

Synergy of application of energy efficiency measures and renewable energy sources as a condition for securing competitiveness of the district heating systems

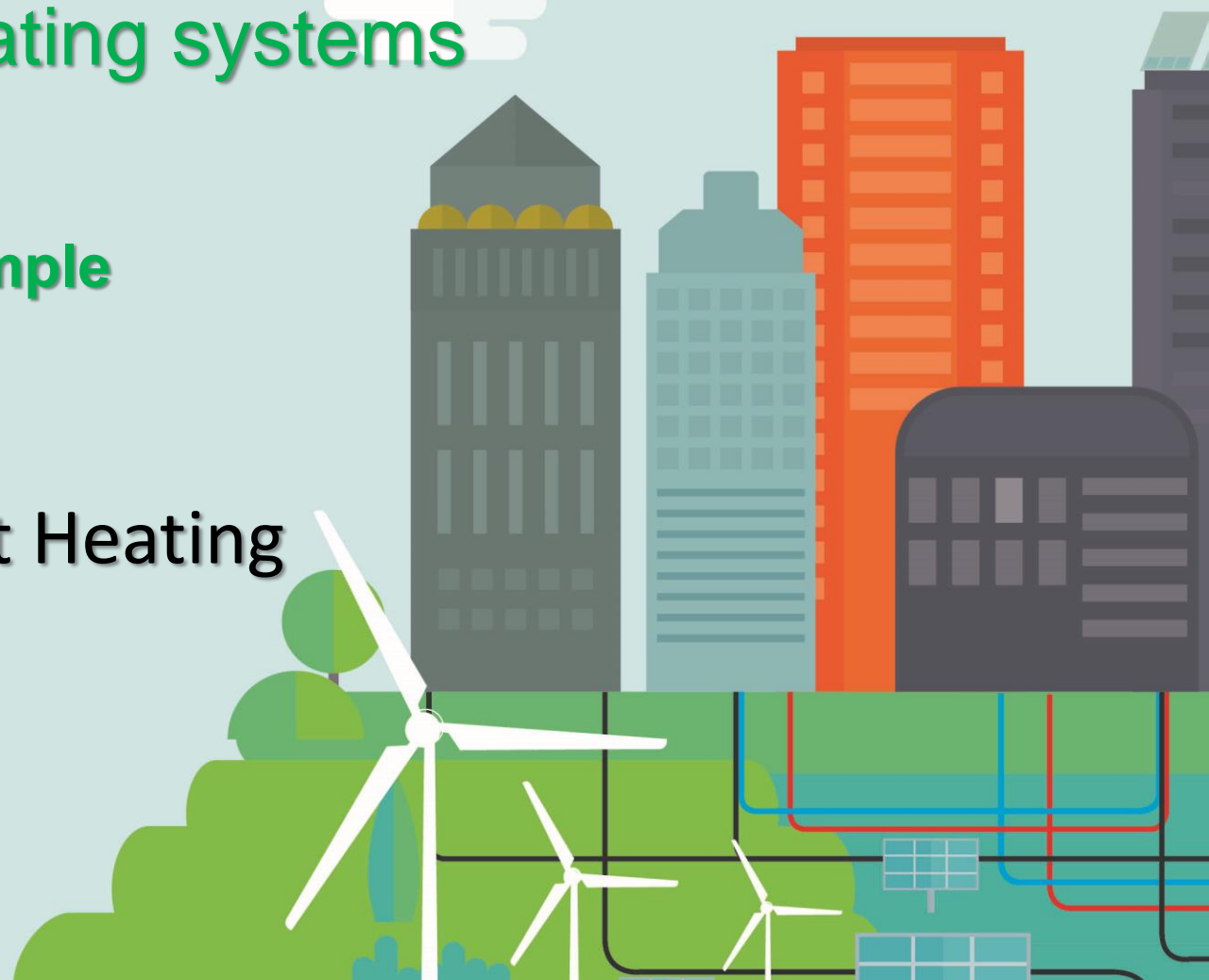


City of Šabac, good practice example

Renewable Energy Sources in District Heating and Cooling Systems

Belgrade, December 5-6, 2019

50th International HVAC&R Congress and Exhibition



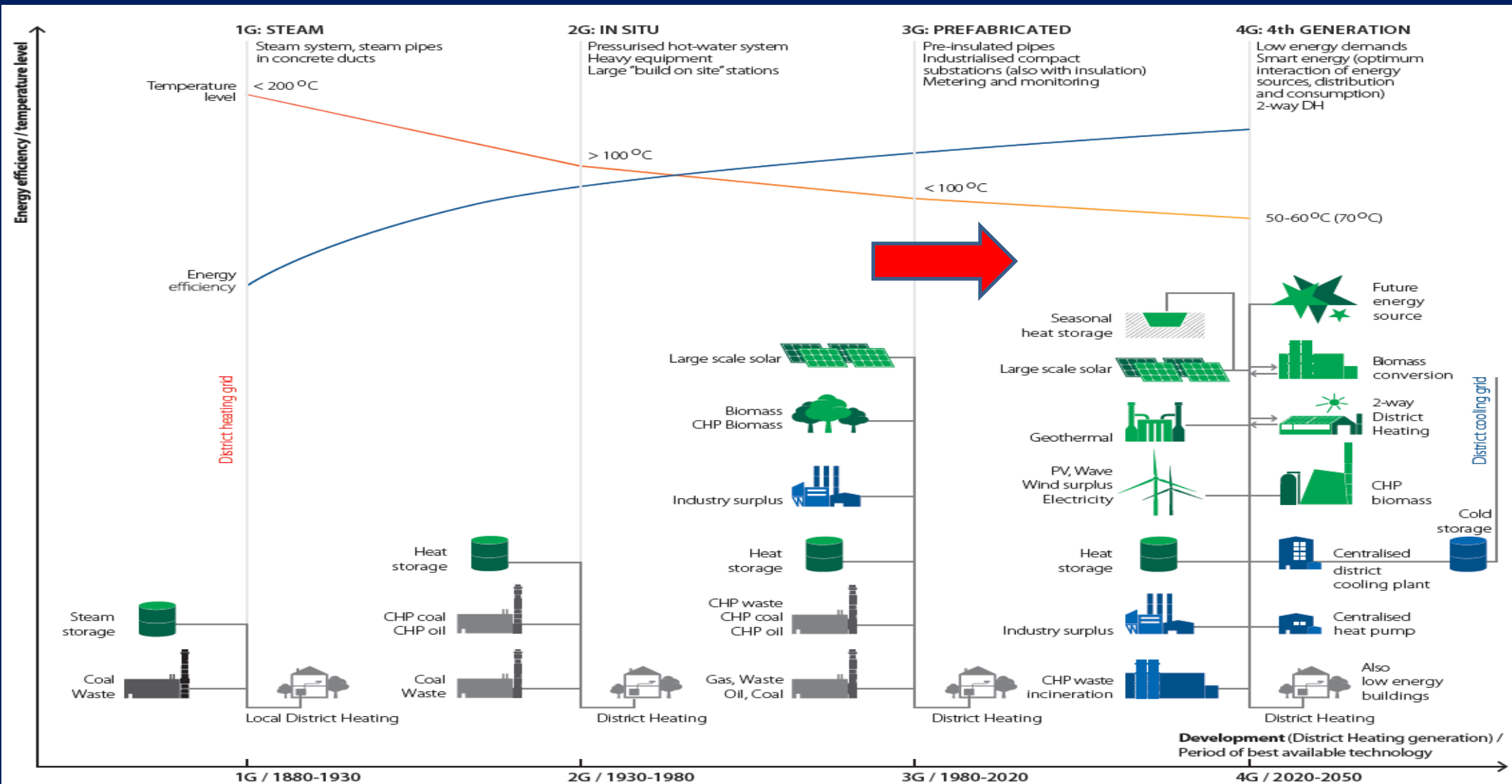
Energy policy

(The document adopted by the City Assembly in 2018):

- **Efficient use of energy and fuels,**
- **Implementation of sustainable renewable energy technologies,**
- **Support to local economy development and development of the local energy service market**
- **Environmental protection,**
- **Improvement of the quality of life in Sabac,**
- **Energy independence.**

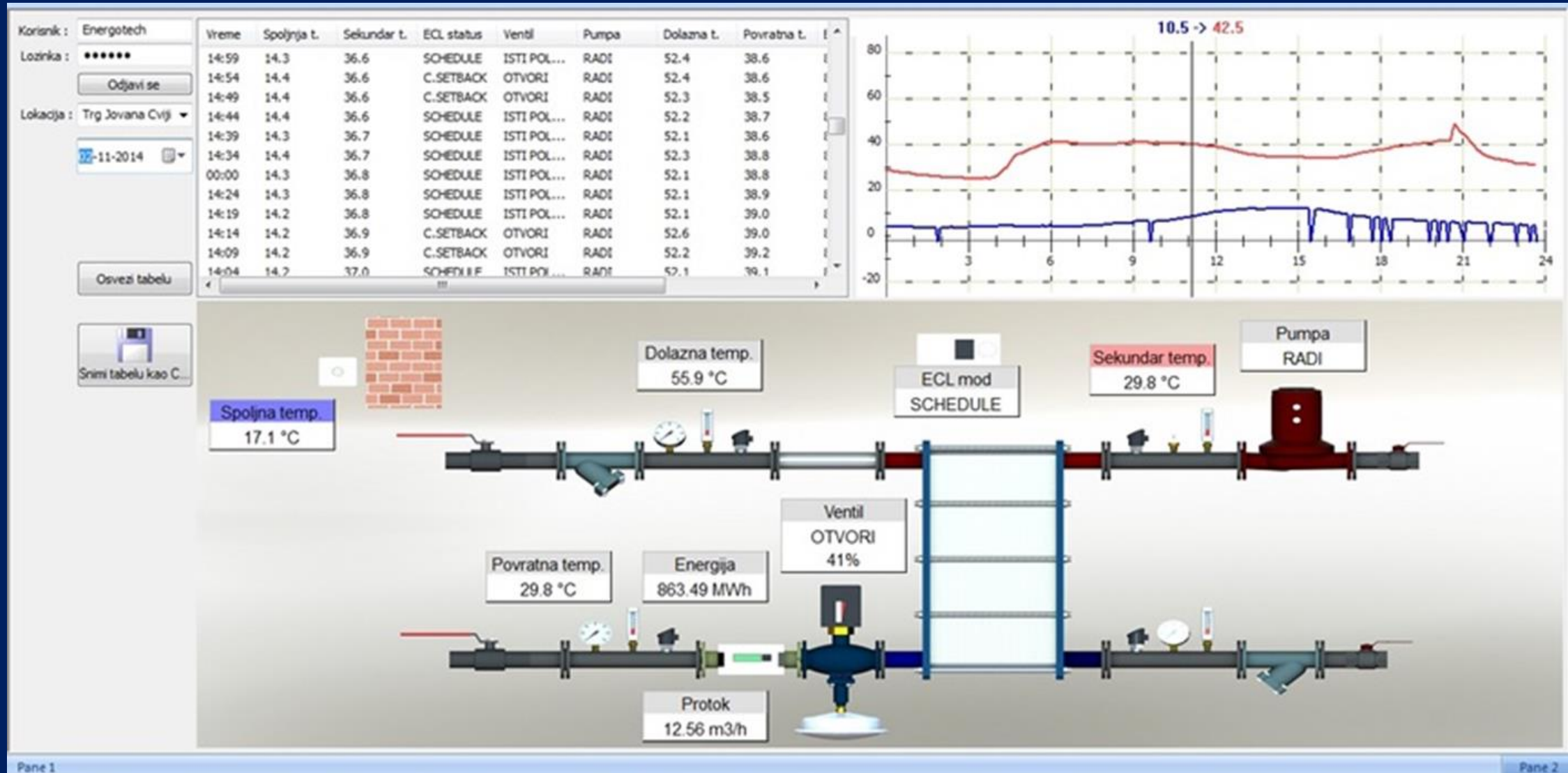
City of Sabac – Sinergy of EE measures & RES as a condition for securing of competitiveness of DH system

We are going to the 4th generation of DH (4GDH)



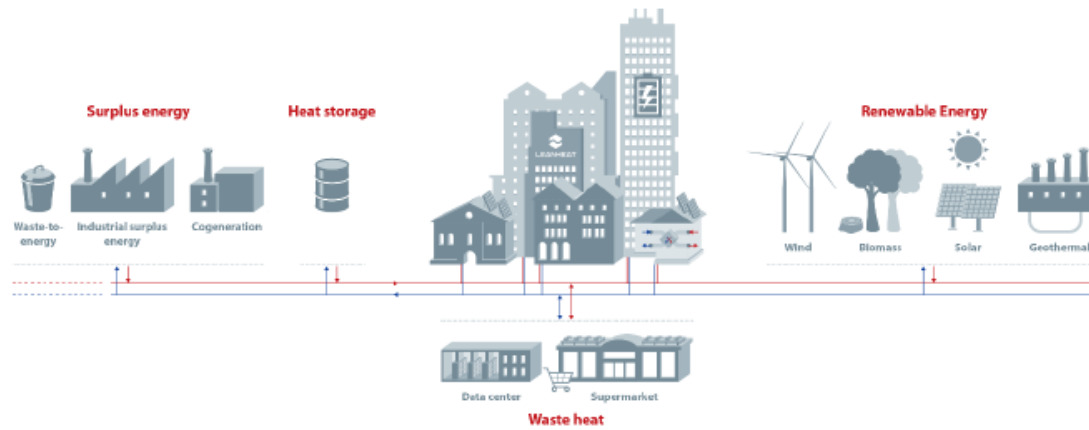
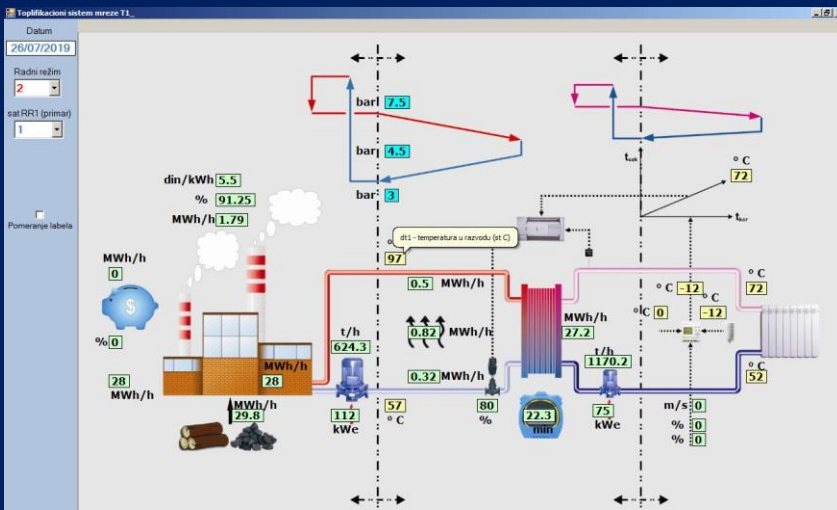
City of Sabac – Sinergy of EE measures & RES as a condition for securing of competitiveness of DH system

Improvement of energy service through smart solution and smart technologies. Implementation SCADA software.

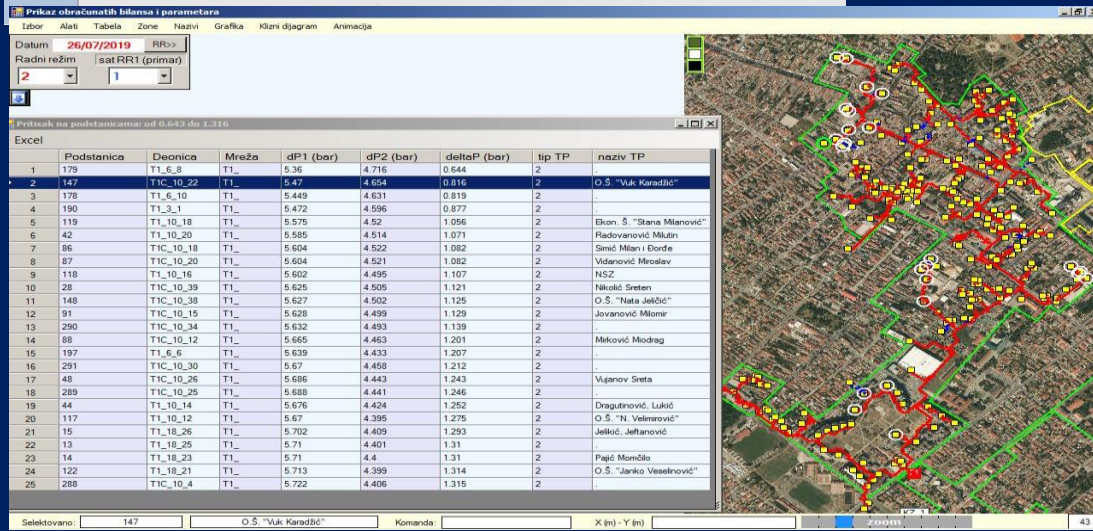


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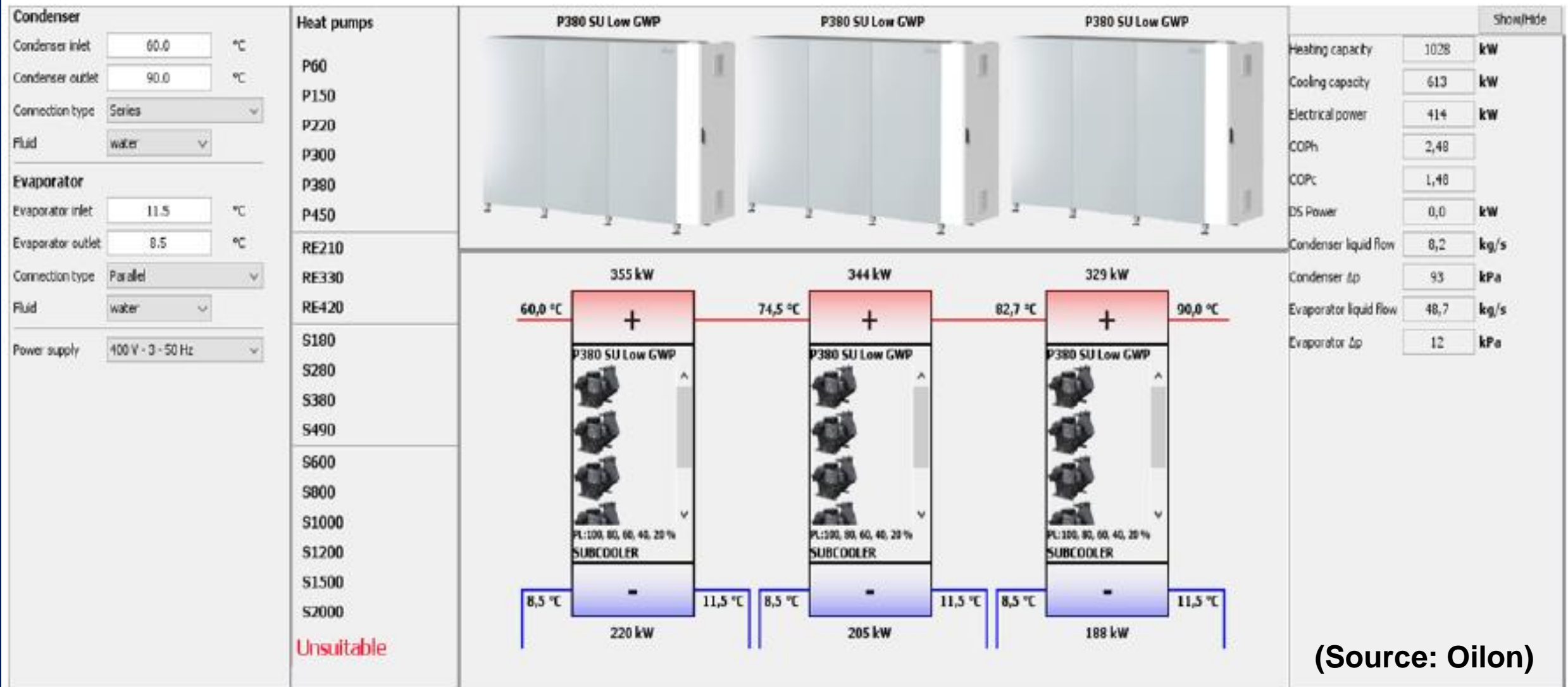
Mentor Planner showing the plan and the accuracy of the load forecast



Software for working parameters optimisation based on weather prediction. Implementation in PUC „Toplana-Šabac“ 2019/2020. MENTOR PLANNER – Izvor: Danfoss

City of Sabac – Sinergy of EE measures & RES as a condition for securing of competitiveness of DH system

Renewable energy – 8 MW capacity heat pump which will use waste water released from Waste water treatment plant in Šabac (WWT Plant has been operating since 2016.)



(Source: Oilon)

Why energy efficiency in private buildings

- **Serbia is country highly dependent on fossil fuels import**
- **More than 45% of final energy consumes is in private buildings**
- **Low quality of buildings caused unsatisfied space heating (high heat losses)**
- **Energy billing based on energy metering**
- **Energy expenses became unsustainable and energy poverty became visible**
- **Climate changes caused overuse of (fossil) fuels become serious problem**

What were first steps towards energy efficiency

- **Open communication with decision makers and provision of support on EE projects**
- **Involving market price for energy**
- **Energy metering and billing based on real consumption**
- **Education and motivation of citizens**
- **Dissemination of project results**
- **Promotion of local community as the leader in EE in Serbia**

Project execution – Part one

- **Preliminary energy examination of 5 buildings**
- **Cost – effectiveness analysis**
- **Calculation of payback period in case of investing in energy efficiency measures**
- **Decision on investing model**
- **Results**
- **Since 2010 more than 40 multistory buildings past project, that means 1,500 apartments (80,000 square meters) where 5,000 people live.**
- **Almost 1,5 million EURO spent**

Thermography of same building before and after thermo-insulation



Before renovation



After renovation

Thermography of same building before and after thermo-insulation



Before renovation



After renovation

Project execution – Part two

Conclusions based on executed project are:

- **Slow process**
- **Private sector not motivated to be involved into project activities**
- **Financing private properties using public budget lays at gray zone**
- **Limited and insufficient local budget to meet expressed requirements**
- **Scope of executed works did not include installation of thermostatic valves and heat allocators, there are no opportunities to controls heat consumption in apartments**

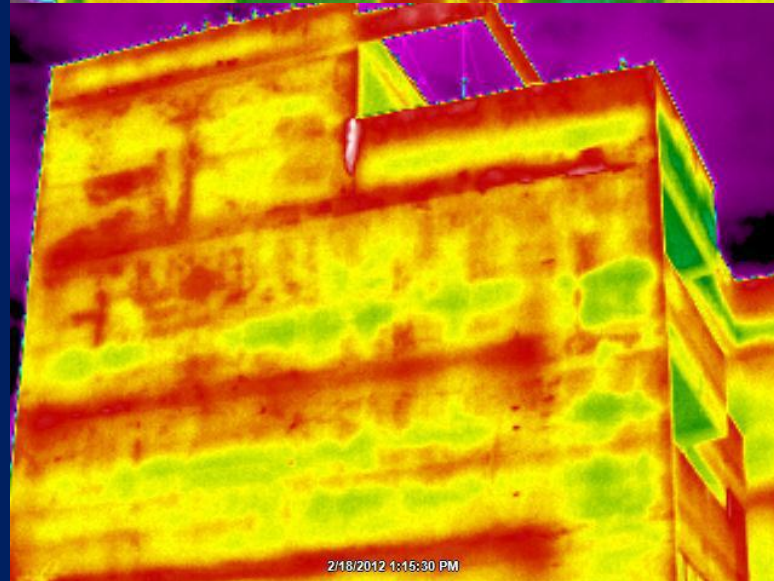
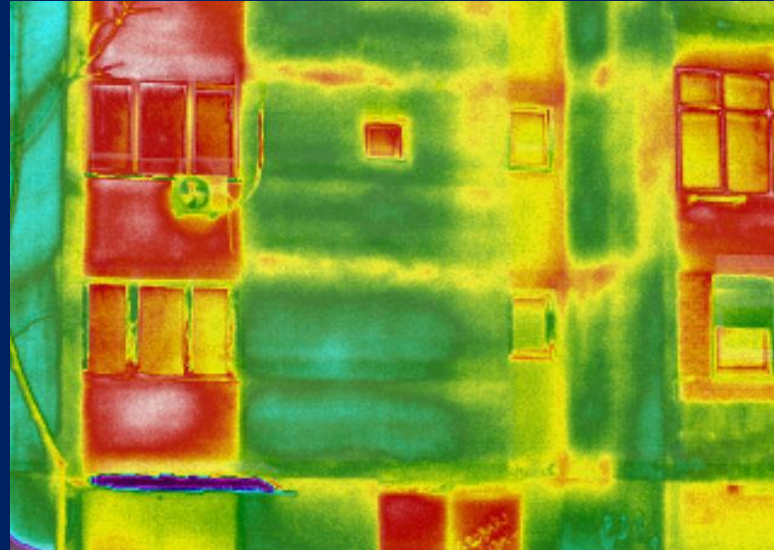
Project execution – Part two

- **Project in progress – 110,000 square meters in multifamily buildings that are connected to DH**
- **Preliminary energy examination executed and cost effectiveness analysis done**
- **Methodology**
- **Energy performance analyzed and calculated energy consumption for each of additional 40 buildings**
- **All energy efficiency measure identified**
- **Cost – effectiveness analysis for all measures were done. Optimal package of EE measures selected**

REPORT on ENERGY EXAMINATION

Analysis supported by thermography

Poor quality of buildings and inadequate maintenance of buildings cause extremely high heat losses.

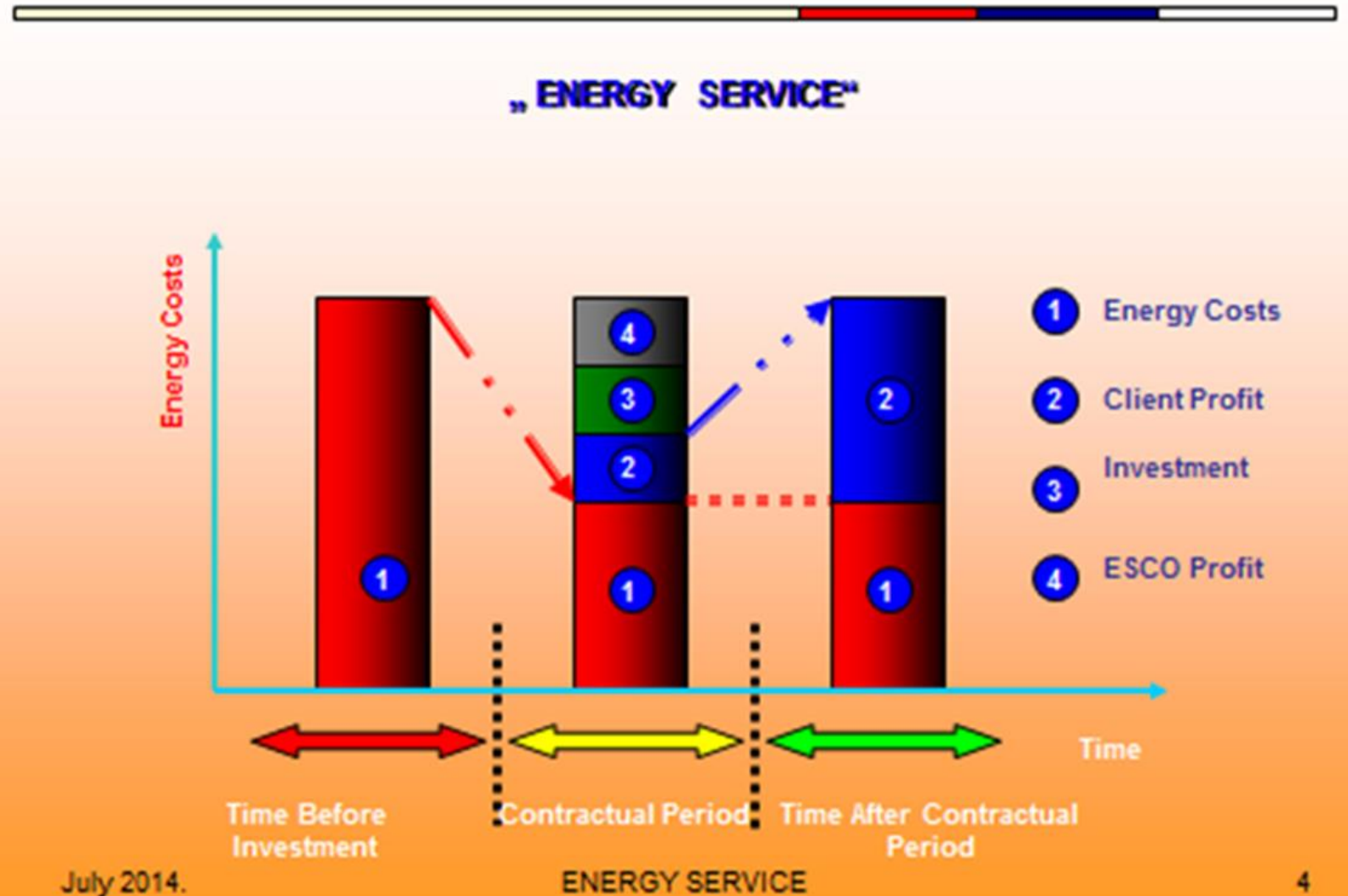


ACTUAL MODEL

To the DH Company assigned ESCO role

Normally, there is ESCO profit, but the peculiarity of the actual model is that the profit is omitted because it is a public company

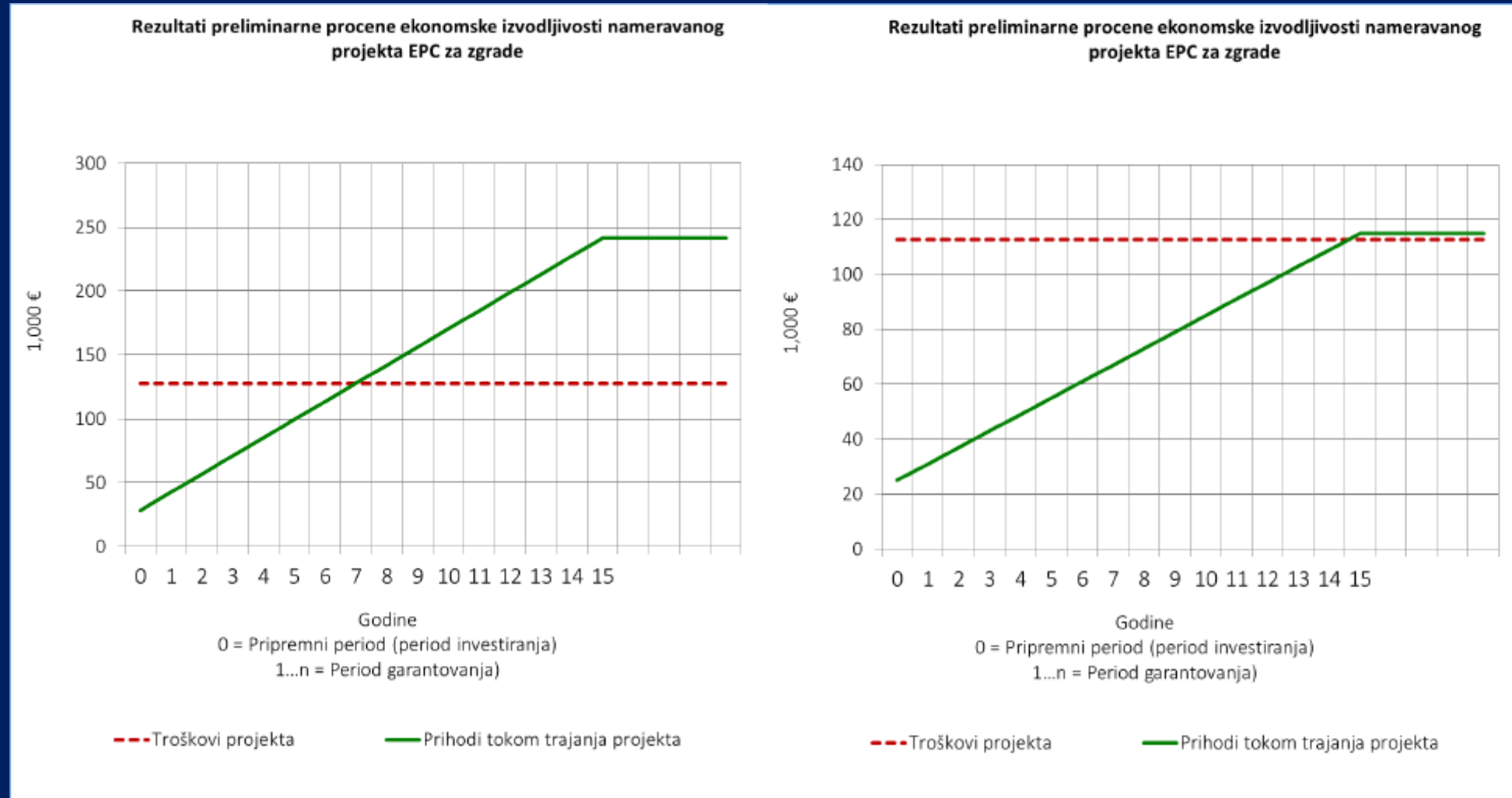
No subsidy to apartments owners



ACTUAL MODEL

Long-term payback period depends of energy savings

General case



Investment
Payback

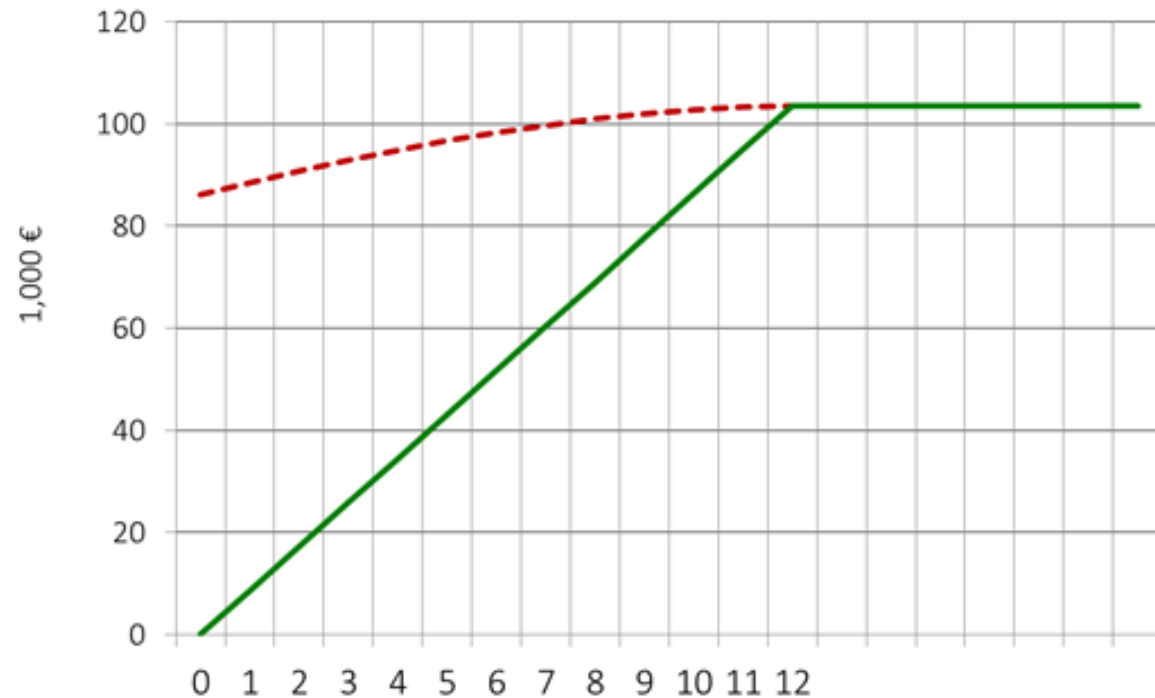
ACTUAL MODEL

Long-term payback period

Real case means 12 years payback period

Project include thermoinsulation of building envelope, installation of thermostatic valve and heat allocators

Rezultati preliminarne procene ekonomske izvodljivosti nameravanog projekta EPC za zgrade



0 = Pripremni period (period investiranja)
1...n = Period garantovanja

Investment

Payback

GOOD PRACTICE

- **Public utility company TOPLANA-SABAC contracted with EBRD 2.5 milion EUR loan for improvement of energy performance of existing buildings**
- **The loan repayment period is 12 years**
- **Project implementation being based on EBRD rules**
- **Based on energy savings, DH company customers payoff their part of investment**
- **Besides their own business TOPLANA-SABAC plays role of ESCO**
- **Using energy metering the effects of the investment will be proven**

NEXT STEPS

- **Priority have to be given on energy efficiency measures in private buildings**
- **Very important process is switching present DH to 4th generation DH as flexible system that involves renewable energy aims to remove fossil fuels**
- **Good communication with customers**
- **Permanent education and improvement capacity of own staff to meet high standards on new renewable energy technologies and energy efficiency directives and procedures**
- **Involving prosumers and blockchain technologies to meet high requirements in energy services and other local services**

City of Sabac – Sinergy of EE measures & RES as a condition for securing of competitiveness of DH system

ONGOING Project:

OPEN DATA – Mobile or internet application on information of energy consumption data in real time and GIS application – „Green buildings“.

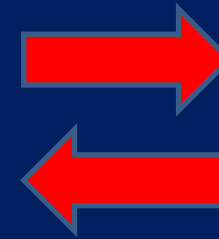
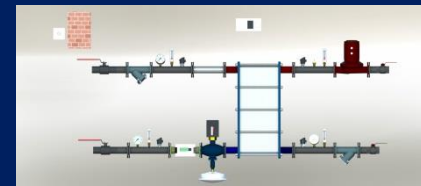
Krajnji korisnik -- Softverski alat za analizu i korekciju grešaka

Hourly	Daily	Monthly	Yearly
08:00	12.1		
09:00	0.402		
10:00	0.613		
11:00	1.26		
12:00	0.35		
13:00	2.57		
14:00	10.5		
15:00	40.9		
16:00	31		
17:00	28.5		

Download on the App Store

ANDROID APP ON Google play

ONGOING Project supported by PUC „Toplana-Šabac“:
Prosumers and Energy Cooperative „Sunny roofs of Šabac“



Two-way electricity meter

Ultrasonic heat meter



THANK YOU FOR ATTENTION

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