



*“Working together to ensure reliable, affordable and clean energy”*

The International Energy Agency (IEA) has established an Implementing Agreement on Energy Conservation in Buildings and Community Systems (ECBCS), with the aim of undertaking research and providing an international focus on building energy efficiency. Tasks are undertaken through a series of annexes that are directed at energy saving technologies and activities that support their application in practice.

The project “**Cost Effective Energy and Carbon Emissions Optimization in Building Renovation**” is in this context known as Annex 56, and it aims at developing a new methodology, as basis for future standards, to enable cost effective renovation of existing buildings while optimizing energy consumption and carbon emissions reduction.

### Participating countries

The following countries are participating in Annex 56:

**Portugal, Switzerland, Austria, Norway, Denmark, Italy, The Netherlands, China, Finland, Sweden, Spain and Check Republic.**

The overall responsibility for the management of the Annex belongs to the operating agent — Manuela Almeida, from University of Minho, Portugal, that is supported by the Portuguese National Energy Agency—ADENE.

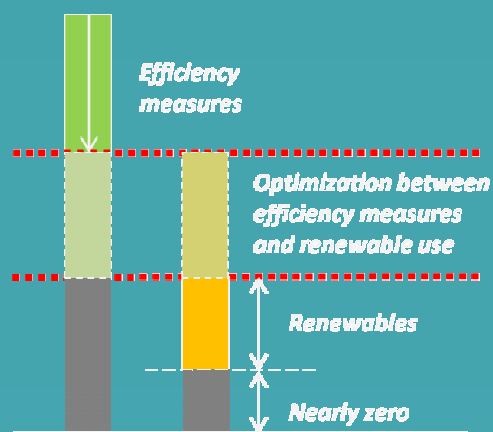
Contacts and further information about the project are available at [www.iea-annex56.org](http://www.iea-annex56.org)

## BACKGROUND

IEA has identified the building sector as one of the most cost-effective sectors for reducing energy consumption and consequently reduce carbon emissions. Existing building stock is crucial since buildings have long lifetimes and old buildings are the most inefficient ones.

*“Built environment is responsible for 40% of primary energy and 24% of carbon emissions.”*

In building renovation, current standards, mainly targeted to energy efficiency measures, often result in expensive processes and complex procedures, seldom accepted by users, owners and promoters. These procedures can be simplified if onsite production of renewable energy is taken into consideration in the renovation process, potentially reducing the volume and depth of work.



*“In search for the most cost-effective balance between energy efficiency measures and the use of energy from renewable sources in building renovation.”*



## PROJECT OVERVIEW

Within the overall objective of slowing down climate change by reducing carbon emissions, existing buildings renovation must consider energy conservation and efficiency measures, as well as measures and technologies that foster the use of energy from renewable sources, produced onsite or nearby.

This project is developing a new methodology for cost effective renovation of existing buildings, using the right balance between the energy conservation and efficiency measures for one side and the measures and technologies that promote the use of renewable energy on the other. This methodology is to be used by private entities helping them in their renovation decisions as well as by governmental agencies that can use it for the definition of regulations and their implementation.

Annex 56 Methodology will allow:

- Establishing cost optimized targets for energy consumption and carbon emissions in building renovation;
- Clarifying the relationship between emission and energy targets and their eventual hierarchy;
- Determining cost effective combinations of energy efficiency measures and measures to promote the use of energy from renewable sources.

## THE OPTIMIZATION PRINCIPLE

Project is investigating how to achieve the best results in:

**Reduction of energy consumption | Reduction of carbon emissions | Comfort improvement | Overall added value**

With the least effort in terms of:

**Financial investment | Depth and duration of intervention | Disturbance of users**

## GLOBAL BENEFITS OF RENOVATION

Renovation process and cost optimization calculations must consider benefits beyond energy related parameters, which means identifying and as far as possible quantifying:

**Global quality improvement | Economic Impact | Operating cost reductions | Comfort improvement | Increased value of the building**

## TOOLS AND CASE STUDIES

New tools or add-ons to existing ones will be developed to support the different target groups economic evaluation of building renovation options as well as deal with added value related issues.

Several case-studies are being used to provide significant feedback from practice on a scientific basis and support the process of decision-making.



*Rainha D. Leonor neighborhood (Before renovation)*



*Rainha D. Leonor neighborhood (After renovation)*