

# AVPLAN – AN OPTIMIZATION TOOL ENSURING YOUR BUSINESS INVESTMENT

## DESIGNING DISTRICT HEATING SYSTEMS

We advise energy and utility companies when they invest in new district heating technologies.

In our consultancy, our focus is to ensure the best solution in terms of supply security, flexibility, environmental impact, and economy. In a so-called roadmap (investment plan), we recommend how to develop the supply system over a planning period of typically 20 years.

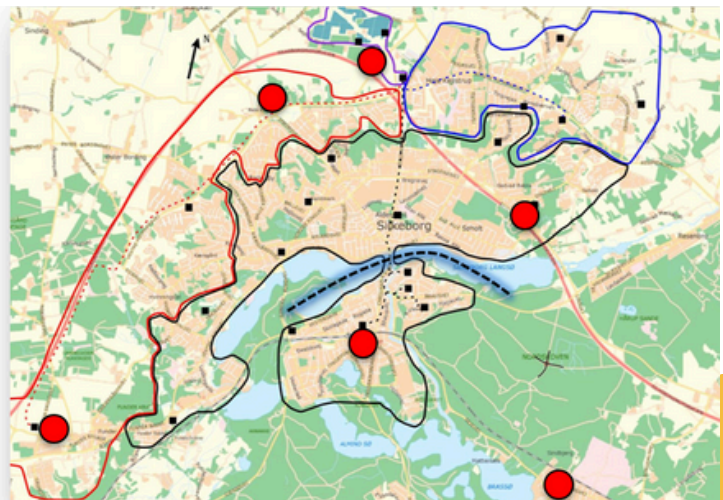
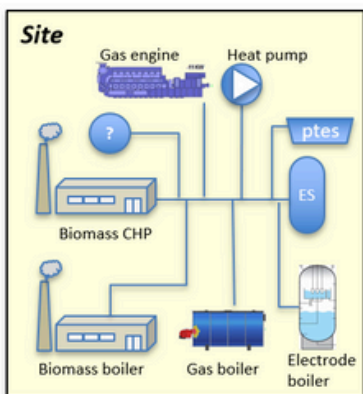
The investment plan is based on several scenarios, each of which contains possible future events that are typically outside the owner’s control. To quantify consequences and optimize investments and plant operation, we use our in-house developed tool AVPLAN.

A roadmap is calculated for each scenario, and for every roadmap sensitivity analyses of changes in market and regulatory conditions are made. The optimization considers the planning period as a unity to prevent that early investments become unprofitable later.

Based on the roadmaps, the customer is now capable of making the right investment decision. Together we identify which plant solutions to invest in, the capacities, where to be located, and when to be commissioned.

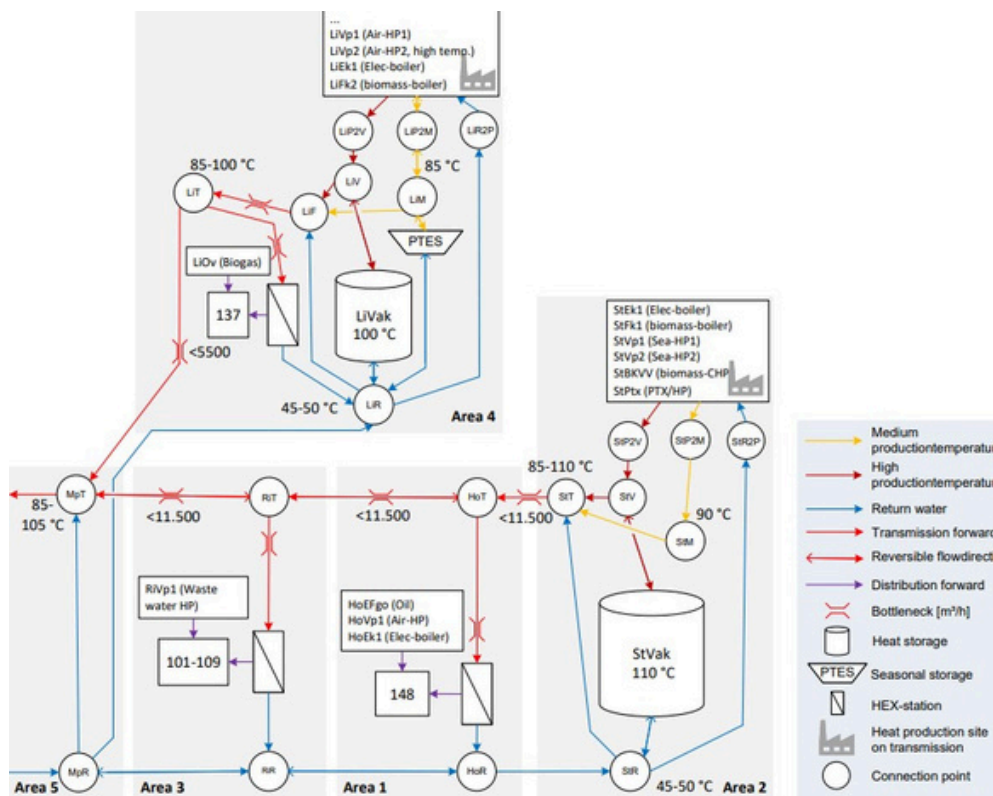
### Our approach:

- In AVPLAN we model the customer's present district heating system: types of plants, transmission network, required temperatures, future heat demand, etc.
- We include all needed data such as plant specification, transmission bottlenecks, efficiencies, future market prices, and weather data.
- Together with the customer, we now identify the most promising future heat production technologies, and these are added as investment options into AVPLAN
- Then AVPLAN optimizes plant operation and investments – all based on the customer’s criteria such as: heat prices, CO2 emission targets, plant size, fuel diversity, robustness towards future fuel prices. The result is an optimized roadmap.



## AVPLAN

- optimizes the overall economy (CAPEX and OPEX) of up to 30 years. It ensures a long-term overview of investments and expected operation in the long term.
- performs true optimization; meaning that any competitiveness between the production facilities and their location need not be defined at this early stage. Therefore, it is possible to optimize capacities, geographical location, and time of implementation, and thereby achieve an overall optimization based on operating economy and investment economy. It saves both time and money.
- handles very high complexity. An example is the handling of COP optimization on heat pumps by optimizing the inlet temperature in interaction with facilities that can boost the outlet temperature, and the possibility of later temperature mixing to the required district heating temperature. This ensures that the pre-planned operation is realistic.
- contains great flexibility in terms of introducing new types of plant models and calculating with varying regulatory and market conditions. This ensures that the customer's risks can be quantified and identified?



**Figure:** Section of a technical/economic model of existing facilities and location of new investment opportunities. Modelled in AVPLAN for one of our customers.

## SPECIALIST CONSULTANCY WITH AVPLAN

It is essential that AVPLAN persistently matches future requirements for climate-neutral energy solutions. That is why we have developed, refined, and expanded the tool since 2013. Combined with our unique knowledge of the energy/power market, energy technologies and model-based design, our AVPLAN specialists are able to build solid, precise models that our clients can trust when faced with investment challenges from changing climate, resource and energy policies.