9. Evaluation and EE Indicators

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9. Evaluation and EE Indicators

Trainer(s): John Dulac

Scenario: The national government wants to know how effective the energy efficiency programmes have been and wants to compare different cities.

Question: How do you develop indicators that properly measures the benefits of your programmes?

Training Overview

1. **Why Evaluate?**
   - Determine impact, provide insight, determine value for money

2. **Using indicators**
   - Value of indicators
   - Analyses that can be done (performance, demand, decomposition)
   - Examples of indicators in urban areas: IEA, ESMAP

3. **Activity:** Telling the story

4. **What are the steps?**
   - What needs to be tracked, define the indicators
   - Assess data and tell the story
   - Embedding evaluation in project planning

10 mins

15 mins

30 mins

15 mins

1. Why Evaluate?

1. Why Evaluate?

Your peers in the Indicators and Evaluation course will specialise more on this topic. It is important to understand how you can use evaluation into your specialty in the urban environment

1. Why Evaluate?

Impact, what did we achieve?

- Regulators
- NGOs and public

Process, how did it go?

- Programme managers
- Partners

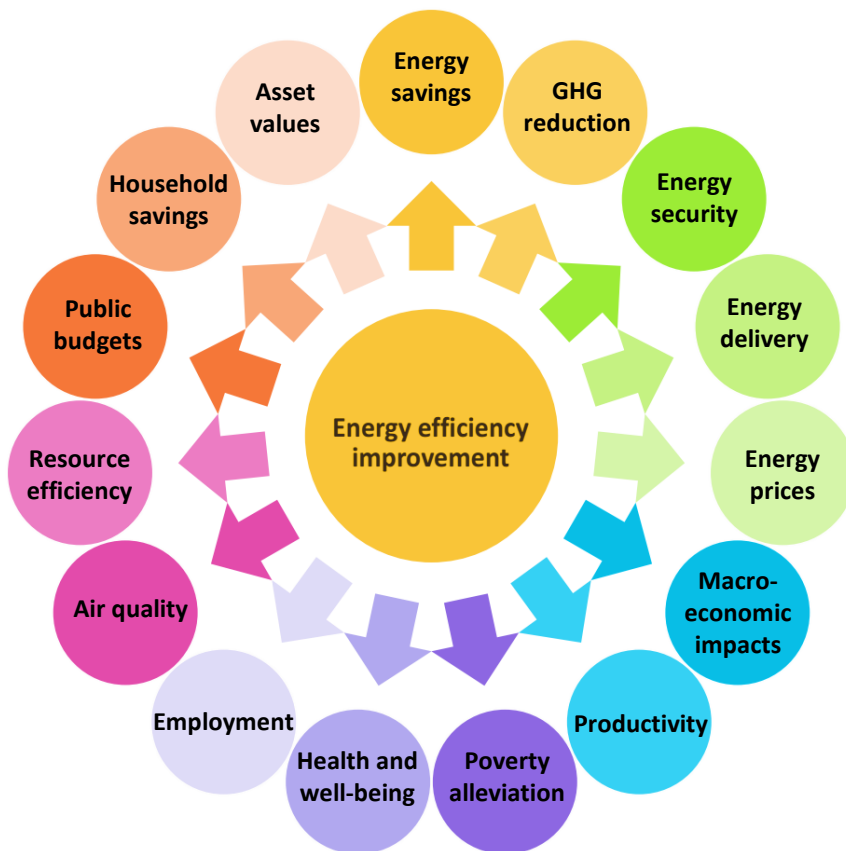Economic, did we get value for money?

- Funders
- Treasury

1. Why Evaluate?

Impact, what did we achieve?

Energy savings · GHG reduction · Energy security · Energy delivery · Energy prices · Macro-economic impacts · Productivity · Poverty alleviation · Health and well-being · Employment · Air quality · Resource efficiency · Public budgets · Household savings · Asset values

Energy efficiency improvement

Energy efficiency policies affect multiple aspects of society and the economy of interest to stakeholders

These are some of the multiple benefits or impacts that must be considered in evaluation

Are these impacts being considered in your evaluation reports?

IEA's Multiple Benefits Diagram
https://www.iea.org/publications/freepublications/publication/Multiple_Benefits_of_Energy_Efficiency.pdf

1. Why Evaluate?

Process, how did it go?

Evaluation also provides insight on how the programme was delivered

Programme Delivery

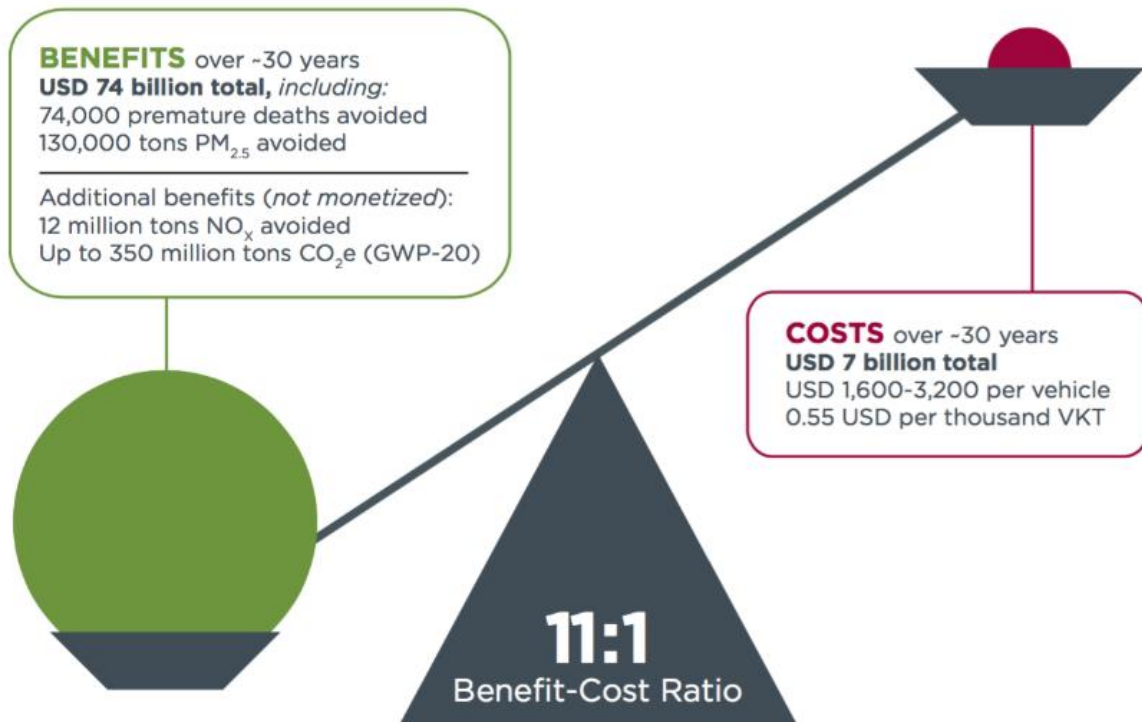| Economic, Social, Political climate	Organizations engaged	Business or Execution models used	Problems encountered

1. Why Evaluate?

Economic, did we get value for money?

Evaluation also provides metrics in comparing costs to benefits

BENEFITS over ~30 years
USD 74 billion total, *including:*
74,000 premature deaths avoided
130,000 tons $PM_{2.5}$ avoided

Additional benefits (*not monetized*):
12 million tons NO_x avoided
Up to 350 million tons CO_2e (GWP-20)

COSTS over ~30 years
USD 7 billion total
USD 1,600-3,200 per vehicle
0.55 USD per thousand VKT

11:1
Benefit-Cost Ratio

Source: https://www.theicct.org/publications/cost-benefit-analysis-brazils-heavy-duty-emission-standards-p-8

2. Using indicators

2. Using indicators. Value of indicators

Target

- reinforces **the message of the targets**

Progress

- keeps **everyone aware of their progress** and whether they **are on-track** to meet the goals

Motivation

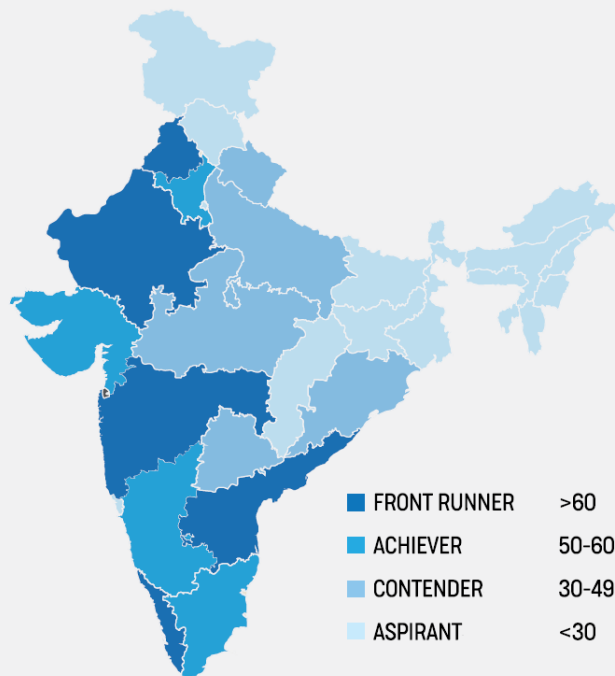- reinforces **competition** and provides **evidence for stronger policies** when necessary

2. Using indicators. Value of indicators

- **For example:** AEEE's EE preparedness report

■ FRONT RUNNER	>60
■ ACHIEVER	50-60
■ CONTENDER	30-49
■ ASPIRANT	<30

Source State-EE-Preparedness-Index-FINAL_July2018.pdf

Motivation

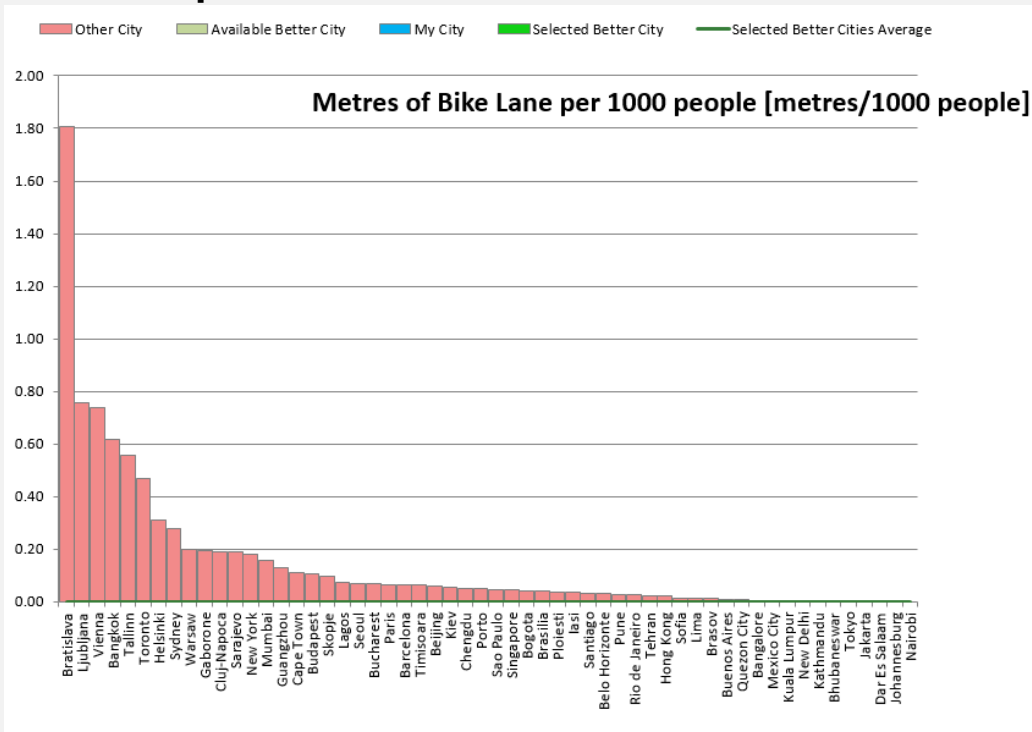- reinforces **competition** and provides **evidence for stronger policies** when necessary

2. Using indicators. Value of indicators

- **For example:** ESMAP TRACE tool

Legend: Other City | Available Better City | My City | Selected Better City | Selected Better Cities Average

Metres of Bike Lane per 1000 people [metres/1000 people]

Source ESMAP TRACE 2.0

Motivation

- reinforces **competition** and provides **evidence for stronger policies** when necessary

2. Using indicators. Analyses that can be done

| Where to start? | Tools | What are the steps? |

Performance Metrics

- Measures changes in energy intensities

Demand Analysis

- Analysing demands and projecting possible futures

Decomposition

- Break down energy use into individual factors to help determine where best to address future policy concerns.

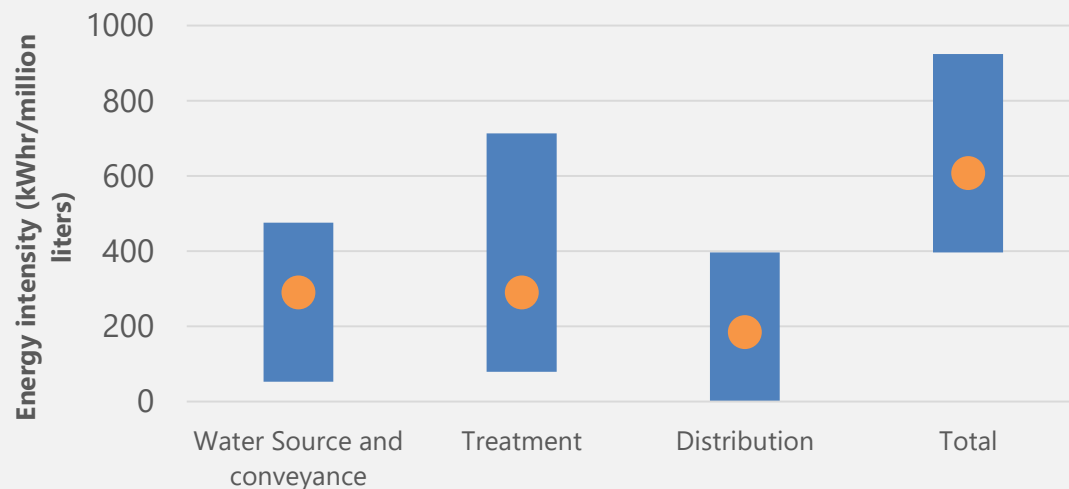# 2. Using indicators. Analyses that can be done

Performance Metrics

- Measures changes in energy intensities
  - Main energy use divided by main driver
  - More aggregated, the better

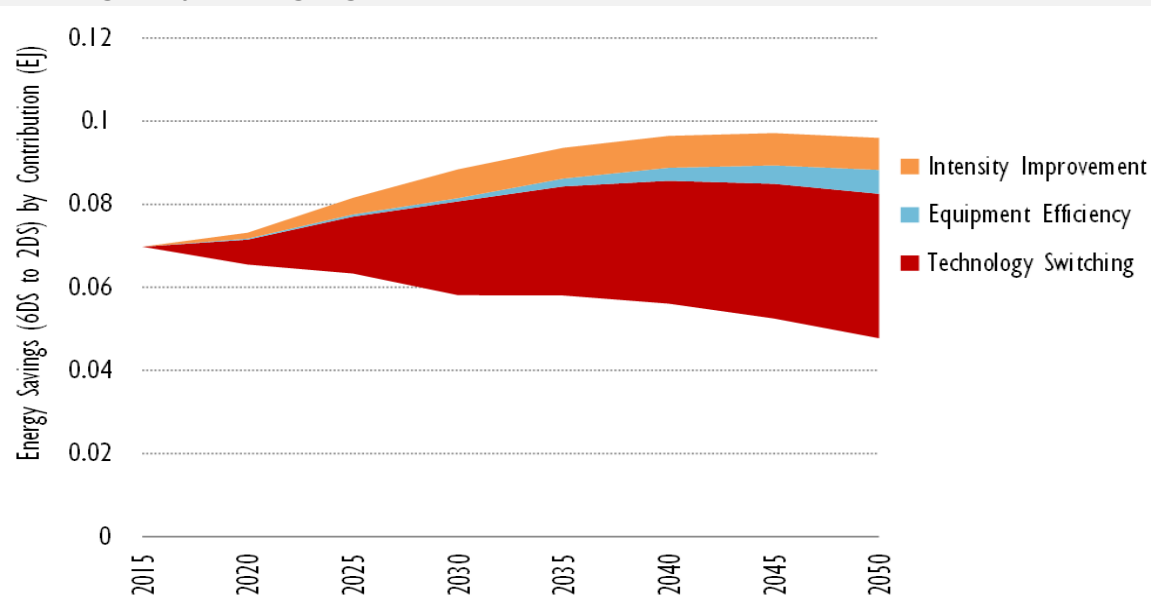- **Water Energy Intensity** kWhr/million liters

Source ACEEE Survey on Energy Use in Water

Demand Analysis

- Analysing demands and projecting possible futures
  - Change each factor and see how they affect future trends

- **What-if analysis**: Proportional distribution of energy savings by holding only changing one indicator at a time

Legend:
- Intensity Improvement
- Equipment Efficiency
- Technology Switching

Y-axis: Energy Savings (6DS to 2DS) by Contribution (EJ)

Decomposition

- Break down energy use into individual factors to help determine where best to address future policy concerns.

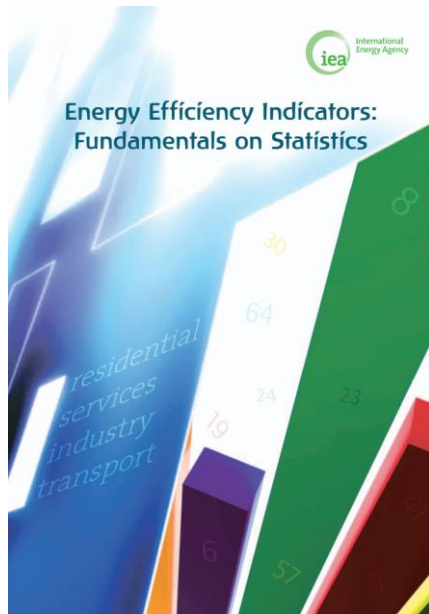- **Sample Municipality X**, street lighting performance
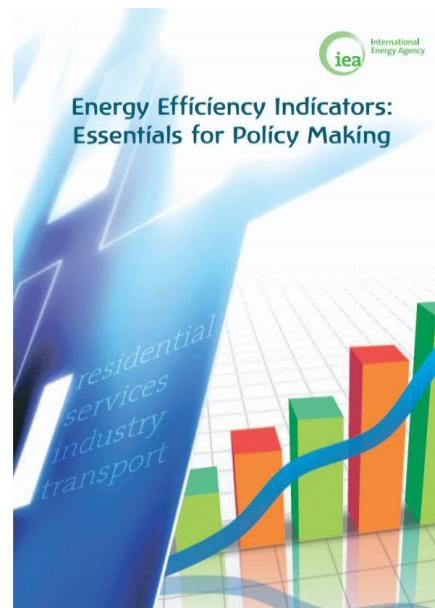
17
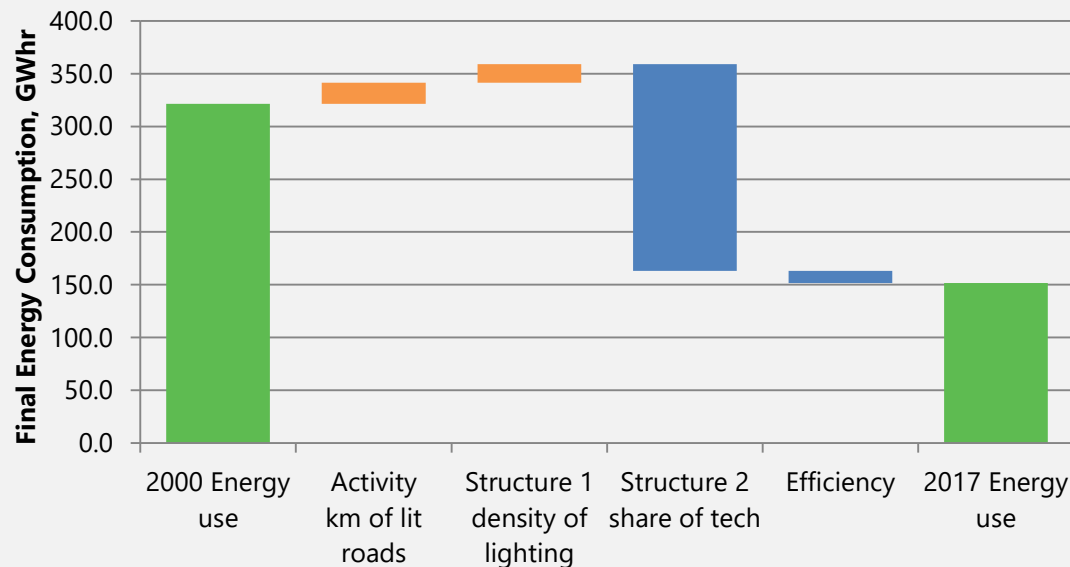
2. Using indicators. Example: IEA indicators

Manuals on statistics

Energy Efficiency Indicators: Fundamentals on Statistics

https://webstore.iea.org/energy-efficiency-indicators-fundamentals-on-statistics

Manuals on policymaking

Energy Efficiency Indicators: Essentials for Policy Making

https://webstore.iea.org/energy-efficiency-indicators-essentials-for-policy-making

| Where to start? | Tools | What are the steps? |

Online Course

Energy Efficiency Indicators: Essentials for Policy Making

International Energy Agency -

View Course

Energy Efficiency Indicators: Fundamentals on Statistics

International Energy Agency -

View Course

2. Using indicators. Example: Worldbank

Step 1 of 12. City KPIs and Data
Please provide details about your city in the Categories shown on the left.

ESMAP
Energy Sector Management Assistance Program

THE WORLD BANK
IBRD · IDA | WORLD BANK GROUP

8%

☑ Show KPI Definition

	Show All
	DETAILS
	CONTEXT
	PUBLIC TRANSPORTATION
	PRIVATE VEHICLES
	MUNICIPAL BUILDINGS
	COMMERCIAL BUILDINGS
	RESIDENTIAL BUILDINGS

Double click on Year or Source to view or edit full details

KPI	Value	Units	Year	Source	Prox	keyKPI
Metres of High Capacity Transit		metres				
Metres of High Capacity Transit per 1000 People		metres/1000 people				
Transportation Non-Motorized Mode Split		%				
Public Transportation Mode Split		%				
Public Transport Energy Consumption per Passenger km		MJ/passenger km				Yes
Public Transport Energy		MJ				
Passenger Kilometers		km				
Meters of Bike Lanes		meters				
Metres of Bike Lane per 1000 people		metres/1000 people				

2. Using indicators. Example: BEST

Benchmarking and Energy Saving Tool for Low Carbon Cities (BEST Cities)
(BEST Cities)

BEST-Cities is designed to provide city authorities with strategies they can follow to reduce city-wide carbon dioxide (CO_2) and methane (CH_4) emissions. The tool quickly assesses local energy use and energy-related CO_2 and CH_4 emissions across nine sectors (i.e., industry, public and commercial buildings, residential buildings, transportation, power and heat, street lighting, water & wastewater, solid waste, and urban green space), giving officials a comprehensive perspective on their local carbon performance. Cities can also use the tool to benchmark their energy and emissions performance to other

cities inside and outside China, and identify those sectors with the greatest energy saving and emissions reduction potential.

2. **Using indicators**. Example: Urban RAM

Urban Form Rapid Assessment Model (Urban-RAM)

The Urban-RAM modeling tool is an Excel-based macros-enabled model designed to provide a high-level breakdown of the major contributors to a city's energy and carbon footprint when measured from the point of view of the city's inhabitants. This model asks users to provide city-level data on basic macroeconomic factors (GDP, households, population), residents' income and expenditures, building floorspace and building types, infrastructure (road, rail, subway length) and vehicle fleet to characterize a given city but also provides national average data as default.

Based on a synthesis of data and life-cycle modeling approaches from both US and China sources, this model enables a quick assessment of the magnitude and sources of a city's energy and carbon footprints with minimal data requirement. This modeling tool is intended to help urban planner, policymakers and researchers quickly understand the underlying drivers of a city's energy and carbon footprint by calculating the city's embodied and operational energy and related emissions as well as common energy and CO_2 indicators.
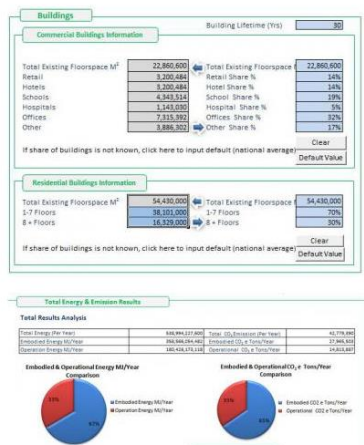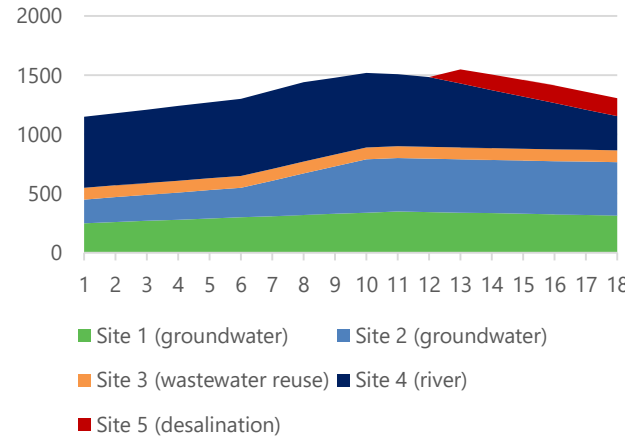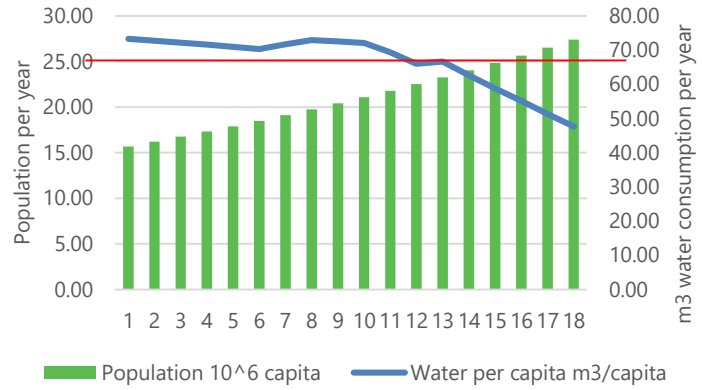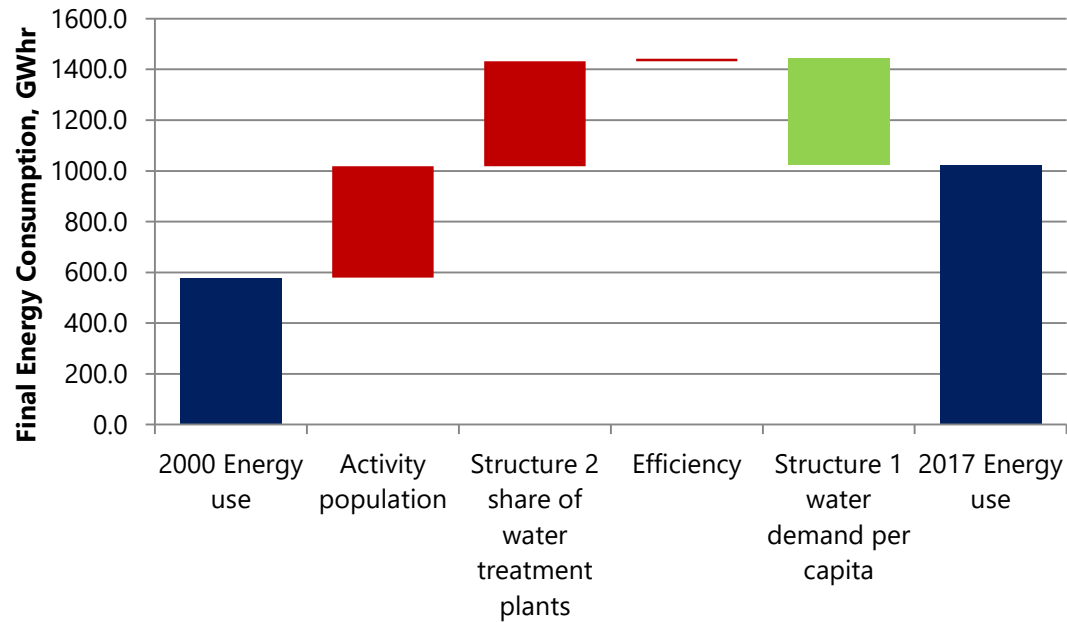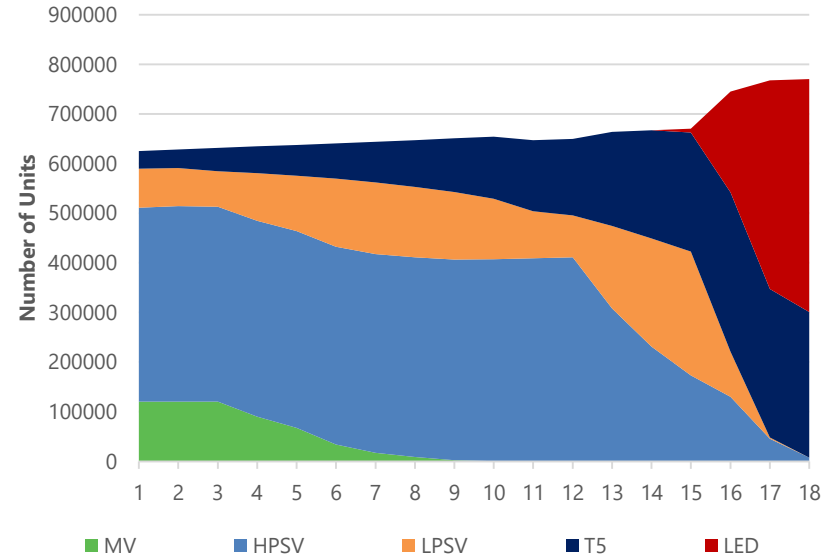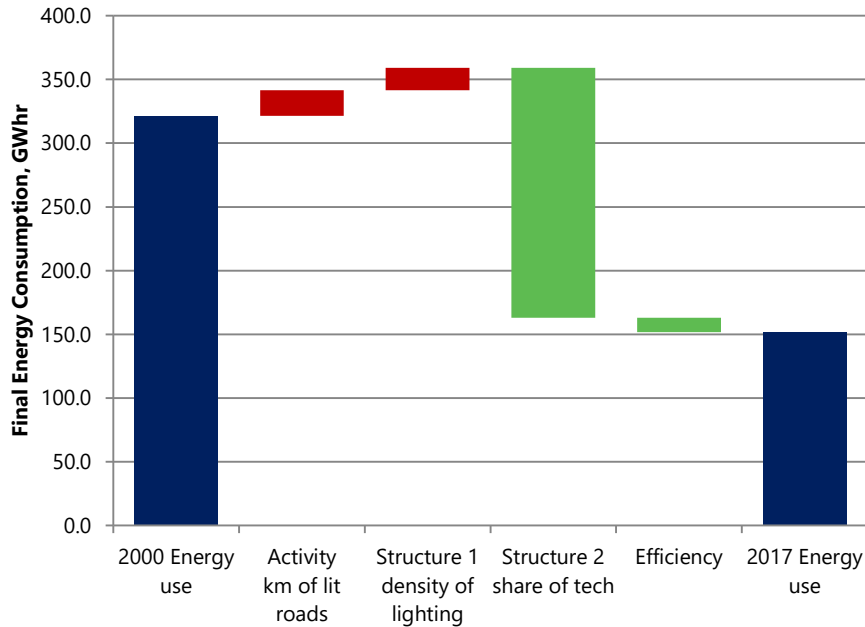
3. Activity

- What story can you tell about these figures?

- What story can you tell about these figures?

3. What are the steps?

4. Steps in the process

Step 1: Identify what needs to be tracked
- *What story should be told?*
- *What were the objectives?*
- *What are the risks?*

Step 2: Define the tracking indicators
- *What performance metrics can you use?*
- *What data is needed?*

Step 3: Assess the data
- *What analysis method should you use?*

Step 4: Tell the story
- *How do you visualise the results?*
- *How would it vary across countries?*

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