

D.T3.2.8 PILOT ACTION SUMMARY

Final report

Version 2
12 2019

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Ministry of Science
and Higher Education
Republic of Poland





1. General information about pilots

1.1. Aim of pilots

The aim of pilot activities was to test and evaluate the FEEDSCHOOLS toolkit: ERE App, Financial App, and the database of best NZEB practices. Pilots have taken place in 6 countries: Croatia, Czech Republic, Hungary, Italy, Poland, and Slovenia. 8 schools from each country have been involved. In each school three different functional zones were targeted: classroom, sport hall, and canteen. Pilot consisted of the following activities:

1. Data collection - preliminary data, such as historical energy consumption and building technical schemes, have been collected.
2. On site energy audits - pilot schools have been visited and energy audits have been conducted. As a result, reports describing building energy performance have been drafted.
3. Improvement options - based on on-site energy audits results, energy efficiency measures have been proposed so that nZEB standard could be reached.
4. Optimal financing schemes - using the Financial App, plans of financing the renovation measures have been proposed.
5. Carbon footprint of restoration - using the ERE App, the improvement of building carbon footprint has been calculated.
6. Open lessons for behavioural change of school staff and students - in each school participating in the project lessons activating energy saving behaviour have been organised. Lessons targeted students, teachers and technical staff.
7. Improvement and validation of the apps - results of the ERE App and Financial App have been compared with results of on-site audits, so that Apps could be improved.

1.2. Schools selected for pilot activities

School ID	Building name	Street, number, city and postcode
CZ_01	ZŠ Louny Prokopa Holého	Prokopa Holého 2632, Louny
CZ_02	ZŠ Jablonec nad Nisou - Rýnovice	Pod Vodárnou 88/10, Jablonec nad Nisou
CZ_03	Elementary school Komenského	Komenského 668/13, 708 00 Ostrava-Poruba
CZ_04	Elementary school of Gen. Zdeňka Škarvady	Porubská 831/10, 708 00 Ostrava-Poruba

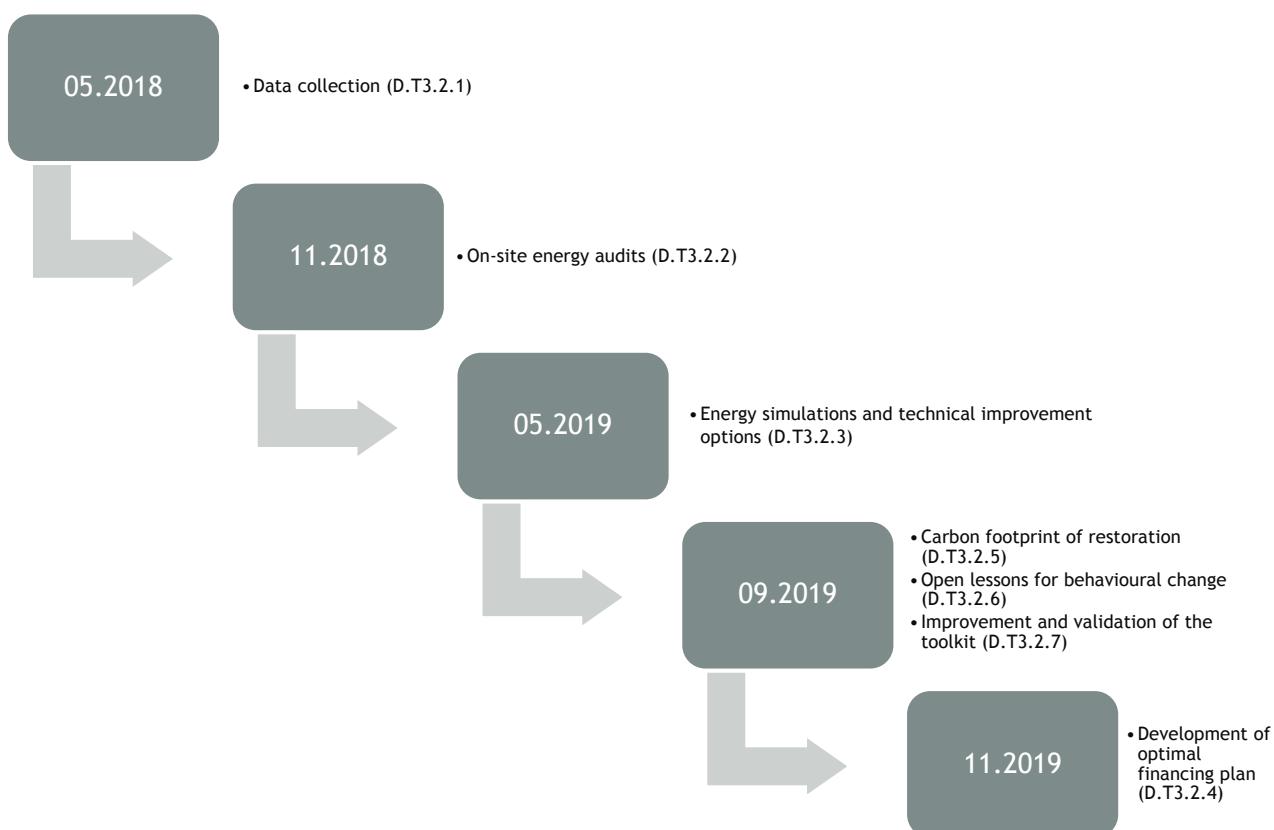


CZ_05	Elementary school of Gen. Píky	Gen. Píky 2975, 702 00 Moravská Ostrava a Přívoz
CZ_06	Elementary school Kosmonautů 15	Kosmonautů 2217/15, 700 30 Ostrava-jih
CZ_07	Elementary school Michálkovice	U Kříže 28, 715 00 Ostrava - Michálkovice
CZ_08	Elementary school V. Košaře	Václava Košaře 121/6, 700 30 Ostrava-jih-Dubina
HR_01	Osnovna škola Dobri	Slavićeva ul. 40, 21000, Split
HR_02	Osnovna škola Ravne njive	Sarajevska ul. 30, 21000, Split
HR_03	Osnovna škola Split 3	Bruna Bušića 6, 21000, Split
HR_04	Osnovna škola Žrnovnica	Hrvatskih velikana 41, 21251, Žrnovnica
HR_05	Osnovna škola Brda	Put Brda 2, 21000, Split
HR_06	Osnovna škola Meje	Gunjačina ul. 1, 21000, Split
HR_07	Osnovna škola Pojišan	Viška ul. 12, 21000, Split
HR_08	Osnovna škola Spinut	Teslina 12, 21000, Split
HU_01	Zalaegerszegi SzC Csány László Szakgimnáziuma	8900 Zalaegerszeg, Jókai u. 4-6.
HU_02	Zalaegerszegi SZC Deák Ferenc Gimnáziuma, Szakgimnáziuma és Szakközépiskolája	8900 Zalaegerszeg, Göcseji út 16.
HU_03	ZsZC Munkácsy Mihály Szakgimnáziuma és Szakközépiskolája (főépület)	8900 Zalaegerszeg, Gasparich M. u. 24.
HU_04	Nagykanizsai SZC Zsigmondy Vilmos Szakképző Iskolája	8800 Nagykanizsa, Hunyadi u. 16-18.
HU_05	Nagykanizsai SZC Thúry György Szakképző Iskolája	8800 Nagykanizsa, Ady E. u. 29.
HU_06	Zrínyi Miklós Általános Iskola	8800 Nagykanizsa, Zrínyi Miklós u. 38.
HU_07	Batthyány Lajos Gimnázium	8800 Nagykanizsa, Rozgonyi u. 23.
HU_08	Kiskanizsai Általános Iskola	8800 Nagykanizsa, Bajcsy-Zsilinszky u.67
IT_01	LEA D'ORLANDI	via Della Roggia, n.52, Udine, 33100
IT_02	E. FERMI	via Pradamano, n.21/23, Udine, 33100
IT_03	M. B. ALBERTI	via Baldasseria Media, n.25, Udine, 33100
IT_04	P. ZORUTTI	via XXX Ottobre, n.17, Udine, 33100
IT_05	G. MARCONI	via Torino, n.49, Udine, 33100
IT_06	CARDUCCI	via Dante, 3/5, Bologna, 40125
IT_07	FERRARI	via Cesare Pavese, 15, Bologna, 40141
IT_08	ZANOTTI	via Del Giacinto, 39, Bologna, 40133
PL_01	Szkoła Podstawowa Nr 61	Białobrzaska 27, Warsaw
PL_02	Szkoła Podstawowa 340, budynek B	Lokajskiego 3, Warsaw
PL_03	Szkoła Podstawowa 378	Bartnicza 8, Warsaw
PL_04	Szkoła Podstawowa 341	Oławska 3, Warsaw
PL_05	Szkoła Podstawowa 77	Samogłoska 9, Warsaw
PL_06	Szkoła Podstawowa Nr 28	Gościeradowska 18/20, Warsaw
PL_07	Szkoła Podstawowa Nr 277	Suwalska 29, Warsaw
PL_08	Szkoła Podstawowa Nr 26	Miedziana 8, Warsaw
SI_01	Tinje	Veliko Tinje 29, 2316 Zg. Ložnica
SI_02	Srednja šola Sl. Bistrica	Ul. Dr. Jožeta Pučnika 21, 2310 Slov. Bistrica
SI_03	Šmartno na Pohorju	Šmartno na Pohorju 24a, 2315 Šmartno na Pohorju
SI_04	KEBELJ	Kebelj 17b, 2317 Oplotnica
SI_05	2. OŠ	Šolska ulica 5, 2310 Slov. Bistrica
SI_06	Laporje	Laporje 31, 2318 Laporje



SI_07	Črešnjevec	Črešnjevec 47, 2310 Slov. Bistrica
SI_08	Sp. Polskava	Sp. Polskava 240, 2331 Pragersko

1.3. Pilot timeline



1.4. Partners responsible for Pilots

- > **ENVIROS, s.r.o.**
 - Country: the Czech Republic
 - Partner type: technical
 - Partner description: limited private company providing technical consultancy since 1994 in energy efficiency and environmental projects in the EU and the Czech Republic, ENVIROS develops for its clients from private and public sector:
 - energy audits, energy assessments, energy action plans, energy studies,
 - energy management implementation,



- energy efficiency projects financing advisory
- other
- Main role and duties in Pilots: development of comprehensive pilot projects activities consisted of coordination activities, communication activities, data collection, onsite energy audits, improvement option proposal, financial scheme proposal, calculation of carbon footprint, open lessons conducting.
- > **City of Split**
 - Country: Croatia
 - Partner type: institutional
 - Partner description: City of Split is the second largest city of Croatia, with about 250,000 people living in its urban area. The city's target, committed in the Sustainable Energy Action Plan, is to reduce CO₂ emissions by 20% and energy consumption by 20% by 2020 compared to 2007.
 - Main role and duties in Pilots: institutional partner, coordinating collaboration with schools.
- > **Roterm ltd.**
 - Country: Croatia
 - Partner type: subcontractor
 - Partner description: Roterm ltd. is expert company for providing technical consulting services, specialized in engineering design and works supervision. Besides engineering design and supervision, also provides technical consulting services throughout the whole investment process. Roterm ltd. Is providing professional assistance and expertise in the field of energy auditing and energy efficiency improvement of buildings.
 - Main role and duties in Pilots: subcontractor responsible for audit conducting.
- > **Zala County Foundation for Enterprise Promotion**
 - Country: Hungary
 - Partner type: technical / institutional / external: institutional
- > Partner description: **Zala County Foundation for Enterprise Promotion** was founded in 1992 to provide support for stakeholders, entrepreneurs. Our objectives to promote the economic development of Zala County, support the establishment, survival and first of all the growth of SMEs by operating with 5 offices. Participating in a number of national and EU- funded projects. ZMVA is significant stakeholder in the field of projects, raising, energy efficiency, incubator houses, fields of financing, micro crediting. ZMVA offers starting possibilities for newly established enterprises, to promote their growth by offering affordable rentals. ZMVA built up a wide range of international partnership, committed to boost environmental awareness through joint initiatives.
 - Main role and duties in Pilots: manage to cooperation with schools and coordinating the pilots with an external technical manager
- > **ENEA Italian National Agency for New Technologies, Energy and Sustainable Economic Development**
 - Country: ITALY
 - Partner type: technical/institutional



- Partner description: technical partner coordinating Pilots and supervising work done by the subcontractor. ENEA is the National Agency for New Technologies, Energy and Sustainable Economic Development, a public body aimed at research, technological innovation and the provision of advanced services to enterprises, public administration and citizens in the sectors of energy, the environment and sustainable economic development. ENEAS is divided in Department involved in different sectors. DUEE and SSPT Departments are involved in FEEDSCHOOLS project and main fields of experience of these two Departments are sustainable energy, energy efficiency and environmental sustainability. Since its foundation in the 1960s, ENEA's strengths have been applied research, technology transfer and technical-scientific support to companies, associations, territories, central and local administrations: for this reason - unlike other research institutions - the Agency depends on the Ministry of Economic Development. DUEE (Energy Efficiency Unit Department) of ENEA is the Agency for Energy Efficiency, established by the Italian legislative decree n° 115 of 30th May 2008, as transposition of directive 2006/32/EC on energy end-use efficiency and energy services and repealing Council Directive 93/76/EEC, which offers technical and scientific support to companies, supports the public administration in the preparation, implementation and control of national energy policies, and promotes training and information campaigns for the dissemination of energy efficiency culture.
- Main role and duties in Pilots: technical partner coordinating Pilots in Bologna and supervising work done by the subcontractor. Lead partner of the project managing all activities.
- > **External Energy Expert - Arch. Giovanni Margareci**
 - Country: Italy
 - Partner type: external
 - Partner description: Technical professional (energy auditor), providing professional assistance and expertise in the field of energy auditing and energy efficiency improvement of buildings, factories and processes.
 - Main role and duties in Pilots: subcontractor responsible for audit conducting.
- > **City of Udine**
 - Country: Italy
 - Partner type: institutional
 - Partner description: City of Udine, located in the middle of the Friuli-Venezia Giulia region, with population over 99 thousand, in the last years has been a forerunner on sustainability issues. At the time being, Udine is committed to: implementation of retrofit actions on its own buildings, historic buildings in particular; improvement of local regulations with energy efficiency and sustainability aspects; participatory processes and communication campaigns on urban issues; EU initiatives such as Covenant of Mayors, implementation of SEAP and update to SECAP; participation at EU projects on energy and environmental sustainability.
 - Main role and duties in Pilots: institutional partner, coordinating collaboration with schools.
- > **Energy Management Agency of Friuli Venezia Giulia - APE FVG**
 - Country: Italy
 - Partner type: external
 - Partner description: APE FVG is a technical organization with operational capacity in the field of energy efficiency, renewable energy systems and energy planning. APE FVG was established in 2006 as a non-profit association with legal personality. It provides guidance on EU relevant policy



frameworks and promotes the uptake of EU strategies by local stakeholders. Main competences are: promotion of stakeholders' participation in sustainable energy projects, dissemination of best-practices, increase of energy knowledge through awareness campaigns, empowerment of decision- and policy-making processes.

- Main role and duties in Pilots: subcontractor responsible for audit conducting.

> **Research and Innovation Centre Pro-Akademia**

- Country: Poland
- Partner type: technical
- Partner description: RIC Pro-Akademia is a non-profit research organisation based in Central Poland. RIC Pro-Akademia's main field of experience is sustainable energy and energy efficiency. Since its establishment in 1996 Pro-Akademia has successfully implemented over 200 research and advisory projects for EU institutions, Polish local and central authorities as well as industry.
- Main role and duties in Pilots: technical partner coordinating Pilots and supervising work done by the subcontractor.

> **City of Warsaw**

- Country: Poland
- Partner type: institutional
- Partner description: City of Warsaw is the capital and the largest city of Poland, with a population of 1.7 million and around 3 million live within the agglomeration. The city's target, committed in the Sustainable Energy Action Plan, is to reduce CO2 emissions by 20% and energy consumption by 20% by 2020 compared to 2007.
- Main role and duties in Pilots: institutional partner, coordinating collaboration with schools.

> **Olaff Energy**

- Country: Poland
- Partner type: external
- Partner description: Olaff Energy is a private company based in Warsaw, providing professional assistance and expertise in the field of energy auditing and energy efficiency improvement of buildings, factories and processes.
- Main role and duties in Pilots: subcontractor responsible for conducting audits and open lessons.

> **Local Energy Agency Spodnje Podravje**

- Country: Slovenia
- Partner type: technical
- Partner description: Local Energy Agency Spodnje Podravje is energy manager for the Spodnje Podravje municipalities. Main activities of the agency are: developing local energy concepts, energy management, energy bookkeeping, energy auditing of the building and lighting systems, developing the investment documentation for energy renovation supervision of the energy renovation of the public buildings and energy certification.
- Main role and duties in Pilots: technical partner, responsible for audit conducting

> **Municipality of Slovenska Bistrica**



- Country: Slovenia
- Partner type: institutional
- Partner description: The municipality of Slovenska Bistrica is one of the largest in Slovenia. It is 260 km² in size and it has a population of about 25,000. Local energy plans aim at decreasing energy consumption in public buildings of 20% till 2020, and acceleration of renewables (RES) at local level.
- Main role and duties in Pilots: institutional partner, coordinating collaboration with schools.

2. Pilot activities

2.1. Data collection

In this task preliminary data, such as historical energy consumption and building technical schemes, have been collected. Each out of 6 national data collection reports (D.T3.2.1) provides a preliminary overview of a current state of school buildings selected to the FEEDSCHOOLS project, in terms of their energy consumption and climatic data. It also identifies existing and available technical documents such as building plans, installation schemes, user guides etc. Data provided with this report was used by energy auditors as a preparation to energy audits, to understand a specific situation of each building, and in particular to identify which type of data is necessary to be collected during on-site audits. Summary of collected data presents Annex 1.

2.2. On site energy audits

In this task pilot schools have been visited and energy audits have been conducted. Auditors have identified problematic issues related to energy consumption in all functional zones considered in the project: classrooms, sport halls, and canteens. As a result, reports describing building energy performance have been drafted. Summary of collected data presents Annex 1.

2.3. Improvement options

In this task, based on on-site energy audits results, energy efficiency measures have been proposed so that nZEB standard could be reached. Summary of collected data presents Annex 1.

2.4. Optimal financing schemes

In this task, using the Financial App, plans of financing the renovation measures have been proposed. Own resources, credits, ESCO model, and public-private partnership have been considered to develop an optimal financing scheme of the renovation. Summary of collected data presents Annex 1.

2.5. Carbon footprint of restoration

In this task, using the ERE App, the improvement of building carbon footprint has been calculated. Data from on-site audits and improvement options reports have been used as an input. As a result, fuel carbon footprint related to thermal energy and electricity savings, as well as emissions related to construction work of the modernisation has been calculated. Summary of collected data presents Annex 1.



2.6. Open lessons for behavioural change of school staff and students

In this task in each school participating in the project lessons activating energy saving behaviour have been organised. Lessons targeted students, teachers and technical staff.

In the Czech Republic, there have been 10 lessons organised. In total, 253 students and 16 school staff participated in open lessons. Lessons for students were focused on energy and its generation, renewable energy introduction, global warming and its connection to energy consumption, and mainly on options how to save energy in school and how can students affect the energy consumption in their school. The lessons included interactive activities to engage the students to the topic.

The lesson for the schools' staff consisted of the introduction of the pilot action results of the particular school - presentation of energy audit outputs and explanation of proposed energy efficiency measures together with the financing options, comparison with other Czech schools involved in project, presentation of results from energy audits of partner countries. In the end the forthcoming activities of the project were introduced.

In Croatia, there have been 8 lessons organised. In total, 349 students and 18 school staff participated in open lessons. The main objective is to encourage and activate students in energy efficiency issues as an important element in counteracting the negative impacts of climate change. The aim of the workshop is to raise students' awareness of the need for efficient use of energy and sustainable management of resources for environmental protection.

In Hungary, there have been 9 lessons organised. In total, 264 students and 25 school staff participated in open lessons. Lessons for students focused on importance of sustainable environment and encourage them to the environmentally responsible behaviour and providing sound information and strengthen motivation and behavioural skills that are necessary to make the needed changes in behaviour and lifestyles. The lesson for the schools' staff concerned: during the open lesson we focused on energy saving and energy wasting and how can we use the energy economically in the school and at home. The main topic was the greenhouse effect and global warning which the students should study more detail in the school. The staff of school was informed the methodology of energy efficiency and awareness raising.

In Italy, exactly in the city of Udine, there have been 10 lessons organised. In total, 311 students and 100 school staff participated in open lessons. Lessons for students focused on behavioural change aimed at energy savings in schools. Specific objectives focused on the importance of how we can save energy only by implementing small and low- or no-cost measures: through the changing of some small daily behaviours and avoiding or limiting the use of any energy-consuming devices. After a short introduction about the issue of energy, we made children play two interactive games "Energy Alphabet" and "Right or Wrong. During the introduction and games, students were actively involved in the discussion and participated with enthusiasm, showing a great involvement in these activities. The lesson for the schools' staff concerned the importance of energy savings at schools and actions that improve them. The reduction of energy consumption more by 15-20% can be reached without considerable investments, but only through a more rational use of energy, a better organization and a greater awareness of the end users. Simple energy savings behaviours are the followings: turning off water and energy-using appliances when not in use, using the building systems properly, upgrading heating controls, using energy efficient lighting and so on. A good organization of working hours in schools in order to concentrate air conditioning/heating use and times is recommended. Teachers can bring energy information into lesson plans and repeat the activities of open lessons for students.

In Bologna 3 further open lessons have been planned in city's schools. According to the needs of pilot schools' representatives, activities have been planned to be completed in February 2020. Covid-19 lockdown in Italy nevertheless prevented any possibility to implement face to face lessons. ENEA is actually verifying the possibility to organize the activities online.



In Poland there have been 9 lessons organised. In total, 159 students and 9 school staff participated in open lessons. The main goal of lessons for students was to shape pro-ecological attitudes by building awareness in the field of energy saving among primary school pupils. The students learned about different forms of energy, how it is used both at home and at school, why it is important to save energy, and how it can be conserved. The lesson for the schools' staff concerned raising awareness in the field of energy consumption in school buildings and importance of energy conservation. In particular, energy saving measures that can be implemented in schools by different users (students, teachers, technical staff) have been presented.

10 lessons have been organized in Slovenia. In total, 245 students and 25 school staff participated in open lessons. Lessons for students focused on saving energy due to the changes in their behaviour. They were introduced to energy efficiency and renewable energy. They got acquainted with existing and new upcoming energy technologies, different possibilities of using removable energy sources and use of energy... Staff were acquainted with activities that could influence energy savings, and how much could be saved with certain procedures, e.g. proper ventilation, regulating valves on radiators etc.

2.7. Improvement and validation of the apps

In this task results of the ERE App and Financial App have been compared with results of on-site audits, so that both apps could be improved. Partners involved in Pilots tested apps and provided their feedback to developers.