Polski Komitet Narodowy Międzynarodowej Rady Ochrony Zabytków ICOMOS

Fondazione Romualdo Del Bianco

Sapienza Università di Roma

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Sapere Aude — Vilnius Gediminas Technical University

Fondazione Flaminia per l'Università in Romagna

Sustainable Urban Rehabilitation in Europe

LECTURE 5
BARRIERS TO ENERGY EFFICIENCY

OVERALL AIM:

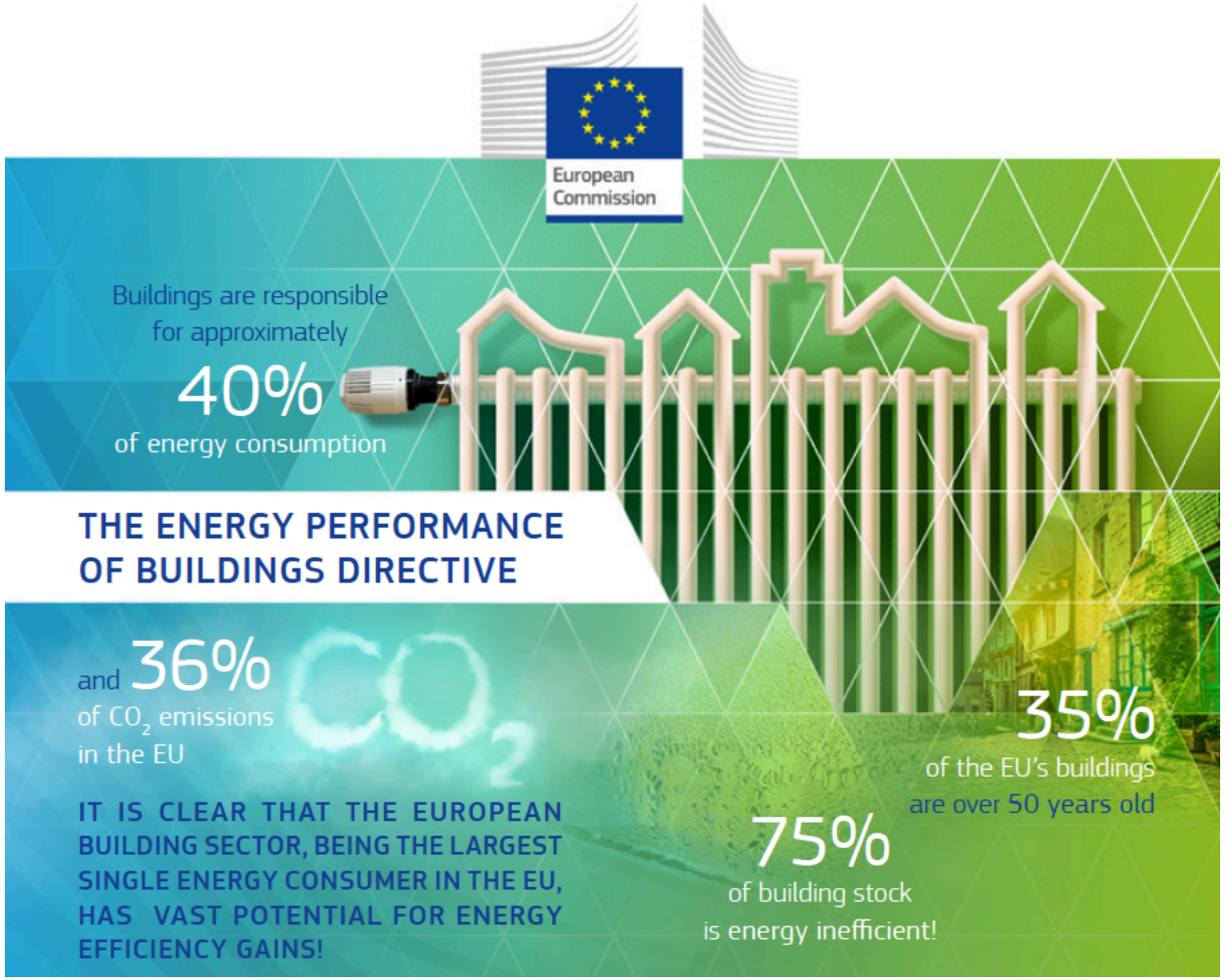
Gaining knowledge on solutions to overcome barriers for the regeneration and the retrofit of existing buildings

Erasmus+

Facts and figures

- Buildings are responsible for approximately 40% of energy consumption and 36% of CO2 emissions in the EU
- 35% of the EU's buildings are over 50 years old
- Almost 75% of the building stock is energy inefficient
- 0.4-1.2% of the building stock is renovated each year (depending on the country)
- more renovation of existing buildings has the potential to lead to significant energy savings – potentially reducing the EU’s total energy consumption by 5-6% and lowering CO2 emissions by about 5%

Facts and figures



Source: ec.europa.eu/energy

EU main policies

- Energy Performance of Buildings Directive (2010)
- Energy Efficiency Directive (2012)

EU's main legislative instruments promoting the improvement of the energy performance of buildings within the EU

Directive (2018/844/EU) amending the Energy Performance of Buildings Directive was published. The revised provisions entered into force in July 2018

EU main policies

Energy Performance of Buildings Directive (EPBD) (revised in 2018)

- EU countries will have to establish stronger **long-term renovation strategies**, aiming at decarbonising the national building stocks by 2050, and with a solid financial component
- A common European scheme for rating the **smart readiness of buildings**, optional for Member States, will be introduced
- **Smart technologies** will be further promoted, for instance through requirements on the installation of building automation and control systems and on devices that regulate temperature at room level

EU main policies

- **E-mobility** will be supported by introducing minimum requirements for car parks over a certain size and other minimum infrastructure for smaller buildings
- EU countries will have to express their **national energy performance requirements** in ways that allow cross-national comparisons
- **Health and well-being of building users** will be promoted, for instance through an increased consideration of air quality and ventilation.

Barriers and challenges

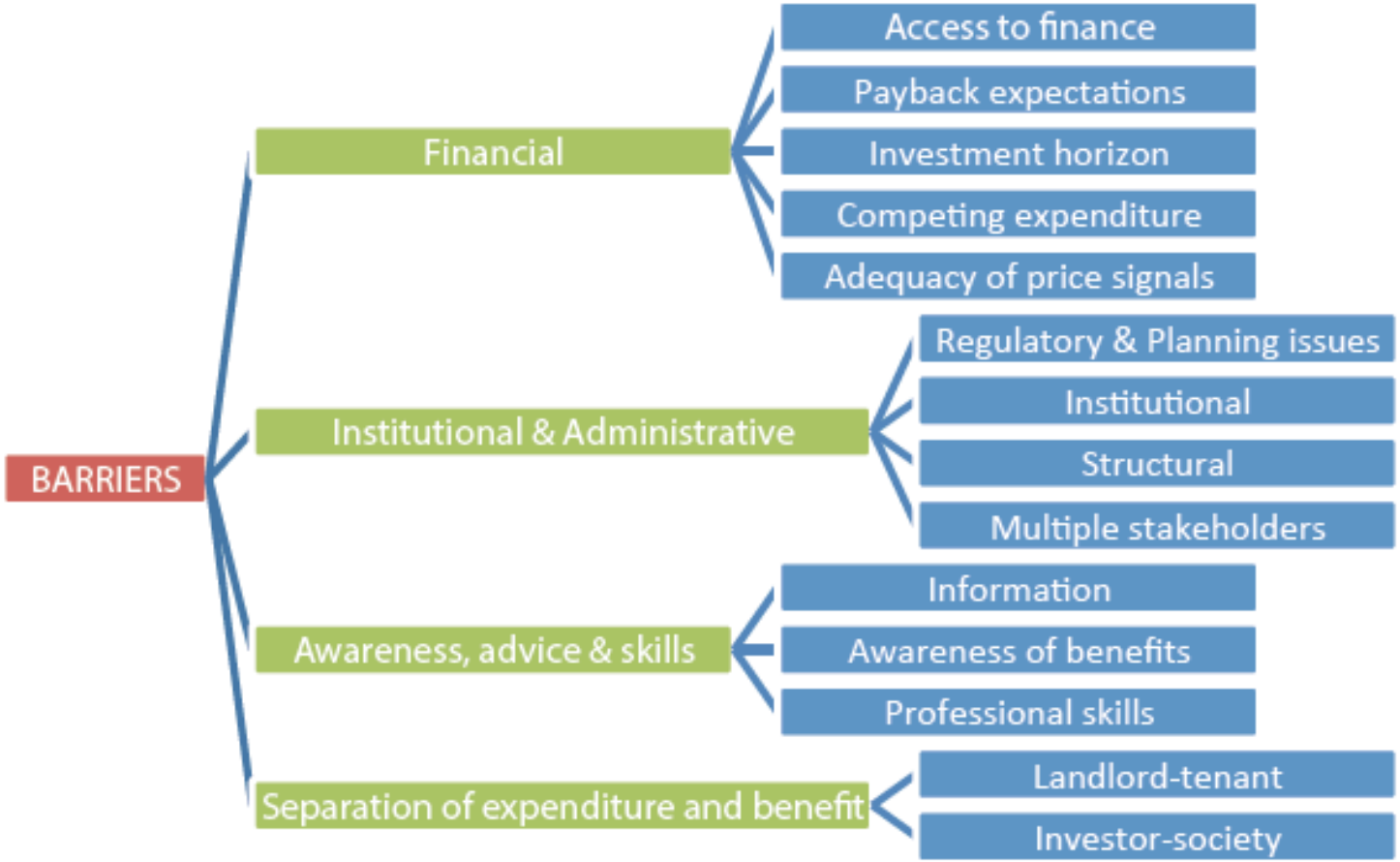
Improving the energy performance of buildings is determined by the decisions of a large number of people, particularly in multi-family, commercial and public buildings.

What is important for policy making is to better understand the factors that affect those decisions in order to design and implement policies that will more effectively promote energy efficiency investments and actions.

BPIE conducted a survey (2011) to get information on specific barriers within the individual countries, reflecting the priorities and differing circumstances affecting implementation and improvements

Barriers

Types of barriers when it comes to building renovation



Source: BPIE (2013)

Barriers

Financial barriers (1/3)

- **Lack of funds or access to finance**

at the level of the individual householder, businesses (large or small), social housing providers and the public sector

- **Payback expectations/Investment horizons**

Even though many energy savings measures are financially rational in that they have a positive Net Present Value (NPV) or a high Internal Rate of Return (IRR), the time taken for the initial outlay to be recouped is a major barrier

Barriers

Financial barriers (2/3)

- **Competing purchase decisions**

Business will prioritise what are perceived as core investments in staff and equipment over energy costs, which typically make up only a small fraction of business costs.
For householders, investments in energy saving measures will struggle to compete with the latest electronic gadgets or a new kitchen or bathroom, which are not particularly cost-effective investments but yield a much higher perceived ‘social benefit’.

Barriers

Financial barriers (3/3)

- **Price signals**

If the financial incentive associated with investing in energy savings measures is sufficiently large, households, businesses and the public sector have a higher propensity to undertake such investments. Energy costs often represent a small share of household expenditure resulting in lack of motivation for the vast majority of consumers to take meaningful action to reduce consumption levels

Barriers

Institutional and administrative barriers (1/2)

- **Regulatory & planning regimes**

These range from various degrees and speeds at which EU Directives, including the EPBD, have been implemented by autonomous regions within a Member State, through to energy market barriers, such as the approvals process for building integrated renewable technologies.

- **Institutional**

There is a bias among institutional investors more familiar with supply-side investments and large-scale financing, rather than generally smaller and more risky projects on the demand side.

Barriers

Institutional and administrative barriers (2/2)

- **Structural**

The age of the building stock is the main barrier, because of a low demolition rate.

- **Multi-stakeholder issues**

Various barriers exist where there are multiple owners and/or occupiers of buildings. Ownership and responsibility can be opaque, while it can be very difficult to agree on energy saving investments in multi-family residential buildings if many different property owners have to either approve a decision or make a financial contribution.

Barriers

Awareness, advice and skills barriers (1/2)

- **Lack of advice/information**

Due to miscommunication issues, in some cases consumers are not aware of or do not fully comprehend the effectiveness of specific technologies. This may lead to scepticism over implementing a technology especially if two or more professionals give supposedly conflicting advice as to the best way to renovate.

- **Awareness of energy savings potential**

While there is a general appreciation that energy saving is a “good thing”, there remains a lack of understanding of the energy, cost and carbon savings from different measures.

Barriers

Awareness, advice and skills barriers (2/2)

- **Skills & knowledge related to building professionals**

Skill shortages exist in both the contractor market responsible for effective installation of energy saving measures, as well as in professional services, with few architects and designers familiar with how to specify a low energy renovation.

Barriers

Separation of expenditure and benefit

- Landlords investing in a property where tenants pay the energy bill
- Landlords' inability (through legislative restrictions or other reasons) to raise rents after a building renovation
- Developers constructing a new building or renovating an existing one, where market prices do not reflect the energy performance of the building

Barriers

Howarth C., Roberts B.M. (2018)

Barrier	Description
Acceptability	Fear that installing an energy efficiency measure will restrict freedom of choice [38]. Measures associated with increased effort or decreased comfort [39].
Access to capital	Not having the means to pay for energy efficiency measures. Even if householders are aware of the return on investment, a purchase cannot go ahead [40]. It may not alter willingness to pay, but limits how much householders are willing to spend [41] which can cause a cheaper option being purchased, which may be sub-optimal in quality [42].
Aesthetics	Choosing a product by looks over functionality [43]. This may manifest itself in the purchase of a new kitchen instead of an energy efficiency investment because of the greater excitement that this purchase causes [44,45].
Appearance	External wall insulation could impact the visual appearance of a house, which some may find undesirable. For heritage buildings with attractive external features, external wall insulation may not be permitted due to the significant alteration in appearance this measure causes (see 'regulatory').
Cost–benefit uncertainty	Householders perceiving costs of the energy efficiency measure to be greater whilst underestimating the benefits that the measures will deliver [46,47].
Defaults	People are more likely to accept the default option, which is the option taken if no active choice is made. This mostly results in no action being taken, even when it is not in the person's best interest [48].
Discounting the future	Preferring present benefits to those received in the future. The benefits of installing energy-efficiency measures are accrued over long periods, whilst the costs are immediate [7].
Energy price	Current energy prices are too low to incentivise investment in domestic energy efficiency [49]. Energy bills occupy a low budget share in proportion to total household expenses [50], with only the fuel-poor having significant motivation to make their homes more energy-efficient.
Hidden costs	Rooted in fear, such as 'trust', hidden costs include the stress and inconvenience of construction mess ('hassle-factor'), fears that the work will be of poor quality and irreversible, and struggles to find a suitable installer [14,51]. The hassle-factor could also include the need to clear the loft space before insulating [52].
Income	High-income households generally consume more energy than low-income households [53]. However, for higher income households, energy bills account for a lower percentage of outgoings, so they may be less incentivised to invest. Wealthier householders do not always have concern for making the most economically efficient decisions, and may be more likely to be wasteful [54].

Barriers

Howarth C., Roberts B.M. (2018)

Lack of information	Forms 'bounded rationality' [25] whereby decisions are made based on past experience rather than presently available information [55]. With the right information, householders are more likely to act rationally [56]. Householders need information on how much they currently spend on energy and how much they will save by having energy efficiency measures installed [48].
Property value	Energy efficiency improvements do not provide the same increase in home value as visual improvements such as a new kitchen would [57].
Regulatory	Regulatory barriers, for instance planning regulation on solid wall insulation for homes within a Conservation Area, can hinder householders making energy efficiency improvements [48].
Social norms	Behaviours expected from others [58] that people use as a benchmark to measure and influence their own behaviour based on what others are doing [59]. Promoting energy efficiency as a social norm energy use in the home can be reduced [60].
Split incentives	In the private-rented sector, this manifests itself as a landlord–tenant problem whereby those who invest in the measure, the landlords, don't benefit from a lower fuel bill [22], and the tenant will not invest, as they are likely to move out before the benefit of their investment is fully received [61].
Tenure	Whether or not a householder owns their own home or rents affects their willingness to invest in energy efficiency measures, see 'split incentives'.
Trust	The ability to trust stakeholders to act responsibly and for the installed measures to perform as advertised, and the associated fear that they won't is a barrier to energy efficiency investment [62].
Uncertainty	Changes to future energy prices and unfamiliar technologies affect the perceived risk. The uncertainty of achieving savings from an energy efficiency measure because the householder may move house before reaping the returns through a reduction in energy bill [57].
Value–action gap	The difference between personal values and deeds carried out [63], which lowers motivation to install energy efficiency measures. 71% of people are "very or fairly concerned" about climate change [64], yet a paradox exists where pro-environmental values are not reflected in energy efficiency investments [65]. This is true even when people feel capable of making a difference to climate change [66].

Challenges

The lack of activity resulting from the financial, structural and other barriers have not allowed market and technical barriers to emerge

Supply chain
a significant increase in demand could lead to a significant shortage of material, components and suitably skilled labour could lead to renovation work not including low energy measures

Quality of workmanship
a significant increase in demand could be the rapid growth of contractors offering to undertake low energy renovation work, which if not appropriately regulated or managed, could give rise to poor workmanship and even some serious short term failures.

Challenges

Technical failure

risk of building-in long term failure risks that may not emerge for a decade or more. If such failures began to occur on a large scale in several years they could result in a massive loss of confidence and a halt in major renovation programmes

Disturbance

practical issue of what happens to the building occupier when a major renovation is being undertaken. Deep renovation can only be implemented in a vacant building which will involve practical and financial barriers associated with re-locating the occupant for the period of the retrofit (4-10 weeks).

Further readings

- BPIE (2011) EUROPE'S BUILDINGS UNDER THE MICROSCOPE
- BPIE (2013) A GUIDE TO DEVELOPING STRATEGIES FOR BUILDING ENERGY RENOVATION
- Howarth C., Roberts B.M. (2018) The Role of the UK Green Deal in Shaping Pro-Environmental Behaviours: Insights from Two Case Studies, Sustainability 10, 2107. doi:10.3390/su10062107

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