


Ready4NetZero webinar

Experience in Implementing
ELENA Projects:
REGEA Overview

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ELENA - NEWLIGHT

A story on aggregation
of public lighting projects



Co-funded by the Intelligent Energy Europe
Programme of the European Union



NEWLIGHT – Main Facts

Project financed by ELENA facility (EIB)

Project start: October 2015 (36 months)

Final Beneficiaries: 57 cities and municipalities (located in two counties – CRO)

Overall goal: 15+ million EUR investment in public lighting



NEWLIGHT – Main Facts

Total project budget: 790.000 EUR (TA)

Final cost: 704.469 EUR

ELENA (EIB) co-financing:

634.022 EUR (90%)



Co-funded by the Intelligent Energy Europe
Programme of the European Union

Two regional authorities co-financing:

Zagreb County



Krapina-Zagorje County

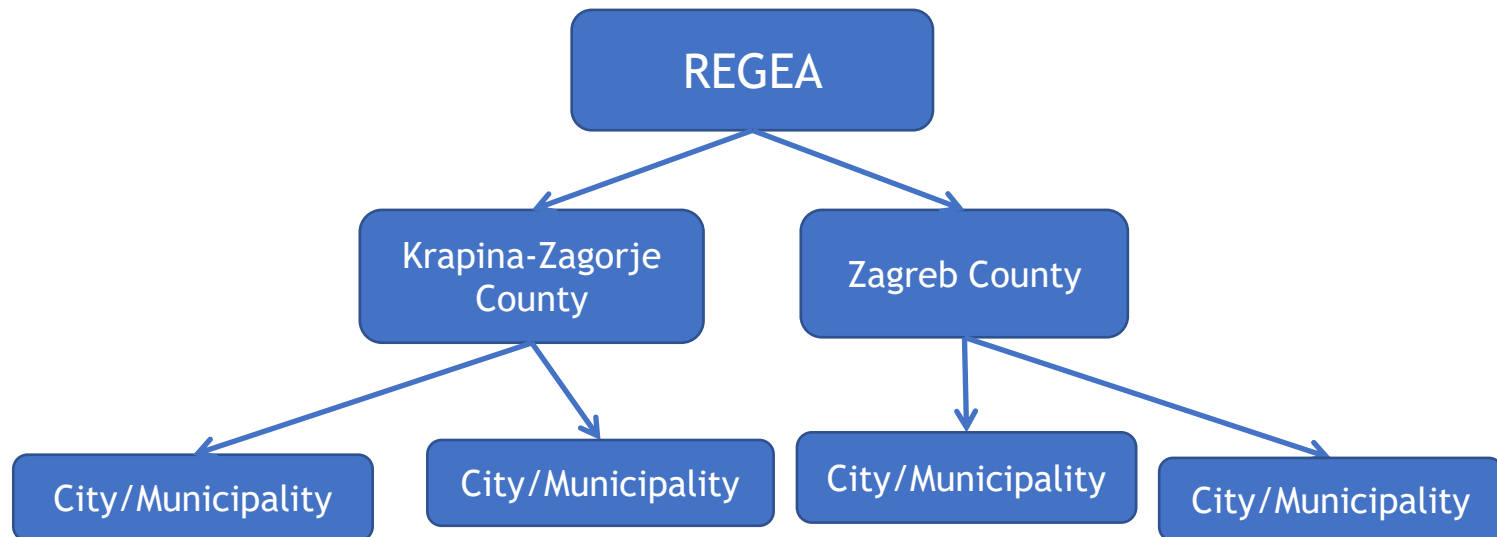


70.447 EUR (10%)



NEWLIGHT Idea/Objective

To **BUNDLE** cities and municipalities for
efficient and effective project execution



NEWLIGHT Idea/Objective

Contract modernization in 36 months
in three phases:

Phase I - Energy audits/inventory

Phase II - Model Contracts (D&B, EPC, PPP)

Phase III - Public procurement



NEWLIGHT Key Challenges

Mobilising local authorities

Insufficient Baseline data - methodology for energy audits had to be developed

Undeveloped ESCO market in Croatia – facilitation service mandatory !

Low energy prices resulting in long payback periods (8,2 eurocents/kWh on average)

Financial models – traditional vs PFI (EPC/PPP)

no projects (good examples) to learn from



Insufficient Baseline data

1. Energy audits of public lighting

App. 70.000 luminaires in total

App. 55% of total project cost (!)

Specialized software/mobile app developed (GIS based) – this ensured digitalization of 2,1 million attributes

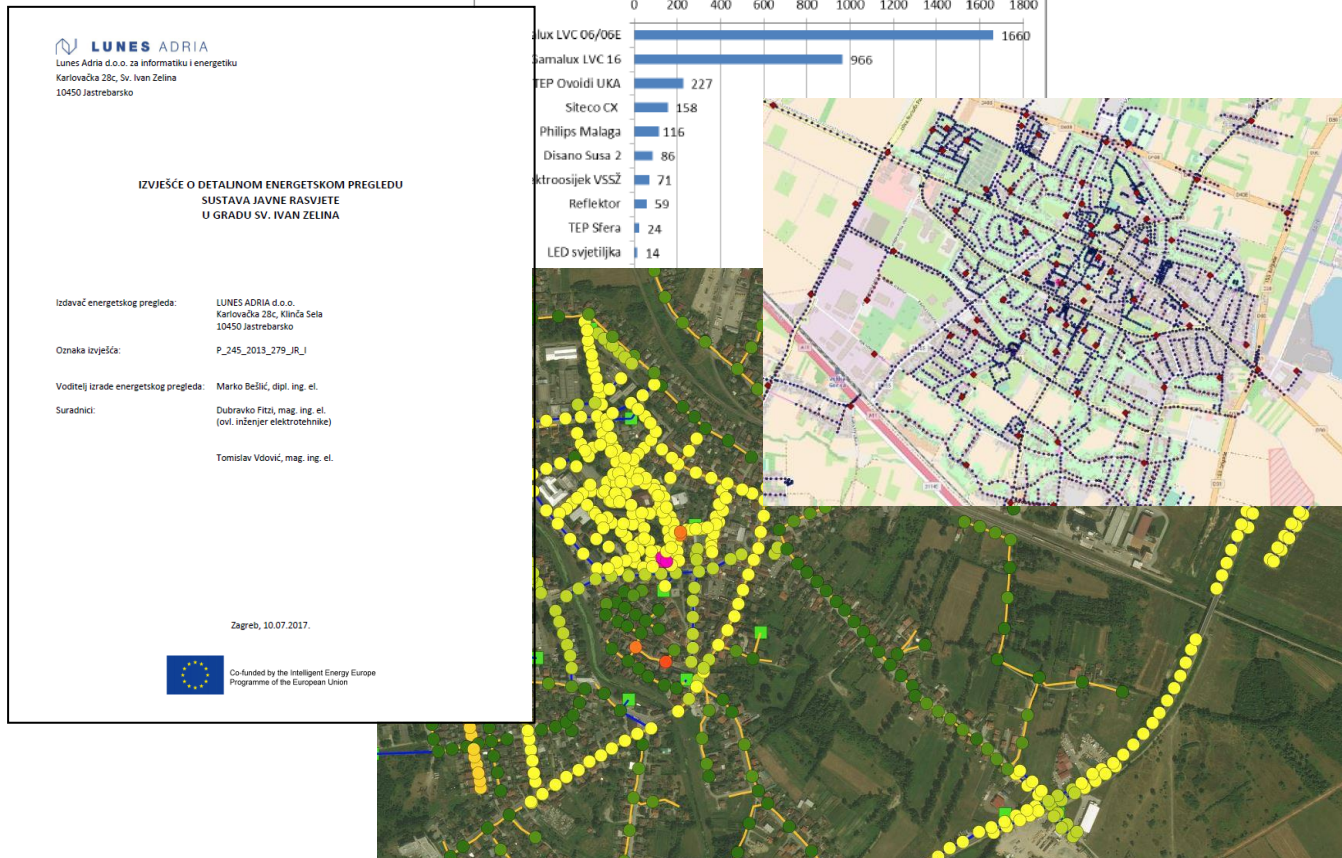
2. Action plan for public lighting reconstruction

Custom for each city/municipality

Officially adopted by city/municipality council



Public lighting Energy Audits



Action plans



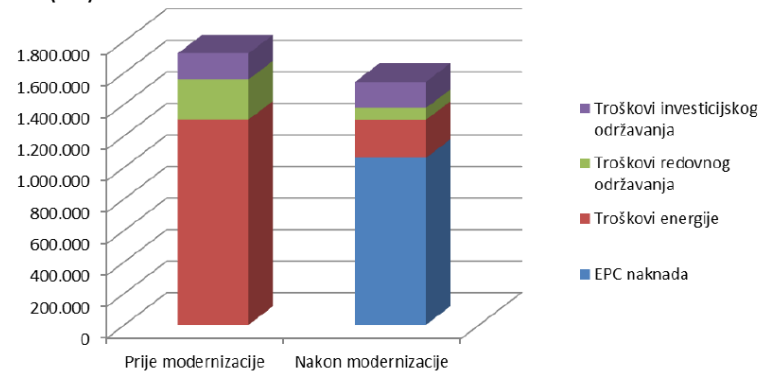

Akcijski plan rekonstrukcije, modernizacije i upravljanja sustavom javne rasvjete Grada Sveti Ivan Zelina




Co-funded by the Intelligent Energy Europe Programme of the European Union
Zagreb, rujna 2017.

Klasa prometnice	Broj svjetiljki na pješačkim prijelazima	Broj svjetiljki na prometnim raskrižjima	Ukupno broj svjetiljki (kom)	Ukupna snaga svjetiljki (kW)
M4	5	15	322	94,2
M5	4	12	660	140,8
M6	3	2	609	113,6
P3	0	0	7	0,2
P4	0	0	1.577	281,9
P7	0	0	159	28,5
Ostalo	4	0	153	45,2
Ukupno	16	29	3.487	704

Trošak (HRK)



Slika 5.2 Usporedba troškova prije i nakon modernizacije financirane putem Ugovora o energetsom učinku
Izvor: REGEA



Financial schemes

3. Tender process - reconstruction of public lighting

Preparation of tender documentation, legal advice

Three types of documentation developed:

- a) Design&Build (D&B)
- b) Energy Performance Contracting (EPC)
- c) Public Private Partnership (PPP)

4. Support in obtaining co-financing

REGEA provided help in securing available funding sources (primarily for D&B projects)



Undeveloped ESCO market

5. Facilitation services (three pillars)

Pillar I - More than 10 meetings organized on county level

Pillar II - More than 300 bilateral meetings with local authority representatives (app. 5 per city/municipality)

- a) Energy Audits and Action plan information
- b) Contract models and financial modeling
- c) Assembly participation
- d) Procurement documentation
- e) Procurement process

Pillar III - More than 30 meetings with ESCO market players and Financial institutions



NEWLIGHT numbers and figures

7. Financial schemes and sources

Around 70% authorities

EPC 12,5 MEUR capex (17 MEUR overall cost)
covered form energy/cost savings

Around 30% authorities

D&B 2,5 MEUR capex (3 MEUR overall cost)
Financial Instrument main source (OP-ESIF)



ELENA facility

Use ELENA for:

- a) **Financing TA**
- b) **Build in-house capacity** for sustaining facilitation services
- c) **Build your network** of external experts and start sustainable cooperation – seed activity for future cooperation



Project development assistance facilities under the IEE Programme





Co-funded by the H2020
Programme of the European Union



ELENA RePubLEEc



ELENA 2 – RePubLEEc Main Facts

Project financed by ELENA facility (EIB)

Project start: Jan 2018 (36 months)

Final Beneficiary: City of Zagreb

Overall goal:

min 30 million EUR

investment in public lighting



ELENA 2 – RePubLEEc Main Facts

Total project budget: 2 000 000 EUR (TA)

ELENA (EIB) co-financing:

1 800 000 EUR (90%)

City of Zagreb

200 000 EUR (10%)



ELENA 2 – RePubLEEc Main Facts

Project timeline

Tender preparation: during 2019 and 2020

Final Tender execution: during 2021/2022

Ideal project scope:

- 50 000 LED luminaire
- 25 mil EUR capex investment in public lighting



REGEA

Advisory services:

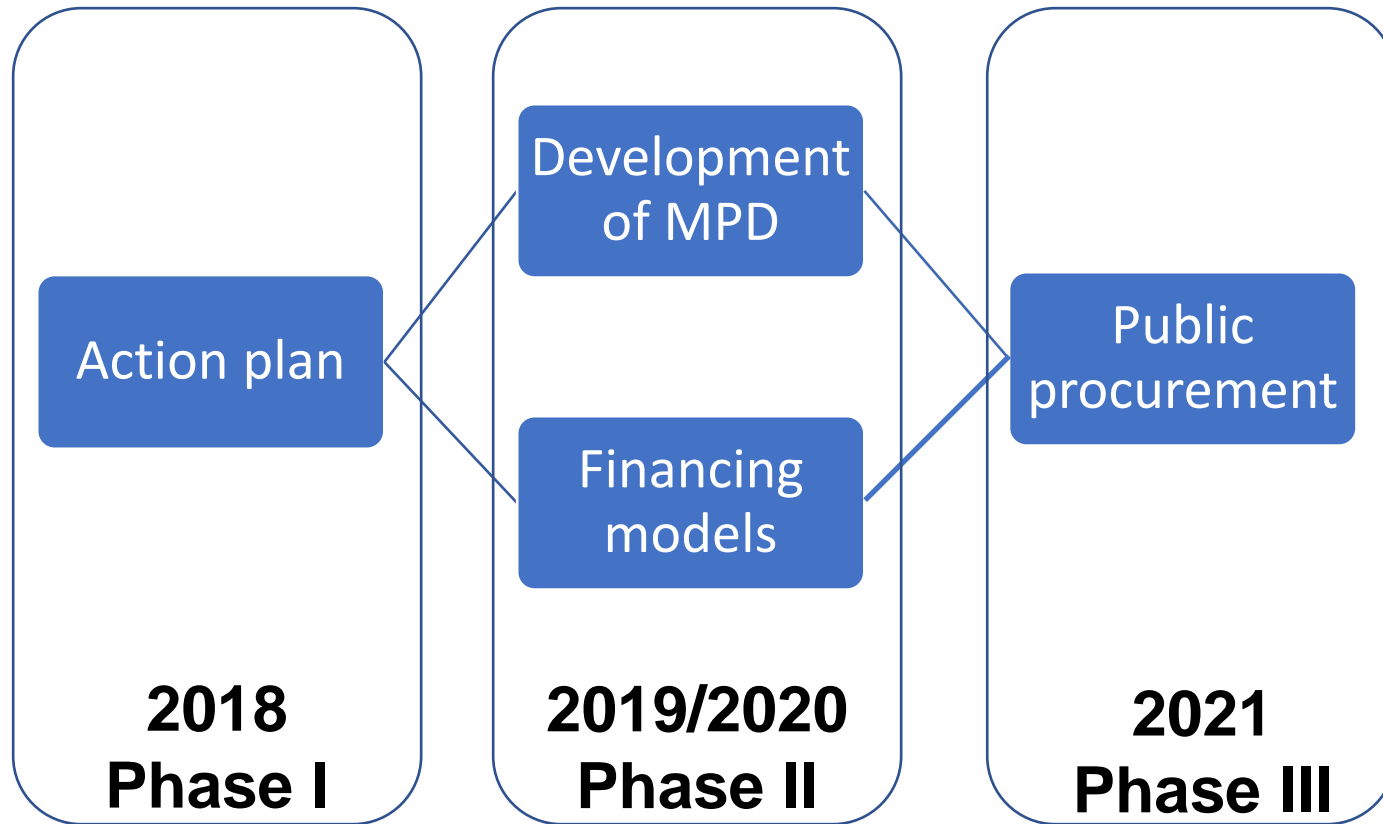
- **Technical** (energy audits, data analysis...)
- **Financial** (feasibility studies, CBA...)
- **Legal** (tender documentation, legal advisory...)



REGIONALNA ENERGETSKA AGENCIJA
NORTH-WEST CROATIA
SJEVEROZAPADNE HRVATSKE
REGIONAL ENERGY AGENCY



RePubLEEc Project Phases

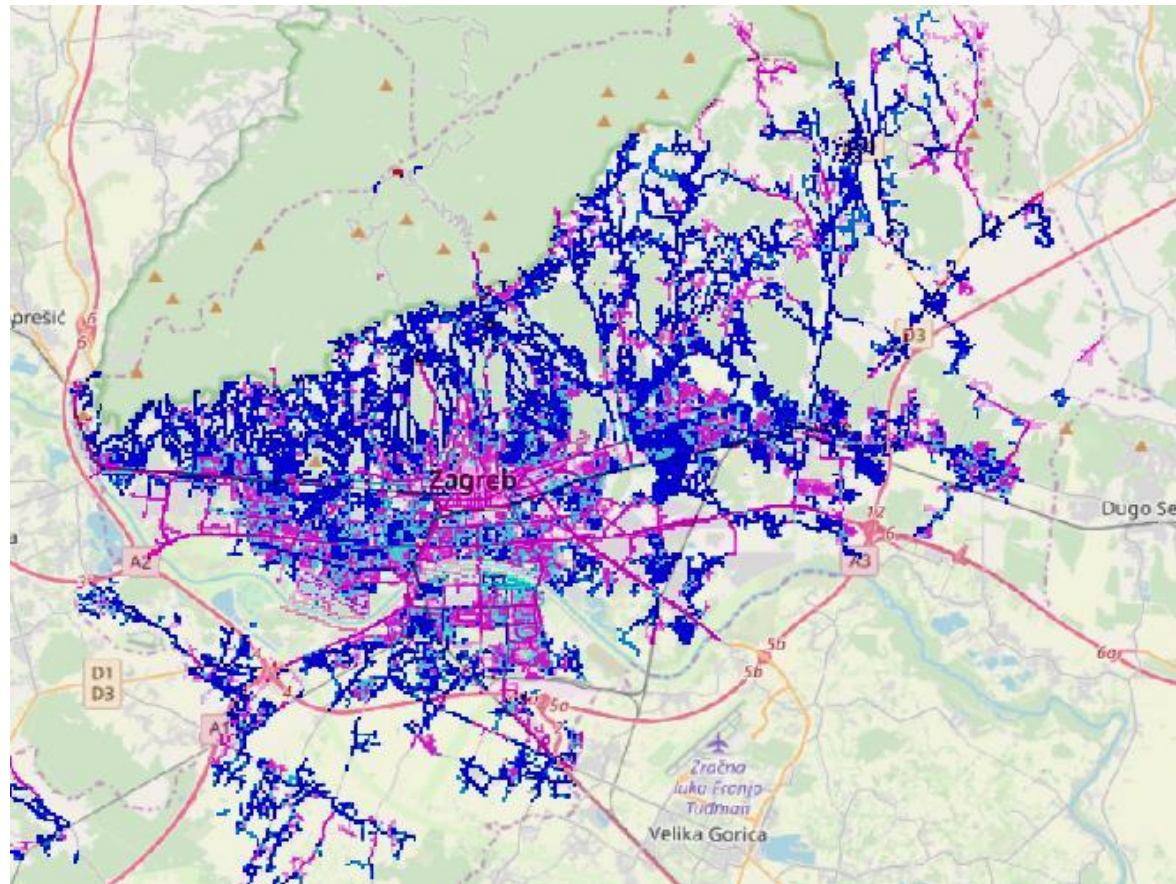


Scope of the project

1. Based on energy audits and other relevant data, by using developed GIS Analytic program
Optimal scope involves 40% of existing luminaires (or 47 000 luminaires)
2. Referent cost of electricity - 3 mEUR
3. **Overall cost (CAPEX) - 25 mEUR**



Scope of the project



EPC as a Financing model

1. Based on EUROSTAT guides and scope of the reconstruction, **EPC (Energy Performance Contracting)** is selected
2. Overall EPC cost - 35 mEUR
EPC will be contracted on 17 years
 - 2 years for works, and
 - 15 years commissioning
3. EPC remuneration - 2.3 mEUR (yearly)



Treatment of the EPC contract

1. Based on EUROSTAT guides and scope of the reconstruction, **EPC (Energy Performance Contracting)** will be treated as off balance for the City of Zagreb
2. **Electricity costs saving - 2.4 mEUR** vs EPC remuneration of 2.3 mEUR (yearly) (repaid entirely from energy savings)

With electricity prices (May 2022), savings app. 4x (!!!)



PVMax

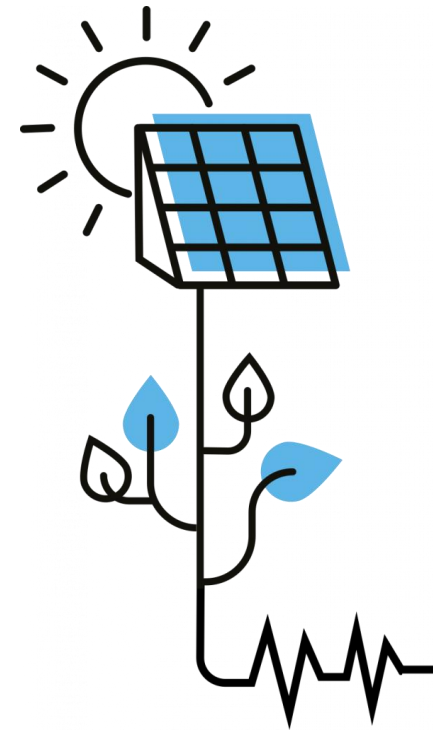


Co-funded by the Horizon 2020 programme
of the European Union



**Ready4
NetZero** 

ELENA PVMax: Investment in PV systems in Croatia



PVMax: Overview



EIB/ELENA - European Local ENergy Assistance

Duration: 1.7.2021.-30.6.2024.

Beneficiary: REGEA

Total Budget: 1.980.000 eur

Main Goal: Achieve investment in PV building integrated systems and EE electricity measures of over 80 Meur



PV status in Croatia - Why focus on PVs?



- Current situation

- Total PV capacity in Croatia (end of 2019): 69 MW (app. 17 W/cap)
- Among the lowest per capita in EU countries (Germany: 590 W/cap, Austria: 187 W/cap, Slovenia: 107 W/cap)
- Investment costs in PVs decreased drastically over last 5 years (700-1000 eur/kW)

- PVs are financially feasible even without subsidies

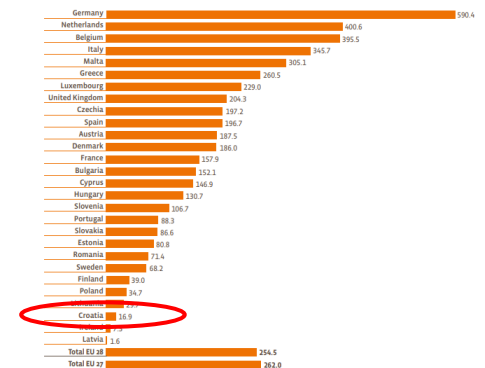
- Obvious market failure in Croatia!

- Legal barriers
 - new Law on Electricity Market, Law on Renewables
- Lack of project pipeline



Graph. n° 1

Photovoltaic capacity per inhabitant (W/inhab.) for each EU country in 2019



*Estimation. Source: Eurobarometer 88.2019



PVMax Public Call



Open from 1 Sep 2021 to 31 Dec 2022

Only for:

- 1) Public Sector
- 2) Private Sector

Technical assistance for building owners (legal persons)
Investors in PV building integrated systems
Anywhere in Croatia



PVMax Public Call, con't

Technical assistance free of charge,
with condition that investment must be
realized/started (!)

All necessary preparatory activities

- technical consulting
- financial consulting
- legal consulting

PVMax



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PVMax - Javni poziv

REGEA priprema investicijski val u sunčane elektrane

Projekt PVMax osmišljen je u svrhu pružanja podrške u pripremi izgradnje sunčanih elektrana u Hrvatskoj.

Nepovratna sredstva osigurana u sklopu ovog Javnog poziva, u formi tehničke pomoći, namijenjena su pravnim osobama (vlasnicima građevina na kojima se planira izgradnja integriranih sunčanih elektrana) iz javnog i privatnog sektora na cijelom teritoriju RH.





Tehnička pomoć: opisana Javnim pozivom sufinancirana je u iznosu od 100%, od čega je 80% troškova sufinancirano kroz ELENA program u sklopu HORIZON 2020 suradnjom ugovora sa Europskom investicijskom bankom kroz ugovore o tehničkoj pomoći. ELENA (2018-144) sa 10% troškova sufinancirano temeljem vlastitih sredstava REGEA-a.






PVMax project

Implementation and results



PVMax



PVMax project



Implementation and results

Pipeline of 300+ projects

- Total capacity 100+ MW, all through public call
- Signed MoU with clients

Realized projects

- 106 Investments realized (26.5 MWp)

Zagreb Solar Roofs Program 2022-2024

- City Assembly of City of Zagreb - 28 October 2021 – official adoption
- Main goal: 50+ MW of building integrated PVs
- All building types (public, residential, commercial)
- All financing models (PPA, Premium price, CF, Energy communities,...)



PVMax project

Implementation and results

Fine-tuning and testing of contract documentation

- Design, Design&Build, Design&Build&Finance / PPA
- All models includes strict contract documentation which puts clients at 1st place

Insisting of "above-standard" practice in technical aspects of PV systems

- High-level minimum technical requirements for all components of PV system
- Adoption of Slovenian technical design requirements (especially regarding fire safety)
- Main project design must include static analysis of roof, fire safety measures,...
- Big focus on proper operation and maintenance

"Creation" of new pathways in cooperation

- Assistance in application on different available national/EU funds
- Coupling with battery energy storage systems / heat pumps / EV chargers...
- Aggregation...
- Virtual power plants...



PVMax



PVMax project

Implementation and results

PPA example – County Hospital Bračak – 500 kW

Yearly PV production (kWh, %RES)	450 000 kWh, 14%
PPA contract duration	10 years
Referent price of electricity	0,827 €/kWh
PPA price of electricity	0,744 €/kWh
Yearly financial savings during PPA	5 300 €
Yearly financial savings after PPA	33 000 €

Other examples (finalized)

- County hospital Karlovac – 350 kW
- Special hospital "Krapinske toplice" – 400 kW

Other examples (in progress)

- City of Zagreb – aggregated public tender - 1.5 MW
- Krapina-Zagorje County – aggregated public tender – 1.6 MW
- Croatian radiotelevision (HRT) – 1.2 MW
- University Hospital Center Rebro – 1 MW.....



PVMax



PPAs in implementation of RES (PVs)

Power Purchase Agreements (PPAs) are in essence procurement of goods (power).

There are various models of PPAs and they are evolving rapidly.

General distinction is off-site PPAs vs on-site PPAs – what is the difference?



PPAs in implementation of RES (PVs)

PPAs vs Traditional (why PPA?)

Does client know how to manage or maintain PV power plant?

How to monitor PVs production (how to know when PV modules are not working)?

Management of equipment guarantees?



PPAs in implementation of RES (PVs)

PPAs vs Traditional (why PPA?)

In PPA model, it is of interest of PPA provider to get best value per delivered kWh of electric energy – efficient design (orientation, optimisation of installed power, optimisers or microinverters for more efficient production, etc.

In PPA model, client pays for investment on EUR per kWh basis (on performance basis)



PPAs in implementation of RES (PVs)

PPAs vs Traditional (why PPA?)

Are there any risks? What to be aware of?

- optimum size of RES (risk of being too small or too big – depending on contractual payment mechanism)
- optimum duration of PPA contract (risk of equipment being designed for duration of PPA contract – inverters)
- indexation (is there any need for it and how to specify indexation)



PPAs in implementation of RES (PVs)

General concept

Building owner (consumer) gives right to PPA producer to build RES plant on his property

PPA provider designs, finances, installs, maintains and operates PV power plant and delivers energy to consumer

Consumer pays for delivered energy with guarantees of origin per kWh of delivered (and consumed) energy

After PPA contract ends, power plant is transferred to client without cost or for predefined price



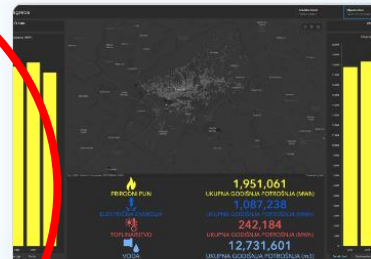
Energetski info centar Grada Zagreba

Dobro došli na web stranice Energetskog info centra Grada Zagreba – središnjeg mjesta za geoinformacijski prikaz raznih energetske alata koji su na raspolaganju našim građanima. Energetski info centar je u kontinuiranom razvoju i usluge/alate koje možete koristiti na ovom mjestu ćemo stalno unaprjeđivati.



Izračun sunčanog potencijala za vaš objekt

Internet stranica omogućuje preliminarni izračun osnovnih parametara sunčane elektrane (snaga, potrebna površina krova, investicija, proizvodnja...)



Energetski atlas Grada Zagreba

Energetski atlas Grada Zagreba je web aplikacija za prikaz potrošnje energenata u gradu tijekom godina.



Energetska obnova zgrada javne namjene

Prostorni pregled aktivnosti vezanih za energetske obnovu zgrada javne namjene u vlasništvu Grada Zagreba.

Zagreb Energy Info Center



ENERGETSKI INFO CENTAR
GRAD ZAGREBA

INTERNET STRANICA **ENERGETSKI INFO CENTAR GRADA ZAGREBA** OMOGUĆUJE PRELIMINARNI IZRAČUN OSNOVNIH PARAMETARA SUNČANE ELEKTRANE (snaga, potrebna površina krova, investicija, proizvodnost i isplativost) ZA ODABRANU ZGRADU.

Vidi više

Grad Zagreb - karta sunčanog potencijala - odabir krova

POVRŠNI ODABIR KROVA

ODABERITE TARIFU

MJESEČNI OBRACUN | GODIŠNI OBRACUN

Mjesečni obračun
LINIJSKE POTROŠNJE ELEKTRICNE ENERGIJE ZA ODABRANI MJESEC NA OSNOVI KOEFICIJENATA ŽELITE NAPRAVITI KALKULACIJU

1. 2. 3. 4. 5. 6. 7. 8. 9. 10. 11. 12.

VIŠA TARIFA kWh | NIŽA TARIFA kWh

LINIS CIJENE 0.5635 kn/kWh | LINIS CIJENE 0.2765 kn/kWh

Maksimalno upisati uključuju jediničnu cijenu visoke / niske tarife iz obračuna opskrbne cijene bez uključivanja ostalih naknada i obračuna za korištenje mreže, npr. 0.5635 prema računu na [www.eo.hr](#) za visoku tarifu

IZRAČUNAJ

ENERGETSKI INFO CENTAR
GRAD ZAGREBA

INTERNET STRANICA **ENERGETSKI INFO CENTAR GRADA ZAGREBA** OMOGUĆUJE PRELIMINARNI IZRAČUN OSNOVNIH PARAMETARA SUNČANE ELEKTRANE (snaga, potrebna površina krova, investicija, proizvodnost i isplativost) ZA ODABRANU ZGRADU.

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1. 2. 3. 4. 5. 6. 7. 8. 9. 10. 11. 12.

IZDAVANJE MJESEČNO 500 kWh | UNOS CIJENE 0.5295 kn/kWh

Maksimalno upisati uključuju jediničnu cijenu visoke / niske tarife iz obračuna opskrbne cijene bez uključivanja ostalih naknada i obračuna za korištenje mreže, npr. 0.5635 prema računu na [www.eo.hr](#) za visoku tarifu

IZDAVANJE

ODABERITE KROVNU PLOŠTU IZ OBRACUNA

39.60m² | 4.95 kW

Uštede

IZDAVANJE MJESEČNO | ODABERITE KROVNU PLOŠTU IZ OBRACUNA



REGEA's experience with ELENA projects



ZA-GREEN

A story on investments in public
buildings' energy efficiency in the City
of Zagreb



ZA-GREEN project

Targets

- Investment: at least 85 M€
Building retrofit: 75 M€
PV (building integrated): 10 M€
- No. of buildings: 50
- Retrofitted area: 150.000 m²
- Energy savings: 14,75 GWh/year
- Renewables: 14,9 GWh/year
- Building energy management system (BEMS)
- Technical assistance: 2 700 000 M€
- Final beneficiary: The city of Zagreb

Activities

Project start: May 2023
Project duration: 36 months (April 2026)

Deep building retrofit

- Feasibility studies for EMS
- Detailed revision of existing energy audits and documentation
- Main Project Design (standard works contract model)
- Feasibility studies (for EPC contract model)

PV systems (building integrated)

- Screening and analysis, feasibility
- Optimisation of PV + storage
- Feasibility studies

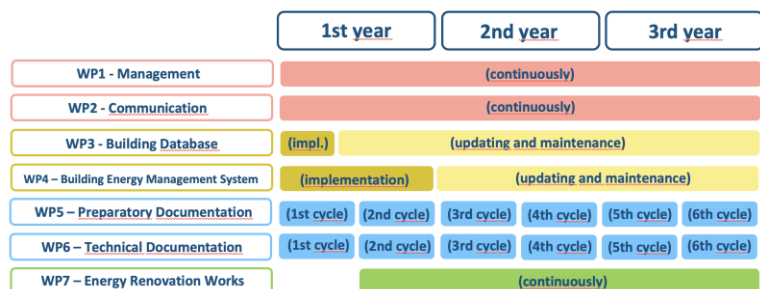


ZA-GREEN



ZA-GREEN project

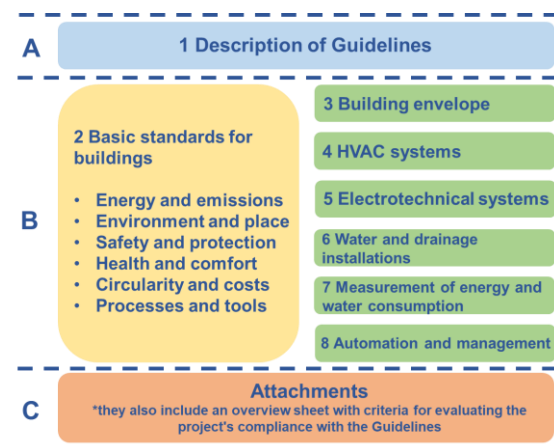
Plan for implementation



- All types of public buildings in different city areas
- Selecting 50 buildings out of more than 600 in the building stock
- Both analysis of general condition of buildings and analysis of energy consumption
- Worst energy performance and biggest savings potential – main criteria
- Potential to be a lighthouse for district renewal!

Plan for implementation – documentation

- Preparatory documentation – EPC, feasibility studies, various reports on the current status of the building
- Project task (ToR) for each building made in accordance with REGEA Green Deal Building Design Project Guidelines
- Main Project Design documentation
- Analysis of design solutions during the development of the project documentation
- Obtaining the necessary permits and project approvals
- Continuous monitoring and process management



Thank you!

*North-West Croatia Regional Energy and Climate Agency –
REGEA*

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