Municipal energy management as a part of the national monitoring, reporting and verification system

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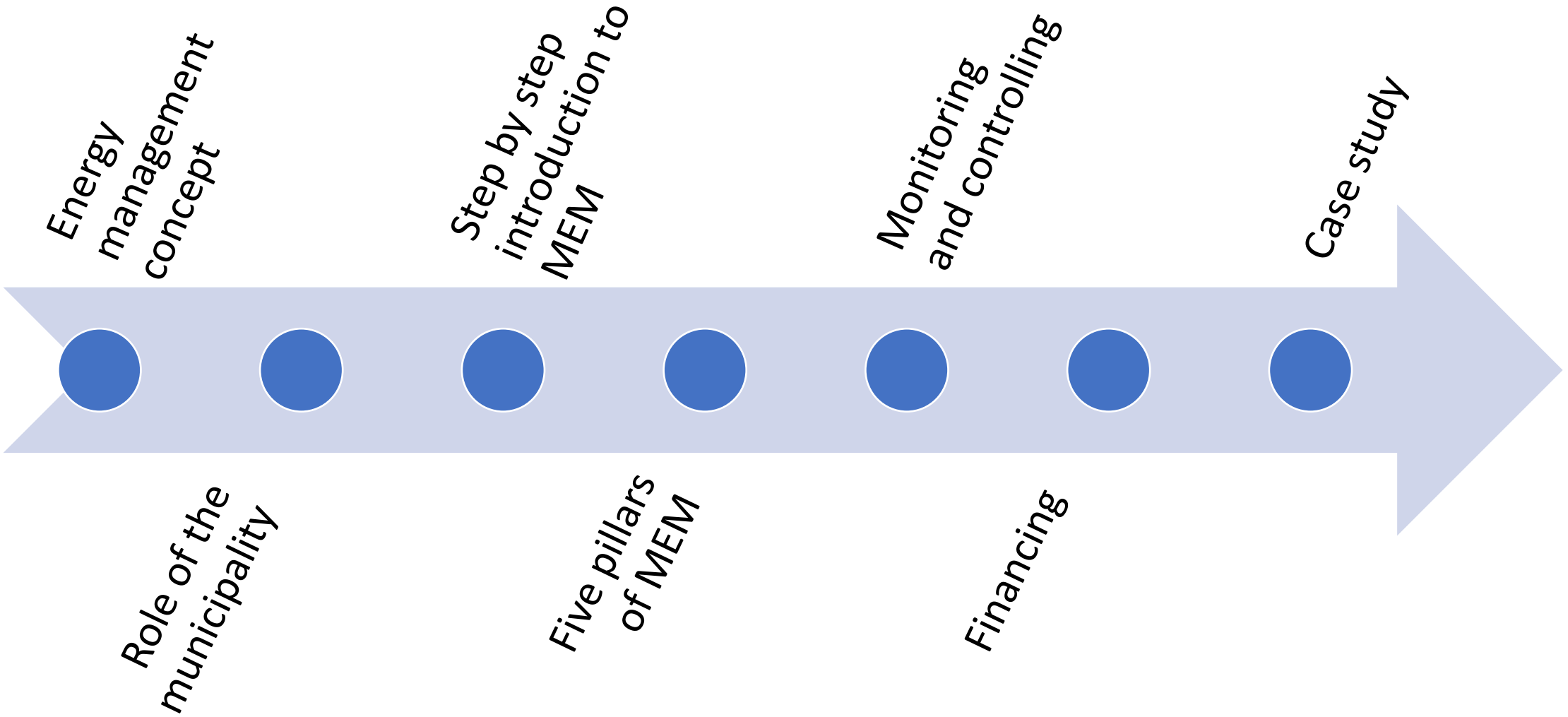


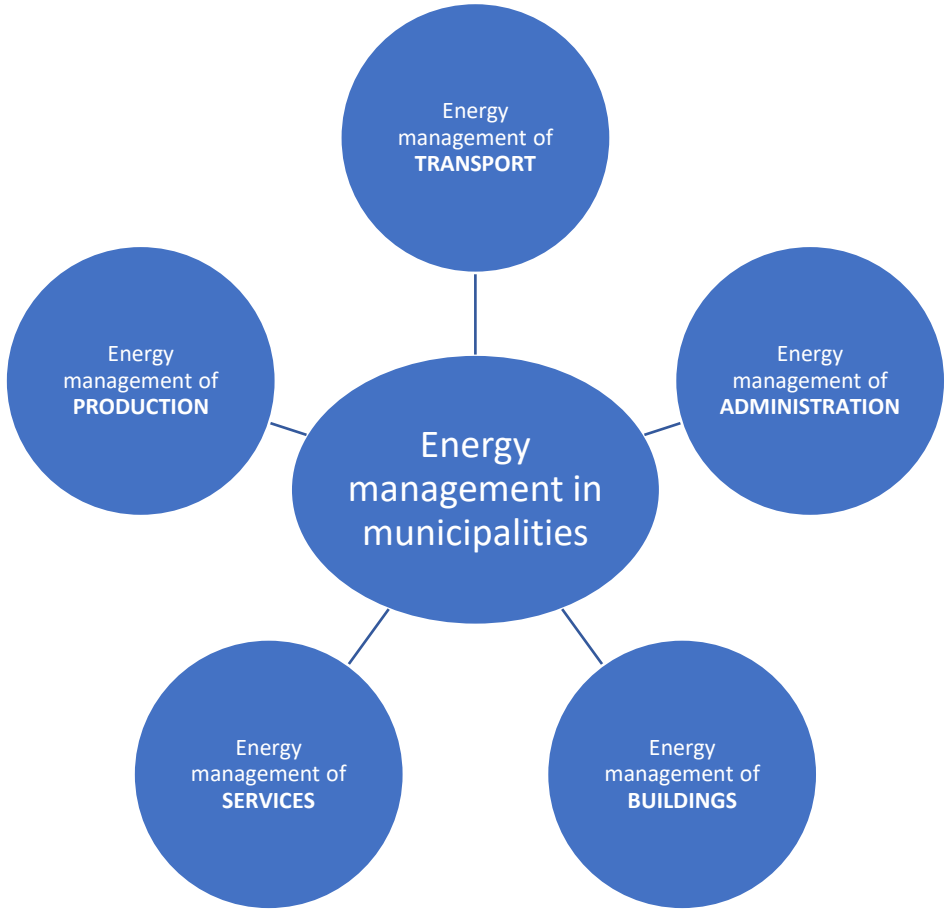
What is energy management?

- Implementation of organizational, technical and behavioural actions in order to optimise the use of energy consumption and consumption of materials
- Effective instrument to continually improve energy efficiency
- Holistic approach that is result oriented, not an objective in itself

Why energy management in municipalities?

- High potential to reduce energy consumption in municipalities
- Improvement of environmental performance
- Good insight into the energy flow (important to know how much energy is used in various sectors)
- To have the documentation of the energy systems (supply and consumption) systematically structured

Areas of energy management in municipality



- Municipal energy management is important to:
  - Immediately react when energy consumption changed considerably in certain sector
  - Implement effective measures through continuous monitoring and controlling
  - Effective use of resources
- Annual cost reduction can be up to 40%

Key elements for implementing MEM

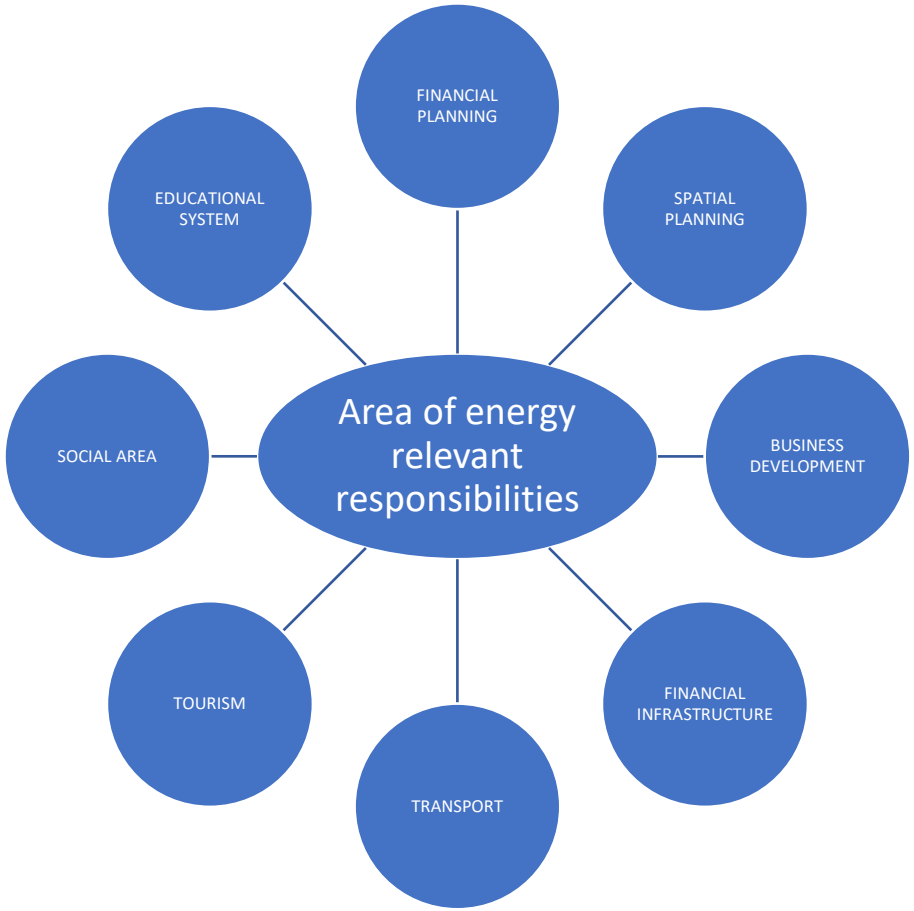
- Energy policy with clear objectives
- Properly determined and assigned tasks and responsibilities
- Sufficient resources available for maintaining the management system
- Regular documentation and communication of progress achieved through energy management
- Other important elements:
  - Monitoring – meeting the expectations?
  - System for corrective and preventive actions
  - Regularly performing energy management audits to ensure the continual improvement

Communication

- Involvement of all relevant stakeholders and awareness raising among staff and citizens
- Mobilisation of activities (i.e. involvement of schools)
- Realisation of pilot projects (act as a role model)
- Permanent activities

Role of the municipality

- Municipalities have a broad area of energy relevant responsibilities:
  - Financial planning
  - Spatial planning
  - Business development
  - Technical infrastructure
  - Transport
  - Tourism
  - Social area
  - Educational system
  - Environmental planning
  - Etc.



Role of the municipality

- Municipalities are energy consumers (i.e. heating, lighting, office equipment, etc.)
  - Public buildings (schools, hospitals, etc.)
  - Infrastructure (public transport, district heating system, etc.)
  - Public spaces
- Municipalities are both – energy producers and distributors (i.e. owners of power supply and distribution companies)
- Municipalities are responsible for regional development (spatial planning, traffic system, etc.)

Role of the municipality

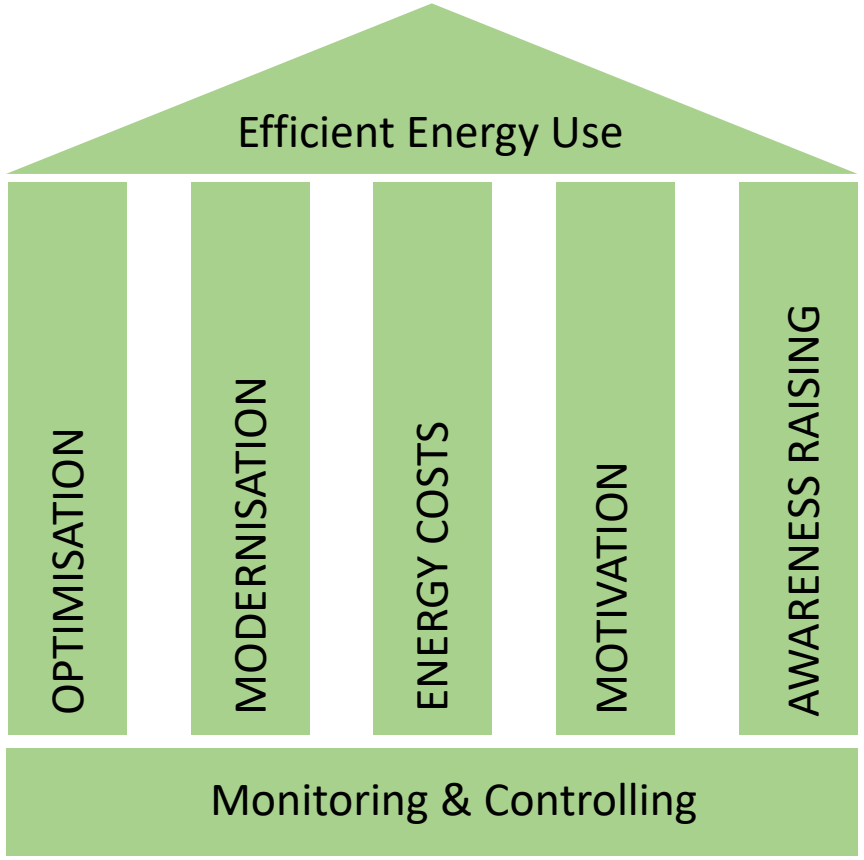
- Municipalities are obliged to use their budget in a cost effective and responsible way
- Municipalities are close to end-users (stimulate a change in user behaviour)
- Municipalities can act as public role models and information centres for citizens
- Most effective way to increase energy efficiency in a municipality is to establish an energy management system:
  - Inter relationships between different challenges can be identified
  - Relevant measures can be aligned
  - Therefore measures can be realised most cost efficiently
  - Modern and proven method to increase energy efficiency

Role of the municipality

- By means of energy management:
  - Municipalities take over an important position in decreasing energy consumption, reducing emissions and costs, modernisation, etc.
  - Spill over effects can be achieved
    - Increase living standards
    - Modernisation of infrastructure and equipment
    - Increase competitiveness
    - Stimulate local economy
    - Etc.

Step by step introduction to MEM

- Important steps
  - Getting started
  - Form an energy team
  - Define an energy policy
  - Understand the organisation's (municipalities') energy consumption (energy audit)
  - Compile an Energy Action Plan
  - Promote and implement energy efficiency measures
  - Check energy performance
  - Check energy management system and energy efficiency
  - Achieve further efficiency improvements



Getting started

- Knowledge of applicable energy relevant laws and regulations
- Commitment of the municipal council to introduce energy management
  - Raising awareness with council members is important to meet long term aims and to get full back stopping during the realisation
  - Define the area which should be covered
  - Commitment to provide necessary resources
- Define and publish and energy policy which reflects the commitment of the council (basis for the action plan)
- Establish and energy team
  - Experts, administration, council members, citizens, etc.
  - Involve all relevant stakeholders
  - Nominate a responsible coordinator

Establish an energy team

- The energy team should consist of representatives from all major areas:
  - Construction
  - Real estate
  - Environment
  - Organisation
  - Financing
  - Schools
  - Citizens
  - Etc.

- Responsibilities of an energy team:
  - Provide guidance and advice to the energy coordinator
  - Provide assistance in drafting an energy management policy and action plan
  - Assist in the dissemination of information and programme progress reporting
  - Provide general support to the energy coordinator
  - Assist in the promotion of the energy management initiatives

Energy coordinator

- Multi skilled person with
  - Good consultation, negotiation and liaison competency
  - Solid general technical and economic background
  - Project management experience
  - Motivation, social skills and flexibility
- Full time or part time?
  - Very time consuming during the establishment period but strongly decreasing after the management system is in place

Stock taking

- Data collection (past and present energy consumption)
- Identification of areas of significant energy consumption (and changes)
- Estimation of expected energy consumption
- Energy audit reports
- Identification and prioritisation of opportunities for improving energy efficiency

Data collection on energy consumers

- List all energy consumers
  - Buildings
  - Lighting
  - Transport
  - Etc.
- List all people involved
  - Housekeeper
  - Administrators
  - Facility manger
  - Etc.
- Document all kind of energy (and water) consumption
  - Electricity
  - Heating
  - Cooling
  - Fuel
  - Etc.

- Energy assessment report
  - List of energy consumers
  - Current and previous (min. 4y) Estimated expected energy consumption
  - Energy costs
  - Duties and responsibilities
  - Suggestions for improvement measures

Objectives, targets and programmes

- Targets should be: clearly defined, ambitious, realistic, specific and measurable
- Energy policy contains overall objectives
- Energy programmes contain specific objectives
- Programmes should detail how the organization plans to improve energy efficiency methods
- Energy management programmes should contain:
  - WHAT are the priority activities?
  - WHAT is to be achieved? (including timeframe)
  - WHO is responsible
  - WHAT resources are required?
  - HOW will it be monitored?

Implementation and operation

- Programmes can include different kinds of measures and activities:
  - Political
  - Technical
  - Organisational
  - Capacity building (training etc.)
  - Awareness raising

- Activities have to be aligned within the overall programme

Energy performance and distribution of results

- Permanent Monitoring and Controlling of realised activities and the programme itself
- Check conformity – evaluation of compliance
  - Procedure has to be established
  - Evaluation if targets have not been fulfilled
  - Adjust project plans
- Detect improvement of energy management system
- Review of the energy performance by energy team and municipal council
- Review of the energy management system by energy team, external experts and municipal council
- Inform the public about positive results (campaigns, events, direct contact, etc.)

Communication towards the key stakeholders

- How to convince the relevant stakeholders?
  - Regular meetings (reporting and identification of problems) to increase their sense of responsibility
  - Regular reports (short, simple and concise
  - Good presentation of planned activities
  - Failures – discuss before act
  - Build alliances

- Obstacles for successful implementation of MEM?
  - Lack of motivation (energy not seen as a key issue)
  - Missing organisational structure
  - Low budget
  - Not open for new ideas
  - Lack of know how
  - Different political interests
  - Conflicts in administration
  - Lack of regional initiatives
  - Lack of data

Serve as a public role model

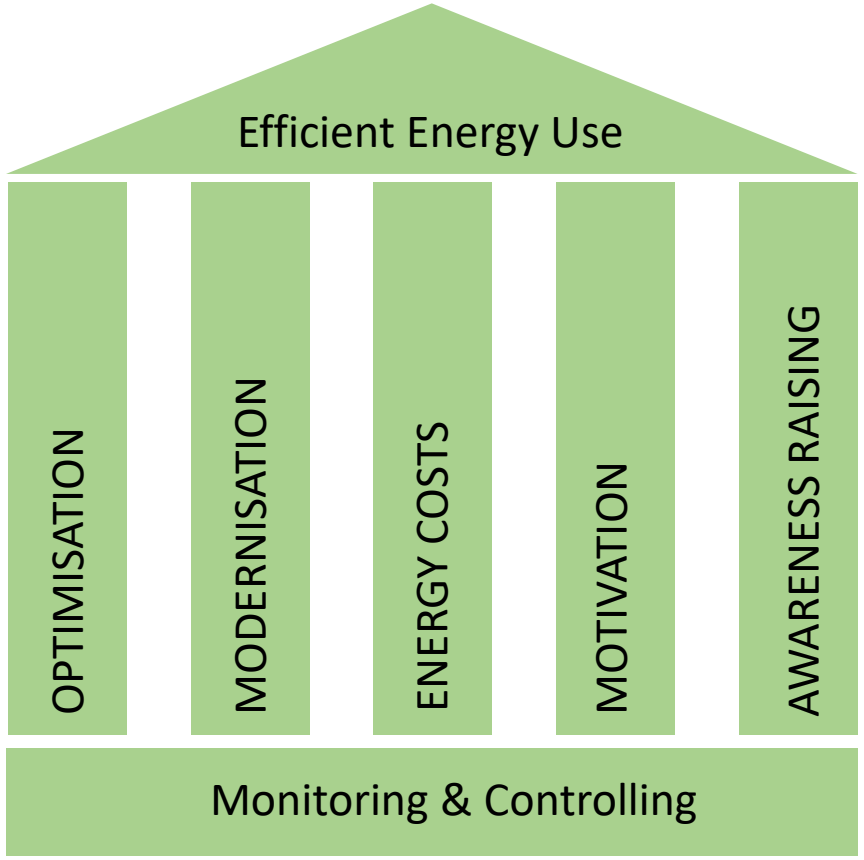
- Municipalities can convince the people easier if they show what can be done through acting as a role model
  - Make energy savings visible
  - Show what is possible and what can be done
  - Make decisions transparent for the public
  - Be a know-how and competence centre
  - Adopt an energy policy which is transparent to the public
  - Show that there is a full commitment from the city or municipal council
  - Set activities and inform the public

Public awareness raising

- Often, people are not aware of the importance of energy efficiency because of lack of know how
- Public awareness raising should cover two issues
  - Communication
  - Education
- Involve the public into processes
- Municipalities can act as a competence centre
  - Information events
  - Centre for the public to get information and expert support
- Design and form of well targeted campaigns that need to reach the expected results (get support by PR experts)
- Different target groups require different actions

5 pillars of energy management

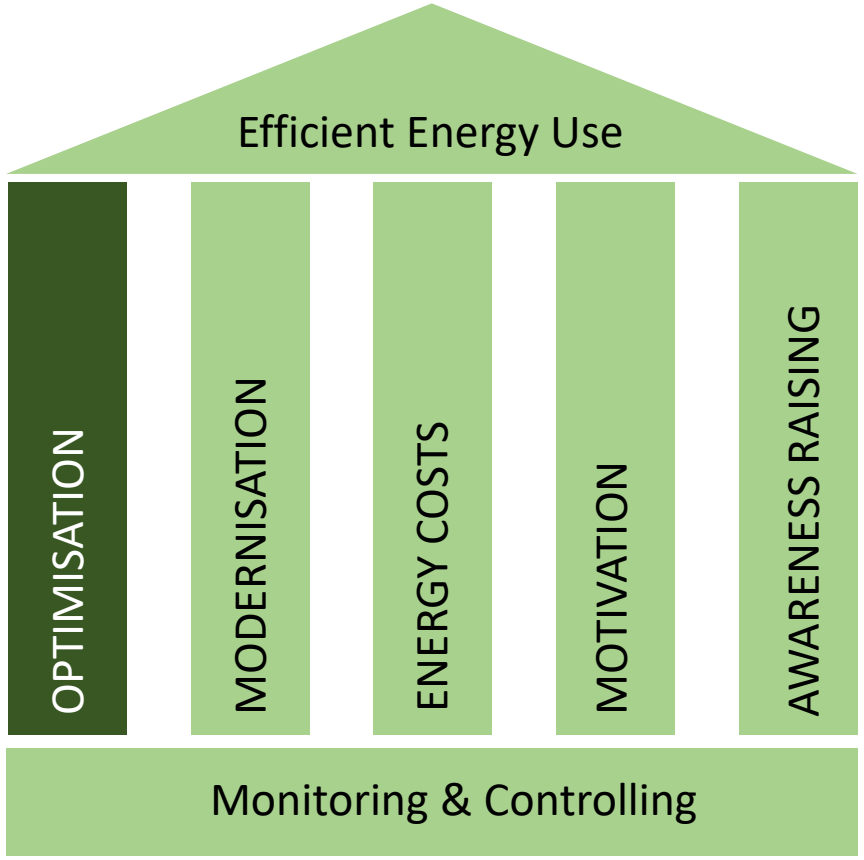
- 5 pillars of energy management
  - Optimisation
  - Modernisation
  - Energy costs
  - Motivation
  - Awareness raising



Optimisation

- Minimal input – maximal output

- Optimise
  - Energy performance
  - Use of existing technologies
  - Processes
  - Work flows
  - Organisational structures

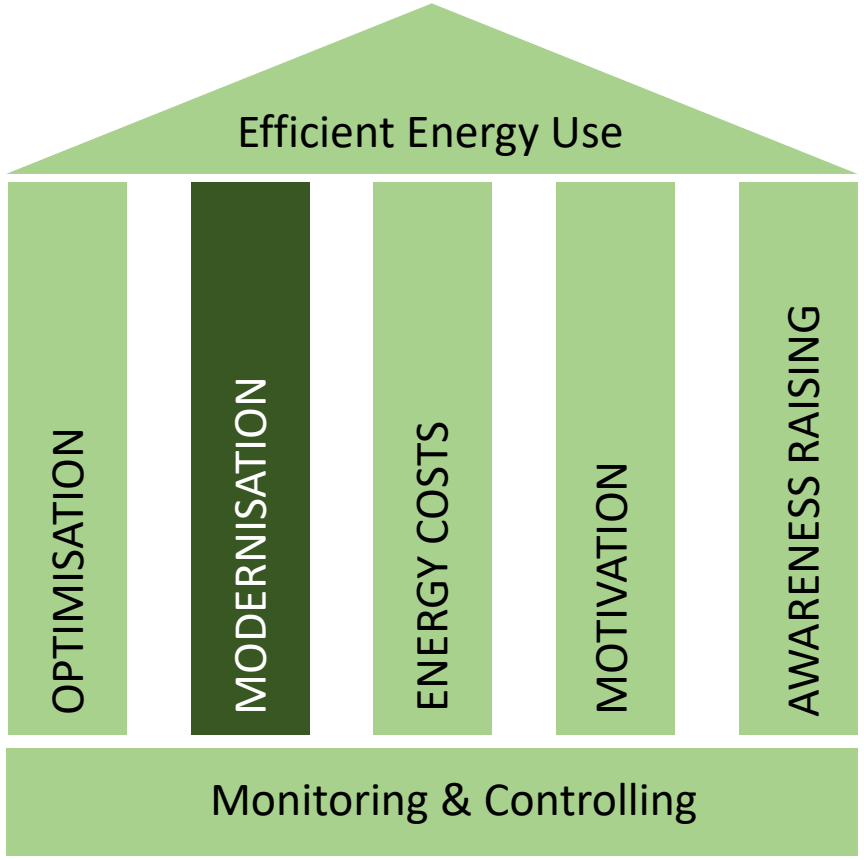


Optimisation

- Reduce energy requirements
- Detect and reduce energy losses
- Ensure energy supply is balanced effectively to demand
- Improve existing facilities
- Control energy demand
- Manage energy consumption

Modernisation

- Use the best available technology and most efficient equipment
- Covers all areas of energy consumption:
  - Heating
  - Cooling
  - Electricity
  - Transport
  - etc.



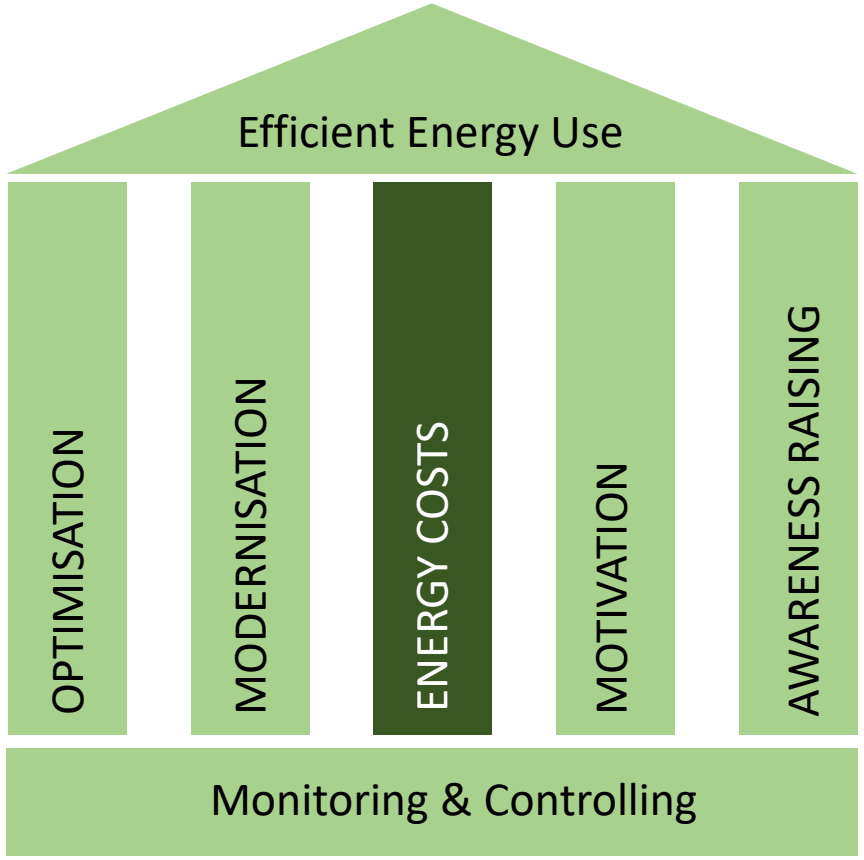
Modernisation

- Why?
  - State of the art
  - Highly efficient equipment
  - Cost efficient technologies
  - Increase living standard
  - Reduce maintenance costs
- How?
  - Follow the energy management programme action plan
  - Modernisation has to be aligned with other actions (training, awareness raising, etc.)

- Example on building:
  - Building envelope
    - Windows
    - Walls
    - Basement floor
    - Roof
  - Heating and cooling system
  - Controlling system
  - Distribution system
  - Energy supply system

Energy costs

- Costs of energy management includes as follows:
  - Energy supply costs (e.g.: coal, oil, gas, ..)
  - Energy distribution costs (e.g. district heating, local distribution losses, etc.)
  - Appliances/equipment/devices
  - Operating costs (e.g.: pumps, vents, etc.)
  - Maintenance costs
  - Administrative costs (e.g.: procurement, billing, contracting, metering, etc.)
  - Investment and financing costs
  - Etc.

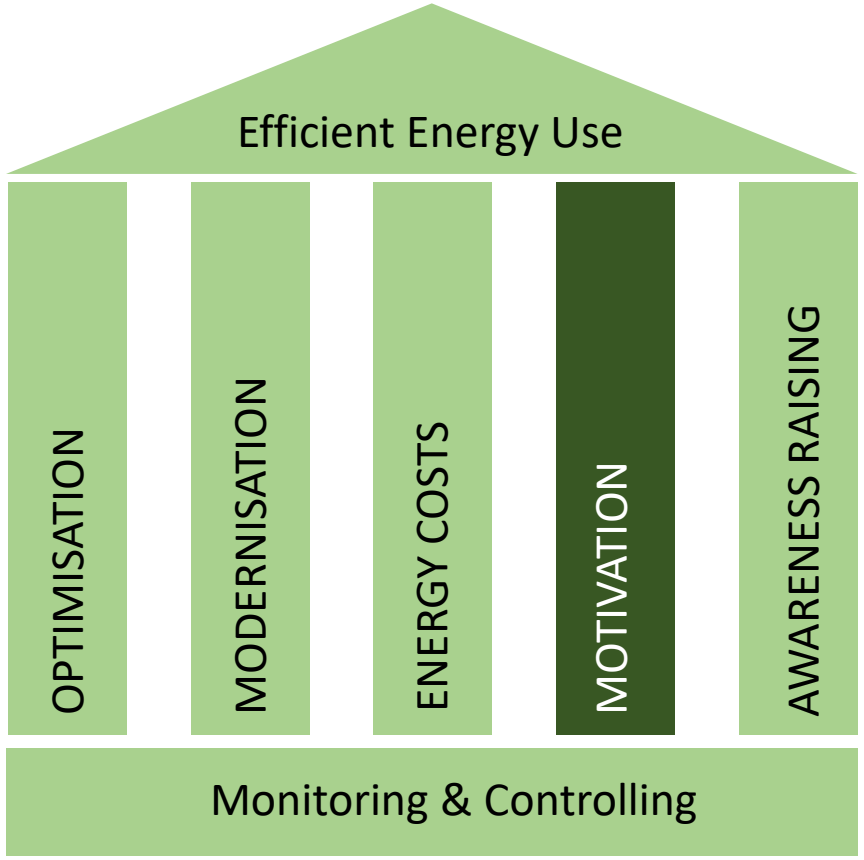


Energy costs

- Reduce energy demand
- Increase energy efficiency and use efficiency
- Reduce maintenance costs
- Optimize procurement
- Optimize contracting

Motivation

- High efficient – low costs
- Necessary to meet the objectives
- Driver to change user behaviour
- Important to mobilise relevant staff on all levels
- Motivation – identification - action

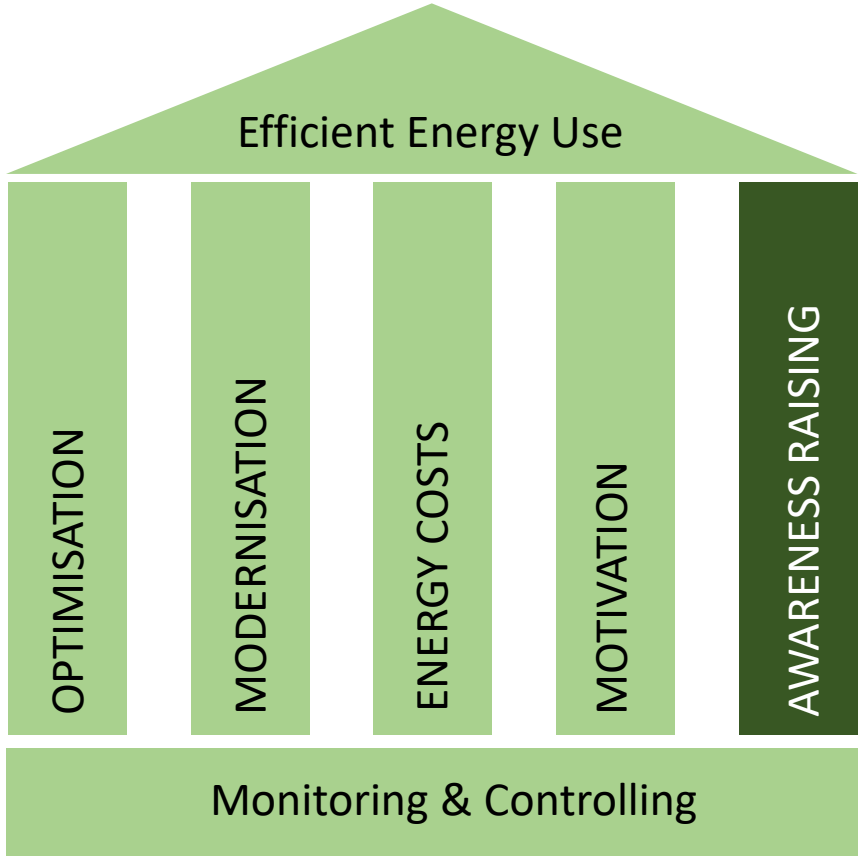


Motivation

- Motivate staff, council, citizens, etc.
- Provide incentives
- Persuade opponents
- Point out and highlight benefits
- Make energy saving appealing

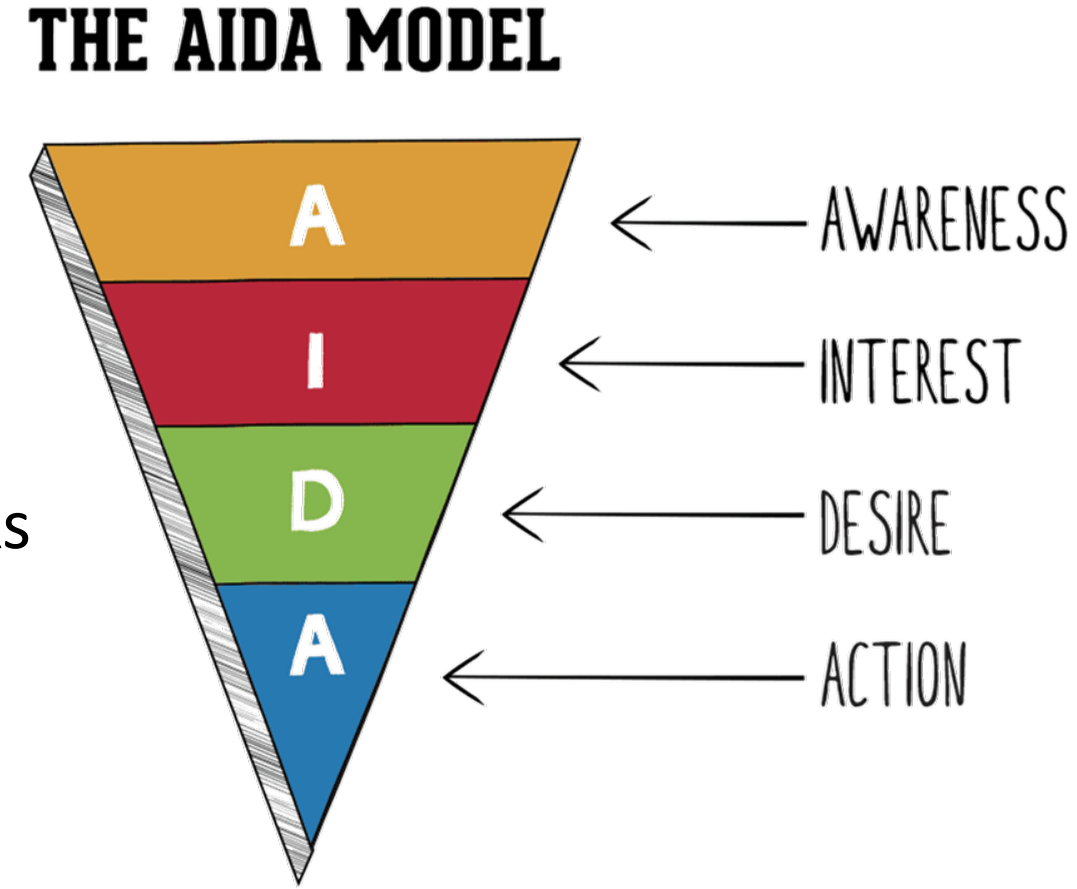
Awareness raising

- Act as a role model
- Motivate citizens through campaigns, events, advertising, etc.
- Show overall benefits
- Show financial benefits
- Show technical improvement
- Contribute to social responsibility



Awareness raising

- Encourage positive behaviour
- Win to win deal
- Use all kind of media
- Demonstrate best practice
- Distribute knowledge through networks



Monitoring and Controlling

- Monitoring
  - To oversee a programme during execution
  - Someone who gives a warning so that a mistake can be avoided
  - A control programme within the operating system that manages the allocation of system resources to active programs
- Controlling
  - To oversees, to supervise, to check, to verify, to guide, to manage, to regulate

- Objectives of monitoring
  - Data collection (record energy performance)
  - Analyse and assess collected data
  - Define energy indicators
  - Detect failures and undesirable development
  - Stimulate improving processes
  - Prepare data for targeting and reporting
- Objectives of controlling
  - Check data quality
  - Check and compare energy performance
  - Check and management efficiency measures
  - Manage misbalances and variations
  - Cost controlling and reporting

Benefits

- Administrative
  - Overview energy performance
  - Detailed information on energy related equipment and devices
  - Information of energy flows
  - Detect the efficiency potential
  - Better knowledge regarding the energy demand and supply
  - Transparent administration of the energy supply
  - Statistical information and database
- Economic
  - Estimation and targeting resources
  - Overall costs provided
  - Cost savings potential
  - Cost reduction in administration, procurement and maintenance
  - Calculation of efficiency measures is possible
  - Data for financing needs is available (e.g. business plan)
  - Avoidance of double accounting
- Ecological
  - Finding energy saving potential
  - Reduction of CO_2 emission can be quantified
  - Reduction of other emissions
  - Fuel switch (oil to electricity)
  - Emissions data is available
  - Transparent energy consumption information

Resources needed

- Staff
  - Responsible person
  - Training and capacity building
  - Working hours of departments
- Equipment
  - Training equipment
  - Meters if necessary
  - IT-tools
- Information
  - Building infrastructure
  - Invoices and billing
  - Energy data

- Costs and benefits
  - Working time of energy expert (attending workshops, collecting data, metering, ..)
  - Departments need to spend time to provide information
  - Advise from external experts in exceptional cases
  - Expenses for information campaigns if needed

Assessment / targeting / reporting

- First assessment/check
  - Create metering plan
  - Monitor energy performance constantly
  - Meter processes
  - Verify data
  - Analyse energy performance and processes
  - Detect and calculate saving potential
- Targeting
  - Use statistical information and database
  - Create basis for supply estimation and for targeting
  - Compare data and analyse energy performance
  - Calculating efficiency potential
  - Detect losses
  - Calculate degree of efficiency
- Reporting
  - Inform the municipality (staff, mayor, municipal council, …)
  - Information to the public
    - Energy performance
    - Targets and objectives
    - Successes and failures
    - Costs
    - Improvement programmes
    - Outlook

Financing

- Before starting the financing process, bare in mind..
  - …that most saving measures can be achieved at least cost
  - …start with less cost intensive measures at first
  - …new equipment will change maintenance costs
  - …that a well defined action plan is in place (to avoid unnecessary investments)
  - …that possible financing risks are considered
  - …that the investment is approved by relevant stakeholders involved
  - …that investment in new technology will lead to a reduction in energy consumption

Added value for the municipality

- Reduced costs for operation and maintenance
- Improve the standard of the equipment
- Reduced risk of buildings' technical system failures
- Awareness raising within the municipality
- Improvement of skills
- Improvement of competitiveness
- Improved comfort and indoor conditions within buildings
- Better quality and reliability of operating units/facilites

Funding

- National subsidies, funds, etc.
- International subsidies
  - EU funds through neighbourhood policy
  - EBRD/EIB/KfW/..
  - Donor programmes (bilateral: GTZ)
  - International organizations (UNECE, UNDP, etc.)
  - Interregional programmes (EU, etc.)
- Loans
- Energy Service Company (ESCO)
- Energy Performance Contracting (EnPC)

Case study – Municipal energy management in Ukraine

- Based on the Study on the current state of energy management in Ukrainian municipalities
- Performed in 2020
- Authors:
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  - Liubava Radiychuk
  - Vasyl Vovchak
  - Airat Khakimzianov

Case study – Municipal energy management in Ukraine

PROJECT METHODOLOGY

ANALYSIS OF THE CURRENT SITUATION WITH MEM

CONCLUSIONS AND RECOMMENDATIONS

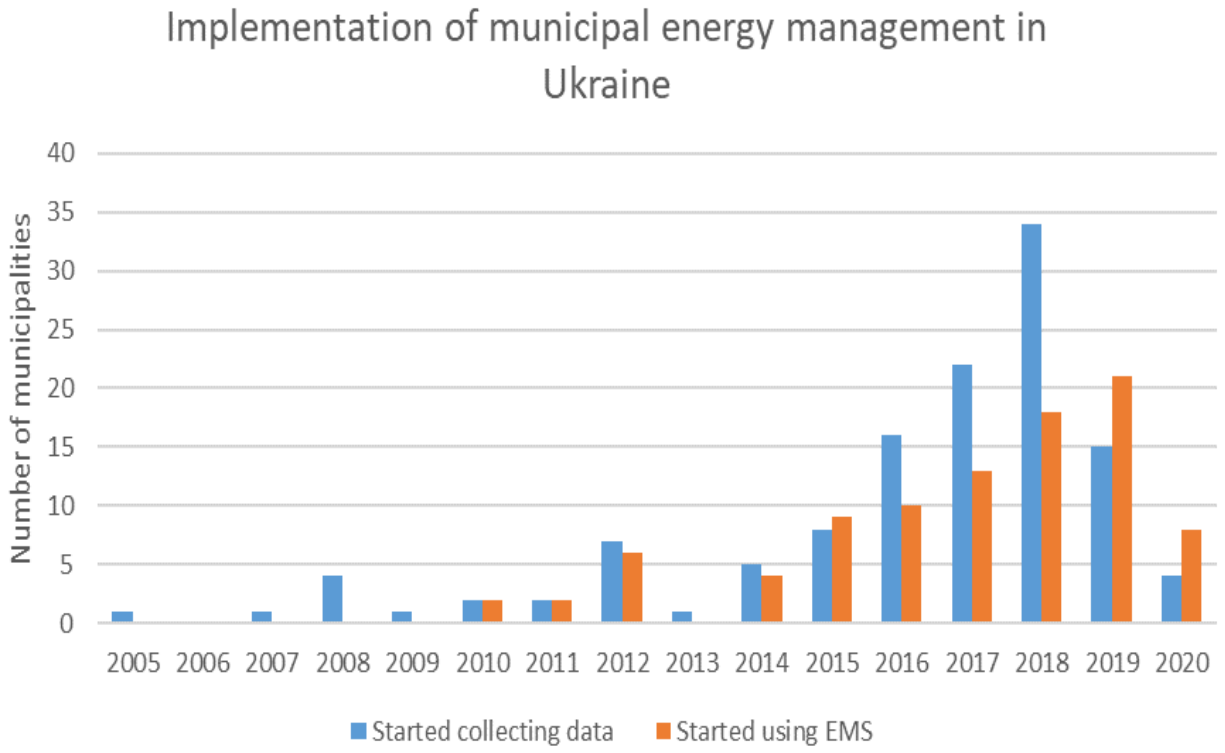
Project methodology

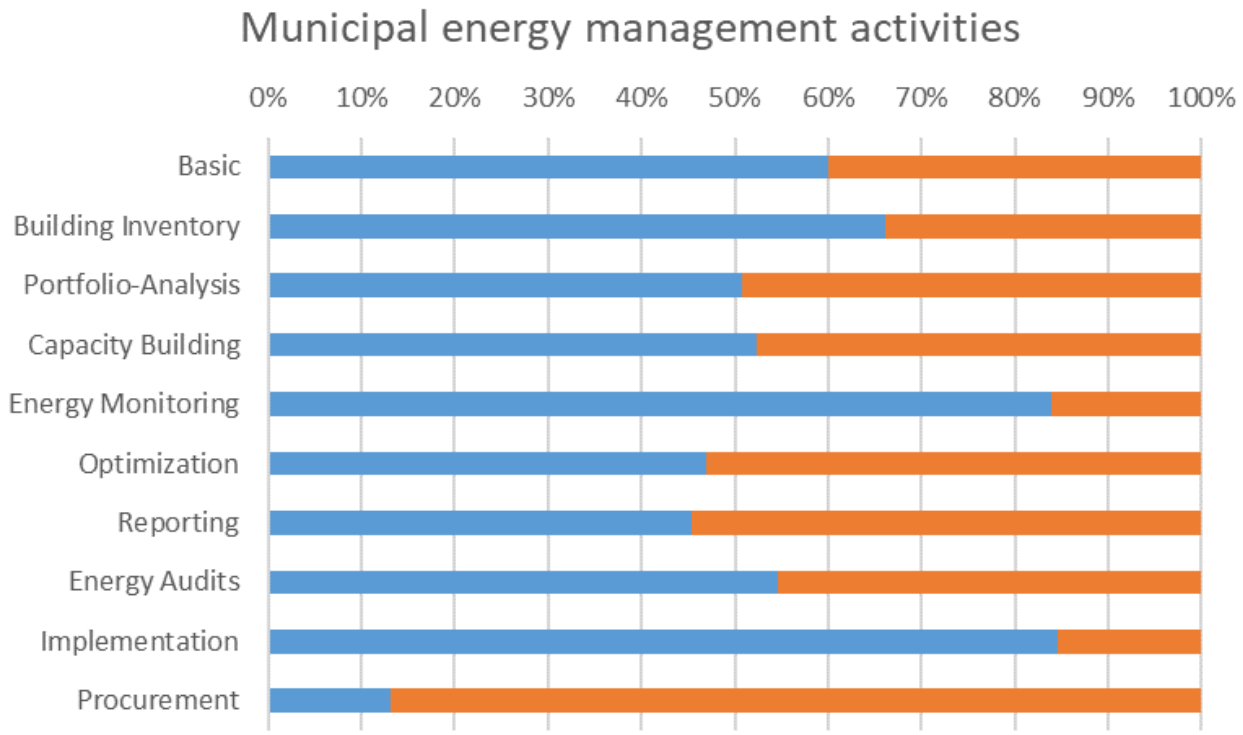
- Tree key steps:
  - Desk research
  - Online questionnaire
  - Fact-finding missions

- 130 unique municipalities answered the questionnaire (out of 267 municipalities reached)
- 64 municipal energy managers interviewed and analyzed more thoroughly

Analysis of the current situation with municipal energy management (MEM)

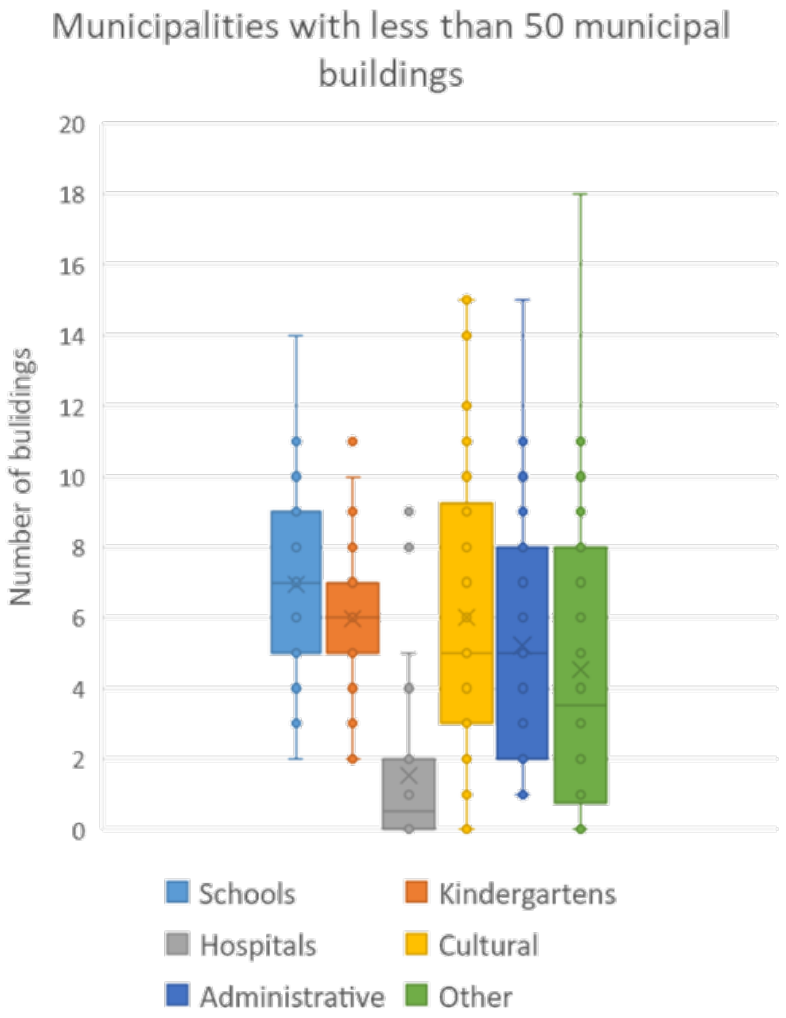
Introduction of MEM in Ukraine

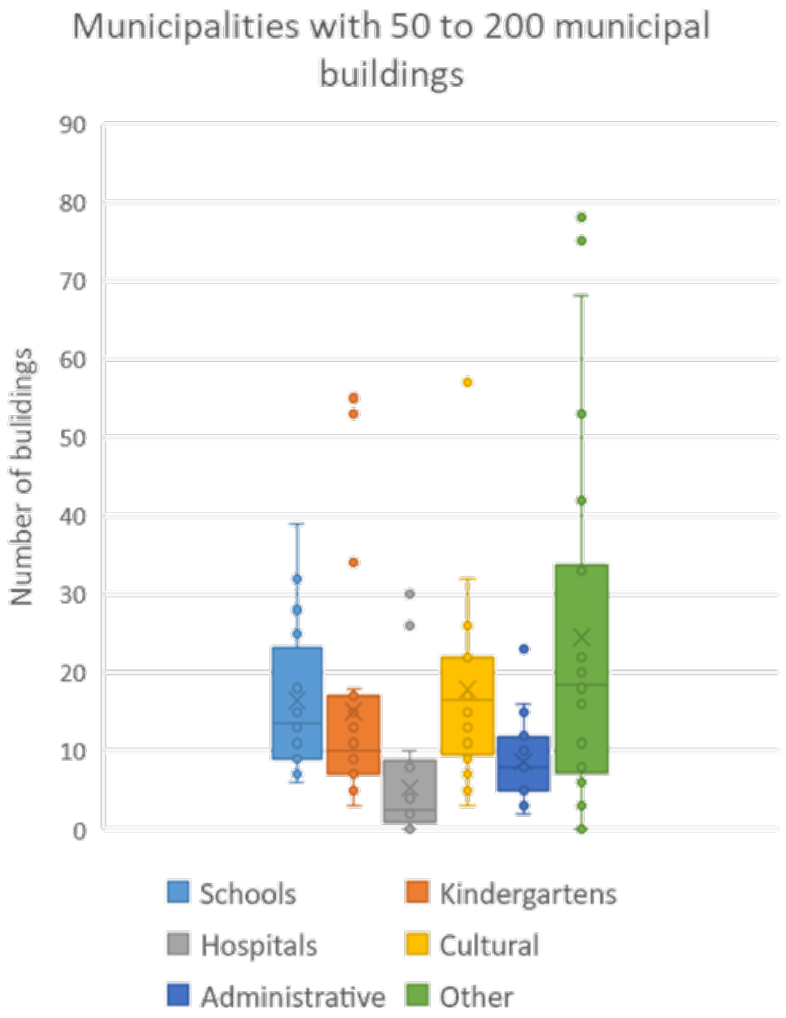


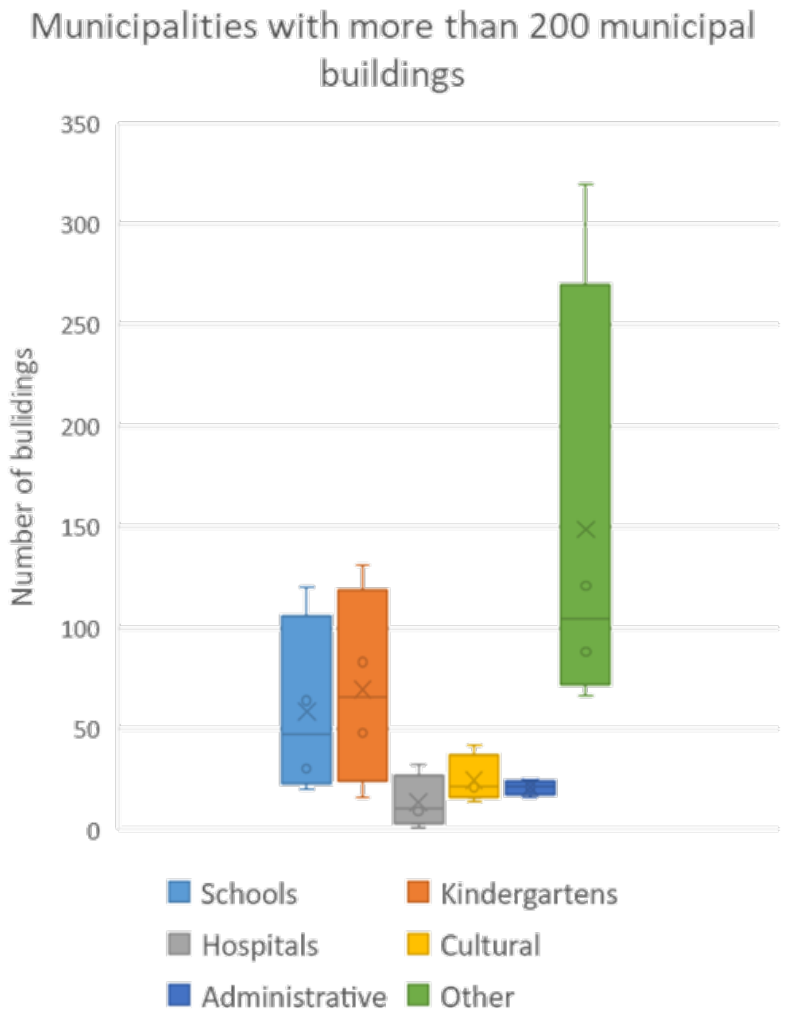


Analysis of the current situation with municipal energy management (MEM)

Public buildings typology

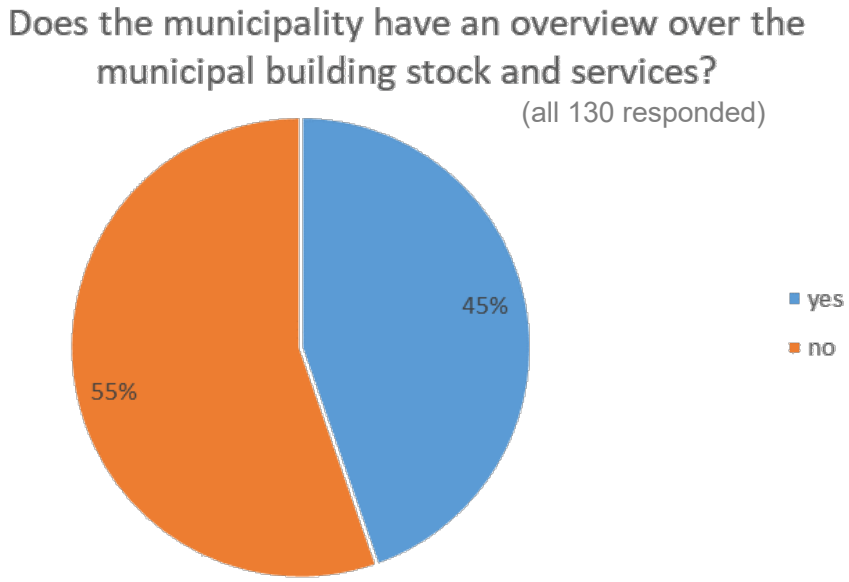


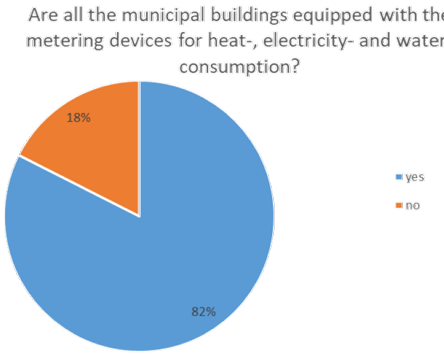




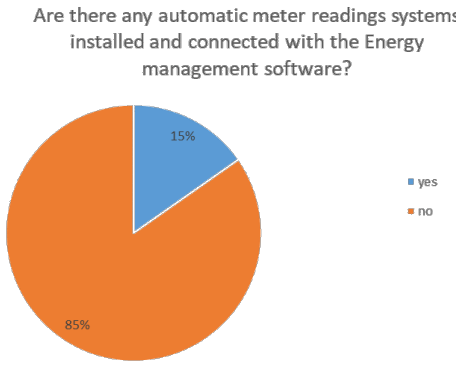
Analysis of the current situation with municipal energy management (MEM)

Municipal energy data collection

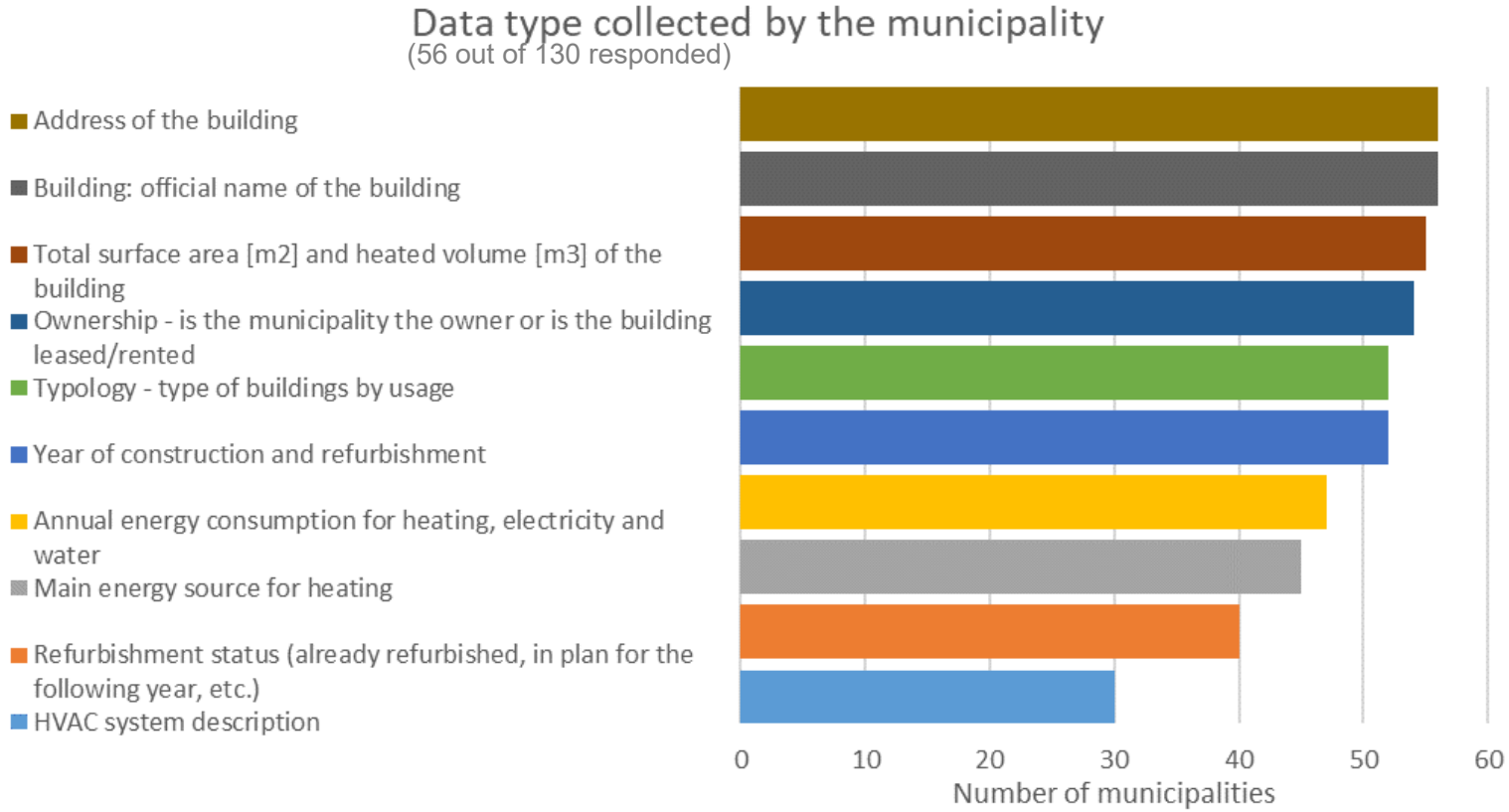




(57 out of 130 responded)

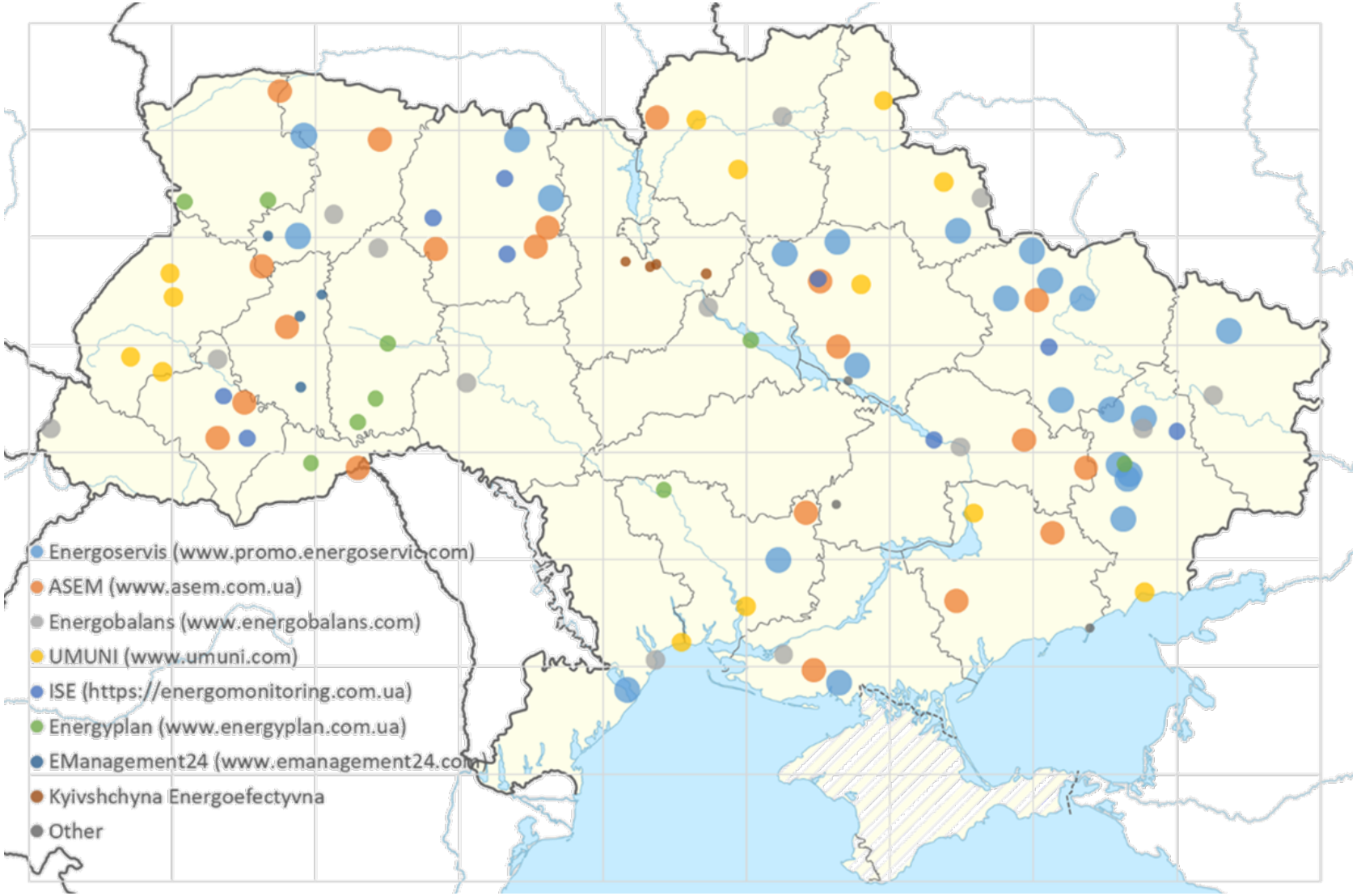


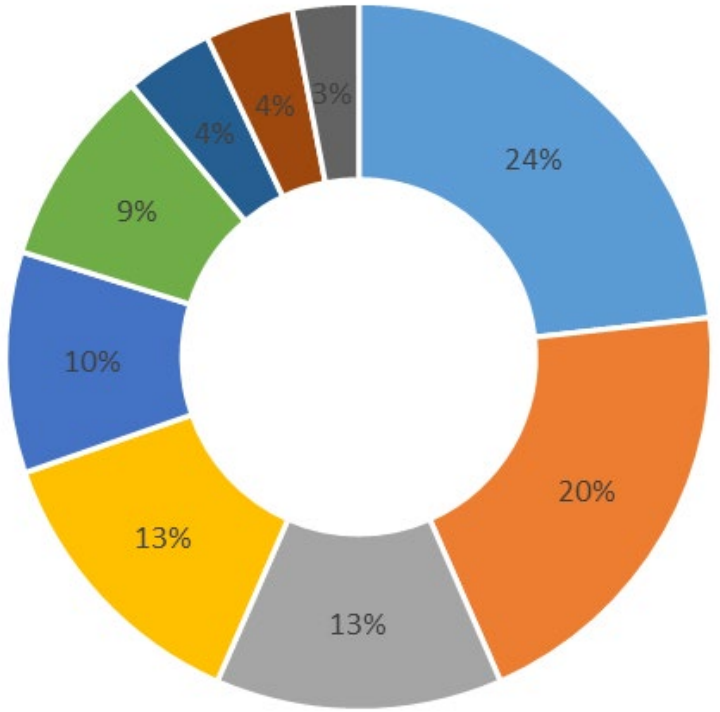
(98 out of 130 responded)



Analysis of the current situation with municipal energy management (MEM)

Energy management information systems used in Ukraine

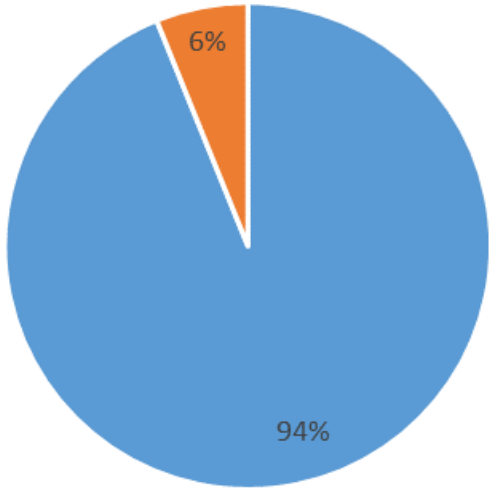




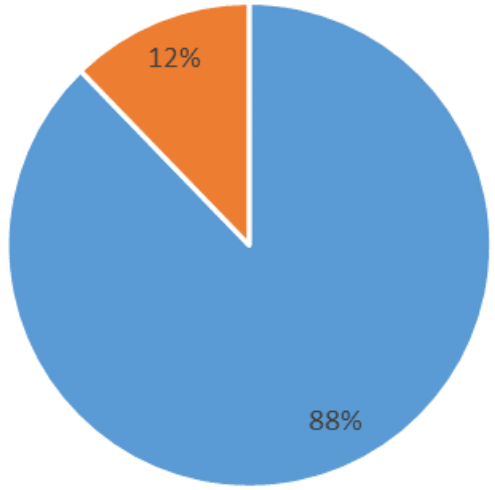
Analysis of the current situation with municipal energy management (MEM)

Centralized Energy management information systems

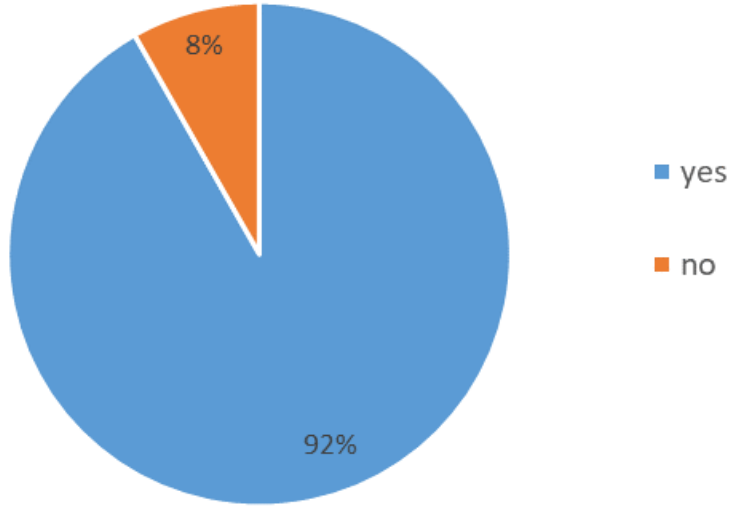
Do you support the idea of establishing of a national energy monitoring platform (open electronic energy monitoring system and a database of operational and energy characteristic of buildings)?



Is it relevant for you to compare the consumption of energy and utilities of similar municipal buildings (benchmarking) located in other cities during the selection of buildings for insulation?



Would you be willing to share your data with other cities online?



Analysis of the current situation with municipal energy management (MEM)

International activities and energy savings measures

Participation in international projects and loans/subsidies/grants (out of 130 respondents):

- Most municipalities and ALCs (32) cooperated with EMiM II project;
- The main donor is NEFCO - 18 municipalities obtained loans or grants;
- Funding from other donors is distributed almost evenly - 2 municipalities obtained support from EBRD (E5P), 9 from USIAD, 4 from UNDP.

Municipalities are either active and work with several donors or don't have such projects at all!

The most common measures (at the expense of international funds) are:

- Carrying out energy audits;
- Development of documentation and feasibility studies;
- Complex thermal modernization;
- Implementation of energy monitoring systems;
- Some municipalities participate in trainings, develop SEAP/SECAP, improve municipal transport and street lighting.
- Only 1/3 of respondents provided the information on savings, others just listed the measures or mentioned the costs.

Methodology on the measurement and verification of energy savings is not available!

Analysis of the current situation with municipal energy management (MEM)

Key gaps and barriers recognized by municpal energy managers

- Lack of funding for EE measures implementation – 38 municipalities (29%)
- Shortage of qualified personnel – 24 municipalities (18%)
- Lack of political will – 16 municipalities (12%)
- Lack of incentives for EE measures implementation – 14 municipalities (10%)
- No comprehensive energy management system – 12 municipalities (9%)
- Insufficient coverage of all buildings by energy monitoring system – 8 municipalities (6%)

Conclusions and recommendations

- Municipal energy management (incl. EE and RES) trainings for energy managers at all levels (building, village/city/ALC, region) should be intensified and continuously available
- Intensify the work and consulting activities at the management level of the municipality, especially towards municipal energy managers and heads of departments in which EM units are established
- Develop projects that would suit as best practice examples by co-financing of the deep and thorough retrofit of specific types of public buildings in various parts of Ukraine
- Technical assistance for preparation of projects and monitoring of results (energy audits, feasibility studies, development of municipal EMS, development of templates and guidelines, etc.)
- Create tools that would serve as multi-criteria analysis tools for faster recognition of buildings that are critical and should be retrofitted immediately
- Assist municipalities to develop clear action plans taking into consideration technical, financial and legal aspects of municipal energy management
- Provide support at the governmental and utility level to boost the usage of automatic meter reading systems
- Technical assistance in the development of the national guidelines and methodology on the measurement and verification of energy savings
- Help the Government establish the national energy management information system by developing the detailed functional specification and ensuring the use of the state-of-the-art technology based on the EU best practice

Q&As

Thank you for your attention!

Matija Vajdić