Partnership of European Regions on Energy Efficiency in Buildings

Interregional Pilot project Development and Interactive Discussion for next year

Decission support tools for planning nZE interventions in buildings

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Instituto Valenciano de la Edificación (Valencia Institute of Building)

Decission support tools for planning nZE interventions in buildings

THEMES	Description
1. Reference theme	Systems of Maximum Energy Efficiency use in Buildings and Cities
2. Action line	?
3. Name of offer of collaboration	Decission support tools for planning nZE interventions in buildings
4. Entity that presents the offer	IVE (Instituto Valenciano de la Edificación)
5. Member of the Partnership that supports the offer	TBC
Annex. Including data of the entity.	Attached

Decission support tools for planning nZEB interventions in public buildings

THEMES	Description
1. SCOPE - Brief history of the project:	One of the main challenges tackled when speaking about energy efficiency in public buildings is the insufficient capacities of small public administrations to set-up reliable and affordable energy efficiency plans for their public building stock. Therefore, there is a need for concrete decision-support solutions that help these small public administrations to define their energy strategy regarding the improvement of their public building stock. As an example, IMPULSE is an Interreg MED project whose objective is to develop a transnational purpose web and GIS-based information system being a user-friendly decision-making tool for affordable SEAPs with high impact. The tool is verified through small-scale renovation projects in each pilot City and further evaluated through targeted transferring activities.

Management support tools for planning nZEB interventions in public buildings

THEMES	Description
2. CURRENT MARKET AND POTENTIAL:	Market: passive and active measures aplicables to buildings. The decission support tool identify those passive and active measures to reach nZE interventions.
3. ADDED VALUE SOUGHT BY THE COLLABORATION:	Development of tools for diagnosis, intervention strategies and promotion of building renovation and urban regeneration. Systemic integrated approaches for NZE renovation of buildings.
4. ACTORS OF THE VALUE CHAIN:	Public administrations & policy decission makers (municipalities, regions) Research centres or technical partners Energy consultancy services Technology providers
5. REPLICABILITY:	The methodology could be enlarged to all the municipalities or regions over Europe.
6. OFFER OF REGIONAL SUPPORT (and in the case of their national or European entities):	H2020 calls on Energy – CSA – building upon previous projects. The pilot Project idea is just an example, but needs to be tailored and adapted according to the requirements of the specific call we adress.

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IMPULSE

Integrated **M**anagement Support for Energy efficiency in Mediterranean **PU**blic bui**L**dings

Miriam Navarro (IVE) / mnavarro@five.es / Bilbao, 28.Nov.2018

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Call
Interreg MED
Type
Transnational Cooperation Projects
Duration
11/2016 – 04/2019
Overall Budget
2.222.863 €
Web
https://impulse.interreg-med.eu/

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WHAT?

OBJECTIVE: To foster low-carbon strategies and energy efficiency in Mediterranean public buildings

HOW?

By introducing a GIS integrated management support system

WHO?

This tool will support Public Administrations and municipalities to set-up reliable and affordable energy efficiency plans for their public building stock

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APPROACH

6 MED CITIES

Through the testing of exhaustive data collection approaches, IMPULSE seeks to categorize public buildings at local level and create inventories for each pilot city

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INVENTORY

ELCHE (Spain): Inventory of **85** buildings classified into

12 typologies represented by **12** Ambassador buildings.

Majority of **EDUCATIONAL** USE

Typologies		<1979		1980-2006		>2006	
		<=2 floors	3-5 floors	<=2 floors	3-5 floors	<=2 floors	3-5 floors
Educational buildings	<1000 m2	PTB12		PBT11			
	1000-5000 m2	PBT4	PBT1	PBT2	PBT3		
	>5000 m2				PBT7		
Comunitario	<1000 m2			PBT6			
	1000-5000 m2			PBT5			
	>5000 m2						
Sports centers	<1000 m2						
	1000-5000 m2			PBT8		PBT9	
	>5000 m2						
Office buildings	<1000 m2		PBT10				
	1000-5000 m2						
	>5000 m2						

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ENERGY SIMULATIONS

The 12 ambassador buildings have been simulated energetically in 5 scenarios

Upgrading SCENARIOS:

5. Deep retrofit towards nZEB
4. Major retrofit
3. Medium retrofit
2. Minor retrofit
1. Existing situation

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INDICATORS: A list of 33 KPIs

Classified into ENERGY, ENVIRONMENTAL and ECONOMIC impact

ENERGY PERFORMANCE	Total annual primary energy consumption
	Annual final energy consumption for space heating
	Annual final energy consumption for space cooling
	Annual final energy consumption for domestic hot water
	Annual final energy consumption for lighting
	Annual electricity consumption
	Annual consumption of fossil fuel
	Annual generation of Renewable Energy
	Energy class
ENVIRONMENTAL	Total annual CO_2 emissions
	Annual CO_2 emissions from electricity consumption
	Annual CO_2 emissions from fossil fuels consumption
	Total annual GHG emissions
	Nº of occupancy hours within which PMV is retained
	Hourly-averaged PMV value on a hot summer day of the year
	Hourly-averaged PMV value on a typical winter day of the year
	Number of hours of overheating during the occupied period in the year
	Minimum winter indoor temperature (^oC)
	Maximum summer indoor temperature (^oC)
	Nº of occupancy hours within which pollutant is retained below maximum allowed
ECONOMIC	Annual total energy-related operational cost
	Annual electricity cost
	Annual fossil fuel cost
	Total investment cost

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PILOTS

One small scale renovation project in one public building in each partner country

The building and the upgrading scenario were selected based on the AFFORDABILITY indicator "Total investment cost per total annual energy saved"

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SPANISH PILOT: School in Elche

INFORMACIÓN GENERAL	
Nombre del Centro	**C.E.I.P. El Plà**
Propietario	Consellería de Educación, Investigación, Cultura y Deporte
Arrendatario	Ayuntamiento de Elche
Dirección del edificio	Carrer Alquería de Aznar, 2, 03204 Elche (Alicante), Spain
Uso del edificio	Edificio educacional de infantil y primaria
Año de construcción	1982
Año de renovación/ámbito de actuación (si procede)	
Nº de plantas	3 plantas
Altura media de planta (m)	Planta baja: 3m, primera planta: 3m, segunda planta: 3m
Superficie total construída (m^2)	3.121,53 m^2
Desglose de áreas (m^2) por planta	Planta baja: 919,49 m^2, planta primera: 1.013,07 m^2, planta segunda: 1.013,07 m^2
Desglose de áreas (m^2) por sistema	**Total área calefactada:** 2.162,70m^2 (Administración, aseos, aulas, cocina-comedor, no habitable, zonas comunes, usos
	Total área refrigerada: 159,90m^2 (Administración, usos múltiples)
	Total área con ventilación mecánica: 0m^2
Número de ocupantes	452
Horario de ocupación	Ocupación: 207 días al año, Lunes a Viernes 09:00-17:30
	No ocupado: Durante fin de semana
Fotografías	 

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SPANISH PILOT: School in Elche

Renovation measures undertaking

- Roof insulation
- Replacement of some windows (double glazing)
- Replacing luminaires with LED
- Installation of photovoltaic panels

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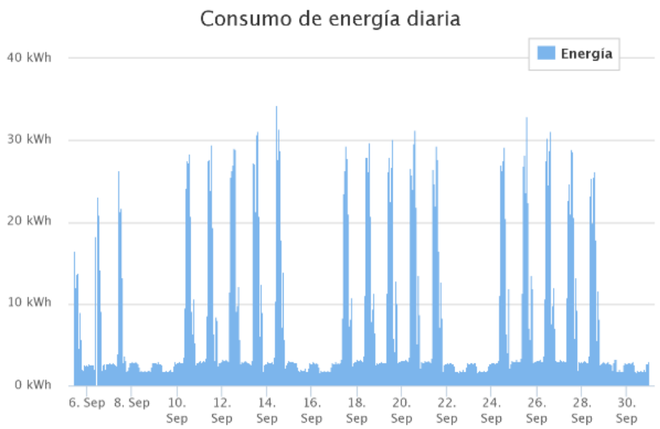
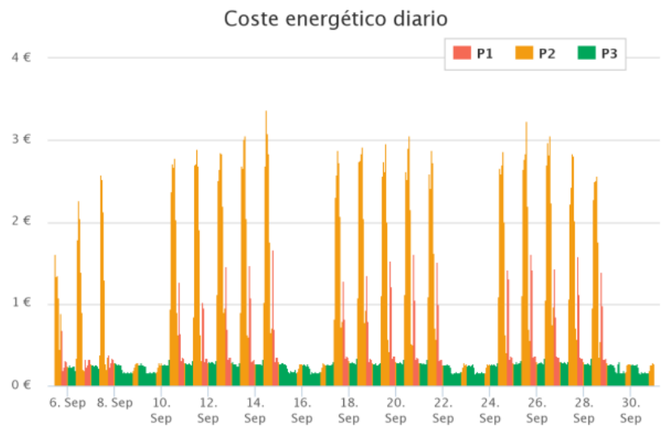
SPANISH PILOT: School in Elche

Monitoring Plan

Monitoring BEFORE retrofit	WORKS	Monitoring AFTER retrofit
Sep. - Oct. 2018	Dec. 2018	Jan. - June 2019





Indicators monitored:

Temperature (ºC)

CO2 emissions (ppm)

Humidity (ext/int)

Lighting (lux)

Electricity conssumption (Kwh)

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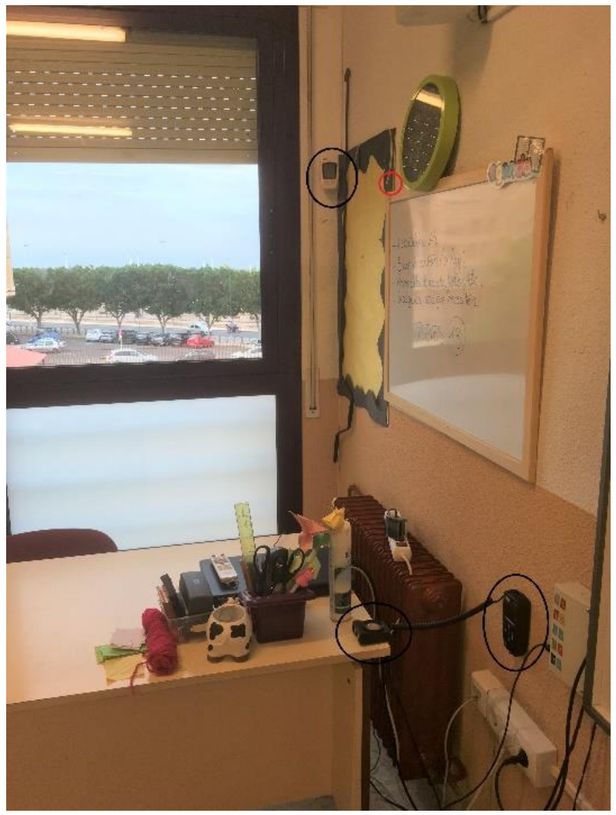
SPANISH PILOT: School in Elche

Monitoring Plan



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PROJECTION OF THE RESULTS

The KPIs' impacts from the PILOT (1) and AMBASSADORS (12) were extrapolated to all buildings in the inventory (85). And the same in the other Med CITIES (6).

City, COUNTRY	PILOTS	AMBASSADORS	BUILDINGS
Elche, SPAIN	1	12	71
Heraklion, GREECE	1	10	73
Cannes, FRANCE	1	10	42
Mostar, CROATIA	1	10	70
Osijek, BOSNIA-HERZEGOVINA	1	12	73
Ravenna, ITALY	1	10	42
TOTAL	**6**	**64**	**371**

x 5 scenarios = **1,855** SIMULATIONS

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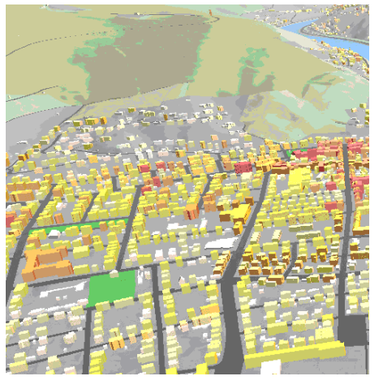
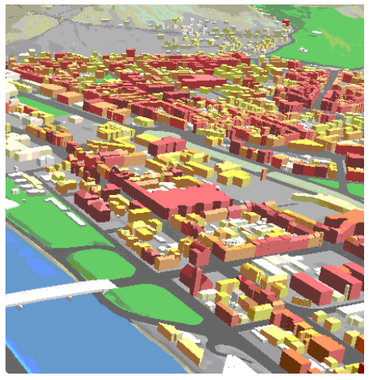
LIBRARIES OF MUNICIPAL BUILDING TYPOLOGIES

Six libraries of municipal buildings typologies that will enhance the AWARENESS of public administrations regarding their stock and can be EXEMPLARY for others to further use the system



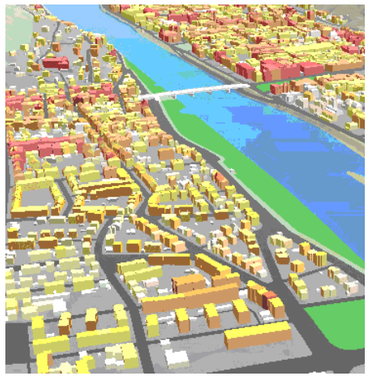
Mostar

BOSNIA HERZEGOVINA



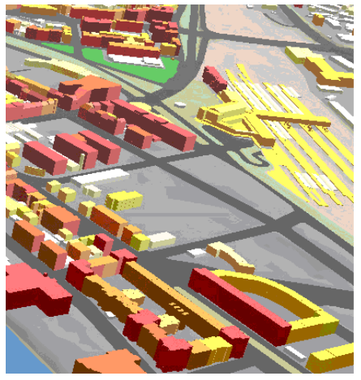
Osijek

CROATIA



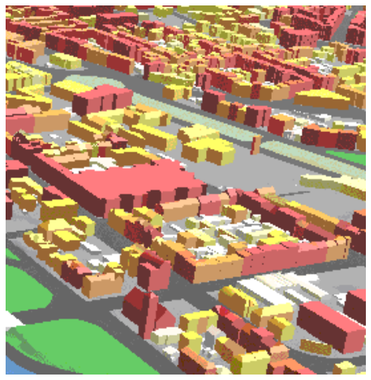
Elche

SPAIN



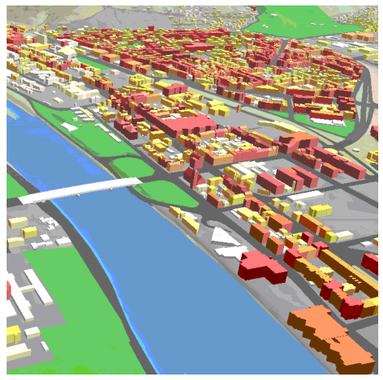
Heraklion

GREECE



Ravenna

ITALY



Cannes

FRANCE

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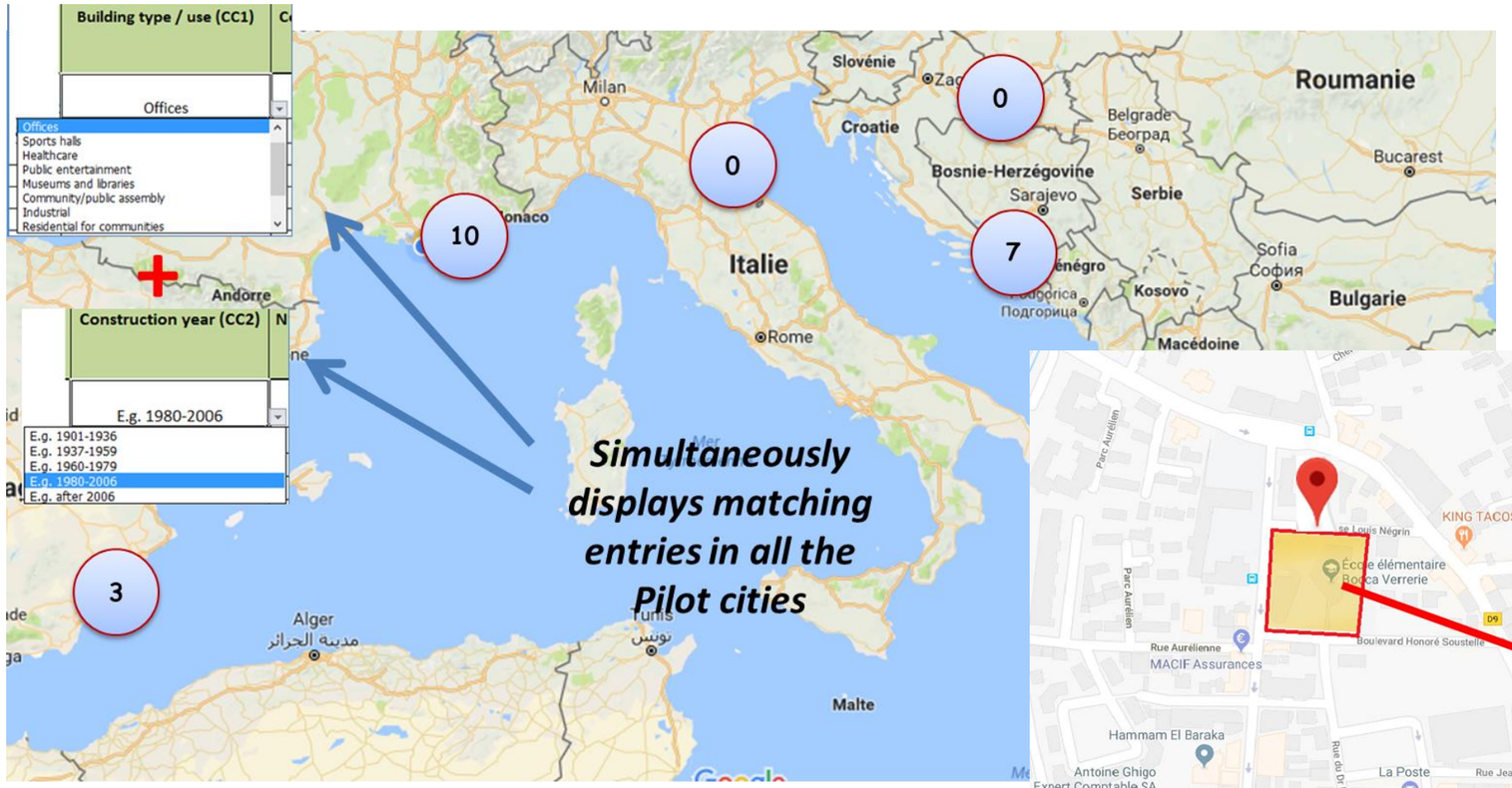
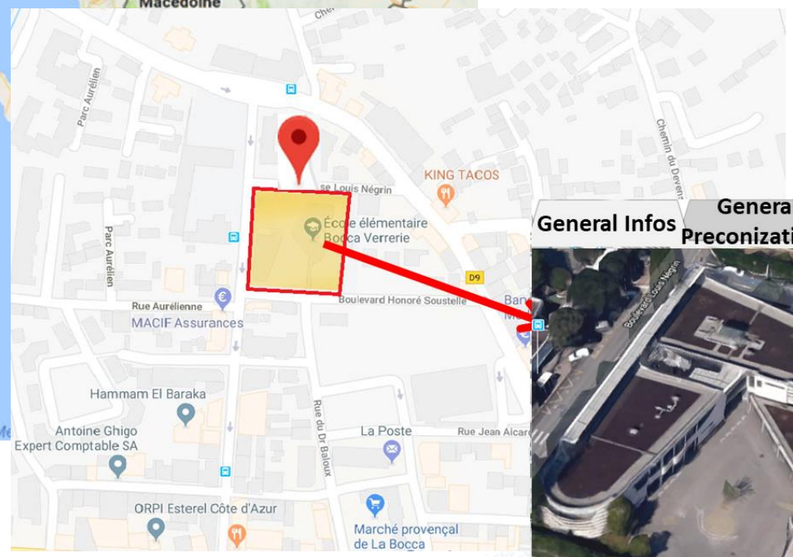
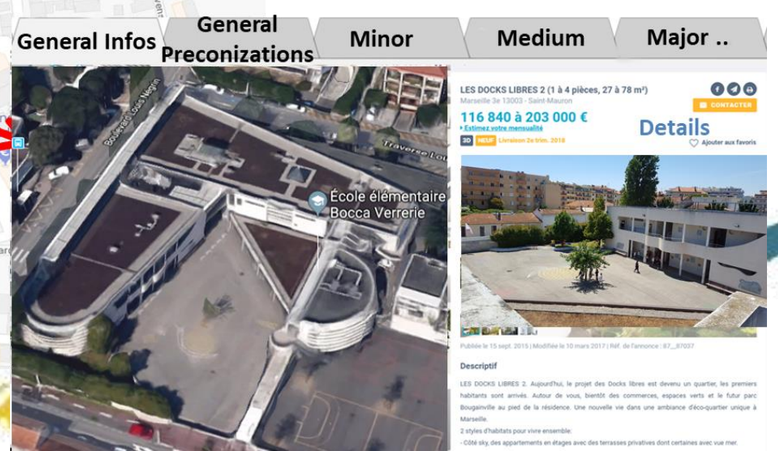
IMPULSE management support system

GIS MAPS based

The information of the libraries will be collected and visualized in GIS-maps. The IT system will provide cost prioritized solutions from small to deep renovations, monitoring plans, financial plans, and 3% floor area annual renovation plans.







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IMPULSE management support system

SEAPs acceleration (sustainable energy action plans)

The IT system will raise capacities of public administrations to take more confident decisions and will encourage the increase of local SEAPs or their improvement

Year		1	2	3
Floor area retrofited	m²	12.223,76	13.010,07	11.552,31
Anualy investment	NC	11.229.455	16.063.637	16.693.788
Savings - currency	NC/a	839.735	1.069.862	882.724
Savings - CO2	tCo2/a	543	898	614
Savings - kWh	kWh/a	2.769.855	3.551.169	2.722.958
	1	PBT4 - Višnjevac Sports Hall - Minor Retrofit	PBT6 - Dobriša Cesarić, Neretvanska - Elementary Scho	PBT7 - August Šenoa Elementary School - Deep retrofit
	2	PBT4 - Sports Hall FKF - Minor Retrofit	PBT7 - Vladimir Becić Elementary School - Deep retrofit	PBT7 - Vijenac Elementary School - Deep retrofit
	3	PBT4 - Franjo Krežma Sports Hall - Minor Retrofit	PBT7 - Mladost Elementary School - Deep retrofit	PBT7 - FKF, Frankopanska - Elementary School - Deep re
	4	PBT4 - Ljudevit Gaj Sports Hall - Minor Retrofit	PBT7 - Antun Mihanović Elementary School - Deep retro	PBT10 - Cvrčak Kindergarten - Deep retrofit
	5	PBT6 - Višnjevac Elementary School - Deep retrofit	PBT7 - Franjo Krežma Elementary School - Deep retrofit	PBT10 - Pčelica Kindergarden - Deep retrofit
	6	PBT6 - Josipovac Elementary School - Deep retrofit		PBT10 - Stribor Kindergarden - Deep retrofit
	7	PBT6 - Ivan Filipović Elementary School - Deep retrofit		PBT10 - Sunčica Kindergarden - Deep retrofit
	8	PBT6 - Grigor Vitez Elementary School - Deep retrofit		PBT10 - Sjenčica Kindergarten - Deep retrofit
	9	PBT6 - Tenja Elementary School - Deep retrofit		PBT10 - Latica Kindergarden - Deep retrofit
	10	PBT6 - Dobriša Cesarić, Drinska - Elementary School - De		PBT10 - Jaglenac Kindergarten - Deep retrofit

Triple A-reno

Discover more | Visit Gamification Platform

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Other approaches:

Decission support tools to plan nZE renovation of residential buildings: gamification platform providing attractive, aceptable, affordable and tailored solutions

Energy efficiency and low-carbon solutions in buildings, but also well-being and health its occupants

Attractive

Attractive means one of the objectives of the project is to raise consumer awareness when it comes to behaviors in homes, by providing attractive personalized information on energy use, indoor environment, health, and lifestyle, by a set of ICT-based solutions (i.e. the gamification platform, virtual reality, energy and 3D modeling etc.). Attractiveness is reflected i.e. in some of the elements of the gamification feature.

Acceptable

Acceptability refers to the TripleA-reno user-centric approach. The project aims at getting the "renovation motor running, with the end-user in the driver's seat". TripleA-reno will involve a various set of users in the co-designing processes, and keep a constant communication flow between consumers and developers to assure design of people-centered products.

Affordable

Affordable means that by using the TripleA-reno decision support tools (i.e. dynamic and user-centric business models) users can tailor their renovation and make informed and economically-wise decisions. In TripleA-reno affordability reflects the idea of the business model, cost savings for the user and the holistic idea of "user in the center".

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