

# ASSESSMENT REPORT

of the current state of energy management  
and planning in Danube region

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## Introduction

The assessment report focuses on description of the current state of energy management and planning in the Danube region. According with international projects, the assessment report used developed framework to identify the state of implementation of the ISO 50001:2011 “Energy Management Systems” on the Danube Region as well as the state of implementation of energy efficiency actions, in order to, in a close future, implement the ISO 50001 as much municipalities as possible. This ISO 50001 has the potential to impact 60 % of world’s energy use, including industry, commercial and institutional sector<sup>1</sup>, for this reason contribute to EU 20/20/20 and Agenda 21 goals. The report also provides short SWOT analysis of ISO implementation for each country of interest.

As a source of information the qualitative analysis of the data obtained from the surveys and the analysis of secondary survey/reports on situation of ISO, EP and EM in DR is used. The **questionnaire survey** (appendix 1, appendix 2, appendix 3) across the municipalities in Danube region has shape as "case study" on base of questionnaire. Together, 18 case studies were carried out (3 case studies per country, one in municipality implemented ISO standard, one in municipality using energy management, one in municipality lacks of using such tools). In the countries, where the ISO is not implemented yet, the two case studies from MU with energy management were obtained.

The questionnaire survey consists of following parts related to the core research questions:

- A) If, how, in what form and to what extent MU do use Energy management and planning.
- B) If, how, in what form and to what extent MU implement the ISO standard, In particular, if they know what to do, what data to provide etc.
- C) What are the „external influences“ of property municipal management, including economic impact on municipal budgets.

From each PP’s country, three different municipalities with a different state of implementation of energy management were scouted:

1. Municipality where no energy management tool is in use
2. Municipality applying energy management
3. Municipality already implemented the ISO 50001

The designed questions were measurable and comparable between municipalities. For that reason the questions have a yes/no form or very short open questions. The **controlled interviews** were used to filling up the questionnaire to ensure proper fulfilment of all relevant questions/information.

**The Assessment report contains chapters listed as follows:**

- An introduction to energy management and a short introduction of the principle ISO 50001 standard in relation to municipalities.
- A SWOT analysis of energy management.
- The state of art of the ISO 50001 implementation in each country.

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<sup>1</sup> McKane, Desay et. al., 2009, Berkeley, CA (US). “Continual improvement of energy performance: ISO 50001. Implementation demonstration. Proposal Submission”.



- Overview on municipalities analysed with a resume of data and situation across partners countries.
  - If, how, in what form and to what extent MU use Energy management and planning.
  - If, how, in what form and to what extent MU implement the ISO standard.



## 1. Energy management and “Energy Management Systems”, ISO 50001:2011 in Municipalities

An understanding of energy use throughout the organisation can reduce the cost of energy. Generation technologies, fuels, energy measures, audits and contractual opportunities can be assessed and implemented as part of a comprehensive energy management approach. When combined with energy efficiency measures, the optimisation of supply and on-site generation technologies could yield dramatic improvements in performance (municipality’s performance). Managing the use of energy, maximum demand, energy “self-generation”, and other aspects of electricity contracts can yield substantial savings. The rising costs of energy have municipalities looking for opportunities to reduce costs.

**“Energy management”** is a term having a number of meanings but is mainly concerned with the one that relates to saving energy in businesses, public-sector/government organizations, and homes. In our case, this term is closely connected with its using in municipalities as the report debate about using of energy management in municipalities across the Danube region. The implementation of energy management provides support enabling municipalities (MU) to establish the systems and processes necessary to improve energy performance, including energy efficiency, control of energy use, consumption and – increasingly production of energy, mostly from renewables.

Energy management is the key to saving energy in every organization in the world. Much of the prominence of energy saving follows from the global need to save energy - this global need affects energy prices, emissions targets, and legislation, all of which lead to several griming reasons why municipalities should save energy at their buildings specifically.

Energy management is a system bringing many benefits through its effective implementation.

- Enabling significant savings – Municipalities that have taken a strategic approach to energy efficiency often find project opportunities with attractive payback periods and ongoing reductions in energy expenditure.
- Reducing exposure to future energy price increases – Energy efficiency improvements offset these costs, making municipality less vulnerable to future price increases.
- Reducing greenhouse gas emissions – managing energy use is the way to minimise greenhouse gas emissions.
- Reducing maintenance costs – Energy efficiency actions can foresee problems before they occur and therefore reduce the “one-off” costs.
- Ensuring corrective and preventative actions with workflow through to completion.
- Recording legal requirements, energy policy, Audit management – both energy and management system audits – with triggering of action through workflow.
- Controlling energy targets and objectives, management representative appointment, Nonconformities, corrective action, preventive action. Prepare basis for municipal energy audits.



Whilst energy management has been implemented in larger companies (and their buildings) for a long time, it has only started catching on in municipalities in previous decade mainly. Most municipalities aren't even aware of the term, and take more of a randomly, crisis approach (responding when the problems in buildings occurs, such as replacement of heating source and etc.) to reducing their energy consumption. But the monitoring and systematic approach used by energy management is just as effective in the municipalities as it is in companies.

In an effort to reduce energy costs and greenhouse gas emissions, many municipalities across the world have considered or implemented energy management in recent years seeing an use of alternative energy sources or generation technologies such as co-generation plants, solar systems (roof-mounted), heat pumps and many other technologies, off.

	Czech Republic	Hungary	Croatia	Austria	Slovenia	Serbia
Energy Management in Municipalities	Yellow	Orange	Yellow	Green	Yellow	Red
Strategic Energy Planning in Municipalities	Orange	Red	Orange	Green	Orange	Red

*\*RED –contempt or rarely existing; \*\*ORANGE - poor; \*\*\*YELLOW – medium; \*\*\*\*GREEN – well*

The Table above shows the disparities across the DANUBE region in municipal energy management implementation and strategic energy planning. In the field of energy management, the worst situation is in the Hungary and Serbia, although some strong singular initiative exists. On the other hand, the energy management is well situated in Austria. Strategic energy planning is well integrated in Austria, other regions start to implement the energy planning into strategic planning.

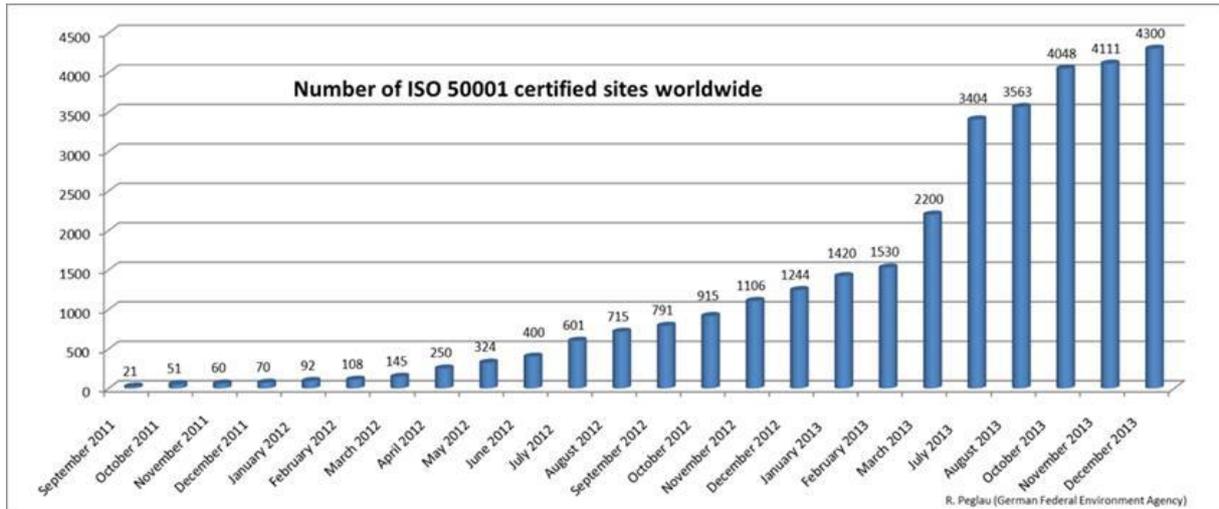
**„Energy management system“ – EnMS** in accordance with ISO 50001 is based on the management system model of continual improvement also used for other well-known standards such as ISO 9001 or ISO 14001. This makes it easier for municipalities to integrate energy management into their overall efforts to improve environmental/energy management.

The EnMS is a proven framework for industrial facilities, commercial facilities, or entire organizations and municipalities to manage energy—including all aspects of energy procurement and use. An EnMS establishes the structure and discipline to implement technical and management strategies that cut energy costs and greenhouse gas emissions—and sustain those savings over time.

The purpose of EnMS is to enable organizations to establish the systems and processes to improve energy performance, including energy efficiency, use and consumption. This International Standard is applicable to all geographical, cultural or social conditions. EnMS specifies and guarantees requirements, upon which an organization can develop and implement an energy policy, and establish objectives, targets, and action plans which take into account legal requirements and information related to significant energy use. EnMS can be tailored to fit the specific requirements of the organization, including the complexity of the system, degree of documentation, and resources and etc. The International standard is based on the Plan-Do-Check-Act (PDCA) continual improvement framework and incorporates energy management into everyday organizational practices.

The number of ISO 50001 certifications are raising steadily, as illustrated in figure below.





Source: Online, <https://dqsus.com/what-is-the-iso-50001-energy-management-standard/>

It is important to mention, that figure above states the implementation of ISO regardless type of the organization (covering companies, municipalities as well). In case of municipalities, the share is rather low (reaching 10 %) and the implementation of EnMS in municipalities across the Europe is about 80 implementations in 2014.

	Czech Republic	Hungary	Croatia	Austria	Slovenia	Serbia
<b>Implementation of EnMS in Municipalities</b>	Yellow	Red	Red	Green	Red	Red

\*RED –contempt or rarely existing; \*\*ORANGE - poor; \*\*\*YELLOW – medium; \*\*\*\*GREEN – well

The table above states the current situation in DANUBE countries which do not align clearly or are not supported in an optimal way in their implementation of energy management and planning. Despite the strong coordinating efforts of the EU and of the Covenant of Mayors (CoM) Initiative, municipalities lack the knowledge, capacity, alignment and overall support helping them with the implementation of energy management and planning according to the ISO 50001. Only few cities in all DANUBE region countries already implemented and certificated energy management system (EnMS) according to the ISO 50001 and the situation with implementation of any form of municipal energy management and policy is similar. Based on this survey, only 4 municipalities in Czech Republic (City of Tábor, City of Chrudim, Statutory City of Opava and Statutory city of Jablonec nad Nisou), 1 in Austria (Municipality of Bad Eisenkappel) and 1 municipality in Serbia (Municipality of Vrbas) already implemented EnMS respectively ISO 50 001.

## 2. A SWOT analysis of energy management in Danube region

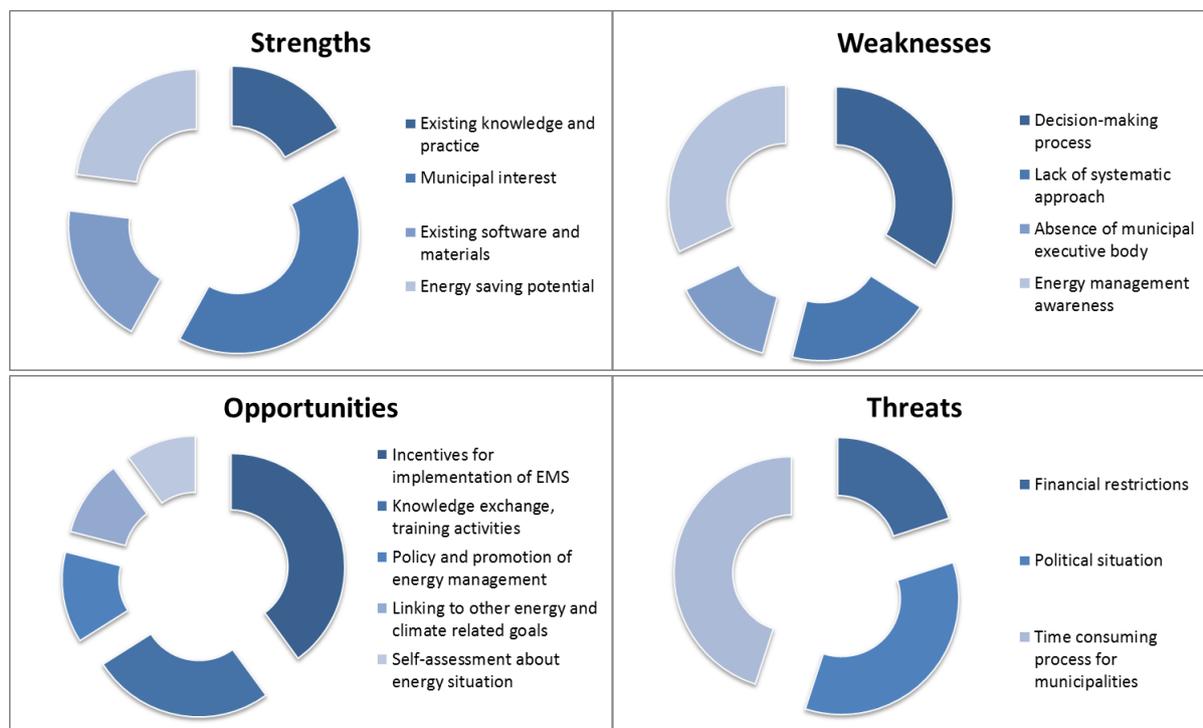
Municipal energy management in Danube region is used mainly to manage the buildings with the purpose of more efficient energy consumption and reduction of costs. To maintain its core aim, the energy management must be systematic, permanently reducing costs and must be implemented in each step of municipal management to address all important aspects (day-to-day management, planning, “ad hoc” management). Nevertheless, this „systematic“ approach to energy management is rather rare and only few cities in Danube region implement such kind of attitude (except Austria with highly skilled energy management). In other words - municipalities often have own energy action plans or strategies and have certain form of energy management but these activities are done separately without interconnection and often lead to impractical solutions lacking concept and control.

In the SWOT analysis are discussed 6 countries (Austria, Czech Republic, Croatia, Hungary, Serbia, Slovenia) of which only major part of municipalities in Austria are actively using energy management, municipalities in Czech Republic, Croatia and Slovenia implement it less and major part of municipalities in Serbia and Hungary implement energy management rarely or not at all.

Energy management SWOT analysis – Danube region	
Strengths	Weaknesses
Existing knowledge and practice (mainly Austria), Existence of SEAPs in several cities in each country	Decision-making process (political), No legal obligation to implement EM in municipalities
Municipal interest in future implementation	Strategic planning (partly spread and undeveloped), Lack of systematic approach
Existing software and materials	Absence of municipal executive body and lack of human resources adulterate energy management potential)
Energy saving potential	Energy management awareness - lack of internal awareness on the municipal representatives and lack of financing motivation (poor motivation of politician to start act)
Opportunities	Threats
Incentives for implementation of EMS	Financial restrictions according to the implementation of sustainable procurement and also to advancements
Knowledge exchange, training activities	Political situation (need for more stable municipal authorities)
Policy and promotion of energy management	Time consuming process for municipalities
Linking to other energy and climate related goals	
Self-assessment about energy situation	

Among the remarkable strengths in Danube region belongs the municipal interest in future implementation backing with high energy saving potential up. On the other hand, core general

weaknesses are a decision-making process (political) and lack of awareness of politicians. Leading opportunity in Danube region are seen government incentives for implementation of EMS; as main threat is taken into consideration the time consuming process of implementation of energy management avoiding municipal representatives to do so.



## 2. 1. Czech Republic

Interest towards energy management is relatively high, constantly growing, as evidenced by the pace at which it unfolds. In the Czech Republic, the interest resulted in the implementation of energy management in 12 municipalities last year, representing approximately 500,000 inhabitants affected by it.

Market demand has not been fully satisfied, whereby, due to growing awareness can be assumed that the volume of inquiring municipalities will increase significantly in the future. One of the main points of further development is therefore the energy management implementation across all municipalities in the Czech Republic (at least more than 5 000 inhabitants).

### 2. 1. 1. Future main objectives

Development of energy management is a step in the right direction by all. Along with the growing volume of projects, the demand of energy managers for a platform that would allow sharing experiences with other colleagues, establishing technical cooperation and preferably at international level, springs up too. Another point of development is strategy and planning. Despite the fact that municipalities have own strategic plans, energy and energy savings are often lacking or are a minor. Furthermore, if exist, only as a proclamation and not working.

#### Objectives

- Improve of the level of energy management – step to strategic and systematic management.

- Energy action planning – introduction of energy action planning in MU having energy management.
- ISO 50001 implementation.
- Knowledge exchange.

### 2. 1. 2. Main experiences and deficiencies of energy management

Among the main experiences regarding energy management belong municipalities already implementing energy management within their region. In most cases, this occurs precisely in cooperation with professional consulting company (energy agency). The planar coordination of activities and cooperation among municipalities, however, does not exist. On the other hand, in the Czech Republic, the Energy Managers Association of Towns and Municipalities (ASEMO) has been established year ago for this purpose.

#### The experiences

- ASEMO – Association of energy managers
- Existing knowledge – energy agencies, well-placed and experienced municipalities
- Existing software and materials

#### The deficiencies

- Lack of cooperation among the municipalities
- Decision-making process (more political than practical)
- Strategic planning (partly spread and undeveloped)
- Absence of municipal executive body (in case that MU has strategic planning and have energy data – lack of human resources adulterate energy management potential)

Energy management SWOT analysis - Czech Republic	
Strengths	Weaknesses
Existing knowledge and practice (5 CZE municipalities already implemented ISO 50001)	Decision-making process (more political than practical)
Municipal interest in future implementation	Strategic planning (partly spread and undeveloped), Lack of systematic approach
Energy management awareness	Absence of municipal executive body (in case that MU has strategic planning and have energy data – lack of human resources adulterate energy management potential)
Existing software and materials	Energy management awareness - lack of internal awareness on the municipality level
Energy saving potential	Lack of financing motivation (poor motivation of politician to start act)
Opportunities	Threats
Incentives for implementation of EnMS, ISO – subsidy programme EFEKT (Ministry of industry and trade)	Financial restrictions according to the implementation of sustainable procurement and also to advancements

Knowledge exchange, Training activities	Political circle (need for more stable municipal authorities)
Policy and promotion of energy management	

## 2. 2. Slovenia

General situation on implementation of energy management in public sector in Slovenia is in accordance with the conclusions/ findings derived from the three municipalities. Namely, there is a growing number of larger municipalities using Energy book-keeping software (various software solutions), that provides them with the possibility to analyse their energy needs and provides the guides/ first step to comprehensive energy management of buildings. Market demand has not been fully satisfied, whereby, due to growing awareness can be assumed that the volume of inquiring municipalities will increase significantly in the future.

### 2. 2. 1. Future main objectives

Follow the current situation, several core improvements in municipal energy management were done/should be done:

- New Energy Law (EZ1, 2015) art. 29 sets obligation for municipalities to prepare a local energy concept (LEC), serving as a program for energy management in municipalities (based on the methodology prepared by responsible Ministry). LEC's should according to EZ1 form a mandatory basis for preparation of municipal spatial plans.
- One of the prerequisites for successful implementation of energy management (EnMS) is linked to preparation/ drawing of good organizational structure in municipalities. Potentially with a top-bottom approach lead by national authorities aiming at providing a support and education on local level to facilitate implementation of EnMS on local level; but not withstanding a bottom-up approach to integrate local stakeholders into the process.
- Keystone element in the process is put on ensuring sufficient investment potential for activities; potentially by an energy efficiency fund covering implementation of EnMS in public sector.

### 2. 2. 2. Main experiences and deficiencies of energy management

In municipalities with no clear defined responsibilities and processes for energy management, energy consumption and the costs normally increases as no established mechanisms to inhibit energy anomalies exist. Responsibility for the management dictates that important elements of the energy management system should be laid down in writing and approved by the leadership of the municipality/organization. On the other hand, the public sector is characterized by obstacles to the implementation of energy management: neglecting energy costs where the energy is experienced as a fixed cost; fear of changes; focus on the primary function and neglecting technological improvements; no stimulation of employees for technological improvements; slow entry of young professionals in managerial positions in the public sector; higher initial costs hindering energy efficiency measures and therefore staying with energy inefficient solutions.

#### The experiences



- Existing knowledge – energy agencies, well-placed and experienced municipalities
- Existing software and materials.
- National Energy plan and Energy Efficiency Action plan (aligned with the EE targets of EU)
- Substantial potential of energy savings and easy access to equipment and technologies for energy management
- Local Energy Agencies are supportive of energy management actions

### The deficiencies

- No systematic implementation of EE criteria for local communities
- High investment cost in case of very sophisticated systems
- No working groups, regional or provincial agencies are established with the aim of best practices exchange, facilitating/coordinating the procedures
- Lack of internal awareness on the municipality level

Energy management SWOT analysis - Slovenia	
Strengths	Weaknesses
National Energy plan and Energy Efficiency Action plan (aligned with the EE targets of EU)	No systematic implementation of EE criteria for local communities
Substantial potential of energy savings and easy access to equipment and technologies for energy management	High investment cost in case of very sophisticated systems
Local Energy Agencies are supportive of energy management actions	No working groups, regional or provincial agencies are established with the aim of best practices exchange, facilitating/coordinating the procedures
Central management increases operational safety of the energetic systems	Lack of internal awareness on the municipality level
Opportunities	Threats
Incentives for implementation of EnMS, ISO (Public funding for EE projects, Government guarantees for loans for EE investments,...)	Financial restrictions due to Local and European Financial Crisis according to the implementation of sustainable procurement and also to advancements
Policy and promotion of energy management in buildings strongly supported by national authorities	
Training activities should include refreshing courses and allow a wider exchange of best practices and experiences among different local authorities as well as on the National level	

## 2.3. Croatia

In Croatia, interest towards energy management is relatively low but constantly growing, as evidenced by the pace at which it unfolds. The republic of Croatia has a total of 128 cities and towns and 428 municipalities distributed amongst 20 counties with the City of Zagreb being both a county and a city. There are currently 59 Sustainable Energy Action Plans developed for these cities and

municipalities and no municipality or city has the ISO 50.001 norm implemented. Part of the public buildings utilizes an EMS (ISGE) system. It was developed as a pilot project by the UNDP and is mostly used to monitor the consumption of the public sector. It is not used for planning or similar activities by itself but the information it provides can be and is used. In an effort to reduce energy costs, many municipalities in Croatia have SEAP or implemented energy management in decent years. On the other hand, better communication towards the local community, integrated planning of different sectors, empowering city officials and energy managers to follow up on the developed plans.

### 2. 3. 1. Future main objectives

City officials in Croatia are usually aware of their energy issues, with the possible exception of small and poor municipalities that do not have a high energy consumption or own energy production capacities. Both municipalities and cities normally have an energy department that is mostly linked to, aside from direct energy issues for example energy related spending and projects, energy efficiency and so on, environmental protection and in some cases waste and waste water. Energy efficiency is a popular topic and a lot of “low hanging fruit” solutions have been and are being handled, mostly public lighting and fuel switch from fuel oil to natural gas in old systems. Building refurbishment is also being implemented but at a much slower pace. Energy management is usually handled through the use of ISGE and the goals are set in national, regional and local strategies and plans and Sustainable Energy Action Plans. The most prevalent issue related to energy efficiency and environmental protection is usually financing.

#### Objectives

- Increased energy efficiency,
- More data available,
- Commitment to the implementation of the energy plans and strategies,
- Stronger communication towards the local communities and the general public.

### 2. 3. 1. Main experiences and deficiencies of energy management

Energy management is a relative unknown in Croatia when it comes to municipalities. Most public buildings utilise the online EMS called ISGE but mostly for consumption tracking. The tool is useful and it's data can help with planning and monitoring but more needs to be done with this in mind.

#### The experiences

- Existing knowledge – energy agencies, well-placed and experienced municipalities
- Existing software and materials.
- Local Energy Agencies are supportive of energy management actions.
- Existence of SEAPs in several cities.
- Implementation of an online EMS in the public sector.
- Strong awareness of energy related issues by some city officials.

#### The deficiencies

- Lack of internal awareness on the municipality level
- Financing issues.



Energy management SWOT analysis - Croatia	
Strengths	Weaknesses
Existence of SEAPs in several cities	No legal obligation to implement EMS in municipalities
Implementation of an online EMS in the public sector	Opposition of municipal workers to do extra work
Strong awareness of energy related issues by some city officials	
Opportunities	Threats
Linking to other energy and climate related goals	Financing issues
Political problems in case the government (local, regional or national) changes	

## 2. 4. Austria

In terms of energy management there is no regulation advocating/demanding use of an EMS. Every municipality uses different ways to account their energy demand if they do it. In Austria some programs are available (e.g. e5 program, Climate and Energy Regions) to get connected with municipalities and introduce tools that municipalities enable to monitor their energy demand.

As already mentioned in Austria are several programs ongoing to help municipalities to get aware of energy issues and shifting to renewable energies. The most intensive program to take part is the European Energy Award respectively e5 program called in Austria. Following an ISO 50.001 approach the program is designed for municipalities and regions with a strong focus on energy but also sustainability issues. Especially external auditing, certification and re-certification are the core parts of the quality management process in e5. In Austria 177 municipalities and cities are already taking at the program actively. Another program with a different obligation level for regions is the Austrian Climate and Energy Regions program. Several municipalities are grouping together and form regions. Each region has a manager to coordinate and initiated implementation of renewables and energy efficiency measures. Both programs are coming closer together as the quality management process of e5 was integrated in to the Climate and Energy Program in 2015.

### 2. 4. 1. Future main objectives

Future objectives will be clearly the extensions of the e5 program and inclusion of much more municipalities. There is an explicit will of politics to stress the program and support municipalities and regions in their daily work in energy innovation actions. Furthermore introduction of indicators (e.g. energy, water, waste, densities) will be introduced and stressed to reach a better level of planning and management on the local level.

#### Objectives

- Increasing energy efficiency and reducing costs for communities.
- Strengthening local economy and sustain local community.

- In the near future we expect that very rural municipalities have more problems to maintain their infrastructure because of decreasing population.
- Mobility issues are getting much more prominent especially in rural communities.
- Strong commitment from municipalities especially mayors to join initiatives (e.g. European Energy Award).
- Funding.
- Awareness raising campaigns.

### 2. 4. 2. Main experiences and deficiencies of energy management

Those who are aware of EnM systems are seeing the benefit in having a tool available to generate quick reports of their energy state. Having a comprehensive database of energy data available enables them to observe their energy consumption and production and also visualize energy savings.

Deficiencies are a high barrier level before having a database established. Responsible people see advantages usually if the database is established for several years already. Especially to get comparison periods and trend analysis results. Another hindrance is time consuming data gathering and missing connection to databases for data transfer. This could be easier if smart meter technologies are applied more widely.

#### The experiences

- Existing knowledge – energy agencies, well-placed and experienced municipalities
- Existing software and materials.
- Working very well if a strong commitment from the local mayor is available.
- Strong awareness of energy related issues by some city officials.

#### The deficiencies

- Financing issues. Major hindrance is about resources (person month) available for EnM.
- Benefits are becoming visible to the local authority usually after some time and being used to EnM.

Energy management SWOT analysis - Austria	
Strengths	Weaknesses
Experience with European Energy Award (similar audit process as in ISO 50.001)	No experience with ISO 50.001 implementation in Styria
Direct communication channel	
Opportunities	Threats
Self-assessment about energy situation	Time consuming process for municipalities
Strategic planning of energy development	Political instability



## 2. 5. Serbia

The Republic of Serbia is currently in the the proces of accession to the European Union, with two open Chapters. The Republic of Serbia has 198 municipalities from which 18 municipalities with city status e.g. City of Šabac. The experiences with local energy management systems are rare but some local energy planning exists. One of the reason is lack of human capacity for energy planning especially in the smaller, rural communities. Some municipalities attempted to develop SEAP's trough the CoM initiative but after the unsucessful sumbission according to deadlines they have been downgraded from the membership. From curent six signatories only City of Nis has developed SEAP. Some municipalities e.g. Municipality of Vrbas have shown extraordinary interest for energy planning and significant improvements. Therefore need for energy planning in Republic of Serbia has been recognized and activites strongly recommended.

### 2. 5. 1. Future main objectives

The role of energy management should be more important than nowadays. The energy managers should not be only technocrats doing the statistics and using software tools, but rather a person who has ability to talk to every citizen and to practically show the advantages of energy management. Therefore perspective of energy planning should be improved. More attention in local communities should be also given to the quality of environmental protection based on affordable and current practices in energy consumption.

#### Objectives

- Increasing energy efficiency and reduce costs for communities.
- Better reputation of energy managers,
- More attention to the energy costs which are expected to rise in near future and create problems.
- Funding.
- Awareness raising campaigns.

### 2. 5. 2. Main experiences and deficiencies of energy management

The optimal energy management and planning at the local level almost does not exist in Republic of Serbia, but in some municipalities there are some elements on low and medium level. This fact is accompanied with lack of energy manager positions at the municipal level. Usually there is only one or none paid position, so the energy management activities are done on the volunteering base and enthusiasm. Only a few Mayors are aware of importance of the energy management.

#### The experiences

- Implementation of ISO 50.001 standard in Municipality of Vrbas

#### The deficiencies

- Lack of cooperation among the municipalities

- Decision-making process (more political than practical)
- Strategic planning (partly spread and undeveloped)
- Absence of municipal executive body (in case that MU has strategic planning and have energy data – lack of human resources adulterate energy management potential)

Energy management SWOT analysis - Serbia	
Strengths	Weaknesses
The complexity of ISO approach - it is advantage to have big picture and find best energy management measures.	The implementation of complex approach can be problematic in the municipalities with low and medium levels of energy management without capacity building.
The standard in Republic of Serbia which is also applied in the region is an advantage.	The experiences of the application of energy management in municipalities are not successful in general.
Opportunities	Threats
Fuel and technology switch.	Increase in energy costs
Improved regional connectivity.	Interruption in energy supply.

## 2. 6. Hungary

In Hungary municipalities usually don't have long-term and conscious energy management activity. There is no strategic, integrated and long-term approach in the context of energy related actions and investments. Instead of sustainable planning, local authorities take part in energy related project casually. Several projects and initiations exist as best practices or models however, these are rather solutions for one problem instead of comprehensive system.

Moreover, there is not enough knowledge about the benefits of energy management. Usually they are not aware of the financial benefits of energy management and the fact that energy-related actions are not just environmental-friendly measures.

Investments are usually planned for one year and implementation of a SEAP or other energy conscious plan is not a priority because it is not mandatory and it has long term impact.

The most general problem is that municipalities don't employ related experts. Furthermore, energetics has a deep knowledge in nationwide energy planning and/or project implementation however they don't have any experience in local integrated energy planning. Therefore policy makers are not informed about the benefits of energy management. Nevertheless, there is a positive progress: in the near future SEAP can be financed from national EU sources, namely from the Territorial Operational Programme.

### 2. 6. 1. Future main objectives

One of the most important tasks is to improve systemic approach in energy management which means a coherent process from conceptual planning to monitoring and feedback. Other important need is to raise local authorities' awareness and sensitizer politicians in the field of energy efficiency



and management. Moreover the integration of spatial planning and energy planning as well as other related areas is necessary in order to successful energy management and planning.

Due to the decrease in indirect EU sources there is increasing interest among municipalities in other sources such as energy saving and direct EU funds. Additionally, the Territorial Operational Programme in Hungary will support SEAP development.

**Objectives**

- Increasing energy efficiency and reduce costs for communities.
- Coherent process from conceptual planning to monitoring and feedback.
- Integration of spatial planning and energy planning.
- Awareness raising campaigns.

**2. 6. 2. Main experiences and deficiencies of energy management**

The most general problem is the lack of energy awareness thinking and strategical, integrated and long-term approach in the context of energy related actions and investments. Instead of sustainable planning, local authorities take part in energy related project casually. Due to this the planning is based on actual support schemes. Hence, they have experience only in project implementation.

Moreover, municipalities don't employ energy managers or related experts and also they don't think that they should do so. Other crucial problem is that however energy experts have deep knowledge in nationwide energy planning and/or project implementation - they don't have any experience in local integrated energy planning. Hence, they need capacity and knowledge building. Finally, in Hungary there is a gap between spatial planning and energy planning so integrated approach is missing.

**The experiences**

- Existing financing sources
- Existing best practice examples

**The deficiencies**

- Decision-making process (more political like practical)
- Lack of energy awareness thinking and strategical, integrated and long-term approach
- Absence of municipal executive body (in case that MU has strategic planning and have energy data – lack of human resources adulterate energy management potential)

Energy management SWOT analysis - Hungary	
Strengths	Weaknesses
Strong legal framework	Lack of energy awareness
Strong legal compliance	Lack of assignments in a voluntary manner



Commitment toward successful development of the city/region/settlement	Investments are based on actual support schemes instead of long-term strategies
Economy-oriented approach	Short-term planning instead of sustainability
<b>Opportunities</b>	<b>Threats</b>
Development of the central legal framework	Investments based on actual national policy of subsidies
Development of the national policy on subsidies	Lack of changing in legal framework
Awareness raising campaigns, elaborate incentive schemes (such as awards)	Centralized energy authorities and jurisdiction
Training, capacity building of experts and administrators	Energy policy which is not based on RES



### 3. ISO 50001 implementation in Danube region

From the world perspective, Germany continues to demonstrate the leading role with a wide margin. Studies learning from Germany are mainly pointed out that pursue of sustainability drive through EnMS to maximise the energy efficiency and use of renewable and alternative energy under the circumstances of high energy cost and phasing out of nuclear energy. In case of Danube region, leading country is Czech Republic where the ISO 50001 (municipalities) is perceived as the practical guideline to implement effective EnMS operation participated by entire workforce engaged in PDCA.

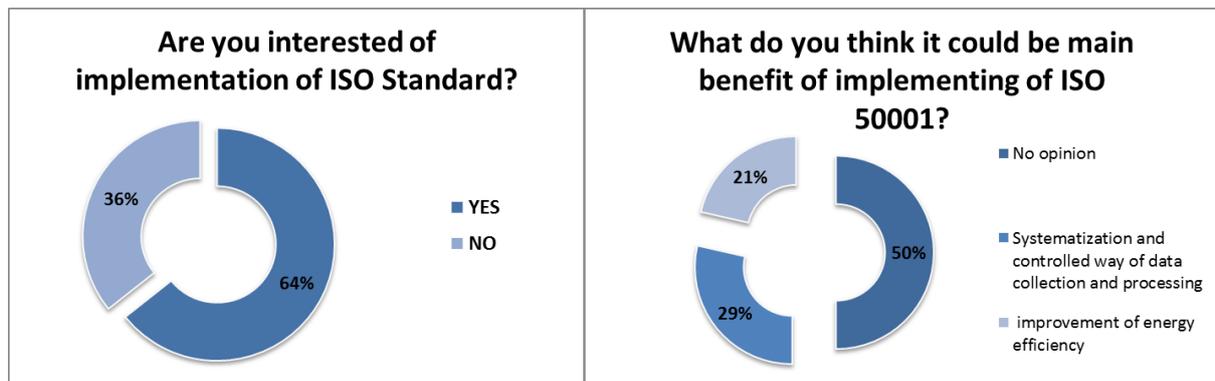
Only few cities in all DANUBE region countries already implemented and certificated energy management system (EnMS) according to the ISO 50001 and the situation with implementation of any form of municipal energy management and policy is similar. Based on this survey, only 4 municipalities in Czech Republic (City of Tábor, City of Chrudim, Statutory City of Opava and Statutory city of Jablonec nad Nisou), XY in Austria (Municipality of Bad Eisenkappel, ) and 1 municipality in Serbia (Municipality of Vrbas) already implemented EnMS.

The Table below shows the current situation in municipalities across DANUBE countries which do not align clearly or are not supported in an optimal way in their implementation of energy management and planning. Municipalities often lack the knowledge, capacity, alignment and overall support helping them with the implementation of energy management and planning according to the ISO 50001.

	Czech Republic	Hungary	Croatia	Austria	Slovenia	Serbia
<b>Implementation of EnMS in Municipalities</b>	GREEN	RED	RED	GREEN	RED	RED
<b>Potential for the implementation of EnMS</b>	GREEN	GREEN	YELLOW	ORANGE	YELLOW	YELLOW

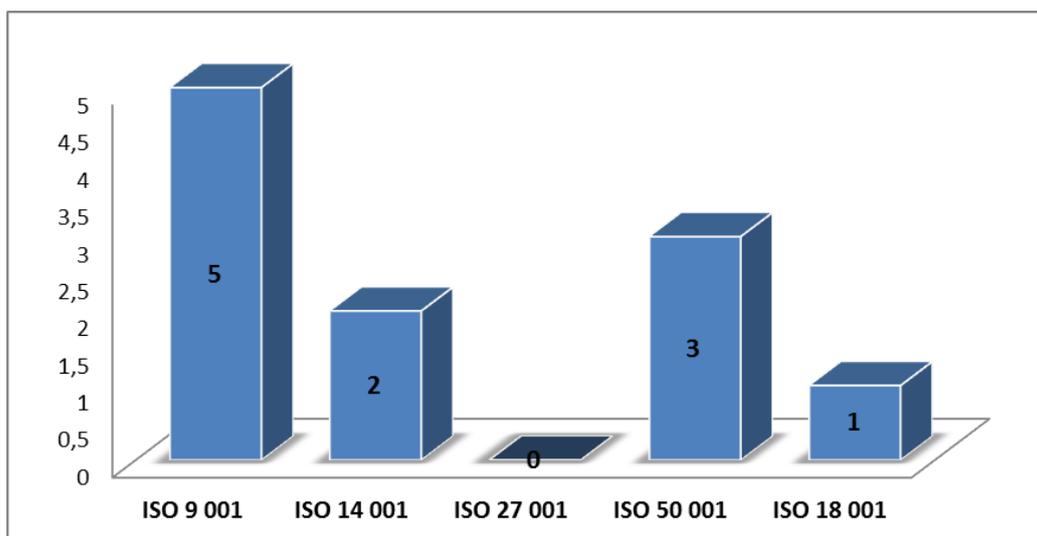
\*RED –contempt or rarely existing; \*\*ORANGE - poor; \*\*\*YELLOW – medium; \*\*\*\*GREEN – well

The potential of the Danube region in the implementation of EnMS in accordance with ISO 50001 is relatively high. The lowest potential is detected in Austria as comparable programs (e.g. European Energy Award, Austrian Climate and Energy Regions) are available there. Contrary, the highest potential has been indicated in Czech Republic, Hungary.



Based on the questionnaire survey, 9 from 15 cities without ISO 50 001 are willing to implement this standard in the future. On the other hand, only 1/2 of them have a clear view of the main benefits of implementing of ISO 50001 (mostly stated benefits were systematization and controlled way of the data collection and processing).

Regarding the implementation of ISO standards, municipalities are relatively used to implement these standards (almost 53 % of them have already implemented any type of ISO standard).



### 3. 1. Czech Republic

The potential of the Czech Republic in the implementation of EnMS in accordance with ISO 50001 is high and the overall awareness could be easily raised if the municipal representatives will be willing to act. At the same time, the municipalities should have enough information or sources of information either for implementation of EnMS or realization of energy saving measures. And, the most important point the financial sources (capital investments) are not the crucial point as the municipalities lack in enthusiasm of municipal representatives and their know-how (willingness to gain knowledge). As a consequence of above stated problems, the financial sources are not spent economically and energy saving potential is not reached.

### 3. 2. Slovenia

All municipalities in Slovenia have an existing Local Energy concept (LEC) – Energy planning document prepared by externals or energy agencies they have established. In accordance with the methodology, the action plan part defines the measures and actions which the municipality should follow in order to achieve energy sustainability. The problem lies in the implementation part of the actions.

Concerning ISO implementation, there are a number of municipalities implementing energy book-keeping. Only a few municipalities have made a step forward. Of those, several would be interested into adapting functionalities to be in line with the requirements of ISO 50001.

Among main factors hindering the implementation of EnMS in public sector is lack of financing linked to the decrease of public budget on yearly level, but also to non-sufficient awareness of positive impacts attributed to it. As no management plan creates miracles by it selves, there is a precondition to be met – creating acceptance in the municipality/ organization and facilitating behaviour changes in the municipalities/ organizations.

### 3. 3. Croatia

The usual problem of implementation of ISO 50 0001 in Municipalities in Croatia is always the cost and secondly a lack of any obligations to implement such systems. In lot of cases only cost is concerned, municipalities keep only in mind that the issue is not just the cost of the implementation or the maintenance of the system but also the manpower involved with such work. This makes a certain limits within the implementation of EnMS in accordance with ISO 50 001.

Several cities and municipalities in Croatia are members of the Covenant of Mayors and the online EMS is also active in a lot of public buildings all across the country. There should not be a problem to attract cities to join the initiative. The municipality Krk (an island) is planning to implement ISO 50001 in the near future. Other cities that would most likely be willing to participate are Osijek, Velika Gorica, Dubrovnik and Zagreb.

### 3. 4. Austria

Comparable programs available (e.g. European Energy Award, Austrian Climate and Energy Regions). No specific funding. Promoted only for industry/companies.

### 3. 5. Serbia

The general issue of ISO 50 001 in Republic of Serbia is the very high complexity of its structure which makes problem in municipalities with low or medium levels of energy planning. The other issue is the lack of people and their skills. The potential for ISO 50 001 is well but the implementation is extremely rare (1/198). The potential can be increased with more capacity building activities such as CoM promotion, while implementation level can be increased with systematic and long term approach with local energy managers.

### 3. 6. Hungary

The general problem of implementation of ISO 500001 in Hungary is that MUs don't have knowledge on this standard and there is no guidance or any support on how to implement it. This tool is spread mostly among medium and large companies. There are such preparations about the implementation however the target groups are companies.

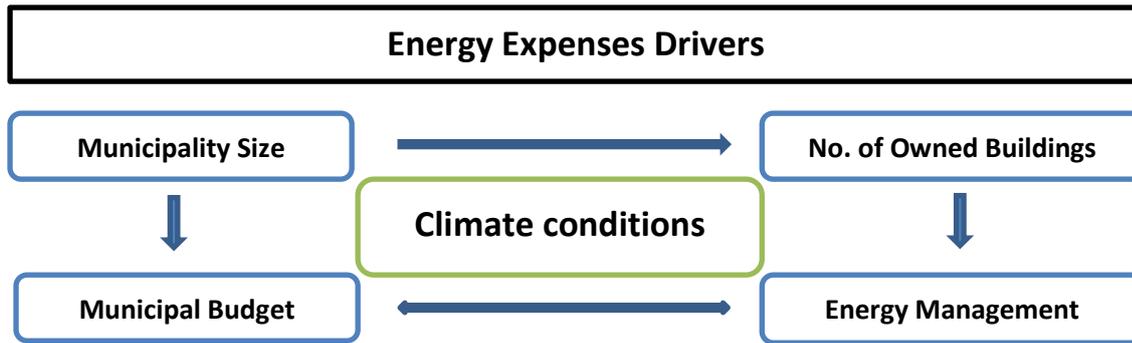
## 4. Overview on municipalities analysed

18 municipalities were polled in SMEP DANUBE project survey, 3 municipalities from each partner's country except the Hungary within two questionnaires. Of these, 6 were municipalities without any form of energy management, 9 were municipalities within energy management and 3 were municipalities implemented ISO 50 001. To simplify the survey, and focus solely on the identification of current situation in Danube region, only predefined municipalities cooperating with project partners were considered.

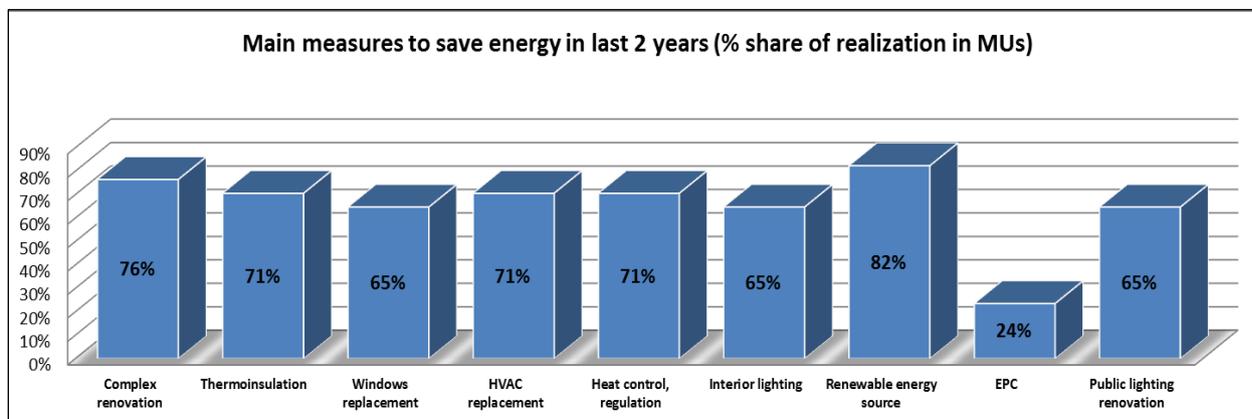
General info		Total MU budget (k. mio €)	of it energy expenses	Of it (%)	Do exist any official energy strategy, policy?	Does municipality apply any kind of EM?	Does municipality have ISO 50001 standard?
<b>CZE</b>	WEM (Sušice)	13	1.7	13.1 %	No	No	No
	EM (Litoměřice)	14.8	1.1	7.4 %	Yes	Yes	No
	ISO (Chrudim)	14	1.2	8.6 %	Yes	Yes	Yes
<b>SLO</b>	WEM	5.2	0.149	2.9 %	Yes	No	No
	EM (Vransko)	2.3	0.047	2.0 %	Yes	Yes	No
	EM (Velenje)	43.2	7.5	17.4 %	Yes	Yes	No
<b>HUN</b>	WEM (Josefáros)	73	N/A	N/A	No	No	No
	EM (Budaörs)	57.5	N/A	N/A	Yes	Yes	No
	EM (Ujpest)	75	N/A	N/A	No	No	No
<b>CRO</b>	WEM	50	2	4.0 %	YES	No	No
	EM (Osijek)	N/A	N/A	N/A	Yes	Yes	No
	EM (Velika Gorica)	39	1.89	4.8 %	Yes	Yes	No
<b>AUT</b>	WEM (Dobl-Zwaring)	7	N/A	N/A	No	No	No
	EM (Mürzzuschlag)	24	N/A	N/A	Yes	Yes	No
	ISO (Bad Eisenkappel)	5.2	0.07	1.3 %	Yes	Yes	Yes
<b>SER</b>	WEM (Arandjelovac)	20	N/A	N/A	No	No	No
	EM (Sabac)	9.2	N/A	N/A	Partially	Partially	No
	ISO (Vrbas)	11	1.1	10.0 %	Yes	Yes	Yes

\*WEM – without energy management, EM – energy management, ISO – ISO 50 001 implemented

Table above overviews municipalities which took a part in the survey. From the general point of view, we seek causal relationships between a network of factors that influence level of energy expenses and explain their variability across the Danube region (range from 2 % up to more than 17 %). A network diagram of key factors is proposed in Figure below. The five „energy expenses drivers“ shown are hypothesized to determine financial factors such as energy investments and energy related operation expenses. To consider how identified energy expenses drivers may influence municipal energy expenses, new study must be designed as the survey pool was small and results would be rather insignificant. Therefore, we do not explore whether there is a significant correlation between each of factors themselves.



The different types of energy measures were conducted in selected municipalities in last 2 years and are summarised in graph below. Among the most common measures belongs utilization of renewable energy sources. Contrary, less used measure is energy contracting.



### Overview on municipalities - Czech Republic

City of Chrudim is county town with app. 23 000 inhabitants. The city owns app. 85 buildings with annual energy expenses of € 1.2 million (including public lighting) (9 % of municipal budget in 2014). The municipalities' economy is classified as industrial, dominated by light industry. City of Chrudim implemented EnMS using subsidy from national programme EFEKT in 2014. The main additional value of implementation of energy management is considering in saving of energy and regular data collection including invoices evaluation. Annual energy savings are estimated around € 60 000 (app. 5 % of total energy expenses) due to the implementation of energy management. Total energy expenses were app. 9 % of municipal budget in 2014.

City of Litoměřice is county town with app. 23 000 inhabitants. The city owns app. 100 buildings with annual energy expenses of € 1.1 million (including public lighting) (10 % of municipal budget in 2014). The City has old history and it has agriculture character (wineries etc.). The municipalities' economy is classified as rural, dominated by agriculture and crafts. City of Litoměřice implemented energy management in 2010 and belongs among the most advanced cities in CZE in the field of energy management. Annual energy savings approach 7 % due to the either investments or non-investments (low cost investments). Energy management is fully integrated in municipality management as well as in planning (spatial planning in case of use of RES). The city has already realized several energy efficiency measures and project oriented on utilization of RES (PVE mainly).

City of Sušice is county town with app. 11 000 inhabitants. The city owns app. 60 buildings with annual energy expenses of € 1.7 million (including public lighting) (13 % of municipal budget in 2014). City of Sušice is important catchment municipality for local region with old history and advanced light industry. City of Sušice has been starting to implement energy management in spring 2015 due to the high share of energy expenses from municipal budget (more than 13 %). City representatives believe that energy management will ensure high rate of financial savings and will lead to better property management reflecting energy expenses.

### Overview on municipalities - Slovenia

Municipality Vransko's long-time strategy is besides a general development and wellbeing of its citizens, ecological improvement and according to this reducing energy consumption and transition to local renewables for energy production. Although small in size (population size 2620 citizens), the development on the energy actions was notable – biomass DHS, RES innovation center, preparation of feasibility studies for use of geothermal energy, etc. All this has brought the municipality the label Greenest municipality in Slovenia. The municipality is employing the services of an energy manager and has, in cooperation with their utility company, developed energy management software (EKOSOR) enabling analyses of existing energy situation and helping in decision-making. The main reason for implementation was to have the data on energy consumption and potential for reduction of energy costs. The utilization of energy manager brought in the investment into energy refurbishment of primary school, renovation of most public lighting systems and optimization parts of DHS. The municipality is interested into implementation of ISO 50001 into their energy management.

Municipality Velenje is a municipality with more than 34 thousand inhabitants and Velenje is the fifth largest city in Slovenia. Velenje acts as a administrative and educational center of the wider region – Savinjsko - Šaleška. The municipality is characterized by the high rate of industrialization, its economy bases on energy, metal and only recently on the services of environmental protection, industrial design and ICT. The municipality established regional energy agency KSENA, which is acting as municipalities' energy manager, promotor of sustainable energy and implementing energy book-keeping in public buildings. The general awareness of energy management is high, which is also to be attributed to promotion actions lead by local (regional) energy agency KSENA. Also all of the public buildings use energy bookkeeping service to monitor the energy consumption and associated energy costs. The results are monitored regularly to mediate the anomalies in energy consumption and set measures to remediate them. Since 2010, the Velenje established energy contracting for the supply of heat from cogeneration systems for district heating Škale and with private investors co-invested into PV plant.

Municipality Starše is a small municipality located in the north-eastern part of Slovenia, with the population of app. 4300 citizens. The municipalities' economy is classified as rural, dominated by agriculture and crafts. One of the largest hydropower plants Zlatoličje on Drava River is located within the municipality borders. In the last years three public buildings have been renovated, focusing on energy rehabilitation of buildings. The municipality prepared a local energy concept in 2011 and in the last few years invested into energy refurbishment of its primary school and kindergartens. Although having a general knowledge of the benefits of energy management, is due to restrictions in budget not willing to deploy the service of an energy manager. In the latest



communication with the municipality, they came to an agreement with a local energy agency to implement energy book-keeping for the public buildings.

### Overview on municipalities – Croatia

The City of Dubrovnik is the capital of the Dubrovnik Neretva County and the smallest of the 3 surveyed cities with around 42.000 inhabitants. It is also the only of the 3 surveyed cities that did not implement a Sustainable Energy Action Plan. It does however have a Smart City Strategy and is implementing the ISGE in its public buildings. As far as energy efficiency measures are concerned, the activities have mostly been focused on public lighting and the refurbishment of schools and other public buildings. Of its overall budget of 50M EUR, energy expenses make up 4% with a total cost of 2M EUR. Although the city currently does not a Sustainable Energy Action Plan, unusual for such a rich and developed city, it is planned in the near future. The energy department of the city is very proactive and open to new ideas and financing possibilities. They are unaware of what the ISO 50001 norm represents or how it could help them.

The City of Velika Gorica is the countries sixth largest city with roughly 63.000 inhabitants located in the Zagrebačka County. The city has a Sustainable Energy Action Plan and it is using the ISGE tool for the energy management of its public buildings. The city plans its energy issues regularly and has implemented several energy related projects for example the energy certification of most of its buildings, modernization of the district heating system, utilization of renewables, renovation of public buildings and so on. Energy expenses represent almost 5% of the cities total budget of 39M EUR. The city office of energy is determined and proactive when it comes to energy related issues demonstrated by their energy planning and the planned and implemented energy and environment related projects. They are aware of the ISO 50001 norm and are interested in its implementation but the problem they have, not only with this idea but with all of their potential projects, is financing and in some cases the lack of knowledge on the city and national level.

The City of Osijek is the country's fourth largest city with a population of proximally 107.000. It is the capital of the Osiječko Baranjska County. Sustainable Energy Action Plan and it is using the ISGE tool for the energy management of its public buildings. When it comes to energy efficiency related projects, the city has invested in public lighting, refurbishment of public buildings, mostly schools, the implementation of renewables in the forms of pellet boilers and photovoltaic panels and so on. Very similar to the situation in Velika Gorica, the city also has a dedicated office for energy related issues that plans its future development highly supported by the regional development agency. The city representatives are again aware of the ISO 50001 norm and are interested in it but the problem they face again, is financing of such initiatives.

### Overview on municipalities – Serbia

Municipality of Vrbas is aware that ISO 50001 standard is a good tool for organization and validation of energy management in their municipality and it has been financed from the local budget. Since 2011, the municipality is developing their own online software tool for public procurement and validation of the municipal energy plan. In last two years they applied all kind of energy saving measures, including: complex energy renovation, envelope renovation, window replacement, HVAC replacement, control, lighting, solar thermal, ESCO and other soft measures.

City of Sabac has a capacity to develop sustainable energy action plan, especially in the field of envelope renovation since 2010, in which they are leaders in Republic of Serbia, but also public lighting, energy production and distribution and renewable energy. Since 2008, they have ISO 9001 standard and they are interested to improve energy management by implementing ISO 50001 standard. They use own developed desktop software tool for the yearly energy balances, calculation of energy indicators and for the benchmarking. In last two years they applied most of the energy saving measures except: renewable energy sources and ESCO contracting.

Municipality of Arandjelovac has little experience of energy management. In 2012, municipality has developed sustainable energy action plan. The municipality as a leader in the city applied complex energy saving measure of fuel switch from oil to gas in their building together with window replacement. Besides that measure a photovoltaic plant in the size of 24 KW has been installed in municipality. They are aware that energy manager could bring coherent approach in solving energy efficiency problems. They apply ISO standards benefits in different municipal activities.

### Overview on municipalities – Austria

Dobl-Zwaring is situated south-west to the capital city Graz. Population is about 3,430 inhabitants and annual budget of the municipality is around 7 million €. Interview partner was Manfred Wagner who owns the position of chief officer for construction. Formerly named Zwaring-Pöls has been fused with the municipality of Dobl at the beginning of 2015. They take part in the Climate Alliance program since 1995 but no other climate or energy program so far. Dobl-Zwaring poses no information about EMS, ISO 50.001 or similar systems and is also non aware what is on the market regarding this topic. Energy Action Plan is also an unknown topics but the interview partner assumes it is about sustainability and reducing costs. Last 2 year's activities in terms of energy reduction were 1.) retrofitting of public street lightning for the whole municipality to LED technology and 2.) construction of a new fire department building based on new standards in terms of energy demand. There is a district heating grid available connecting kinder garden, municipal office, fire department and elementary school and several residential houses. There is also a 5 kWp photovoltaic plant based on the municipal office. There has also been an activity in introduction of electric cars for public use. The reason why no one took care of energy action plan and EMS is because of a lack of awareness. But they would see the major advantage in the control function if measures are efficient or not. In terms of other standards (e.g. EMAS) there have been no activities so far. There is a principal interest but a lack of information about available systems and what is suitable for the municipality.

Mürzzuschlag has been a district capital city before merged with neighboured district Bruck in 2014. Population is about 8,500 inhabitants and its area is about 12 km<sup>2</sup>. Interview partner was Ms. Gisela Wartensteiner who is responsible for energy related issues within the city administration. Mürzzuschlag is taking part in the “e5 – program for energy efficient communities” or also known as “European Energy Award program” since 2010. Mürzzuschlag has already an official energy concept respectively strategy and is actively involved in the e5 program, which requires such a vision and strategy. Mürzzuschlag sees an advantage for EMS in economic acting and sustainable energy usage. e5 can be considered as the EMS program but they have also an energy saving contract with the company ENERGIECOMFORT for energy and facility management. But they don't offer a certified software or similar. There is no interest in introduction of new management software but they see a



general advantage in ISO standards because of comparability and visibility of strength and weaknesses.

Main focus of their EMS is the regular monitoring of energy demands of their facilities (monthly base) and their reason to introduce was the joining to e5 in 2010. There are no financial incentives for using EMS so far. Regarding software application they don't use any software program for the EMS.

Mürzzuschlag has its own responsible person for energy (which is also obligatory for joining the e5 program). But it is not a full time employment (20h per week). Main responsibility is the energy accounting whereas the data has to come from the caretakers from each building. In terms of energy costs saving the amount is estimated with around 10% through ENERGIECOMFORT. Money saved through this contract is not reinvested but used to reduce the overall budget. Last 2 years measures include insulation of public buildings and insulation of heating pipes for the municipal building yard. Very proud is Mürzzuschlag of the introduction of an electric utility vehicle. Regarding the knowledge of ISO 50.001 standardisation, Mürzzuschlag is aware of its existence and how the major certification and continuous evaluation steps are. They see an advantage in reducing energy demand, setting energy targets and action plans. An introduction could be useful mainly because of energy demand reduction and marketing and image reasons. Nevertheless there is a slight conflict between e5 and ISO 50.001 because e5 has a similar process included but delivers more additional help to the municipality.

Bad Eisenkappel is a rural municipality situated in the federal state of Carinthia near to the Slovenian border. Many people are able to speak German and Slovenian due to the history of the municipality. Population is about 2,400 inhabitants and area is about 200 km<sup>2</sup>. From the overall budget of 5.2 million € about 70,000€ are needed for energy in their public buildings. Bad Eisenkappel is taking part as well at the "e5 - program for energy efficient communities" since 2010. They have been also the first European municipality achieving the ISO 50.001 certification in 2011 and reached the highest level within the e5 program. Interview partner was Ferdinand Bevc, who is the municipality's chief officer. Bad Eisenkappel are e5 municipality and ISO 50.001 certified municipality, which is unique in Austria and certainly in Europe. ISO is not used in public documentation because inhabitants are not aware of ISO and what it means. In terms of advantages they see a major advantage in optimal use of energy and possibility to measure energy savings continuously. But it requested also major adaptation on internal processes. Regular reports are created within the e5 team and once per year for reporting to the municipal council. A lot of effort is invested by the chief officer Ferdinand Bevc who also has education in EMAS certification. They tried ISO 14000 as well but was then discarded because of not been such a good match for the municipality. ISO 50.001 was then used but needed also some adaptation to fit the municipality.

Advantages in ISO 50.001 as named by Mr. Bevc:

- Certainty that energy resources are used appropriately
- ISO 50.001 allows to develop yourself along a pathway
- Responsibilities and competences are defined accordingly
- Measurable goals and quantified success

Focus of Bad Eisenkappel is to get rid of fossil fuels in heating purposes (now 90% biomass based) and installation of photovoltaics and mid-size hydro power plants. They also have an e-car sharing



system and 2 charging stations. Reason to introduce ISO50.001 was the question “Are we doing right?”. The introduction of ISO was subsidised by the state with 1,800€ but the rest was done by the municipality. Software program for EMS is used: “ÖKOM – Gemeindesoftware”. Energy values are managed through this software and are forwarded to the accounting system. Major advantage is that these two systems are interconnected. The software itself is a mix between client software but has also a webpage available to publish results online. Since 2009 an energy department is established and led by Ferdinand Bevc. Around 10% of a full time equivalent can be estimated as the amount of workload associated to energy issues. External consulting is used through the regional energy agency. Estimated 1% (54,000€) per year is saved because of EMS. ISO certification was granted in 2011. Technical support was provided by ENERCON.

### Overview on municipalities – Hungary

Budaörs is a town in Pest county, Budapest metropolitan area. It is a small city situated at the southern edge of the Buda Hills. The city's commercial district is adjacent to the joint section of motorways M1 and M7 linking the capital with Vienna and the Lake Balaton. Budaörs became a city in 1986 and after 1989 started to develop dynamically. In 2007 it was qualified as the most developed settlement of Hungary. Budaörs is one of the richest municipalities in Hungary mostly because of its commercial park. The city has signed the Covenant of Mayors and its SEAP was developed in 2012. Despite the fact that Budaörs has a SEAP there is no long-term and conscious energy management in the city. The management of the city has already realized the problem and they would like to move on. The problem is that they don't know how to proceed.

Józsefváros is the 8th district of Budapest and located in Pest as a part of the city centre. As one of the districts of the capital it has its own local authority however in some cases, such as public lighting, it is controlled by the municipality of Budapest. So the district is managed at two levels. Budapest developed its own SEAP in 2009 however this fact doesn't have any direct effect on the district's energy management. The municipality has implemented several investments in energy efficiency however the strategic and long-term approach is missing. Another crucial problem is that energy efficiency is considered not as a financial but an environmental issue. Because of that reason the problem is pushed into the background at political level. Consequently, there is a need for awareness raising, guidance activities and trainings.

Újpest is located in the northern part of Budapest. With its population of approx. ~100,000, it's one of the biggest districts in Budapest. Just as it is in the case of Józsefváros, the municipality hasn't got any power in decisions regarding public lighting and public transport. Újpest seems to make big efforts on improving energy-efficiency within their economic and political means. They have plans for improving the performance in energy-efficient investments – among them implementing the Smart City methodology – but these plans are usually for mid-term periods, not for long term. Nevertheless – compared with similar scale municipalities – Újpest is performing well considering energy-management.

#### 4. 1. Use of Energy management and planning

On behalf of questionnaire survey, 9 municipalities within energy management were polled to filling questionnaire out:

- City of Litoměřice, Czech Republic

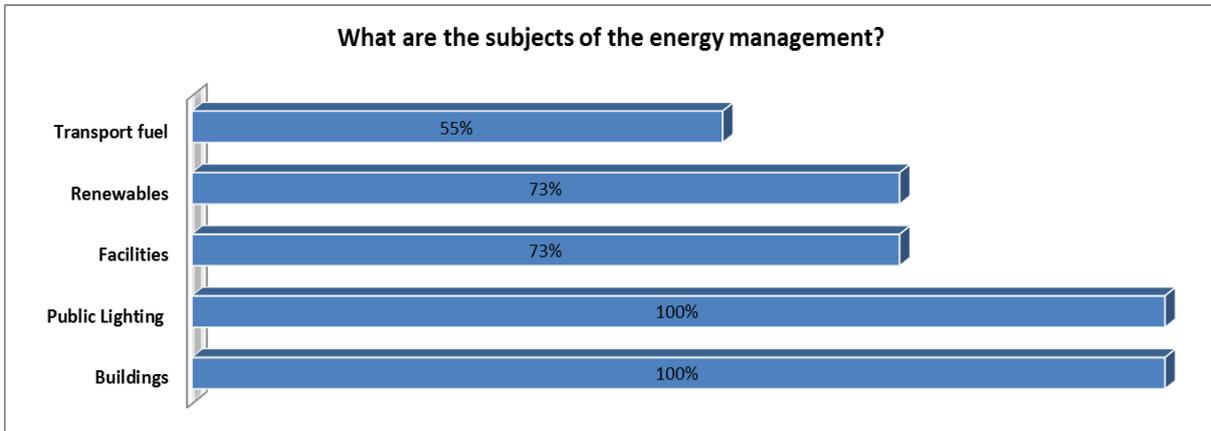


*This project is partly financed by the European Union and the City of Vienna.*

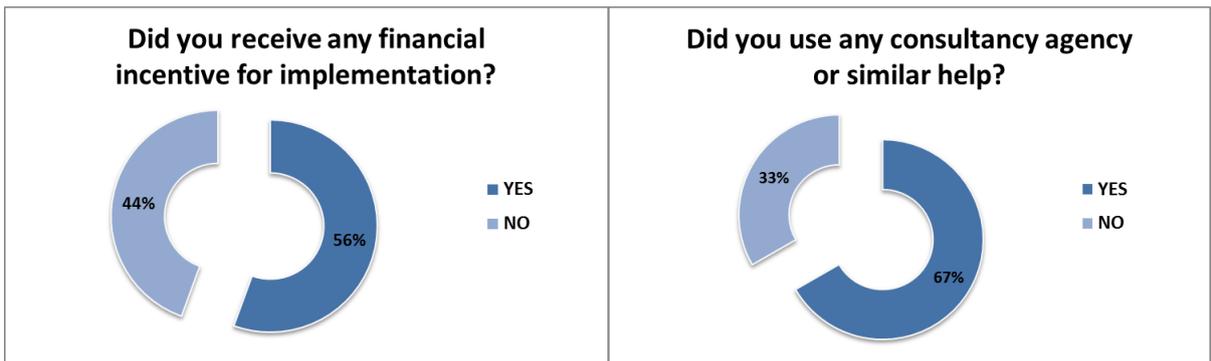


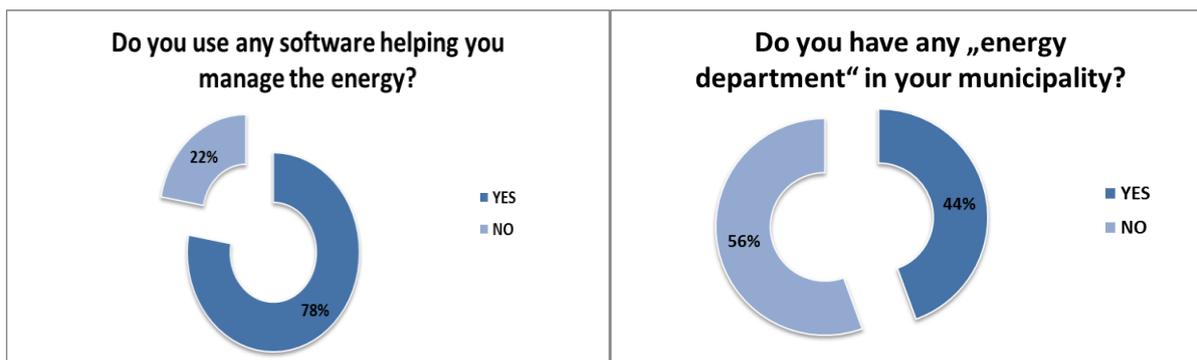
- Municipality of Vrankso, Slovenia
- Municipality of Velenje, Slovenia
- Municipality of Osijek, Croatia
- Municipality of Velika Gorica, Croatia
- Municipality of Mürzzuschlag, Austria
- Municipality of Sabac, Serbia
- City of Budaörs, Hungary

Among the main reasons for the implementation of an energy management stated by municipalities belong reduction of cost for energy and joining an initiative (CoM, e5 program, ect.)/following legal requirements. As a subject of the energy management, buildings and public lighting were most often listed by municipalities.



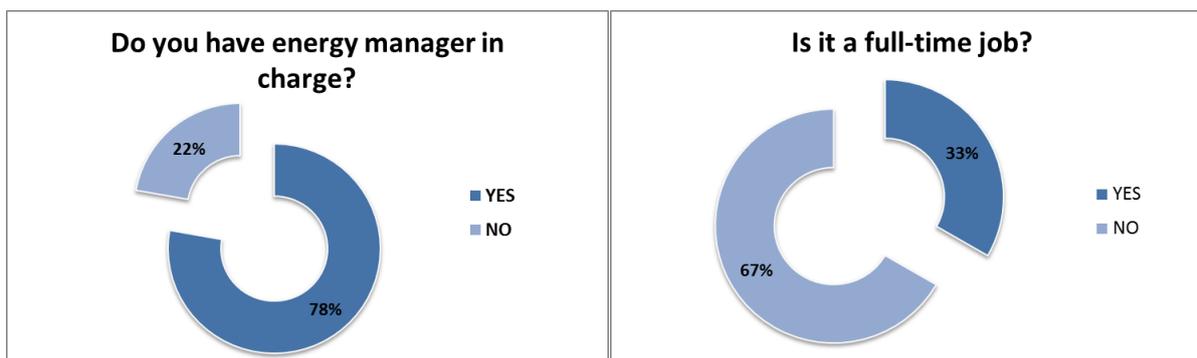
Within the implementation process 56 % of municipalities received financial incentive ranged from 20 up 90 % of the implementation cost. At the same time, 67 % of them used consultancy agency or other “external” help as the overall implementation process is rather too complex to be implemented only by them.





Also, 78 % of municipalities use different types of software to manage the energy. In the overall context, programmes are used for monitoring energy use in buildings, energy consumption and associated costs on a daily/monthly basis. The software often provides a number of energy analyses, statistical analyses, alerting of the derogations and have plenty of other functionalities. During the survey, respondents often mentioned that the most appreciate function of the software is simple data analysis helping them in the reporting duties towards legal municipal representatives.

In our survey, 44 % of municipalities also generally have an “energy department” and 78 % of them have energy manager in charge. Due to the lack of financial sources or capacities (smaller municipalities), the energy manager has wide spectrum of duties which often lower the effectiveness of energy management.



From this point of view, the introduction of full-time energy manager into force is rather problematic and the new anchored energy manager often double the reporting duties instead of replacing other (older) duties with a new energy related one. Furthermore, respondents often indicated that the usability of the energy manager only for energy activities in their municipality is questionable regarding its size and a lower number of facilities – this indicates the question to what extent the responsible body (energy department) is able to enforce and control the energy management.

#### 4. 2. ISO 50 001 implementation

Only few cities in all DANUBE region countries already implemented energy management system (EnMS) according to the ISO 50001. From them, 3 municipalities took part in our survey:

- City of Chrudim, Czech Republic
- Municipality of Vrbas, Serbia

- Municipality of Bad Eisenkappel, Austria

As a core ground for implementation of ISO 50 001 standard they named the necessity to implement comprehensive system leading to energy efficiency and energy savings. Table below summarizes general overview on EnMS in selected municipalities.

	City of Chrudim	Mun. of Vrbas	Mun. of Bad Eisenkappel
<b>Did you receive any financial incentive for implementation?</b>	YES	YES	YES
<b>Did you use any consultancy agency or similar help?</b>	YES	NO	YES
<b>Do you use any software helping you manage the energy?</b>	YES	YES	YES
<b>Do you have any „energy department“ in your municipality?</b>	NO	YES	YES
<b>Do you have energy manager in charge?</b>	YES	YES	YES
<b>Is it a full-time job?</b>	YES	NO	NO

All participating municipalities received a financial incentive for implementation of ISO standard. Most significant incentive received City of Chrudim covering 80 % of implementation cost from national subsidy (EFEKT programme by Ministry of Industry). Within the implementation, City of Chrudim and Municipality of Bad Eisenkappel used consultancy agency.

All municipalities are using software helping them manage the energy. City of Chrudim and Municipality of Bad Eisenkappel use commercial software and pay annual fee for the software and a support. Municipality of Vrbas has developed own software. At the same time, all municipalities have energy manager but City of Chrudim did not established energy department yet. On the other hand, only City of Chrudim’s employs full-time energy manager.

The potential of the Danube region in the implementation of EnMS in accordance with ISO 50 001 is relatively high. The lowest potential is detected in Austria as comparable programs (e.g. European Energy Award, Austrian Climate and Energy Regions) are available there. Contrary, the highest potential has been indicated in Czech Republic, Hungary.



## Appendix 1 – Questionnaire for municipality without EM

No	Question	Y / N	NO.	Date (year)	ANSWER TO OPEN QUESTION or COMMENT
1	Do you know about the existence of any energy efficiency plan or management system applicable for the municipalities?				
1a	Did you hear about SEAP? Do you know what is it?				
2	What is main benefit of using of energy management from your point of view? Please state the most important one.				
3	What were main measures to save energy in last 2 years? Please check and state number of them (facilities/buildings/projects), if possible.				
3a	Complex energy renovation of the building (at least two at once of these listed below)				
3b	Renovation of the envelope of buildings = thermoinsulation				
3c	Windows replacement				
3d	HVAC replacement, esp. heating system				
3e	Heat control, energy control system, regulation				
3f	Interior lighting				
3g	Renewable energy source. Please state what kind.				
3h	Energy performance contracting				
3i	Public lighting renovation				
3j	Others. Please state.				
4	Please, identify barriers or reasons for not having energy plan or energy management system.				
5	Do you have an idea, what would be main benefits in case you had an energy management implemented? Please state.				
6	Did you implement any ISO or other standard in municipality (even in one building or institution)? If yes, since when?				
6a	ISO 9001 (Quality)				
6b	ISO 14000 (Environment)				
6c	ISO 27001 (IT security)				
6f	EMAS				
6g	Other				
7	Are any of these standards certified? Which one and since when?				
8	Are you interested of implementation of any of these standards? Which one?				
9	Have you ever heard about the ISO 50001 standard? What is your opinion about it?				

## Appendix 2 – Questionnaire for municipality with EM

No	Question	Y / N	NO.	Date (year)	ANSWER TO OPEN QUESTION or COMMENT
<b>General opinion on energy management</b>					
1	Is there energy management established in any kind of document? (Municipal strategy plan, energy policy, SEAP...)				
2	What is main benefit of using of energy management from your point of view? Please state the most important one.				
3	Do you plan regularly - annually plans for investments, maintenance and operation related to energy savings? How?				
4	Did you implement any ISO or other standard in municipality (even in one building or institution)? If yes, since when?				
4a	ISO 9001 (Quality)				
4b	ISO 14000 (Environment)				
4c	ISO 27001 (IT security)				
4d	EMAS				
4e	Other				
5	Are any of these standards certified? Which one and since when?				
6	Are you interested of implementation of any of these standards? Which one?				
7	In general, what is a main advantage of having ISO standards?				
<b>Questions related to energy management system</b>					
8	What are the subjects of the energy management? Since when?				
8a	Buildings				
8b	Public Lighting				
8c	Facility (energy/heat production and distribution)				
8d	Renewables (solar energy, wind, biomass, hydro...)				
8e	Transport fuel				
8f	Other. Please state.				
9	Do you intend to extend the scope of energy management? If yes, how?				
10	What was the main reason for the implementation of an energy management?				
10a	Did you receive any financial incentive for implementation? If yes, from what resource?				
10b	How much was financial help? State in % from total implementation costs.				
11	Did you use any consultancy agency or similar help? In case yes, who helped you?				
12	Do you use any software helping you manage the energy?				
12a	Can you name it and describe a scope/aim and subject of main use of software?				
12b	What its function you mostly appreciate? Name at least one. (data collecting, data analysis, budget prediction etc.)				
12c	Is it online software?				
12d	Is it desktop software?				
12e	Is it commercial software?				
12f	It is freeware or shareware?				
12g	It is own developed SW?				
<b>Energy manager</b>					
13	Do you have any „energy department“ in your municipality? If yes, since when?				

No	Question	Y / N	NO.	Date (year)	ANSWER TO OPEN QUESTION or COMMENT
14	Do you have energy manager in charge? Since when?				
14a	Is it a political position?				
14b	Is it a technical position?				
14c	Is it a full-time job? If not, what part it is (%) and what is the other agenda?				
14d	It is external service?				
15	Who is responsible for agenda of energy manager? (Mayor, energy councillor, environmental manager/councillor...)				
16	What are the main responsibilities of the energy manager? Please name at least 2 of them.				
17	How many <b>other</b> people are working with the energy management? (converted to full time)				
18	Who is in charge of collecting energy, costs and other data across the municipality? (Automatic information system, energy manager himself, janitors, caretakers...)				
<b>Financial aspects</b>					
19	What is the budget of the energy department? Estimation in % of total municipal budget.				
20	Do you know how much money do you spare annually thanks to energy management? Please state approximate amount or in % of total municipal budget.				
21	Do you have experience with any form energy services (EPC, joint purchasing of electricity)?				
21a	Especially with Energy performance contracting method. In case yes, since when and describe a little.				
22	What purpose do you use spared money?				
22a	Used in special energy fund				
22b	Reinvested in energy saving measures				
22c	Used in overall budget				
22d	Not possible to specify or other way				
<b>Energy saving measures</b>					
23	What were main measures to save energy in last 2 years? Please check and state number of them (facilities/buildings/projects), if possible.				
23a	Complex energy renovation of the building (at least two at once of these listed below)				
23b	Renovation of the envelope of buildings = thermoinsulation				
23c	Windows replacement				
23d	HVAC replacement, esp. heating system				
23e	Heat control, energy control system, regulation				
23f	Interior lighting				
23g	Renewable energy source. Please state what kind.				
23h	Energy performance contracting				
23i	Public lighting renovation				
23j	Others. Please state.				
24	What was the most effective energy/money save measure/investment?				
24a	And less effective?				
25	Does there exist any activity your municipality or you personally would like to implement but for some reasons (budget, technology, and lack of willingness...) you couldn't?				
26	Are there any actions or project(s) that make you especially proud?				
<b>ISO 50001</b>					



No	Question	Y / N	NO.	Date (year)	ANSWER TO OPEN QUESTION or COMMENT
27	Have you heard about the ISO 50001 standard?				
27a	Do you have any idea how it's works?				
28	What do you think it could be main benefit of implementing of ISO 50001?				
29	Do you think implementation of ISO 50001 standard could be useful for your municipality? In case not, why?				



## Appendix 3 – Questionnaire for municipality with ISO 50 001

No	Question	Y / N	NO.	Date (year)	ANSWER TO OPEN QUESTION or COMMENT
<b>General opinion on energy management</b>					
1	Is there energy management established in any kind of document? (Municipal strategy plan, energy policy, SEAP...)				
2	What is main benefit of using of energy management from your point of view? Please state the most important one.				
3	Do you plan regularly - annually plans for investments, maintenance and operation related to energy savings? How?				
4	Did you implement any ISO or other standard in municipality (even in one building or institution)? If yes, since when?				
4a	ISO 9001 (Quality)				
4b	ISO 14000 (Environment)				
4c	ISO 27001 (IT security)				
4d	EMAS				
4e	Other				
5	Are any of these standards certified? Which one and since when?				
6	Are you interested of implementation of any of these standards? Which one?				
7	In general, what is a main advantage of having ISO standards?				
<b>Questions related to energy management system</b>					
8	What are the subjects of the energy management? Since when?				
8a	Buildings				
8b	Public Lighting				
8c	Facility (energy/heat production and distribution)				
8d	Renewables (solar energy, wind, biomass, hydro...)				
8e	Transport fuel				
8f	Other. Please state.				
9	Do you intend to extend the scope of energy management? If yes, how?				
10	What was the main reason for the implementation of an energy management?				
10a	Did you receive any financial incentive for implementation? If yes, from what resource?				
10b	How much was financial help? State in % from total implementation costs.				
11	Did you use any consultancy agency or similar help? In case yes, who helped you?				
12	Do you use any software helping you manage the energy?				
12a	Can you name it and describe a scope/aim and subject of main use of software?				
12b	What its function you mostly appreciate? Name at least one. (data collecting, data analysis, budget prediction etc.)				
12c	Is it online software?				
12d	Is it desktop software?				
12e	Is it commercial software?				
12f	It is freeware or shareware?				
12g	It is own developed SW?				
<b>Energy manager</b>					
13	Do you have any „energy department“ in your municipality? If yes, since when?				

No	Question	Y / N	NO.	Date (year)	ANSWER TO OPEN QUESTION or COMMENT
14	Do you have energy manager in charge? Since when?				
14a	Is it a political position?				
14b	Is it a technical position?				
14c	Is it a full-time job? If not, what part it is (%) and what is the other agenda?				
14d	It is external service?				
15	Who is responsible for agenda of energy manager? (Mayor, energy councillor, environmental manager/councillor...)				
16	What are the main responsibilities of the energy manager? Please name at least 2 of them.				
17	How many <b>other</b> people are working with the energy management? (converted to full time)				
18	Who is in charge of collecting energy, costs and other data across the municipality? (Automatic information system, energy manager himself, janitors, caretakers...)				
<b>Financial aspects</b>					
19	What is the budget of the energy department? Estimation in % of total municipal budget.				
20	Do you know how much money do you spare annually thanks to energy management? Please state approximate amount or in % of total municipal budget.				
21	Do you have experience with any form energy services (EPC, joint purchasing of electricity)?				
21a	Especially with Energy performance contracting method. In case yes, since when and describe a little.				
22	What purpose do you use spared money?				
22a	Used in special energy fund				
22b	Reinvested in energy saving measures				
22c	Used in overall budget				
22d	Not possible to specify or other way				
<b>Energy saving measures</b>					
23	What were main measures to save energy in last 2 years? Please check and state number of them (facilities/buildings/projects), if possible.				
23a	Complex energy renovation of the building (at least two at once of these listed below)				
23b	Renovation of the envelope of buildings = thermoinsulation				
23c	Windows replacement				
23d	HVAC replacement, esp. heating system				
23e	Heat control, energy control system, regulation				
23f	Interior lighting				
23g	Renewable energy source. Please state what kind.				
23h	Energy performance contracting				
23i	Public lighting renovation				
23j	Others. Please state.				
24	What was the most effective energy/money save measure/investment?				
24a	And less effective?				
25	Does there exist any activity your municipality or you personally would like to implement but for some reasons (budget, technology, and lack of willingness...) you couldn't?				
26	Are there any actions or project(s) that make you especially proud?				
<b>ISO 50001</b>					

No	Question	Y / N	NO.	Date (year)	ANSWER TO OPEN QUESTION or COMMENT
27	Since when you have ISO 50001 standard implemented in your municipality? Please state the year.				
27a	What was the main reason for its implementation?				
28	Do you have this standard certify? Since when?				
29	Did you receive any financial incentive for implementation? If yes, from what resource?				
30	Did you use any technical help? If yes, who did help you?				

