Projektsteckbrief

Technische Hochschule Ingolstadt
Institut für neue Energie-Systeme

Projekt	**Nutzung thermischer Solarenergie zur sorptionsgestützten Klimatisierung - Planung, Errichtung und Überwachung einer solargestützten Gebäudeklimatisierung in einer gewerblich genutzten Halle**
Schlagwörter	Solargestützte Gebäudeklimatisierung, messtechnische Überwachung, Güterverkehrszentrum, Demonstrationsobjekt, Gesamtenergiebilanz

Projektdetails

Projektstart	2003	**Projektlaufzeit**	4 Jahre
Fördermittelgeber	Bayerisches Staatsministerium für Landesentwicklung und Umweltfragen		
Projektträger	--	**Förderkennzeichen**	71m-U3320.1-2003/12-UF6
Förderprogramm	--		
Projektbudget	49.380€		
Ansprechpartner	Prof. Dr.-Ing. Wilfried Zörner (Projektleiter) Dr. Michael Becker		
Kooperationspartner:	IFG Ingolstadt GmbH, pbb Planung + Projektsteuerung GmbH		

Beschreibung

The Institute of new Energy Systems of Ingolstadt University of Applied Sciences investigates the renewable-only based HVAC system of a multipurpose building. The 10.000 m² gross floor area building is part of the biggest logistic-centre in the region serving the AUDI automobile production facilities. On the one hand, the investigation is supposed to demonstrate the potential of solar-assisted cooling, on the other hand, the monitoring focuses on the total energy balance of the building and the various innovative building technologies. Next to a ground source heat pump plant for base-load heating and cooling, the building is equipped with two arrays of solar-thermal flat-plate collectors (108 m² + 178 m²) and a desiccant air-conditioning system (DEC). This consists of two plants with a nominal air flow of 8.000 m³/h each. One of the two plants is monitored, where the plant itself is considered a black box in a first approach, i.e. all incoming and outgoing energy flows and the air condition are measured. Apart from the investigation of the performance of the solar-assisted air-conditioning system, the feasibility of DEC-operation using flat-plate collectors available on the market is investigated.

During the first year of operation (2006) massive problems occurred in the operation of the DEC-plant. While the degree of comfort in the building was found to be satisfying during the cooling period, the solar-driven DEC-plant showed major deficiencies in cooling performance, hydraulics and control. Especially, a too high rotational speed of the desiccant wheel and an inadequate adjustment of solar collector arrays, DEC-plants and building structure were identified. Therefore, in an overhaul of the system several problems in the hardware were found and corrected such as blocked nozzles due to calcinations, leakages in the sealing of the desiccant wheel and an incorrect installation of a non-return valve in the hydraulic system of the regeneration air heater. Moreover, the control strategy regarding the cooling power of the plant and the speed of the desiccant wheel was checked.

In the second year of operation (2007), some deficiencies of the first year were found to be removed, but the plant still did not work according to its capacity. Insufficient dehumidification by the desiccant wheel was identified as a major problem. Based on a detailed analysis of the desiccant wheel, one-sided displacement of the sorbent was supposed to be the reason for insufficient cooling capacity. Obviously, control or mechanical malfunctions during operation have lead to a one-sided oversaturation and thus to a one-sided damage of the desiccant wheel. Consequently, the damaged wheel is to be removed prior to the 2008 cooling period.

In order to tap the full potential of both the solar DEC-plant and the building's innovative concept, a number of further measures, especially concerning the matching of the DEC-plant and the solar system with the building management, need to be taken in future.

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