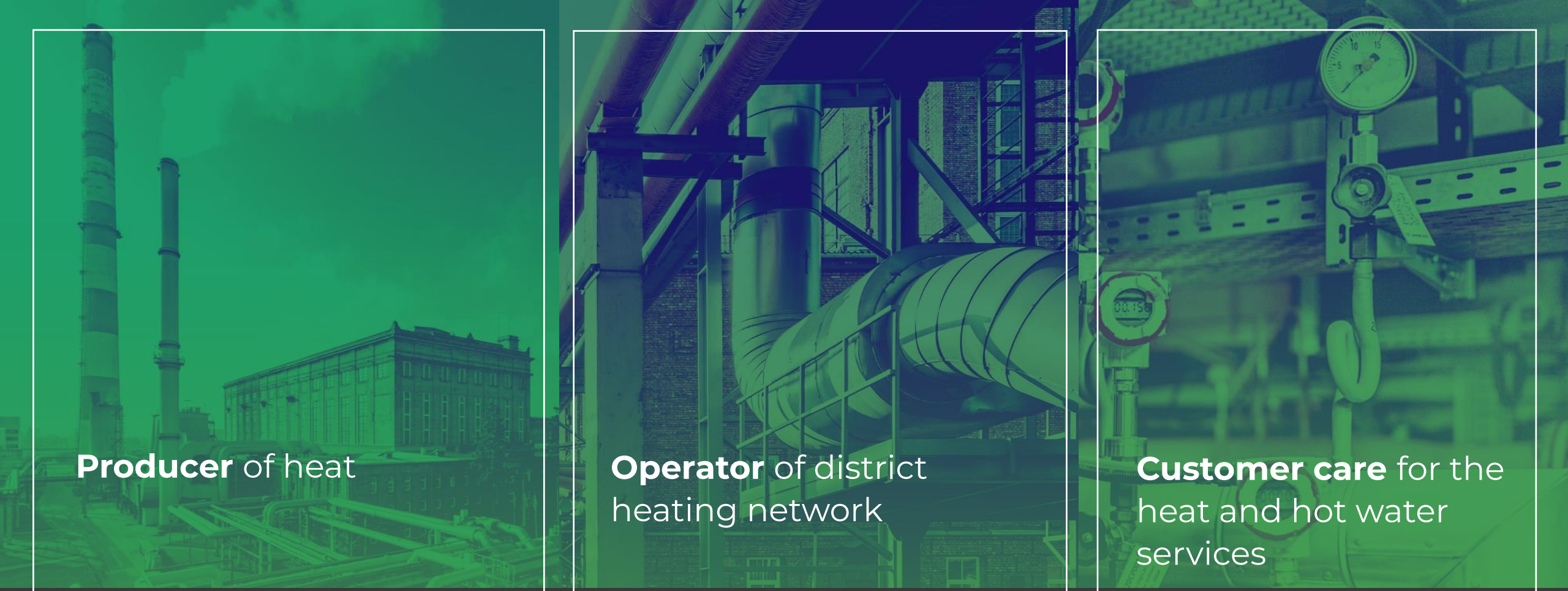
Low temperature DH development in Vilnius

Presents: Project manager Vytautas Džiuvė

2021, Vilnius



Producer of heat

The Company operates in competitive market and supplies heat and electricity from combined heat and power plant.

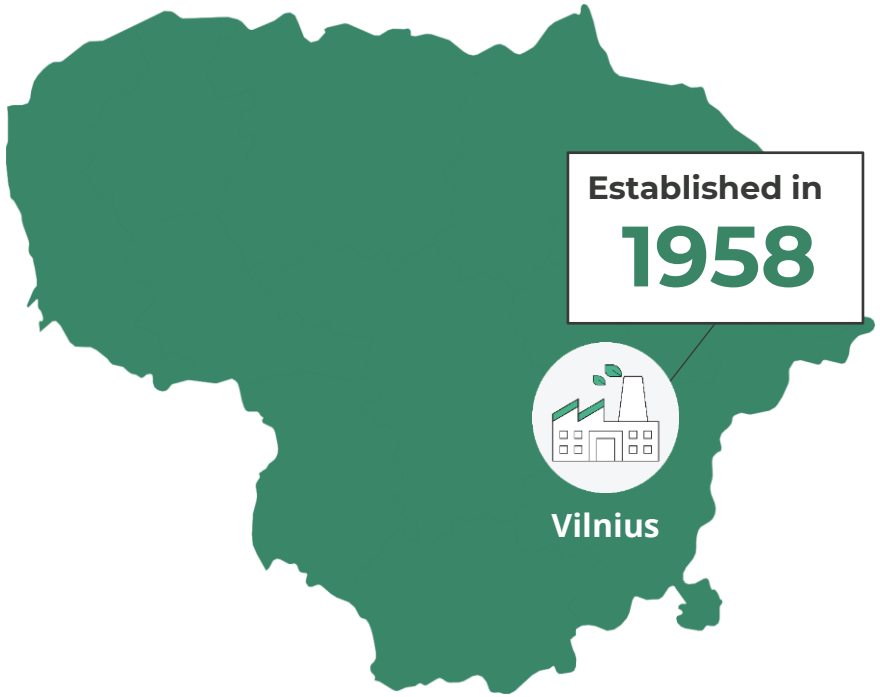
Operator of district heating network

The Company owns and operates district heating network in Vilnius. We provide peak load and reserve capacity to ensure the quality of service for final customer.

Customer care for the heat and hot water services

The Company supplies heat and hot water for the end customer.

Key facts



2 400 GWh

Annual heat sales

>60 % of heat produces by biomass powered boilers

Infrastructure and capacity:

740 km

Length of heat networks
Design temperature 115/60

80%

of all consumers in Vilnius are provided with district heating

20 mln. m²

of buildings are conecctd to the DH network

7200+

District heating substations

LITHUANIAN BUSINESS LEADERS **500** 2020

200.000+

HOUSEHOLDS

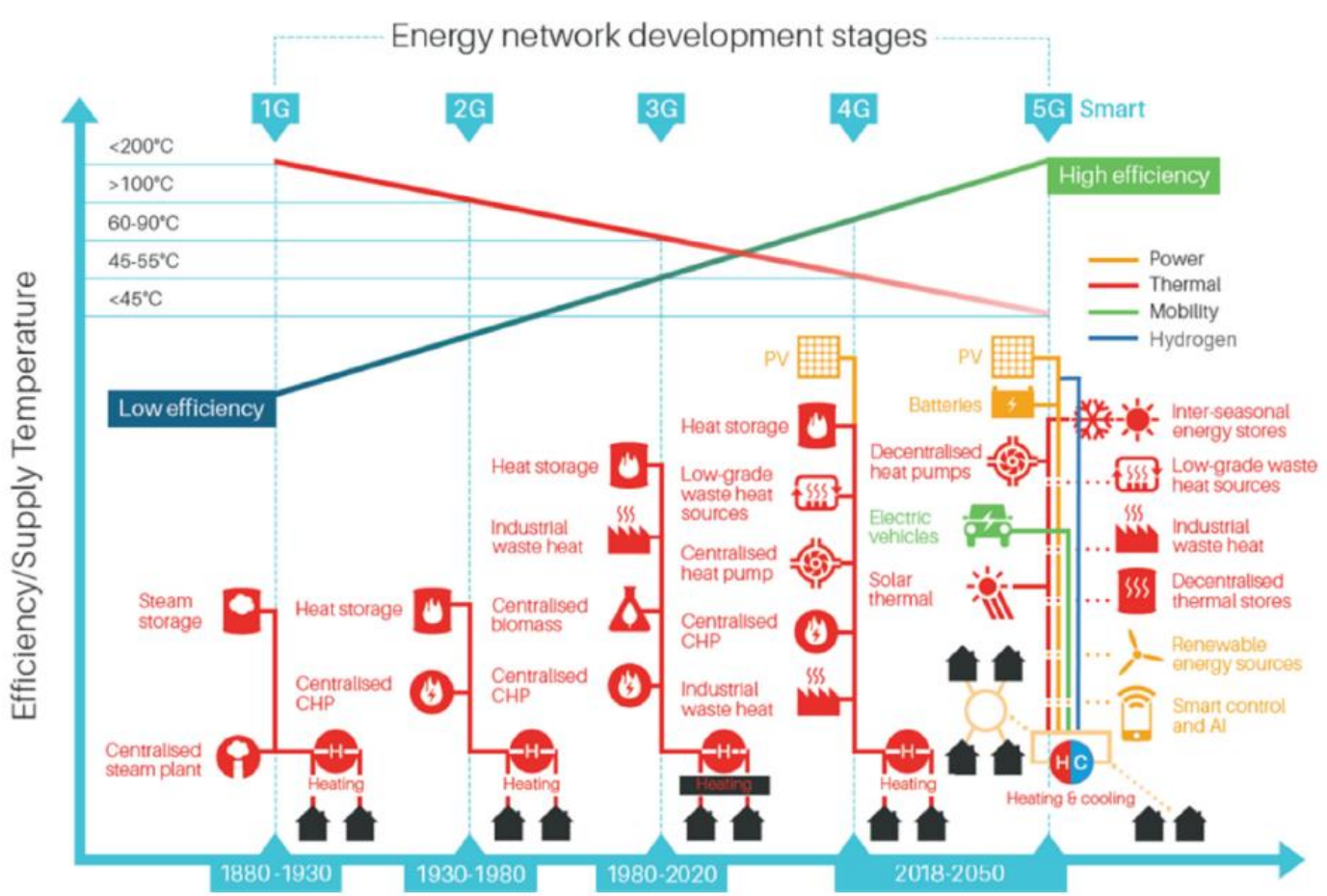
550+

NUMBER OF EMPLOYEES

REVENUES OF **131M EUR**

TOTAL ASSETS OF **139M EUR**

THE FUTURE OF DISTRICT HEATING



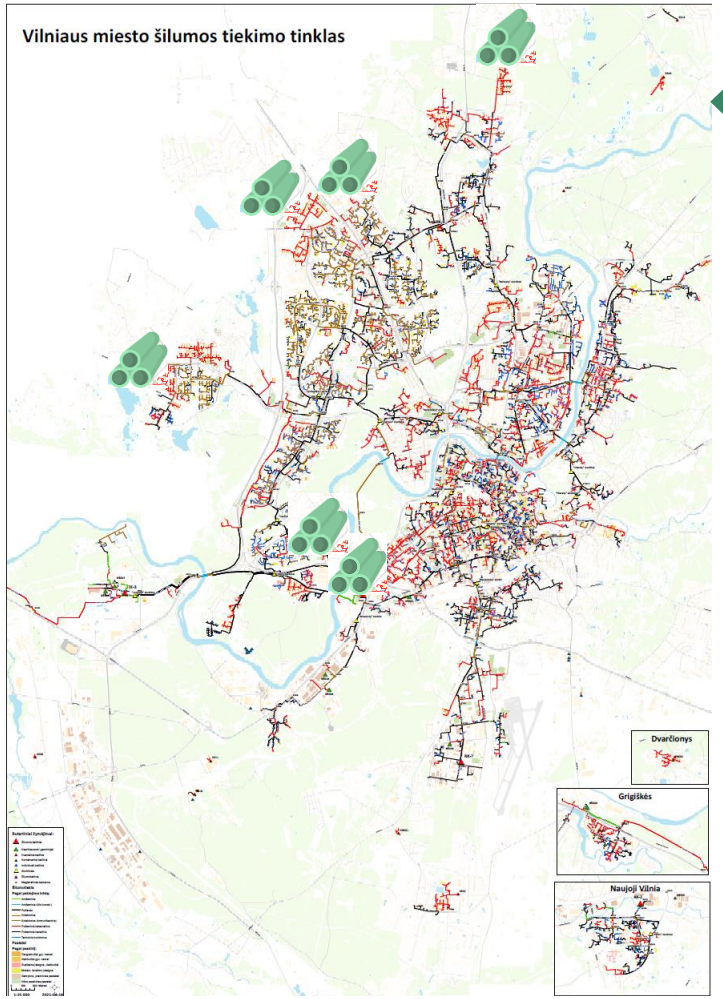
Source: A. Revesz et al. (2020). Developing novel 5th generation district energy networks

LOW TEMPERATURE DISTRICT HEATING IN VILNIUS

Network expansion is designed as LTDH 65/45 °C

New clients in new areas are connected to LTDH

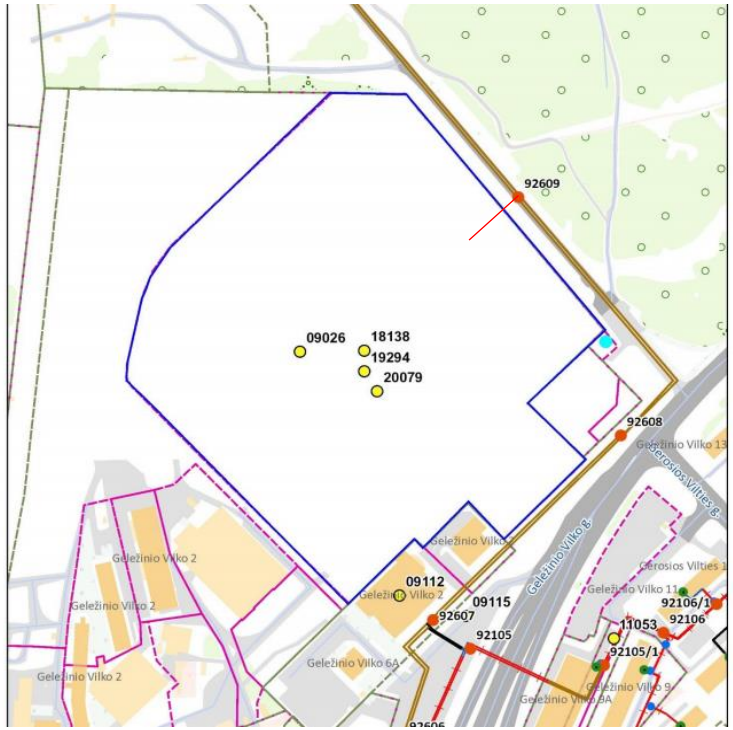
Reconstructions and new clients in high temperature areas are required to prepare internal system for LTDH

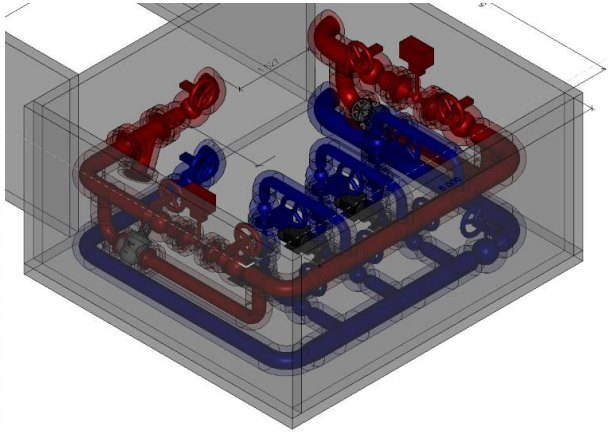


Discussion to develop 45/25 or 5th generation DHS

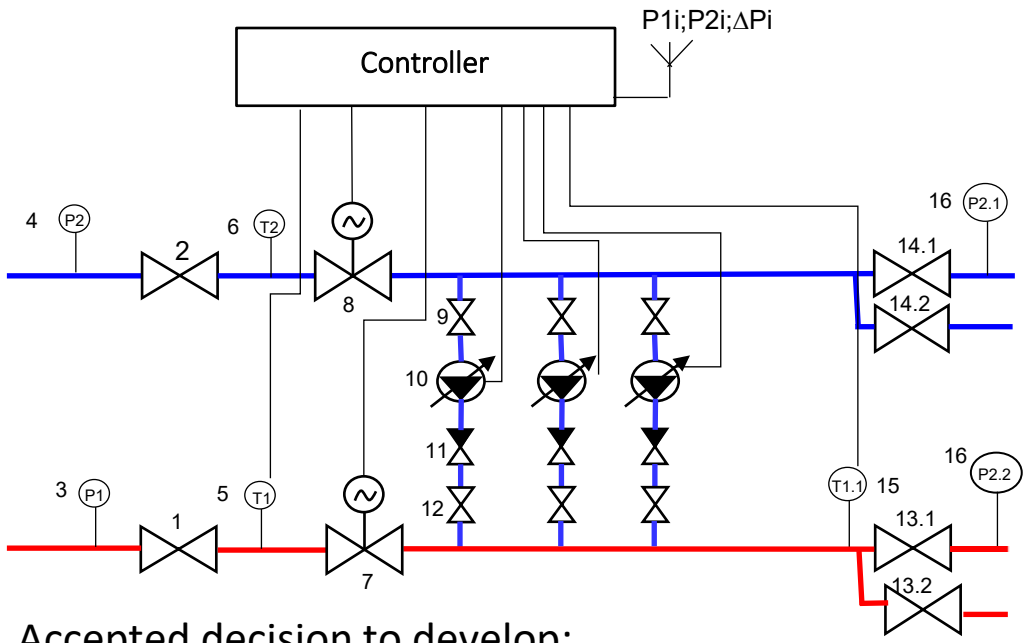
Estimated capacity demand in low temperature areas should be more than **100 MW**

Development of low temperature district heating networks in the complex of commercial buildings in Geležinio Vilko str.2, Vilnius





Water mixing unit principal scheme

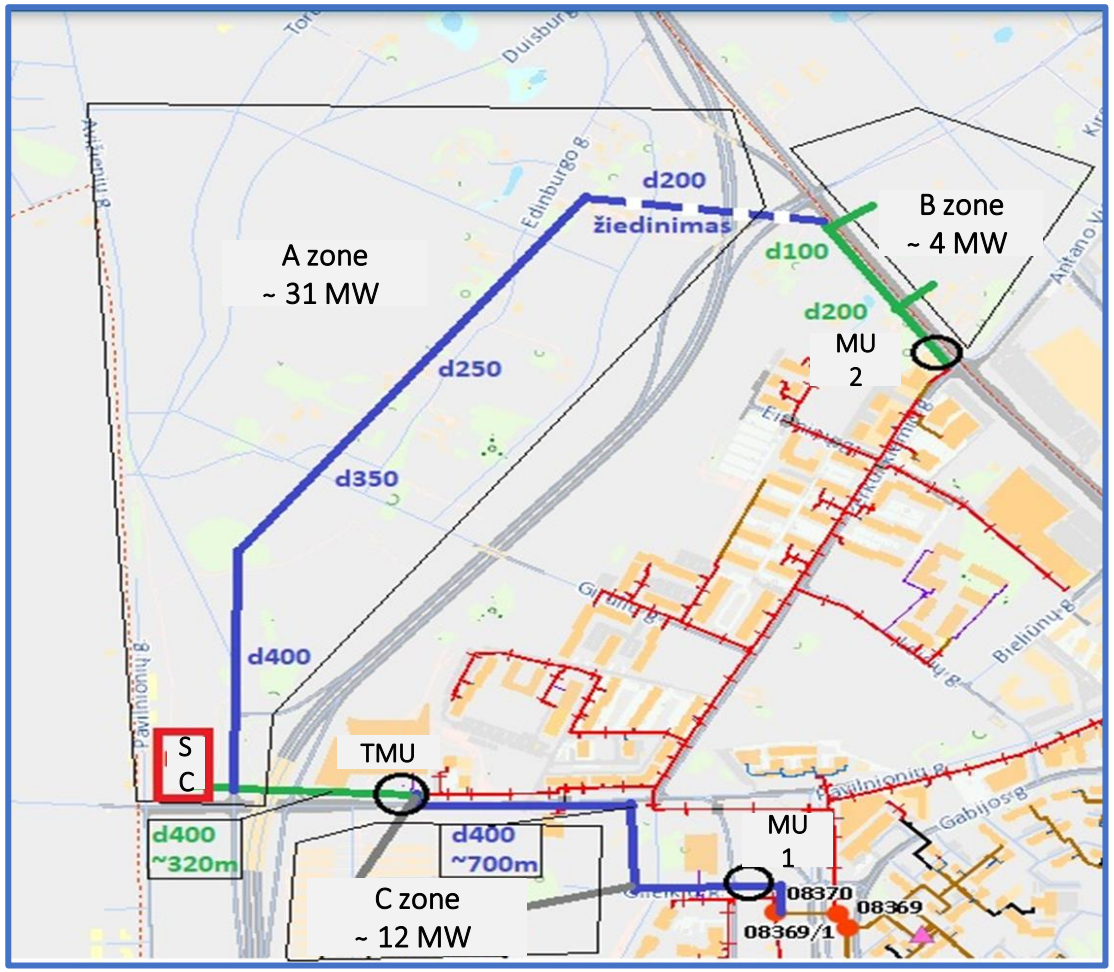


Accepted decision to develop:

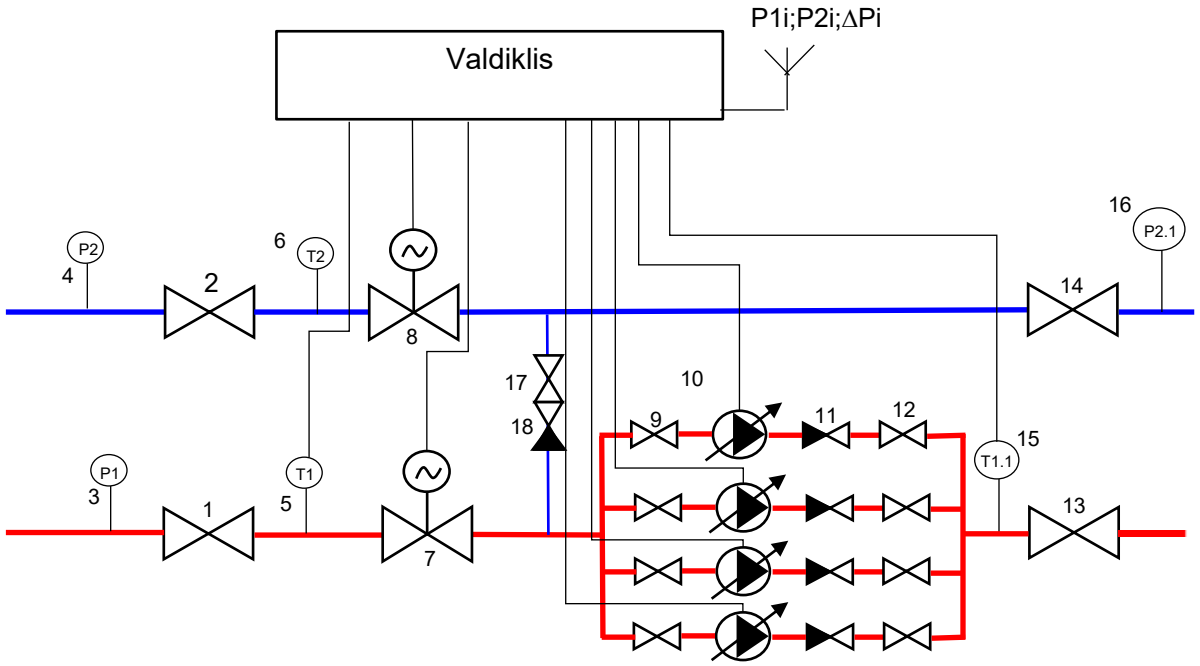
- **Low temperature district heating (65-45 °C)**

- Total heat demand of the commercial buildings (shopping and entertainment center “AKROPOLIS VINGIS”) is **9,8 MW**
- This supply water temperature lowering mixing unit scheme would be applied when the supply water pressure in the main networks is sufficient to ensure heat supply to the consumers of low temperature networks

Connection of Vilnius Pavilnionių area to low temperature district heating networks



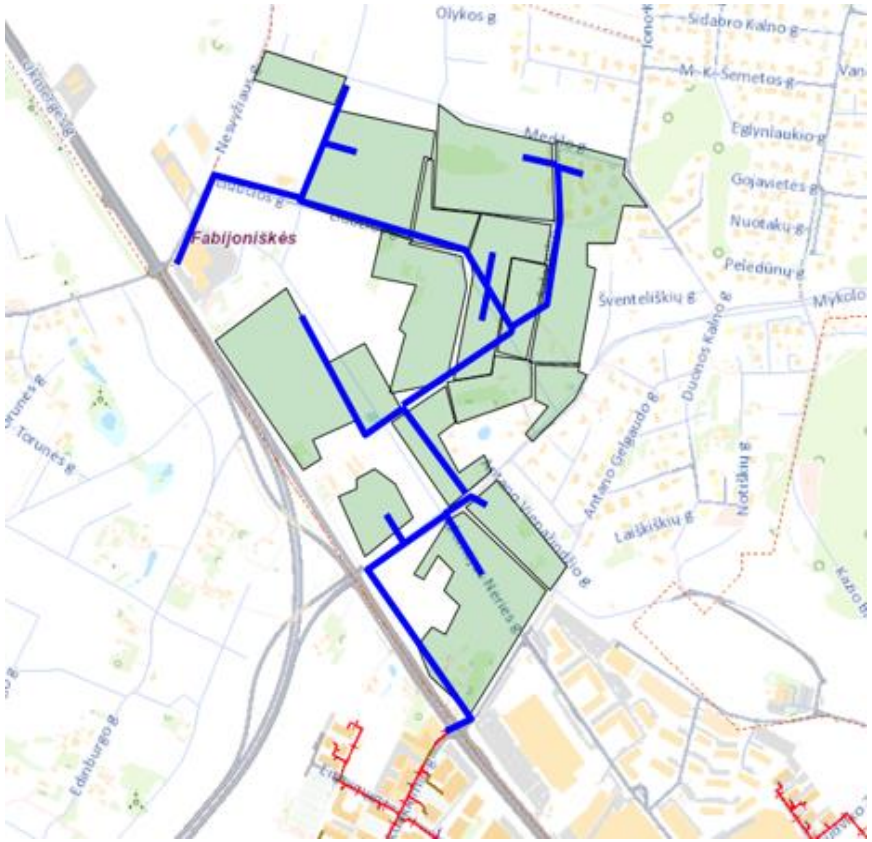
Water mixing unit principal scheme



Accepted decision to develop:

- **Low temperature district heating (65-45 °C)**
- Total design heat demand until 63 MW
- This water mixing unit that reduces the supply water temperature would be applied when the supply water pressure needs to be increased throughout the year.

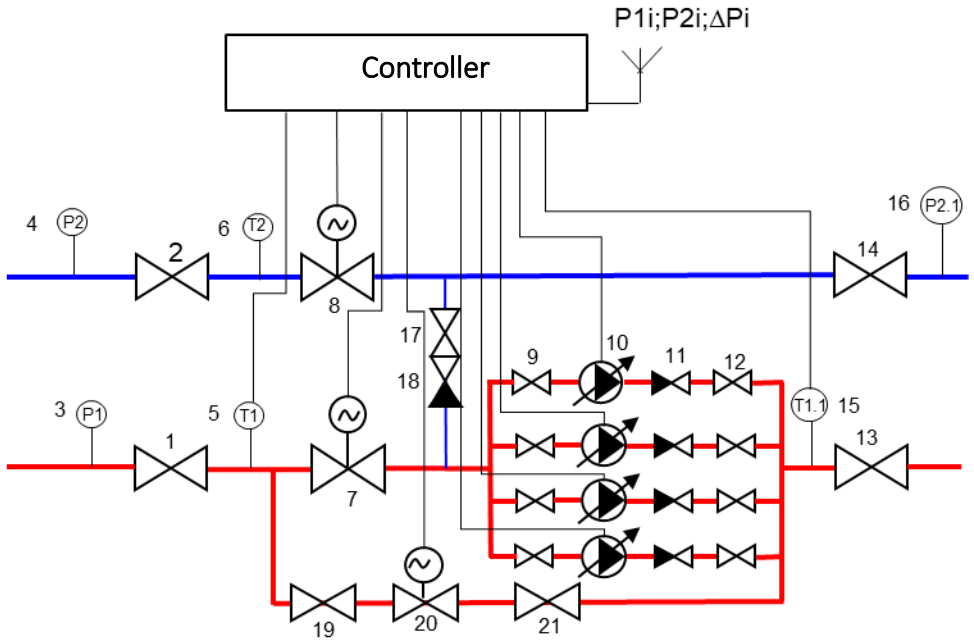
Development of low temperature district heating networks in the territory of Bajorai, Vilnius



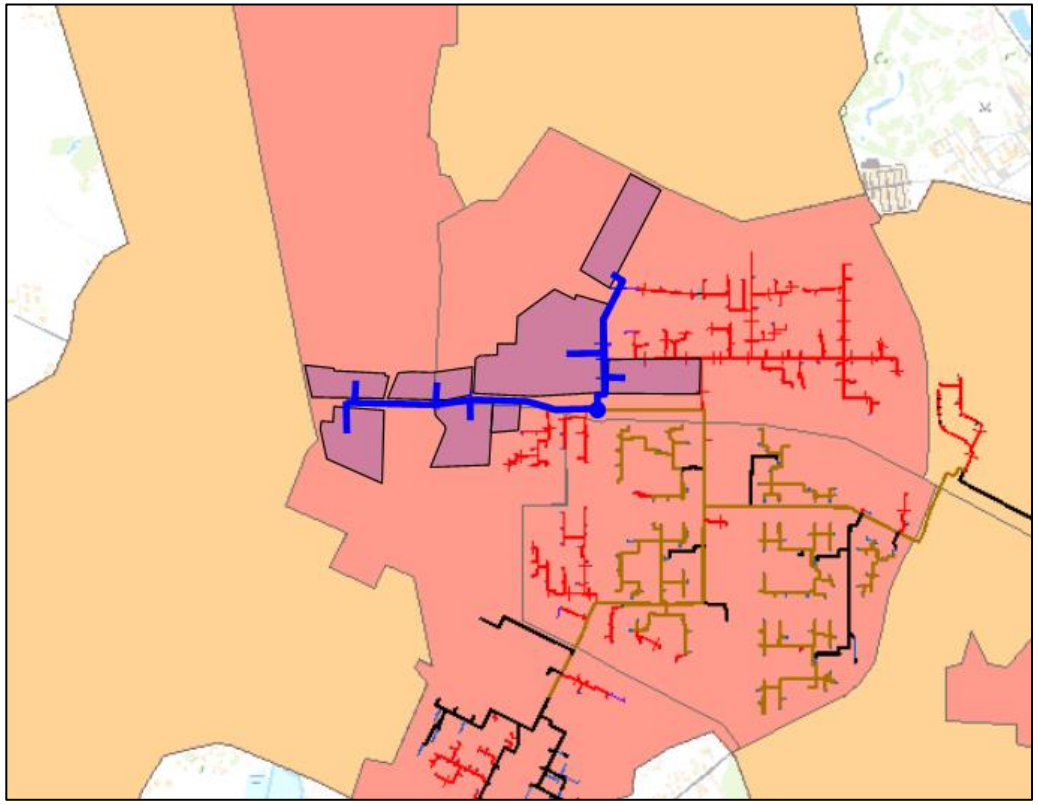
Development of LTDH **(65-45 °C)** in Bajorai territory

- The heat demand for heating of the planned buildings is forecast at about 6,1 MW;
- The heat demand for hot water supply may reach about 6,6 MW;
- The heat demand for ventilation could be about 5.5 MW;
- The total estimated heat demand is about **18.2 MW**

Scheme of water mixing unit for lowering the water temperature and raising pressure of the supply network

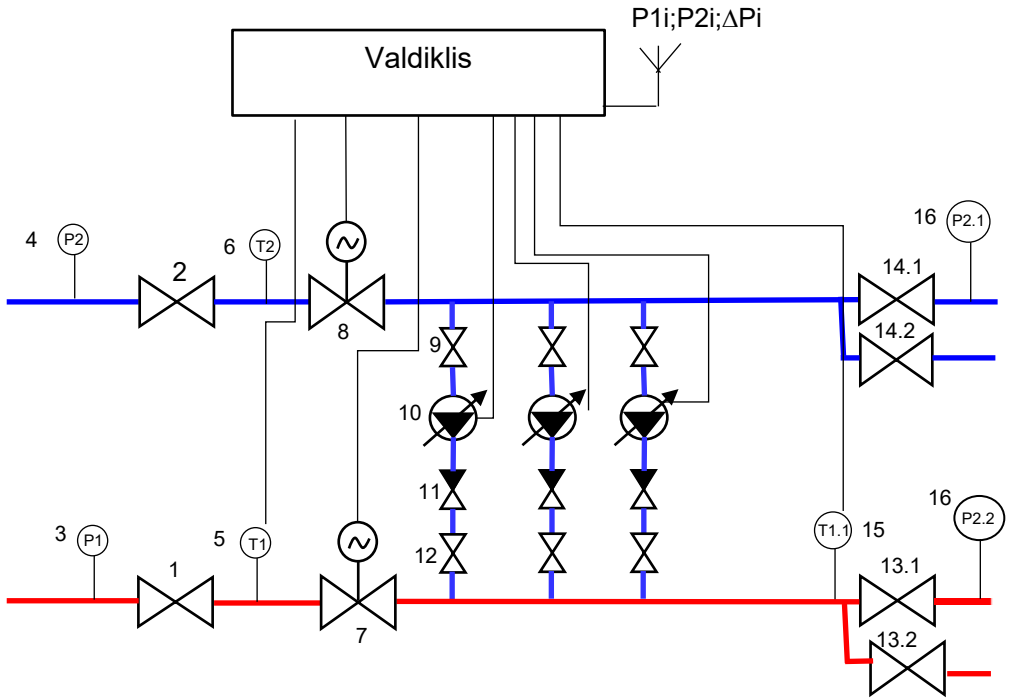


Development of low temperature district heating networks in the territory of Pilaitė, Vilnius



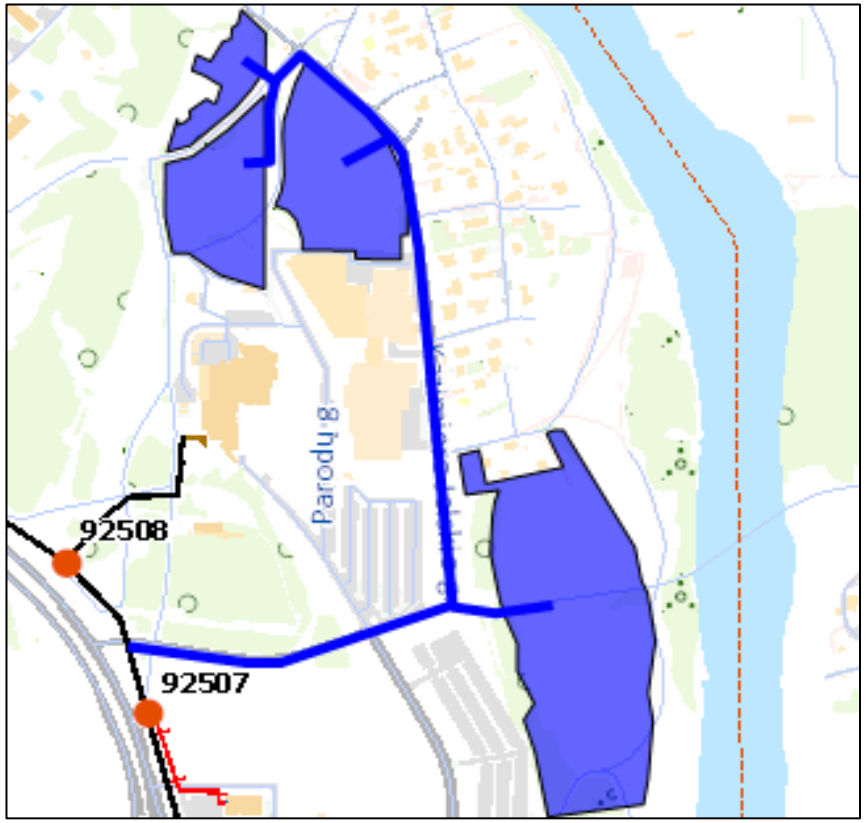
Development of LTDH **(65-37°C)** in Pilaitė territory

Water mixing unit principal scheme



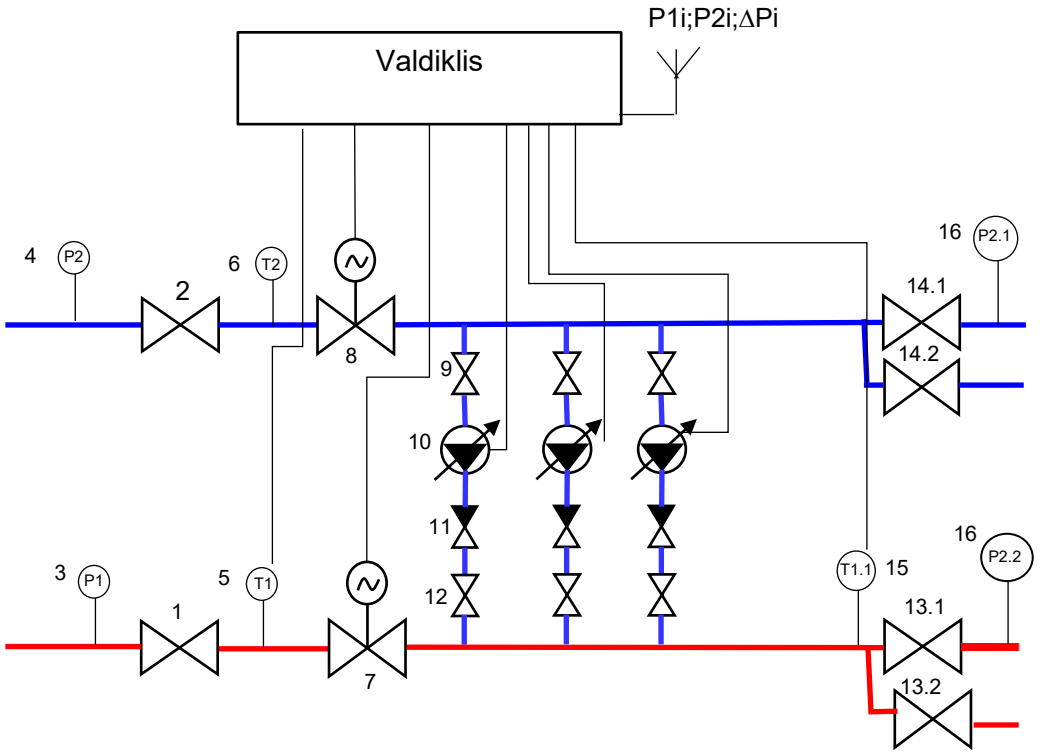
- Total design heat demand 18 MW;

Development of low temperature district heating networks in the territory of Lazdynai, Parodų street, Vilnius



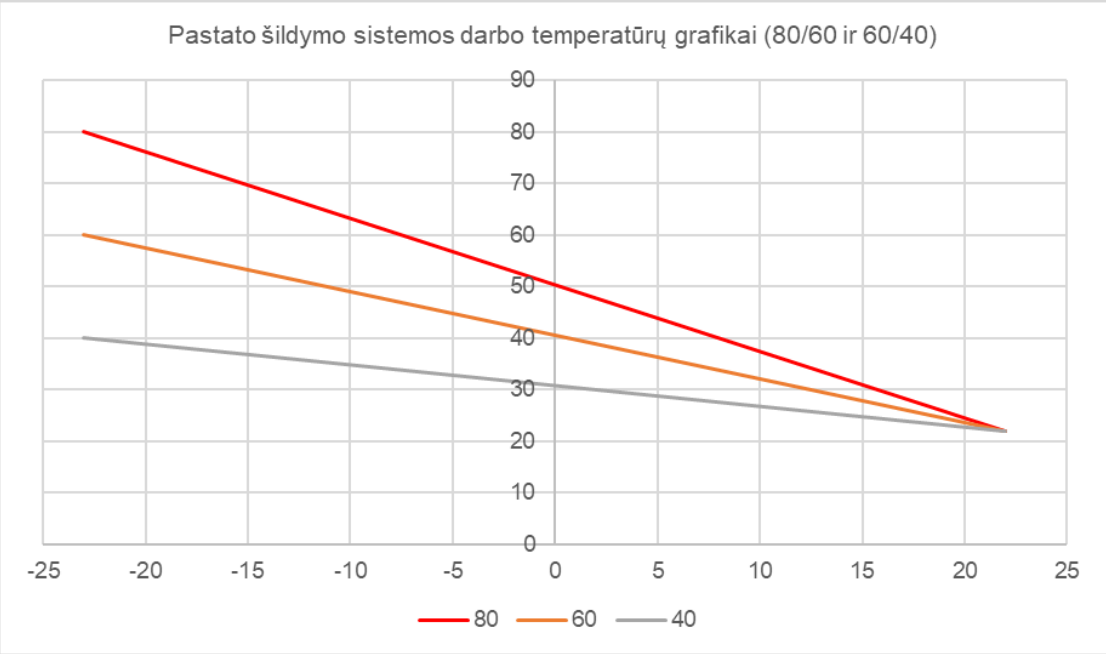
Development of LTDH **(65-37 ºC)** in Lazdynai territory, Parodų street.

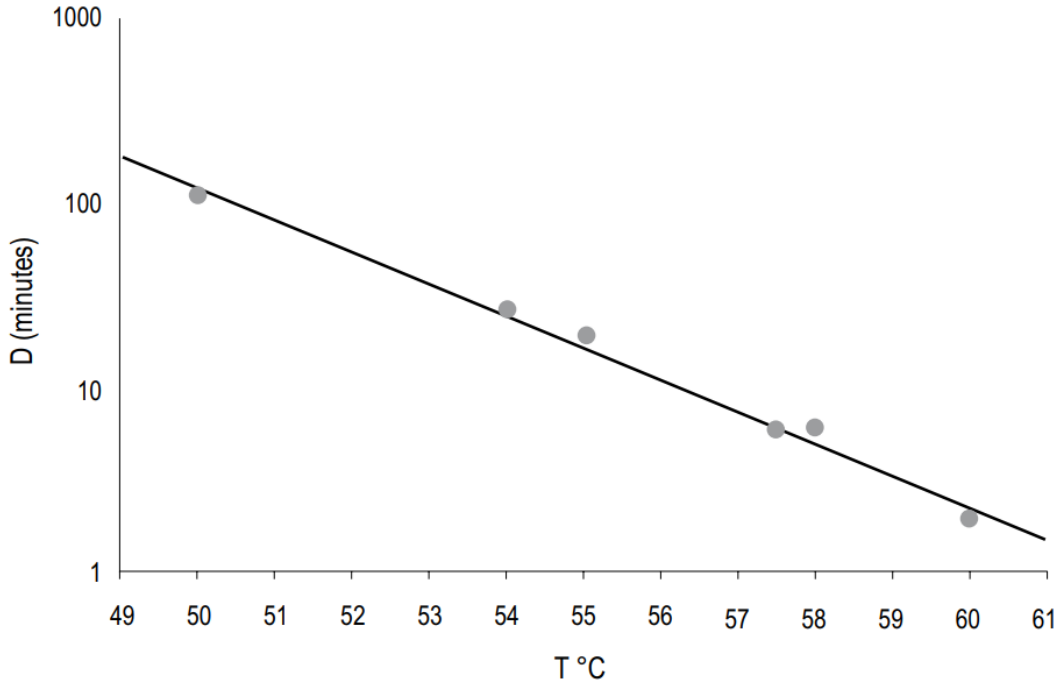
Water mixing unit principal scheme



- **Total design heat demand 3,24 MW** (15 new multi-dwelling units);

WORKING TEMPERATURES AND LEGIONELLA





Decimal reduction time (D) = time in minutes to kill 90% of the population of *Legionella*

Source: Legionella and the prevention of legionellosis

- **Average temperature in Vilnius -1 ÷ +2 ºC;**
- **In case of 4th generation network (60/40 ºC) return temperature would be ~30ºC;**
- **In case of 3rd generation network (80/60 ºC) return temperature would be ~40 ºC;**
- **Due to decrease of T2 the efficiency of economizers could increase by 10%.**

NETWORK LIFETIME

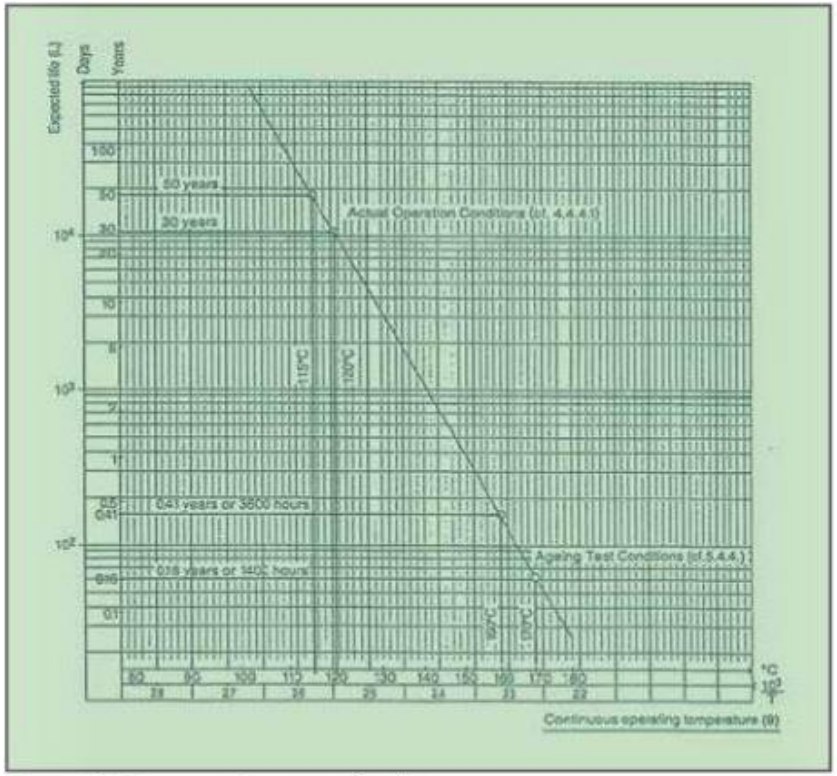


Figure 5: Life curve of a pre-insulated pipe.

Source: T. Holm and L. Gullev. (2001). Expected lifetime of pre-insulated pipes

- **At 115ºC the lifetime of pipes would be around 50 years;**
- **At 60ºC the lifetime of pipes would exceed 100 years.**

BENEFITS OF LOW TEMPERATURE HEAT SUPPLY SYSTEMS

- Increased comfort:
  - Lower temperature surfaces and lower risk of injury in case of contact
  - Lower risk of vapor damage for the property during in case of system failure
  - Lower dehumidification of air during heating season
  - Floor, wall or ceiling heating solutions allow to save indoor space (no need for radiators)
  - Dismantling cooling towers reduces noise levels in the district
- Decreased costs:
  - Lower heat losses in the network and internal building systems
  - Longer lifetime of the infrastructure
  - Higher efficiency of production facilities
  - Efficient integration of RES
  - Efficient recuperation of waste heat
  - New possibilities for prosumers
  - Power-to-heat possibilities (balancing of the electricity supply peaks)
  - Seasonal heat storage solutions
  - Integration of cooling and heating solutions
  - A 65C supplied water temperature does not require additional equipment for hot water preparation
- Sustainability and health:
  - Higher efficiency allows to avoid CO2 emissions
  - Alternative sources and higher efficiency allows to lower NOx and other emissions
  - 65C ensures prevention of legionella


Vilniaus šilumos tinklai
WE CARE ABOUT THE EARTH
BE BOLD