

Maritime Energy Simulation for the Configuration of Electrical and Hybrid Ship Systems

With **MARESYS**, besecke has developed a unique way to simulate the behaviour of on-board consumers depending in typical processes and realistic scenarios, which allows the energy requirements of a ship to be calculated before construction begins. Based on the simulation results, hybrid systems with different systems with different generators and energy storage units can be optimally designed and dimensioned. Ship operating modes, onboard events and environmental influences are considered. In this way, besecke offers a new alternative to the conventional method of e-balancing with simultaneity factors.

Conventional E-Balance

- ▶ The maximum power requirement is estimated per operating mode.
- ▶ The possible states are limited to a few operating states
- ▶ The evaluation of electrical consumers with simultaneity factors leads to a subjective and non-transparent determination of the energy demand.
- ▶ With the mix of power consumption and running time in the simultaneity factor, an optimal dimensioning of electrical generators and storage units are impossible.
- ▶ The result: mostly oversized systems with inefficient energy use, higher space requirements and more weight.

MARESYS

- ▶ The energy consumption is calculated with a mathematical model.
- ▶ Possible energetic conditions are considered in detail by the dynamic state process model.
- ▶ By linking the consumers with events and external influences, the energy consumption is determined objectively and transparently.
- ▶ The separate consideration of power consumption and runtime of electrical consumers enables the design of energy generators and energy storage systems in hybrid systems.
- ▶ Benefits: optimal energy design for real on-board processes, understandable and transparent calculation, basis for consumer-based energy management.



What is MarESiS?

MarESiS is our tool to create an optimised energy concept for your new vessel or retrofit project. For this purpose, we simulate the behaviour of the electrical consumers on board in relation to the ship's operating modes, on-board events, environmental influences and model the behaviour of generators, fuel cells, batteries and other generators and storage systems on the determined load profile.

Is the simulation based on real data?

The basis of every energy simulation are real routes and weather data of comparable ships. This can be a cruise of the previous ship, other ships in your fleet or any ship of the same type from our database. Typically, the linking of consumer activities with condition parameters is based on empirical values and the vessel specification. If we have specific measurement data for the behaviour of consumers depending on the ambient conditions, we include these in the simulation, so that the system trains itself.

What is the result of an energy simulation with MarESiS?

For each simulation, an individual energy report will be created. This includes a description of the simulated scenarios, the determined load profile and a proposal for a generator storage concept to operate your ship. On request, we compare different concepts and contrast existing concepts and energy balances.

Can I purchase MarESiS and do the simulation myself?

No. MarESiS is a powerful and complex tool with a knowledge database in the background. The operation and analysis are complex, and our employees have been trained for this in a process over several years.

What does a simulation/energy consultation cost?

The costs are based on the range and level of detail of the simulation. The number of simulated consumers, the number of state parameters which have to be considered and the number and duration of the simulated scenarios are the price-forming factors.