2010 HIGHLIGHTS

SHC Task 40 / ECBCS Annex 52
Towards Net-Zero Energy Solar Buildings

THE ISSUE

Energy Use in buildings worldwide accounts for over 40% of primary energy use and 24% of greenhouse gas emissions. Several International Energy Agency (IEA) countries have adopted a vision of so-called 'net zero energy buildings' as a long-term goal of their energy policies. However, what is missing is a clear definition and international agreement on the measures of building performance that could inform 'zero energy' building policies, programmes and industry adoption around the world.

PARTICIPATING COUNTRIES

Australia
Austria
Belgium
Canada
Denmark
Finland
France
Germany
Italy
South Korea
New Zealand
Norway
Portugal
Spain
Sweden
Switzerland
United Kingdom
United States
2 industry

OUR WORK

The objective of the Task is to study current net-zero, near net-zero and very low energy buildings and to develop a common understanding, a harmonized international definitions framework, tools, innovative solutions and industry guidelines. A primary means of achieving this objective is to document and propose practical NetZEB demonstration projects, with convincing architectural quality. These projects aim to equalize their small annual energy needs, cost-effectively, through building integrated heating/ cooling systems, power generation and interactions with utilities. These examples and the supporting sourcebook, guidelines and tools are viewed as keys to industry adoption. The Task will build upon recent industry experiences with net-zero and low energy solar buildings and the most recent developments in whole building integrated design and operation. The joint international collaborative activity will address concerns of comparability of performance calculations between building types and communities for different climates in participating countries. The goal is solution sets that are attractive for broad industry adoption.

Task 40 is a five-year collaborative project with the IEA ECBCS Programme and will be completed in September 2013.

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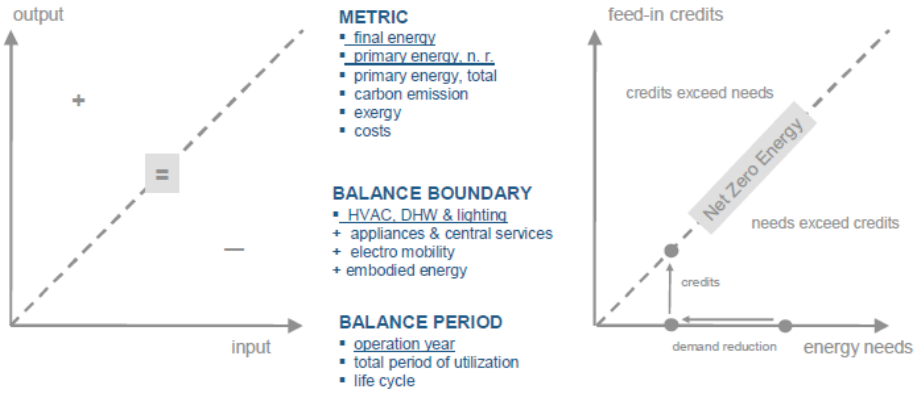
KEY RESULTS OF 2010

Net-ZEB Definitions Framework, Grid Interaction and Implications

An internationally agreed understanding on NZEBs based on a common methodology.

During 2010 work continued to arrive further at an international consensus on a definitions framework, and monitoring procedures of NetZEB as well as adapting the US DOE High Performance Buildings Database to capture information on NetZEB in participating countries.

Definitions Framework



Another major highlight of 2010 was finalizing the Table of Contents of Volume I of the NetZEB Source Book and securing its publications by a well-known German publisher. Volume I chapters will deal with the history, theory and project experiences from all building types, including projects in North American and European countries, taking into account all projects of architectural & conception relevance. The planned publication date of this book is in the 3rd quarter of 2011.

NetZEB Design Processes and Tools

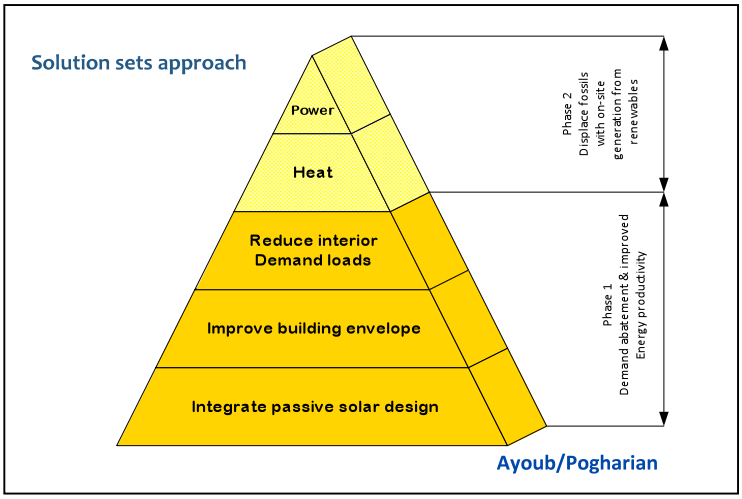
Identify and refine design approaches and tools to support industry adoption.

During 2010 work continued in the four major R&D streams; in documenting and analyzing processes and tools currently being used to design NetZEBs and under development by participating countries; in assessing gaps, needs and problems to inform simulation engine and detailed design tools developers of priorities for NetZEBs; in qualitative and quantitative benchmarking of selected tools; and in selecting six case study buildings (detailed analysis of simulated/designed vs. actual performance), and proposing the redesign/optimization of these buildings.

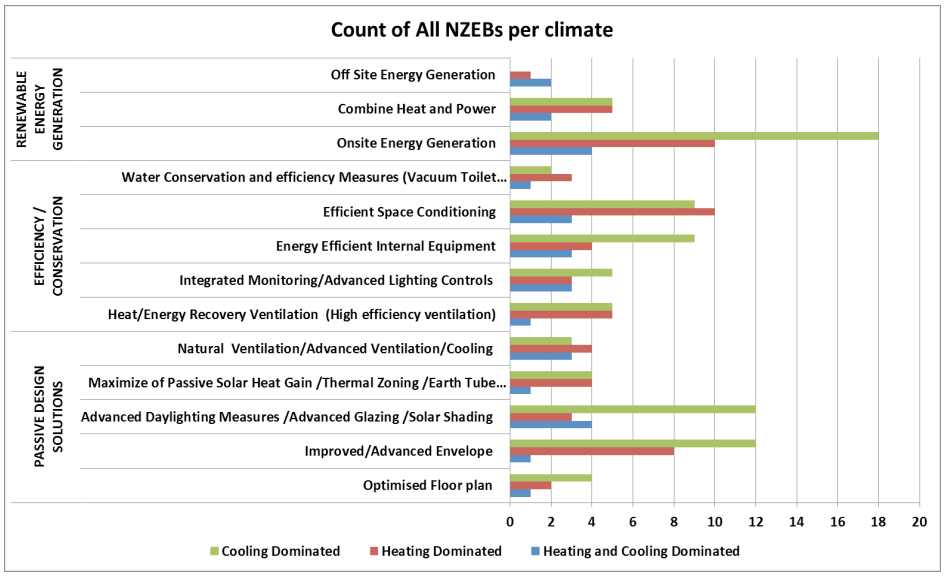
NetZEB Solution sets (design, engineering and technologies)

Develop and test innovative, whole building net-zero solution sets for different climates with exemplary architecture and technologies that would be the basis for wide industry uptake.

During 2010, 50 projects of NetZEB buildings worldwide were identified for further analysis to come up with solution sets that could inform industry adoption. An analysis matrix of solutions sets categories (passive approaches and envelope, energy efficient systems, and renewable energy) and climate type (cooling dominated, heating dominated, cooling & heating dominated) was developed to document the various projects.



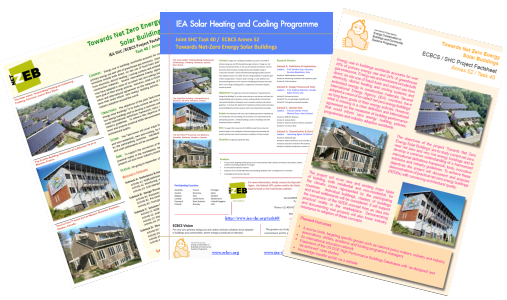
Example of Solution Set output



NetZEB Dissemination and Outreach

Support knowledge transfer and market adoption of NetZEBs on national and international levels.

The first PhD training workshop to provide specialist training to PhD students participating in the Task will be held June 20-25, 2011 in Montreal, Canada, in conjunction with the ASHRAE 2010 summer conference. This is joint activity with SHC Task 41 is for current PhD students and advanced Master's students to gain a thorough understanding of NetZEBs and their fundamental principles. The wide-reaching scope will fill gaps for both engineers and architects in subject areas of engineering and mathematical theories, modeling (methods and tools), and design and architectural perspectives.



Also in 2010, Task brochures were developed and posted on the Task's SHC web page.