SLOVAKIA CATCHING-UP REGIONS

GUIDEBOOK FOR ENERGY MANAGEMENT SYSTEMS

European Commission
PREŠOVSKÝ SAMOSPRÁVNY KRAJ
DEPUTY PRIME MINISTER'S OFFICE FOR INVESTMENTS AND INFORMATIZATION OF THE SLOVAK REPUBLIC
WORLD BANK GROUP

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WORLD BANK GROUP

1818 H Street NW

Washington DC 20433

Telephone: 202-473-1000

Internet: www.worldbank.org

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ACRONYMS AND ABBREVIATIONS

AMU	Asset Management Unit
EC	European Commission
EBRD	European Bank for Reconstruction and Development
EE	Energy Efficiency
EEAP	Energy Efficiency Action Plans
EIB	European Investment Bank
ELENA	European Local Energy Assistance
EMS	Energy Management System
ENECO	Energy Service Company in Prešov
EPA	Environmental Protection Agency, U.S.
EPC	Energy Performance Contract
ESCO	Energy Service Companies
ESIF	European Structural and Investment Funds
EU	European Union
FEMU	Facilities and Energy Management Unit
GWh	Giga Watt hours
GHG	Greenhouse Gas
IU	Investment Unit
JESSICA	Joint European Support for Sustainable Investment in City Areas
MoE	Ministry of Economy
MWh	Mega Watt hours
MUNSEFF	Municipal Energy Efficiency Support Instrument
MoF	Ministry of Finance
MRV	Monitoring Reporting and Verification
M&V	Monitoring and Verification
NZEBs	Nearly zero-energy buildings
OECD	Organization for Economic Co-operation and Development
PMD	Property Management Department
PSK	Prešov Self-Governing Region
RRA	Regional Roads Administration
SIEA	Slovak Innovation and Energy Agency
SLOVSEFF	Slovakia Energy Efficiency Support Program
TWh	Terra Watt hours
WB	World Bank

INTRODUCTION

The activity on "Enhancing Energy Efficiency of Public Buildings in the Prešov Region" is designed to assess the existing regulatory framework and financial alternatives and recommend strategic planning options to implement an energy efficiency (EE) program in public buildings in the Prešov Self-Governing Region (PSK). The activity is also designed to assist PSK in establishing an Energy Management Unit that can help build an Energy Management System (EMS) to help its newly established Property Management Department (PMD).

THE IMPERATIVE TO IMPROVE EE IN PUBLIC BUILDINGS

Energy efficiency is an important focal issue in EU and Slovak energy policies and as of November 2016, the EU's EE Directive includes a 30 percent target for energy efficiency by 2030, up from 20 percent in the EE Directive of 2012. To meet the new target, the EU's EE Directive now requires member states to take measures that include renovating annually at least 3 percent of the total floor area of central government-owned buildings to meet the minimum energy performance requirements. Public buildings are also required to meet new standards for Near Zero Energy Buildings (NZEB), which will require greater use of renewable energy sources. The new EE directive also requires energy distributors or retail energy sales companies to achieve annual energy savings equivalent to 1.5 percent of their annual energy sales through EE measures.

Given the imperative of energy security to Slovakia, the energy policy supports self-sufficiency in energy through an optimal energy mix that promotes low-carbon technologies and domestic renewable energy, and increased efficiency in energy use in all sectors of the economy. The targets of the energy sector are consistent with EU targets for reduced greenhouse gas (GHG) emissions, increased energy efficiency, and increased use of renewable energy systems.

Improving EE in public buildings in PSK will help the country meet its commitments under the energy policy, lead to lower expenditure on energy and more efficient use of public resources and lower emissions from the use of fossil fuels. Improved EE in public buildings will also reduce the consumption of natural gas, which is the primary fuel used for heating public buildings in PSK and help improve energy security for Slovakia which imports natural gas.

Implementation of EE in public buildings in PSK will reduce its annual expenditures of fuel and permit funds to be used for other infrastructure and economic development activities. A large-scale EE program will also support economic growth by creating new job opportunities, which is crucial for economic development of PSK.

DEVELOPING AN ENERGY MANAGEMENT SYSTEM FOR PSK

Given the above backdrop for PSK to improve EE in public buildings, there is a need to develop a robust framework and systematic process to plan and deliver EE programs at scale for PSK's public buildings. PSK will also have to develop a coordinated approach to implement EE in PSK. Energy Management Systems (EMS) provide the necessary framework and systematic processes to undertake EE, and PSK would benefit greatly from establishing an EMS within its administrative units responsible for property management.

This guidebook for EMS has been prepared for the newly established energy management unit in PMD in PSK. The guidebook presents the main elements of an EMS, including organizing for implementing EE in public buildings, planning and analysing, implementing program, monitoring progress, and developing a mechanism for continual improvement. It has been developed to serve as a resource on good practice to establish an effective and successful energy management team which can coordinate and help implement EE projects in public buildings in the Prešov region.

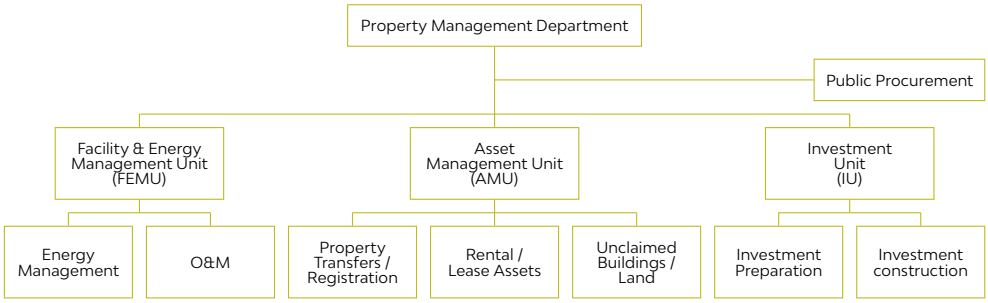
PSK'S PROPERTY MANAGEMENT DEPARTMENT AND THE INCORPORATION OF ENERGY MANAGEMENT

PSK is in the process of establishing energy management team within their Property Management Department (PMD) to manage public building. The PMD has established a new organizational structure where there is a structure in place to incorporate energy management as part of its functions. The energy management team once fully staffed will be responsible for improving EE in public buildings owned by PSK. PSK's plan to establish a Property and Energy Management Unit is an initiative of PSK and is not required by Slovak laws or regulations.

ORGANIZATIONAL STRUCTURE OF THE PMD

The organizational structure for the PMD, was discussed extensively to ensure that energy management could be mainstreamed along its different areas working with public building assets. The organizational structure presented below is what has been defined during the past year.

FIGURE 1 Organization Structure of the Property Management Department (PMD) in PSK



Source: Authors, 2019

Roles of PMD's Organizational Structure

The PMD will serve as a centralized department within PSK to coordinate all activities relating to the operations, maintenance and capital improvements of public buildings. As illustrated in the figure above, the PMD will house three main units responsible for: (i) facility and energy management unit (FEMU), (ii) investment unit (IU), and (iii) asset management unit (AMU). Under the facility and energy management unit, there will be the energy management team.

The facility and energy management unit (FEMU) will be responsible for creating and maintaining a database of all public buildings. The database will be comprehensive and provide all necessary information on public buildings including information on building use, characteristics and energy usage. The energy management team within FEMU will also have an energy modeling tool that will help do assessments based on the building database, EE investment costs (including labor and climate aspects specific for Prešov), economic rate of return (ERR) of the investments, and payback periods. The energy management team will principally use the database and the excel based energy modelling tool to develop a priority of investments and recommend shortlisted opportunities for EE.

The asset management unit (AMU) will be responsible for the buying, selling, rental/leasing of the real estate that PSK has. This includes public buildings as well as lots of land, and any leasing arrangement PSK has on their real estate. The asset management unit needs information from the facility management unit on O&M costs and energy costs, to be able to make decisions on what to do with the asset. If an investment is decided on a public building, then AMU will pass on the project to the investment unit.

The investment unit (IU) will be responsible for evaluating the EE project recommended by the energy management unit at FEMU and prepare financing plans for projects selected for implementation. The investment unit is staffed partly with staff from the earlier ELENA unit which has significant experience with assessing and supporting the implementation of EE projects. The investment unit will also assess and support implementation of other capital improvement and building rehabilitation projects identified by the directors/managers of public buildings.

Objectives and scope of energy management team at PSK's PMD

The energy management team within FEMU will be responsible for identifying and analyzing EE opportunities in PSK's public buildings. The energy management team at PSK will work under the direction of the PMD and in close collaboration with the IU to fulfill its contractual obligations. It will utilize the database of energy consumption of public buildings to plan and develop a program for improved EE in PSK public buildings.

The energy management unit will monitor the data consumption of public buildings and keep an updated database. Energy use information for individual public facilities from utility bills is not collated and databased centrally and this makes it difficult to analyze energy bills on a periodic basis and better manage annual budgetary spend on energy consumption. The energy management unit will be responsible for collecting the energy consumption information from public facilities and keep an updated database.

Based on the database disaggregated data, the energy management unit will make assessments, conduct initial financial and economic analysis to identify potential EE project opportunities. and undertake (or outsource) energy audits of public buildings in PSK. The energy management team will prepare a prioritized list of EE projects and provide its recommendations to the FEMU who in turn will pass on the head of the PMD. The energy team will also have to handle requests for energy related operation and maintenance issues (e.g. boiler replacement and other energy aspects) from the public buildings.

Although currently PMD is working with an outsourced Energy Agency that is doing much of the analytical work to define priority investments and a short-term strategy, it is important that this role and responsibility be later absorbed by the energy team within PMD.

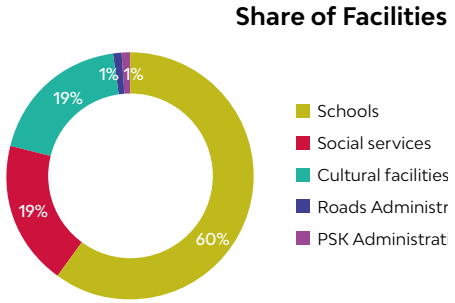
CHARACTERISTICS OF PUBLIC BUILDINGS AT PSK

The PSK owns 133 public facilities which include secondary schools, assisted living facilities (social services), cultural facilities, buildings of the regional roads administration (RRA), and administrative buildings of PSK.[1] The 133 public facilities encompass some 488 public buildings with most facilities comprising multiple buildings. It should be noted that PSK operates only two buildings, namely the administrative buildings of PSK. Public buildings and facilities may be characterized as shown in the following tables below.

TABLE 1 **Characterization of Public Buildings in Prešov Region**

Facility	Number of Facilities	Number of Buildings	Floor Area (m2)
Schools	80	239	580,000
Social Services	25	87	91,000
Cultural Facilities	26	71	73,000
Road administration and maintenance	1	89	32,000
PSK buildings	1	2	12,000
Total	**133**	**488**	**788,000**

Source: PSK, 2018



The public facilities at PSK are managed independently by directors/managers of the facilities who coordinate with the relevant director in PSK to plan and budget operational and capital improvement projects. The public schools, social services facilities and cultural facilities benefit from financial support from the Slovak central government with the relevant ministries providing budgetary support, and the facilities individually manage their energy facilities and pay their utility bills. However, any increase in energy consumption negatively impacts the operational budgets of the facilities. At times of budgetary shortfalls, PSK provides incremental financing to cover utility bills; this generally happens during winter months when heating bills can be high depending on the weather.

A relatively small number of public buildings in PSK have been renovated (14 percent) and many facilities need deep renovations together with energy efficiency measures. Public buildings at PSK are relatively old structures with poor thermal insulation and often times old energy equipment. This increases greatly the payback periods, as investments are needed that are directly related to energy efficiency (i.e. leaky roofs, humidity issues, structural issues, etc.). For instance, many of the investments of municipal buildings in the Prešov region identified under EU's ELENA initiative had payback periods of about 40 to 50 years.

In PSK, routine maintenance of public buildings is conducted by technicians and equipment operators within the facilities and major maintenance and repairs are contracted out to specialized firms. The individual public facilities are unable to raise financing for capital improvements and capital projects are financed by PSK. The individual facilities also do not have the technical expertise to undertake energy analysis and identify opportunities for energy savings, and such analysis is either undertaken by technical staff in PSK or contractors and equipment suppliers.

The energy management unit at FEMU has an updated database on public buildings with accurate information on energy consumption of various forms of fuels, total square footage, square footage for each building in the facility (identified by usage of building), and square footage heated. This data will provide more accurate information on energy use per unit area of utilized and non-utilized space. Cross referenced with other fields in the database, it will be possible to estimate energy use per square foot for each type of fuel and in each type of building in a public facility.

OVERALL ENERGY CONSUMPTION IN PUBLIC BUILDINGS

EE of public buildings can be improved by rehabilitating the building structure/envelope, thermally insulating the building, improving energy sub-systems (space heating, hot water systems, cooling, lighting, etc.), and using more efficient appliances. The opportunities for EE are limited

by the cost-effectiveness of the available solutions and the financing required to implement projects. The opportunities for improving EE in the different categories of public buildings in PSK are briefly described below.

School buildings

Schools in PSK in general use energy principally for space heating, lighting and water heating. Schools in PSK generally do not have space cooling expect for in specific areas. Energy consumption may vary significantly depending on the type of school. For instance, energy use in a typical gymnasium (grammar school) will vary from that in a specialized vocational school, which trains students as technicians (plumbing, electrician, metal working, etc.), or in hotel management. A school specializing in nursing may have a totally different energy use profile given its needs for hot water and cooling and refrigeration. Schools with swimming pools or extensive sports facilities may have additional energy equipment. Some schools are housed in historic buildings where opportunities to improve the façade of the building or install insulation are limited. Energy use in school facilities could thus vary significantly depending on the type of education and training being provided in the school.

The options to improve energy use in schools in PSK vary from simple steps to improve housekeeping measures to minor and major retrofitting to the building façade, or heating or water energy sub-systems installed in the buildings. Benchmarking data from schools with similar functions can help identify opportunities to improve efficiency. Regardless of the measures undertaken, training and awareness programs are essential for maintenance and other school staff to reduce energy waste.

Social Services

Energy use in social services facilities may also vary significantly depending on the type of function and care being provided to the residents of such facilities. For instance, energy use in a retirement home would vary from that in a facility which provides medical care in addition to housing residents. However, space heating and hot water systems are likely to be the highest energy use systems in this type of public facilities. Regardless of the measures undertaken, training and awareness programs are essential for maintenance and other facility staff to reduce energy waste.

Cultural Facilities

PSK Public buildings housing cultural facilities vary tremendously in their usage from an observatory to a museum to a performance center for the arts. Energy use in these buildings may thus vary significantly since the needs are very different. Further, many are unique buildings with one-of-a-type facility.

Benchmarking energy use in cultural facilities may not be easy given the diversity of use of cultural facilities. The hours of operation of these facilities also has a significant impact on the cost-effectiveness of installing energy efficiency measures. Identifying specific measures that are cost-effective will be critical. As with other buildings, training and awareness programs are essential for maintenance and other facility staff to reduce energy waste.

Administration Offices

Public buildings housing administration offices for PSK and the roads organization are likely to be homogeneous in their use profile. Space heating and lighting are likely to consume the most energy followed by office equipment. However, energy use in these buildings may vary significantly since some offices are housed in historic and old buildings. The main PSK administration building, for instance, is housed in a grand old building where space heating costs would be very significant compared to an office housed in a newer building. Administration buildings may also be mixed use buildings and include cafeterias and auditoriums where energy use is different from that in an office. The energy use profile may thus vary among such public buildings.

CHALLENGES FOR IMPROVING ENERGY PERFORMANCE OF PUBLIC BUILDINGS

A number of factors will likely influence the outcomes of EE initiatives in PSK. These include national and regional policies, institutional framework, building technologies, availability of financing, and implementation mechanism. Some of the risks for PSK to implement an action plan to achieve goals to improve the energy performance of public buildings and options for PSK to mitigate the risks are summarized below.

TABLE 2 Challenges, Risks and Risk Mitigation for improving energy performance of Public Buildings

Challenges and Risks	Risk Mitigation
Policies and directives of the Slovak government and EU which regulate energy use in buildings. Present regulations require existing public buildings to improve energy performance provided the measures are technically feasible and are cost effective. The measure of technical and financial viability is not defined and PSK may well choose to not improve energy performance in public buildings where the cost of implementing measures is very high.	PSK is committed to improving the energy performance of public buildings and has established the PMD to oversee improvements in public buildings.
PSK and public buildings in Slovakia have typically been using EU grant funds to finance energy efficiency improvements. They may not be keen commercially finance such programs and increase their debt burden.	There is political commitment in PSK to finance and implement EE projects in public buildings.
The EPC Act and its model contract is new and many of its provisions and contracting mechanisms are yet to be tested. PSK has no experience with preparing bids documents for EPC contracts and for implementing projects under the EPC Act. This too may be a hurdle to implement projects under the EPC Act.	PMD is in discussions with the SIEA and the Ministries of Finance and Economy to implement a pilot project under the EPC Act to test the provisions of the Act.
ESCO will likely not bid on projects that have payback period longer than 15 years since it would be difficult and expensive to obtain commercial financing for loan tenors beyond about 10 years.	The EPC Act permits combining commercial financing with grant financing from the EU (and not from the government of Slovakia), and this could potentially be a solution to financing projects with long payback periods.
Many public buildings under PSK are very old and may require substantial renovation prior to implementation of some energy efficiency measures such as thermal retrofitting. The cost of such building renovations cannot be included in the energy efficiency improvement project.	PMD will identify and prioritize program implementation in public facilities which have the most potential and are also financially viable to implement.
Some facilities use coal and wood for heating and the price for these fuels is very low. It may not be cost effective to improve energy efficiency in such facilities since the payback period of installing measures may be too high.	Fuel switching could be justified on the basis of improved air quality.

Source: Authors, 2019

DEVELOPMENT OF AN ENERGY MANAGEMENT SYSTEM AT PSK

WHAT IS AN ENERGY MANAGEMENT SYSTEM?

An EMS is a systematic process to improve energy performance and economically and sustainably achieve energy policy goals and targets. Establishing a successful EMS starts with obtaining management commitment at the highest level. The basic premise behind developing an EMS is that an entity wishes to put in place a systematic process to achieve EE goals and targets. An EMS helps achieve the targets by serving as a tool to guide the entire process of organizing for meeting targets, analysing energy use, identifying opportunities for improving EE, prioritizing projects, developing financing plans, procuring services and materials to implement projects, and tracking and monitoring and reporting results and outcomes. Through this process, a set of identified indicators can be monitored and investments in EE and the resultant efficiency improvements and savings can be compared to goals and targets.

EMS for public and commercial facilities has been developed in most European and Organisation for Economic Co-operation and Development (OECD) countries. The European Commission (EC) has developed specific guidance for local governments to undertake EE improvements.[2] Many states in the United States have also developed EMS, or elements of it, to meet policy and regulatory requirements. Countries in Asia and Latin America have also developed EMS. The last section of this report provides a list of references to similar guides and EMS developed by a few other countries.

WHY DEVELOP AN ENERGY MANAGEMENT SYSTEM AT PSK?

As noted above, the EMS is a tool that provides a systematic approach to achieving energy policy goals and targets, whose primary drivers may be improving EE to meet local and national policy objectives, which may include reducing energy use, lowering expenditure on energy, improving air quality, etc. The EMS should be developed consistent with national and local policies, laws and regulations, and within the framework of Slovak legal frameworks.

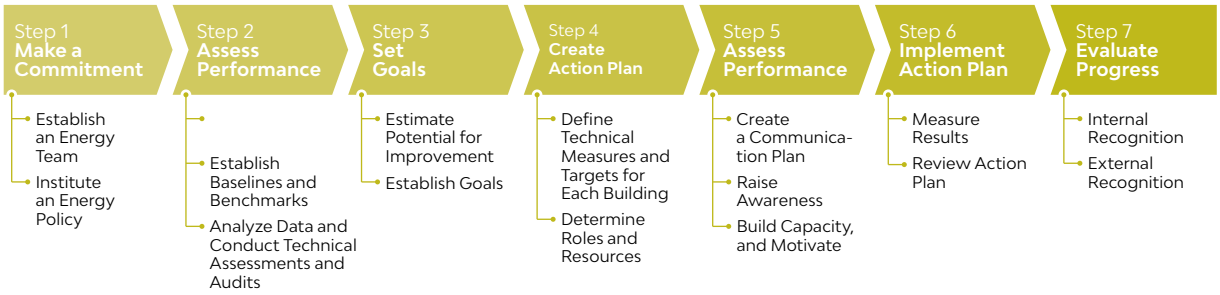
In the context of PSK, an EMS can help with the systematic implementation of action plans to improve energy performance of public buildings, while also help PSK meet its obligations under Slovak energy and EE policies and directives.

Some of the key advantages of developing an EMS include the following:

- Reduce expenditure on fuels used in public buildings
- Develop a prioritized list of projects to improve energy performance
- Promote best practices for energy management and energy efficiency
- Document in a transparent manner actions taken to improve energy performance
- Procure efficient equipment and upgrade energy performance of public buildings to be closer to near zero energy building (NZEB)
- Train PSK staff on issues related to energy management
- Create awareness of energy efficiency among all stakeholders
- Meet obligations under energy and energy efficiency laws and directives
- Lower greenhouse gas emissions by reducing use of conventional fuels

The US EPA's Energy Star Program,[3] has developed a proven and systematic approach for achieving high energy management in existing buildings called the "Guidelines for Energy Management." It involves seven steps as described in the Figure below.[4]

FIGURE 2 Guidelines for Energy Management in Public Buildings, EPA



Source: US EPA Energy Star, Energy Efficiency in Local Government Operations, US EPA, 2011

PROPOSED METHODOLOGY FOR AN ENERGY MANAGEMENT SYSTEM IN PSK

A similar 11-step approach to identification and implementation of EE projects in public buildings is proposed below. This 11-step approach has been adapted based on a 7-step process proposed by the EU Guidance for Energy Efficiency in public buildings,[5] and a local government EE program launched in the Western Cape region of South Africa.[6]

FIGURE 3 Organizing for implementing EE in public buildings

Source: Authors, 2019

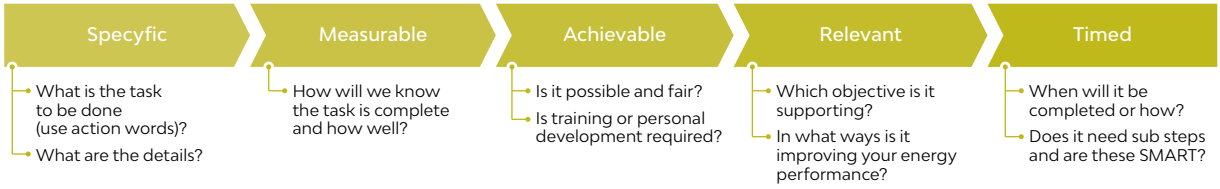
Management commitment

The first step in establishing an EMS is to have top management commitment to improving energy performance. This is essential to establish policies and agree on goals, objectives and targets for performance improvement, approve and empower an organizational and management structure for program implementation, allocate the resources necessary to implement the EMS.

In PSK, for instance, management commitment could be demonstrated through the following actions:

- Commitment of the President of PSK to develop an energy policy and goals and targets;
- Commitment of PSK top management to instituting an EMS to deliver results. PSK should commit to making EMS integral to its ownership and operations of public buildings in the region;
- Collaboration of the various committees of PSK responsible for education, health, social services, finance, etc. with the PMD's staff responsible for energy management to ensure alignment of objectives with the EMS. The EMS will not succeed if the energy management staff and defined activities are not seen as central to the functioning of the relevant committees in PSK.
- PSK commitment to implementing an EMS should translate to provision of funding to staff to support its implementation and be operational to do so.

FIGURE 4 SMART targets



Source: Practical Guide for Implementing an Energy Management System UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION Vienna, 2013

Establish policies, goals and targets

Establishing policies, goals and targets for energy performance improvement is a crucial step in the EMS. Clear goals and targets are necessary for an organization to systematically implement processes to achieve results. The policy, goals and targets could stem from national energy efficiency policy objectives which apply to self-governing regions, municipalities, and public entities. Policies could also be an initiative of local governments to achieve goals that go beyond national policy objectives. For instance, PSK could adopt an energy policy and establish energy performance goals and targets that exceed national policy goals. Program targets could be selected based on the "SMART" framework (Figure 4).

In the context of PSK, the energy policy to be adopted would be a reflection of the aspiration of the region to achieve specific goals and targets to improve EE of public buildings and reduce energy consumption and emissions. The policy to be adopted should be consistent with Slovak national energy policies and directives, which are compatible with relevant EU policies and directives, and with any legal requirements. For instance, PSK's energy policy goals and targets could include:

- Target to renovate a percentage of floor space of its public buildings on an annual basis consistent with Slovak energy directives to annually renovate 3 percent of floor space of all public buildings;
- Integrating the goals of developing a low-carbon economy with the goals and targets of its energy policy. This will expand the scope of the EMS from energy in public buildings to energy use in other PSK facilities such as public lighting, vehicle fleet, etc.

The adoption of an energy policy and targets would signal a clear commitment to continually improve energy performance. PSK should also consider developing a regional level policy to prioritize EE in public buildings. The policy should have a stated goal to achieve specific targets for EE and should have the full support of the PSK administration.

Commensurate with the energy policy, PSK would need to allocate resources to the PMD to achieve goals and targets. Commitment to a formal energy policy will allow PMD to obtain the necessary resources to plan, implement, and track the impacts of EE programs. The policy should also address any issues related to public procurement laws which commonly support purchase of the cheapest rather than the most efficient equipment.

Establish a dedicated team for EE within PMD

Consistent with management commitment and policy objectives, an organizational structure should be developed to plan, implement and monitor energy projects. The organization should have the necessary authority and be staffed and resourced to achieve targets. A focal point should be appointed to head the energy team.

The head of the PMD's energy management system should have the following responsibilities.

- Report to top PSK management on the performance of the EMS
- Form a team with different departments of PSK's PMD to implement programs and deliver results consistent with PSK policy goals, objectives and targets

- Develop clear roles and responsibilities for the staff from PMD unit or other units within PMD to collaborate with them
- Define the scope of the EMS consistent with PSK policy objectives (limited to energy performance of public buildings or include elements of a low-carbon program)
- Plan and direct energy management activities
- Identify training needs of energy management staff to effectively implement the EMS
- Develop budget estimates for implementing the EMS
- Work with PSK management to leverage resources for program implementation
- Ensure progress through continual improvements in energy performance
- Create awareness of the EMS and energy management activities at all levels in the PSK management and its committees

PMD has already taken this first step by establishing the energy management team within FEMU and demonstrating its commitment to improve energy efficiency across PSKs portfolio of public buildings. The energy management team should be staffed with qualified personnel who can identify and support implementation of EE projects.

In support of the PSK policy, the energy management team will have a mandate to identify EE opportunities in public buildings and look for opportunities to enter into an EPC contract (under the new EPC Act developed by the Ministry of Finance) with an ESCO together with grant financing, to undertake the project at relatively low risk. A portfolio of projects is more likely to attract larger ESCO's than smaller projects. The energy management team should communicate its plans to the managers of public buildings and engage all stakeholders to identify and prioritize EE projects, and integrate best practices.

Gather data

The energy management team at FEMU should gather data from public buildings. This step will involve (a) establishing baselines for energy consumption, (b) collecting and managing data from buildings, and (c) data analysis and energy assessments including energy audits. The analysis in this step will help identify opportunities for EE in public buildings.

The energy management team at FEMU should develop a baseline for energy use in buildings based on analysis of annual energy consumption in buildings. FEMU is updating this information and has energy consumption data for years 2010-2017, which should be more than adequate to develop a baseline. A database software could be used to store data for easy access, sorting and analysis. Benchmarking that involves comparing a building's energy performance to the performance of similar buildings across the portfolio, should be done. Benchmarks for energy use in buildings can be developed based on energy studies of different categories of buildings and from information available through the Slovak Innovation and Energy Agency (SIEA) and other standards for building energy consumption. Information from energy audits conducted under ELENA may also be used to develop benchmarks. Benchmarking will help PMD prioritize buildings for EE investment and/or a comprehensive energy audit.

The use of standardized templates and comprehensively gathering data and information is to enable the development of a database or inventory of the current state of energy use for each building and facility. The data will also help identify energy use systems and understand their operations and energy consumption. Data from monthly utility bills for all forms of energy (electricity, natural gas, oil, biomass fuels, etc.) should be routinely collected from each public building/facility. The public buildings should be required to submit copies of all utility bills monthly to the energy management team at FEMU. Data on physical consumption of energy (kWh, liters/kg of fuel, m3 of gas, etc.) and its monetary value (in Euros) for both cost of fuel and total utility bills, should be gathered and databased on a monthly basis.

The database needs to be revised to and updated on an annual basis to enable periodic tracking of energy consumption trends in public buildings.

Planning, Analysis and Goal Setting

Planning and analysing is critical to developing a functioning EMS. The energy planning and analysis will also help systematically understand where and how energy is used and prioritize interventions to improve energy performance.

Some of the important steps in planning and analysis include:

- Review policies, laws, regulations and performance targets
- Gather energy use data from all public buildings for all fuels
- Analyse energy use to understand where and how energy is used. Assess if additional metering is required to understand energy use in multiple buildings within a facility which may have different operational characteristics (for instance, there could be multiple buildings within a school facility including class rooms, store rooms, dining halls, etc., which all have different hours of operation and energy use)
- Determine revised performance standards to be met based on applicable Slovak building codes and standards (performance indicators), and data available from energy audits of similar types of buildings with similar use characteristics
- Identify opportunities for improving energy performance through building retrofits (addition of insulation, improvements to the building envelope, etc.) and more efficient equipment (improved heating systems, efficient hot water or lighting, etc.)
- Estimate energy savings in physical (kWh, GJ, etc.) units and monetary units (EUR) and estimate environmental impacts such as potential reduction in CO_2, particulate emissions (PM2.5, PM10), SOx, NOx, etc.
- Develop criteria for prioritizing projects (such as potential for savings, investment required, payback period and IRR, ease of implementation, need to rehabilitate building, etc.)

The public building energy analysis by the energy management team at FEMU will serve as a first cut assessment to present information to key stakeholders such as ESCOs and service providers and incentivize them to bid for the project through a procurement process.

Goal setting involves identifying potential savings in public buildings. This helps in tracking and measuring the progress towards the portfolio-wide energy efficiency. Key considerations for goal setting include, (i) estimating potential for improvement (i.e., savings) and (ii) establishing goals. For existing buildings, these portfolio-wide goals can be based on the results of the baseline energy performance assessment and the priority investments identified through that process. Goals for improving energy savings across a portfolio can be established at the building portfolio level or at the project level. The goals can be established over varying time periods. Short-term and long-term goals can be established to achieve immediate cost savings and future cost savings.

Establishing goals is critical to identifying opportunities and the energy management team at FEMU could, initially, choose to outsource the function of developing benchmarks since it does not have adequate staff to undertake such analysis. FEMU should develop a directory of energy professionals, energy auditors, and ESCOs who can support the PMD in undertaking analysis and developing projects through EPC.

Prepare an action plan to implement the program

Based on the planning, analysis and goal setting of energy use, an action plan should be prepared to execute prioritized programs and projects to improve building energy performance. The action plans should include objectives, actions, tasks, responsibilities, timelines, human and financial resources required, as well as the measuring and result verification plan, and the plan to improve energy performance. The action plan should be updated on an annual basis, to reflect achievements and changes in performance as well as priorities

The elements of an action plan include:

- Action plans for the short, medium and long-term to phase implementation based on objectives to be met, resources available and time required for implementation.
  - Short term action plans are typically one-year action plans to implement projects that need fewer resources and could be executed quickly to demonstrate results and achieve targets. Such projects could be financed by internal capital and operational budgets without the need for leveraging additional financing.
  - Medium term action plans may be developed to target projects which need higher investment and have longer payback periods. This may require leveraging of external financing through commercial borrowings, use of Energy Service Companies (ESCOs) which can finance projects and guarantee savings, etc.
  - Long term programs may be developed to target projects which have high investment needs and very long payback periods (such as building insulation, deep renovation of the building envelope, etc.), which cannot be commercially financed or be financially attractive. Financing may have to be leveraged from public funds and EU programs
- Action plans may include management and organizational activities to be undertaken by the energy team. The action plan should include steps beyond project implementation to include monitoring and verification, and criteria for prioritization
- Identify linkages with internal (PSK committees, building management, etc.) and external stakeholders (consultants, energy auditors, equipment suppliers, EPC contractors, etc.)
- Need for training and capacity building of energy management staff and building management to help implement programs and projects

Identify Funding Needs and Resources

The capital costs of implementing the action plan should be identified and financing opportunities evaluated. The priority should be to first implement cost-effective projects in the short- and medium- term, followed with projects with longer payback. Implementing priority projects generates information on the benefits and costs of investments, which can be used to create wider stakeholder awareness of EE activities. Although EPC can be used to implement EE upgrades at no upfront cost, the long payback period of the investments will need of grant resources to bring payback periods down for investments to make viable EPC contract.

Provide information and Training to Building Managers

This step involves gaining support from stakeholders in PSK including building managers. A communication plan could be developed to raise awareness, building capacity, and motivate individuals to gain buy-in. Training could include training buildings manager and operation and maintenance (O&M) staff on options to reduce energy use, administrative training for monitoring and gathering data and reporting energy consumption and/or savings, specialized training for maintenance of tools and/or equipment.

Program implementation

The next step is to implement programs and projects consistent with the prioritized action plan. Project interventions may have to be reprioritized if warranted and a final list of interventions prepared for implementation during a planned period (fiscal or calendar year or other time period). Projects may be shortlisted based on the cost-benefit analysis, project impact, available budget or other criteria to be developed by the energy team and investment team at PMD.

Since projects will be implemented in public buildings, the energy management unit will have to work coordinated with the investment unit (IU) at PMD that will prepare bids for public procurement of goods and services. Standardized templates and bid evaluation criteria are preferred to ensure consistency and transparency. Project construction supervision and commissioning would be undertaken by IU with support from the energy management unit or the services contracted to experts if in-house expertise is lacking.

Some of the key steps taken in the program implementation phase include:

- Implementing the short, medium and long-term action plans
- Analysis to confirm benchmarking and energy audits to projects shortlisted for implementation in the planning process
- Preparation of final list of programs/projects to be implemented along with investment needed
- Development of a financing plan to leverage the investment needed for project implementation
- Public procurement for procuring goods and services to implement projects with due consideration to energy performance in additional to price quotations
- Project implementation supervision to oversee work of consultants, installers, and/or EPC contractors
- Training and capacity building for building operators to sustainably operate new equipment
- Preparation of all necessary documentation

To attract ESCOs, market analysis could be conducted by the energy management team PMD to determine the interest of private partners. In response to a public tender, ESCOs typically conduct a detailed audit prior to submitting a proposal for implementing EE projects. Data gathered from detailed energy audits is used for scenario analysis by the ESCO, showing various ways through which energy is consumed.

Monitoring, reporting and verification

Monitoring, reporting and verification (MRV) is a crucial step in the implementation of the action plan. Identifying appropriate indicators of success and monitoring them through measurements or other forms of observation is critical to ensure that planned targets are met and to assess program success. Reporting and verification of data and information is equally important to verify results and communicate to management.

Selection of the right kind and number of indicators is very important. Indicators could be a combination of energy units (such as units of fuel), monetary indicators (monetary savings, IRR, etc.) and physical indicators (temperature, air quality inside buildings). The indicators should initially be developed during the planning phase and modified as appropriate during the implementation phase to improve their effectiveness in assessing the achievement of planned targets.

Some of the key elements of MRV include:

- Selection of appropriate indicators to measure/assess program success
- Measurement of indicators including measurement protocols (quantitative and qualitative), periodicity of measurement, etc.
- Verification of indicators through spot checks (energy audits or other simpler assessments) to verify results. Number of spot checks to be conducted, unbiased external verification, etc.
- Reporting of indicators including format and periodicity of reporting. Separate reports systems for different internal and external stakeholders
- Progress in implementation of action plans
- Progress in training and capacity building of stakeholders

Review results

It is important to periodically review results to ensure that the EMS process is being implemented effectively and delivering desired results. The purpose of the exercise is to continually improve effectiveness of the EMS and make it a sustainable process. Some of the elements of this task include the following:

- Define periodicity of review; could be once or twice a year.
- Request feedback from internal and external stakeholders on results achieved and areas for improvement

- Identifying critical factors associated to compliance or non-compliance with energy policy goals, objectives and targets
- Evaluate the effectiveness of resources deployed to implement the action plan
- Meet metrics for internal audits and controls for use of public funds
- Make informed decisions on future programming and project implementation
- Identify factors for continued improvement in program delivery and achievement of results
- Revise policies and targets as appropriate for future program implementation
- Reallocate and or enhance resource as required for continued program delivery and for scale-up of programs

FEMU and its energy management team should establish performance indicators and monitor targets. On a routine basis, they should evaluate the progress made on the Action Plan, activities and projects. Routine evaluation will help FEMU and the energy management team take corrective action and make improvements to the implementation process.

Communication and awareness campaigns

Communication and awareness programs are an integral part of an EMS. Communication of program plans and results and awareness of program benefits and outcomes, is essential to encourage participation, generate enthusiasm among stakeholders, leverage financing for programs, and informing policy makers and the community.

Internal communication reinforces the management commitment to energy policies and motivates them to allocate resources. Communication with external stakeholders promotes the program and helps leverage financing for medium and long-term action plans. The elements of a communication and awareness campaign may include the following.

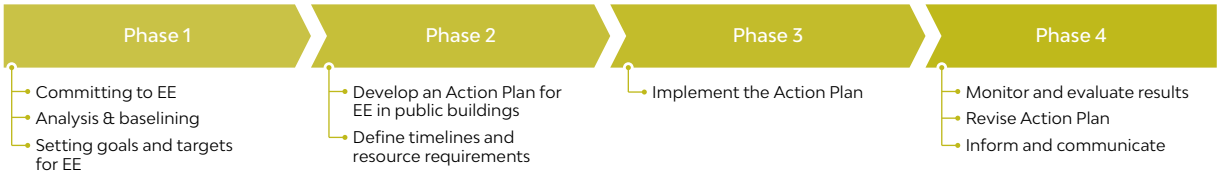
- Identifying means of communicating (websites, brochures, newsletters, advertisements, participation in seminars, etc.)
- Defining the information to be disseminated to internal and external stakeholders

FEMU should set up a process to recognize the achievement of internal and external entities that help meet energy savings targets. Recognition is critical to sustain program momentum and support for energy efficiency activities. Results of progress of projects and programs should also be communicated to stakeholders. Some of the specific tasks may include the following:

- FEMU could prepare reports and other forms of material to publicize information on the implementation of the action plan and the program to improve EE in public buildings in PSK.
- FEMU/PMD could undertake program awareness and promotion programs to communicate program results to internal stakeholders in PSK and external stakeholders which include public and private agencies.
- FEMU/PMD could set up a process to recognize the achievement of internal and external entities that help meet energy savings goals and targets

A Phased Approach to Implement an Energy Management Systems at PSK, that would enable PMD to be strengthening its staff as it implements the EMS. There needs to be a commitment to allocate staff and funding to undertake PMD and EA functions and achieve continuous improvement

FIGURE 5 Phases for development and execution of an Action Plan for PSK



Source: Authors, 2019

IDENTIFICATION OF EE PROJECTS AT PSK

PMD should put in place a process for prioritizing investments in EE in their public buildings. This process should streamline project preparation prior to procurement and implementation. PMD should consider the entire process for project preparation including project identification, deciding on the financing, assessing the potential involvement of contractors and other private partners, and evaluating the costs and benefits of the different options available to finance and implement the project. A structured planning process will help PMD prepare and tender projects in a systematic manner.

PROJECT IDENTIFICATION AND PRIORIZATION

PSK would benefit from a systematic analysis of its stock of public buildings to identify and prioritize investment opportunities to implement EE measures. A four-step process is suggested for PSK to identify and prioritize EE projects and investments in public buildings as can be seen in Figure 6.

Step 1: Development of a longlist of projects. Use the database of public buildings to conduct statistical analysis based on key variables such as energy intensity, age of building, usage characteristics, etc. to identify buildings with high energy consumption that should be examined further and develop a longlist of projects.

Step 2: Development of a shortlist of projects. Use the Excel based buildings energy model to analyze opportunities for energy savings in buildings included in the project longlist. The assessment includes assessment of different EE measures with actual installation cost information to provide economic rate of return and payback periods. The outcome of the analysis is the preparation of a shortlist of buildings that should be prioritized for investment.

Step 3: Identify top priority investments projects. Data and information for buildings on the shortlist is validated with site visits, review of records, and preliminary or walk-through energy audits.

Step 4: Preparation of bid documents. Energy audits and feasibility studies may be conducted for the final shortlist of projects, followed by preparation of bid documents for tendering the projects for implementation.

FIGURE 6 Four-Step Process for Identifying and Prioritizing EE Investments in Public Buildings

Source: Authors, *2019*

Development of the first level of systematic analysis

The first level of analysis includes the incorporation of additional categorization fields in the database to be able to get more granular data to be able to identify a longlist of investments. The database was modified with additional fields to sub-categorize public building based on type of facility and building usage. For instance, schools are further categorized by type of school (vocational, grammar school, hotel management, etc.) and usage of building (class room, dining facilities, gymnasium, etc.). These additional sub-fields in the database have helped better categorize buildings and understand and compare energy use in such facilities.

An energy modelling assessment to build a shortlist of EE investments.

A building energy model has been developed in collaboration with a technical expert from the Košice Technical University's Department in Building Energy Use, to conduct detailed analysis of opportunities to improve energy performance of building. The Excel based model has been developed specifically for the climatic and labor conditions in the Prešov region and was done in collaboration with PSK staff in the Property Management Department and energy experts from ENECO.

The energy model has three principal components:

Component 1: Energy demand for heating
Component 2: Energy demand for other facilities – air conditioning, lighting, hot water
Component 3: Data on fuels and energy use (actual billing information), emissions from fuel use, material and labor costs of energy efficiency measures, etc.

The model estimates the actual heat demand for heating and hot water and the energy demand for lighting and air-conditioning. Energy demand is estimated for both the base case based on existing building characteristics including any installed thermal insulation. Any variation in the estimated energy from actual demand based on energy bills are reconciled with additional information from the building. For instance, there could be differences between energy purchase and energy use; although electricity and gas used in a building is consistent with metered energy use during that period, the usage of other fuels such as coal and pellets may not coincide with the billing period.

The energy demand for heating post installation of thermal insulation and heat source replacement as per building codes is then estimated to reassess the energy demand and energy use in space heating. Energy use in other building energy systems is also estimated based on various energy efficiency measures that can be installed.

The building energy model enables the generation of building certificates that are consistent with building energy codes in the country. The model's components are the same as the energy codes and performance standards in Slovakia, and therefore could be used so that PSK have baseline energy demand certificates in each energy sub-system of their public building portfolio.

Technical and financial analysis is conducted for each of the EE measures considered in the model. Emissions of CO_2 from energy used in the building is also estimated based on fuels used in each energy sub-system.

TABLE 3 Energy Efficiency Measures Considered in the Energy Modelling

Sub-component	EE Measure
Building Envelop	Thermal insulation: for wall, floor, roof, ceilings, and other building openings
Heating System	Replacement of the heat source (boiler) and related modification to the boiler room
	Replacement of the heat source (boiler) alone
	Hydraulic regulation of heat distribution system
	Optimization of heating distribution system
Hot Watery System	Replacement of the hot water heating system
	Change the fuel used for heating water
	Installation of a solar hot water system
	Optimization of the hot water distribution system
	Hot water accumulation
Lighting	Replacement of existing lights by LED lighting

Source: Authors, 2019

EE Financial expertise

PMD should include an individual with expertise in the technical and financing aspects of EE projects as part of its energy management team. The EE financing expert will support in structuring the project, defining technical performance indicators and preparing the technical portions of the tender for project procurement and implementation. The EE financing expert should also have technical expertise to help PMD go through bidding processes and evaluate the technical and financial proposals of bidders, as well as help identify the best service provider through the procurement process.

The EE financial/technical expert should have capabilities to understand project financing through different financing mechanisms, assess the technical and financial risks, and allocate risk to the entity that is best able to mitigate the risk. The EE financial/technical expert should have the capacity and knowledge to understand EE transactions and EE project cash flows and budget implications and undertake feasibility analyses and assess the financial credibility of bidders. The financial analysis will help PMD evaluate the merits of implementing the project. Economic analysis of the project should examine the project from the perspective of the project as a public good and include an analysis of externalities such as emissions reduction and reduced use of imported fuels. In the case of performing and energy performance contract (EPC) with an ESCO, the EE financing expert will support PMD in the commercial negotiations with the service provider/ESCO and advise on the contracting process to ensure that project technical risks are transferred to the ESCO/service provider.

The EE team/expert in PMD should have the capacity to undertake financial and economic analysis of EE projects. The financial analysis should examine the cash flow stream from the EE project to assess the simple payback period and the Internal Rate of Return (IRR) for the project. The financial analysis will help PMD evaluate the merits of implementing the project. Economic analysis of the project should examine the project from the perspective of the project as a public good and include an analysis of externalities such as emissions reduction and reduced use of imported fuels.

PMD should prepare standardized templates for financial and economic analysis to streamline the process and ensure consistency in analysis of projects. Together with the University of Košice and ENECO, the Project is developing a modeling tool that will incorporate the economic and financial rate of returns that could help prioritize investments. Projects identified for implementation should be prioritized and phased to ease the burden on public financing for projects. PMD should consider prioritizing project on the basis of some of the following parameters.

- Payback period: projects with high energy savings and short payback period
- IRR: projects with high energy savings and high IRR
- Level of financing: projects that require low levels of investment and can be easily be financed
- Improvement in comfort of building users: projects that significantly improve comfort levels in the building (for instance, a project that improves the quality of heating and hot water in a retirement home)
- Short permitting process: projects that can be implemented quickly and require less time for obtaining permits and approvals (for instance, projects in historic buildings may require a long permitting process)

PROJECT IMPLEMENTATION

Project implementation is the stage after the design of the project is approved and a contract signed with a service provider to install materials and equipment as per the scope of the project. PMD will take the lead in organizing for implementing projects and coordinate the implementation of projects with service providers and/or ESCOs.

PROJECT IMPLEMENTATION MECHANISM

There following stages are part of the implementation of projects depending on the implementation mechanism.

- **Preparation for project implementation.** The preparation for implementation of the project will vary depending on the implementation mechanism. A standard procurement for services from a service provider will entail awarding the tender, agreeing and approving all the design, installation, operational, and cost and financing elements of the project and signing a contract for implementation.
  An EPC with an ESCO will require some additional steps. In addition to review and approval of project elements of a regular EE project, PMD will have to review the specific terms of the EPC and agree with the monitoring and verification plan and the terms of the shared savings or guaranteed savings contract.
- **Implementation of project.** When the construction of the new energy system is undertaken, and the system handed over to the building manager after testing and commissioning. In the case of an EPC, the monitoring and verification protocol is established as per the terms of the EPC. Building managers are trained in the operation and maintenance of the new energy systems and equipment installation.
- **Measurement of Performance.** In a traditional installation, the service provider hands over the project to the building and either provides maintenance services for a certain period as per the terms of the contract. In the case of an EPC contract, the ESCO starts monitoring and measurement of data as per the terms of the EPC.
- **Operations and maintenance.** In a regular project procurement, the installation is completed, and the building staff is responsible for routine operations and maintenance of the new system. In the case of an EPC, the ESCO generally provides extra training to staff to ensure that the system is maintained as per the agreed protocol and can deliver the expected performance.
- **Service payments.** In the case of a regular project installation, the service provider is paid as per the terms of the contract. In the case of an EPC contract, payments are made contingent to the ESCO meeting the terms of the EPC contract, which they have previously agreed. The ESCO is responsible for ensuring that energy savings are achieved. Payment to the ESCO is based on the performance of the project and the target energy savings to which the ESCO is contractually committed.

A project installed by an ESCO will involve additional steps since the savings from the project are guaranteed.

PROJECT PROCUREMENT MECHANISMS

PSK has to follow the public procurement process for tendering EE projects in public buildings. The PMD includes a procurement unit which has experience with the public procurement process.

In general, procuring the services of a service provider or an ESCO to implement an EE project in public buildings will require the following steps.

- **Preliminary Assessment of Energy Savings.** Through the energy modeling and site verification or audit, PSK would prepare a feasibility report with an assessment of the potential to save energy in the building. This activity could also be outsourced to a consultant or firm. The purpose of this preliminary energy assessment of buildings is to confirm that cost-effective energy-saving opportunities exist and identify the energy systems that need to be retrofitted or replaced and define project parameters.
- **Invitation to participate in a tender.** PMD will prepare bid documents for procuring the services of an energy services provider or ESCO. The invitation to tender may also be a two-step process with PMD first seeking to short-list eligible bidders. Short-listed bidders are then provided the bid documents and invited to participate in the bid.
- **Shortlisting of bidders.** PMD could develop a "Request for Qualifications" (RFQ) from the market. The RFQ document should provide summary information on the projects that PMD wishes to implement and request interested bidders to submit qualifications of the firm to undertake EE and building retrofit projects. The pre-qualification process could be used for larger projects or for projects which are bundled together to create scale and attract more credible bidders.
  The qualifications to be submitted typically include information on the firm, brochures and capabilities statement, listing of similar EE projects implemented in buildings, etc. For pre-qualifying ESCOs for EPCs, additional information should be sought on the ability of the firm to raise capital and finance projects. PMD can use the short-listing process to identify and select credible bidders who will be provided with the bid documents. Pre-bid criteria to shortlist firms may include the following:

  - Corporate history and experience
  - Corporate capabilities
  - Project implementation experience
  - Project performance
  - Project financing capability
  - Project capabilities
  - Project management process
  - Experience in EPC
  - Financial stability of the firm

- Inviting detailed bids. Prequalified bidders should be provided with the complete bid documents. The tender documents should include information on the energy systems to be replaced, potential energy savings and the specific services requested from the bidder. The tender document should (1) provide respondents with information on PSK and description of the project, (2) provide information on the types of services required, and the areas of competency that the service provider/ESCO must demonstrate, (3) instructions for preparing and submitting the proposals, (4) criteria to be used to judge and rank tenders, (5) specify the format in which information is to be provided, (6) describe additional information to be submitted by the bidder in appendices to the bid (resumes of assigned personnel, sample contracts, sample preliminary assessment of energy savings, etc.). PMD could also choose to invite the pre-qualified bidders to a conference with a site visit to provide bidders with an opportunity to learn more about the project prior to submitting bids.
  Bidders may conduct their own assessment of energy savings to confirm the potential savings and cost of installation. The assessment of energy savings is a detailed document that validates all savings and costs for each EE measure. The assessment of energy savings includes the baseline data, analysis of consumption for each fuel, detailed cost of each measure and

total cost, amount of expected savings, basis of savings and design/build cost for each measure and a full description of the analysis methods, calculations, data input, assumptions for each measure, final M&V plan, energy reconciliation, schedule of work and risk analysis of the project. The energy audit conducted at this stage is especially critical for an ESCO since it will be bidding to finance the project and get paid from the energy savings. An ESCO bidder must develop detailed M&V protocols. An ESCO bidder should also be required to submit information on how they will finance the investment and provide analysis to demonstrate best value to PSK.

- **Bid evaluation.** PMD should evaluate the bids submitted by the shortlisted bidders based on the evaluation criteria defined in the invitation to bid. Bids should be evaluated against technical and financial criteria. For ESCO bids, evaluation should include the terms of financing and mode of repayment to the ESCO (guaranteed or shared savings approach). Specifics of the financing plan including issues such as use of equipment as collateral to finance the project, any pledging of cash flows to debt finance the project, and any co-financing required from PSK should also be carefully evaluated.
- **Issuance of Contract.** Post evaluation of bids, PMD should issue a contract to the service provided or ESCO that best meets the value for money criteria. PMD should follow the guidance of the public procurement law and of the new Act to promote the use of ESCOs for implementing EE in public buildings. The M&V plan to be used and the type of guarantee offered by the ESCO should also be specified in the contract.

MONITORING AND REPORTING

The energy and cost savings which result from EE retrofit projects in public buildings cannot be directly measured since the energy savings results from an absence of consumption of energy in an energy system. It is crucial to measure and verify energy and cost savings generated by the project to assess the value of the investment made in the EE project.

The measurement and verification (M&V) protocol is a plan to assess the energy savings from the EE project, which is required to determine the payments due to the ESCO for its services. The M&V protocol is the principal basis for the public building to compensate the ESCO for its investment and implementation services. All data as defined in the M&V protocol is measured as per the defined periodicity and stored in a database. Comparison of the performance of the system to the baseline energy consumption after making adjustments to variable factors is the basis for payments made to the ESCO. The ESCO uses an agreed upon M&V protocol to measure savings. The public building can choose to use a third-party entity to validate the findings of the M&V protocol.

ESCOs in Slovakia have adopted its principles to develop a M&V protocol which is widely accepted by the ESCO Association of Slovakia. It is recommended that the PMD use the M&V protocol used by ESCOs in Slovakia to assess the energy and cost savings from EE projects in public buildings. This will help mitigate the various risks to estimating energy savings that can arise after project completion. For instance, the energy consumption in a heating system may vary from the baseline not only due to the improvement in efficiency of the retrofitted system but also due to changes in operational and weather conditions. The M&V protocol explicitly accounts for the impact of such external factors on energy savings, which is essential to protect the interests of both the ESCO and the public building (or PSK).

TECHNICAL ASSISTANCE FOR PROJECT PREPARATION AND TRAINING AND CAPACITY BUILDING

It is suggested that PMD develop a comprehensive training and capacity building program to support its staff in all phases of project identification, design, and implementation which can cost-effectively help them perform energy management in their public building. Training and capacity building programs in energy management and all cycles of EE project implementation should be developed to benefit the PMD, in particular the energy management team. PMD should seek the support of ELENA, SIEA and other such EU and Slovak government initiatives to finance and develop a capacity building and training program.

Organizing for energy management

Building an effective team starts with the full commitment of PSK management, starting with the President of the region and have clarity on the need to allocate resources to build capacity needed for the functioning of the energy management team at FEMU. To establish an energy management team within FEMU, it will be critical to involve staff at all levels at PMD to provide them information on the benefits of EMS, and the needed capacities. The involvement of people who are trained and aware of EE opportunities is critical to successful energy management.

Recognizing the contributions and achievement of the energy management staff is equally critical to the successful functioning of the FEMU. Recognition could be in the form of public felicitations and awards and certificates. Equally important to building a strong and effective team will be to improve communications within the PMD. Communications can be built by keeping open channels of discussion and formal and informal means of communication within the team.

Building Capacity and Raising Awareness

Training and capacity building for energy management staff at PMD is important to ensure that staff are up-to-date on knowledge, in particular of EE and recent trends and developments as they pertain to improving EE in public buildings for FEMU. All staff at FEMU should have insight into energy consumption and the impact it has on operation and maintenance costs to help raise awareness. Specific trainings in energy management systems or facility manager that includes energy management of facilities would be useful for staff at FEMU and at PMD. A practical introduction to energy management would be recommendable to all staff at PMD, to understand its relevance and why it is important. The Slovak University of Technology - Faculty of Civil Engineering has a course on facility management that includes specialized section on energy management that could be assessed for training purposes for PMD staff.

The energy management team at FEMU should have the essential knowledge on energy use, as well as have a thorough understanding of managerial aspects of an energy management role. The training should include electricity and fuel/heat transfers, and fundamentals of system optimization. It should also include energy measurement sources, costs and tariffs; energy use data analysis methods; energy performance indicators; as well as monitoring and performance measurement. In addition, having training on public procurement, including training on the new EPC Act and its model contract would be very beneficial. The training should help the energy management team to understand the opportunities to save energy, reduce carbon emissions and help meet PSKs environmental targets and save money.

Training and capacity building should be provided through internal and external training. External training could include participation in relevant workshops, seminars and conferences. Internal training could focus on building an in-house knowledge database and training modules on specific topics such as developing databases and analyzing data, M&V protocols, trends in latest technologies and best practice for efficient building energy systems, etc.

PMD could also consider conducting an energy fair to involve the local community and generate wider public support for investment in EE in public buildings.

NOTES

1. The administrative buildings of the towns and municipalities are not owned by PSK. Elementary and middle schools, and other public buildings owned by the towns and municipalities are not included in the Table.
2. Please see: "Guidance note on Directive 2012/27/EU on energy efficiency, amending Directives 2009/125/EC and 2010/30/EC, and repealing Directives 2004/8/EC and 2006/32/EC", of 2013; or "Energy Management in public buildings – Step-by-step procedure handbook for EnMs in public buildings", CE51TOGETHER, Interreg Central Europe 2014-2020
3. Energy Efficiency in Local Government Operations. A Guide to Developing and Implementing Greenhouse Gas Reduction Programs, U.S. Environmental Protection Agency, 2011
4. Details of the 7-step program can be found at http://www.energystar.gov/index.cfm?c=guidelines. guidelines_index.
5. Guidance on Energy Efficiency in Public Buildings, European PPP Expertise Center (EPEC)
6. A Guide to Energy Management in Public Buildings, Western Cape Department of Environmental Affairs and Development Planning, May 2008

LINKS TO ADDITIONAL RESOURCES

Energy Efficiency in Local Government Operations. A Guide to Developing and Implementing Greenhouse Gas Reduction Programs, US EPA, 2011

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