About ORTEP company

- ORTEP was founded in 1994 with the participation of the Association for the District Heating of the Czech Republic (ADH CR).
- Services: consultancy, auditing, engineering;
- Software products for thermo-hydraulic calculations: **MOP**, **DYMOS**;
- ...for heat producers, distributors, industrial enterprises, regional, municipal and local authorities and DHS designers

DYMOS

DYMOS® is a software system designed for **dispatcher control** and for **operation planning** and **optimization** of district heating systems.

- targeted to DHS operators (used at a dispatcher control room and at a operation planning office);
- individually deployed for a particular customer,
- system tied up with a particular heat network

DYMOS has history from 1996:

- In 1996-1997, DYMOS was deployed in Pražská teplárenská as Prague DHS dispatcher control system and operation planning system.
- It was offline + online, optimizing, dynamic model of heat sources, distribution and consumption with optimization of output temperature from 4 sources (and its direct control), with fuel cost optimization respecting electricity trading, with hydraulics control.
- DYMOS was completely redesigned and rewritten to modern platform in 2016-2018, reflecting 2 decades of experience.

MOP

MOP is a software tool used when optimizing, expanding, reconstructing or verifying the operation of an existing heat network or when planning or designing a new heat network.

- based on complex thermo-hydraulic calculations – both steady-state and dynamic,
- targeted to both DHS designers and DHS operators,
- both for water networks and steam networks,
- universal – for modeling of any heat network – unlike DYMOS

MOP has history from 1995, initially independent product from DYMOS

- ...redesigned to modern platform and finally merged with DYMOS to unified product technology base in 2016-2018

Key technologies

- detailed, stable and accurate physics calculation core for **digital model** of heat production, distribution and consumption;
- heat distribution: **dynamic** modelling of water or steam flow – temperature / flow rate / pressure model;
- heat consumption: consumption prediction using **deep learning** (artificial neural networks model) and weather prediction, smart fast consumption model adaptation;
- online connectivity for loading measured valued and integration with other customer‘s systems

WATER network – example problems

- network heat loss calculation,
- dimensioning of network:
  - dimensioning of pump, valves, pipes, shunts; pressure differences of heat exchangers;
- redistribution of the power supply among available heat sources (according to their capacities, priorities and the heat transfer capacities of pipelines of the network);
- checking the possibility of connecting new local heat sources;
- hydraulic analysis including pump operation,
- optimizing output temperature from sources

STEAM network – example problems

- network heat loss calculation,
- evaluate the possibility of reducing the output pressure from the source;
- condensate balance calculation:
  - dimensioning of the steam traps;
- evaluation of steam properties:
  - calculation of enthalpy in heat exchangers;
  - steam properties dynamic calculation – ensuring customer contract compliance

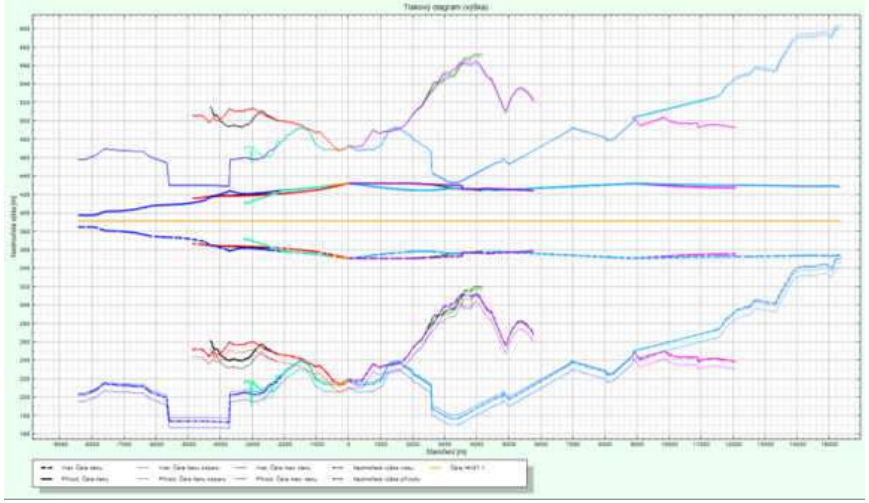
Example tasks solved

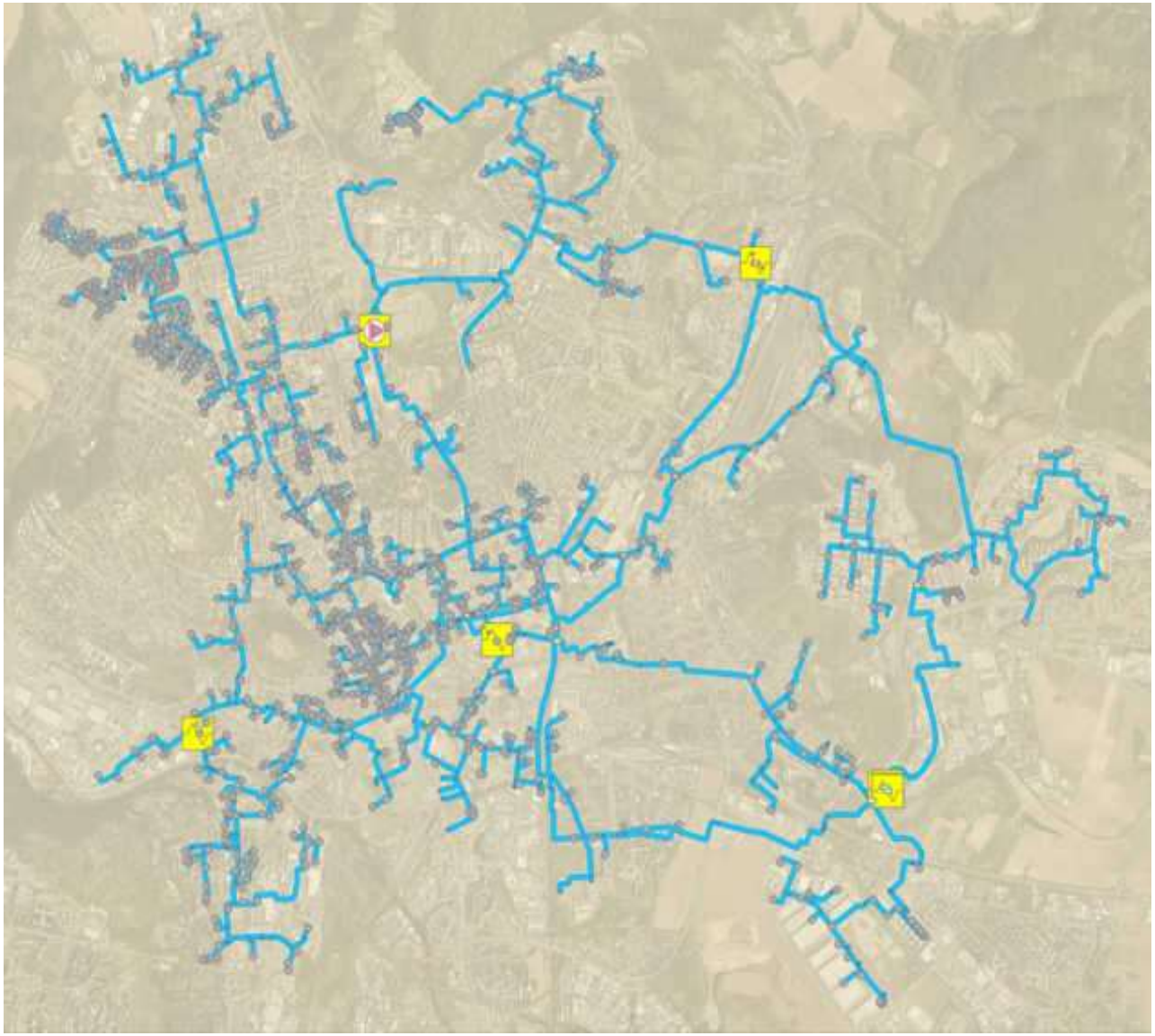
Brno city heat network:

- approx. 300 MW of heat in peak load
- 2500 – 3000 TJ/year
- steam + hot water systems

Solved:

- complete conversion of steam/water system to only hot water system
- cooperation of 5 sources





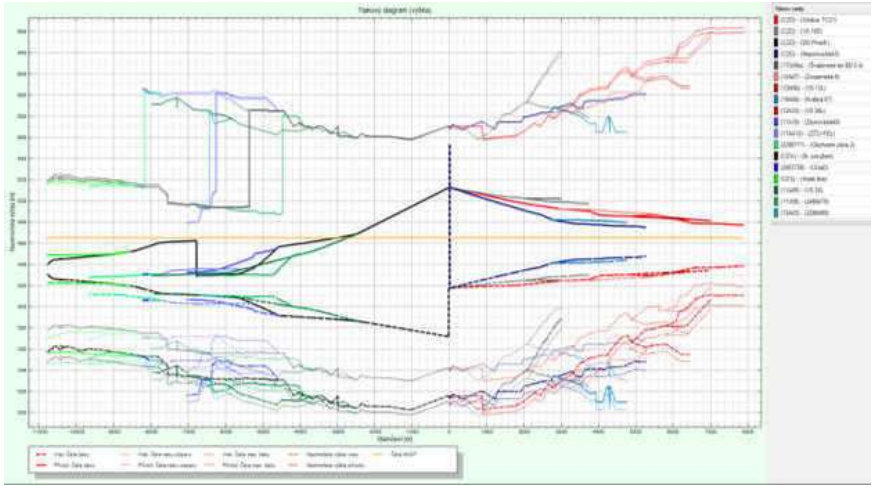
Example tasks solved

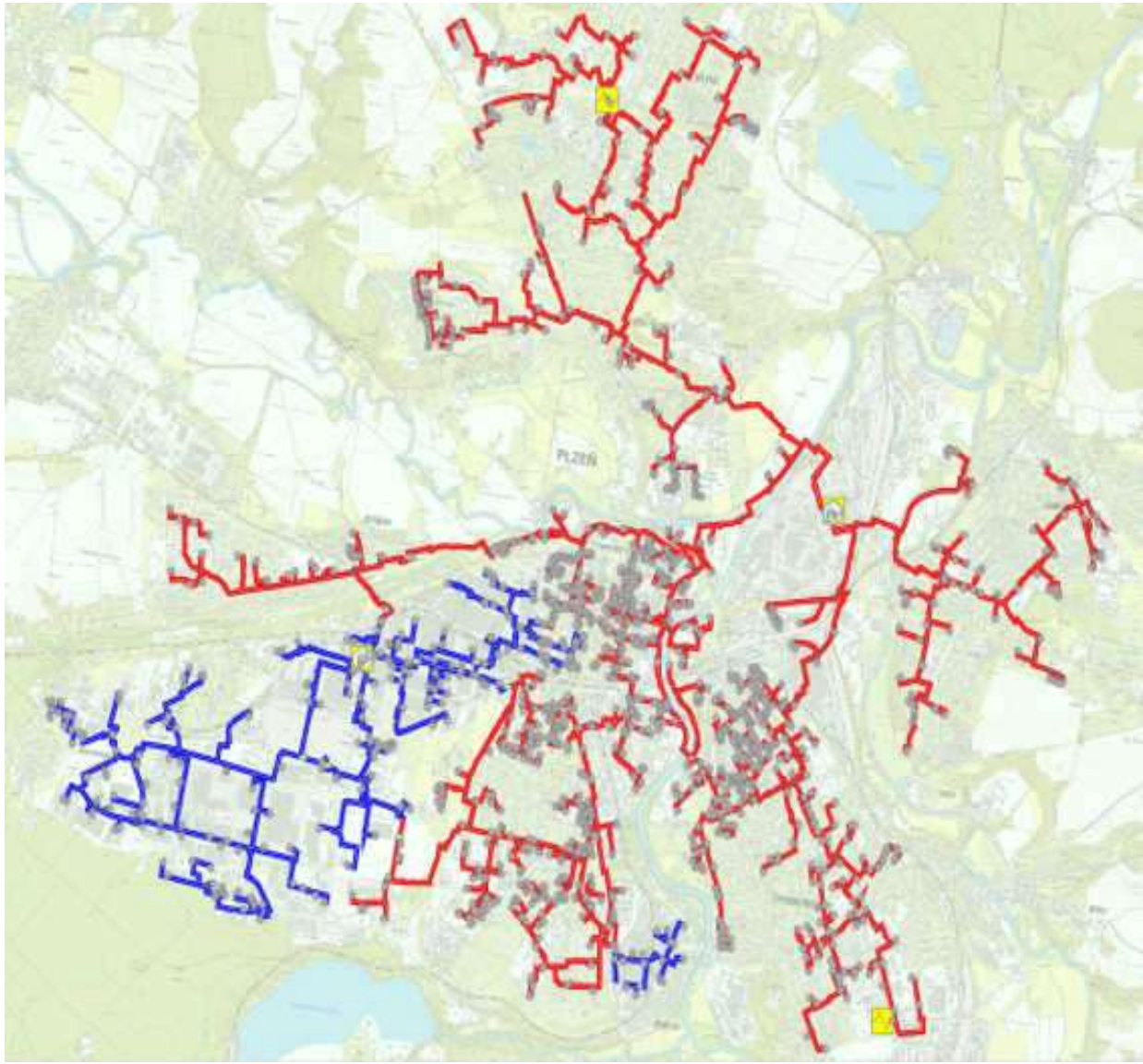
Plzeň city heat network:

- approx. 330 MW of heat in peak load
- approx. 3400 TJ/year
- 2 separate hot water systems, 2 DHS operators
- different maximum pressure levels

Solved:

- interconnection of both networks and assessment of possibilities of cooperation of both sources





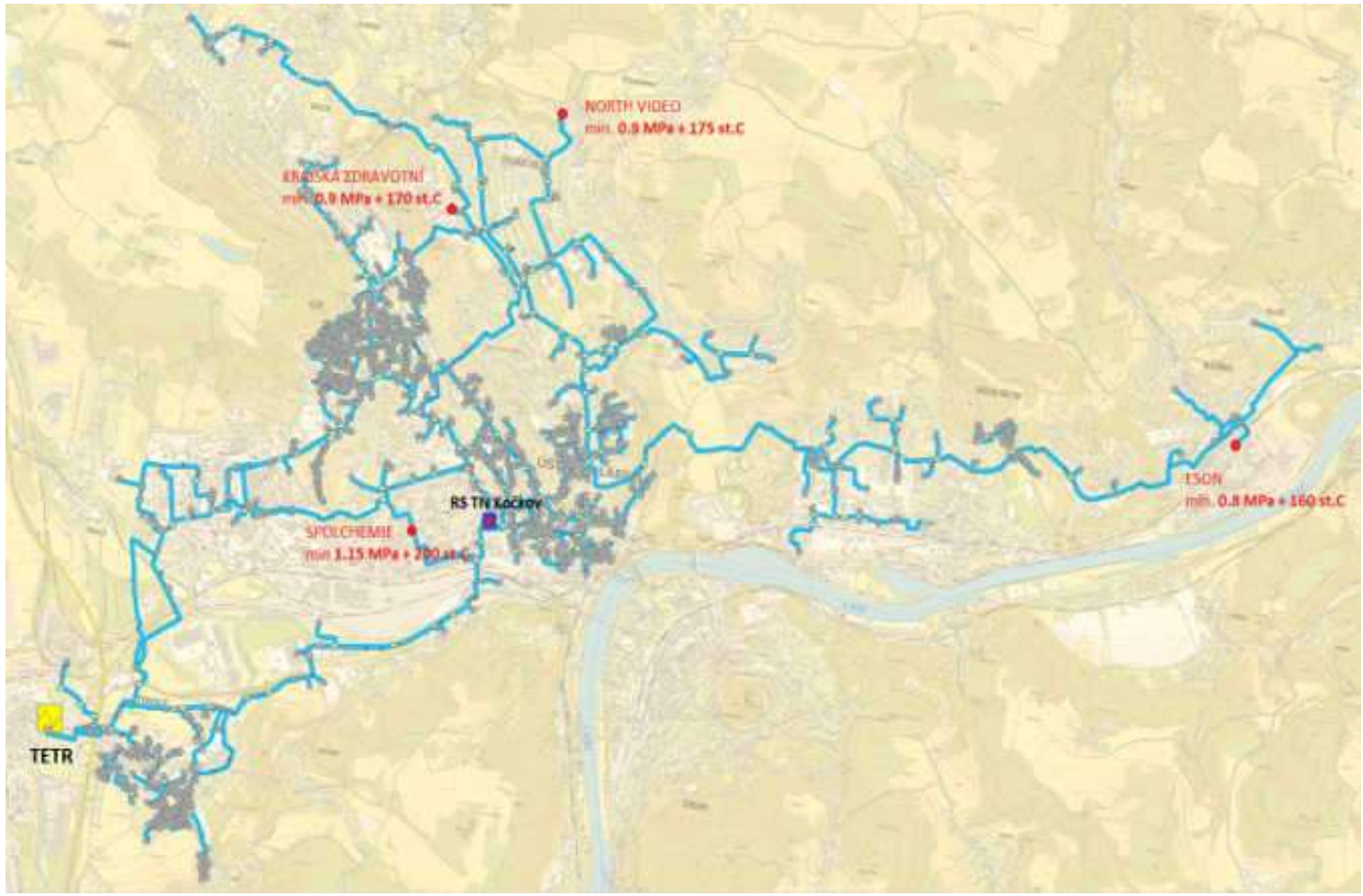
Example tasks solved

Ústí nad Labem city heat network

- approx. 220 MW of heat in peak load
- approx. 2300 TJ/year
- old steam network from 60s

Solved:

- possibilities of reducing the outlet pressure
- evaluation of heat losses in the network



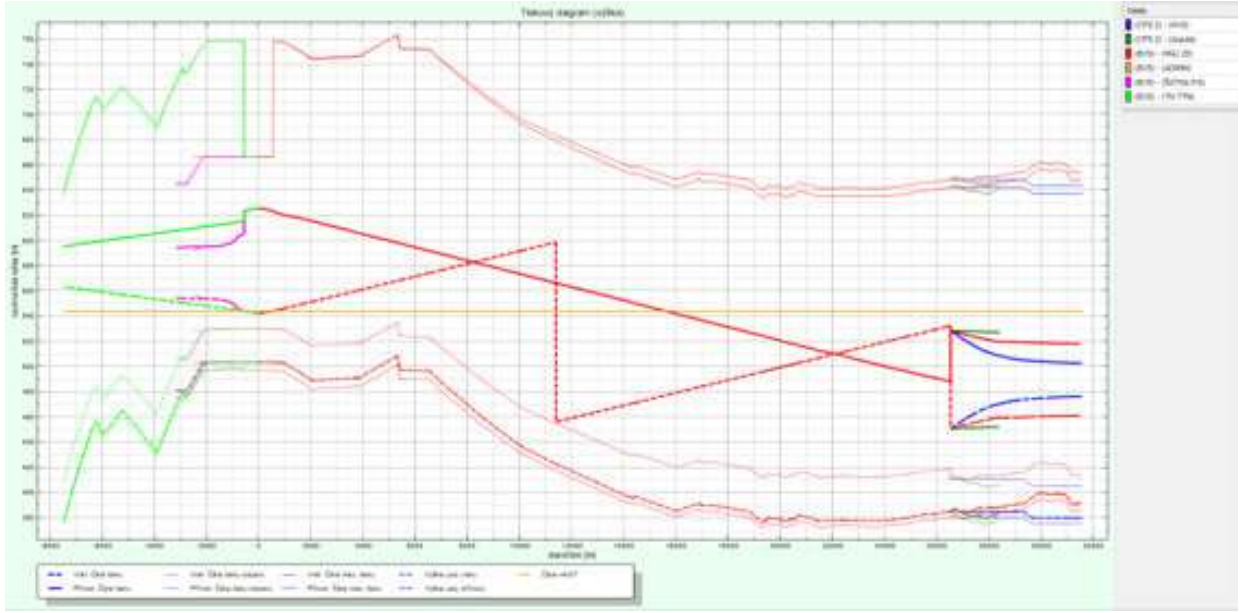
Example tasks solved

České Budějovice city heat network

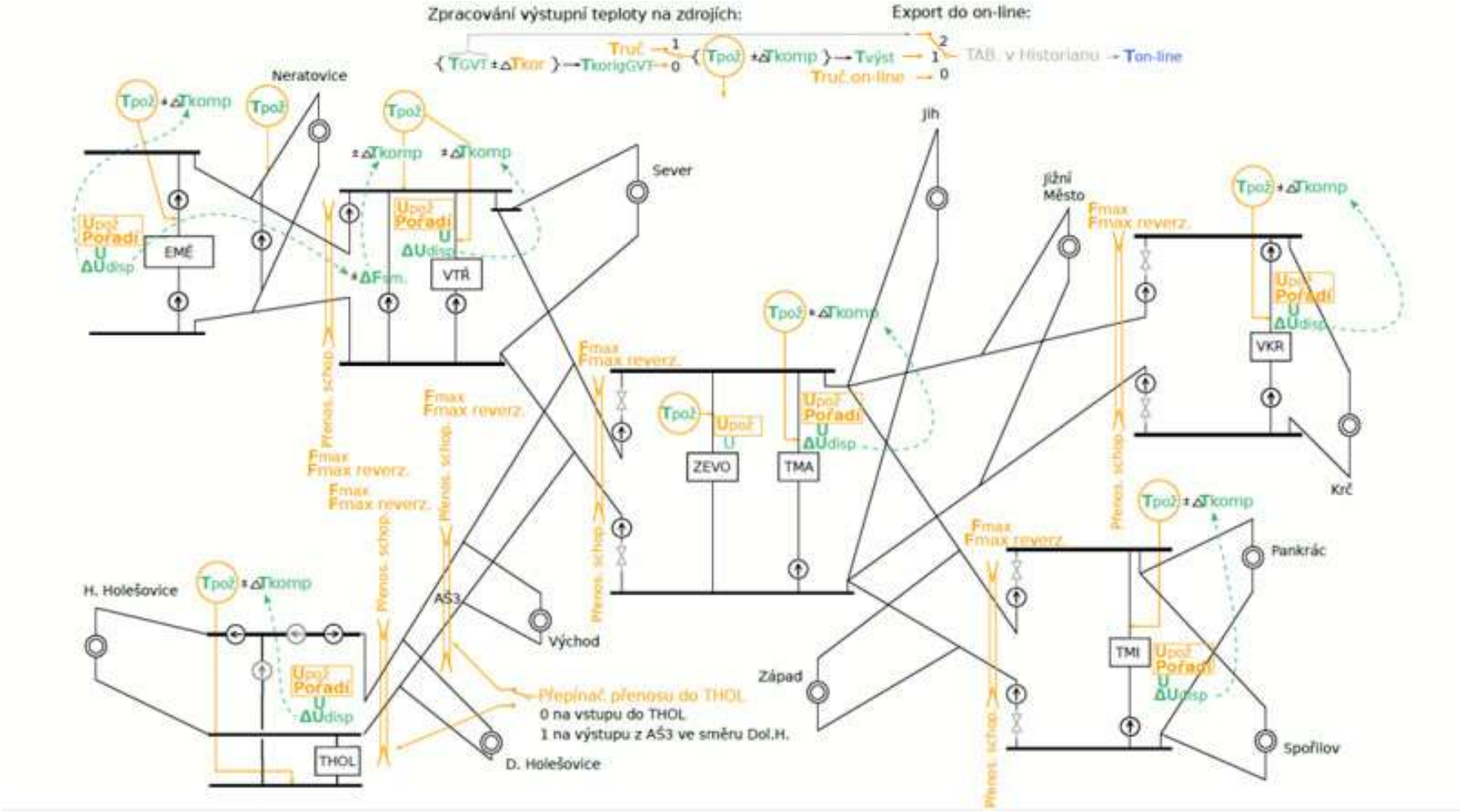
- hot water system in České Budějovice
- 70 MW of heat in peak load
- 750 TJ/year
- coal boilers

Solved:

- design of new thermal feeder (26 km) from NPP Temelín
- dimensioning of pumps (4 groups of pumps) and their cooperation in various modes



Example of custom hydraulic control



What can be modelled

- water and steam heat networks
  (steam pipes including condensate running down at the bottom),
- complex topological structures, many loops, many heat sources,
- large networks with volume loss calculations,
- pumps, pressure control valves, stop valves, mixing nodes and shunts,
- overall energy balance including heat losses,
- energy accumulation and transport delay optimization,
- superheated and wet steam flow including steam traps calculation,
- island mode operation,
- network dynamics including heat accumulation in piping,
- pumps, pressure reduction valves, checking maximum and minimum pressure control;
- dynamic consumption model using deep learning (artificial neural networks).

MOP & DYMOS customers

Successful deployments

Pražská teplárenská by VEOLIA

TEPLÁRNY BRNO

Teko TEPLÁREŇ KOŠICE

TEPLÁRNA ČESKÉ BUDĚJOVICE, a. s.

EOP ELEKTRÁRNY OPATOVICE

ALIMOPROJEKT

Eurotherm

PLZEŇSKÁ TEPLÁRENSKÁ

save

Teplospol a.s.

EVČ

SITEZ s.r.o.

TEPLÁRNA STRAKONICE a.s.

Tenza

ST SEVEROČESKÁ TEPLÁRENSKÁ

MVV Energie

UE UNITED ENERGY

ČEZ TEPLÁRENSKÁ

THERMO PLUS

Consulting & services references

...complete list (hundreds of cases) available on **www.ortep.cz**

For completing more than 100 cases we have also used MOP models.

We ourselves are very frequent users of our own software.


Interested to learn more?
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www.ortep.cz