Fraunhofer IVI

autartec® and aquaforum

Design ensemble at Lake Bergheide

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A floating house as a symbol for integrated alternative energy concepts and modern residential culture may well become a crystallization nucleus for further action towards new forms of living both on land and on water.«

Prof. Dr. Matthias Klingner,
Fraunhofer IVI Director

Idea and concept

Design as an interdisciplinary field that works within technical, ergonomic and creative framework conditions has been gaining importance in the research sector. Project results usually reflect the Technology Readiness Level achieved. Integrating design processes can improve the users' experience with the products developed and facilitate the transfer to practical application. Fraunhofer IVI researchers have recognized the added value of considering aesthetic and user-centered aspects in the development and commercialization of products, as well as in the acquisition of projects. Through this attitutde, they take a pioneering role within the Fraunhofer-Gesellschaft.

In addition to creating technical concepts, one aim of the BMBF-funded autartec® research project was to highlight the coherent design of the ensemble located right next to the impressive F60 overburden conveyor bridge, which is now out of service. A design aesthetic was developed based on the architecture and interior of the autartec® house that makes the building and the boat appear as a single unit despite their different utilization concepts.

autartec® – self-sufficient living on water

Energy generation and storage

Energy is generated by conventional crystalline photovoltaic modules – mounted on a 70° slope in a closed formation – and by structurally integrated photovoltaic modules mounted on a glass facade.

These elements face in different directions, cover a total surface of 54.2 m² and generate up to 8.5 kWp. The energy is stored in structurally integrated lithium-ion batteries with a capacity of 50 kWh, which is a sufficient amount to supply the house and its inhabitants with electricity for as long as five days. An energy management system guarantees an ideal balance between energy producers, storage units and consumers in the building.

Thermal energy

Managing isulation in a house built on a floating metal pontoon is a great challenge. In addition, systems for heat generation and storage as well as efficient cooling systems are important factors for self-sufficient buildings. For these reasons, individual elements of the roof and facade are designed especially for heat generation and natural cooling effects.

One of the roof surfaces is inclined by 15° and equipped with solar panels for hot water production. Combined with a lake water heat pump, the system guarantees a cozy room climate even in the wintertime. A wall surface covered in live plants uses windward-leeward effects to create a cool atmosphere surrounding the building. Additionally, an adiabatic cooling ceiling serves to lower room temperatures in the summer.

Water treatment

An integrated filtration plant purifies greywater to fresh water quality. Within the research project, different methods for water treatment were investigated and an overall system developed. The main focus was on water treatment with the help of ceramic membrane filtration and photocatalysis. The facility is installed partly within the building's floating bodies.

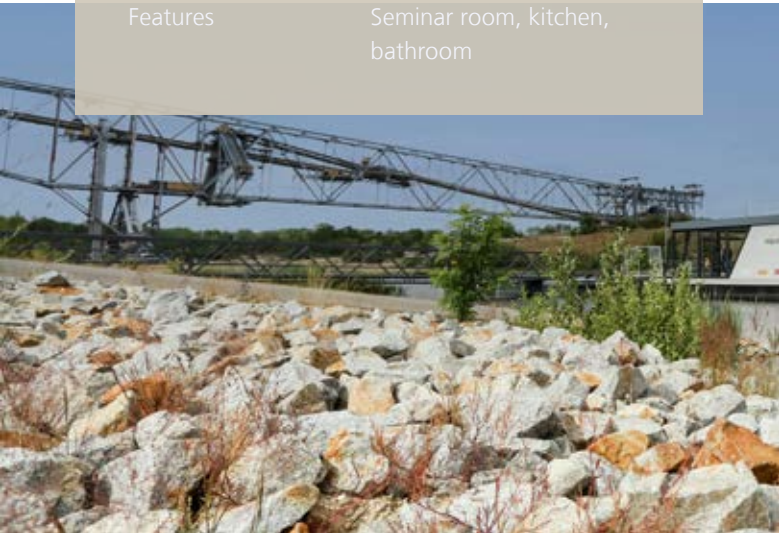
Facts and figures

autartec® house

Pontoon size	13 m x 13.5 m
Living space	100 m²
Technical area	11 m²

aquaforum seminar ship

Main dimensions	7 m x 16.5 m
Max. capacity	30
Usable area	78 m²
Features	Seminar room, kitchen, bathroom



aquaforum –
solar-powered seminar ship

Events with a view

In addition to the autartec® house, Lake Bergheide offers yet another attraction: A solar-powered seminar ship was built on the initiative of the chairman of the EUROS foundation. This ship is intended for events and conferences that can now be held on the water in front of the impressive scenery of the out-of-service F60 overburden conveyor bridge.

Fraunhofer IVI defined the seminar ship's initial design and the technical layout of its electric drive system in close collaboration with their experienced contractor, Jacko Schiffsbau und Yachtservice.

The structure is executed as a trimaran with 16.5 meters length and 7 meters width with an accessible upper deck. Depending on the seating layout, the interior offers space for 30 to 60 guests. Driven by two 25 kW electric motors, the ship, which weighs approximately 40 tonnes, can reach a speed of over ten kilometers per hour.

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