

EDITORIAL

Dear Reader,

In the middle of its implementation phase, the "German and Polish Energy Efficiency Project" welcomes you to the third GPEE newsletter. We are pleased to inform you about our current research activities, events which were organized or which are planned within the framework of GPEE and about some initial project results.

On the next pages, the standardized handbook "Guidance on Energy Efficiency Evaluation in Commercial Buildings" which is in preparation will be introduced and current research activities on the energy performance of dynamic insulation in experimental façade systems as well as the utilization of BIPV in order to cover the energy demands of an experimental office room will be described. Research results on environmental, energy and economy aspects – so called Life Cycle Assessment - in zero-emission façade system design will be highlighted. Information will also be given about the 2nd GPEE Specialist Seminar "Energy efficiency, façade technology and the environmental footprint" which took place in Hamburg on the 23rd of February 2015 and which attracted an international audience.

Two major events will be organised in cooperation with GPEE during 2015: The colloquium "Research on sustainability at German higher education institutions" on the 11th of June and the "4th European Fair on Education for Sustainable Development - Implementing Sustainable Development in European Cities and Regions" from the 9th to the 11th of September. Both events will take place in Hamburg. You will find more information about these events on the next pages. We look forward to seeing you there!

Enjoy reading!



Maria Kowald



Prof. Dr. Walter Leal



Kathrin Rath

NEW INSIGHTS IN CURRENT FAÇADE TECHNOLOGY

2nd GPEE Specialist Seminar "Energy efficiency, façade technology and the environmental footprint" delivered new insights in current façade technology development

In order to deal with the question of "How big is the environmental footprint of energy efficient façade technology?" the Research and Transfer Centre Applications of Life Sciences of Hamburg University of Applied Sciences (HAW Hamburg) - in collaboration with the GPEE partner consortium - organized the 2nd GPEE Specialist Seminar "Energy efficiency, façade technology and the environmental footprint" on the 23rd of February 2015 at the Hafencity Hamburg. The international audience covered representatives from universities but also from private companies and local authorities and included guests from Poland, Finland, Estonia and Lithuania.

The keynote speech about potentials and challenges of energy efficient buildings within the framework of sustainable urban development in Europe was given by Prof. Dr. Klaus Rückert from TU Berlin. Colleagues from GPEE project partner Lodz University of Technology presented research results on energy efficient façade systems including photovoltaic elements. The Life Cycle Assessment of energy efficient façades was in special focus and complemented by dynamic control of ventilation, costs-benefit analysis and the influence of daylight with the need for regulations presented by and discussed with speakers from Hamburg, Helsinki and Tallinn.

The seminar was followed by a guided tour through the practical energy efficient example Hafencity Hamburg.

The presentation slides of the event are available at:
<http://www.gpee.net/en/download/>

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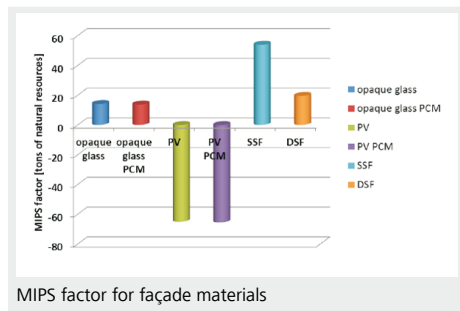


Team in front of the experimental façade at Technical University of Lodz (west side)



Experimental façade at Technical University of Lodz

Current research results of the Project are available in the aspects of life cycle assessment for different façade solutions, insulation material enhancement by phase change materials and the covered energy demand by building integrated photovoltaic.



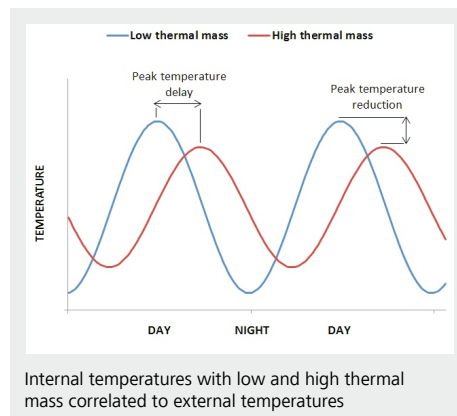
ENVIRONMENTAL, ENERGY AND ECONOMY ASPECTS IN ZERO-EMISSION FAÇADE SYSTEM DESIGN

Improvement of energy efficiency in buildings is without doubt one of the greatest challenges for sustainable development. The building sector is responsible for about 40% of global energy consumption and about 30% of CO₂ emissions. Therefore, one of the most promising alternatives is a concept of a building which has zero (or a close to zero) energy demand, known as zero-energy buildings or zero-emission buildings (ZE). One of the most important parts of ZE buildings is the façade. However, the efficient design of a zero emission façade system cannot focus purely on energy performance, but should as well include the economic aspects and environmental impact analysis, in order to make the solution feasible for application and sustainable over the whole life cycle of the façade. Accordingly, this approach has been applied in the frame GPEE and a full analysis of six different façade panels was done by evaluating the LCA, economic aspects and energy performance. The panels considered in the analysis included innovative combinations of photovoltaic panels, solutions with phase change materials active insulation, passive insulation systems and different transparent solutions. The LCA calculations were performed applying

Material Input per Service Unit (MIPS), whereas the energy aspects were evaluated with ESP-r software (a modelling tool for the simulation of building energy performance). Subsequently, an optimal façade design was proposed, which proves that systematic analysis of environmental, energy and economy aspects can lead to an improvement in zero-emission façade system design. The proposed solution has been applied on the experimental installation constructed at the university building in Lodz (Poland).

ENERGY PERFORMANCE OF DYNAMIC INSULATION BUILT IN THE EXPERIMENTAL FAÇADE SYSTEM

Good thermal insulation is a basic requirement for the design of energy efficient construction of external partitions. Nevertheless, another approach that can enhance the energy performance of the façade systems is to increase its heat capacity. Utilization of latent heat storage and the proper application of phase change materials (PCM) in external walls is very promising, but also a very challenging approach. Such a solution reveals very dynamic performance and is highly sensitive to weather conditions.



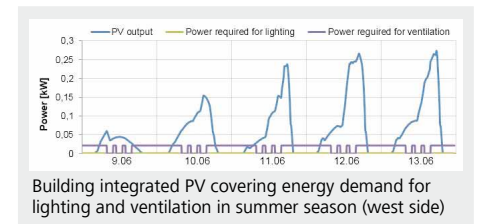
Internal temperatures with low and high thermal mass correlated to external temperatures

Therefore, there is a strong need for development and validation of specific evaluation and design methods for insulations enhanced by PCMs. Additionally, an interpretation of the simulation and experimental results is still under consideration by GPEE researchers. An attempt to assess the energy performance of the

experimental façade with PCM was carried out by evaluation methods from literature and the original method proposed by the GPEE team. Based on the performed analyzes, it can be concluded that the method of results interpretation has a strong impact on the definition of the optimal solution. Regardless the approach of an assessment, there is a visible dependence between the melting temperature of PCM, the external weather conditions and the heat storage efficiency. Result from this theoretical analyses were the guidelines at the design stage of material parameters that were used in the construction of the experimental façade system.

BIPV WILL COVER ENERGY DEMAND FOR LIGHTING AND VENTILATION

Within the framework of the GPEE project, an analysis was performed in order to evaluate the potential of the proposed BIPV façade to cover the net energy use in the office room. The optimized photovoltaic façade consists of 8 CIS panels with an efficiency declared by the producer at the level of 12%. Additionally, a centrally located double skin façade element that is built from the window and the Louvres system complements the external envelope.

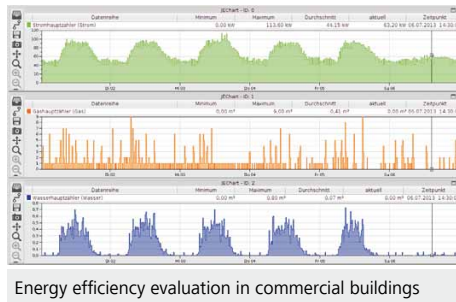


Building integrated PV covering energy demand for lighting and ventilation in summer season (west side)

Calculations for a selected section of the BIPV façade effecting the adjacent office room were made using the simulation program ESP-r. The energy obtained from the photovoltaic facade was intended to cover the energy demand for the mechanical ventilation and the artificial lighting. The decentralized underfloor ventilation unit was assumed for maintain appropriate internal air conditions in the analyzed office room. Supplementary lighting was provided by three LED lamps. Studies were performed for two orientations of the façade (east and west) and for two occupancy profiles with one or two office employees. In view of the different ventilation and lighting profiles, the whole year analysis was divided for three periods: winter, transitional and summer season. The obtained results indicate that the BIPV façade is able to cover the energy demand both for lighting and ventilation during summer season. However during winter season the energy generated by the photovoltaic panels is sufficient only for ventilation requirements. The subsequent step within the GPEE project is to verify the theoretical considerations by experimental studies. The existing BIPV façades are connected to the individual off-grid electrical system and each of them consists of charge controllers, a bank of batteries and an inverter.

ENERGY MANAGER'S HANDBOOK "GUIDANCE ON ENERGY EFFICIENCY EVALUATION IN COMMERCIAL BUILDINGS"

Within the GPEE Project a standardized handbook "Guidance on Energy Efficiency Evaluation in Commercial Buildings" is under development. The handbook will be especially designed for energy managers of residential and non-residential buildings. The aim of the standardized guidance is to find out procedure, which can be used for energy efficiency evaluation of any commercial building. The guidance will describe activities of the evaluation process towards energy efficiency on a step-by-step basis. Moreover it will define especially developed standardized tools,



Energy efficiency evaluation in commercial buildings

needed for the evaluation. The methods for energy efficiency evaluation of buildings described in the guidance have been tested on reference buildings in Poland and Germany. Energy Efficiency Evaluation of buildings requires several steps including interviewing, auditing, reporting, etc. After conducted performance evaluation of a building and correspondingly analyses, which identify the energy saving potentials, appropriate energy efficiency measures can be suggested and implemented.

ANNOUNCEMENTS



Implementing Sustainable Development in European Cities and Regions - 4th European Fair on Education for Sustainable Development

From the 9th to the 11th of September 2015, the Research and Transfer Centre "Applications of Life Sciences" in cooperation with GPEE and other European projects will organise the 4th European Fair on Education for Sustainable Development at Hamburg University of Applied Sciences under the auspices of the RCE Hamburg and Region. The aim of the fair is to provide European organisations with an opportunity to display and present their works on implementing sustainable development in cities and regions. Furthermore, the fair will foster the exchange

of information, ideas and experiences acquired in the execution of projects, from successful initiatives and good practice. It will also provide opportunities to discuss methodological approaches and projects which aim to better integrate the work of the various actors in the field of sustainable development especially at local level.

The event is a timely one, since it takes place as a follow-up to the UN Decade on Education for Sustainable Development, and is one of the first major activities supporting the "Global Action Programme" developed by the United Nations, which specifically calls for more initiatives in the field of education for sustainable development at the local level.

Thematically, the event will focus on a wide range of areas, which include (but are not limited to) education for sustainable development initiatives surrounding themes such as renewable energy and energy efficiency, sustainable water management and use, sustainable transport, climate change and others. The idea is that by contextualising education for sustainable development initiatives around these key topics, their applied nature can be better understood, and concrete possibilities for cooperation may be explored.

Last but not least, a further aim of the event will be to link and network people and organisations working in this field, so that they can take advantage of the many opportunities that cooperation in the education for sustainable development offers.

VENUE

Hamburg University of Applied Sciences
Faculty of Life Sciences – Campus Bergedorf
Ulmenliet 20
20133 Hamburg

For more information and registration please visit:
<http://www.haw-hamburg.de/en/fair-on-education-2015/registration.html>



Colloquium „Research on sustainability at German higher education institutions“ will take place on the 11th of June 2015 at 09.00 - 16.00h

Research on sustainability has a long tradition in Germany and is still high on the political as well as on the research agenda of German higher education institutions. Various national and EU research programmes funded numerous projects dealing with the topic of sustainability in the past 10 years. Whereas many projects in the early days of research on sustainability have tackled substantial questions, research on sustainability nowadays requests interdisciplinary as well as cross-sectoral, so-called "applied sustainable development" approaches (Leal Filho 2014).

The amount and variety of actors and research projects in Germany focusing on sustainability meanwhile has reached an incredible dimension which leads to difficulties in getting an overview of "Who is doing what?". There is a perceived need to bring actors involved in research on sustainability at German higher education institutions together in order to discuss as a "community" the current state-of-the-art as well as future trends.

It is against this background that the research colloquium „Research on sustainability at German higher education institutions“ will be organized. The colloquium will take place

VENUE

Hamburg University of Applied Sciences
Aula – Berliner Tor 21
20099 Hamburg

Conference language is German. More information and registration is available at: <http://www.haw-hamburg.de/ftz-als/veranstaltungen/life-sciences-forschungskolloquium-2015.html>

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Hamburg University of Applied Sciences

CALENDAR

» XV Polish conference of science and technology – building physics in theory and practice

9th to the 11th of June 2015

ŁÓDŹ-SŁOK, Poland
Polish conference on building physics
<http://fizykabud.nazwa.pl/konferencja2015.html>

» Research on sustainability at German higher education institutions

11th of June 2015

Hamburg, Germany
Research colloquium on sustainability
<http://www.haw-hamburg.de/ftz-als/veranstaltungen/life-sciences-forschungskolloquium-2015.html>

» 6th International Building Physics Conference (IBPC 2015)

14th to the 17th of June 2015

Turin, Italy
International conference on Building Physics for a Sustainable Built Environment
<http://ibpc2015.org/index.php>

» 4th European Fair on Education for Sustainable Development

9th – 11th September 2015

Hamburg, Germany
European fair focusing on implementing sustainability in cities and regions
<http://www.haw-hamburg.de/en/fair-on-education-2015/registration.html>

» Baltic University Programme (BUP)

9th to the 11th of September 2015

Hamburg, Germany
Summer Course on sustainable development

» POL-ECO-SYSTEM

27th to the 30th of October 2015

Poznan, Poland
International Fair of Technology and Products for Sustainable Development and Municipal Services.

THE GPEE PARTNERSHIP

The following partners form the GPEE partnership:



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Hamburg University of Applied Sciences

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