

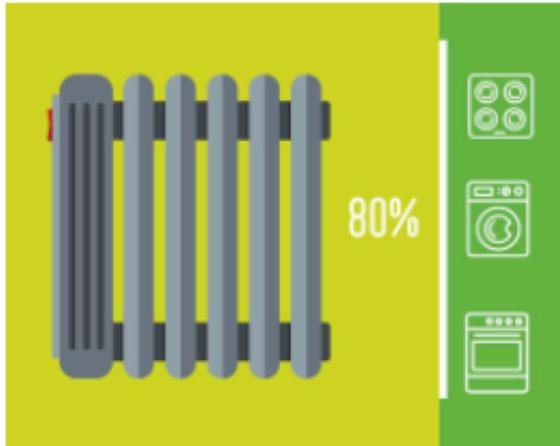
*Supporting user's decision-making  
behaviour through identification of  
co-benefits of energy efficient  
heating solutions*



Universidade do Minho

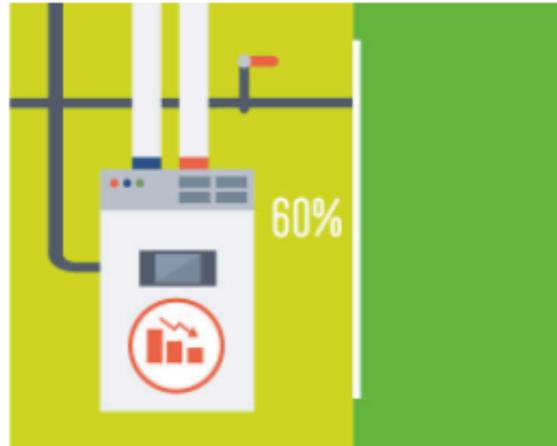


# What is wrong with Heating?



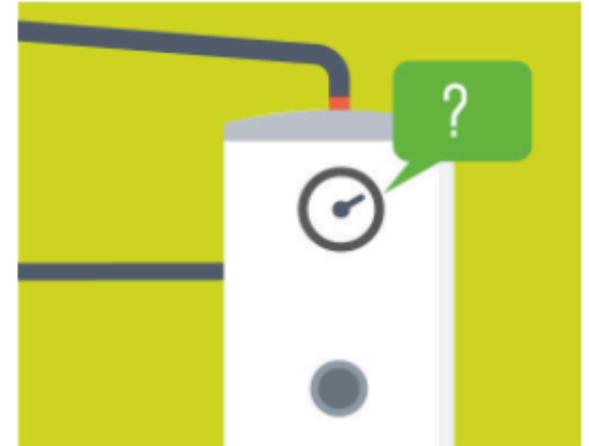
Heating and hot water represents 80% of the energy demand of EU households.

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60% of the heating stock consists of inefficient boilers (class C or lower).

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Except in Germany, consumers are not informed about the efficiency of their installed heating systems.

# The HARP Project

The objective of HARP is to raise consumer awareness about the inefficiency of their heating systems, in order to accelerate their replacement rate and significantly reduce energy consumption in existing buildings, contributing to the EU's energy efficiency targets.

1.

Increase the replacement rate of old and inefficient heating appliances

and significantly reduce the energy consumption and emissions from residential buildings in the 5 HARP countries (Portugal, Spain, France, Italy and Germany).



2.

Draw lessons from the implementation of a labelling scheme

for installed heating systems for potential replication at the EU level, and potential development of financing schemes building upon the experience drawn from HARP.



# The HARP Project

The HARP project consortium has 18 partners, with long-standing expertise in relevant work areas.



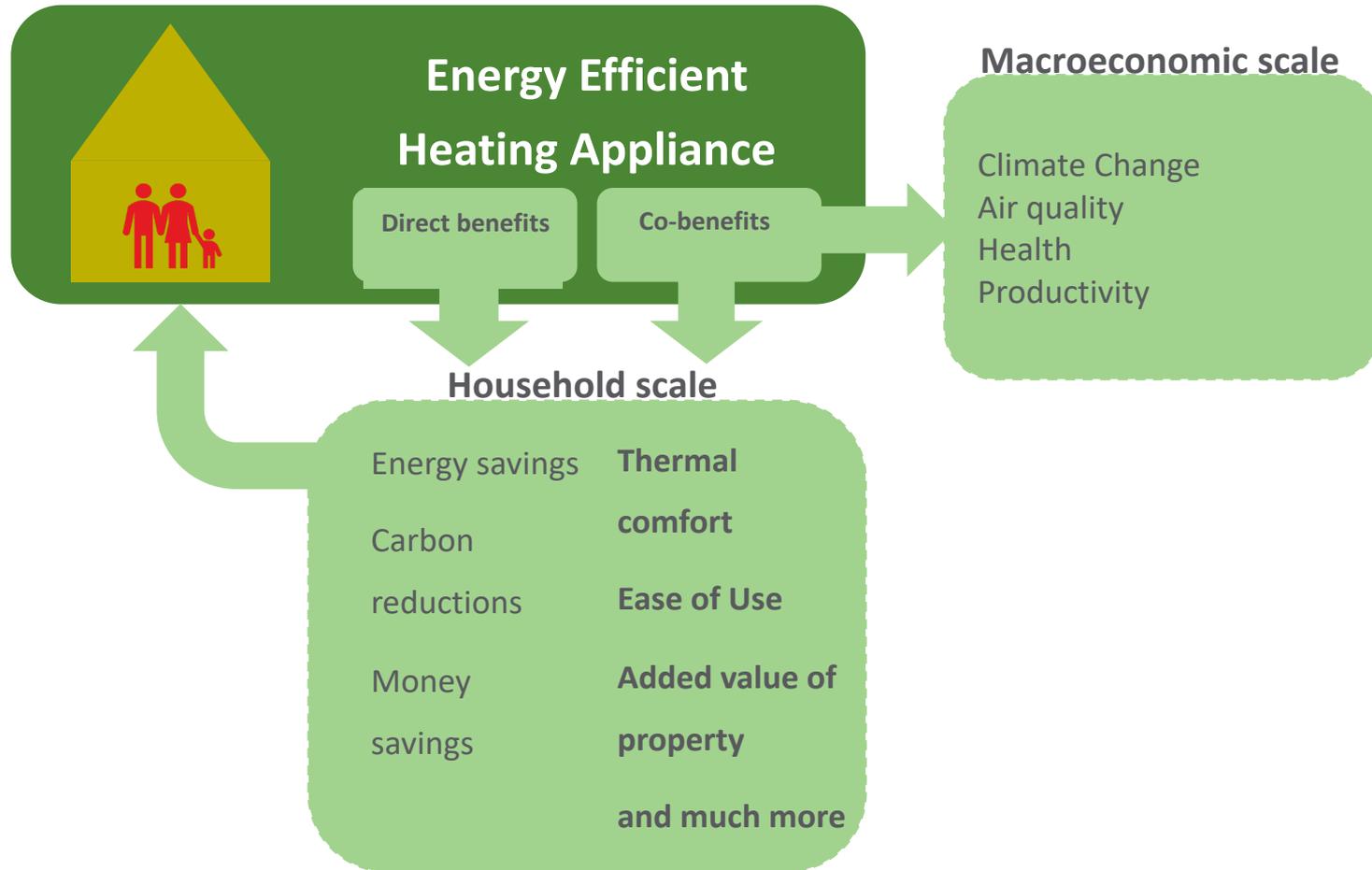
**HARP will develop an application providing consumers with an indicative assessment of the performance and costs of their heating system**

and accompany them in the replacement process, informing about efficient alternatives, benefits and support schemes.

[learn more](#)

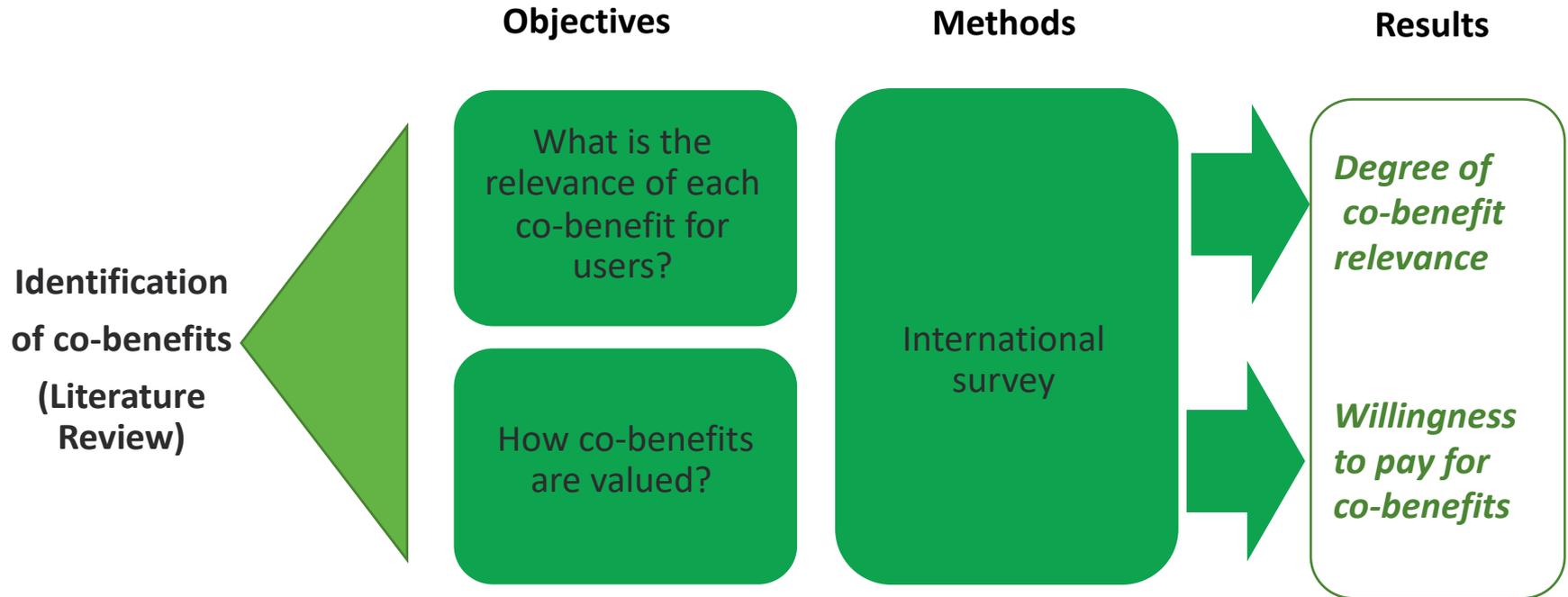


# The importance of co-benefits



**CO-BENEFITS** are accompanying potential benefits to the consumer arising from the specific (technical and physical) characteristics of the heating (production) system (adapted from Ürge-Vorsatz et al (2009) and Rasmussen (2017))

# The methodology



# The identification of co-benefits

Co-benefits	Description
<b>Thermal comfort</b>	Higher thermal comfort due to more adequate room temperatures and relative humidity.
<b>Air quality</b>	Improved indoor air quality, meaning reducing harmful gases, particulates, microbial contaminants (which can cause mould), or other stressor that induce adverse health conditions
<b>Aesthetics</b>	Aesthetic improvement of the building after implementation of the heating solution
<b>Ease of use /Control by user</b>	Ease of use and control of the heating solution by the users (e.g. automatic thermostat controls, easier filter changes, faster hot water delivery, etc.)
<b>Added value into the market</b>	Improvement of the market value of the property after implementation of the heating solution
<b>Impact on useful area</b>	Increase or reduction of useful area of the dwelling after implementation of the heating solution
<b>Independence from energy prices</b>	Reduction of exposure to energy price fluctuations in order to maintain the desired level of thermal comfort
<b>Reduction of environmental impact</b>	Improved environmental performance regarding energy and associated carbon emissions (e.g. avoidance of use of fossil fuel as energy source)

# The survey

Point numerical scale for relevance

Contingent valuation method

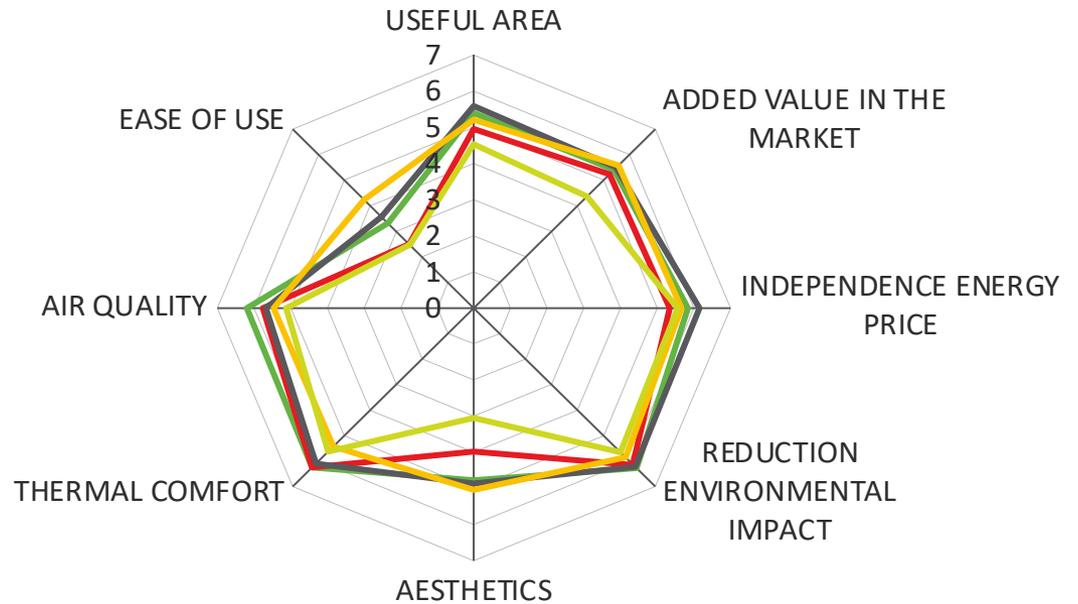
	No	Up to 100€	Between 100€ and 500€	More than 500€
Achieve a comfortable indoor temperature during the heating season more easily	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Have better air quality	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Operate the equipment more easily	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Be more independent to energy prices	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Have a more aesthetically pleasant equipment	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Have more useful living area	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Value the dwelling in the real-estate market	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Have a reduced environmental impact	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Country	Number of complete responses
France	411
Germany	179
Italy	387
Portugal	331
Spain	4736
All	6044

# The degree of relevance

Degree of relevance of co-benefits

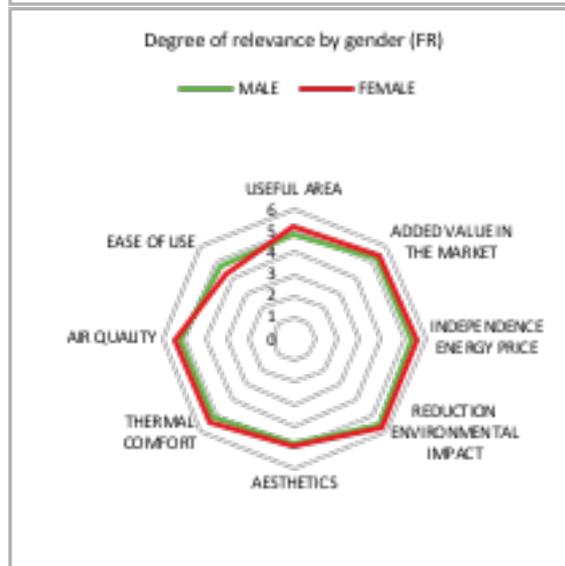
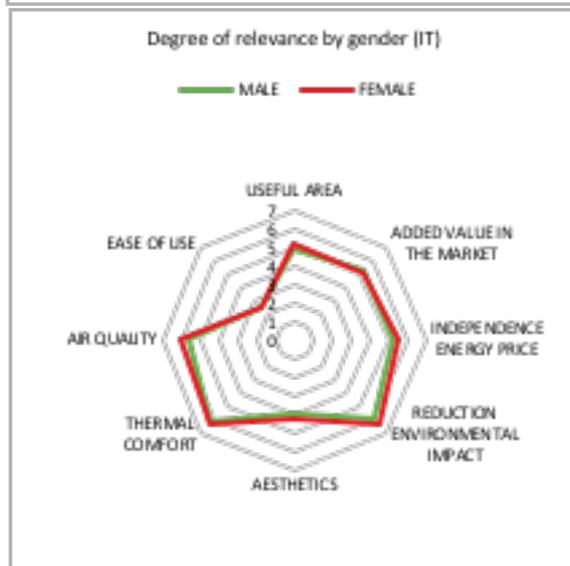
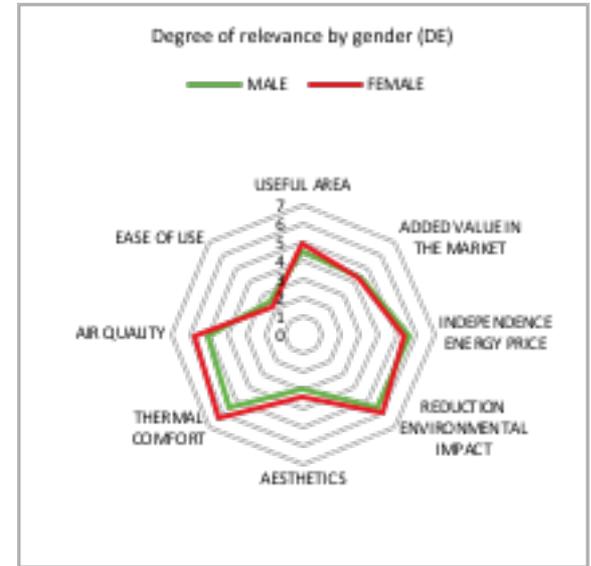
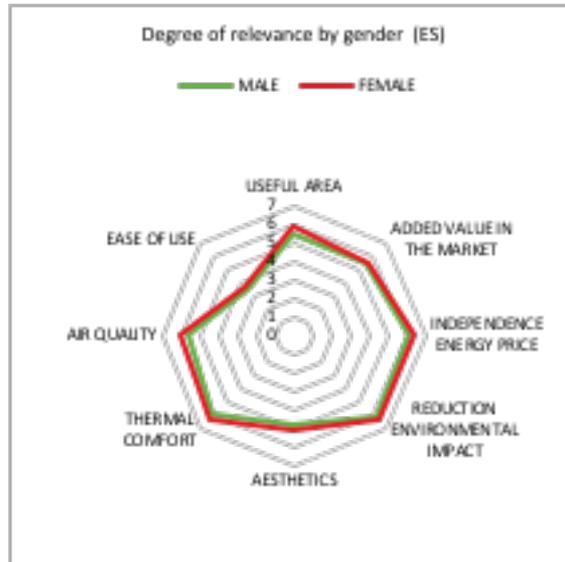
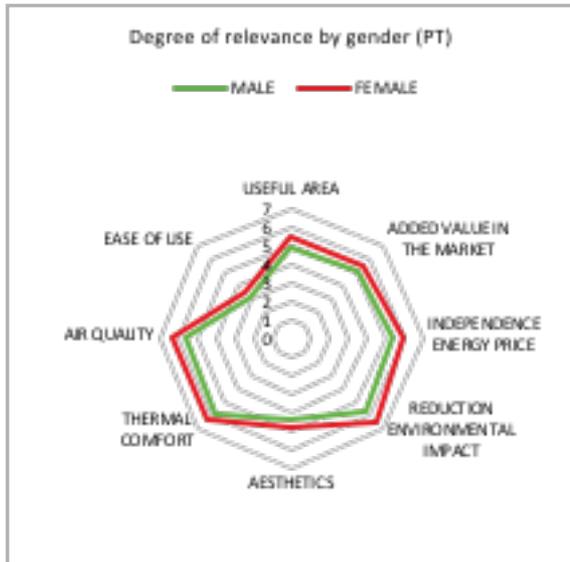
— PORTUGAL — ITALY — SPAIN — FRANCE — GERMANY



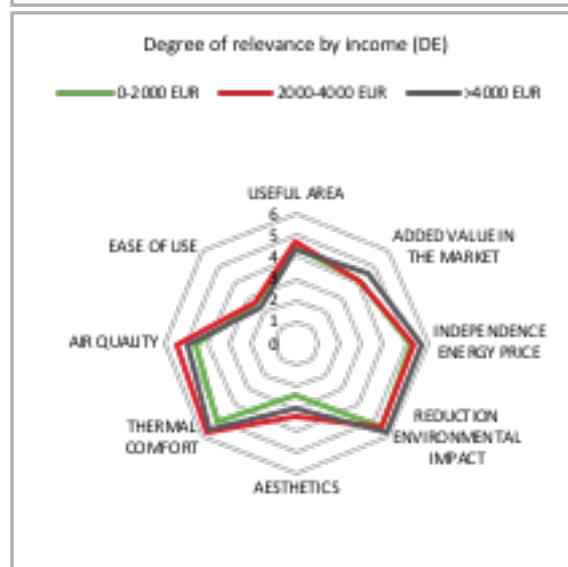
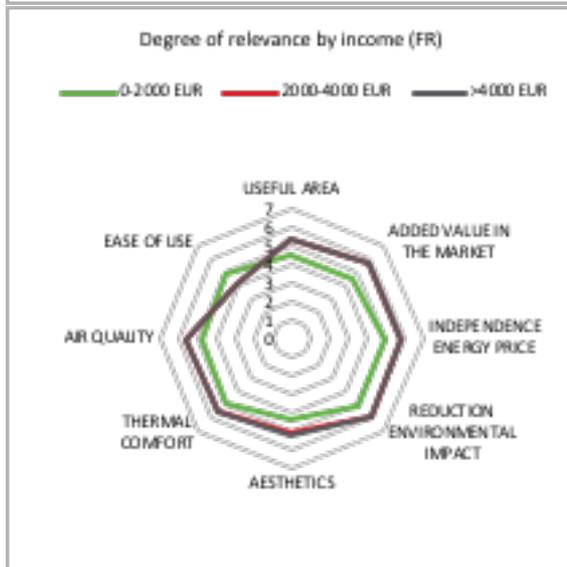
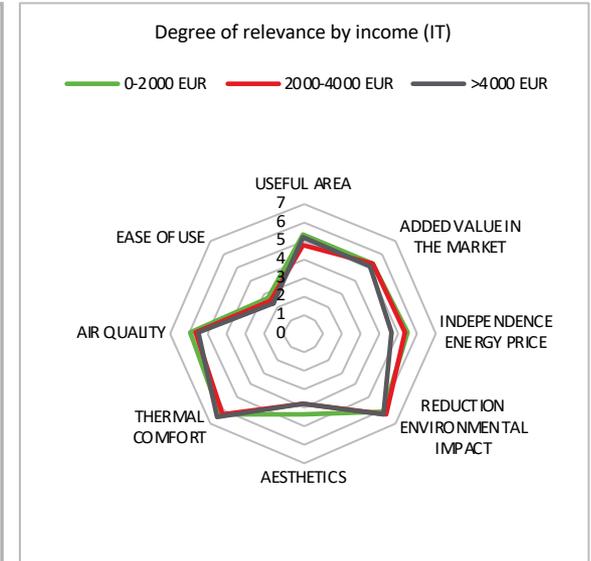
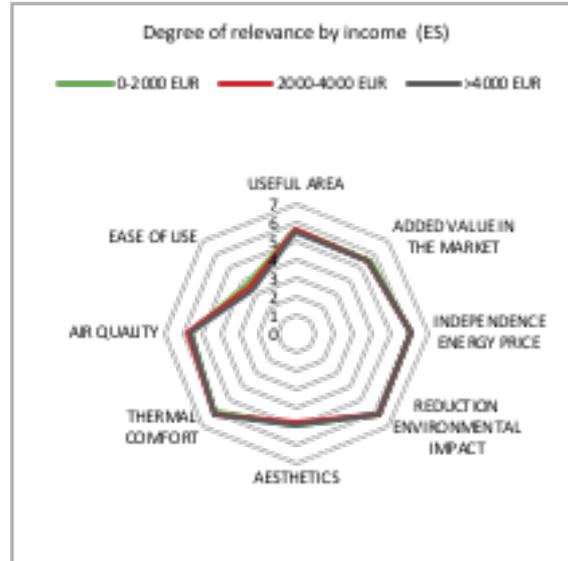
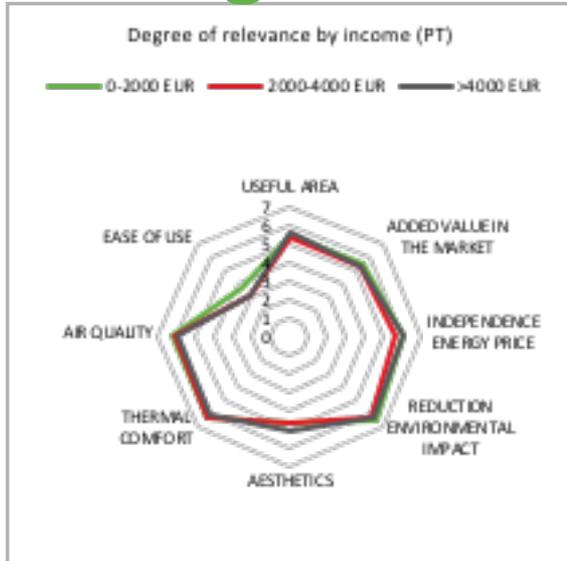
**Thermal comfort** is very relevant in all contexts

**Ease of Use** is considered to be one of the lowest relevance

# The degree of relevance

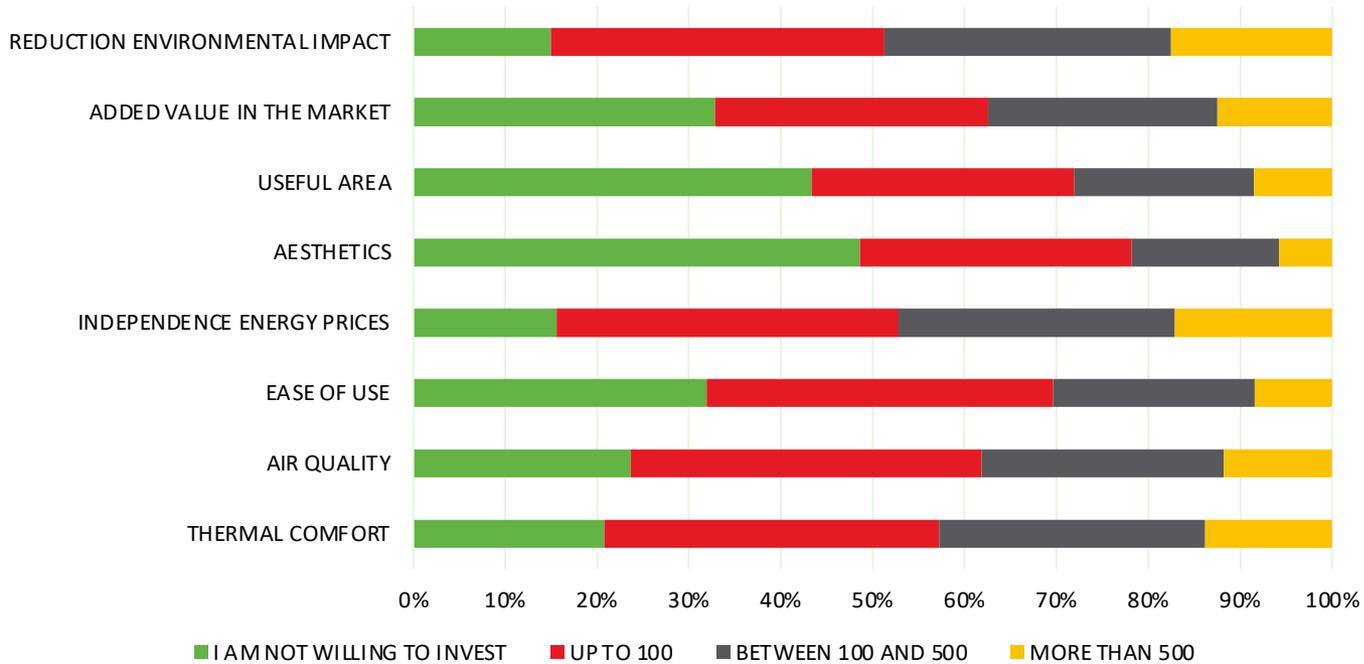


# The degree of relevance

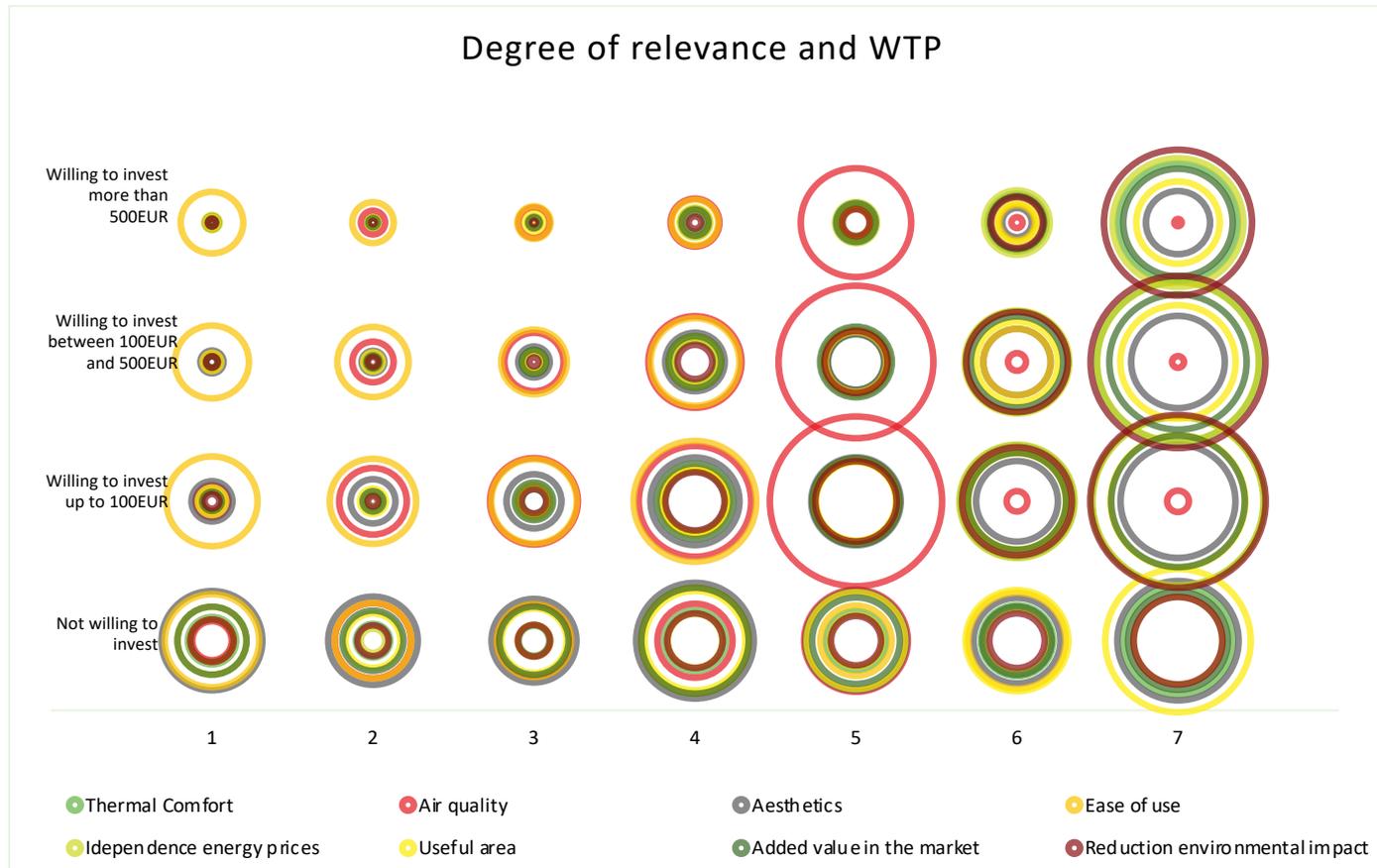


# The willingness to pay for co-benefits

Willingness to Pay for Co-Benefits



# The WTP and the degree of relevance



## PORTUGAL

**Thermal comfort, air quality and reduction of environmental impact** are the most relevant co-benefits identified by the consumers. They are willing to invest more significantly on **reduction of environmental impact, thermal comfort and increased value of the property**

## GERMANY

**Reduction of environmental impact and thermal comfort** were the most relevant co-benefits identified by the consumers. **Reduction of environmental impact** is the one they are willing to invest more money.

## ITALY

**Thermal comfort and reduction of environmental impact** are the most relevant co-benefits identified by the consumers. Most of them are willing to invest significantly on **reduction of environmental impacts and thermal comfort.**

## SPAIN

**Reduction of environmental impact, independence from energy prices and thermal comfort** are the most relevant co-benefits identified by the consumers. They are willing to invest more significantly on **reduction of environmental impact and independence from energy prices.**

## FRANCE

**Reduction of environmental impact** is the most relevant co-benefit identified by the consumers and the one they are willing to invest more money

# Main conclusions and next steps

**Some co-benefits are more relevant than others**

The most relevant co-benefits mentioned were thermal comfort, air quality and reduced environmental impact.

**Different countries, different co-benefits**

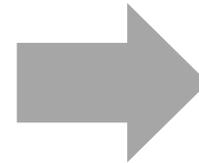
The co-benefits depend on the context. In France, the most relevant co-benefit is the increase in the added value of the building, while in Spain thermal comfort and the independence from energy prices are the most valued.

**Consumers are willing to invest in co-benefits**

The reduction of environmental impact and independence from energy prices are the most valued co-benefits in terms of monetary value. In opposition, aesthetics was the one less likely to invest.

Deeper analysis of the collected data (e.g. using cluster analysis)

Policy and communication implications (e.g. integrating in HARP heating campaigns)





<https://heating-retrofit.eu/>

**Thank you.**

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