HOLISDER

Integrating Real-Intelligence in Energy Management
Systems enabling Holistic Demand Response Optimization
in Buildings and Districts

Consumer engagement visualization platform and toolkit Demonstration in the Serbian pilot site

Pablo de Agustin Camacho   tecnalia) Inspiring Business   *HOLISDER project coordinator*

Milan Vukovic belit *Serbian pilot location coordinator*

SUSTAINABLE PLACES 2020
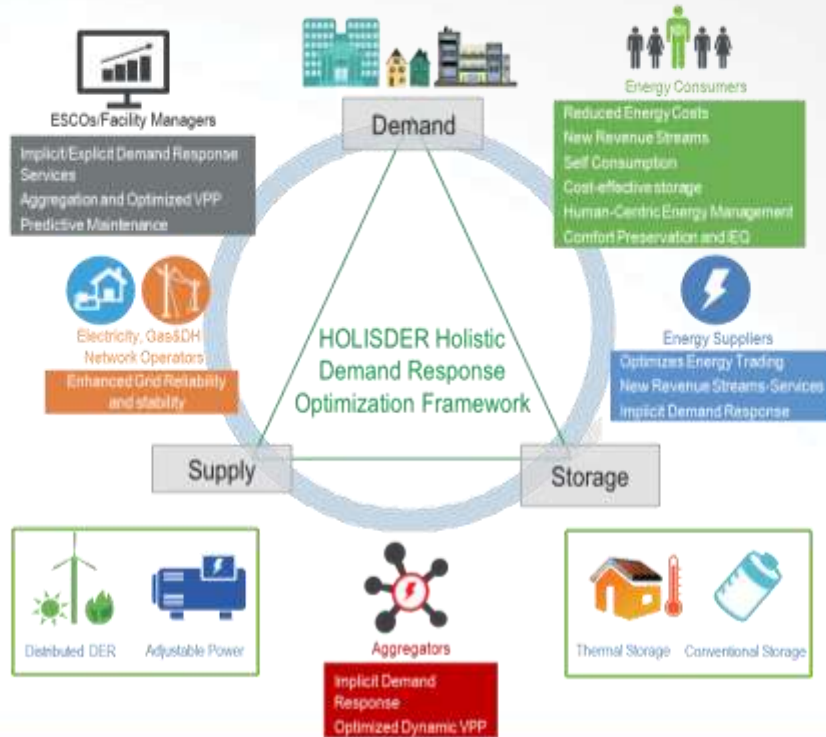October 27-30, 2020
Digital Event

The project in a nutshell

European energy market is evolving towards more **decentralized**, **less predictable** and **flexible** to operate forms, as a consequence of the large-scale integration of renewable and distributed energy. In this context the necessity and value of **demand response schemes** is gaining significant role within energy markets.

HOLISDER introduces a Holistic Demand Response Optimization Framework that enables significant energy cost reduction at building/consumer side. Additionally, small and medium sized buildings are introduced as **major contributors** to maintain the energy networks' stability in response to network constraints and conditions through **optimized energy management**.

ESCOs/Facility Managers
Implicit/Explicit Demand Response Services
Aggregation and Optimized VPP
Predictive Maintenance

Energy Consumers
Reduced Energy Costs
New Revenue Streams
Self Consumption
Cost-effective storage
Human-Centric Energy Management
Comfort Preservation and IEQ

Electricity, Gas&DH
Network Operators
Enhanced Grid Reliability and stability

Energy Suppliers
Optimizes Energy Trading
New Revenue Streams-Services
Implicit Demand Response

Demand

HOLISDER Holistic Demand Response Optimization Framework

Supply

Storage

Distributed DER   Adjustable Power

Aggregators
Implicit Demand Response
Optimized Dynamic VPP

Thermal Storage   Conventional Storage

The project in a nutshell

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- HOLISDER brings together energy networks, building energy management systems and devices, addressing the needs of the **whole demand response value chain** through enabling two-way communication, data exchange and integration.
- The HOLISDER hybrid demand response scheme is supported by a **variety of end-user applications** for Personalized Informative Billing, Human-Centric Energy Management, Load Scheduling and Intelligent Controls and Predictive Maintenance.
- HOLISDER introduces **new business models** for third parties, facilitating consumer involvement, representing them in energy market transactions and tackling knowledge barriers.
- HOLISDER ensures **consumer empowerment** and transformation into **active market players** reducing their energy bills, tackling energy poverty and using various demand response schemes.
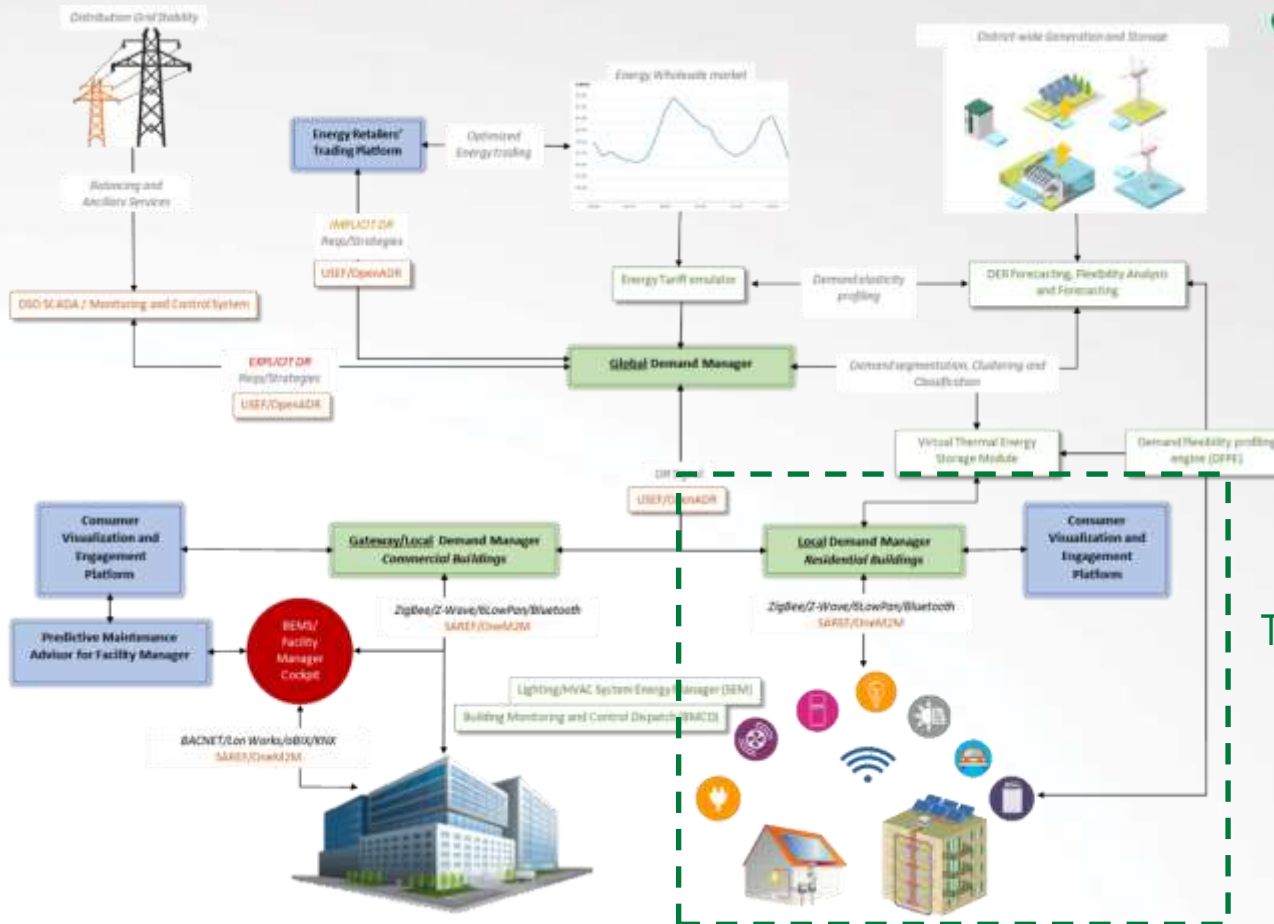
Pilot sites

- Office buildings and domestic consumers of electricity producer in Athens, **Greece**
- Commercial and residential buildings from a DR Aggregator's portfolio of clients in London, **UK**
- Building management cases in commercial and residential buildings in Helsinki, **Finland**
- District Heating customers in a large residential neighborhood in Belgrade, **Serbia**

More information on Conference-Paper at SUSTAINABLE PLACES Proceedings

HOLISDER holistic demand response optimization framework's architecture

This presentation will be focused on the components oriented to residential end-users

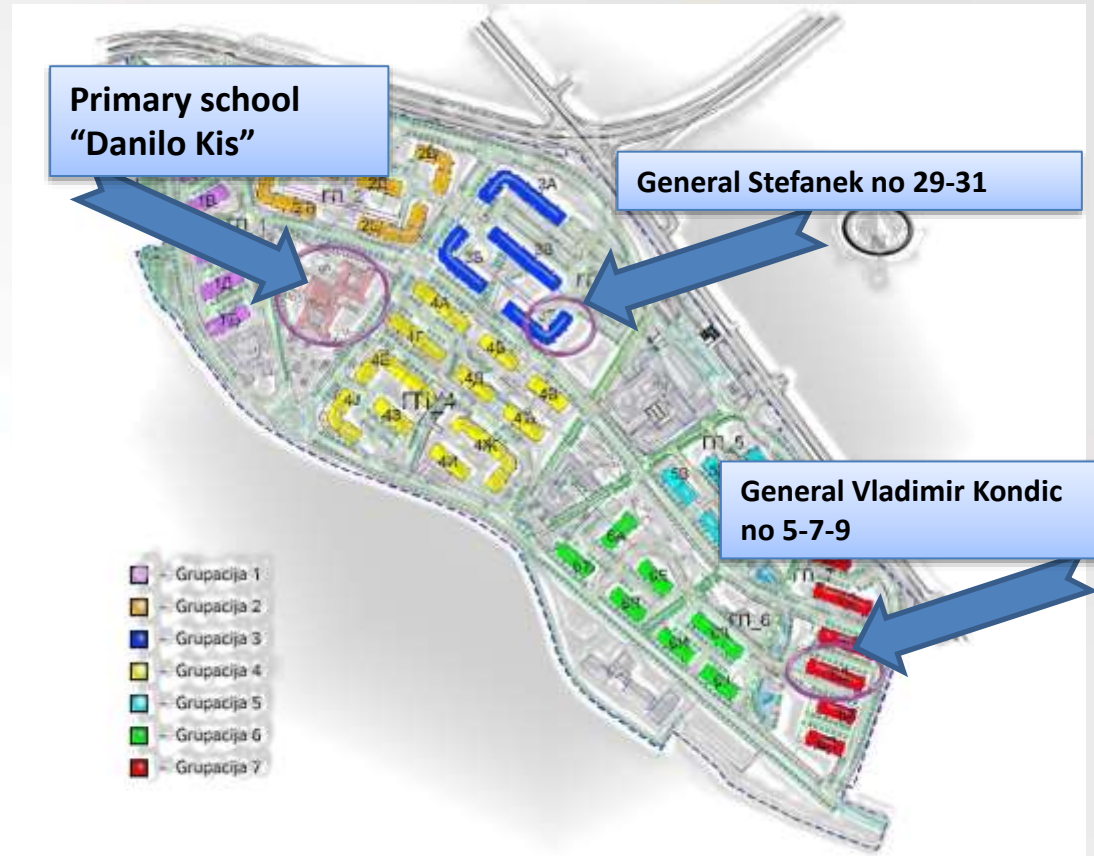Further components of the framework are described on Conference-Paper at SUSTAINABLE PLACES Proceedings

Serbian pilot site:
Stepa Stepanovic neighbourhood in Belgrade

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- 42 ha area
- 44 buildings with 4,616 apartments
- 434,000 m2 business and living area
- 146 business/office space units
- Primary school and Children day care
- 1,430 indoor parking space
- 3,300 outdoor parking
- 9.5 км roads
- Parks and green areas
- Sport fields and playgrounds

Primary school "Danilo Kis"

General Stefanek no 29-31

General Vladimir Kondic no 5-7-9

- Grupacija 1
- Grupacija 2
- Grupacija 3
- Grupacija 4
- Grupacija 5
- Grupacija 6
- Grupacija 7

MAIN GOALS OF HOLISDER PROJECT IN STEPA STEPANOVIC PILOT LOCATION

❖ Monitoring and visualization of data on consumed energy, devices and sensors

❖ Analysis of change of behavior and awareness on consumption

❖ Personalized informative consumption monitor to enable useful and active participation in tariff systems

❖ Further control of individual consumption

❖ Monitoring and managing installed equipment in real time and active notification and warning system

Pilot location residential buildings

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General Stefanek 29-31

General Kondic 5-7-9

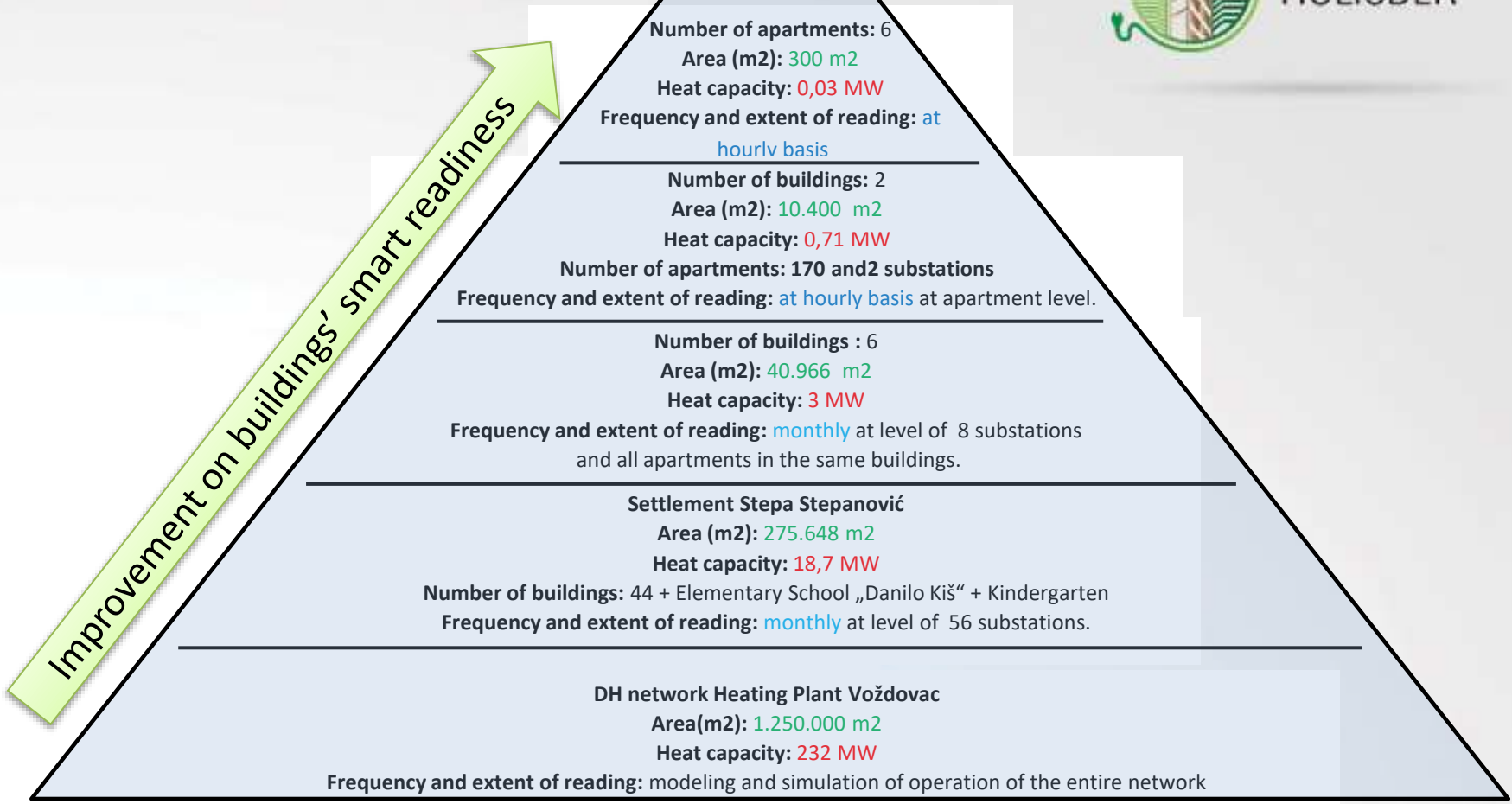# Pilot location
Public building
Primary school "Danilo Kis"

How to reach main goals of HOLISDER project?

❖ Pilot location presented mainly analogic meters → project's deployment plan included diverse devices that increased significantly the smartness (SRI) level of the buildings

❖ Data is presented on different diagrams on mobile and web application.

❖ Hourly and real-time electricity heat consumption data collection;

❖ Remote monitoring of heat substation, data reading and data collection from controllers, calorimeters, circulation pumps and pressure maintenance systems in the building heating installation.

❖ Local tariffs for heat energy is fixed. Electricity tariffs are variable in relation to consumption and different period of the day. Enable users to choose which energy to use for heating.

❖ Mobile application where end users have cooperative overview of electricity and heat consumption and warnings or useful tips;

❖ Workshops for End users and building managers

Overview of pilot location

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Improvement on buildings' smart readiness

Number of apartments: 6
Area (m2): 300 m2
Heat capacity: 0,03 MW
Frequency and extent of reading: at hourly basis

Number of buildings: 2
Area (m2): 10.400 m2
Heat capacity: 0,71 MW
Number of apartments: 170 and2 substations
Frequency and extent of reading: at hourly basis at apartment level.

Number of buildings : 6
Area (m2): 40.966 m2
Heat capacity: 3 MW
Frequency and extent of reading: monthly at level of 8 substations and all apartments in the same buildings.

Settlement Stepa Stepanović
Area (m2): 275.648 m2
Heat capacity: 18,7 MW
Number of buildings: 44 + Elementary School „Danilo Kiš" + Kindergarten
Frequency and extent of reading: monthly at level of 56 substations.

DH network Heating Plant Voždovac
Area(m2): 1.250.000 m2
Heat capacity: 232 MW
Frequency and extent of reading: modeling and simulation of operation of the entire network

NOTE: at the level of 6 apartments
Frequency and extent of reading: at hourly basis with detailed data on parameters in apartments: Temperature, humidity, air quality, brightness.
Additional characteristics: Internet and mobile application for customers– information and control of installation
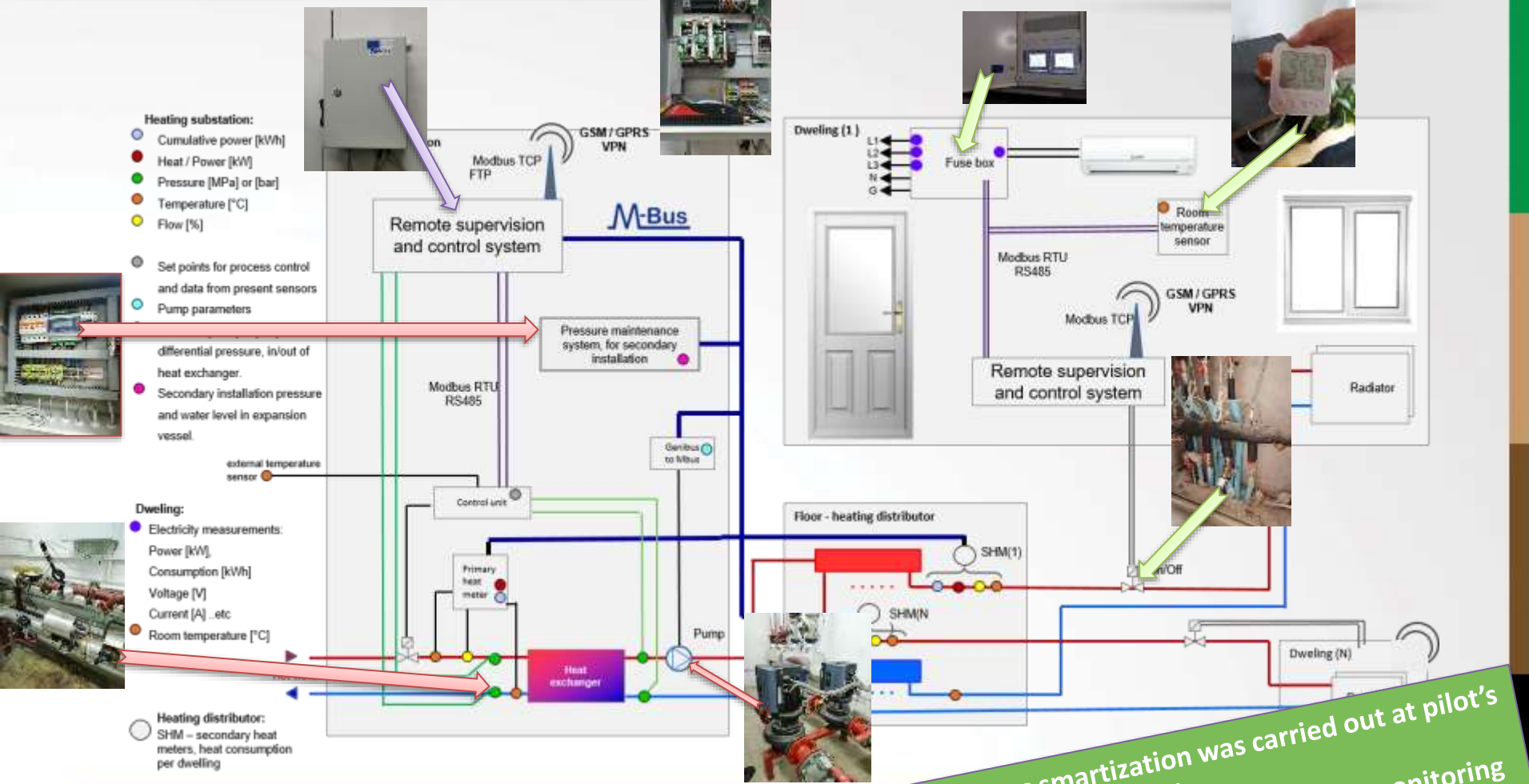
Supervisory technological diagram
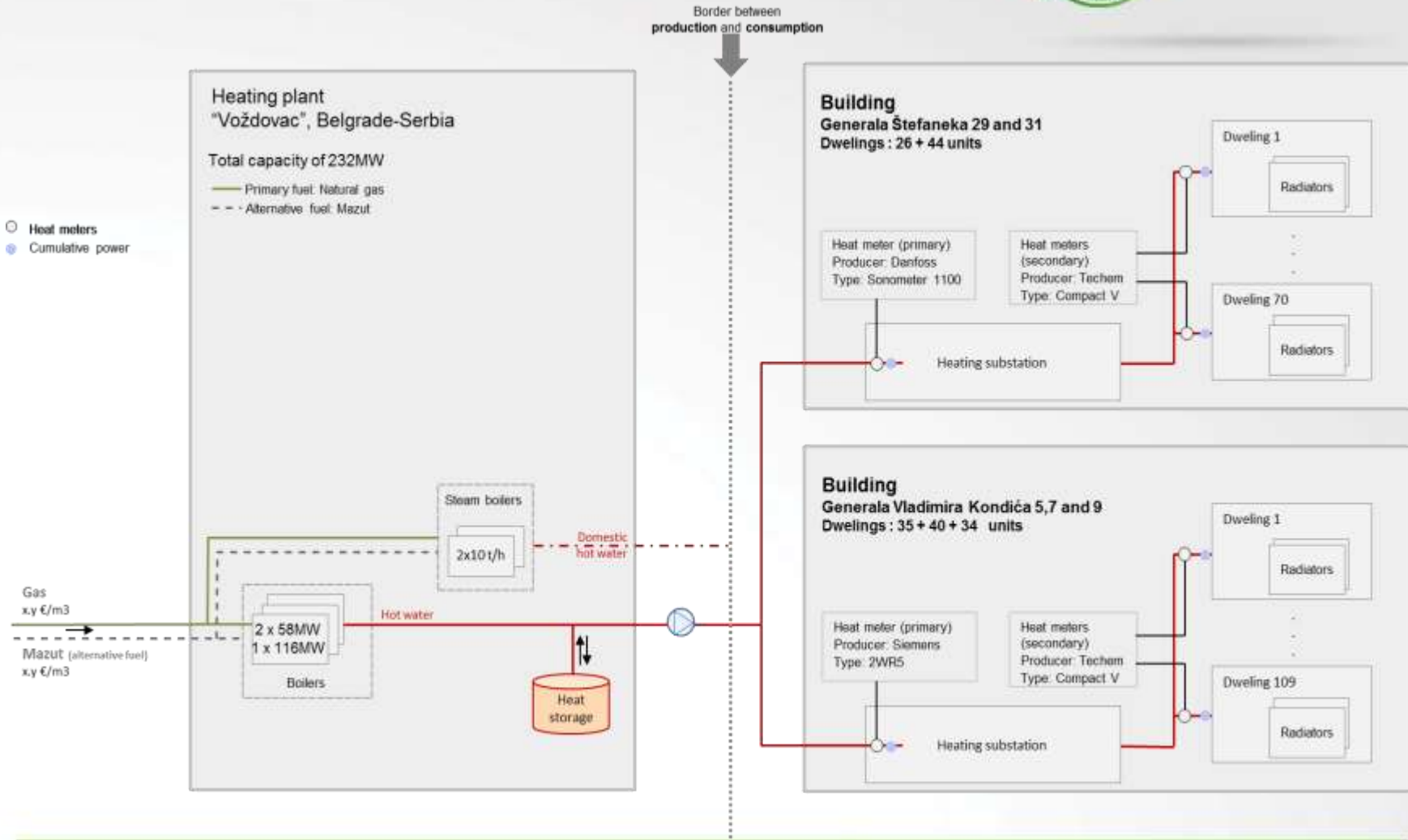
PILOT LOCATION

2 Substations + 6 apartments
ГЕНЕРАЛА ШТЕФАНИКА 29-31
ГЕНЕРАЛА КОНДИЋА 5-7-9

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An analogous smartization was carried out at pilot's
Danilo Kis Primary school
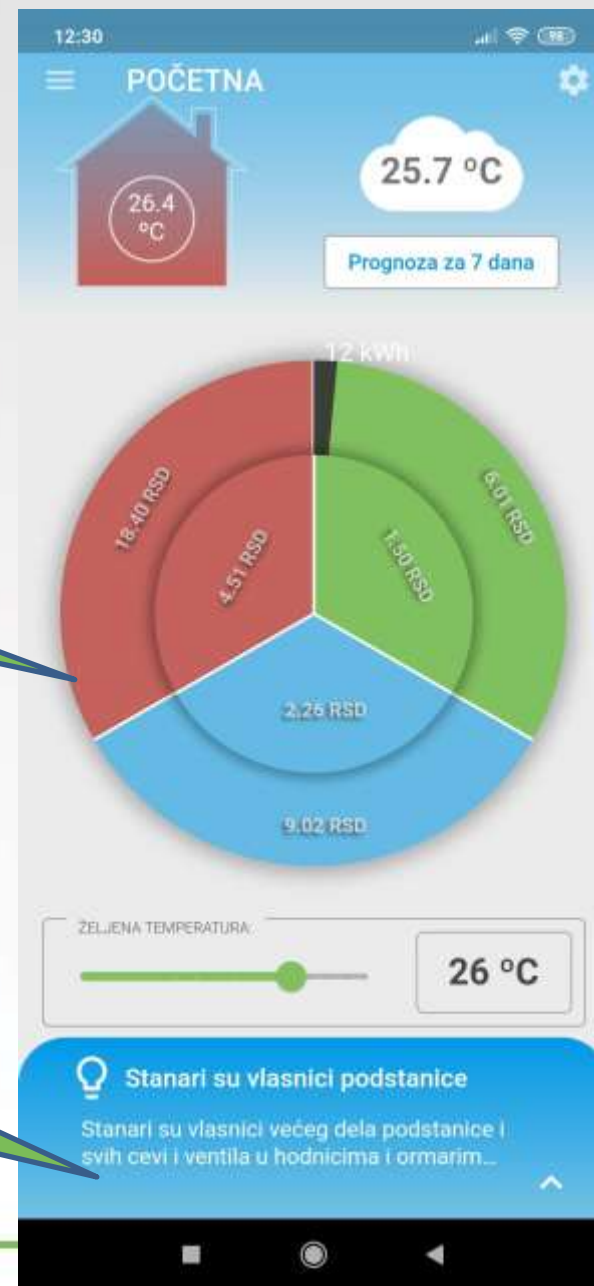Electrical and heat energy consumption monitoring

New Mobile Application for End users

Tariff "wheel" showing night/day tariffs and three tariffs depending on consumtpion

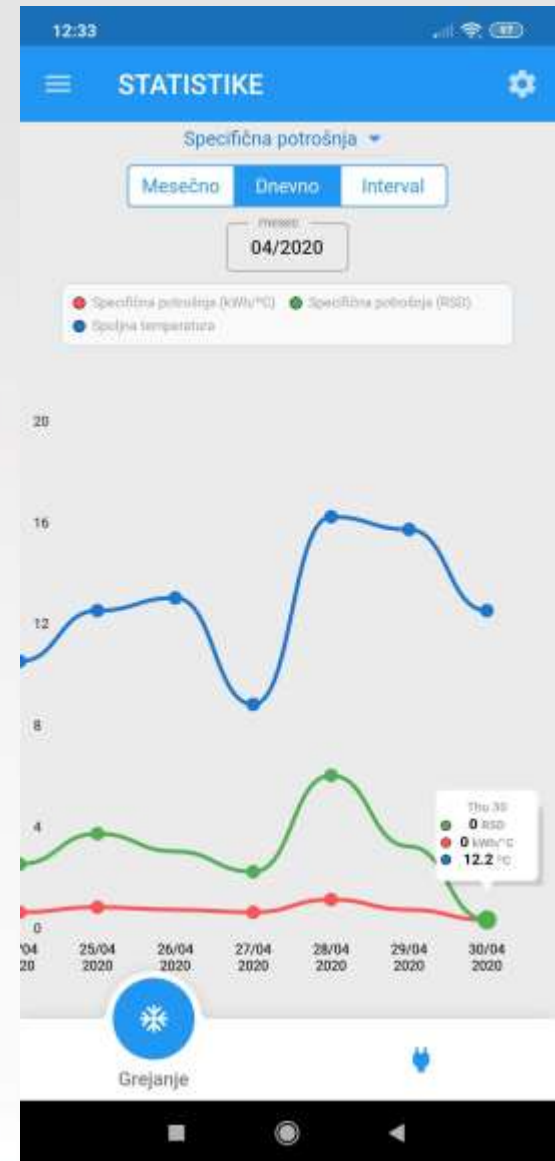End user can set desired indoor temperature. At the bottom there are energy saving tips.

New Mobile Application for End users

Interface for remote controlling boiler, A/C unit and heating

Weather forecast, advices screen and statistics

New web portal for End-users

**Training workshops
for end-users**

Additional information on end-users
tools can be consulted on project's
Youtube channel:
https://cutt.ly/2gvS96g

Next upgrades on the mobile application

❖ In the proyect, TECNALIA has developed and recently registered an *Energy costs calculator for domestic space heating (wiseHEAT)* that takes into account variable energy tariffs and weather conditions to predict energy hourly costs of heating homes under diverse technologies.

❖ This calculator will be integrated in the mobile app developed by BELIT for an enhanced end-users experience during last semester of the project (2020-2021 heating season).

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Thank you for your attention

Milan Vukovic
milan.Vukovic@belit.co.rs

Pablo de Agustin
pablo.deagustin@tecnalia.com

www.holisder.eu