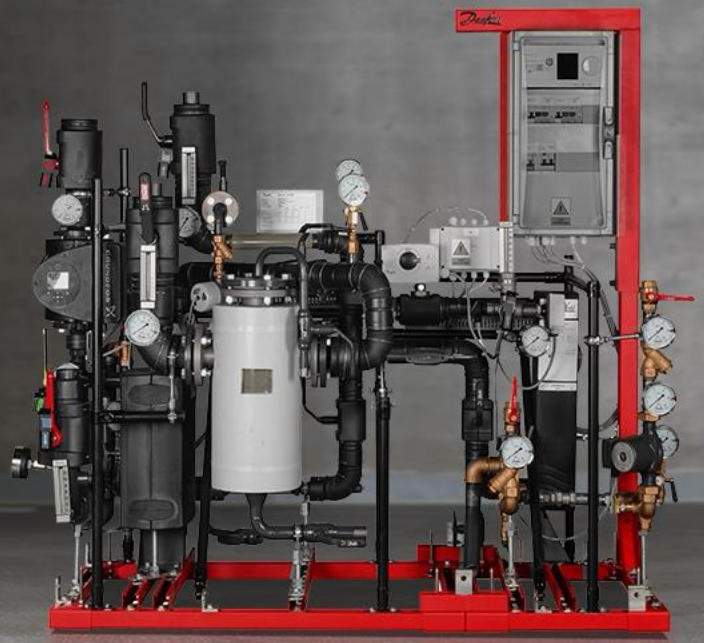
ENGINEERING
TOMORROW

Enter a new dimension of district energy



Titan™
by Danfoss

Let's unlock the grid

As the demand for energy-efficient and resilient district energy networks increases—**so does the complexity.**

Digitalization is the fundamental lever for new generations of district energy—**and substations are a key component of an optimized grid.**

It's time to unlock the grid's full potential. For ultimate cost-effectiveness, energy efficiency, and resilience on **the path to a greener future.**

Trends driving district energy

With cooling and heating responsible for nearly half of the EU's energy consumption—75% of which is still based on fossil fuels—the need for integrated, smart district energy networks is stronger than ever.

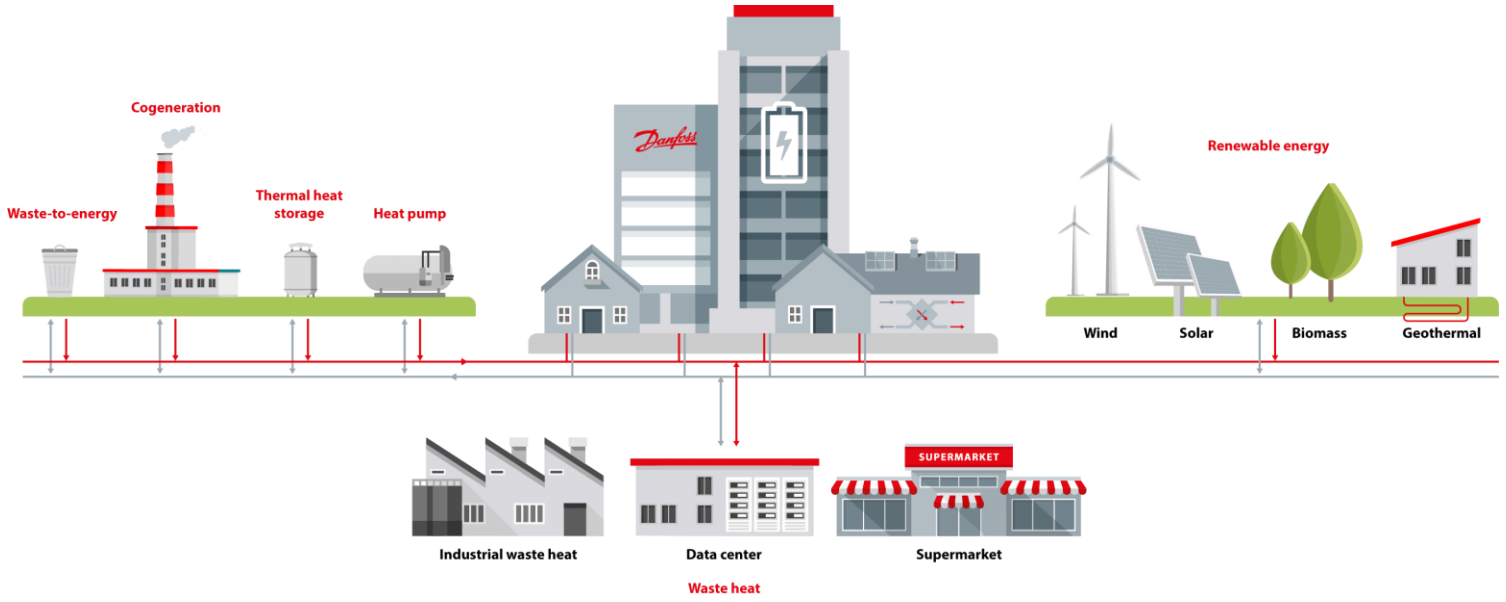
Key trends driving district energy on the road to decarbonization are…

From **SINGLE SOURCE** to **MULTI-SOURCE**

From **FOSSIL FUELS** to **RENEWABLES & SURPLUS ENERGY**

From **HIGH TEMPERATURE** to **LOW TEMPERATURE DISTRICT HEATING**

Key design challenges
in district energy networks



ΔT optimization

Economical balance between temperature and flow

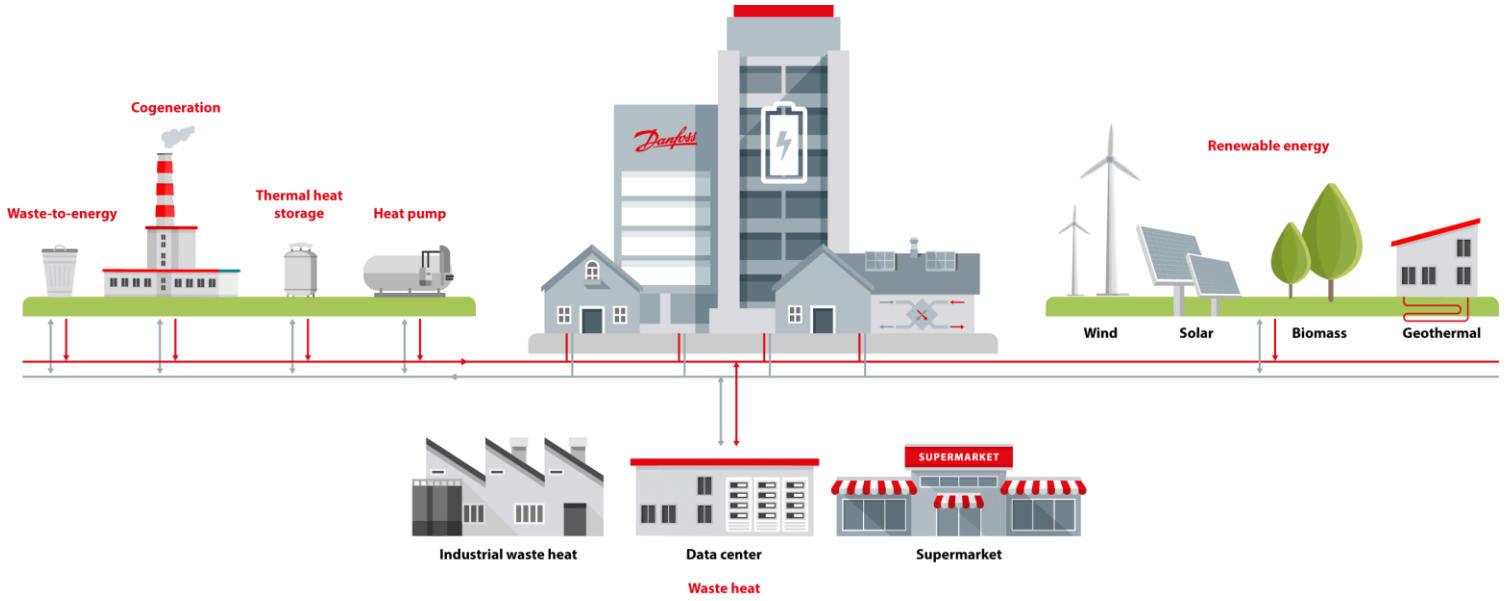
Optimal network design

With new connections and new buildings

Increased source complexity

Integrate more heat sources—including renewables—in production

Key design challenges in district energy networks



Increased source complexity

Integrate more heat sources—including renewables—in production

Decarbon–ization

Legislation and environmental awareness driving energy efficiency

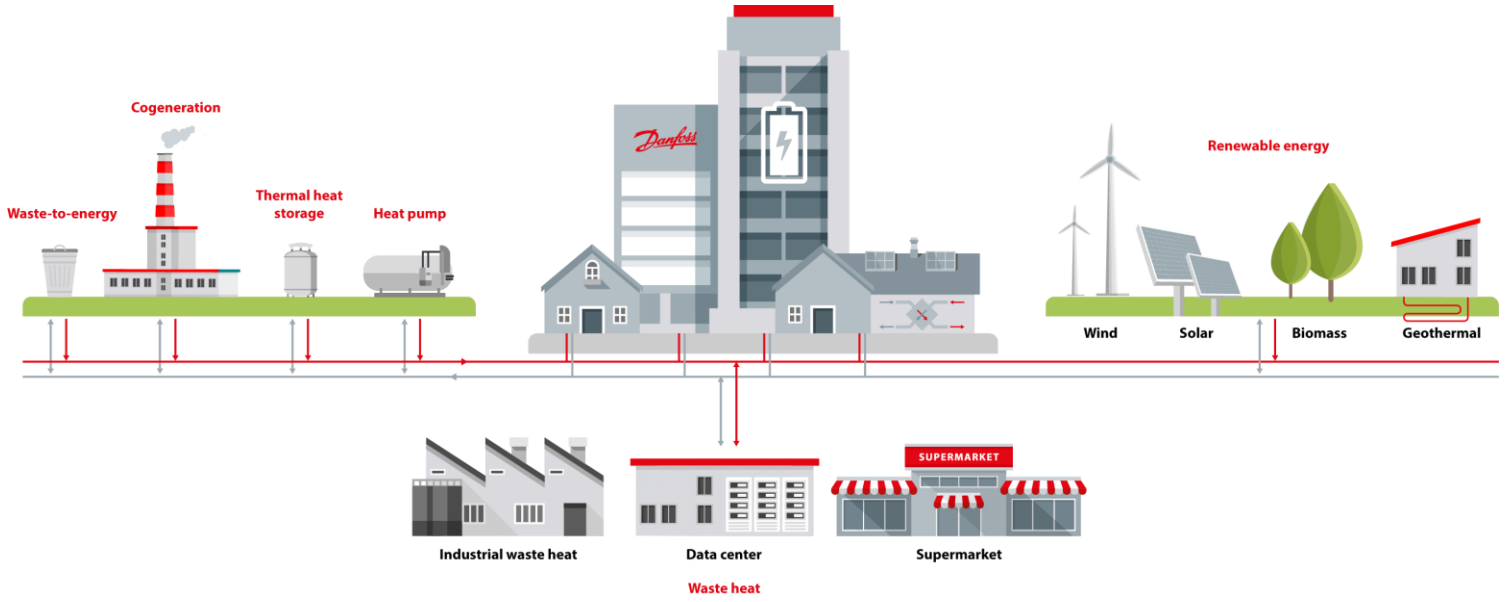
Peak energy demand

Drives up overall cost (OPEX and CAPEX)

Legacy SCADA

Data integration needs to be less difficult and time-consuming

Key design challenges
in district energy networks



Legacy SCADA

Data integration needs to be less difficult and time-consuming

Increase focus on business models

Create an attractive business environment for the future

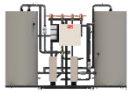
Resilience

Guarantee high operational efficiency in unexpected conditions

Danfoss end-to-end district energy solutions

From components to optimization tools and services

Heat recovery unit



Motorized valves

Heat pump compressor technology

eTRV

Intelligent controllers

Heat exchangers, line components

Heat meters

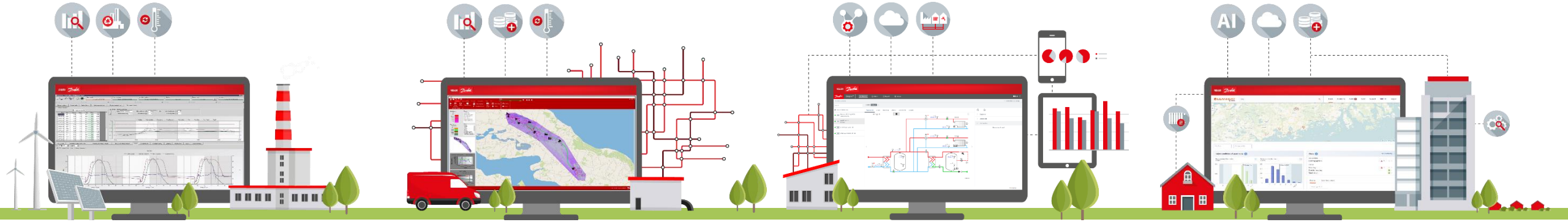
Automatic balancing valves

Substations

Self acting diff. pressure controls

iNET

iSET



Production (LHP)

Network (LHN)

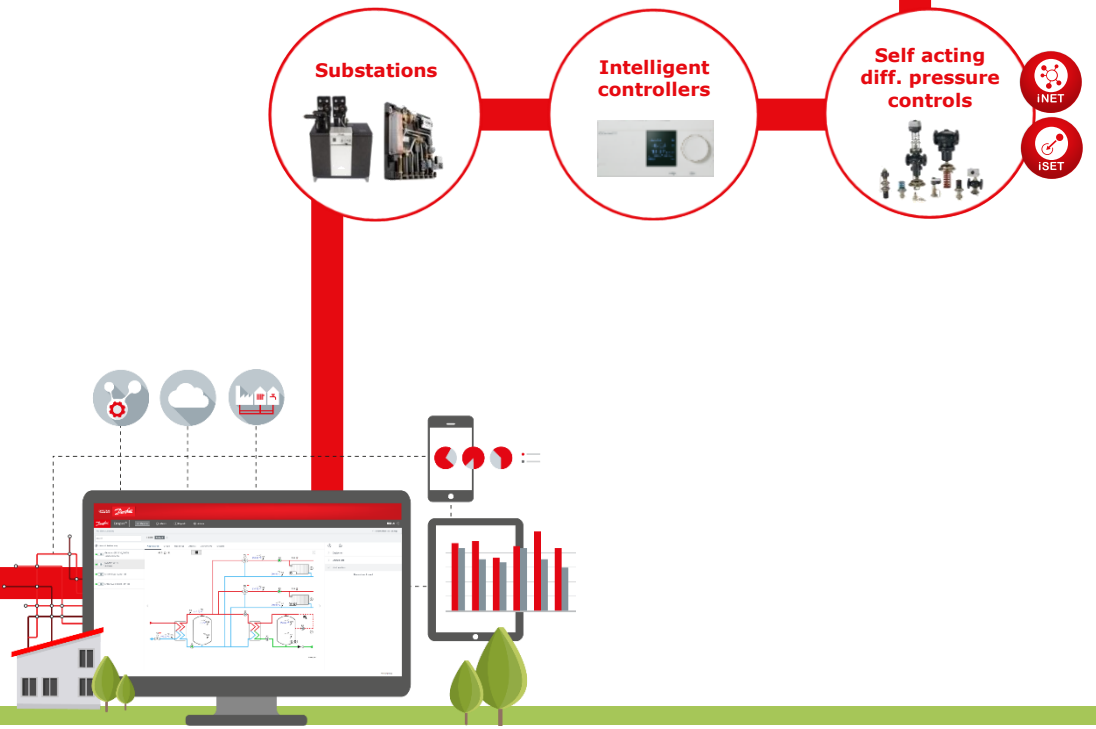
Monitor (LHM)

Building (LHB)

Danfoss end-to-end district energy solutions

From components to optimization tools and services

Titan™ by Danfoss



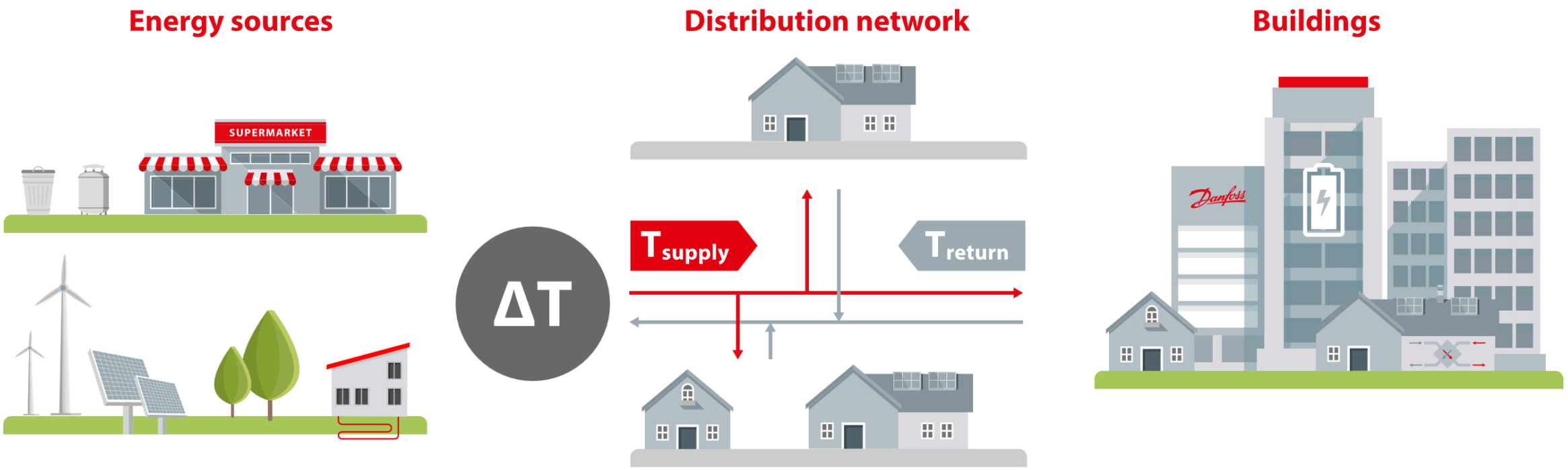
Monitor (LHM)

Poor commissioning: The No. 1 challenge for substations

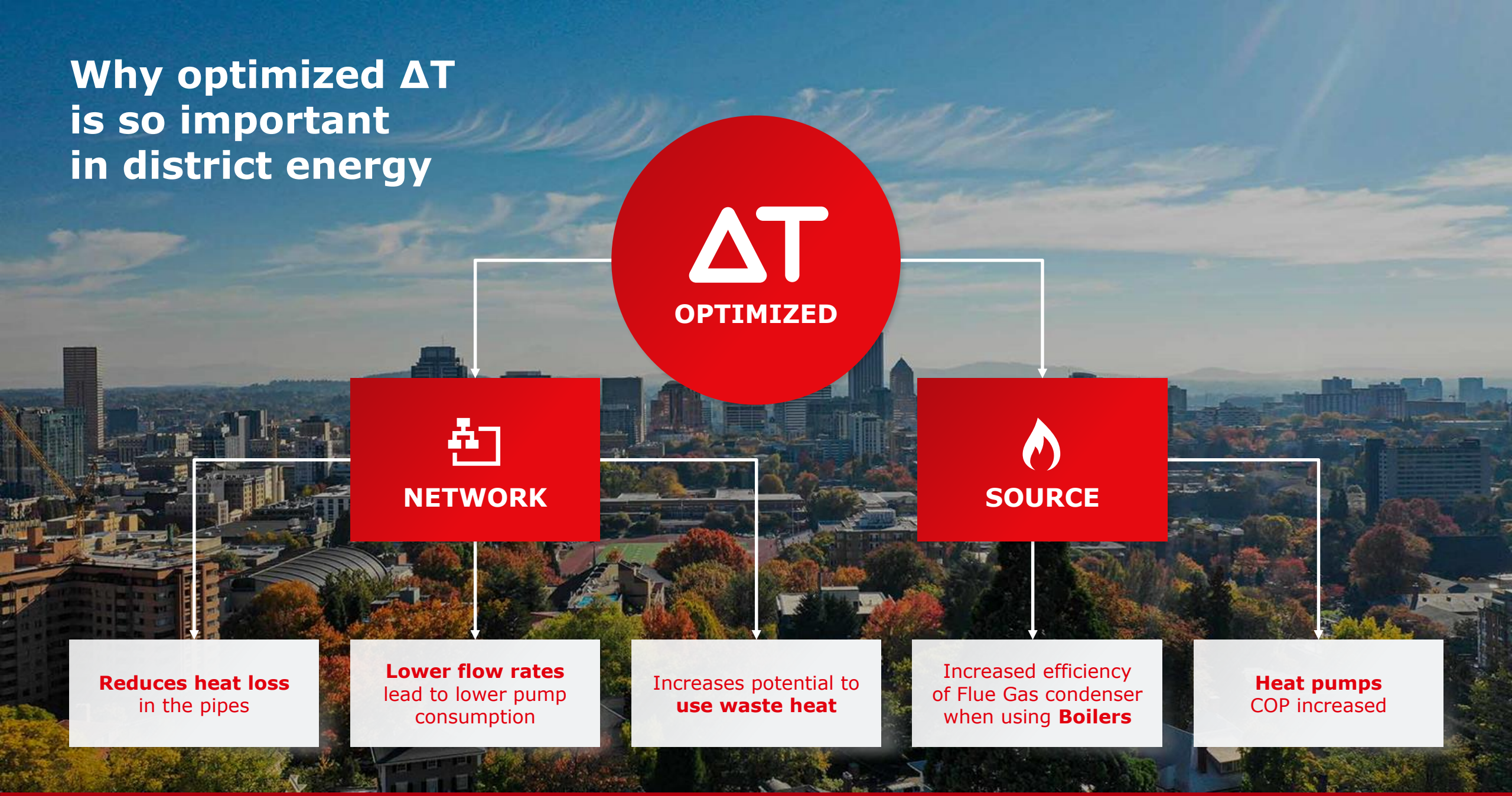
ΔT optimization in district energy:
How it’s achieved and why it’s so important

In district heating, ΔT optimization is achieved by reducing the return temperature—as close to ambient temperature as possible.

$$\Delta T = T_{supply} - T_{return}$$



Why optimized ΔT is so important in district energy



The root cause of high return temperatures: Overflow

Overflow starts with poor commissioning—due to lack of installation training and complexity.

Without commissioning a controller, the substation's primary side valve opens more than necessary in partial and low loads.

This causes more flow to pass through the heat exchanger while preventing an energy transfer to the secondary side—resulting in **high return temperatures**.

On top of poor commissioning, **seasonal changes** can also affect overflow.

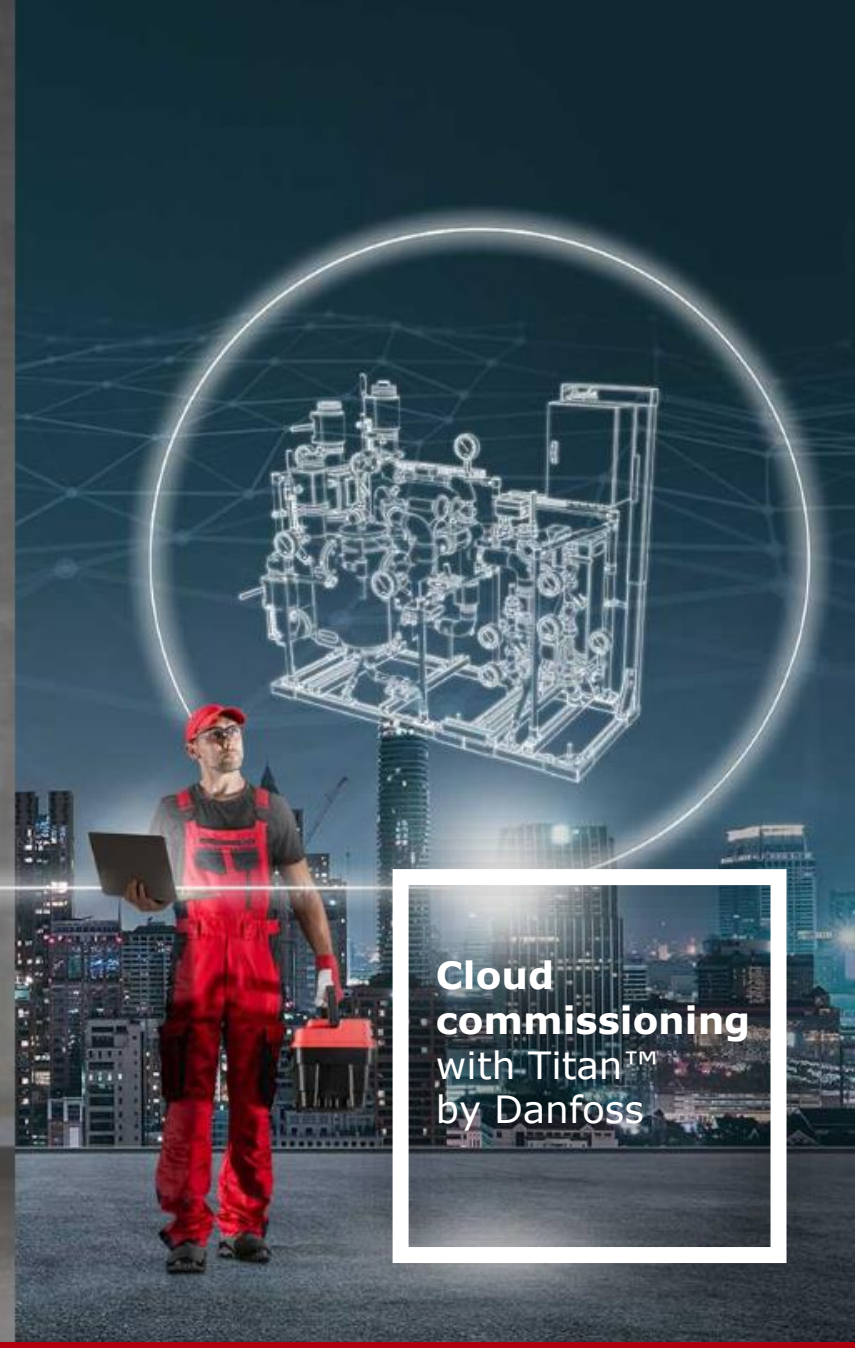
70%
of substations are un-commissioned

Smart substations: The key to operational optimization

Enter a new dimension of district energy with **Titan™** by Danfoss

Danfoss Titan™ combines best-in-class substations with digital twin technology

- Intuitive, reliable, and continuous cloud commissioning
- Best-in-class settings—ensuring longer station lifetime
- Optimum ΔT unlocking data-driven energy efficiency
- 100% Danfoss component-based station ensuring the highest quality and reliability



Cloud commissioning with Titan™ by Danfoss

Traditional substations
—from challenge to solution

District Heating Utility

Low ΔT

- High heat losses in return pipes
- Higher pumping costs

Installer

Complex and unreliable commissioning

- Many unscheduled return visits
- Building owner complaints on comfort and return temp.
- Commissioning takes many hours

Root cause

- Poorly-set controller
- Poorly-set dp or flow controller
- HEX scaling

Optimum ΔT (highest possible)

- Reduction of return temperature by 1–3°C in case of oscillations
- Higher energy efficiency and cost savings for district energy utilities

Smart station

Shortest **commissioning time** on market

- Commissioning is always reliable
- Commissioning time is shortened (min. 2 hours faster)
- No complaints or callbacks

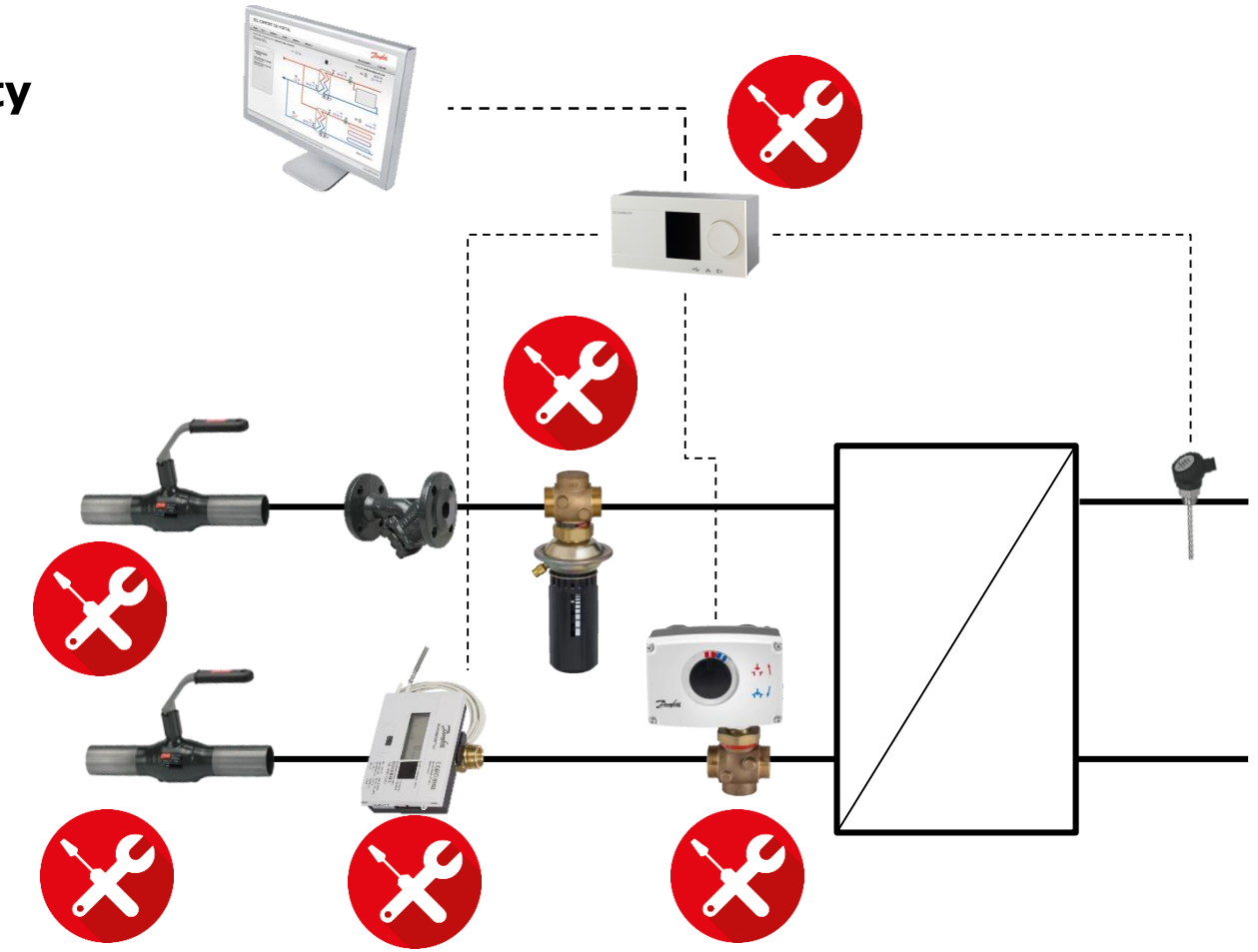
Titan™ by Danfoss

Titan™ Cloud

- Intuitive electronic controller settings
- Automatic differential pressure or flow settings
- Continuous optimization
- Detect HEX scaling

Danfoss Titan™:
Digital twin technology at work

Automatic, cloud-based commissioning reduces complexity while boosting reliability and resilience in the entire network



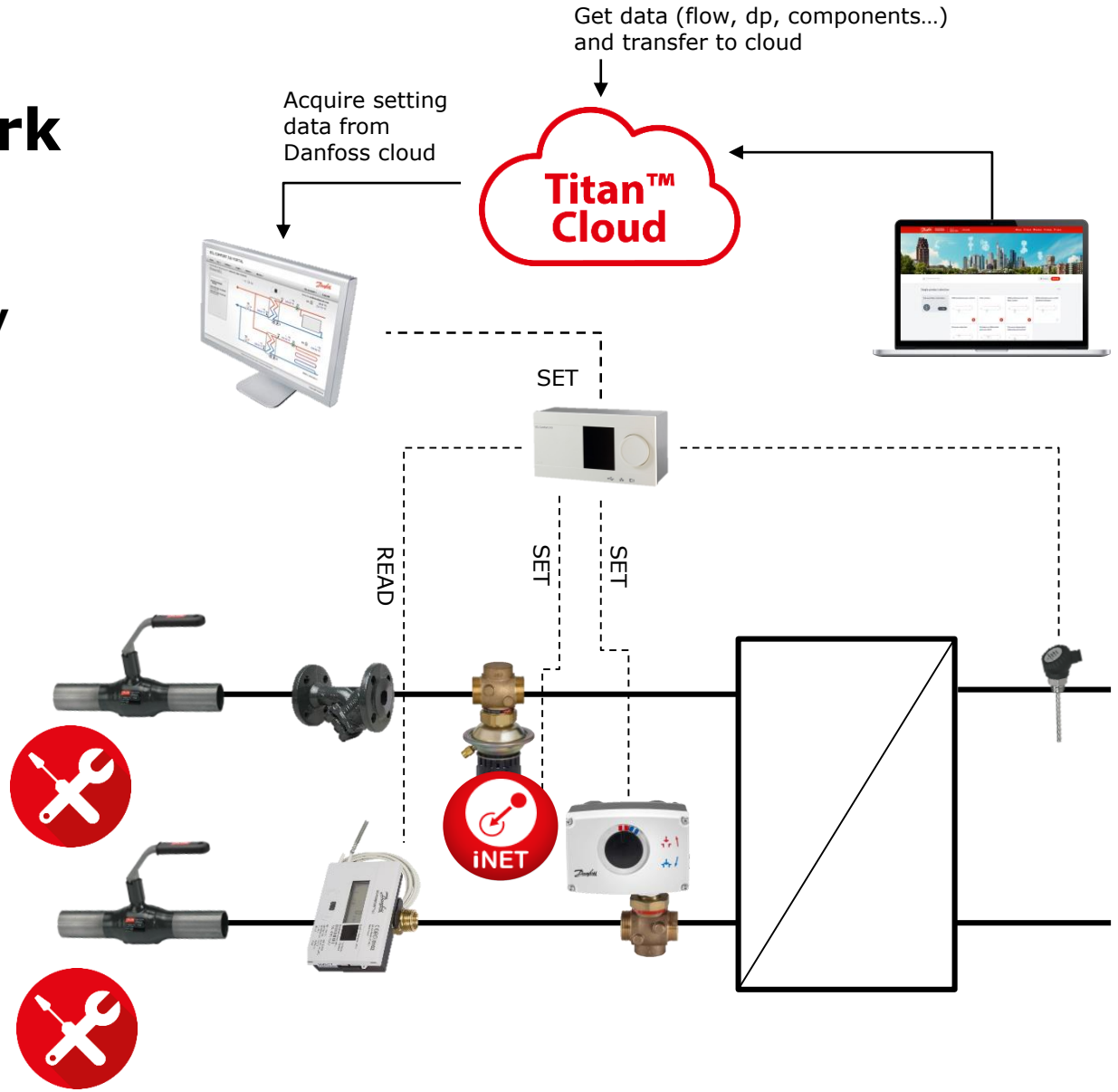
Today

Installation is time-consuming and complex…

1. Fill in secondary side and start pumps
2. Open shut-off valves
3. Open motorized control valve 100%
4. Set differential pressure controller and monitor flow meter to set flow
5. Set PI parameters in electronic controller
6. Set neutral zone in electronic controller
7. Set running time of motorized control valve in electronic controller

Danfoss Titan™:
Digital twin technology at work

Automatic, cloud-based commissioning reduces complexity while boosting reliability and resilience in the entire network



Titan™ by Danfoss

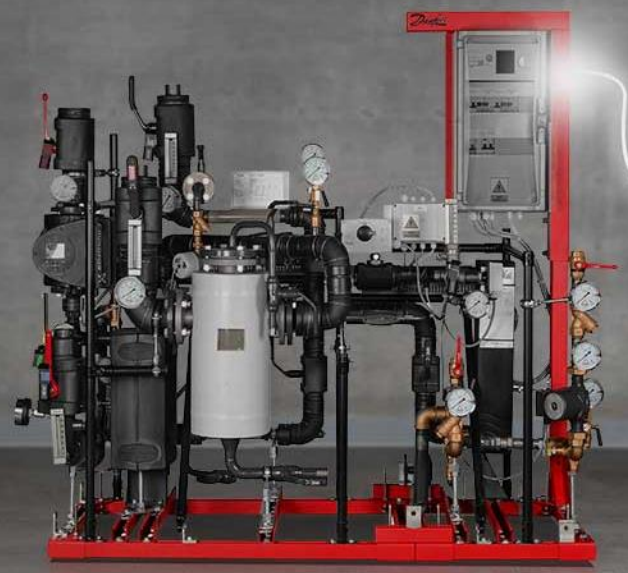
All the installer needs to do is…

1. Open shut-off valves and power the substation
2. Connect the controller to the Internet

Danfoss Titan™ will…

- Read and deploy setting data from the cloud
- Set differential pressure controller by reading flow and controlling the iNet actuator
- Access motorized control valve data to set running time
- Initiate cloud PI settings
- Automatically set neutral zone

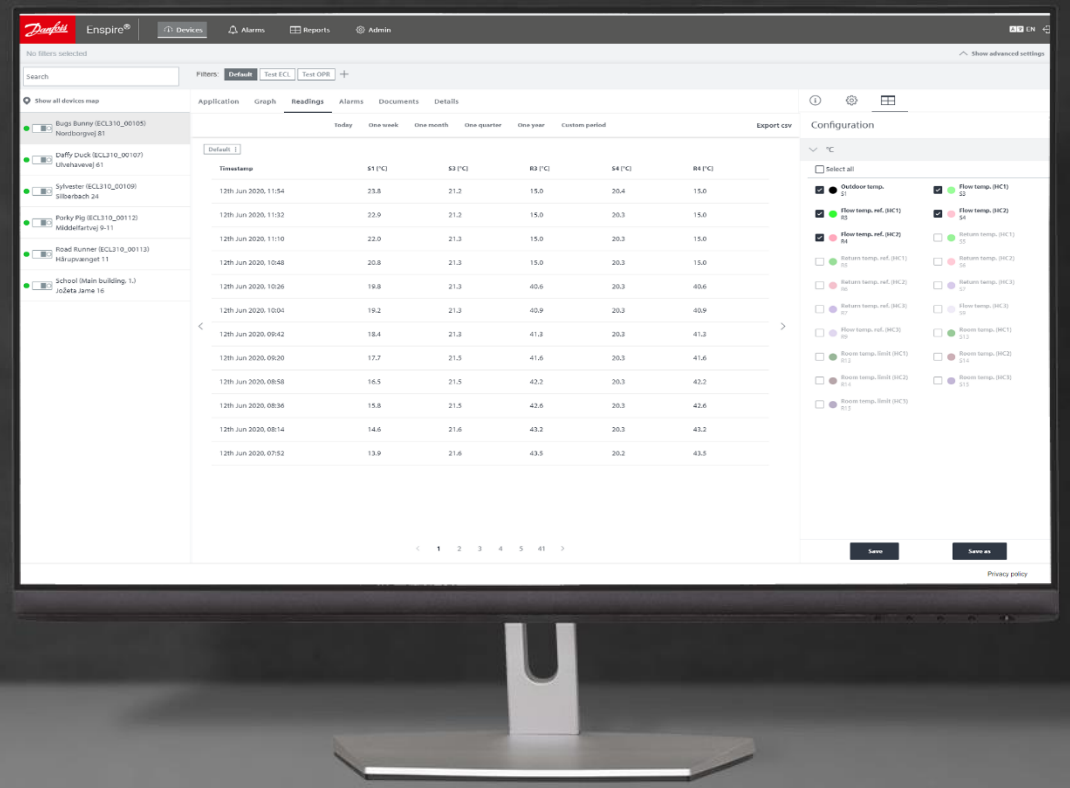
Titan™ by Danfoss:
Value-adding services



Leanheat® Monitor
Improve and control operational management

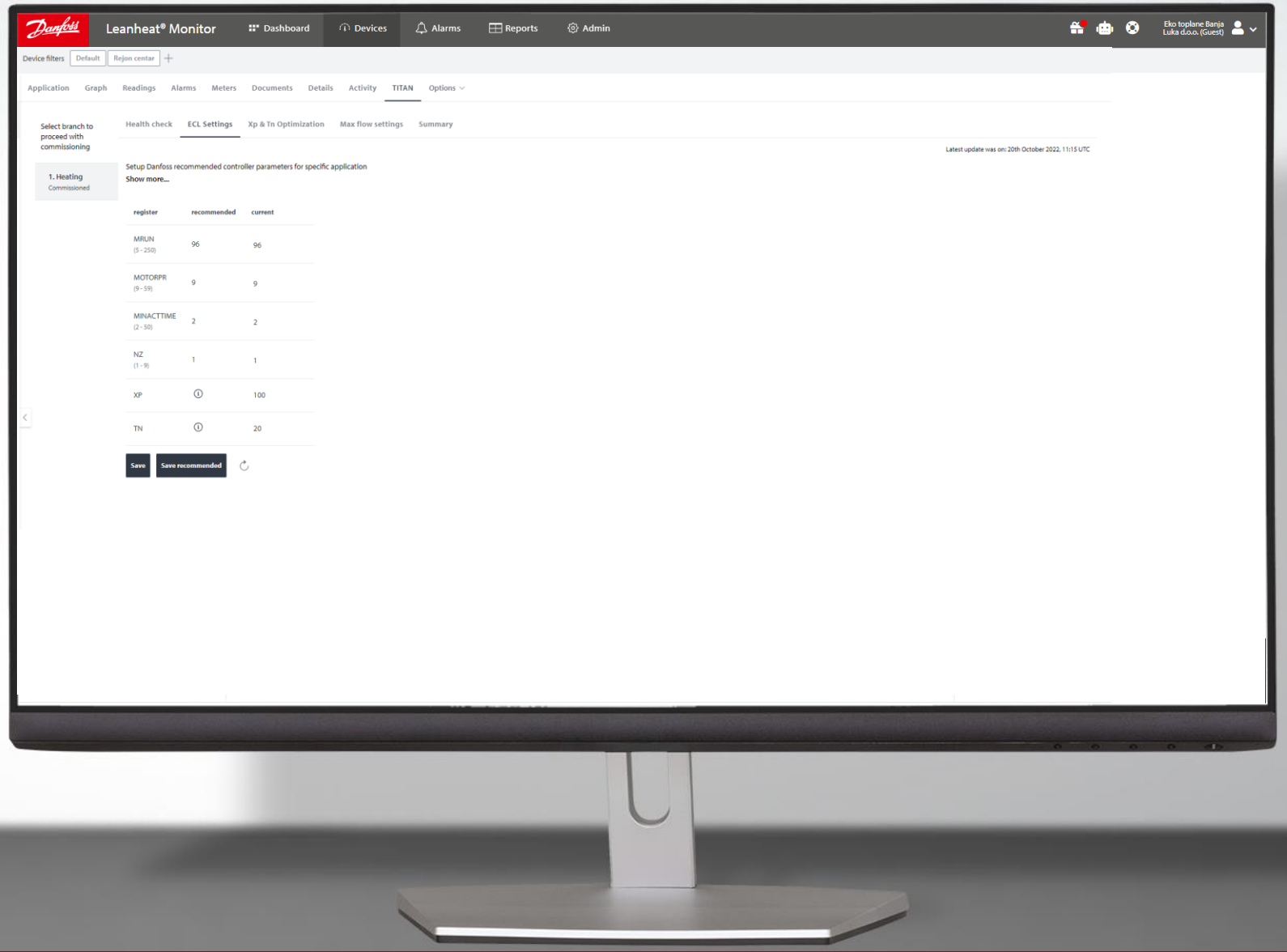
Danfoss Titan™ is integrated into Leanheat® Monitor—an advanced software tool for **remote monitoring**, **control** and **optimization** of your district heating:

- Open, connected, and transparent
- Modern, web-based solution
- Customized for district energy
- Lowered investment and predictable operation costs



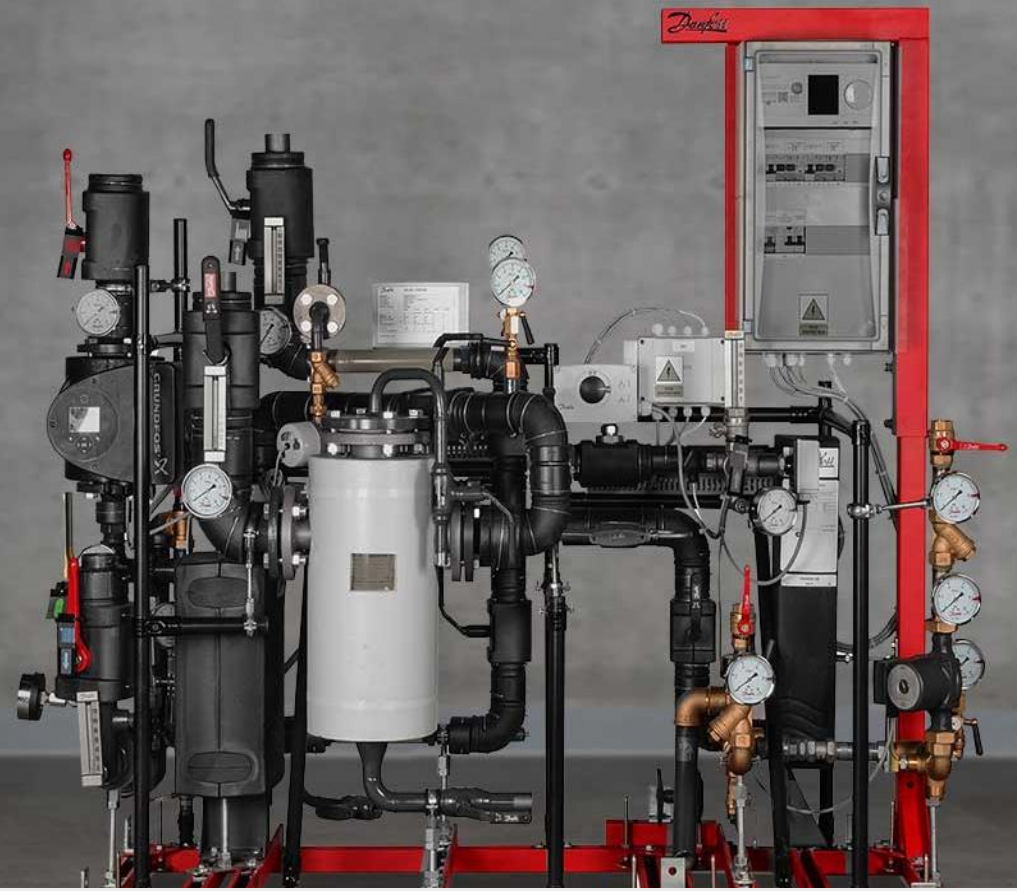
Smart substations support your commissioning phase

- Substation Commissioning
- The tool offers three commissioning procedures to be used during initial substation commissioning:
- Setup Danfoss recommended controller parameters for specific application and design conditions
- Calculate and deploy Danfoss optimized PI parameters for the control loop
- Automatic remote setting of Maximal flow or Differential pressure.
- The tool also provides a commissioning report generator



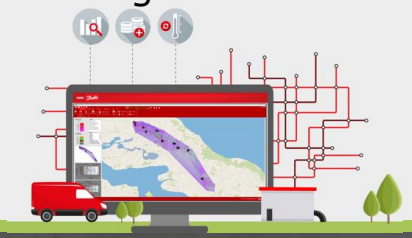
Danfoss District energy portfolio

From components
to optimization tools
& services



Leanheat® Production
Improves data for temperature optimization

Leanheat® Network
Improves network digital twin



Leanheat® Monitor
Enables visualization

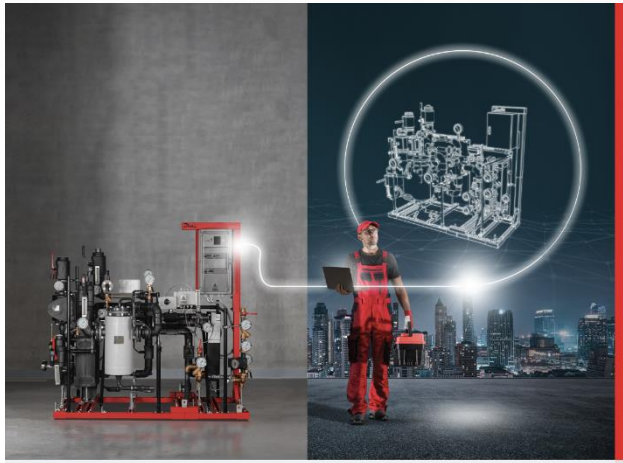
Leanheat® Building
Enables energy savings

ENGINEERING
TOMORROW

Let's unlock the grid

What does it take to unlock the grid's full potential?

With the industry's only full-product portfolio combined with our hardware domain knowledge, Danfoss' end-to-end solutions deliver actionable insights and optimization—from production to distribution and consumption.



Danfoss Titan
A new dimension of district energy

Danfoss Titan combines best-in-class substations with innovative digital twin technology to add a new and data-driven dimension to the district energy network.

Discover Titan >

Danfoss Leanheat®
Holistic heating optimization from production to people

Danfoss Leanheat® is an application-driven suite of end-to-end software and services that optimize energy production and consumption, increase operational efficiencies, and put building control and maintenance in your hands.

Discover Leanheat® >