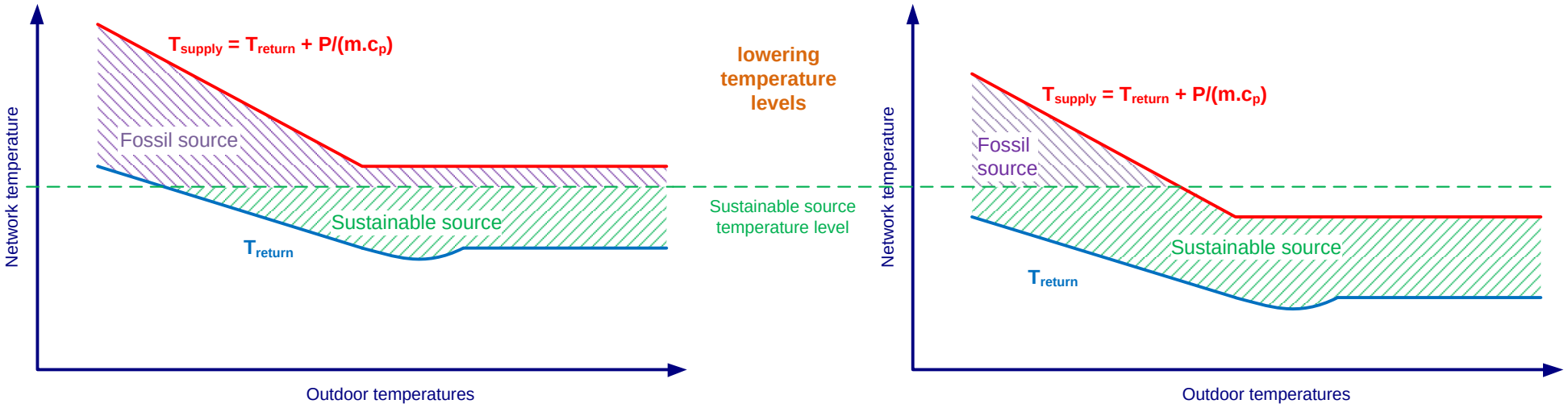
This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 768936.

TEMPO - Results of the first temperature reduction measures in the demo sites

Dirk Vanhoudt – EnergyVille/VITO

Sustainable Places 2020, 28 October 2020, Digital Event

Lower network temperatures



Project Partners

Participant No	Participant organisation name	Participant short name	Country
1 (coordinator)	Vlaamse instelling voor technologisch onderzoek	VITO	Belgium
2	NODAIS AB	NODA	Sweden
3	AIT Austrian Institute of technology GmbH	AIT	Austria
4	Thermaflex International Holding bv	THF	The Netherlands
5	Steinbeis innovation GGMBH	Solites	Germany
6	Vattenfall Europe Wärme AG	Vattenfall	Germany
7	ENERPIPE GmbH	Enerpipe	Germany
8	A2A Calore & Servizi SLR	A2A	Italy
9	Hogskolan |Halmstad	HU	Sweden
10	Euroheat & Power	EHP	Belgium

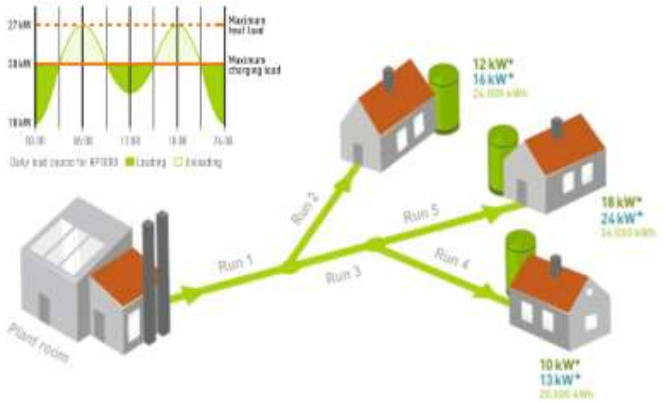
Technological innovations

1. A supervision ICT platform for detection and diagnosis of faults in DH substations
2. Visualisation tools for expert and non-expert users
3. Smart DH network controller to balance supply and demand and minimise return temperature
4. Innovative piping system
5. Optimisation of the building installation
6. Decentralised buffers at the consumer side

Demonstrator 1: new built LT network in rural area

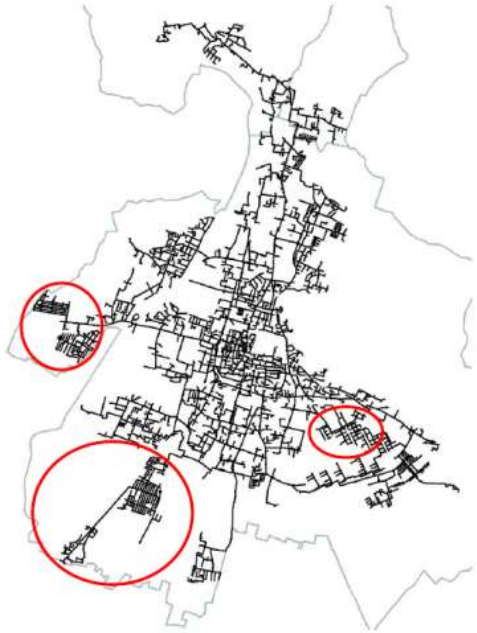
- Operated by Enerpipe
- Windsbach, Germany

- New developing area for 100 homes, energy supply by DH network
- In phase 1: 50 houses are connected, phase 2: the remaining 50 houses
- TEMPO innovations:
  - Supervision ICT platform
  - Visualisation tools
  - Smart DHC controller
  - Decentralised buffers
  - Optimisation of building installation



Demonstrator 2: existing HT network

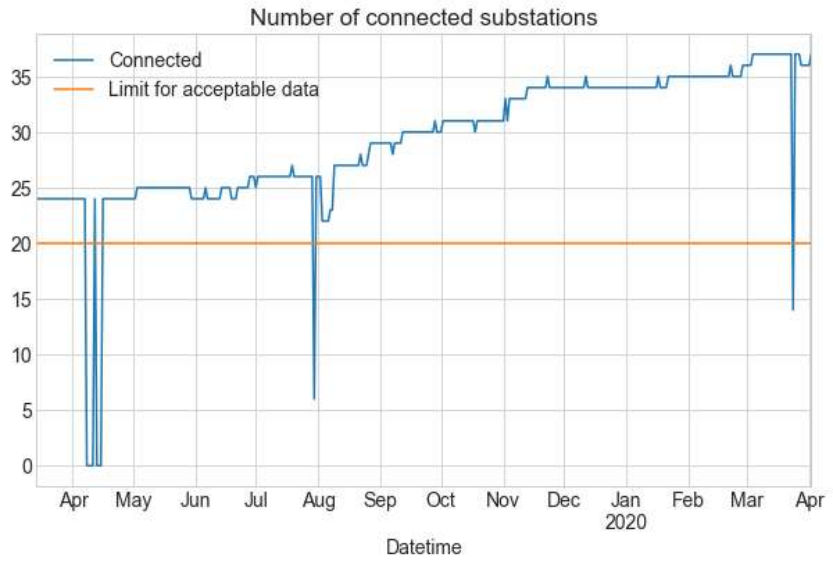
- Operated by A2A
- Brescia, Italy



- Is it possible to decrease network temperatures in low heat density area's, through the TEMPO innovations?
- Main constraints: existing buildings, existing radiators/substations, small diameter house connection
- TEMPO innovations:
  - Supervision ICT platform
  - Visualisation tools
  - Smart DHC controller
  - Optimisation of building installation

Status of the Enerpipe demo

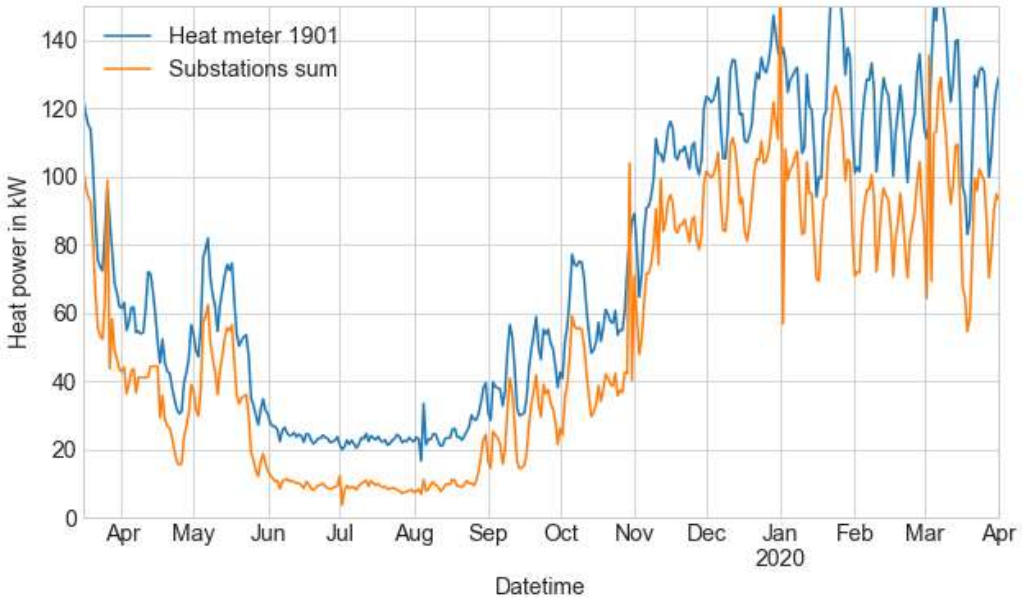
- Steady increase of the number of connections

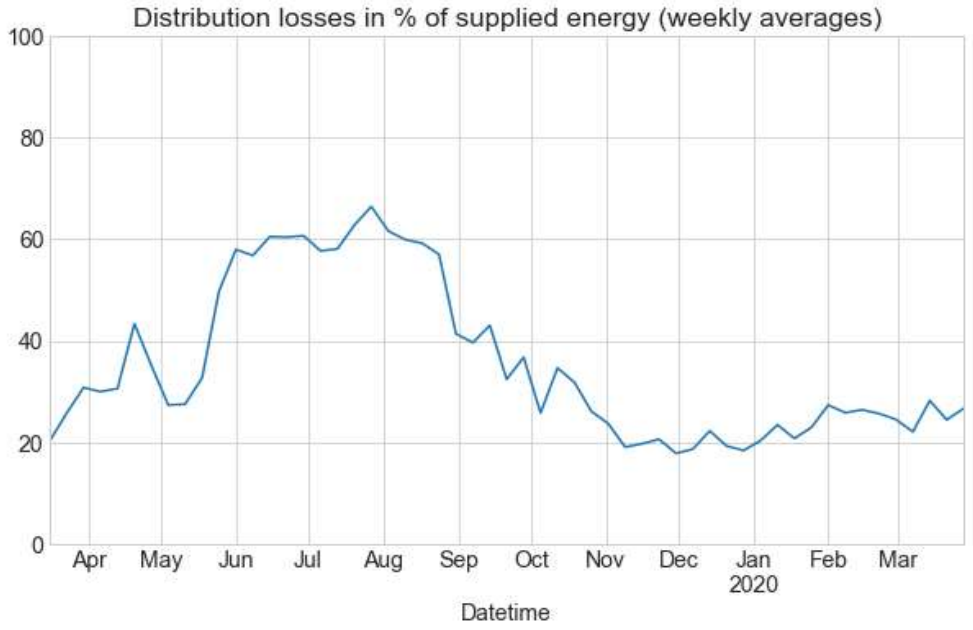


- Installation of redesigned decentralized buffers

Status of the Enerpipe demo

- Achieved temperature levels of 75/45˚C





Preliminary results of the Enerpipe demo

- Only one heating season, no physical reference
- Heat losses can be evaluated, based on simulation and measurements:
  - Ref case: substation + hot water storage
  - TEMPO case

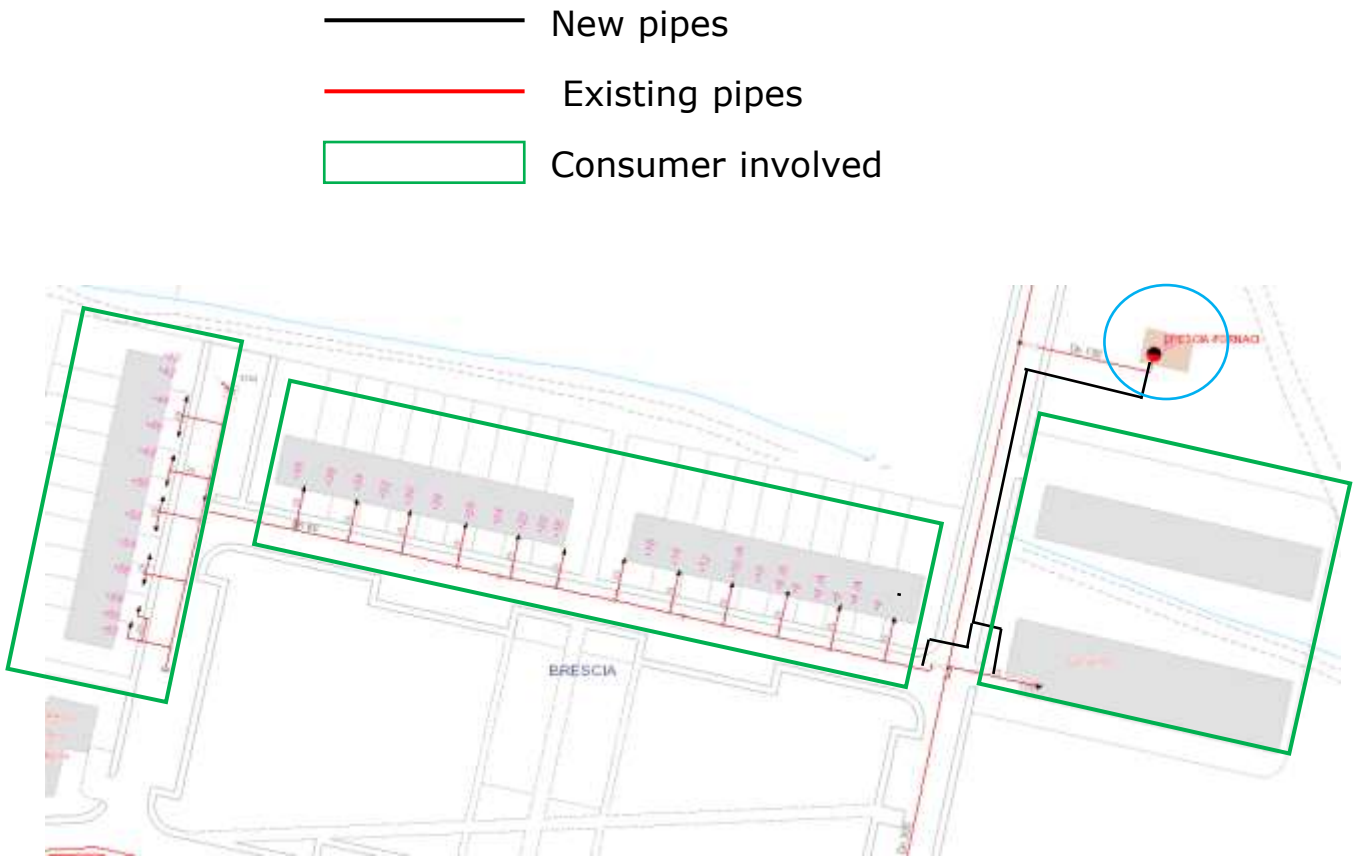
	Concept	Distribution losses	
		Power in kW	Yearly energy in MWh/a
Calculation	Decentralised buffer	27.2	238.3
	Substation + hot water storage	29.3	256.9
Measurements	Decentralised buffer	20.7	193.4

Preliminary results of the Enerpipe demo

- Conclusion:
  - TEMPO concept 7.2% less distribution losses than reference
  - 5% savings in investment costs
  - Monitored losses significantly lower than the calculated heat losses (19%)
    - But: not yet fully operational
  - But distribution losses still rather high (~30%)
    - Necessity of lower temperature levels

Status of the A2A network

Demo site: 1 MFH (with 43 flats) + 34 SFH



Status of the A2A network

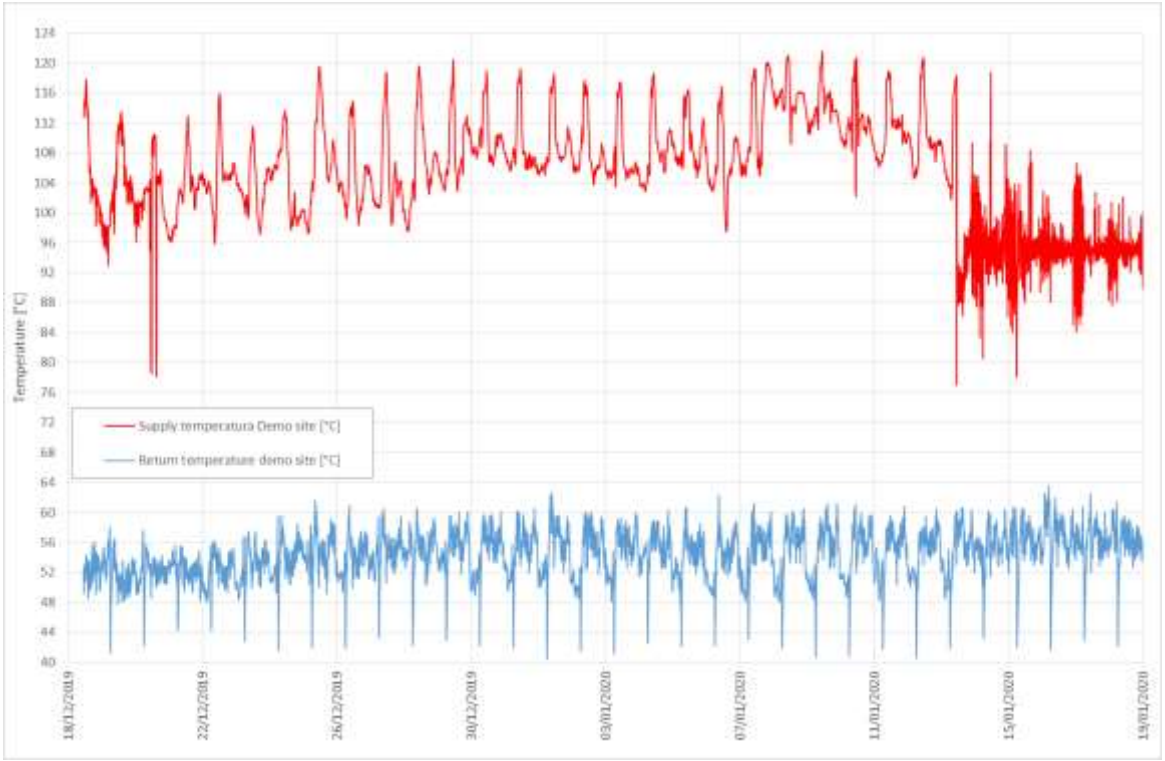
- Installation of a mixing station, mixing fresh supply water with return water

- Original heating curve
  - $T_{outside}$: 0°C → T_{supply}: 115°C
  - $T_{outside}$: 15°C → T_{supply}: 100°C

- Stepwise reduction of the supply temperature

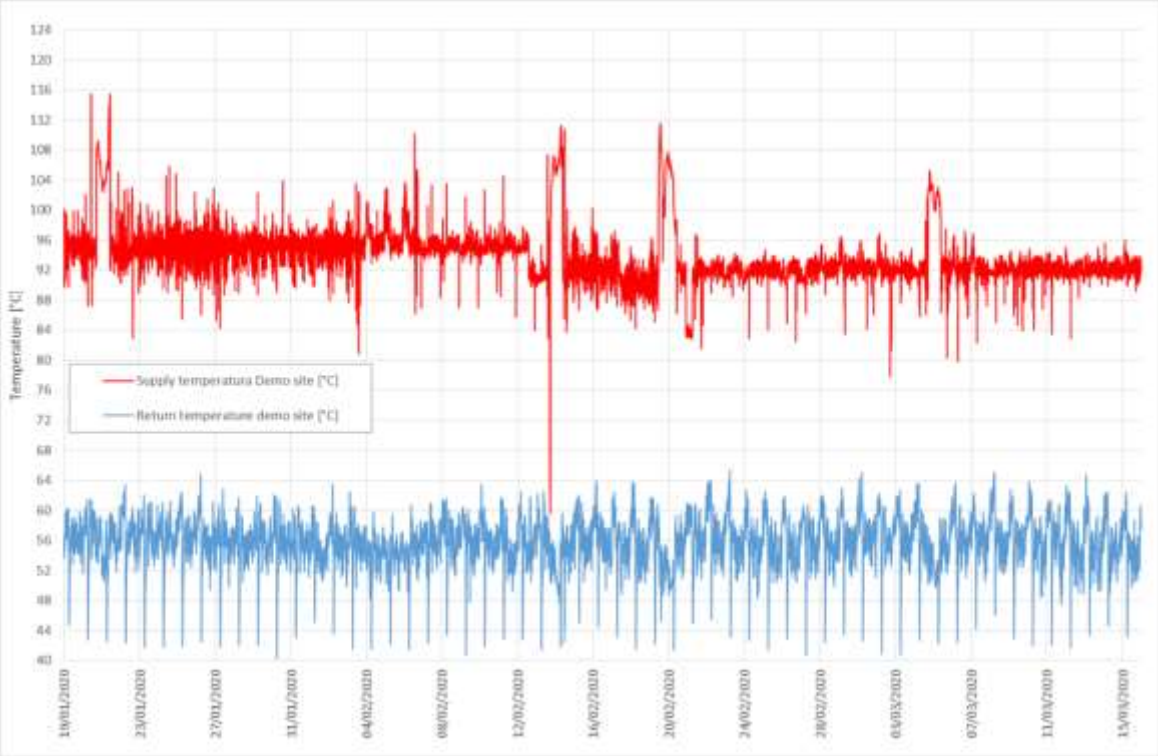
Preliminary results of the A2A network

- Step 1: Temperature reduction 110˚C → 95˚C



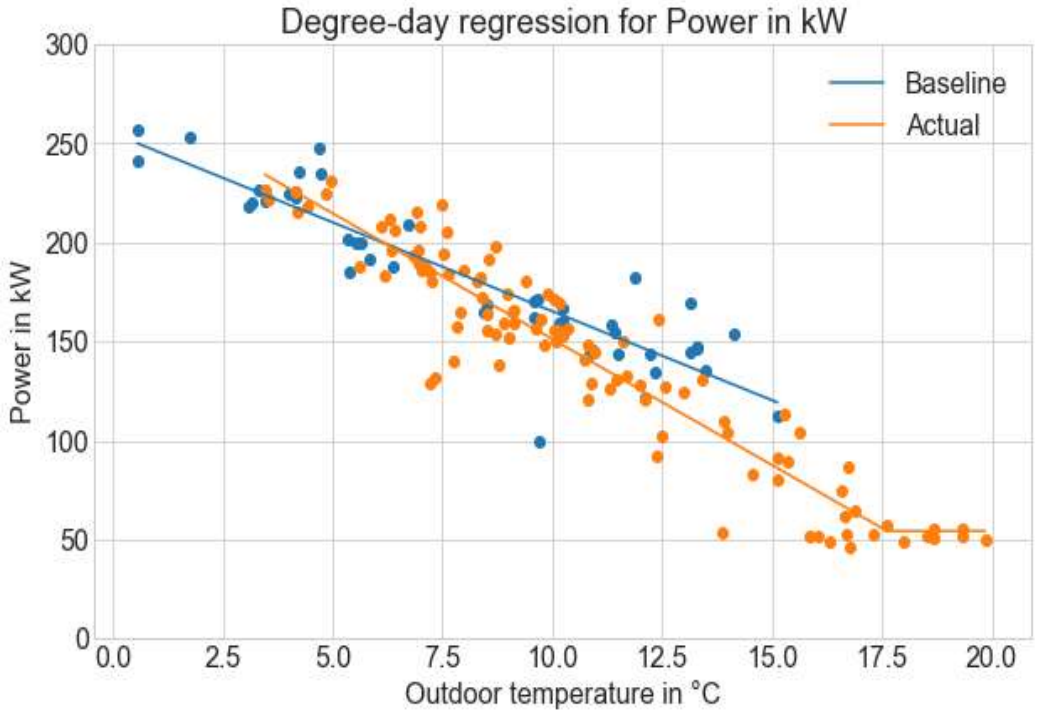
Preliminary results of the A2A network

- Step 2: Temperature reduction 95˚C → 92˚C



Preliminary results of the A2A network

- Thermal energy consumed by the network

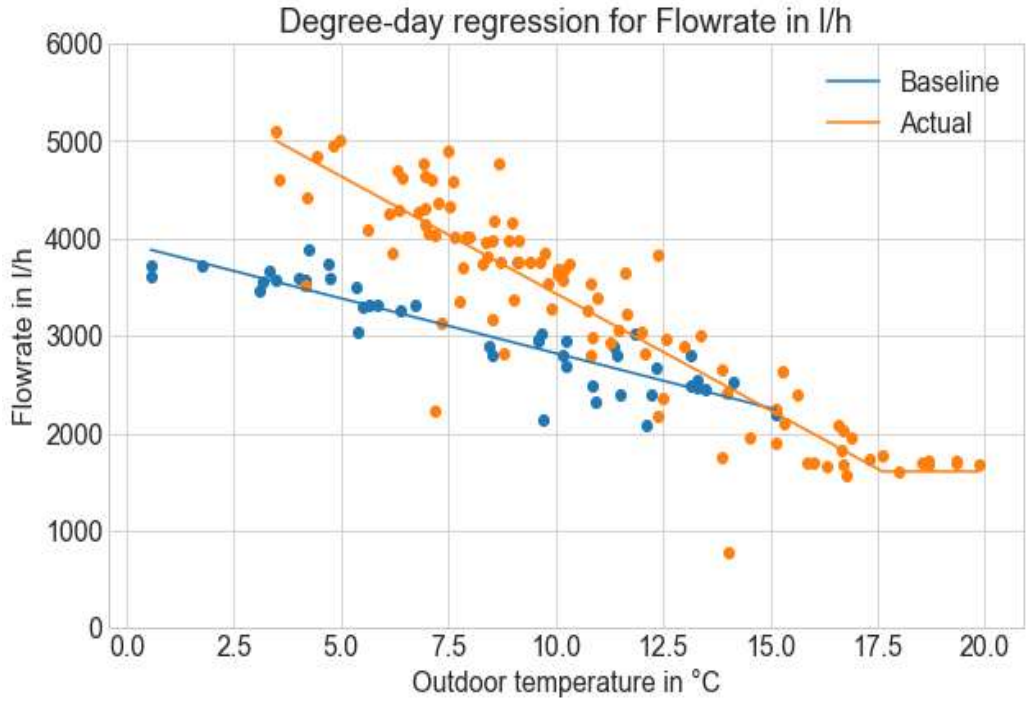


Preliminary results suggest less network power consumption, most likely due to reduction in distribution heat losses.

Disclaimer: limited amount of test data

Preliminary results of the A2A network

- Flowrate in the network



Higher flowrate because of smaller dT

Preliminary results of the A2A network

- Primary energy consumption

	Recalculated actual period		Recalculated year	
Baseline	122.0	MWh	392.5	MWh/a
Actual	109.3	MWh	330.8	MWh/a
Relative (actual to baseline) difference	-10.4%		-15.7%	

Preliminary results of the A2A demo

- Conclusion:
  - Supply temperature reduction led to a lower energy demand demand of the network, translated into a lower significant reduction in primary energy demand (15.7% on annual basis)
  - Slight increase the return temperature
  - Increase in flowrate due to smaller dT

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TEMPO

Questions?

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