CHALMERS
UNIVERSITY OF TECHNOLOGY

BUILDING MARKET BRIEFS (BMBs)

CONTENT OVERVIEW

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CHALMERS

Knight Frank NAPE ETH zürich UCL RICS TU Delft TEP Wuppertal Institut Climate-KIC

A. Market Overview - *Literature based*

- Building stock structure
- Energy, emissions and climate goals
- Policy framework
- Investment and employment

B. Market technology diffusion and dynamics - *Empirical-evidence based*

- Barriers and drivers to EE technologies
- Characterization of technology selection process
- Assessment of market maturity

C. Market development and volume potential - *Building stock model based*

- Status quo of the building stock
- Feasible development
- Market volumes per technology in different RoI segments (from high to low profitability)

CHAPTER A | AIM & SCOPE

- **Aim: Overview of the country's building market, its background conditions, and current trends.**
  - A1. Economy and society
  - A2. Building stock
  - A3. Energy emmissions and climate goals
  - A4. Policy framework
  - A5. Investment & employment
  - A6. Demand, supply & affordability

CHAPTER A | METHOD

- **Method**
  - **Data collection & synthesis**
    - European statistical data,
    - Countries' own statistical offices,
    - National and international public reports,
    - Scientific publications, and market information, e.g. prices and sales volumes.

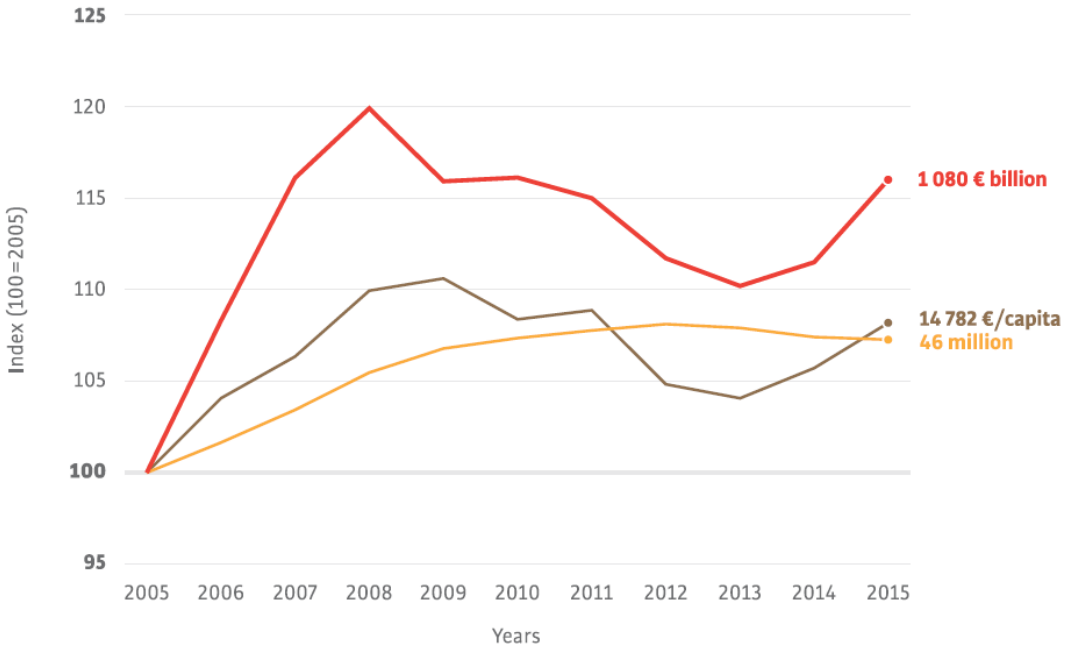
A1. COUNTRY´S ECONOMY & SOCIETY

Trends in Spain's GDP, disposable income, and population.

Source: EUROSTAT

NOTE

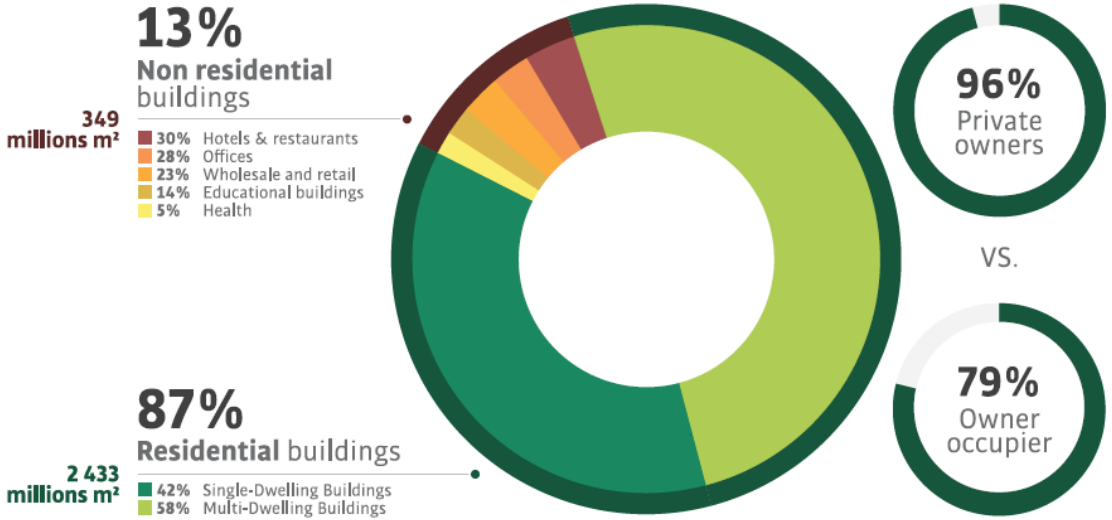
GDP index depicted in the graph is in current EUR.



A2. BUILDING STOCK CHARACTERISTICS

Spain's building stock.

Source: *EU Building Observatory, Observatorio de Vivienda y Suelo Boletín. Especial Censo 2011-Parque edificatorio. Marzo 2014, Scanlon, K,, Fernández Arrigoitia, M. & Whitehead, CM E 2015. Social housing in Europe. European Policy Analysis (17). pp. 1-12.*



A4. POLICY FRAMEWORK

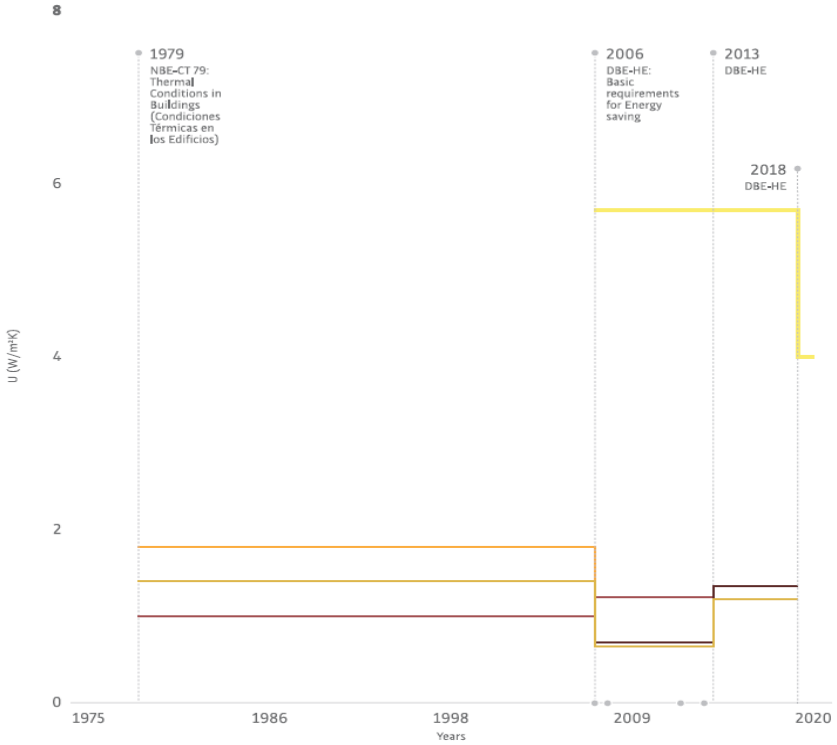
Progression of U-values (W/m²K) for building components in Spain.

Source: IVE, CUES

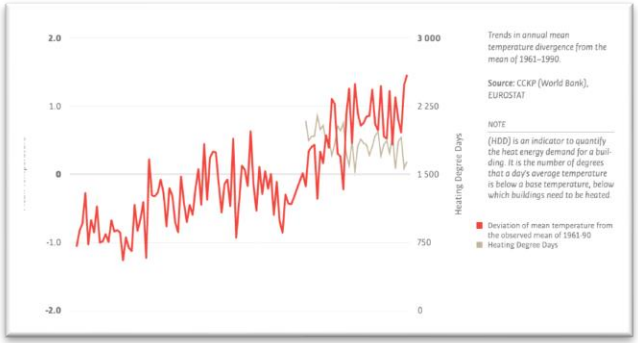
NOTE

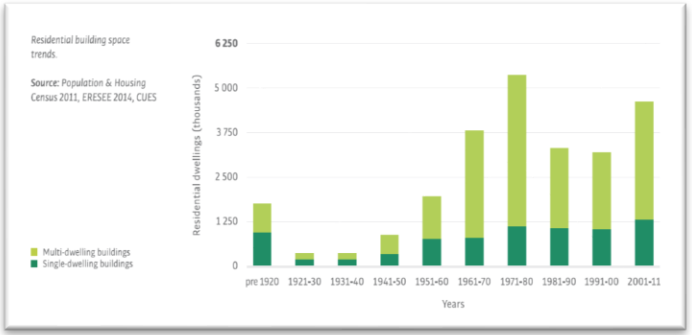
The U Values of the building components depicted in Figure A4.1 are at the upper end of the range suggested in the technical documents.

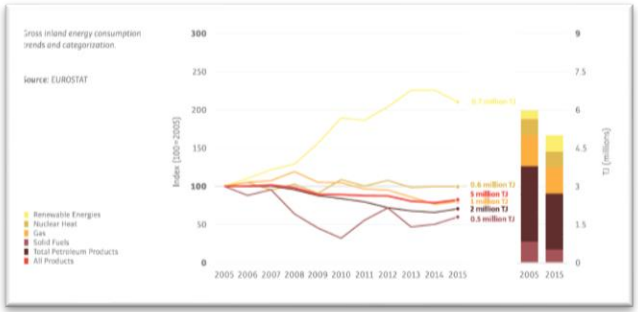
2006
Código Técnico de la Edificación
2007
Building Energy Certification
2007
Spanish Strategy on Climate Change and Clean Energy 2007-2012-2020
2013
PAREER Programme for energy rehabilitation
2015
National Energy Efficiency Fund - 2015

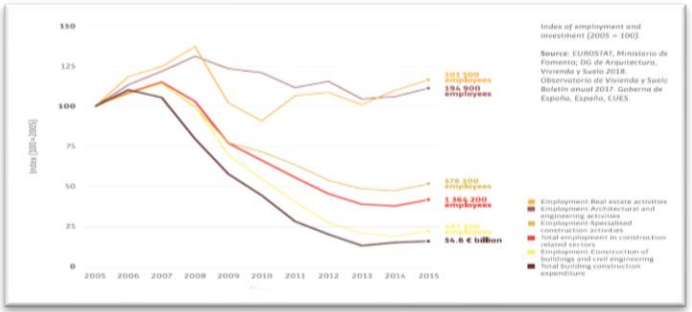


MANY MORE INSIGHTS









CHAPTER B | AIM & SCOPE

- **AIM: Stakeholders' views on residential building projects**
  - B1. Building value chain
  - B2. Building typologies & project types
  - B3. Technology competences
  - B4. Measures implemented
  - B5. Key stakeholders in the technology selection
  - B6. Motivations & obstacles in projects
  - B7. Promising approaches to reach climate goals
  - B8. Barriers & drivers to specific technologies

CHAPTER B | METHOD

- Empirical-based evidence
- Online survey to collect data
- Multi-country scale
- All stakeholders involved in the building value chain
- Stratified sample approach to describe the various market segments
- Characterisation of the population in each country > according to the statistical classification of economic activities in the European Community (NACE)

B1. SAMPLE - STAKEHOLDER GROUPs

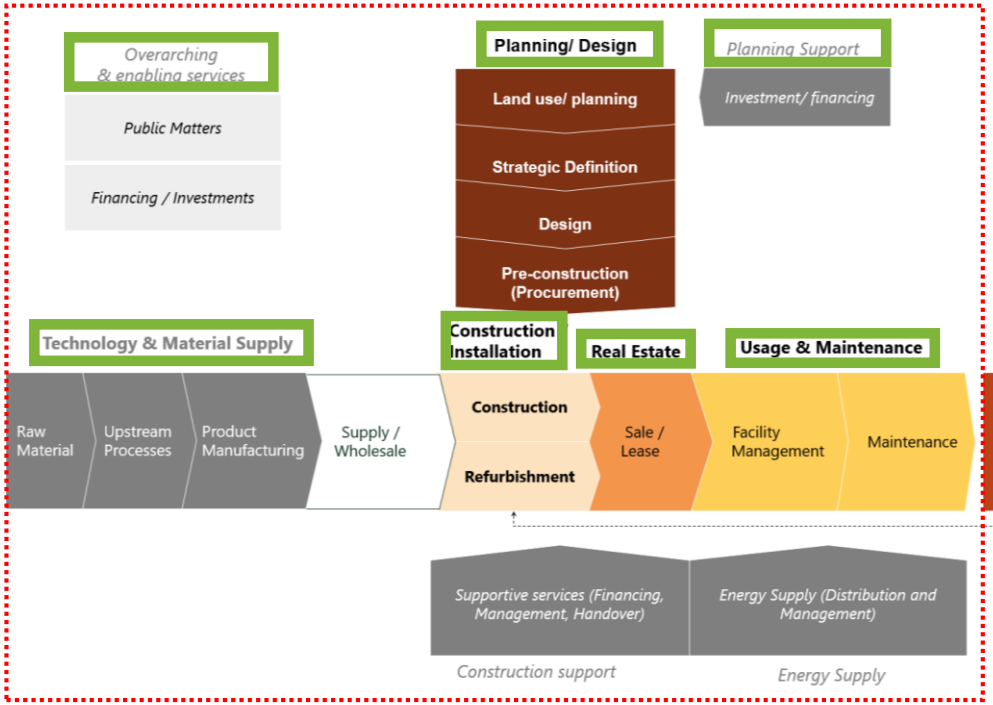


Figure B1.1: Simplified residential building value chain.

	Stakeholder group
Enablers	Architects, engineers, construction companies, installers, local public authorities, bank or other financial service, facility managers, Energy supply/utility or ESCOs
Suppliers	Technology or material manufacturer or trader
Demand-side actors	Investor or Developer, Housing company or housing association, cooperative, Private house owner

Table B1.2: Stakeholder groups per perspective in the adoption of EET

B2. BUILDING TYPOLOGIES

	Region	Construction Year Class	Additional Classification	SFH Single-Family House	TH Terraced House	MFH Multi-Family House	AB Apartment Block
1	National (nicht regional spezifiziert)	... 1859	Generic (Basis-Typ)	 DE.N.SFH.01.Gen		 DE.N.MFH.01.Gen	
2	National (nicht regional spezifiziert)	1860 ... 1918	Generic (Basis-Typ)	 DE.N.SFH.02.Gen	 DE.N.TH.02.Gen	 DE.N.MFH.02.Gen	 DE.N.AB.02.Gen
3	National (nicht regional spezifiziert)	1919 ... 1948	Generic (Basis-Typ)	 DE.N.SFH.03.Gen	 DE.N.TH.03.Gen	 DE.N.MFH.03.Gen	 DE.N.AB.03.Gen
4	National (nicht regional spezifiziert)	1949 ... 1957	Generic (Basis-Typ)	 DE.N.SFH.04.Gen	 DE.N.TH.04.Gen	 DE.N.MFH.04.Gen	 DE.N.AB.04.Gen
5	National (nicht regional spezifiziert)	1958 ... 1968	Generic (Basis-Typ)	 DE.N.SFH.05.Gen	 DE.N.TH.05.Gen	 DE.N.MFH.05.Gen	 DE.N.AB.05.Gen

Figure B2.1: Residential Building typologies in Germany. Source: TABULA. EPISCOPE

	Definition (i.e. building types included)
Single-dwelling building (SDB)	Single family houses (SFH), Semi-detached house (SDH), Terraced house (TH), Row houses (RH)
Multi-dwelling building (MDB)	Small multi-dwelling houses (SMH), Large multi-dwelling houses (LMH).

Table B2.2: Building typology clusters used in the survey.

B2. PROJECT TYPES

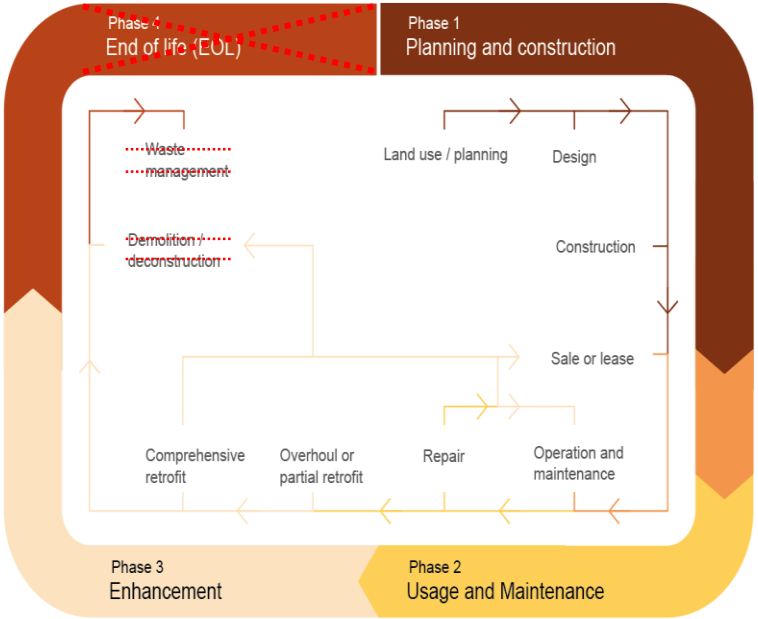


Figure B2.3: Life-cycle of a building: main phases, project types and interactions.

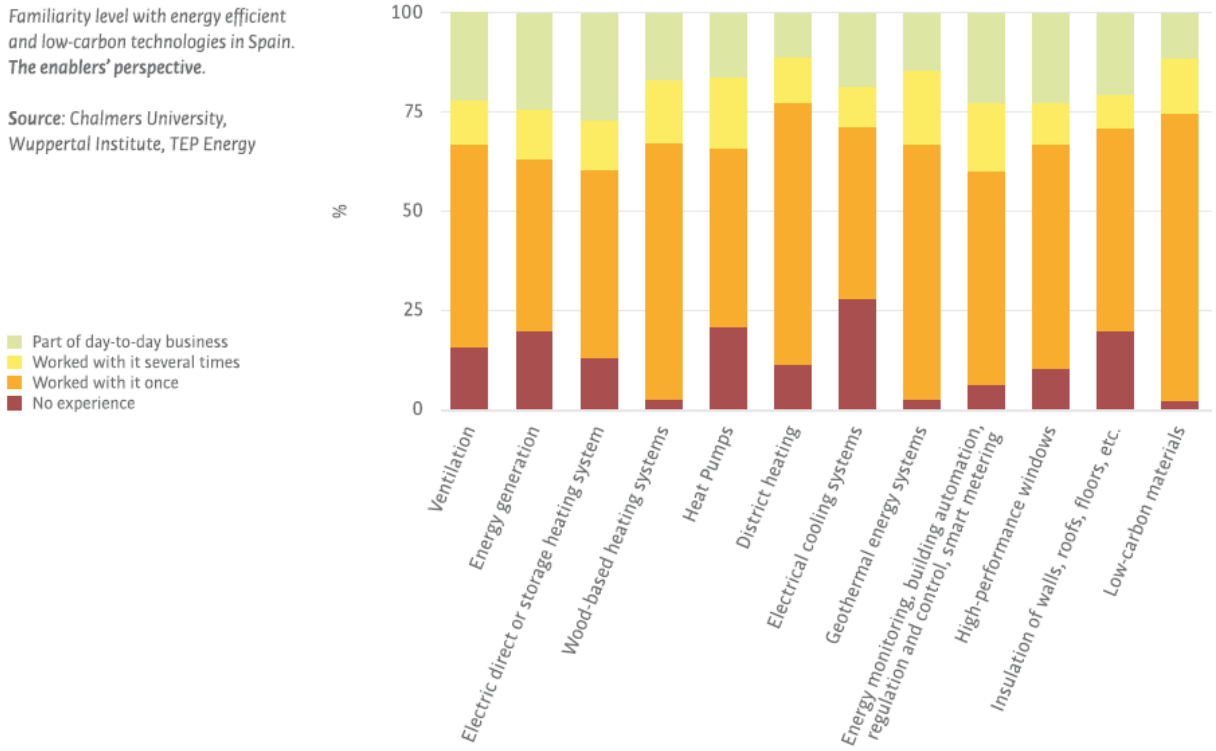
Trigger	Project type
New	New construction
Problem	Repair or overhaul or partial retrofit
Opportunity	(Deep) retrofit

Table B2.4: Project types clustered by trigger, based on Hecher et al.

B3. TECHNOLOGY COMPETENCES

*Familiarity level with energy efficient and low-carbon technologies in Spain. **The enablers' perspective.***

Source: *Chalmers University, Wuppertal Institute, TEP Energy*

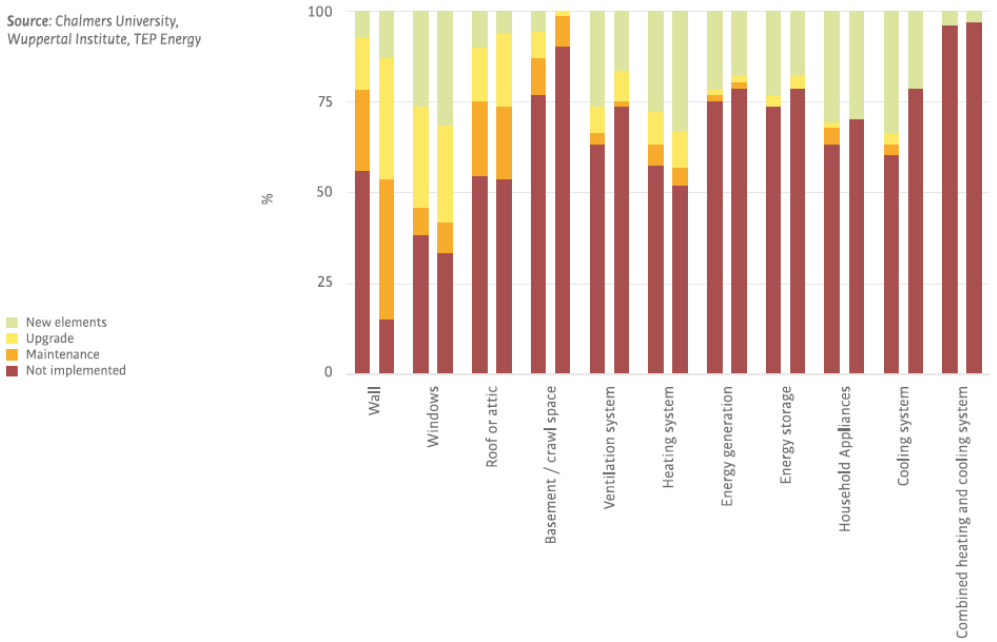


B4. MEASURES IMPLEMENTED

Figure B4.1
Measures implemented in overhaul, partial retrofit, or retrofit projects in (i) SDBs and (ii) MDBs in Spain.

Source: Chalmers University, Wuppertal Institute, TEP Energy

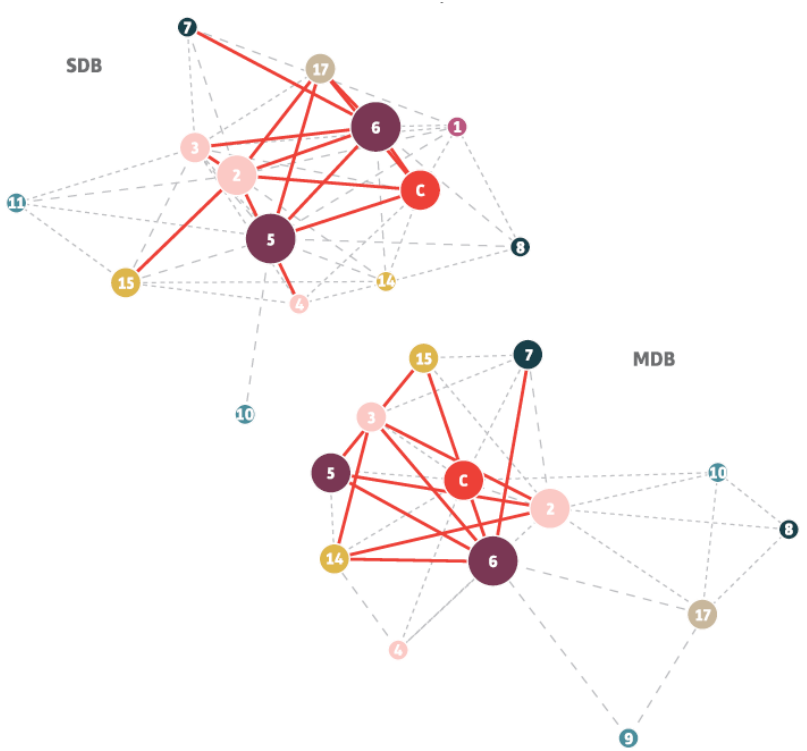
Adding a new cooling system is the most often implemented measure in SDBs, whereas in MDBs it is the maintenance or upgrade of the outer wall.



B5. TECHNOLOGY SELECTION

Stakeholder interaction in the technology selection in overhaul projects in Spain.

Source: *Chalmers University, University of Stuttgart*



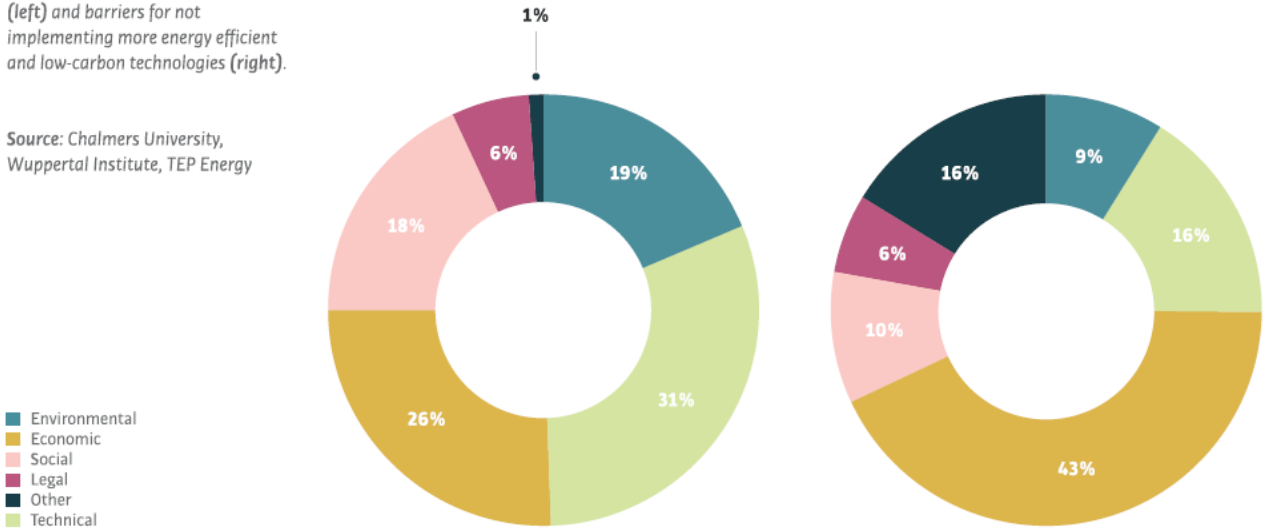
- C. Investment or development agent
- 1. Material or technology trader
- 2. Architect
- 3. Engineer
- 4. Consultant
- 5. Installer
- 6. Constructor
- 7. Public authority
- 8. Bank / other financial service company
- 9. Facility manager - administrative
- 10. Facility manager - technical
- 11. Energy supplier / utility or Energy service company
- 12. Business association, agency agent
- 13. Investment or developing agent
- 14. Housing company agent (for profit)
- 15. Housing company or association agent (public / non-profit)
- 16. Other
- 17. Building owner

B6. MOTIVATION & OBSTACLES IN PROJECTS

Figure B6.1
In overhaul, partial retrofit, or retrofit projects in Spain. Main motivations behind projects (left) and barriers for not implementing more energy efficient and low-carbon technologies (right).

Source: Chalmers University, Wuppertal Institute, TEP Energy

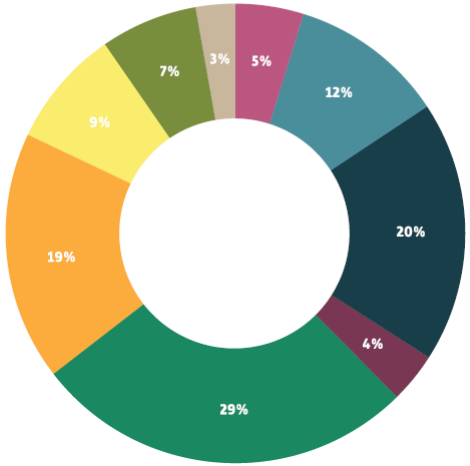
Technical aspects are the most important motivations behind overhaul or partial retrofit projects, whereas economic-related matters are among the strongest barriers to not implementing more energy efficient or low-carbon technology measures in projects.



B7. PROMISING APPROACHES TO ACHIEVING CLIMATE PROTECTION GOALS

Technologies perceived to have the greatest potential to contributing to reaching climate-protection goals for new buildings in Spain.

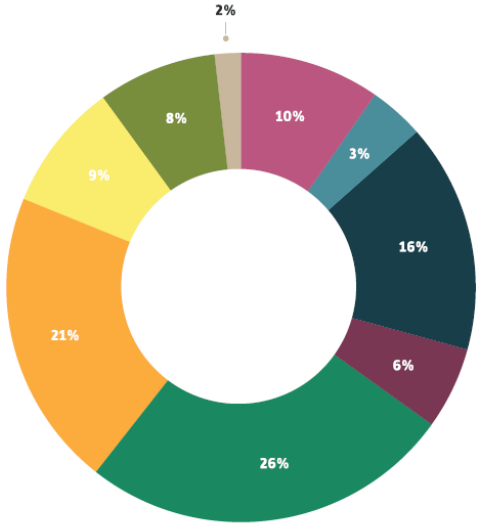
Source: *Chalmers University, Wuppertal Institute, TEP Energy*



- The heating system
- Centralised energy production
- Decentralised energy production
- The ventilation system
- The building envelope
- The user
- Monitoring, regulation and controls
- Efficient household appliances
- Other

Technologies perceived to have the greatest potential to contribute to reaching climate-protection goals for refurbishment in Spain.

Source: *Chalmers University, Wuppertal Institute, TEP Energy*



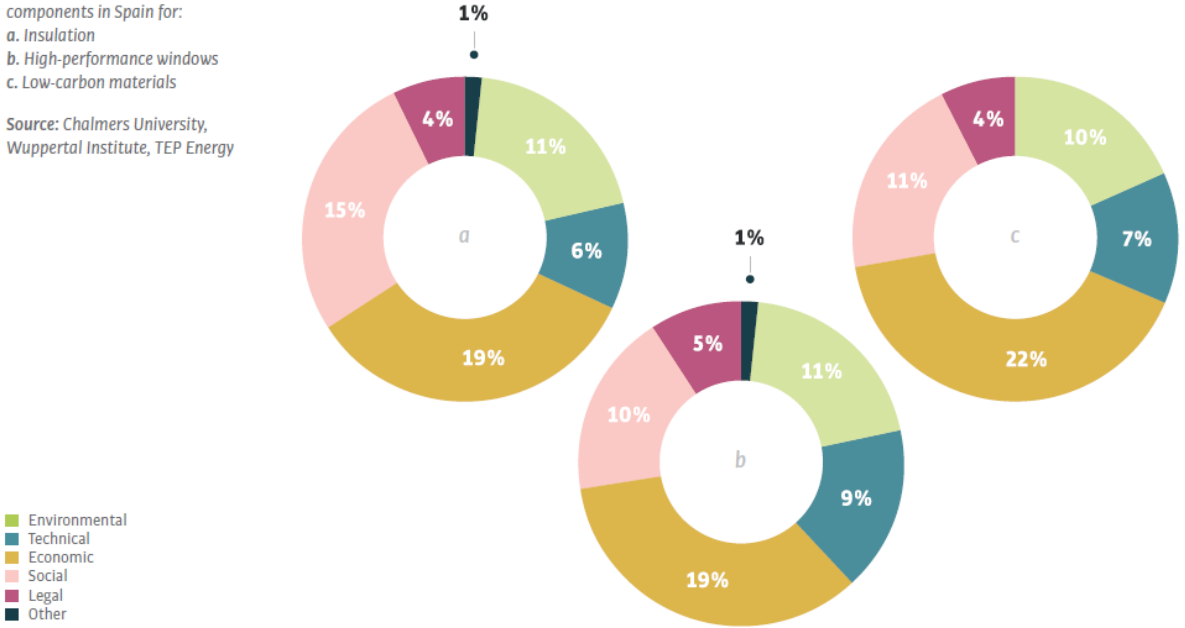
- The heating system
- Centralised energy production
- Decentralised energy production
- The ventilation system
- The building envelope
- The user
- Monitoring, regulation and controls
- Efficient household appliances
- Other

B8. DRIVERS & BARRIERS TO TECHNOLOGIES

Figure B8.1
Barriers to building envelope components in Spain for:
a. Insulation
b. High-performance windows
c. Low-carbon materials

Source: *Chalmers University, Wuppertal Institute, TEP Energy*

Economic aspects are the main barriers to large-scale implementation of building envelope components.



… & MUCH MORE

https://cuesanalytics.eu/

Thank you for your attention!

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