

ZAGREB ENERGY EFFICIENT CITY

Refurbishment of public buildings and modernization of public lighting

Contract N°: IEE/12/816.SI2.645701, Duration: 1 April 2013 – 30 March 2017

Energy Efficiency Finance Market Place – 19 January 2017

WHY ZagEE ?



Building sector in the City of Zagreb:

- Owned by the City
(Self-Government buildings, schools, kindergartens, health centers, retirement homes, museums, etc.,) 1.700 objects
- Zagreb holding (17 branches, 4 trade associations and 1 institution) - 210 objects
- Sector for commercial and service activities 19.900 objects
- Housing sector (apartments) 280.000 objects

Total annual energy consumption:

Buildings: 8.310 GWh
Transport: 3.532 GWh
Industry: 2.506 GWh
Public lighting: 90 GWh

In order to encourage the application of energy efficiency measures, the City of Zagreb shall provide an example of the usefulness of such measures for individuals and the society.

The project ZagEE supports the realization of energy savings through the implementation of economically justified EE measures on objects owned by the City of Zagreb.





GENERAL CONDITIONS

- SEAP of the City (planned EE measure)
- Data of energy consumption
- Energy audits (current state of buildings)
- Technical and human resources
- Good cooperation with stakeholders

TIME FOR PREPARATION

- Approx. two months – activities on analyses data, project drafting, researches of costs for project documentation preparation and for works

PARTNERS CONTRIBUTED

- The City Office for Energy, Environment and Sustainable development (coordinator)
- City offices who are competent for objects (buildings and public lighting)
- REGEA (project partner)

IEE program for technical assistance 2012. – MLEI Mobilization of local energy investments (call 2012)

- total proposed energy investment cost (works for which the technical documentation have been produced amounts EUR **29.379.114**)
- Leverage factor is **16,2**
- The works must be finished in three years after the end of the project



OBJECTIVES



Primary objectives

- Renovation of 87 public buildings – deep retrofitting measures
- Modernization of public lighting (3000 lamps)
- Reduced Energy consumption by 33.526 MWh , CO2 emission by 8.390 t/year and 290 MWh green energy
- Changing behavior of users

Project background

- Largest retrofitting project in Croatia
- 90% of buildings below F energy class
- Ambitious energy saving targets (49-72%)
- Short time for implementation (clear division of responsibilities and strict deadlines)

Secondary objectives

- Capacity building (technical, financial, managerial) of city office employees and building managers;
- Awareness raising among citizens and other stakeholders;
- Find and use financing models for energy efficiency applicable to the city administration;
- Acquire knowledge and experience necessary for all participants of the energy refurbishment process through examples of energy efficiency implementation on a large number of objects of various purposes;
- To influence positive changes in the economy;
- More new jobs;
- To share the acquired skills and experiences and influence energy efficient development in other cities of the region and beyond.



MAIN STEPS



- Establish Project Core team named by the Mayor: experts from different city offices responsible for implementation of action;
- Buildings register and database (validated and updated data from all energy audits, selection of buildings, the list of energy efficient measures;
- Production of the City of Zagreb Lighting Masterplan;
- Production of quality technical documentation for the energy refurbishment of objects with a feasibility study;
- Find various financing sources;
- Performing public tenders for works on the energy refurbishments of objects;
- Procedure of public procurement for documentation, works and supervisory activities;
- Trainings for building managers.



CHALLENGESS



- Define financial sources and set up in the city budget according the regulations
- Public procurement (long and complicated process)
- Preparations a lot of tender documentation and procedure of public procurement in a short time
- Catch the summer holidays for refurbishment of buildings (in kindergartens and schools) in 2015, 2016 and 2017
- Estimated costs for works (there is no experience)

Project ZagEE has political and public acceptance:

- Project Core team cooperate efficiently
- Politicians, experts, financial institutions and media support Project ZagEE

Program ZagEE 2013 – 2017 (in detail investment plan) is essential for estimate investment in the city budget and it is the base document for application on founs, banks, etc.

(Program ZagEE 2013 – 2017 has been approved by the City Assembly)



FUNDING SOURCES



Type of investment	Size of the investment (€)	Sources and share of funding		
		Own budget	Loans	EU funding
Refurbishment of buildings	26.579.114	30%	35%	35%
Public lighting	2.800.000	30%	35%	35%

ESTIMATED IN PROJECT

- **Environmental Protection and Energy Efficiency Fund (EPEEF) grants of 40% of investment for works**
- **Croatian Bank for Reconstruction and Development (HBOR) loans + EIB grant**
- **Calls for proposals of Ministry of Construction and Physical Planning**
Energy renovation of public schools and other educational buildings
grants aprox 60% of investment for works
- **ESCo model** - Agency for Transactions and Mediation in Immovable Properties - coordinator of the program on national level

AVAILABLE SOURCES



CURRENT SITUATION



Technical documentation for buildings

- 89 buildings (completed)

Technical documentation for public lighting

- 3.000 led lamps (completed)



Refurbishment of buildings (58)

- 24 buildings (finished)
- 4 buildings (work is going on)
- 9 buildings (contracted)
- 15 buildings (in the process of public procurement)
- 6 buildings (preparation phase for public procurement)



Refurbishment of public lighting

- 1.153 led lamps (finished)
- 300 led lamps (preparation phase for public procurement)

Measures in buildings

- Thermal insulation of envelopes (walls and roof)
- Replacement of old joinery with energy efficient joinery
- Replacement of inefficient fuel oil boilers with gas boilers
- Balancing the heating system and the installation of thermostatic valves
- Replacement of inefficient indoor light bulbs
- Installation of solar panels and solar collectors
- Smart metering





Kindergarten *Pčelica*

Surface: 2.368 m²

Year of built: 1972

Before refurbishment

- Energy consumption (2013): 466,99 MWh/year
- Energy class: E

After refurbishment

- Energy class: B
- Energy savings: 370 MWh/year
- CO₂ reduction: 85 t/year
- Investment: 414.000 EUR
- Financial savings: approx. 26.790 EUR per year

The refurbishment involves

- the reparation of the building's external envelope - thermal insulation: rock wool - 16cm walls, 20 cm roof
- replacement of existing windows with more energy efficient (1,10 W/m²K)
- replacement of inefficient indoor light bulbs
- balancing the heating system and the installation of thermostatic valves
- smart metering



How it looks

KINDERGARTEN PČELICA



How it looks



Smart metering

Mjerna oprema

- RVT
- JNTPO
- JVTPO
- JNTPR
- JVTPR
- GZ Rudes (Jablanska 51) -
Kotlovnica - grijanje
 - Toplina
 - Volumen
- GZ Rudes (Jablanska 51) -
Potrosnja vode
 - Volumen 1
 - Volumen 2
- Djecji vrtic Pcelica
 - GZ Djecji vrtic Pcelica - Brojilo 1 -
el. energija
 - JNTPO
 - JNTPR
 - JVTPO
 - JVTPR
 - RNT
 - RVT
 - GZ Djecji vrtic Pcelica - Brojilo 2 -
el. energija
 - JNTPO
 - JNTPR
 - JVTPO
 - JVTPR
 - RNT
 - RVT
 - GZ Djecji vrtic Pcelica - Plin
 - Volumen 1**
 - Volumen 2
 - GZ Djecji vrtic Pcelica - Potrosnja
vode
 - Volumen 1
 - Volumen 2

BROJAC: VOLUMEN 1

DETALJI VIZUALIZACIJA KOMUNIKACIJA UPRAVLJANJE

OD 1.10.2015. 00:00

DO 2.10.2015. 08:39

PODACI S MJERAČA SATNI DNEVNI TJEDNI MJESEČNI

Vrijeme	Vrijednost
1.10.2015. 02:00 - 1.10.2015. 03:00	3.47
1.10.2015. 03:00 - 1.10.2015. 04:00	3.53
1.10.2015. 04:00 - 1.10.2015. 05:00	9.57
1.10.2015. 05:00 - 1.10.2015. 06:00	9.67
1.10.2015. 06:00 - 1.10.2015. 07:00	9.76
1.10.2015. 07:00 - 1.10.2015. 08:00	2
1.10.2015. 08:00 - 1.10.2015. 09:00	6
1.10.2015. 09:00 - 1.10.2015. 10:00	5
1.10.2015. 10:00 - 1.10.2015. 11:00	7

Zagreb Lighting Masterplan

- **208 locations**
 - all of the visited locations photographed, intervention zones determined and graphically portrayed
 - an approximate number of lamps and light controls per location determined
 - locations sorted per city districts (15 city districts included)
 - project assignment made
 - the light parameters of the reconstructed public lighting system have been set
 - minimal technical characteristics of lamps, LED modules (lighting sources), regulations and managing the reconstructed public lighting system



77-165W (and over)



20-46W



How it looks



IS IT WORTH IT TO APPLY FOR HORIZON 2020?



This allows the beneficiaries to produce project documentation and feasibility studies and obtain the necessary documentation needed for financing the energy refurbishment of objects from sources other than the city budget, such as banks and EU funds.

With more effort, capacities of city administrations are directed to implementation of works (refurbishments of buildings and modernization of public lighting) due to certain deadlines for works.

Benefits of such investment have

- City administration (reduced bills, satisfied citizens, meeting performance target by SEAP, experience in implementation of such projects, economic growth)
- Manager of buildings (easier maintenance)
- Users of the buildings (better and healthier working environment)

As renovation of buildings and public lighting will be done in any case, IEE - MLEI funding allows this to be done in energy efficient way



WHAT IS NEXT ? ZagEE 2, ZagEE 3, ZagEE 4,.....



Yes !



Thank you for your attention

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