Did it Work?

Tracking progress & assessing the multiple benefits

Appliances & Equipment: Session 9

Melanie Slade, IEA

Delhi, 12 December 2018

#energyefficientworld

Group exercise

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

Scenario

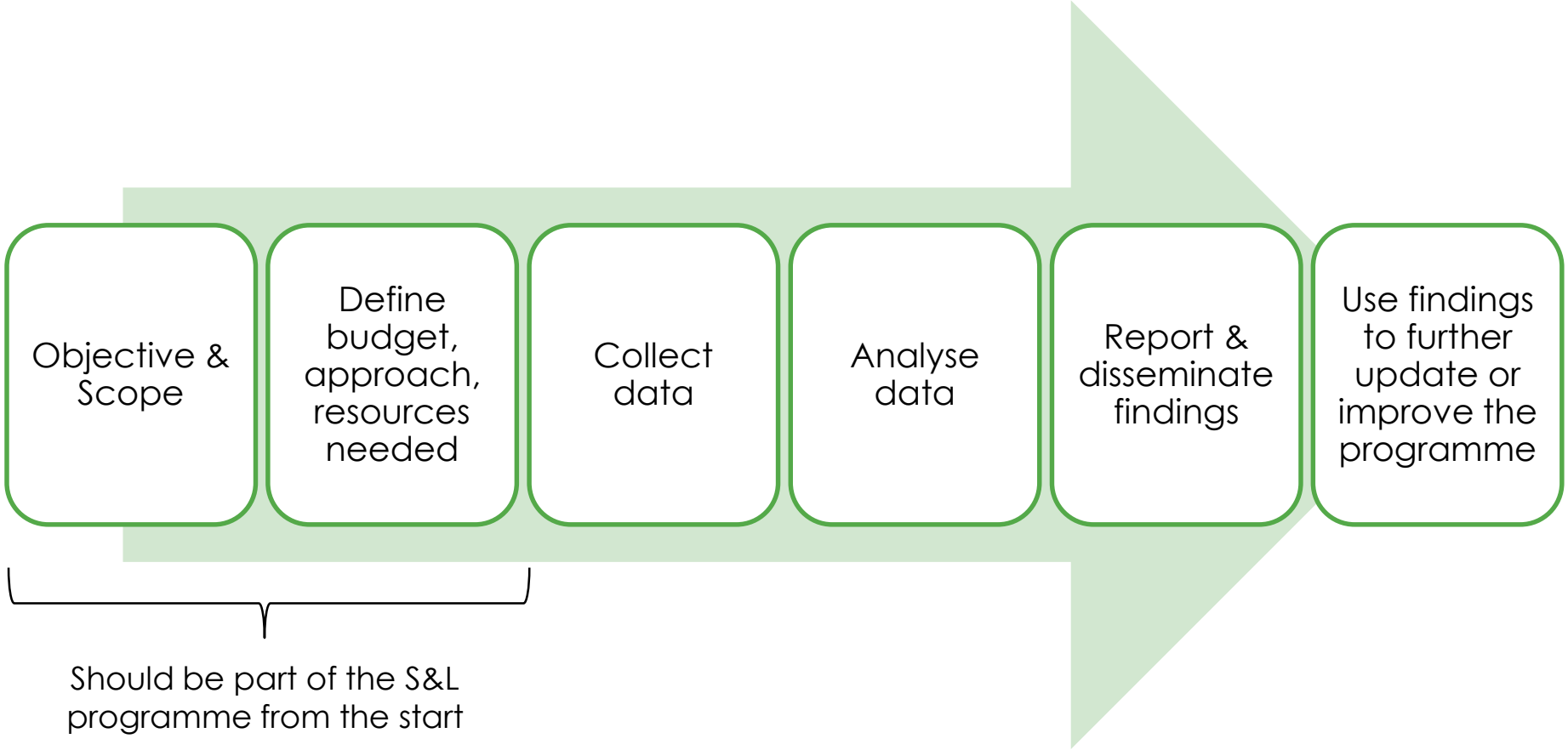
The Minister wants to know how effective your programme has been

How do you go about answering this?

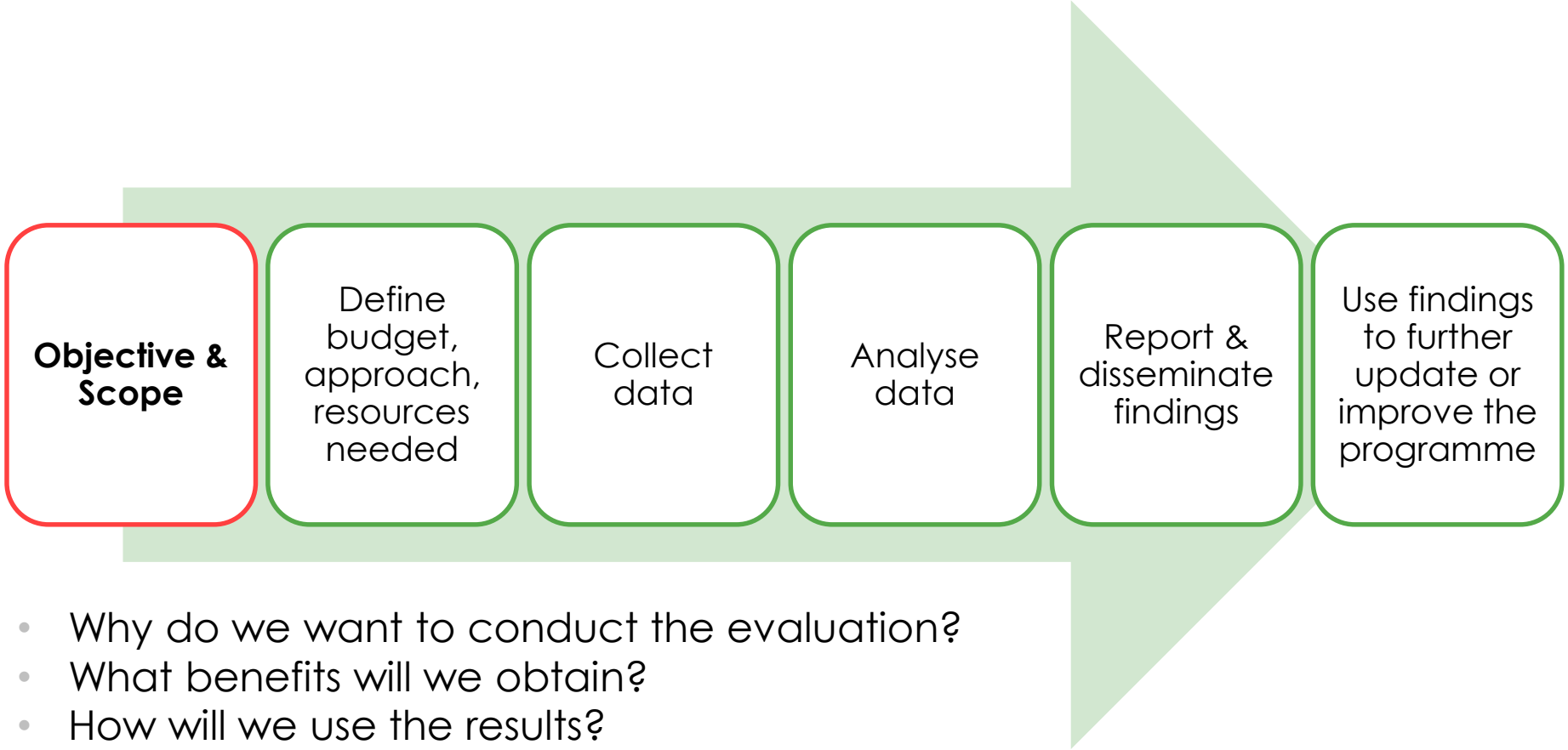
Group exercise

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

Basic Steps for Evaluation

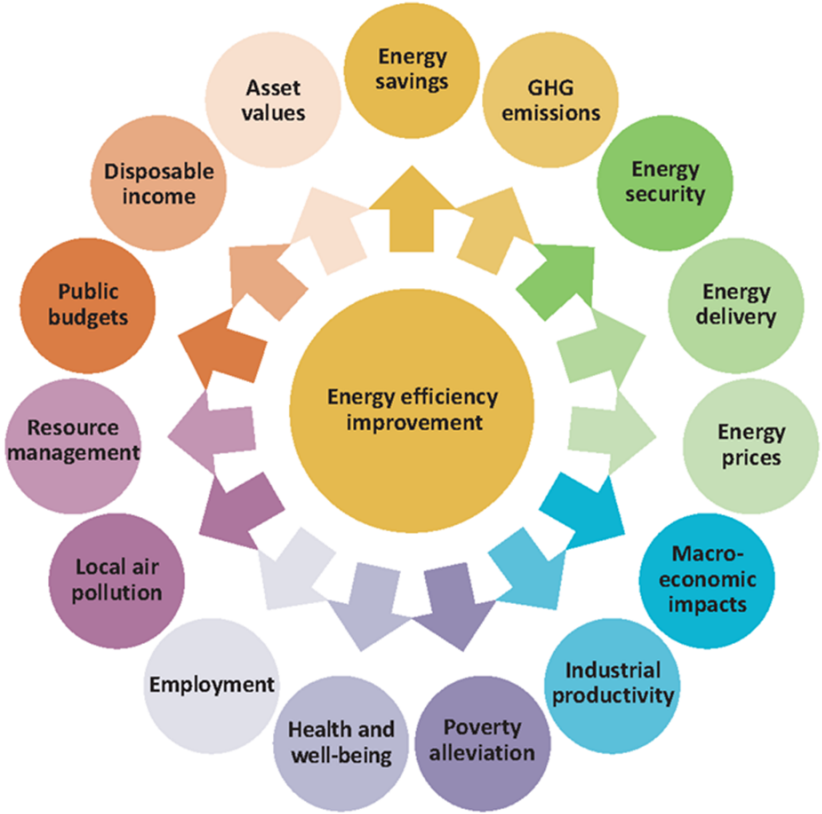


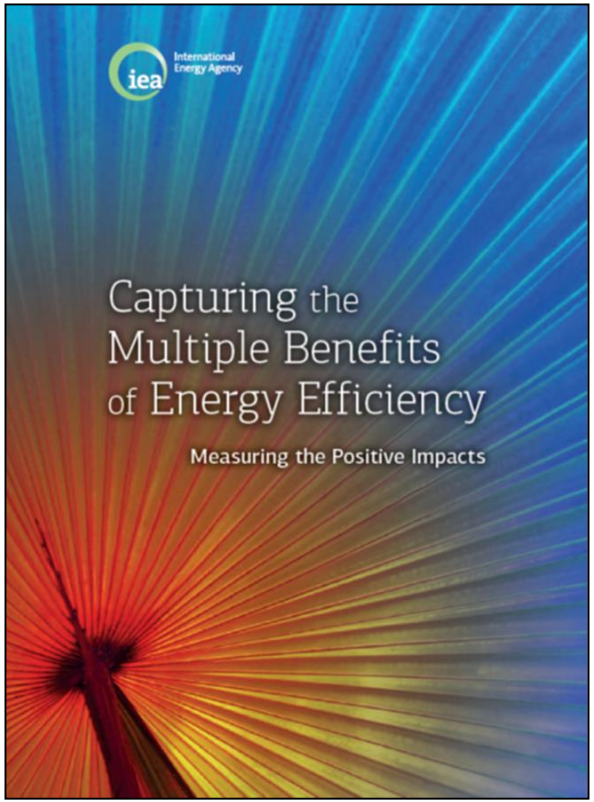
Understanding Programme Objectives



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

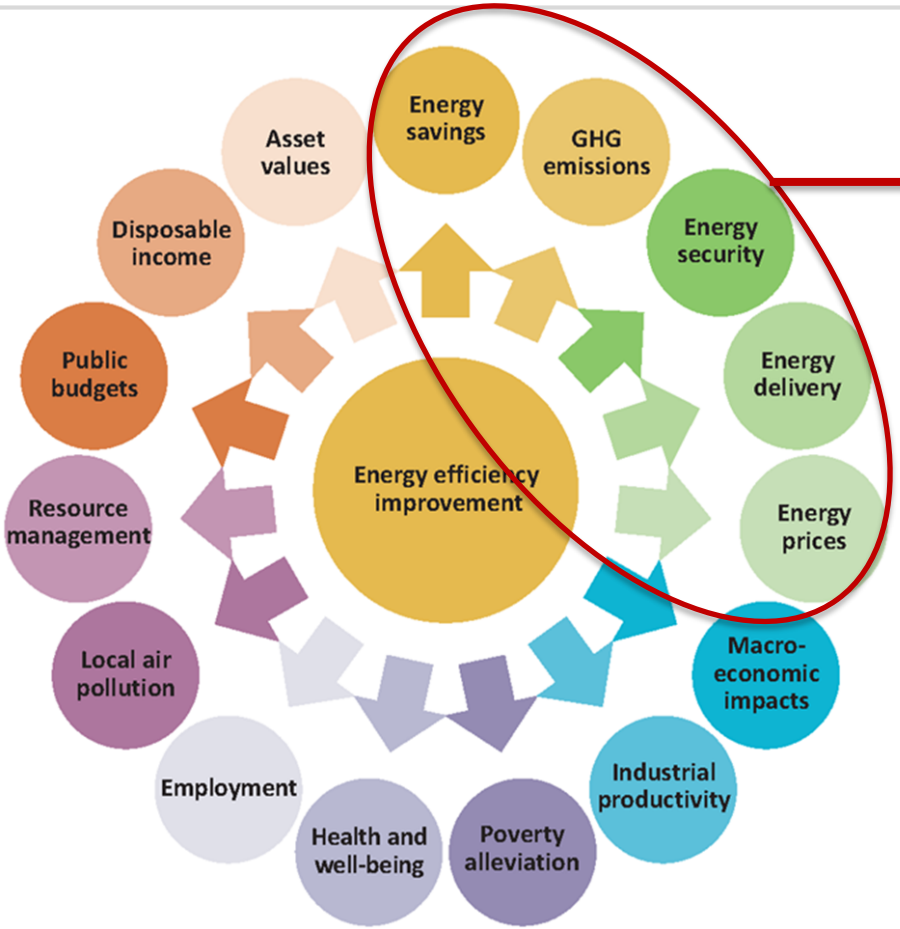
Objectives: What are the Multiple Benefits?





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

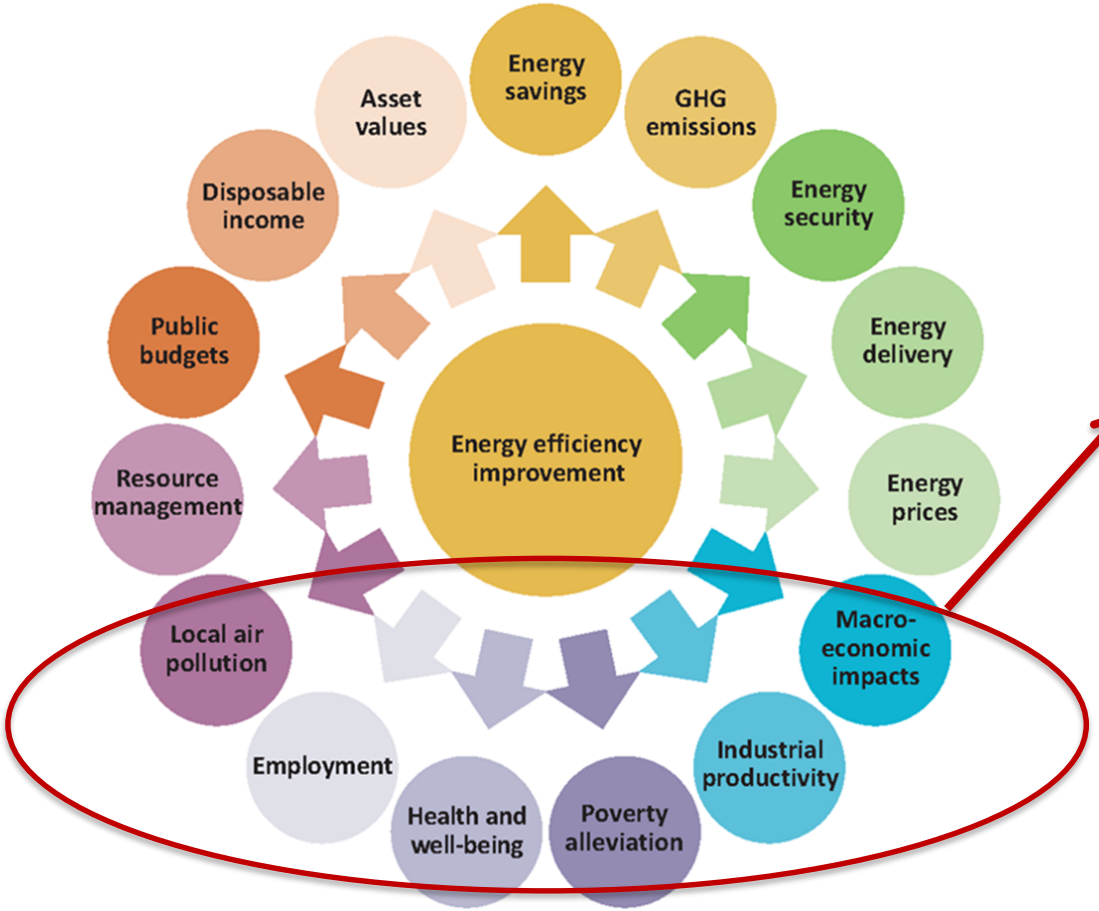
Objectives: What are the Multiple Benefits?



Examples:

- Energy savings
- Avoided imported fossil fuels
- Avoided GHG emissions
- Avoided generation capacity
- Peak demand reduction
- Household energy savings

Objectives: What are the Multiple Benefits?



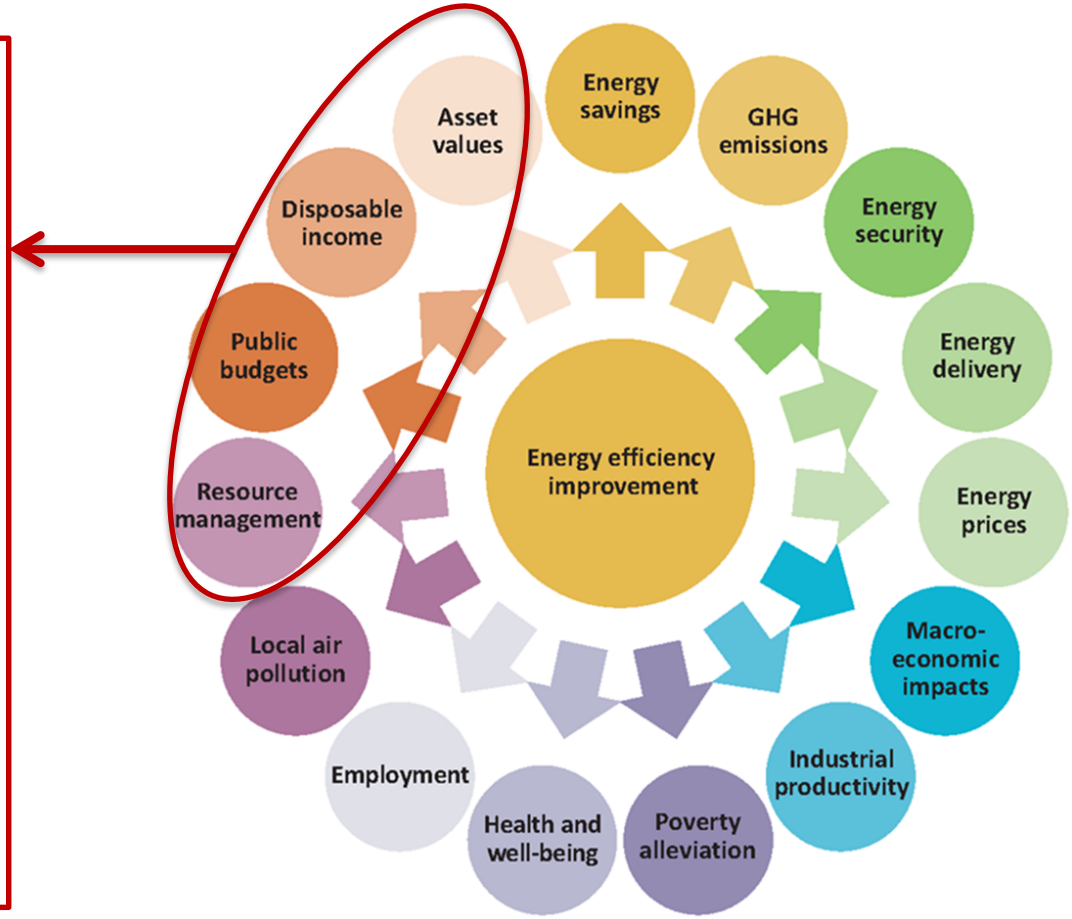
Examples:

- 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

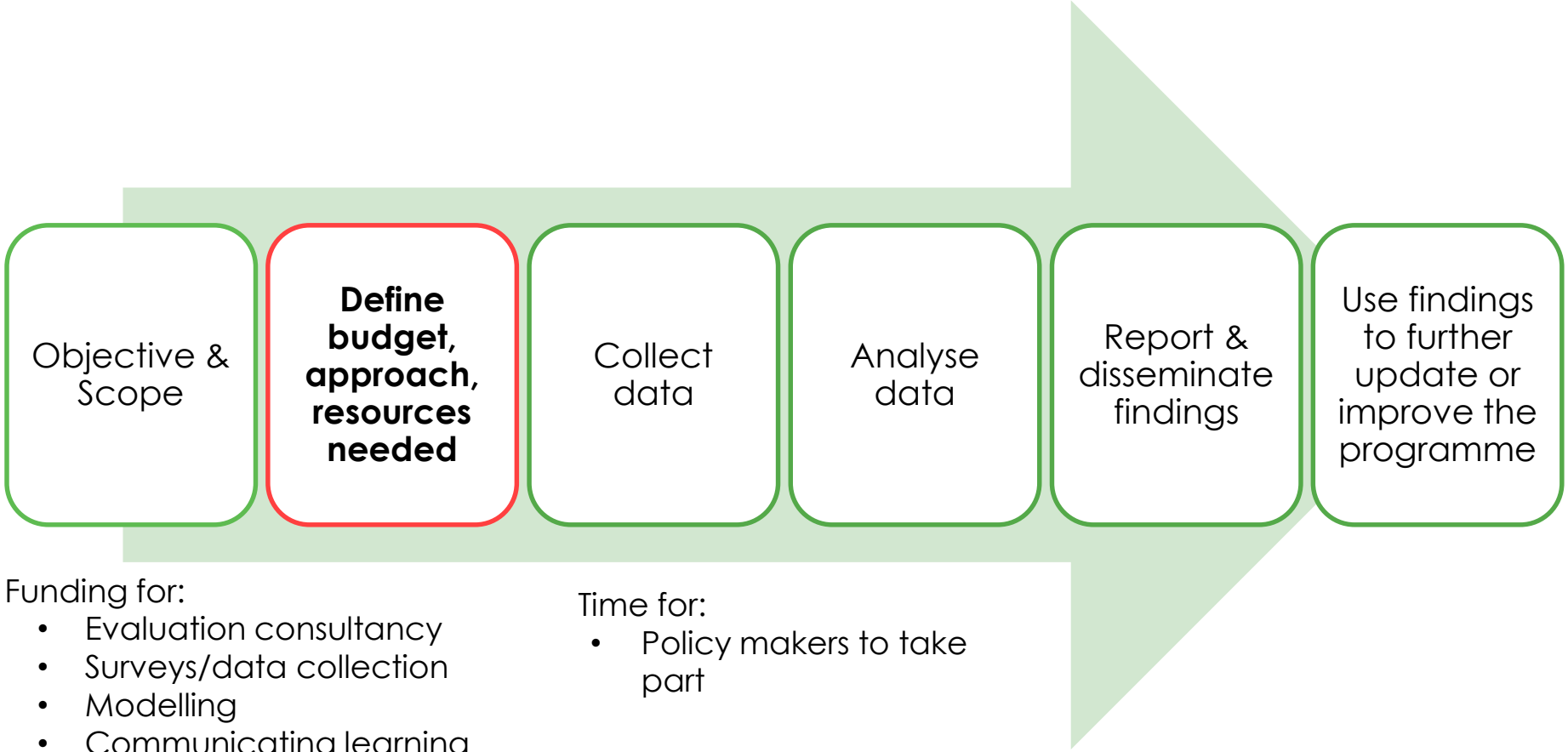
Objectives: What are the Multiple Benefits?

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)



Define budget, approach, resources



Funding for:

- Evaluation consultancy
- Surveys/data collection
- Modelling
- Communicating learning

Time for:

- Policy makers to take part

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

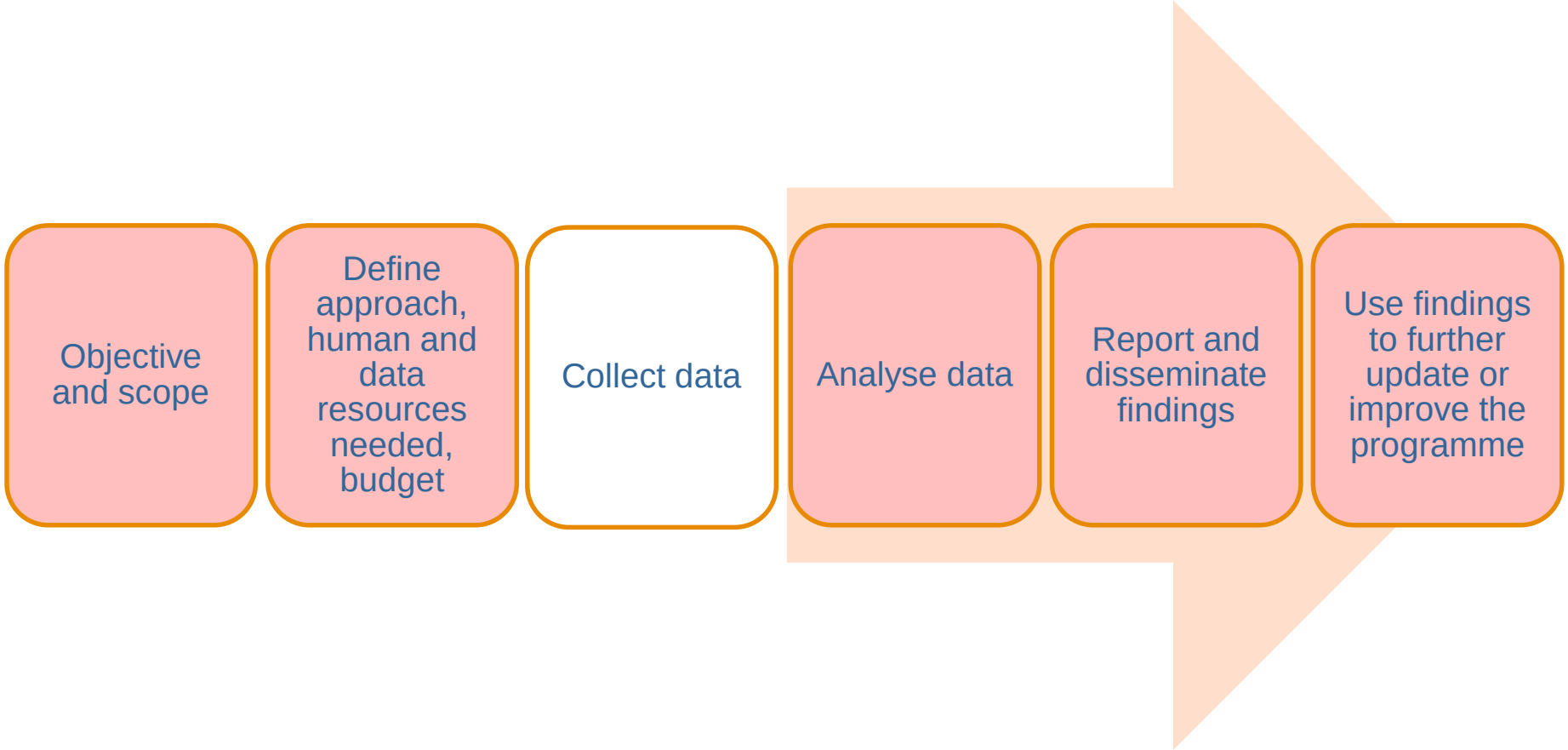
What the programme does e.g…….

- 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

Steps to evaluation…



Data Types and Sources

Data Type	Main Data Sources
Customer and retailer knowledge, awareness and understanding	Surveys of customers and retailers
Availability of Products	Sales data from manufacturers, trade associations or government (customs)
	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)
	Purchased from third party (e.g. GfK)
Energy Use	Manufacturer data
	Independent laboratory data
	Metered end-use data
	Mandatory registration database

Example of market data: ASEAN lamps

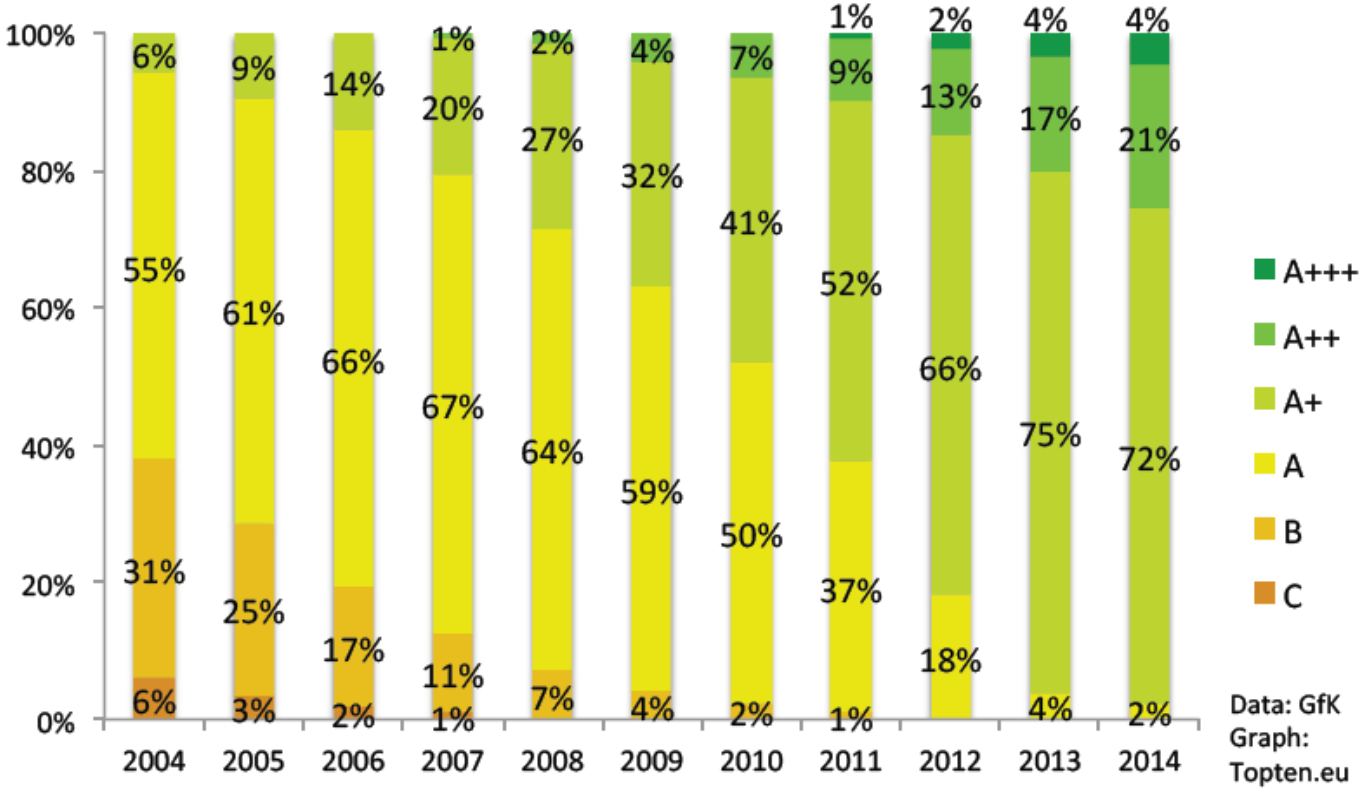
	Brunei	Cambodia	Indonesia	Lao PDR	Malaysia	Myanmar	Philippines	Singapore	Thailand	Viet Nam
Population (M)	**0.4 M**	**15.6 M**	**257.6 M**	**6.8 M**	**30.3 M**	**53.9 M**	**100.7 M**	**5.5 M**	**68 M**	**91.7 M**
Residential electrification	100%	34%	81%	87%	100%	32%	79%	100%	99%	97%
House: average light 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% ↔	↓	65% ↔	33%		23%	50%	46% ↔	↓
CFL		34% ↑	↔	30% ↑	44%		71%	23%	29% ↑	↑
LED		↑	↑	1% ↑					↑	↑
Inc/Hal		16% ↓	↓	4% ↓	16%		6%	27%	13% ↓	↓
Other				1% ↔	7%				2%	

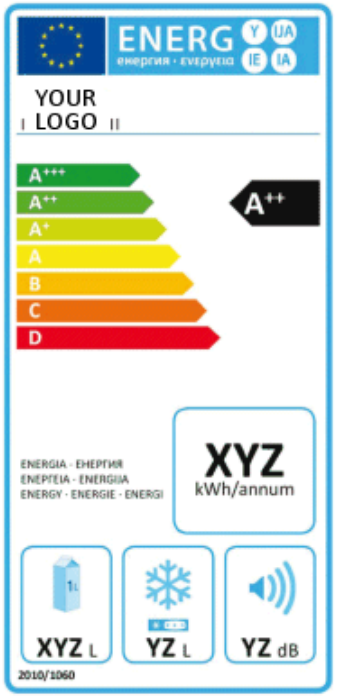
Example of performance indicator: ASEAN lamps

Statistics: Rated values and Efficacy

		LED lamp 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 limit of 65	26	0	0	8	0	0	6	4	3	5
	11%	0%	0%	27%	0%	0%	20%	13%	13%	31%
Exceed rated Power by 110%	4	0	1	0	0	2	1	0	0	0
	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 lumens by 110%	38	4	4	2	6	14	5	3	0	0
	16%	13%	20%	7%	20%	47%	17%	10%	0%	0%
Below rated lumens by 90%	39	1	1	10	7	1	3	4	10	2
	16%	3%	5%	33%	23%	3%	10%	13%	42%	13%

Example indicator: EU Energy Label and Refrigerator Sales

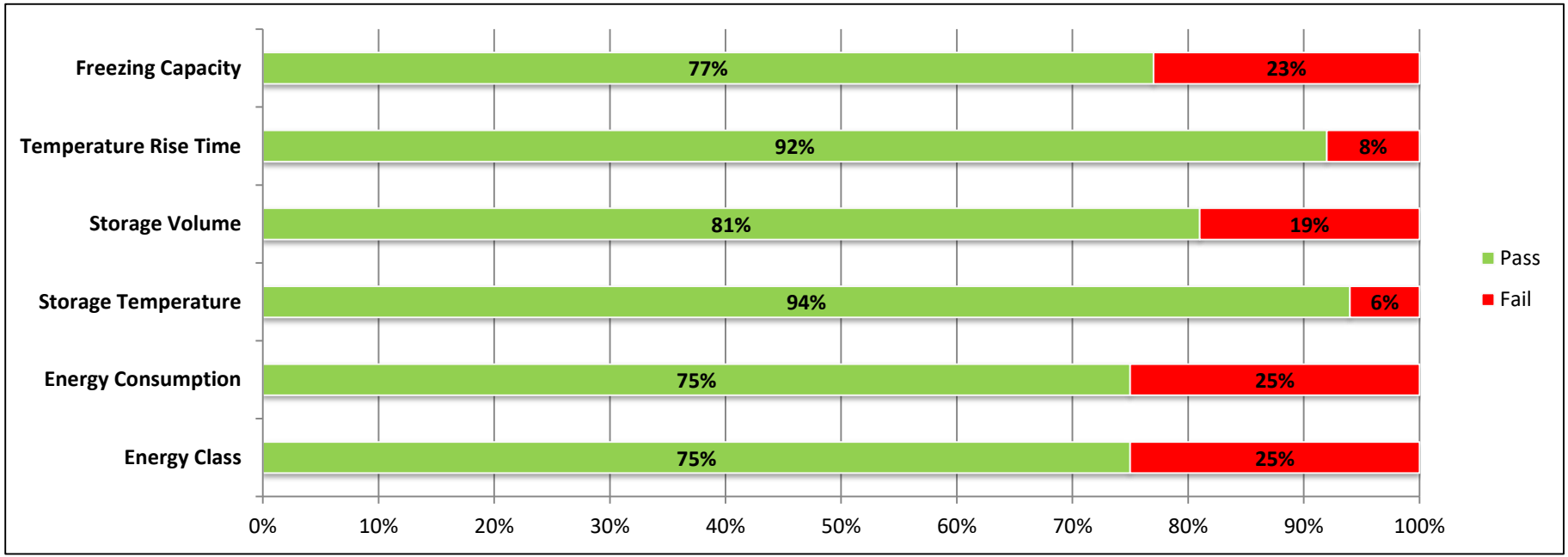




topten.eu - Energy efficiency of White Goods in Europe: monitoring the market with sales data (2004-2014)

Example: Compliance of Refrigerators and Freezers in Germany

- 21 models selected for compliance verification
- 5 models failed



EU Come On Labels Project www.come-on-labels.eu

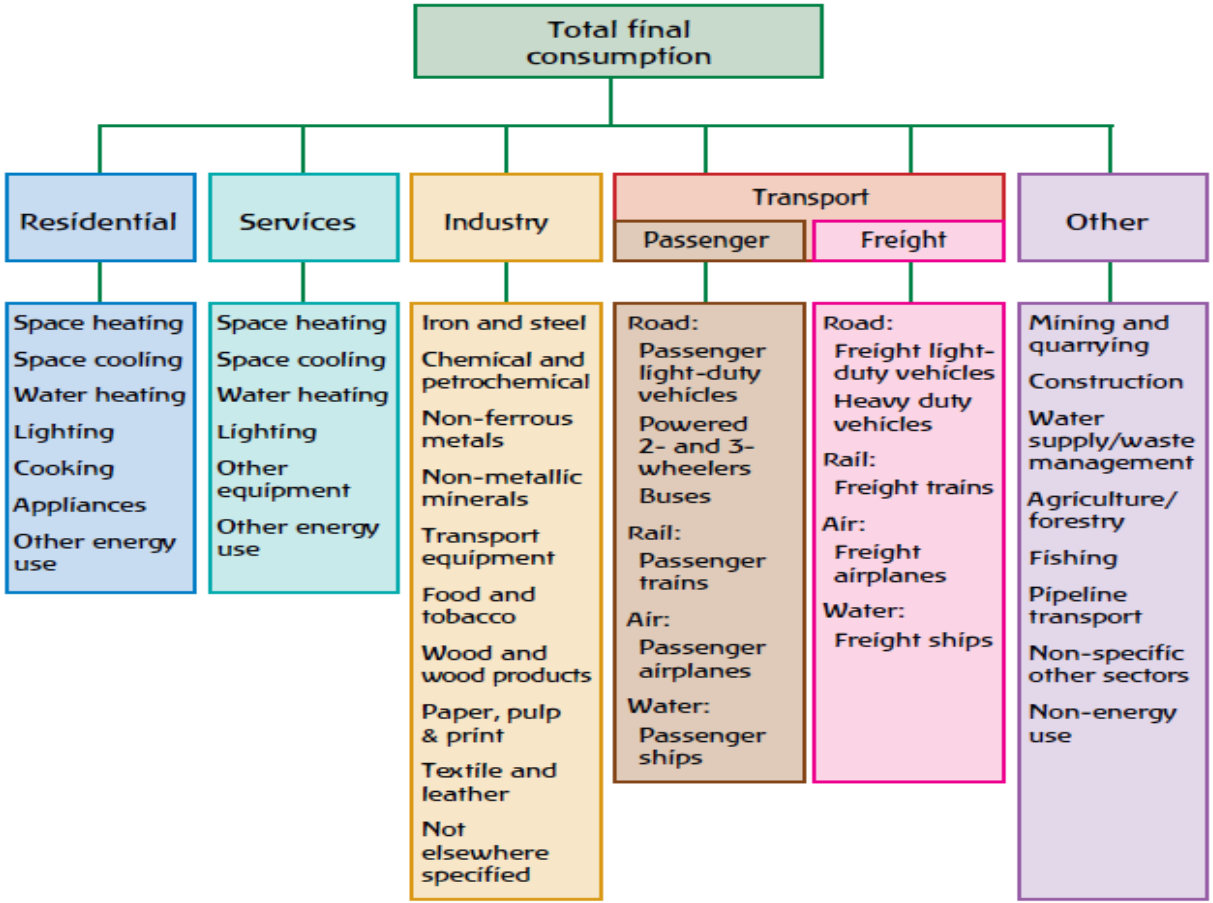
IEA energy efficiency indicators

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

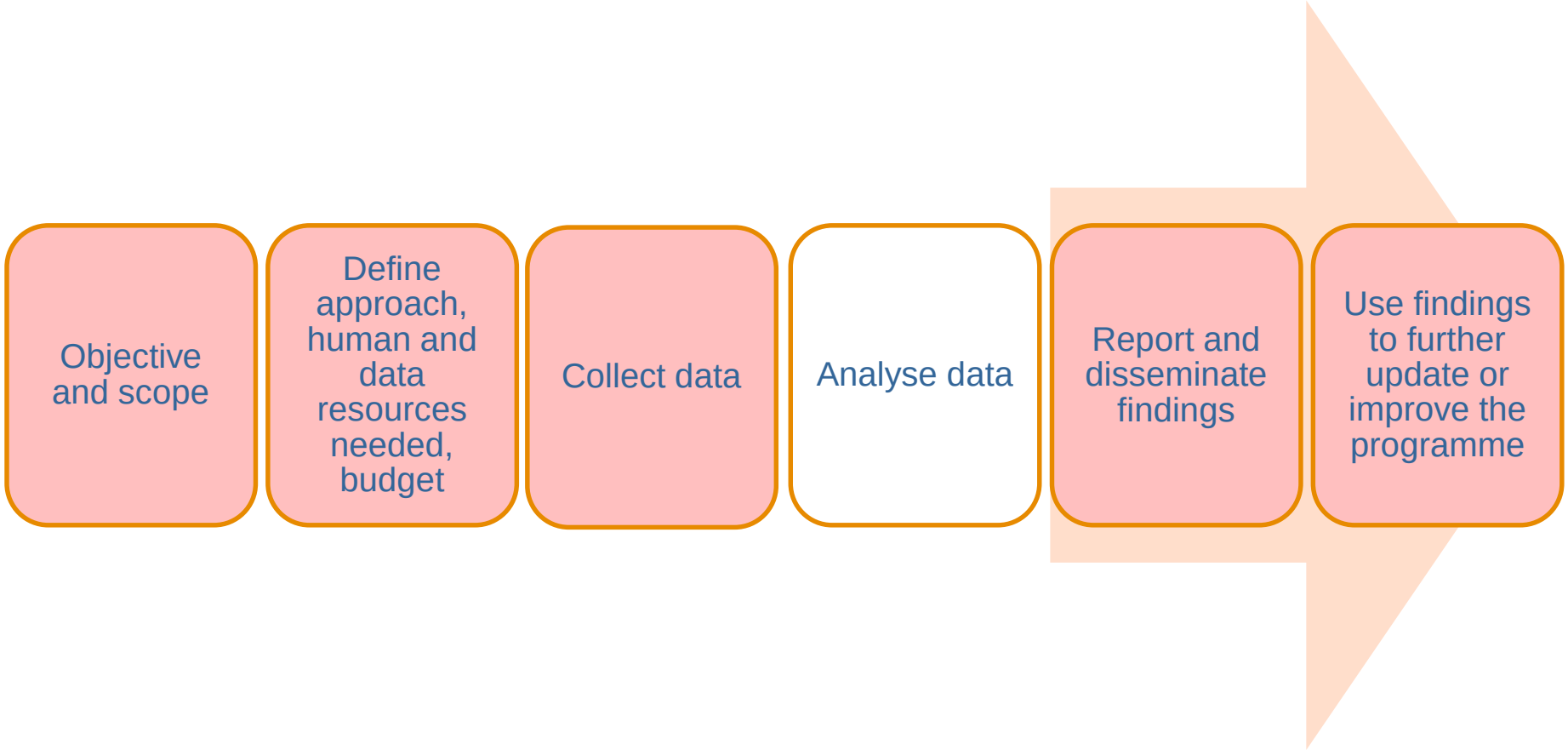
Background: Disaggregation of total energy consumption

Source: Energy balance

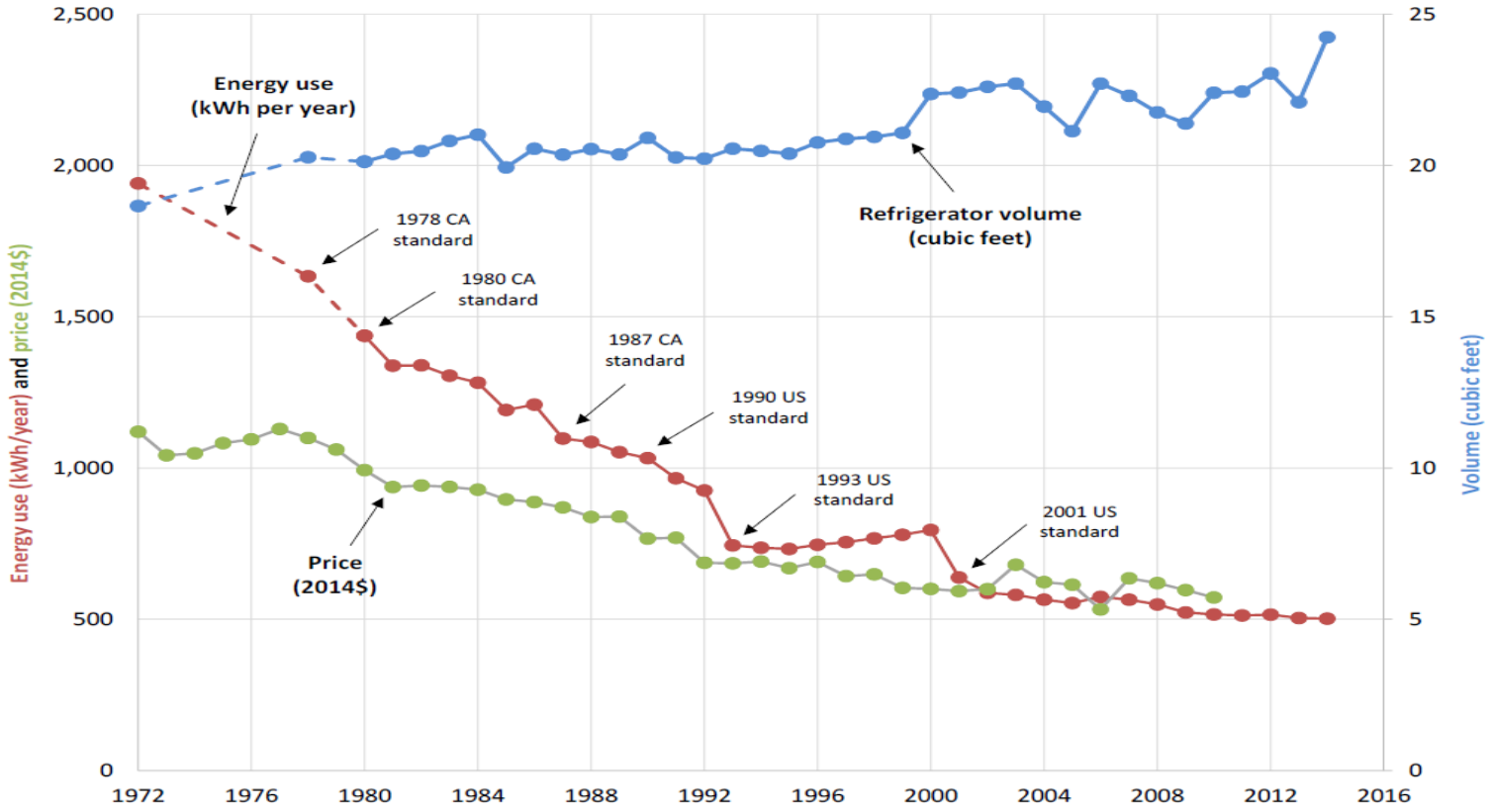
Source: Other



Steps to evaluation…

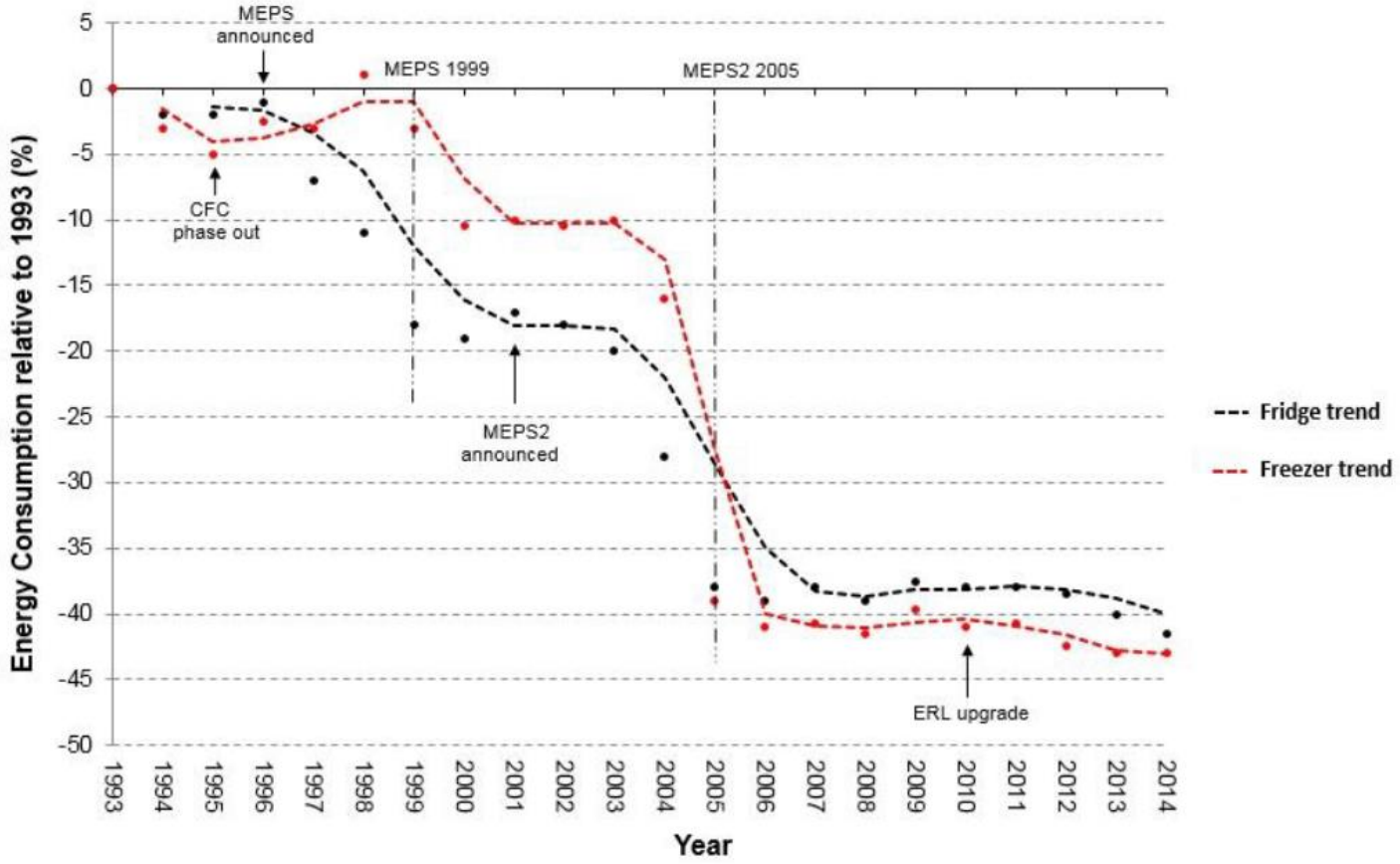


Analysis: Impact of Refrigerator Standards: Energy Consumption in the USA



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

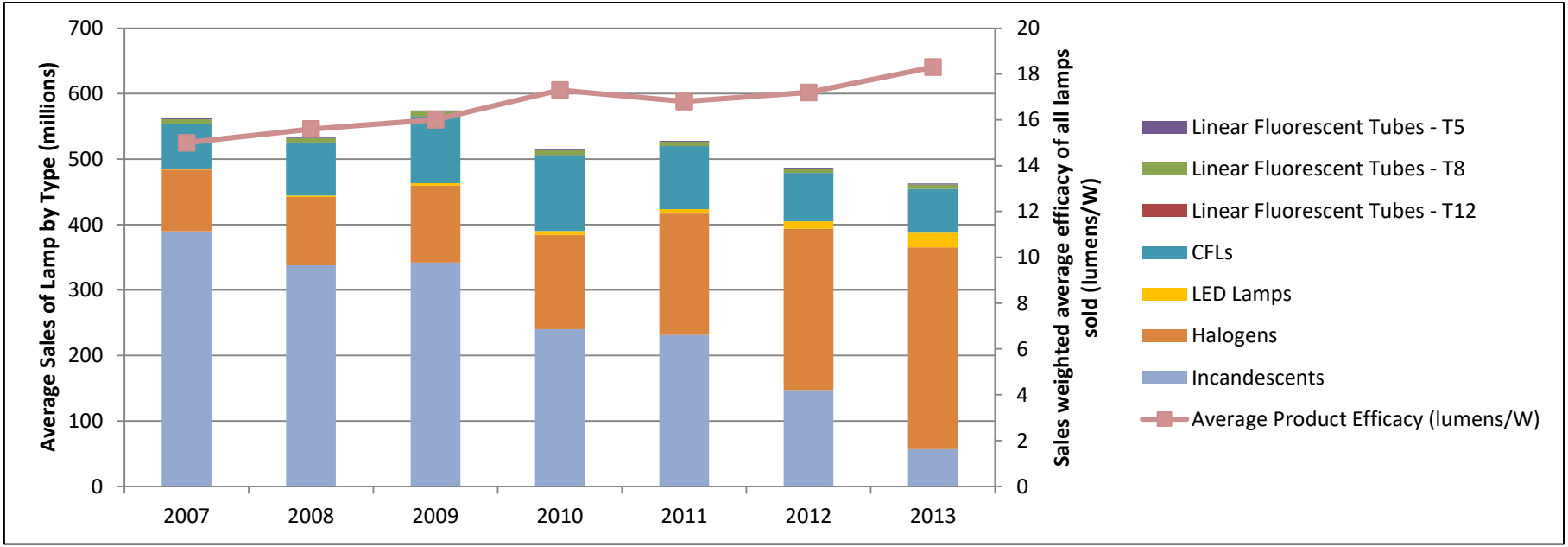
Example: Improvements in Refrigerator and Freezer Efficiency in Australia



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

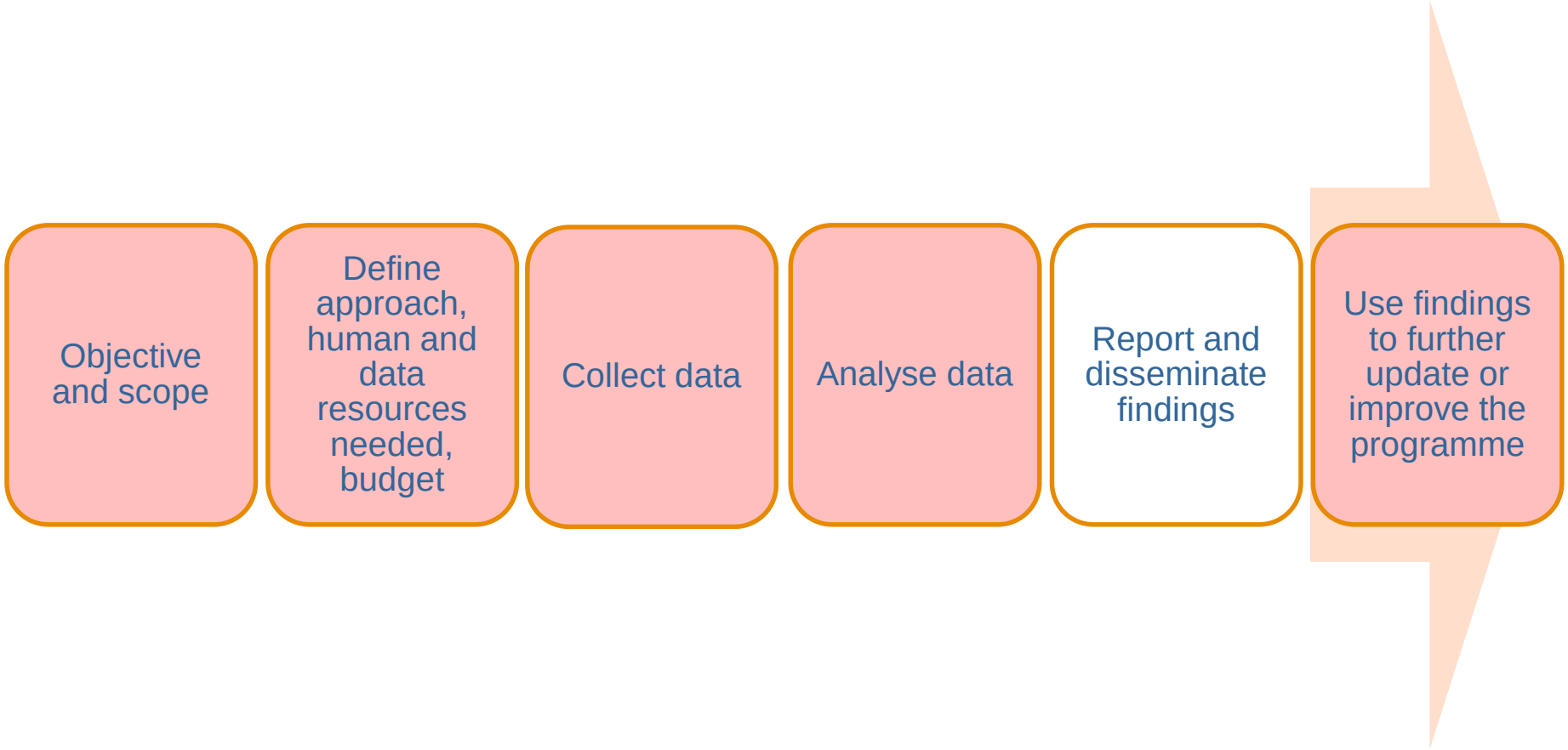
Example: Monitoring the Sales of Lighting in Seven EU Countries

- 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



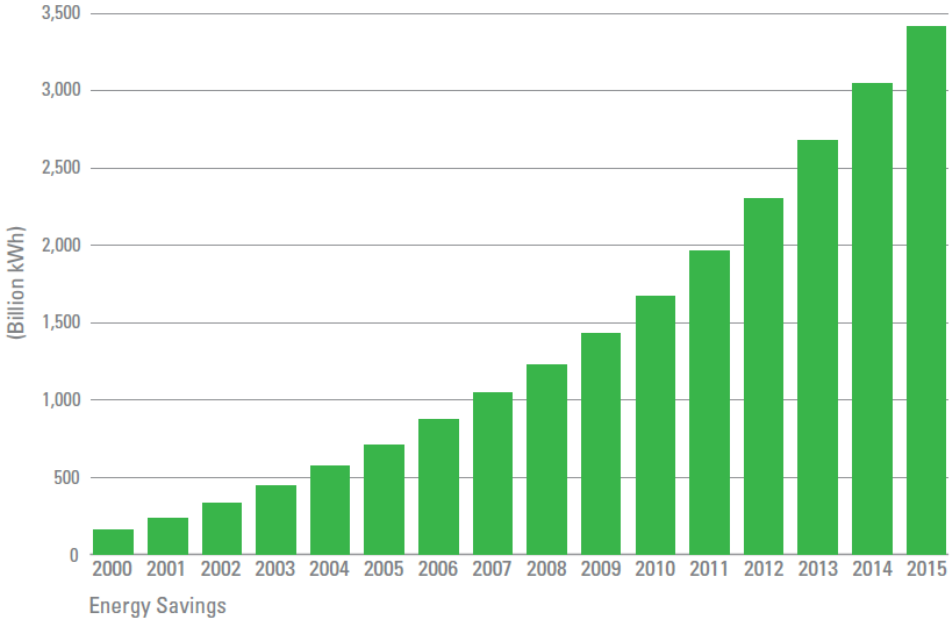
IEA 4E Mapping and Benchmarking. EU Mapping Report, September 2014, mappingandbenchmarking.iea-4e.org

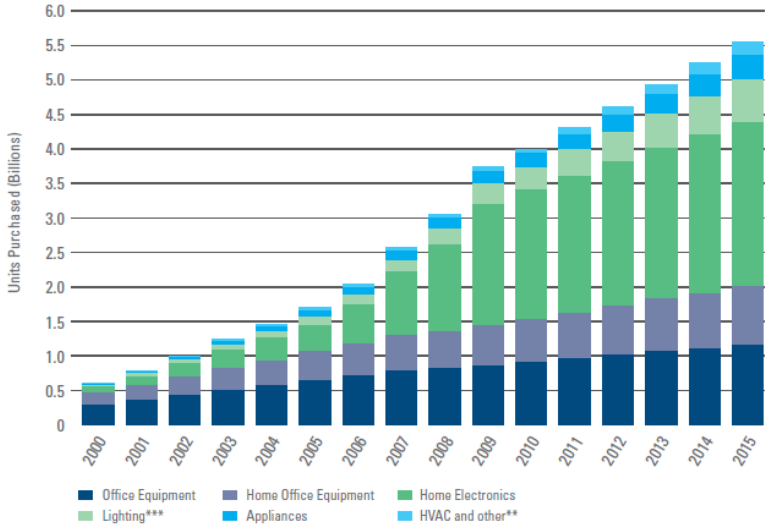
Steps to evaluation…



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

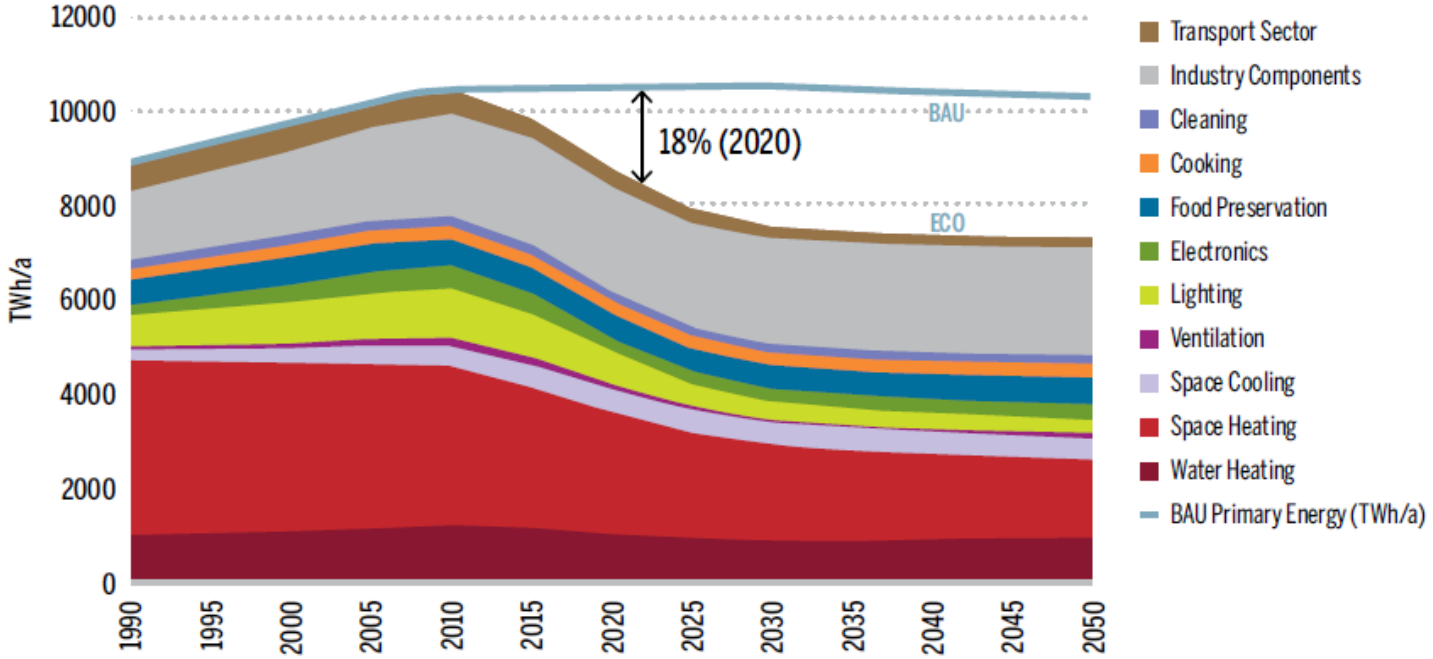




* Program began in 1992.
** Other category does not include roofing purchases.
*** Lighting category does not include purchases of light bulbs.

Energy Star, 2015. Overview of 2015 Achievements, http://www.energystar.gov/

Reporting: Impact of EU Ecodesign Programme on Primary Energy Consumption



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

10 things you didn't know about **ENERGY EFFICIENT PRODUCTS**

EUROPE consumes less energy thanks to energy efficient products

100 billion euros It has saved in the last 5 years

If you use only energy efficient products in your home,

You could be saving **465** euros annually in your household by 2020

If we all do, Europe will

SAVE ENERGY

equivalent to the annual energy consumption of Italy

This will happen annually, from 2020 onwards

ECODESIGN

helps to make products energy efficient

It addresses products' energy consumption and other environmental impacts such as emissions, waste or water use

Today in Europe

24 product groups are energy efficient thanks to Ecodesign

14 of them also have an **ENERGY LABEL**

The first label was created in **1979** following the oil crisis

It informed consumers about the energy performance of common household appliances

GAS OVENS will have the energy label from 2015

Buying the most efficient one means saving **180** euros per gas oven over its lifetime

New **COFFEE MACHINES** will switch into standby when not used

This means **45** euros saved per coffee machine over its lifetime

NETWORKED devices will power down when not needed, and let you save **40** euros per year

And energy labels will be shown in online shops

In the EU, more than **85%** of consumers use the energy label when purchasing

This means 55 billion euros per year **EXTRA REVENUE** for businesses and 800 000 **MORE JOBS**

Energy efficient products. Your power to choose.

#EnergyEfficiency #EUenergy

December 2014

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

1 Affordable:

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

2 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.

3 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.

4 UJALA is cheaper than electricity:

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.

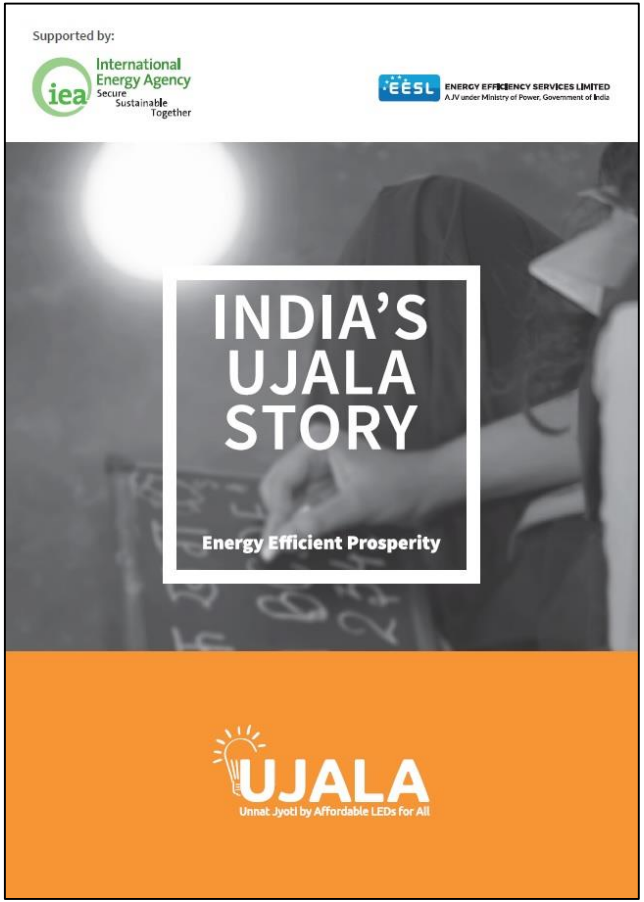
5 Reducing air pollution:

Cutting **CO_2 emissions** by **3 million tonnes a year** equivalent to **removing 2.7 million cars** from the road.

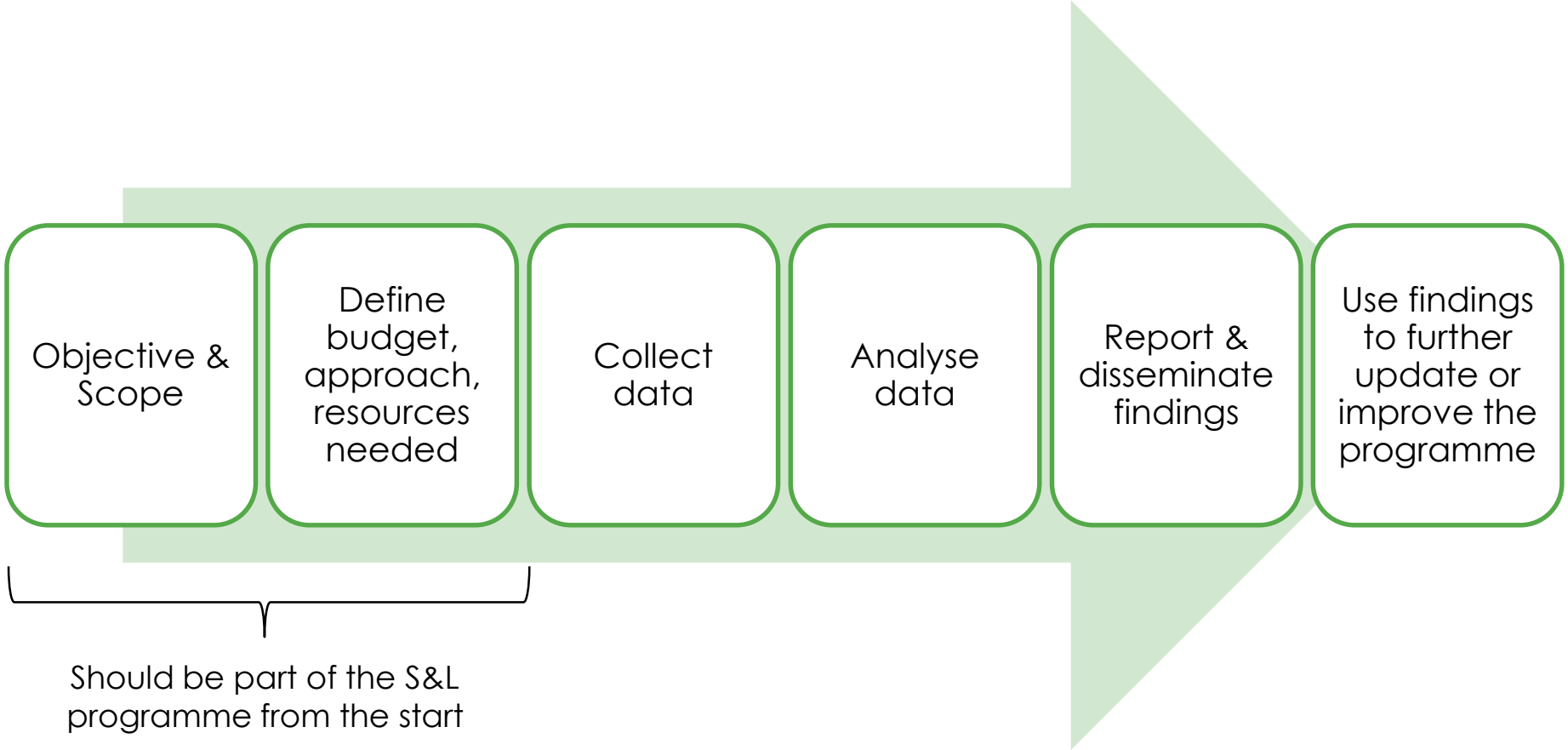
6 Helps manage growing energy demand:

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



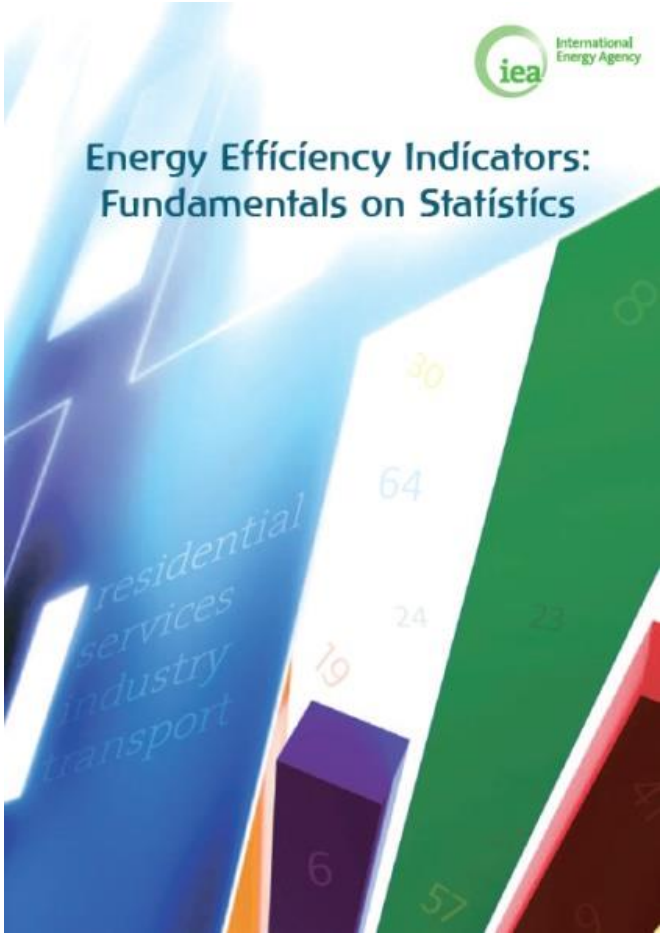
Summary - Basic Steps for Evaluation

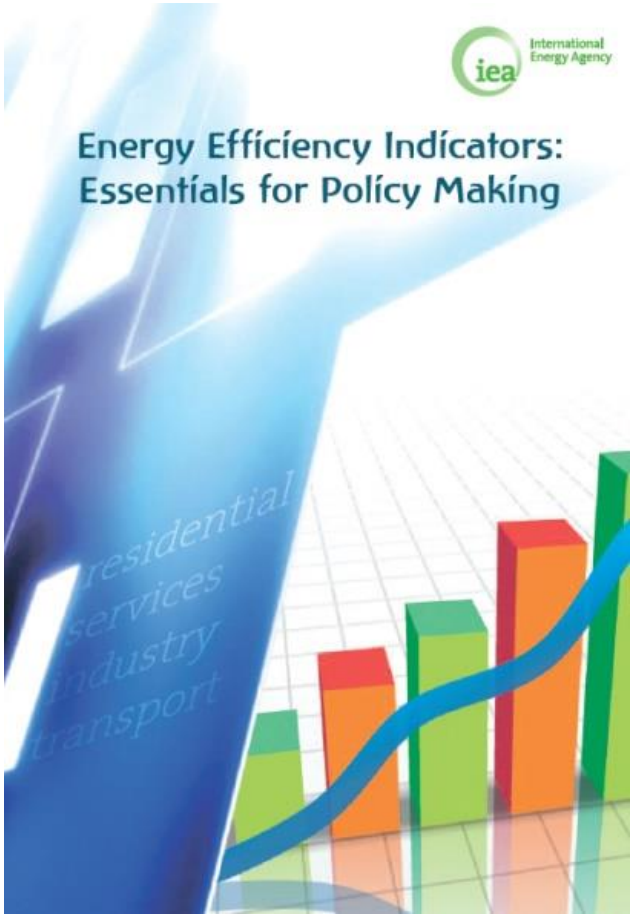


Summary

- 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

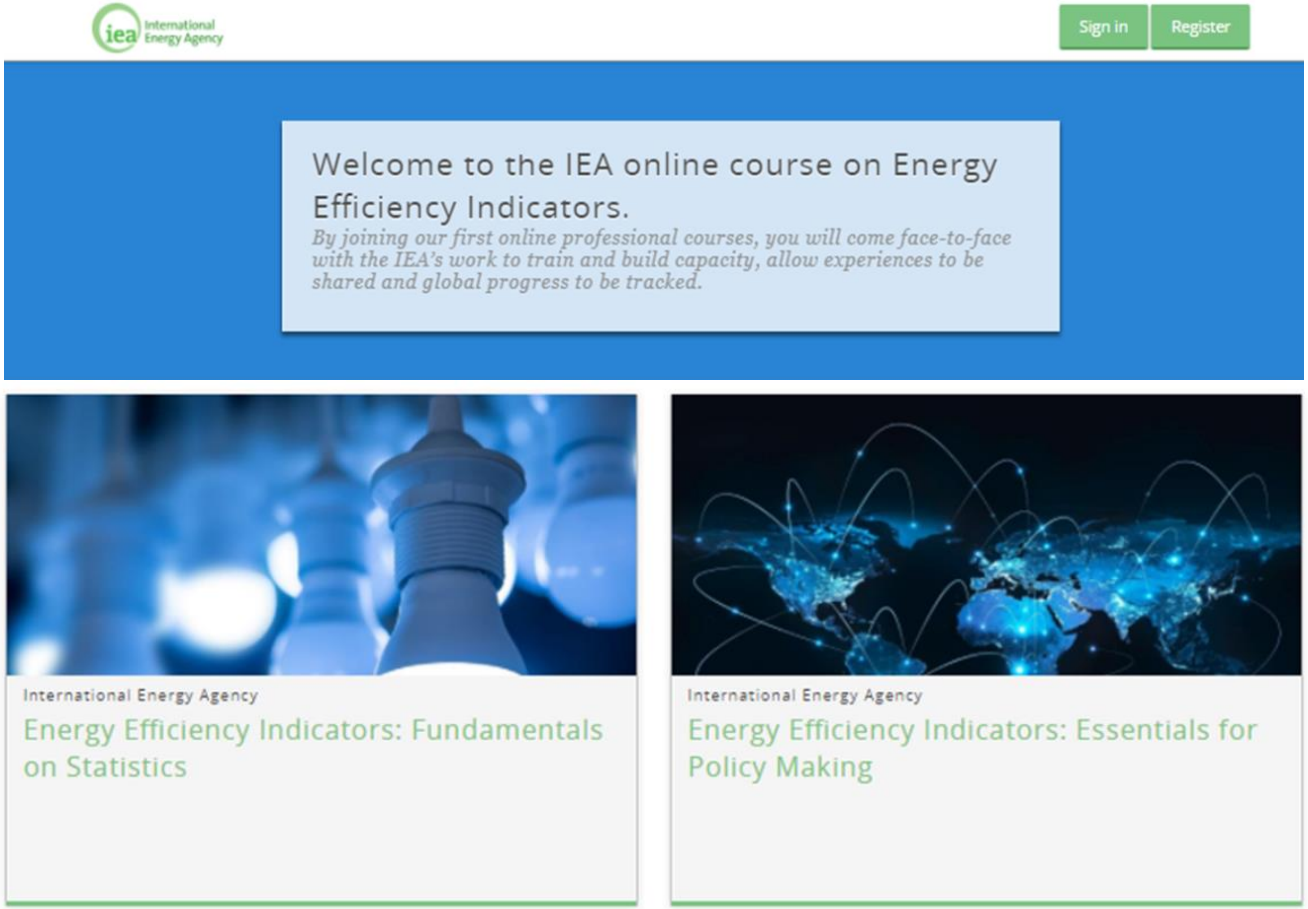




Energy Efficiency Indicators Online Courses

- 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.
- https://edx.iea.org/

Energy Efficiency Indicators Online Courses



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

www.iea.org

#energyefficientworld

Annex – extra examples, slides

- Kevin Lane
- Paris, May 2018

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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

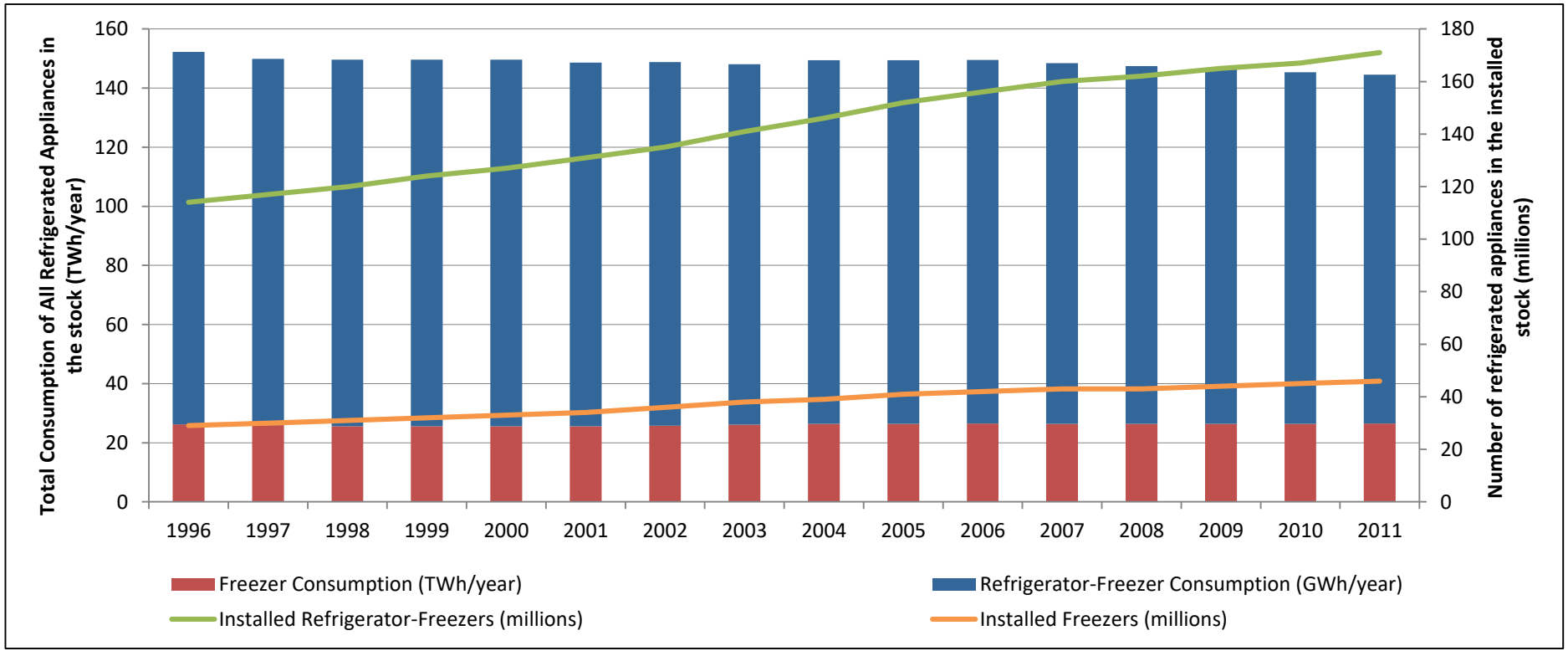
Analysis: Multiple Benefits (impacts) in Europe

- **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

European Commission, 2015 - https://ec.europa.eu/energy/node/2349

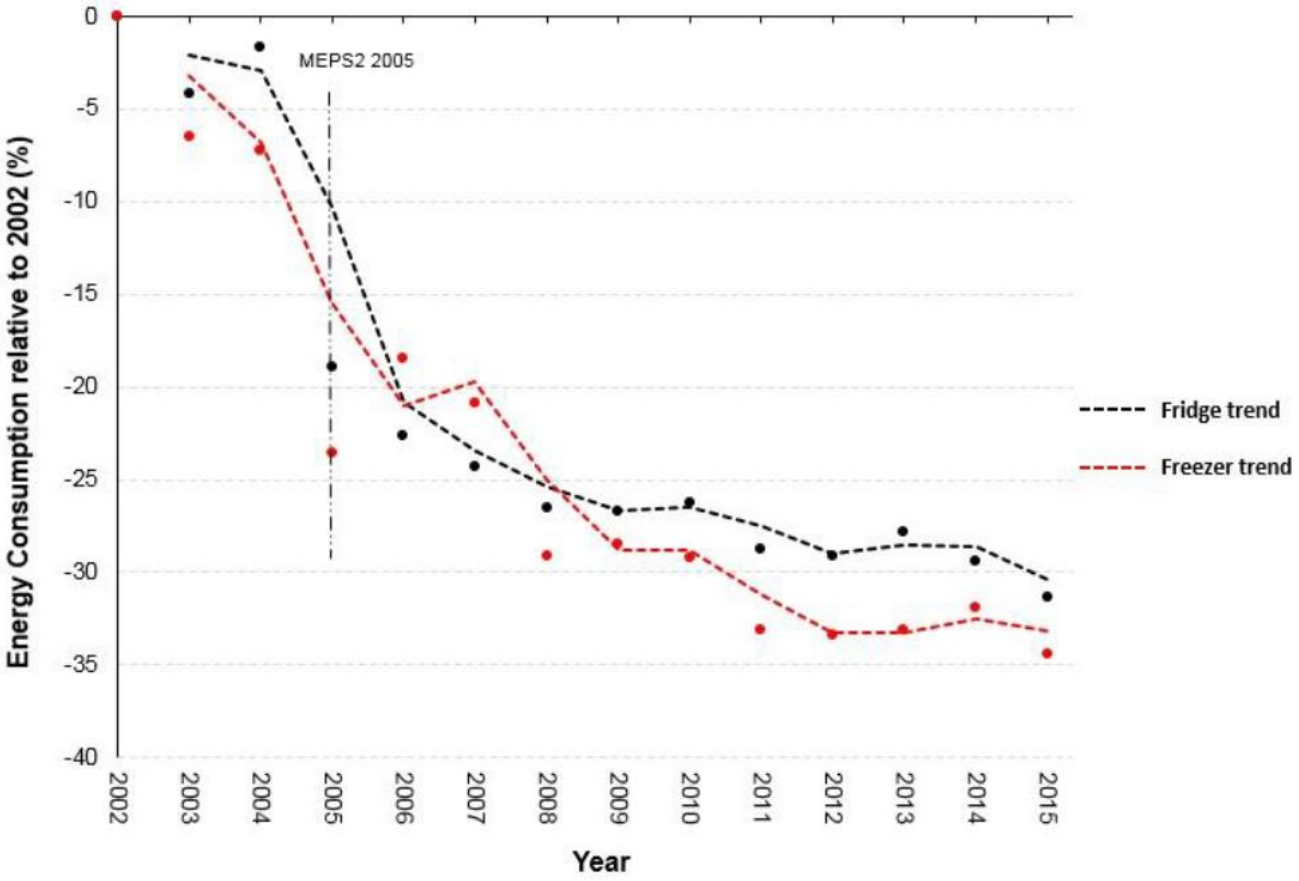
Example: Energy Consumption and Sales of Refrigerators in the USA

- Stock rising while total consumption is decreasing slightly



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

Example Indicator: Improvements in Refrigerator and Freezer Efficiency in New Zealand



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

www.iea.org

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