

CE51 TOGETHER

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Koncept pregovaračkog odbora: uloge i
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TOGETHER

TOwards a Goal of Efficiency THrough Energy Reduction

The Negotiating Panel Concept: roles and function

D.T2.3.1.

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Izvršni sažetak

U ovom se Vodiču govori o konceptu pregovaračkog odbora, a cilj mu je pružiti više informacija o značenju samog koncepta. Pregovarački odbor jest skupina ljudi u određenom objektu/zgradi koji skupa surađuju, zajednički nastojeći ostvariti postignute ciljeve uštede energije, postižući tako obostranu korist (gospodarsku i ekološku). Koncept pregovaračkog odbora sastoji se od predstavnika vlasnika, upravitelja i korisnika (uključujući krajnje korisnike, tj. stanare) koji zajednički pridonose upravljanju energijom zgrade. Konceptom se definiraju uloge i operativni načini.

Osnivanje pregovaračkog odbora prvi je korak u uvođenju cjelovitog sustava upravljanja energijom u zgradi. Sastoji se od svih mjerodavnih dionika i razmatra načela otvorene rasprave kako bi se definirale mjere i ostvarili željeni ciljevi uštede energija na razini zgrade. U ovom se Vodiču opisuju uloge i odgovornosti različitih članova pregovaračkog odbora.



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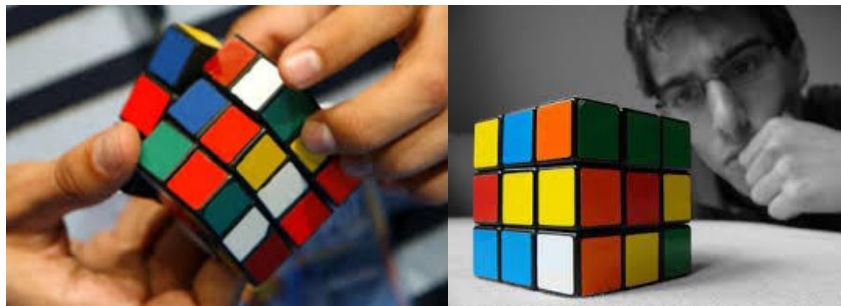
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1. Introduction

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, 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 organization 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 the Negotiating Panel Concept: roles and function

In order to fully understand the concept of Negotiating Panel, this Guide starts with explanation of wider goals in energy efficiency that must be understood in order to take appropriate actions. Therefore, the EU policy and legal framework has been briefly described. The three core directives - Energy Efficiency Directive, Energy Performance of Buildings Directive and Renewable Energy Directive - all impose certain obligations to the public sector and promote their "lead-by-example" role in achieving energy savings in their existing building stock. The European Union's Member States are further obliged to transpose these requirements into national legislation. Approaches differ among the Member States, however all of them are taking actions to improve energy efficiency in their public buildings. Buildings are the key in achieving desired energy savings by 2020 and beyond. One of the barriers preventing the higher uptake of the energy efficiency improvement measures is the lack of data and practices of continuous monitoring of energy consumption in the public sector's building stock. Therefore, introduction of comprehensive energy management system in the public sector is crucial step for enabling energy efficiency improvement.

This Guide is comprised so as to give detailed answers to the possible questions arising when introducing energy management in public buildings aimed at providing users' behaviour. After discussing energy policies, laws and regulation that form a framework for energy efficiency in public buildings, energy consumption in buildings will be analysed in order to obtain a general idea on the significance of the building stock in achieving policy targets. The role of energy management systems in buildings will be further explained, with the focus on the roles and responsibilities of different stakeholders, that can be gathered in the Negotiation Panel - formal set-up that will on interactive and informative basis decide on both behavioural and technical measures to be implemented at the building level in order to achieve defined targets.

This Guide is aimed at building owners, managers and users' representatives, who shall, after familiarizing themselves with the deliverable, be capacitated to tackle the issues concerning energy savings in their buildings.

1.3. Use of the Negotiating Panel Concept: roles and function

Energy management system rests on two pillars: 1) organisational structure with clear roles and responsibilities related to energy consumption and energy efficiency in a public building and 2) continuous monitoring of energy consumption and influencing parameters, which enables setting up the targets at building level and definition of technical and behavioural measures that will lead to the reduction of energy consumption.

All members of Negotiation Panel need to be acquainted with the main technical characteristics and systems of a building, and must be familiar with behaviours related to these systems that will lead to



energy savings. Therefore, this Guide also describes behavioural aspects of using building's technical systems.

Finally, the Guide provides simple instructions how to establish a Negotiation Panel and how to use the established energy management system in a building to provoke consumer's behaviour change.

It has to be emphasised that, apart from this Guide, the TOGETHER project team has produced other guides that deal in more details with analytical and behavioural demand side management and energy management systems. All these guides should be combined in order to obtain a complete information and instructions how to establish systematic energy management practices within a building, which will in turn provide desired energy savings and other benefits like reduced negative environmental impact, reduced energy bills and increased level of comfort and quality of provided services within a public building.



2. Energy policy, laws and regulations

In order to better understand the energy issues and the connection of energy, environment and economical savings, it is necessary to first take a closer look into the EU and national energy policies, laws and regulations related to energy efficiency in building sector. It is the obligation of the community and individuals to implement these policies, so an overview of the same may prove helpful.

According to the Energy Efficiency Directive (EED; 2012/27/EU) the building sector is the world's largest energy consumer sector, surpassing the transportation sector in terms of final energy consumption. Buildings are crucial to achieving the Union objective of reducing greenhouse gas emissions by 80-95 % by 2050 compared to 1990. The rate of building renovation needs to be increased, as the existing building stock represents the single biggest potential sector for energy savings. Buildings owned by public bodies account for a considerable share of the building stock and have high visibility in public life. Member States should encourage municipalities and other public bodies to adopt integrated and sustainable energy efficiency plans with clear objectives, to involve citizens in their development and implementation and to adequately inform them about their content and progress in achieving objectives. Such plans can yield considerable energy savings, especially if they are implemented by energy management systems (EnMS) that allow the public bodies concerned to better manage their energy consumption. As set in Article 7 EED Member States should achieve new savings each year of 1,5 % of the annual energy consumption from 2014 to 2020. By 30 April 2014, and every three years thereafter, Member States shall submit National Energy Efficiency Action Plans. The National Energy Efficiency Action Plans shall cover significant energy efficiency improvement measures and expected and/or achieved energy savings, including those in the supply, transmission, and distribution of energy as well as energy end-use, in view of achieving the national energy efficiency targets referred to in Article 3(1) respectively Union's 2020 energy consumption has to be no more than 1474 Mtoe of primary energy or no more than 1078 Mtoe of final energy. The Article 5 sets a 3% annual renovation target for public buildings owned and occupied by its central government from the beginning of 2014 onwards. Central government buildings are required to be renovated to meet at least the national minimum energy performance requirements. According to Article 9 Member States shall ensure that, as far as it is technically possible, financially reasonable and proportionate in relation to the potential energy savings, final customers for electricity, natural gas, district heating, district cooling and domestic hot water are provided with competitively priced individual meters that accurately reflect the final customer's actual energy consumption and that provide information on actual time of use.¹

Conforming to the Energy Performance for Building Directive (EPBD; 2010/31/EU), buildings occupied by public authorities and buildings frequently visited by the public should set an example by showing that environmental and energy considerations are being considered and therefore those buildings should be subject to energy certification on a regular basis. Exchange of experience between cities, towns and other public bodies should be encouraged with respect to the more innovative experiences. Articles 6 and 7 of the EPBD state that the Member State have to take the necessary measures to ensure that new and existing buildings (undergoing major renovation) meet minimum energy performance requirements, taking into account the use of high-efficiency alternative systems (e.g. decentralised energy supply systems based on energy from renewable sources; cogeneration; district or block heating or cooling, particularly where it is based entirely or partially on energy from renewable sources; heat pumps). In line with Article 9 Member States shall ensure that by 31 December 2020, all new buildings are nearly zero-energy buildings (nZEB) after 31 December 2018, new buildings occupied and owned by public authorities are nZEB.²

By Article 13 of the Renewable Energy Directive (2009/28/EC) Member States shall ensure that new public buildings, and existing public buildings that are subject to major renovation, at national, regional, and

¹ Directive 2012/27/EU on energy efficiency, October 2012

² Directive 2010/31/EU on the energy performance of buildings



local level fulfil an exemplary role from 1 January 2012 onwards. Member States may, inter alia, allow that obligation to be fulfilled by complying with standards for zero energy housing, or by providing that the roofs of public or mixed private-public buildings are used by third parties for installations that produce energy from renewable source.³

According to the revised renewable energy (RES) Directive from November 2016 the role of the consumers has been even more highlighted “consumers are the drivers of the energy transition⁴”, thus changing their behaviour could significantly affect energy savings. Customers, respectively consumers are invited to actively participate in the energy management system, demand response (DR) and demand side management (DSM) and thus play a key role in the energy efficiency transition.

The above-mentioned directives are showing a path in which Member States should go and implement the items of the directives into national legislation.

³ Directive 2009/28/EC on renewable energy sources

⁴ Technical Memo Renewables: Revised Renewable Energy Directive, EC, November 2016,
https://ec.europa.eu/energy/sites/ener/files/documents/technical_memo_renewables.pdf



Example from Members States: case - Croatian Energy Management System in the public sector

In December 2012, the Croatian Parliament adopted the Act on Energy Efficiency⁵ aligned with EED. Article 21 of the Act sets the duties for the public sector, in particular to: plan energy efficiency measures, manage energy and water consumption in an energy efficient manner, designate legal or natural person responsible for monitoring energy and water consumption, regularly monitor and at least once a month enter data on energy and water consumption in buildings in the national IT system for energy management and periodically, and at least once a year analyse the energy consumption in buildings, and report it to Real Estate Agency.

Regional governments and cities over 35,000 inhabitants are, by the aforementioned Act, obliged to prepare their three-year action plans and annual implementation plans. Three-year plans are made by the representative body, but annual plans are made by an executive body and the procedure is thus simplified. Plans on sustainable development of cities, which most cities already have as Sustainable energy efficiency action plans (SEAP) are complementary to these documents, so that there is already experience in the preparation and implementation of these documents.

The method of energy management, analysis of energy consumption and manner of reporting is prescribed by an ordinance issued by the Minister of Construction.

This Ordinance defines the obligation to the public sector to use the Energy Management Information System (EMIS). The purpose of EMIS is to determine the consumption of energy and water, to determine the place, manner, and amount of consumption in buildings or parts of public buildings and public lighting, reduce energy and water consumption and financial costs for energy and water, reduce the environmental impact through the implementation of energy efficiency measures. The Ordinance set a role for energy consultant/associate as a natural person responsible for the entry, monitoring, analysis and reporting process. The Real Estate Agency conducts regular training of designated persons, energy advisors and energy associates. Although public administration still should have a person responsible for monitoring consumption in buildings that are in their possession, those people will no longer have to enter bills in the EMIS. To improve the accuracy of the entered data, the obligation of entering monthly bills into EMIS now passes to the energy suppliers. People in charge of EMIS still need to control the data in EMIS, use consumption data for a more rational use of energy and, if necessary, enter weekly readings, but herewith their job is made considerably easier.

Connecting EMIS database with external databases store energy and water certainly would result in higher quality, more accurate, more regular data (which allows direct and "Real-time" consumption planning) not relying on manual entry (the error) users. The establishment of such inter-system communication would enable users to focus on itself Cooperation consumption, and thus had better manage consumption of its facilities. Through better management of its facilities allows the national "bottom-up" approach to consumption which is the goal to provide as a more accurate picture of the national energy and water consumption.

More information about Croatian EE Policy and implications for public sector can be found at the web site of Croatian National Energy Efficiency Authority: <http://cei.hr/en/ee-policy/>

⁵ Act on Energy Efficiency, Official Journal 127/2014



3. Energy consumption in building sector

The total floor area of buildings is around 25 billion m² in EU, non-residential buildings represent more than ¼ of the total and are on average 55% more energy intensive than residential buildings (286kWh/m² compared to 185 kWh/m²)⁶. In the EU around 1/3 of the consumption in buildings is for non-residential, however in some countries such as Luxemburg, the Netherlands, Italy, Portugal non-residential consumption in buildings is higher than in other MS and represent around half of the total consumption of buildings. The share of buildings in final consumption according to the last data from ODYSSEE databases is represented in Figure 1. As shown, MS as Italy, Lithuania, United Kingdom, Denmark, Poland, Estonia, Hungary, Latvia, and Croatia are above the European average of 40% of final energy consumption in buildings.

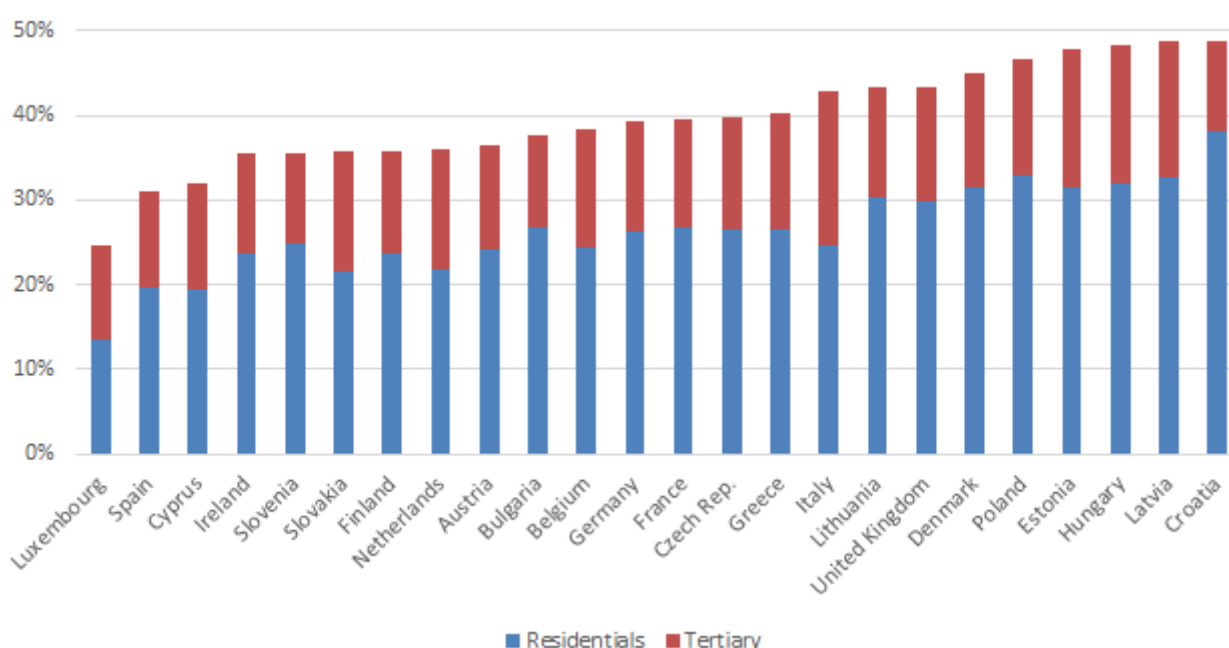


Figure 1. Share of buildings in final consumption (2014), source: ODYSSEE, Enerdata

Trends in the tertiary sector according to ODYSSEE databases show that energy consumption increased rather rapidly until 2008, and has been decreasing since the economic downturn in 2008, by 1.5%/year. On the other hand, electricity consumption has continued growing since 2008 but at lower pace (1.1%/year, against +3%/year before). Figure 2 shows decomposition of energy consumption in tertiary sector according to the fuel type, showing the dominance of electricity in most countries. However, there is no separated data for space heating, water heating, cooking, air conditioning and lighting in non-residential tertiary sector, which points out to one of the essential problems - lack of data gathered through actual monitoring of energy consumption in tertiary building sector.

⁶ <http://www.odyssee-mure.eu/publications/br/energy-efficiency-trends-policies-buildings.pdf>

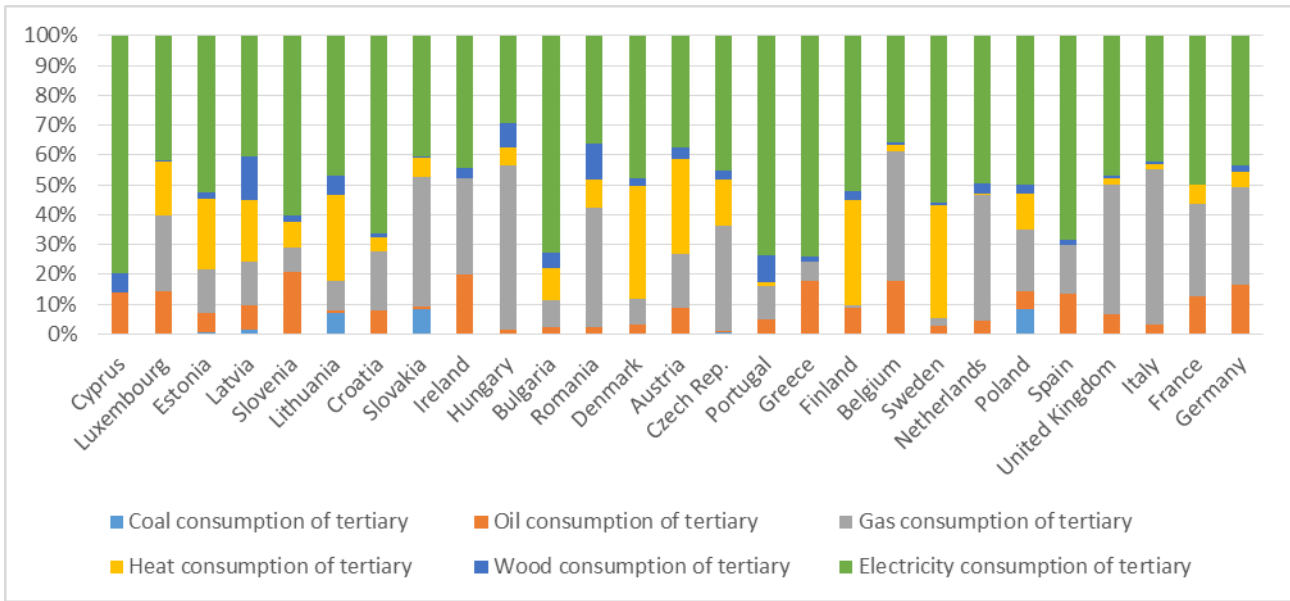


Figure 2. Share in final consumption in tertiary sector (2014), source: ODYSSEE, Enerdata

It is important to underline the lack of data for final energy consumption in non-residential building in the public sector. According to ODYSSEE and Enerdata only data for UK, Germany, the Netherlands, Romania, Sweden, and Denmark are available as shown in the Figure 3. Nevertheless, Italy, Croatia and Cyprus have provided data for electricity consumption in the public sector, but data for final energy consumption are absent.

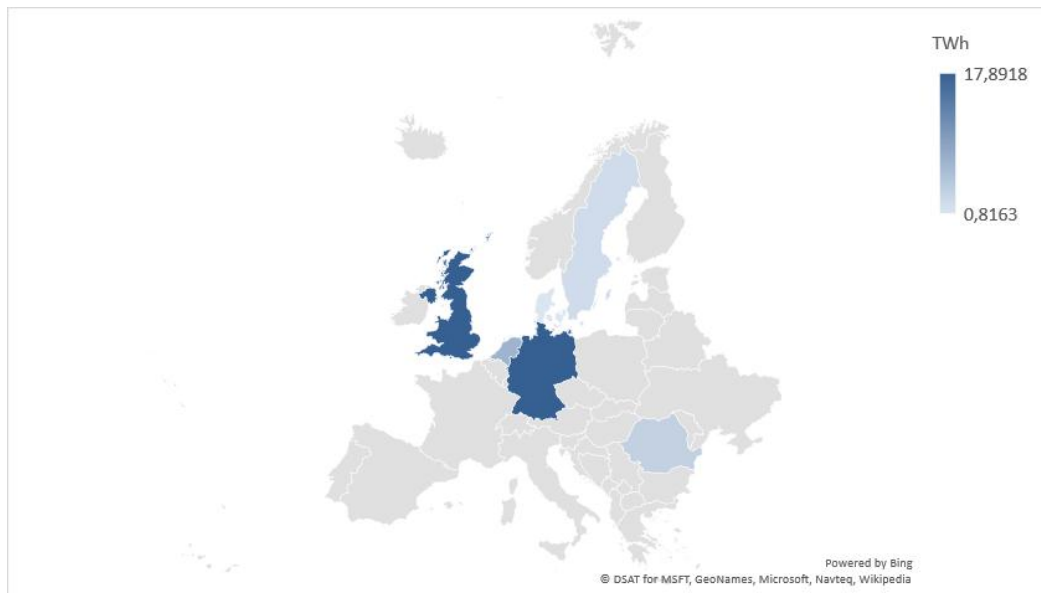


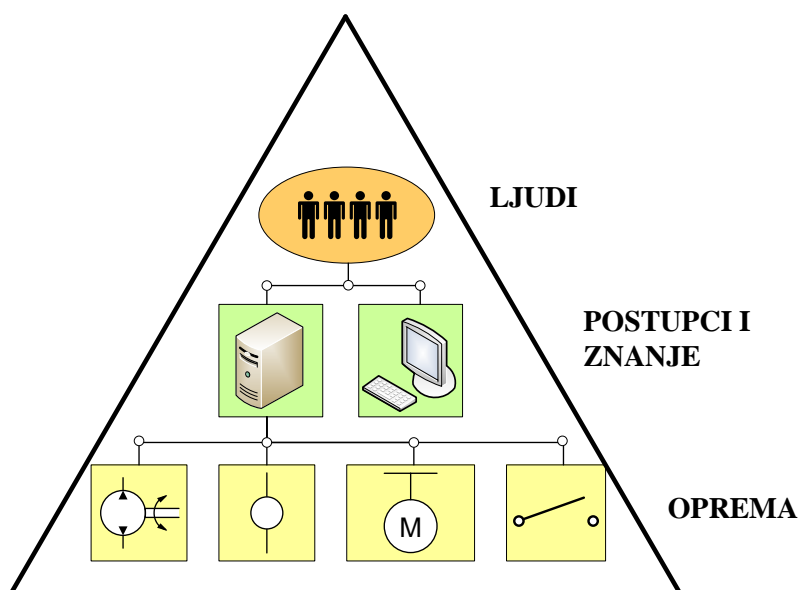
Figure 3. Final consumption of energy in public administration (2014), source: ODYSSEE, Enerdata

There is evident shortage in energy monitoring data in non-residential buildings both from private and public sector. This should be emphasized, especially for the public sector because it is heavily in collision with the main statements of EPBD and EED. Without a monitoring system of energy consumption, which is an essential part of any EnMS, it will not be possible to implement the most appropriate energy efficiency measures and deliver required targets.

4. Upravljanje energijom u zgradi - opći koncept

Upravljanje energijom u zgradi oslanja se na dva stupa prikazana na Slici 2 - ljudima i tehnologiji ili, detaljnije, na:

- organizacijsku strukturu s jasnim ulogama i odgovornostima (ključni dionici) i
- cjelovit i sveobuhvatan sustav upravljanja energijom koji povezuje korisnike zgradom i tehnologije, omogućuje praćenje energetske potrošnje zgrade i tu potrošnju povezuje s navikama, ponašanjem i praksama održavanja u samoj zgradi.



Slika 4. Opći koncept sustava upravljanja energijom⁷

Kao što je prikazano na Slici 4. njihovim stavljanjem na vrh piramide, posebnu pozornost treba dati definiranju jasnih uloga i odgovornosti ključnih dionika (vlasnika, upravitelja i korisnika/krajnjih korisnika zgradom) u procesu upravljanja energijom u zgradama. Bez konsenzusa ljudi nije moguće upravljati energijom. Njihove uloge i koristi trebaju biti jasno utvrđeni prije nametanja bilo kakva sustava i tehnologije upravljanja energijom. Ključno je utvrditi načelo prepoznavanja koristi svih potrošača energije u javnim zgradama. To treba postići podizanjem svijesti o potrošnji energije i pristupanjem potrošačima s njihovom stvarnom potrošnjom. Opća populacija uglavnom ne zna očitati podatke o potrošnji energije i vode s računa. U većini su slučajeva podatci o potrošnji energije u javnoj zgradi „izolirani” od službenika koji radi u zgradi i čije navike potrošnje energije utječu na konačnu ukupnu potrošnju. Da bi se razumjela potrošnja energije, važno je utvrditi puteve potrošnje energije. Razumijevanje teme rezultira mjerama za smanjenje potrošnje energije, a time i povezanih financijskih troškova. Uz vlasnike zgrada i upravitelje zgradama, u razvijanju koncepta upravljanja energijom za javne zgrade ključni su korisnici zgradom.

Osim činjenice da bi javne zgrade trebale biti primjer u skladu s Direktivom o energetskej učinkovitosti (EED) i Direktivom o energetskej učinkovitosti zgrada (EPBD), fond javnih zgrada u EU-u nije zanemariv te su zgrade koje se ne upotrebljavaju za stanovanje energetski intenzivnije od stambenih zgrada. Vrlo je važno usmjeriti se na njihove troškove potrošnje, naglašavajući iznos javnih izdataka koji bi se mogli bolje preusmjeriti i utrošiti u slučaju smanjenja potrošnje energije u javnim zgradama.

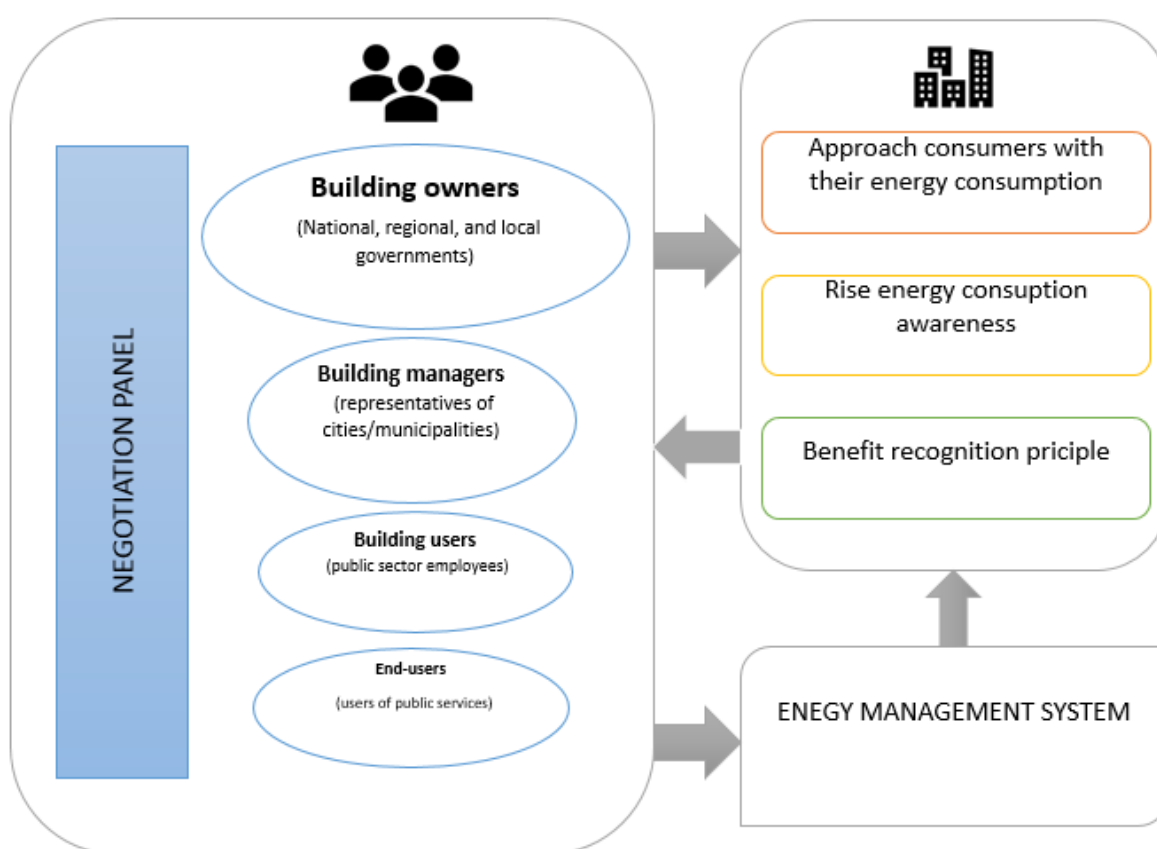
⁷⁷ Projekt „Uklanjanje prepreka energetskej učinkovitosti u Hrvatskoj”, 2005. - 2013., UNDP Hrvatska



Nakon što sve zainteresirane strane nauče više o temu, mora se razmotriti cjeloviti pristup u procesu uvođenja sustava upravljanja energijom u javne zgrade putem pregovaračkog odbora koji će okupiti predstavnike dionika sa svih razina.

Kad je riječ o tehnologiji, alati pametnog mjerenja i upravljanja potražnjom omogućuju ljudima da mjere uštedu i upravljaju potrošnjom. Ljudi bi se trebali znati koristiti tehnologijom, zaposlenici odgovorni za energetske praćenje trebali bi biti educirani za upotrebu IT alata za praćenje potrošnje, poput pametnih mjerača za potrošnju struje, grijanja i hlađenja te vode, kao i za tumačenje dobivenih podataka, a time i za upravljanje potrošnjom. Kad je riječ o smanjenju potrošnje energije i vode, prvi je korak mjerenje potrošnje jer bez mjerenja nije moguće ni upravljanje potrošnjom.

Kao što je prikazano na slici Slika 5, vlasnici zgrade, upravitelji zgradom, korisnici zgradom i krajnji korisnici trebali bi biti članovi Pregovaračkog odbora. U sljedećem će se poglavlju detaljno razmotriti interesi, uloge i odgovornosti ključnih dionika u procesu upravljanja energijom.



Slika 5. Inkluzivni pristup sustava upravljanja energijom



5. Ključni dionici u procesu upravljanja energijom zgrade

Ključni dionici u procesu upravljanja zgradom jesu vlasnici zgrada, upravitelji i korisnici / krajnji korisnici zgradama. Navedeni dionici imaju velik stupanj odgovornosti u provedbi energetske ciljeve i aktivnosti te moraju biti članovi pregovaračkog odbora koji će odlučivati o provedbi mjera dogovorenih sa Savezom zgrada. Oni su „predvodnici promjene“, a o njihovim se ulogama raspravlja u sljedećim odjeljcima.

5.1. Vlasnici zgrade

Vlasnici zgrada predstavnici su gradova/općina nadležnih za javnu zgradu. Trebaju osigurati provedbu cjelokupne gradske/općinske politike o energetske učinkovitosti kao i ostvarenje željenih ciljeva u pogledu potrošnje energije i smanjenja emisija.

5.1.1. Interes i motivacija

Funkcija predstavnika gradova/općina jest ispuniti europske i nacionalne obveze. U skladu s člankom 5. Direktive o energetske učinkovitosti (EED), 3 % ukupne površine poda grijanih i/ili hladjenih javnih zgrada treba obnoviti svake godine te se, u skladu s Direktivom o energetske učinkovitosti (EED), svake godine trebaju predavati izvješća za nacionalne akcijske planove za energetske učinkovitost (NEEAP-ovi) koji pokazuju da je ostvarena ušteda energije od 1,5 %. Bez pokazivanja da su u fondu javnih zgrada postignute mjere energetske učinkovitosti nije moguće ostvariti europske ciljeve. Ako se ne može mjeriti energetska potrošnja, ne može se ni upravljati njome te tako ostvariti energetske uštede, što bi predstavnicima trebao biti glavni motiv za uvođenje sustava upravljanja energijom.

5.1.2. Uloga i funkcija

Vlasnici zgrada trebali bi inicirati uvođenje sustava upravljanja energijom. Budući da će djelovanje Saveza zgrada rezultirati određenim promjenama u poslovanju, vlasnici zgrada trebali bi pažljivo razmisliti o načinu njegova uvođenja. Njihov je prvi korak osnivanje pregovaračkog odbora te utvrđivanje uloga i hijerarhije odgovornosti. Pregovarački odbor trebao bi uključivati upravitelje zgradom, korisnike i krajnje korisnike, dok bi glavnu ulogu neosporno trebalo dodijeliti upravitelju zgradom o čijoj će se odgovornosti, ulogama i funkciji raspravljati u nastavku.

5.1.3. Odgovornost i potencijalni utjecaj na upotrebu energije

Vlasnici zgrada trebali bi nadgledati rad upravitelja zgradom te ostvarenje kratkoročnih i dugoročnih ciljeva uštede energije. No, istodobno bi trebali naglašavati važnost ovakve vrste projekata, zahtijevati redovita izvješća i objavljivati uspjehe, što pridonosi motivaciji i predanosti projektu. Vlasnici zgrade odgovorni su za ispunjavanje nacionalnih i europskih zahtjeva za energetske učinkovitosti te su o postignutim ciljevima uštede energije dužni obavijestiti nacionalna tijela odgovorna za prikupljanje podataka za godišnja izvješća o nacionalnim akcijskim planovima za energetske učinkovitost (NEEAP-ovi).

5.2. Upravitelji zgradom

Uloga upravitelja zgradom proteklih je godina postala važna jer oni moraju znati sve pojedinosti o zgradi kako bi njome mogli upravljati na primjeren način.



5.2.1. Interes i motivacija

Svaki projekt treba imati vlasnika, odgovornu osobu koja nadgleda provedbu projekta i koja će se pobrinuti da se projekt uspješno završi. Prije uspostave bilo kakva sustava upravljanja energijom, važno je sklopiti Savez zgrada što bi bio zadatak upravitelja zgradom, koji je ujedno i energetske upravitelj. Razvoj Saveza zgrada utvrdit će kratkoročne i dugoročne ciljeve uštede energije čije je ostvarenje zadatak upravitelja zgradom / energetske upravitelja. U njihovu je interesu postići rezultate utvrđene u Savezu zgrada, o čemu će se izvijestiti vlasnici zgrade.

5.2.2. Uloga i funkcija

Uloga i funkcija upravitelja zgradom jest pratiti i analizirati podatke o potrošnji energije i vode te o njima izvješćivati. U procesu prikupljanja podataka, sveobuhvatni podatci trebali bi obuhvaćati povijesne podatke (mjesečna potrošnja), podatke iz energetske revizije (pročelje zgrade, postojeća oprema, vrijeme upotrebe itd.) i podatke veće razlučivosti (u stvarnom vremenu ili blizu stvarnom vremenu). Podatci veće razlučivosti omogućuju upraviteljima zgradom / energetske upraviteljima da utvrde dinamiku potrošnje koja se inače ne bi promatrala da su dostupni samo povijesni podatci. To je ključ za provedbu shema automatiziranih kontrola u kojima se djelovanje zahtijeva u stvarnom vremenu, što je zadatak upravitelja zgradom / energetske upravitelja. Podatke o mjesečnoj potrošnji treba svaki mjesec dostavljati vlasnicima zgrade, a time i pregovaračkom odboru kako bi se utjecalo na ponašanje potrošača u pogledu potrošnje energije. Ostvarivanje kratkoročnih i dugoročnih ciljeva uštede energije treba pratiti iz EMIS-a te o tome izvješćivati vlasnike zgrada.

5.2.3. Odgovornost i potencijalni utjecaj na upotrebu energije

Prije pristupanja vlasnicima zgrada putem EMIS-a, upravitelje zgradom / energetske upravitelje treba educirati o arhitektonskim i tehničkim značajkama zgrade jer nije moguće upravljati nečim što se ne razumije. Nakon što steknu dovoljno znanja, na njima je da savjesno prate potrošnju energije te da postignu kratkoročne i dugoročne ciljeve uštede energije utvrđene u Savezu zgrada. Oni su referentne osobe za upravljanje energijom i ključni dionici u pregovaračkom odboru, što znači da bi trebali svakodnevno pratiti putove potrošnje energije te upozoravati i obavještavati druge u slučaju prevelike potrošnje.

5.3. Korisnici zgradom (zaposlenici javnog sektora)

Korisnici zgradom treći su ključni dionici. Iako nisu izravno odgovorni za zgradu, trebaju biti svjesni koraka koji se poduzimaju i aktivnosti koje se provode u zgradi. Ovdje se u najvećoj mjeri radi o zaposlenicima javnog sektora koji svoj svakodnevni posao obavljaju u promatranoj zgradi. Nužno je da sudjeluju u svim aktivnostima povezanim s energijom kao i u radu pregovaračkog odbora jer njihove navike i ponašanje imaju znatan utjecaj na upotrebu energije u zgradi.

5.3.1. Interes i motivacija

Zaposlenici javnog sektora predstavljaju većinu u hijerarhiji dionika, stoga njihovo ponašanje može znatno promijeniti putove potrošnje. U njihovu je slučaju ključno načelo prepoznavanja koristi koje se ne odnosi samo na smanjenje računa, već i na utvrđene nagrade onima koji imaju razvijeniju svijest o energetske učinkovitosti.

Koncept „nagrađivanja” detaljno je obrađen u projektu „EURONET 50/50 MAX - povećanje energetske učinkovitosti u javnim zgradama promjenom ponašanja” koji je financiran iz programa „Inteligentna



energija - Europa (IEE), a koji korisnike zgradom aktivno uključuje u proces upravljanja energijom te ih uči održivim ponašanjima kroz praktičnu mjeru određivanja ekonomskog poticaja za uštedu energije, i za korisnike zgradom i za lokalna tijela koja plaćaju račune: 50 % ušteta postignutih zahvaljujući mjerama energetske učinkovitosti koje poduzimaju korisnici vraća im se kroz financijsku isplatu, dok drugih 50 % ostaje lokalnom tijelu koje plaća račune z energiju. To bi trebalo biti primjer jer je rezultat takav da su svi na dobitku: korisnici zgradom podižu svoju svijest o energiji, poboljšavaju svoje navike u vezi s energijom i dobivaju dodatna sredstva; lokalna tijela plaćaju manje za energiju iskorištenu u svojim zgradama; lokalna zajednica dobiva čišće lokalno okruženje.

Cilj je korisnike upoznati s problemom, objasniti im i dati uvid u moguće rezultate ostvarene promjenom ponašanja.

5.3.2. Uloga i funkcija

Ključno je definirati najuspješnije strategije za postizanje cilja trajnog utjecanja na ponašanje korisnika zgradom. To se može postići dijalogom u pregovaračkom odboru za „meke mjere” (engl. soft measures) te prijedloge i službena pravila u pogledu upravljanja energijom. Pravila trebaju biti vrlo jednostavna, primjerice: aktivirajte postavke mirovanja na opremi, izbjegavajte mogućnost stanja pripravnosti, ugasite svjetla kad izlazite iz ureda, izbjegavajte pretjerano zagrijavanje ili hlađenje ureda, zatvarajte prozore itd. Poticaji i nagrade pojednostavnit će promjenu ponašanja korisnika zgradom.

5.3.3. Odgovornost i potencijalni utjecaj na upotrebu energije

Korisnici zgradom odgovorni su za svjesnu potrošnju energije i poštivanje pravila utvrđenih u Savezu zgrada. Što se korisnici zgradom više pridržavaju pravila potrošnje, to će ostvareni ciljevi uštede biti bolji, što je u interesu i svim više rangiranim dionicima u hijerarhiji.

5.4. Krajnji korisnici (korisnici javnim službama)

Krajnji su korisnici u većini slučajeva samo djelomično povezani sa zgradom kojom se koriste za određenu svrhu ili za nju zainteresirani. Možda nisu pretjerano zainteresirani za detaljno funkcioniranje zgrade, ali, neovisno o tome i uz odgovarajuće naputke, mogu pridonijeti uštedi energije ili svakodnevnom funkcioniranju zgrade. Njihovo sudjelovanje u pregovaračkom odboru u nekim je javnim zgradama iznimno poželjno (npr. učenici i roditelji u školama), dok u drugim slučajevima ono nije moguće (npr. javni bazeni i slični sportski objekti, upravni uredi koji izdaju razne isprave mnogobrojnim građanima itd.).

5.4.1. Interes i motivacija

Kao što je prethodno navedeno, sudjelovanje nekih krajnjih korisnik u pregovaračkom odboru nije moguće, dok se u slučajevima obrazovnih zgrada iznimno preporučuje u odbor uključiti učenike i roditelje. Nastavnici bi trebali uključiti učenike u skupine za energetske učinkovitost čiji su zadatci analiza i evaluacija energetske situacije škole, predlaganje mjera energetske učinkovitosti, provedba predloženih mjera i organizacija obrazovne i informativne kampanje usmjerene učenicima, nastavnicima, osoblju i članovima društva škole. Među učeničkom je populacijom iznimno važno postići planirane rezultate, a dodatno ih se može motivirati osvajanjem „certifikata o uštedama energije”.

5.4.2. Uloga i funkcija

Učitelji bi učenike u školama trebali voditi na razgledavanje zgrada na temu energije kako bi saznali više o energiji, upotrebi energije u svakodnevnom životu, energetske učinkovitosti, RES-u i klimatskim



promjenama. Primjerice, izloženi plakati o uštedama energije smješteni uz strujne prekidače trebali bi potaknuti učenike na gašenje svjetla, mjerenje temperature, jačine svjetla i potrošnje energije različitih uređaja, provođenje anketa među drugim učenicima, nastavnicima i ostalim osobljem, zbog čega se mogu osjećati aktivnim sudionikom u postizanju energetske ušteda.

5.4.3. Odgovornost i potencijalni utjecaj na upotrebu energije

Budući da u školama učenici brojčano predstavljaju većinu, njihovo ponašanje znatno utječe na potrošnju energije. Odgovornost je nastavnika da educiraju učenike o važnosti energije, ekološke osviještenosti i klimatskih promjena kao i da ih nauče kako da malim postupcima pridonose očuvanju okoliša i uštedi energije.

5.5. Sažetak

U tablici u nastavku sažeto je prikazana prethodno opisana raznolikost dionika koje treba uključiti u razvoj procesa i aktivnosti upravljanja energijom.

| Dionik | Interes i motivacija | Uloga i funkcija | Odgovornost i utjecaj na upotrebu energije |
|-----------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Vlasnik zgrade | <ul style="list-style-type: none"> ispunjavanje europskih i nacionalnih obveza uvođenje sustava upravljanja energijom radi mjerenja i dokazivanja postignuća | <ul style="list-style-type: none"> pokretači uvođenja sustava upravljanja energijom uvođenje Saveza zgrada osnivanje pregovaračkog odbora | <ul style="list-style-type: none"> nadgledanje rada upravitelja zgradom i ostvarenja kratkoročnih i dugoročnih ciljeva uštede energije izvješćivanje o postignućima i objava postignuća |
| Upravitelj zgradom | <ul style="list-style-type: none"> „vlasnik” projekta uspješan dovršetak aktivnosti i ostvarenje kratkoročnih i dugoročnih ciljeva utvrđenih u Savezu zgrada | <ul style="list-style-type: none"> praćenje i analiziranje podataka o potrošnji energije i vode te izvješćivanje vlasnika zgrada i pregovaračkog odbora o njima izvješćivanje o ostvarenju kratkoročnih i dugoročnih ciljeva uštede poticanje promjene ponašanja korisnika i krajnjih korisnika | <ul style="list-style-type: none"> praćenje potrošnje energije ostvarenje kratkoročnih i dugoročnih ciljeva uštede utvrđenih u Savezu zgrada postavljanje upozorenja zbog prevelike potrošnje |
| Korisnici zgradom (zaposlenici) | <ul style="list-style-type: none"> za motiviranje zaposlenika javnog sektora potrebno je načelo prepoznavanja koristi | <ul style="list-style-type: none"> članovi pregovaračkog odbora ciljane skupine za promotivne i edukativne aktivnosti | <ul style="list-style-type: none"> svjesno troše energiju i poštuju pravila utvrđena u Savezu zgrada. |
| Krajnji korisnici (korisnici javnom uslugom) | <ul style="list-style-type: none"> visoka zainteresiranost i motiviranost za postizanje rezultata (učenici) motiviranje uključivanjem u aktivnosti i promotivne | <ul style="list-style-type: none"> ciljane skupine za promotivne i edukativne aktivnosti aktivni sudionici u aktivnostima praćenja i uštede energije | <ul style="list-style-type: none"> predvodnici promjena u nekim slučajevima (npr. učenici) visok utjecaj na potrošnju energije i održivost rezultata |



| | | | |
|--|-----------------------------------------------------|--------------------------------------------------------------------------------|--|
| | aktivnosti s nagradama za postignuća (natjecanjima) | • ako je to moguće, uključivanje u pregovarački odbor (npr. učenici u školama) | |
|--|-----------------------------------------------------|--------------------------------------------------------------------------------|--|

6. Energy Management System in Buildings

Energy Management System in a building connects people and technologies and uses ICT solutions to monitor and, in advanced applications, control energy consumption in a building. The information provide feedback to building managers and users about consequences of their energy related behaviour practices. This will further enable building managers to propose corrective actions (and discuss them within Negotiation Panel) both in terms of activities that will target users' behaviour change and technology improvements. In this deliverable, we only focus on users' behaviour. Therefore, the subsequent subchapters will provide a basis for building managers and users to better understand building technologies and their influence on energy consumption and to adjust their behaviour accordingly, thereby improving their buildings' energy performance.

6.1. General guidelines for energy management in buildings

Efficient and sustainable management of the building, all its elements and equipment may be achieved by the following guidelines:

- ✓ allow sunlight heating of premises;
- ✓ close the doors, windows, and other places where heat is lost;
- ✓ regular maintenance of gas and oil installations, pressures, burners, and heat exchangers because unclean heat burners and heat exchangers cause insufficient fuel combustion, and low efficient operation of the whole system;
- ✓ heat exchangers should be scale free, because little ticker layer of soil reduces heat transfer, consumes more fuel and the space will be heated less;
- ✓ radiators must be cleaned frequently to ensure that impurities don't prevent heat transfer;
- ✓ prevent furniture, curtains, or other coverage of heating devices because in this way heat transfer is reduced;
- ✓ maximise the use of daylight for illuminating premises;
- ✓ switch off the lights in the premises when people are out;
- ✓ regularly cleaning lightbulbs, pendants, and lamps, impurities absorb more than 50% of light;
- ✓ use table lamps and lamp where the illumination is needed most;
- ✓ rationalise the use of water;
- ✓ frequently clean and replace filters in air conditions to prevent that device becomes a pollutant;
- ✓ close the doors and windows if cooling is on, when ventilating turn cooling off;
- ✓ setting rationally the desired temperature in the premise;
- ✓ all the premises in the building must be regularly cleaned and ventilate (it also applies to the premises that are not used daily);



- ✓ equipment in premises and installation elements should be used according to the intended purpose, rationally and economically;
- ✓ regular audits and services of the installed equipment in order to eliminate shortcomings on time.

6.2. Architectural and construction elements

General safety and functionality of construction elements of the building are a prerequisite for achieving the set energy savings. A basic information about use and behaviour related to these elements is given here.

Airing of building space

Ventilation must be done before and after using the premises in the related working day. If the modality of using the premises changes or climate condition require so, the premises should be ventilated during the working hours repeatedly, for ingress of fresh air. To ensure complete functionality of the thermal envelope of a building, preserving physical characteristics of the external envelope and preventing uncontrollable water vapour condensation in premises is important to ensure thoroughly 10 minutes' ventilation 2-3 times per day opening all windows completely to have air exchanges and maintain necessary hygienic conditions. The ventilation should perform by opening the lower parts of the window for the ingress of fresh air, and upper parts for the outlet of hot air, if it is technically possible. After major physical activities, ventilation of premises must be done as quickly as possible by opening all elements, but taking care about the draft.

Use of windows and shadings in relation to heat and light gains

Natural light represents a valuable factor for quality improvement of working and living spaces. Daylight illuminates the environment of working and living places and is our contact with all that surround us. To make full use of daylight windows should be frequently cleaned, putting pots of plants and other objects near the windows and dark curtains should be avoided, tables should be positioned to maximise the daylight use. Sun protection elements reduce heat radiation inside the space, their proper use can avoid additional costs for cooling in summer and for heating in winter.

Besides increasing comfort, lifting, and lowering shutters depending on the season can lead to considerable energy savings. By lowering shutters, temperature in the room can decrease for 8°C, which directly reduces electrical energy consumption for cooling. In winter, lowering shutters allows heat retention inside the room which reduces consumption for heating.

6.3. Heating, cooling and ventilation

Heating, cooling and ventilation systems in a specific object allow the users to rationally manage and regulate the temperature in the building, thus creating a comfortable atmosphere. Installations of these systems need to be used in an efficient manner, together with the other architectural and installation elements for regulating the microclimate of the rooms. User behaviour practices in relation to use of heating valves, adjusting heating and cooling temperature are stressed hereafter as well as need for regular control and maintenance of these systems.

Radiator heating

During the heating season, heating represents majority of final consumption thus significant savings can be achieved with devices for heating control. It is important to know how to use the devices because in this way efficiency and functionality is increased. Heating elements should be placed so they can release heat unimpeded without blocking them with other objects or furniture. For enabling heat release, radiators should be regularly cleaned and ventilated to ensure good circulation of hot water; this way, saving of 3-5% can be achieved.



Thermostatic valves

Quality and rational use of energy is not possible without installation of thermostatic valves on heating elements. Thermostatic valves enable temperature control inside the premise according to use, people, and personal will of workers.

Boiler room

The work of the boiler room is mainly automatized with regular supervision of a qualified person. For efficient and correct work of the boiler room it is necessary to:

- follow factory instructions and use authorized service personnel for handling and maintenance of boilers and burners;
- clean heat exchangers once a year;
- perform pressure control of water pipelines on the pressure of 6 bars every 5 years;
- perform services of gas boiler and circulating pump once a year;
- replace safety valve and measuring instrument (manometers and thermometers) every 3 years;
- visually inspect boiler room and electric command panel every 3 months;
- visually inspect and test gas leakage of electromagnetic valve once in 3 months and replace after 5 years;
- replace HV electrodes on the burner one a year;
- inspect the burner fan and remove dust from air intake once a year;
- inspect pressure switches every 3 months and replace them after 2 years;
- clean impurities catchers every 6 months;
- visually inspect pipelines and armature every 3 months;
- regular clean a chimney;
- maintain fire warning and extinguishing equipment;
- lead a boiler room diary.

Solar collectors

For making solar collectors perform their function the following instructions should be used:

- monitor the pollution and impurities on glass and clean it regularly in morning hours when they are cool;
- checking glass, sealings, quality of liquid, and construction correctness regularly;
- replace the liquid every 2 years and wash away sludge and dirt;
- hot water tanks should be cleaned from scale;
- keep the thermostat of mixer or sanitary water at the maximum of 50 °C;
- keeping the pressure in the installation not lower than 1,5 bars;
- check freezing protection and pumps;
- ventilate the system;
- inspect overpressure in expansion room;
- visual check of collectors, check of automation, security valves;



- disinfection of hot water in collectors (with temperature above 70°C).

Air conditioning control

Temperature difference between inner and outer temperature should be not higher than 6°C. Apart the fact that it consumes much more energy, having the higher difference is also harmful for the health. In summertime, optimal temperature of inner space is 5°C lower than outer. Decreasing temperature for 1°C, increases energy consumption by 5%.

6.4. Lighting and other electric appliances

A valid choice of electrical appliances and equipment as well as rational and responsible behaviour of the users allows for achieving significant savings of energy.

When purchasing electrical appliances, energy efficiency classes must be considered thus buying more energy efficient devices is an imperative in the public sector. Energy consumption difference between class A and D ranges between 30 and 45%. It is also important to consider the actual needs avoiding buying power oversized devices. The use of modern lighting devices instead of incandescent light bulbs and cleaning luminaries at least twice a year can increase energy savings significantly.

Indoor and outdoor lighting should be turned on when needed, depending on the daylight illumination (light switch timers should be turned on and off depending on daylight illumination and season). Artificial lighting should be applied only when daylight illumination is insufficient. Lights should be turned off when leaving the room.

Switch clock for water pumps has to be set to work during working time. Reducing water consumption, decreases electrical energy consumption for driving the pumps.

Larger electrical appliances should mostly be used during low tariffs periods, if working hours allows it, and should be plugged off when not in use. Avoiding “stand by” mode is also important because in this mode energy is consumed. Computers must be turned off when not in use, if not possible, at least turning off the monitor.

The key task of employees is turning off appliances when not using them.

6.5. Smart metering and monitoring of energy consumption

By introducing smart metering for monitoring energy consumption in buildings and the reports created thereby, it shall be easier to continuously monitor the energy consumption and analyse consumption per object/group of objects. This is the basis of systematic energy management. **Studies have shown that monitoring consumption and costs has the highest impact on behaviour change, education, and motivation for end users. Without approaching consumers with their actual consumption in real time it is impossible to achieve savings.** With real time monitoring consumption systems users have a direct approach with consumption trends and costs which is the first step for behaviour change. The framework for enabling behaviour change will be further discussed in the chapter regarding the Negotiation Panel Concept.

6.6. Benefits of systematic energy management

The benefits of using such a system include: energy savings, cost reduction, better comfort for users, reduction of the CO₂ gas emission etc. The said benefits are important for raising awareness of users and shall improve users' motivation.

According to some case studies, with good demand side management global savings of 40% electrical energy and 10% of HVAC can be achieved. Proportionally by decreasing consumption, cost reduce, which is



very important, especially for building owners, to have immediate financial benefit. Meanwhile, by reducing annual consumption for 1,5 % obligations in Article 7 of EED for reducing energy consumption are fulfilled. With consumption, GHG emissions also reduces which is important for achieving 2020, 2030 and 2050 EU targets.

7. Koncept pregovaračkog odbora

Koncept pregovaračkog odbora relativno je nov pojam te ga je stoga potrebno objasniti. U osnovi, to je skupina ljudi u određenom objektu/zgradi koji skupa surađuju, zajednički nastojeći ostvariti postignute ciljeve uštede energije, postižući tako obostranu korist (gospodarsku i ekološku). Odbor također radi na promjeni ponašanja korisnika u pogledu ušteda energije u određenoj zgradi kako bi se ostvario dugotrajniji učinak.

Osnivanje pregovaračkog odbora podrazumijeva uključivanje svih sudionika, pri čemu im se pruža mogućnost da u procesu razvoja sustava sudjeluju kao predstavnici skupina ciljanih korisnika s ciljem unaprjeđenja mogućnosti uspješnih sustava.

Svi su sudionici pregovaračkog odbora dionici. Ključni je dionik svaki dionik na kojega znatno utječu mjere koje poduzima organizacija i/ili koji znatno utječe na te mjere. U ovom slučaju, to su vlasnici zgrada, upravitelji zgradama i korisnici zgradama. Vanjski dionici u ovom su slučaju krajnji korisnici. Točnije, to su ljudi na koje utječe rad organizacije jer su primatelji usluga organizacije.

Angažman dionika u pregovaračkom odboru podrazumijeva neprestan proces maksimiziranja uključenosti unutrašnjih i/ili vanjskih dionika kako bi pomogli u izradi nacрта, provedbi i prilagodbi strategija za postizanje ciljanih ishoda.

Primarni ciljevi pregovaračkog odbora jesu:

- utvrđivanje i angažiranje ključnih (vlasnici zgrada, upravitelji zgradama i korisnici zgradama) i vanjskih (krajnji korisnici) dionika te stvaranje potrebnih struktura za provedbu specifičnih funkcija i zadataka koji su ključni za postizanje cilja i zahtijevaju angažiranost dionika;
- pružanje učinkovite koordinacije, komunikacije, pomoći i ostalih pomoćnih uvjeta za postizanje maksimalno učinkovitog angažmana;
- poticanje okruženja u kojem se neprestano uči kako bi se korisnicima zgrade, upraviteljima zgradom te korisnicima i krajnjim korisnicima zgradom pomoglo da razumiju, pridonose, provode i prilagođavaju strategije kako bi se ostvarili važni ciljevi u uštedi energije.

7.1. Omogućavanje okvira za osnivanje i osnivanja pregovaračkog odbora

Osnivanje pregovaračkog odbora u zgradi mora se omogućiti određenim prethodnim mjerama kojima se potvrđuje predanost i ustrajnost u poboljšanju energetske učinkovitosti u javnim zgradama. Te aktivnosti omogućivanja osnivanja pregovaračkog odbora mogu se sažeti u obliku formalnog ili neformalnog sporazuma (npr. koncept Saveza zgrada u okviru projekta TOGETHER) koji uključuje relevantne dionike usmjerene zajedničkom cilju uštede energije, a koji se može prenamijeniti u uštede upravljanja koje će se ponovno uložiti za uvođenje aktivnosti upravljanja potražnjom u okviru pristupa u kojem svi dobivaju (engl. win-win). Nakon donošenja nove energetske strategije zgrade, koja je detaljnije objašnjena u rezultatu koji se odnosi na Savez zgrada, članovi pregovaračkog odbora trebaju se usmjeriti na područja koja imaju i interni i eksterni domet:

- jasno angažiranje vlasnika zgrade, upravitelja zgradom te korisnik i krajnjih korisnika u proces strateškog planiranja upravljanje energijom;
- vanjsko izvješćivanje o postignutim rezultatima uštede energije putem društvenih mreža, lokalnih izvješća o akcijskim planovima itd.;



- provedbu procesa odlučivanja na temelju podataka.

Ideja koncepta pregovaračkog odbora jest razviti zajedničko rješenje za zajednički problem koje se može utvrditi provedbom sljedećih koraka:

1. Utvrđivanje problema dionika ključno je za njihovo bolje razumijevanje kao i utvrđivanje na koju se ulogu odnose.
2. Informiranje vlasnika zgrade upravitelja zgradom, korisnika i krajnjih korisnika zgradom o njihovim ulogama, očekivanjima i odgovornostima u procesu upravljanja energijom i upravljanja potražnjom; pritom prema svima treba biti iskren i pošten.
3. Omogućivanje unutrašnje i vanjske interakcije u pregovaračkom odboru (ostala uputstva za usporedbu rezultata, ušteta itd.), usmjerenost na stvaranje potreba korisnika umjesto utvrđivanja zahtjeva sustava jer potrebe korisnika potiču kreativno razmišljanje, a sve uključene osobe moraju biti otvoreni za iskazane potrebe korisnika.
4. Svrha iterativnog procesa razumijevanja potreba i ideja korisnika jest povećanje razumijevanja tima za situaciju korisnika, proširivanje znanja korisnika u pogledu mogućih rješenja i različitih gledišta te vrednovanje odluka o dizajnu tijekom procesa. Korisnici se osjećaju osnaženima jer mogu pratiti kako se njihovi vlastiti izražaji i stavovi zastupaju u dizajnu, od početne ideje koncepta do potpuno razvijenog IT sustava.
5. Uključivanje stvarnih korisnika sa stvarnim iskustvima, kao što je osoba odgovorna za održavanje opreme i njihovih svakodnevnih praksi u rane faze procesa razvoja - treba zanemariti ili isključiti teorije i postojeće znanje o određenim skupinama korisnika, ali ih treba dopuniti, potvrditi ili ažurirati iskustvom korisnika.
6. Utjecaj uključenosti korisnika ima dva različita značenja: korisnici mogu utjecati na razvoj ako ih se u proces uključi rano, mogu imati stvaran utjecaj na razvoj novih tehnoloških rješenja umjesto da samo daju povratne informacije o određenim sustavima. S druge strane, razvojni tim treba razmotriti moguć utjecaj svakog poticaja primijenjenog u procesima uključivanja korisnika te o njemu raspraviti. Stvaran utjecaj pridonosi osnaživanju korisnika, što zauzvrat rezultira pozitivnim učinkom jer su korisnici više motivirani da utječu na proces. Da bi se to omogućilo, pregovarački odbor mora biti otvorena uma.
7. Vlasnike zgrada, upravitelje zgradama te korisnike i krajnje korisnike zgradama treba potaknuti na promjenu, dok razvojne programere sustava upravljanja energijom (EnMS) treba potaknuti da prošire područje mogućeg rješenja. Članove pregovaračkog odbora treba poticati da se izražavaju na vlastiti način te da razgovaraju o svojoj situaciji i ciljevima koje žele postići u svojoj svakodnevici. Da bi oni potaknuli razvojne programere, članove pregovaračkog odbora treba potaknuti da zamisle željeno stanje u budućnosti te da to stanje opišu, što dovodi do novih i boljih rješenja. Kreativnim razmišljanjem šire se korisničke granice.
8. Stvaranje otvorenog okruženja u kojemu se svi članovi pregovaračkog odbora osjećaju dovoljno ugodno da podijele svoje misli - poticanje na to da se otvore i otkriju ključne aspekte svojeg ponašanja omogućuje osmišljavanje provedbe sustava upravljanja energijom (EnMS) prilagođenog situaciji.
9. Zastupljenost potreba korisnika treba činiti sastavni dio sustava upravljanja energijom (EnMS) kako bi se povećala mogućnost da konačni sustav pruža dodan vrijednost. Pri uvođenju sustava upravljanja energijom (EnMS), potrebno je integrirati ga u stvarni kontekst korisnika koji se temelji na znanju stečenom u procesu interakcije.
10. Završna faza podrazumijeva provedbu. Jedan od ključnih razloga uključivanja članova pregovaračkog odbora jest mogućnost provedbe i testiranja rezultata u okruženju stvarnog svijeta. U ovoj fazi provedbe važno je zadržati pozornost na korisnicima jer ljudi općenito nerado



mijenjaju svoje ponašanje te ih treba redovito ohrabrivati i podsjećati na upotrebu provedenog sustava.

7.2. Pristup promjene ponašanja

od glavnih ideja projekta jest dugoročna promjena ponašanja u pogledu pitanja vezanih s energijom. Kako bi se ostvarili postavljeni ciljevi, **potrebno je pokušati promijeniti ponašanje svih korisnika (vlasnika, upravitelja, korisnika i krajnjih korisnika) utječući na njihove utvrđene ideje. Metoda transformacije ponašanja korisnika prikazana je na Slici 6.** Metoda transformacije ponašanja korisnika sastoji se od pripreme, provedbe i provjere.

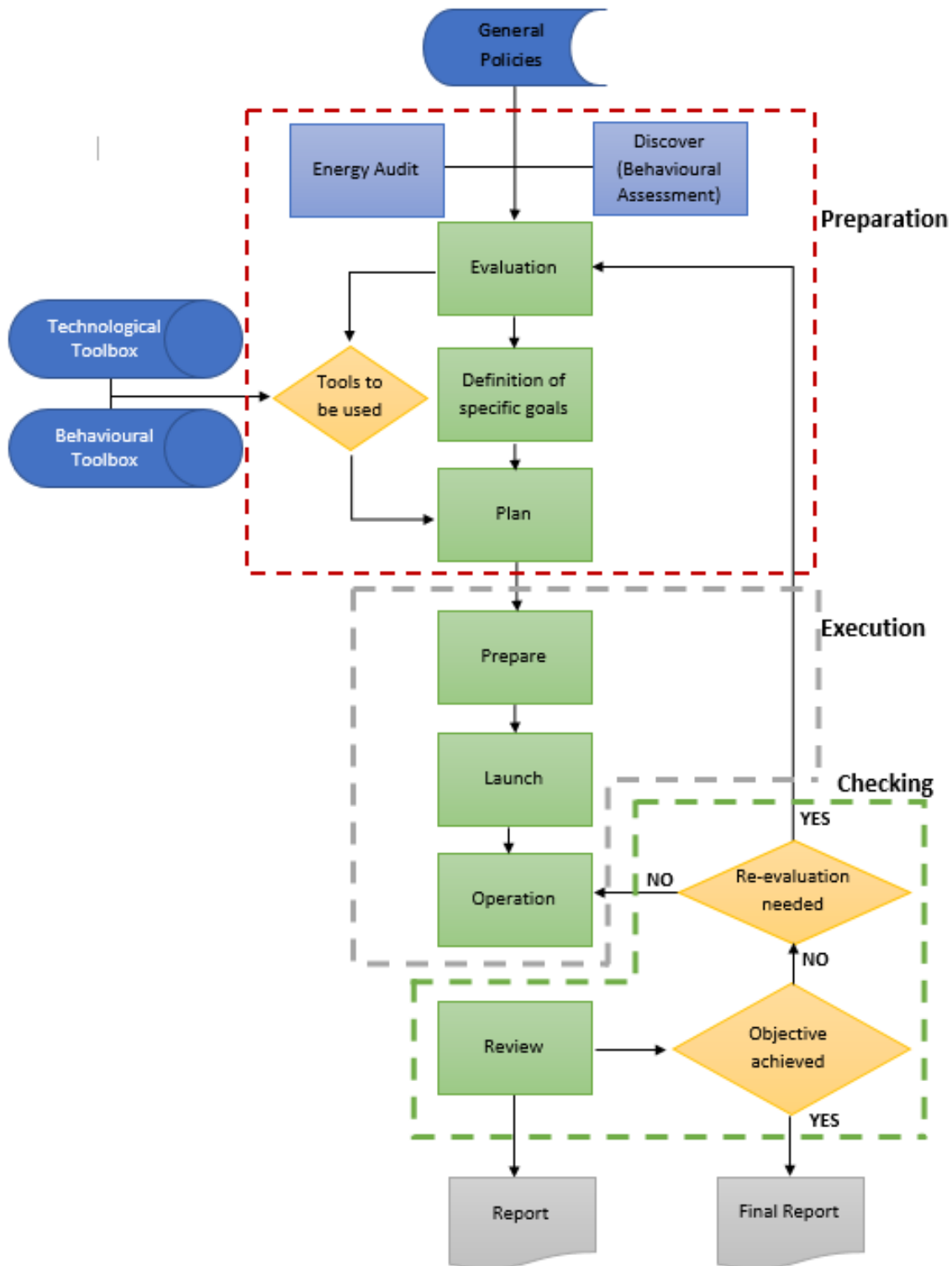
Nakon temeljitog pregleda politika EU-a, nacionalnih i lokalnih politika te njihovih utjecaja na lokalnu razinu zgrade, potrebno je provesti energetske revizije javne zgrade u sklopu pripreme faze uvođenja EnMS-a, što će potaknuti promjenu ponašanja. Treba postaviti ciljeve ovisno o tome što je moguće 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.** Ljudsko djelovanje općenito ovisi o pitanjima koja postavlja i na koja odgovara naša podsvijest:

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

Pri pokušaju promjene ponašanja drugih ljudi treba primjenjivati različite edukacijske i motivacijske tehnike koje su detaljnije opisane u materijalu za obuku o upravljanju potražnjom (DSM) koji je razvijen u okviru projekta TOGETHER i dostupan kao besplatan alat (može se preuzeti s internetske stranice projekta).

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 radi prilagodbe te e potrebno revidirati ciljeve kako bi se mogla sastaviti kratka međuizvješća o napretku. U završnom izvješću treba navesti podatke u usporedbi s ciljevima. To je ključ bihevioralne promjene u potrošnji energije.



Slika 6. Metoda promjene ponašanja⁸

⁸ Izvor: "Motivating for Change", Snap Solution Portugal



Conclusion

Buildings are in the centre of the EU's energy and climate policy. They are responsible for more than 40% of final energy consumption. As existing European building is likely to stay here for many years to come, it is obvious that determined and coordinated actions are needed at national levels to improve energy efficiency of existing buildings. Public sector has a key role to play, because it has the power to “lead-by-example”, i.e. to demonstrate that energy efficiency can be improved and that it has multiple benefits. The share of public buildings in total energy consumption cannot be determined precisely due to lack of data, which only shows that there are no wide-spread practices of detailed and continuous monitoring of energy consumption in the public sector.

Therefore, there is a need to introduce comprehensive energy management systems in public buildings. Only by doing so significant energy savings at no or low costs can be achieved through better understanding of energy consumption patterns and consequential definition of improved operational and maintenance procedures as well as activities that will change stakeholders' behaviour towards more energy efficiency choices.

This Guide provides basic information about such an approach and focuses on roles and responsibilities of different stakeholders that are relevant for energy efficiency improvements at building level. These include building owners, building managers, building users and end-users (users of services provided within a building).

The main message/conclusion of this Guide is that **energy efficiency improvements and energy savings cannot be achieved without people - those who have direct influence on the pattern of energy use in a building (managers and users) but also those that are paying the bills and are responsible for contributing to higher national and EU targets (owners, i.e. local authorities).** They all need to be summoned in a formal assembly - Negotiation Panel.

The role of Negotiation Panel is to monitor energy consumption and to agree, on democratic principles and open communication, about measures that will be undertaken in a building in order to reduce its energy consumption. The emphasis is on provoking behavioural changes related to the use of building components and systems, hence the general instructions on energy efficient behaviour has been given in this Guide. Moreover, general instructions on how to approach people and how to provoke change of behaviour are given. The approach includes good preparation of activities in which different educational and motivational methods should be used. In execution phase, it is crucial to introduce people with the results of their behaviour through real time metering and monitoring of energy consumption. This way, behavioural and analytical part of energy management system are closely connected. Continuous monitoring will reveal deficiencies in implemented activities, will enable re-definition of these activities and will eventually deliver desired results in terms of energy savings.



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Glossary

| | |
|------|--------------------------|
| DSM | Demand Side Management |
| EE | Energy Efficiency |
| EnMS | Energy Management System |
| EU | European Union |



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