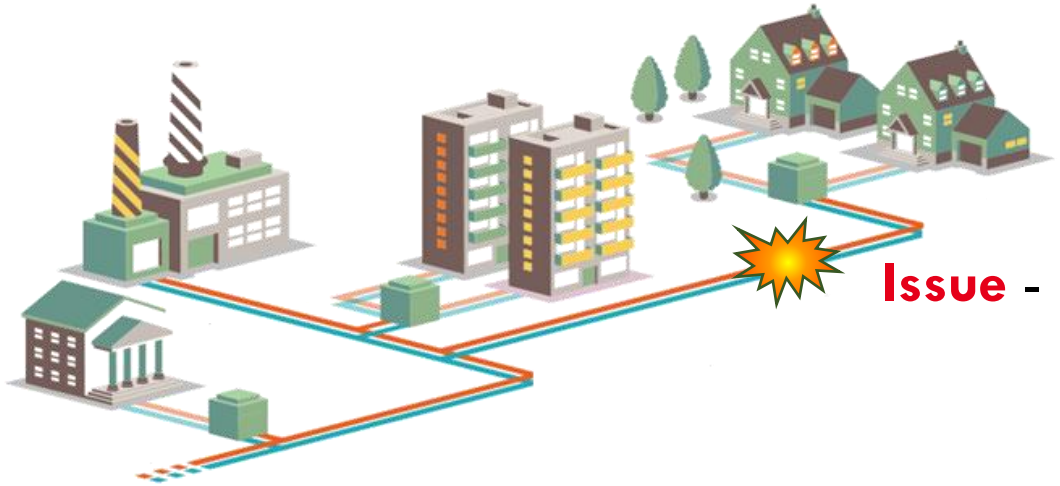
A MINLP OPTIMISATION METHOD TO SOLVE HYDRAULIC BOTTLENECKS ON EXISTING DISTRICT HEATING NETWORKS

Lemelle et al.

Goal - Reduce the supply temperature of district heating networks

↘ *Losses & heat produced*

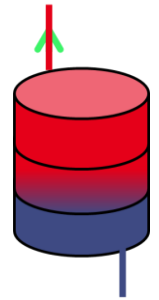
↗ *renewable & waste heat*



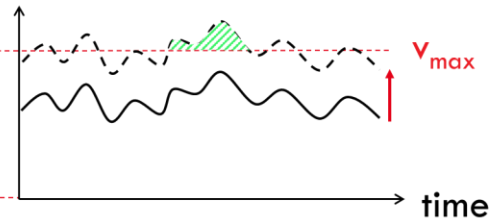
Source : ADEME

Issue - Hydraulic bottlenecks in pipes

Add distributed storage



Replace critical pipes



-- Low T_{prod}

– High T_{prod}

Question - Replace pipes or add storages ?

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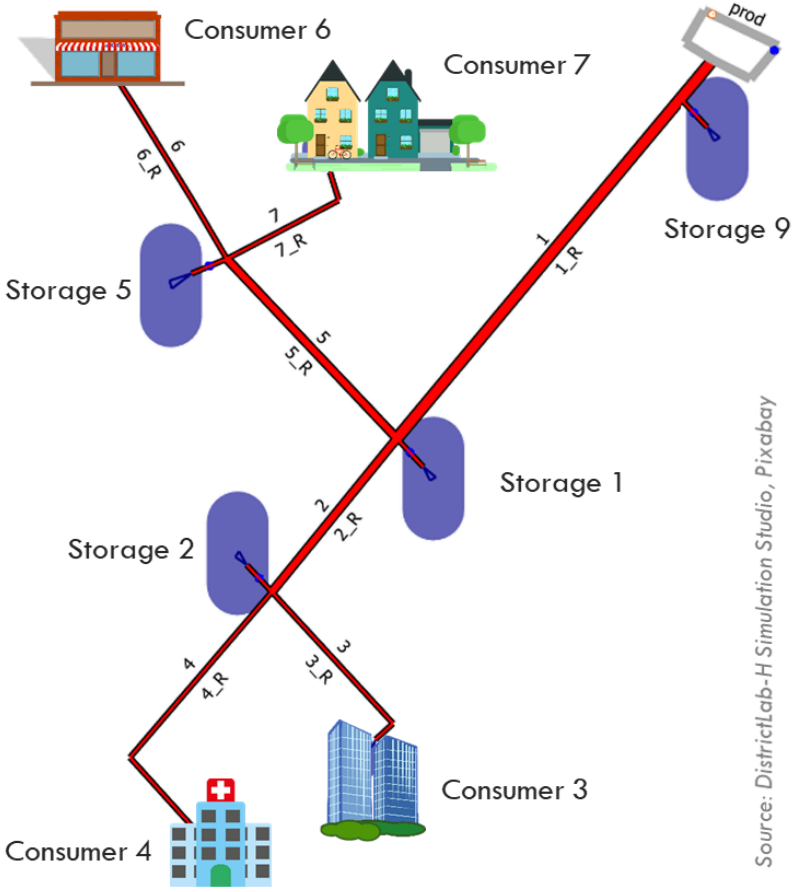
MINLP optimization

Objective : min(total costs)



Source: DistrictLab-H Simulation Studio, Pixabay

① *Formulation*

Binary variables

- $X(t)$ storage charge/discharge
- Y storage locations
- Z pipe diameters

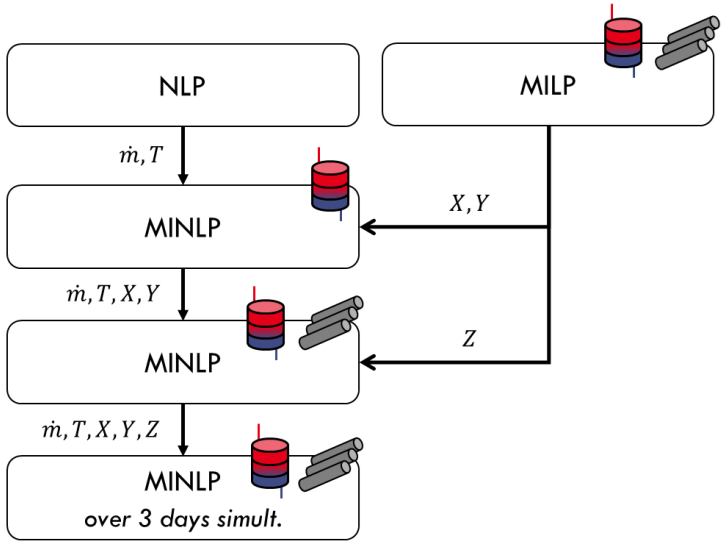
Continuous variables

- T pipe temperatures
- $\dot{m}$ pipe mass flow rates

...

② *Annual demand -> 3 representative days*

③ *Initialization strategy*



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Results