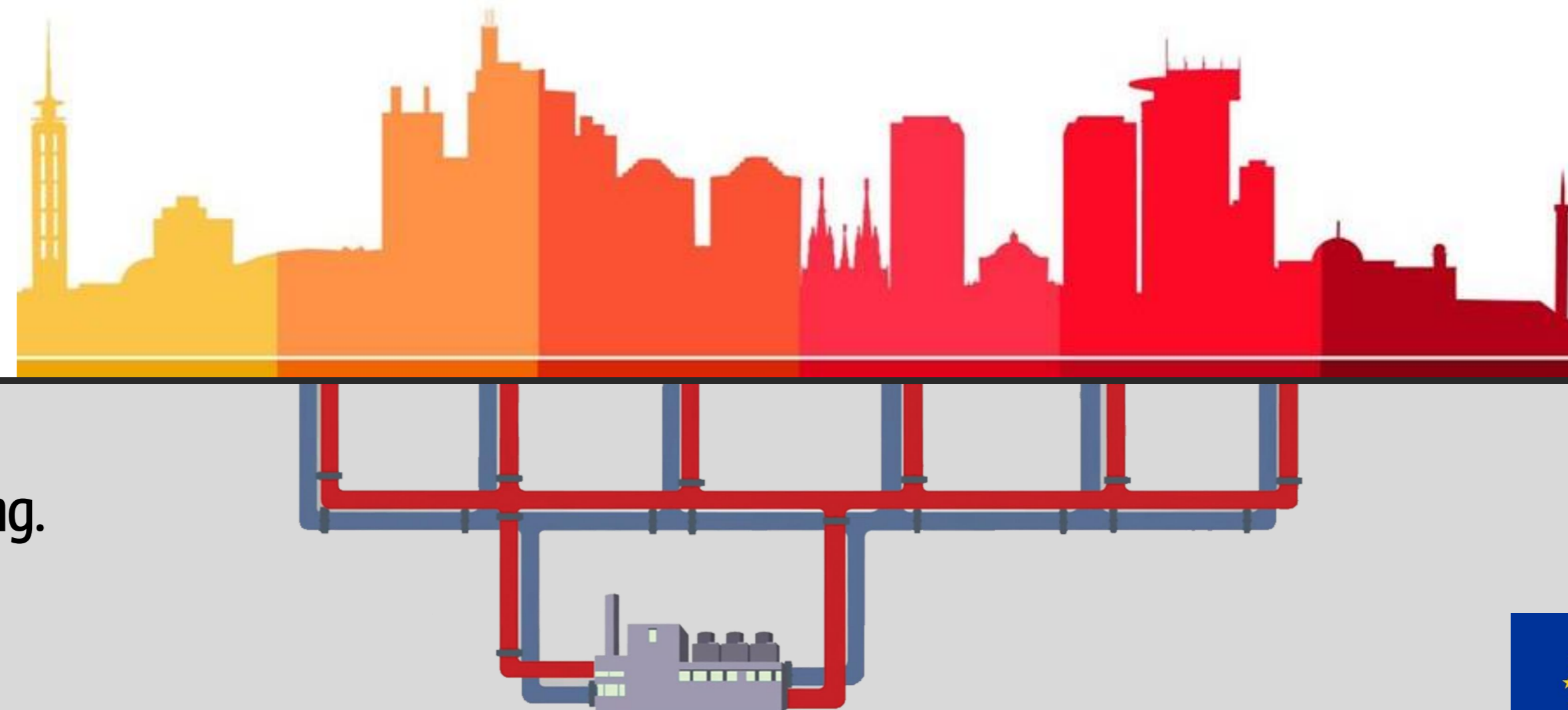


Municipality of Visoko
Bosnia and Herzegovina

Solar thermal energy and seasonal storage for district heating grid in Visoko (B&H)



Dr Marin Petrovic, M.Eng.

Amra Babic, M.Econ.

Emir Fejzovic, M.L.



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 691679.



Environmental & Social sustainability



Environmental

Better air quality due to air pollution reduction



Social

Cheaper heating bills for citizens



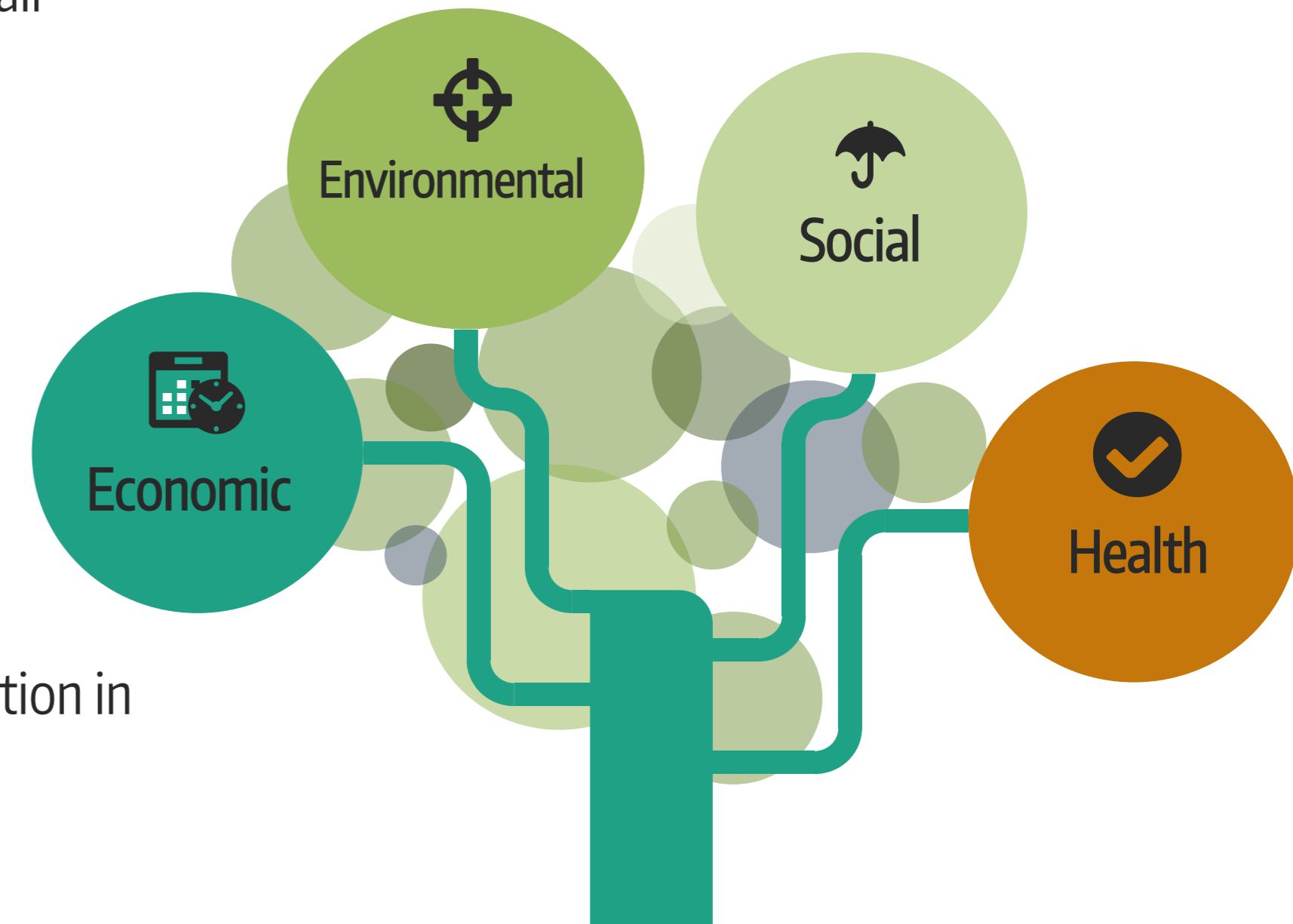
Economic

The city is fostering the development of new technologies and innovation in new energy sources

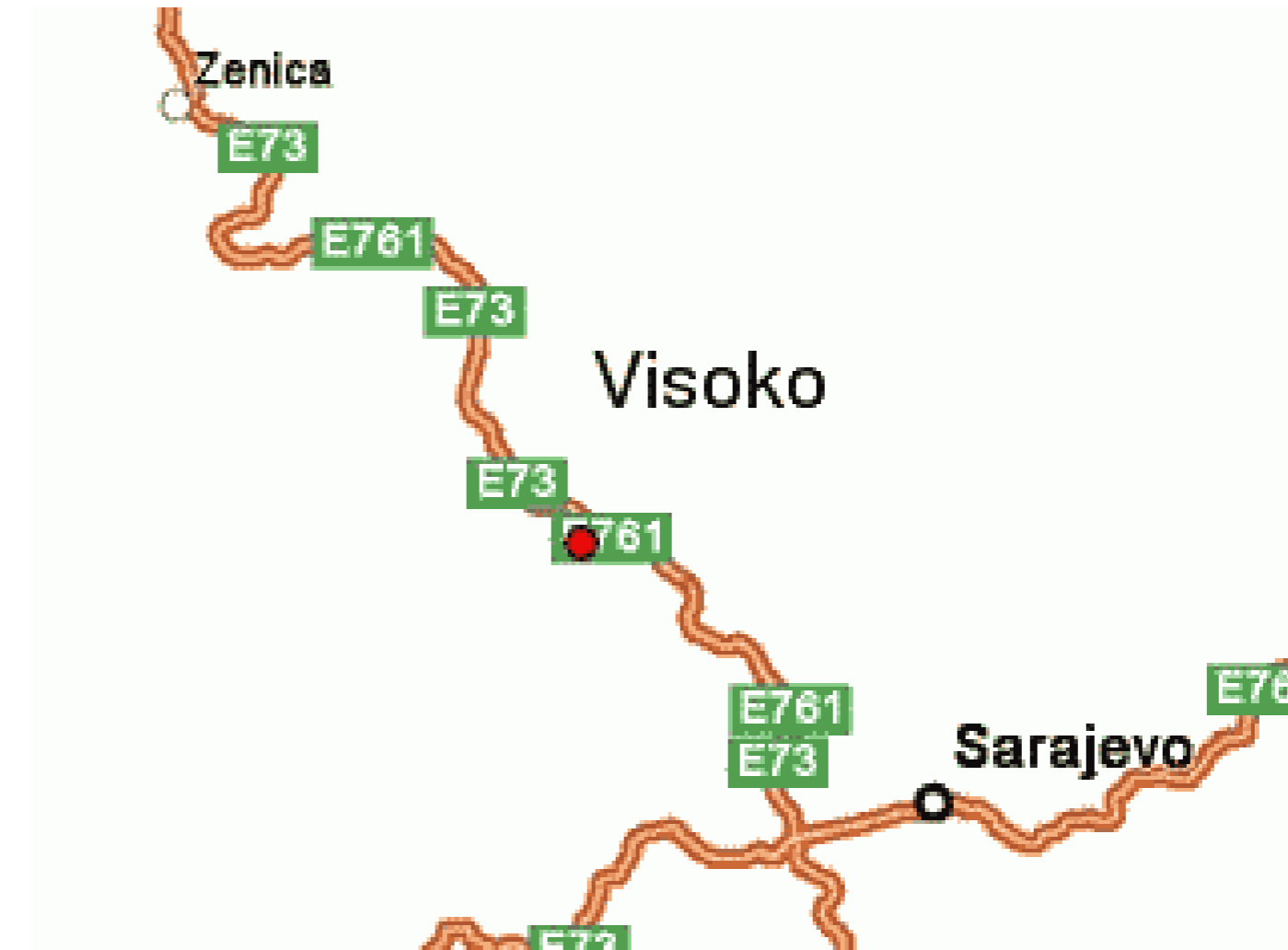
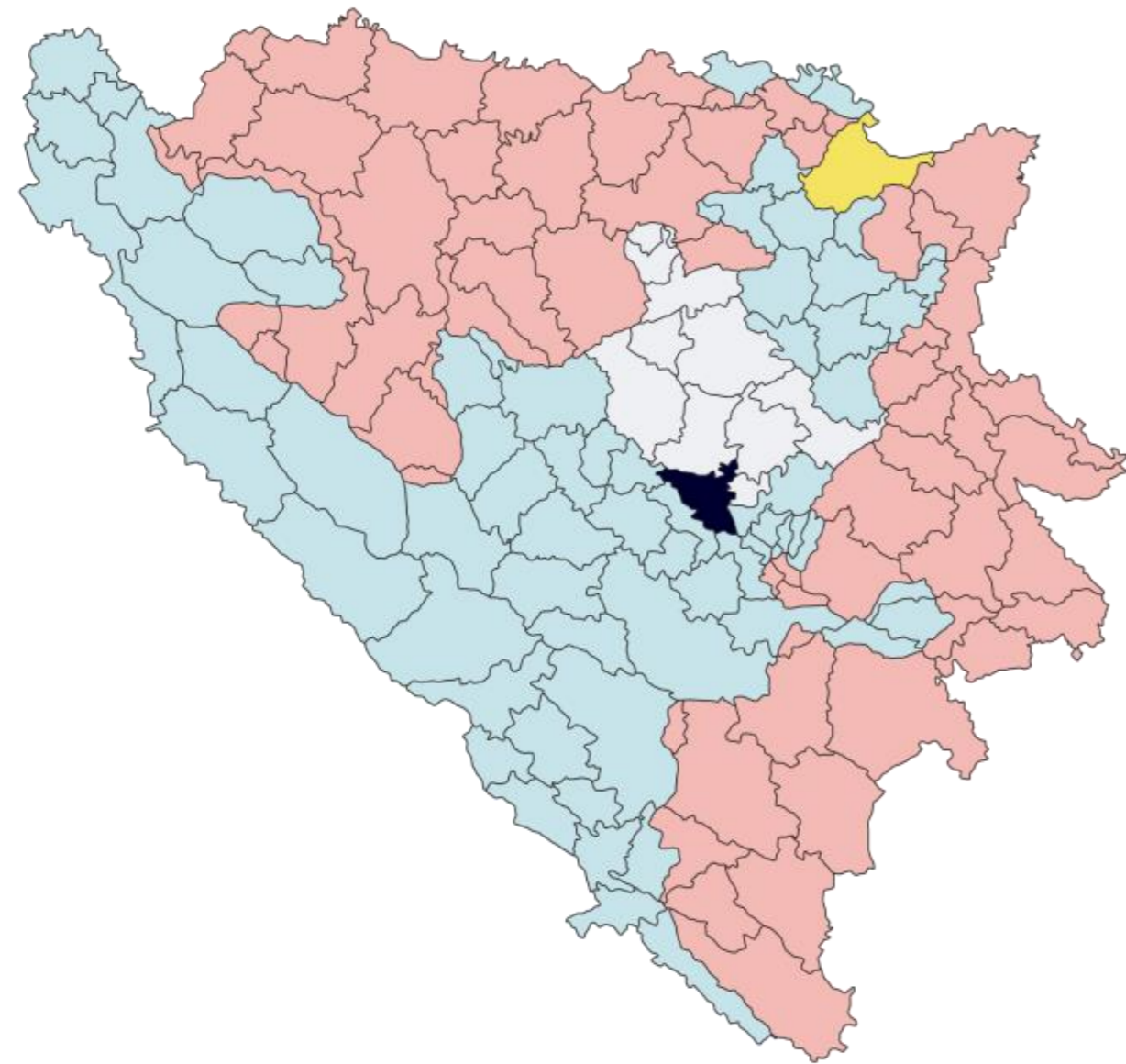


Health

Better health of citizens due to air pollution reduction



The Municipality of Visoko



Country: Bosnia and Herzegovina
Area: 230.8 km²
Population: 41,352
Climate zone: Continental

Central part of B&H

Natural environment determined by river valleys of Bosna and Fojnica



Problems in heating sector



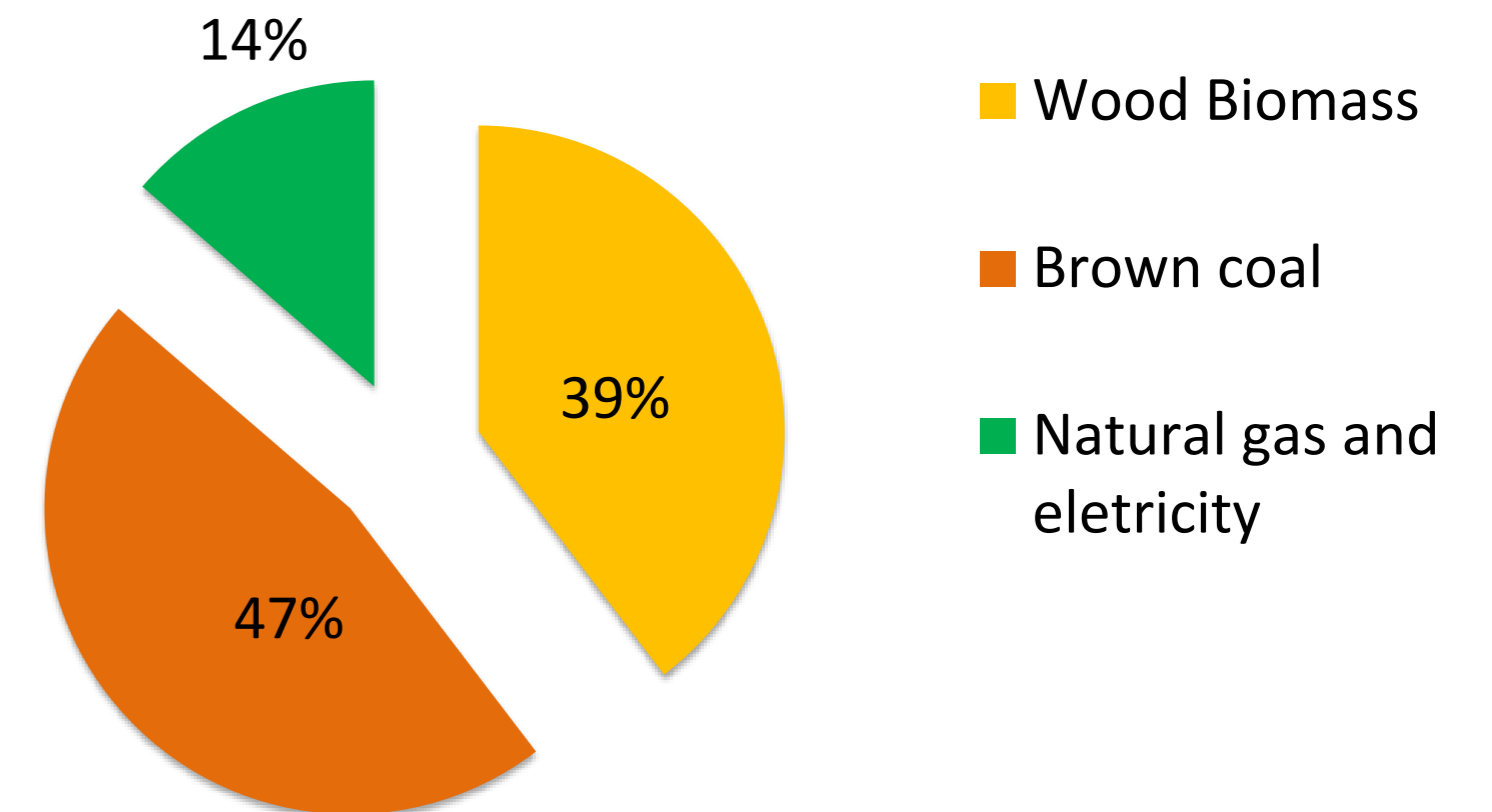
Fossil fuels

- 8 months heating season
- Brown coal mostly used for heating!

Air pollution

Respiratory diseases

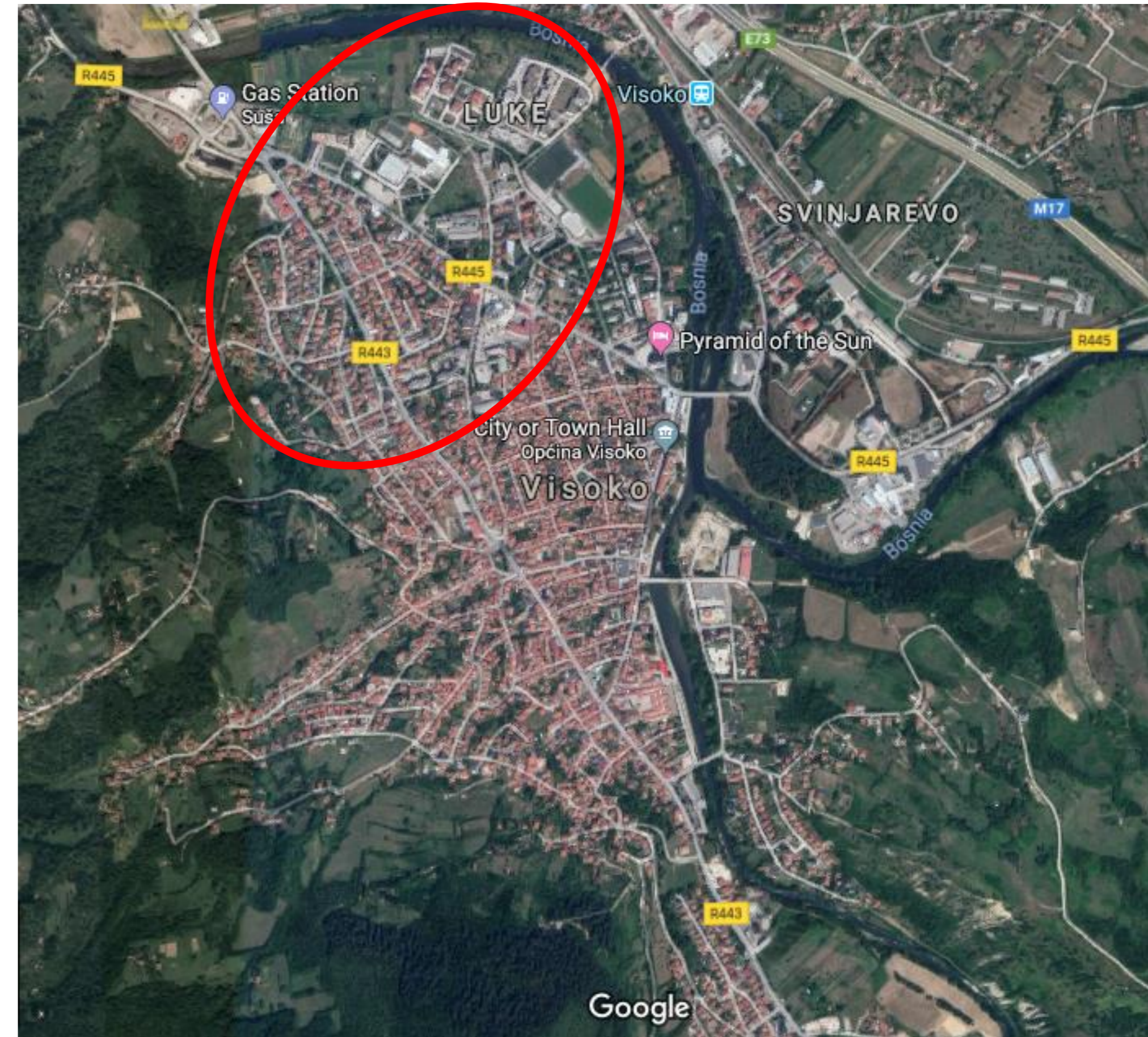
Dense fog



Project area



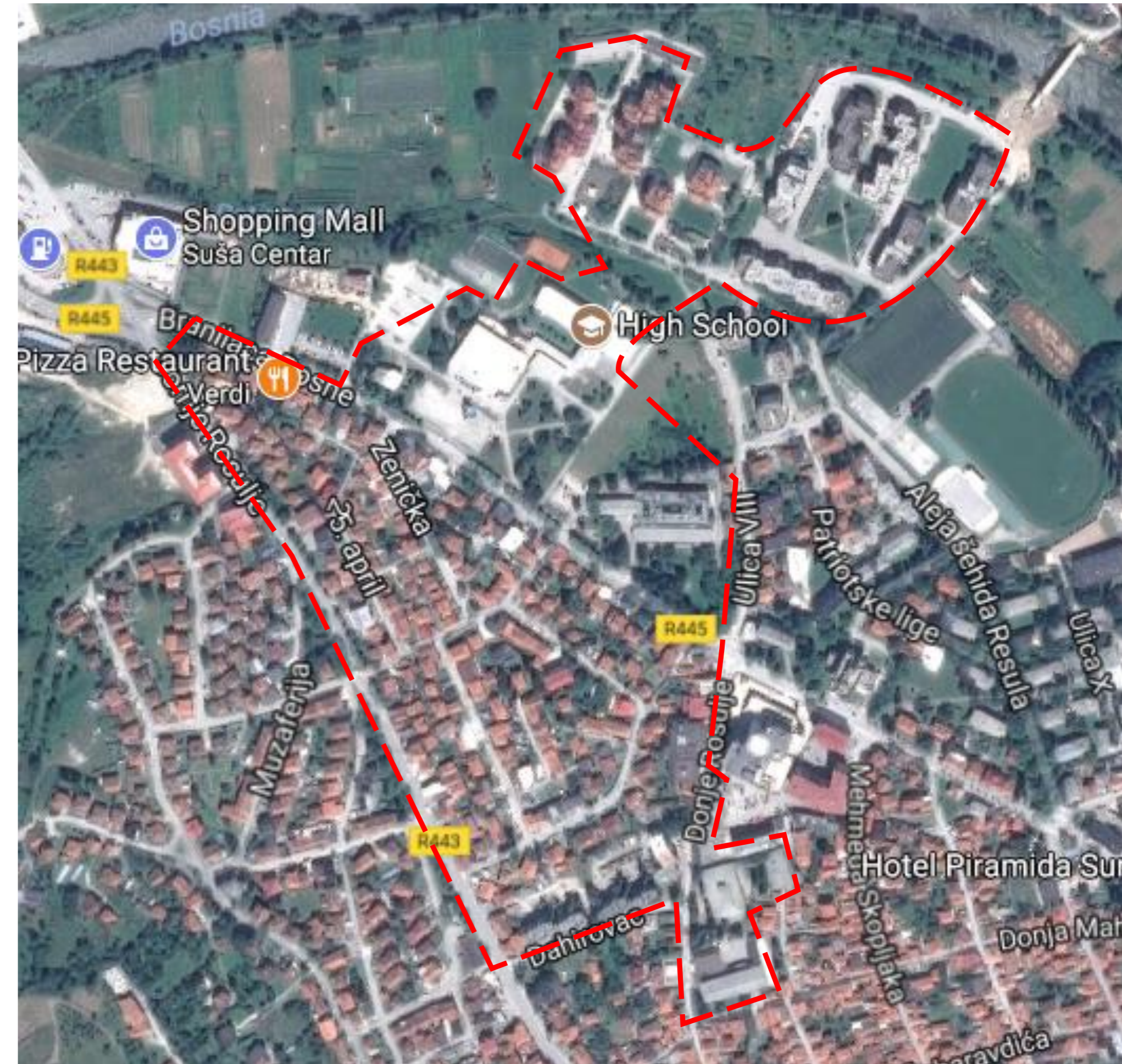
- North-western part of town
- Total conditioned area of around 92,000 m²



Project area



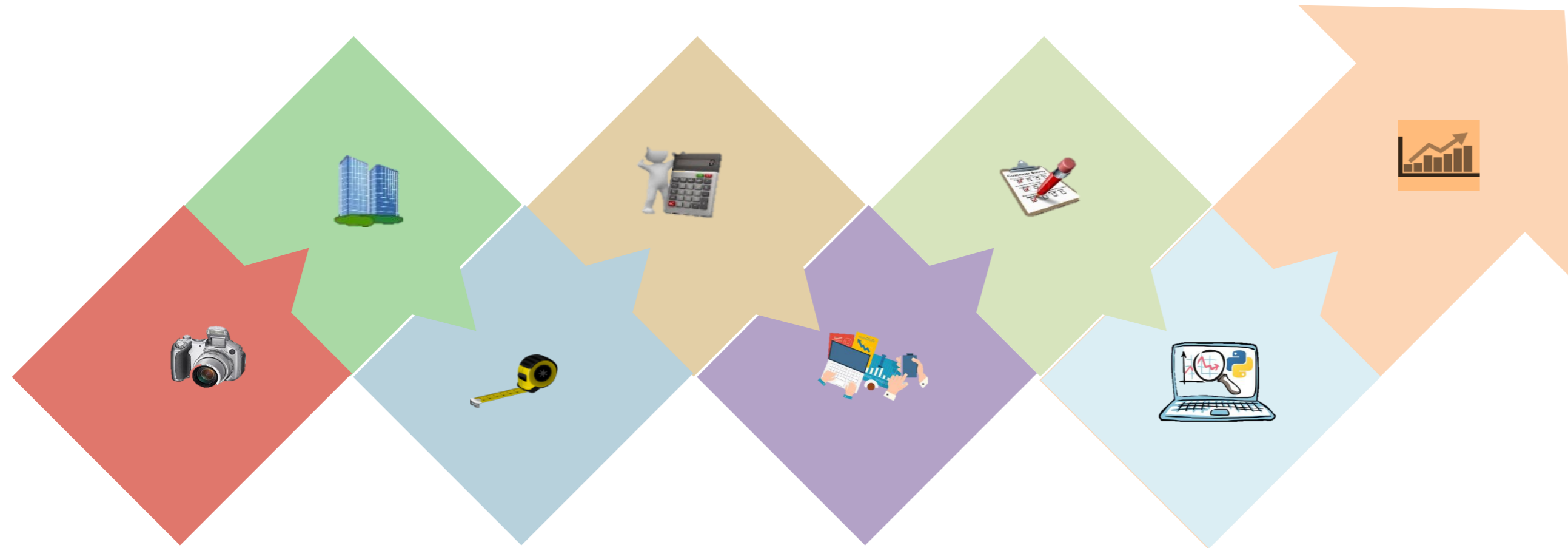
- North-western part of town
- Total conditioned area of around 92,000 m²





Analysis of consumption

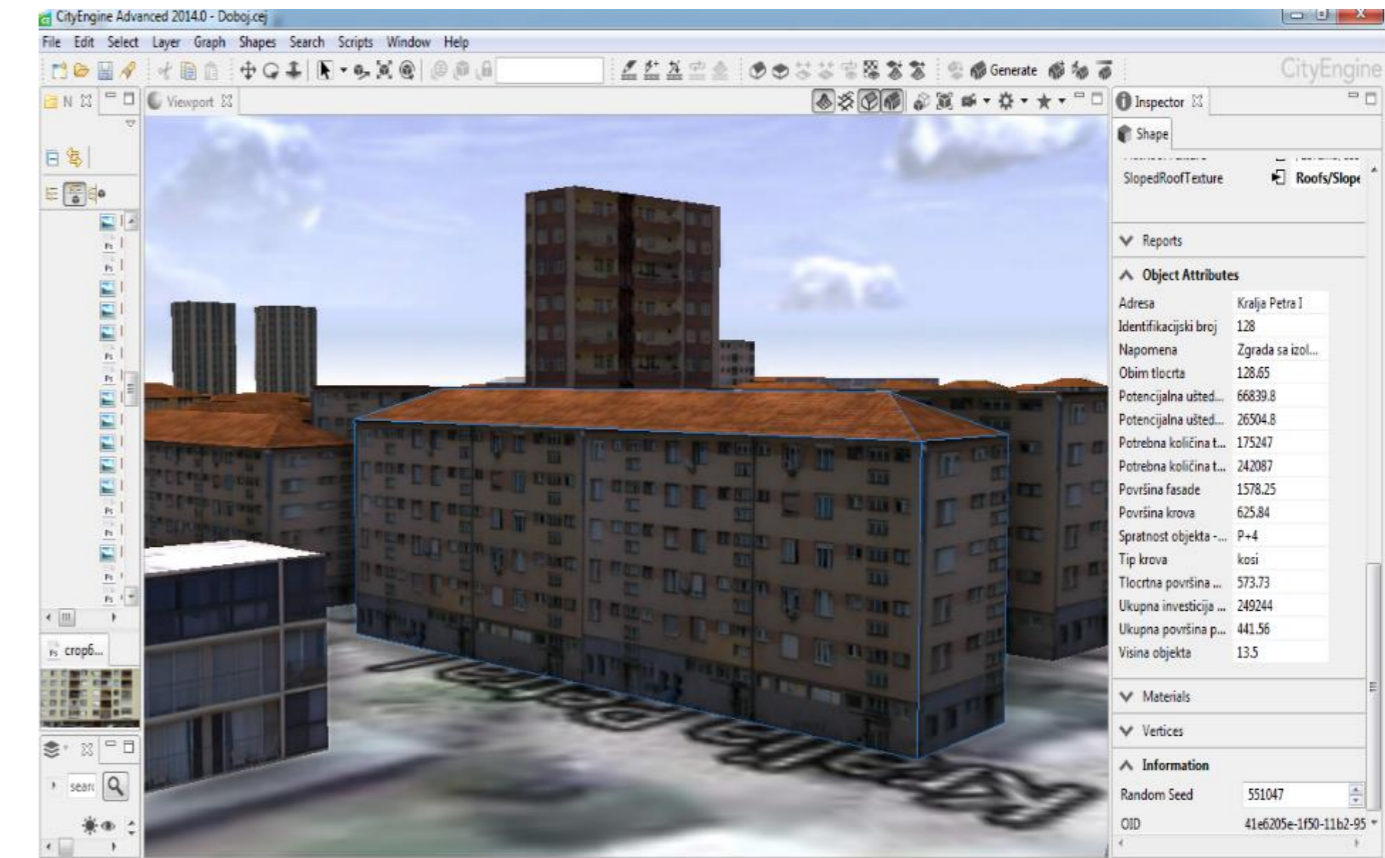
Multitude of energy audits performed



Analysis of consumption



3D model and database



Analysis of consumption



3D model and database



Building view in 3D model



Real building view



selected | 3630 Polygons (5 selected)

Shape		
Object Attributes		
Adresa	7. Novembar 2	
GPS	21	<input type="range"/>
Investic_1	142725	<input type="range"/>
Investic_2	0	<input type="range"/>
Investicij	0	<input type="range"/>
Ivesticija	0	<input type="range"/>
Nacin	Toplana	
Napomena		
Obim_tlocr	70	<input type="range"/>
Potencij_1	0	<input type="range"/>
Potencij_2	24178.01	<input type="range"/>
Potencij_3	12224.18	<input type="range"/>
Potencij_4	24178.01	<input type="range"/>
Potencijal	0	<input type="range"/>
Potrebna	186790.5	<input type="range"/>
Površina_f	1595	<input type="range"/>
Površina_k	306	<input type="range"/>
SHAPE_ID	39	<input type="range"/>
Smanjenj_1	0	<input type="range"/>
Smanjenj_2	0	<input type="range"/>
Smanjenj_3	10.24	<input type="range"/>
Smanjenj_4	0	<input type="range"/>
Smanjenje	10.24	<input type="range"/>
Spratnost	12	<input type="range"/>
Tlocrt	306	<input type="range"/>
Ukupna	142725	<input type="range"/>
Ukupna_pov	519	<input type="range"/>
Vicina	30 2	<input type="range"/>

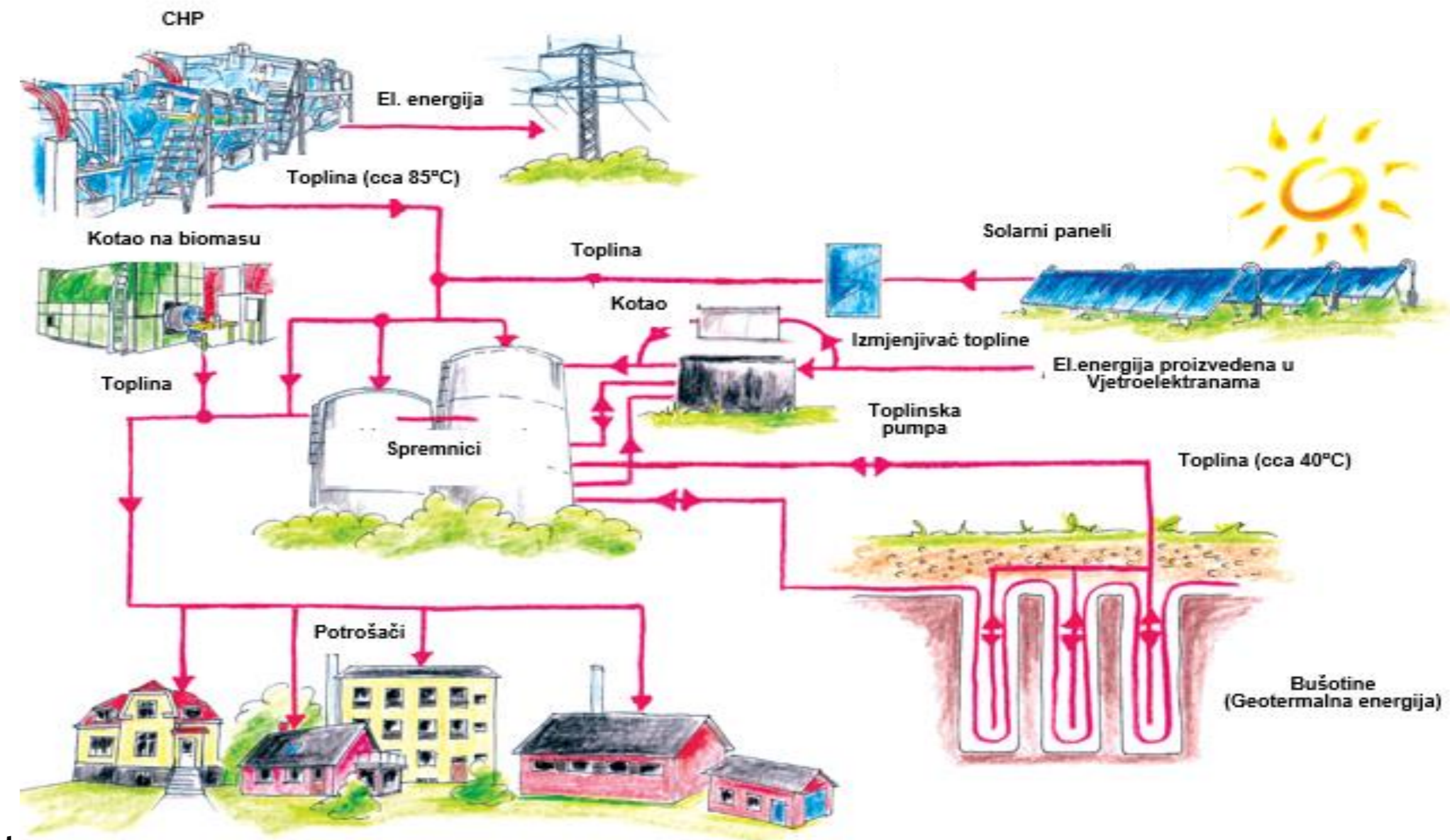


Variety of energy sources analysed

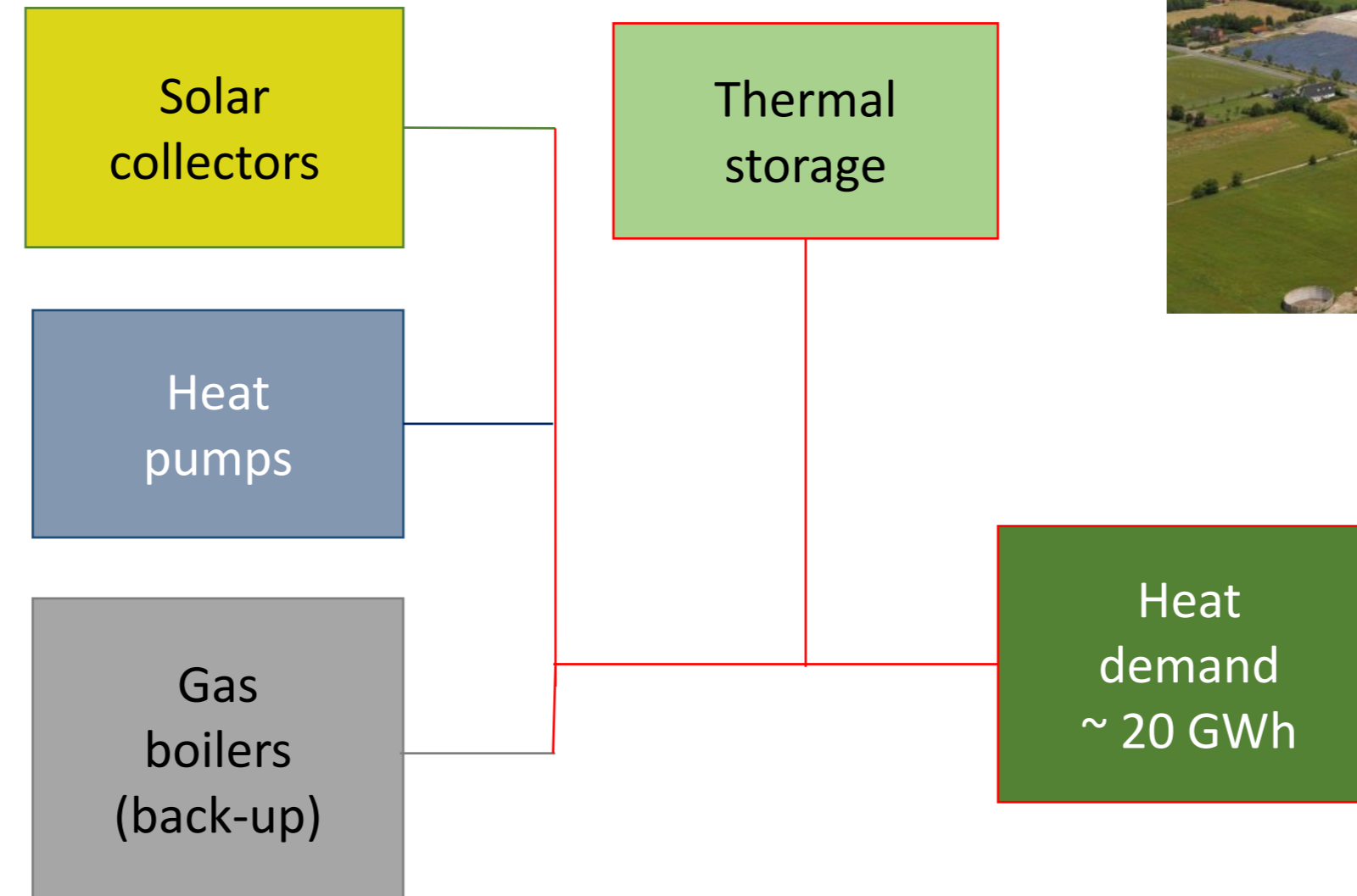
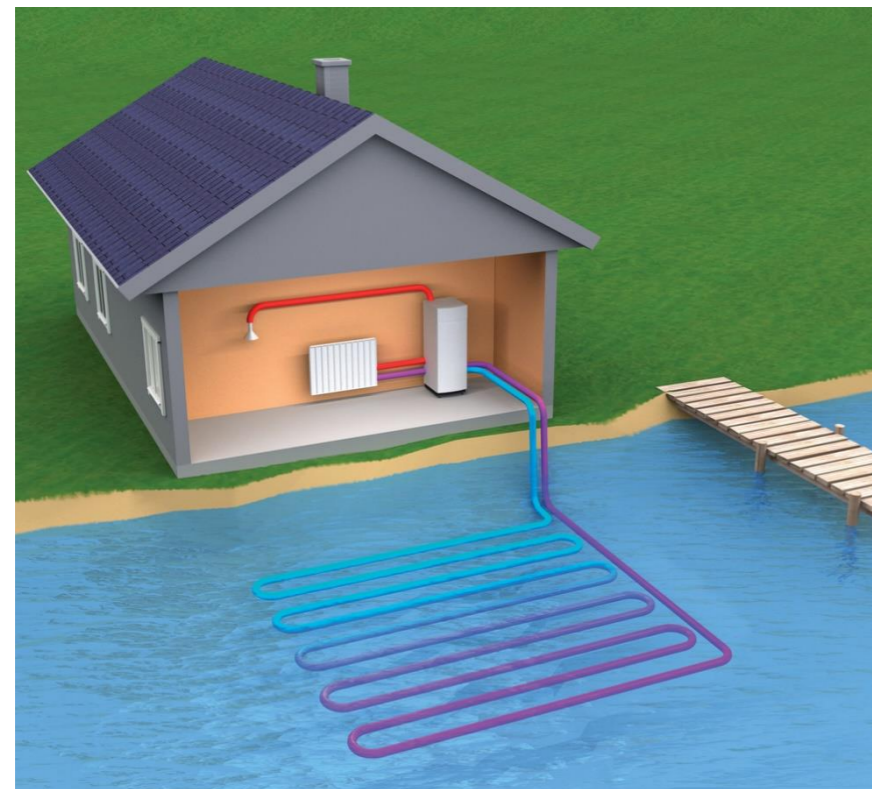


Specifics for Visoko

- Location of Visoko in the river valley,
- Large number of foggy days in winter time,
- No groundwater sites in the project area,
- Insufficient quantities of industrial waste heat,
- Insufficient quantities of usable waste available for biogas production,
- Seasonal pit thermal energy storage - lowest investment price compared to other technologies,
- Use of PV panels installed on available roofs of public buildings attractive for electricity generation.



Production units



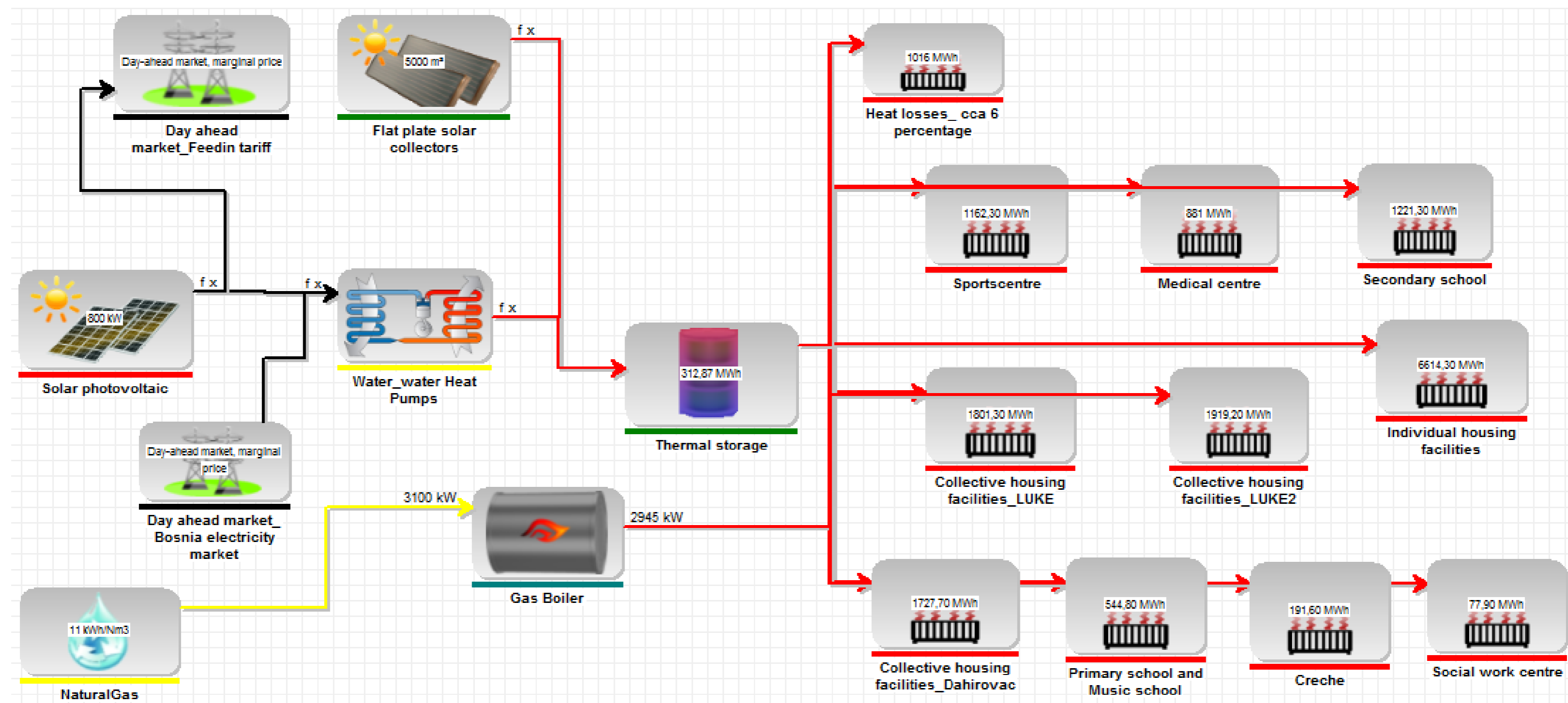
- Several different production units
- **Cheap energy**, even with higher initial investment





System optimization

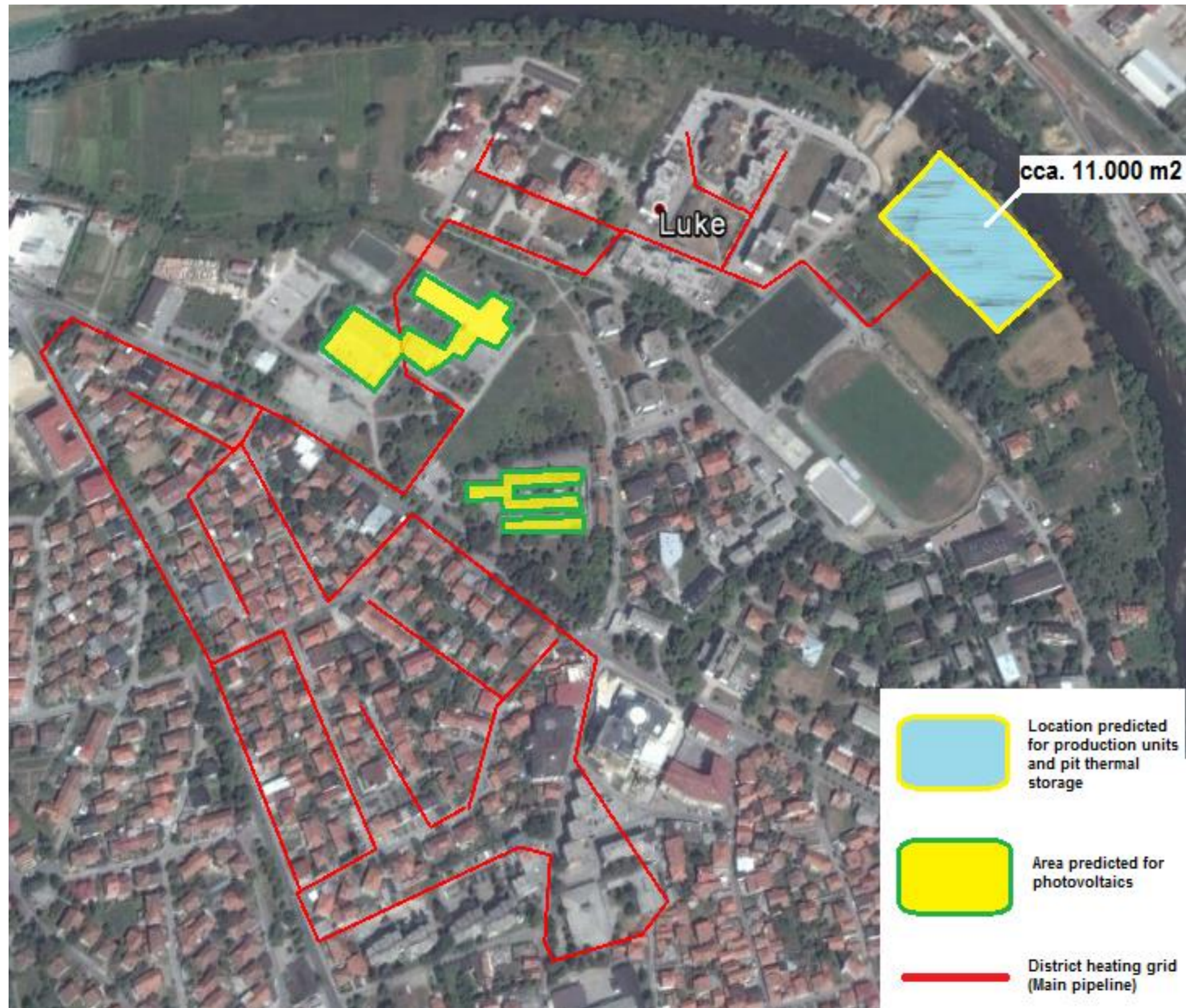
- System optimization performed in EnergyPro modelling software
- Optimization based on prices of energy from different sources and rate of investment return
- Maintenance costs for production units taken into account



The Most Advanced and Flexible
Energy Modelling Software Package



Capacities and investment costs



Investment parameter	Investment costs (€)
Planning, feasibility study and design docs	50.000
Land for the DH plant	60.000
Civil works	50.000
Photovoltaics 800 kW	640.000
Heat pumps (water-air) 6.3 MW	756.000
Solar collectors 5,000 m ²	1.150.000
NG peak load boilers 3.1 MW	existing NG boilers
Thermal pit storage tank 13,500 m ³	625.000
Connection fee to the medium voltage grid	170.000
District heating network 5,500 m	1.100.000
Heating stations	309.400
TOTAL	4.909.400

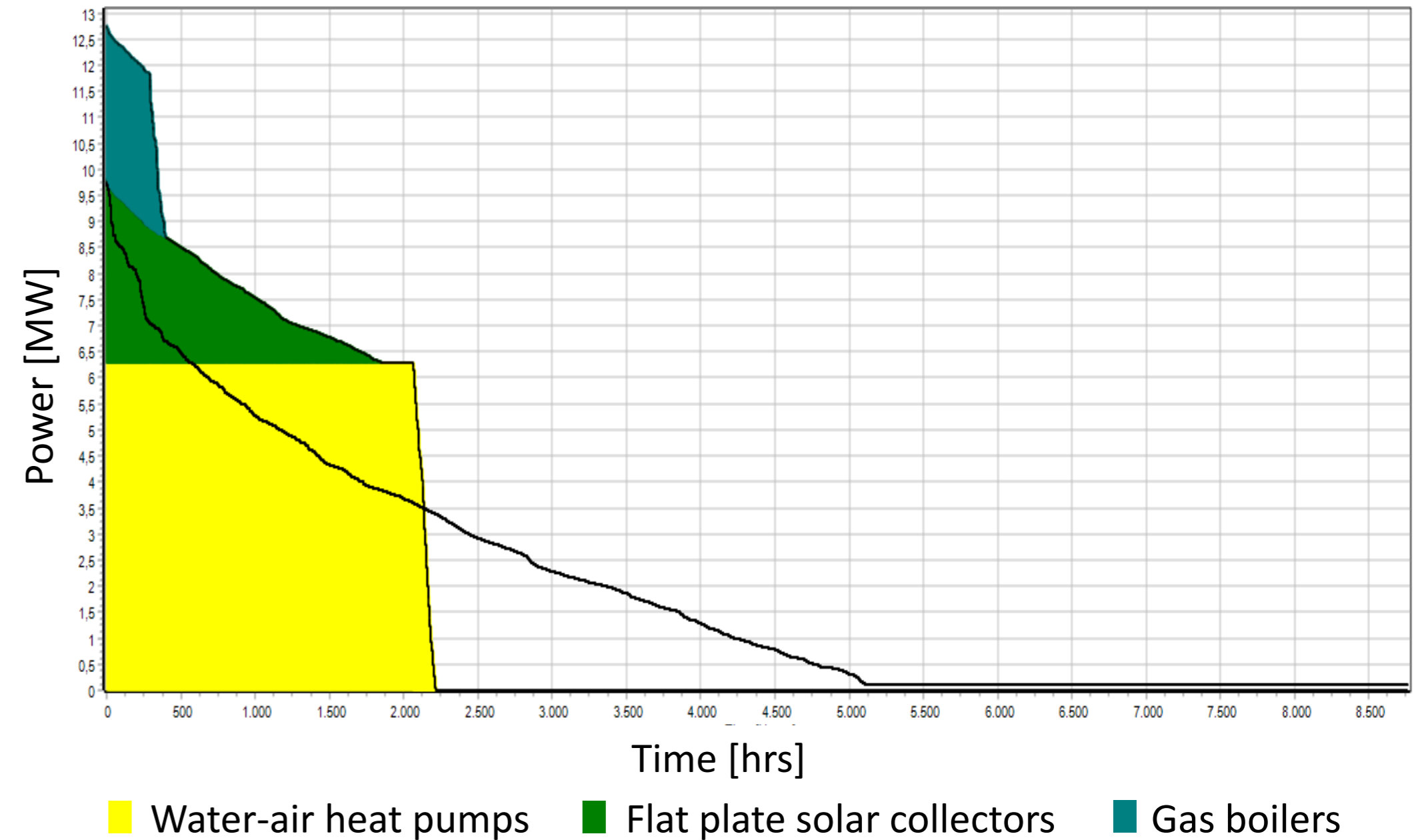
Capacities of all production units			
Heat pumps	6.3 MW	Solar collectors	5,000 m ²
Gas boilers	3.1 MW	Heat storage	13,500 m ³
PVs	800 kW	DH grid length	5,000 m

- Total installed power 9.4 MW_{th}

Heat generation



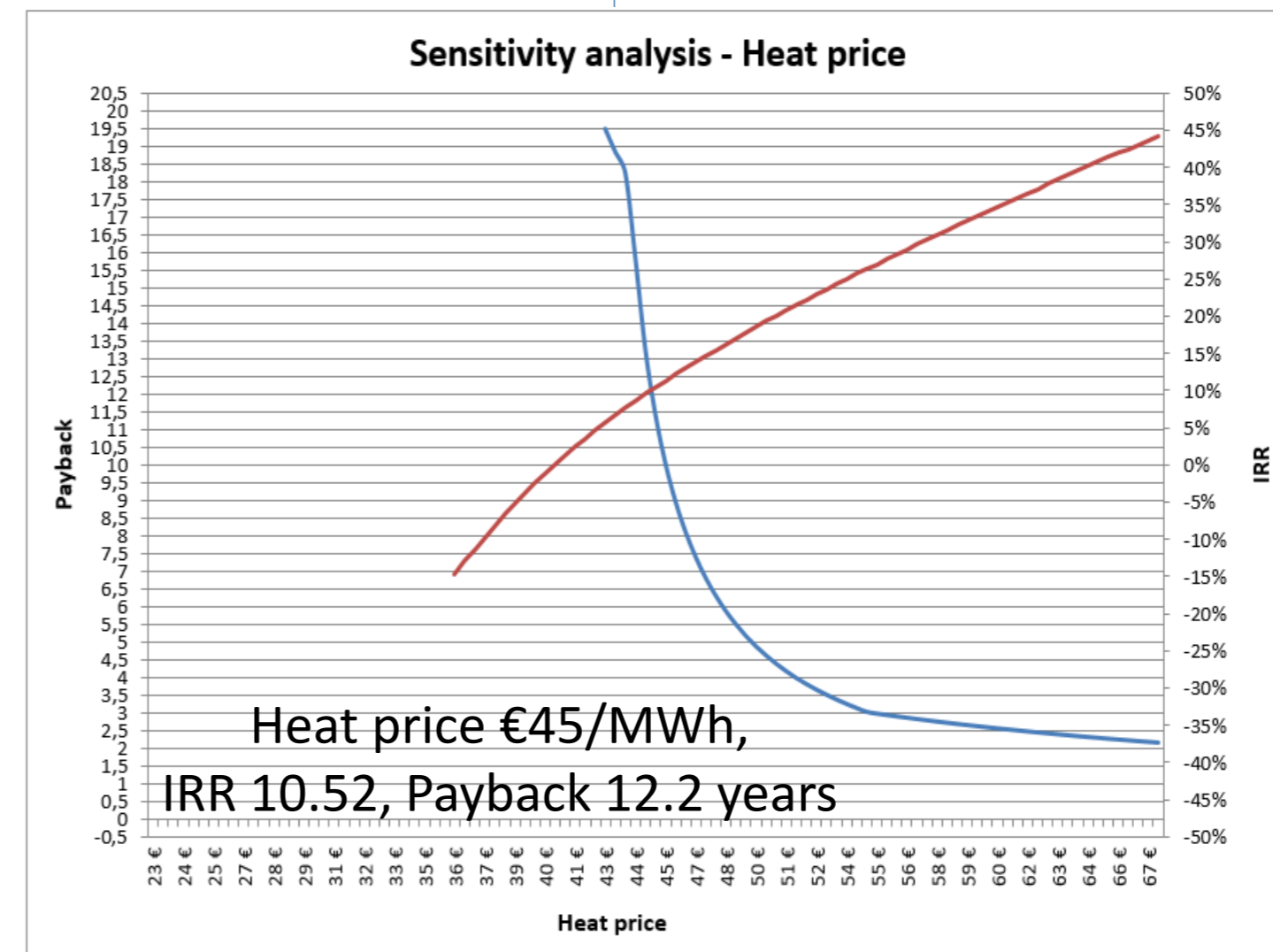
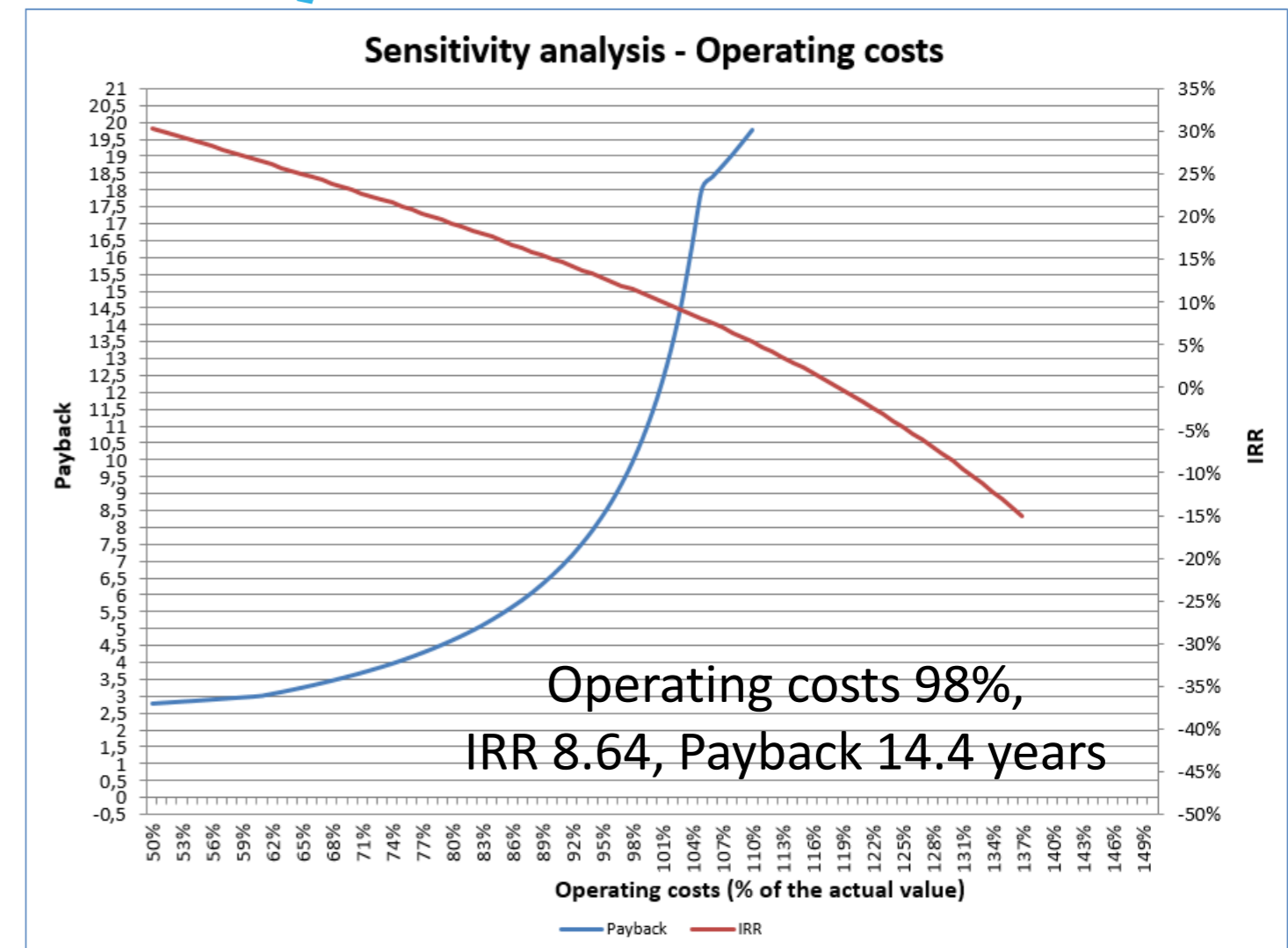
- All public buildings connected to DH grid
- 80% connection rate for households in DH grid supplied area
- In total 18.13 GWh/year of thermal energy needed to be delivered through DH grid
- The amount of heat sold to consumers estimated to 17 GWh/year





Business assessment and sensitivity analysis

- Existing specific cost for heating in Visoko cca 35 €/MWh
- Revenues within Visoko DH project generated by sales of thermal energy (88.48%) and electricity (11.52%):
 - Heat sale price: **45 €/MWh**
 - **(zero profit and zero connection fee)**
 - Electricity sale price: 80 €/MWh
- IRR on invested equity 10-11%
- Payback time: **12 years**



Ownership model and financing sources



- Owner of the entire DH system: Municipality of Visoko
- Operator: Visoko Ekoenergija d.o.o, municipal public utility company
- Location of all production units: mostly owned by the Municipality, the rest to be purchased from private owners

Financing source	Share of investment costs
Loan (i=2,5%; repayment period: 15 years; grace period: 3 years)	75%
Grants / donations	25%
TOTAL	100%





Impacts on local environment

- Reduction of CO₂ emissions by 5,046 tons per year
- Lower energy costs, high level of energy supply comfort
- Improved air quality will result in lower expenses in health services
- Direct and indirect employments due to the effects on local economies

01

CONSIDERABLE
ANNUAL GHG
EMISSION
REDUCTION

02

TOTAL ANNUAL
COSTS SAVINGS

03

BETTER LIVING
QUALITY

04

CREATION OF
"GREEN JOBS"

05

INCREASED
AWARENESS AND
UNDERSTANDING
FOR ENERGY
EFFICIENCY



Latest achievements

- National conference (19/06/2018) ✓
- Info / Investors event (17/10/2018) ✓
- Signed Letter of Commitment (October 2018) ✓
- Signed Memorandum of Understanding (November 2018) ✓

It is a great honor and pleasure to invite you to participate in the Info Investment Conference: Small modular renewable heating and cooling grids.

Altindag Cultural Center - Visoko
WEDNESDAY, 17 October 2018



CoolHeating Team
Municipality of Visoko



BOSNA I HERCEGOVINA
FEDERACIJA BOSNE I HERCEGOVINE
ZENIČKO-DOBOJSKI KANTON
OPĆINA VISOKO
OPĆINSKA NAČELNICA

Broj: 01/2-02-337-1/18
Datum: 17. 10. 2018. godine

To:
European Commission - Innovation and Networks
Executive Agency (INEA)
Daniel MARAVER DE LEMUS, PhD
Project Officer Horizon 2020 - Energy Research
Chaussée de Wavre 910
W910 03/26
B-1049 Brussels/Belgium
+32 2 295 29 69
daniel.maraver@ec.europa.eu
http://ec.europa.eu/inea

17-Oct-18

Letter of commitment of the involved stakeholders

In the framework of the project CoolHeating with the title "Market uptake of small modular renewable district heating and cooling grids for communities" (Grant Agreement No 691679), supported by the European Union's Horizon 2020 research and innovation programme, technical concepts, business models and feasibility checks have been elaborated by the consortium.

We, **The Municipality of Visoko** as the project initiator and future system owner, **Public utility Visoko Ekoenergija** as the future system operator and **Public communal utility Visoko** as the residential buildings' manager, are undertaking responsibility to bring the project to the implementation stage.

We confirm that we were involved in the discussions about the elaboration of the project results, and that the results were presented to us. For example, the feasibility check document "Small modular renewable district heating of the central zone in Municipality of Visoko", was presented to us during the information event for attracting the investors by Amra Babic, Marin Petrovic and Emir Fejzovic, from the Municipality of Visoko, as well as Anes Katagic, from EPBiH, on 17.10.2018. at "Altindag Cultural Centre - Visoko", Prijeko, 71300 Visoko, Bosnia and Herzegovina.

We are highly interested in the realization of a small modular renewable district heating grids in Visoko municipality, in order to contribute to the considerable annual GHG emission reduction, total annual costs savings, reducing the rate of expenditures of public money, better living quality, creation of "green jobs", increased awareness and understanding for energy efficiency and its resulting benefits.

We are committed to support the project realization whose technical, economical and legal aspects have been presented, under following assumptions given in the feasibility check:

1. The use of renewable energy sources and modularity: **heat pumps, solar collectors** (thermal and PVs), **gas peak boiler, seasonal storage tank**;
2. The **heat distribution grid** will be built;
3. Total investment costs will be around **4,910,000 €**;
4. The ownership form will be **public utility**;
5. The financing scheme will be **credit line (75%) and investment subsidy (25%)**;
6. The average cost of heat energy over the project lifetime will be equal or lower than the average existing heating price in this area;
7. Zero revenue condition will be set in order to keep the lowest possible heating price;
8. The equity internal rate of return for the project will be around 10% and the payback time will be around 12 years.

Ulica A. Izetbegovića br.124, 71300 Visoko, tel:032732-501, fax:032738-330, mail: nacelnica@visoko.gov.ba

BOSNA I HERCEGOVINA
FEDERACIJA BOSNE I HERCEGOVINE
ZENIČKO-DOBOJSKI KANTON
OPĆINA VISOKO
OPĆINSKA NAČELNICA

On behalf of Municipality of Visoko Mayor Ms. Amra Babic	On behalf of PU Visoko Ekoenergija General Manager Mr. Muhamed Husic	On behalf of PCU Visoko General Manager Mr. Hasan Preljic
Date: 17. 10. 2018 Place: VISOKO	Date: 17. 10. 2018 Place: VISOKO	Date: 17. 10. 2018 Place: VISOKO

Ulica A. Izetbegovića br.124, 71300 Visoko, tel:032732-501, fax:032738-330, mail: nacelnica@visoko.gov.ba

European Commission - Innovation and Networks Executive Agency (INEA)
Daniel MARAVER DE LEMUS, PhD
Project Officer Horizon 2020 - Energy Research
Chaussée de Wavre 910
W910 03/26
B-1049 Brussels/Belgium
+32 2 295 29 69
daniel.maraver@ec.europa.eu
http://ec.europa.eu/inea

Sarajevo, 22-Nov-18

SUBJECT: Memorandum of understanding

Hereby we express our commitment to the principles promoted within the framework of the CoolHeating project: "Small modular systems for district heating and cooling based on renewable energy sources", supported by the European Union's Horizon 2020 Research and Development Program (Grant Agreement no. 691679), as follows:

1. Adequate use of locally available, renewable energy sources.
2. Reducing the impact of district heating and cooling on the environment.
3. Improvement of air quality leading to lower healthcare costs.
4. Reduction of CO₂ emissions from the district heating and cooling sector to mitigate the climate change.
5. Reducing energy costs for heating and cooling while keeping a high level of comfort.
6. Opening up new opportunities for forest owners and agricultural areas for biomass delivery for district heating and cooling.
7. Creating a local, regional and national biomass market.
8. Increasing security of supply and reducing dependence on imported fossil fuels.
9. Increasing energy efficiency in the district heating and cooling sector.
10. Sustainable development and establishment of a competitive and modern energy sector as a whole.

These principles are in line with the Framework Energy Strategy of Bosnia and Herzegovina by 2035, and we express our will to continue to do so through our work and to support the expansion of good practices and solutions in the district heating and cooling sector based on the principles outlined above.

Prof. dr sci. Mustafa Musić,
Public utility company Elektroprivreda BiH d.d.
Sarajevo

Mr. sci. Amra Babić
Visoko Municipality

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement no. 691679

CoolHeating.eu

Communication and dissemination



Naslovna Visoko Politika Privreda Kultura Sport Lifestyle Multimedia M Plus

Održana prezentacija o CoolHeating projektu

Objavljeno prije 10 mjeseci · u sri, nov 16th, 2016

Sviđa mi se 0 Dijeli



Općina Visoko je u saradnji sa JP Elektroprivreda BiH organizovala sastanak i prezentaciju za lokalne predstavnike Općine Visoko, direktore Javnih ustanova i predstavnike privatnih sektora, i tom prilikom ih upozнала sa projektom Horizont 2020 CoolHeating (Br. 691679), koji finansira Evropska unija.

U prethodnom periodu Općina Visoko je provela anketu o utrošku energije u određenim područjima grada Visoko, a koja je dio projekta EU Horizont 2020 CoolHeating (Br. 691679). Cilj ovog Projekta je pružiti podršku implementaciji malih modularnih sistema grijanja i hlađenja na bazi obnovljivih izvora energije za potrebe općina i manjih gradova.

Na današnjem sastanku održana je prezentacija kroz koju su prisutni upoznati o CoolHeating projektu i predstavljeni su primjeri dobre prakse u nekim od razvijenih zemljama Evropske unije, kao što je Njemačka, Danska i Austrija. Na kraju prezentacije naveden je i pregled planiranih aktivnosti kroz projekat, navodeći primijenjeni modularni sistem u susjednim zemljama, kao i nekoliko značajnih primjera iz naše zemlje.

Najnovije

- Proizvodi žena iz BiH nose se diljem Evrope, Azije i Amerike
- Meč karijere za 'Viteza iz Viteza'
- Službeno upozorenje Federalnog hidrometeorološkog zavoda BiH za nedjelju, 17. septembra
- Bh. načelnici i gradonačelnici s ministrom ekonomije Republike Turske
- ZDK pripremio 39 projekata za model javno-privatnog partnerstva

Općina Život u Općini Usluge Investirajte u Visoko Posjetite Općinu Međunarodni odnosi

Općina Visoko

Početna Pregled novosti

22.02.2017

Stručni tim Evropske komisije sagledao mogućnosti zagrijavanja na području općine Visoko putem obnovljivih izvora energije



Danas je u Općini Visoko boravila delegacija ispred Evropske komisije i predstavnici JP Elektroprivrede BiH koji u saradnji sa Općinom Visoko rade na projektu Horizont 2020 CoolHeating. Ovim povodom ispred kabineta Općinske načelnice mr.sci Amre Babić obratila se Amila Koso i prisutnim zaželjela dobrodošlicu. Šef Odsjeka za lokalni ekonomski razvoj, Emir Fejzović i stručni saradnik na Projektu Milada Mataradžija održali su prezentaciju kojom su prisutne upoznali sa općinom Visoko i njenim potencijalima, kao i mogućnostima ulaganja u ekološki prihvatljiva rješenja zagrijavanja/hlađenja u cilju smanjenja emisije štetnih gasova čiji je glavni uzročnik čvrsto gorivo/ugalj.

Najčitanije novosti za septembar

- petak, 15.09.2017
ODRŽANI KONFERENCIJA I SAJAM „ZELENA EKONOMIJA U BIH“ – MOGUĆNOSTI I ŠANSE“
- četvrtak, 14.09.2017
NAPREDUJU RADOVI NA REALIZACIJI PROJEKTA PROŠIRENJA GRADSKOG VODOVODA
- srijeda, 13.09.2017
JAVNA NABAVKA – ZAMJENA POSTOJEĆE JAVNE RASVJETE LED RASVJETOM U NASELJU LUKE I ŠETNICI PORED RIJEKE FOJNICE
- utorak, 12.09.2017
NAJAVA KONFERENCIJE I SAJMA „ZELENA EKONOMIJA U BIH – MOGUĆNOSTI I ŠANSE“
- utorak, 12.09.2017
NAČELNICA BABIĆ OTVORILA ASEFALNI PUT U NASELJU PRADOVO – IZ POKRETNOSTI

Alije Izetbegovića 12A, 71300 Visoko, Zeničko-dobojski Kanton, Bosna i Hercegovina. email: info@visoko.gov.ba. tel: 032/732-500 fax: 032/738-330

kojem je potrebno pronaći adekvatno i ekonomično rješenje zagrij 2013 © Općina Visoko

Next steps toward implementation



- Considering financing options, efficiency and affordability of funds (early 2019)
- Preparation of preliminary technical documentation (2019)
- Necessary permits (2019/2020)
- Loan negotiation / agreement and consents (2020)

5 years time – realistic period for project implementation



... because we all need cleaner environment!



Thanks for your attention!



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 691679.

