

INTERVIEW

Advanced Lighting Solutions for Retrofitting Buildings

Interview with Jan de Boer

The IEA SHC Programme wrapped up its work on *Advanced Lighting Solutions for Retrofitting Buildings (Task 50)* this year, and is developing a new Task on the topic of *Integrated Solutions for Daylight and Electric Lighting: From Component to User Centered System Efficiency*. To learn first hand about the impact Task 50 has had in this field, we asked Jan de Boer, the Task Operating Agent, a few questions.

Solar Update (SU): Why was this work needed?

Jan de Boer (Jan): Lighting accounts for approximately 19% of the global electric energy consumption. Without essential changes in policies, markets and practical implementations, it is expected to continuously grow despite significant and rapid technical improvements like solid-state lighting (SSL) and new façade

and light management techniques. With a small volume of new buildings, major lighting energy savings can only be realized by retrofitting the existing building stock. Many countries face the same situation; about 75% of the lighting installations are considered to be out of date (older than 25 years). Compared to existing installations, the majority of new solutions allow a significant increase in efficiency – easily by a factor of three or more – going along with

highly interesting payback times. However, lighting refurbishments are still lagging behind compared to what is economically and technically possible and feasible.

SU: What were the benefits of doing this work thru the IEA SHC Programme?

Jan: We benefitted from an excellent international network of experts. This among

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others allowed us to look into local – partly very different markets – and address their specifics, for instance with respect to the economics of retrofits like electricity and component prices.

SU: What, if any, result surprised you?

Jan: In the field of electric lighting the technology change towards LED went faster than expected and is in many regions of the world now almost completely. Developments for new lighting systems are nowadays almost only done on the basis of LED. SHC Task 50 fell into this period of market transition from fluorescent to SSL (LED) lamp technology. Not only efficiencies increased by nearly a factor of two, but also costs were cut more than in half. This had an impact on energy and economic modelling. We tried to compensate for this with late updates (in parts combined with extrapolations) in the affected activities, while denoting that both efficiencies and prices are now rather in a phase of convergence. Thus, the results and conclusions for this particular field are generally expected to be valid now for a time to come.

SU: What is the most important deliverable(s) of the Task and why?

Jan: Without wanting to highlight one aspect, we can quickly go through the subtasks. We generated a more profound understanding of the financial structure of lighting retrofits by identifying what we called “low hanging fruits” (i.e., retrofits at very beneficial payback times) in the work of

Subtask A. In Subtask B, 35 technologies for lighting retrofits were thoroughly analyzed and made comparable to each other, from the façade over light management to the electric lighting solutions. A survey among more than 1,000 practitioners gave a profound view on retrofit approaches being used and shed light on the barriers in practice as well as providing advice for future software development to better tailor future tools to the actual needs (Subtask C). Using a new developed monitoring protocol (on energy, user acceptance, cost) 24 retrofit case studies covering a variety of different building types showed that the energy demand for lighting could be on average cut in about half – giving strong practical evidence that lighting retrofit does significantly lower building energy consumption.

SU: Do you have a success story about a Task deliverable being used by an end-user/industry?

Jan: It’s a little too early to tell, but we see for instance initiatives to bring developed approaches (for example, rules to take out dated installations out of order; minimum requirements for new and replacement technologies) into legislation and sustainability discussions. Over the course of collecting the case studies, Task experts supported, with lots of appreciation from the building owners, the retrofit processes and demonstrated the significant potentials with the developed approaches.

SU: How has your Task work supported capacity and skill building?

Jan: Connected to the Task meetings, we had all together 6 workshops with participants from industry, which included manufacturers, designers, and architects. More than 380 people attended the workshops. The Lighting Retrofit Adviser – in our opinion - contains lot of valuable information and methodologies for practical application, but may be used for educational purposes as well.

SU: What is the current status of the technology?

Jan: The electric lighting market remains in a phase of fast technological developments.

After costs fell and efficiencies increased, now we are starting to see a phase of adding new functionalities like tunable white concepts, new lighting control schemes. In the field of daylighting, the supply of indoor spaces in retrofits generally can suffer significantly in retrofits, as the preference is most often given to thermal energetic improvement of building shells (low transmittance glazing due to thick insulation systems, thicker window fins and sills). Solutions to counter this are required.

SU: What is the future of the technology – new developments, market, policies needed, etc.?

Jan: Better integration of daylighting and electric lighting solutions is one next big trend for increasing efficiency and better matching lighting to the user’s needs. As many studies show, daylight is the user’s favorite light source and so it must be protected from a simple substitution or mimicking by low priced electric lighting. A key challenge here is to bring today’s mainly independently operating industries – electric lighting, facade, building management – together to cooperate in generating added values.

SU: Will we see more work in this area in IEA SHC?

Jan: I sure hope so! We proposed a new Task on integrated solutions for daylight and electric lighting and it is currently in the definition phase. If approved by the SHC Programme in June 2017, the work will get underway soon after that.

SU: Did the Task work on/support any standards?

Jan: Not directly. Nevertheless, we identified specific needs that we’re planning to address in the proposed new Task. This will encompass approaches to rate new lighting technologies with respect to energy on a more detailed scale (hourly basis). Plus, further standardization needs in the field of façade photometry are necessary.

Visit the SHC Task 50 webpage to learn more and to download reports, or contact Jan de Boer at jan.deboer@ibp.fraunhofer.de.