

Hitting Hard

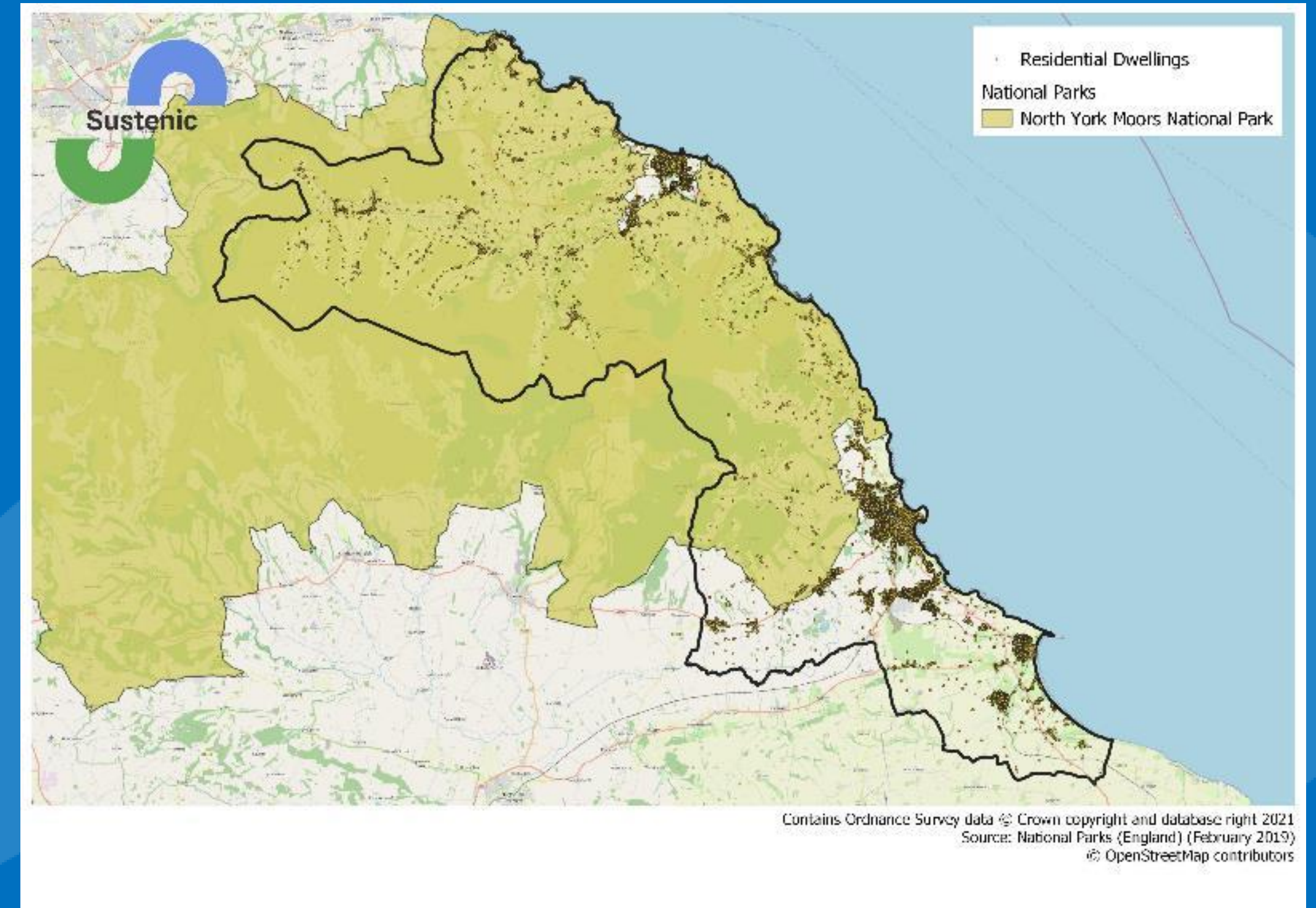
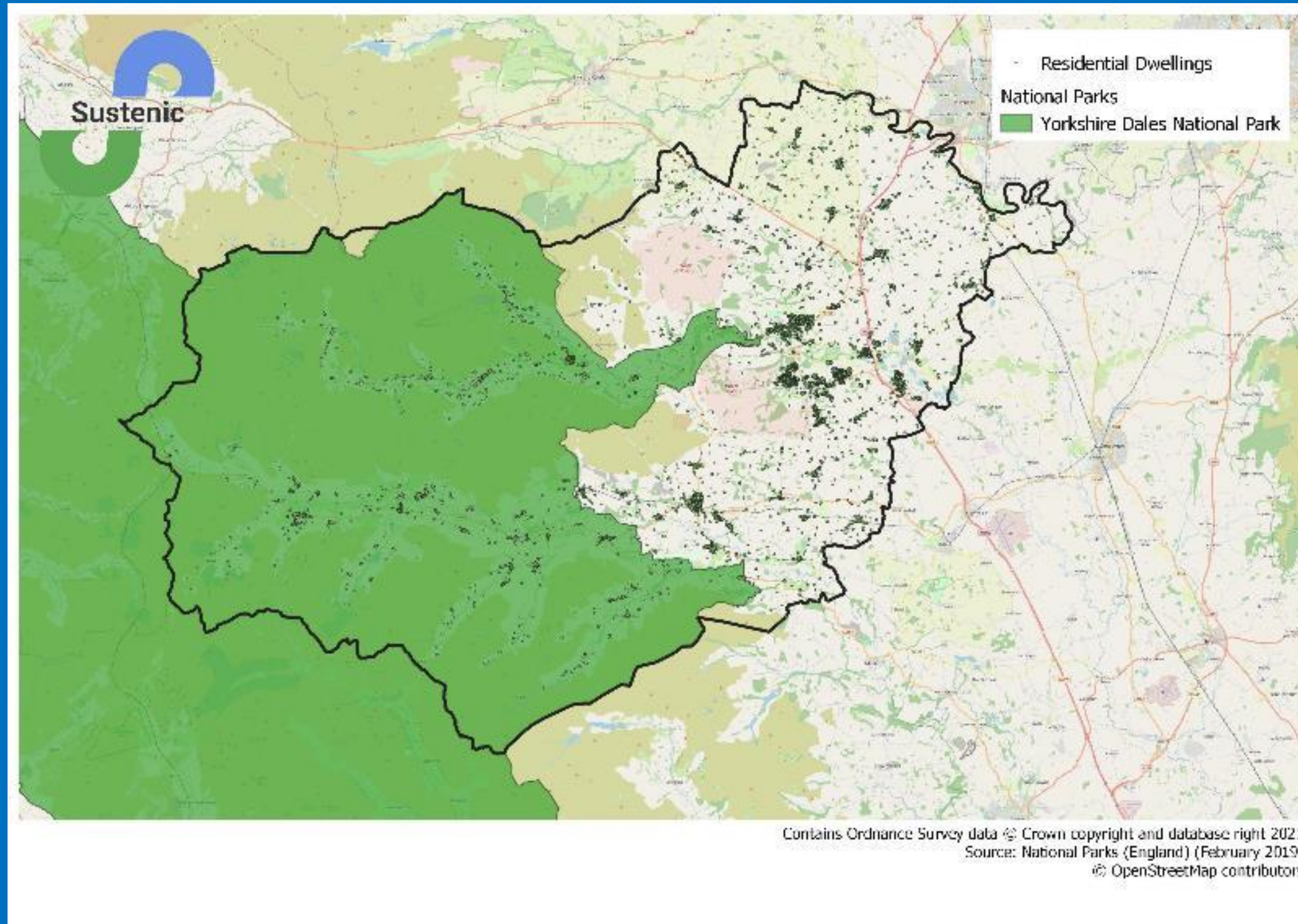
Developing a targeted approach to hard-to-decarbonise homes

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Context – North Yorkshire



Context – Scarborough



Context – Staithes



Context – Beck Hole



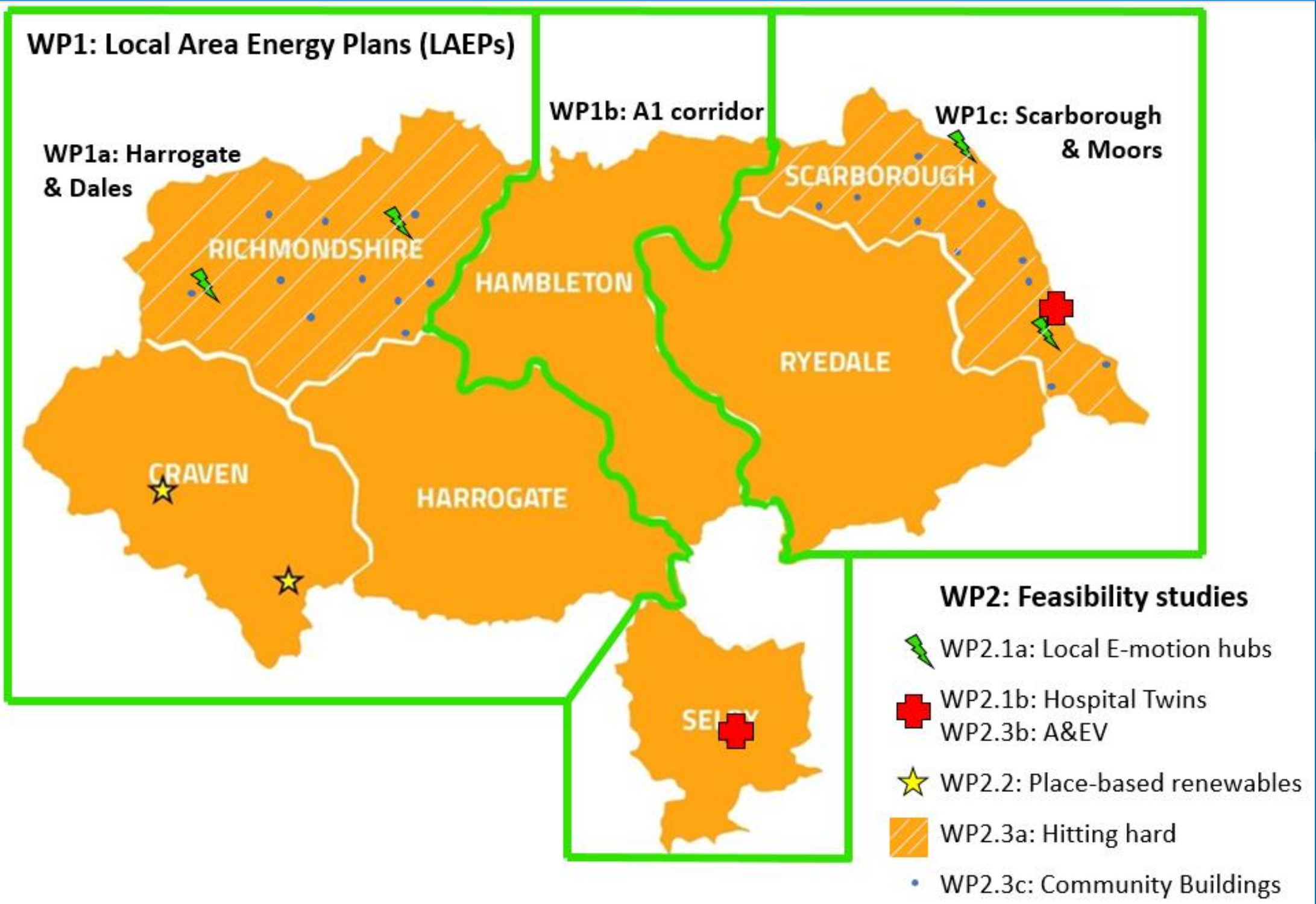


Context – North Yorkshire

- Ambition to be net zero by 2034 and carbon negative by 2040
- Community Renewal Fund programme to plan for 2040 carbon negative



UK Government



Context – Project background

- A range of past retrofit programmes, including LAD, HUG, ECO etc
- Found difficulty in delivering for hard-to-decarbonise properties like old terraces and rural stone properties

	Targets		Per year		Per week		Per day	
	2030	2038	2030	2038	2030	2038	2030	2038
Retrofit to band C	180,000	250,000	22,500	15,625	433	300	62	43
Heat pump	165,000	235,000	20,625	14,688	397	282	57	40
PV	70,000	100,000	8,750	6,250	168	120	24	17

Context – Project background

- Assessment of technology available
- Review of non-cost barriers
- Development of relevant cost model
- Analysis of community research
- Targeted retrofit action plan

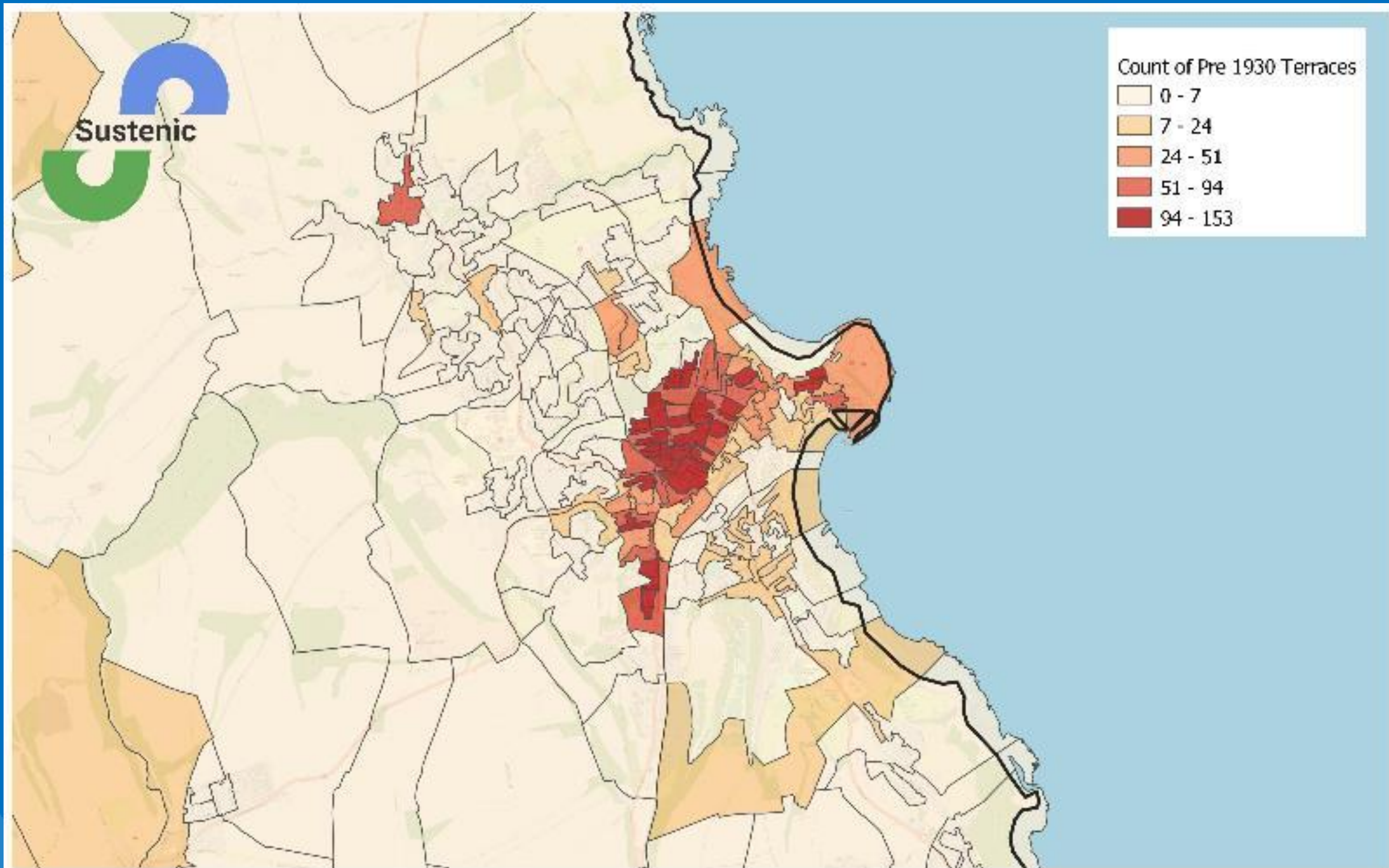
Housing stock analysis

Typology	Richmondshire				Scarborough			
	Stone		Not Stone		Stone		Not Stone	
	Count	Per Cent	Count	Per Cent	Count	Per Cent	Count	Per Cent
Pre 1930 Mid-terrace	1,060	4%	182	1%	820	1%	5,411	9%
Pre 1930 End-terrace	716	3%	132	1%	543	1%	1,319	2%
Pre 1930 Semi-detached	1,273	5%	311	1%	959	2%	1,754	3%
Pre 1930 Detached	1,934	8%	349	1%	1,570	3%	1,030	2%
Pre 1930 Flat	408	2%	64	0%	609	1%	7,910	13%
1930-1949 Mid-terrace	20	0%	286	1%	1	0%	1,217	2%
1930-1949 End-terrace	37	0%	315	1%	3	0%	734	1%
1930-1949 Semi-detached	41	0%	1,303	5%	20	0%	4,624	8%
1930-1949 Detached	51	0%	499	2%	43	0%	1,413	2%
1930-1949 Flat	15	0%	143	1%	4	0%	867	1%
1950-1995 Mid-terrace	37	0%	1,249	5%	32	0%	1,252	2%
1950-1995 End-terrace	36	0%	1,009	4%	13	0%	961	2%
1950-1995 Semi-detached	85	0%	3,293	14%	40	0%	7,493	13%
1950-1995 Detached	179	1%	2,807	12%	144	0%	5,622	9%
1950-1995 Flat	48	0%	706	3%	23	0%	3,140	5%
Post 1995	652	3%	4,960	20%	370	1%	9,539	16%
Sub Total	6,592	27%	17,608	73%	5,194	9%	54,286	91%
Park homes				2				22
Total EPCs				24,202				59,502

Housing stock analysis

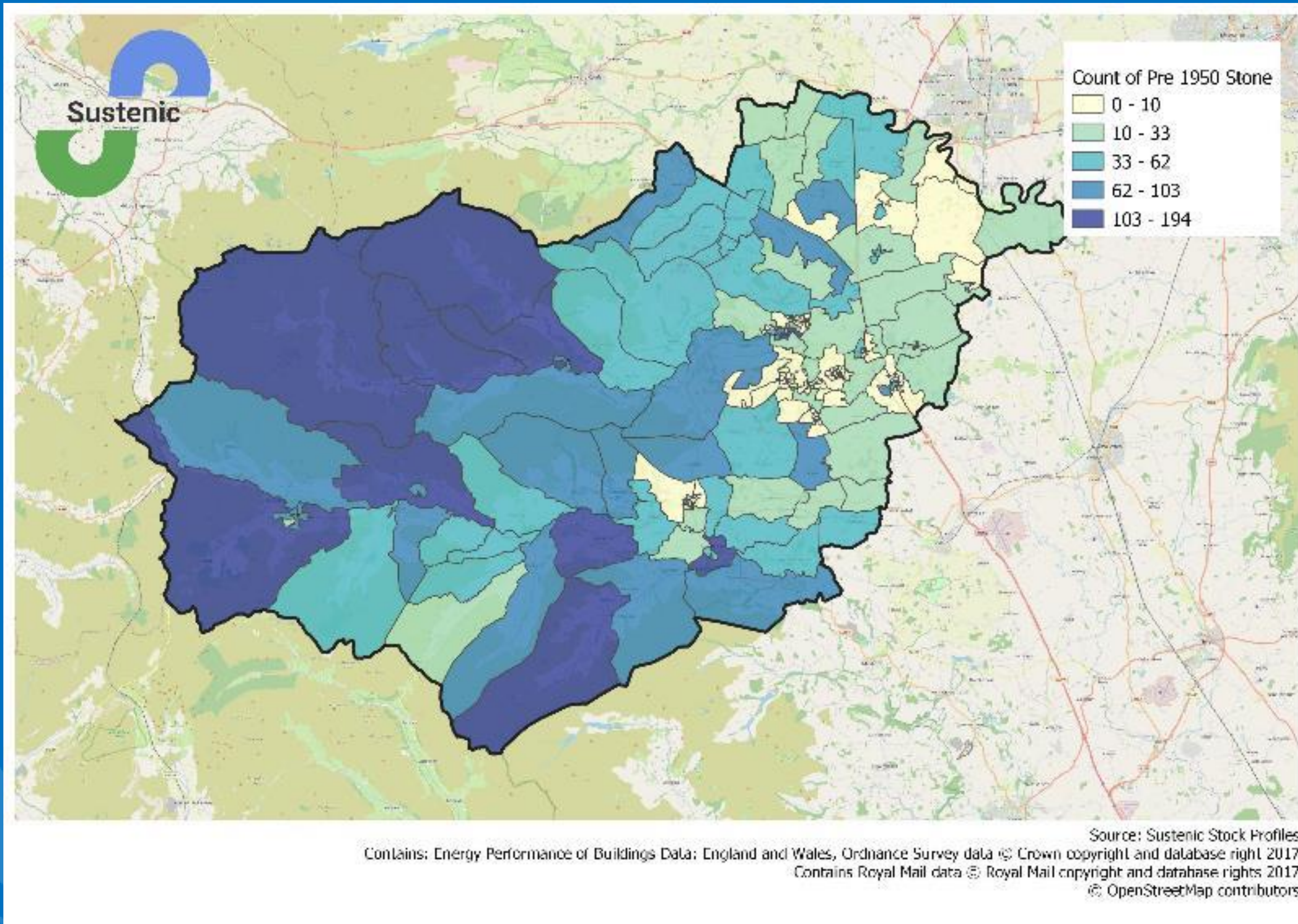
Typology Mean SAP Rating	Richmondshire		Scarborough	
	Stone	Not Stone	Stone	Not Stone
Pre 1930 Mid-terrace	48	56	44	54
Pre 1930 End-terrace	42	53	43	48
Pre 1930 Semi-detached	42	52	41	50
Pre 1930 Detached	38	48	38	46
Pre 1930 Flat	51	54	57	58
1930-1949 Mid-terrace	54	64	54	64
1930-1949 End-terrace	55	63	42	62
1930-1949 Semi-detached	50	59	35	60
1930-1949 Detached	44	53	40	51
1930-1949 Flat	67	56	47	64
1950-1995 Mid-terrace	57	64	58	66
1950-1995 End-terrace	50	62	49	63
1950-1995 Semi-detached	54	63	56	62
1950-1995 Detached	51	57	52	59
1950-1995 Flat	65	66	60	68
Post 1995	66	74	70	76

Housing stock analysis



Source: Sustenic Stock Profiles
Contains: Energy Performance of Buildings Data: England and Wales, Ordnance Survey data © Crown copyright and database right 2017
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Housing stock analysis



Retrofit options for H2D stock

Walls

- No cavity walls to fill
- EWI not allowed or desirable
- IWI disruptive and needing detailed modelling but possibly necessary; novel aerogel solutions to consider

Roofs

- Generally actionable
- Victorian terraces more likely to have partially vaulted ceilings requiring care to avoid thermal bridging

Windows

- Heritage-sensitive windows likely necessary
- Secondary glazing may be required in listed buildings

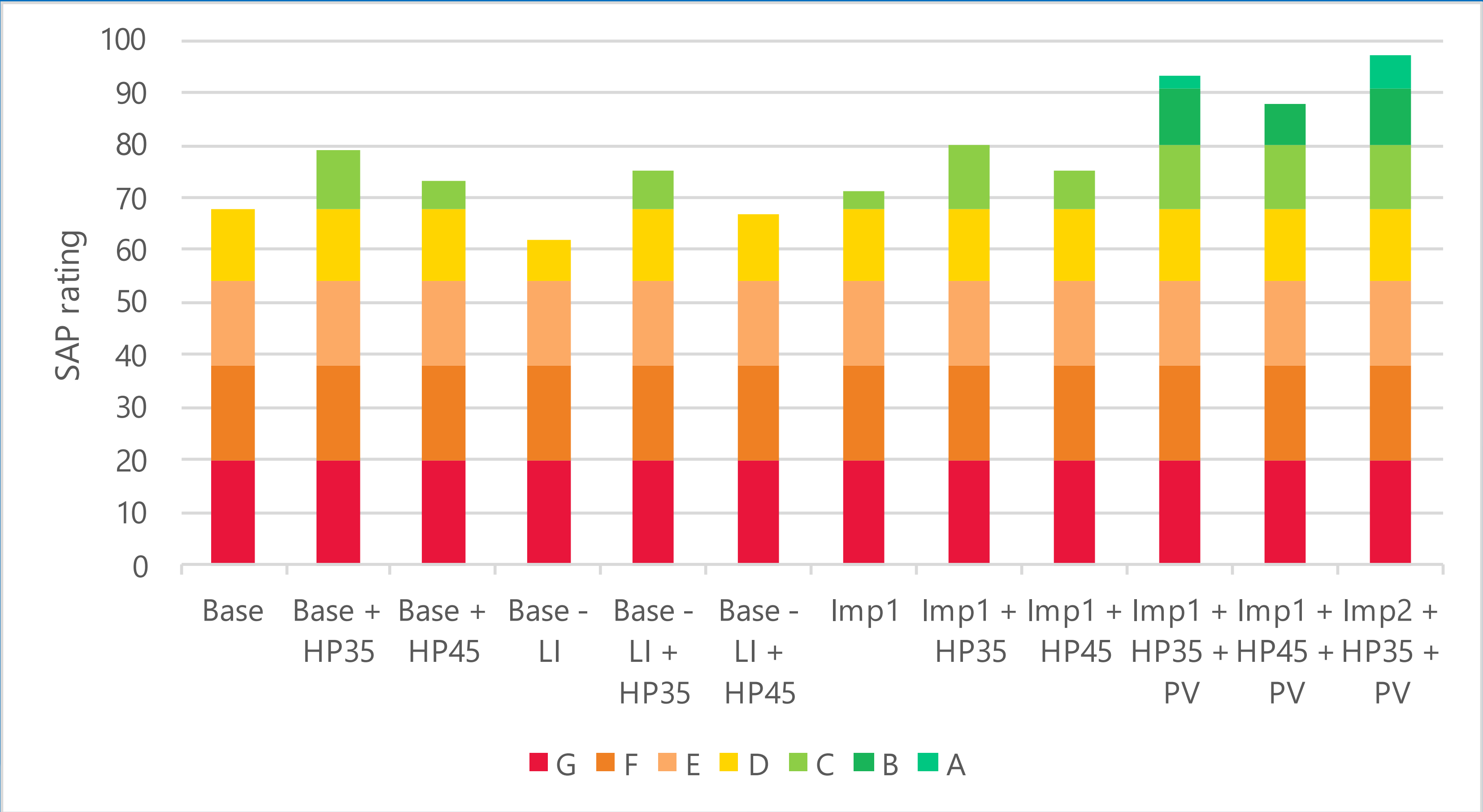
Floors

- Hugely disruptive foam under solid floor slabs
- Suspended timber boards, blankets, or foam

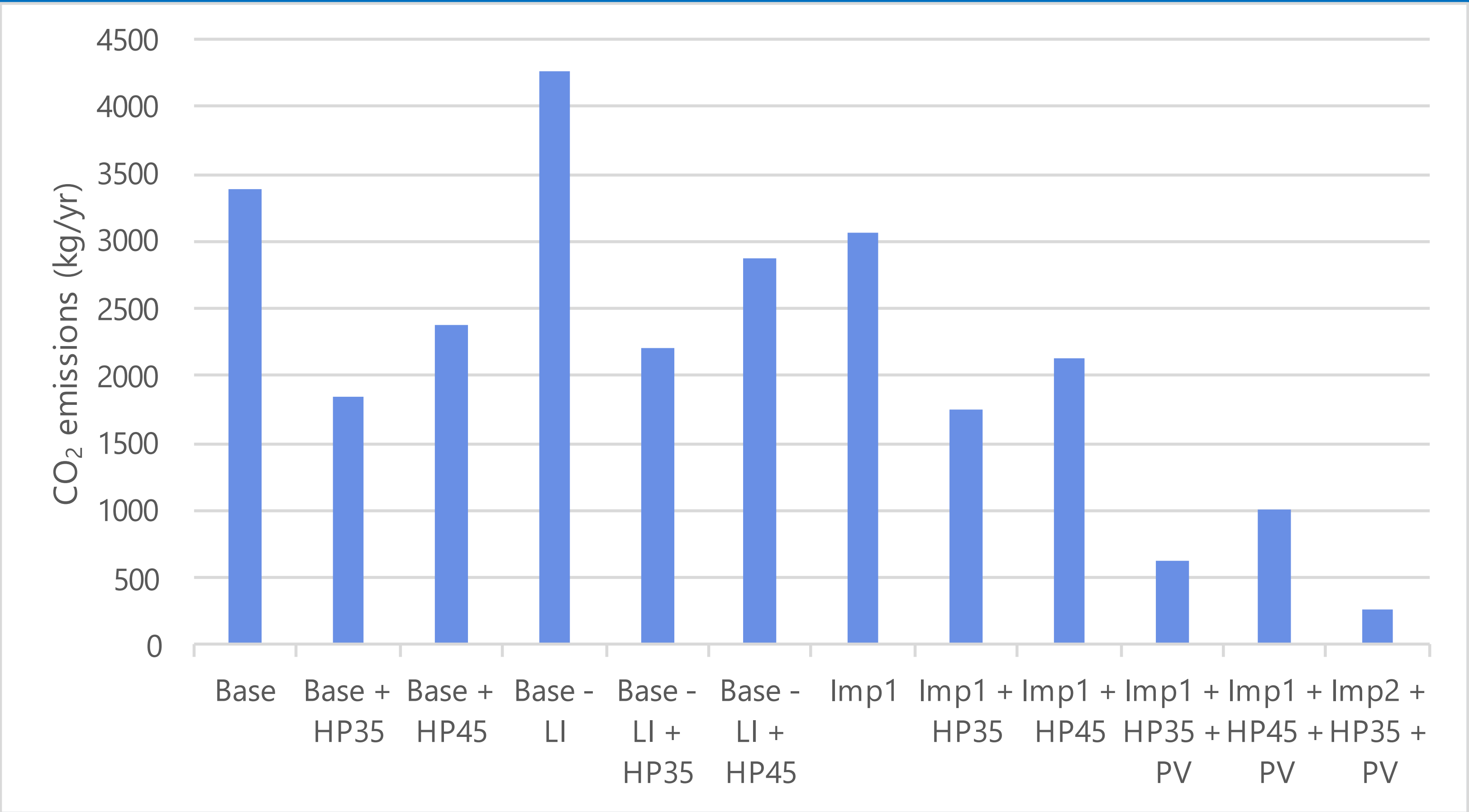
Heating

- Desire for 90kwh/m²/yr achieved by fabric first approach
- Retrofit difficulties may require higher temperature heat pumps
- Radiator resizing almost a certainty

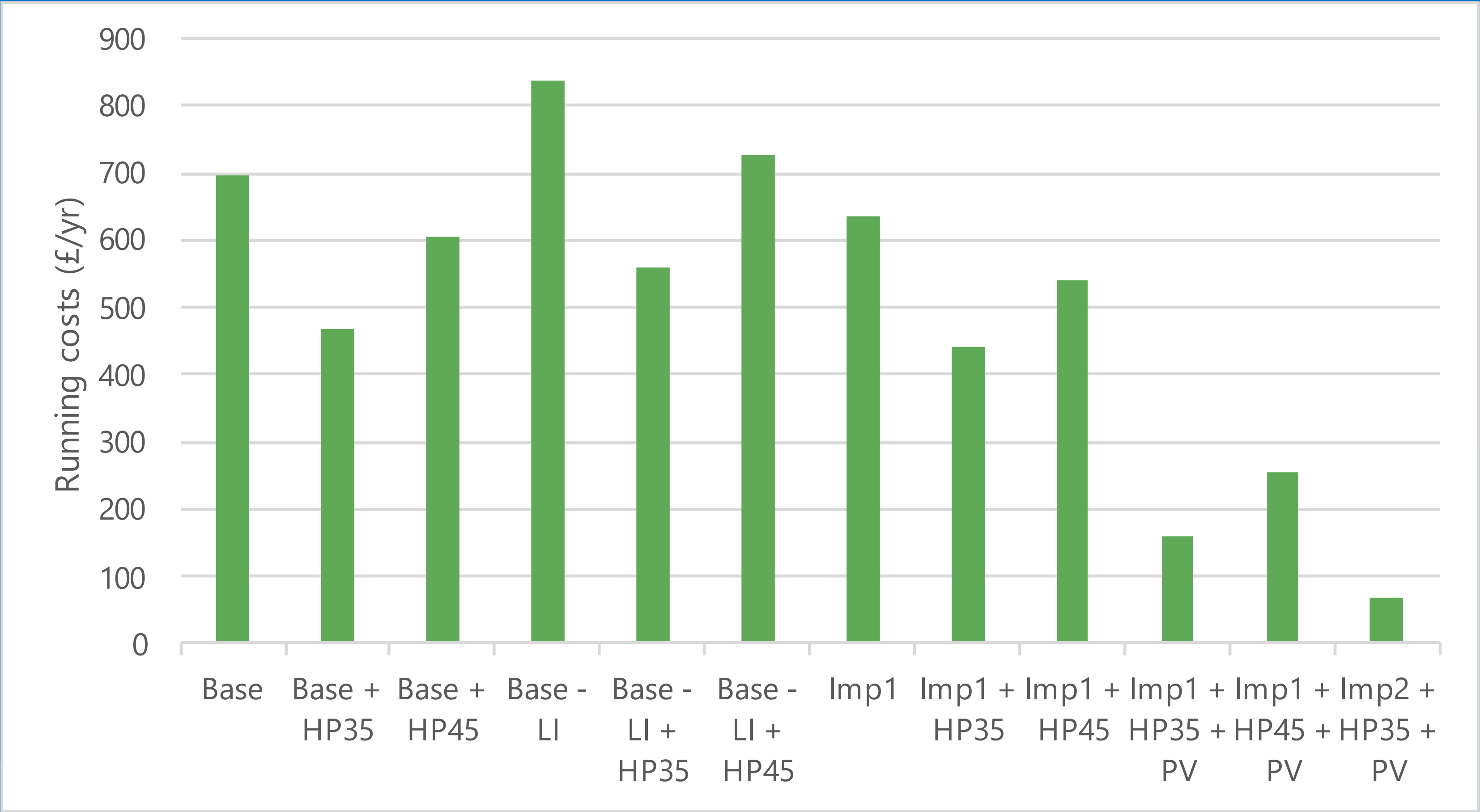
Example – Victorian terrace



Example – Victorian terrace



Example – Victorian terrace



Non-cost barriers

Administrative

- Including planning restrictions

Physical

- Related to space and positioning

Financial

- High cost or long payback of measures

Knowledge

- A lack of understanding leading to reluctance to take up measures

Social

- Human factors that influence the likelihood of installing measures

Technical

- Barriers related to the physical characteristics of the dwelling

“I am not convinced that heat pumps are suitable for this house all year round.”

“It’s a big problem these days to get reliable and competent tradesmen.”

“I would need to know that my house would be as warm... as using my gas boiler.”

“I don’t know if solar PV or thermal [would be] allowed in the national park.”



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Retrofit cost model

Step	Action	Source	Notes	Example	Cost
1	Decide on measures		Victorian end terrace in Scarborough	EWI/IWI 70/30 HTT loft Solid/timber flood 50/50	
2	Base costs	Element Energy (2020)	Look-up tables	Medium mid-terrace	£10,164
3	Heritage uplift	Element Energy (2020)	Low/Medium/High provided per measure	Low uplifts applied	£12,607
4	Local uplift	Local knowledge or PRP/Peabody (2016)	29% for current, 23% for future	29%	£16,242
5	Inflation	ONS	Uplift vs 2019	5.7%	£17,190
6	Economies of scale	PRP/Peabody (2016)	Assume 0%	0%	£17,190
7	Condition contingency	PRP/Peabody (2016)	35% uplift	£3,557	£20,748
8	Scaffolding	Element Energy (2020)	£986 - £1,475	£1,033	£21,780
9	Design and planning	UCL (2020)	£2,500	£2,500	£24,280
10	Prelim overhead inflation	ONS	(Current index / June 2016 index) x prelim overheads	11%	£24,660
11	General overheads and profit	PRP/Peabody (2016)	6.5%	6.5%	£26,263
12	Future inflation	BoE	Highly variable	8%	£28,364

Retrofit cost model

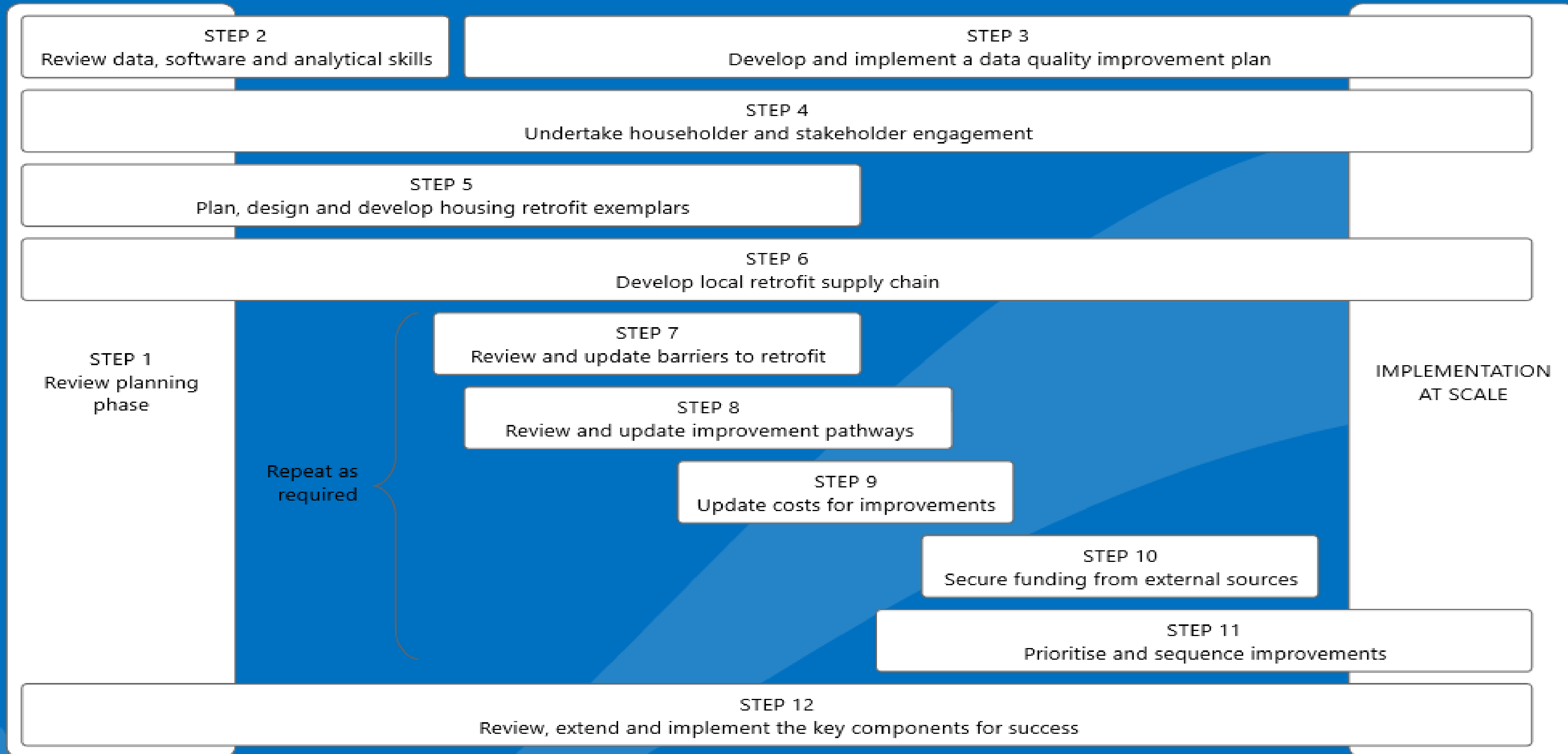
	Max-fabric		Min-fabric	
	Average cost per dwelling	Total cost for all H2D stock	Average cost per dwelling	Total cost for all H2D stock
Scarborough VT	£46,000	£312,000,000	£21,000	£143,000,000
Scarborough stone	£70,000	£320,000,000	£29,000	£132,000,000
Scarborough total	£56,000	£633,000,000	£24,000	£275,000,000
Richmondshire VT	£48,000	£15,000,000	£22,000	£7,000,000
Richmondshire stone	£80,000	£442,000,000	£32,000	£175,000,000
Richmondshire total	£78,000	£457,000,000	£31,000	£182,000,000

- More than half of the cost of the Max-fabric package is comprised of wall and floor insulation.
- Costs in Richmondshire are higher on average
- Total costs of retrofitting the hard to decarbonise dwellings in both areas to the Max-fabric standard would exceed £1 billion. For the Min-fabric approach, the figure is just over £450 million
- Assuming a linear spend profile, this would require an annual budget of around £90 million for the Max-fabric and £40 million for the Min-fabric

15 Actions

1	Establish an agreed view of what net zero means for hard to decarbonise housing. This establishes the goal for which a plan can be formed.
2	Design and carry out targeted condition surveys to improve data held on the housing stock and enable an effective segmentation and prioritisation process.
3	Work with planners (including in the national parks) to ensure net zero objectives are balanced with heritage considerations.
4	Provide high quality advice that goes a step beyond what is currently available from central government.
5	Promote the development of skilled installers and seek to build capacity while maintaining quality through local training providers.
6	Ensure and facilitate good governance and good practice in retrofit. This includes all phases of the retrofit process from initial survey, through to post-completion monitoring.
7	Don't reinvent the wheel when it comes to retrofit technical solutions. There is a wealth of material on retrofit of traditional buildings and many examples of how this has been done well.
8	Define packages of measures to suit a range of scenarios. These should be kept under review and updated regularly as the evidence base develops. Should include a high and low fabric approach.
9	Secure and sustain senior-level buy-in.
10	Define job roles and organisational structure within the council/s to execute the programme.
11	Integrate the costs model into council activity and update it with actual costs. Continually review costs to keep them as realistic as possible.
12	Move from a reactive model to a proactive one.
13	Create local exemplars. These are homes that are retrofitted by the councils in their areas, perhaps to varying standards, including heat pumps, that local residents can visit to experience retrofit in person.
14	Create a network of 'open houses' where people can see retrofit 'in the wild'. These would be homes that have been retrofitted by their owners and who are willing to open their doors to local people on certain days.
15	Develop a mechanism to promote good tradespeople. This ensures that more jobs are successful and customers have a better experience, creating a virtuous circle that should encourage more retrofit.

12 Steps



Actions – deliverable priorities

Retrofit designs

- Requiring retrofit designers to blend EWI and IWI

Archetypal exemplars

- Develop a project to deliver deep retrofit to a series of property archetypes to learn from and engage communities

Council structure and capacity

- Recruit dedicated and skilled officers with a strong governance structure around them

Thanks for listening

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