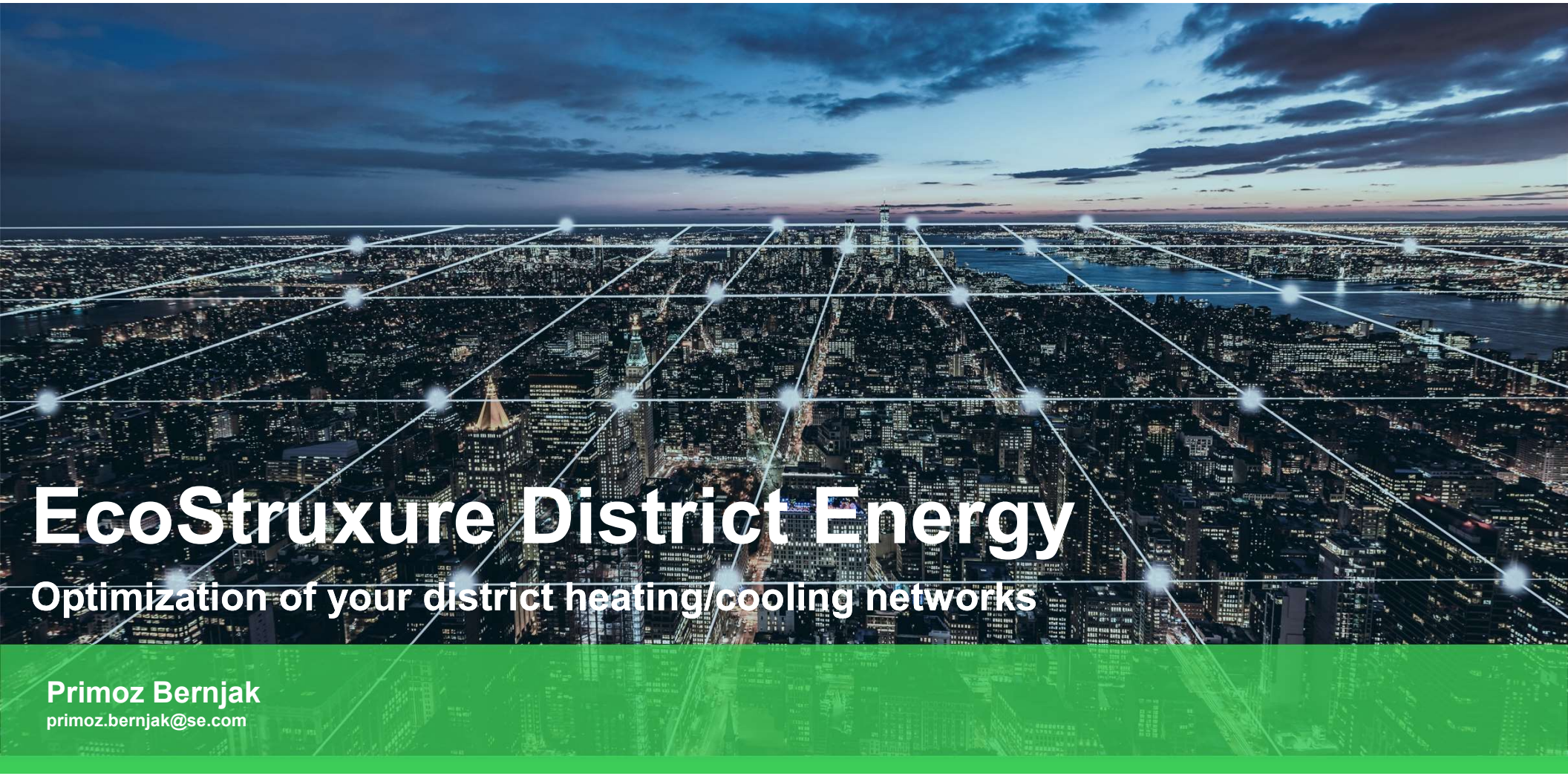

EcoStruxure District Energy

Optimization of your district heating/cooling networks

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Challenges, Imperatives, and New Enablers

Imperatives

- Increase energy efficiency, temperature optimization
- Investments in development and new technologies
- Environment, quality, safety regulations
- Dynamic security concerns
- Generation shift
- Pace of change

Market Environment

Energy transition, decarbonization and price

Regional trends and regulations

CAPEX constrains, Compressed construction, engineering & design cycles

Operational efficiency to drive sustainability and profitability

Performance management and decision support

Workforce evolution

Circularity and new business models

Technology Trends

- **Cloud**
- Industrial IoT/Edge
- **Big Data**
- **Digital Twin**
- **Artificial Intelligence**
- AR/VR

Daily challenges in DH management

Customer satisfaction

Reducing energy losses

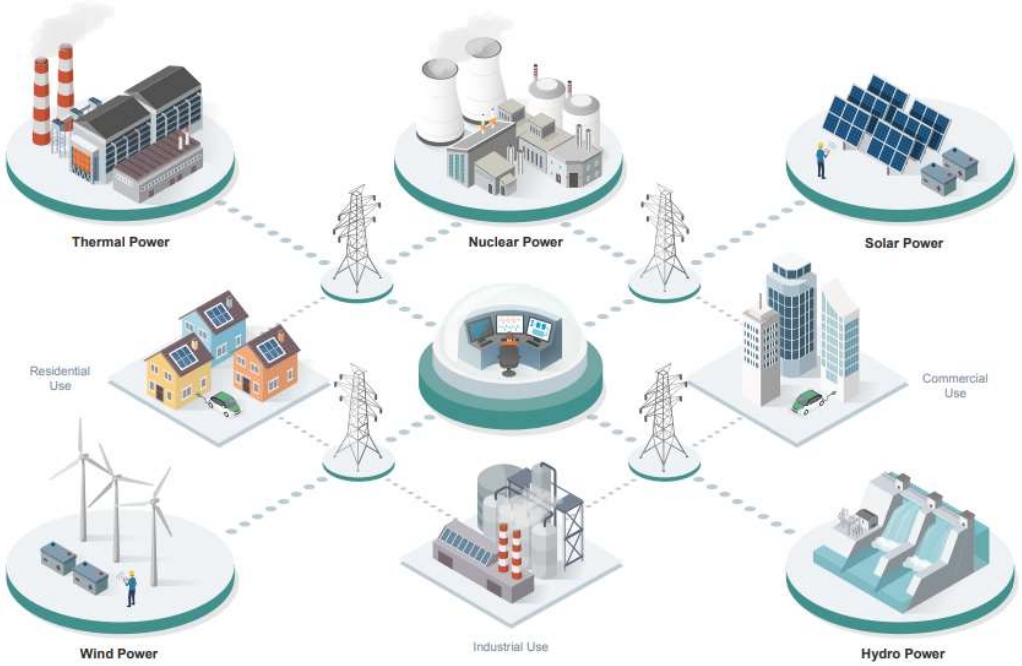
Reduction of CO_2 emissions

Fluctuation in demand

Changing weather conditions

Integration of multiple sources

Integration of renewable sources



Lack of information of system operation

Heat to power ration

Economical operation

Efficient network management

Network expansion

EcoStruxure Innovation At Every Level For District Heating Plants

EcoStruxure™ Architecture

Thermal

End-to-end Cybersecurity

Cloud and/or On Premise

Apps, Analytics & Services

- Project Management
- Unified Engineering (iE3D / SimSci)
  Dynamic Data management (PI System Platform)
  Predictive Analytics (Turbine Predictive Maintenance)
  Operator Training Simul / Augm. Operator Assistance
- **etapAPP** Field Data Collection
  NetPM Network Model Managment
  Modeling & Simulation (ETAP Design) / eOTS
- EcoStruxure Control Advisor
  EcoStruxure Asset Advisor
- EcoStruxure Power Advisor
  EcoStruxure Maintenance Advisor
- EcoStruxure Water Cycle Advisor - District Energy

Edge Control

- Magelis IIoT Box & Industrial PC
- ePROTECT eTESLA
- Modicon
- EcoStruxure Process Expert (Hybrid DCS)
- EPAS Maintenance & Engineering
- SCD 6000 RTU
- EcoStruxure Foxboro DCS
- EcoStruxure Triconex Safety System Triconex TMC
- EcoStruxure Power Automation System (EPAS)
- EcoStruxure Power Monitoring Expert

Connected Products

- eHouse
- Instrumentation & Control
- Galaxy & Symmetra UPS
- Comprehensive, robust portfolio of LV & MV Distribution products Incl SF6 free range
- Altivar
- TeSys Island

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JKP “Beogradske elektrane”

With nominal power of 2.819 MW this is the largest thermal plant in Serbia.

Customer Challenges

- Overlapping of the responsibilities of different utilities (DSO and Belgrade District Heating Utility)
- Centralized monitoring of the switching states of all heating plants
- Reliable partner for equipment maintenance
- Optimization of the consumption of the primary energy source

The Solution

- EcoStruxure District Energy - real-time acquisition of actual system parameters and integration on third party control system
- EcoStruxure Power Scada Operations
- Boosting Field Services with annual maintenance contract
- Modern approach to distribution network automation with Easergy T300

Customer Benefits

- Reliable Control Solution
- Reduced investment and life cycle costs with manufacturer maintenance
- End-to-end cybersecure EcoStruxure architecture

Beogradske elektrane
JAVNO KOMUNALNO PREDUZEĆE

Schneider Electric’s **largest install base** in last 20 years on Serbian market

They constantly make efforts to increase the **energy efficiency** of the system and to **reduce the negative impact** on the environment.

Apps, analytics and services	 EcoStruxure District Energy
Edge control	 EcoStruxure Power Scada Operations
Connected products	 Comprehensive, robust portfolio of LV & MV Distribution products; Altivar

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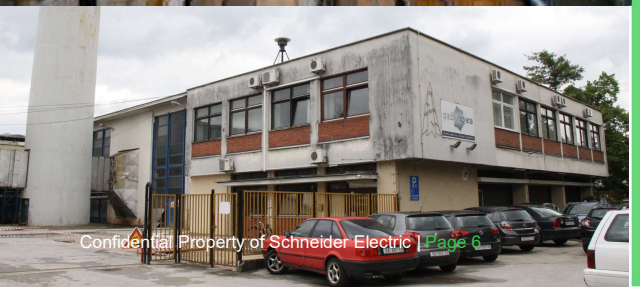
District heating utility in Croatia

Optimized district heating distribution network



Customer Challenges

- Increasing pressure on operations optimization
- Digitization of complete system
- To be a first choice as a heating provider in a city
- Service quality increase
- Decrease of CO2 emissions

The Solution

- Geo SCADA for monitoring and control of heating substations and complete district heating network
- M171 PLC's, pressure sensors and different low voltage equipment for substation switchboards
- District Energy system for hydraulic modeling with AI Load Forecaster module

Customer Benefits

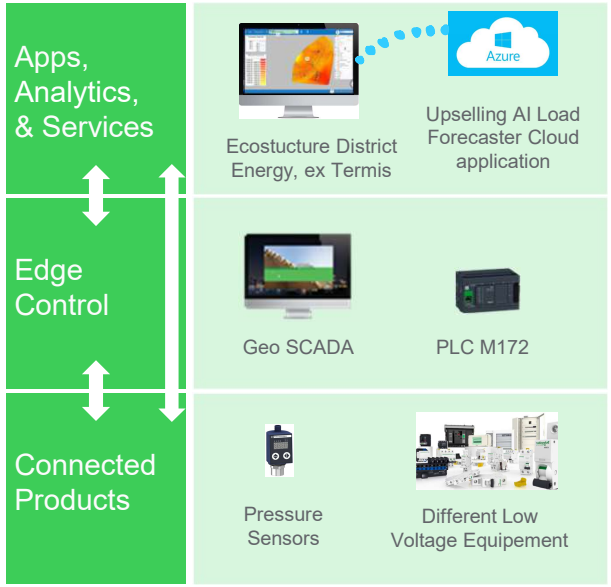
- Decrees of operational and maintenance costs
- Increased operational efficiency end quality of service
- Decrease of CO2 emissions

The Results: Life Is On with…

Secure and reliable solution based on Schneider Electric technology and Specialized partner relation

District heating provider in Croatia with a nominal power of 150 MW, which supplies heat for 7833 citizens.

EcoStruxure™ District Energy



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What is EcoStruxure District Energy (Former Termis)

EcoStruxure™ District Energy is the **digital twin** for **designing, operating** and **optimizing** your energy supply network. EcoStruxure™ District Energy reduces the utility's **energy costs** and usage to provide the appropriate **cooling/heating service,** minimize **heat losses,** and **streamline** the network operations**.**

Thanks to the use of our digital twin, we can provide further predictive analytics, **automated dynamic optimization** and **control**, **continuous visibility** and **transparency**, as well as **AI powered intelligence,** hence, offering **higher efficiency** and **lowering temperatures** on every district energy utility.

The digital twin for managing your energy supply network

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Why EcoStruxure District Energy?

Eco Struxture District Energy provide a complete solution for optimization of your DH system in production, distribution and final demand.

Optimization of heat production

Based on artificial intelligence and thermohydraulic modelling, it is possible to optimize heat production where it can be achieved:

- Forecasting and optimizing the required energy production
- Determination of the most economical and efficient operating mode of production plants with respection of providng optimal inlet temperature in DH network
- Determining the most economical and efficient way to operate the production units at each plant
- Respecting electricity and heat market, operating by shifting generated power to ensure the most profitable operation.
- Integrating into operations renewable sources, waste sources, ensuring the most optimal operation in terms of reducing emissions.
- Integration and determination of the most optimal and efficient operation of heat storages

Optimization of heat consumption

Based on collecting data from energy sensors and smart meters, and thermohydraulic modelling with artificial intelligence on top, it is possible to achieve:

- Optimization of heat consumption and demand forecasting
- Detecting problems in heat demand
- Optimizing demand-response heating for peak load savings
- Integrating and determining the operation of buildings with integrated heat storages

Optimization of heat distribution

Based on hydraulic and thermodynamic modelling with artificial intelligence on top, it is possible to achieve:

- Stabilization and optimization of controls of hydraulic and thermodynamic parameters in distribution network
- Providing optimal inlet temperatures at the plants while ensuring sufficient and comfortable supply temperatures at consumers' side.
- Minimizing total energy losses in the network
- Reduce operational and maintenance costs while extending the lifetime of key components in the DH system
- Optimization of the pipe dimenzining in distribution network and increasing the knowledge of the system operation.
- Integration and determination of the most optimal and efficient operation of distribution heat storages

Benefits of EcoStruxure District Energy

- Tool designed also **for control room operators** that can be easily **integrated to SCADA** systems from Schneider Electric or third parties
- **Dynamic temperature optimization** minimizes heat losses and maximizes heating/cooling capacity, in real-time
- **Production scheduler**: the best possible production scenario is chosen to ensure minimum production cost at the service level required
- **Forecast network behaviors**: what-if scenarios based on real-time constraints
- **Augmented reality**: reaches where SCADA does not get with virtual sensors and network wide monitoring

The solution has proven to provide project pay-back in less than 18 months

Up to 20% **Reduction of energy costs**

Up to 25% **Increase in operational efficiency**

Up to 20% **Reduction of CO_2 emissions**

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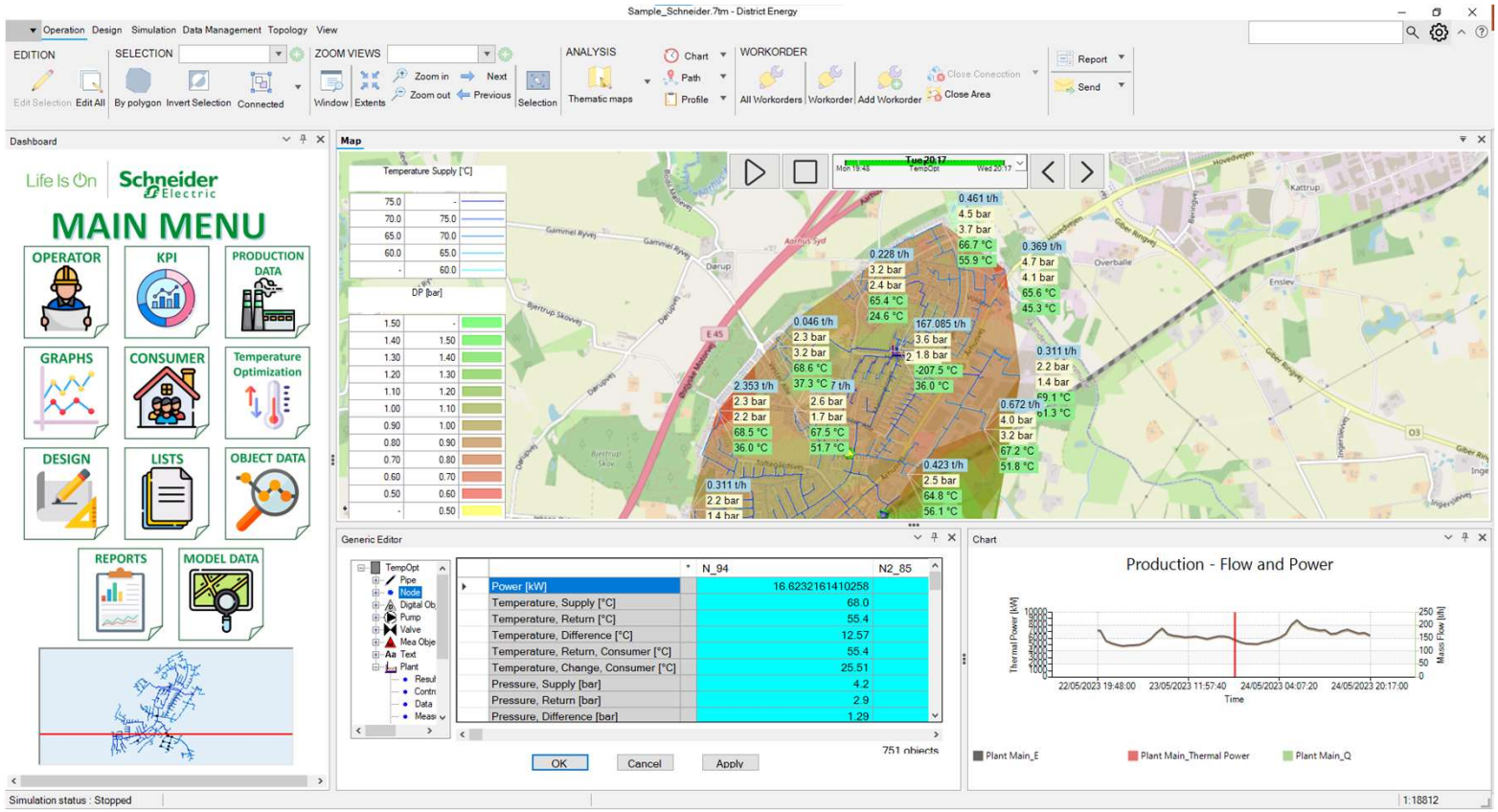
What are the new developmets

A completely new application

Faster performance, more user friendly, customizable, scalable, powered by latest technologies



Escalability (cut-edge technology and architecture)

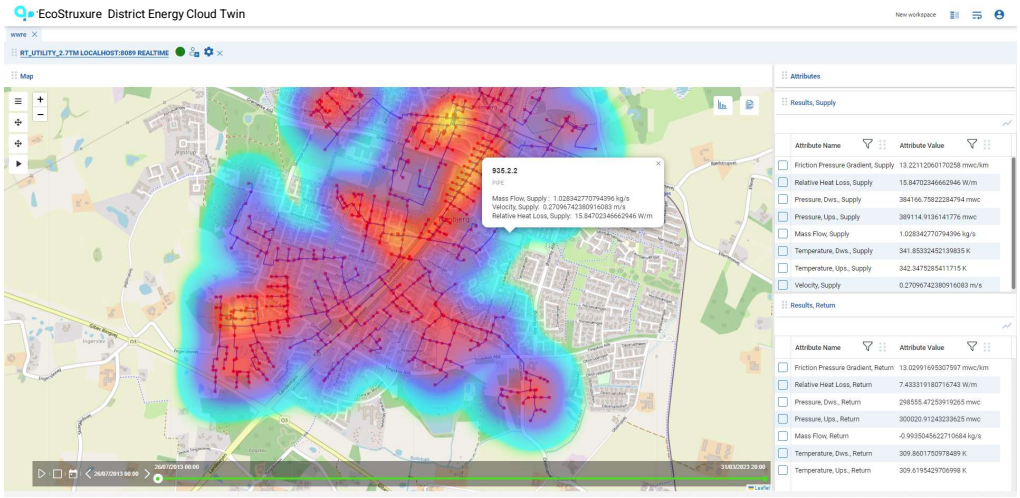
Customization (Engine and GUI – Citizen Developer)

Simplified usability and workflows (Common rules)

EcoStruxure District Energy Cloud Twin

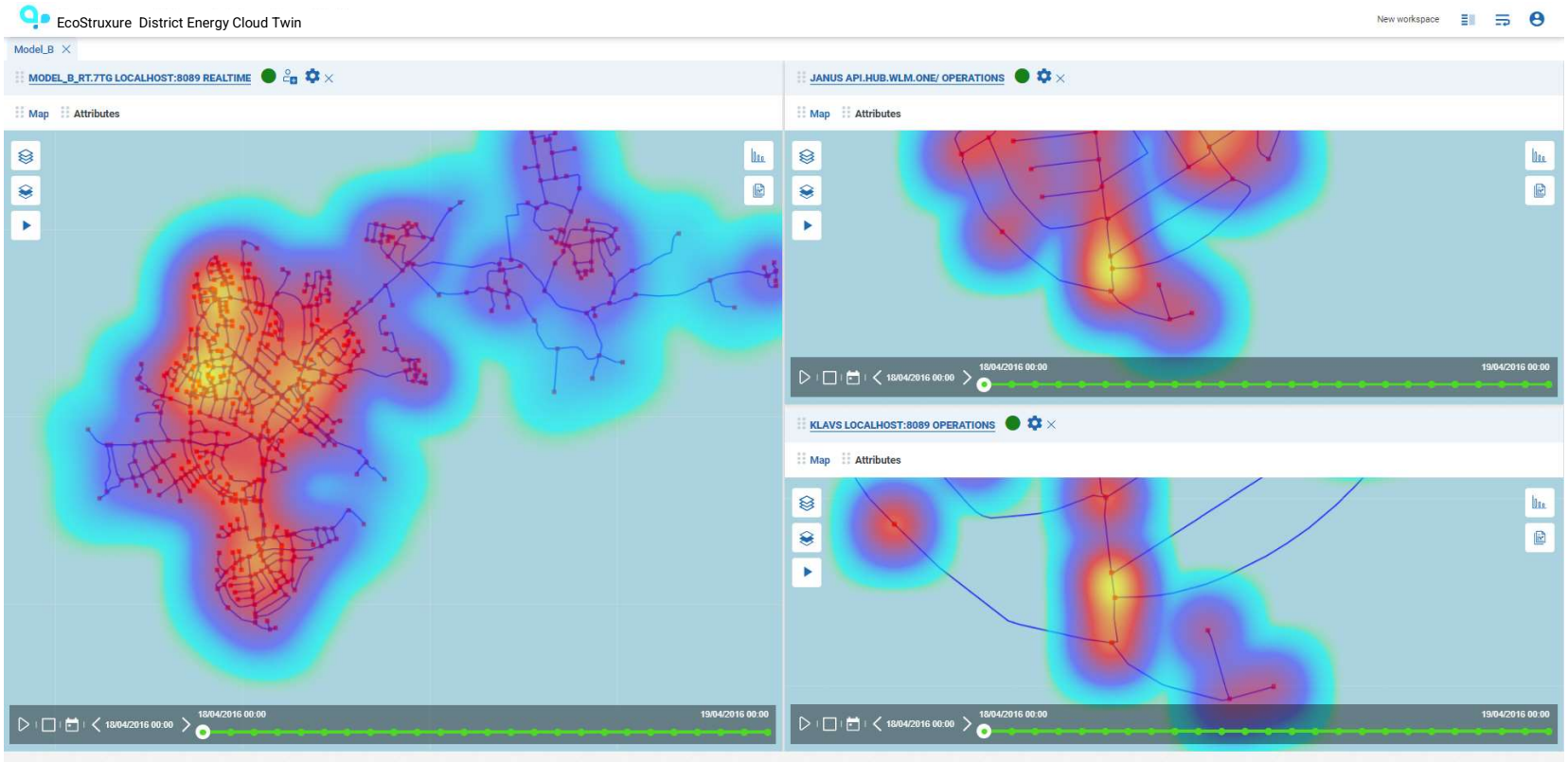
Our Solution

- **EcoStruxure District Energy Cloud Twin** is a cloud-based service which enables a connection to the different Digital Twins in the organization, so these are centralized in a single Hub.
- EcoStruxure District Energy Cloud Twin allows the user to:
  - Visualize all the real time and operation models in a centralized dashboard.
  - Compare several what-if scenarios and design alternatives, comming from different peopel in organization, side by side with the real time scenario. (Compare thematic maps, time series profiles, calculated values tables, etc.)
  - Create operation consigns, run them from the web, analyze the output, compare it with real-time models or any other operation scenario and send it to the real-time scenario. All from the same application and visualizing in live all the process
  - Alarms visualization and notifications
  - ….



EcoStruxure District Energy Cloud Twin

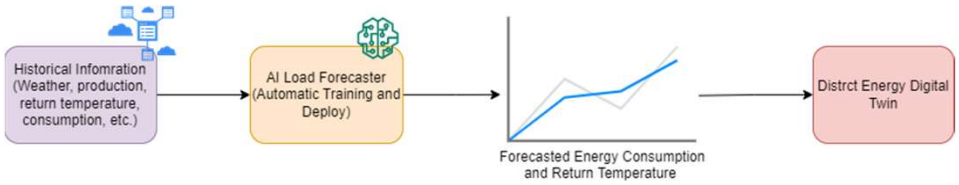
Look and Feel – What-if and real-time scenarios comparison

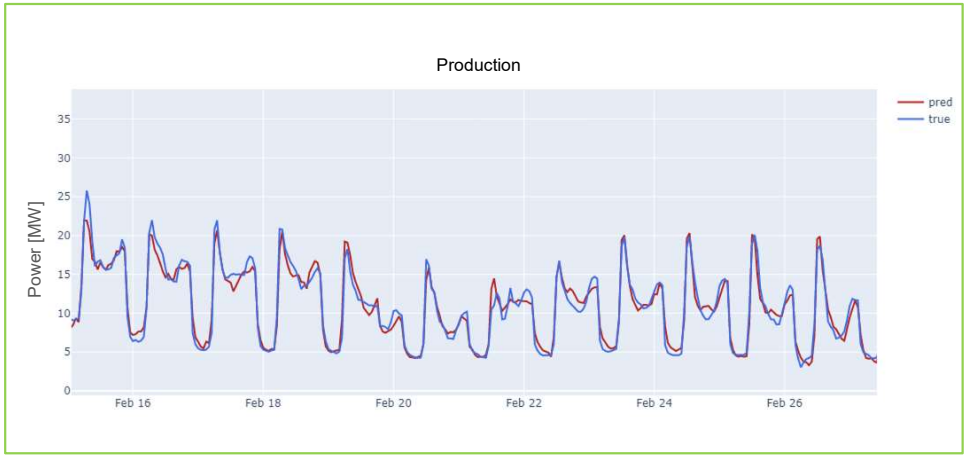


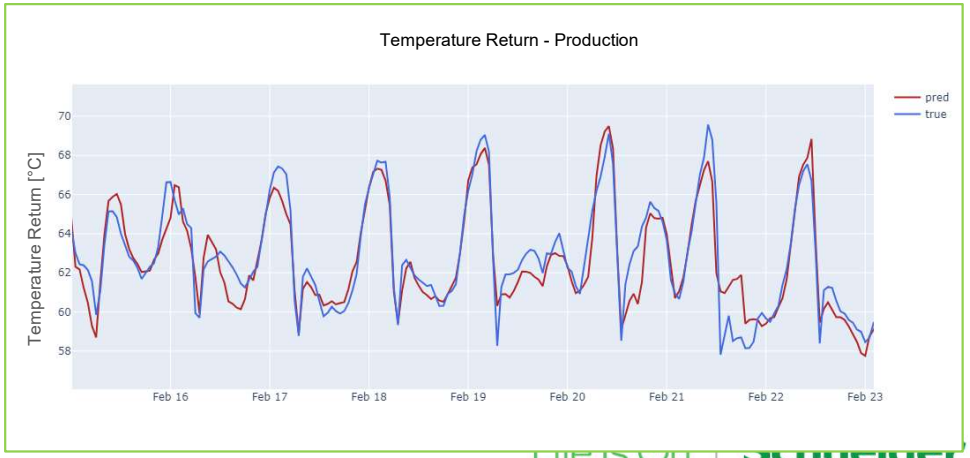
Digital Intelligent – AI Load Forecaster

The main purpose is to provide a more accurate and stable prediction of demand and therefore to ensure an optimal operation of the system in the future.

- Handle demand variations in due time according to the impact parameters.
- Consistent operation under certain external conditions
- Increase asset utilization and reduce downtime or cancellations of production
- Reducing energy consumption by improving process efficiency
- Optimizing production using different scenarios







We work with the biggest and most renowned companies in the world

Some of our key customers in district heating/cooling market:

Over 300 references worldwide

Applications ranging from 10 to 6.000 MW

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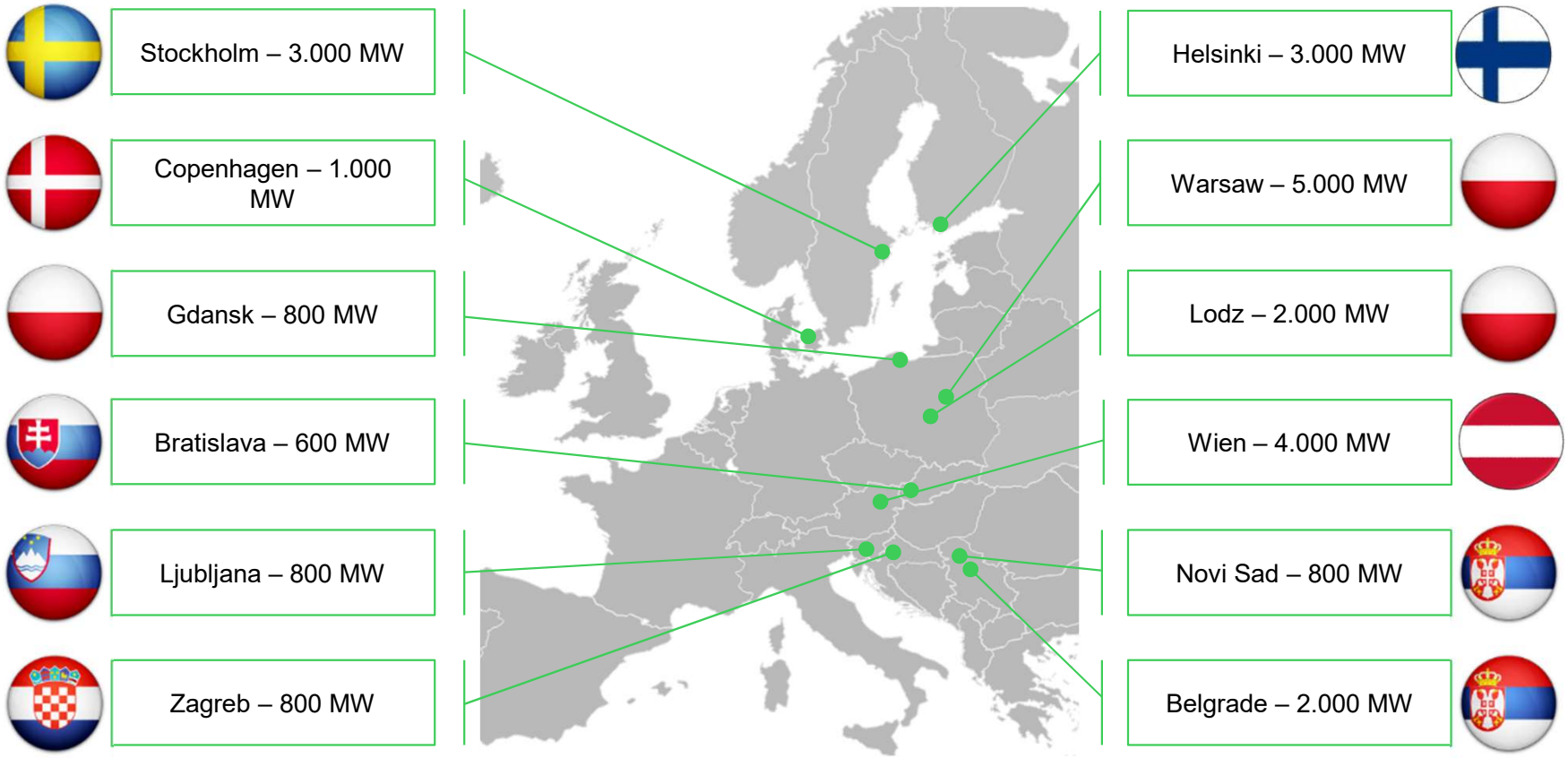
Many of the biggest district heating systems in Europe use EcoStruxure District Energy



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