

# Zukunft Bau

## Short Report

### Title

Development and testing of a device and logic control which allows a storage free use of heat produced in a bioenergy facade in a residential building

### Starting point

In the BIQ The algae house both microalgae and heat are produced by sunlight in a bioenergy façade. However, the use of the heat produced in the facade to supply the building was not optimal and most of it had to be stored in the underground. Aim of the present project was to optimize the system by developing an energy concept which allows to minimize storage and maximize direct use without negative effects on algae production.

### Subject of the research project

The research approach was to develop and implement a plant and control technology for the bioenergy façade at the BIQ The algae house which allows to use the heat that is produced to cover the heat demand of the building of hot water and heating

Four work packages were defined for this purpose. The project management was carried out in work package 0. In work package 1, the existing energy concept in the BIQ was expanded to include hot water supply. The approach was to bring the heat through a heat pump to  $> 50$  °C. This was associated with a new planning and reconstruction of the heating system. In work package 2, the necessary control for this system technology was developed. This was done on the base of the results obtained by analysis of the data from previous monitoring. Work package 3 monitors the newly established plant and control technology. Based on the findings gained from this, control technology was iteratively optimized in WP 2.

### Conclusion

The project goal of both a largely storage-free use of the heat from a bioenergy façade and optimal conditions for microalgae production could be fully achieved. The plant and control system developed and implemented for this purpose is directly transferable and therefore usable for bioenergy facades of different sizes and different locations or sun orientation. Further use is also conceivable on all hybrid systems which cover a plurality of functionalities, such as photovoltaics with solar thermal energy or wastewater treatment with solar thermal energy. With an energy conversion efficiency of 38 and 8-10% for the heat and biomass, the bioenergy façade achieves a total efficiency of 48%, surpassing even the established systems.

## **Key Data**

Short title: Fassadenwärme

Researcher/project leader: Dr. habil. Martin Kerner

Total costs: 209,624.46 Euro

Amount of Funding: 115,162.23 Euro

Duration: 24 Months

## **Picture**

1 Photo

Bildnachweis: SSC GmbH

Frei von rechten Dritter

Bildunterschrift:

Bioenergy façade of the BIQ The algae house at Hamburg Wilhemsburg