



# Guideline in convincing decision makers

## How to argue and convince energy- efficient investments?

**EFFECT4buildings Toolbox:**  
Convincing decision makers; Annex 1



The project “Effective Financing Tools for implementing Energy Efficiency in Buildings” (EFFECT4buildings) develops in collaboration with public building managers a comprehensive decision-making support toolbox with a set of financial instruments: **Financial calculation tools; Bundling; Funding; Convincing decision makers; Energy Performance Contract; Multi Service Contract; Green Lease Contract; Prosumerism**. The tools and instruments chosen by the project has the biggest potential to help building managers to overcome financial barriers, based on nearly 40 interviews with the target group. The project improves these tools through different real cases.

To make sure building managers invest in the best available solutions, more knowledge on different possibilities is needed as well as confirmation from colleagues that the solutions performs well. EFFECT4buildings mapped **technological solutions** for energy efficiency in buildings with the aim to share knowledge and experiences of energy efficiency solutions among building managers in the Baltic Sea Region.

This part of the project is the guide devoted to convincing decision makers to invest in energy efficiency projects. Thus, it addresses the problems and dilemmas of authorities, investors, and users.

The tool helps assess factors behind success and failure in convincing decision makers to fund energy investments, and to provide good practices. The tool will be accompanied by a series of regional conferences, workshops and study visits, and policy recommendations will be prepared.

## Partners



EFFECT4buildings project is implemented with the support from the EU funding Programme Interreg Baltic Sea Region (European Regional Development Fund) and Norwegian national funding. The aim of the project is to improve the capacity of public building managers in the Baltic Sea Region by providing them a comprehensive decision-making support toolbox with a set of financial instruments to unlock the investments and lower the risks of implementing energy efficiency measures in buildings owned by public stakeholders. More information:

<http://www.effect4buildings.se/>



## Table of Contents

	1
Table of Contents	3
Introduction	4
1. Motivations for investment in energy efficiency	5
1.1. Arguments for energy-efficient investments for decision-makers	5
1.2 Arguments for energy-efficient investments for investors and facility managers	7
1.3 Arguments for energy-efficient investments for users	9
2. Energy saving potential	10
2.1. Ways to save electricity	10
2.2. Ways to save thermal energy	11
3. Good and bad practices	13
Pałacznica - good place	13
GPP Business Park in Katowice	13
The 50/50 concept	14
Bad practice	15
4. Errors	16
4.1 Errors made by decision-makers at the decision-making stage	16
4.2 Errors made by managers investors in the approach to carrying out investments	16
4.3 Errors made by users at the stage of using energy-efficient public buildings	16
5. Tools to succeed in investing in energy-efficient projects	17
5.1 Tools for decision makers	17
5.2 Investor tools	18
5.3. Tools for users	18
6. Requirements for local and national policies	19
7. Literature	20



## Introduction

Investments to increase energy efficiency bring both short-term and long-term benefits. A properly carried out investment has many effects and has an impact on many aspects of the functioning of local governments, employees and facility managers.

What energy efficiency really is? Energy efficiency is nothing more than efficient use of energy, skillful management, and intelligent use of energy.

Due to poor insulation, leaking windows and many other factors, the building loses heat. To prevent energy losses, it is necessary to use more and more modern technologies for building and insulating buildings and also obtaining electricity from renewable sources, which allows for savings in the use of fossil fuels.

Actions to reduce energy consumption at municipal level include:

1. Thermomodernization of public buildings which consists in:
  - insulation of walls, ceilings, roofs, floors,
  - replacement of window and door joinery,
  - replacement of central heating installations,
  - replacement of coal-fired boilers for more ecological sources,
  - the use of renewable energy sources.
2. Replacement of street lighting, traffic lights, for LED lamps or other energy-saving light sources
3. Subsidizing renewable energy sources
4. Replacement of used components in heat and power plants.

The application of measures conducive to increasing energy efficiency reduces CO<sub>2</sub> emissions, reduces energy consumption and increases the energy efficiency of thermal power plants. Such activities also allow for caring for the environment.



# 1. Motivations for investment in energy efficiency

## 1.1. Arguments for energy-efficient investments for decision-makers

Energy saving in the commune means lower costs of self-government functioning. Actions in this area also bring benefits to the environment, and ultimately improve the quality of life of residents. That is why more and more local governments put emphasis on effective energy management.

The main argument for decision makers to implement energy efficiency measures is the need to meet the requirements set out in the law.

In 2006, the European Commission launched its first energy efficiency action plan to mobilize decision-makers to support energy efficiency.

Already in 2010, the European Commission stated that the public sector in each Member State should lead the way in the field of energy performance of buildings, and therefore the national plans should set more ambitious targets for the buildings occupied by public authorities (Directive 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 taken into account and therefore those buildings should be subject to energy certification on a regular basis. What is more, striving to save energy, Member States may tighten the minimum requirements.

In the applicable legal act (2010/31/EU) in the long-term renovation strategy it is stated, that each Member State shall establish a long-term renovation strategy to support the renovation of the national stock of residential and non-residential buildings, both public and private, into a highly energy efficient and decarbonised building stock by 2050, facilitating the cost-effective transformation of existing buildings into nearly zero-energy buildings. The long-term renovation strategy concerns policies and actions to target all public buildings.

In addition, legislation on energy efficiency can be established in each country as different acts. For example, in Poland, according to the Energy Efficiency Act (Dz.U.2019.545) a public sector entity must accomplish its tasks using at least one of the energy efficiency improvement measures. It means, that decision makers have to implement one of the activities listed below:



- implementation and financing of a venture improving energy efficiency
- acquisition device, installation or vehicle with low energy consumption and low operating costs
- exchange or modernization used devices, installations or vehicles
- implementation of a thermomodernization project
- implementation of an environmental management system
- implementation of communal low-emission programs

What is more, a public sector entity must provide information on energy efficiency improvement measures on its website or otherwise customarily adopted in the locality.

The responsibilities of policy makers in Poland include the purchase of energy-saving products as well as the implementation of other energy efficiency improvement measures in the field of energy performance of buildings.

The above arguments are connected with Poland, but that motivations and responsibilities for decision makers to invest in energy efficiency can be included in every law, because of their versatility.

In addition to legal aspects, there are many others arguments for energy-efficient investments for decision-makers. Among the most important aspects can be mentioned:

- Ensuring energy security in the commune, including both access to energy types selected by the recipients and reliability of energy supply.
- Reduction of pollutant emissions
- Ensuring a socially acceptable level of energy prices
- Development of the local economy, among others, through the use of local energy resources
- Supporting competitiveness in enterprises in the commune
- Increasing the prestige of the commune compared to other communes
- Developing a network of good practices

The arguments show that the implementation of plans connected with energy efficiency are greatly profitable.





## 1.2 Arguments for energy-efficient investments for investors and facility managers

Modern buildings are built with a view to saving their operating costs. Avoiding heat loss is something normal in today's construction, but it was not in old constructions. That is why thermomodernization is carried out in older buildings.

The main argument for investors and facility managers to implement energy efficiency measures is savings. A building after thermomodernization uses less energy.

Not only energy can be saved. Energy efficiency means lower energy consumption and in the consequences lower energy bills. Even very costly investments have a chance to pay back in a few years. Investors have to only change bills into installments or simply use their saved capital.

According to COBI's information, energy efficiency actions can lead to better macroeconomic performance, as measured by employment, output (GDP), the public budget and other economic indicators.

What is very important, in case of investment in energy efficiency it is easier to get public funding. There are many forms of support that partly cover investment costs. This results in shorter payback periods and a smaller use of own funds. Member States shall make the financial measures for improving energy efficiency in the renovation of buildings conditional on the achieved results. An example of actions supporting such investments are subsidies from European Funds, which are available in Polish voivodeships.

Another significant aspect is the impact on the environment. The implementation of activities related to energy efficiency results in less emissions and also stimulates the rational use of energy by consumers.

An argument mentioned by Sweden is that investing in energy efficiency makes investors and facility managers attractive employers with attractive and skilled workers. What is more, investment in the building shows that someone cares about it.

The lack of properly functioning ventilation does not allow to provide an adequate microclimate for the human body, which unfortunately goes hand in hand with deteriorating well-being and health. Insufficient air exchange may cause the appearance of SBS - Sick Building Syndrome, the symptoms of which include, among others: headache and dizziness, fainting, fatigue, irritation of mucous membranes, etc. An increased incidence of asthma, allergies and respiratory infections is also observed. Care for good ventilation, which is associated with energy efficiency, will affect the good condition of employees and the building.

The scale of savings depending on the system increasing energy efficiency:



There are many partitions in the building that can be insulated. Each of them transmits heat differently, which can affect savings in various degrees. Let's look at examples:

- Insulation
  - roof, ceiling under the attic: 5-15%
  - walls: 10-20%
  - ceiling above the basement: 2-5%
- Window replacement - about 10-15%

On the market there are a lot of types of windows. Depending on whether windows will be selected: double- or triple-glazed, the savings would be different.

- Replacement of the heating system: 10-20%

The scale of savings depends on the type of the heating system. After choosing system with the heat pump, investor can achieve savings of up to 75%. It is worth noting that insulating pipes is also important.

- Installation of mechanical ventilation and recuperation: 30-50%

Thanks to the recuperator in the installation, it is possible to recover heat from polluted air removed from the building and heat the fresh air flowing into the rooms. Despite increased capital expenditure, heat recovery reduces the cost of heating and increases energy efficiency.

- lighting replacement: 70-90%

LED lighting thanks to low energy consumption, generates very large savings. LED technology is the most cost-effective source of light, because the small LED shines with the power of very strong old type bulbs. In practice a 3.5W LED bulb shines as brightly as a classic 50W bulb. Energy consumption is more than 10 times lower, thus electricity charges can decrease by up to 80%. The level of savings depends on the particular case and method of use.

- individual power plant installation - about 80%

The best source of electricity is the own source of electricity. In the era of rising energy prices, it is worth thinking about generating electricity from the own installation based on renewable energy sources. An example is photovoltaic installation. It is best if the installation can cover the total electricity demand. Then it causes the biggest savings, and the bills are limited to standing charges

The production of energy by individual wind, photovoltaic and cogeneration plants supplies the facilities with local, clean energy, but the scale of savings depends to a large extent on the method of settling accounts with power plants. Settlement is determined individually in each country. In Poland there is a prosumer system, flexible, cashless, based on top-down factors depending on the power of the power plant. There is also an auction system.





## 1.3 Arguments for energy-efficient investments for users

The basic argument for energy-efficient investments for users is better comfort and indoor climate. Carrying out activities related to energy efficiency is not only associated with the insulation of external partitions but also with the replacement of devices such as boilers or ventilation.

After replacement of devices, users can work in better climate condition. For example, using mechanical ventilation cause not only reduce energy consumption, but also cause that the rooms are well ventilated. It means that employees have access to fresh air, better work conditions and that results in better worker's productivity and health. A lack of fresh air in a lot of situations cause headaches and general malaise. After making energy efficiency investments, this problem can be eliminated.

New devices are more modern than there were in the past. Modern devices require less involvement and often are practically maintenance-free. It means that devices do not need a special employee to operate the equipment.

New boilers ensure that the building always has the right temperature for work. What's more, replacing old boilers with heat pumps allows not only heating, but also cooling buildings during hot summers. The use of renewable energy sources means that users have access to clean, green energy. This not only supports energy efficiency, but also has a positive impact on the environment. It also allows to have an access to a socially acceptable level of energy prices.

Users of energy-efficient solutions in public buildings take advantage of them every day at the workplace. Therefore, their expectations for their own homes are rising. Noticing the assets of working in such buildings, users can translate them into behavior in their own houses. If employees notice in their workplace, that a given solution is working, they are more likely to invest in it. What is more, after implementation users can give the good examples in their neighbourhood. Even conversations with friends and neighbors about the advantages of energy effective solutions may affect the broaden of the network of good practices.



## 2. Energy saving potential

Energy saving has become the focus of many energy consumers, mainly due to rising energy prices. The greatest potential for efficiency gains is noticeable in construction, mainly in combination with renewable energy sources.

Energy saving potential can be analyzed in many aspects, for example in lighting, climate change and combating their effects, in buildings and their heating systems, in electricity generation or even in data processing.

In different areas there are a lot of possibilities to save energy. Let's summarize the examples.

### 2.1. Ways to save electricity

There are many ways to save electricity, and contrary to appearances, most of them depend on the user's habits. The list of possible ways to save energy includes: rational use of lighting, metering, control of the number of connections and analysis of energy bills, change user's behavior, using devices with high energy efficiency classes, PV installations with autoconsumption of energy, smart systems, bms.

Light is essential to man. Thanks to it, people can continue their activities after sunset. Without artificial light it would be very difficult, and in most cases impossible.

For the last 100 years, Edison's invention - the light bulb - has reigned in the lighting of rooms. It is one of the most commonly used light sources. Unfortunately, this type of lighting is already seen as a very energy-consuming source. In a 100 watt light bulb, only 5% of the energy is converted into visible light. The remaining energy is lost to heat, which is still paid for together with the electricity bill.

LED lighting thanks to low energy consumption, generates very large savings. LED technology is the most cost-effective source of light, because the small LED shines with the power of very strong old type bulbs. In practice a 3.5W LED bulb shines as brightly as a classic 50W bulb. Energy consumption is more than 10 times lower, thus electricity charges can decrease by up to 80%. The level of savings depends on the particular case and method of use.

Another example is the need of metering. By using metering in the building, the manager can easily find the source with the most energy losses. During renovation, it is easy to locate the place where theromomodernization is most needed. What is more, even during usual using, seeing the sources of losses, in is possible to implement good practices by changing user's behaviour.

Another example of using the potential to save energy is the use of smart, bms or energy self-consumption systems. Energy production and self-consumption, the use of photovoltaic



panels or other renewable energy sources is the best way to save energy and protect the environment.

All devices that are in permanent equipment of the building (fridge, air conditioner, computers ...) should be characterized by high energy classes - it is a guarantee of economical work. It is therefore recommended that you always pay attention to the energy efficiency classes on the energy label when choosing your equipment.

Optimization of activity in individual public buildings and effective planning is the key to reducing electricity consumption.

Often, evening courses, training sessions, meetings, rehearsals and consultations are held in public buildings. For this type of initiatives, various objects are often used, which need to be properly illuminated and heated. Skillful planned activities are the key to success here. Courses, training or rehearsals can take place simultaneously in different school rooms of only one building. It is not necessary for the course to take place in the city hall and rehearsing in the school room.

## 2.2. Ways to save thermal energy

There are many ways to save thermal energy. Most of them are based on preventing cold outside air from entering.

To save heat loss, external partitions must meet the relevant requirements. One of the ways to meet the requirements is to insulate external partitions such as walls, floors, ceilings or roof.

If the building's heating system is based on radiator heating, it is worth investing in thermostatic valves and it is necessary to train users how to use them. It is common practice for office workers, for example, to open windows when it is too warm than to reduce the temperature by screwing on radiators.

Effective ventilation is another example. By using mechanical ventilation with heat recovery, it is possible to get significant savings as a result of reusing used air.

Heat recovery, despite increased investment outlays, can reduce the cost of heating the building and increase energy efficiency. The construction of the recuperator does not allow fresh air to mix with the used one, thanks to which the incoming air does not gain additional pollution. Often, in recuperators are additionally installed automatically electric heaters, which preheat the air when the outside temperature drops below  $-10^{\circ}\text{C}$  and the inflow of such cold air could cause excessive cooling of the room.



The key to success is an energy efficient heating system. An example would be heat pumps. Heat pumps are efficient devices, which are an average efficiency factor - for these branded devices - 3.5–4. Let's assume optimally the calculation of the factor ten at level 4. This means that they consume 1 kWh of energy, give away 4 kWh of thermal energy by analogy.

A ventilation system with heat recovery must meet certain requirements. One of the most important is that at least 80% of the heat has to be possible to recover. An equally important requirement is low electricity consumption, below 0.45 W/(m<sup>3</sup>/h). What is important to mention, the above requirements do not make sense if the proper tightness of the building is not maintained. That is why good condition of the building is necessary.

The undoubted advantages of using ventilation with heat recovery are, among others: better microclimate inside the building - the used air is constantly exchanged for fresh, and the provided filtration ensures that insects and dust do not get inside. In addition, odors and pollution from kitchens and toilets are eliminated. What's more, the moisture content of the air, which occurs as a result of cooking or bathing, does not increase due to its direct removal. Energy recovery of 80% allows heating costs to be reduced by 30 to 50%.

Saving thermal energy is not just about saving energy. At the time of investment in an efficient energy heating system - one that is not based on solid fuels - saving space and time for employees.

Why the place There is no need for a boiler room with a huge composition of coal, coke, wood, etc. .... Energy-efficient systems do not need as many people to care as solid fuel systems. Support for such systems consists in monitoring them.

When planning investments aimed at reducing heat consumption, attention should be paid to the comprehensiveness of the operation. Replacing windows without wall insulation will not be effective, just as replacing a heating system alone will not reduce energy consumption without thorough thermal modernization. To this end, it is always necessary to use the help of a specialist - an energy auditor, who in the audit that will be prepared for a specific building will plan further actions and propose materials with appropriate coefficients.



## 3. Good and bad practices

### Pałecznicza - good place

To the north of Krakow there is a small municipality of Pałecznicza, which with the help of responsible people and their determination can be an example for many. Why?

Already in 2013, using the funds of the Malopolska RPO 2007–2013 (co-financing of PLN 1.38 million), the commune installed ground heat pumps supplying the multi-functional building (2x22 kW), the Municipal Promotion and Culture Center (2x14.65 kW), the library (11 , 1 kW) and school (161 kW). In 2015, the municipality invested in solar farm. They also benefit from co-financing, and PV installations with a total capacity of 261.36 kWp installed on the roofs and near seven communal facilities.

In the years 2018-2019 a thorough thermomodernization of the commune office building was carried out: the facade was insulated, window and door carpentry was replaced, 20 kWp PV installation was installed, the central heating installation was replaced. The heat is provided by an air-source heat pump (50 kW).

Through its investments, the commune encourages residents to use various technological solutions, giving the opportunity to observe and rethink activities for their farms. For example, in the years 2017–2019 financial support with a total amount of PLN 392.6 thousand PLN includes replacement of old coal boilers. A total of 74 furnaces were replaced.

### GPP Business Park in Katowice

GPP Business Park is a modern complex of energy-saving A-class office buildings, dedicated in particular to companies from the modern business services sector (BPO / SSC / R & D / IT).

Currently, the complex consists of 3 office buildings located in Katowice: Goeppert-Mayer, Stern and Alder with a total area of over 23,000 m<sup>2</sup>.

The most modern solutions and technologies have been used in GPP buildings, which are an element increasing the comfort of work in the building, as well as allowing for actual reduction of operating costs, so important from the point of view of future tenants:



- **Tri-generation system** - a process in which electricity is produced from natural gas. The heat obtained as a by-product is used to prepare potable water, heat outside air in the ventilation system, as well as to produce cold. On-site production of electricity, heat and cooling reduces transmission losses and increases the efficiency of using primary fuel;
- **Proprietary BMS** building management system that analyzes the behavior of individual system components affecting energy efficiency and comfort of users;
- **Temperature, CO<sub>2</sub> and humidity sensor system**, necessary to maintain requirements for air quality and its optimal distribution;
- **GPP Business Park based on heating and cooling beams** - the beam system regulates the VAV flow to maintain the correct air exchange rate and comfort parameters, the air exchange rate in the building is up to 35 m<sup>3</sup> per person per hour, thus exceeding standards by 75%;
- **Window and facade system** with high thermal insulation;
- **Advanced facade system** with automatically controlled blinds, integrated with the light intensity control system - the intelligent system controls the lighting and operation of the blinds, analyzing the intensity of external and internal lighting as well as the direction of sunlight, the installation ensures the maintenance of the required illuminance at the maximum possible utilization natural light;
- **Energy saving lighting system** with light intensity sensors;
- **High-performance system** of fast and energy-saving elevators with electricity recovery;
  - rainwater recovery and reuse system;
- Charging stations for electric vehicles.

The technologies used translate directly into operating costs up to 50% lower than in reference buildings. Currently, the average monthly total costs of utilities, i.e. water, electricity, heat, cooling and ventilation, in GPP office buildings are below PLN 3.50 / m<sup>2</sup> when working in one shift.

The 50/50 concept

In this guide, we have mentioned many times how important the activities of local authorities and managers of public facilities can play in the education of society. The 50/50 concept assumes the active involvement of building users in the energy management process and teaching them ecological behavior through specific actions, as well as the distribution of their financial savings between them and the entity financing the energy bill.



The spectacular success of the implementation of this methodology under the EURONET 50/50 and EURONET 50/50 MAX projects (in 2009-2016) confirmed the creation of a pan-European, ever-expanding network of educational centers, currently associating over 550 schools and 50 other public buildings, including over 150 schools from Poland. 36 of them from the province Pomeranian - from Gdynia, Kobylnica, Krokowa, Malbork, Rumia, Sopot, Słupsk, Sztum and Ustka, in June 2016 they jointly launched the campaign entitled "Every WAT is worth its weight in gold - that is, Pomeranian children and youth are learning how to effectively save energy at school." The aim of the campaign is to raise the awareness of children and young people in the field of combating climate change and to promote rational use of energy by implementing an innovative 50/50 methodology in Pomeranian schools.

## Bad practice

Stereotypes, habits, theories passed down from generation to generation make it hard to convince and open up to new ones, despite the most sincere intentions. This applies to decision-makers, their employees and society. Hence, investments in energy-efficient solutions are long, not always comprehensive and not always correct.

A good example are borders in the implementation of ESCO / EPC projects, which were analyzed in the earlier stages of Effect4Buildings projects.

Often, the fear of investing in energy efficiency results from costs, unfortunately, often investors and decision-makers only look at a simple retort period, forgetting a number of benefits. They fear that too much investment will translate into bad public opinion. It is also not justified, once available forms of support: loans, grant programs, support of EU funds really helps and relieves financially.

Problematic situations in the area of significant energy aspects are:

1. Excessive electricity and thermal consumption for the needs of the building
2. Unsatisfactory quality of electricity supply in communes and poviats
3. Excessive emissions to the environment
4. Threat to the functioning of a public building in the event of a long-term failure of the external electricity supply
5. Breaks in external fuel supplies

Problematic situations rarely occur in an individual way and are usually interrelated. One of them determines the appearance of the next. In the fight against problem situations, expanding the network of good practices can help.





## 4. Errors

### 4.1 Errors made by decision-makers at the decision-making stage

Errors at the stage of making decisions by decision makers have various reasons:

The most popular are:

- Lack of willingness to carry out activities related to energy efficiency,
- Ignorance of regulations,
- Fear of high investment costs,
- Lack of awareness of the existence of subsidy systems,
- Fear of the opinion of not always conscious society,
- Objections of the unconscious society,
- Lack of qualified employees
- Resistance to employing specialists
- Multitude of technologies and products, i.e. difficulty in making the final decision

### 4.2 Errors made by managers investors in the approach to carrying out investments

The most common mistakes at the investment preparation stage include:

- Incorrect use of financial support products,
- Problems meeting the requirements that cover support programs
- Unaware of the need for a comprehensive approach to the task
- No energy audits,
- Looking for savings on materials, products, devices, equipment
- Making decisions and carrying out tasks under time pressure

### 4.3 Errors made by users at the stage of using energy-efficient public buildings

When it comes to the stage of operation, errors should be divided into those made by decision-makers and those made by users, which may result in the fact that the investment with the improvement of energy efficiency will not bring results.



#### Decision maker errors:

- No employee training
- No information / instructions
- No control over bills
- No interest in change scales

#### User side errors:

- Misuse of equipment will be the result of ignorance and lack of training. This, of course, does not justify employees
- Bad habits (cooking a full water kettle, excessive lighting, improper operation of electronics, e.g. a dormant computer, etc. ...),
- General unwillingness to change,
- No time to learn systems,
- Lack of basic knowledge about savings,

## 5. Tools to succeed in investing in energy-efficient projects

### 5.1 Tools for decision makers

A public sector entity may implement, and finance ventures aimed at improving energy efficiency on the basis of an energy efficiency contract. The contract specifies in particular:

- achievable energy savings as a result of the implementation of the project aimed at improving energy efficiency
- method of determining the remuneration, the amount of which depends on energy savings obtained as a result of projects

In addition, it is necessary to promote the use of energy efficiency improvement measures. As an example of action, it should be mentioned information and education activities and monitoring the application of energy efficiency improvement measures.

Decision makers can also provide information about instruments for financing energy efficiency improvement measures and how they can be obtained.



## 5.2 Investor tools

A tool for investors is to use the financial support, especially come from EU funds. The Directive 2010/31/EU stated, that Member States shall link their financial measures for energy efficiency improvements in the renovation of buildings to the targeted or achieved energy savings, as determined by one or more of the following criteria:

- the energy performance of the equipment or material used for the renovation; in which case, the equipment or material used for the renovation is to be installed by an installer with the relevant level of certification or qualification
- standard values for calculation of energy savings in buildings
- the improvement achieved due to such renovation by comparing energy performance certificates issued before and after renovation
- the results of an energy audit
- the results of another relevant, transparent and proportionate method that shows the improvement in energy performance.

## 5.3. Tools for users

Users of energy-saving solutions in public buildings are simply its employees and people using such facilities (children and young people, students, meeting participants). Therefore, the tools that are available to them are indirect:

- use of prepared instructions
- demonstrating interest and care for the environment
- guides and brochures
- social campaigns - informing about the benefits of proper use of facilities (health, savings, convenience, comfort, ecology, maintenance-free, cleanliness)
- TV commercials with recognizable faces that inspire

In addition, users of public buildings can do such simple things as: adjust the outfit to work to the weather outside, save water in the tap, use daylight, use stairs instead of the elevator, boil as much water in the kettle as he intends to drink it, ventilate the room short but intense.

The arguments used in brochures, guides and advertisements as well as instructions should be simple and directly about family, savings and health. Only such personal arguments that are easy to convey and easy to perform are able to give users a desire to submit to the requirements. If the arguments are properly shown, there is a chance that users will translate these behaviors into homes, pass on to their families



## 6. Requirements for local and national policies

Decision makers, investors, users or employees are part of one society that thinks and works within a certain framework, according to a specific canon of behavior and is inspired by similar incentives, which is why the role of authorities and legislators is to show, convince and teach society appropriate energetic behaviors. To this end, changes in law, bureaucratic facilitation, tightening of its norms are useful, but the most needed is to show the problem, show good practices and examples and show how to achieve this goal.

Social campaigns with well-known people (athletes, actors, icons of style, fashion) are effective. Popular science programs, family festivities with efficiency motives and gadgets (energy meters, multimeters, toys with photovoltaic elements) are interesting.

In addition, it is worth investing in guidebooks and additional energy efficiency lessons in schools and kindergartens.

Trainers should see investments that are good examples, through photos and companies show recipients how to make their lives easier.

The role of the authorities is therefore to inspire, divert attention from bad patterns, showing the best examples. It is necessary to open society to new ones, refute myths and fight stereotypes.



## 7. Literature

1. globenergia.pl
2. eur-lex.europa.eu
3. energia.wse.edu.pl
4. muratordom.pl
5. greenie-world.com
6. GLOBEnergia 4/2015
7. GLOBEnergia 1/2020
8. Scientific monograph: "Low Emission - energy efficiency in municipalities and local governments". Scientific editor dr inż. Michał Kaczmarczyk
9. Globenergia editorial materials
10. Danielak M, *Odzysk energii – ciepła i chłodu w instalacjach wentylacyjno-klimatyzacyjnych* „Dodatek specjalny Wentylacja i klimatyzacja, Inżynier budownictwa październik 2013”, s 58
11. wentylacja.org.pl

