RENTCAL
European Rental Housing Framework for the Profitability Calculation of Energetic Ret rofitting Investments

Funded by
The European Union

WP2: Technical Framework Conditions for Energy Efficiency Retrofit Investments in the Rental Housing Market Sector

(Summary of WP2)

KEY FINDINGS

- Size, age and energy performance of rental housing stocks varies widely across the RentalCal countries
- A typology of the rental housing stock per country (according to building type and building age) is based on national census data, other statistical data and mainly the IEE project TABULA. The typology approach is used to estimate energy saving potentials and investment costs
- Among the RentalCal countries there are certain common energy efficiency measures but also country specific differences
- Current energy efficiency measures relate to the building envelope (insulation, windows, doors) and the heating systems (heating/DHW, ventilation)
- Investment costs for energy efficiency measures vary widely across the RentalCal countries
- Energy savings vary depending on climate conditions, building types and the composition of the refurbishment packages

CROSS-COUNTRY FINDINGS

Rental Housing Stock

A characterisation of the national rental housing stock is based on the TABULA typologies and through data provided by the RentalCal partners. The level of detail of the available data varies from country to country. However, it is possible to outline the national rental stocks as follows:

- Czech Republic: only residential buildings from the period 1920-2010 play significant role, especially the apartment blocks from 1950 till 1990.
- Denmark: distributed over the whole 20th century stock with a peak construction from 1960s till 1990s. Not only residential buildings but also semi-detached and terraced houses make important part of the Danish rented stock knowing, that 70% of dwellings constructed in the period 1960-80 were various types of single family houses.
- France: single family houses till 1980, multi-family houses and apartment blocks from 1960s till now.

RentalCal Consortium
c/o IWU Institut Wohnen und Umwelt GmbH
Rheinstrasse 65
64295 Darmstadt, Germany

- Germany: multi-family houses from all periods, apartment blocks from all periods with a significant peak construction period 1970-1980.
- The Netherlands: some types of single family houses, usually terraced houses from the period 1960-1990, some types of apartment blocks from all periods
- Poland: multi-family houses from the post-war period till now, apartment blocks mainly from 1967 till 2002, recently built family houses (from 2009 till now).
- Spain: all age groups of multi-family houses and apartment blocks, recent family houses (from 2007 till now).
- United Kingdom: privately rented dwellings belong to multi-family houses from the period before 1944 while social rented dwellings are mostly from the period from 1945-1980.

Energy Saving Measures

Among the RentalCal countries there are certain common energy efficiency measures but also country specific differences (see Fig.1). Current energy efficiency measures relate to the building envelope (insulation, windows, doors) and the heating systems (heating/DHW, renewables, ventilation).

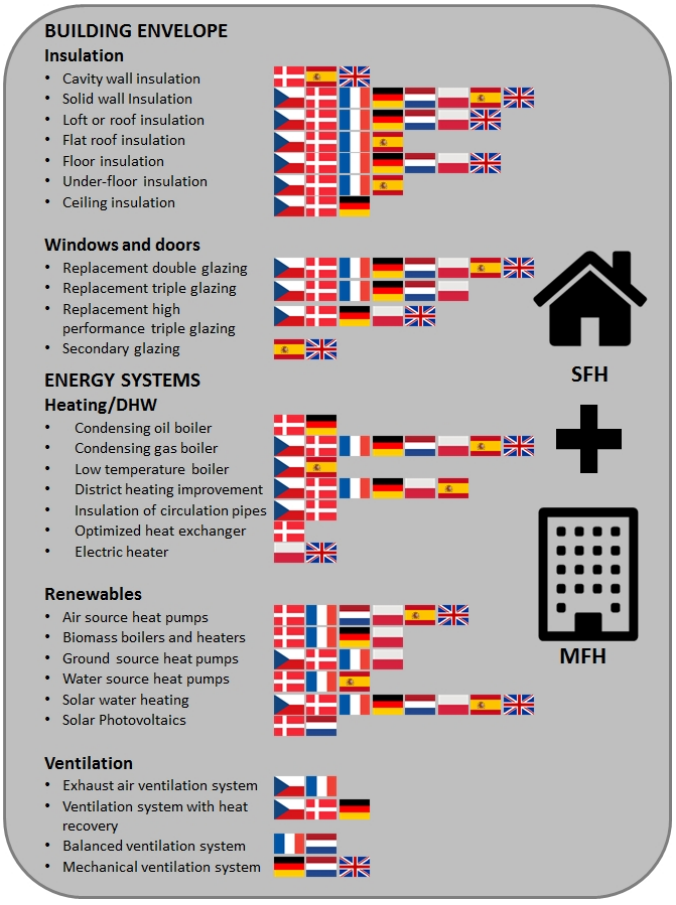

Figure 1: Infographic about main building envelope and energy system measures

RentalCal Consortium
c/o IWU Institut Wohnen und Umwelt GmbH
Rheinstrasse 65
64295 Darmstadt, Germany

Investment Cost

RentalCal presents own cost estimations for the standard and advanced refurbishment packages from TABULA separated for single-family/terraced houses (SFH/TH) and multi-family-houses/apartment blocks (MFH/AB). In general the standard refurbishment package is defined according to the current national practice or regulation and the advanced refurbishment packages considers more ambitious levels of insulation, windows and energy supply systems (e.g. to achieve refurbishment requirements of national funding schemes). As expected, the investment costs for both packages vary:

- widely across the RentalCal countries; and
- partly within both building categories in each country.

In spite of some restrictions (e.g. differently defined packages in different countries or varying availability and quality of cost data), the results of cost calculations are at least in line with general expectations:

- Due to a larger thermal envelope area in relation to living area and higher specific costs of energy supply systems, energetic refurbishment is more expensive (in €/m² living area) in SFH/TH than in MFH/AB; and
- Advanced refurbishment is more expensive than standard refurbishment due to the fact that more ambitious single measures are usually part of the advanced packages

Figure 2 show the range of exemplary investment costs in €/m² for the standard refurbishment packages (without VAT) separated for the RentalCal partner countries and the building types SFH/TH and MFH/AB.

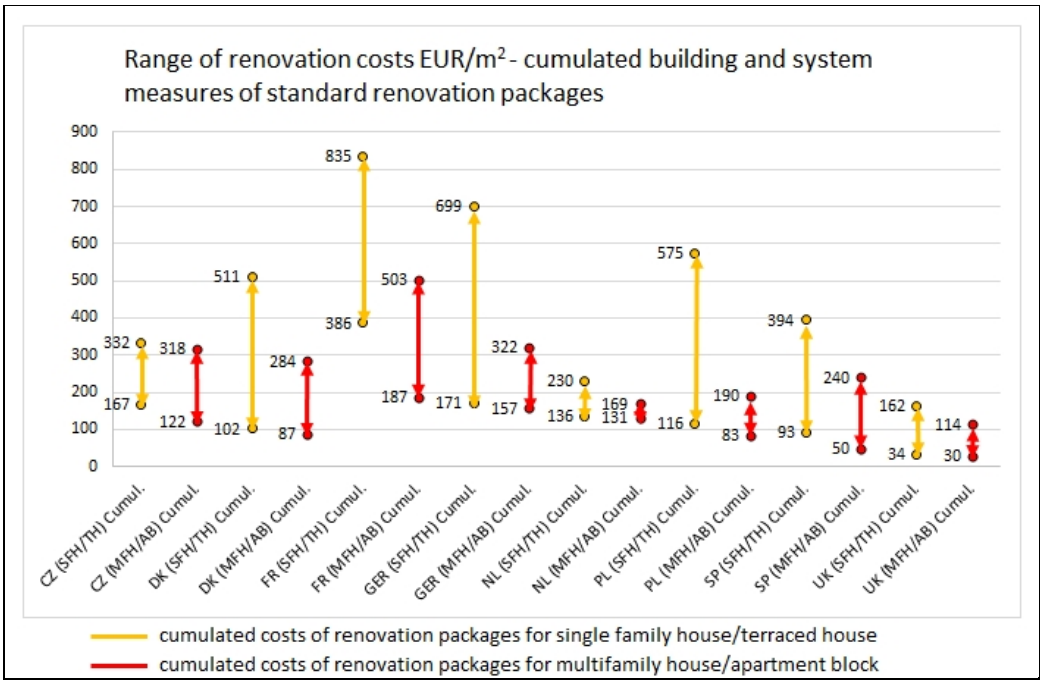

Figure 2: Range of renovation costs EUR/m2 – standard renovation packages

RentalCal Consortium
c/o IWU Institut Wohnen und Umwelt GmbH
Rheinstrasse 65
64295 Darmstadt, Germany

Energy Saving Potentials

As expected, savings of energy delivered are higher after advanced refurbishment than after standard refurbishment. Depending on the country, the building types and the definition of the refurbishment packages, savings of energy delivered of up to about 50 % can be achieved through standard refurbishment and up to about 80 % through advanced refurbishment.

Figure 3 shows the annual amount of energy saved per m^2 of living area by introducing the standard refurbishment packages (the column chart with vertical axis on the left). The chart with vertical axis on the right displays the estimation of standard refurbishment costs (VAT excl.) that must be invested to achieve annual energy saving of 1 kWh. All values are shown separately for the RentalCal partner countries and the building types SFH/TH and MFH/AB.

The high renovation costs per unit of saved energy for heating and DHW in Spain can be explained by the fact that only Mediterranean climate zone data were available for the purpose of this evaluation. This zone is a specific case with low energy demand for heating and a very high energy demand for cooling and air conditioning which could not be reflected in the chart.

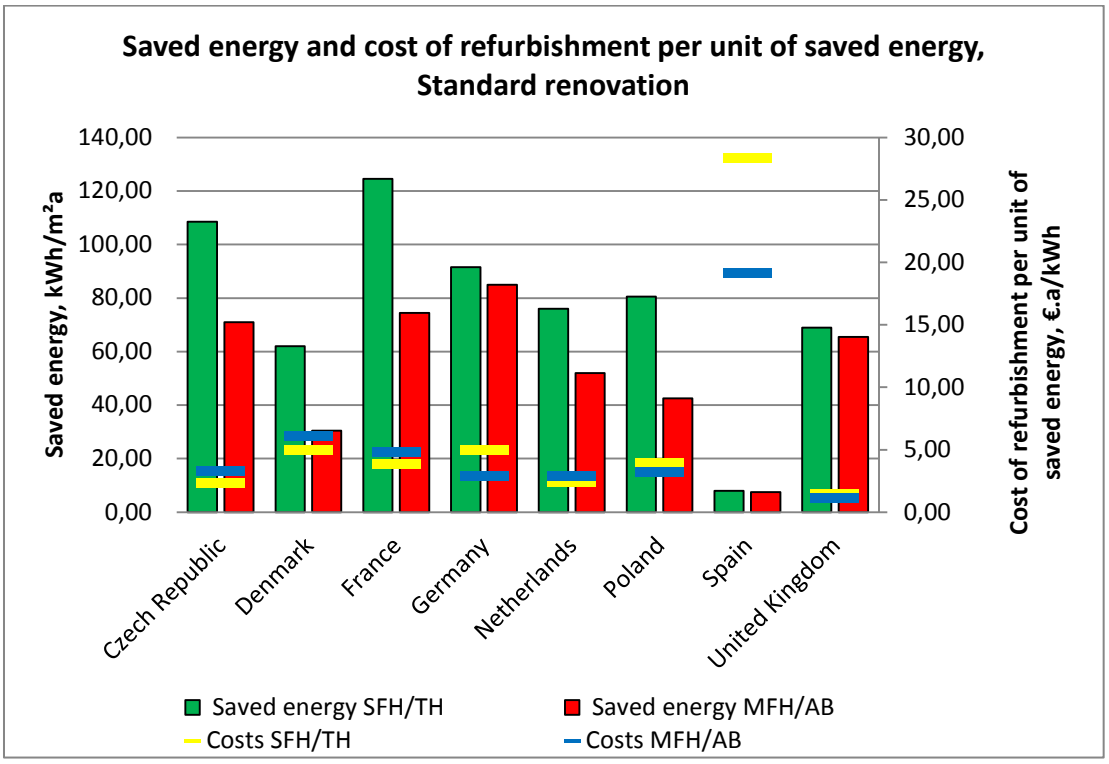

Figure 3: Annual amount of saved energy per 1 m2 of living area and cost of refurbishment per unit of saved energy – standard renovation packages

POLITICAL IMPLICATIONS

It is of particular interest for the policy-makers to ensure that their policy meet the needs of the tenants, specially low-income households and that it does not discourage the landlords from investing and does not hamper the relationships between the landlords and tenants. In this regard following actions should be considered:

- Seek to create a simple and, cost-effective policy which can deliver energy efficiency, carbon reduction, energy security and other possible benefits to the stakeholders. This policy should be matched with a sufficiently durable 'pay as you save' mechanism
- Schemes need to be simple and easy to understand, communicated effectively and giving clear picture of benefits, should also look to benefit a wide range of consumers
- Co-ordinate schemes and relationships with the building industry
- Use of building typology approach to focus on building categories (by size and age band) with highest energy saving potentials
- Efficiencies of scale, stimulated by regulation are capable of reducing costs further
- Support greater volumes of installations which will lower costs- both as installers become more efficient and capable, but also as manufacturers are able to supply in greater volumes and quantities.
- Explore and promote technologies which offer relatively quick savings to consumers
- Support innovative ways of improving energy efficiency. These should be checked through pilot testing and cost-benefit testing
- Promote the uptake of suitable new business models.
- High costs of installation for some measures necessitate action to protect consumers from high fuel bills

INVESTOR'S PERSPECTIVE

A set of recommended strategies for investors could include:

- The best cost-effective way to handle energy-efficiency measures is while performing necessary maintenance and repairs
- Use whole house approach or at least renovation packages as against installing measures on an individual basis
- Ensure that EPCs are accurate. The expected energy savings and GHG reductions must be based on realistic assumptions enough to guarantee that the targets will be met

- Ensure that technical issues (e.g. replacement of windows in relation to ventilation) are properly addressed
- Newly installed building systems or their components like heating or ventilation controls shall be simple and user friendly
- Apply also other than technical energy efficiency measures, (e.g. raise energy awareness of tenants), analyse the data from smart metering systems and propose corrective actions
- Take into consideration that efficiency of energy saving measures can drop down rapidly without proper maintenance
- Consider additional benefits that may also advocate the investments (see below)

OTHER STAKEHOLDER PERSPECTIVE

The effects of improving the energy efficiency of the European rental housing stock go far beyond the immediate reduction of final energy demand and decreased heating costs. Improving the energy performance of the existing building stock is likely to contribute to:

- reduced consumption of non-renewable resources (environmental aspect)
- reduced greenhouse gas emissions and emissions of airborne pollutants (environmental aspect)
- improved thermal comfort during winter and summer (social aspect)
- reduced risk of black mould formation and structural damages (social and technical aspect)
- reduced heating costs and therefore stable cost of living (social aspect)
- value stability and performance of property market (economic aspect)
- reduced risk of rent reduction (economic aspect)
- improved image (social and economic aspect)
- extended technical life spans of outer walls (technical aspect)
- extended life cycles of existing buildings due to energy modernisation and consequently conservation of the embodied energy and resources (environmental aspect)

FURTHER READING & SOURCES

- RentalCal 2016, Deliverable D2.1: Fact Sheets for the Residential Buildings as well as Building Types
- RentalCal 2016. Deliverable D2.2: Fact Sheets for Energy Saving Measures
- RentalCal 2016, Deliverable D2.3: Fact Sheets for Energy Saving Calculation and Environmental Relief
- TABULA 2012, Typology Approach for Building Stock Energy Assessment. Available at: http://episcope.eu/iee-project/tabula/ [Accessed June 30, 2016]