

# Ready4NetZero webinar

## Experience in Implementing ELENA Projects: REGEA Overview

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21.11.2023 



# 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

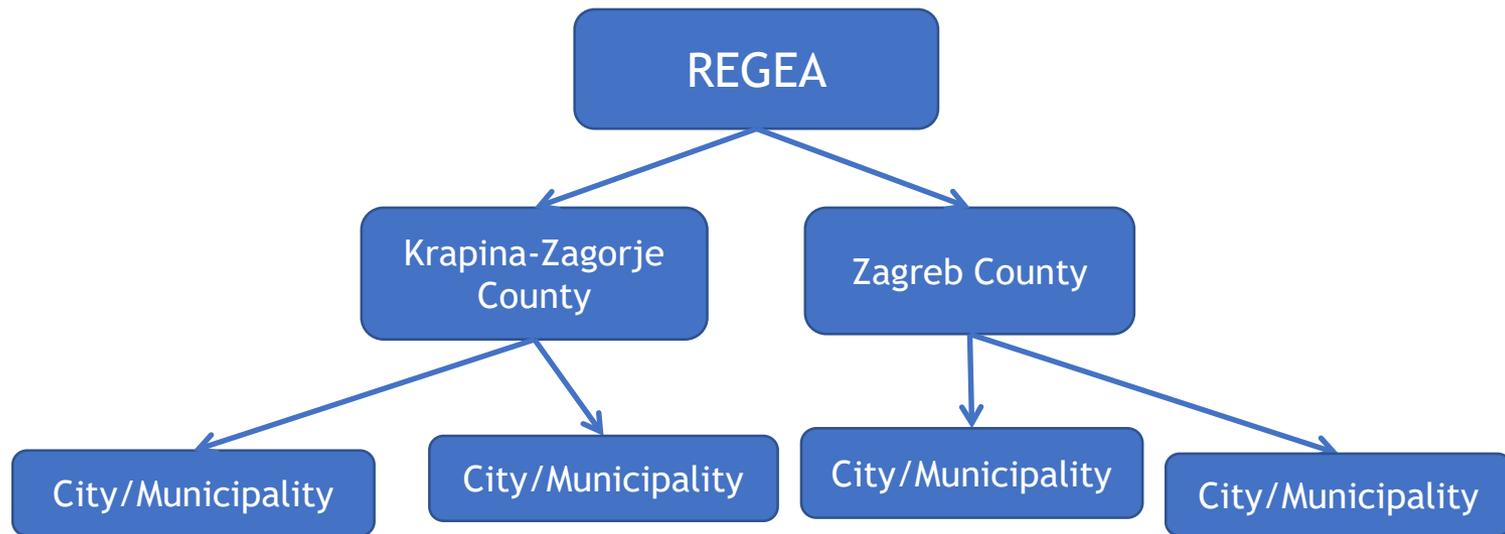


70.447 EUR (10%)



# 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

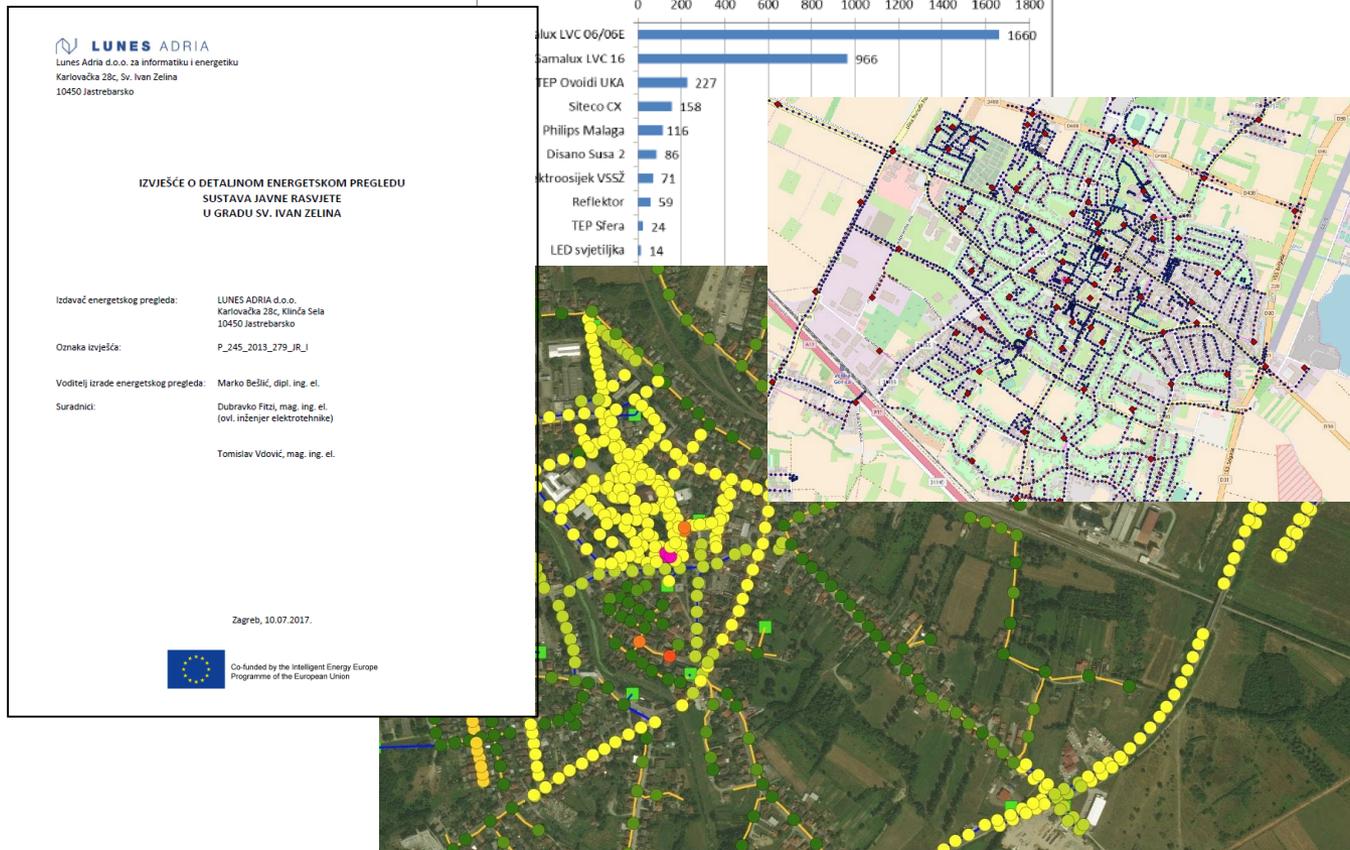
## 2. Action plan for public lighting reconstruction

Custom for each city/municipality

Officially adopted by city/municipality council



# Public lighting Energy Audits



# Action plans



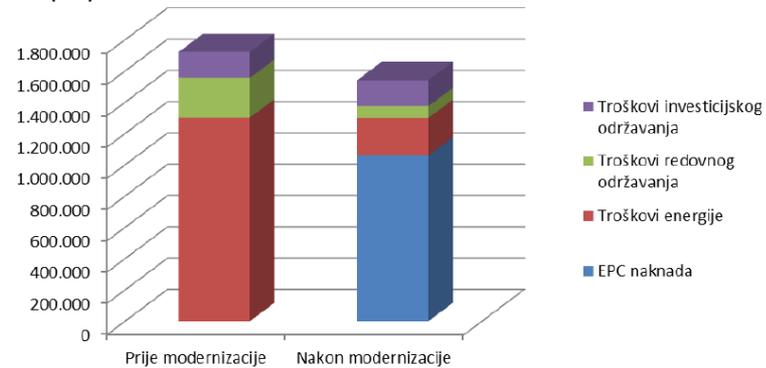

**Akcijski plan rekonstrukcije, modernizacije i upravljanja sustavom javne rasvjete Grada Sveti Ivan Zelina**




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	Ukupan 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
<b>Ukupno</b>	<b>16</b>	<b>29</b>	<b>3.487</b>	<b>704</b>

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:

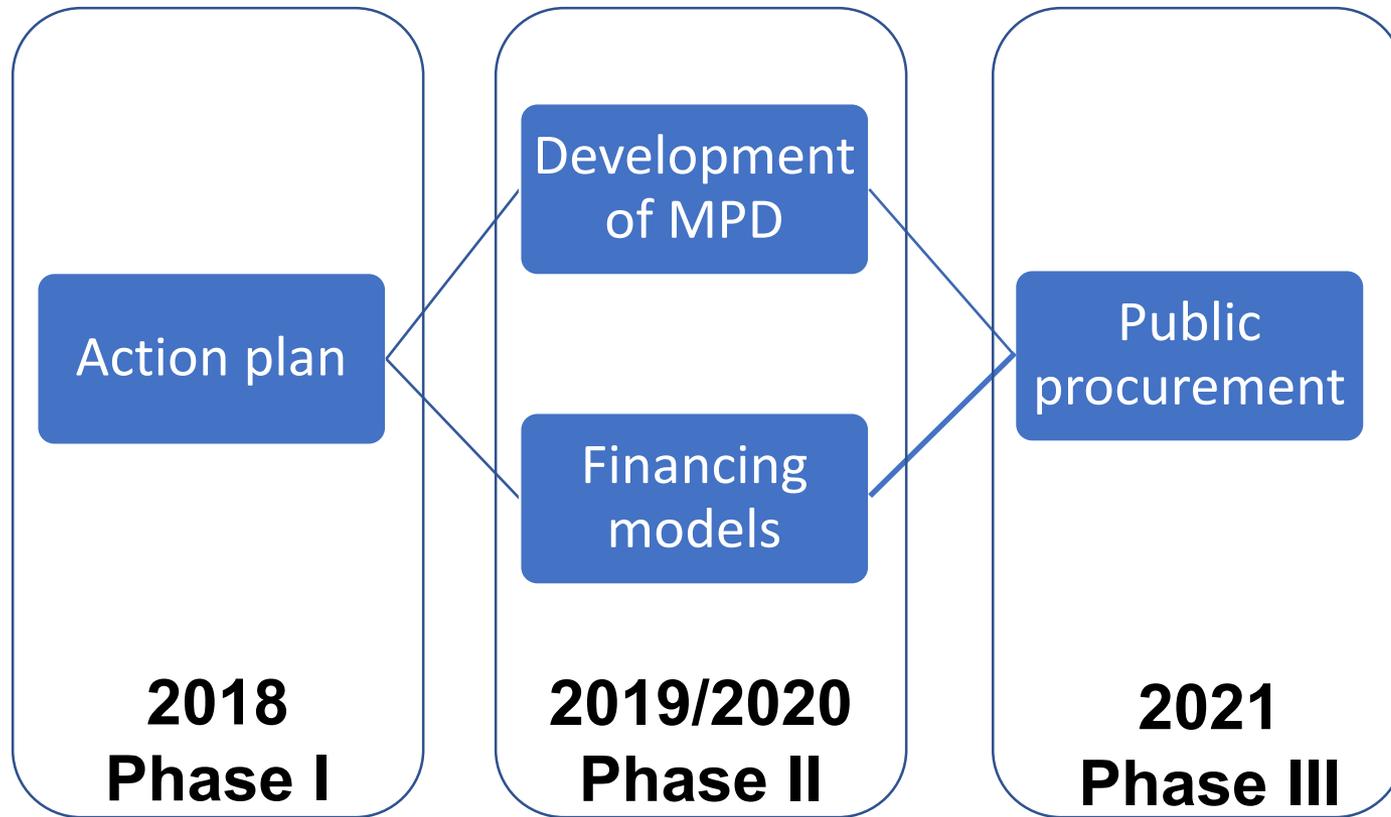
- **Technical** (energy audits, data analysis...)
- **Financial** (feasibility studies, CBA...)
- **Legal** (tender documentation, legal advisory...)



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



# RePubLEEc Project Phases

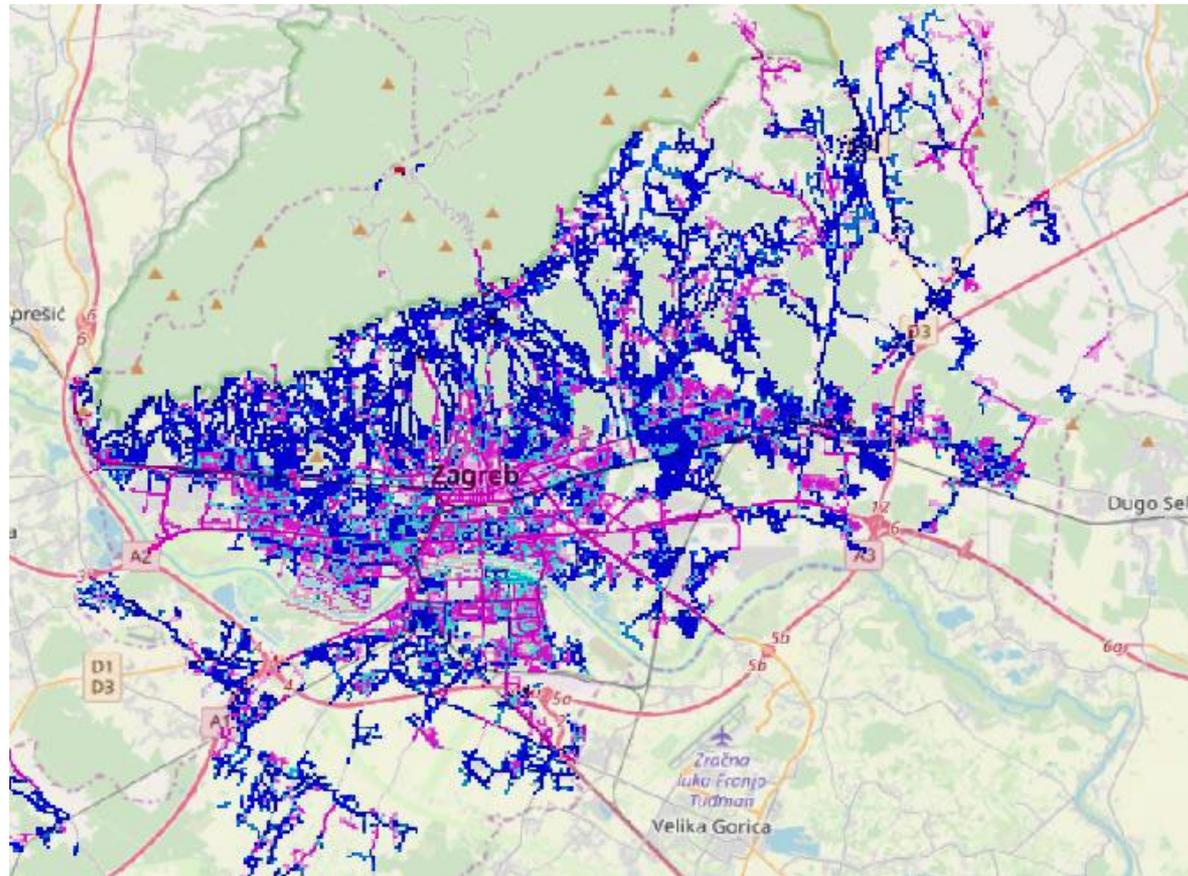


# Scope of the project

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 (!!!)



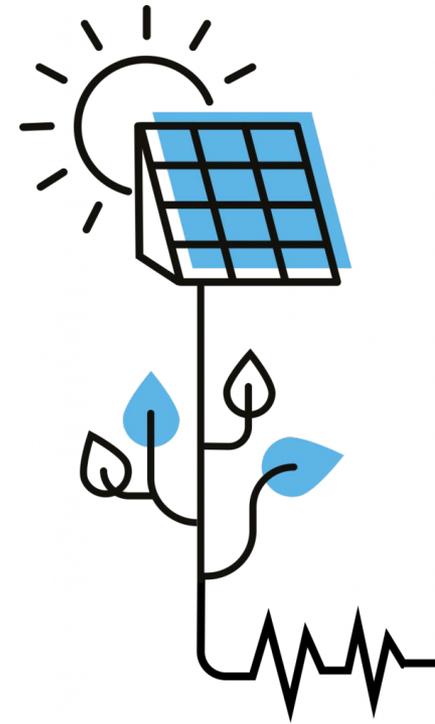
**PVMax**



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



# ELENA PVMax: Investment in PV systems in Croatia



# PVMax: Overview



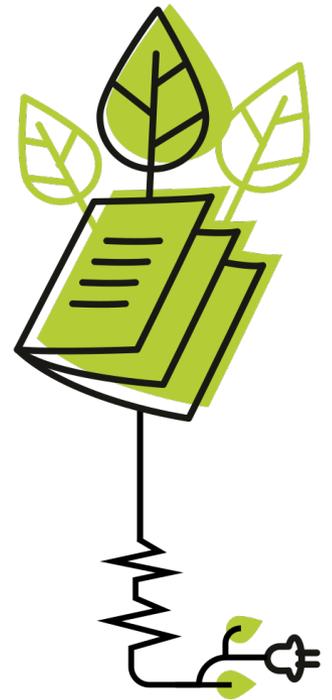
EIB/ELENA - European Local ENergy Assistance

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?

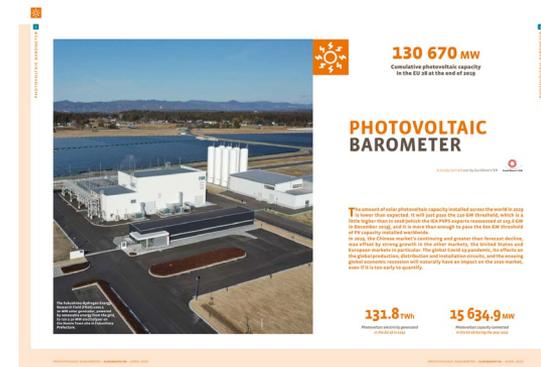
- Current situation

- 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

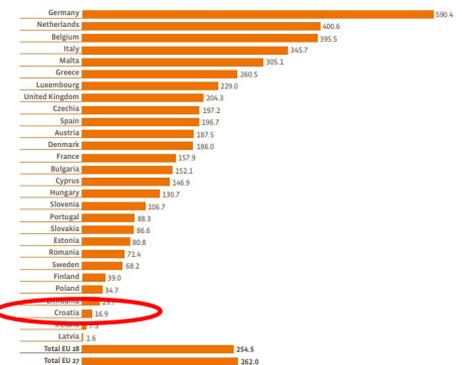
- Obvious market failure in Croatia!

- 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: EuroObserv'ER 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




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

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 (2019-144) je 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.



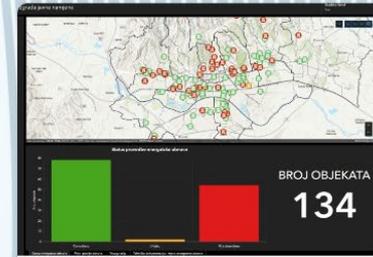
### Izračun sunčanog potencijala za vaš objekt

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 energetska 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 ELEKTRENE (snaga, potrebna površina krova, investicija, proizvodnost i isplativost) ZA ODABRANU ZGRADU.

Vidi više

### Grad Zagreb - karta sunčanog potencijala - odabir krova

Pronađi adresu ili mjesto

**POTREBNA PLOŠTINA ODABRANOG KROVA** | **ISKORISTIVA PLOŠTINA ODABRANOG KROVA**

328.88 m<sup>2</sup> | 196.23 m<sup>2</sup>

**Info**  
PROCJENA KAPITALNOG ULAGANJA  
49700 kn  
JEDINSTAVNI PERIOD  
POVRATA INVESTICIJE  
9.8 godina

**ODABERITE TARIFU**

MESEČNI OBRACUN | GODIŠNI OBRACUN

#### Mjesečni obračun

LINEARNE POTROŠNJE ELEKTRIČNU ENERGIJU ZA ODABRANI MJESEC NA OSNOVU KOJEGA ŽELITE NAPRAVITI KALKULACIJU

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

VIŠA TARIFA kWh | NIŽA TARIFA kWh  
LINSKI CILJEVI 0.5635 kn/kWh | LINSKI CILJEVI 0.2765 kn/kWh

Molimo upisati isključivo jediničnu cijenu visoke / niske tarife iz obračuna opskrbe (cijena bez uključених осталих malina) i obračuna za korištenje mreže, npr. 0.5635 prema računu na [u](#) za visoku tarifu

IZRAČUNAJ

**ENERGETSKI INFO CENTAR**  
GRAD ZAGREBA

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

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**Info**  
PROCJENA KAPITALNOG ULAGANJA  
49700 kn  
JEDINSTAVNI PERIOD  
POVRATA INVESTICIJE  
9.8 godina

**77%**  
PROCJENA GODIŠNJIH UŠTEDA  
5090 kn

**IZDOKUMENTIRANO BIKRIBILO**

MESEČNI OBRACUN | GODIŠNI OBRACUN

#### Mjesečni obračun

LINEARNE POTROŠNJE ELEKTRIČNU ENERGIJU ZA ODABRANI MJESEC NA OSNOVU KOJEGA ŽELITE NAPRAVITI KALKULACIJU

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

ODABRANA TARIFA 500  
LINSKI CILJEVI 0.5270 kn/kWh

Molimo upisati isključivo jediničnu cijenu visoke / niske tarife iz obračuna opskrbe (cijena bez uključених осталих malina) i obračuna za korištenje mreže, npr. 0.5270 prema računu na [u](#) za visoku tarifu

**IZDOKUMENTIRANO BIKRIBILO**

ODABRANA PLOŠTINA POTREBNA PLOŠTINA ODABRANOG KROVA 39.60m<sup>2</sup> | OŠTAKA PROIZVODNOSTI ELEKTRANE 4.95 kW

#### Uštede

PROCJENA GODIŠNJIH UŠTEDA | OŠTAKA PROIZVODNOSTI ELEKTRANE



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 m<sup>2</sup>
- 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

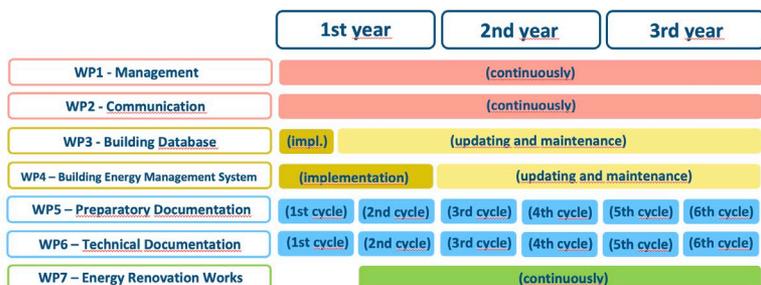


# ZA-GREEN



## ZA-GREEN project

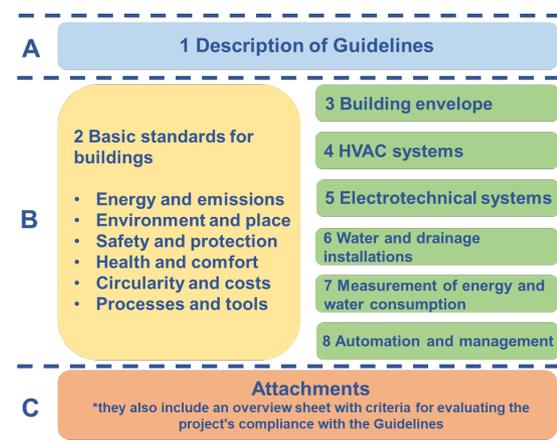
### Plan for implementation



- 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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