Fact Bank

Retrofitting wall insulation: Benefits and the opportunity earthquake repairs offer Christchurch

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Author	Lois Easton, Andrea Blackmore (Beacon Pathway Inc.)
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Purpose

This document is the repository of Beacon's core facts and knowledge about retrofitting wall insulation and the potential for this to be undertaken during earthquake repairs in Christchurch. It is drawn from a range of publications and research and was developed by Beacon to underpin efforts to encourage all insurers and EQC to provide homeowners with the opportunity to retrofit insulation when undertaking wall repairs in earthquake damaged Christchurch homes.

Beacon acknowledges that the Christchurch earthquake recovery is a fluid situation. This fact bank reflects our current knowledge and is correct to the best of our belief. If you have other or more up-to-date information, we invite you to draw our attention to it. We will hold the fact bank as a living document and issue updated version as we receive feedback and input. The latest version will be held on the Beacon website: www.beaconpathway.co.nz/existing-homes/article/wall_insulation

Why install wall insulation?

A large number of benefits from installing wall insulation have been identified[1], including:

- Increased indoor temperatures
- Reduced heating costs
- Reduced relative humidity levels/dampness
- Reduced noise
- Improved mental health
- Improved physical health outcomes

1 Burgess, Buckett, Camilleri, Burrough, Pollard and Hancock (2010) Sustainable Renovations of 1970s New Zealand Houses, Proceedings of the New Zealand Sustainable Building Conference SB10, Wellington May 2010; Burgess, Buckett, Camilleri, Burrough and Pollard (2010) Papakowhai Retrofit Project –Improving the Thermal Envelope and Space Heating, Proceedings of the New Zealand Sustainable Building Conference SB10, Wellington May 2010; Trotman (2009) Papakowhai Renovations Householders Experiences and Perceptions, Report TE 106/17 for Beacon Pathway Ltd.

No detailed study has been undertaken on the benefits of wall insulation in isolation from other insulation components; however, research[1] undertaken by Beacon Pathway Limited and BRANZ has looked at outcomes from insulating walls combined with ceiling and under-floor retrofits. This research showed that in order to achieve minimum World Health Organisation recommended temperatures (16°C in bedrooms and 18°C in living spaces), as well as energy efficiency gains, wall insulation was required.

Because New Zealand houses are so cold, insulating only ceilings and under-floors generally makes only small energy efficiency gains, and temperature gains do not raise houses to healthy levels. In addition, this research found that healthy relative humidity levels (between 40-70%) are difficult to achieve in older houses without wall insulation being installed.

Barriers to wall insulation retrofit

Retrofitting wall insulation is not currently something which is widely undertaken in New Zealand homes. In a standard retrofit situation, there are a number of barriers to retrofitting wall insulation:

- **Cost** – generally wall linings or cladding are required to be removed for wall insulation retrofit to be undertaken. The cost of this associated work is significant, although the cost of the wall insulation and installation itself is relatively low.
- **Inconvenience** – removing wall linings or cladding is disruptive work. Where linings are removed, rooms cannot be occupied during the duration of the work which will include gib stopping and finishing (e.g. painting, paper hanging) making this a major inconvenience in an occupied dwelling.
- **Low awareness of the benefits of insulating walls** – generally homeowners are unaware of the benefits of insulation
- **Lack of a publicly-funded wall insulation retrofit programme** – currently wall insulation is not subsidised under government programmes which, for some homeowners, confirms a view that it's not worth doing. However (for example), the simple (energy savings based) benefit cost ratio for insulating walls in Christchurch is far higher than the benefit cost ratio for insulating under-floors in Auckland – which is a subsidised activity. In Christchurch EECA have calculated that there is a 7.72 year payback on insulating the walls of living rooms – and a 1.88 year payback on insulating the walls of bedrooms. Even insulating the walls of utility spaces and kitchens will deliver a payback of less than 9 years[2].
- **Opportunity doesn't arise very often** – people don't undertake major renovations frequently. For many houses this could be regarded as a once-in-30-year event. There are an estimated 3,300 renovations normally undertaken per year in Christchurch where re-lining of plasterboard in walls occurred. [3]

[2] ***EECA, Estimated annual heating energy and cost savings from installing wall insulation in Christchurch.***

[3] ***Pers. Comm. Winstone Wallboards, 27 April 2012***

The opportunity in Christchurch

The September 2009, February and June 2010 earthquakes and aftershocks have damaged a approximately half of Christchurch's housing stock[4].

As of April 2012[5]

- 15-17,000 houses to be demolished – approximately 5600 in the red zone
- 110,000 houses to be repaired
- 100,000 homes with repairs under $100k, 390,000 claims to EQC
- 15,000 homes need major repair i.e. in excess of $100,000 worth of damage.

Of the houses to be repaired, typically the damage includes[6]:

- damage to the internal wall linings
- twisting of windows, doors and fixtures
- cracks in concrete slabs
- twisted or broken building frames
- damage to external cladding
- chimneys falling in
- broken windows
- damage to plumbing and hot water cylinders.

As 63% of Canterbury houses were built before minimum insulation standards were introduced into the Building Code[7], it can be expected that a similar proportion of earthquake-damaged homes will have no wall insulation whatsoever.

As discussed above, retrofitting wall insulation to existing homes is best done when wall claddings or linings are being removed and/or replaced. Therefore, effecting wall repairs to Christchurch homes provides an opportunity to improve the overall insulation of the home by installing insulation in previously un-insulated walls. Even more than the opportunity to provide wall insulation offered by the large number of homes requiring substantial repair, is the opportunity lost by not doing so. Assuming normal renovation patterns occur in the future, in these homes, it can be expected that opportunity to reline and install wall insulation, is unlikely to occur again for 30 years.

It has been estimated that about 15% of the homes[8] could have wall insulation installed through the majority of the dwelling, without the usual cost of removing wall linings or cladding. In addition, a further unknown proportion of homes could have partial wall insulation included, for example, in bedrooms or living areas.

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[4] ***CERA Briefing for Incoming Minister, December 2011***

[5] ***Rob Kerr, CERA email April 2012***

[6] ***Canterbury Earthquakes: Answers to Critical Questions, Royal Society of New Zealand, IPENZ, SeSoc, New Zealand Geotechnical Society & NZ Society for Earthquake Engineering Factsheet***

[7] ***Page and Fung (2008) Housing Typologies: Current Stock Prevalence. Report EN/6508 for Beacon Pathway***

[8] ***Estimate from Tasman Insulation February 2012***

The response to insulating walls as part of earthquake repairs

Some areas of industry and government have looked at the issues around including wall insulation in Canterbury earthquake repairs. Guidance has been provided by statutory bodies around the regulatory issues and industry has undertaken work to address the technical and installation issues involved.

Regulatory guidance

DBH guidance

The Department of Building and Housing has prepared guidance documents for building consent authorities (BCA) which includes advice on retrofitting wall insulation into exterior walls. The Guidance is designed to help BCAs decide whether wall insulation projects should be exempt from a building consent or to approve or decline applications for retrofitting wall insulation.

The Guidance includes information on the following:

- Why a building consent is required for retrofitting insulation in exterior walls
- Complying with the Building Act and Building Code
- Risks with retrofitting wall insulation
- Appendices explaining:
  - Building Code performance criteria relating to retrofitting insulation
  - How retrofitted insulation can affect the way a house performs

See www.dbh.govt.nz/retrofitting-insulation-guidance

Christchurch City Council BCA guidance

As a BCA, the Christchurch City Council has issued some guidance on when a building consent is **not** required when installing wall insulation into existing external walls.

In Form B390 the Council exempts installation of thermal insulation in external wall framing cavities from requiring a building consent. It covers segment type insulation and has the following limitations:

a) Foam injected or loose fill insulation are outside the scope of this exemption
b) Fire resistance rated walls are outside the scope of this exemption
c) Building wrap or breather-type building paper is required to be in place behind the existing exterior cladding system
d) Timber framing to have a moisture content in accordance with NZS3602:2003 (below 18% m/c)

See http://resources.ccc.govt.nz/files/B390ExemptionInformationSheet.pdf

Industry response

Insulation providers

The insulation industry has been significantly engaged in the need for retrofit solutions, and in undertaking product development so that simple retrofit solutions are available. This work recognises that the methodology for retrofitting wall insulation, as identified in NZ4246: 2006 *Energy Efficiency – Installing Insulation in Residential Buildings*, is complex and labour intensive and that the development of alternative solutions and products would enable a simpler and faster installation methodology suitable for use in large numbers of Canterbury houses. At least one provider has also looked at a streamlined process for installing wall insulation as part of EQR repairs where the homeowner is willing to pay the installation costs. While EQR have indicated that this was an approach that appeared to address their concerns about any potential delays or conflicts with the repair process, EQC have indicated they are not willing to see such an approach progressed.

Insurers

The picture from insurers is somewhat unclear, as conflicting information has been provided to Beacon on the inclusion of wall insulation where walls are being repaired.

Some insurers have advised Beacon that their policy is to include wall insulation where walls are being repaired; however, when specific instances have been looked at by the Beacon team, and this issue is discussed further with insurers' PMOs, it seems that the actual approach on the ground is not to include wall insulation.

Where homeowners wish to see wall insulation installed and are prepared to pay the extra cost upfront to the PMO, some PMOs are indicating that this is an option available to the homeowner. Again, however, examples in practice of this approach are not currently available.

EQC

Up until October 2011, some wall insulation installations were occurring as part of EQC/EQR repairs on an ad hoc basis. In October 2011, EQC issued a policy document which stated that wall insulation would not be installed at the time of repairs.

EQR's policy document gives the following reasons for this approach:

- Time delays caused by some Councils requiring a Building Consent as it is a requirement of the Building Act 2004
- Time delays in arranging for Homeowners or Homeowners' Contractors to fit insulation under EQR and Contractor supervision and the associated inter-contractual and liability issues.
- Issues on older houses with suspect or degradation issues of insulation to electrical wiring.
- The release of the Department of Building and Housing Guidance Note relating to insulation.
- Health and safety concerns.

Advisory Note: *This fact bank has been compiled by Beacon Pathway Inc. Beacon is actively undertaking research to supplement the information in this fact bank and to investigate ways in which measures such as wall insulation retrofit can be easily incorporated into earthquake repairs (Build Back Smarter). The findings from this research to date indicate that the slowness in the repair process getting underway may be a significant barrier to the EQC / insurance company inclusion of wall insulation as part of the repair process. It is seen as an extra step in the process for which they perceive there is little demand or justification.*