

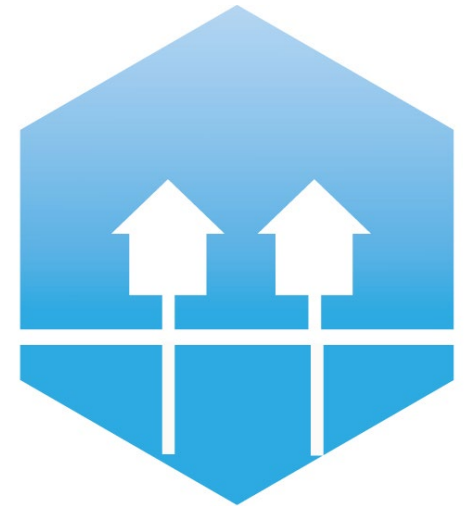
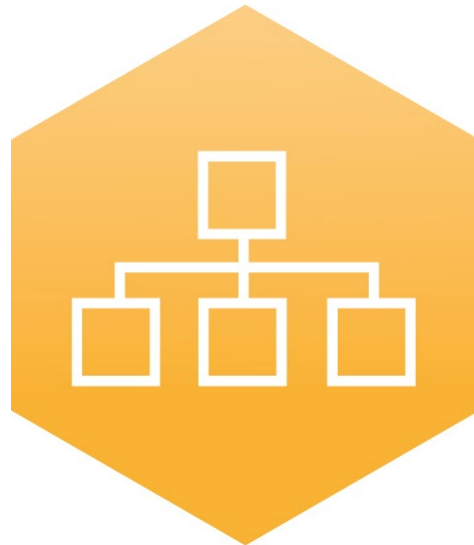
4th International Conference on Smart Energy Systems and 4th Generation District Heating
Aalborg, 13-14 November 2018



LUND
UNIVERSITY

Methodology for addressing bottleneck problems in district heating networks

Lisa Brange, Marcus Thern, Kerstin Sernhed



AALBORG UNIVERSITY
DENMARK

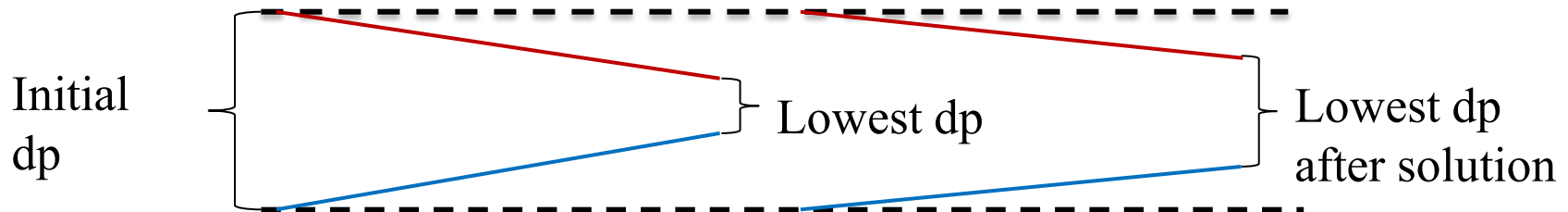
4th International Conference on Smart Energy
Systems and 4th Generation District Heating 2018
#SES4DH2018

4DH

**4th Generation District Heating
Technologies and Systems**

What is a bottleneck?

- **Bottlenecks – differential pressure (dp)**
- **Optimization**



Aim



- **Develop a methodology on how to choose the best bottleneck solution**
- **Discuss advantages and disadvantages of different bottleneck solutions**



Why a bottleneck methodology?



- **Previous studies**
 - Not all parameters included
 - Not all solutions included
- **More effective district heating networks**



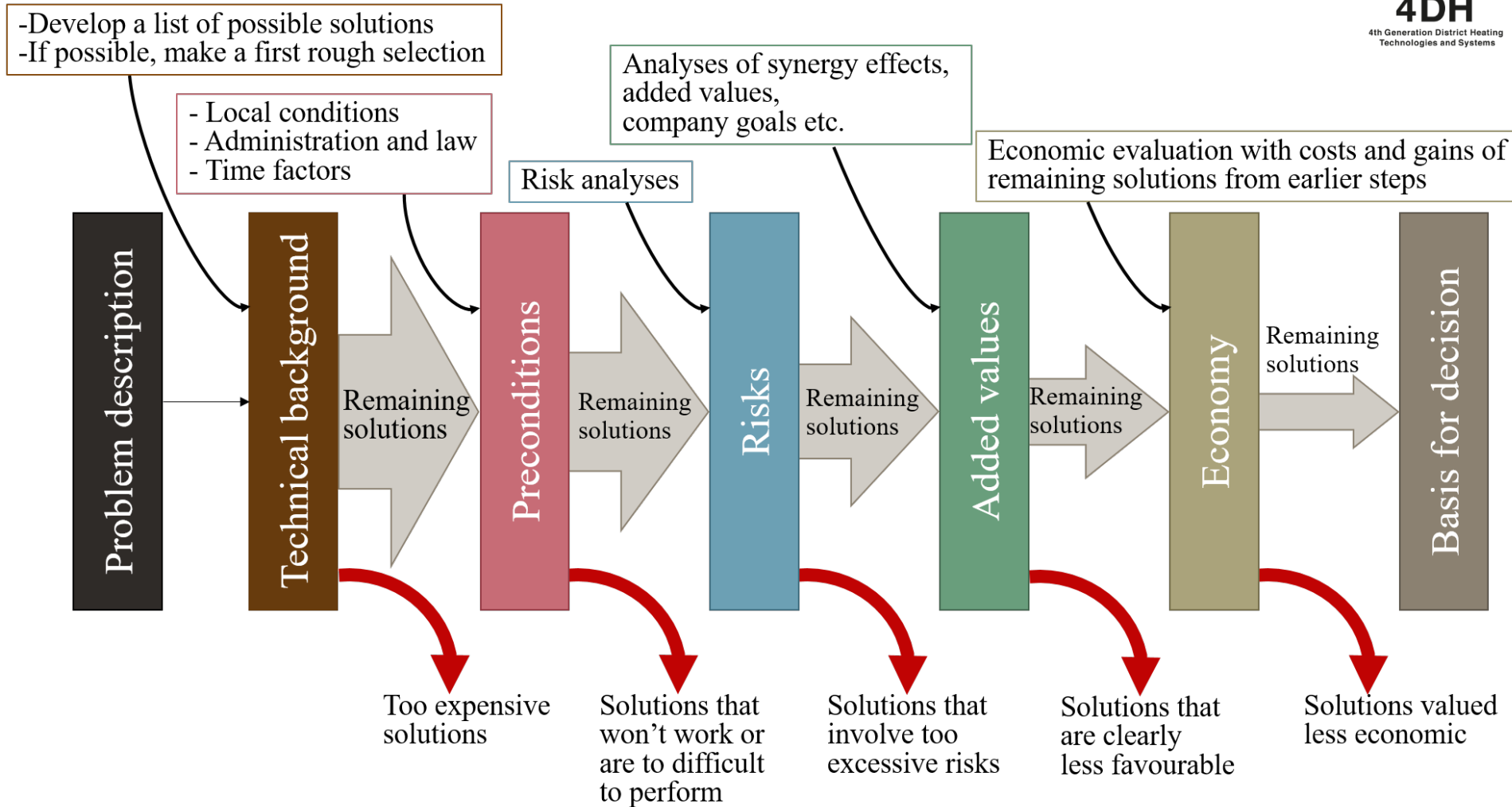
Method



- **Previous studies**
 - Survey study about the bottleneck situation in Sweden
 - Simulation and cost study about potential and costs for different bottleneck solutions
 - Interview and simulation study about risks, opportunities and added values for different bottleneck solutions
- **Workshops**
 - Persons from different positions in one company
 - Persons from different companies but with the same position
 - Pros and cons for different solutions



Methodology

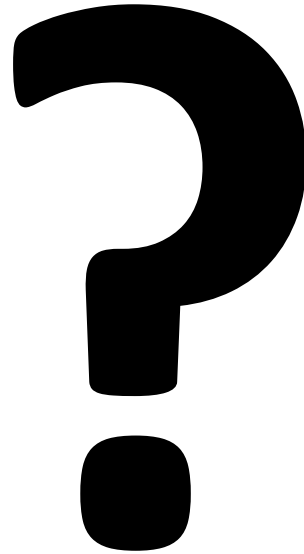


Pros and cons for some bottleneck solutions

	Increased supply temperature	Increased pipe area	Increased pump work - existing pump	Increased pump work - new distributed pump	Increased cooling	Local heat supply - liquid or gas fuel	Local heat supply - solid fuel	Local heat supply - prosumers	Demand Side Management
Reliability	Green	Green	Green	Green	Yellow	Green	Green	Red	Yellow
Simplicity	Green	Red	Green	Red	Yellow	Yellow	Red	Yellow	Yellow
Swiftness	Green	Red	Green	Red	Yellow	Yellow	Red	Yellow	Yellow
No investment cost	Green	Red	Green	Red	Yellow	Red	Red	Yellow	Yellow
Costliness	Red	Red	Green	Red	Yellow	Red	Red	Yellow	Yellow
Additional customer interaction	Red	Red	Red	Red	Green	Red	Red	Green	Green
Environmental outcome	Red	Red	Red	Red	Green	Red	Yellow	Green	Green
No extra maintenance demand	Yellow	Yellow	Yellow	Red	Green	Red	Red	Yellow	Yellow



Thank you!



AALBORG UNIVERSITY
DENMARK

4th International Conference on Smart Energy Systems and 4th Generation District Heating 2018
#SES4DH2018