

# LOWERING THE OPERATING TEMPERATURES IN OLD-GENERATION DISTRICT HEATING SYSTEMS: FIRST RESULTS FROM THE TEMPO DEMONSTRATION PROJECT IN BRESCIA (ITALY)

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# OUTLINE

- DH system in Brescia (Italy)
- Demonstration of temperature reduction:
  - Site selection and preparation
  - Customer engagement
  - First results (heating season 2019-2020)
- Observations and future activities

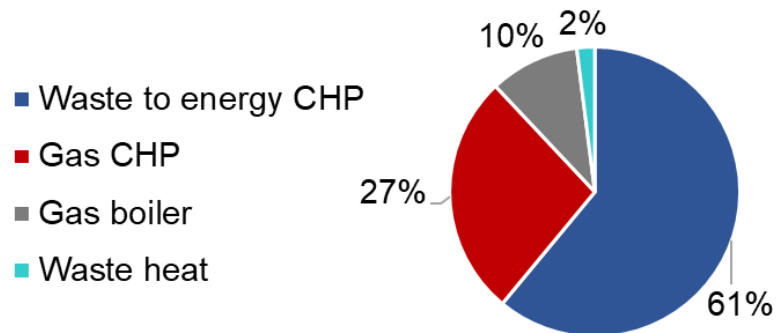


# DH SYSTEM IN BRESCIA OVERVIEW

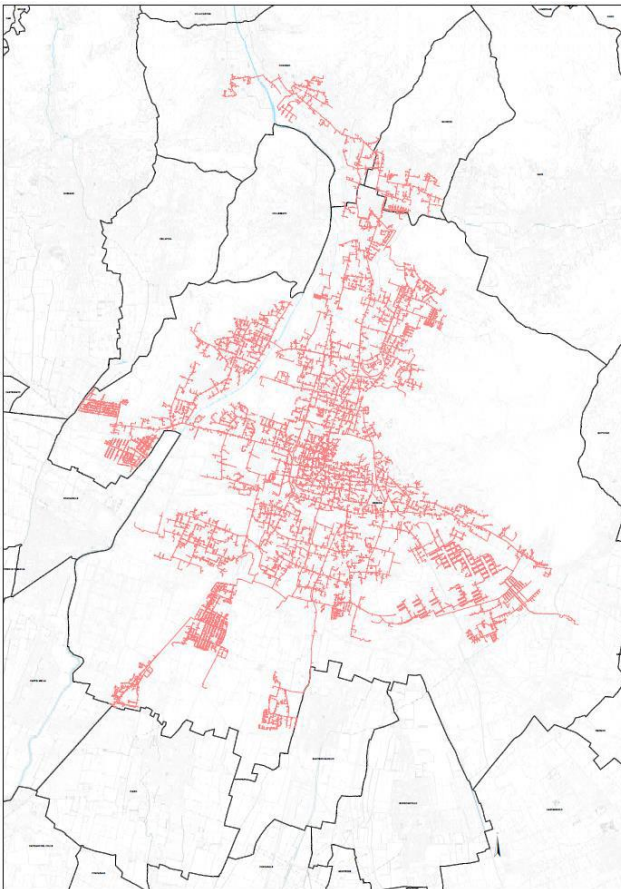
- Owner and operator: A2A Calore e Servizi
- Started operating in 1972
- Today is the largest DH system in Italy:
  - ~**1.1 TWh/a**, peak 670 MW
  - ~70% of town demand
  - Trench length: 380 km
  - Heat density: ~2.9 kWh/(m·a)



Heat by source (2017)



# DH SYSTEM IN BRESCIA DISTRIBUTION NETWORK



- >21,000 customers
- Supply temperature: up to **130 °C** in winter, **80÷90 °C** in summer
- Return temperature: ~ 60 °C
- **Annual heat losses: ~ 17.5%**

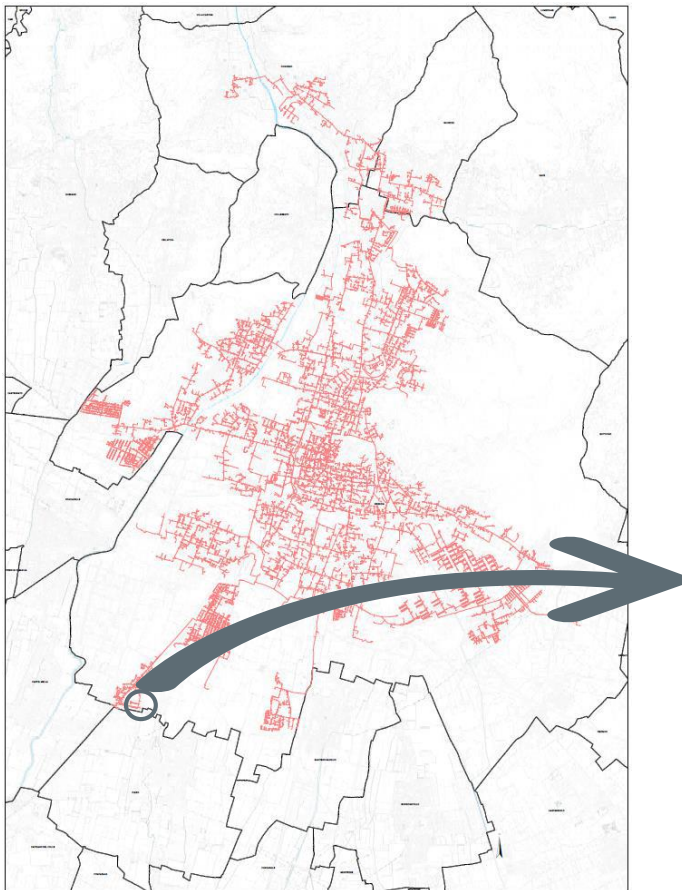




High interest in temperature reduction,  
at least in low-density branches

- **Bottlenecks on the building side:** heat demand, heating system, CTRL, connection size, customer behavior



# TEMPERATURE LOWERING DEMO SITE

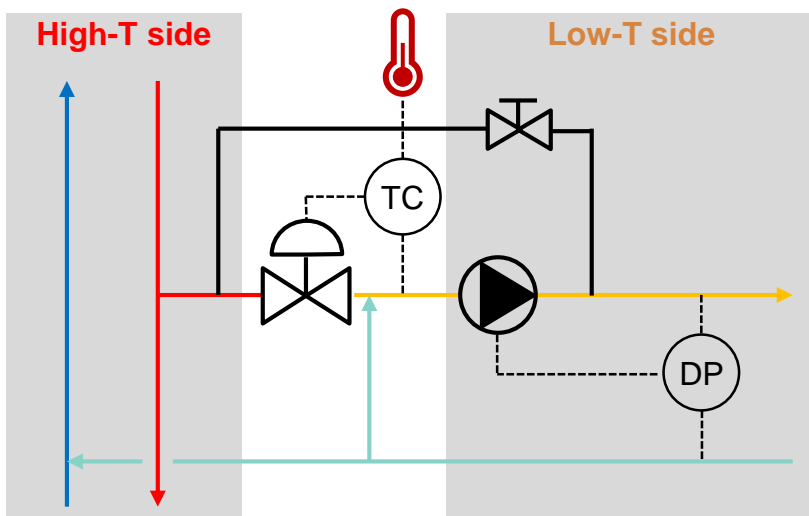


- 35 customers: 
  - 1 large MFH (43 flats)
  - 34 SHF
- Overall contract capacity ~700 kW
- Dismissed gas boilers 





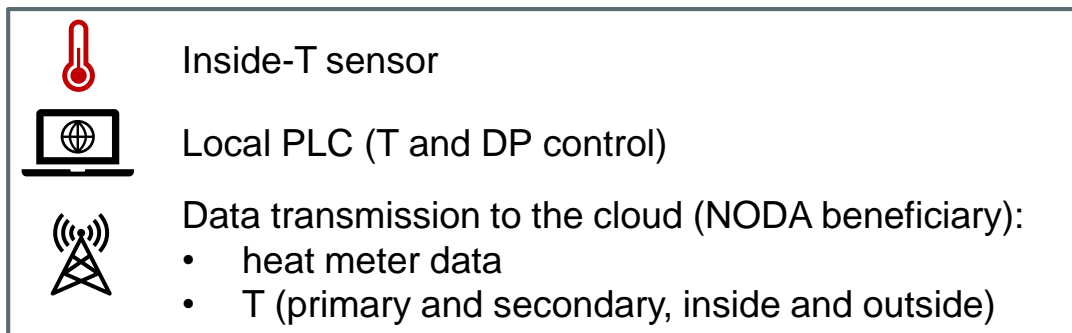
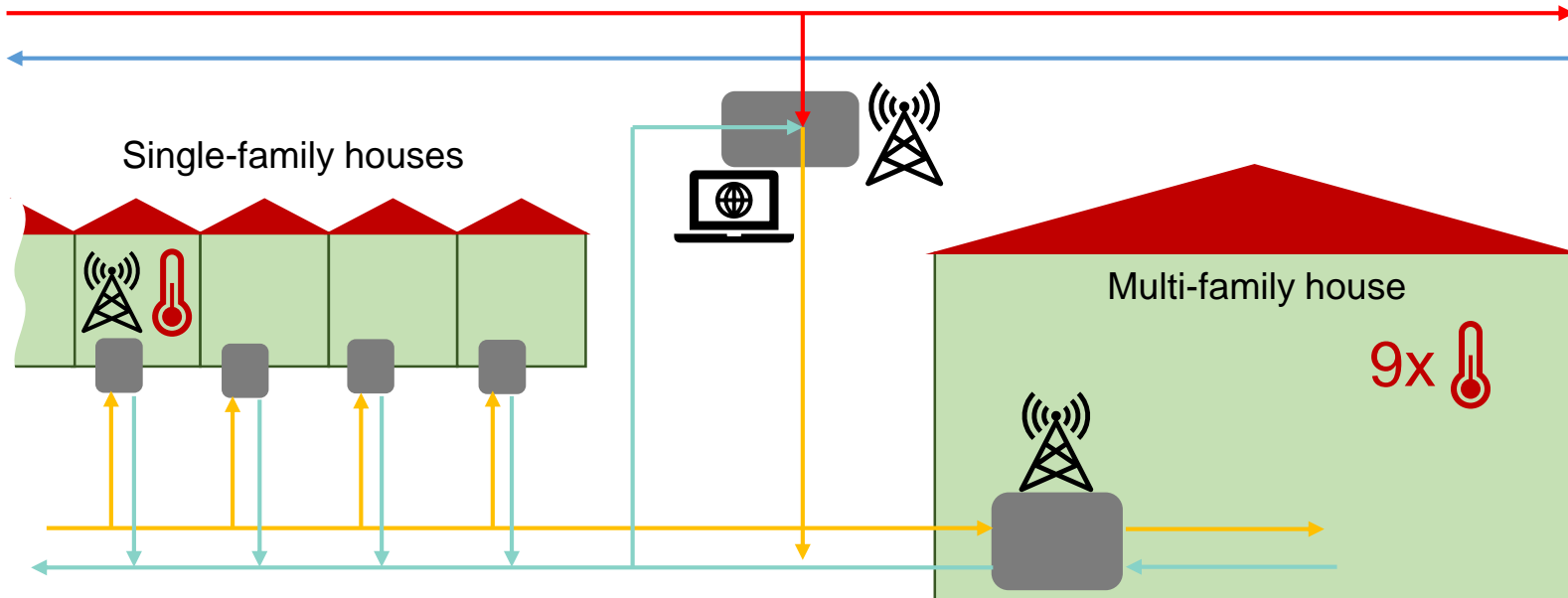
# TEMPERATURE LOWERING MIXING STATION



- New trench (low-T side)
- Lamination valve to enable mixing:
  - CTRL according to ambient T
- Feed pump with inverter:
  - CTRL by pressure drop
- Bypass (in case of any failure)

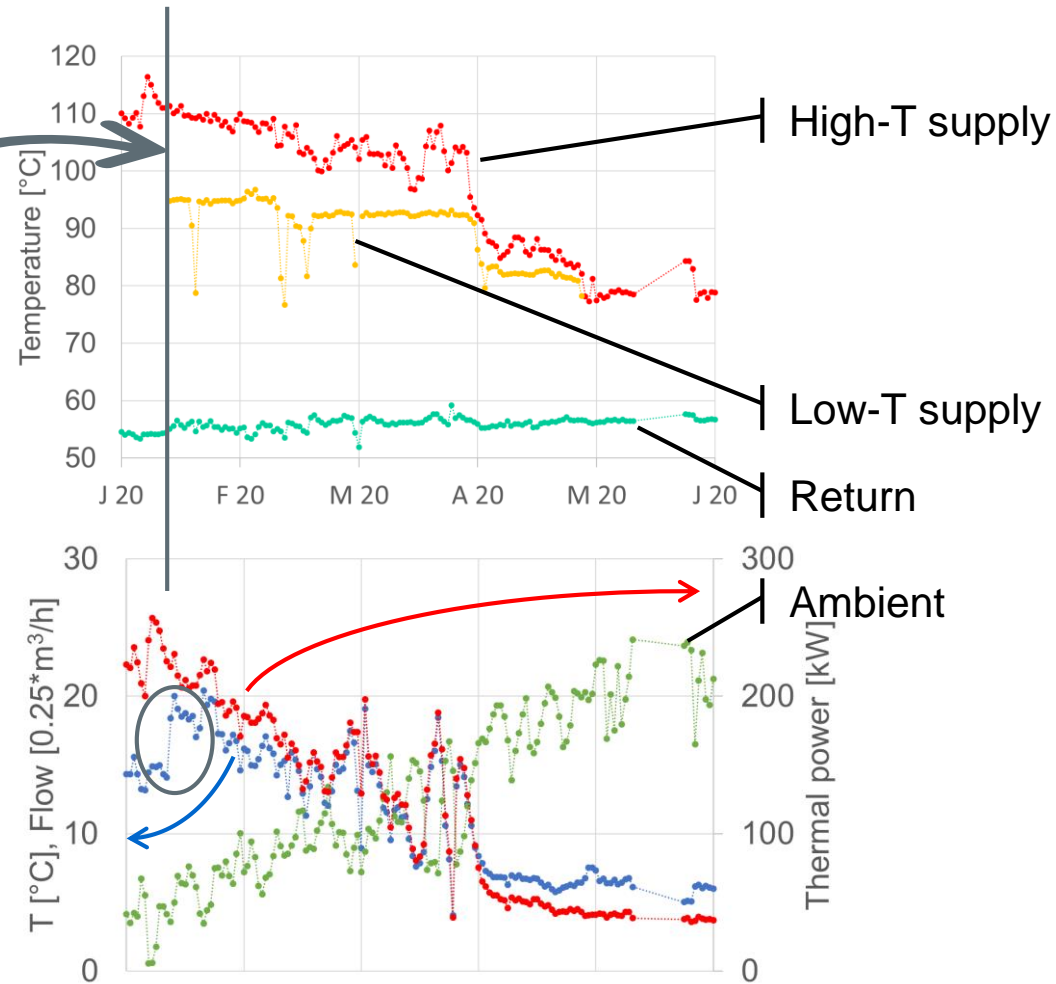


# TEMPERATURE LOWERING MONITORING EQUIPMENT



# TEMPERATURE LOWERING RESULTS

T reduction started  
(January 14<sup>th</sup>, 2020)





# OBSERVATIONS

- Technical feasibility of lowering the supply temperature by 15 °C
- Increased flow and slight increase of return temperature as result of substation control
- Opportunity for site requalification
- Success of customer engagement for the acceptance of lower supply T and for the sensor installation in the buildings (incl. letters, flyers, and public assembly with local authorities)



# PROJECT TEMPO

- **Objectives:** demonstrate the applicability of low temperature district heating through different solution packages including:
  - Technological innovations on the network and building side
  - Consumer empowerment enabled by digital solutions
  - Innovative business models for EU replication.
- **Duration:** October 2017 – September 2021
- **Funding frame:** EU H2020 EE-04-2016-2017: New heating and cooling solutions using low grade sources of thermal energy, GA 768936
- **Web-site:** [www.tempo-dhc.eu](http://www.tempo-dhc.eu)



## NEXT ACTIVITIES

- **Additional T reduction, including also the return line:**
  - Through smart control and optimization of the building installations
- **Monitoring over a longer period** to evaluate:
  - Technical and economical KPIs
  - Costs and benefits for stakeholders
  - Potential for replicability and scale-up
- **Outlook beyond TEMPO scope:**
  - Extend the low-T area
  - Integration of **new low-temperature, low/no-carbon sources?**





# THANK YOU!

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