Integrated Financial and Contracting Tools

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TOGETHER

Transnational Good Governance Handbook
D.T2.2.2

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TOGETHER

TOwards a Goal of Efficiency THrough Energy Reduction

Transnational Good Governance Handbook

D.T2.2.2

- PP8 – Slovak Innovation and Energy Agency (SIEA)
- PP2 – Energy Agency Vysočiny (EAV)
- PP4 – City of Zagreb (Zagreb)

Executive summary

This document introduces possible low cost measures in a field of energy efficiency. It is comprehensibly structured. At the beginning it describes a background of the tool (project TOGETHER) and methodological approach to its development. Chapters are followed by introduction to low cost measures, their importance in a field of energy efficiency and finally introduces possible examples. One of the key messages is to motivate the reader to not think only about large investments in energy efficiency but to think “outside the box” and explore potential hidden behind easy and cheap solutions. It is especially important for a building manager which has already finished large building and technology reconstructions and seek further potential for energy saving.

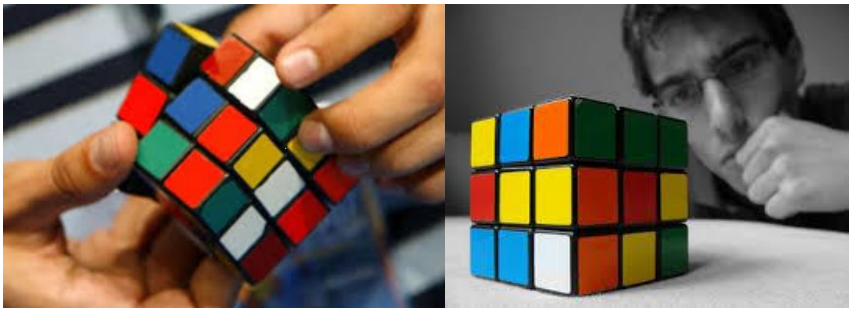
Contents

1. Introduction

The Project TOGETHER offers a transnational capacity building platform, where partners with different levels of knowledge can strengthen their competences together, thus reducing their disparities and promoting actions on both the supply and demand side, in the context of planning EE in public buildings. The main goal of the project is improving energy efficiency and energy saving in public buildings by changing behaviour of building users and promoting energy efficiency measures.

This document provides common guidelines to the partners for drafting their respective pilot project implementation plans and developing the presentation of their Pilot Actions in their pilot buildings clusters with a common framework and visual identity.

This tool is contextualized within the framework of the second objective of the project TOGETHER: if the first project objective "To increase energy efficiency and secure investments thanks to improved multidisciplinary in-house staff skills and thanks to an Alliance system with more engaged and motivated buildings users" calls for the observation and learning of possible tools to be combined together for achieving energy efficiency in public buildings, and the second one "To produce and test the most appropriate combinations of technical, financial and Demand Side Management tools for the improvement of the energy performance of public infrastructures" calls for the practical and concrete implementation of the possible identified measures.



1.1. Project TOGETHER

The three main objectives of the project TOGETHER consist in:

1. Increasing public buildings energy efficiency and securing investments, through the improved multidisciplinary in-house staff capacity building of Public Administrations and the establishment of a system of alliances with more engaged and motivated building users;
2. Producing and pilot testing the most appropriate combinations of technical, financial and Demand Side Management tools for the improvement of the energy performance of public infrastructures, currently in the 8 regional Pilot Actions involving a total of 85 buildings;
3. Codifying the project outcomes into a comprehensive policy package for a large-scale implementation, bringing local buildings governance practices to the centre of ambitious energy saving policies.

In its inception, TOGETHER plans the organisation of an interdisciplinary "Training of Trainers" course for building owners, managers and public decision makers that integrates the traditional technical inputs on energy management and buildings retrofitting with targeted contributions from behavioural science, economics and psychology, aiming to engage the end users in the building energy performance goals.

The "Training of Trainers" course is completed by the provision of an Integrated Smart Toolkit, including:

1. Guidelines for implementing the innovative EPIC (Energy Performance Integrated Contract) scheme, combining technological devices and behavioural-based components;
2. A set of exemplary models of Energy Management Systems in schools, institutional and other type of buildings;
3. An innovative Building Alliance concept among building owners/managers/users who cooperate within a Negotiating Panel to achieve energy savings to be reinvested through a Reinvestment Action Plan.

Additionally, and by the project's end, the Partners will jointly elaborate a Transnational Strategy and Mainstreaming Programme, including policy/strategic and operational recommendations for an appropriate follow-up and a sustainable take-up of the project outputs.

1.2. Purposes of Transnational Good Governance Handbook

This deliverable aims at providing a common guide to the project partners when planning their Pilot Actions in their respective pilot buildings clusters. The ambition of this deliverable/tool is to create a standardized platform that the project partners can use to plan their Pilot Actions, by using not only a common template, but **a common basis of thinking and reasoning**, together with their buildings stakeholders.

1.3. Use of Transnational Good Governance Handbook

The first test of the pilot concept design was conducted in Jihlava on occasion of the Thematic Working Group meeting devoted to discussing the Pilot Actions.

On occasion of that meeting, the partners discussed about the Pilot Actions process and about the preliminary activities that lead to their delivery and decisions.

The partners had to bear in mind that according to the Application form, the Pilot Actions have to be planned on the basis of the pilot concept design, other integrated T2 tools (technical, financial and demand side management) and on the basis of the Building Alliance (D.T2.3.2).

The Building Alliance identifies the common goals of energy reductions, the "profit sharing" approach, incentives etc. decided by the Negotiating Panel.

The Pilot Concept Design represents the fundamental attachment of the Building Alliance: it represents the action plan of the 8 Pilot Actions in 85 different pilot buildings.

The partners will adapt and implement the Pilot Concept Design to their respective pilot scenarios.

The pilot concept design has to be implemented in each pilot building, so eventually the partners will elaborate 85 pilot concept designs related to their 8 pilot buildings clusters, together with the whole chain of their buildings players: owners, managers, end users representatives.

1.4. Methodological approach to the developement of this handbook

This tool is one of eight tools which have been developed by consortium of project partners of TOGETHER. To ensure a good workflow, University of Maribor (UM) and Lead partner (LP) had presented the idea of Subleaders at the 1st Project meeting in Zagreb. Every Project Partner (PP) was a subleader of different tool on which he was working with other two PPs.

SIEA was a subleader of Transnational Good Governance Handbook and its responsibilities were mainly to:

- Report to UM and LP about the progress
- Establish a workflow among participating PPs
- Monitor the progress

UM also did a proposal of overall structure for the TOOLS, which each Subleader had to adopt their proposed index. Whole document, from Introduction to conclusion, should not overcome 50-60 pages, but also it should not be too concise. The guideline developed by UM also contained instructions on chapters content and graphical design. Template which all partners have used was developed and used to fill in the text with matching styles.

This tool was developed in coordination with project partners PP2 – Energy Agency Vysočiny (EAV) and PP4 – City of Zagreb (Zagreb). EAV has contributed with chapter Energy conservation measures (regulating services) and Recommissioning (as recalibration of operating systems) and Zagreb has contributed with short introduction to chapter 3 and Behaviour based measures + example. SIEA has prepared the theoretical background of low cost measures (Low cost measures in field of energy efficiency) and finalized the document as a subleader.

2. Low cost measures in field of energy efficiency

2.1. Introduction

In this short chapter, reader can find short introduction to the low cost measures or so called “low-hanging fruit”. It mainly describes what is meant by this term and how important it is for energy efficiency. Next chapter which is a bit more comprehensive with possible implementations and examples.

2.2. What is meant by low cost measures “low-hanging fruit”

Low cost energy efficiency measures are understood to consist of different types of measures (chiefly advice and information, energy efficiency services (e.g. re-commissioning) and energy efficiency devices and kits (e.g. energy efficient lighting, thermostats)) that deliver power, heat and/or water savings (with energy savings as an indirect benefit in the latter case) at little or no upfront cost.

The low (or no) cost of these measures distinguishes them from the larger, deeper, more structural retrofit measures. Unlike the latter, low-cost energy efficiency measures can be rolled out and installed relatively quickly and easily – in many cases by building managers themselves, without the need for a technician. These measures can, therefore, be provided cheaply and quickly to a large number of buildings. Although limited in their scope and the level of potential energy savings achievable, and despite offering only short-term fixes to energy efficiency issues, they can use fully complement the more ambitious actions that remain necessary to reach energy efficiency objectives in the longer term.

2.3. Why are low cost measures crucial for the energy efficiency

There was a study (Gancheva et al., 2016) conducted by Milieu Ltd and Ricardo Energy & Environment for the European Commission. It has analysed existing schemes providing low-cost energy efficiency measures to low-income households and showed that the measures delivered provide various benefits to the buildings. Even though these low-cost measures cannot replace longer-term, higher cost energy efficiency measures (e.g. deep building renovations), they offer immediate benefits in terms of reduced energy consumption and related costs, as well as improved indoor temperatures and associated health benefits. (Gancheva et al., 2016)

The delivery of low-cost energy efficiency measures can contribute to wider energy and social objectives and bring multiple benefits to local communities, such as relieving energy poverty and contributing to social inclusion.

Other point of view is on the buildings, which has come through substantial reconstructions. In last years, The European commission has largely supported and founded implementation of traditional energy saving measures as for example thermal retrofitting of the envelope. In such buildings, which has been retrofitted, the potential of energy saving is lowered. It however can be found in low cost measures as for example lighting reconstruction or introducing an energy management in to this buildings. In following chapter, we would like to introduce you to some of these.

3. Low cost measures in energy efficiency

3.1. Introduction

There are some practices that are good basis on how to trim energy waste with nothing more invested than time and elbow grease. These 'no- or low-cost' measures can be grouped into three categories:

1. Introducing energy management practices comprising continuous monitoring of energy consumption and benchmarking of performance;
2. Improving operation and maintenance practices that lead to reduced energy consumption and
3. Stimulating change of behaviour among building occupants (employees in public sector buildings) that leads to reduced energy consumption.

While energy management system is described in much more details in the chapter 3.2, hereafter some examples of good practices in improving operation and maintenance practices and provoking behavioural change will be given.

3.2. Energy conservation measures (regulating services)

Energy conservation measures (ECM) aim at the reduction of the energy consumption in a building by using for example new technologies. Usually these types of projects are designed to reduce cost for energy (water, electricity, gas, heat etc.). The main goal is to achieve a savings, to reduce the amount of energy that is used in buildings. These systems are sometimes used in combination with EPC. This could guarantee higher energy savings with lower disruption for building users with renovations of building. The good thing is that often the implementation costs of ECM are lower and cost of energy saving measures are higher.

Lighting reconstruction projects can be mentioned as good examples. These projects could be implemented with little effort.

Here are some possible changes in lighting:

- Replace 40-watt to 36-watt or lower fluorescent tubes with efficient fluorescent tubes.
- Replace incandescent bulbs LED, i.e. 50-watt incandescent with 8 watt CFL
- Turn lights off during lunch breaks.
- Clean lamp tubes regularly.
- Use natural daylight to reduce artificial lighting

By using these methods in changing lighting systems, saved money could be used in more substantial upgrades e.g. HVAC systems in large facilities. Smaller buildings should try to combine window replacement with modern insulation using advanced insulating foams to improve energy performance. These ECM systems relies on the behavioural changes of buildings users to save energy. Under the right circumstances could these projects be implemented for free to achieve even higher savings .

On global basis energy efficiency works behind the scene to improve our energy security, lower our energy bills and move us closer to reaching our climate goals. Energy Performance Contracts (EPC) are one financing mechanism by which ECMs can be implemented now and paid for by the savings realized over the life of the project. EPC is a turnkey service, sometimes compared to design/build construction contracting which provides customers with a comprehensive set of energy efficiency, renewable energy and

distributed generation measures and often is accompanied with guarantees that the savings produced by a project will be sufficient to finance the full cost of the project. A typical EPC project is deliver ed by an Energy Service Company (ESCO). Stakeholders could be in this way implementing energy-efficiency measures that include low-energy lighting and insulation to cut bills by avoiding waste and increasing productivity.

Building owners and managers could try to cooperate with Energy service companies that have a lot of experiences in EPC. They can also build up energy management of each building.

The most important thing at all cases is to start with energy audits! There will be described what building and system elements are using and possibly losing energy. Setting the right energy management and ECM should save significant amount of energy and money with low afford and low cost measures.

3.3. Recommissioning (as recalibration of operating systems)

Many buildings are today insulated due to energy and cost savings. But savings can be determined using asset or operational methods. Asset methods are based on the calculation of losses before and after thermal insulation of the building. Operational method aims at the determination of the difference between invoiced energy use before and after thermal insulation. The difference may be even higher if we proceed to control the heating system, which should go in hand with the insulation.

After thermal insulation of the house, the heat loss through the building envelope (if the natural exchange of air is maintained) is reduced in individual rooms. The existing installed heating system is now largely over-sized.

Therefore heat insulation should be followed by the balancing of the heating system and the implementation of controllable heating. Due to the well-established regulation, there will be no overheating in the building and the overall cost savings will be even higher.

Facade insulation and window replacement are now standard measures to reduce the energy demand of buildings. Many of their owners, however, forget about the subsequent modification and controllability of the heating system. Total energy savings are less than they could ideally be. The heat-physical parameters of the whole building will change by the thermal insulation of the house facade and the replacement of the windows. It is therefore necessary to set the heating system so that there is no overheating.

The yearly heat consumption depends not only on heat losses by thermal insulation of the facade and replacement of windows, but also on other parameters. Specifically, the average daily outside temperature, the number of heating days per year, the number of hours per day for which we heat the building, and the average indoor air temperature in the building. The first parameters are the same for all houses, but the average indoor air temperature is higher when the house is insulated. So if we want to achieve savings, we need to limit the heat supply. We could achieve this by manually limiting the flow of heating water or by setting a lower temperature on radiator thermometer.

3.4. Behavior based measures

In order to realize the set energy saving targets, it is necessary to change energy related behaviour of building users. The User Behaviour Transformation Methodology is shown in Figure 1. User behaviour transformation methodology consists of preparation, execution and checking.

After thorough examination of EU, national and local policies and their reflections at the local, building level, an energy audit of the public building has to be performed in the preparation phase of introducing EnMS. Goals have to be set depending on what is possible to achieve and what cost is acceptable for achieving this. It is necessary to define a Behaviour Toolbox, which should include smart metering (to provide immediate feedback to the users about consequences of their behaviour) and users' involvement instructions. In doing so, one has to have in mind that humans' actions are generally dependent on the questions that are asked and answered by our sub-conscious mind:

1) Is there a problem?;
2) Do I care?;
3) Do I know what to do about it?;
4) Will the solution work?
5) What will others think about what I do?

Therefore, when attempting to change the behaviour of other people we need to have these questions in mind and provide answers to them in a way that users should recognise their own benefits from changed behaviour. For questions 1), 3) and 4) we need to use educational techniques, while for 2) and 5) motivational methods are advised. For more information on these methods, you can consult other TOGETHER deliverables, such as: D.T2.2.3 - Set of subsidies and incentives integrated with Demand Side Management. This deliverable deeply analyses many methods of motivation and behavioural change in order to achieve energy savings.

In the execution phase, smart metering and monitoring energy consumption is of great importance. It will enable users to compare previous and present consumption data. When installing a real time metering device for the first time, it is impossible to have previous real time data, hence historical data from bills will be the first reference. The program of energy consumption monitoring has to be launched officially, involving all the users so that everyone is aware and committed.

In the checking phase, intermediate result analysis and review of progress is needed for performing adjustments and reviewing of goals as well as making of short intermediate reports about the progress. A final report should be issued stating the results compared to the targets. This is the key for behaviour change in energy consumption.

An example of behaviour based action is provided in Box 1.

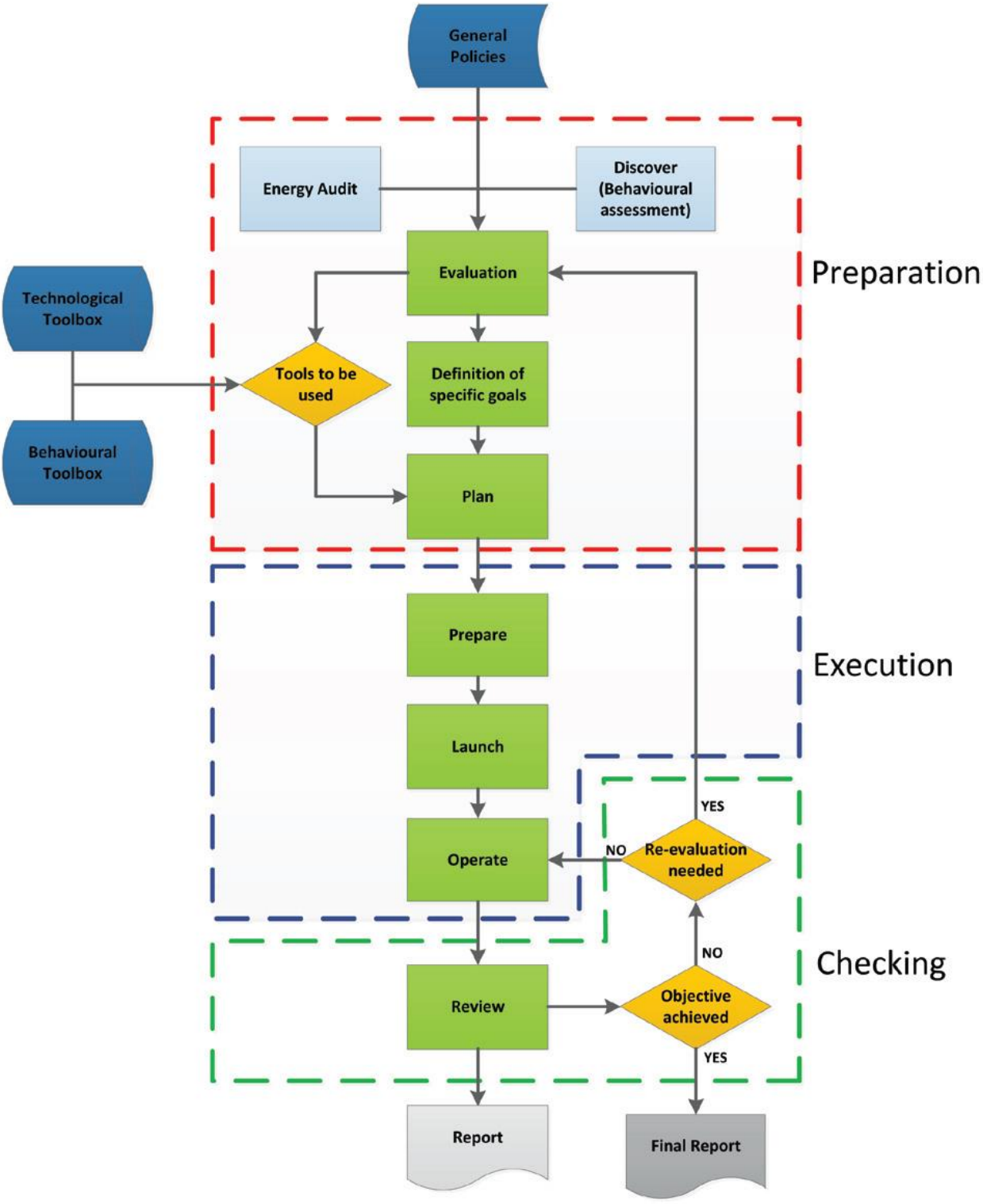


Figure 1. Behaviour Transformation Methodology (Oliveira and Nina, 2012)

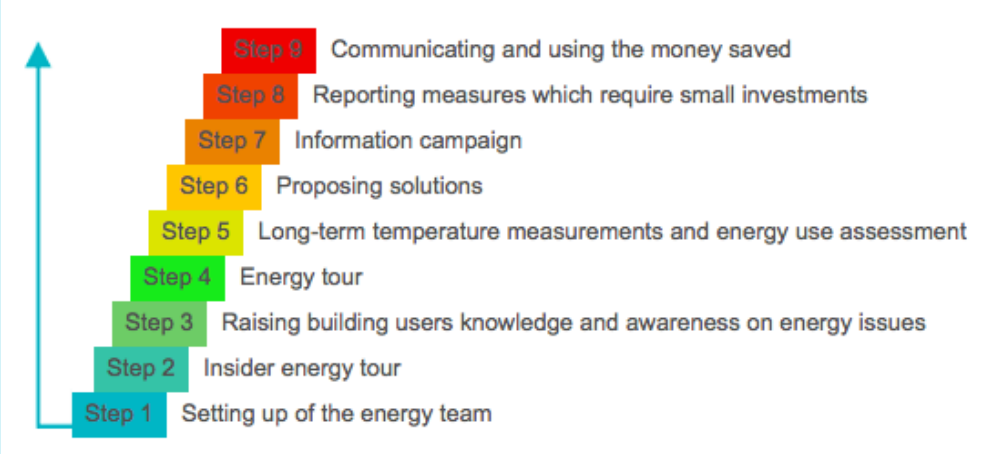
Box 1 - EURONET 50/50 MAX project - increasing energy efficiency in public buildings through change of behaviours

EURONET 50/50 MAX was the follow-up of the very successful EURONET 50/50 project which tested the implementation of the 50/50 methodology in over 50 European schools. It was implemented between 2013 and 2016.The main concept is as follows:

- 50% of the financial savings achieved thanks to the energy efficiency measures taken by pupils and teachers is returned to school through a financial payout;
- 50% of the financial savings is a net saving for the local authority that pays the energy bills.

As a result everybody wins! The school teaches pupils how to save energy by changing their behaviour and gets additional financial resources, the local authority has lower energy costs and the local community gets cleaner local environment.

The 50/50 methodology is a 9-step methodology that actively involves buildings' users in the process of energy management and teaches them environmentally friendly behaviour through practical actions. The steps in the methodology are presented in the Figure below.



The methodology includes educational and motivational techniques. Pupils are gathered in an energy team, which also includes at least one teacher and one school caretaker. They learn about forms of energy, using energy in everyday life and its impact on the environment, greenhouse effect, climate change and climate protection, energy saving, energy efficiency, use of renewable energy sources. They use the gathered knowledge to reveal potentials for energy savings in their school and to propose solutions, focusing on change of behaviour and small investments. The energy team shares what they have learned during project implementation with the rest of the school, as well as their proposals what all energy users in school can do to save energy. The team may use different communication channels, including: making posters and bulletin board displays, making presentations during class time and at school events, organization of an Energy Saving Day, creating a dedicated website, etc. Finally, when energy and cost savings are realised, pupils are involved in the decision-making process on how to use the money. This way they will really feel that their actions have positive and measurable results. Therefore, after each year of 50/50 implementation it is necessary to calculate and inform the school society, how much energy, CO2 and money was saved, and then discuss with the pupils about what shall be done with the money saved.

The EURONET 50/50 MAX project offers an excellent example of behaviour change based energy efficiency programme. Not only that energy savings is achieved, but the behaviour change accomplished by pupils is a guarantee that they will take that behaviour out of the school as well and take care of their energy consumption in their homes.

More info about the project can be found at:

http://www.euronet50-50max.eu/en/about-euronet-50-50-max/the-50-50-methodology-9-steps-towards-energy-savings

4. Conclusion

This tool has introduced the low cost measures to the reader. It has demonstrated the usefulness of so-called low hanging fruit – that it is possible to save energy even without large investments. In some of the buildings – which has already passed large energy saving reconstructions, it is especially useful. There can be many applications of low cost measure and some of the possible implementations were introduced in the chapters as for example energy conservation measures, recommissioning and behaviour based measures.

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Glossary

EE	-	Energy Efficiency
EPIC	-	Energy Performance Integrated Contract
PP	-	Project Partner
LP	-	Lead partner
UM	-	University of Maribor
HVAC	-	*Heating, ventilation and air conditioning*
ECM	-	Energy conservation measures
EPC	-	Energy Performance Contracting

List of Figures