



**POLITECNICO**  
MILANO 1863



**WATT+VOLT**  
ELECTRICITY | NATURAL GAS



**HEAT4COOL**



**Presentation of Pilot site: Sofia**

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Heat4COOL project has received funding from the European Union's Horizon 2020 research and innovation program under grant agreement No 723925



## CASE STUDY BULGARIA

### Location

Sofia

Continental climate

$$T_{\text{MAX}} = 31\text{ }^{\circ}\text{C}$$

$$T_{\text{AVG}} = 10\text{ }^{\circ}\text{C}$$

$$T_{\text{MIN}} = -11\text{ }^{\circ}\text{C}$$

### Zoning

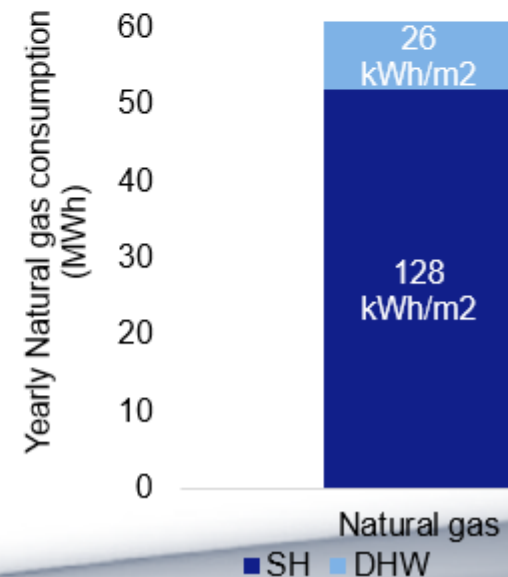
- Total of 6 apartments on four levels
- 5 apartments to be retrofitted

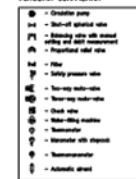
### Building envelope

Refurbished envelope  
Exposed façades oriented towards South-East and South-west

### HVAC system

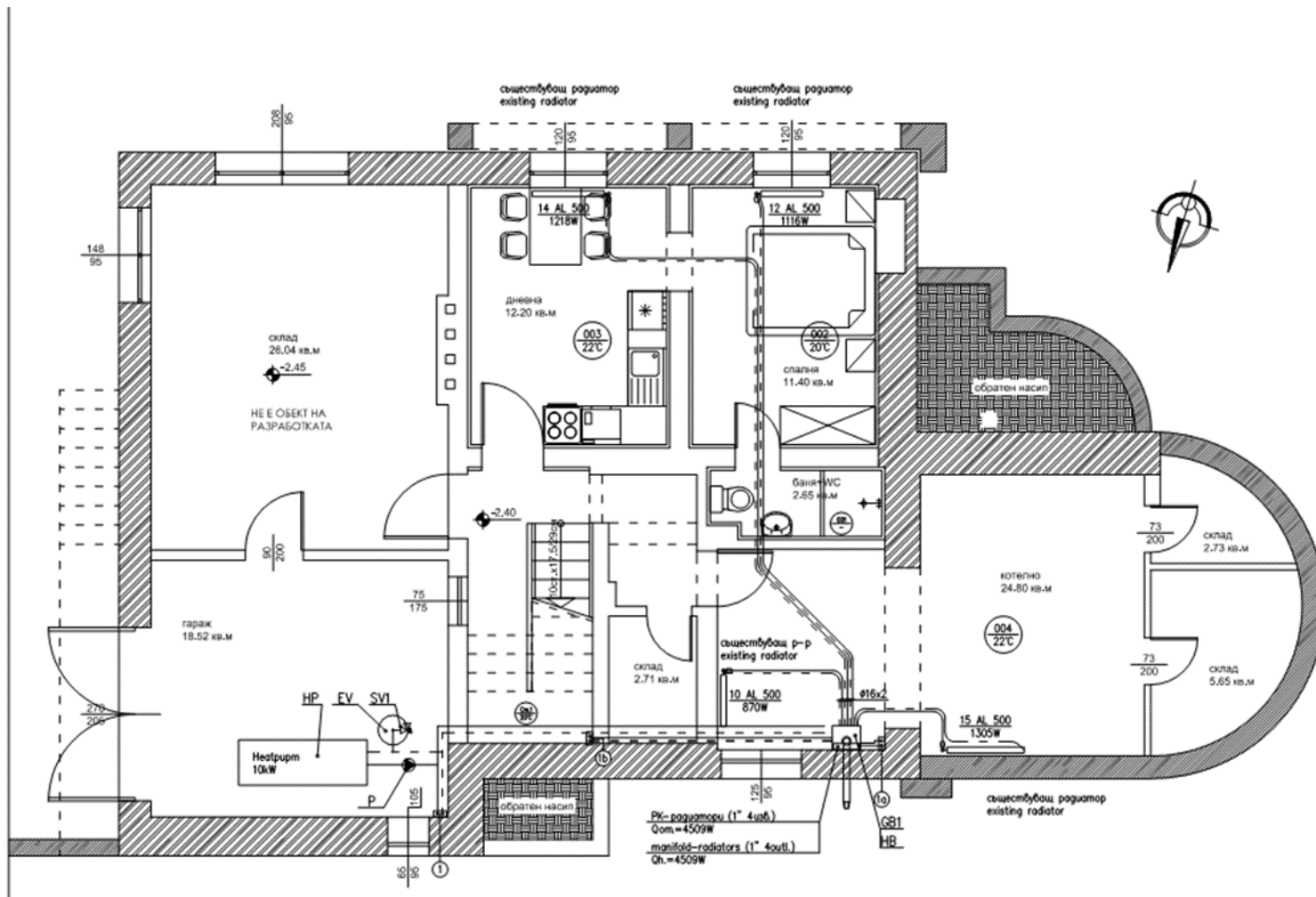
3 apartments with natural gas boilers ( $\eta_{\text{GCV}}=0.85$ ) for SH and DHW. 2 apartments with coal stove/electric boiler, cooling required but not yet accounted for



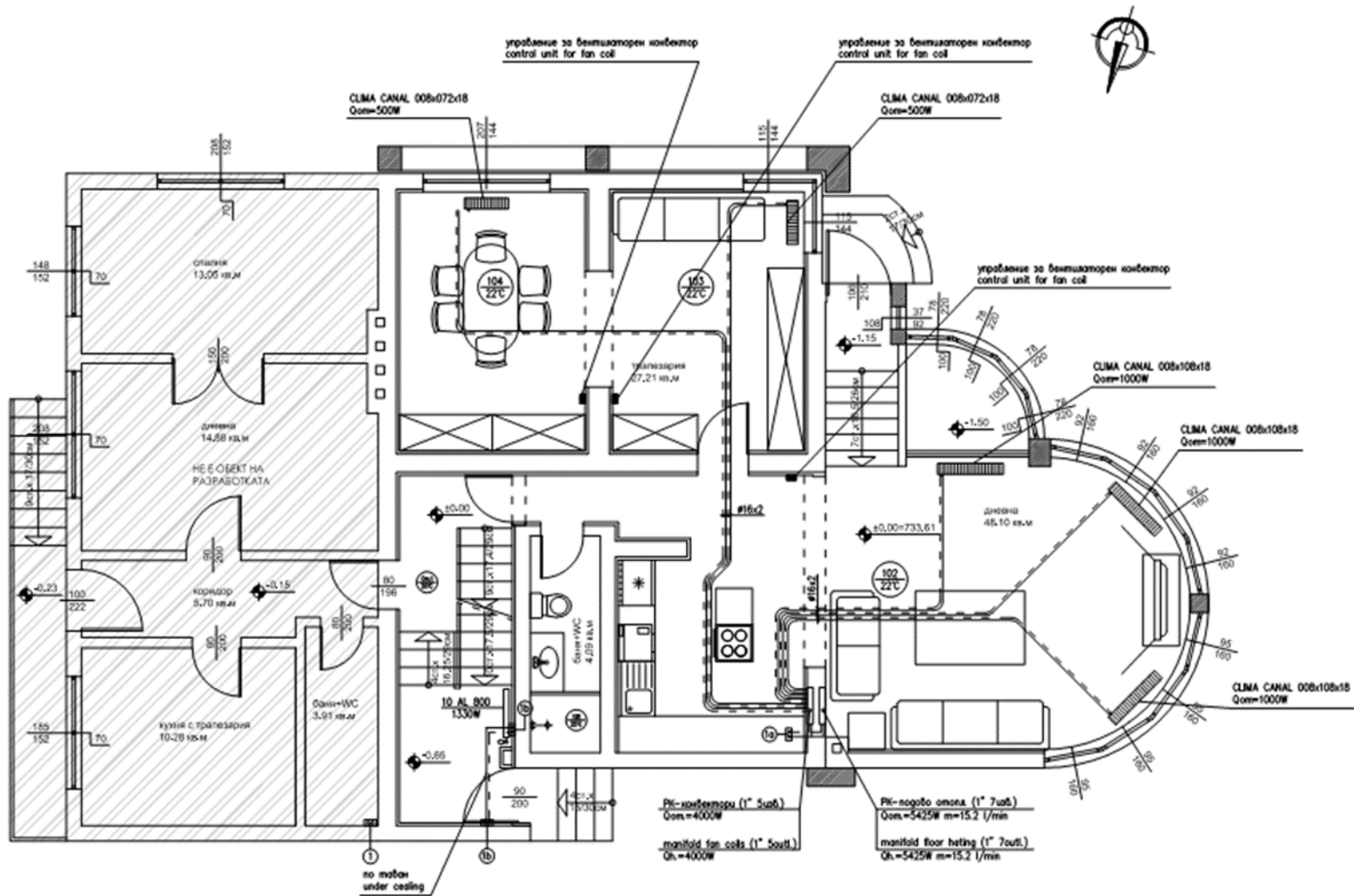


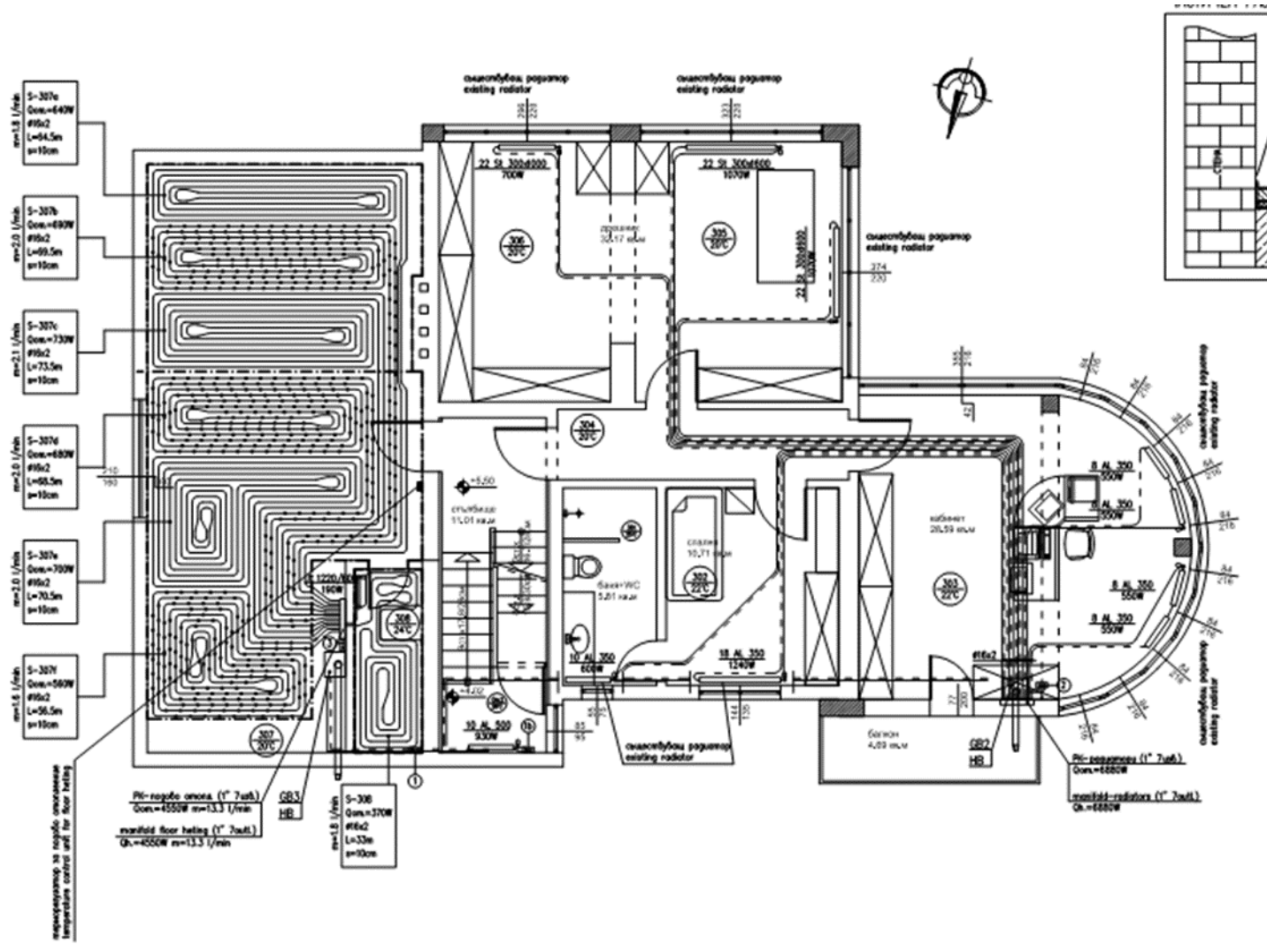


# Sous-terrain



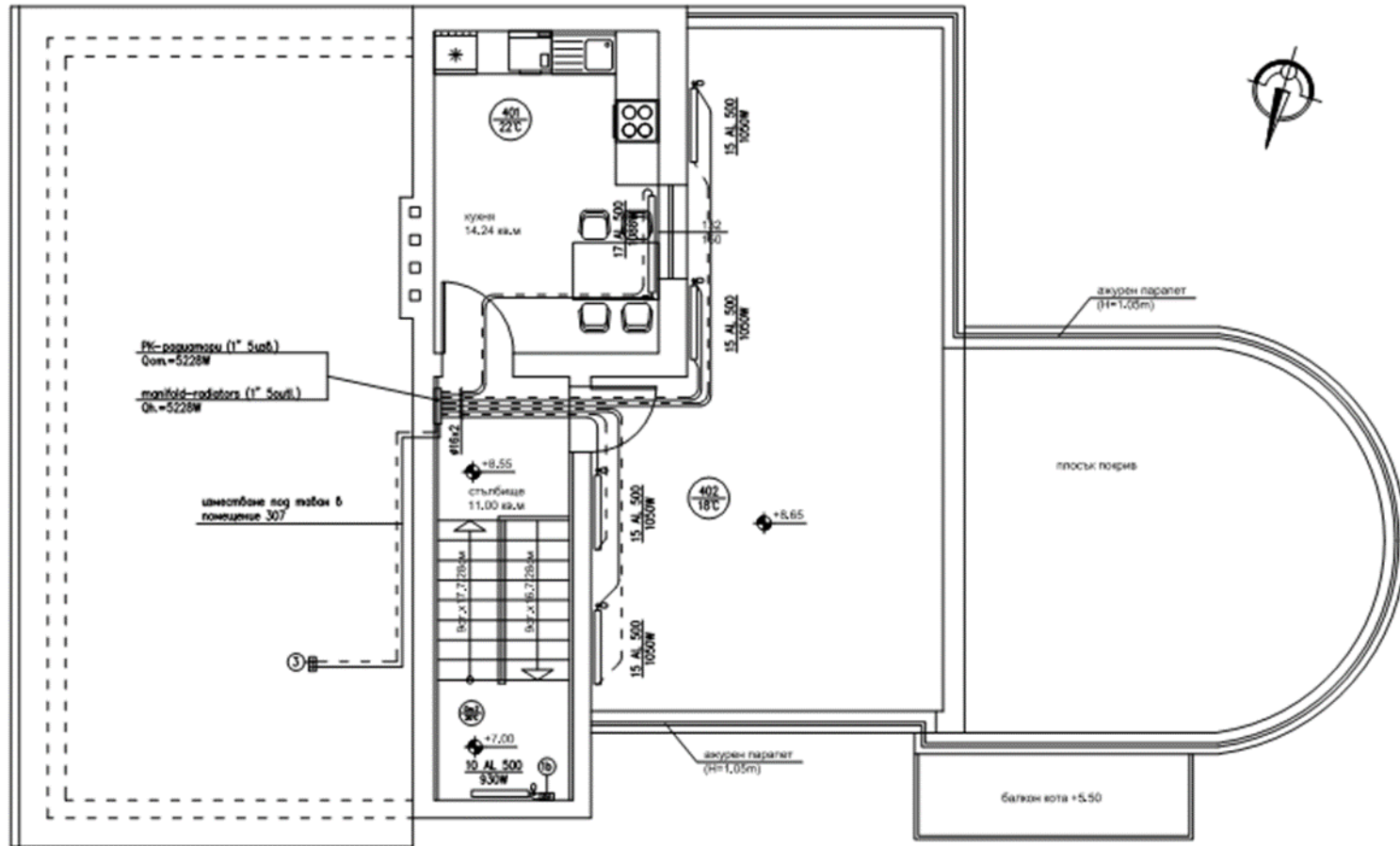








# Third floor

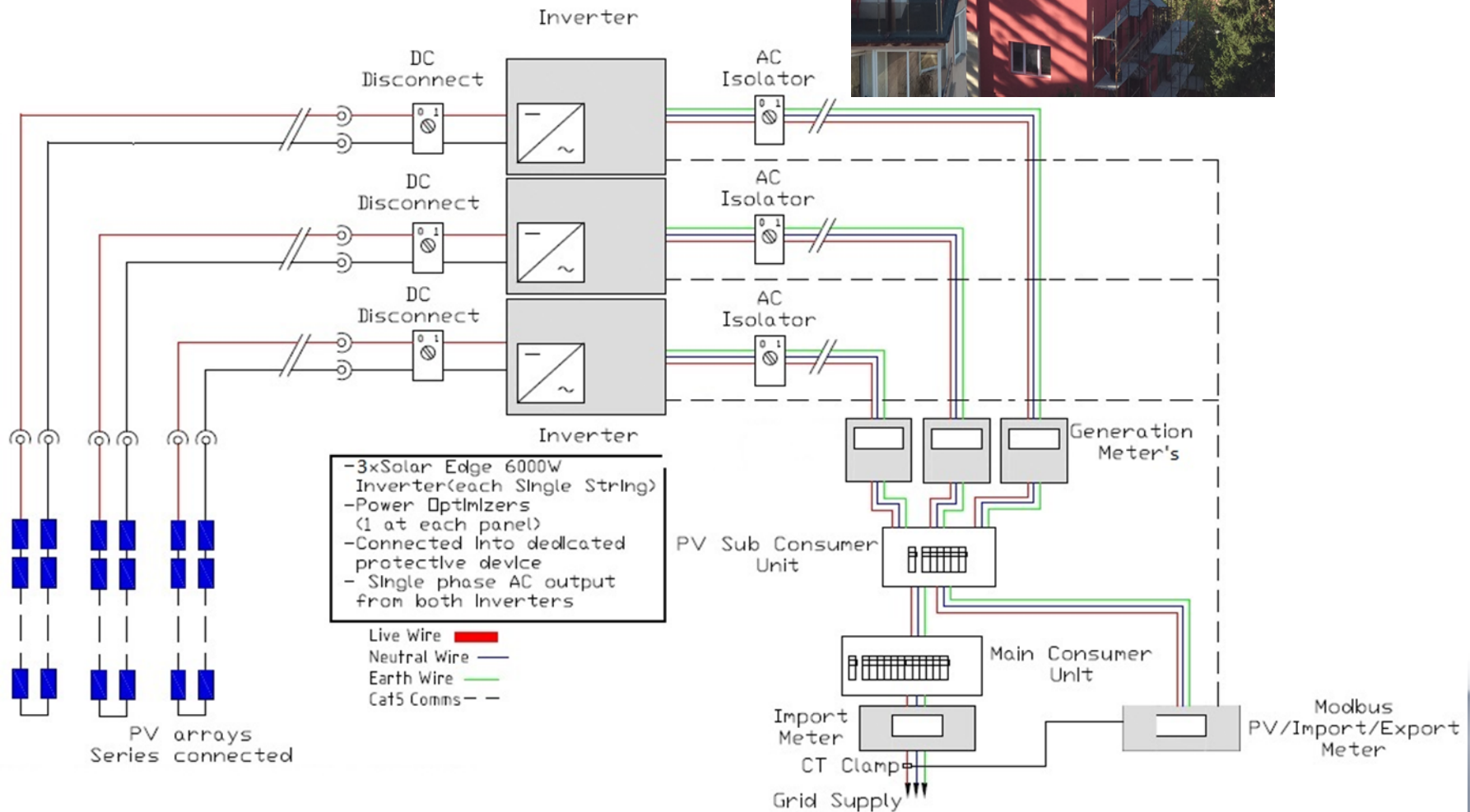




# PV system in Sofia

3 Solar Edge 6kW 1 phase inverter

3 x 14 x 340 W

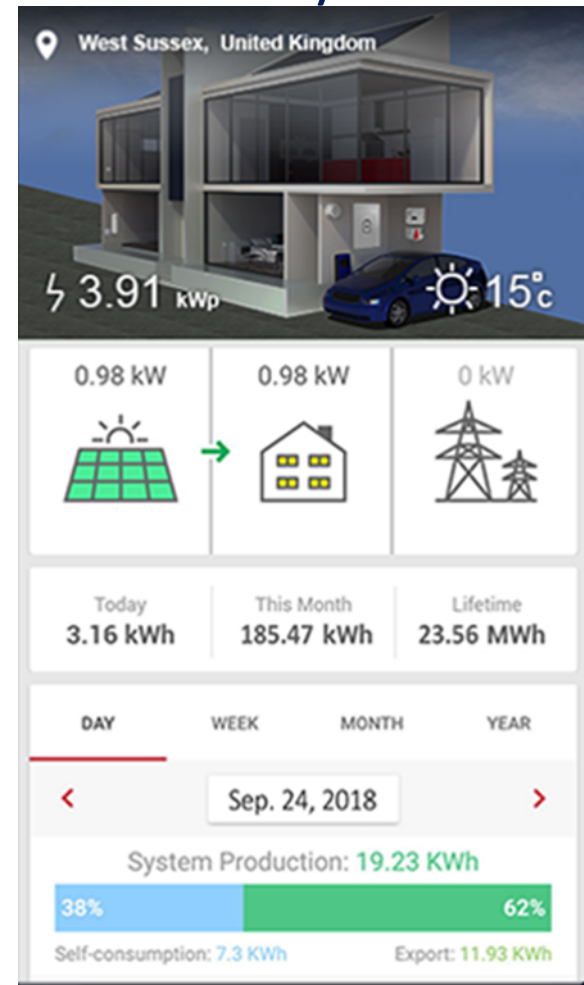






## Building Energy Management System – Solar System

- Solar Edge SetApp monitoring Platform is perfectly integrated with the installed system so that the solar energy generated can be monitored in detail. The photovoltaic system is connected to the electricity distribution network







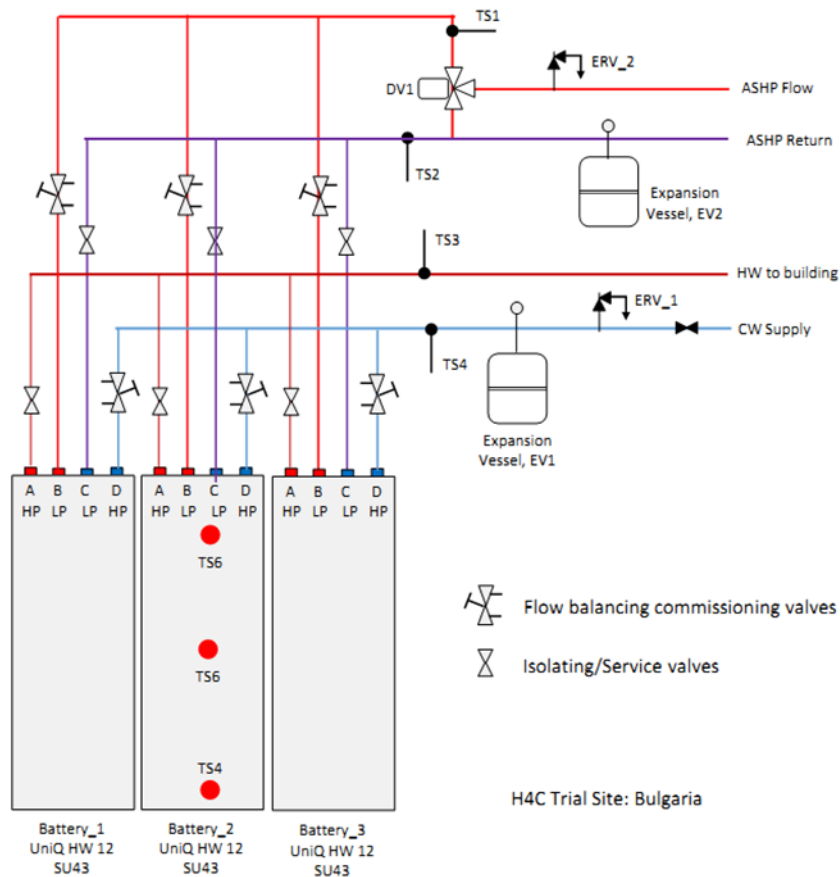
# Heat pump and heat batteries



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# Building Energy Management System – Control of Heat Batteries and Heat Pump

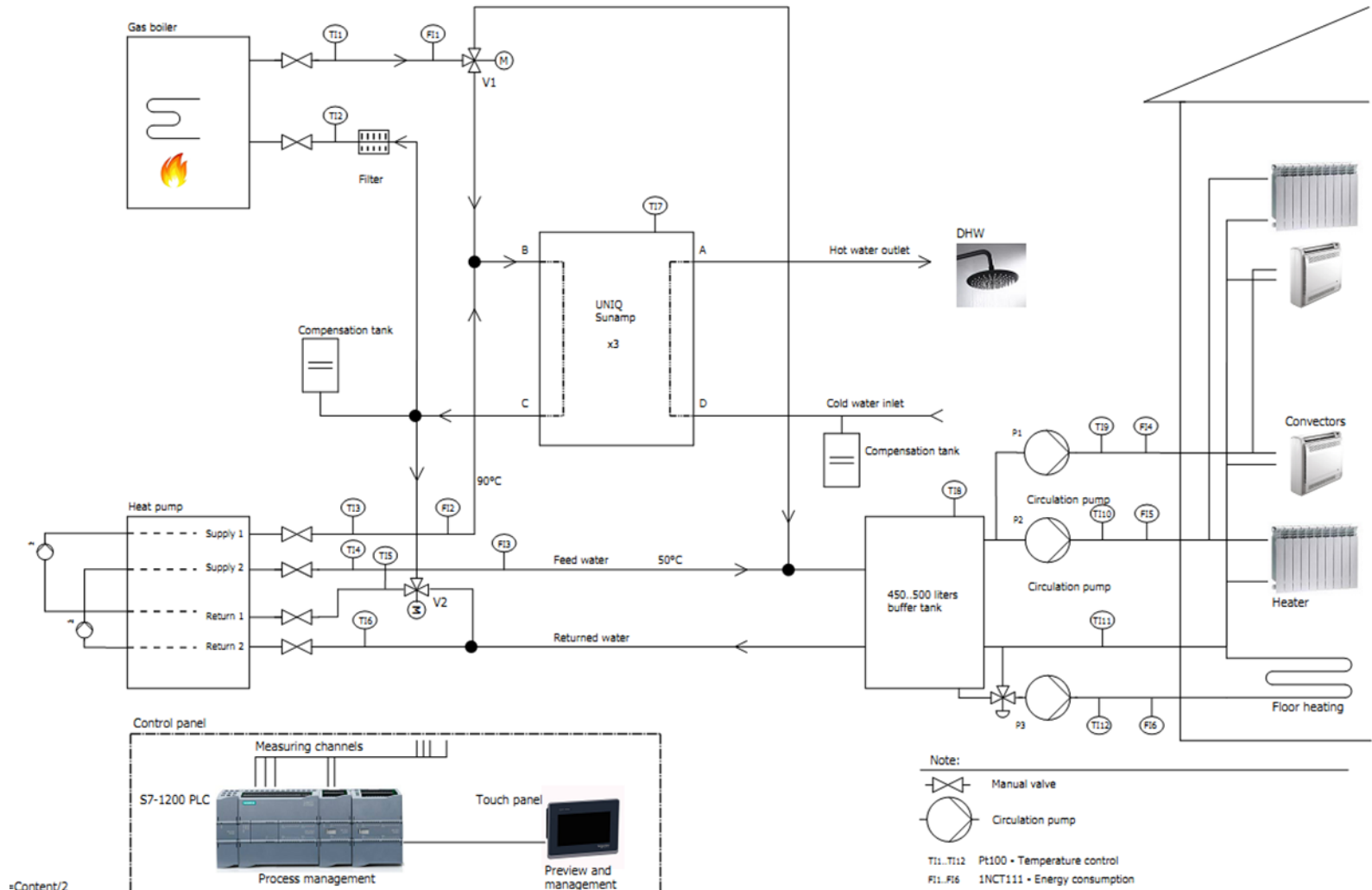


- When the heat battery charging demand is generated, the controller switch on the heat pump run demand signal.
- When the heat batteries are charging, the valve DV1 controls the charging flow temperature between 53oC and 55oC
- The pump also turns on when there is flow in outlet pipe to supply pre-heated water to the gas boilers.





# Building Energy Management System – temperature control



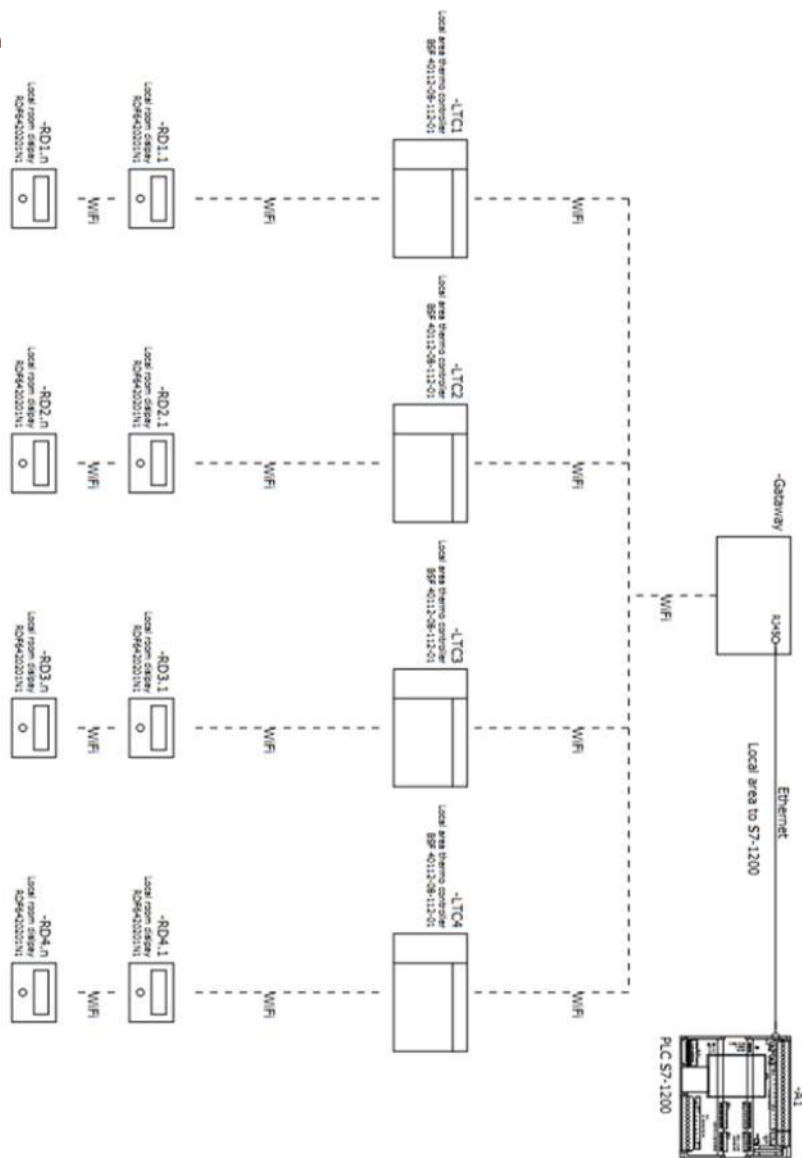
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# Local temperature controllers







Thank you.  
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