

## Benchmarking of energy demand of domestic and small business buildings

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### 1. Introduction

In Europe the building sector represents 41% of the final energy consumption and the 40% of the total GHG emissions of end-use sectors (Directive 2010/31/EU) [1]. Solar energy is one of the forms of renewable energy that has great potential to enable EU the ambition of 12% of heating coming from renewable sources by 2020 [2]. Within this context, the overall objective of the project Innovative Micro Solar Heat and Power System (Innova MicroSolar) is to develop a high performance and cost effective solar heat and power system, which consist in a novel flat Fresnel mirror solar concentrating collector and micro organic Rankine cycle plant combined with advanced phase change materials as thermal storage, all system managed by smart control units. This technology will be initially implemented in individual dwellings and small business residential buildings for on-site electricity and heat generation using solar thermal energy.

### 2. Methodology

To evaluate the potential of this innovative system when installed in the current European building stock such as: Spain, France Germany, Italy and United Kingdom, a detailed building information of envelopes (walls, roof, lofts, etc.), structure and annual energy demands (domestic hot water, space heating and electricity) for domestic residential buildings have to be obtained. Therefore a state of the art of the current residential building stock at EU level was performed [3]. The classification obtained is divided in four types of buildings, three different building ages and three climatic conditions for all the above mentioned EU countries to quantify the energy saving potential of this innovative system.

### 3. Results and discussion

The energy need for heating is lower in apartment blocks in comparison to single family houses for all the EU countries analyzed as it can be seen in Figure 1. Moreover, many variations in terms of energy consumptions were observed for the same building typology when countries and building construction periods were compared. These results highlight the wide application potential of the Micro Solar Heat and Power System in different countries and different building typologies.

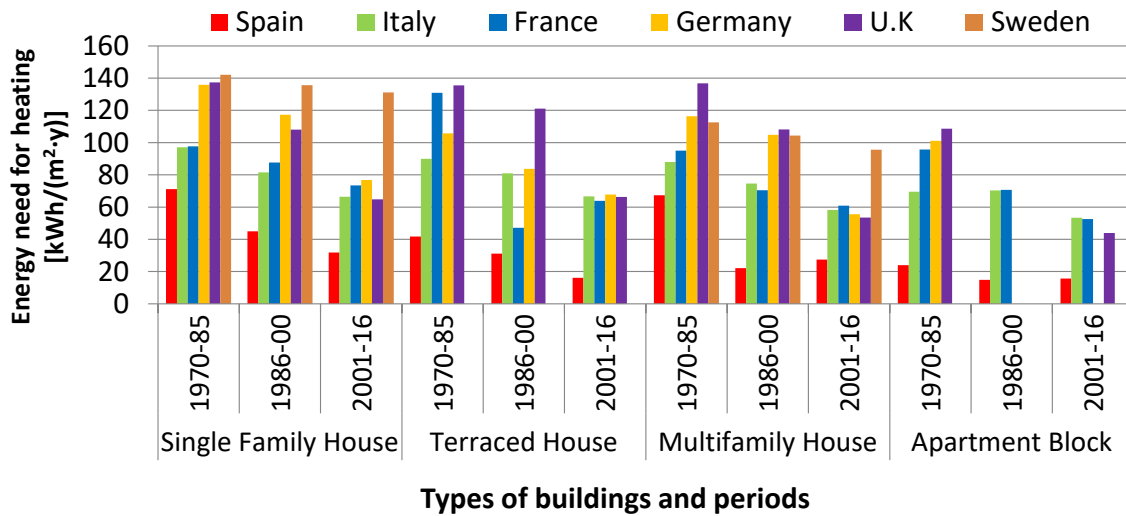


Figure 1. Energy need for heating for four types of buildings divided in three different building construction periods in different EU countries

#### 4. Conclusions

Valuable technical information for domestic residential buildings was collected, analysed, and organized to provide a continuous benchmark of building and energy demand and market analysis. It will be used as input data during the development of Innova MicroSolar Horizon 2020 project to evaluate the potential benefits of the proposed solar domestic heat and power system in different countries and building typologies.

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