Energy retrofitting of existing social housing: A case study in Spain

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1. Case study
   1.1 Introduction
   1.2 Goals
   1.3 Methodology
   1.4 Results

2. Need for cost-effective solutions
   2.1 What are the barriers to the social housing energy retrofitting?
   2.2 Examples of innovative solutions
Case study

Introduction

- San Juan XXIII is a social housing neighbourhood located in Alicante, a city in eastern Spain.
- Alicante enjoys a south mediterranean climate: mild temperatures in winter and very hot summers.
- This project is part of the measures taken by the City Council of Alicante within an Integrated Action Plan.
- The neighborhood has high social problems and several signs of decay. There are high proportions of low-income people and a high proportion of immigrant population. Moreover, it is disconnected from the rest of the city, in an area of difficult access.
- The case study involves 324 dwellings built in 1967. It was built in order to respond to a high demand in housing.
- The neighbourhood typology are low-rise isolated buildings with low quality.
The main goal of the project was the renovation of facades and roofs to improve the quality, comfort and energy efficiency of buildings.

The study developed by the IVE was to provide an environmental assessment of the buildings in their current state and in their final state, after the energy efficiency improvements. The study considered different options for saving energy in terms of making the project as cost-effective as possible.
02. Methodology

CURRENT STATE ASSESSMENT PHASE

BUILDING CONSERVATION REPORT AND ENERGY ASSESSMENT

ENERGY ASSESSMENT TOOLS

CONSTRUCTIVE COMPONENTS
CATALOGUE FOR BUILDING RETROFIT

CERMA-SOFTWARE
Certification and evaluation of energy efficiency in buildings

IMPROVED STATE ASSESSMENT PHASE

Case study
Constructive components catalogue for building Retrofit

The catalogue contains a wide range of constructive solutions which make up the thermal envelope of buildings, used in building constructed in Spain from the 40s to the 80s.

The catalogue also includes typologies resulting from energy improvements of previous historic solutions, with information on the thermal performance achieved, including construction details and giving criteria for the selection of each proposed solution...

### Constructive Components Catalogue for Building Retrofit

<table>
<thead>
<tr>
<th>Case Study Methodology</th>
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<tbody>
<tr>
<td>Instituto Valenciano de la Edificación</td>
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</table>

#### Constructive Components Catalogue for Building Retrofit

The catalogue contains a wide range of constructive solutions which make up the **thermal envelope** of buildings, used in building constructed in Spain from the 40s to the 80s.

The catalogue also includes typologies resulting from **energy improvements** of previous historic solutions, with information on the thermal performance achieved, including construction details and giving criteria for the selection of each proposed solution...
Case study
Results: Thermal Envelope

Windows U (W/m²K) = 5.7

Roof U (W/m²K) = 1.61

Windows U (W/m²K) = 3.54

Roof U (W/m²K) = 0.59
Case study
Results: Thermal Envelope

Façade U (W/m²k) = 1.64

Main Façade U (W/m²k) = 0.47

Facilities: Conventional LPG boilers

Courtyard Façade U (W/m²k) = 0.83
Case study

Results: Demand savings

<table>
<thead>
<tr>
<th>Component</th>
<th>Initial U</th>
<th>Max U</th>
<th>Final U</th>
<th>% Demand Savings</th>
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<tbody>
<tr>
<td>Fachada 1</td>
<td>1.8</td>
<td>1.2</td>
<td>0.8</td>
<td>50</td>
</tr>
<tr>
<td>Fachada 2</td>
<td>1.6</td>
<td>1.0</td>
<td>0.5</td>
<td>60</td>
</tr>
<tr>
<td>Cubierta</td>
<td>1.4</td>
<td>0.8</td>
<td>0.3</td>
<td>75</td>
</tr>
</tbody>
</table>

% Demand Savings in windows

- Calefacción: 20%
- Refrigeración: 21%

% Demand Savings in facades

- Calefacción: 45%
- Refrigeración: 14%

% Demand Savings in roofs

- Calefacción: 14%
- Refrigeración: 12%
Case study
Results: Demand savings
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Need for cost-effective solutions
What are the barriers to the social housing energy retrofitting?

Lack of funding is a major barrier to the energy retrofitting of social housing in Europe. Due to this there is a need for innovative cost-effective solutions in existing social housing retrofitting.

Innovative solutions must:

- Use local materials, such as ceramics in the Mediterranean area.
- Reduce labor and work times
- Ensure high durability with low maintenance costs
- Reduce the final price
Need for cost-effective solutions
Examples of innovative solutions

Sierravent
04.

Need for cost-effective solutions
Examples of innovative solutions

Flexbrick
Thank you for your attention

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