

Homes of today for tomorrow

Decarbonising Welsh Housing between 2020 and 2050

#FPRN7 Fuel Poverty in Wales

Simon Lannon, Ed Green, Joanne Patterson, Heledd Iorwerth, Fabrizio Variale

Monday 25th November 2019

CARDIFF
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Decarbonising Welsh Housing between 2020 and 2050

STAGE 1

April 2018 to September 2018

A scoping review combining retrofit best practice and relevant publications to understand 'what works' and begin to establish decarbonisation pathways.

STAGE 2

November 2018 to July 2019

A modelling exercise to understand the size and shape of the Welsh housing stock, and its potential to be decarbonised - based on the existing knowledge base.

STAGE 1 - understanding the challenge

Legislation requires at least 80% reduction in carbon emissions by 2050 (vs 1990 levels).

CCC has stated that Wales should target >95% reduction in carbon emissions by 2050.

Housing is responsible for 21% of Welsh carbon emissions.

90% of existing Welsh homes are likely to remain in use in 2050.

Wales has one of the oldest housing stocks in Europe.

The stock is diverse, in terms of type and condition.

A decarbonisation pathway must deliver holistically against Well-being of Future Generations Act.

STAGE 1 – What works

Case studies (40)

Literature (46)



STAGE 1 - findings

We know how to retrofit

There is considerable scope to develop appropriate retrofit strategies utilising actions that are understood, and skills and products that are widely available.

Fabric known, systems less so, people introduce uncertainty

Retrofit actions affecting dwelling fabric are best understood. Renewables and systems-based actions involve more emerging technologies. People represent the least understood aspect of retrofit, and introduce the most uncertainty around effectiveness, making future work around lifestyle and behaviour change particularly important.

STAGE 2 :

modelling decarbonisation of the Welsh housing stock

What it included:

- 14 dwelling models to represent the Welsh housing stock.
- 4 retrofit narratives to explore domestic retrofit options.



Good practice



Best Practice



Heritage



Rural

- 3 energy supply scenarios to investigate the impact of cleaner energy.

Scenario 1

minor improvement

Scenario 2



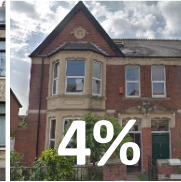






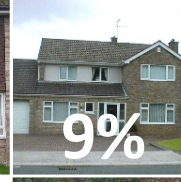




significant improvement

Scenario 3

transformational change

- Assumptions made to model the housing stock as a whole, based on: EPC database, Welsh House Condition Survey and VOA data

STAGE 2 : A representative taxonomy of 14 dwelling types

	HOUSE End terrace	HOUSE Mid terrace	HOUSE Semi- detached	HOUSE Detached	FLAT (Purpose built)	Total
pre 1919	 5%	 9%	 4%	 7%		23%
1919- 1944			 5%			5%
1945- 1964			 10%			10%
1965 - 1990	 4%	 6%	 10%	 9%	 4%	33%
post 1990			 5%	 7%	 1%	13%
Total	7%	15%	33%	23%	6%	84%

STAGE 2 :

modelling decarbonisation of the Welsh housing stock

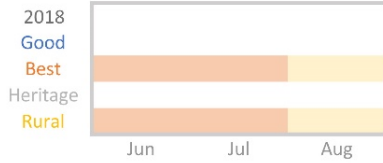
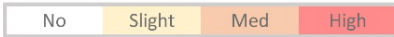
Modelling stages:

1. 1990 stock condition
2. Transformation of grid to 2018
3. Transformation of grid to 2050
4. Services – heating and hot water
5. Renewables – PV
6. Roof
7. Draught proofing
8. Wall insulation
9. Floor insulation
10. Improved windows
11. Changing people's behaviour

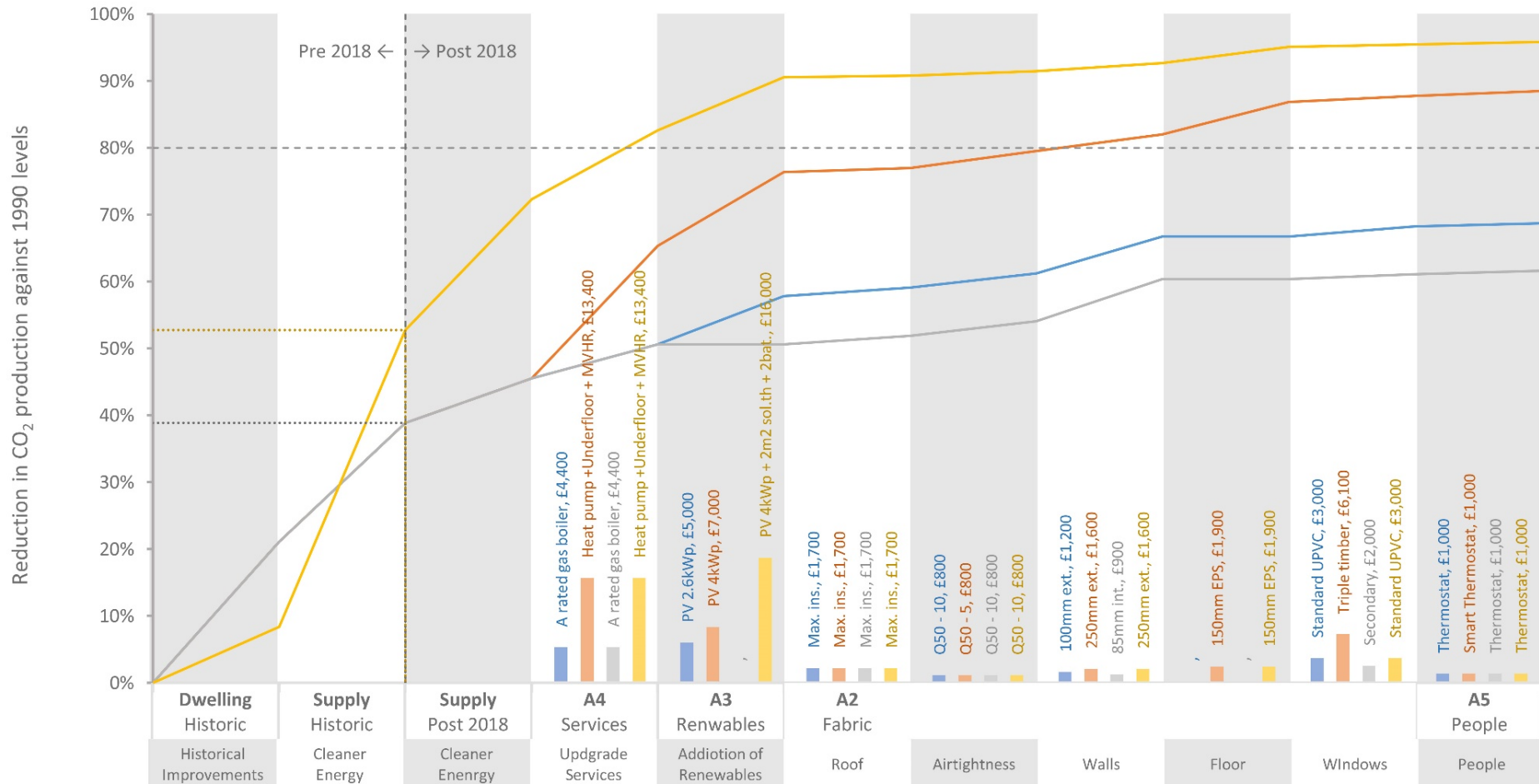
Dwelling type 2: Mid terrace pre 1919

Scenario 1

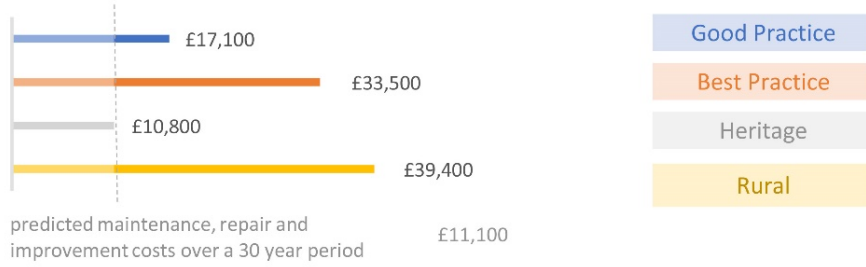
Overheating Risk



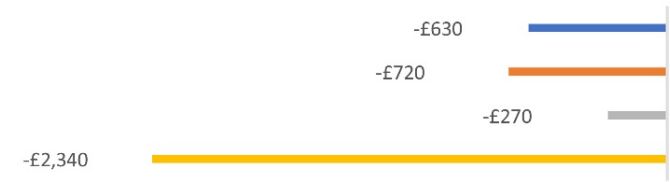
Impact on carbon emissions of four distinct retrofit narratives, each with costed actions



Total capital cost by narrative

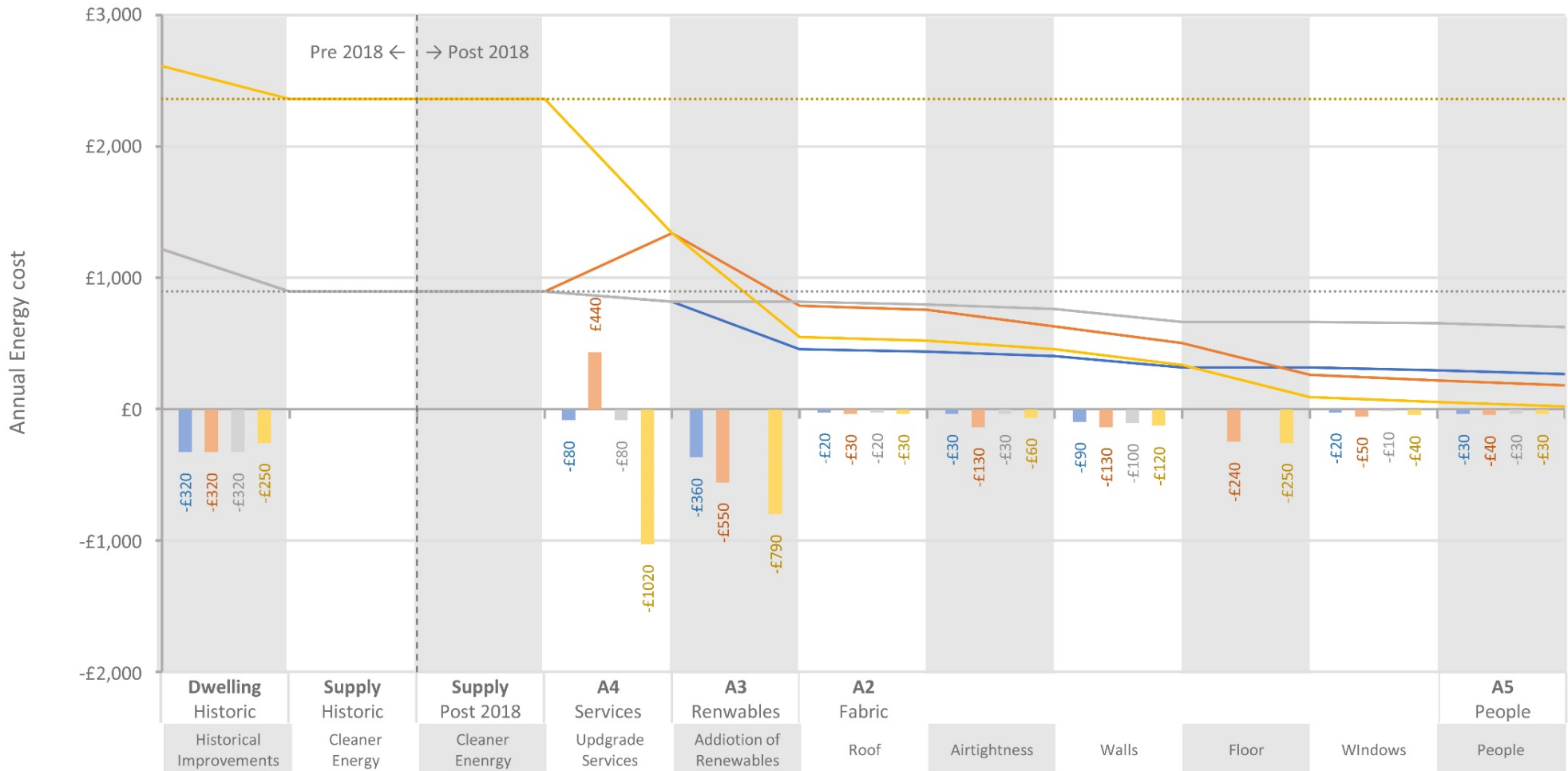


Total reduction in annual energy cost by narrative



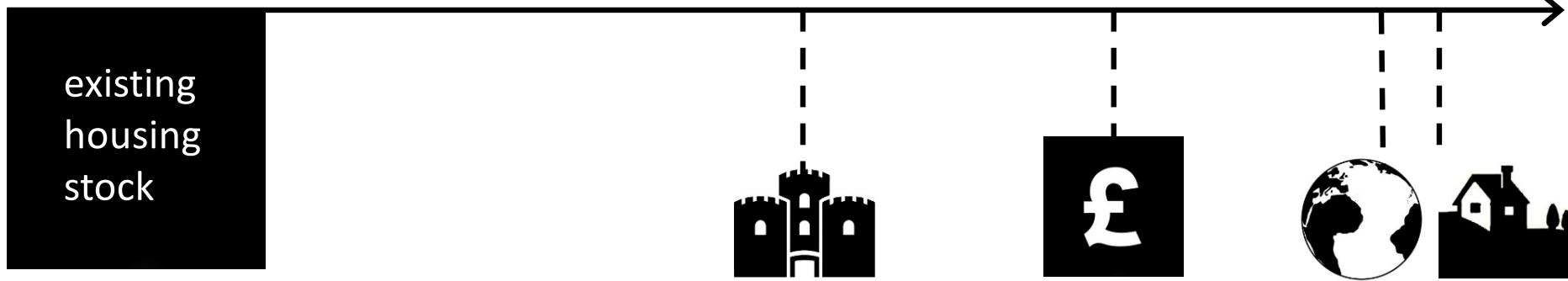
Impact on annual energy cost of four distinct retrofit narratives

Scenario 1 assumes no change in energy costs

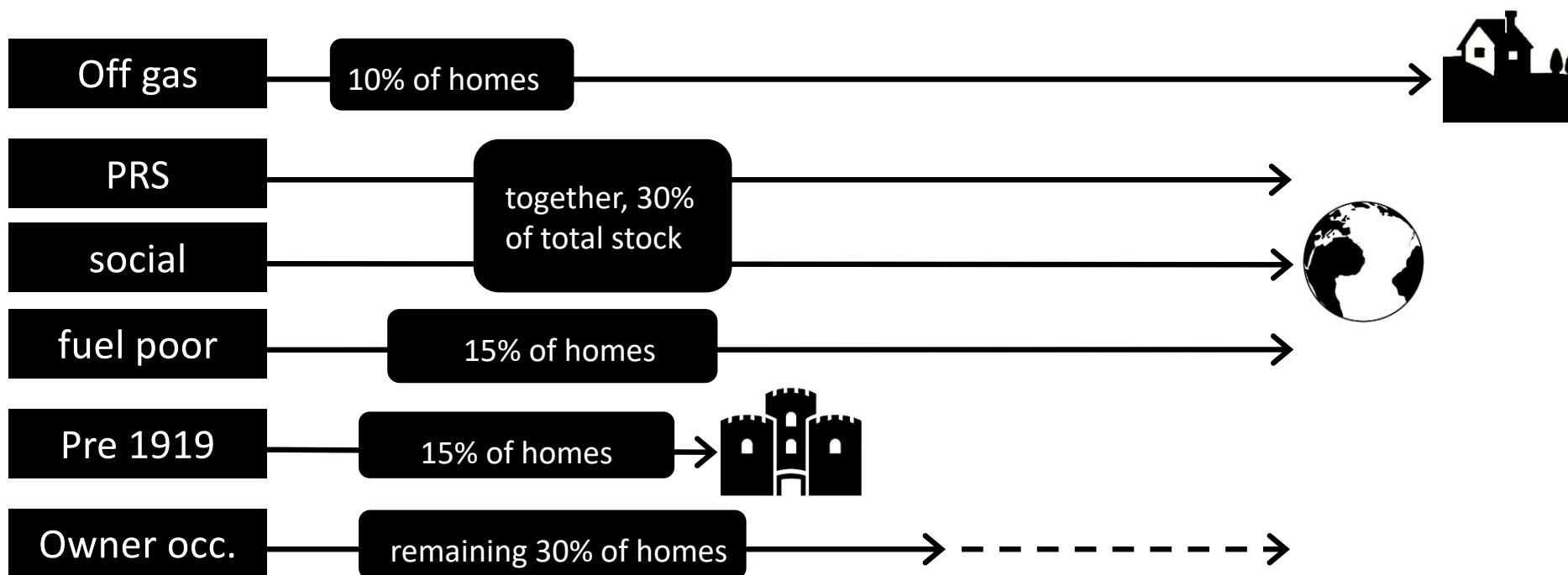


Performance (reduction in carbon emissions versus 1990 levels)

100%



The Welsh housing stock as modelled, to explore limits to decarbonisation:



Recommendations

- UK Government must be lobbied to ensure the national grid exceeds 60% clean energy by 2050.
- Action must be taken to protect vulnerable households, to ensure that increases in fuel costs or retrofit of new heating systems do not increase fuel poverty.
- The Welsh housing stock should, as a whole, be retrofitted to the equivalent of EPC 'A' rating.
- There should be no distinction between performance standards for retrofit and newbuild*. There should be no distinction between standards due to tenure, house type or condition.
- Retrofit of some Welsh houses is constrained by character. However the justification for 'acceptable fails' must be carefully defined so as not to jeopardise decarbonisation targets.
- Retrofit must overcome the performance gap - targets should be delivered, not just predicted.
- Retrofit is easier to enforce for social housing and PRS sectors. Work must be undertaken to explore how to initiate retrofit in the owner occupied sector.
- A flexible approach requiring all homes to achieve appropriate standards by 2050 is the only way to anticipate achieving 90%+ decarbonisation under assumed energy supply scenarios.

* The Independent Review of Affordable Housing Supply (WG, 2019) recommended that "all new affordable homes be built to EPC 'A' using a fabric first approach from 2021".