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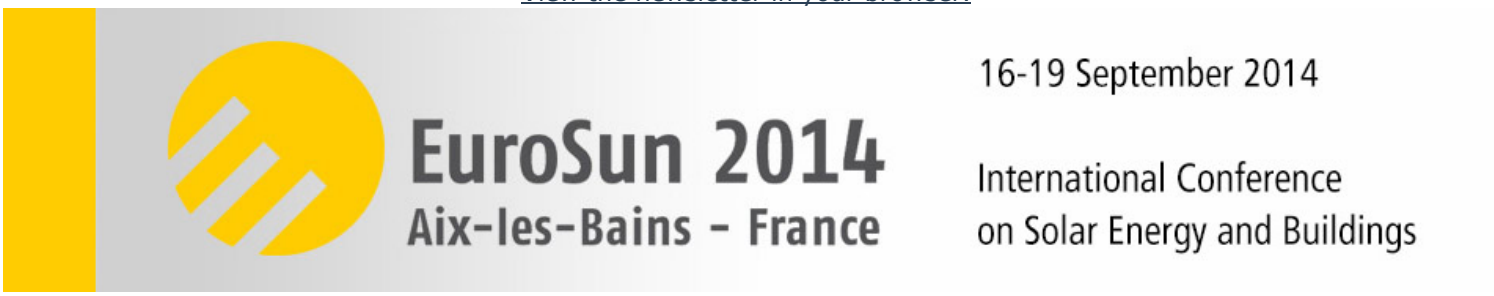

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EuroSun 2014 Conference: Notification of Acceptance

Dear Dr. Filetoth,

On behalf of the EuroSun 2014 Scientific Committee, we are pleased to inform you that your abstract with the ID **88243**, titled:

- **Low-energy Building Design Toolset for Architects**

has been accepted as a **poster** for the EuroSun 2014 conference.

Registration

The registration deadline for authors is August 15, 2014. Please be aware: any paper for which no author or an alternate is registered until this deadline, will be removed from the program.

Full paper submission

The full paper submission deadline is September 01, 2014. Additional information regarding the full paper submission, including your login and password will be sent in a separate email.

We look forward to seeing you at EuroSun 2014. For any questions or concerns, please do not hesitate to contact us at info@eurosun2014.org.

Kind regards,
EuroSun 2014 Organizing Team

For more information:
www.eurosun2014.org

Add EuroSun 2014 to your calendar

Date:
September 16-19, 2014
Venue:
Aix-les-Bains, France
A conference of: ISES
Conference host: INES

Contact:
info@eurosun2014.org
review@eurosun2014.org

This email is sent from the conference secretariat at:

PSE AG
Emmy-Noether-Straße 2, 79110 Freiburg, Germany
www.pse.de

Register: Amtsgericht Freiburg HRB 701854
CEO: Dr. Andreas Häberle, Board: Prof. Dr. Volker Wittwer, Prof. Dr. Eicke Weber, Prof. Dr. Joachim Luther

88243:

LOW-ENERGY BUILDING DESIGN TOOLSET FOR ARCHITECTS

Summary

This paper presents a low-energy design toolset recommended for architectural designers; to be used at any stage of the design development process; within the familiar building information modeling environment; without the necessity to buy, install or learn additional software application. Designers will gain accurate feedback about the energy-related aspects of their design within minutes; and can bring informed design decisions without involving energy experts, engineers or consultants.

1. The Role of the Architect

Architectural design decisions made at the early design stage determine about 50-80% of the energy characteristics of a building project. Therefore it is crucially important to develop and provide sustainable design toolsets for architects that do not require steep learning curve and that truly helps everyday design decisions by incorporating the effect of low-energy design solutions. This paper describes a new software tool that provides an easy-to-implement architectural workflow that incorporates all the major aspects of low-energy building design including:

- Climate analysis,
- Building energy model calibration,
- Sensitivity analysis,
- Validating the project-specific, low-energy building solution sets.

2. Climate Analysis

The goal of this step is to gather the climate characteristics - external air temperature, relative humidity, solar radiation, wind speed - of the building site; determine degree days and unmet load hours and to efficiently consider these throughout various stages of the dynamic building energy model analyses. We obtain weather data files created for such simulations free of charge from the US Department of Energy website (1) for over 2100 locations worldwide. The climate analysis is performed on a simple "internal space" on the given climate location, having minimal resistance to be able to study and identify the characteristics of the local weather. Dynamic energy simulation is performed using the VIP-Energy (2) calculation method of StruSoft. The result of the climate analysis provides in-depth understanding of the project- and function-specific comfort conditions that will help to select the most appropriate design approach later on.

3. Building Energy Model Calibration

The building energy model calibration process capitalizes on data input accuracy: the final output of any building energy model simulation is only as good as the accuracy of the data input was at the first place. Architectural designers are not always fully familiar with the energy-related characteristics of their design. To make sure that all the energy-related characteristics of the project are correctly set, it's worth performing the model calibration for every model, but at least once for a specific project location and building function. Such calibration can be done with the help of an existing reference project built on a specific climate or with the help of an energy standard. The paper presents a scenario using the ASHARE 140 Energy Standard (3) to present and explain a typical building energy model calibration step. The result of the calibration ensures that all input data is correct and that the results of the final building energy evaluation will be accurate.

4. Sensitivity Analysis

For the sensitivity analysis we create a so called "baseline building" that does not include any low-energy design solution sets. The baseline building will be used for testing all the relevant low energy building solutions, one by one. This paper presents how to apply the results of researches carried out by the "Solar Heating and Cooling" chapter of the "International Energy Agency", "Task 40" (4) research group in the architectural design practice. Other low-energy design recommendations can also be used in this step of the presented design workflow. The result of the sensitivity analysis identifies the exact energy-related aspects of individual low-energy building solution sets, providing a solid basis to select the most appropriate solutions to be incorporated in the final design.

5. Project-Specific, Low-Energy Building Solution Sets

Throughout the last step of the low-energy building design workflow we incorporate the combined, energy-related performance of the previously selected low-energy building solutions sets and validate the building energy performance of the final architectural design. This paper presents a design toolset that can be efficiently used within a BIM solution (5), without the necessity to buy, install or learn any other building-energy specific application. Multiple thermal blocks can be created incorporating the thermal properties of the designed building materials and structures. Structural details with thermal bridges will be identified and improved. Various operation profiles will be created and assigned to spaces having identical functions. The combined effect of the previously selected, project-specific, low-energy building solution set is displayed in the final, customizable building energy evaluation diagrams (Fig.1).

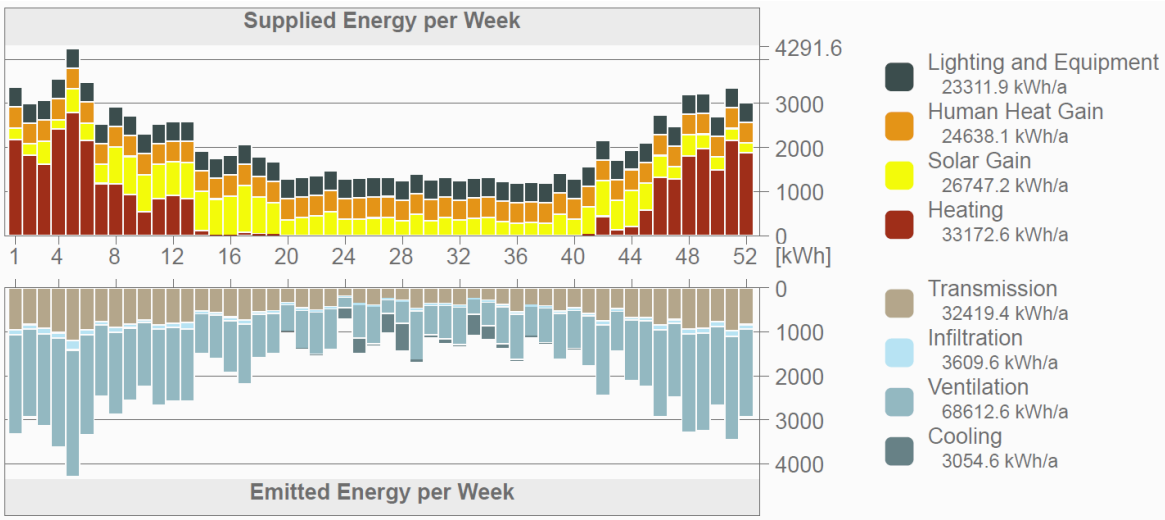

Fig. 1: Project Energy Balance diagram of the final building energy evaluation report

References

1. US Department of Energy, weather data website (2014):

http://apps1.eere.energy.gov/buildings/energyplus/weatherdata_about.cfm

2. StruSoft's VIP-Energy engine website (2014): http://www.strusoft.com/products/vip-energy

3. ANSHI/ASHRAE 140 Energy Standard website (2014):

https://www.ashrae.org/standards-research--technology/standards--guidelines/titles-purposes-and-scopes#140

4. Solar Heating and Cooling (SHC) chapter of the International Energy Agency (IEA), "Task 40" research website (2014): http://task40.iea-shc.org

5. Graphisoft's ArchiCAD building information modeling solution website (2014): www.graphisoft.com