

with the grid

Digitising district heating grid infrastructure



GLOBAL DISTRICT ENERGY DAYS

UNITE | INNOVATE | EXPERIENCE

25-27 September 2018 | Helsinki, Finland

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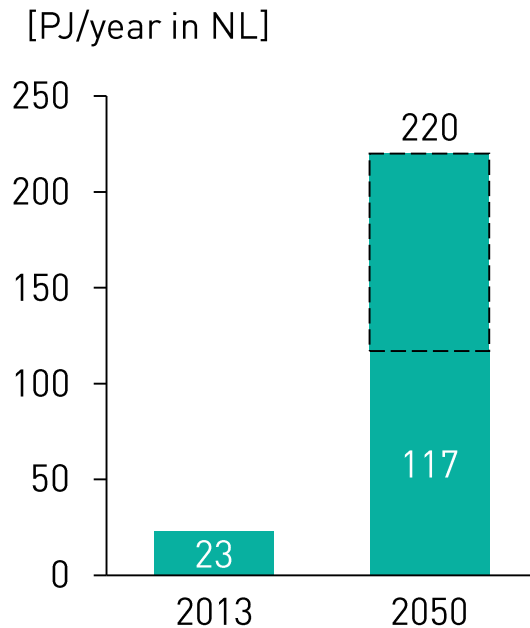
September 26 2018

1. Withthegrid & digitisation

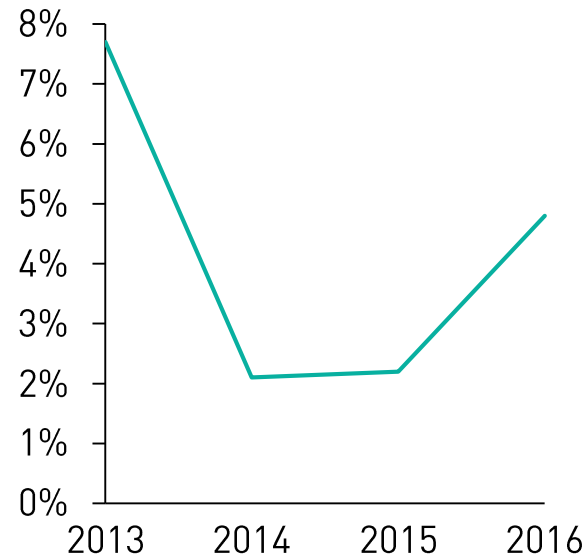
1. Dutch tech startup focusing on district heating
2. Remote monitoring devices and analytics
3. Production and grid optimisation

Why now?

1. District heating is expected to grow by 4-7%/year



2. Current profitability levels are low; so cost reduction measures impact profitability significantly [ROIC]



3. Digitisation is a key topic in district heating industry

EU projects (H2020):

FLEXYNETS
Fifth Generation, Low Temperature, High Exergy Heating and Cooling Network

DIGITAL HEAT
THE conference on digitalisation in DHC

Era of district heating

Source: Industry growth rates from CE Delft, Ecofys, PBL, McKinsey; [ACM rendementsmonitor 2017 warmtebedrijven](#)

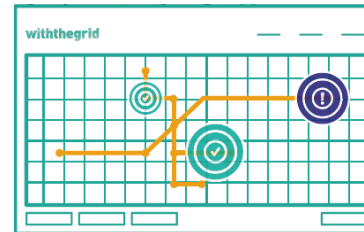
Optimisation engine & maintenance platform

Optimisation

- Static data
- Product and grid data
- External data (e.g. temp. forecasts)

withthegrid

- **Optimisation engine** based on linear programming and **machine learning** algorithms

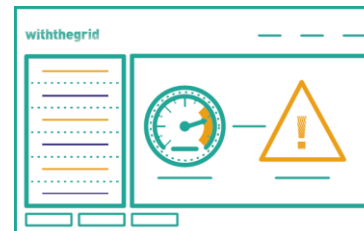


- Demand forecasting
- Dispatch optimisation
- Network visualisation
- Capacity improvement

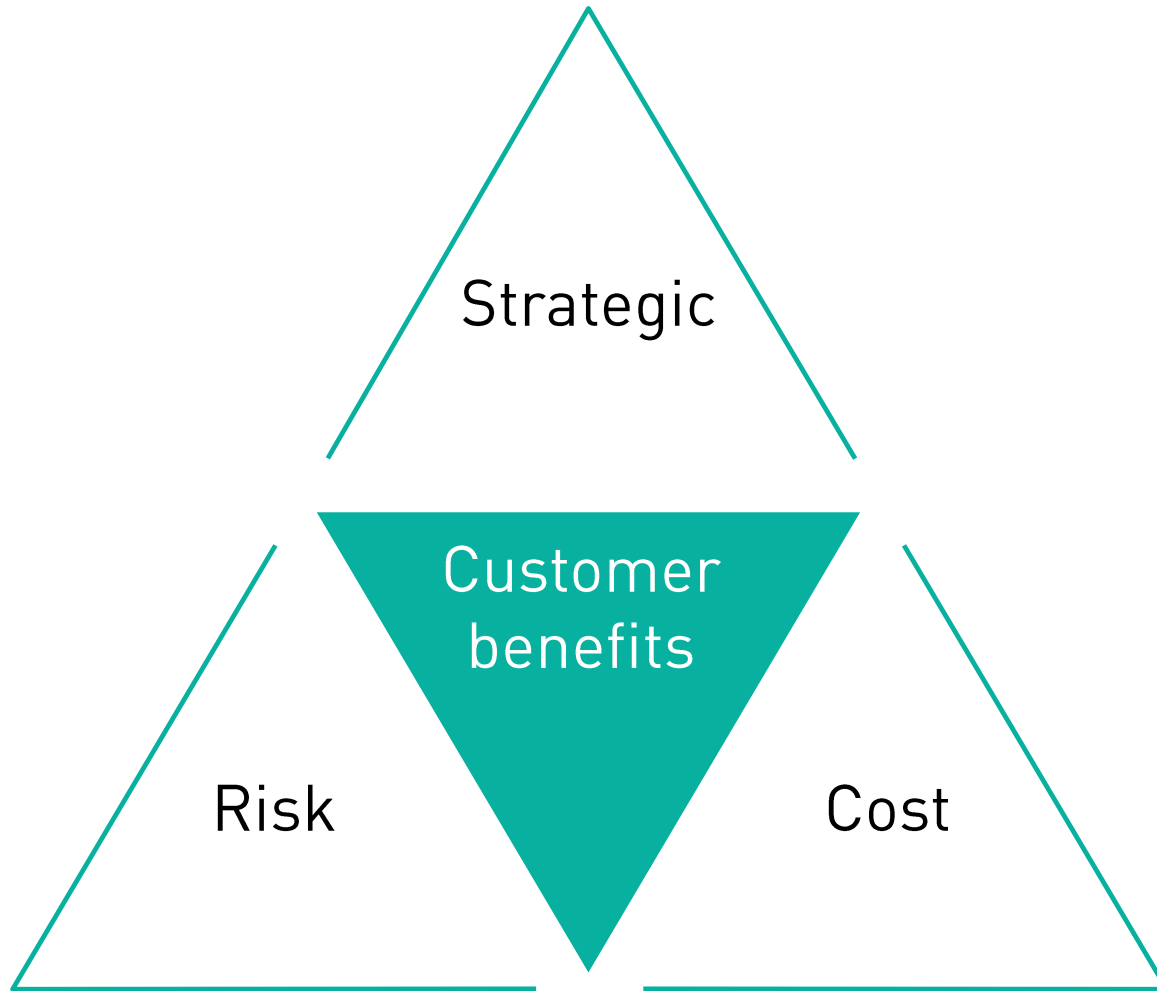
- Withthegrid asset monitoring devices:
 - Leak detection
 - Cathodic protection
 - Vacuum monitoring
 - Temp./pressure monitoring

Maintenance

- **Predictive maintenance platform** based on continuous asset monitoring through withthegrid devices



- Thresholds
- Alerts
- Route optimisation
- Audit trail



Strategic:

- Predictive maintenance
- Solution for growing technical labor shortage
- Clear audit trail
- Digitisation of operational processes

Risk:

- Increase grid safety
- Increase grid quality
- CO₂ reduction

Cost:

- Energy savings (Opex) up to 10%
- Fewer manhours (Opex)
- Reduction in damages (Opex/Capex)
- Fewer outages (Opex/Capex)
- Lifetime extension (Capex)

2. Impact of optimisation on DH sector

Extrapolating potential to EU

Energy savings

- Source: Euroheat country by country reporting (GWh used)
- Assumption: Low scenario 4%, High scenario 10%
- Unit: Energy sold and used in GWh

Cost savings

- Source: Euroheat country by country reporting and European district heating price series
- Assumption: Energy costs 50% of total revenue
- Unit: EUR

CO₂ emissions savings

- Source: Euroheat country by country reporting
- Assumption: Where emission factor was not known, EU average was taken
- Unit: ton CO₂/TJ

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- For countries with all data (18 in total, >90% of market)

Potential savings in district heating with optimisation

Studied countries



Base

1840 PJ_{used}

Energy costs:
EUR 11.5 bn

90 m ton CO₂

Low [4%]

High [10%]

Energy savings

74 PJ - 184 PJ

Cost savings

EUR 460 m - EUR 1,150 m

CO₂ emissions savings

3.6 m ton CO₂ - 9 m ton CO₂

Source: Energy use from: [STRATEGO WP2 - Background Report 4 - Heat & Cold Demands \(Appendix table5\)](#); GJ price from [EU DH price series, Professor Sven Werner \(Halmstad University\) \[table 3 page 20\]](#); CO2 emissions from [Euroheat country by country reports](#) (for Bulgaria, Estonia, Romania, Slovenia, UK the average figure was used for CO2 emissions); withthegrid analysis

Thank you

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