

Barriers of financing models

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1. INTRODUCTION

There are various barriers to energy efficiency, some universal and others which are specific to the public sector¹. Energy efficiency is often not the priority objective over service levels. Good operating conditions always need to be sustained to ensure, for example, healthy indoor environment. However, in most cases energy efficiency and good service levels are not conflicting goals and can be pursued simultaneously.

Information barriers are common in all sectors. Few people work full-time in energy efficiency in the public sector, let alone in schools, making lack of knowledge and availability of time very common constraints. There is often lack of awareness and a very high perceived risk of new more efficient technologies, mistrust in energy audits and measures based on them etc.

There are also challenges associated with decision making. In municipalities, decision making also has a political aspect in contrast to businesses. The number of decision makers is large, the process is distributed, and decisions are also often made in short-term without due attention to life cycle costs.

Another set of barriers is budgetary in character. Firstly, many justified objectives, such as health care, education, social services, environmental protection and energy efficiency compete over the same limited resources. Secondly, the budget share of energy efficiency investments tends to be among the smaller ones, which makes it also a lower priority activity while more focus is put on the larger budget items and their effectiveness. Thirdly, budget items are usually ear-marked to certain functions which can lead to silo mentality making it difficult to pursue horizontal activities, such as energy efficiency or energy management. Furthermore, the rules of public budgeting – including the annual budget cycle and multiannual savings cash flow – make it difficult for public entities to finance energy efficiency investments from savings in energy costs. Authorities may have to finance energy efficiency investments from their investment budget whereas the resulting savings are credited to the operational budget. Finally, local authorities may be unable to retain the monetary savings due to efficiency improvements corroding motivation for improvements. Public procurement legislation, both European and national, has been developed to create a level playing field and improve efficacy. Yet, it can become an impediment for energy efficiency measures. Competition requirements may even disable energy efficiency measures when decisions cannot be made in the long run. While this may not be so evident anymore in the procurement of more common goods and services, it is still true particularly in relation to new technology.

In general, the barriers to energy efficiency in the public sector, and schools in particular, may be divided in the following categories: 1) administrative; 2) legal; 3) financial; 4) accounting and 5) technical barriers.

The aim of this report is to investigate the barriers in these five categories among the participating countries and to reveal the common problems facing energy efficiency in schools across these countries. For that purpose, the workshops are held in each country and the barriers as well as possible solutions are discussed among the relevant stakeholders. The findings from these workshops per country are

¹ Source: <http://www.odyssee-mure.eu/publications/policy-brief/public-sector-building-energy-efficiency.pdf>



provided in Chapter 3, while Chapter 2 provides an overview of main findings that are relevant for all countries.

2. MAIN FINDINGS OF BARRIERS OF FINANCING MODELS ANALISYS

The main findings related to barriers for energy efficacy projects in schools, based on the stakeholders' responses, are presented in Table below. They vary among the analysed countries, however there are common, universal barriers that are summarised hereafter.

Type of barrier	Barrier
Administrative	Lack of coordination between all stakeholders (building owners, operators, users)
	Lack of planning procedures based on the energy performance monitoring
	Human resources and skills to prepare energy efficiency projects
Legal	Unsolved legal and property ownership status of school buildings
	Public procurement procedures too long and hard to manage and unclear when it comes to PPP and EPC
	Lack of coordination between the different legislative sectors (energy efficiency, sanitation, safety, etc.)
Financial	Lack of own funding for high investment costs that are needed for energy renovation to nZEB standard
	Insufficient and inconsistent offering of subsidies, with demanding conditions for application
	Underutilised usage of private capital in EE project in public sector (ESCOs and PPPs)
Accounting	Accounting of energy efficiency projects in public sector often ambiguous and too complex at a local government level
	No immediate motive for energy savings at school level as cost savings cannot be invested in other purposes
	Accounting treatment of EE projects (lack of knowledge and guidance on debt treatment of EE projects applied as ESCO/PPP)
Technical	Outdated and incomplete documentation of buildings
	Low level of executed modernisations due to the low quality of ensured supervision
	Lack of up-to-date diagnosis of the energy efficiency status for buildings (energy audits)
	Buildings protected as a cultural heritage



3. BARRIERS OF FINANCING MODELS PER COUNTRY

3.1. AUSTRIA

In Austria, World Café was not organised due to lack of interested participants. Instead, relevant stakeholders were individually interviewed.

3.1.1. Administrative barriers

	Barrier	Influence of barrier (1= very weak; 5= very strong) Select by marking the number				
1	Administrative barriers					
a	Continuous coordination between the Building Department and the City Administration of Graz necessary - sometimes difficult and complex	1	2	3	4	5
b	Need for a special resolution of the municipal council for getting a budget for energetic restoration of schools - political decisions are necessary	1	2	3	4	5
c	Need to state a Life Cycle Cost Analysis before any budget request can be made (payback times of NZEB renovations are too long - additional other arguments are necessary)	1	2	3	4	5
d	Technicians are not the decision makers for EE renovations (pure financial decisions are very often against energy efficiency)	1	2	3	4	5
e	The builder and those departments who give the money (Financial Department) are not the operator of the buildings - low influence of the operator on the running costs during the planning phase	1	2	3	4	5
f	New educational concepts are a bigger driver for renovations (design of classrooms) than energy efficiency measures (at the building envelope) - the number of students is more important than energy efficiency of schools - schools have to be attractive inside and not energy efficient	1	2	3	4	5

3.1.2. Legal barriers

2	Legal barriers					
a	Obligations to build and renovate at NZEB standard at the federal level are not yet transferred to the municipalities - no pressure from the legislation	1	2	3	4	5
b	PPP models and ESCO models are legally too complicated and costly	1	2	3	4	5
c	Complex VAT and corporate income tax regulations for city owned real estate companies in the context of renovation and maintenance	1	2	3	4	5



3.1.3. Financial barriers

3	Financial barriers						
	a	other priorities with the budget for schools - more important is the expansion and not the energetic restoration of the buildings at the moment	1	2	3	4	5
	b	Not enough overall financial sources for such projects at the moment (money comes from global city budget)	1	2	3	4	5
	c	Lack of knowledge about the financial advantages out of EE measures	1	2	3	4	5
	d	Missing incentives because of the low costs of energy at the moment	1	2	3	4	5
	e	Primary interested in costs and actual and future challenges of the City of Graz (fast growing city with high need of investments into new infrastructure)	1	2	3	4	5
	f	Budget demand alignments from the county to the municipalities are not bound to energetic criteria - political influence much higher than energy targets	1	2	3	4	5
	g	Global city energy cost budget: Energy cost savings are not visible because of many ongoing fluctuations and a resulting lack of monitoring accuracy (influence of energy cost increase is higher than savings in some buildings)	1	2	3	4	5

3.1.4. Accounting barriers

Accounting barriers							
	a	Debts can no longer be outsourced to the city owned real estate company GBG because of Maastricht criteria since affiliated companies have also been added to the city financial rating since 2012	1	2	3	4	5

3.1.5. Technical barriers

5	Technical barriers						
	a	Most buildings are not older than 40-50 years and in good condition (appearance) - no need for restoration (for the city of Graz the need for energetic restoration refers often to the need of renovation of the windows)	1	2	3	4	5
	b	A few buildings are under monument protection	1	2	3	4	5
	c	Renovation only when parts are defect - no coherent plan towards energy efficiency for the buildings	1	2	3	4	5
	d	Missing independent experts for NZEB plans and concepts for schools	1	2	3	4	5

3.1.6. Comments

The main barriers, which each of the questioned stakeholder mentioned at first, are the financial aspects. There is just no specific budget for energetic restorations in public buildings. Especially in these days it's most important to extend the area of schools, since the City of Graz is constantly growing and the need for educational space is therefore increasing. Also low costs for energy and the invisible cost savings in the global energy cost budget resulting from energy efficiency measures are key reasons for not prioritise such activities.

If the City of Graz and the Building Department decides on undertaking such a project, they have to propose a specific resolution for getting a budget - this is a long and ornate process, which again makes it harder to execute EE projects.

Another barrier is the lack of knowledge within the municipalities and cities. Only few people deal with the issue of energetic restauration and nobody knows about current funding's and financial advantages.



(The absent knowledge is even higher in smaller municipalities, because usually there is no person just responsible for this issue)

Regarding administrative barriers, another challenge is that people, who would decide on undertaking EE measures, are not responsible for the budget and the other way around.

To sum up the main problem are missing incentives for undertaking energy efficiency measures. These missing incentives are mostly rising from a lack of knowledge, no budget, not concerned people, low energy costs, different challenges within the city at the moment, buildings with no need for renovation right now.

Educational matters have a higher influence than energy efficiency and these matters therefore are the priority of the cities and municipalities in Styria. Schools have to be attractive in the educational sense and in the inside to get enough students (relevant for the schools' overall budget), energy efficiency is often no relevant question for the decision makers.

Within the interviews, we also discussed possible solutions and ideas for increasing the incentives for undertaking EE measures.

- Legislative guidelines from the European Union should be allocated and transferred to the municipal and cities level - If there would be an official strategy and legal obligations for undertaking energetic renovations in public buildings, it would be much easier getting approved a budget for such projects.
- Focus on the quality and image of the buildings - In order to increase the number of students (financial advantages) and to educationally satisfy them the focus should be on the quality and the good image for public buildings, which should include climate protection.
- Supplementary use for crisis centre - In case of any unexpected energy failure or blackout, schools could serve as crisis centres. For this reason (and as a central argument) it could be a chance to run schools as nZEB`s.
- Potential in terms of demonstrable emission savings - Within the next years it`s likely that there are going to be mandatory CO2 savings, which have to be verified within every city/municipality. Therefore, undertaking an EE project could provide a high potential of CO2 savings.
- Making easier PPP-models and ESCO models - ESCO-models are legally complex and too long lasting. Easier and shorter models are necessary, similar to models in the private sector.
- Design of a renovation bundle, similar to the actual School Expansion Program GRIPS in Graz - At the moment the money goes to school expansion. With the help of the EU program ELENA, a renovation program for schools in Graz could be planned and prepared. Often holistic programs get more political support than single renovation projects, especially before votes.
- List of arguments in addition to energy efficiency - Sometimes more benefits of renovations have to be found and argued towards financial decision makers and politicians. A list of useful arguments and multiple benefits should be worked out



3.2. CROATIA

A World Cafe workshop was organized in an informal and interactive environment to provide stakeholders' feedback. The following topics were discussed: 1) barriers to energy efficiency financing in schools; 2) experiences of participants and 3) potential solutions.

3.2.1. Administrative barriers

The most important administrative barriers are shown in the table below.

1	Administrative barriers					
a	Slow and ineffective public procurement process	1	2	3	4	5
b	Lack of systematic approach and long-term strategy = lack of energy performance monitoring as a basis for determination of energy renovation priorities	1	2	3	4	5
c	Unmotivated, undereducated and lacking in numbers staff in public entities appointed for preparation and implementation of energy efficiency projects in schools (both at founder (city/municipality) and school level)	1	2	3	4	5

3.2.2. Legal barriers

The most important legal barriers are shown in the table below.

2	Legal barriers					
a	Unsolved legal and property ownership status of school buildings (including legalisation of buildings, multiple ownership issues, etc.)	1	2	3	4	5
b	Unclear and inconsistent legal framework	1	2	3	4	5
c	Lack of systematic management of public buildings, especially concerning energy efficiency	1	2	3	4	5

3.2.3. Financial barriers

The most important financial barriers are shown in the table below.

3	Financial barriers					
a	Lack of funding (schools need to have a certain amount of expenditures just to apply to EU or other funds) and ineffective usage of public budget	1	2	3	4	5
b	Underutilised usage of private capital in EE project in public sector (ESCOs and PPPs)	1	2	3	4	5



c	Insufficient and inconsistent offering of grants and subsidies, with demanding conditions for application	1	2	3	4	5
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3.2.4. Accounting barriers

The most important accounting barriers are shown in the table below.

4	Accounting barriers					
a	No immediate motive for energy savings at school level (cost savings cannot be invested in other purposes; energy costs are paid by the founder, not by school itself)	1	2	3	4	5
b	Lack of planning and appointing funds in public budget for EE projects	1	2	3	4	5
c	Accounting treatment of EE projects (lack of knowledge and guidance on debt treatment of EE projects applied as ESCO/PPP)	1	2	3	4	5

3.2.5. Technical barriers

The most important technical barriers are shown in the table below.

5	Technical barriers					
a	Lack of technical documentation which needs to be prepared in advance and often needs to take into account requirements outside legal obligations (e.g. special conditions of local utilities)	1	2	3	4	5
b	Insufficient quality and reliability of suppliers and contractors (capability of construction sector to organise and deliver works in an appropriate manner)	1	2	3	4	5
c	Insufficient quality of energy audits	1	2	3	4	5

3.2.6. Comments

The most important barriers perceived by the participating experts are those of financial and administrative nature.

Regarding **administrative barriers**, the participants highlighted that the lack of long-term planning based on continuous monitoring and evaluation of energy consumption in public buildings (systematic energy management) and motivation to make such plans is one of the largest barriers to energy efficiency improvements. The possible, i.e. needed solution is to establish a full energy management system at both founder (city/municipality) and school level and to ensure that long-term plans are made and implemented based on the systematically determination of priorities and benefits recognised by all participants in the process.

In the domain of **legal barriers**, an unclear ownership was mentioned as the most problematic aspect as well as inconsistent implementation of the public sector's obligation to systematically manage energy consumption in public buildings.



The most important are **financial barriers** as the lack of funding, stable funding sources and underutilisation of other financing models impede implementation of energy efficiency projects on the larger scale. Even when there are grants available for energy renovation of public buildings, procedures are complicated, offer of grants is not continuous and models for use of private capital (ESCO, PPP) are still not trusted enough. Furthermore, energy efficiency projects often compete with other investment projects that may be prioritized.

Regarding **accounting barriers**, the most important perceived is the lack of knowledge how to treat ESCO and PPP projects, due to which these models, that could mitigate lack of funding barrier, are still not widely used. Also, cost savings resulting from implementation of energy efficiency measures are not possible to be invested in other purposes, diminishing the motivation to undertake energy efficiency improvement actions.

In the area of **technical barriers**, problems with skilled working force for implementation of energy efficiency projects as well as challenges to implement these projects when schools are operating are emphasised. There are also examples when local utility companies impose stricter requirements that it is required by the regulations, hence prolonging or increasing the costs of implementation.

Systematic energy management at founder and school level as a basis for evidence-based determination of energy renovation priorities and long-term planning was emphasised and one of the most important possible solutions to stimulate energy renovation. Education for the use of innovative financing models and their accounting treatment is needed to enable their wider application, hence removing the lack of funds barrier to energy renovation of schools.



3.3. CZECH REPUBLIC

The World Cafe participants were given a list of pre-identified barriers, to which they added other barriers based on a discussion. They worked in 3 groups and discussed importance of the barriers, their current experience and potential solutions. Finally, each participant was asked to evaluate the barriers individually.

3.3.1. Administrative barriers

Barrier	Influence of barrier
High administrative burden in relation to obtaining and managing subsidies (e.g. too many documents, long approval process, then not enough time for realization, etc.)	4,19
High administrative burden in relation to projects (e.g. documentation for obtaining a building permit or an approval of changes, etc.)	3,50
Imperfections in building project documentation (e.g. missing parts, inconsistency between a project and real situation, etc.)	3,38
Relevant projects are not identified	3,13
Problems in a building permitting process (e.g. communication with building authorities, their slow operation, etc.)	3,07
Lack of awareness about mechanical ventilation	2,56
Problems in communication between building owner and its operator	2,19

Note: Influence of barrier was evaluated as its importance (1 – not important, 2 – less important, 3 – average important, 4 – important, 5 – very important)

The above barriers were evaluated by a majority of participants. Some other barriers were also mentioned but evaluated only by few participants. They include:

- Resistance to change / reluctance to do the things in a different way
- Schools are not interested to address a quality of indoor environment
- School directors and their staff are too busy
- School directors are not financially engaged (and so not motivated) to implement energy savings

3.3.2. Legal barriers

Barrier	Influence of barrier
Unclear ownership / ownership relations are not solved	4,13
Limitations arising from legislation (e.g. fire protection rules, etc.)	2,94
Technical equipment is often owned by third parties	2,31



Note: Influence of barrier was evaluated as its importance (1 – not important, 2 – less important, 3 – average important, 4 – important, 5 – very important)

The above barriers were evaluated by a majority of participants. Some other barriers were also mentioned but evaluated only by few participants. They include:

- Limitations given by public procurement law
- Public tenders use only the lowest price criterion
- Difficulty in organization of a public tender – cooperation of different experts is necessary (energy auditor/specialist, designer, procurement expert)
- Long approval process at the level of municipality

3.3.3. Financial barriers

Barrier	Influence of barrier
High investment of nZEB measures / long payback period	4,38
High administrative burden in relation to obtaining and operating subsidies	4,19
Not enough financial resources for co-financing in budgets of school owners (i.e. municipalities or regions)	4,00
Not enough external financial sources - subsidies (incl. low rate of funding)	3,47
Other investment projects are prioritized	3,40
Not enough external financial sources - other sources	3,25

Note: Influence of barrier was evaluated as its importance (1 – not important, 2 – less important, 3 – average important, 4 – important, 5 – very important)

The above barriers were evaluated by a majority of participants. Some other barriers were also mentioned but evaluated only by few participants. They include:

- School equipment is too old, so it would require very complex renovation – which is too costly

3.3.4. Accounting barriers

Barrier	Influence of barrier
Accounting of energy efficiency projects in public sector is ambiguous	3,20
Missing documents and data (e.g. invoices, contracts, etc.)	2,33

Note: Influence of barrier was evaluated as its importance (1 – not important, 2 – less important, 3 – average important, 4 – important, 5 – very important)

The above barriers were evaluated by a majority of participants. Some other barriers were also mentioned but evaluated only by few participants. They include:



- Procurement process is not transparent

3.3.5. Technical barriers

Barrier	Influence of barrier
Buildings protected as a cultural heritage	4,00
Insufficient space (e.g. for installation of HVAC units, piping, cabling, etc.)	3,73
Reconstruction carried out in recent period	3,67
Lack of experts for realization of nZEB projects	3,47
Building stability, in particular roof bearing capacity (e.g. it makes it impossible to install PV panels)	3,40
Lack of experts for identification of nZEB projects	3,33
Unclear definition of nZEB standard	3,27
Problems with technical feasibility of measures in general	3,27

Note: Influence of barrier was evaluated as its importance (1 – not important, 2 – less important, 3 – average important, 4 – important, 5 – very important)

The above barriers were evaluated by a majority of participants. Some other barriers were also mentioned but evaluated only by few participants. They include:

- School equipment is too old, so it would require very complex renovation
- Supplier has a problem to meet deadlines

3.3.6. Comments

The most important barriers perceived by the participating experts are those of financial and technical nature. Then they identified a lot of administrative and information barriers. Although evaluated as less important than the previous two, they are often a reason why financial and technical issues are not addressed. Legal barriers are perceived as of average importance, while accounting barriers seem to be the least important.

Regarding **administrative barriers**, a high administrative burden is the biggest problem relating to both obtaining and managing subsidies, and project operation including building permitting process. It was also pointed out that schools are rather reluctant to implement energy projects. The staff has a lack of time to deal with them, and directors are not motivated (not financially engaged) to implement energy savings. The initiative must come from municipalities (i.e. owners); however, mostly building insulation projects are implemented while there is not enough interest in addressing also quality of indoor environment.

The most important barrier above all are high investment costs of nZEB measures, which result in long payback periods. In many schools, equipment is too old and requires very complex renovation, which makes the projects even more costly. Other **financial barriers** are high administrative burden in relation to obtaining and operating subsidies, and lack of external financial resources. Although there is a funding programme for public buildings renovation, the average rate of funding is only 40% (compared to 85% in the



previous programming period), which is not enough attractive for schools/municipalities that often do not have enough financial resources for co-financing. Furthermore, energy efficiency projects often compete with other investment projects that may be prioritized.

In the area of **technical barriers**, the most problematic issue is the fact that several school buildings are protected as a cultural heritage, and so possibilities for their reconstruction are limited. Moreover, the Czech Republic has a long tradition in funding of energy efficiency in public buildings from ESIF funds / operational programmes. Therefore many schools were renovated in the past decade, and so additional renovation is not considered in the following years. Sometimes, technical parameters may be limiting for realization of certain measures (e.g. insufficient space for installation of HVAC units and other equipment; low roof bearing capacity makes it impossible to install PV panels; etc.). To a lesser extent – but still above average – a lack of experts for both identification and realization of nZEB measures was mentioned.

Concerning **legal barriers**, an unclear ownership was mentioned as potentially the most problematic aspect. However, there are not many real examples in the Czech Republic in relation to schools ownership. Certain provisions of legal acts may be restrictive for public buildings renovations, but they are perceived only at the average level. In particular public procurement law was mentioned, which should better incentivise inclusion of quality criteria; at this moment, most of public tenders use the lowest price as the only criterion.

Only few **accounting barriers** were identified and discussed. In particular it was pointed out that accounting of energy efficiency projects in public sector is sometimes ambiguous. In certain cases, energy experts also face a problem that necessary documents and data (e.g. invoices, contracts, etc.) are missing in schools.

Based on experience from other projects that deal with nZEB,² barriers in education and training can also be identified, namely:

- lack of qualified facility managers;
- insufficient interdisciplinary education and training.

Experience from practice

The participants provided their practical experience regarding reconstruction of public buildings including financing aspects with specific regard to nZEB reconstructions.

Apart from the aspects described above, the following points from the discussion can be highlighted:

- The current Operational Programme Environment provides subsidies for public buildings reconstructions. The requirements are higher than those set in the legislation, and some of them are close to nZEB standard. However, the highest possible funding is only 50% (for best performing projects) - which still does not make the projects attractive enough.
- In case of protected buildings, an exemption can be applied and lower energy values are required.
- Introduction of nZEB requirements for newly constructed public buildings into the Czech legislation resulted in a decrease of new public constructions. There is a risk that implementation of similar requirements for reconstructions could lead to a situation that even partial energy saving measures will not be implemented.
- School directors have very low awareness about existence of nZEB standard.

² Train-to-nZEB (<http://www.train-to-nzeb.com>), ingREeS (<http://www.ingrees.eu>)



- Lack of awareness raising / information activities about nZEB from responsible authorities (ministries) towards public.
- It is not possible for schools to squeeze realization of all construction activities into summer holiday time, so realization during a school year is often inevitable. However, it brings several problems, such as spatial restrictions, safety and noise issues, etc.
- There exist training courses dealing also with nZEB, but they are organized mostly in big cities only (48% in Prague; 43% in next two largest cities). Regional education centres are missing.

Potential solutions

The participants provided their views on how to overcome the identified barriers, i.e. what measures should be taken / how the existing conditions should be changed in order to make nZEB reconstructions a standard.

The next improvements were considered as the most helpful:

- Clear and understandable definition of nZEB requirements as well as calculation methodologies.
- Simplification of a building permitting process.
- Consistent building permitting procedures (training / methodological guidance of building authorities staff).
- Subsidy rate should be 90% to motivate schools for implementation of nZEB measures.
- Easier administration of subsidies (lower administrative burden) - application process, management of a project, approval of changes.
- Faster evaluation procedure of subsidy applications that would give enough time for proper procurement process and real implementation.
- Schools (directors and other staff) should be financially motivated to achieve energy savings.
- Training of experts as well as staff of construction companies.
- Existence of training centres at regional level.



3.4. HUNGARY

A World Cafe workshop was organized in an informal and interactive environment to provide stakeholders' feedback. The following topics were discussed: 1) barriers to energy efficiency financing in schools; 2) experiences of participants and 3) potential solutions.

3.4.1. Administrative barriers

1	Administrative barriers					
a	Failure to approve insulation with a thickness of more than 10 cm / Failure to notify	1	2	3	4	5
b	incomplete construction documentation from the 1980s.	1	2	3	4	5
c	the effectiveness of decision-making between school management	1	2	3	4	5
d	ignoring legislative changes	1	2	3	4	5
e	The evaluation of applications is a long process	1	2	3	4	5

1. Failure to approve insulation with a thickness of more than 10 cm / Failure to notify

Certain investments are not subject to license, but if certain conditions are met, notification is required to the relevant authorities. Eg: According to the OTSZ regulations, insulation greater than 10 cm must be reported to the fire brigade and licensed. If they are lost, then the project may fail or a penalty must be paid. Investors are often unaware of this regulation.

2. incomplete construction documentation from the 1980s.

Buildings built in the 1970s and 1980s do not have or only have incomplete construction documentation available. If this is not the case, you will have to carry out a building survey to prepare the projects, but in many cases no financial resources are available. In addition, due to the shortage of the specialist and the overload of human resources, the institutions are not able to make these or only with a significant delay. 80% of these documents are in the County Archives, but they have to be paid for and the original is not issued. The construction of the new construction documentation is costly and the maintenance of the new construction is required.

3. the effectiveness of decision-making between school management

Institutions belong to a center (Tank District or Vocational Training Center), so decision-making takes place on two levels, which in some cases may be slow. Decisions on the launch of investments are made only if the investment is available, the contract is signed by the economic director.

4. ignoring legislative changes

The involved professionals are not up-to-date in terms of legal changes.

5. the evaluation of applications is a long process



Since larger institutions can only make investments from public or EU sources without exception, there is a problem with the lengthy time for applications to be evaluated, and it can take many years to get started.

3.4.2. Legal barriers

2		Legal barriers					
	a	clarification of ownership	1	2	3	4	5
	b	Legislation is not in line with practice	1	2	3	4	5

1. clarification of ownership

Most of the school buildings are owned by the Municipality, but there is no problem with justifying them, but in some institutions, especially in the case of rural schools, the newly built part of the building is already the property of the maintainer due to the extension of the building, but the land under it is self-governing, clarifying these and certification may be a problem when submitting applications.

2. legislation is not in line with practice

For example, a solar system produces energy in the summer, but there is no consumption due to the summer break, so schools do not get the savings.

3.4.3. Financial barriers

3		Financial barriers					
	a	lack of equity	1	2	3	4	5
	b	price increases (eg building materials)	1	2	3	4	5
	c	the specific limits in the tender specifications do not cover the necessary costs in some cases	1	2	3	4	5

1. lack of equity

Schools have little or no own resources to invest, but they can only make renovation from EU or public money. Small investments made from own resources (eg replacement of some windows, replacement of led lights) cannot be planned in advance as they only see the financial resources available for this type of intervention as the budget is approaching the end of each fiscal year. for these If there is money left in the School's budget, they can make smaller renovations, eg: 20 classrooms in 2 classes with open doors. For a large part of the school buildings, the refurbishments are more likely to be used for the building.

The state supports 3% of public institutions annually, but the question is which schools will be included in 3%.

2. price increases (e.g. building materials)



During the long evaluation of applications, the drastic increase in material prices and labor costs is a problem in implementation, as these activities were not budgeted for high costs when preparing the proposal. There is no own resource needed for the supplement, so reducing the technical content is necessary if the application allows it.

3. the specific limits in the tender specifications do not cover the necessary costs in some cases

The maximum specific cost limits set out in some calls for proposals are in fact insufficient to carry out the activity in question;

3.4.4. Accounting barriers

4	Accounting barriers					
	a misuse of accounting policies	1	2	3	4	5
	b the difference between the invoice issued and the detailed activity list	1	2	3	4	5

1. misuse of accounting policies

In many cases, institutions will not take full account of the requirements of existing accounting policies when activating a completed investment. For example, the investment is activated as a single item, so the use of a uniform and non-shipment depreciation key causes problems later.

2. the difference between the invoice issued and the detailed activity list

The 25% -50% -75% -100% availability milestones and billing required for the applications are not in line, because the proportional realization of the activities does not entail a proportional rise in costs.

3.4.5. Technical barriers

5	Technical barriers					
	a skills shortages	1	2	3	4	5
	b the skills of the professionals are incomplete (e.g. designer)	1	2	3	4	5
	c heritage monument: costs are disproportionately high compared to energy savings	1	2	3	4	5
	d obsolescence of planned technical solutions until the start of investments	1	2	3	4	5

1. skills shortages

As a result of the many construction projects running in the country, it is very difficult to find a freelance specialist, a specialist company (designer, constructor).

2. the skills of the professionals are incomplete (e.g. designer)



It is also related to the previous point, that the majority of the available specialists do not have the right expertise, which leads either to poorly designed or incorrectly implemented projects. The professionals involved are unprepared for the OTSZ.

3. heritage monument: costs are disproportionately high compared to energy savings

it is true that not many educational buildings are under protection, but for such buildings or parts of buildings, the cost of the technical solutions expected by the authority is disproportionately high compared to the targeted energy savings

4. obsolescence of planned technical solutions until the start of investments

Due to the long tendering procedure, the planned technical solutions (eg solar panels) become obsolete or no longer exist.

3.4.6. Comments

After the renovations, it would be important to change / change the operational approach. For example, using good ventilation. More awareness-raising programs / activities would be needed for decision-makers, operators, employees and users of institutions. The formation of attitudes should be taught already in preschool age so that they can make the right decisions as adults.



3.5. ITALY

Participants were divided in three working groups comprising technicians from the Municipality of Udine as well as other municipalities, council members, representatives of the regional government, trade associations and school directors and teachers. Arch. Fabio Dandri (APE FVG), Eng. Maria-Anna Segreto (ENEA) and Arch. Giovanni Margareci (ENEA) coordinated and moderated the three working groups. They discussed about barriers to financing EE projects in schools, their experience and potential solutions. Matteo Mazzolini, Director of APE FVG, supervised the overall discussion and summed up the conclusions reached by each working group at the end of World Café.

3.5.1. Administrative barriers

Barrier	Influence of barrier
Lack of a diffuse culture, information and involvement regarding energy efficiency (including users)	3
Lack of a programming method (e.g. Goal Oriented Project Planning and Project Cycle Management methodologies)	3
Undermining between the various institutions (Region, Municipality, Superintendency, etc.)	4
Obsolete buildings, lack of maintenance and difficulty in beginning demolition and reconstruction works	5
Human resources and skills (lack of training)	4
Difficulties in procedural coordination between the various sectors (energy efficiency / seismic prevention / etc.) and related offices	3
Lack of proper building data storage (lots of data are not available)	4,5
Difficulties in managing school construction sites (coexistence of work and school activities)	3

Note: Influence of barrier was evaluated as its importance (1 – not important, 2 – less important, 3 – average important, 4 – important, 5 – very important)

Regarding **administrative barriers**, presence of obsolete buildings, lack of maintenance and difficulty in beginning demolition and reconstruction interventions are the biggest problems. Lack of proper building data storage (lots of data are not available), undermining between the various institutions (Region, Municipality, Superintendency, etc.) and lack of training of technical staff is another problematic issues. Instead, lack of a diffuse culture, information and involvement regarding energy efficiency (including users), lack of a programming method (e.g. Goal Oriented Project Planning and Project Cycle Management methodologies), difficulties in procedural coordination between the various sectors (energy efficiency / seismic prevention / etc.) and related offices and difficulties in managing school construction sites (coexistence of work and school activities) were considered average important.



3.5.2. Legal barriers

Barrier	Influence of barrier
Public procurement procedures too long and hard to manage, with regards to the Contract Code in particular.	4,5
Lack of coordination between the different legislative sectors (energy efficiency, sanitation, safety, etc.)	4
Difficulty in applying the Minimum Environmental Criteria to support environmental sustainability in the choice of materials / products / solutions	2
Excessive bureaucracy	3
Variability of the legislation and provisions not easily applicable	2
Unsuitable timing	2

Note: Influence of barrier was evaluated as its importance (1 – not important, 2 – less important, 3 – average important, 4 – important, 5 – very important)

Concerning **legal barriers**, public procurement procedures too long and hard to managed, with regards to the Contract Code in particular, was mentioned as the most problematic aspect. Lack of coordination between the different legislative sectors (energy efficiency, sanitation, safety, etc.) was also mentioned in connection to an excessive bureaucracy. Difficulty in applying the Minimum Environmental Criteria to support environmental sustainability in the choice of materials / products / solutions and the variability of the legislation and provisions not easily applicable were considered less important.

3.5.3. Financial barriers

Barrier	Influence of barrier
Wrong approach to interventions: it is decided to proceed only in presence of subsidies	2
Deadlines for subsidies applications are too short and inconsistent (compared to the time required for planning and implementation)	3,5
Lack of coordination between different subsidies (energy efficiency, seismic prevention, asbestos removal, etc.)	5
Lack of staff to work on calls for buildings renovation	5
Budget constraints	4
Lack of knowledge about subsidies available	3

Note: Influence of barrier was evaluated as its importance (1 – not important, 2 – less important, 3 – average important, 4 – important, 5 – very important)

The most important **financial barriers** are the lack of coordination between different subsidies (energy efficiency, seismic prevention, asbestos removal, etc.) and lack of staff to work on calls for buildings



renovation. Other financial barriers are budget constraints and deadlines for subsidies applications that are too short and inconsistent (compared to the time required for planning and implementation). Furthermore, lack of knowledge about subsidies available and wrong approach to interventions: it is decided to proceed only in presence of subsidies were mentioned.

3.5.4. Accounting barriers

Barrier	Influence of barrier
Lack of coordination between different forms of public subsidies (ex. for energy efficiency, seismic prevention, asbestos removal, etc.)	3
Difficulties in management of the preliminary examination of the public contracts (release of documents for controls)	2
Accounting standards and procedures too complex at a local government level, difficulties in managing resources.	4
Limits due to the "Treaty on Stability"	5
Accounting times do not fit with realization timelines due to modifications during realization phases.	3

Note: Influence of barrier was evaluated as its importance (1 – not important, 2 – less important, 3 – average important, 4 – important, 5 – very important)

The most **accounting barrier** that was discussed is limits due to the "Treaty on Stability" and then the accounting standards and procedures too complex at a local government level, that causes difficulties in managing resources. Another barrier is lack of coordination between different forms of public subsidies (ex. for energy efficiency, seismic prevention, asbestos removal, etc.) and the accounting times that often don't coincide with realization timelines due to modifications during realization phases. Instead, difficulties in management of the preliminary examination of the public contracts (release of documents for controls) were considered less important.

3.5.5. Technical barriers

Barrier	Influence of barrier
Lack of a planning culture that identifies interventions and priorities in time	5
Lack of methodologies and skills for the definition of the technical targets and the subsequent evaluation of the solutions / products / materials	5
Constraints due to the age of buildings	3
Difficulty in coordinating energy efficiency retrofitting and structural / plant engineering works	3
Variable training of technical staff	4
Lack of appropriate technological perspectives	2



Note: Influence of barrier was evaluated as its importance (1 – not important, 2 – less important, 3 – average important, 4 – important, 5 – very important)

Concerning **technical barriers**, the most problematic issue is on the one hand the lack of a planning culture that identifies interventions and priorities in time. On the other hand, lack of methodologies and skills for the definition of the technical targets and the subsequent evaluation of the solutions / products / materials. Constraints due to the age of buildings (often obsolete) and difficulty in coordinating energy efficiency retrofitting and structural / plant engineering works were considered average important.

3.5.6. Comments

The major obstacles to the implementation of energy efficiency interventions on public buildings emerged during the World Café are the following:

- absence of planning culture;
- lack of coordination between public entities, offices and procedures;
- complexity of procedures;
- complexity of the public procurement legislation.

Unfortunately, most of these problems require a response at a central level, not at a local level.

Nevertheless, public opinion can contribute to sensitize politicians, administrators and public officers in order to improve management systems, favouring more effective approach to energy efficiency renovations in public schools.

The participants provided their practical experience regarding reconstruction of public buildings including examples with specific regard to nZEB reconstructions.

Besides the obstacles and barriers outlined above, the following problems have also emerged:

- technical staff have limited knowledge of the NZEB standards, and how to incorporate those standards in the building and renovation project;
- systems of post-intervention management are never implemented: lack of a shared indications on how to assess the results of the intervention;
- notwithstanding the introduction of new rules of public procedures, with regards to assessment and verification of projects, the quality of the interventions has not increased;
- building upon the example of others is also an important factor to be taken into account. The new school of Ronchi dei Legionari, for example, was built upon the old one, through demolition and reconstruction. This has quickly become a model for other projects.
- good project management can lead to important results in the reconstruction of cultural sites, as Palazzo Badoer of the IUAV in Venice, which was classified class B.

The participants provided their views on how to overcome the identified barriers and in all tables has emerged a wide-spread need to coordinate and simplify public procedures rules at a municipality level.

The participants have suggested the following initiatives to address these problems:



- training and seminars directed to the public and to the municipality staff, in order to provide knowledge on the following topics:
- good practices;
- energy efficiency;
- regulations;
- technical and technological innovation;
- subsidies and other forms of public funding.
- facilitate management, coordination and control of procedures, encouraging the introduction of BIM systems;
- experiment Goal Oriented Project Planning and Project Cycle Management methodologies in procedures linked to energy efficiency;
- encourage politicians to adopt coherent procedures of urban planning.



3.6. POLAND

Participants worked in groups and discussed about importance of the barriers, their experience and the potential solutions. The following sections provide the overview of the main discussion results.

3.6.1. Administrative barriers

1	Administrative barriers					
a	Lack of effective cooperation between schools and district offices	1	2	3	4	5
b	Lack of a possibility to implement energy efficiency projects independently by schools, without the participation of the District Office or Municipal office	1	2	3	4	5
c	Low level of competences in the scope of energy efficiency of the District Offices' employees	1	2	3	4	5

During the World Café meeting, stakeholders listed the following the most significant administrative barriers:

1. Lack of effective cooperation between schools and district offices, which are responsible for investments planning and implementation. Schools inform district offices about their needs and problems but then they have no impact on when, in what extent, and if any investment will be made.
2. Lack of a possibility to implement energy efficiency projects independently by schools, without the participation of the District Office or City Hall, due to the lack of legal personality of schools.
3. Low level of competences in the scope of energy efficiency of the District Offices' employees. Poor quality investments are sometimes performed due to lack of proper supervision of the contractor. School staff have no power to supervise an investment.

3.6.2. Legal barriers

2	Legal barriers					
a	Investment priority - in schools there are orders concerning fire protection, sanitary inspection- Lack of orders concerning energy efficiency lowers priority for such actions	1	2	3	4	5
b	Legislative changes in the field of education cause that the funds previously intended for energy efficiency are used for adjustment to the new legal requirement	1	2	3	4	5
c	A school having no legal personality - the Education Department of the District Office decides on the implementation of all investment activities	1	2	3	4	5

During the World Café meeting, stakeholders listed the following the most significant legal barriers:

1. Due to limited financial resources, investments related to fire protection and sanitary conditions get higher priority. As there are no legal obligations related to energy efficiency, these modernizations are performed only if there are budget reserves.



2. Legislative changes in the field of education cause that the funds previously intended for energy efficiency are used for adjustments to the new legal requirements.
3. Schools have no legal personality, thus in result it is the Education Department of the District Office which decides whether to implement any investment or to join a project.

3.6.3. Financial barriers

3	Financial barriers					
a	Lack of motivation at schools - savings generated in a given school do not come back	1	2	3	4	5
b	Lack of finds for the implementation of comprehensive projects - only small projects are being executed, e.g. replacement of window frames	1	2	3	4	5

During the World Café meeting, stakeholders listed the following the most significant financial barriers:

1. The most important barrier are limited funds for implementation of comprehensive projects in schools, which include improvements in all fields of energy efficiency. Currently only small projects are implemented, and as a result it happens that application of one measure destroys results of the previous one, e.g. replacement of windows partially destroys the façade, which was renovated during the thermal insulation of walls.
2. The other significant barrier is lack of motivation of schools for energy savings. There are no incentives for schools, as savings generated by a given school do not come back to it, even partially.

3.6.4. Accounting barriers

4	Accounting barriers					
a	Analysis of invoices -expenses	1	2	3	4	5
b	Difficulties regarding settlements	1	2	3	4	5
c	Lack of the knowledge of the funding programmes	1	2	3	4	5

During the World Café meeting, stakeholders listed the following the most significant accounting barriers:

3. Difficulties in analysis of energy invoices;
4. Difficulties regarding settlements;
5. Lack of knowledge of the funding programs.



3.6.5. Technical barriers

5		Technical barriers					
			1	2	3	4	5
	a	Outdated and incomplete documentation of buildings	1	2	3	4	5
	b	Low level of executed modernisations due to the low quality of ensured supervision	1	2	3	4	5
	c	Lack of up-to-date diagnosis of the energy efficiency status for buildings (energy audits)	1	2	3	4	5

During the World Café meeting, stakeholders listed the following the most significant technical barriers:

6. Outdated and incomplete documentation of buildings. This increases investment cost and time, as well as makes it difficult to plan the investment in advance;
7. Low quality of the executed modernisations due to the low quality of supervision ensured by the District Office staff;
8. Lack of the up-to-date diagnosis of the energy efficiency status of buildings (energy audits).

3.6.6. Comments

Stakeholders participating in the World Café meeting in Warsaw agreed that the administrative, legal and financial barriers are the most significant as they effectively block energy efficiency improvement in schools. Technical barriers are also important, but could be overcome, if there were more funds. On the other hand, accounting barriers are almost negligible, according to stakeholders' opinion.

Stakeholders listed a set of possible solutions. This includes:

Awareness improvement of the building users. The modernisation of a building is not sufficient; it is also necessary to instruct the users how to correctly operate the building under new conditions (e.g. to change a thermostat set-point instead of opening windows).

A comprehensive energy efficiency improvement programme is needed in schools, which would be executed at the level of a city or a district. All institutions should be involved. Examination of the energy efficiency potential (audit) in each school should be the first step. A similar programme has been executed in Warsaw several years ago and a continuation is needed.

Cooperation and dialog between schools and district offices is crucial.



3.7. SLOVENIA

Participants worked in groups and discussed about importance of the barriers, their experience and the potential solutions. The following sections provide the overview of the main discussion results.

3.7.1. Administrative barriers

1	Administrative barriers					
a	Too much paperwork required for the application of the project and reporting	1	2	3	4	5
b	Instructions for the project preparation are extensive and vague	1	2	3	4	5
c	Inappropriate timetable for the preparation of public tenders and documentation.	1	2	3	4	5
d	Inadequate project documentation.					

The most important barriers are (very strong influence):

- Too much paperwork for preparation of the project and for reporting (too many documents).
- Too extensive instructions for the preparation of project documentation.
- Inappropriate timetable for the preparation of public tenders and documentation.
- Inadequate project documentation.

Some other barriers were also mentioned:

- Problems in communication (communication between the state, municipality and operators),
- School directors are not motivated to implement energy savings.
- Lack of project documentation of referred schools.

3.7.2. Legal barriers

2	Legal barriers					
a	Buildings protected as cultural heritage	1	2	3	4	5
b	Inadequacy of public procurement legislation	1	2	3	4	5
c	New legislation in the field of construction makes it difficult to implement projects in existing buildings.	1	2	3	4	5

The most important barriers are (very strong influence):

- Problems arising from legislation for buildings under heritage protection.
- Inadequacy of public procurement legislation is causing problems in practice.
- New legislation in the field of construction makes it difficult to implement projects in existing buildings.



Some other barriers were also mentioned but voted as less important:

- Changing legislation causes difficulties with renovation of older buildings,
- Public tenders use only the lowest price criterion,
- Disregarding the contract plans (date, etc.),
- Difficulties finding experts for renovation in a short time (time that we had in public tender).

3.7.3. Financial barriers

3	Financial barriers					
a	Insufficient funds for maintenance	1	2	3	4	5
b	Inadequate distribution of risk between public and private partners	1	2	3	4	5
c	Lack of interest for PPP projects (monopoly situation)	1	2	3	4	5

The most important barriers are (very strong influence):

- Insufficient funds for quality maintenance.
- Inadequate distribution of risks between public and private partners.
- Lack of interest of public - private partners (monopoly situation).

Some other barriers were also mentioned but voted as less important:

- Long payback period.
- Not enough external financial sources.

3.7.4. Accounting barriers

4	Accounting barriers					
a	Generated savings are transferred to the municipal budget (no stimulation)	1	2	3	4	5
b	Organizational measures are more cost-effective than usage of the ventilation system.	1	2	3	4	5
c	Missing documents and data (project documentation, invoices, etc.)					

The most important barriers are (very strong influence):

- Generated savings are transferred to the municipal budget (no stimulation).
- Organizational measures are more cost-effective, than usage of the ventilation system.
- Missing documents and data (invoices, etc.)



3.7.5. Technical barriers

5		Technical barriers					
a	The owners sometimes don't know what they want	1	2	3	4	5	
b	After the expiration of guarantee, reimbursement of costs for repairing poor implementation is impossible	1	2	3	4	5	
c	Lack of experts for identification of nZEB projects					4	

The most important barriers are (very strong influence):

- The owner sometimes doesn't know what they want.
- After the expiration of guarantee, reimbursement of costs for repairing poor implementation is impossible.
- Lack of experts for identification of nZEB projects
- Buildings protected as a cultural heritage

Some other barriers were also mentioned but voted as less important:

- Public orders – laws are not written for practise (a lot of paper work)
- Organization measurements (a lot of time we don't know what is built in the building.)
- Flat roofs on schools should be prohibited

3.7.6. Comments

The most important barriers are financial and technical. On the other side are accounting barriers the least important. Financial barriers - Municipalities as owners usually do not have enough financial resources for reconstruction. Although there is a financing program for the renovation of public buildings, the average funding rate is only 40%, which is not enough for municipalities that often do not have enough own funds for co-financing. In Slovenia is also a lack of interest in a public - private partnership. On the other side there is high investment costs of nZEB measures, which results in long payback period. In the area of technical barriers, it is often an obstacle in that owners often do not know exactly what they would like to renovate (mainly due to unjustified costs). A number of public buildings in Slovenia are culturally protected and, therefore, the possibilities of restoration are limited.

Potential solutions:

- Simplification of the procedure for public tenders.
- Faster evaluation procedure of subsidy applications that would give enough time for proper procurement process and real implementation.
- Subsidy rates should be higher.
- More public – private partnership.
- By the implementation of renovation must be better communication between contractors, supervisors, owners, etc.