Energy Efficiency Training - Mozambique

Rahul Raju Dusa
Senior Expert

Thursday, 16 November 2020

UNEP DTU PARTNERSHIP | COPENHAGEN CENTRE ON ENERGY EFFICIENCY
SEforALL EE HUB

ELECTRICIDADE DE MOÇAMBIQUE, E.P.

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Scheduled Topics

Day	Module	Topic
12 November 2020	1.1	What is Energy Efficiency
16 November 2020	**1.3**	**EE Strategic Planning – Part 1**
19 November 2020	1.4	Energy Audit and Management
24 November 2020	2.2	Energy Audit and Management for Buildings
26 November 2020	2.5	Energy Efficiency - HVAC systems

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Energy Efficiency Strategy Planning

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Introduction

Terminology

A **vision** is a description of outcomes that the an individual an entity will strive to achieve.

A **strategic plan** is a document that is used to communicate the municipality's goals and how it will achieve those goals.

A **roadmap** normally covers one decade or longer and includes detailed steps to achieve certain objectives.

An **action plan** addresses the schedule of actions to be taken to achieve certain goals.

Introduction

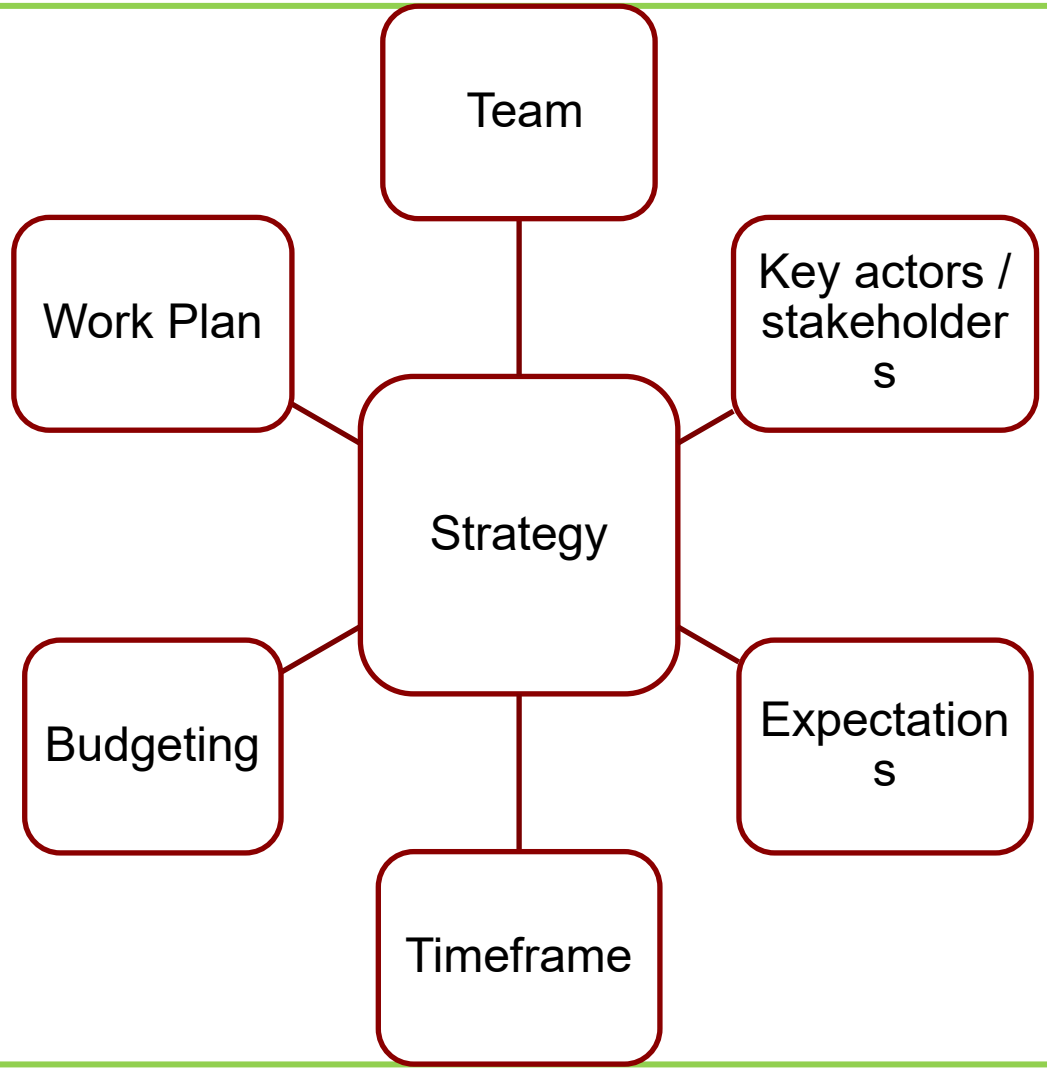
Benefits of strategic energy efficiency planning

- Engages various stakeholders and raises awareness on EE
- Raises awareness on EE and creates common understanding
- Creates certainty and enables long term investment.

Ireland public sector EE target by 33 per cent from the 2009 basis by 2020.
Enactment of a Public Sector EE Strategy in 2017.
By the end of 2018 – improvement by 27 per cent from 2009, EUR 1.3 billion in energy savings and 4.6 million tonnes of CO_2 emissions avoided since 2009.

Source: Sustainable Energy Authority Ireland, 2019

Introduction



Steps in strategic planning

Step 1	• Map existing goals, policies and measures
Step 2	• Map energy use of the municipal public sector
Step 3	• Assess the EE improvement potential
Step 4	• Develop a plan of action, methods, and criteria for strategic selection
Step 5	• Barrier identification and analysis through stakeholder consultations
Step 6	• Strategy formulation and launch

Step 1 – Mapping existing goals, policies and measures

National/ regional policy context	• National policies and targets on EE • National development strategy and priorities • National regulations on municipal governments' roles and responsibilities in local EE, public sector operation costs and investment
Municipal policies and context	• Development of strategy and priorities • Local energy supply and demand • Municipal EE targets and priorities • Local municipal EE institutional setup and stakeholders
Individual context	• Mandatory emission reduction targets as a result of above policies • Mandatory or voluntary energy efficiency improvement targets • Compliance to associated standards and certifications. • Divisional and departmental operational SOPs.

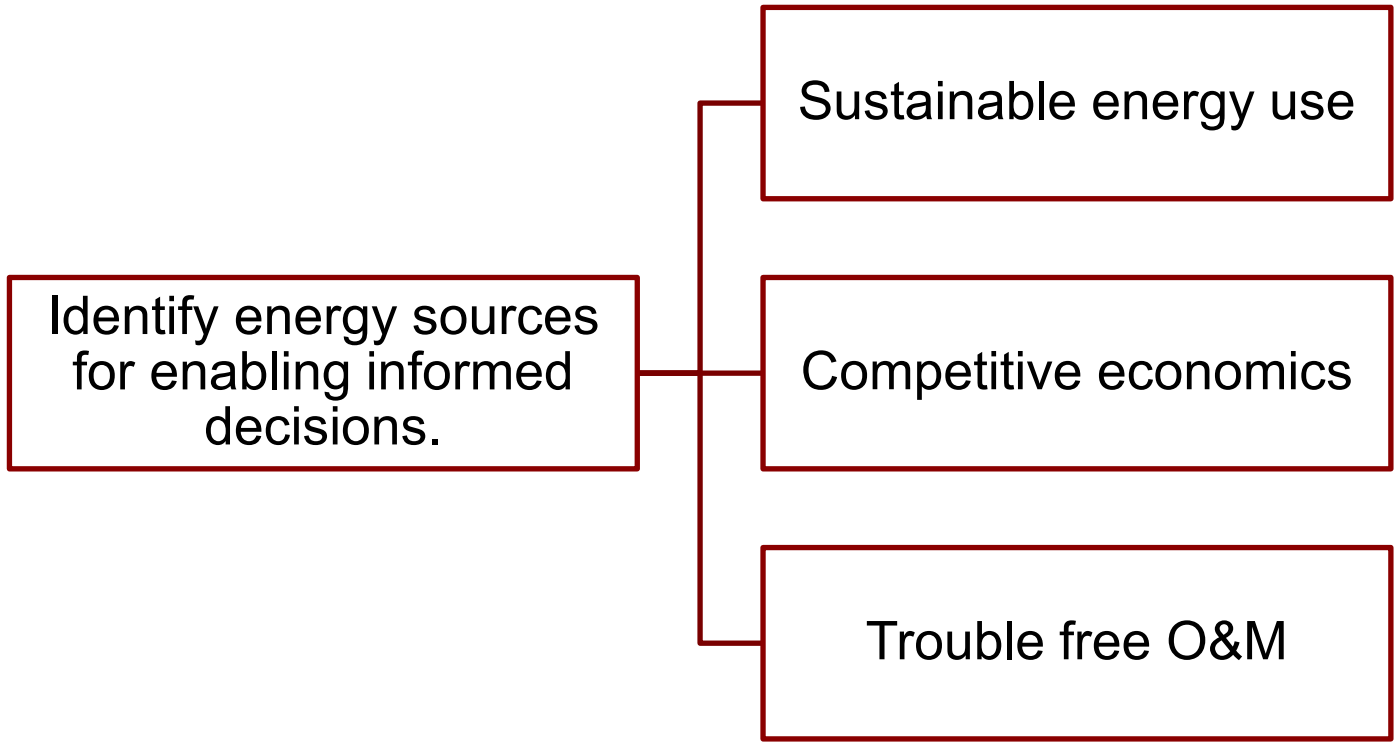
Step 1 – Mapping existing goals, policies and measures

Stakeholder mapping

- Roles and responsibilities.
- Suitable expertise – data collection and drafting the strategic plan
- Consultation of stakeholders and final decision makers.

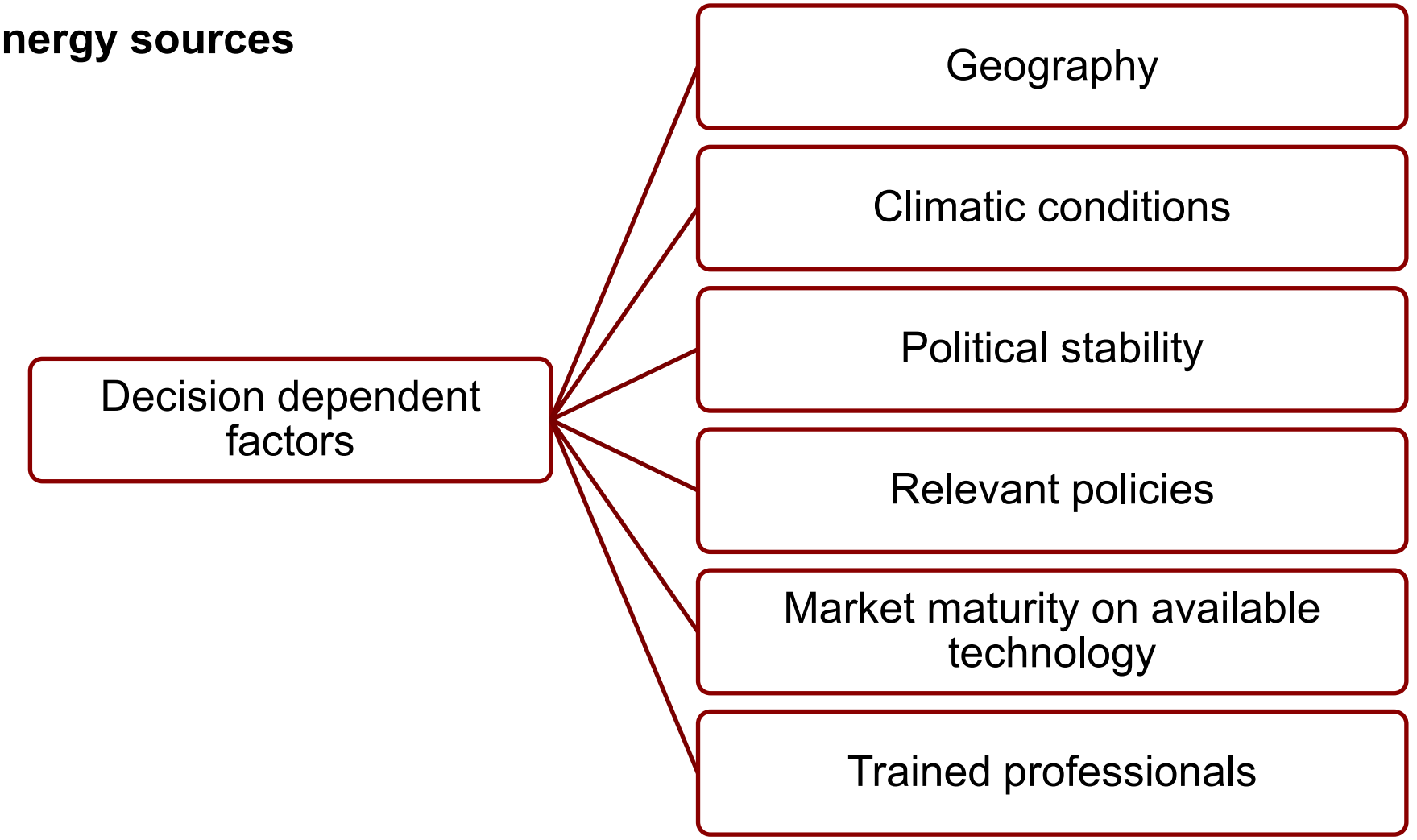
Step 2 – Mapping energy use

Energy sources



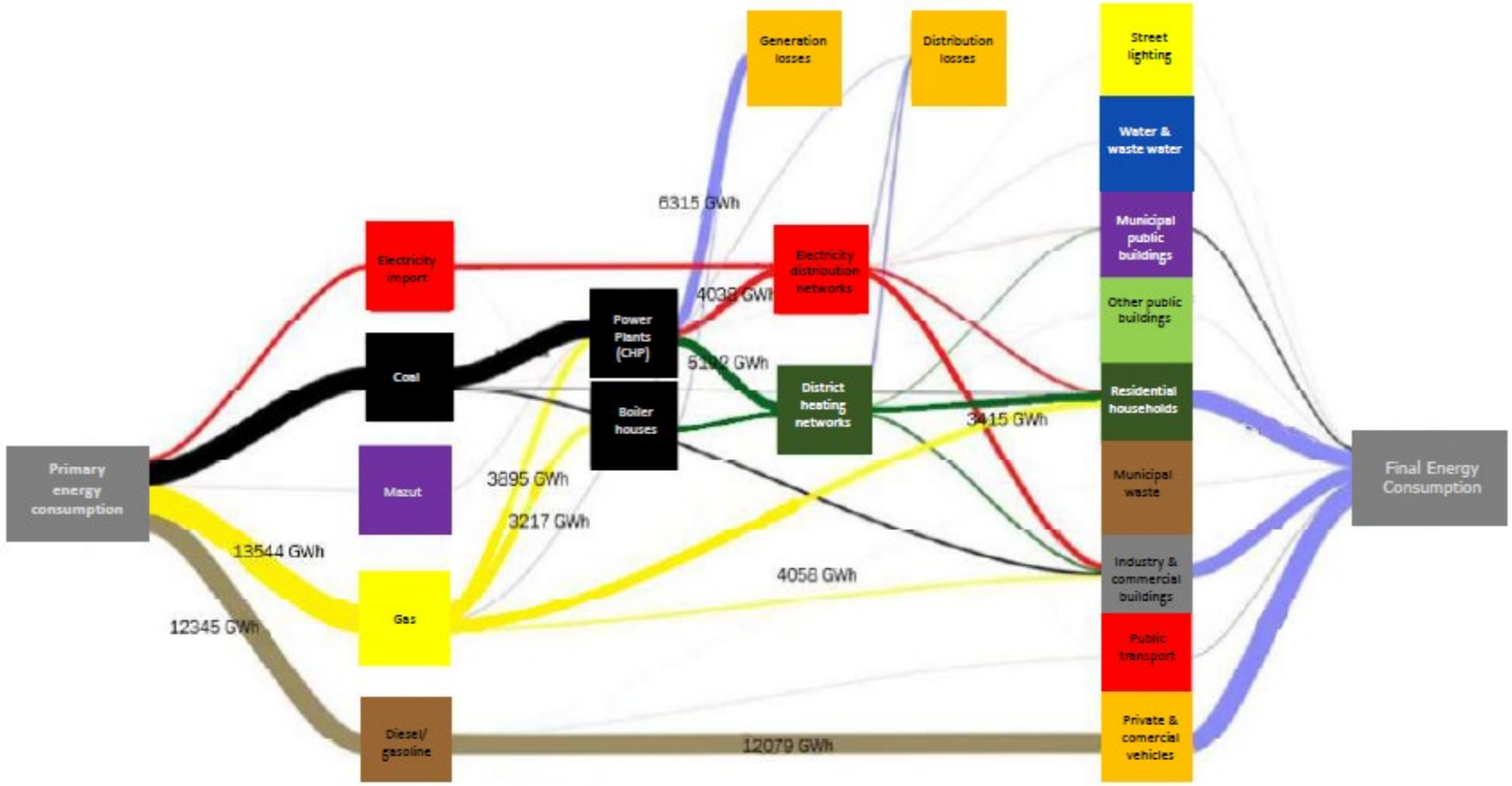
Step 2 – Mapping energy use

Energy sources



Step 2 – Mapping energy use

Energy sources



Source: World Bank's Energy Sector Management Assistance Program (ESMAP), 2017

Step 2 – Mapping energy use

Energy mapping is a holistic approach, with the end goal being to define and integrate energy solutions across as many end users as possible

- Scale of application – National, municipal, individual system level.
- Types and quantum of energy for types of end-use application.

Source: Energy Mapping Feasibility Study, Edmonton. 2014.

Step 2 – Mapping energy use

Key recommended steps in energy mapping approach

A
- Identify high energy intensity facilities through a gate-to-gate defined boundary approach

B
- Develop each facility's process/system layout

C
- Define technology used in each section within the facility

D
- Determine the energy used

Step 2 – Mapping energy use

A. High intensity facilities and boundary approach

- Identify high intensity facilities – Gate to gate defined boundary approach
- The boundary includes all energy consumption against total output or reference (material, production, energy, area, etc..)
- Energy (and Material) types – Inputs and Outputs.
  - kWh/m^2/year (for buildings); kWh/kl (water pumping stations); toe/tonne (manufacturing industries) etc..
- Baseline with respect to
  - Energy consumption
  - Technology and operations
  - Policy regulations

Step 2 – Mapping energy use

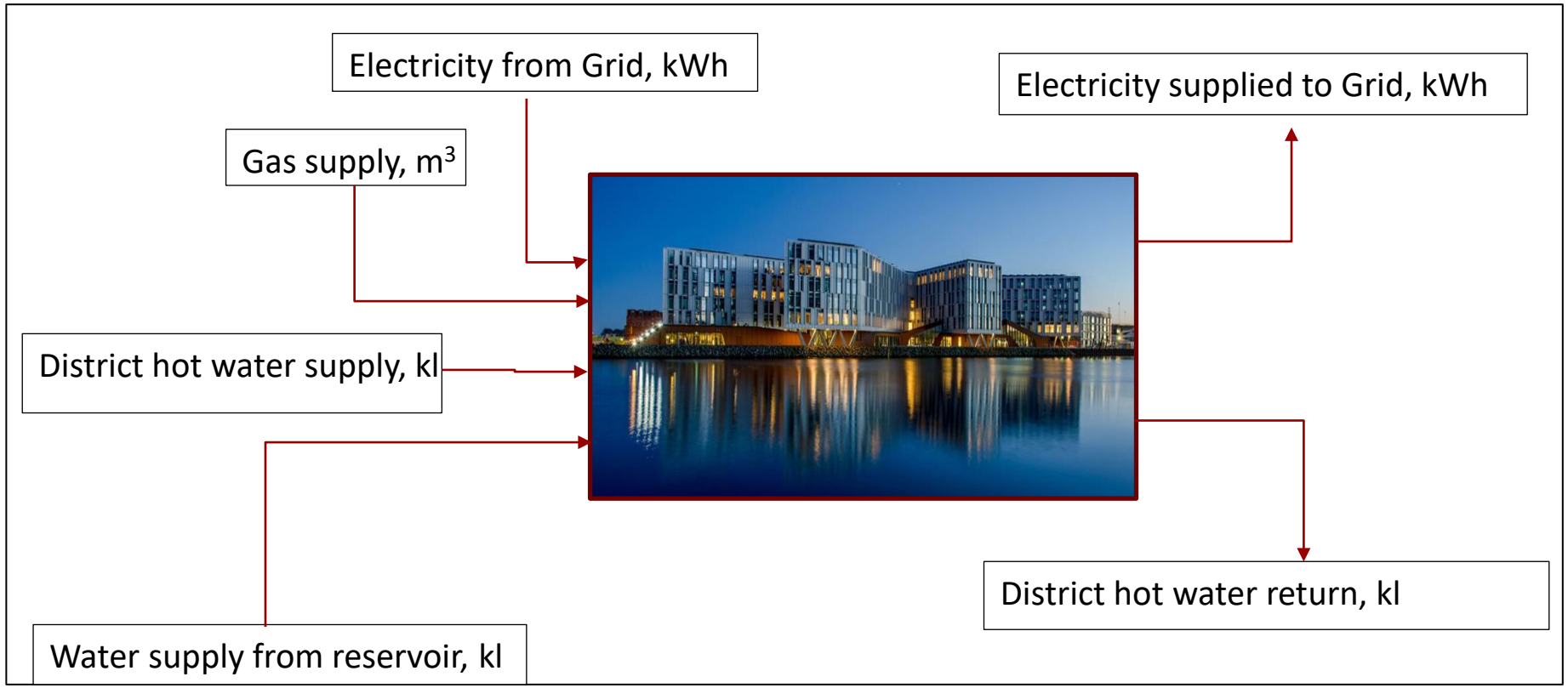
A. High intensity facilities and boundary approach

Boundary approach for municipal water pumping and distribution station

Step 2 – Mapping energy use

A. High intensity facilities and boundary approach

Boundary approach for large office building



Step 2 – Mapping energy use

Baseline

Energy in

Material in

Energy out

Material out

Verification

Energy in

Material in

Energy out

Material out

Energy in

Material in

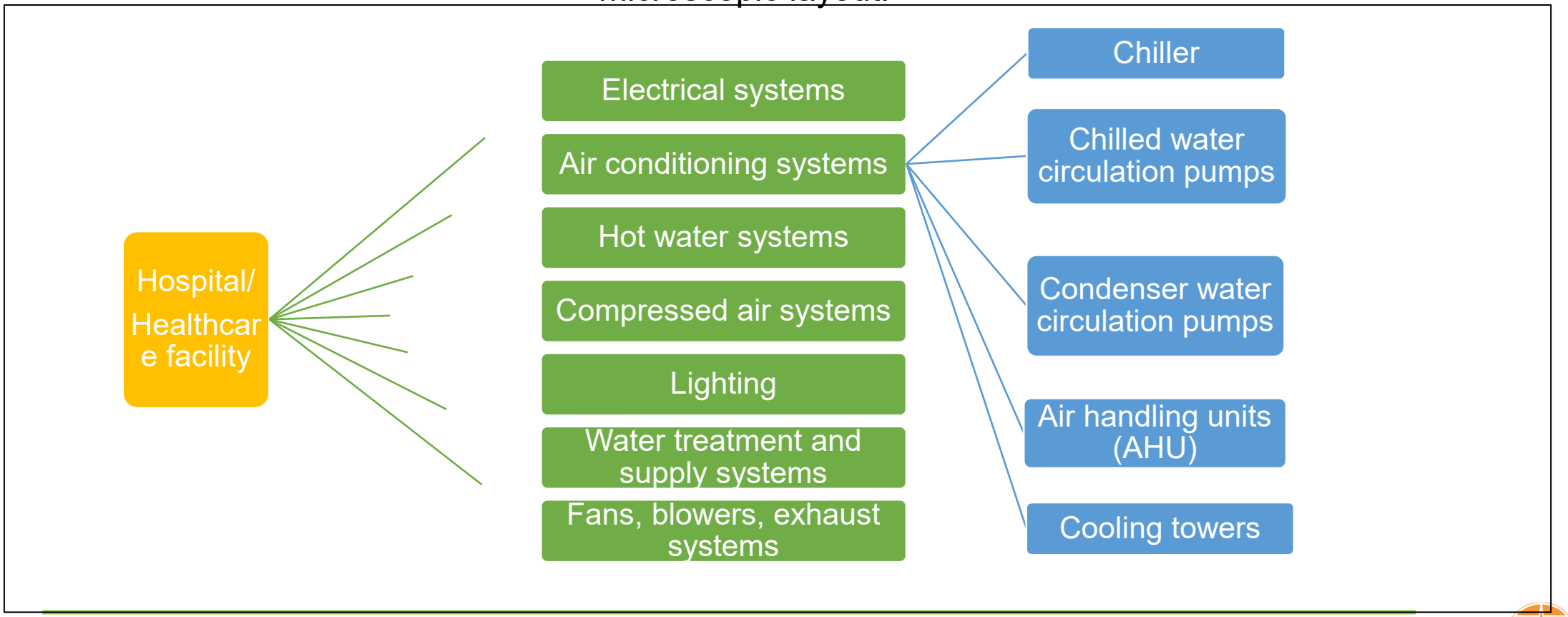
Energy out

Material out

Step 2 – Mapping energy use

B. Develop each facility / process / system layout - Example

Example of a public building Air-Conditioning system illustrating for macroscopic and microscopic layout.



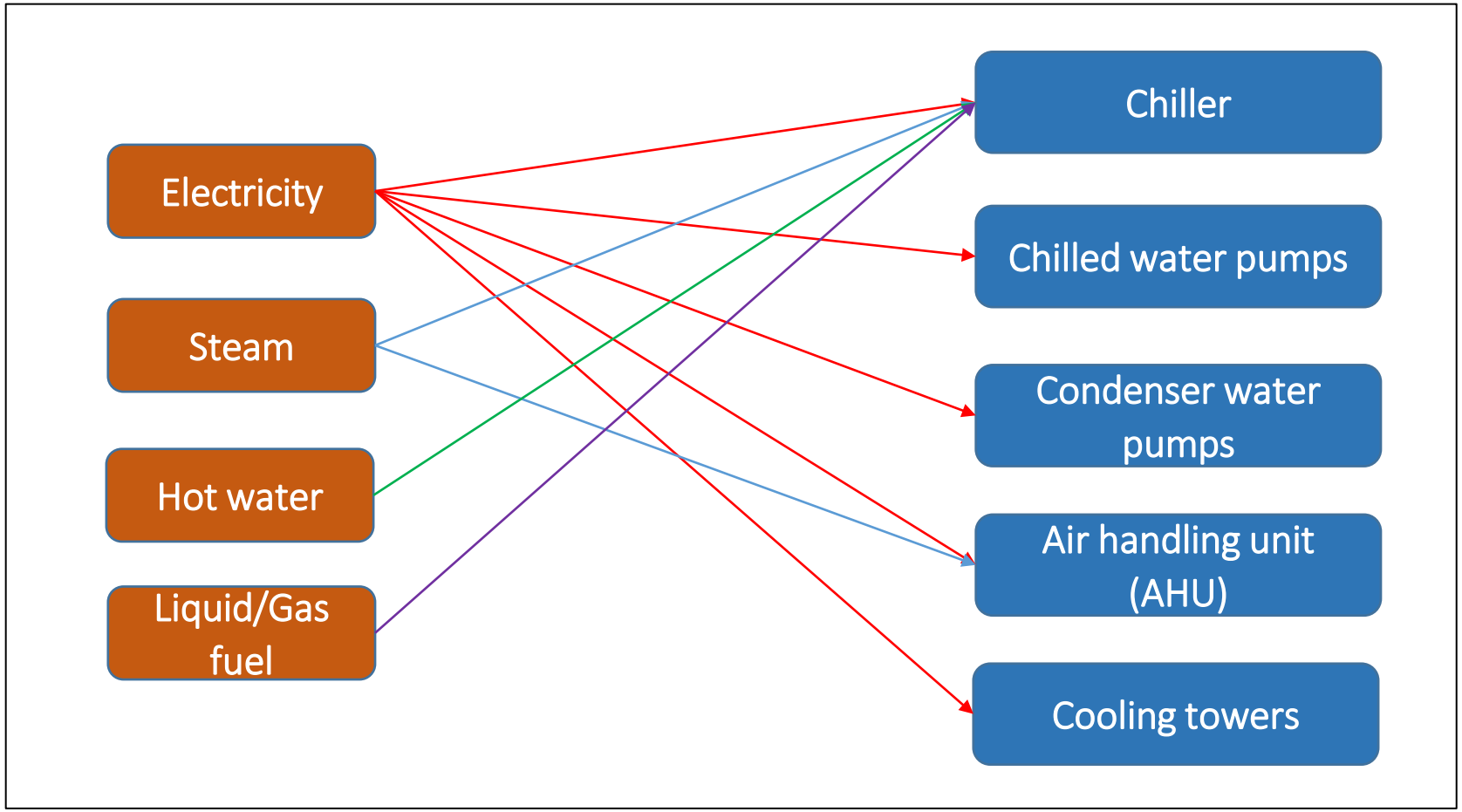
Step 2 – Mapping energy use

C. Defining technology used in each section - Example

Chiller	Chilled water pumps	Condenser water pumps	AHU	Cooling towers
• Electricity (Vapor compression system) • Steam (Vapor absorption machine - VAM) • Hot water (VAM) • Liquid/Gas fuel (Direct fired VAM)	• Electricity (electric motor driven centrifugal pump sets)	• Electricity (electric motor driven centrifugal pump sets)	• Electricity (electric motor driven fans and blowers) • Steam (for integrated dehumidifiers and RH control)	• Electricity (electric motor driven fans) • No energy input (Natural Draft) • Not applicable (Air cooled chillers)

Step 2 – Mapping energy use

C. Determine the energy used - Example



Step 2 – Mapping energy use

Further actions

- Categorize personnel accountable – operations/process, technology, energy.
- Study of data collected – potential optimization of resources and operations.

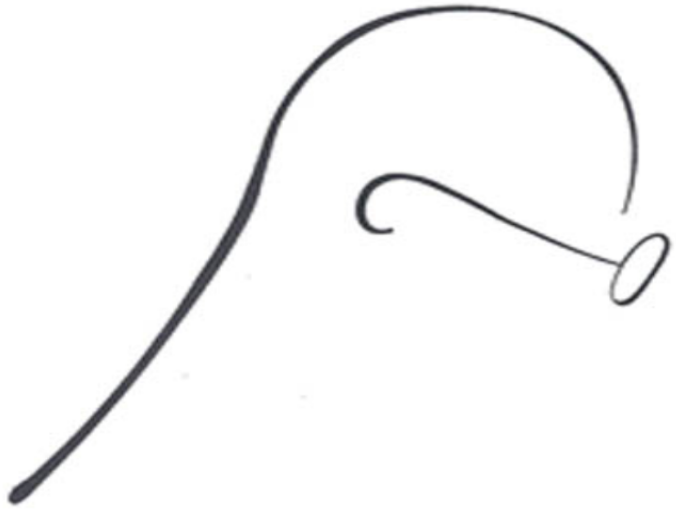
Step 3 – Assess energy efficiency improvement potential

- Energy efficiency interventions by the Ministry of Regional Development, Construction, Housing and Municipal Economy of Ukraine and Federal Ministry for Economic Cooperation and Development (BMZ) has resulted in 5-10 per cent reduction of the annual energy cost of the municipalities. ((BMZ), 2015)
- Energy audit studies of municipal water systems in India have indicated at least 25 per cent energy and monetary savings potential. ((IFC), 2008)
- Energy conservation measures in water utilities of Sharjah Electricity Water Authority have resulted in more than 56 per cent energy savings. (TERI, 2016)
- Local technological improvements of street lighting systems in Timeri, Guyana resulted in a 29.7 per cent lighting energy consumption reduction. (TERI, 2014) BMZ, 2015. Energy efficiency in municipalities. Bonn: GmbH, Deutche Gesellschaft für Internationale Zusammenarbeit (GIZ)

Step 3 – Assess energy efficiency improvement potential

- Benchmarks and standards
- Energy Audits

Facility area or production related	Equipment / utility related
• kWh/m^2/year (Energy performance Index, EPI, of buildings) • kWh/Mt clinker or cement produced (cement plant) • kcal/kWh power produced (Heat rate of a power plant)	• kW/ton of refrigeration (air conditioning plant) • % thermal efficiency (of a boiler plant) • % effectiveness (in a cooling tower)



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Thank You

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