VEXVE iSENSE™

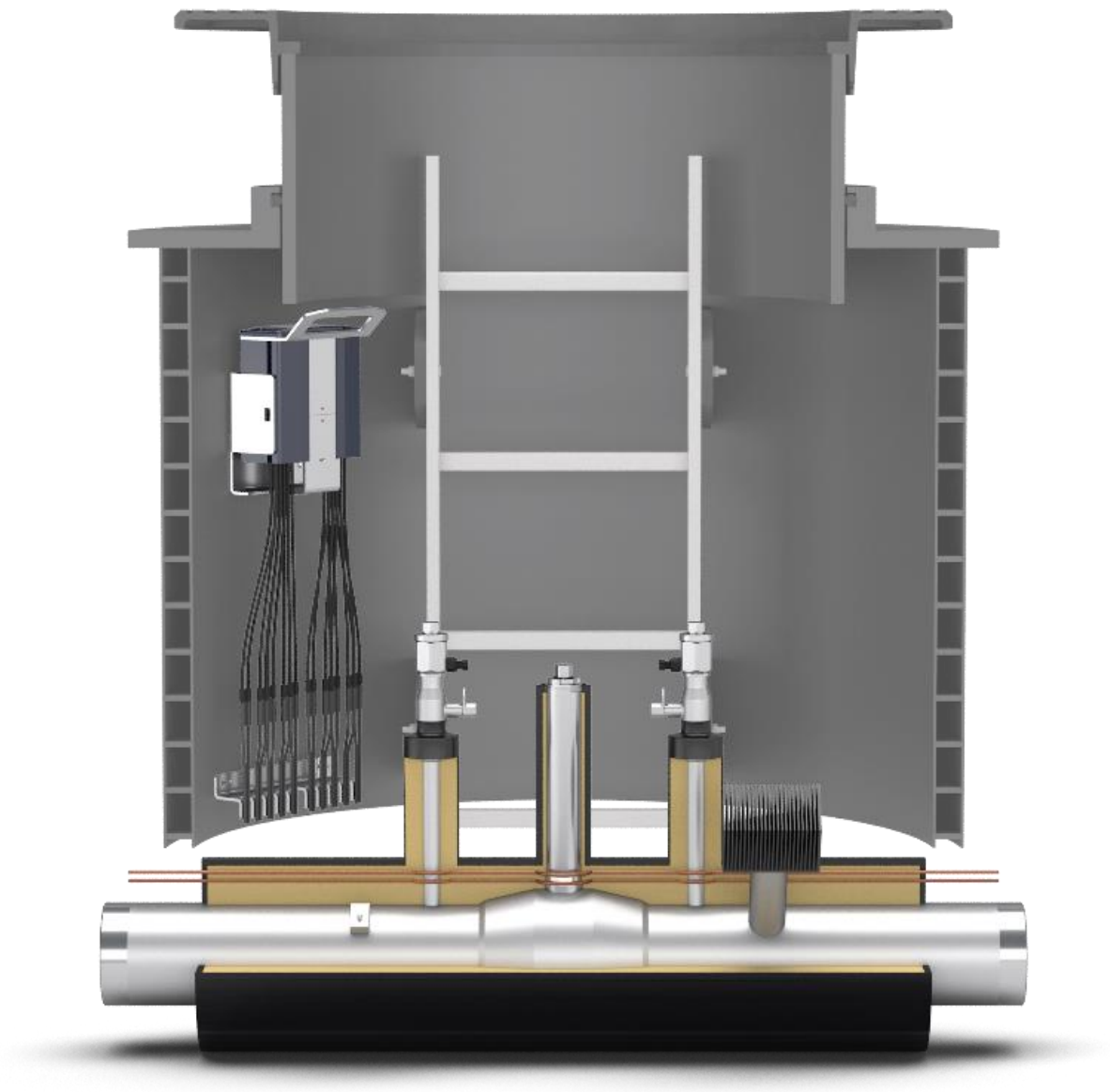
Smart monitoring solutions for district energy networks

New technologies for leak detection – case Espoo, Finland

March 25th, 2021 BSAM training course

Agenda

- Speaker profile
- Vexve in brief
- Traditional leak detection
- New technologies
- Case Fortum Power & Heat, Finland
- Key findings



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Speaker introduction

Maria Kalli
Director, Sales & Marketing, Vexve Oy

- Responsible for the sales, customer service and marketing organization and business development
- Project owner of Vexve Smart Solutions new technologies development project, which later became a full commercial portfolio of iSENSE product family
- Member of Vexve Armatury Group and Vexve Oy executive teams

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Maria Kalli Vexve

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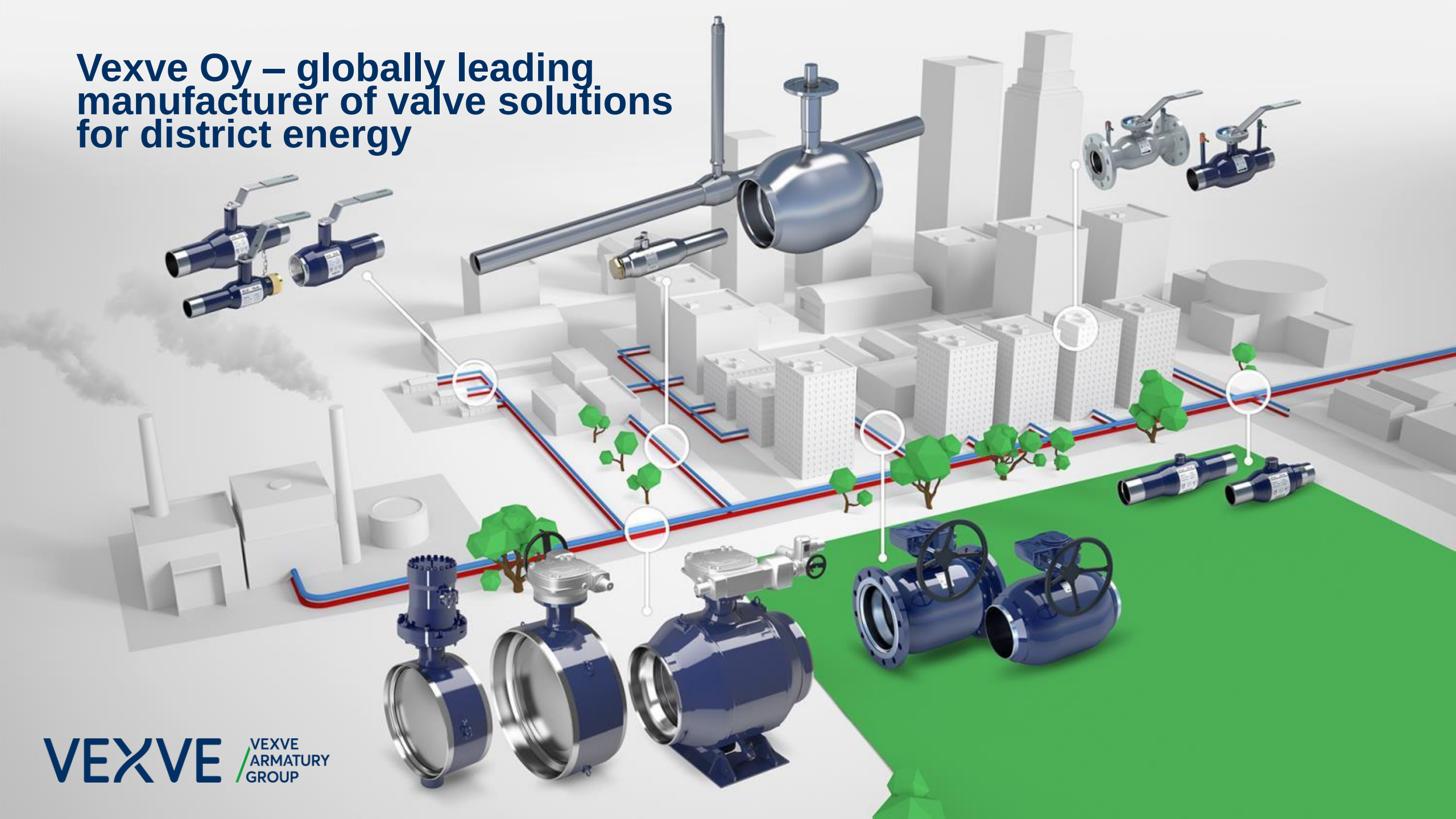
Vexve Oy – globally leading manufacturer of valve solutions for district energy



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Traditional leak detection is rather reactive than predective

Typical network challenges

“We know there is leakage in the network, but locating it takes long.”

“Currently used technologies, for example heat cameras, do not reveal casing pipe leakages and do not work in monitoring the district cooling networks”

“Usually, leakages are recognized only when they occur – preventive tools would be needed”

Typical leak detection methods

District heating damage statistics

Finnish Energy, District heating damage statistics 2018

Method of detection (Mpuk and 2Mpuk pipes)

- *46% external notice*
- *35% melted/dry area in the ground*
- *9% water in the chamber/cellar*
- *5% heat cameras*
- *0% leak detection systems*

Typical causes of damage

District heating damage statistics

Finnish Energy, District heating damage statistics 2018

Cause of damage (Mpuk and 2Mpuk pipes)

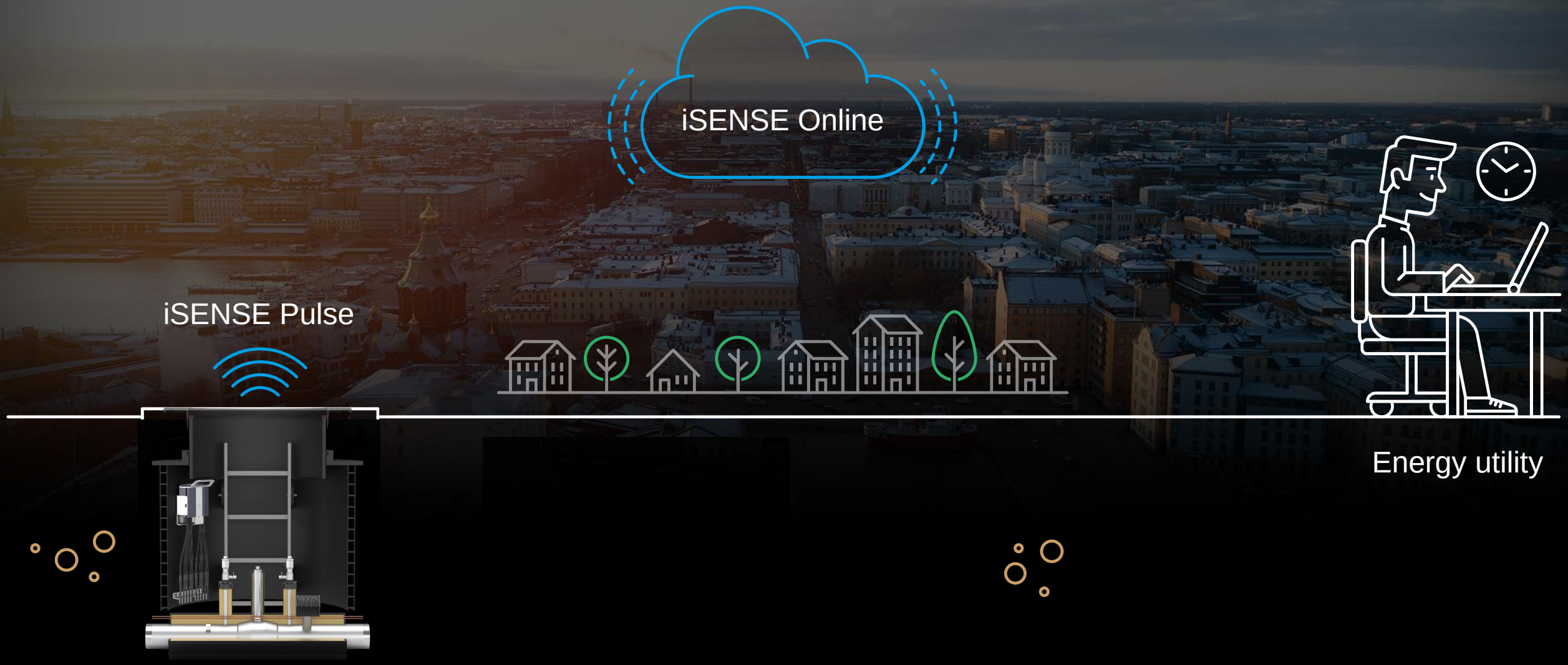
- *13% welding error of the flow pipe*
- *37% leaky casing pipe connection*
- *26% external violence*
- *11% casing pipe damages*
- *13% other*

New technologies
are based on automated preventive monitoring

iSENSE product family is specifically designed for district heating and cooling networks

- ✓ **Underground use**
- ✓ **Wireless operation**
- ✓ **Self-powered**
- ✓ **Retrofittable**

Modern leak detection is based on automated monitoring

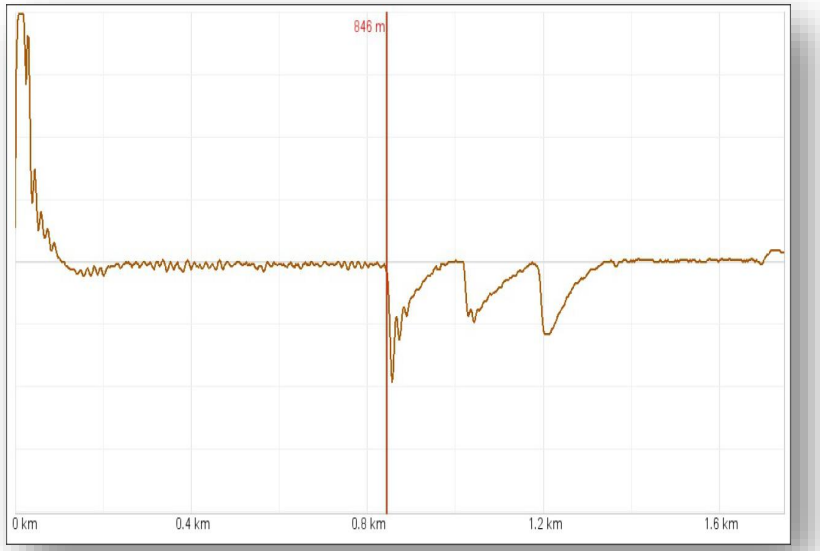


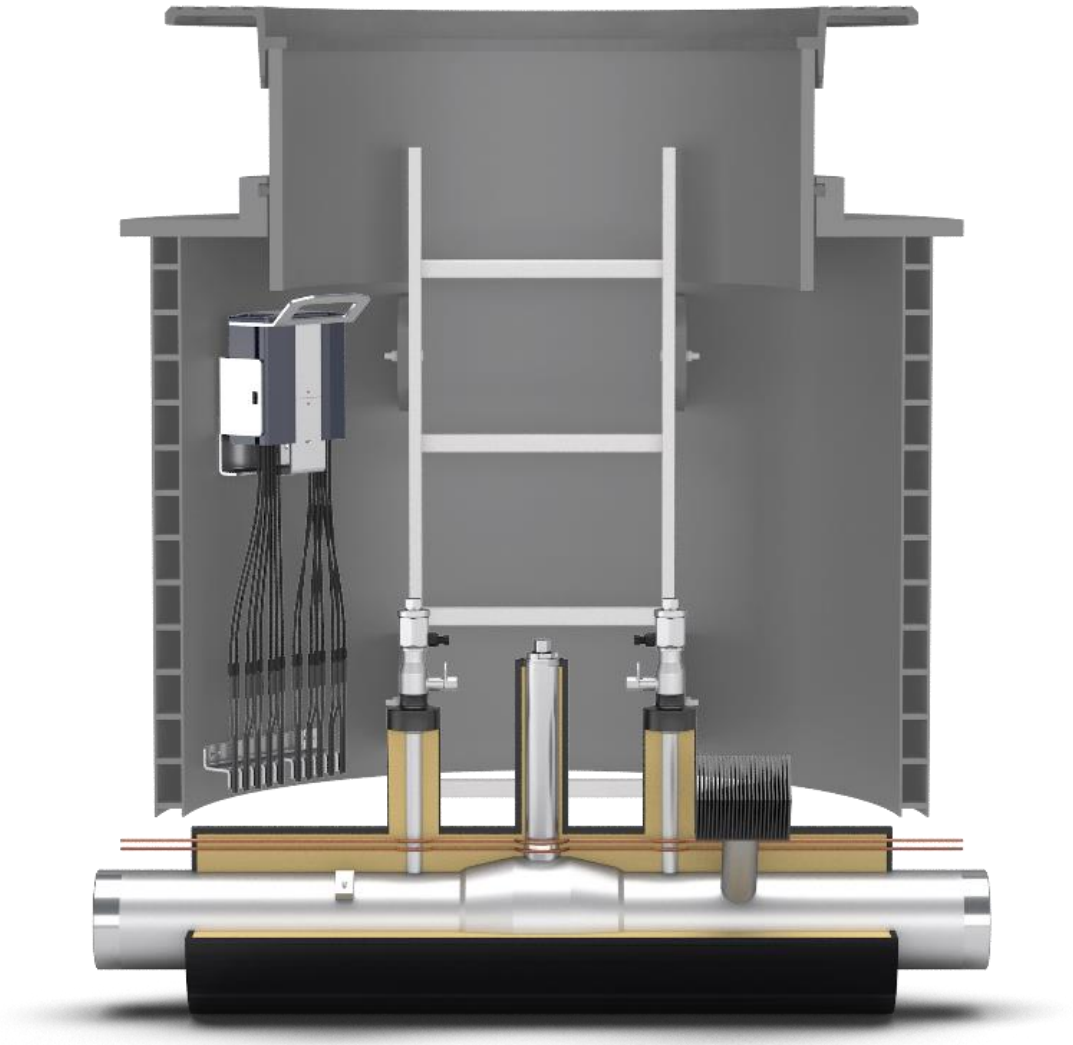
iSENSE Pulse – for fast and precise leak detection

iSENSE Pulse leak detection system is based on pulse measurement technology which is implemented by alarm wires.

After sending the pulse, we are monitoring

- pulse reflections (to detect moisture/wet)
- pulse travelling time (to detect exact location)

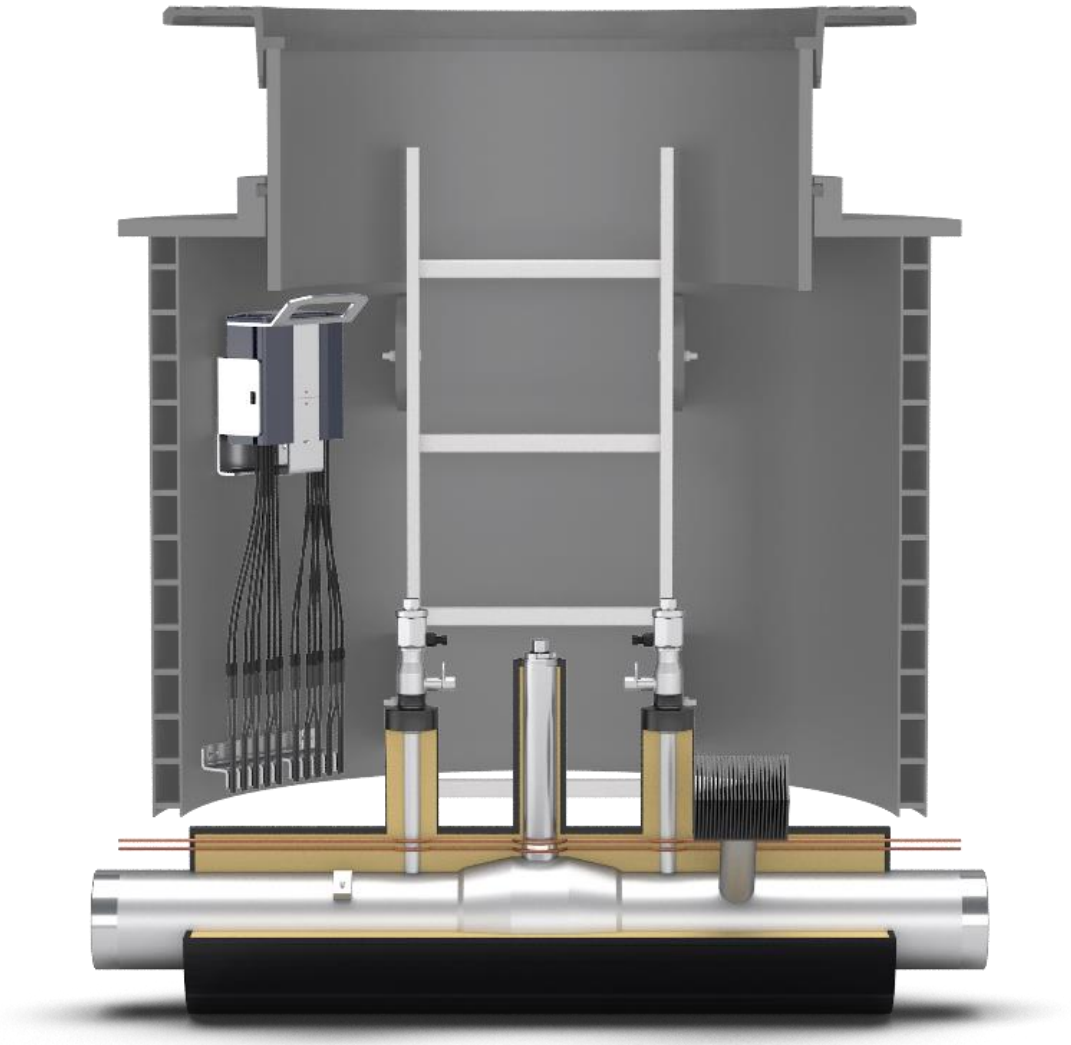




iSENSE Pulse – Technical details

Technical details

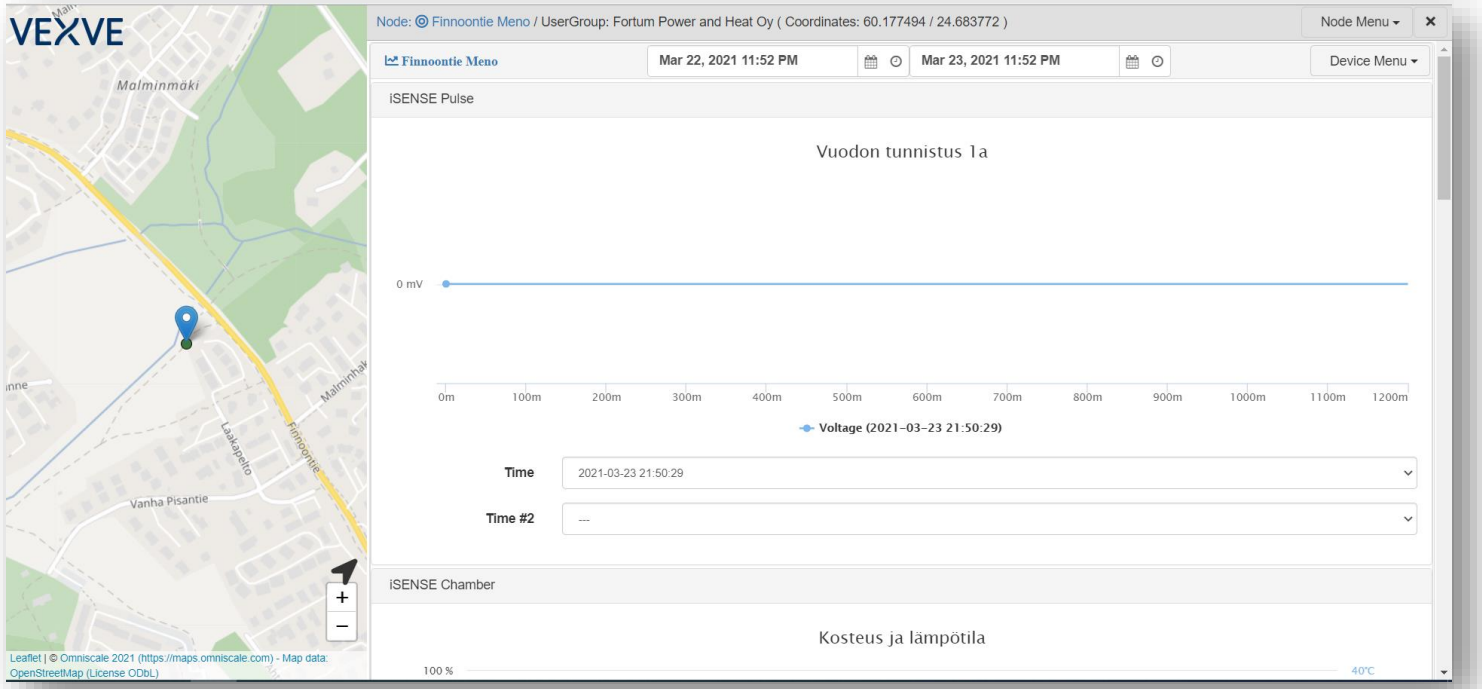
- Type of alarm wire: Nordic system (copper)
- Loop connections: 2 or 4
- Distance: max 3 500 meters
- Accuracy: less than 1%
- Power source: iSENSE Power
  -thermoelectric generator
- Communication method: LoRaWAN network
- Communication frequency: Once a day
- User interface: iSENSE Online -cloud service
- User alarms: SMS or e-mail



iSENSE Online provides real time view to network status

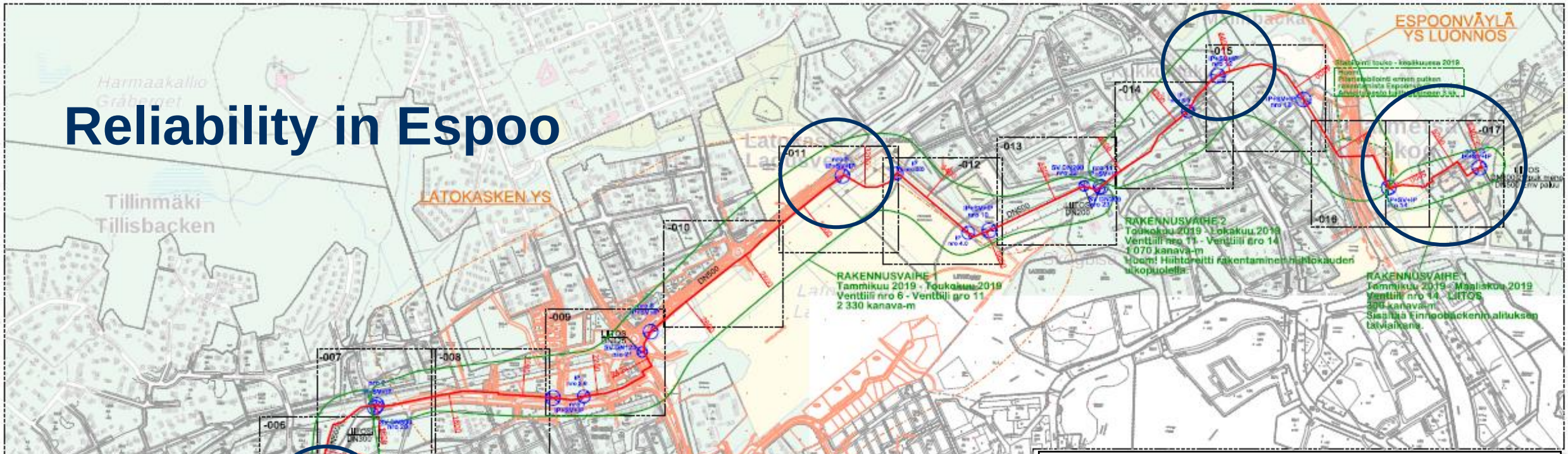
iSENSE Online cloud service is user-friendly and visual tool for monitoring the network in real time. It is available from all devices, anywhere and any time, with SSL-protected login

- Measurements of each device can be viewed in graphs and in map view
- Deviation in the measurement creates an alarm notice, which can be sent to chosen users via e-mail or SMS
- The event log shows the active and acknowledged alarms for each measurement



Case story
Fortum Power and Heat Oy, Espoo, Finland

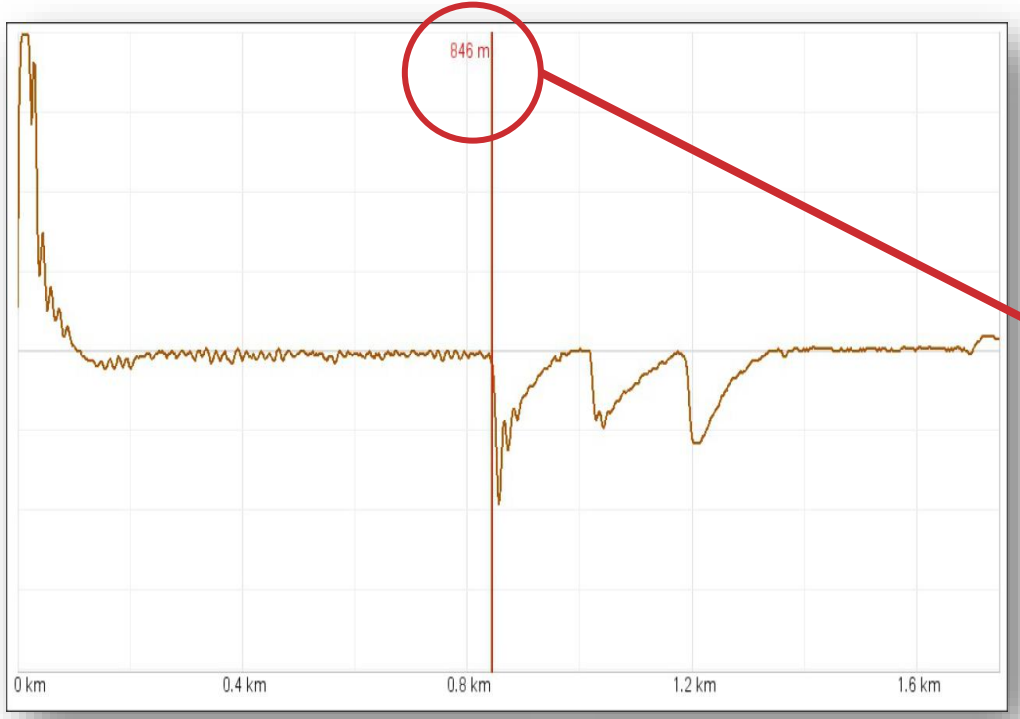
Reliability in Espoo



Fortum is one of the leading energy companies in the Nordics, developing and offering solutions in electricity, heating and cooling.

New 5,5 km heat transmission line from Kivenlahti biomass plant is equipped with alarm wires, which are connected to Vexve's iSENSE Pulse leakage detection system.

With the help of iSENSE Pulse, Fortum detected three casing pipe leakages already during the network’s warranty period, and they could be repaired well in advance before the corrosion caused an actual flow pipe leakage.


846 m
0 km
0.4 km
0.8 km
1.2 km
1.6 km

Total 1028 m
length of pipeline
Real leakage location

Key findings

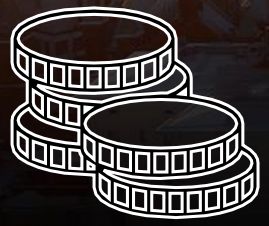
New technologies for leak detection…

… prevent corrosion caused by casing pipe damages

… detect and address pipeline problems already during the warranty period

… save on pumping costs by locating leakage fast

… monitor leakages also in district cooling networks



Operational savings

Reliablility of district energy supply

Preventive maintenance

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