The Victorian Healthy Homes Program

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Victoria's housing stock

- Population: 5.9m.
- Households: 2.5m.
- More than half (1.3m) are stand-alone houses built before 1991.
- Average NatHERS rating of 1.6 stars.
- Annual energy bill for average base house: $2,820.
- If unheated, the houses spend 65% of the year below 18^{o}C.

Energy inequity in Australia

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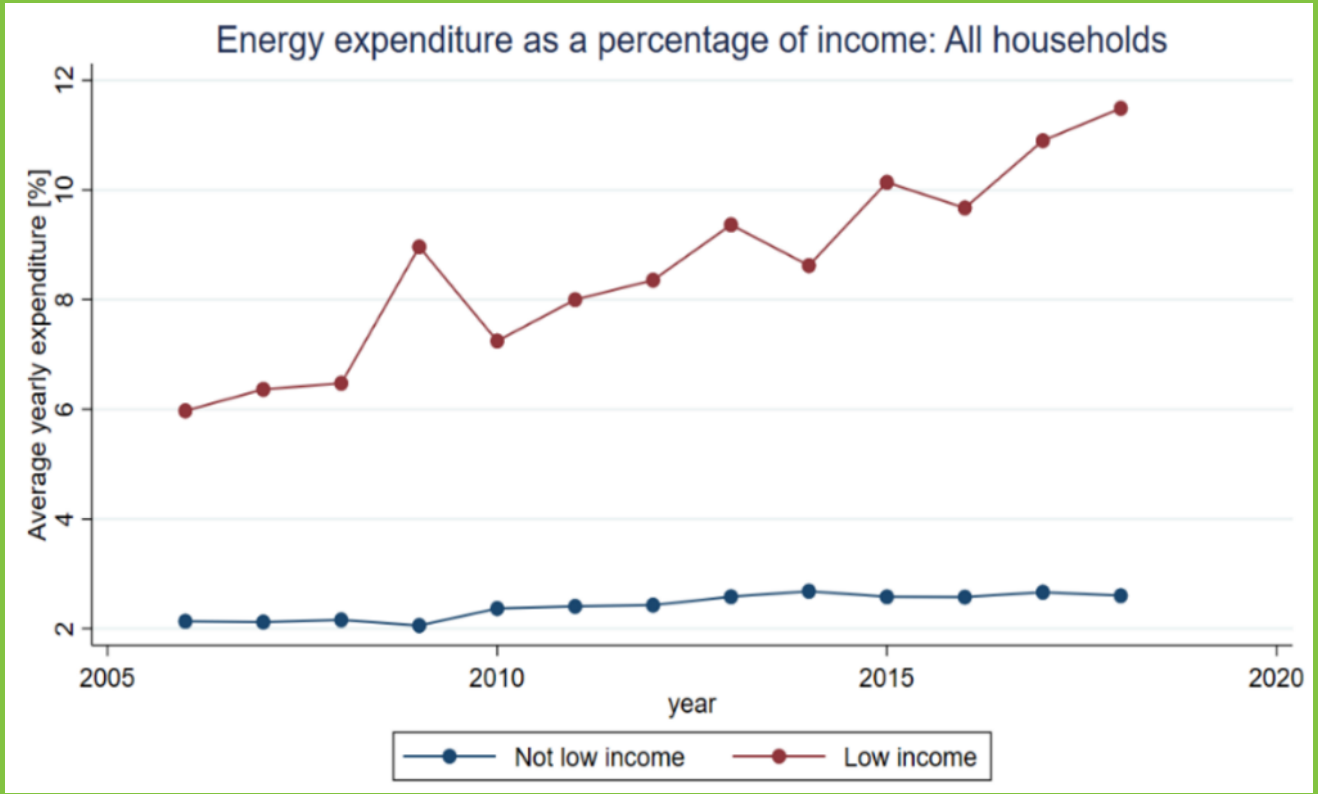

Bedggood et al., 2021 (data source: HILDA)

Why does cold temperature matter?

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» **Lancet (1997):** higher cold-related mortality in temperate regions.

» Thermal efficiency of homes a major factor.

	Athens	Finland
Mortality increase per 1°C below 18°C	2.2%	0.3%
Living room temp. when 7°C outside	19.2°C	21.7°C

What can we do about it?

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» **2007-08 (BMJ) –** NZ research trials showed large health benefits from retrofits.

» **2009-13 –** Warm up NZ: Heat Smart program (NZ$347m).

› 241,000 insulation retrofits delivered.

› Cost:benefit ratio $1:4.

› 99% of benefits due to health.

What we set out to test

That improvements in thermal performance of houses for low-income Victorians with complex healthcare or social care needs would:

» Improve thermal comfort in winter.

» Reduce healthcare costs.

» Reduce energy costs.

Healthy Homes: 1000 upgrades

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- 1000 households: western Melbourne (5 LGAs), Goulburn Valley (4 LGAs).
- Free home upgrade (up to $3,500), focus on thermal comfort and energy efficiency during winter.
- Insulation, draught-sealing, efficient heating, window coverings.

First-in-Australia randomised trial

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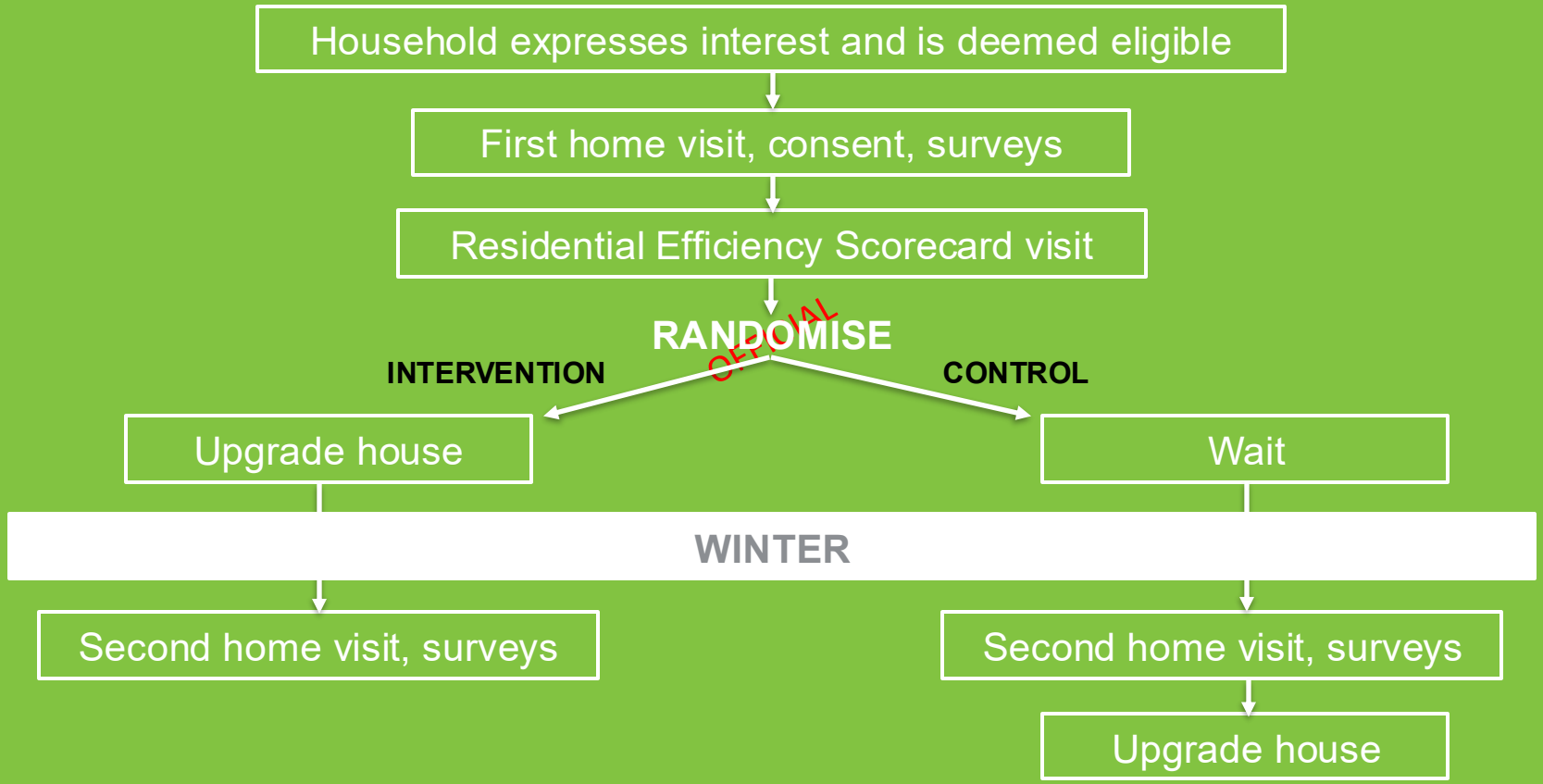

Comprehensive data collection

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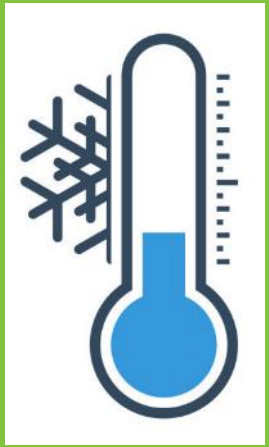
Energy data	Dataset
Residential temperature and relative humidity	30-minute interval readings from data loggers during winter
Outdoor temperature and relative humidity	Temperature and humidity data (Bureau of Meteorology)
Household energy use and thermal comfort	Meter readings and self-report surveys
Residential energy efficiency rating	Residential Efficiency Scorecard assessments
Electricity and gas consumption	Data held by distributors

Health data	Dataset
Health-related quality of life	Self-reported surveys (SF-36, EQ-5D-5L, ASCOT)
GP visits	Medicare records (Australian Department of Human Services)
Medicines prescribed	PBS records (Australian Department of Human Services)
Hospital admissions	Victorian Admitted Episodes Dataset
Emergency department presentations	Victorian Emergency Minimum Dataset
Complex care status	Victorian Integrated Non-Admitted Health dataset
Vital status	Victorian Death Index dataset

Increased winter warmth



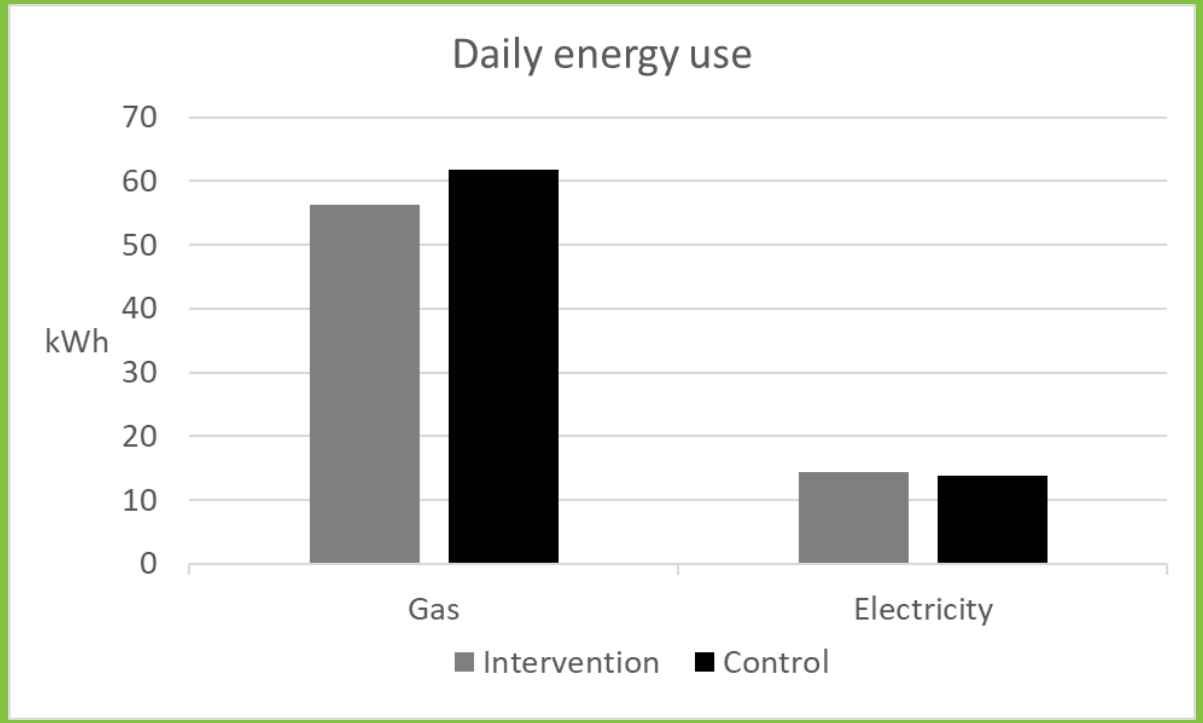
» Intervention homes 0.33°C warmer (p=0.02).

» Largest impact in the morning: 0.47°C warmer.

» Less time exposed to cold (<18°C) by 43 mins/day.

» Householder thermal comfort: intervention group more than twice as likely as controls to report they felt warmer (p<0.001).

Reduced energy use



» Intervention homes used 7.1 kWh/day less gas (p=0.005).

No evidence of rebound effect

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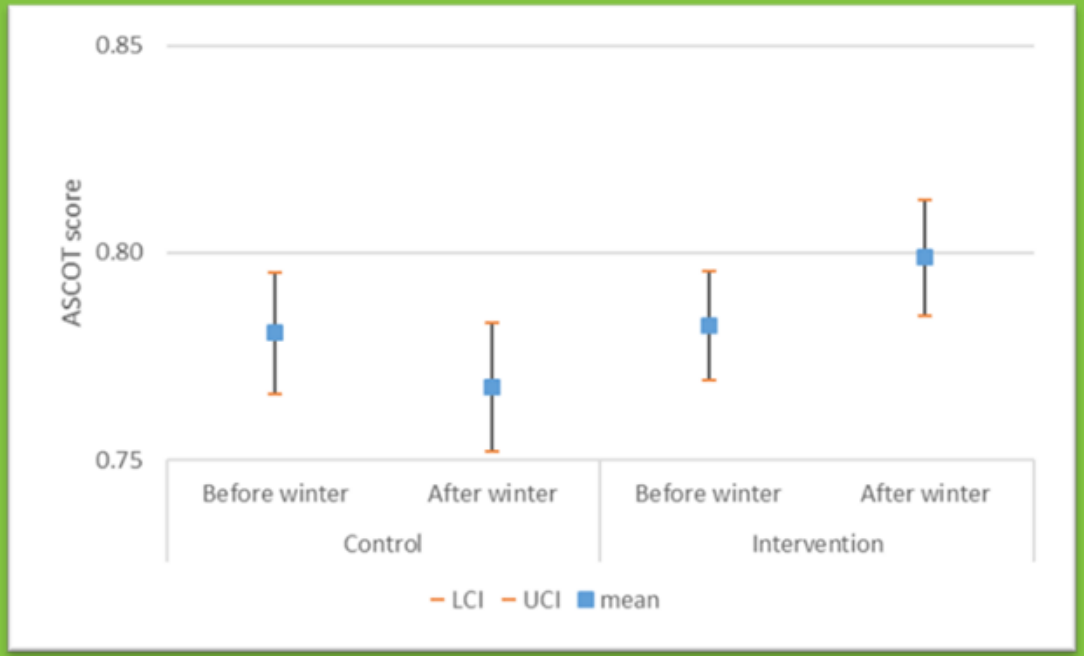
» The intervention group:
  - › 37% more likely to report using main heater ‘only when feeling cold’.
  - › 20% less likely to use main heater ‘all the time’.

» At night, the intervention group:
  - › 57% less likely to resort to an electric heater.
  - › 49% less likely to go to bed early to stay warm.

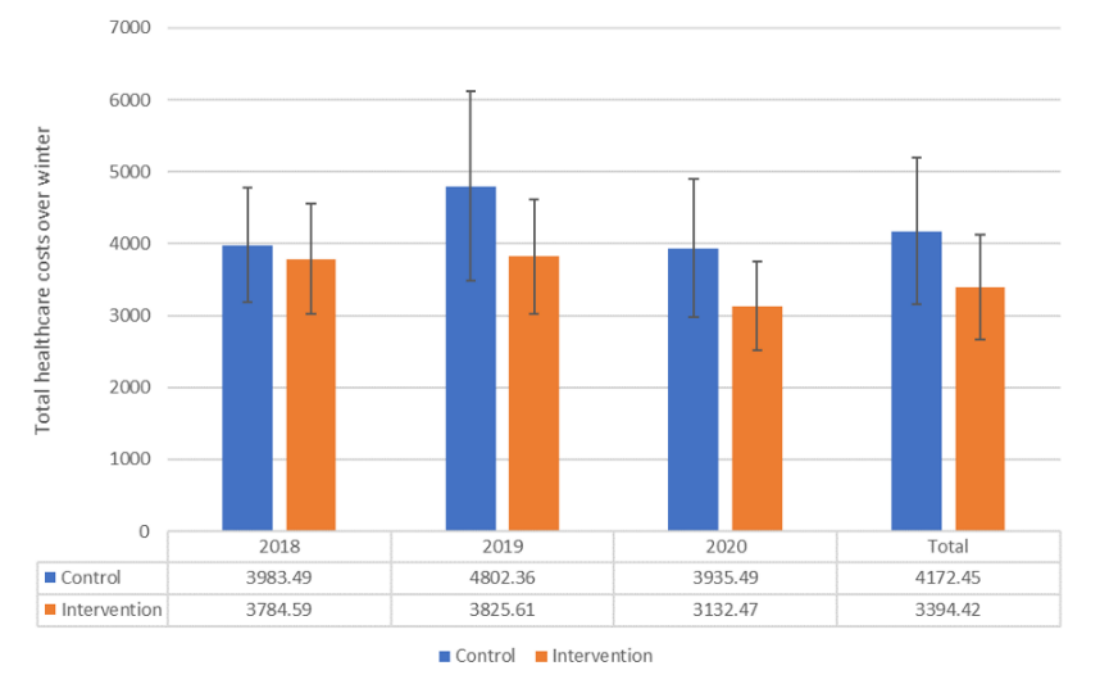
Better quality of life



» ASCOT: more social care needs met (p=0.009).

» SF-36: better mental health-related quality of life (p=0.026).

Lower healthcare costs



» Linked data on MBS, PBS, hospital admissions, ED visits.

» 63% of cost savings due to fewer hospital admissions.

Cost-saving within 3 years

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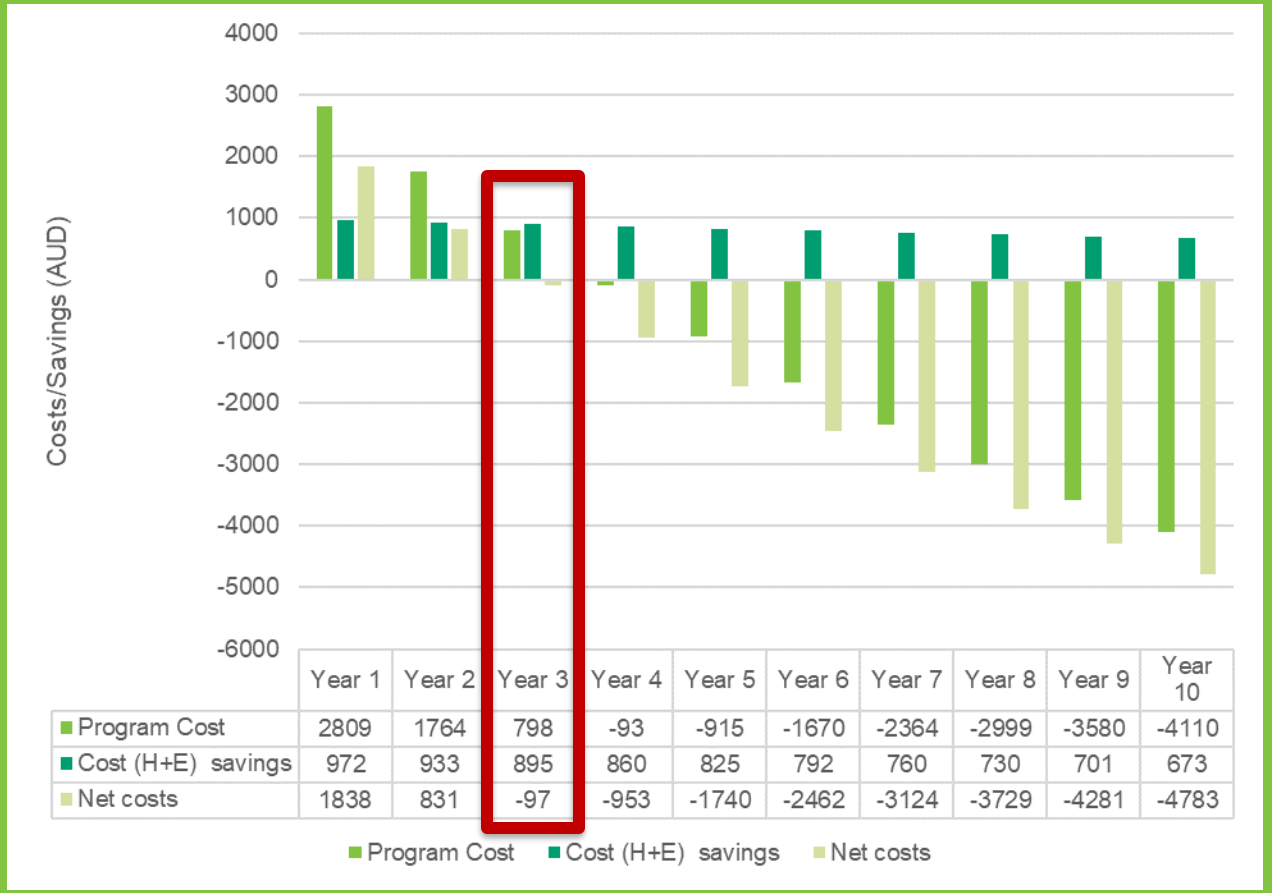

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Program Cost	2809	1764	798	-93	-915	-1670	-2364	-2999	-3580	-4110
Cost (H+E) savings	972	933	895	860	825	792	760	730	701	673
Net costs	1838	831	-97	-953	-1740	-2462	-3124	-3729	-4281	-4783

Upgrade cost: $2809.

Health saving: $887.

Energy saving: $85.

*4% discount rate.

Heather

- Late 70s, brick home, no gas connection.
- Replaced old electric heat banks with single split system.
- Daily electricity use
  - Winter 2020: 43 kWh.
  - Winter 2021: 11 kWh.

Bill savings and quality of life

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"I know I can afford it, whereas you're scared before because it's costing too much, now I'm excited to get my bills to see how much I've saved…it's a funny turn-around."

"I wouldn't have family come and visit me in winter because my house was too cold…they were used to having gas and more heating. Here I am, sitting under a split system with visitors, how good is that? In the middle of winter. So this is great, I've got my life back."

Judy*

- Late 60s, cerebral palsy, car accident, torn meniscus, balance problems, asthma, anxiety, PTSD.
- Upgrade: curtains, draught sealing, split system.
- Split system in bathroom, not living area.

Physical and mental health benefits

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“I want to stay as independent as I possibly can. Staying warm is the best thing. If I get too cold all my muscles and tendons just stiffen up and I can’t move.”

“This has made it a lot more comfortable, a lot warmer, and a lot safer in my head, in my mind, because I feel like nothing can hurt me when I’m home.”

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Thank you

Together we will deliver the State of the Future

Conclusions

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» Winter temperature increased by 0.33°C.
» 43 mins/day less exposed to cold, felt significantly warmer.
» Increased quality of life: mental aspects, social care needs.
» Lower gas use by 7.1 kWh/day.
» Energy savings dwarfed by health savings.
» Cost-saving at 3 years (upgrade cost only).