million toe in primary energy = TPES of Italy or 60 million households

Example: Energy Consumption and Sales of Refrigerators in the USA

• Stock rising while total consumption is decreasing slightly

IEA 4E Mapping and Benchmarking. US Mapping Report, December 2012, mappingandbenchmarking.iea-4e.org

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AUS/NZ, Consultation Regulation Impact Statement – Household Refrigerators and Freezers, April 2017

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