CLEANTECH FINLAND

Planora Oy

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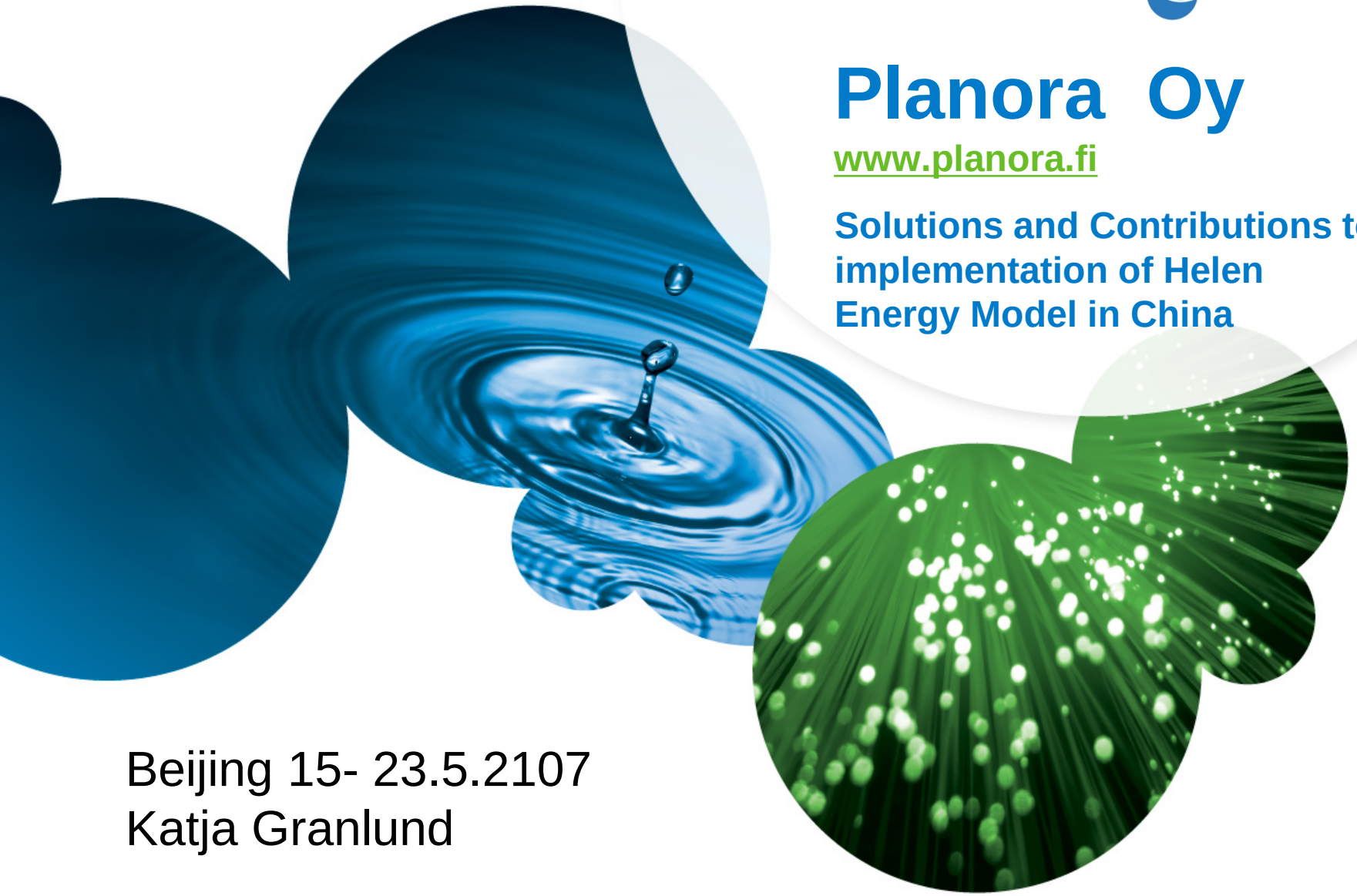
Solutions and Contributions to the implementation of Helen Energy Model in China

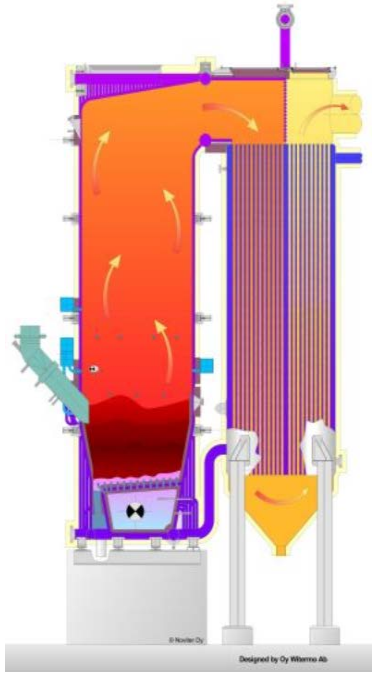


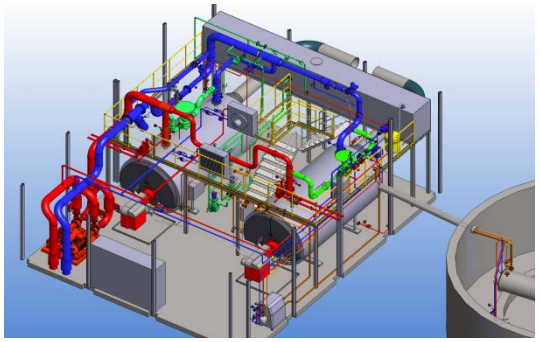
Beijing 15- 23.5.2107

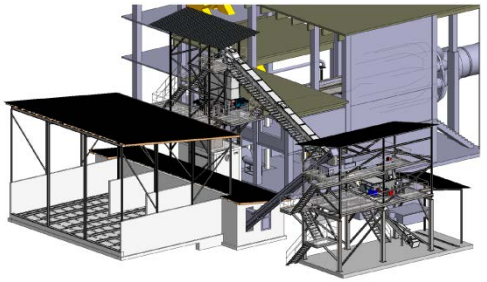
Katja Granlund

Planora's main sectors of activities

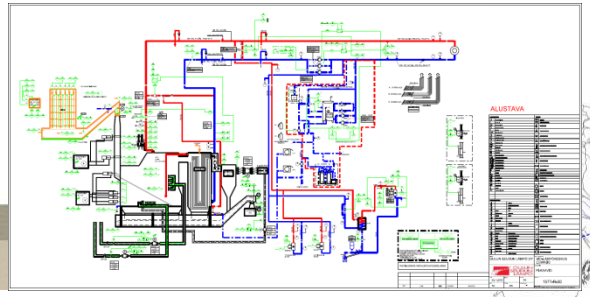
Consulting

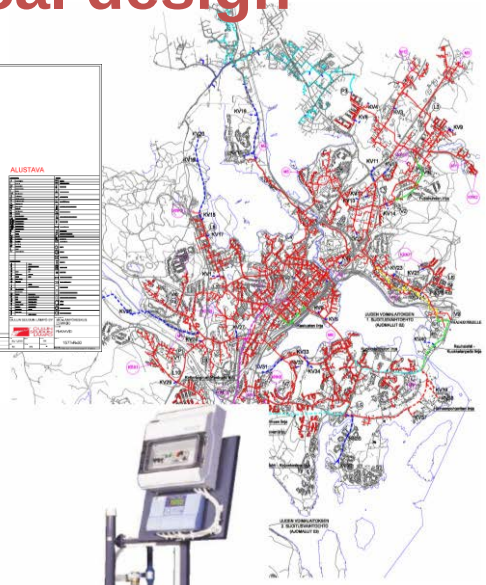






Technical design





Contributions of Planora to the Finnish Energy Model (FEM) f.ex.

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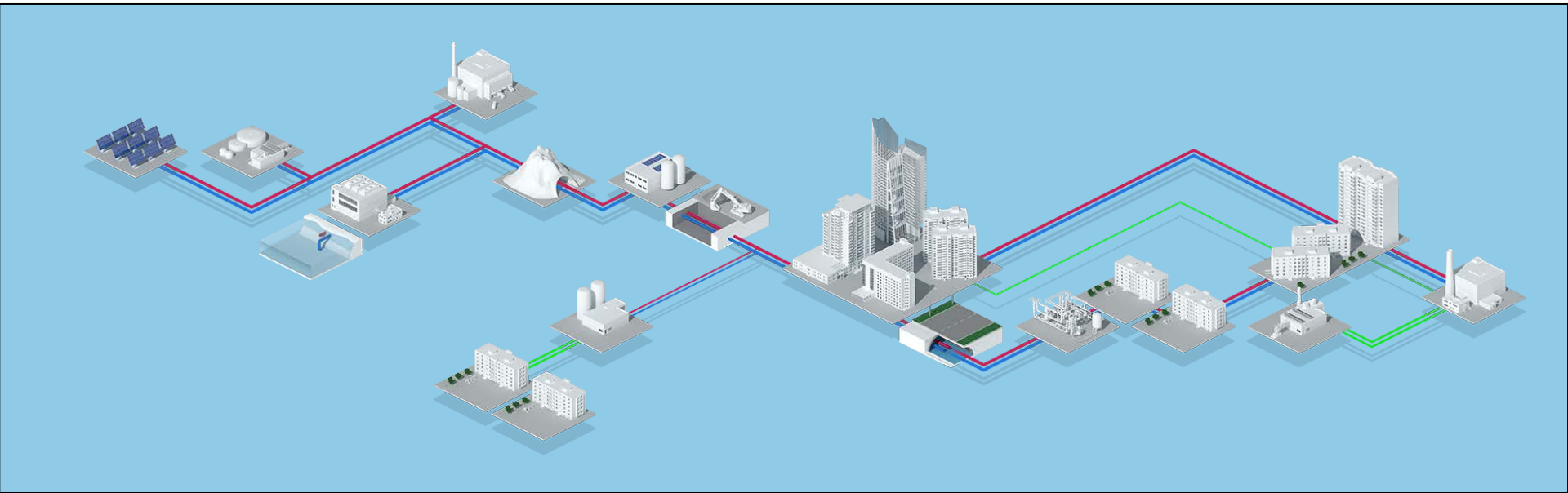
Design of water and steam heating plants

Design of central and local heating plants

Design and optimization of heating networks

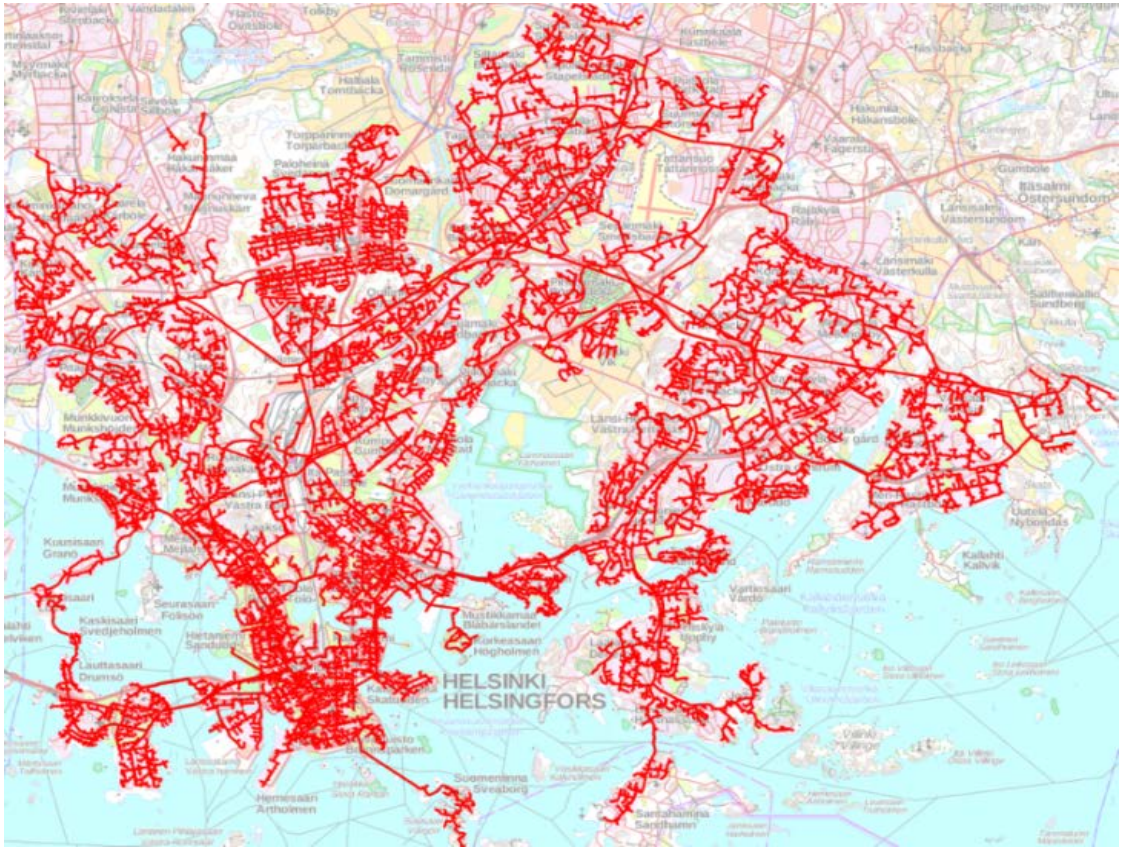
Special sector of Planora's services

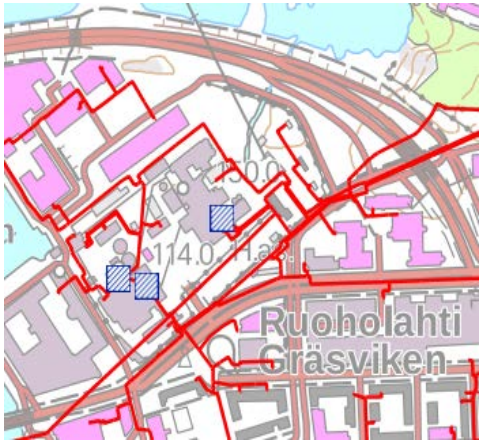
- Optimizing the operation of the heating utility, giving technical specifications and giving dimensions to different network components and boiler plants.
- Iisi-Netti Services

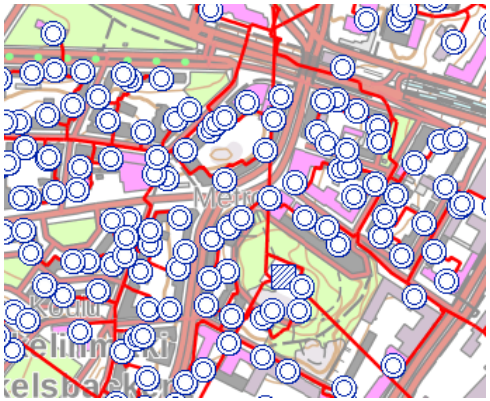


Contributions of Planora Oy to the FEM by Helen

Modelling, Calibreating and Calculations of District Heating Network







How to start the implementation of the Helen Energy Model in China

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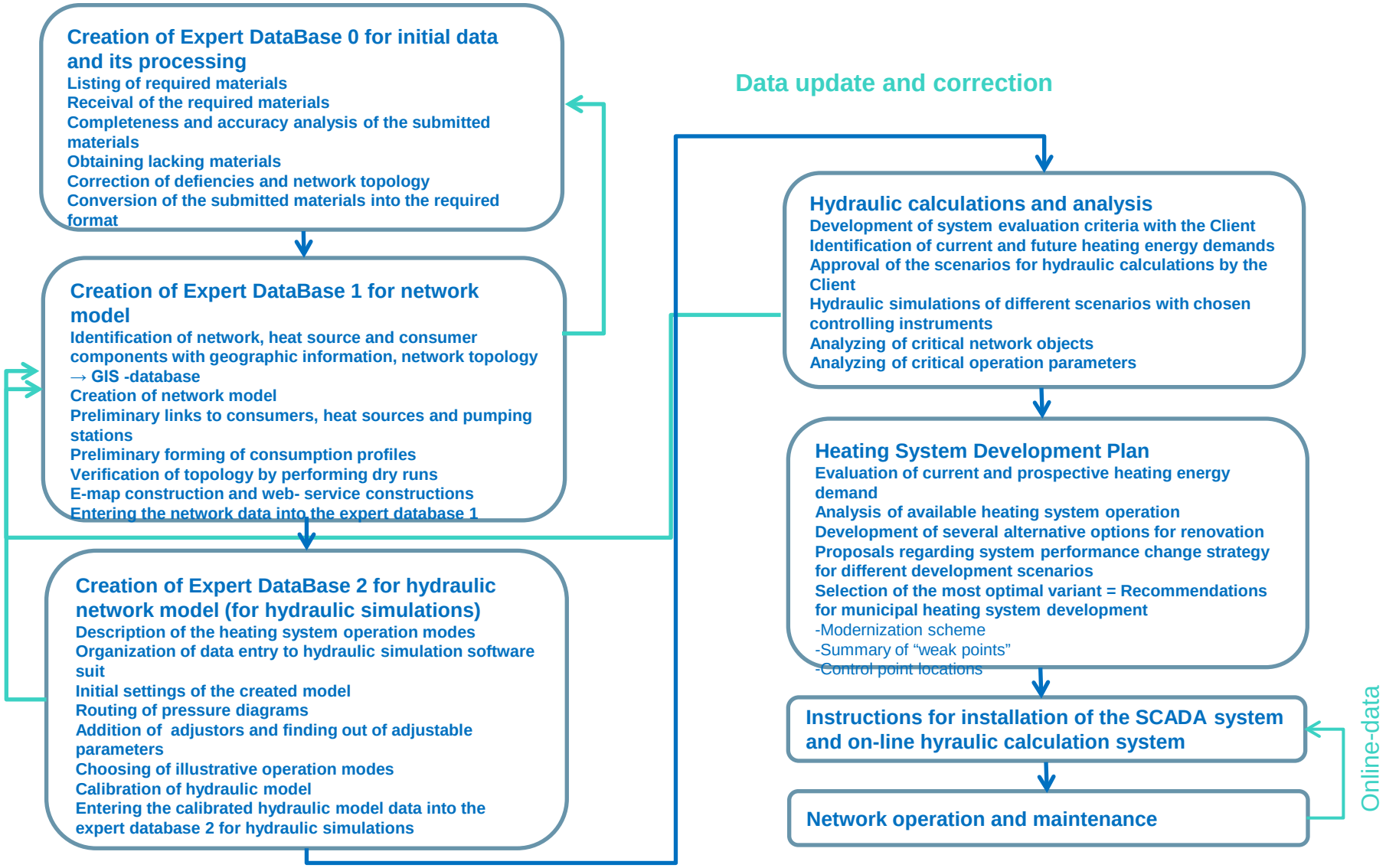
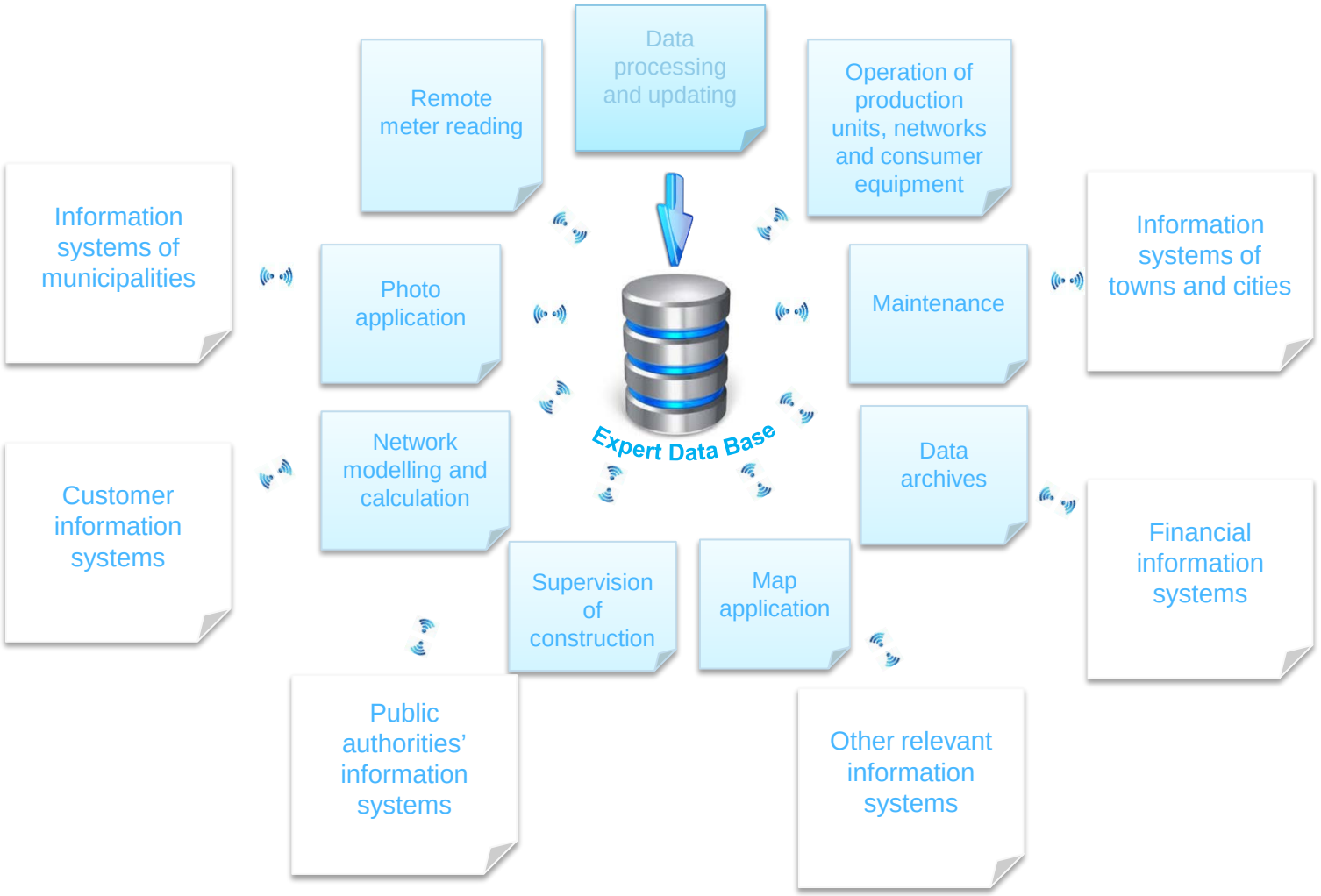
Create the EDB (the steps below)

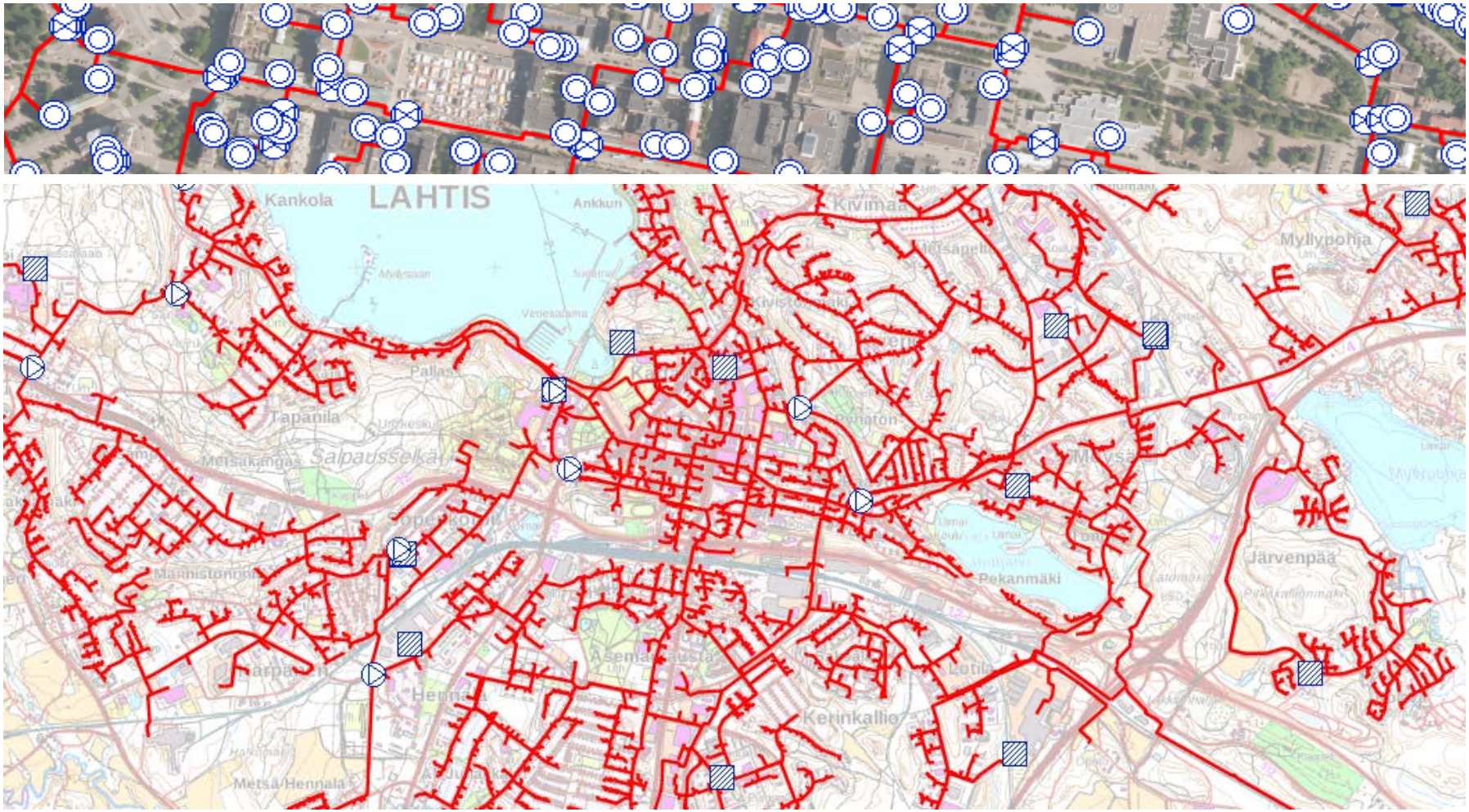


Share the information with other Data Bases



Utilize the created Expert Data Base in different applications (f.ex Iisi-Netti Service)

Develop the topological model of the heating network

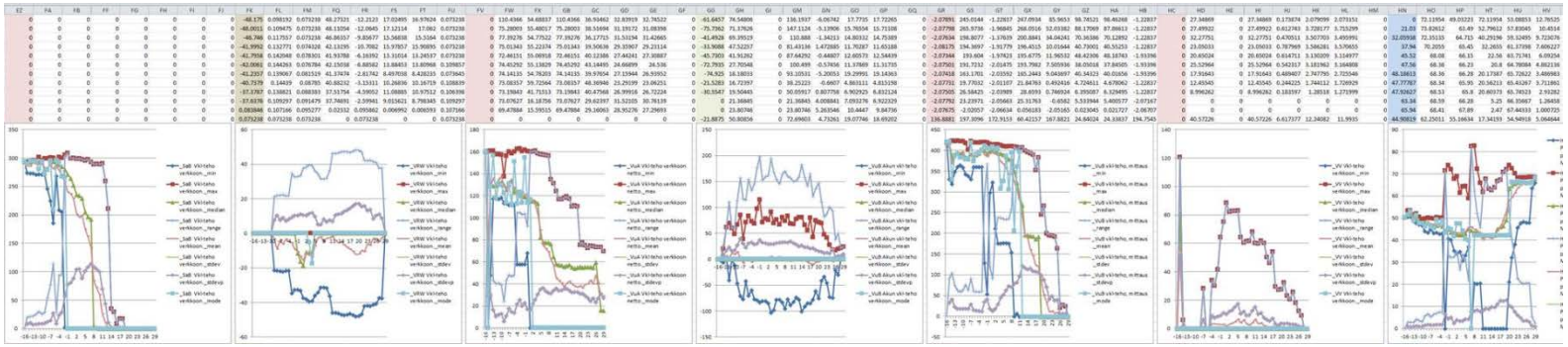


Calibrate the created topological DH Model for hydraulic calculations

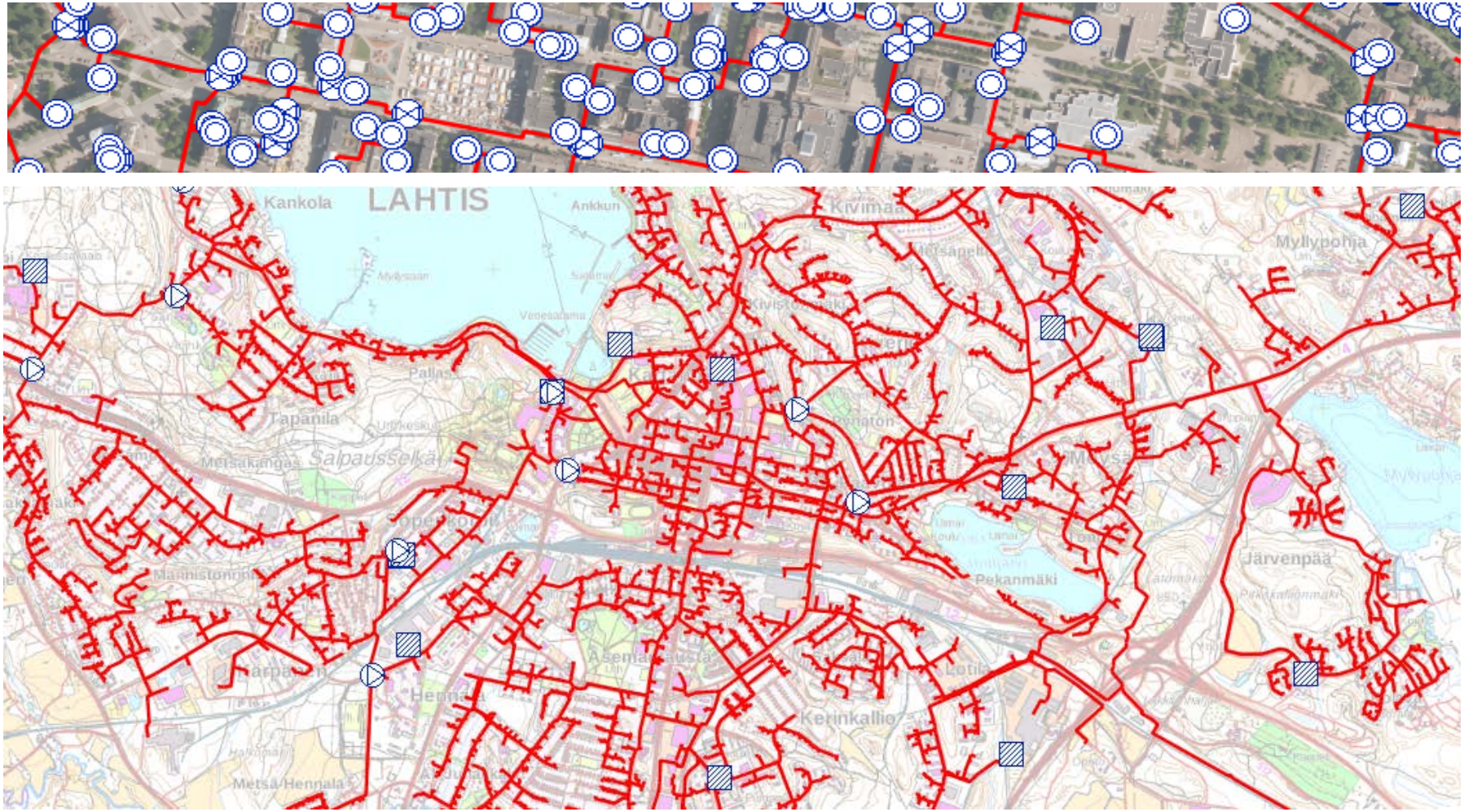
Network calculation model

- Fully intact topology
- Actual elevation data
- Calibration is based on measured data
- Million measured values
- Put them into calculations model

Vaikutus malliin / toimenpide	Korjattava	Osittaispäällekkäisyys korjataan	Alle 0,1 m. Hidastaa vain laskentaa	Kosmeettinen	? ->Tarkastettava vaikutus	Tuhotaan	Tuhotaan, merkittävät käyttöpaikat palautetaan, jos lähellä verkkoa.		Yksi tuhottu, muut korjattu (siirto < 0,1 m)		Toinen tuhotaan	Yhdistetty
	Pipe duplicate	Pipe covered	Very short pipe	Pipe intersects itself	Pipes cross	No connection to any other pipe	Component is not close to any pipe		Components overlap		Pipe are coincident	Pipe split
	ID	ID	ID	ID	ID	ID	ID	Kohde	ID	Kohde	ID	ID
	4411663	4426178	4584803	4466456	4417017	4429547	4500466	Syöttöpiste	4492308	Liittymä	4415214	4435561
	4454148	4449023	4430385	4414794	4435372	4464243	4490181	Liittymä	4490984	Liittymä	4445689	4656605
	4434655		4403191	4655990	4439375	4399882	4489306	Liittymä	4491098	Liittymä		4422041
	4415956		4431050	4456219	4439367	4435643	4629457	Liittymä	4489831	Liittymä		4657158
	4447803		4415280	4466786	4410074	4435462	4490983	Liittymä	4492379	Liittymä		4586471
	4441614		4584866		4435623	4435579	4490324	Liittymä	4658256	Kasettiventtiili		4572514
	4447758		4440496		4454330	4439431	4492182	Liittymä	4494370	Kasettiventtiili		4466504
	4441617		4457441		4458246	4436295	4490690	Liittymä	4629604	Kasettiventtiili		4572182
	4447757		4431612		4448553	4456265	4490960	Liittymä	4629598	Kasettiventtiili		4404232
	4441618		4403053		4454204	4435563	4494890	Kasettiventtiili	4629597	Kasettiventtiili		4462400
	4631380		4647782		4448553	4439355	4494254	Kasettiventtiili	4494366	Kasettiventtiili		4659114
	4631376		4584852		4454203	4439432	4494653	Kasettiventtiili	4494116	Kasettiventtiili		4414488
	4447871		4457717		4454219	4435559	4494183	Kasettiventtiili	4494445	Kasettiventtiili		4461351
	4441667		4429145		4454205	4439430	4494182	Kasettiventtiili	4633197	Kasettiventtiili		4448716
			4423255		4435369	4436247	4494889	Kasettiventtiili	4633191	Kasettiventtiili		4419987
			4397008		4584983	4439356	4494468	Kasettiventtiili	4650148	Kasettiventtiili		4573072
			4448666		4409032	4435338	4495053	Kasettiventtiili	4652252	Kasettiventtiili		4573072
			4454113		4435384	4435888	4495040	Kasettiventtiili	4652253	Kasettiventtiili		4430877
			4577606		4584939	4436244	4597625	Kasettiventtiili	4494932	Kasettiventtiili		4423686

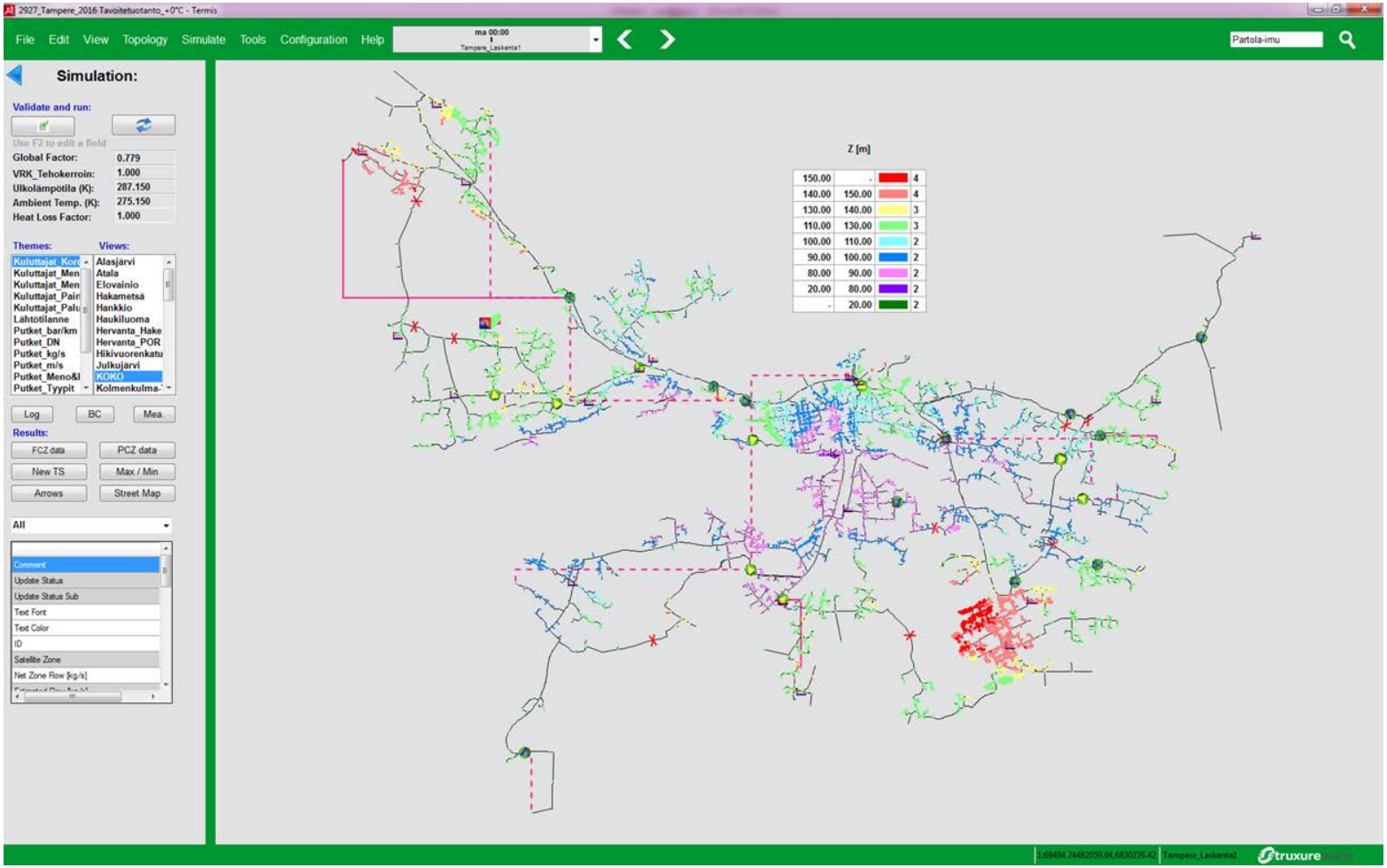


Develop the hydraulic network model for different calculation



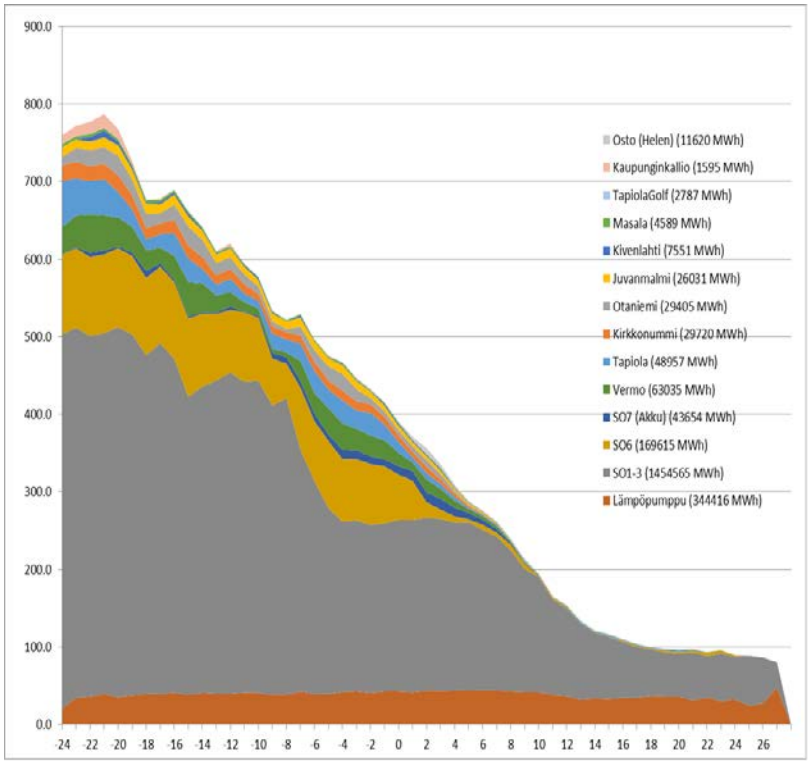
Utilize the created DH Model (EDB) in different hydraulic calculations

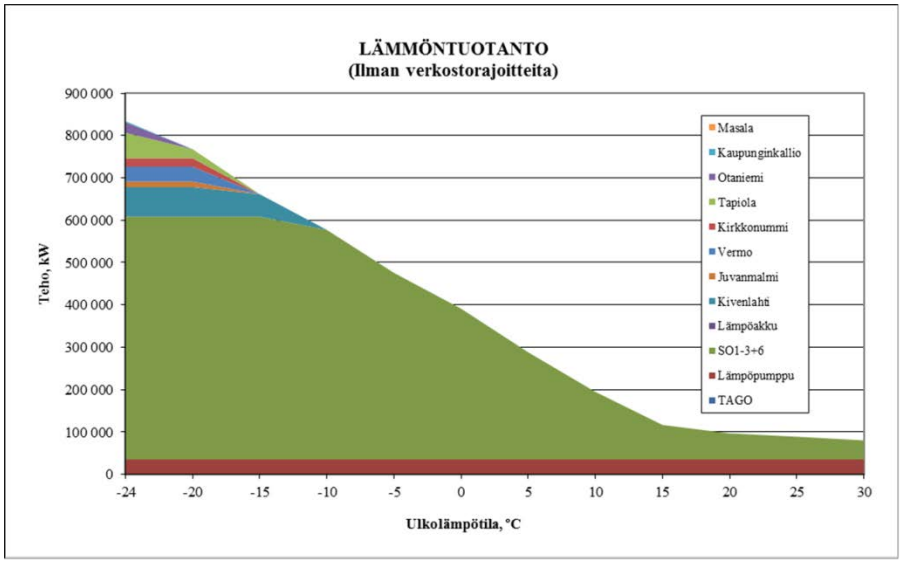
Different pressure levels in a district heating network



Utilize the created DH Model (EDB) in different hydraulic calculations

- **Optimization of heat production based on the cost price of thermal energy and electrical energy selling price**
- **Abnormal heat production simulation**
- **Network downtime simulation**
- **Optimization of pumping and pressure levels**
- **Optimization of the flow temperature and the minimization of network losses**





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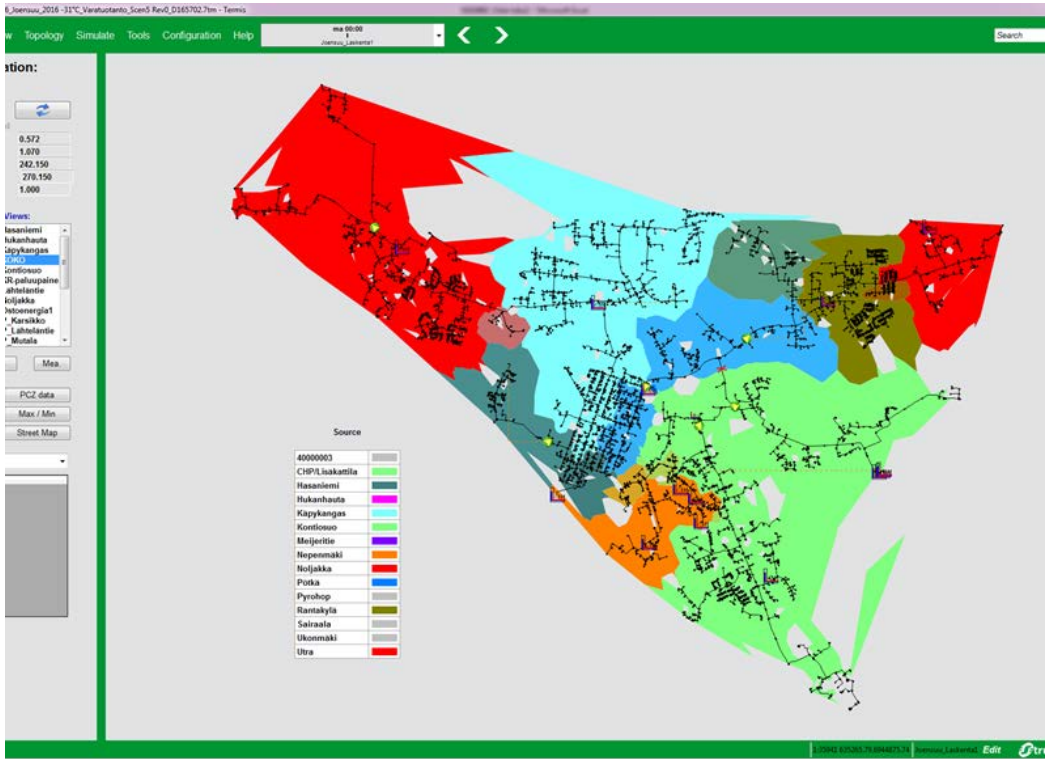

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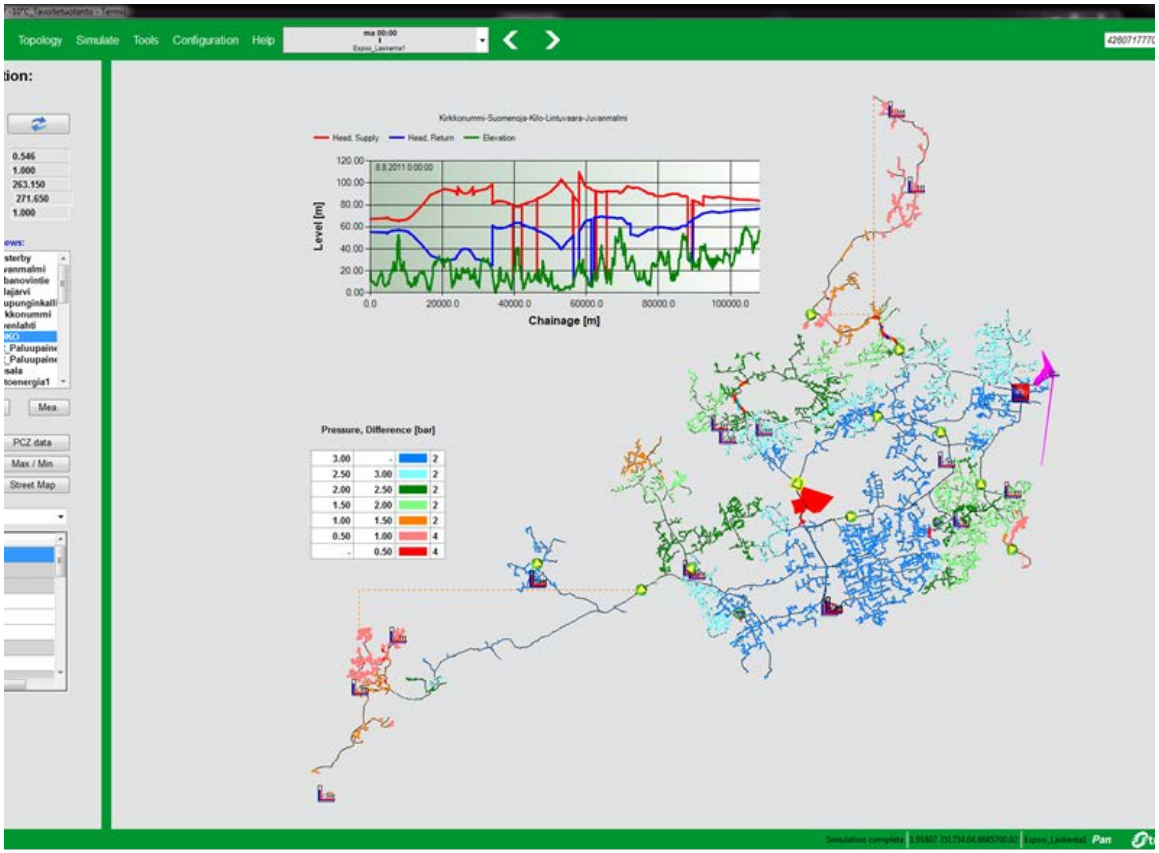

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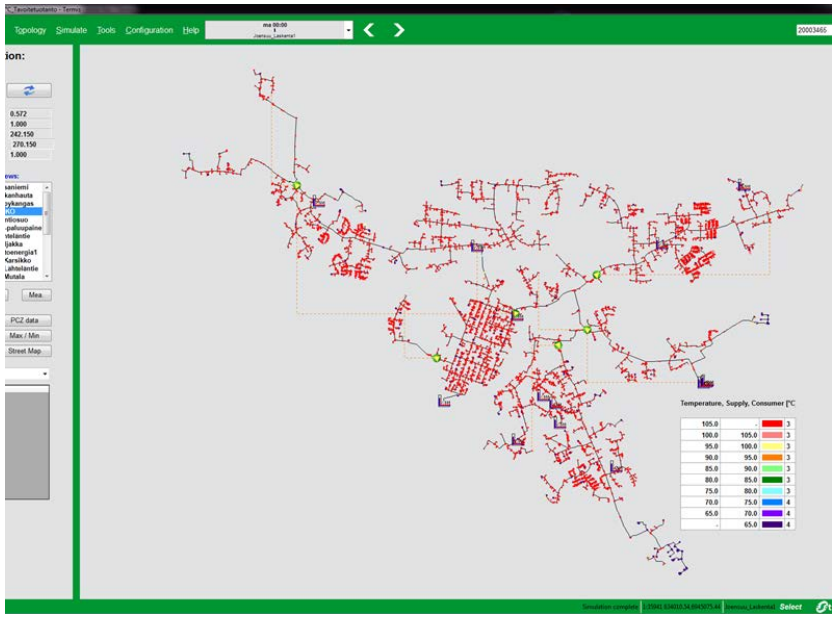
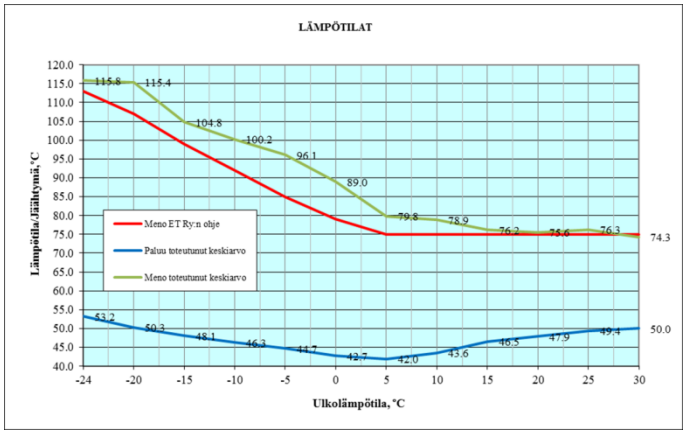
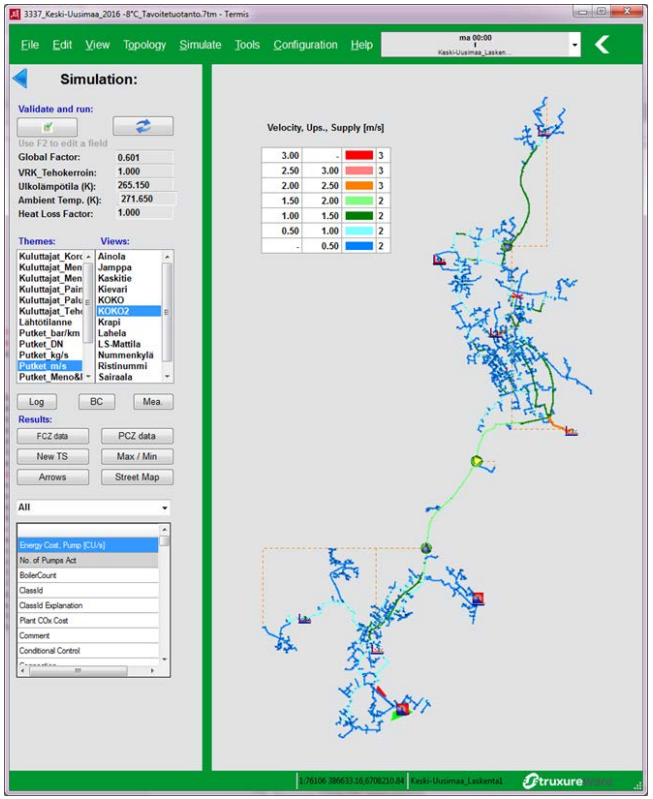
Ulkolämpötila °C	Teoreettinen lämpöhäviötarkastelu					
	Maaperän lämpötila °C	Menohäviöt kW	Paluuhäviöt kW	Häviöt yhteensä MW	Kuluttajien keskimääräinen paluulämpötila °C	Verkosto hyötysuhde %
-29	-3	20649	10240	30,9	58,5	96,6 %
-25	-3	19972	9817	29,8	56,1	96,4 %
-20	-3	19210	9038	28,2	51,4	96,0 %
-15	-2	18127	8717	26,8	50,6	95,5 %
-10	-1,5	17146	8226	25,4	48,0	95,5 %
-5	-1	16130	7667	23,8	45,0	94,8 %
0	0	15081	7126	22,2	42,5	94,0 %
5	1	14116	6686	20,8	41,4	90,3 %
10	1,5	13625	6770	20,4	42,7	88,4 %
15	2	12999	7109	20,1	46,4	85,1 %
20	2	12796	7532	20,3	49,4	77,7 %
25	2	12796	7701	20,5	50,4	76,2 %
30	2	12762	7870	20,6	51,7	74,6 %

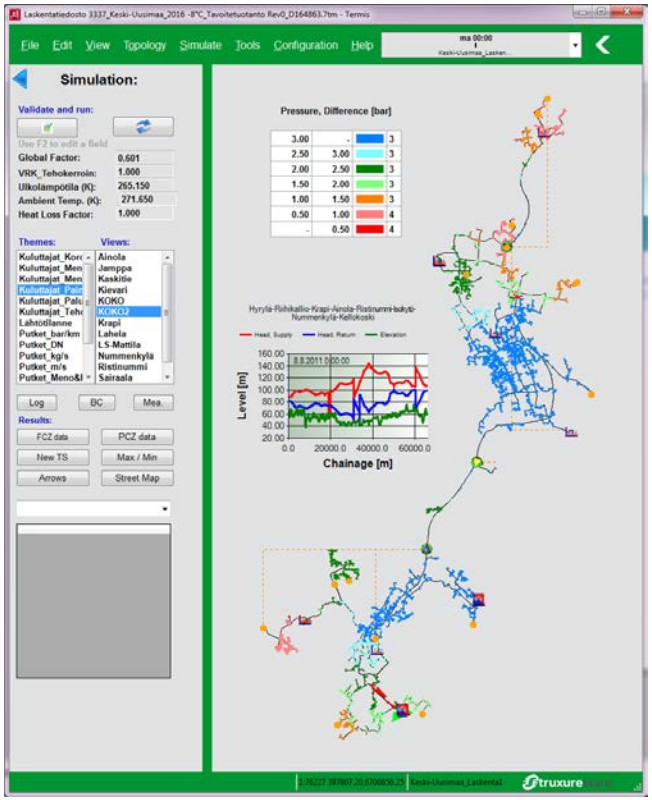




Utilize the created DH Model (EDB) in different hydraulic calculations

- Heat reservation to the network and the heat accumulator, as well as the exploitation of the consumption changes
- Determination of the network and pumping constraints and guiding measurements, as well as to take them into account in controlling and optimizing
- Maximal utilization of the implemented equipment
- Dimensioning of the equipment and investment feasibility studies
- Determination of operating costs of the pumping and network (heat loss)
- Investigation of network leaks





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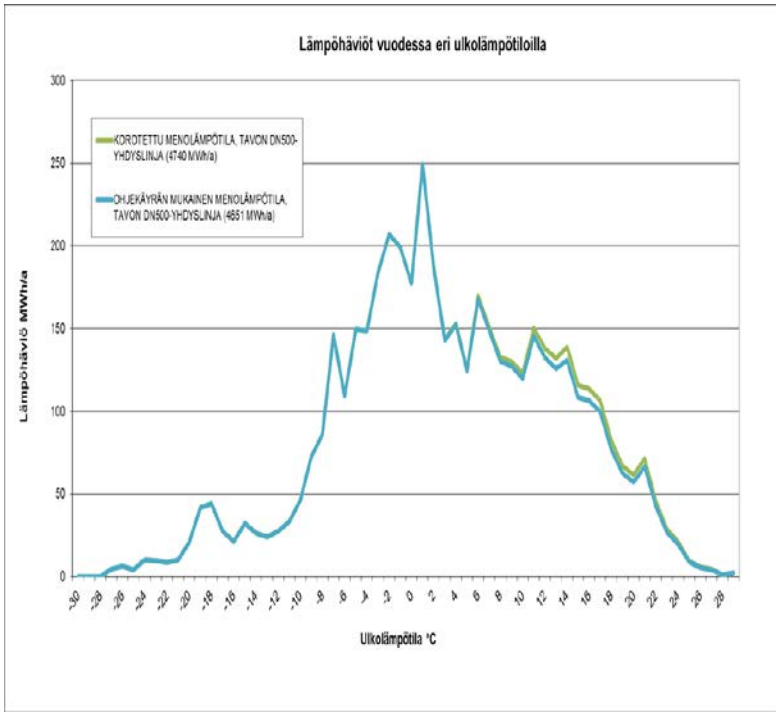

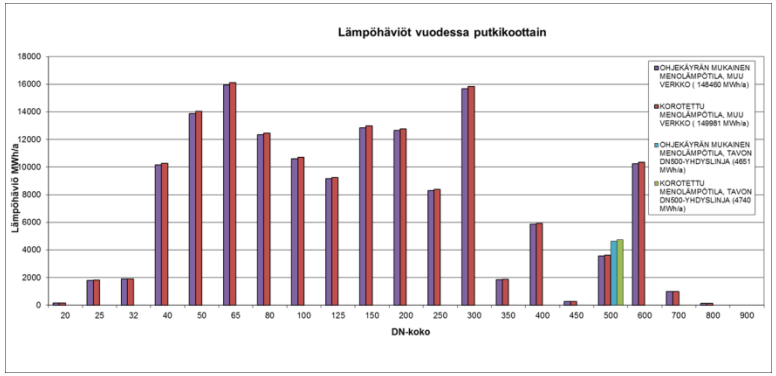

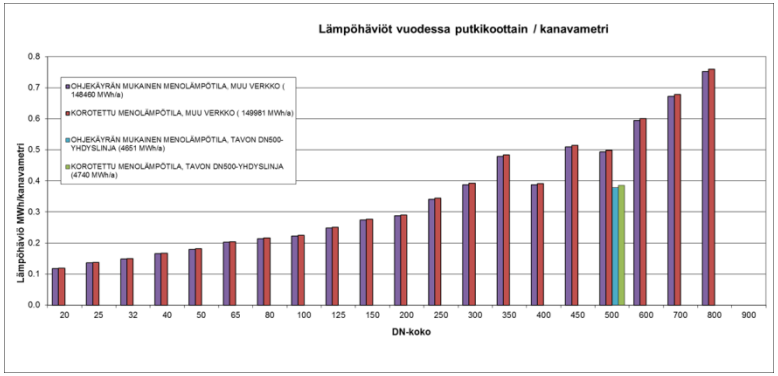

The results of utilizing the Model of FEM by Helen

Happy Consumers

Happy Energy companies

Happy State

Happy Environment

Why they are happy;
Because of savings on investment costs

Phase	Type of Cost Affected	Expected Savings	Environmental Impacts	Remarks
Establishment of Expert DataBase (EDB 0 and 1)	Data Management Investments	10-40 %	Neutral	Consolidated data management, easy access through one interface, enables integration of different data sources vs. Fragmented software and disintegrated systems
Hydraulic calculations and optimization (EDB 2)	Investments in: • Production plants, • Network • Devices & Accessories • Construction	10-50 %	Highly positive	Right dimensoning of the system, corresponded to the needs of the customers, improved energy efficiency, reduced losses, emissions, investment costs vs. Production oriented supply system. This means normally overdimensioned plants and networks

Why they are happy; Because of savings on operation costs

Step	Type of Cost Affected	Expected Savings / Year	Environmental Impacts	Remarks
Data Management	Data management costs	10-40 %	Neutral	Consolidated data management, easy access through one interface, enables integration of different data sources vs. Fragmented software and disintegrated systems
Operation	Operational costs	10-35 %	Highly positive	Operation according to instructions based on calculations and optimization vs. Production oriented system. This means big energy losses and inefficient operation
Maintenance	Maintenance costs	10-35 %	Highly positive	Controlled system with online information features, more reliable operation vs. High maintenance costs due to wrong operation methods and oversized system

Thank You for Your patience

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