Social housing energy retrofitting: Business model and supporting tools for public administration

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Introduction

Social housing
Introduction

Social housing association as inspiring example
Research question

How to support the energy refurbishment process for social housing association?
Methodology

1. Analysis of the context
   Management of the retrofit process by social housing associations

2. Series of Workshops
   Concepts
   Development
   Simulation
   Validation
Methodology

Main findings

1. Definition of **standardized retrofit packages** with warranty of certain energy savings

2. **Supporting tools** for the most critical phases of refurbishment process

3. **Business model** for financing the retrofit by energy costs savings
Existing energy retrofit process

Critical issues

1. Preliminary planning
   - Setting energy efficiency measures
   - Design competition

2. Designing
   - Designing the energy efficiency measures
   - Tendering procedure

3. Building construction works
   - Building site
   - Energy supply

Difficulties of choosing among energy efficiency measures offered by the market

Difficulties with checking the chosen solutions

Poor control over quality of building works

Difficulties on energy savings assessment and on management of building system

Tool online: Analysis Klimakit

Soft criteria for tendering procedure

Building Information Modelling

Monitoring and energy contracts
**Existing energy retrofit process**

**Critical issues**

1. **Preliminary planning**
   - Setting energy efficiency measures

2. **Designing**
   - Designing the energy efficiency measures

3. **Building construction works**
   - Building site

4. **Monitoring**
   - Management and maintenance of building system

- **Difficulties of choosing among energy efficiency measures offered by the market**
- **Difficulties with checking the chosen solutions**
- **Poor control over quality of building works**
- **Difficulties on energy savings assessment and on management of building system**

**Tool online: Analysis Klimakit**

- **Soft criteria for tendering procedure**
- **Building Information Modelling**
- **Monitoring and energy contracts**
Supporting tools
Decision making

Terraced house
Apartment block (Large)
Apartment block (Small)
Multi-family house
Mixed
Supporting tools
Decision making

Terraced house
Apartment block (Large)
Apartment block (Small)
Multi-family house
Mixed

BASIC
FULL
ZERO
FLEXI
SINGLE
**Risultati - Report analisi Klimakit**

### PACCHETTO KLIMAKIT: "BASE"

<table>
<thead>
<tr>
<th></th>
<th>LIVELLO 1</th>
<th>LIVELLO 2</th>
<th>LIVELLO 3</th>
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<tbody>
<tr>
<td>Riduzione costi operativi</td>
<td>62 %</td>
<td>77 %</td>
<td>73 %</td>
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<tr>
<td>Riduzione emissione CO₂ eq.</td>
<td>62 %</td>
<td>77 %</td>
<td>80 %</td>
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<tr>
<td>Costi riqualificazione involucro (€/m²)</td>
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<td>Tempi di rientro incentivi nazionali</td>
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<td>8 anni</td>
<td>10 anni</td>
</tr>
</tbody>
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Existing energy retrofit process

Costs before the retrofit

- Tenant
- Social housing association
- Energy supplier
Existing energy retrofit process
Costs before the retrofit

- Tenant pays 200 € for rent.
- Tenant pays 150 € for energy.
- Social housing association receives 150 € for energy.
- Energy supplier receives 150 € for energy.
Existing energy retrofit process
 Costs before the retrofit

- Tenant
  - Rent: 200 €
  - Energy: 150 €
  - Maintenance: 40 €

- Social housing association
  - Energy: 150 €

- Energy supplier
  - Energy: 150 €
Existing energy retrofit process

Costs after the retrofit

- Tenant: 200 € Rent, 150 € Energy
- Social housing association: 40 € Maintenance, 150 € Energy
- Construction company
- Professionals
- Energy supplier: 40 € Maintenance, 150 € Energy
Existing energy retrofit process

Costs after the retrofit

- Tenant
  - 200 € Rent
  - 150 € Energy
  - 30'000 €/flat for energy retrofit

- Social housing association
  - 40 € Maintenance

- Construction company

- Professionals

- Energy supplier
  - Energy
Existing energy retrofit process
Costs after the retrofit

- **Tenant**
  - 200 € Rent
  - 50 € Energy
  - 40 € Maintenance

- **Social housing association**
  - 30'000 €/flat for energy retrofit
  - 50 € Energy

- **Construction company**

- **Professionals**

- **Energy supplier**
  - 50 € Energy
Proposed Business Model

Tenant

200 € Rent

40 € Maintenance

Social housing association

30’000 €/flat for energy retrofit

Construction company

Professionals

Energy supplier

Tenant

200 € Rent

40 € Maintenance

Social housing association

30’000 €/flat for energy retrofit

Construction company

Professionals

Energy supplier
Proposed Business Model

- **Tenant**: 200 € Rent
- **Social housing association**: 40 € Maintenance
- **Construction company**: 30'000 €/flat for energy retrofit
- **Professionals**
- **Energy supplier**: Application of standardized retrofit package
Proposed Business Model

Tenant

200 € Rent

150€ Service Fee

40 € Maintenance

Application of standardized retrofit package

Social housing association

30’000 €/flat for energy retrofit

Construction company

Professionals

Energy supplier

150€ Service Fee

40 € Maintenance

200 € Rent

30’000 €/flat for energy retrofit

Application of standardized retrofit package

Tenant

Social housing association

Energy supplier

Construction company

Professionals
Proposed Business Model

- **Tenant**
  - 200 € Rent
  - 150 € Service Fee
  - 40 € Maintenance

- **Social housing association**
  - Application of standardized retrofit package

- **Construction company**
  - 30'000 €/flat for energy retrofit

- **Professionals**
  - Energy supplier
  - 50 € Energy

- **Energy supplier**
  - 150 € Service Fee

- **Energy**
  - 50 € Energy
Proposed Business Model

Tenant

200 € Rent

150€ Service Fee

Application of standardized retrofit package

30’000 €/flat for energy retrofit

Social housing association

Maintenance

Energy supplier

50 € Energy

20 € Service Fee

Construction company

Professionals

Application of standardized retrofit package

50 € Energy

20 € Service Fee
Proposed Business Model

- **Tenant**
  - Rents: 200 €
  - Service Fee: 150 €

- **Social Housing Association**
  - Maintenance: 30,000 €/flat for energy retrofit
  - Service Fee: 50 €

- **Energy Supplier**
  - Energy: 50 €
  - Service Fee: 20 €

- **Construction Company**
  - Application of standardized retrofit package
  - Energy System: 50 €

- **Professionals**
Proposed Business Model after 10 years

- **Tenant**: 200 € Rent
- **Social housing association**: 50 € Energy
- **Energy supplier**: 50 € Energy

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Investimenti a favore della crescita e dell'occupazione FESR 2014-2020
Investitionen in Wachstum und Beschäftigung EFRE 2014-2020
Conclusions

Benefits of the proposed Business Model:

- **Social housing associations can recover part of the investment costs** for retrofit;
- It **protects tenants** to future energy prices;
- It define **long-term customer loyalty** between energy supplier and Social housing association;
- It **improves the collaboration** among stakeholders for creating integrated solutions with warranty of energy performance.
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