



Ministry of Energy and Water Resources
of Republic of Tajikistan



Green Diplomacy Week – a global just energy transition **EU-Central Asia Sustainable Energy Days**

International Conference

Energy Efficiency in Tajikistan: prospects and challenges

Dushanbe Serena Hotel, 25-26 October 2023

Energy auditing – role, key elements and eu best practices

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THE OUTLINE OF PRESENTATION

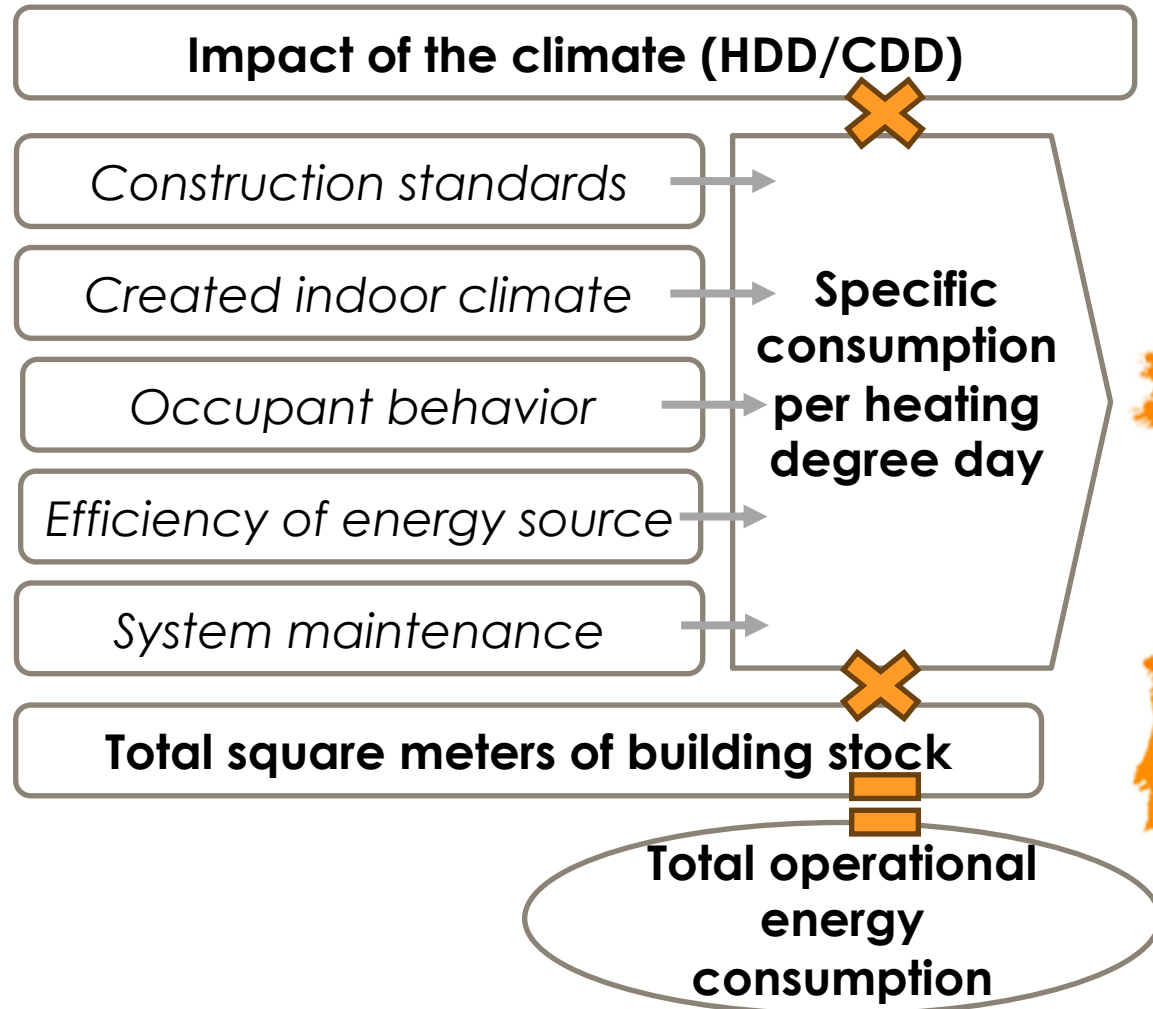


- Why are energy audits important for increasing energy efficiency in buildings?
- How to understand energy audit?
- What are the elements of an energy audit system?
- How the demand for energy audits are created?
- What are the main elements of energy audit methodology?
- How are the appropriate qualifications of energy auditors ensured?
- What are the key steps of the energy audit process?

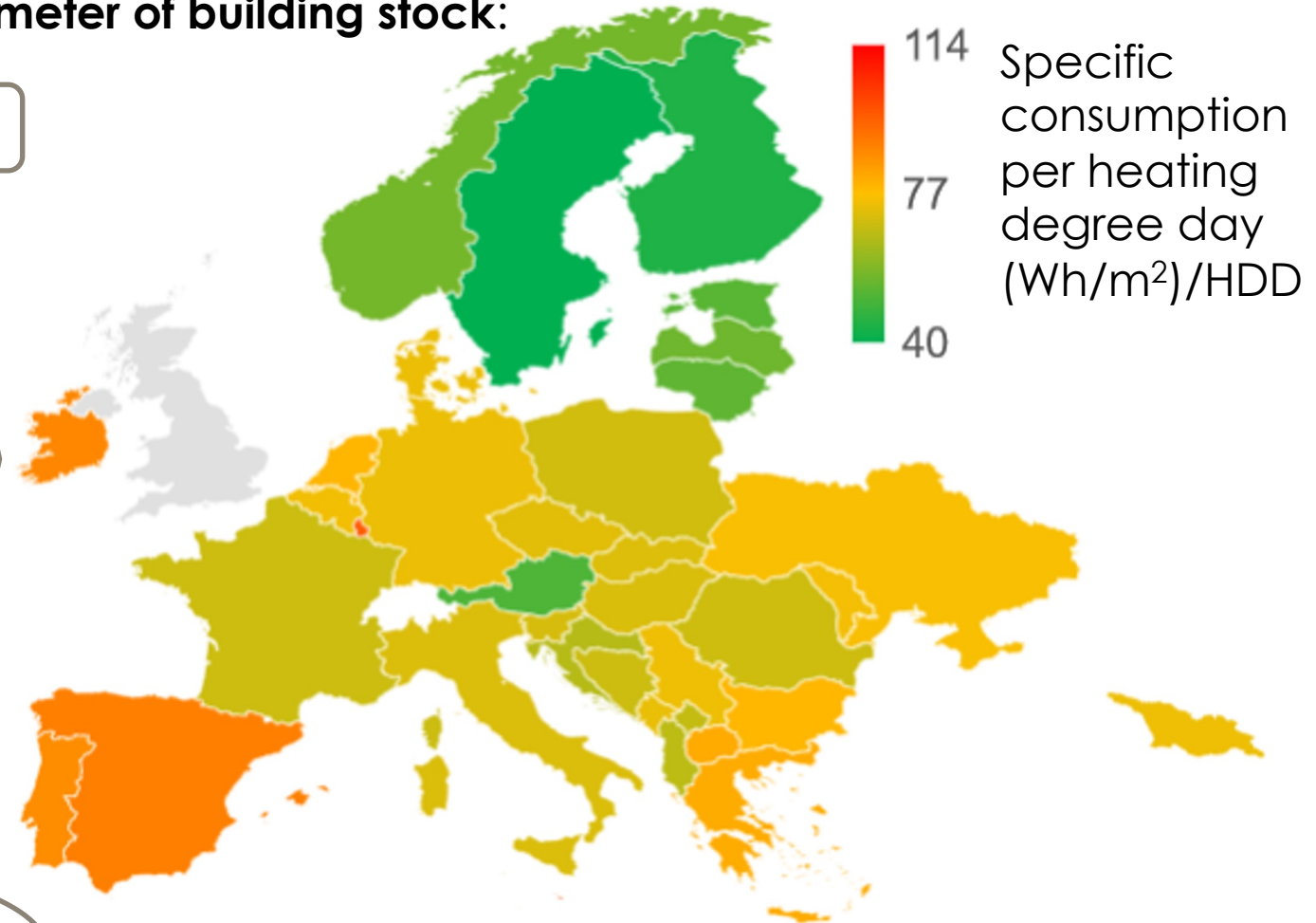
BUILDINGS ARE RESPONSIBLE FOR APPROXIMATELY 40% OF THE EU'S ENERGY CONSUMPTION.



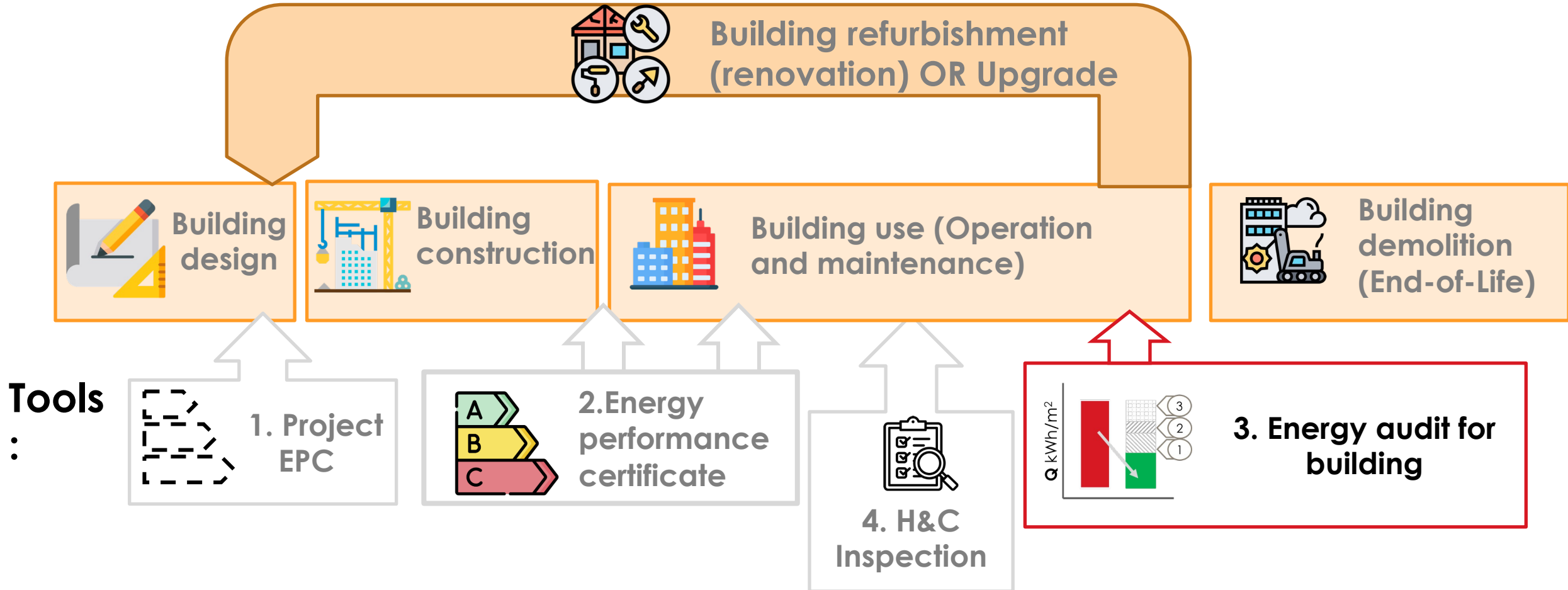
The following factors determine the energy consumption in building sector:



Climate-normalized energy consumption per square meter of building stock:



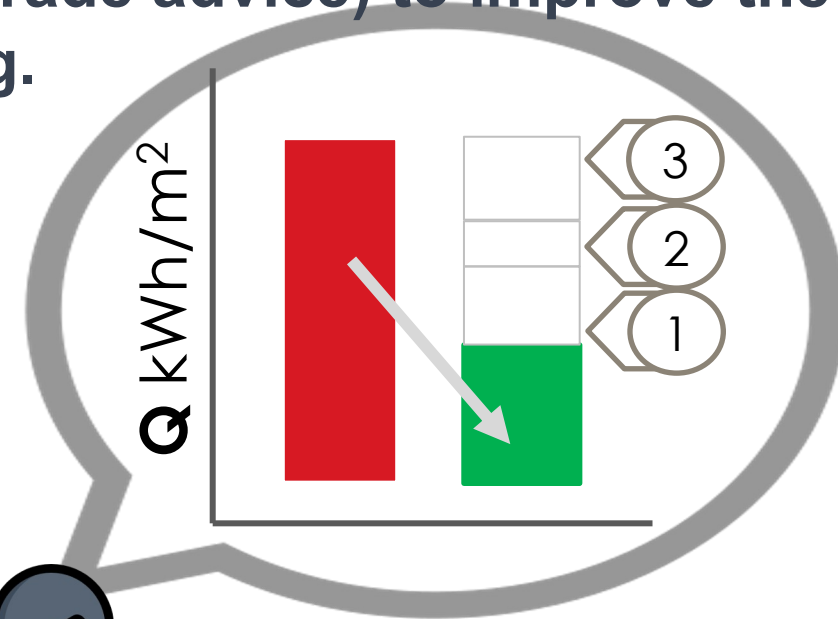
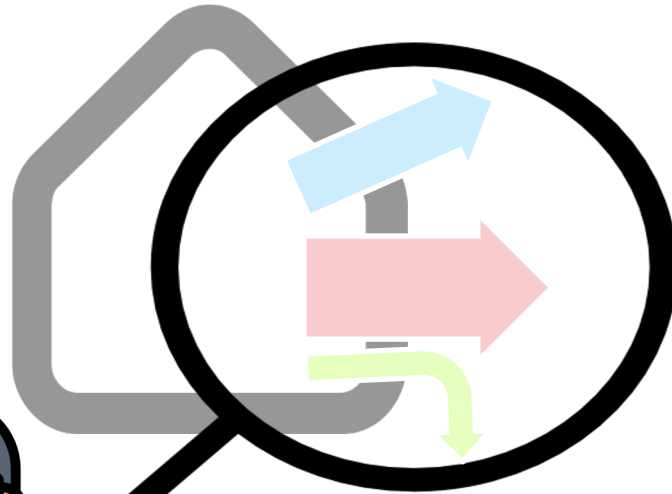
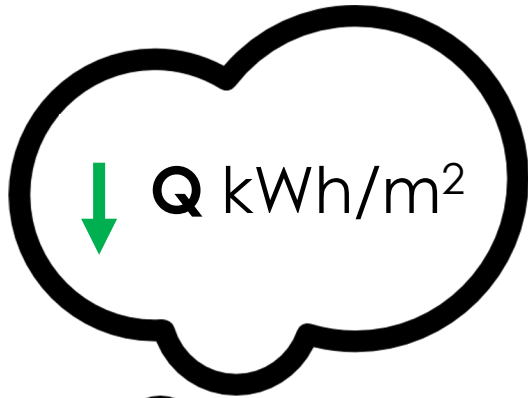
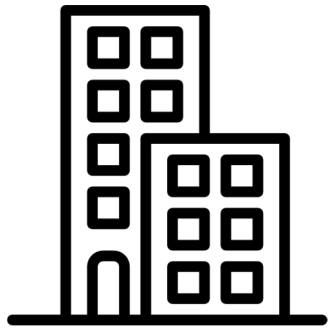
EACH EFFICIENCY IMPROVEMENT TOOLS HAS IMPORTANT ROLE IN BUILDING LIFE CYCLE



③ ENERGY AUDIT HELPS TO DIAGNOSE THE ISSUES AND PROPOSES THE MEASURES TO IMPROVE ENERGY EFFICIENCY OF BUILDING



An energy audit helps to understand energy flows and their impact on consumption, identifies the losses and proposes the prioritized list of measures (investment grade advice) to improve the efficiency of the building.



WHAT IS ENERGY AUDIT?



ENERGY AUDIT - systematic procedure with the purpose of obtaining adequate knowledge of the energy consumption profile of a facility, identifying and quantifying cost-effective energy saving opportunities, and reporting the findings.

In other words – a procedure which aims to document **energy flows and losses** and then **identifies ways to reduce or eliminate those losses** by proposing cost-effective measures.

HIGH QUALITY ENERGY AUDIT - an energy audit that meets the **minimum requirements**, is **performed independently** by **qualified professionals**, and provides **significant benefits** for all stakeholders involved, while being **cost-effective**

Energy audit is a tool that helps unlock cost-effectively energy efficiency improvements. The quality has to be ensured to deliver significant benefits

IT IS IMPORTANT TO UNDERSTAND THE DIFFERENCES BETWEEN ENERGY AUDIT AND ENERGY PERFORMANCE CERTIFICATE



Energy audit

Purpose: identify losses and provide investment-grade advice on how to reduce or eliminate them

Targeted at building owners, managers, or energy professionals capable of implementing the recommended measures.

Detailed examination with actionable recommendations for improving energy efficiency.

Costs more due to detailed analysis and the need for qualified and knowledgeable expert

May take **up to 1 month** due to extensive information collection and measurement

Energy performance certificate

Purpose: to inform the consumer about how good building consumes energy (based on grade)

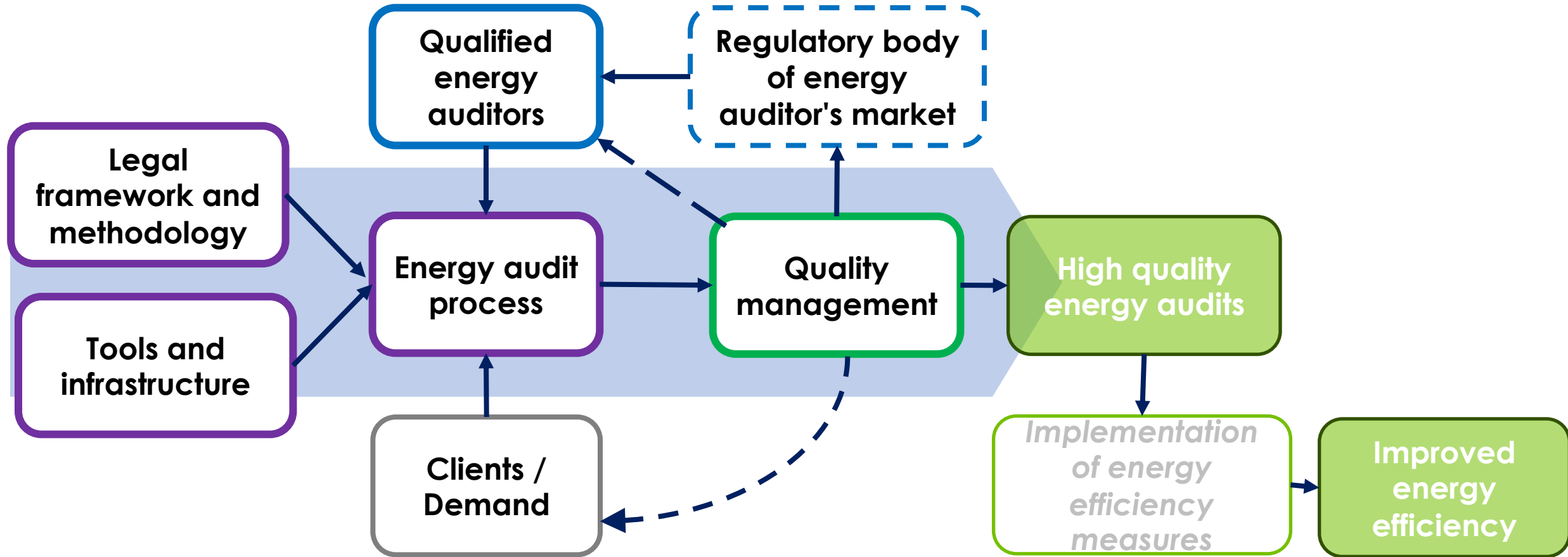
Designed for non-professionals, aiding in comparing the energy efficiency of different buildings at a glance

Surface-level rating based on the building's current energy performance.

Typically – **less costly** than energy audit, due to higher level standardization and surface level analysis

Takes **3-10 days** (calculated rating)

MULTIPLE ELEMENTS ARE NEEDED TO IMPLEMENT ENERGY AUDIT SYSTEM

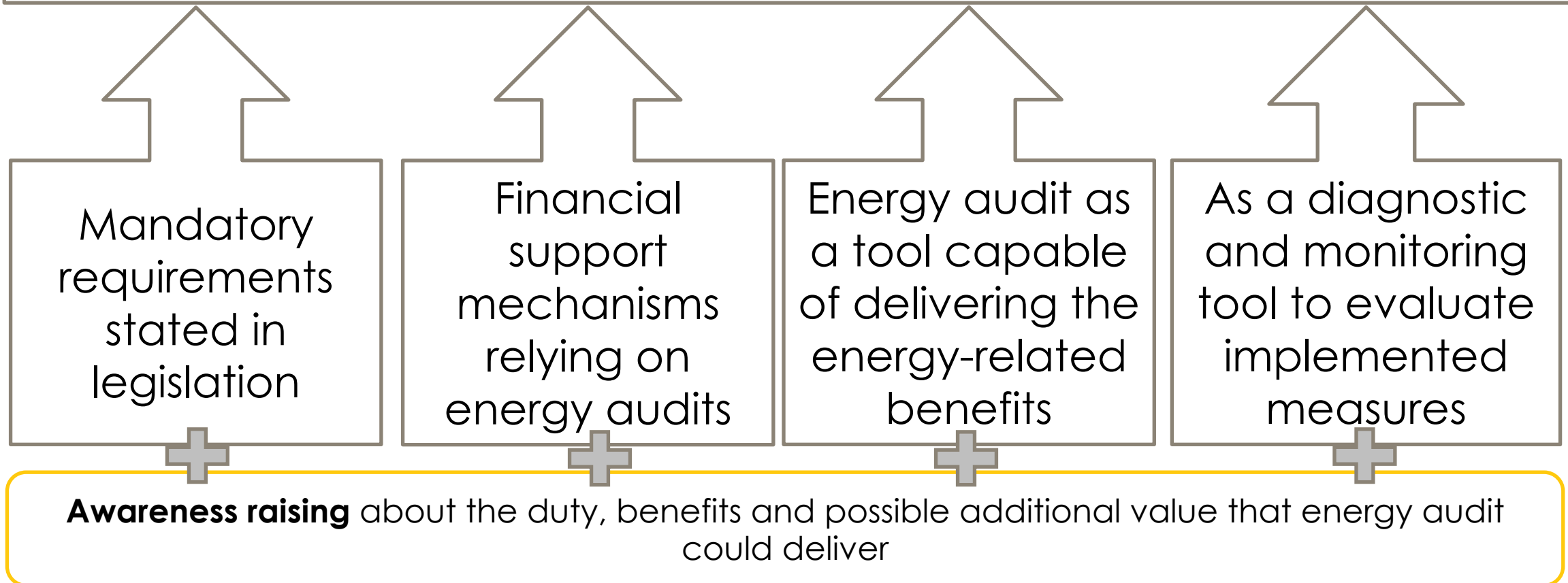


An energy audit system contains main elements that ensure **qualified energy auditors**, **clear procedures** and **quality management**.

THE DEMAND FOR ENERGY AUDITS COULD BE STIMULATED NOT ONLY BY THE MANDATORY REQUIREMENT IN THE LEGISLATION



The market demand for energy audits



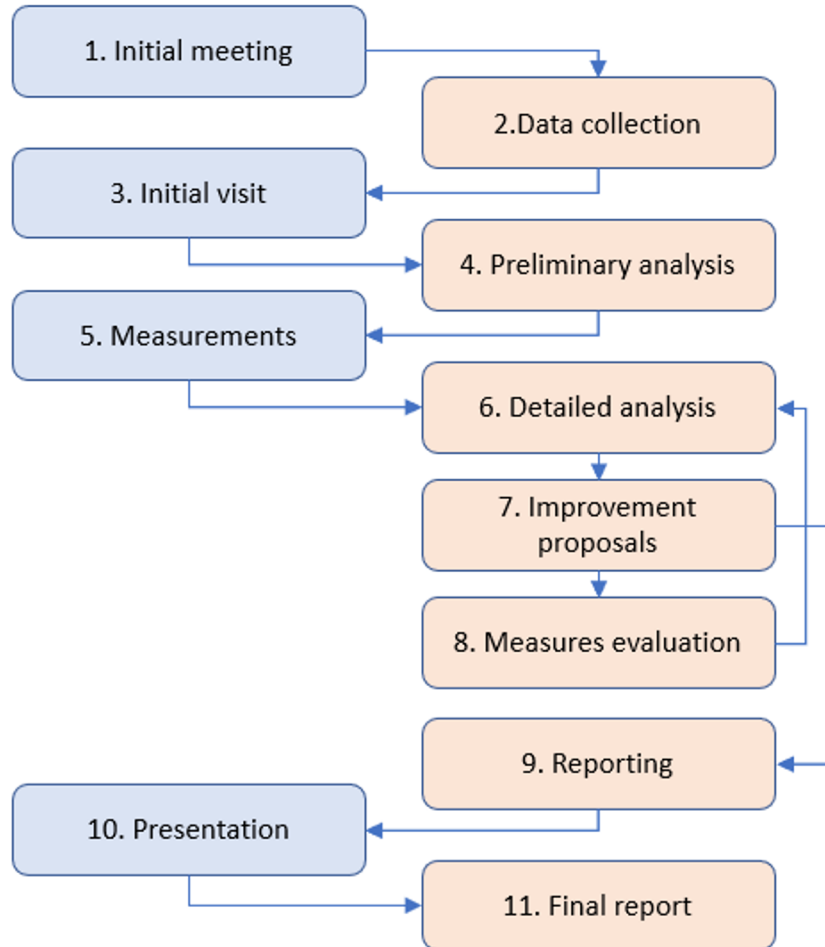
THE ENERGY AUDIT PROCESS SHOULD BE STANDARDIZED AND CLEAR, BUT HAVE THE FLEXIBILITY TO BE TAILORED FOR SPECIFIC CASES



Energy audit process



Performing energy audit and preparing the report



Clear process steps, sequences provides guarantee that it will be properly executed

Importance of collaboration between the client and auditor has to encouraged

The requirements for the output of the process should be clear

The outcomes should be transparent and presented in the understandable way for the client

THE BASIS FOR METHODOLOGY IS DESCRIBED BY EUROPEAN AND INTERNATIONAL STANDARDISATION ORGANISATIONS



The existing standard for energy audits:

- EN 16247-1 (2020) Energy audits - Part 1: General requirements
- EN 16247-2 (2020) Energy audits - Part 2: Buildings
- EN 16247-5 (2020) Energy audits - Part 5: Competence of energy auditors
- ISO 50002:2014 Energy audits — Requirements with guidance for use

Will be replaced by:

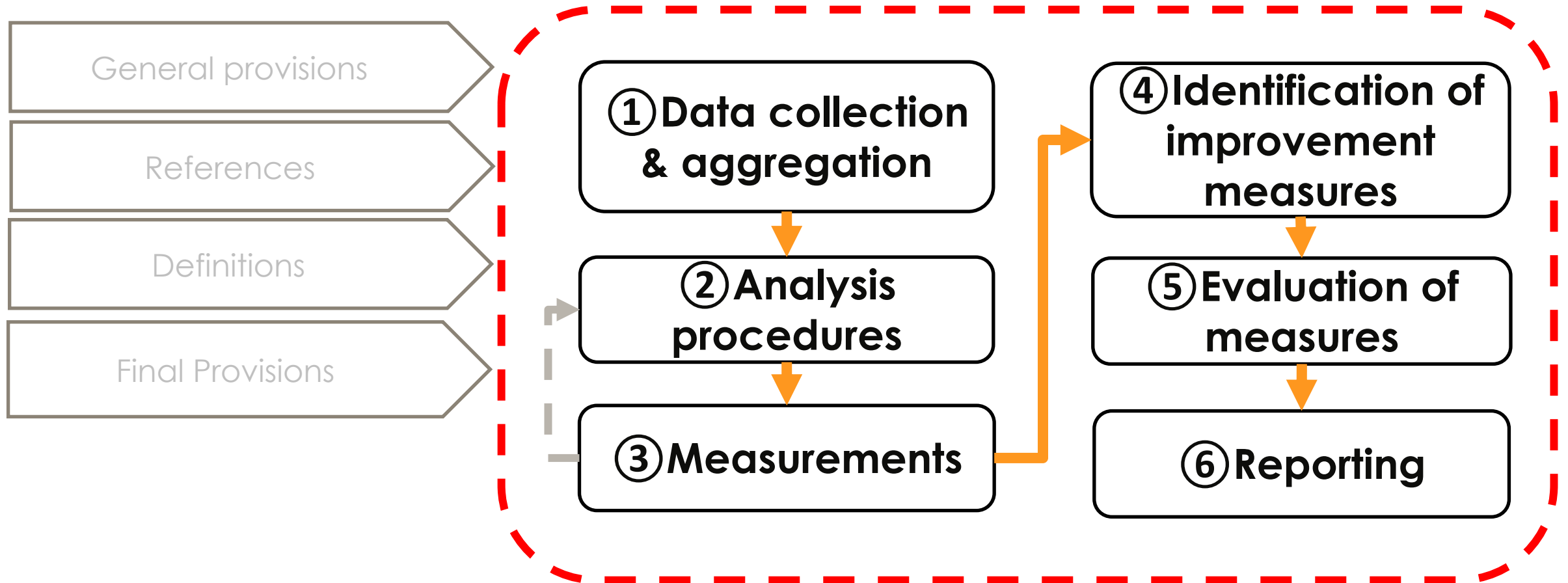
- ISO/DIS 50002-1 Energy audits — Requirements with guidance for use — Part 1: General requirements
- ISO/DIS 50002-2 Energy audits — Requirements with guidance for use — Part 2: Buildings

Describes the **structure of the report** (provides basis for energy audit template)

Provides flexible **framework** for how energy audit should be shaped

Defines the requirements for **qualification** of person performing an energy audit

THE OVERAL STRUCTURE OF THE METHODOLOGY CONCEPT



ELEMENTS OF ENERGY AUDIT IN BUILDINGS

METHODOLOGY (1/3)



① Data collection & aggregation

Collect data needed to perform the energy audit according to requirements:

Information on the Object and Building

Information on Energy Consumption and Costs

Partial Building Inspections

② Analysis procedures

Perform procedures needed to analyse the energy consumption of the building:



Calculated consumption



Actual consumption

???



Calculated consumption (after renov.)

Elements:

- Building energy balance model
- Normalization of energy consumption
- Calibration of calculation model

③ Measurements

ELEMENTS OF ENERGY AUDIT IN BUILDINGS

METHODOLOGY (2/3)



② Analysis procedures

To collect data to calibrate the analytical model and identify actual conditions:

③ Measurements

Measurement of energy consumption

Internal/external microclimate parameters

Calculating Average Microclimate Parameters

④ Identification of improvement measures

Selecting the measures that would help to eliminate or reduce the losses identified and quantified in the analysis:

Building thermal envelope loss

Additional insulation

Losses in heating system

Option 1

Losses due to natural ventilation

Option 2

⑤ Evaluation of measures

ELEMENTS OF ENERGY AUDIT IN BUILDINGS

METHODOLOGY (3/3)



④ Identification of improvement measures



⑤ Evaluation of measures



⑥ Reporting

Identified measures has to be evaluated and ranked based on their feasibility:

1. Evaluate the measures or packages of measures based on:
 - *Simple payback time*
 - *Net present value*
 - *Life cycle cost*
 - *Carbon emission reduction*
 -
2. Create a priority list for the measures (or packages) to be implemented, and provide recommendations based on the criteria

Describing the way energy audit reports should be shaped and presented

Key aspects:

- General structure of the report
- Define mandatory chapters
- Describe the requirements for the audit report

TO FUNCTION, THE MARKET NEEDS QUALIFIED PROFESSIONALS WHO ARE CAPABLE OF DELIVER HIGH QUALITY ENERGY AUDITS



Qualified professionals

EDUCATION

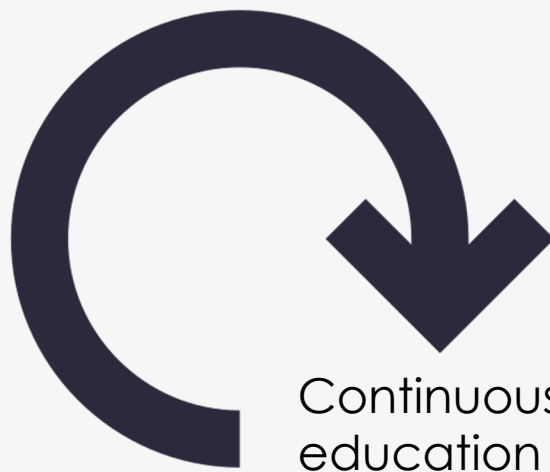
PRACTICAL EXPERIENCE

TRAINING

(followed with examination)

Energy audit Market

Energy audit process



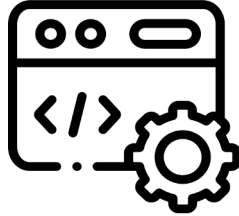
Unqualified participants

THE TOOLS AND GUIDANCE HELP TO START AND MAINTAIN THE PRODUCTIVITY OF AUDITORS

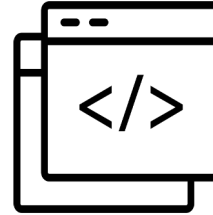


TEMPLATES

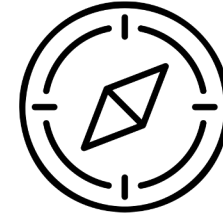
SHOWCASING THE STRUCTURE, LAYOUT AND MAIN ELEMENTS OF ENERGY AUDIT



SOFTWARE TOOL TO PERFORM ENERGY AUDITING PROCEDURES OR PART OF IT.



CALCULATION TOOLS TO SIMPLIFY THE CALCULATIONS OF SEPARATE ASPECTS (For example: life cycle costing calculation, creating sankey diagram)

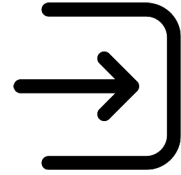


GUIDANCE DOCUMENTS, ADDITIONAL INSTRUCTIONS OR CLARIFICATIONS

THE INFRASTRUCTURE IS NEEDED TO MANAGE THE PROCESS ENSURE TRANSPARENCY OF SYSTEM



**LIST OF APPROVED
ENERGY AUDITORS**



**THE PLACE WHERE TO
SUBMIT ENERGY AUDITS
AND OTHER REPORTING
OPERATIONS**



**LIST OF CREATED ENERGY
AUDITS**

SUMMARY: KEY TAKE AWAYS



- ENERGY AUDIT HELPS TO DIAGNOSE THE ISSUES AND PROPOSES THE MEASURES TO IMPROVE ENERGY EFFICIENCY OF BUILDING
- IT IS IMPORTANT TO UNDERSTAND THE DIFFERENCES BETWEEN ENERGY AUDIT AND ENERGY PERFORMANCE CERTIFICATE
- AN ENERGY AUDIT SYSTEM CONTAINS MAIN ELEMENTS THAT ENSURE QUALIFIED ENERGY AUDITORS, CLEAR PROCEDURES AND QUALITY MANAGEMENT.
- THE DEMAND FOR ENERGY AUDITS COULD BE STIMULATED NOT ONLY BY THE MANDATORY REQUIREMENT IN THE LEGISLATION
- THE ENERGY AUDIT PROCESS SHOULD BE STANDARDIZED AND CLEAR BUT HAVE THE FLEXIBILITY TO BE TAILORED FOR SPECIFIC CASES
- THE BASIS FOR METHODOLOGY IS DESCRIBED BY EUROPEAN AND INTERNATIONAL STANDARDISATION ORGANISATIONS
- TO FUNCTION, THE MARKET NEEDS QUALIFIED PROFESSIONALS WHO ARE CAPABLE OF DELIVER HIGH-QUALITY ENERGY AUDITS
- THE TOOLS AND GUIDANCE HELP TO START AND MAINTAIN THE PRODUCTIVITY OF AUDITORS
- THE INFRASTRUCTURE IS NEEDED TO MANAGE THE PROCESS ENSURE TRANSPARENCY OF SYSTEM

ROLE OF ENERGY AUDITS OF BUILDINGS IN THE PROMOTION OF EE IN BUILDINGS



***THANK YOU FOR
YOUR ATTENTION
!***



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„Helping to Unlock the Value of Energy Efficiency and Sustainability for a More Resilient Future “



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