



# Newsletter No.4

## PILOT IN CROATIA: University of Zagreb Faculty of Electrical Engineering and Computing, Unska 3, 10000 Zagreb

### Basic facts and initial state:

- o 248 controllable heating/cooling zones over 13 floors, covering area of 9.000 m<sup>2</sup>
- o Heating and cooling system with 370 fan coils; digital room climate control
- o Heating energy supplied from the central city heat distribution system via a 1 MW heat exchanger; cooling energy supplied from own 250 kW (electric powered) chiller station
- o SCADA system

### Total cost of the investment:

200.000 EUR, of which 145.000 EUR funded from the Interreg Danube Transnational Programme

### 3Smart investment:

- o Upgraded control application of room controllers to enable both local and centralized controls without any noticeable change for the end-users in rooms
- o Introduced measurements of heating/cooling medium temperatures by fan coils as well as flows and heating energy by floors
- o Installed a 32 kWh/10 kW lithium-ion battery system with controllable charging/discharging power
- o Created 3Smart database as a data source/sink for the 3Smart Energy Management System (EMS) with integrated all relevant data from the heating/cooling system, all new sensory data, data from buildings weather station, solar irradiance measurement equipment and photovoltaic plant, building smart meters, weather forecast service and with data exchange with the grid to implement demand response
- o Enabled simple, robust and modular changeover (soft switch) between the mode in which climate control is performed on a classical decentralized way as up to now, and the mode in which the newly introduced 3Smart EMS can through its open two-way database issue commands towards the key actuating variables in the building – fan coils' fan speeds in all rooms, starting temperature of the medium from the heating substation, pressure difference on the heating substation medium circulation pump, starting temperature of the medium from the chiller, battery system power



### Application of the 3Smart tool on-site:

- o Coordinated
  - I. **(building zone level)** predictive control of energies used for cooling/heating individual rooms
  - II. **(central HVAC system level)** predictive control of starting temperatures/flows for the heating and cooling medium for the building, and shaping optimal energy-exchange profile with the district heating grid
  - III. **(microgrid level)** predictive control of the battery system charging/discharging energy that implements control of energy exchange profile with the electricity grid including demand response which maintain comfort as required by the end-users and minimize the building energy costs
- o Auxilliary prediction and estimation procedures which as a side-effect facilitate and enhance building maintenance
- o Interfacing procedures to implement computed commands on existing actuating equipment

### Expected effect:

Drastic decrease of building operational costs; return on investment conservatively estimated at 7 years – without consideration of gains from participation in meanwhile expectably established demand response schemes



Public presentation  
will be held on  
**3 July 2019**

**SAVE THE DATE**

**Please follow further news regarding the event on 3Smart web page**



## PILOT IN CROATIA: Hrvatska elektroprivreda d.d., Ulica grada Vukovara 37, 10 000 Zagreb

### Basic facts and initial state:

- o 242 controllable heating/cooling zones over 9 floors, covering area of 7.800 m<sup>2</sup>
- o Heating via 288 manually controlled radiators; cooling with 313 fan coils (controlled with local controllers without possibility of integration to the SCADA)
- o Heating energy supplied by the local district heating system via 3 substations (2 x 1 MW and 1 x 120 kW heat exchangers); cooling energy supplied from own 1 MW cooling power water chiller station (electric powered)
- o Building has no automation at all

### Total cost of the investment:

267.000 EUR, of which  
177.444 EUR funded from

### 3Smart investment:

- o All offices equipped with controllers for controlling heating and cooling equipment in the room. SCADA system introduced. All controllers and heating/cooling production equipment integrated to the central SCADA system
- o Introduced measurement of heating and cooling medium temperatures and energy flows on the floor level (overall 33 new heat meters installed in the building)
- o Installed a 32,4 kWh/10 kW lithium-ion battery system with controllable charging/discharging power
- o 3Smart database created as a data source/sink for the 3Smart Energy Management System (EMS) with integrated all relevant data from office, floor, HVAC and micro grid level



### Application of the 3Smart tool on-site:

- o Coordinated
  - I. **(building zone level)** predictive control of energy used for heating the individual rooms,
  - II. **(central HVAC system level)** predictive control of starting temperature for the heating and cooling medium for the building, and shaping optimal energy-exchange profile with the district heating grid
  - III. **(microgrid level)** predictive control of the battery system charging/discharging energy that implements control of energy exchange profile with the electricity grid including demand response

which maintain comfort as required by end-users and minimize the building energy costs

### Expected effect:

Decrease of the building operational costs; return on investment is estimated at 10 years – without consideration of gains from participation in meanwhile expectably established demand response schemes



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## PILOT IN CROATIA: Electricity distribution grid of Hrvatska elektroprivreda d.d., around pilot buildings

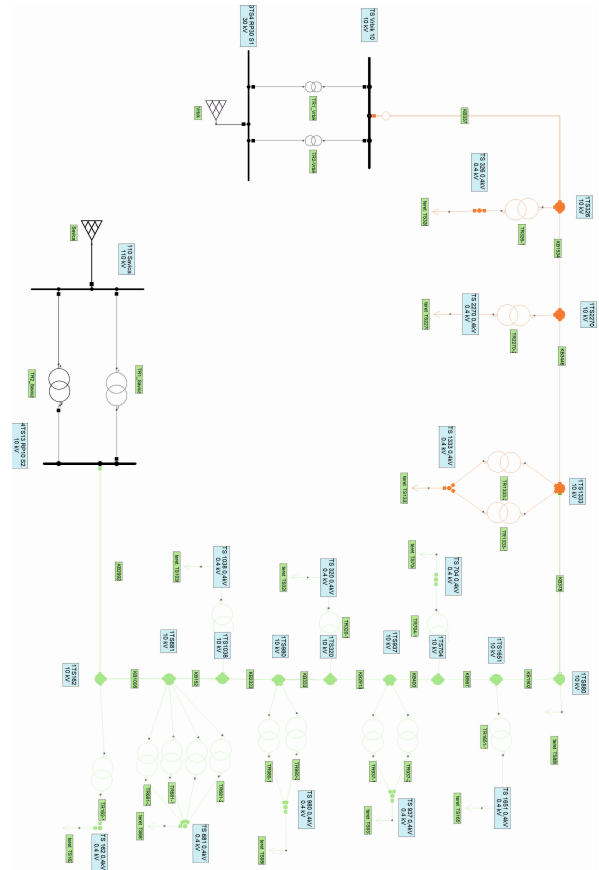
### Basic facts and initial state:

- o Pilot locations are two close 10 kV distribution network feeders supplied from different substations, delivering electricity to different types of end-consumers
- o UNIZGFER and HEP building are of similar size in terms of peak load and electric energy used
- o At the beginning of the project only the day-ahead electricity market at the power exchange was operational, with low liquidity and no access for the end-consumers. End-consumers have time-of-use tariffs defined by their supplier
- o The DSO does not have the tools (and does not do it in real-life) for optimizing grid planning by taking end-users flexibility into account. There is no methodology for encouraging end-users to exhibit flexibility in order to help the grid (and the DSO)

**Total cost of the investment:** 60. 000 EUR, of which 51.000 EUR funded from the Interreg Danube Transnational Programme

### 3Smart investment:

- o Grid-side servers for newly developed tools.



### Application of the 3Smart tool on-site:

- o Short-term modules:
  - I. Day-ahead module for optimal management of building flexibility, driven by long-term contract with the DSO
  - II. Intra-day module for triggering the flexibility based on real-time measurements extracted from DSO's SCADA system (at the beginning of the designated feeder)
- o Long-term modules:
  - I. Annual: Contracting flexibility provided by end-users, defining reservation and utilization costs and "negotiating" these with the end-users
  - II. Multiannual: Defining the need for flexibility in the distribution network based on investment triggers

**Expected effect:** More efficient planning and operation of the distribution network, concept for the methodology to encourage the end-users to assist the system, reduction of end-users electricity bills due to flexibility services for the DSO  
Public pilot presentation date: **3 July 2019**

