LowTEMP2.0

The first Low Temperature Centralized Heat Supply System in Latvia: the pilot of Beļava Parish - Gulbene

Dr.sc.ing. Vladimirs Kirsanovs, Riga Technical University
Dr.sc.ing. Ieva Pakere, Riga Technical University
Professor, Dagnija Blumberga, Riga Technical University
Professor, Francesco Romagnoli, Riga Technical University

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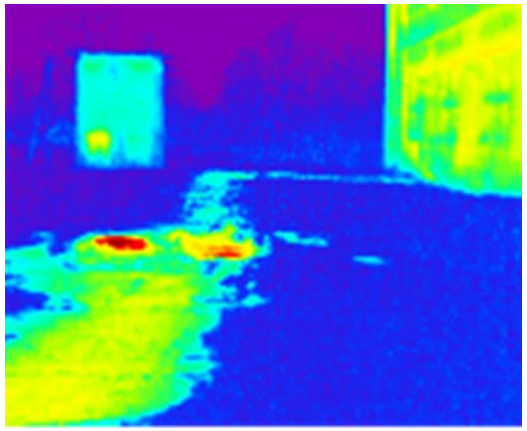
Background

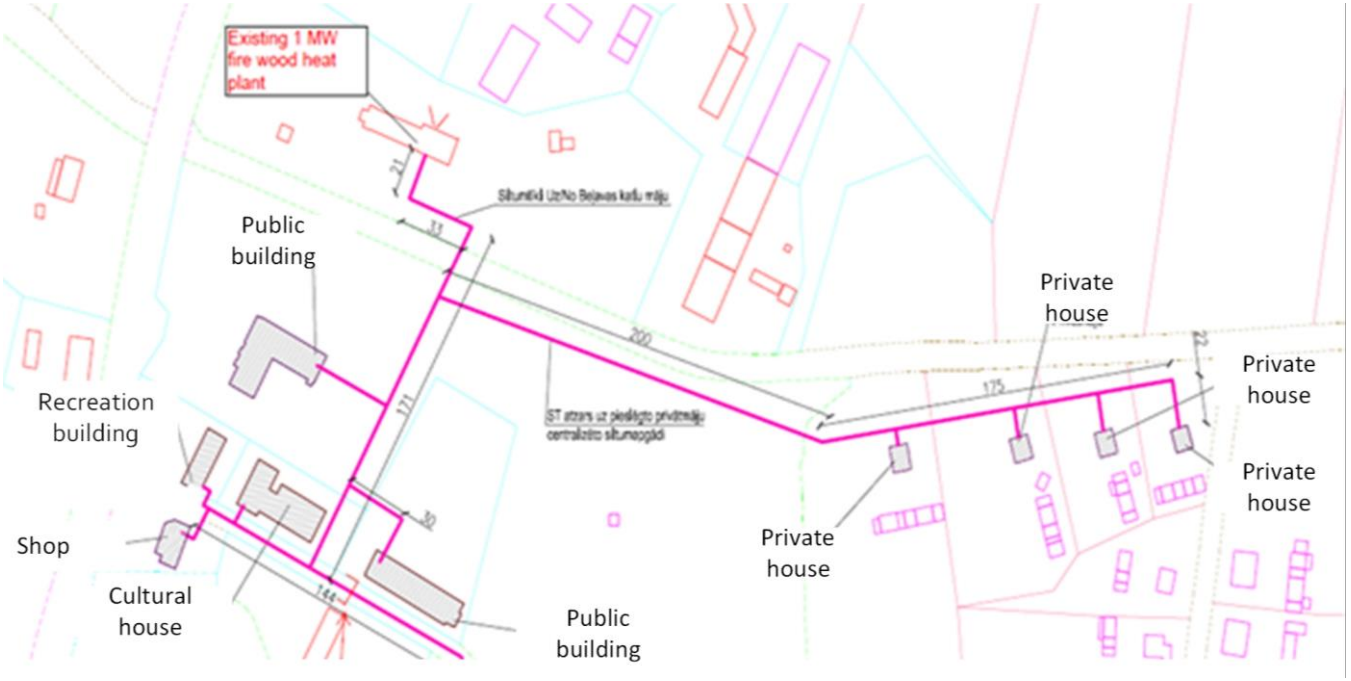
- The former District heating (DH) system at Beļava consisted of a wood boiler house and 9 buildings
- DH includes different groups of consumers: public buildings (i.e. local authority, kindergarten, mail), 1 cultural centre, 1 recreation building, 1 shop, 1 multifamily residential building and 4 private houses
- Public building, cultural house and shop are renovated
- Multifamily residential building is not insulated and have high heat consumption around 190 kWh/m_2 per year
- Existing boiler house: 1 MW fire wood boiler.

Main problem

Existing DH system was old and not effective

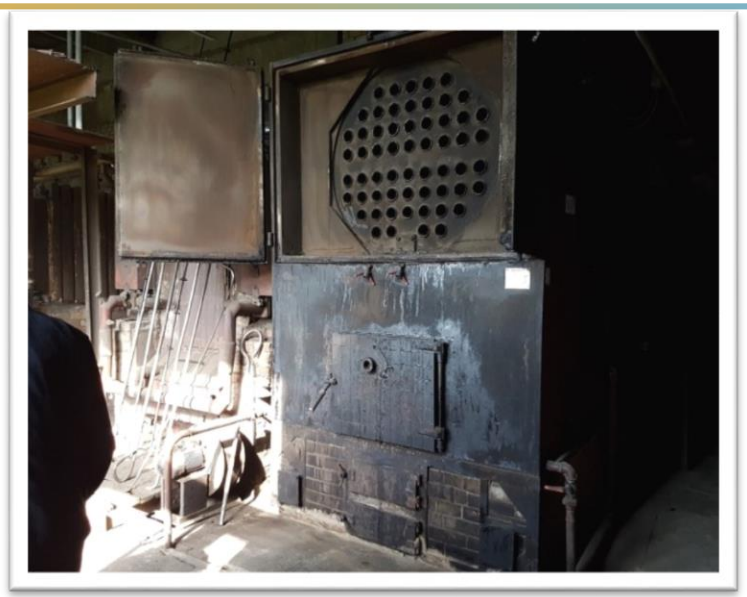
- **Heat transportation**
  - disproportionate DH grid
  - old pipes with bad quality insulation
  - heat loss in the grid ~40 %.





Main problem (II)

- **Heat production**
  - low boiler efficiency (50 – 60 %)
  - 3 workers for wood log preparing and manual loading into boiler
- **Heat consumers**
  - no heat meter for each consumer
  - DH grid and building heating system are not separated with heat exchanger
  - payment based on EUR/m² and not depending on consumers heat consumption
  - consumers are not motivated to save heat energy
  - high heat supply tariff – 87.50 EUR/MWh

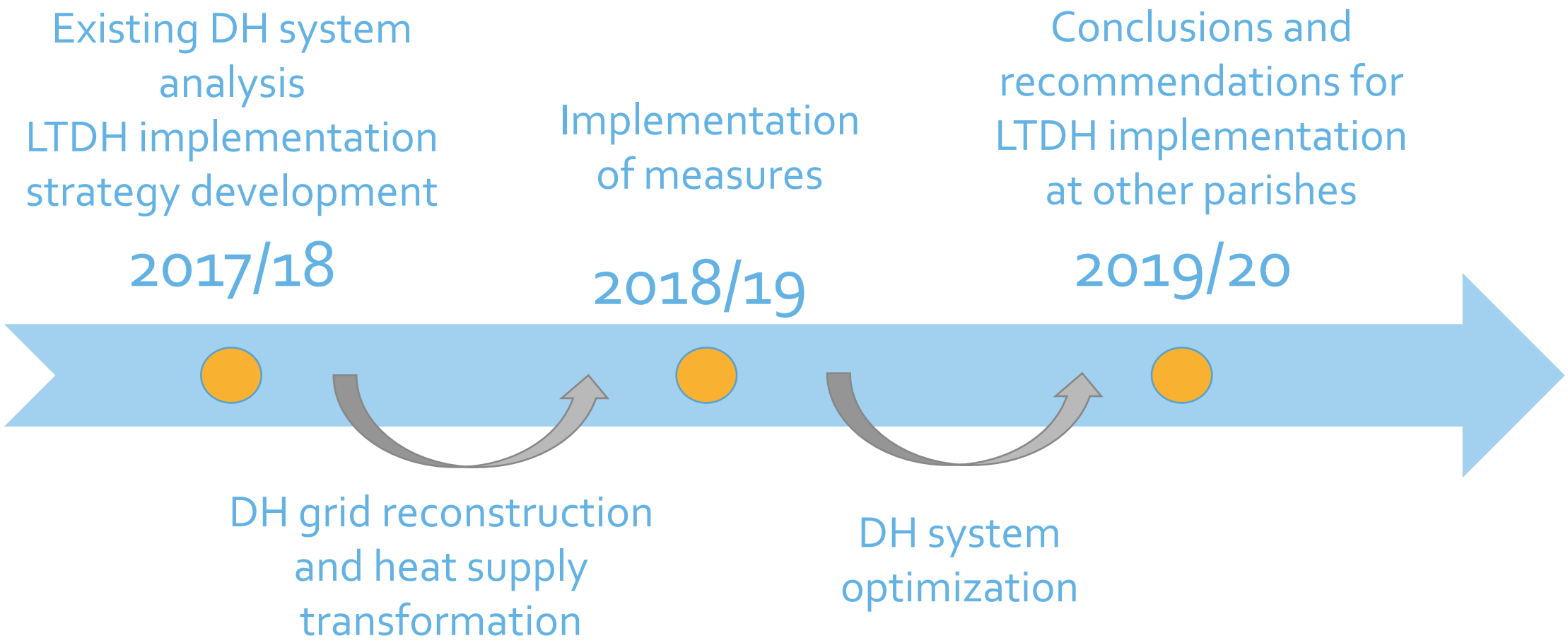


Aim and scope of the pilot measure

The implementation of a modern DH and smart metering system within existing buildings:

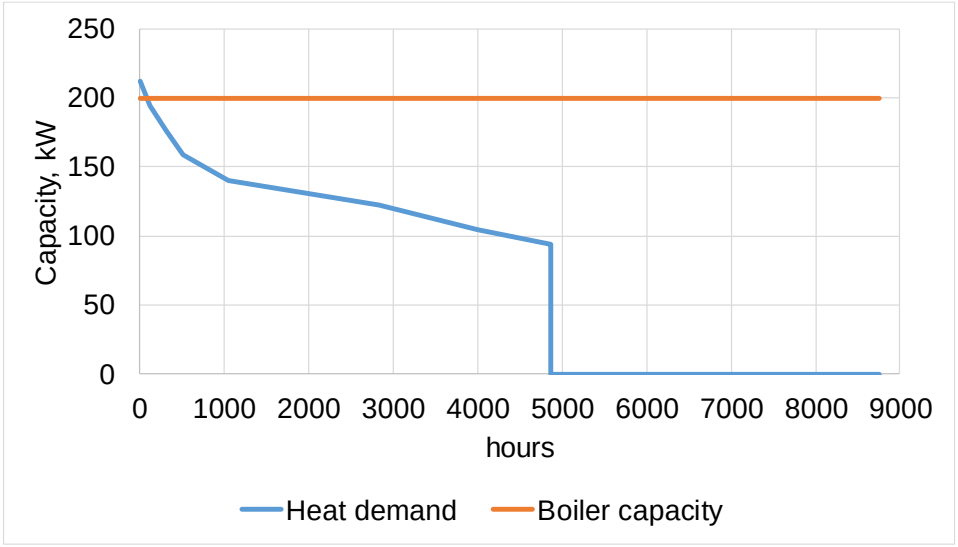
- Transformation of existing DH to LTDH to **develop demonstrative pilot example**
- **Provide LTDH** for two insulated buildings to three different consumer groups in Beļava Parish: culture center, local government and kindergarten
- **Develop a smart metering system** for LTDH monitoring as base for a future integrated energy management system
- **Testing of LTDH implementation strategy**, weak point recognition and suggestion determination for strategies improvement
- **Change of reluctant attitude** towards LTDH implementation by presentation of achieved benefits
- **Reduce CO_2-emissions** from DH system

Pilot measure timeline



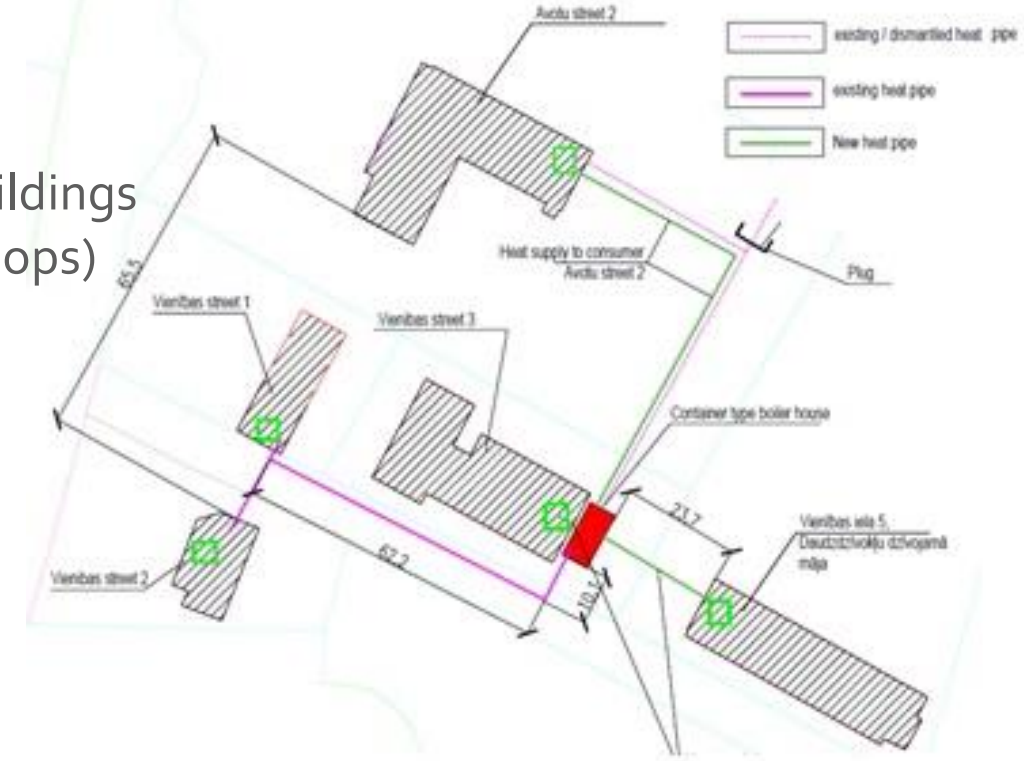
Description of the implemented technology

- **Heat production** – actual heat load calculation and installation of the container type house with automatically operated 200 kW pellet boiler selection with high heat production efficiency



Description of the implemented technology (II)

- **Heat transportation –**
  - DH grid length decrease (disconnection of 4 private houses and boiler house placement closer to main heat consumers)
  - replace of old pipes to new industrially isolated pipelines
  - decrease the temperature in grid - 65°/35° for renovated buildings and 80°/60° not insulated buildings (two separate circulation loops)

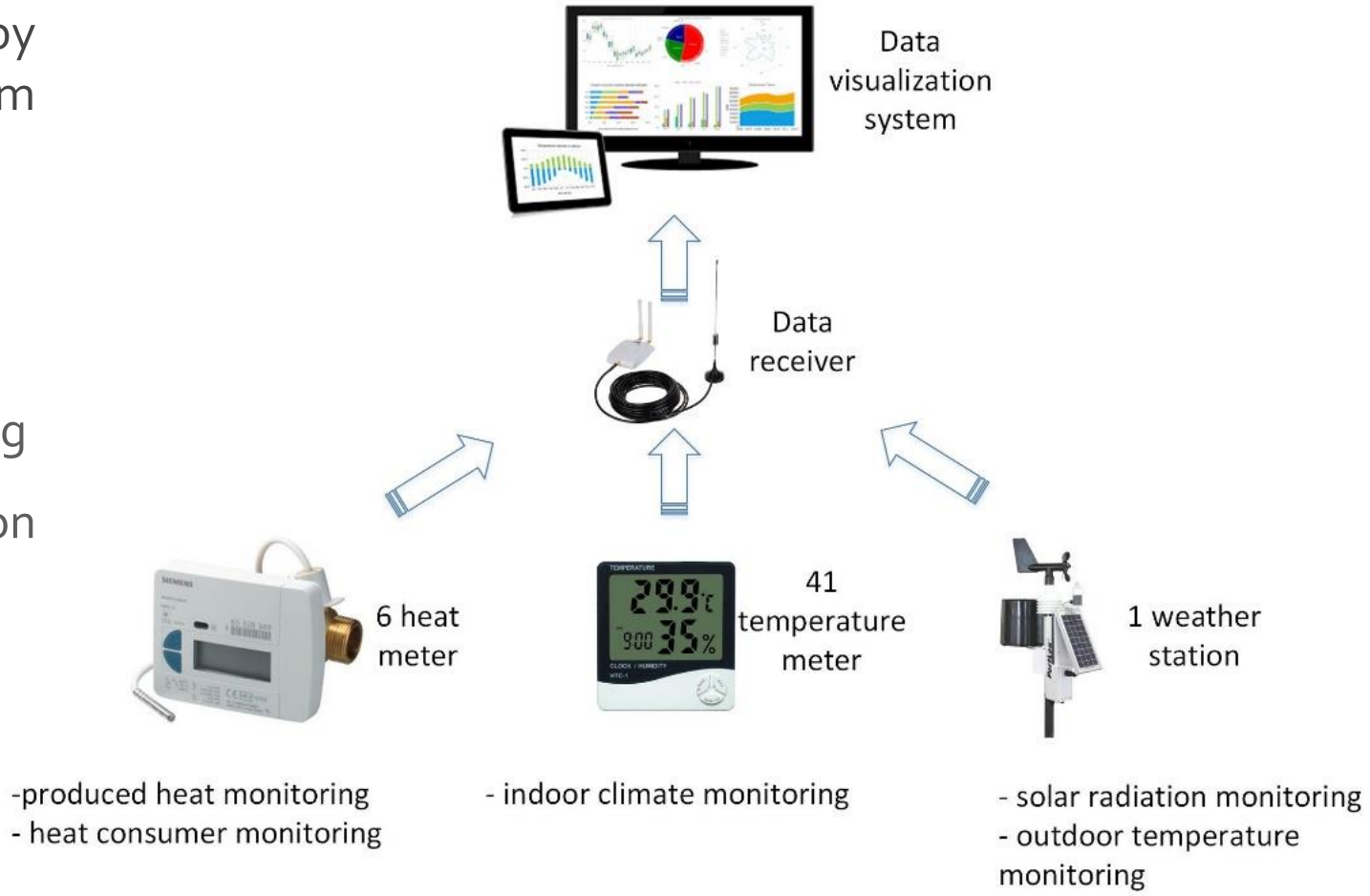


Description of the implemented technology (III)

- **Heat consumers**
  - substations and heat distribution system for each consumer
  - heat meter installation for consumers and ensure payment based on a heat meter readings

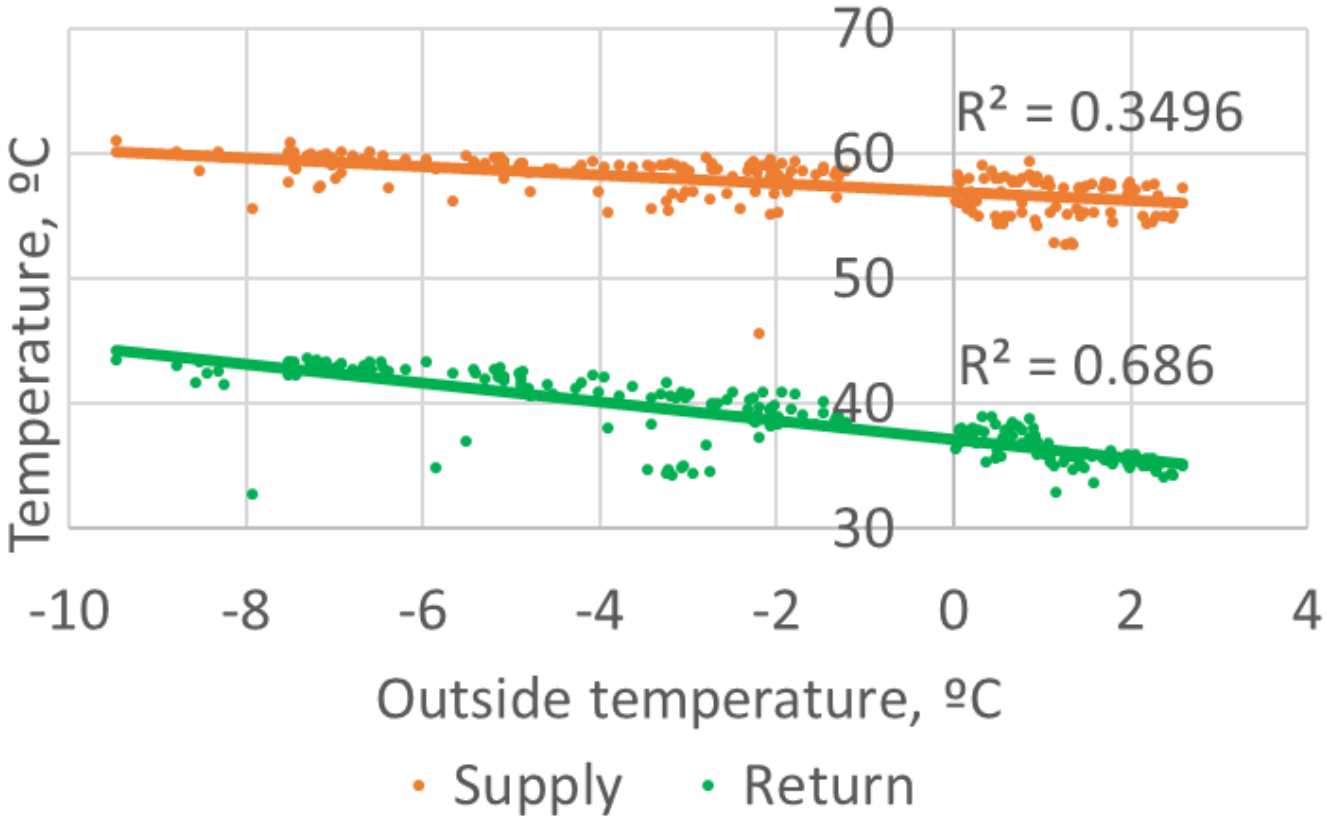
System monitoring

- LTDH system monitoring was organized by installation of smart metering system installation for:
  - Produced heat monitoring
  - Heat consumption monitoring
  - Indoor climate monitoring for each building
  - Outdoor temperature and solar radiation monitoring

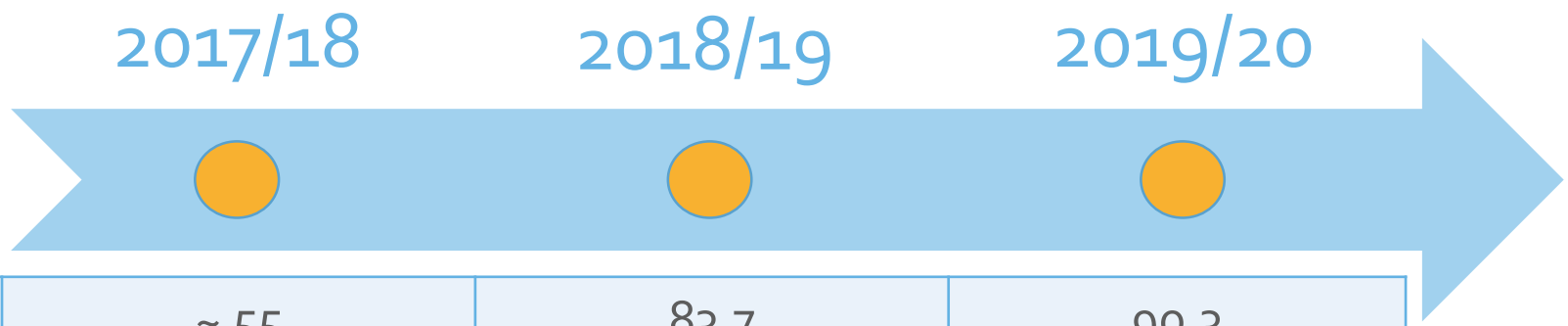


System optimization

- Low correlation between outside temperature and supply temperature from boiler house was identified
- The adjustment of the boiler house automation to increase the higher DH system efficiency



Benefits



Boiler house efficiency [%]	~ 55	83,7	90,3
Heat loss at DH grid [%]	~40	4,6	3,8
Fuel consumption [MWh/year]	1 179	470	459
Electricity consumption, [kWh/MWh]	~20-25	10,9	10,1
Heat supply tariff [€/MWh]	87,50	69,07	69,07

- Cost savings per year average: 16 900 €
- Investment payback period: 11 years

Beneficiaries

- **House owners, apartment owners and apartment building managers**:
  - Reduced heating costs
  - Improved indoor climate conditions
- **Heat suppliers**:
  - Improved heat production efficiency
  - Reduce heat transfer losses
  - Possible integration of waste heat sources
- **Municipality**:
  - Improved DH energy management from installation of stationary and mobile smart metering systems
  - Knowledge about 4th generation DH and implementation in new projects
- **Other municipalities**:
  - Good practice example and action plan for LTDH implementation

Conclusions

- The pilot project implementation offers the opportunity to identify main barriers and bottlenecks for a successful realization at a larger scale.
- An in-depth analysis of the existing situation and developing a clear and tailored action is necessary for new LTDH system construction or existing DH transformation to low temperature.
- System monitoring and optimization are necessary to preclude the possibility of shortcomings.
- Pilot activities supplement the development of pilot energy strategies in municipalities and regions.
- Existence of a reluctant attitude toward LTDH implementation does to the lack of knowledge.
- In-formative campaigns are necessary to change people attitude and show a positive experience of LTDH project realization.

Contact information

Dr.sc.ing. Vladimirs Kirsanovs, vladimirs.kirsanovs@rtu.lv

Institute of Energy Systems and Environment

Riga Technical University