Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra

Départmenet fédéral de l'environnement, des transports,
de l'énergie et de la communication DETEC

Ofiice fédéral de l'énergie OFEN

Rapport final 7 janvier 2013

IEA SHCP Task 41 "Solar Energy and Architecture"

Direction de la sous-tâche A "Criteria for architectural integration"

LESO-PB
LABORATOIRE D'ENERGIE SOLAIRE
PHYSIQUE DU BÂTIMENT

EPFL
ÉCOLE POLYTECHNIQUE
FÉDÉRALE DE LAUSANNE

Mandant:
Office fédéral de l'énergie OFEN
Section Recherche énergétique
CH-3003 Berne
www.bfe.admin.ch

Cofinancement:
EPFL , CH-1015 Lausanne

Mandataire:
EPFL LESO-PB
Ch. Roecker
Station 18
CH-1015 Lausanne
http://leso.epfl.ch/f_default.htm

Auteur:
Christian Roecker, EPFL LESO-PB, christian.roecker@epfl.ch

Responsable de domaine de l'OFEN: Andreas Eckmanns
Chef de programme de l'OFEN: Jean-Christophe Hadorn
Numéro du contrat et du projet de l'OFEN: 154148/ 103154

Abstract

The main goals of the Task are to help achieving high quality architecture for buildings integrating solar energy systems, as well as improving the qualifications of the architects, their communications and interactions with engineers, manufactures and clients. This year one final meeting has taken place (Lisbon) and the three Subtasks have mostly completed their planned work. As Subtask leaders, we contributed in co-organising this meeting and conducting the sessions dedicated to Subtask A. The LESO has prepared the template for the website dedicated to innovative products (DA6). After approbation of its content by the participants in Lisbon, the site has been established and finalised, and was put on-line starting October 2012.

The LESO has finalised the edition of the main deliverable DA2 proposed by Subtask A, as well as the sheets used to report on good examples, for innovative products and for building integrations.

The deliverable DA3 "*Criteria and guidelines for product and system developers*" has been split into two separate publications for PV and ST. As sole author of the DA3 ST part, the LESO is in the finalisation phase for ExCo approval.

The LESO has contributed to three workshops organised in conjunction with the main meeting, presenting original work on acceptability criteria for active solar systems (Lisbon, Montreal and Copenhagen).

The participation to a working group dedicated to the preparation of a new Task proposal on interactions of urban planning and solar energy has also represented an important contribution (on own funding).

Buts du projet

Le but principal du LESO en tant qu'Institut responsable d'une Sous-Tâche a été d'assurer le bon déroulement de la Sous-Tâche A de manière générale, en assumant le rôle accepté par la Suisse, et donc de promouvoir l'usage de l'énergie solaire active dans le cadre d'une architecture de qualité.
Au niveau de la contribution comme participant, un important travail de développement des concepts à présenter dans les divers canaux prévus (livres, cours, web…) a été effectué, basé sur les connaissances acquises lors du travail de thèse de Mme. Munari Probst.

Pour la Suisse, on attendait les résultats suivants :

- une amélioration sensible de la formation et post-formation des architectes
- une meilleure connaissance de la demande des architectes pour les fabricants suisses de capteurs
- des compétences et une vision générale du problème à offrir aux autorités délivrant autorisations, permis et subventions
- une meilleure visibilité et plusieurs inputs nouveaux pour les auteurs de logiciels

Situation du projet et travaux effectués.

1. Situation du projet

Le travail de la Tâche est pratiquement terminé, avec les principaux livrables achevés ou en voie d'achèvement. Le rapport de l'Operating Agent, Maria Wall, en annexe, donne les détails de l'état de chaque Subtask lors du dernier meeting, à Lisbonne.
Il reste à finaliser quelques documents, notamment DA3 PV et DA3 ST, situation normale du fait de la très courte durée de la Tâche et des délais dans un travail communautaire. Ces éléments seront en principe terminés d'ici la fin de l'année.

2. Travaux effectués

Les travaux effectués dans le cadre ou liés à la Tâche couvrent un large spectre qui comporte l'organisation générale de la Tâche, l'organisation et la gestion de la Sous-tâche A, la collaboration avec les 2 autres Sous-tâches et les activités dépendantes ou connexes telles qu'enseignement ou recherche.

Le LESO a participé à l'élaboration du programme détaillé du meeting de Lisbonne dont une partie importante a été consacrée aux jugements des « case studies » proposés par tous les participants. Un sous-groupe composé exclusivement d'architectes (dont M-C Munari Probst) a été invité à sélectionner les meilleurs exemples proposés pour la publication finale.

En tant que Subtask A leader, le LESO a préparé et assuré la conduite des sessions consacrées à cette Sous-tâche lors du meeting de Lisbonne.

La finalisation des *deliverables* encore en cours a été planifiée. Cette mise en forme demande un effort conséquent de clarification et d'organisation des éléments devant figurer dans les divers *deliverables* de la ST A.

Au niveau rédactionnel, pour le DA2, outre la préparation des chapitres spécifiques au solaire thermique, à la partie théorique et aux conclusions, le LESO a co-rédigé la partie photovoltaïque. Le LESO a assuré la coordination complète et la mise en page finale du *deliverables* DA2, qui constitue un résultat majeur de la Task.

Concernant la partie Solaire Thermique du *deliverables* DA3, le LESO en assure la rédaction totale et la finalisation. Du fait d'indisponibilités pour raisons médicales, ce document ne sera prêt que fin 2012, voire janvier 2013, mais dans le cadre budgétaire prévu.

Les DA4 et DA5 ont été préparés et terminés par Gabriele Lobacarro.

Le LESO a accepté de prendre en charge la conception, la préparation et l'hébergement du site web prévu comme livrable DA6. Ce travail supplémentaire a été mené à bien et le site web correspondant a été mis en ligne en octobre 2012.
Il est prévu que le LESO en assure la mise à jour dans le cadre de sa participation à la Task 51, pour autant que cette participation soit assurée.

3.1 Collaborations nationales

La collaboration a été établie avec la HSLU de Lucerne dans le cadre de la Tâche, à travers le travail de Doris Ehrbar.
Un autre axe existe avec le SUPSI, organisme avec lequel plusieurs collaborations ont eu lieu et dont l'intégration dans l'activité nationale Suisse officielle à la Tâche a été vraiment bienvenue. Le nouveau chef de groupe Francesco Frontini collabore activement à la SubTask A, notamment pour les DA2 et lDA3-PV

3.2 Collaborations internationales

L'idée même des Tâches de l'AIE étant d'établir de multiples collaborations internationale, ces collaborations sont assurées. Une collaboration plus ponctuelle avec les experts des-Task 39 et Task 40 a également pu être établie.

4 . Perspectives 2013

La Tâche étant officiellement terminée, les dernières activités ne concernent plus que la finalisation pour approbation par l'ExCo des derniers livrables.

5. Publications et Conférences

Le LESO a publié un ouvrage aux PPUR (Presses Polytechniques et Universitaires Romandes), chez Routledge Publisher :

« Architectural Integration and Design of Solar Thermal Systems », M.-C. Munari Probst – Ch. Roecker, Routledge-PPUR, 2011, ISBN 978-2-940222-46-9

2012 LESO publications for IEA Task 41

- Munari Probst MC, Roecker C *Criteria for Architectural Integration of Active Solar Systems - IEA Task 41, subtask A*, SHC 2012 conference, San Francisco (US).
- Munari Probst MC, Roecker C editors, Manual *Solar energy systems in architecture - integration criteria and guidelines,* Deliverable T.41.A.2 of IEA SHC 41 Solar energy and Architecture, September 2012
- Munari Probst MC, Roecker C, et al, *Website Innovative solar products for building integration* (http://solarintegrationsolutions.org/)

2012 MC Munari-Probst Invited Speaker presentations on Task 41 and QSV method:

- International Conference SOLAR ENERGY AND ARCHITECTURE - Innovation and Development, Lisbon (P) 30 mars 2012
- Congrès des architectes 2012 - Une nouvelle ère pour le solaire en architecture, Montréal 31mai - 1 juin 2012
- Présentation "LESO QSV- acceptabilité urbaine des systèmes solaires actifs", SIPAL (Service immeubles, patrimoine et logistique), Lausanne, 5 nov. 2012.
- Lecture "Solar energy use and architecture", / IDEAS - Integrated Design, Architecture and Sustainability, Doctoral School, EPFL 14 November 2012
- Conference "Solar Energy and Architecture" Solar City Copenhagen Arkitektenes Hus, Copenhagen 15 November 2012
- Interview et portrait dans « Hoch parterre n1-2/ 2012 art. Tour de Suisse-Tour de Sol »

Publications officielles de la Task 41

Voir liste, description et liens Internet dans l'Annexe 1 ci-dessous

Lausanne, le 7 janvier 2013

Ch. Roecker.

Annexe 1 Publications officielles de la Task 41

Page d'accueil du site officiel : http://task41.iea-shc.org/

Lien vers les publications décrites ci-desous: http://task41.iea-shc.org/publications

Subtask A: Criteria for Architectural Integration

Web-site: Innovative solar products for architectural integration
Subtask A: Criteria for Architectural Integration
September 2012 - Posted: 9/14/2012
By MariaCristina Munari Probst, Christian Roecker, Laurent Deschamps
This website shows in an attractive way the innovative/inspiring solar products for building integration now available on the market. The website is dedicated to architects and has three sections: photovoltaic, solar thermal and hybrid systems. By choosing a specific technology and integration approach (roof integration, façade integration, balcony…) the user receives a selection of appropriate products, presented in the form of virtual A4 sheets. These sheets include dedicated information, contact details and pictures, both of the product alone and in situation on buildings.

T.41.A.2: Solar Energy systems in Architecture - Integration Criteria and Guidelines
Subtask A: Criteria for Architectural Integration
September 2012 - PDF 9,21MB - Posted: 9/20/2012
Editors: MariaCristina Munari Probst & Christian Roecker
This document is conceived for architects and intended to be as clear and practical as possible. It summarizes the knowledge needed to integrate active solar technologies (solar thermal and photovoltaics) into buildings, handling at the same time architectural integration issues and energy production requirements. Solar thermal and photovoltaics are treated separately, but the information is given following the same structure: 1- Main technical information; 2- Constructive/functional integration possibilities in the envelope layers; 3- System sizing and positioning criteria; 4- Good integration examples; 5- Formal flexibility offered by standard products; 6 - Innovative market products. To complete the information the manual ends with a short section dedicated to the differences and similarities between solar thermal and photovoltaic systems, with the purpose to help architects make an energetic and architecturally optimized use of the sun exposed surfaces of their buildings.

Product Developments and Dissemination Activities

Coordinated by Subtask A
September 2012 - PDF 3,98MB - Posted: 10/4/2012
Editors: Gabriele Lobaccaro & Maria Wall
This document shows product developments and dissemination activities carried out within the framework of, or in close relation to, the project IEA SHC Task 41; Solar Energy and Architecture. This Task gathered researchers and practicing architects from 14 countries in the three year project whose aim was to identify the obstacles architects are facing when incorporating solar design in their projects, to provide resources for overcoming these barriers and to help improving architects' communication with other stakeholders in the design of solar buildings. Participating countries were Australia, Austria, Belgium, Canada, Denmark, Germany, Italy, Norway, Portugal, Republic of Korea, Singapore, Spain, Sweden and Switzerland. The report gives not a complete list of activities, but shows the different types of activities to spread the findings in Task 41 and to initiate product developments in participating countries.

T.41.A.1: Building Integration of Solar Thermal and Photovoltaics – Barriers, Needs and Strategies

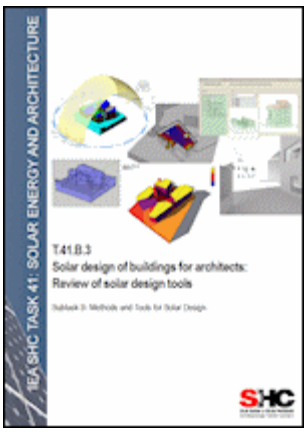
Subtask A: Criteria for Architectural Integration
May 2012 - PDF 3,16MB - Posted: 7/4/2012
By: Klaudia Farkas (NTNU, Norway), Miljana Horvat (Ryerson University, Canada)
This first report of Subtask A describes the results of a large international survey on the reasons why architects do not use or rarely use solar technologies, and gives proposals to help overcome these barriers by identifying the architect's needs in this area.

Subtask B: Methods and Tools

Solar components 3D parametric CAAD objects

Subtask B: Methods and Tools for Solar Design
September 2012 - Posted: 9/14/2012
The developed solar objects are compatible with both Graphisoft ArchiCAD and Autodesk AutoCAD. The main goals of the new tool are to speed up the rendering procedure when integrating PV systems in building design, to facilitate and stimulate the use of BiPV (Building integrated Photovoltaic) systems by architects and designers and to improve the architectural quality of BiPV systems. It was developed by the Institute for Applied Sustainability to the Built Environment (ISAAC) in collaboration with IDC AG, the Swiss national Graphisoft distributor (responsible for CAD object programming), as a part of a national Swiss project: BiPV Tools, Interactive tools and instruments supporting the design of building integrated PV installations. The modules are available for free downloads from the following website : www.bipv.ch/index.php?option=com_content&view=article&id=338&Itemid=306&lang=en

T.41.B.3 Solar design of buildings for architects: Review of solar design tools



Subtask B - Methods and Tools for Solar Design
July 2012 - PDF 11,46MB - Posted: 7/4/2012
Editor: Miljana Horvat (Ryerson University, Canada) Maria Wall (Lund University, Sweden)
The third report of subtask B presents the capabilities of 19 CAAD and BPS digital tools for solar design, in order to increase overall awareness, and provide inspiration and incentive for the future choice of tool(s). The review was carried out by using the same building model as input for all tools, as far as possible. In addition, the second part of the report presents three exemplary case stories that intend to convey valuable experience as they describe different design approaches, which tools were used and how the use of solar design tools affected the design process and final architectural design.

T.41.B.4: Needs of architects regarding digital tools for solar building design

Subtask B - Methods and Tools for Solar Design
June 2012 - Posted: 7/4/2012
By: Miljana Horvat, Jouri Kanters
One important outcome of Task 41 is a reach-out to the industry and digital tool developers in the form of a letter, clearly stating the perceived needs of professional architects, as they had been identified through the international survey and by Task 41 experts through experience and research reviews.

T.41.B.2: International Survey About Digital Tools Used by Architects for Solar Design

Subtask B: Methods and Tools for Solar Design
July 2011 - PDF 4,9MB - Posted: 8/1/2011
Editor: Miljana Horvat (Ryerson University, Canada), Marie-Claude Dubois (Université Laval, Canada), Mark Snow (University of New South Wales, Australia), Maria Wall (Lund University, Sweden)
The second stage of the project aimed at learning from users, i.e. architects, about their satisfaction with currently available tools and methods for solar design, as well as to identify obstacles that they are facing especially during the early design phase. An international survey was carried out in 14 participating countries during 2010. This deliverable is the full survey report, with a description of the survey and a detailed discussion of the results.

T.41.B.1: State-of-the-Art of Digital Tools Used by Architects for Solar Design

Subtask B - Methods and Tools for Solar Design
September 2010 - PDF 1,56MB - Posted: 9/7/2010
Editor: Marie-Claude Dubois (Université Laval) and Miljana Horvat (Ryerson University)
The first stage of work in Subtask B was to review and analyze the current software landscape available for architects, with a focus on early design phase (EDP) decisions of building projects, and to identify missing software tools and/or missing functionalities required for encouraging and enhancing solar design of buildings and the integration of solar systems and technologies. This report includes 56 software packages which were classified in three categories: CAAD (computer-aided architectural design) tools, visualization tools and simulation tools.

Subtask C: Concepts, Case Studies and Guidelines

T.41.C.1: The Communication Process

Subtask C: Communication Guideline
July 2012 - PDF 2,48MB - Posted: 9/2/2012
Editor: Rolf Hagen & Olaf Bruun Jorgensen
In order to stimulate an increased use of solar in energy conscious building design, the Task 41 participants have developed a Communication Guideline as a tool to support architects in their communication process with especially clients, authorities and contractors. Today the energy performance of solar solutions is well documented and well known especially in the “technical environment”. This knowledge, however, needs to be communicated in a convincing way to the decision makers in order to ensure a broad implementation of sustainable solar solutions in future building design. The Communication Guideline includes convincing arguments and facts supporting the implementation of solar based design solutions. The Communication Guideline is divided in three main parts:
• Part 1: Convincing clients to request and commission solar buildings
• Part 2: Communication strategies at the design/ construction team level
• Part 3: Tools and References