4th International Conference on Smart Energy Systems and 4th Generation District Heating
Aalborg, 13-14 November 2018

Reducing peak flow by use of plate heat exchangers for hot water preparation

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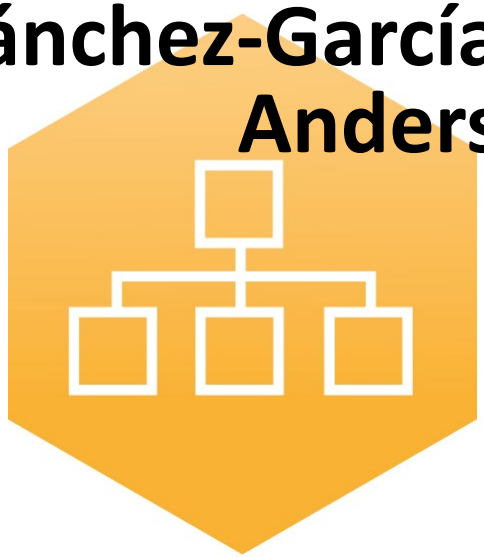

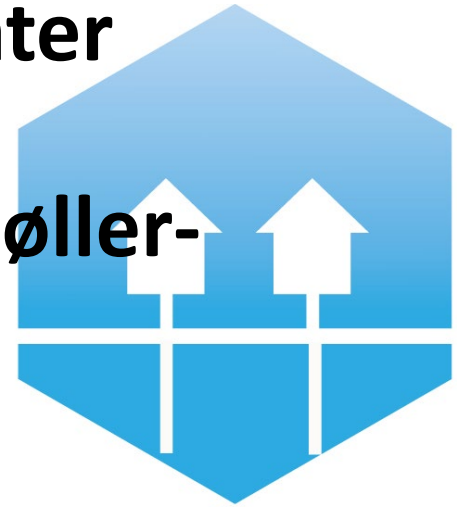

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Content

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- **Discussion with operator**
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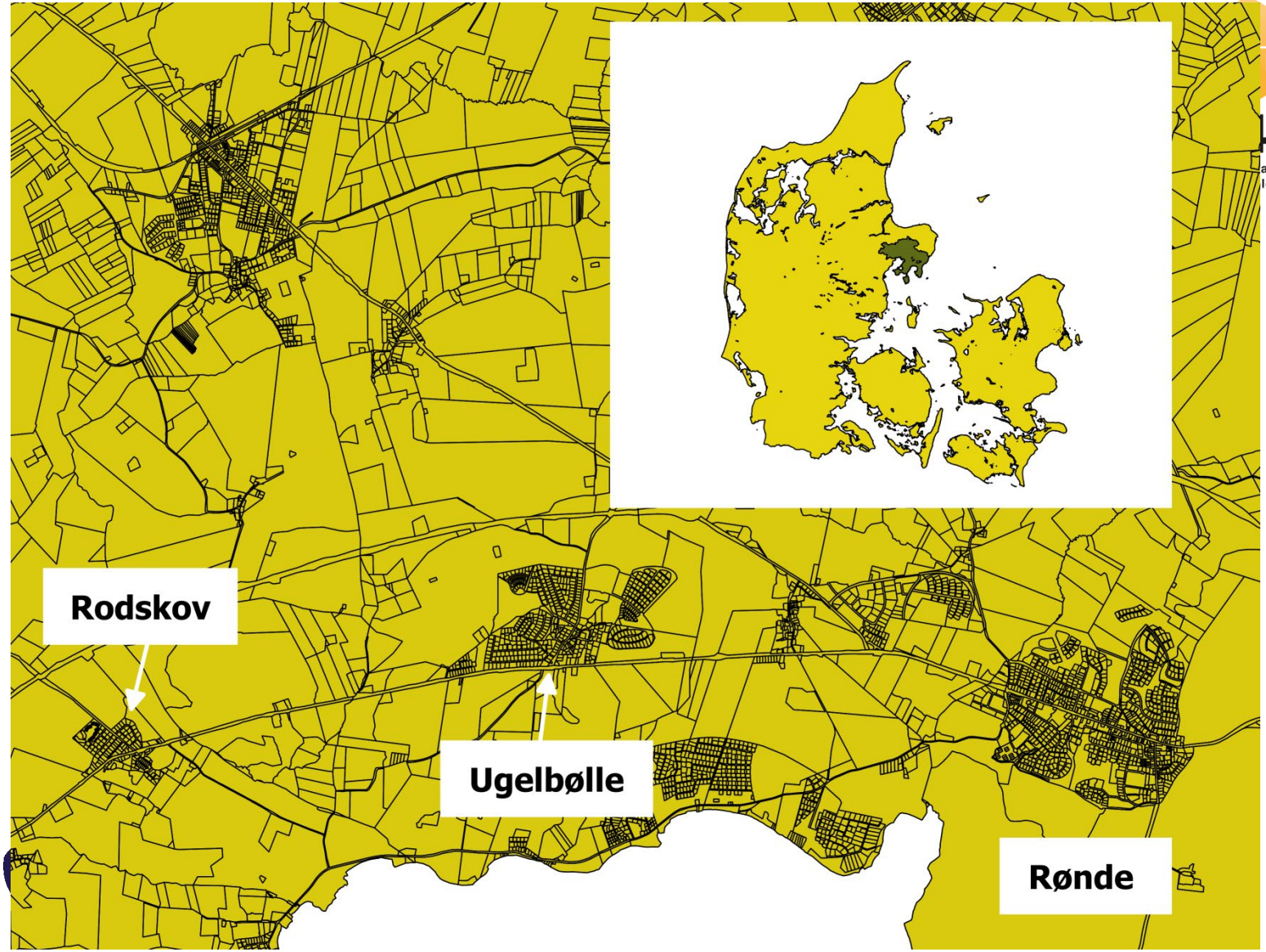
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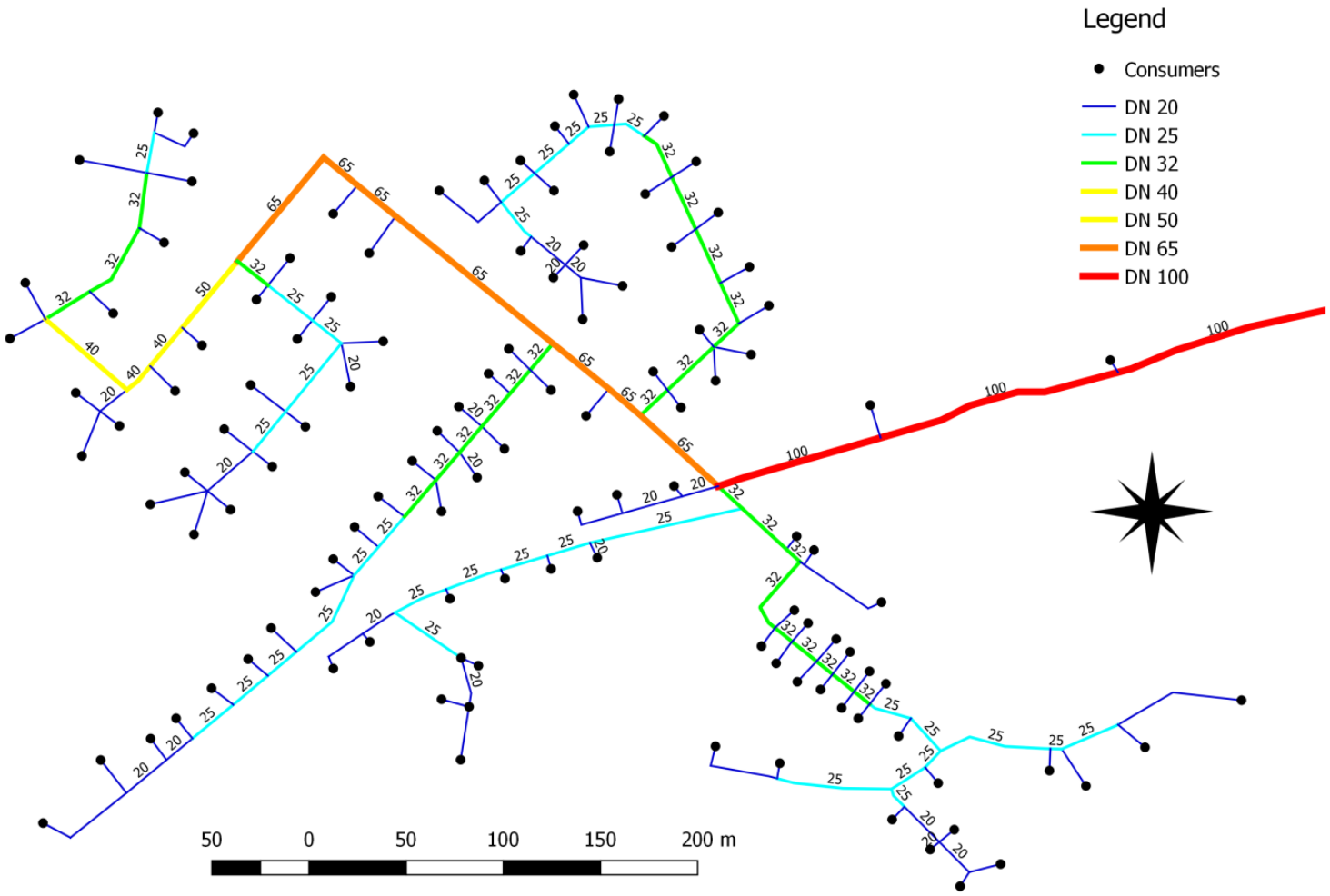

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Discussion with operator regarding DHW production

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District Heating Operator→ Preference for Water Tanks

- **Lower flows in service pipes which allow smaller diameters (DN 16 instead of DN 20-25)**
- **Lower peak flows in the system**
- **Lower heat losses in service pipes, which account for the majority of heat losses**
- **Lower investment overall**

Discussion with operator regarding DHW production

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Research in 4GDH→ Instantaneous production by means of plate heat exchangers

- **They can function with very low supply temperatures (50-55°C)**
- **Very low return temperatures (10-20°C)**
- **No risk of legionella**

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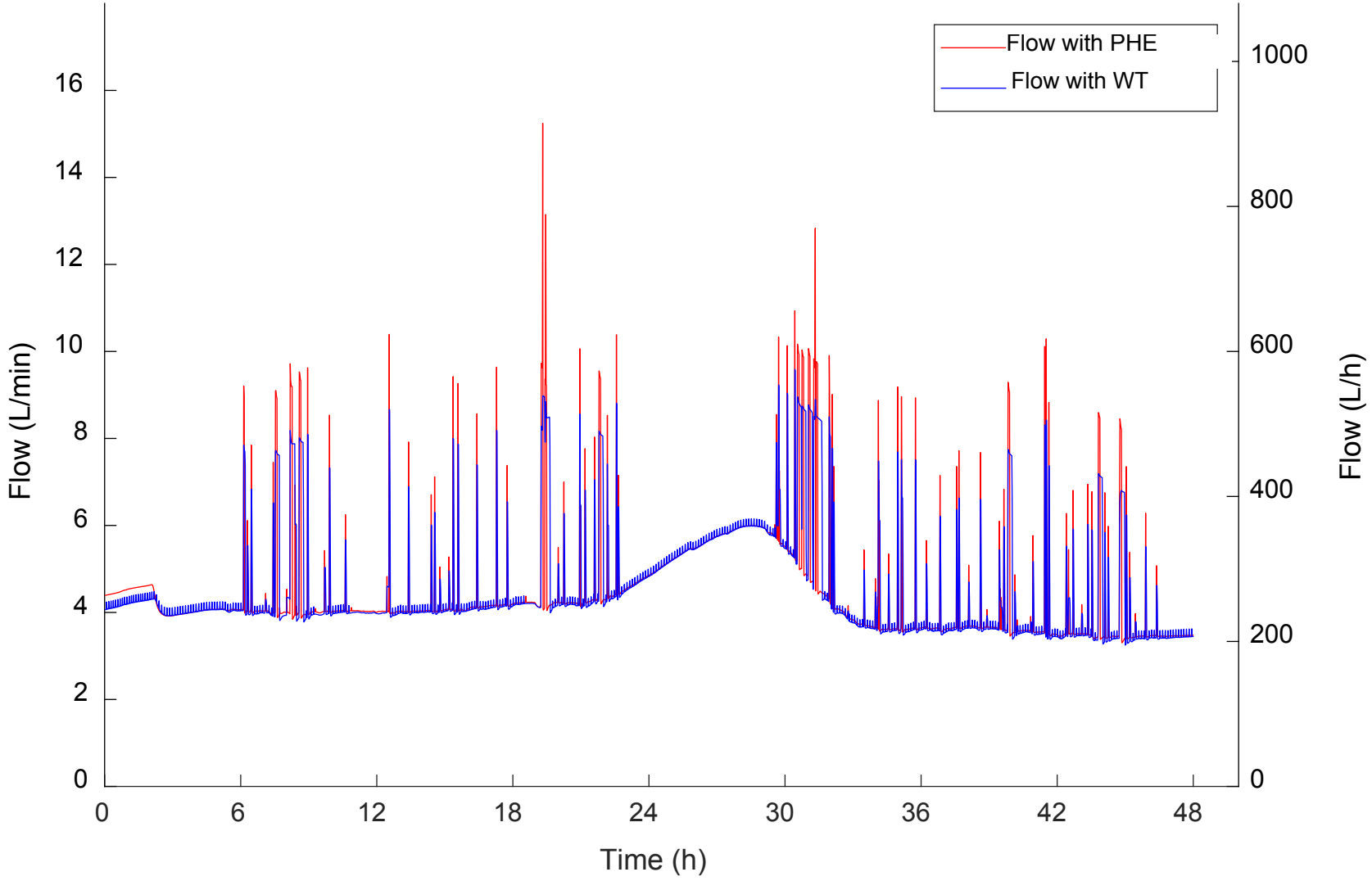
Research question

What are the effects of both DHW solutions in a 3rd Generation network in terms of flow and temperatures?

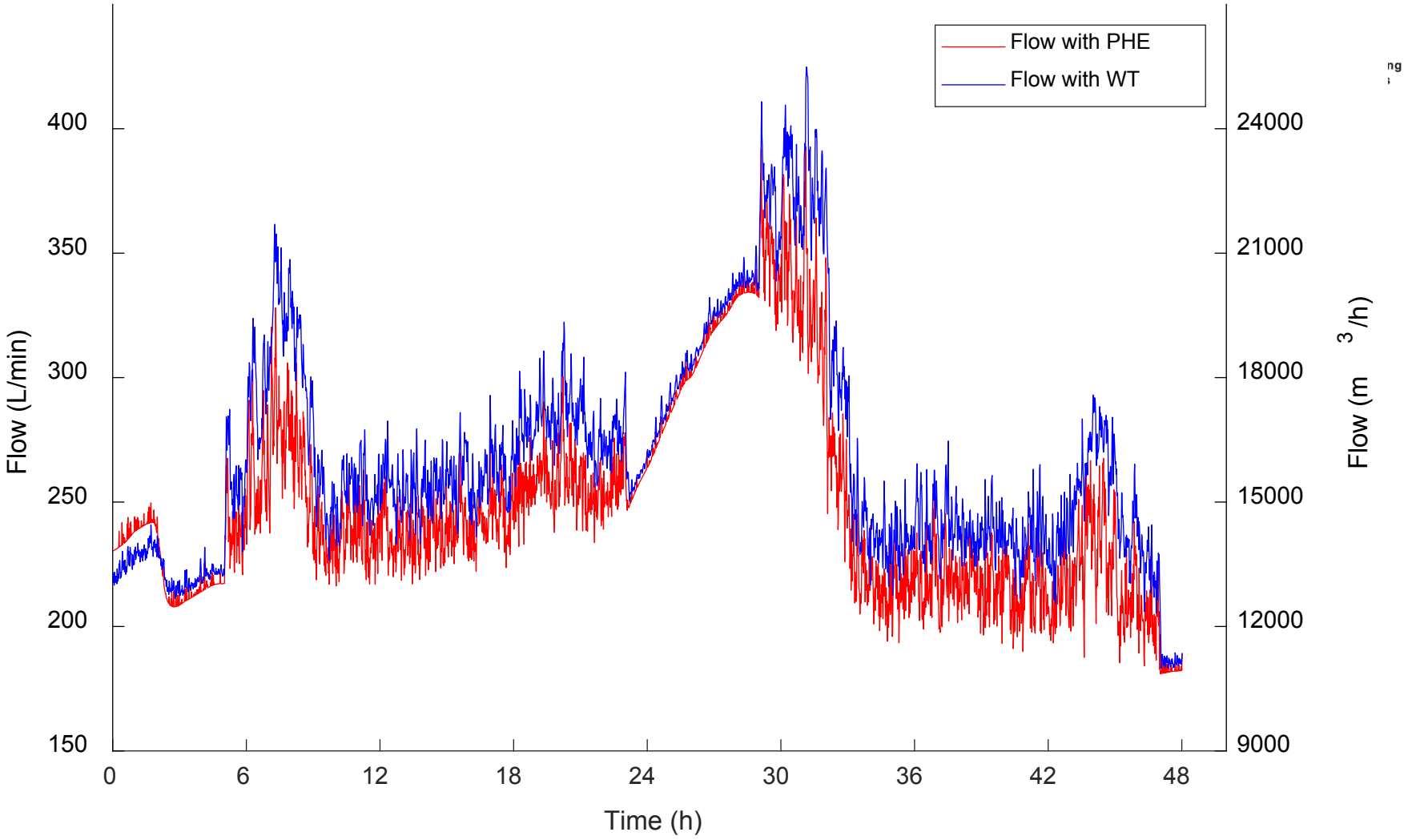
Methodology

- **Demand of DHW based on stochastic approach**
- **Realistic model of a plate heat exchanger but simplified (no valves)**
- **Simplified model of a hot water tank**
- **Gradient algorithm (Todini) for hydraulic network**
- **Benonysson's node method for thermal model with heat losses by van der Heijde et al.**

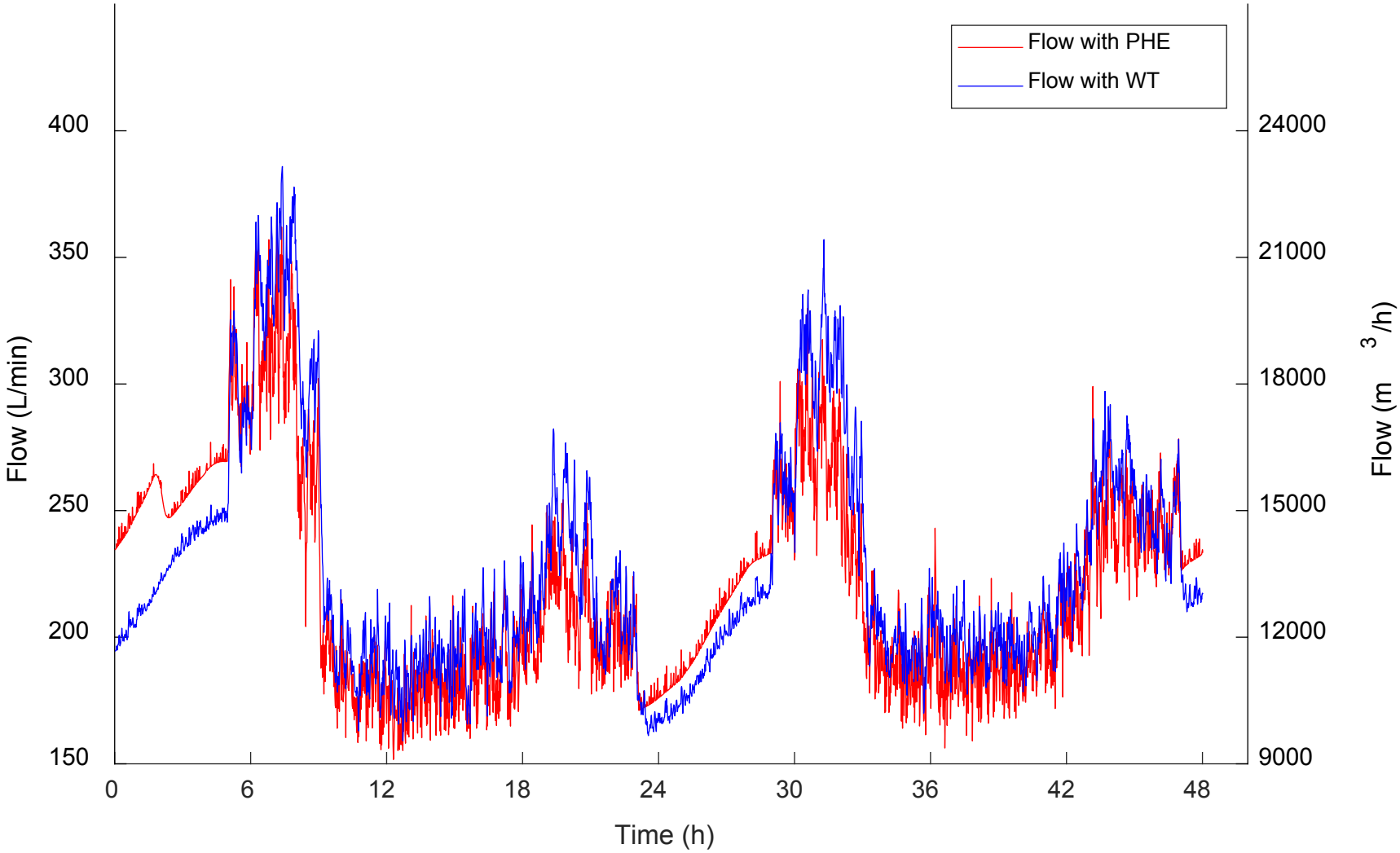
Flow in service pipe during the coldest day



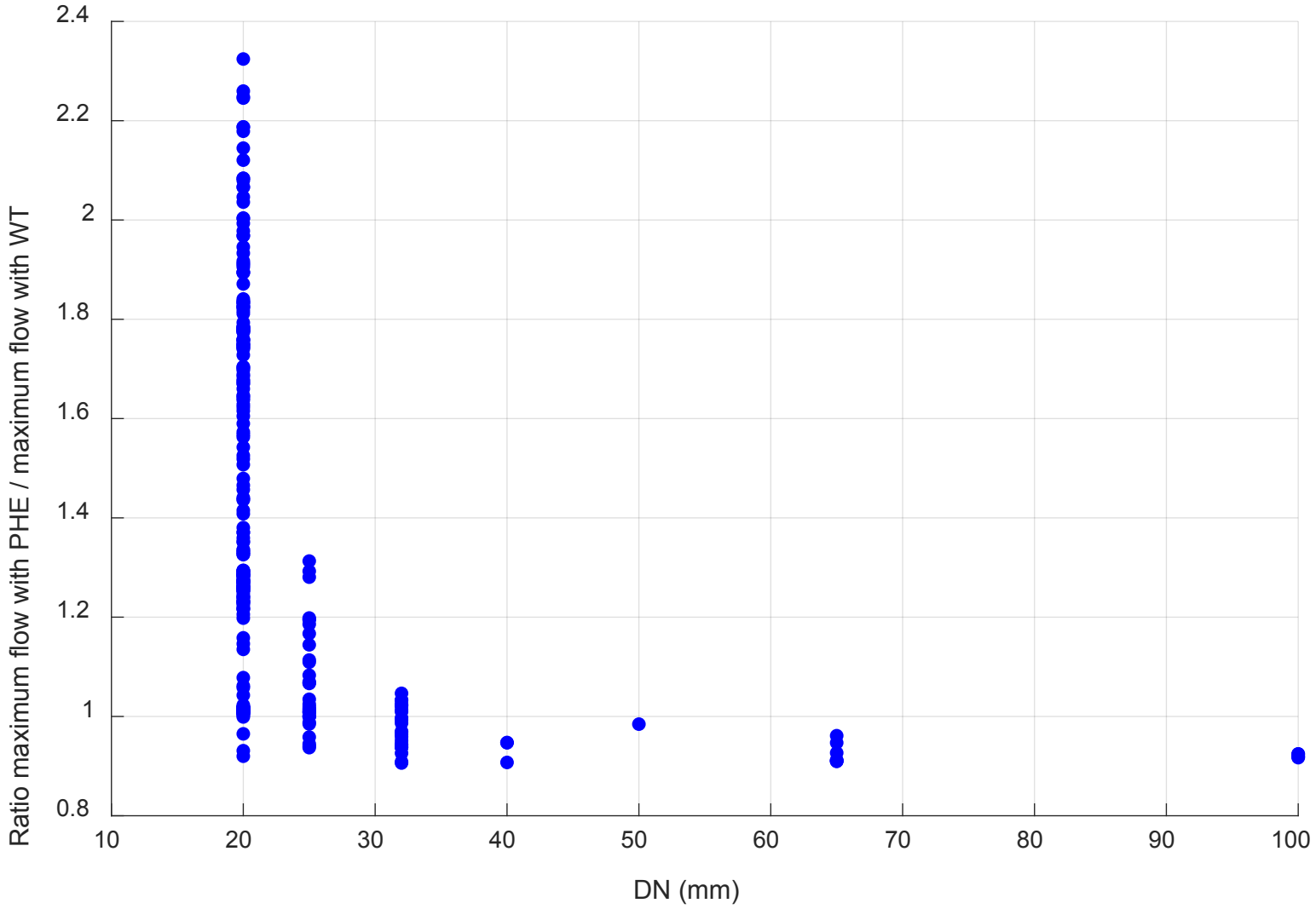
Flow in transmission pipe during the coldest days



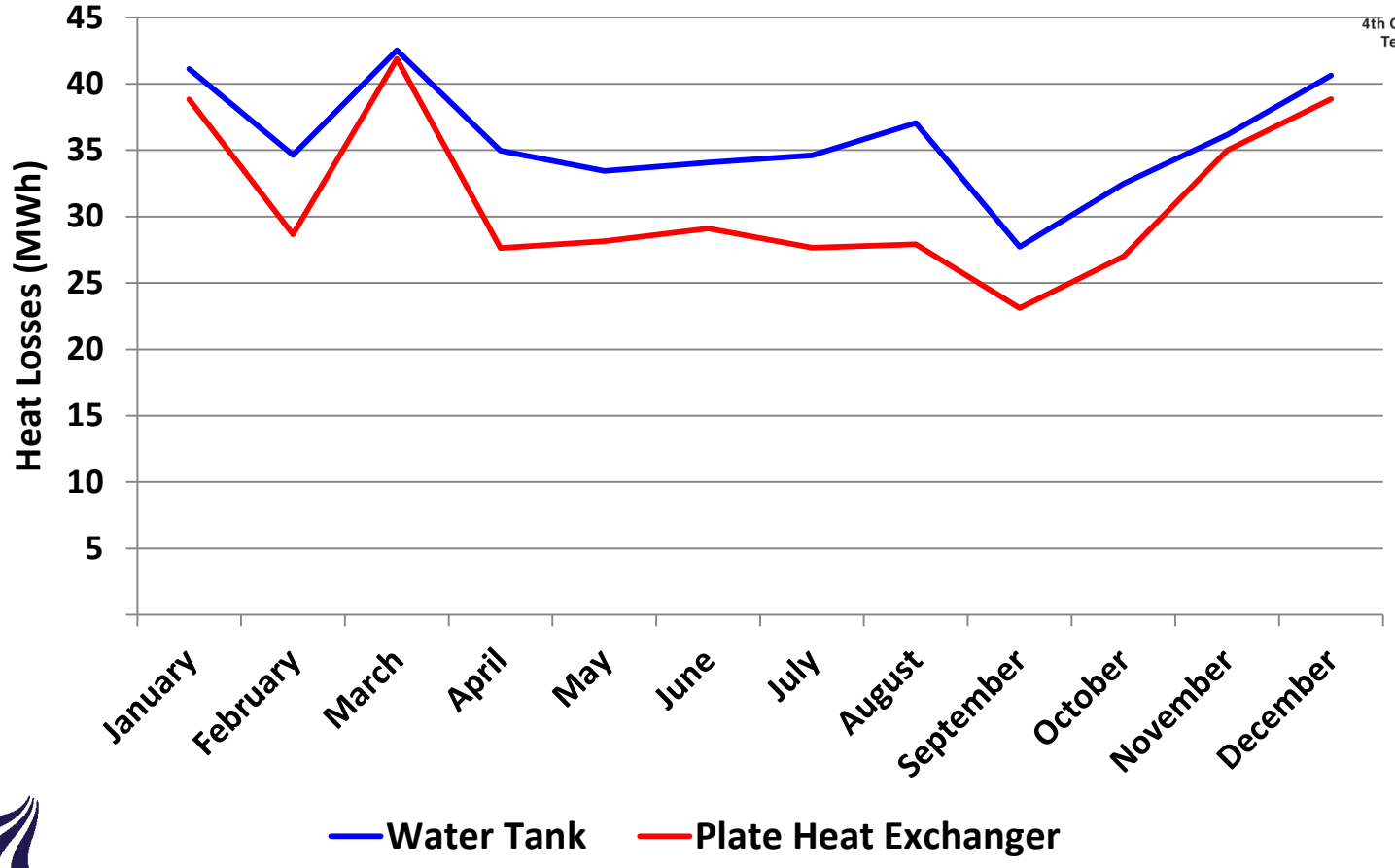
Flow in transmission pipe in March



Flow comparison between WT and PHE



Heat losses in network



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Conclusions

- **Water tanks lead to higher peak flows in transmission and distribution network**
- **Water tanks give similar/higher investment costs despite smaller service pipes**
- **Plate heat exchangers render lower heat losses and increase efficiency in production.**
- **Plate heat exchangers pave the way for the 4th Generation**