

IEA EBC Annex 56

Cost-Effective Energy and Carbon Emissions Optimisation in Building Renovation

Main Recommendations for Policy Makers and Professional Home Owners

Manuela Almeida
University of Minho
Portugal

Webinar
8 November 2016

IEA EBC Annex 56 | General Conclusions

- The **cost optimal level does not lead to zero (or nearly zero) energy or emissions levels**. It is essential to go a step further and **explore the full potential of the cost-effective energy related to renovation measures**
- The **optimal renovation scenario** for the envelope **hardly depends** on the type of heating system
- The improvement of the **energy performance of buildings' envelope** within the building renovation process is essential to assure comfort and prevent pathologies. **It has to be always the first step.**
- It is important to **act on as many envelope elements as possible**. The **number of building elements renovated is more important than the energy efficiency level of a single building element**
- In the **renovation process the impact of embodied energy use is low**

IEA EBC Annex 56 | **Conclusions for standard setting and policy making**

- Higher relevance should be given to **emission targets supplementing energy targets**
- Higher relevance and incentives should be given to the **replacement of heating systems**
- **Synergies** between **renewable energy** measures and **energy efficiency** measures should be encouraged
- Higher attention should be given to **financial constraints and non-synchronism of renovation needs** of the energy related building elements

IEA EBC Annex 56 | Conclusions and recommendations

Recommendation #1

New targets to reduce carbon emissions from buildings should be set supplementing existing energy targets

For policy makers: It is advisable to introduce a target to reach nearly zero carbon emissions in existing buildings undergoing a major renovation, complementing existing energy efficiency requirements.

For building owners: In addition to carrying out energy efficiency improvements, it makes sense to consider reaching nearly-zero emissions in existing buildings, to make an important contribution to protect the climate.

IEA EBC Annex 56 | **Conclusions and recommendations**

Recommendation #2

Switch heating systems to renewable energy

For policy makers: Unless it is proven to be not cost-effective, a switch to renewable energies should become mandatory when a heating system is replaced

For building owners: When a heating system is replaced, a switch to renewable energy should always be evaluated. In many cases it is even economically attractive!

IEA EBC Annex 56 | Conclusions and recommendations

Recommendation #3

Make use of synergies between renewable energy measures and energy efficiency measures

For policy makers: It is recommendable that standards and other policy measures, for example subsidies, create incentives to combine renovation measures on the building envelope with a replacement of the heating system.

For building owners: The replacement of the heating system is an excellent opportunity to carry out renovation measures on the building envelope as well, creating synergies. If carried out together, the investments in the building envelope result in savings on the investment costs for the heating system, because the more energy efficient a building is, the smaller can be the heating system.

IEA EBC Annex 56 | Conclusions and recommendations

Recommendation #4

Orientation towards cost-effectiveness rather than cost-optimality to achieve a sufficiently sustainable development of the building stock

For policy makers: It is recommendable that standards do not limit themselves to make an energy performance level mandatory up to the cost-optimal level, but to make also further measures mandatory as long as they are cost-effective with respect to a reference case.

For building owners: It is advisable to carry out the most far-reaching energy related renovation package which is still cost-effective compared to the reference case, rather than to limit oneself to the cost-optimal renovation package. This option also leads to the maximization of the co-benefits associated with energy related building renovation, increasing the added value of the building.

IEA EBC Annex 56 | Conclusions and recommendations

Recommendation #5

Make use of opportunities when renovations are made "anyway"

For policy makers: It makes sense that standards for achieving improvements in energy performance focus on situations when one or more building elements are in need of renovation anyway.

For building owners: Whenever a renovation of an element of the building envelope needs to be carried out anyway, this is a good opportunity to improve the energy performance of that building envelope element, and to improve also other building envelope elements.

IEA EBC Annex 56 | Conclusions and recommendations

Recommendation #6

Take into account the complexity of building renovation in standards, targets, policies and strategies

For policy makers: Existing buildings complexity requires flexible standards and targets instead of ready-made solutions to allow the search for least-cost paths.

For building owners: Each existing building is unique. Their complexity and the significant investments require the development of specific strategies for maintenance, energy and emissions reductions.

IEA EBC Annex 56 | Conclusions and recommendations

Recommendation #7

Consider the relevance of co-benefits from cost-effective energy and carbon emissions optimized building renovation

For policy makers: Policy makers must be aware of how energy efficiency policies not only lead to energy savings but also create impacts on a broad range of areas of the political action, from environmental aspects, such as those related to pollution or climate change, to economic aspects, as employment or economic growth, and social aspects, as health or fuel poverty.

For building owners: The value of a building depends on the willingness to pay by the customer. In the case of energy related building renovation, this willingness to pay depends on the expectation of future reduced costs on energy bills and building operation, but also on other benefits not related with energy costs that result from energy related building renovation measures.

IEA EBC Annex 56 | Conclusions and recommendations

Recommendation #8

Take advantage of the close relation between specific building renovation measures and co-benefits

For policy makers: Both energy efficiency measures and the use of renewable energy sources reduce the use of fossil fuels and emissions. Co-benefits at the building level are mainly related with energy efficiency measures.

For building owners: There is a close relation between specific building renovation measures and co-benefits. These relationships can be used as additional information in the cost/benefit assessment and subsequent decision making using the methodology developed in Annex 56.

IEA EBC Annex 56 | Conclusions and recommendations

Recommendation #9

A good starting point for a major renovation is a good collaboration between all stakeholders including the residents

Stakeholder roles should be made visible to increase understanding of the needs of those involved: Residents need to feel that they live in a home that have been improved and not impaired; but residents also need to have greater understanding of the housing company's interests and contractors' and subcontractors' situation.

Energy renovation should include parts that will strengthen residents' possibility to perceive the building as a home: Increased security, higher aesthetic values and improved indoor climate are examples of such measures. Actions perceived as deterioration (e.g. degraded indoor climate) are difficult to gain acceptance for.

IEA EBC Annex 56 | Information

Website is online www.iea-annex56.org

The screenshot shows the homepage of the IEA EBC Annex 56 website. The browser address bar displays www.iea-annex56.org/index.aspx. The page layout includes a navigation menu on the left with links for **HOME PAGE**, **PROJECT**, **PARTICIPANTS**, **NEWS**, and **RESULTS**. On the right side, there is a newsletter sign-up form with fields for 'Newsletter' (example@example.com), 'Username', and 'Password', along with 'Subscribe' and 'Log in' buttons. The EBC logo and 'IEA EBC Annex 56' branding are prominently displayed. The main content area features a 'RECENT NEWS' section with two articles:

- 7th meeting of Annex 56** (2014-09-15 by admin): A news item stating that the 7th meeting of the annex 56 project is now starting in Brno, Czech Republic. It mentions ongoing activities, expected dates for final deliverables, and an Industry Workshop on September 16th.
- Shining examples brochure now available** (2014-08-27 by admin): A news item announcing the availability of a brochure compiling 9 examples of refurbished buildings across Europe.

A large article titled **Cost Effective Energy and Carbon Emissions Optimization in Building Renovation** is also featured, discussing standards, regulations, and renovation challenges.

IEA EBC Annex 56 | **Publications available in 2016**

- **Methodology for Cost Effective Energy and Carbon Emissions Optimization in Building Renovation**
- **Assessment of the impacts of energy related renovation measures (used to support the development of the methodology)**
- **Integration of LCA into the Assessment of Renovation Measures**
- **Co-Benefits of Energy-related Building Renovation**
- **Tools and procedures to support decision making for cost-effective energy and carbon emissions optimization in building renovation**
- **ASCOT Tool, A56opt Tool, ECO-SAI Tool**
- **Evaluation of the impact and relevance of different energy related renovation measures on selected real Case Studies**
- **"Shining Examples" Brochure**
- **Owners and Residents Acceptance of Major Energy Renovations of Buildings**
- **Renovation Guidebook for Policy Makers**
- **Renovation Guidebook for Professional Owners and Users**

Thank you

COST EFFECTIVE ENERGY AND CARBON EMISSIONS OPTIMIZATION IN BUILDING RENOVATION

Manuela Almeida

malmeida@civil.uminho.pt

University of Minho, Civil Engineering Department

Guimarães, Portugal

