Benefits of a Connected System

District Energy and the Industrial IoT

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Adam Strynadka
Managing Director

DeviceLynk
Actionable Intelligence

Wonderware
PacWest

Challenges in District Energy Today

- Increasing efficiency, while reducing costs, and lowering emissions
  - > Companies expected to reduce energy consumption and CO2 emissions
  - > Little to no visibility once energy leaves plant
  - > Energy supply / energy optimization: what levels, temperature, flow, and pressure should plants run at?
- Limitations of current systems and network
  - > SCADA only allows for partial monitoring of the network
  - > SCADA does not provide option to efficiently manage fluctuations in demand and weather conditions
  - > No software for temperature optimization
  - > Limited software for online operations
  - > No software for offline simulations

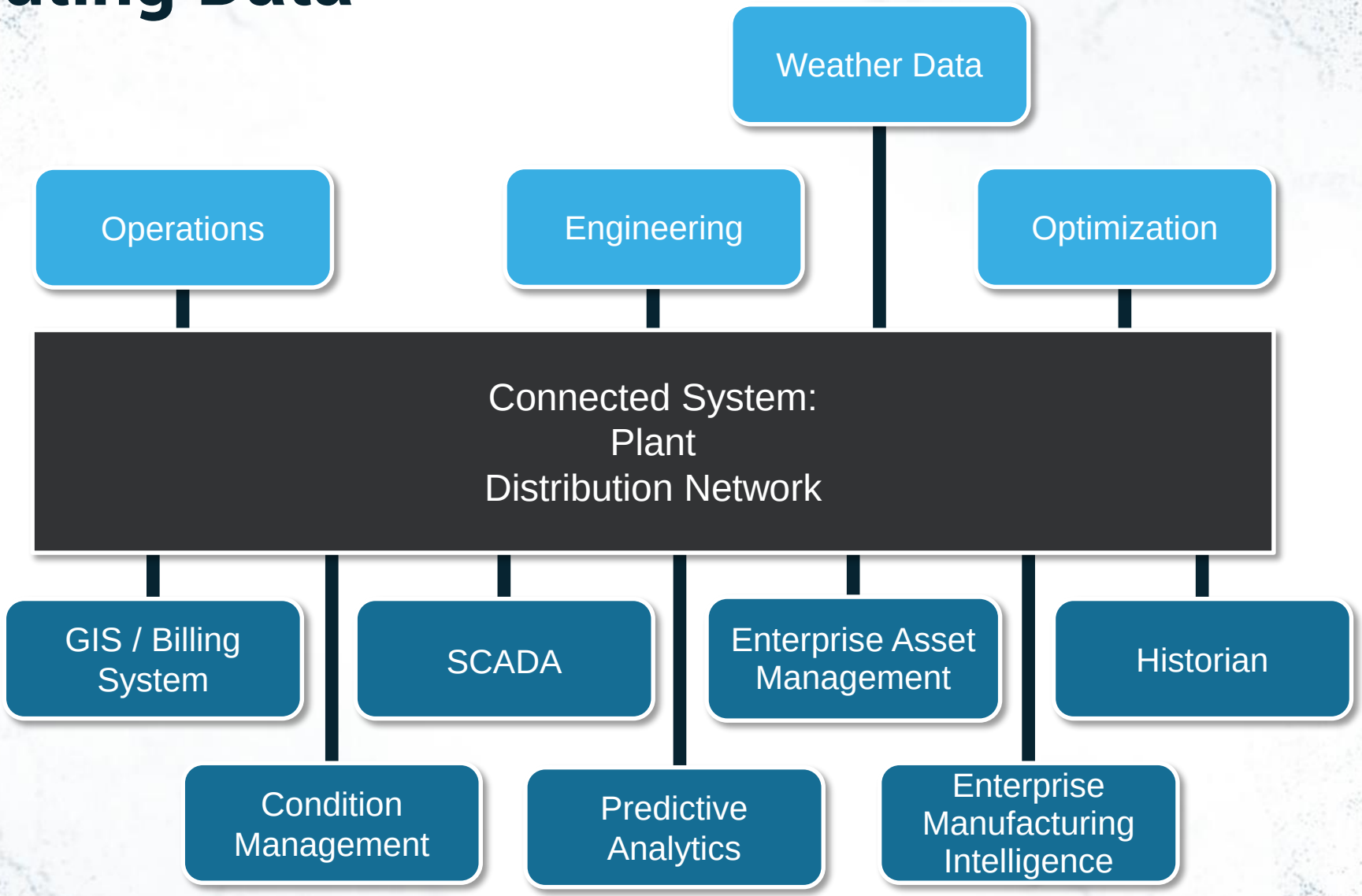
Benefits of a Connected System

From reactive control to proactive management

- Full visibility and control of operations – from distribution plant, to transmission network, to customer sites
- Automated response to dynamic conditions: supply, demand, pressure, weather
- Integrates data from multiple sources to display
- Increased access to actionable intelligence leads to improved, accurate, and timely decision making
- Efficient operations: reduced energy usage, operational costs, and CO2 emissions
- Links usage data and billing to enhance customer experience
- Connectivity to additional systems & data sources:
  - > Sensors
  - > Building Automation Systems
  - > Business Intelligence Systems
  - > Integration of data to SCADA

Progression of a Connected System

Contributing Data



Connectivity & Visualization

Automated Meter Reading

Customer Success Story

Creative Energy – Vancouver, BC

Vancouver based Creative Energy seeks remote monitoring solution for automated metering, customer retention, and more efficient system utilization.

Project goals:

- Automate system-wide meter reading
- Provide customers with visibility into energy usage and billing
- Enable mobile maintenance staff with real-time data on mobile devices
- Make generation facility data available outside the control room

Project Requirements:

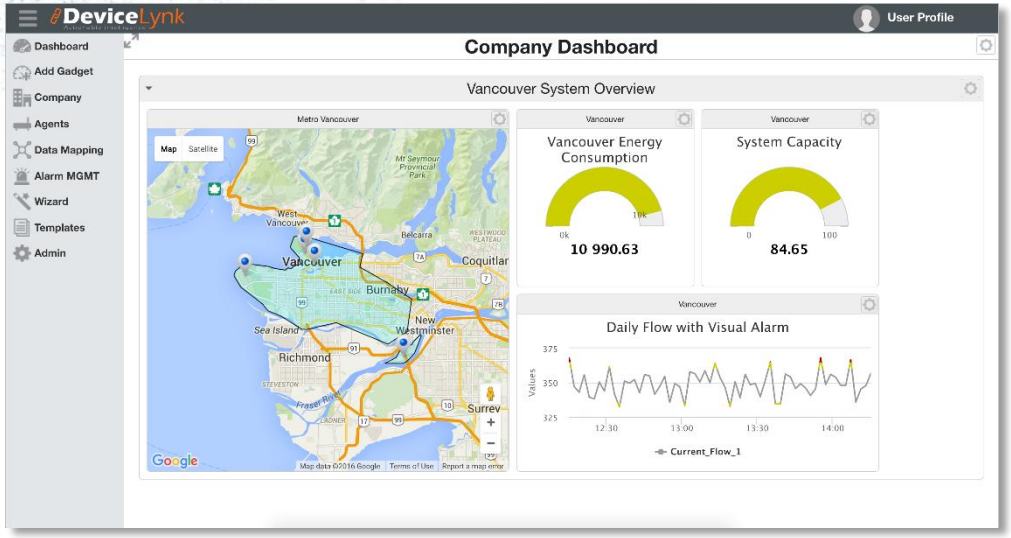
- Customer Retention
  - > Detailed explanation of historical & real-time usage information to backup monthly bill
  - > Information to enable customers to make smart, energy saving investments
  - > Customer portal for real-time viewing
- Automated Data Collection (Meter Reading)
  - > Enhance existing infrastructure
- Connect with Building Automation System of customer
- Integration with District Energy provider's billing software
- Fully interface and compliment energy generation control system
- Provide customer data into CE's enterprise database for advanced analysis

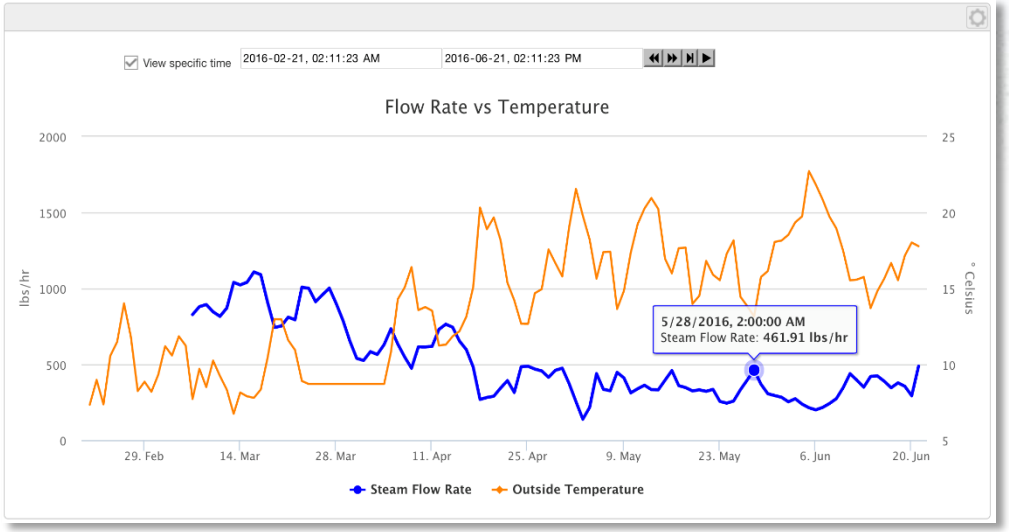
"Based on the data being brought into our dashboard, I already see items that should be addressed in the Building Automation System."

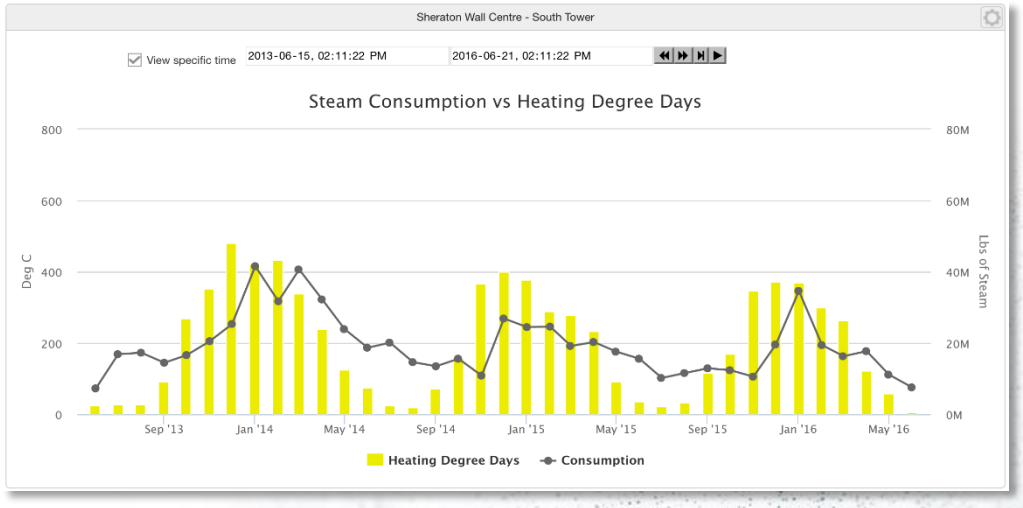
- Lori Parker, Operations Manager, on behalf of Creative Energy, 4 Hours after gaining access to DeviceLynk's Actionable Intelligence

Customer Success Story

Creative Energy – Vancouver, BC







Progression of a Connected System

Customer Success Story

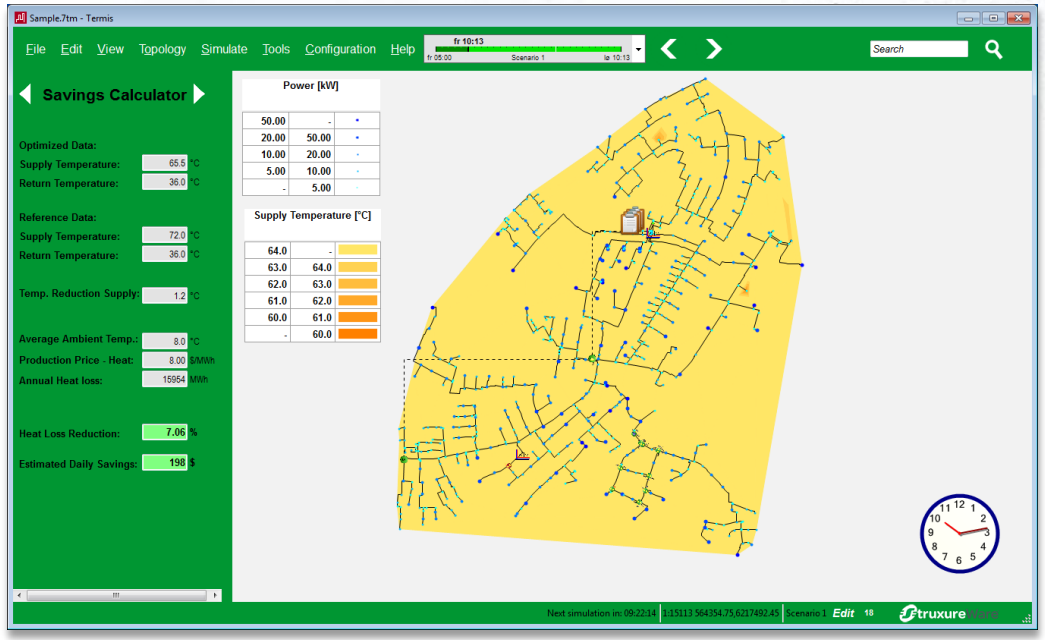
University of Texas, Austin
Energy Network Management

Project goals:

- Reduce energy consumption and environmental impact
- Improve contingency planning
- Optimize expansion and maintenance
- Ensure operational continuity and high levels of reliability

Solution: District Energy Platform with a Connected System

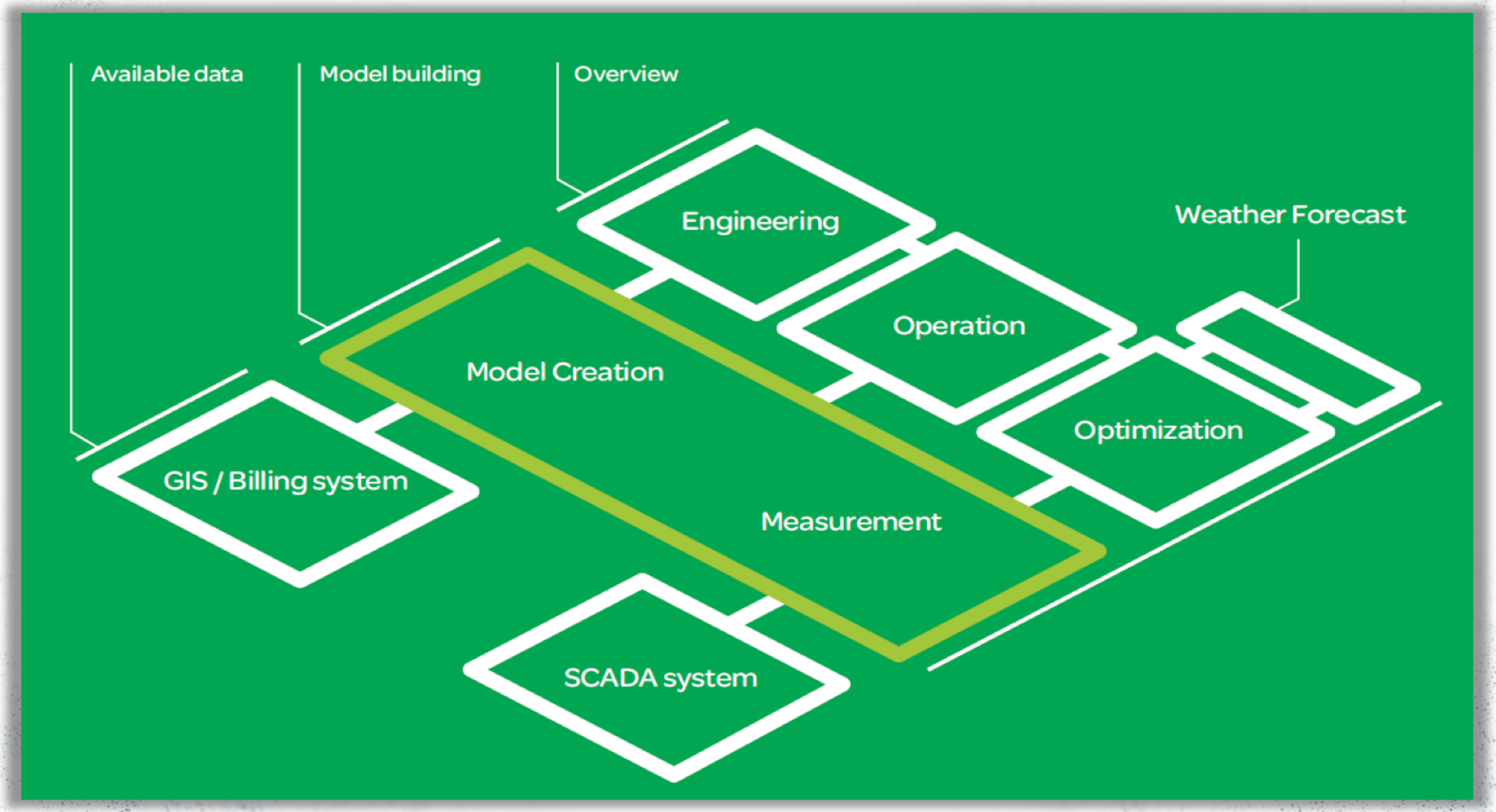
- Access to real-time application for prioritizing production
- Reduced overhead production costs
- Optimized system pressures and temperatures
- Knowledge of impact of operational actions beforehand
- Decreased operational man-hours



UTA Facts:
3rd Largest Campus in USA
Consumers: 50,000
Campus Buildings: 160
Plants: 11
Chillers: 4
Piping: 9.7km (~6 miles)
Temperature: 3.9° C (~39°F)

Customer Success Story

University of Texas, Austin



Network Behavior Forecasting

Reduce operations and maintenance risks and costs

- Forecasts network behavior:
  - > Service pressure, flows, temperature, etc…
- Discrepancies between current and expected situation of network
- Detection of malfunctioning equipment
- Augmented Reality
  - > Switch between simulation and real-time modeling

- What-if scenarios based on real-time data – anticipate impact:
  - > Effects of planned events: closing valves for scheduled repair, network maintenance work
  - > Impact of unplanned events: pump failure, unexpected consumption increase

Sample.7tm - Termis

File Edit View Topology Simulate Tools Configuration Help

ti 06:00
ma 11:00 ti 06:00 on 11:00

Search

Main

- Operator
- KPI
- Production Data
- Graphs
- Consumer
- Design
- Lists
- Object Data
- Model Data
- Reports

Temperature Supply [°C]

75.0	-	
70.0	75.0	
65.0	70.0	
60.0	65.0	
-	60.0	

Differential Pressure [kPa]

150.00	-	
140.00	150.00	
130.00	140.00	
120.00	130.00	
110.00	120.00	
100.00	110.00	
90.00	100.00	
80.00	90.00	
70.00	80.00	
60.00	70.00	
50.00	60.00	
-	50.00	

Flow: 55.370 kg/s
Power: 8.14 MW
Temperature, Supply, Plant: 70.8 °C
Temperature, Return, Plant: 35.7 °C

Temperature, Supply: 68.5 °C
Pressure, Difference: 91.41 kPa

Temperature, Supply: 66.9 °C
Pressure, Difference: 96.49 kPa

Flow: 13.992 kg/s
Power: 1.80 MW
Temperature, Supply, Plant: 72.0 °C
Temperature, Return, Plant: 41.3 °C

Data not available in SCADA

1:11234 563300.79,6217678.27 | Scenario 1 | 70

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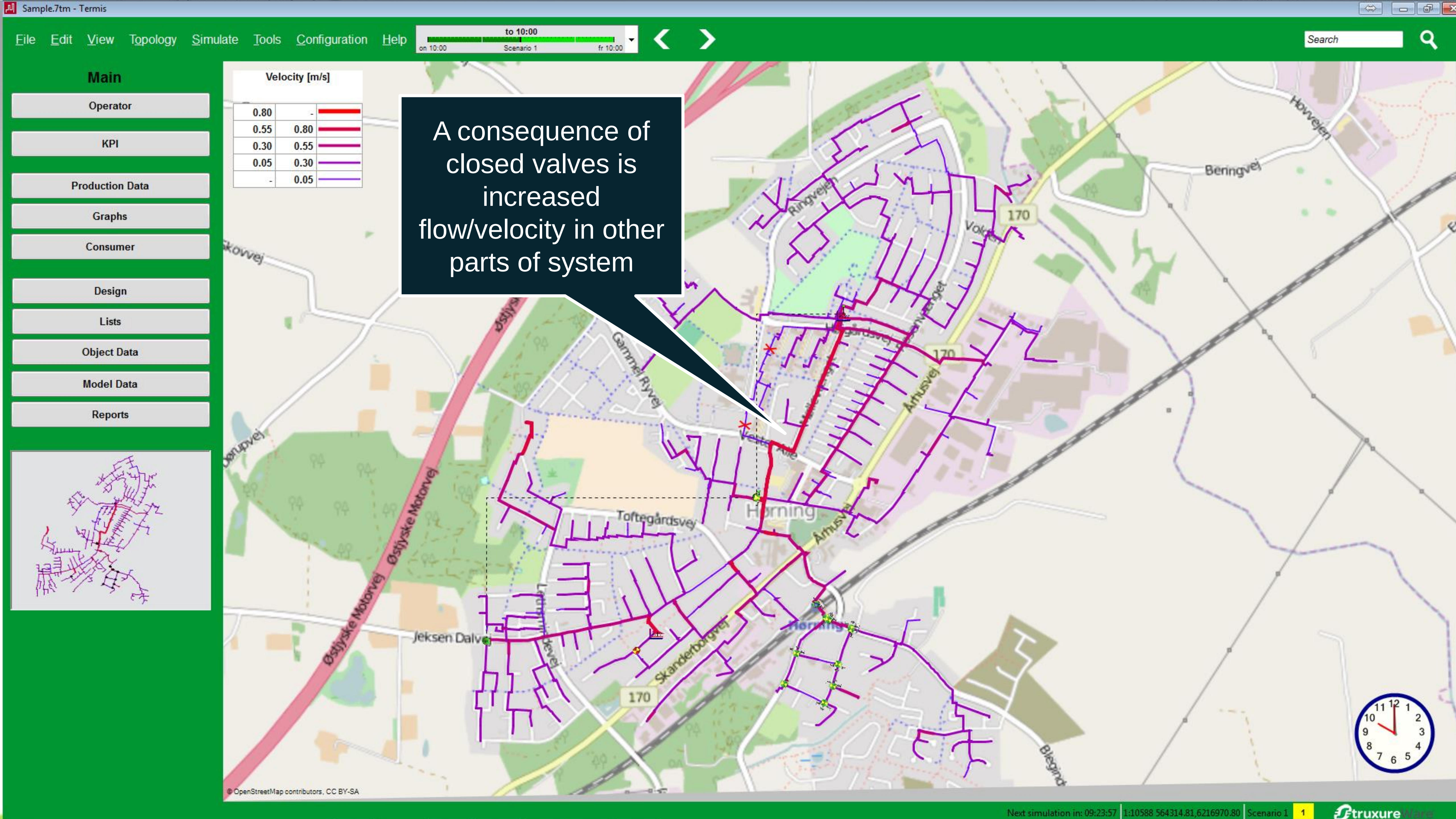


Sample.7tm - Termis
File
Edit
View
Topology
Simulate
Tools
Configuration
Help
to 10:00
Scenario 1
Main
Operator
KPI
Production Data
Graphs
Consumer
Design
Lists
Object Data
Model Data
Reports
Velocity [m/s]
0.80 -
0.55 0.80
0.30 0.55
0.05 0.30
- 0.05
A consequence of closed valves is increased flow/velocity in other parts of system
Ringvejen
Beringvej
Hovvejen
Skovvej
Toftegårdsvej
Gammel Ryvej
Jeksen Dalvej
Skanderborgvej
Århusvej
Østjyske Motorvej
170
© OpenStreetMap contributors, CC BY-SA
Next simulation in: 09:23:57
Scenario 1

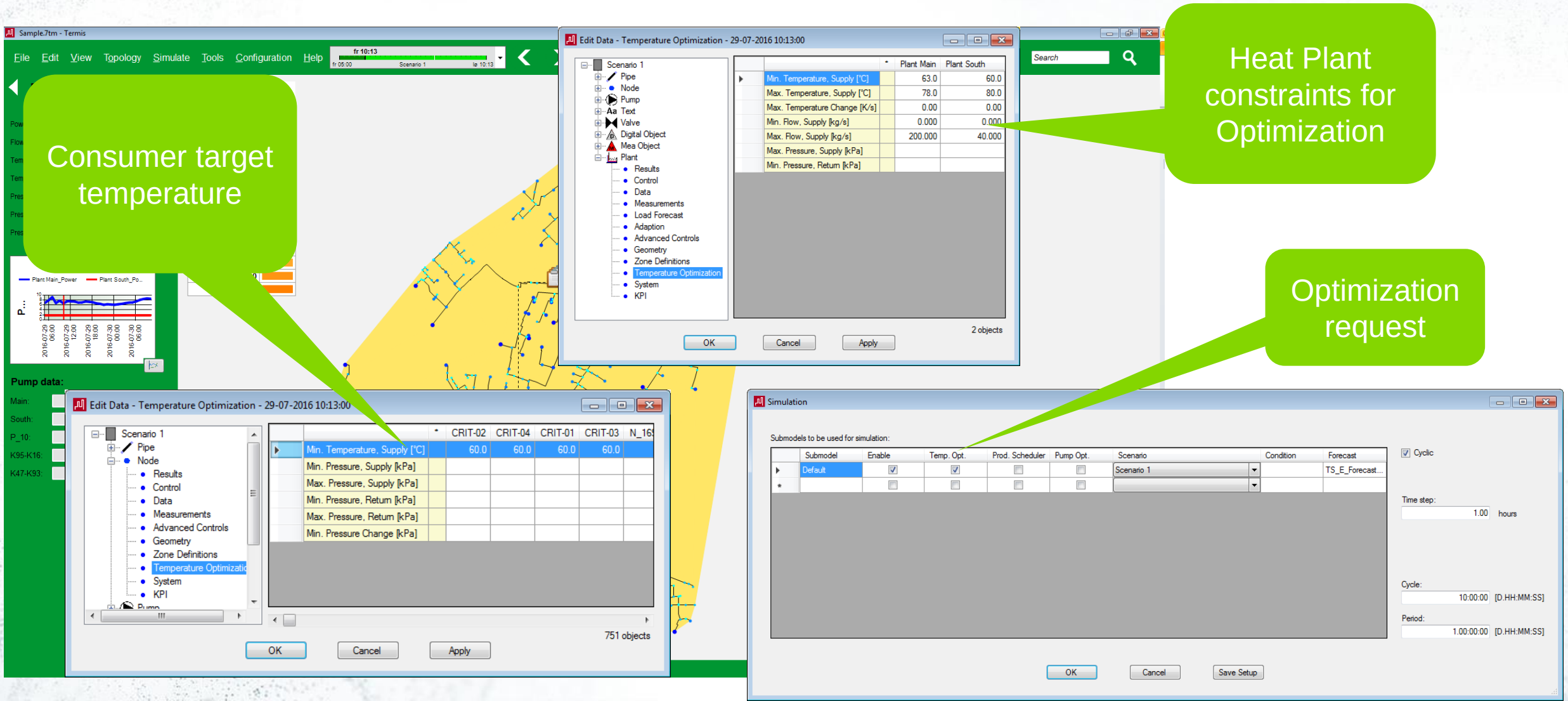
Temperature Optimization

District Heating Systems - Provide required service at lowest production cost

- Optimization of network supply and demand:
  - > Optimize inlet temperatures at plants, while ensuring sufficient supply temperatures at consumer's side
- Dynamically adjusts to temperature variations
- Automatic, optimal operation respecting respecting pressure and flow constraints

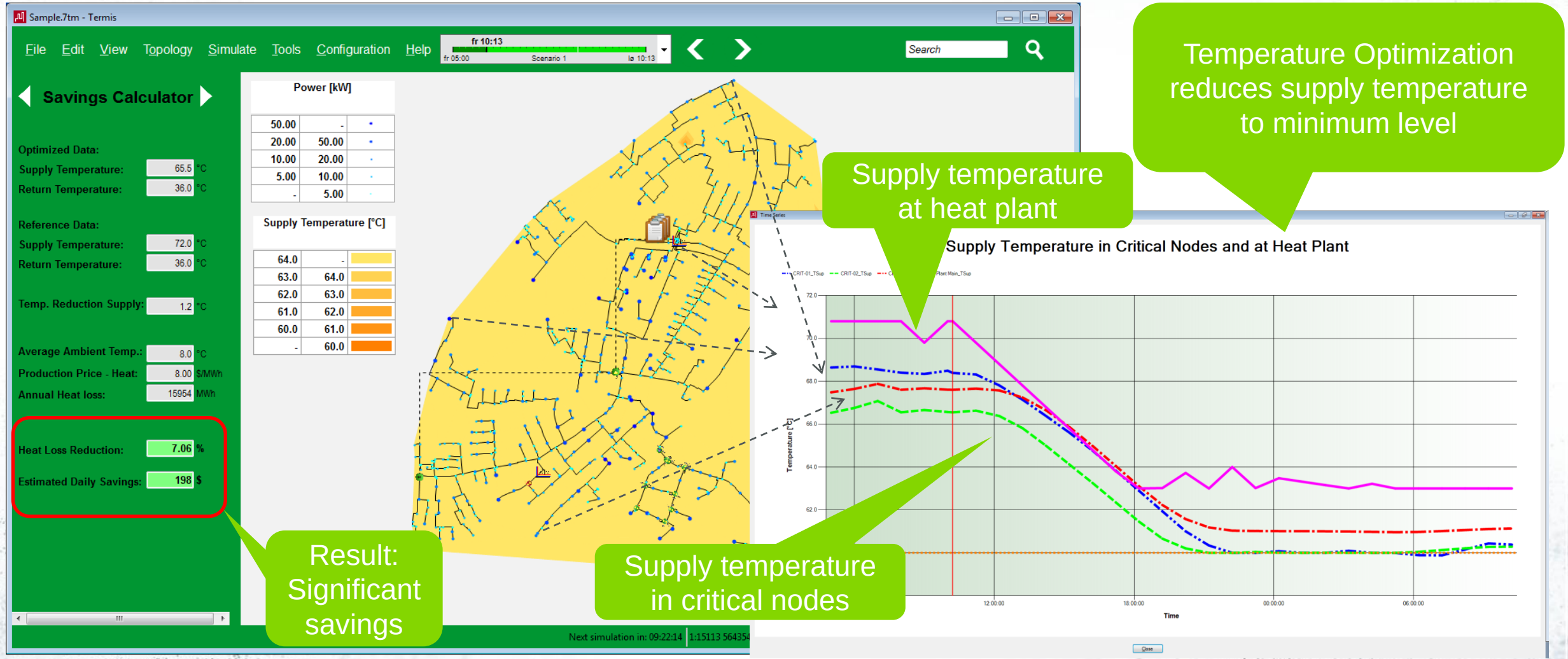
Temperature Optimization

District Heating Systems - Provide required service at lowest production cost



Temperature Optimization

Results & Savings



District Energy Optimization

From reactive control to proactive management

- Transforms network management approach from reactive to proactive
- Enhances real-time supervision in SCADA
  - > Provides more data for real-time decision making
  - > Provides additional data for predictive analysis
- Reduces energy usage, costs, and CO2 emissions while ensuring required level of service
- Reduces operations & maintenance risks and costs: predict network behavior and see what happens before it happens
- Improves service and planning: plan ahead and save time and money
- Builds on existing data and IT: gives existing software and systems new functionality

Progression of a Connected System

Benefits of a Connected System

District Energy System Operator - Generation Facility

- Manage the network efficiently with fluctuations in demand and changing weather conditions
- Increased visibility provides improved decision making
- View key plant data remotely - without affecting production
- Reduce operations and maintenance risks and costs
- Fully optimize pressure, temperature, production to reduce production costs
- Forecast system behavior using real-time data

Mobile Workforce

- Save time and money by automating meter-reads
- Access to operational data any time, any where
- Early detection of malfunctioning / inaccurate equipment

Customer (building operator)

- Provides easy access to usage data via web portal
- Integrate BAS & usage data into a single dashboard
- Relate usage data to external factors (weather, etc…)
- Insight into service status & maintenance

Data sources

- SCADA — Real-time measurements
- GIS — Asset data
- Hydraulic Models — Asset data
- Customer / Billing — Contact / Address

Connected Application

Outputs

- Expanded Real-time Control
- Prediction
- Alerts & Workflows
- Energy Network Management

District Energy Optimization

Improved Control of District Energy Networks

10% Reduction of energy loss

20% Reduction of energy costs

25% Increase in Operational efficiency

20% Reduction of CO_2

Less than 18 months
Return on Investment

Thank you!

Visit us at Booth 83 (DeviceLynk) to discuss your journey toward a connected system!

Adam Strynadka
Managing Director
DeviceLynk
adam.strynadka@devicelynk.com

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Actionable Intelligence

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