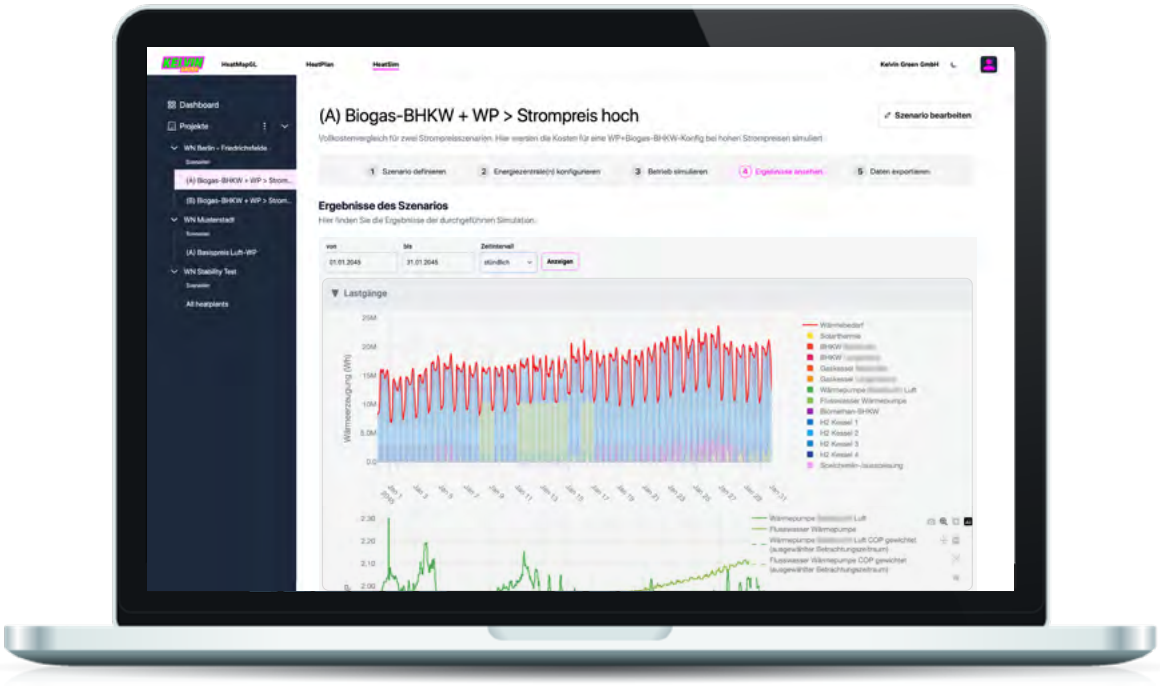
► **Optimising tomorrow's heat supply today.**

KELVIN GREEN

HeatSim



Kelvin Green HeatSim simulates your future heating network as if it were already in operation.

Do you need to know today how your new large heat pump will perform in conjunction with the CHP unit and heat storage tank over the next 20 years – both economically and technically?
Or do you want a specific, optimised generator utilisation plan f or the coming day?
Then **Kelvin Green HeatSim** will be your most practical helper, the **only application on the market that supports all steps from design and planning to operation for optimised heat generation.**
And best of all: as powerful as the computing power and as complex as the many optimisation algorithms in the background are, HeatSim is groundbreakingly easy to use and understand.

Every project developer and asset manager in the heating network sector needs it: the new HeatSim!

Simulate your heat generation easily and simply and

- optimise procurement and investment options
- design tariffs optimally
- calculate cost advantages of VLT reduction
- plan generator use optimally and much more.

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HeatSim

HeatSim can easily and simply solve many of your current challenges, e.g.

- **Tariff optimisation**
  Design new heat contracts, AP0 and pricing formula to reflect future generation costs and minimise risk of loss.
  Case Study
- **Investment optimisation**
  Compare different generation and storage options and optimise total costs over the lifetime of the plant.
  Case Study
- **Procurement optimisation**
  Compare plant utilisation at different procurement prices and successfully conduct negotiations with suppliers.
  Case Study
- **Technical planning and system design**
  Optimally design systems with weighted COP and hourly load profiles for heat pumps and storage behaviour.
  Case Study
- **Grid temperature optimisation**
  Compare generation costs and the use of heat pumps at different flow temperatures.
  Case Study
- **Operational optimisation**
  Calculate potential savings through optimised operating modes and derive priorities.
  Case Study

The following customers, among others, are already successfully using Kelvin Green's HeatSim:

badenova Energie. Tag für Tag

Stadtwerke Ahrensburg

STADTWERKE STAßFURT

STW STADTWERKE WEDEL

Sounds good?

Then arrange a **free, no-obligation introductory appointment** today at **www.kelvin.green** or send an email to **martin.bornholdt@kelvin.green.** We look forward to meeting you.

„As part of the transformation plan for our heating networks in Staßfurt, we made intensive use of Kelvin Green HeatSim to compare the full costs of various heat generation options in different price development scenarios and to better assess risks. We also saw how high the generation cost savings are when we lower the flow temperature to 75°C. The software was very easy to use, and the insights it provided were indispensable for our heating planning."

Torsten Beyer, Head of Technology Stadtwerke Staßfurt

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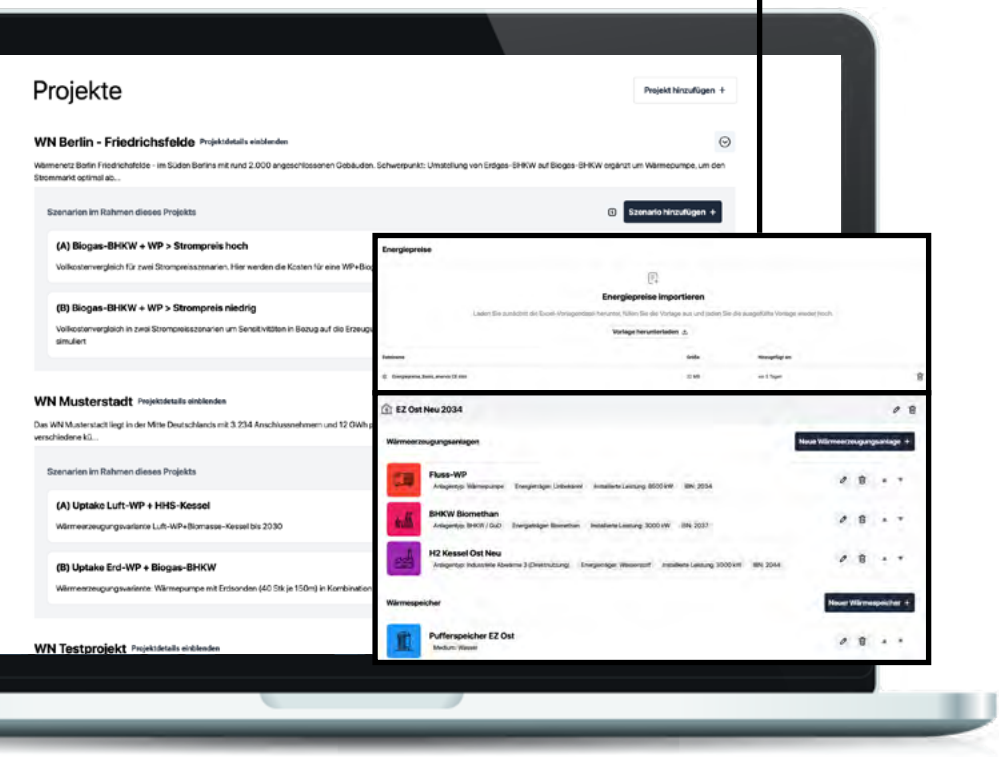
HeatSim is extremely easy to use.

In just a few steps, you can create numerous scenarios for your current and future heating network.



1

Create projects and scenarios

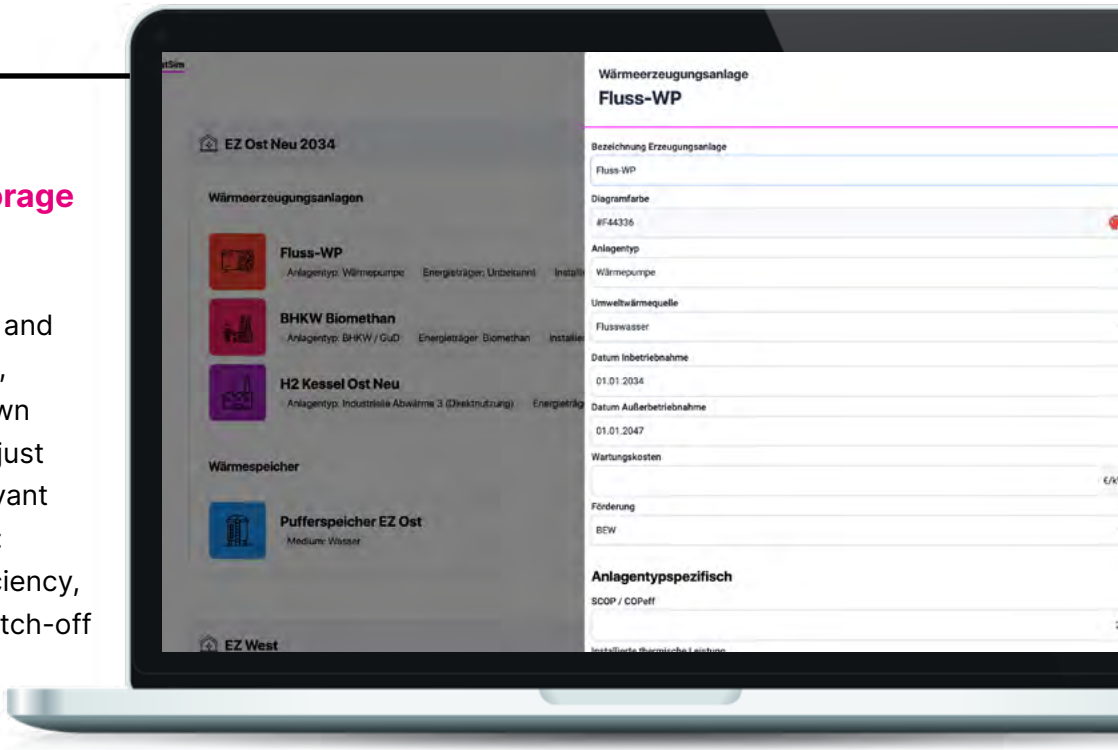
- Create various heating network projects
- Different load profile developments
- Different price scenarios
- Different generator designs and portfolios
- Different temperature control modes
- Different load profiles and temperature curves from environmental heat sources and waste heat sources

The basic scenario can be easily copied with a single click and then customised.

2

Create energy centres with generators and storage facilities

Simply create every current and planned heat generator and, optionally, local biogas or own electricity PV systems with just a few clicks and define relevant system parameters such as: year of commissioning, efficiency, minimum switch-on and switch-off times, subsidies, etc.



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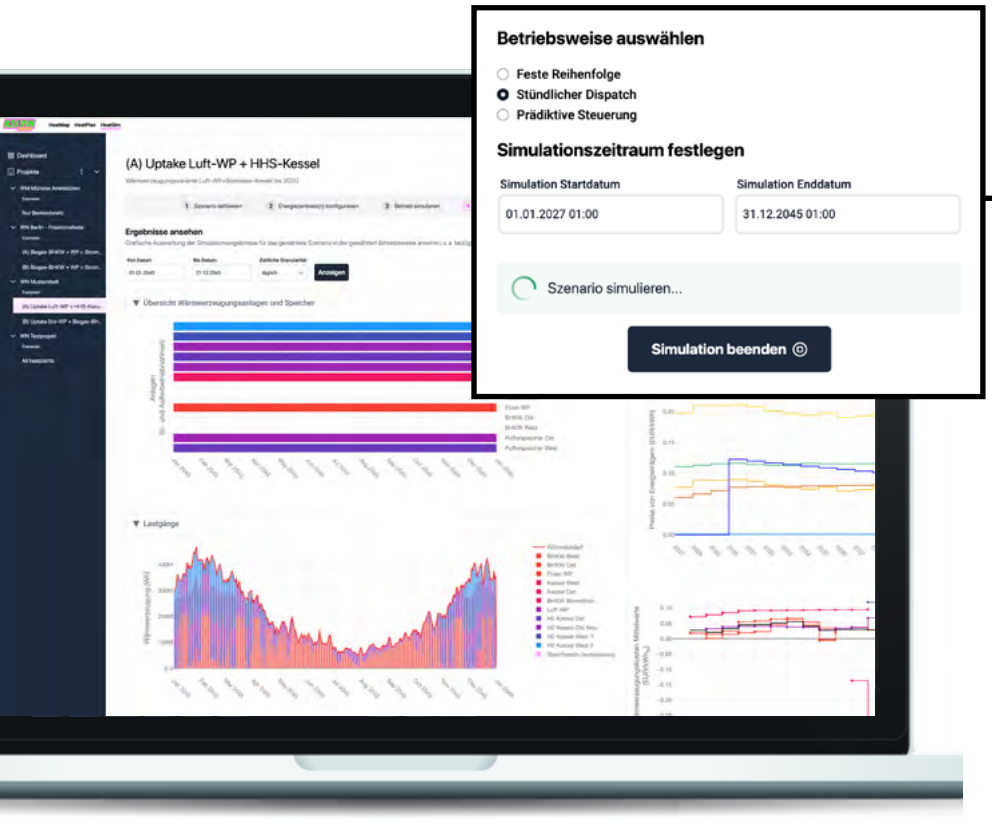


3

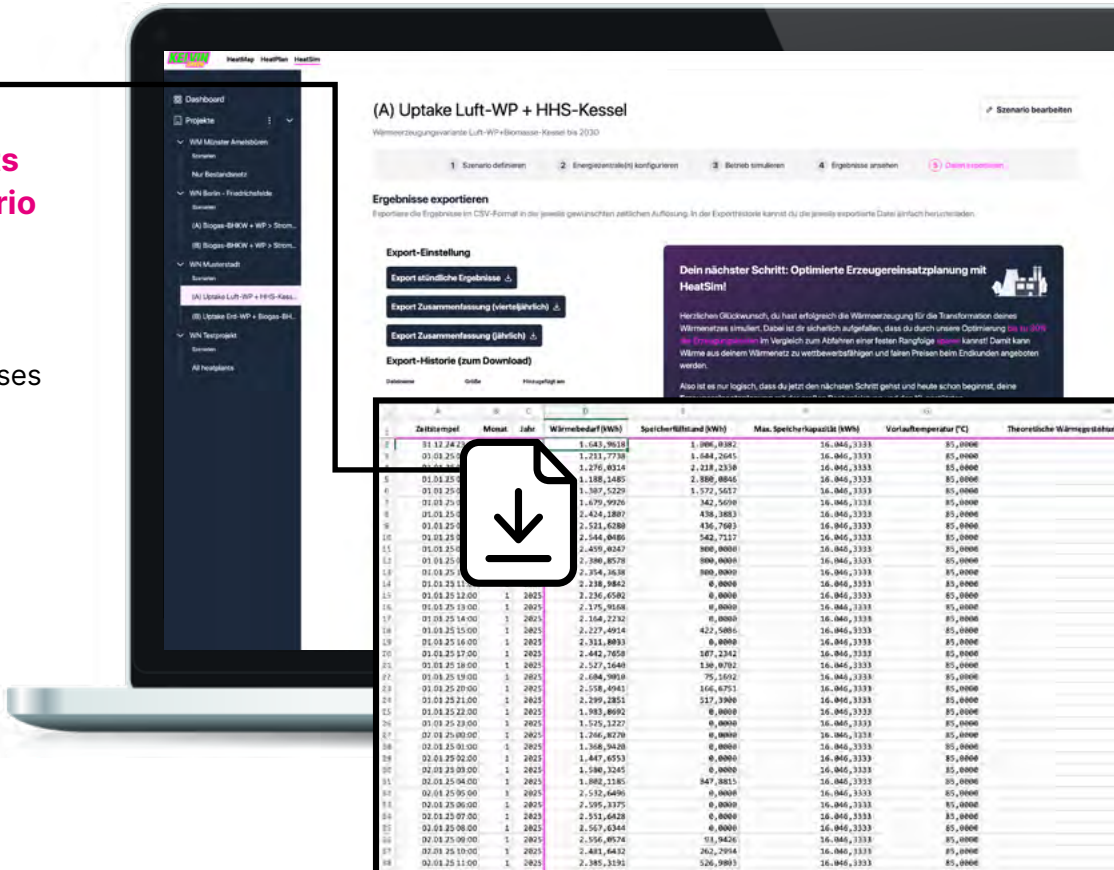
Simulate different operating modes and view results

- Total generation costs and costs per generator
- Total heat generated and heat generated per generator
- Storage levels (loading and unloading)
- And many other analyses and evaluations
- In adjustable time resolution (hourly to annual resolution, simulation period from 1 day to 30 years)

4

Download the results data for each scenario as a CSV file

You can easily perform further, individual analyses yourself using the comprehensive Excel data set based on the hourly cost and performance data.



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All operating parameters and boundary conditions are taken into account in the simulation:

- Hourly energy price forecasts based on the current Enervis model, consistent with the HeatSim weather model
- Hourly weather forecasts with rolling real-time data for the next 7 days (DWD) and long-term forecasts based on 8 real weather years for your postcode
- Hourly resolved annual load profiles of the heating network, scaled and weather-adjusted to your postcode, AI-supported, rolling load forecast for the next 7 days
- Hourly temperature curve of the VLT depending on the outside temperature for your postcode
- Hourly COP depending on the temperature profile of the environmental heat source and VLT (air is generated directly from weather data)
- Hourly load and temperature profiles of waste heat and environmental heat sources
- Hourly storage charging and discharging (taking into account the maximum capacity depending on the current grid temperature), also predictive depending on the operating mode (actively managed storage)
- Hourly electricity income (direct marketing) for combined heat and power
- Choice between optimised operation (hourly dispatch and predictive mode) and fixed ranking
- Dynamic COP/efficiency for partial load modes
- Technical restrictions of the generation plants, such as minimum running and downtimes and planned maintenance times
- Time of planned commissioning and decommissioning of the respective plants and storage facilities
- Usage-specific maintenance costs per kWh of heat generated
- Consideration of regulatory requirements (minimum renewable energy heat quantities according to WPG)
- Optional consideration of BEW, EEG and KWKG subsidies
- Own energy source generators such as biogas or own electricity PV

It can be integrated into your inventory system individually on request:

- Integration and logging of real operating data via interface to plant control system
- AI-based heat demand forecast via real-time consumption values from remote-readable heat meters
- Integration of energy source prices from portfolio management (e.g. for structured procurement) or price forward curves via interface
- Optimised plant control

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Specific € added value (examples)

Tariff optimisation: price and contract design and risk management based on future operating scenarios

If tariffs are incorrectly designed for long-term contracts, there is an extremely high economic risk:

- How do I set a good AP0?
- How do I need to design my price structure in order to optimally reflect actual generation costs?

Case Study

Procurement optimisation: Comparison of various procurement strategies and support in price negotiations

In the optimal procurement of electricity, gas, etc. for the heating network, there is extremely high potential for added value:

- How do different price offers affect the total cost of production?
- At what prices are which producers displaced and when?

Case Study

Investment optimisation: Full cost comparison of different generators and storage systems over their lifetime

The optimal investment decision depends largely on the full cost analysis in the specific operating scenario:

- Which generation option is the most economical in the specific operating scenario?
- How do different energy price scenarios affect the investment decision?

Case Study

Forward-looking generator deployment planning: OOptimised economic operation of the various heat generation systems

In order to keep heat generation costs under control, the generators in the overall system must be operated optimally:

- When should the heat pump be switched on and the CHP unit switched off tomorrow in order to generate heat as cheaply as possible?
- What impact will it have on today's operating mode if a wind farm provides cheap electricity next week?

Case Study

Application example: Tariff optimisation

Working price vs. production costs:
Based on the results of the simulation for two different energy price scenarios, it was possible to compare exactly how production costs develop in relation to working prices.

Result: The original price adjustment formula and the AP0 could be adjusted in such a way that the supplier's risk of loss was minimised while still offering customers an attractive price.