

Accelerating energy efficiency retrofits in owner-occupied homes: an international review

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Review questions, approach, scope

Overall research question: What are the best practice policies to accelerate quality, energy efficiency retrofits of owner-occupied, “able to pay” households in the UK?

Sub-research questions relating to international evidence on policies targeting “able to pay” owner-occupied homes:

- Is there an optimal combination of policies and/or sequence for their implementation to achieve a step change in quality, energy efficiency retrofits in “able to pay”, owner-occupied homes?
- What is the role of national government co-ordination, across different areas of policy, to deliver this?
- What are best practice examples of policy co-ordination between national and local retrofit governance strategies?
- Internationally, how effective are public policy versus market-based (or public-private) approaches for energy efficiency renovation in owner-occupied homes?

Scope and method:

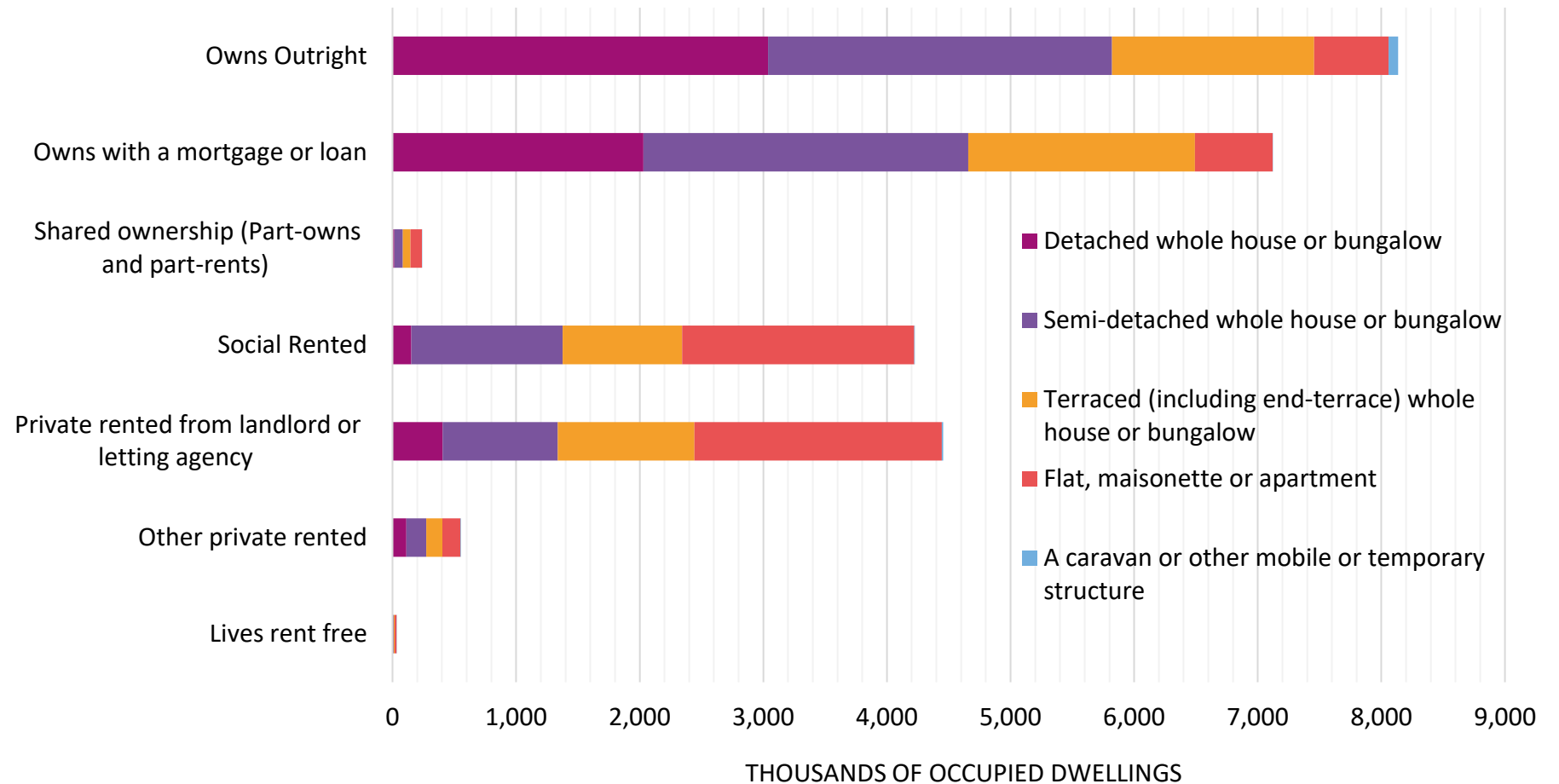
- Focus is on thermal fabric efficiency improvements (but also includes low-carbon heating).
- Rapid evidence assessment (REA) following UKERC TPA approach: <https://ukerc.ac.uk/research/tpa/>
- Review has identified relevant literature using key word searches in Web of Science (academic literature) and Overton (policy documents and grey literature): ~ 70 relevance rating 1 documents from 700+ identified.

Owner-occupiers: England and Wales

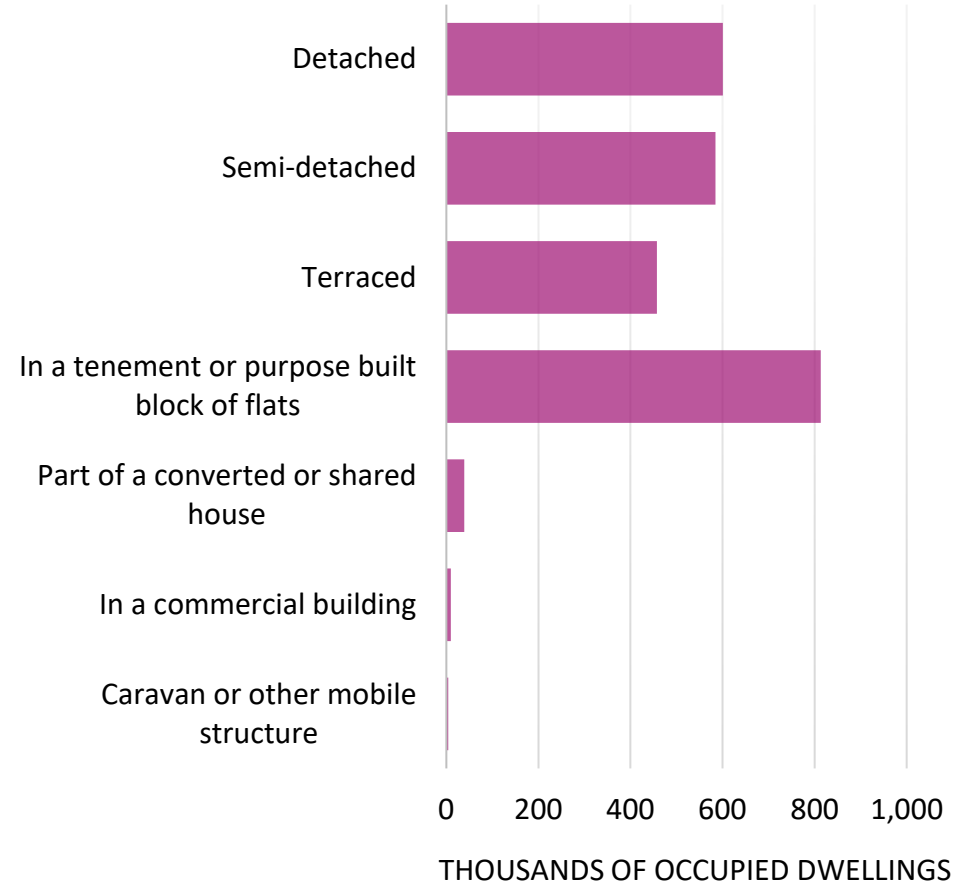
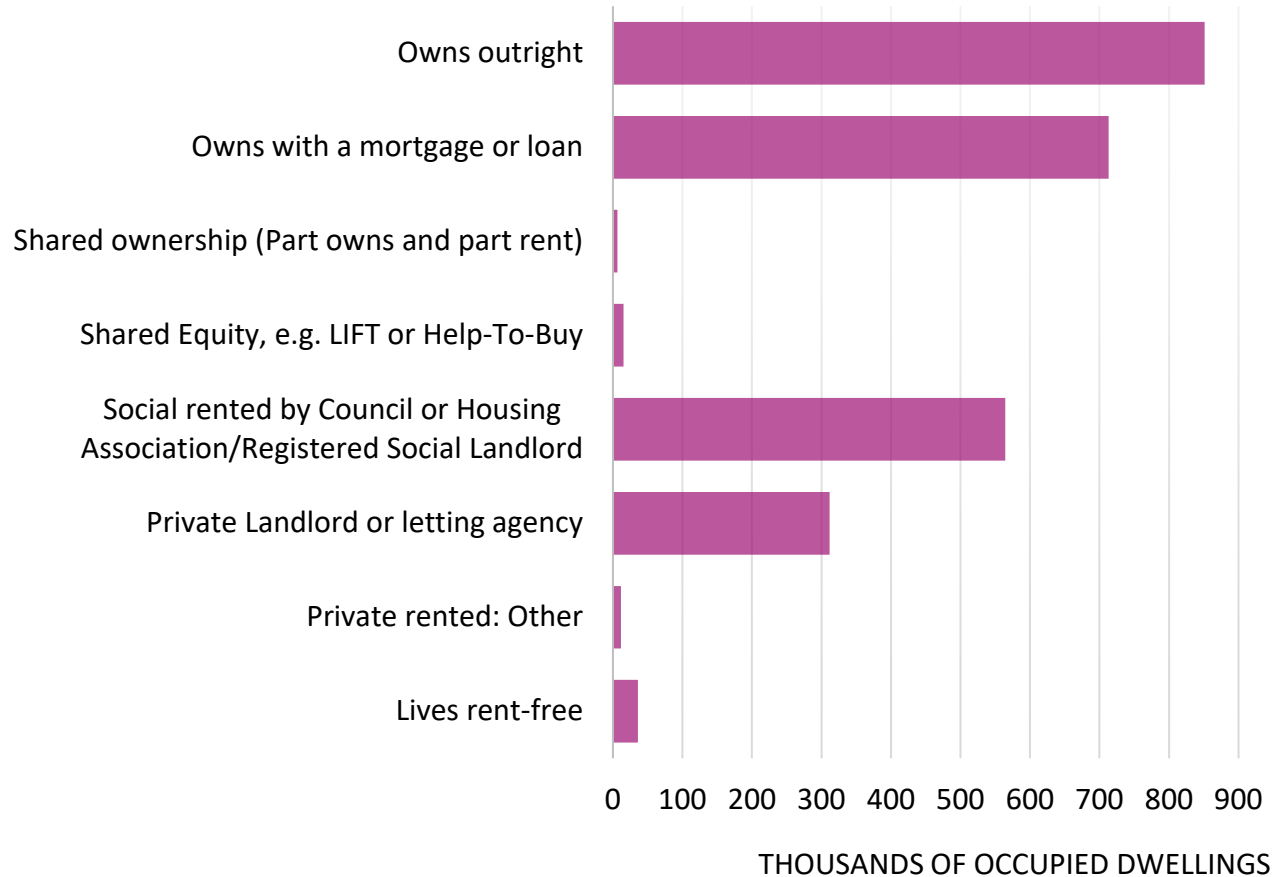
England, Wales and Scotland:

- 63% of households were owner-occupied in 2021/2
- 15.5 million in E&W
- 1.6 million in Scotland (next slide)

EU27 – in 2022, 69% of households were owned (Eurostat, 2024)



Owner-occupiers: Scotland



International progress: home energy retrofit

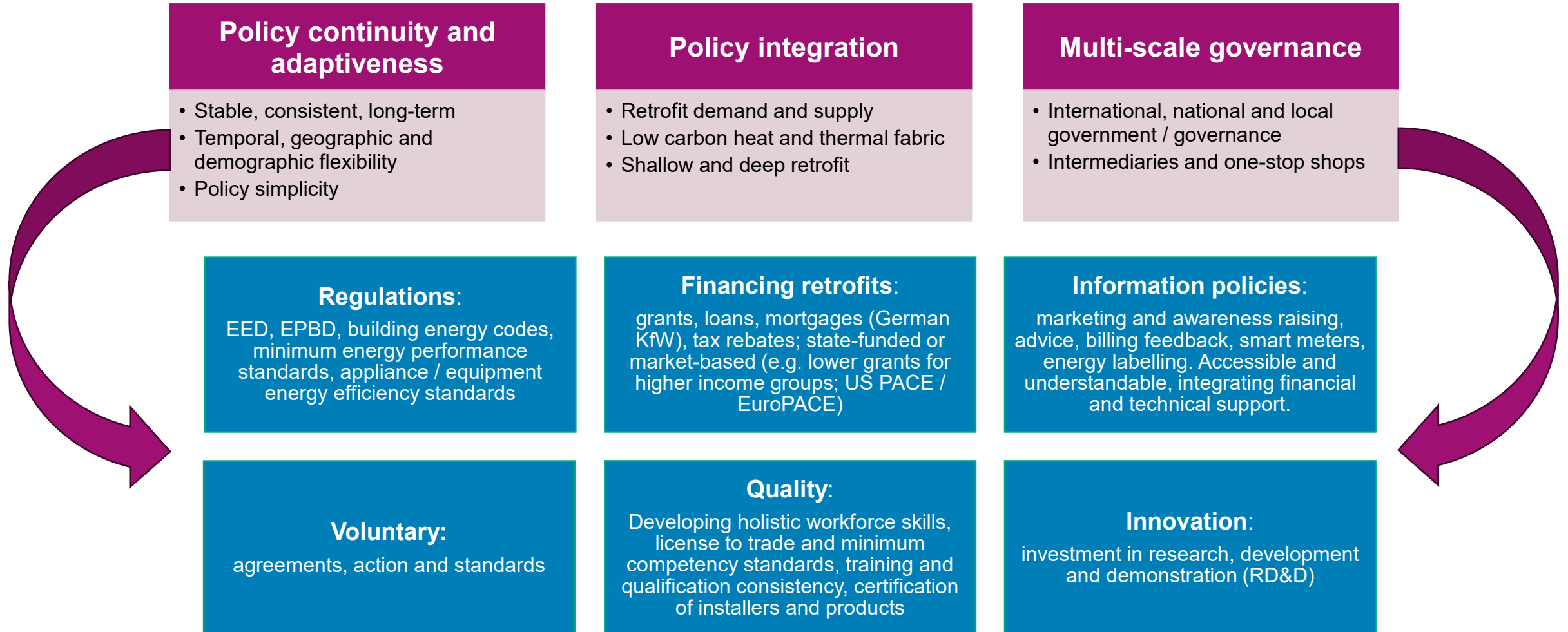
- **Few countries yet to deliver retrofit at a large-scale or make it mainstream (some emerging examples).**
 - Annual energy renovation rates per floor area in EU (2012-2016): 1% for residential buildings or 0.2% for deep renovations.
 - Home Energy Scotland (2008-): > air source heat pump and solar PV installations per 100,000 homes in Scotland vs England

- **Germany: KfW bank loan / grant scheme from 2005-2017: 2,870,000 dwellings refurbished in total.**
 - 275,000 homes refurbished in 2017: 35% - thermal insulation measures; 69% heating replacement.
- **France: MaPrimeRénov' investment funding (grant) scheme led to 670,000 home energy renovations in 2022.**
 - Includes installation of 156,000 air source heat pumps and 148,760 biomass pellet stoves.
 - One million (mostly low-income) households received funding 2020 – February 2023 (70% heating, 21% insulation).
 - Mostly single measures funded; 10% of dwellings - whole building renovation / multiple measures installed.
- **Canada: Greener Homes Initiative - over half a million applications from 2021 to 2024, 165,000 grants issued to homeowners.**
 - Almost half (82,000) of grants for heat pump installations, higher demand and average grant size than expected.
 - Greener Homes Grants scheme recently closed. Greener Homes Loans still available (53,000 approved since 2022).

Building retrofit policy categories in literature

Authors (Year)	Countries / regions included	Regulations	Financing	Information policies	Voluntary agreements and action	Training and quality assurance	RD&D and innovation
Bertoldi et al (2020)	EU		x				
Camarasa (2023)	International (>80 countries)	x	x	x			
Economidou et al (2020)	EU	x	x	x	x	x	x
Kerr & Winskel (2020)	Europe and North America, including Denmark, France, Italy, US.	x	x	x	x	x	x
Rosenow et al (2017)	14 EU Member States	x	x	x	x	x	
Sebi et al (2018)	France, Germany and USA	x	x	x		x	x
Zhang et al (2021)	US, Canada, Germany, France, UK, Spain, China, Singapore, Japan, Australia, and New Zealand.	x	x	x			x
Björklund et al (2023)	EU	x	x	x	x	x	x

Policy strategies and instruments for home energy retrofit: identified themes in literature



Policy recommendations

- **Key success factors are stable, long-term and flexible policy support.**
 - Should increase confidence in supply chain and raise consumer trust, including via trusted installer accreditation.
- **Policy targets should be measurable / quantitative, set clear direction of travel, allow continuous monitoring of progress.**
 - Internationally, quality of monitoring data on progress (renovation rates), impact (carbon reduction) and benefits/ drawbacks (indoor air quality, comfort, health etc) of home energy retrofitting is particularly poor.
- **Holistic approach or “policy packages” more effective than individual policies alone.**
 - Should include policies to stimulate both homeowner demand and competent supply chain for retrofit.
 - Review highlights several more appropriate financing mechanisms for (higher income) owner-occupiers.
 - Public funding is limited - role for utility / private capital funding of building retrofits or innovative financing models
 - EU Energy Efficiency Directive requires member states to develop certification schemes or equivalent qualifications for workers providing energy efficiency improvements.
 - Potential to expand Microgeneration Certification Scheme (MCS) to thermal fabric energy efficiency interventions, incorporating requirements for more holistic, multi-trade competencies and soft skills.
- **A national retrofit programme with financial incentives for “able to pay” homeowners and a “one stop shop” advice service can help to support customer retrofit journey and develop supply chains.**
 - Opportunities to develop skilled workforce for quality retrofit integrated as part of one stop shops or through requirements for accessing retrofit grants and loans.