

CE51 TOGETHER

Transnacionalni priručnik dobrog
upravljanja

Version 1
05 2017

D.T2.2.2





INTERREG CENTRAL EUROPE 2014-2020

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)



Izvršni sažetak

U ovom dokumentu opisuju se moguće jeftine mjere na polju energetske učinkovitosti. Sveobuhvatan je. Na početku se opisuje pozadina alata (projekt TOGETHER) te metodološki pristup njegovu razvoju. Nakon poglavlja slijedi uvod u jeftine mjere, njihova važnost na polju energetske učinkovitosti te se konačno navode mogući primjeri. Jedna od ključnih poruka jest motivirati čitatelja da ne razmišlja samo o velikim ulaganjima u energetska učinkovitost, već da razmišlja „izvan okvira” i istraži potencijal skriven iza jednostavnih i jeftinih rješenja. To je posebice važno za upravitelja zgradom koji je već izvršio velike radove građevinske i tehnološke rekonstrukcije te traži daljnji potencijal za uštedu energije.



Contents

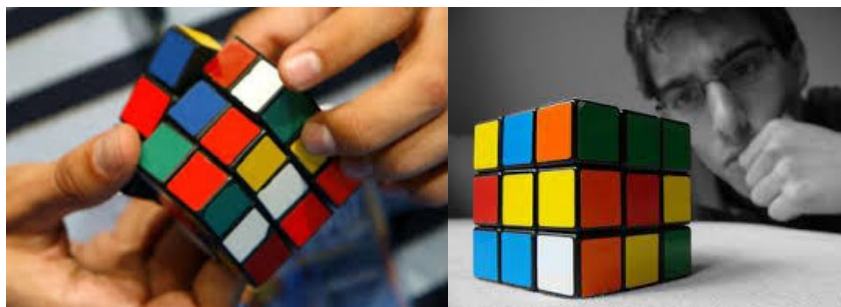
| | |
|---|-------------------------------------|
| 1. INTRODUCTION..... | 1 |
| 1.1. PROJECT TOGETHER | 1 |
| 1.2. PURPOSES OF TRANSNATIONAL GOOD GOVERNANCE HANDBOOK | 2 |
| 1.3. USE OF THE PILOT CONCEPT DESIGN TEMPLATE | 2 |
| 1.4. METHODOLOGICAL APPROACH TO THE DEVELOPEMENT OF THIS HANDBOOK | 2 |
| 2. LOW COST MEASURES IN FIELD OF ENERGY EFFICIENCY | 4 |
| 2.1. INTRODUCTION..... | 4 |
| 2.2. WHAT IS MEANT BY LOW COST MEASURES “LOW-HANGING FRUIT” | 4 |
| 2.3. WHY ARE LOW COST MEASURES CRUCIAL FOR THE ENERGY EFFICIENCY | 4 |
| 3. LOW COST MEASURES IN ENERGY EFFICIENCY | ERROR! BOOKMARK NOT DEFINED. |
| 3.1. INTRODUCTION..... | ERROR! BOOKMARK NOT DEFINED. |
| 3.2. ENERGY CONSERVATION MEASURES (REGULATING SERVICES) | 5 |
| 3.3. RECOMMISSIONING (AS RECALIBRATION OF OPERATING SYSTEMS) | 6 |
| 3.4. BEHAVIOR BASED MEASURES | ERROR! BOOKMARK NOT DEFINED. |
| 4. CONCLUSION..... | 11 |
| REFERENCES | 12 |
| GLOSSARY | 13 |
| LIST OF FIGURES | 14 |

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 development 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. Jeftine mjere energetske učinkovitosti

3.1. Uvod

Neke su prakse dobra osnova za smanjenje energetske otpada koje zahtijeva samo ulaganje vremena i fizički rad. Te se „besplatne” ili „jeftine” mjere mogu grupirati u tri kategorije:

1. Uvođenje praksi upravljanja energijom koje obuhvaća stalno praćenje potrošnje energije i označavanje ključnih rezultata
2. Unaprjeđenje praksi rada i održavanja koje rezultiraju smanjenom potrošnjom energije i
3. Stimuliranje promjene ponašanja među stanarima zgrade (zaposlenici u zgradama javnog sektora) koje rezultira smanjenom potrošnjom energije.

Dok se sustav upravljanja energijom vrlo detaljno opisuje u poglavlju 3.2., u nastavku ovog poglavlja bit će dani neki primjeri dobrih praksi u unaprjeđenju praksi rada i održavanja te poticanja promjene ponašanja.

3.2. Mjere očuvanja energije (regulirajuće usluge)

Cilj mjera osiguranja energije (engl. Energy conservation measures, ECM) jest smanjenje potrošnje energije u zgradi upotrebom, primjerice, novih tehnologija. Obično su takve vrste projekata dizajnirane kako bi smanjile trošak energije (voda, struja, plin, grijanje itd.). Glavni je cilj uštedjeti, smanjiti količinu energije koja se upotrebljava u zgradama. Ti se sustavi ponekad upotrebljavaju u kombinaciji s EPC-om. To može jamčiti veće uštede energije s manjim ometanjima korisnika zgradom obnovom zgrade. Dobro je što su troškovi provedbe ECM-a često niži, dok je trošak mjera za uštede energije viši.

Kao dobar primjer mogu se navesti projekti rekonstrukcije osvjetljenja. Ti se projekti mogu provesti uz malo truda.

Evo nekih mogućih promjena u osvjetljenju:

- zamjena fluorescentnih cijevi od 40 do 36 i manje vati učinkovitim fluorescentnim cijevima
- zamjena žarulja sa žarnim nitima LED žaruljama, npr. žarulju sa žarnom niti od 50 vata CFL-om od 8 vati
- gašenje svjetala tijekom pauza za ručak
- redovito čišćenje cijevi lampi
- upotreba prirodnog sunčeva svjetla radi smanjenja umjetnog osvjetljenja.

Primjenom ovih metoda pri promjeni sustava osvjetljenja može se uštedjeti novac koji se može iskoristiti za značajnije nadogradnje, primjerice sustava HVAC-a u velikim zgradama. Manje zgrade trebale bi pokušati kombinirati zamjenu prozora s modernom izolacijom primjenom naprednih izolacijskih pjena kako bi se poboljšali energetske rezultati. Ovi sustavi ECM-a pouzdaju se u bihevioralne promjene korisnika zgradom pri uštedi energije. Pod odgovarajućim okolnostima ovi se projekti mogu provesti besplatno kako bi se i dodatno uštedjelo.

Globalno gledajući energetska učinkovitost odvija se u pozadini kako bi poboljšala našu energetske sigurnost, smanjila račune za energiju i približila nas dostizanju naših klimatskih ciljeva. Ugovori o energetske rezultatima (EPC) jedan su mehanizam financiranja kojim e ECM-ovi mogu provoditi sada, dok ih se može plaćati iz ušteda ostvarenih tijekom trajanja projekta. EPC je potpuna usluga koja se ponekad uspoređuje s ugovaranjem dizajniranja/izgradnje konstrukcija koje korisnicima pruža sveobuhvatan



komplet mjera energetske učinkovitosti, obnovljive energije i distribuiranog stvaranja te ga često prate jamstva da će uštede ostvarene u projektu biti dovoljne za financiranje punog troška projekta. Uobičajeni projekt EPC-a provodi društvo za energetske usluge engl. Energy Service Company, ESCO). Dionicima se tako omogućuje da provode energetske mjere koje uključuju niskoenergetsko osvjetljenje i izolaciju kako bi smanjili račune izbjegavanjem otpada i povećanjem produktivnosti.

Vlasnici zgrada i njihovi upravitelji mogu pokušati surađivati s društvima za energetske usluge koja imaju mnogo iskustva u EPC. Također mogu uspostaviti upravljanje energijom svake zgrade.

Najvažnije je u svim slučajevima započeti energetske revizijama! U reviziji će se opisati koji elementi zgrade i sustava upotrebljavaju i vjerojatno gube energiju. Uspostava odgovarajućeg upravljanja energijom i ECM-a može uštedjeti znatnu količinu energije i novca mjerama koje su lako dostupne i jeftine.

3.3. Ponovno stavljanje u pogon (poput rekalkibracije operativnih sustava)

Danas su mnoge zgrade izolirane zahvaljujući uštedama energije i novaca. No, uštede se mogu utvrditi primjenom metoda procjene imovine ili operativnih metoda. Metode procjene imovine temelje se na izračunu gubitaka prije i nakon toplinske izolacije zgrade. Operativne metode ciljaju odrediti razliku između obračunane upotrebe energije prije i nakon toplinske izolacije. Razlika može biti još viša ako nastavimo kontrolirati sustav grijanja, što treba ići pod ruku s izolacijom.

Nakon toplinske izolacije kuće, gubitak topline kroz pročelje zgrade (ako je zadržana prirodna razmjena zraka) u pojedinačnim je prostorijama smanjeno. Postojeći instalirani sustav zagrijavanja sada je iznimno prevelik.

Stoga bi toplinsku izolaciju trebalo slijediti uravnoteženje sustava grijanja i primjena grijanja koje se može kontrolirati. Zbog jasno utvrđenih propisa u zgradi neće dolaziti do prezagrijavanja te će ukupne uštede troška biti još više.

Izolacija pročelja i zamjena prozora danas su standardne mjere za smanjenje energetske potrošnje zgrada. Međutim, mnogi vlasnici zgrada zaboravljaju na sljedeću izmjenu i promjenu sustava grijanja te mogućnost kontrole nad njim. Ukupne uštede energije manje su od idealnih. Toplinske i fizikalne parametre cijele zgrade promijenit će toplinska izolacija pročelja kuće i zamjena prozora. Stoga je potrebno postaviti sustav grijanja kako ne bi dolazilo do prezagrijavanja.

Godišnja potrošnja topline ovisi o gubitcima topline zbog toplinske izolacije pročelja i zamjene prozora kao i o ostalim parametrima. Preciznije, riječ je o ovim parametrima: prosječna vanjska dnevna temperatura, broj dana grijanja u godini, broj sati u danu tijekom kojih grijemo zgradu te prosjek unutarnje temperature zraka u zgradi. Prvi su parametri jednaki za sve kuće, dok je prosječna unutarnja temperatura zraka viša kad je kuća izolirana. Stoga je potrebno ograničiti isporuku topline želi li se uštedjeti. To se može postići ručnim ograničavanjem protoka vode za grijanje ili postavljanjem niže temperature na termometru radijatora.

3.4. Mjere temeljene na ponašanju

Da bi se ostvarili postavljeni ciljevi uštede energije, potrebno je promijeniti ponašanje svih korisnika zgradom u pogledu energije. Metoda transformacije ponašanja korisnika prikazana je na Slici 1. Metoda transformacije ponašanja korisnika sastoji se od pripreme, provedbe i provjere.



Nakon temeljitog pregleda politika EU-a, nacionalnih i lokalnih politika te njihovih utjecaja na lokalnu razinu zgrade, potrebno je provesti energetske revizije javne zgrade u sklopu pripreme faze uvođenja EnMS-a. Treba postaviti ciljeve ovisno o tome što je moguće postići i koji je trošak prihvatljiv za postizanje tih ciljeva. Nužno je definirati komplet bihevioralnih alata koji bi trebao uključivati pametno mjerenje (kako bi korisnici dobivali trenutačne povratne informacije o posljedicama svojeg ponašanja) te upute za uključenost korisnika. Pritom treba imati na umu da ljudsko djelovanje općenito ovisi o pitanjima koja postavlja i na koja odgovara naša podsvijest:

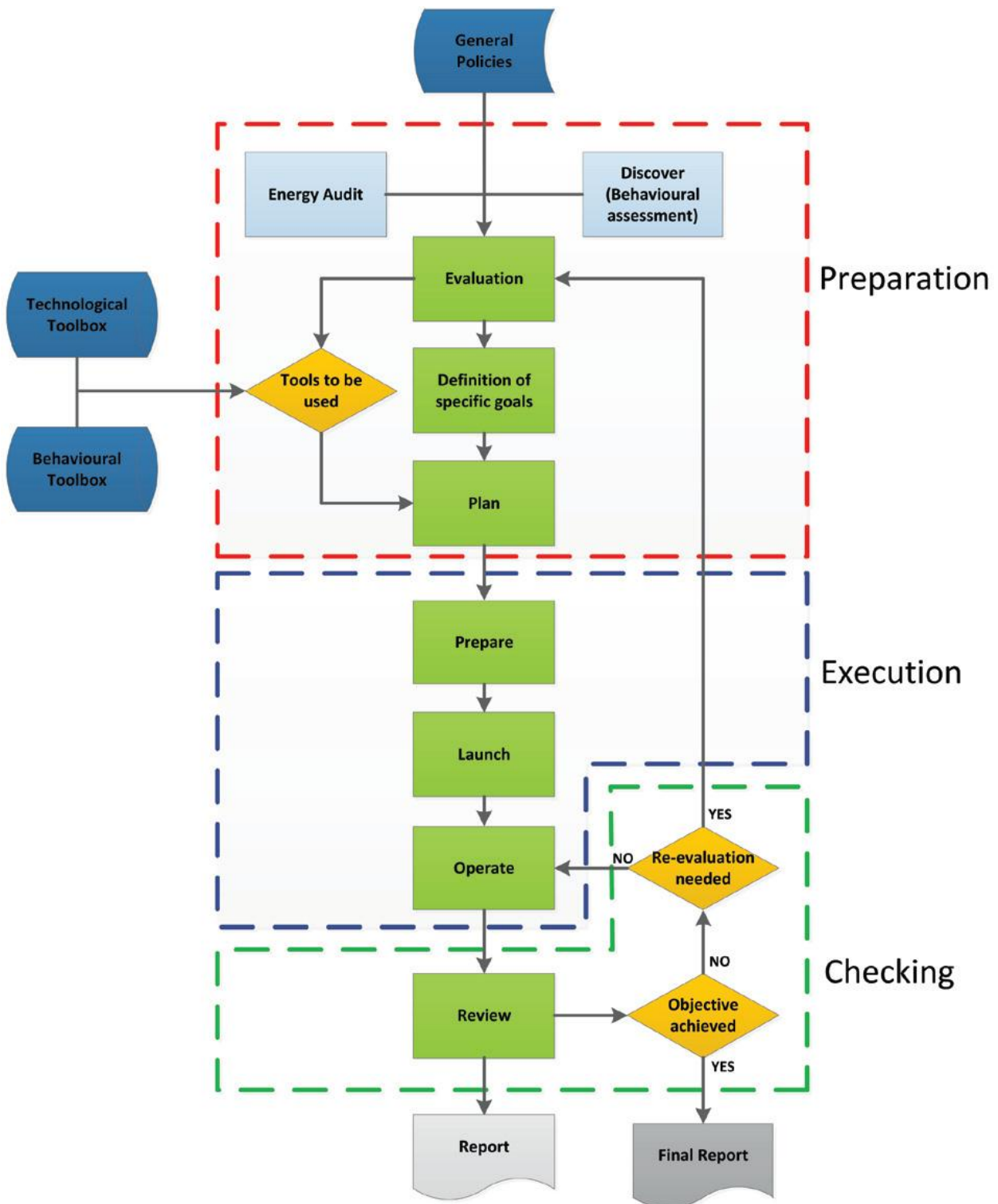
- 1) Postoji li problem?
- 2) Brinem li se zbog njega?
- 3) Znam li što poduzeti u vezi s njime?
- 4) Hoće li rješenje biti učinkovito?
- 5) Što će drugi misliti o mojem djelovanju?

Stoga pri pokušaju promjene ponašanja drugih ljudi, na umu treba imati navedena pitanja na koja treba odgovoriti na način da korisnici prepoznaju vlastite koristi od svojeg promijenjenog ponašanja. Za 1., 3. i 4. pitanje treba primijeniti edukativne tehnike, dok se za 2. i 5. pitanje preporučuju motivacijske metode. Više informacija o navedenim metodama može se pročitati u rezultatima projekta TOGETHER, primjerice u sljedećem priručniku: D.T2.2.3 Komplet subvencija i poticaja integriranih u upravljanje potražnjom (DSM). U navedenom se priručniku dubinski analiziraju brojne metode motivacije i bihevioralne promjene kako bi se uštedjela energija.

U fazi provedbe iznimno su važni pametno mjerenje i praćenje potrošnje energije. To će korisnicima omogućiti da usporede podatke o prethodnoj i trenutačnoj potrošnji. Pri prvom postavljanju uređaja koji mjeri u stvarnom vremenu nije moguće imati prethodne podatke u stvarnom vremenu, stoga će prva referencija biti povijesni podatci s računa. Program praćenje potrošnje energije treba službeno pokrenuti te aktivirati sve korisnike kako bi svi bili svjesni programa i predani programu.

U fazi provjere potrebni su analiza međurezultata i revizija napretka kako bi se ciljevi mogli prilagoditi i revidirati te kako bi se mogla sastaviti kratka međuzvješća o napretku. U završnom izvješću treba navesti podatke u usporedbi s ciljevima. To je ključ bihevioralne promjene u potrošnji energije.

Primjer mjere temeljene na ponašanju nalazi se u Okviru 1.



Slika 1: Metodologija promjene ponašanja (Oliveira i Nina, 2012.)



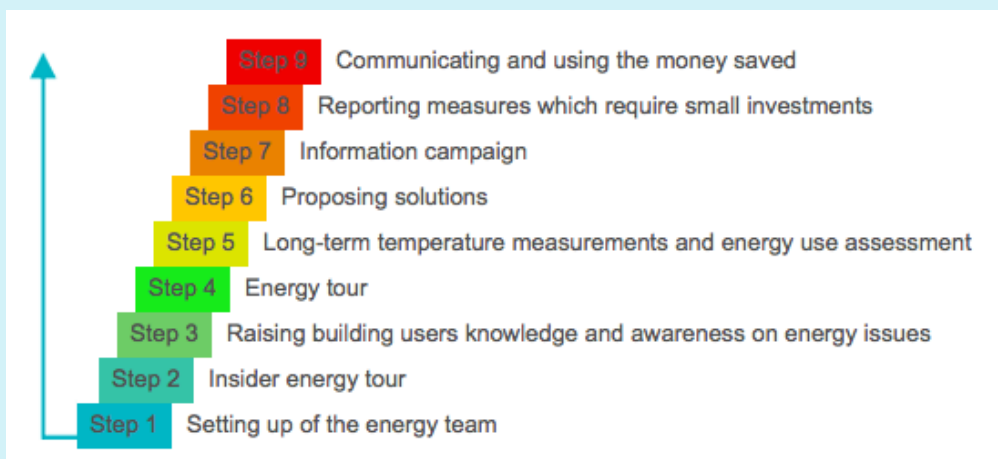
Box 1 - EURONET 50/50 MAX project - increasing energy efficiency in public buildings through change of behaviours

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.



References

1. Gancheva 2016 - Milieu Ltd.: Mariya Gancheva, Jennifer McGuinn, Giuseppe Nastasi, Ricardo Energy & Environment: David Birchby, Chiara Essig Feasibility study to finance low-cost energy efficiency measures in low-income households from EU funds, Final Report for DG Energy, August 2016
2. Oliveira and Nina, 2012 - Álvaro de Oliveira, Manuel Nina, Save energy manual, Alfamicro, February, 2012



Glossary

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



List of Figures

FIGURE 1. BEHAVIOUR TRANSFORMATION METHODOLOGY (OLIVEIRA AND NINA, 2012) 8