Monitoring and evaluating the Warm Up New Zealand: Heat Smart Programme

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Energy Efficiency Conservation Authority

New Zealand
Energy Efficiency Conservation Authority

• a Government crown entity, formed 2008, and now has some 80 staff
• mandate to encourage, support and promote energy efficiency, energy conservation, and the use of renewable sources of energy
• broader Government initiatives:
  - 90% renewables target by 2025
  - operate an emissions trading scheme
NZ residential sector

- 600,000 under-insulated homes
- cold climate and rising damp
- timber housing stock
- older buildings
- over crowding
- rheumatic fever
- ageing population
- excess winter hospitalisation
- no building code pre 1978 for any insulation standard
Age distribution of houses by occupancy

[Bar chart showing the percentage of rental and owner-occupied houses by decade of construction.]

- Pre-1920s: 4% Rental, 4% Owner-occupied
- 1920s: 7% Rental, 6% Owner-occupied
- 1930s: 1% Rental, 2% Owner-occupied
- 1940s: 11% Rental, 6% Owner-occupied
- 1950s: 16% Rental, 10% Owner-occupied
- 1960s: 15% Rental, 14% Owner-occupied
- 1970s: 17% Rental, 14% Owner-occupied
- 1980s: 14% Rental, 12% Owner-occupied
- 1990s/2000s: 22% Rental, 9% Owner-occupied
- Mixed: 9% Rental, 5% Owner-occupied

Decade of construction

Percentage of weighted sample
Exterior and envelope components in poor or serious condition

[Bar chart showing the percentage of sample with different components in poor or serious condition, categorized by ownership (Owner Occupied vs Rented).]
Warm Up New Zealand: Heat Smart

• home insulation programme, NZ$350 million for 188,500 low income and general income homes, commenced 2009
• achieved 241,038 homes
• aims - save energy, deliver health benefits and stimulate the economy
• part-funding for home-owners and landlords who owned homes built before 2000 for:
  – insulation retrofits (floor and ceiling)
  – heater retrofits (primarily heat pumps, also pellet burners and efficient wood-burners), gas
  – other retrofits (pipe lagging, draught-proofing, moisture barriers)
Overall programme achievements

• strong safety focus, not DIY
• quality assurance:
  - retrofits reported to EECA in detail – materials, quantities
  - regular auditing and enforcement for non conformance
• built good relationship with small service provider base
• regular media coverage and promotion
• EECA team customer service – ensuring positive service delivery
• regular letters of gratitude from the public
Evidence based evaluation – Motu report

• independent evaluation conducted, commissioned through a different department - three reports on health, energy and economy
• first evaluation of its kind in New Zealand
• cost benefit analysis based
• proactive arrangement with health authorities providing addresses and health information about clients
Methodology

• high quality research - the treatment (insulated) group was tested against various control (non insulated) groups
• data on all homes in New Zealand is held by Quotable Value (QV), an organisation that provides the data that allows councils to assess rates
• using addresses of treated homes it was possible to identify up to 10 control homes with similar relevant characteristics such as size, condition, year of construction, and geographic location.
• treatment and control addresses could then be linked with the Government database - National Health Index, identifying likely occupants
Energy use evaluation

• metered energy (electricity and reticulated gas, not wood/coal or stand alone gas)
• data provided by four of the biggest energy companies
• useable data for 12,082 treatment households, from an initial list of 46,655 treated households
• removed factors of influence - households that changed suppliers
• model used difference in monthly energy use between treatment households and control households
• for a year before treatment and a year after treatment
Energy use evaluation results

- with insulation saved 0.96% of average annual household electricity use
- with insulation saved 0.66% of average annual total metered energy use
Health cost evaluation

- NHI linked data provided over 900,000 treatment and control group individuals
  - cost of each publicly funded hospitalisation
  - cost of each Government subsidised pharmaceutical prescription
  - demographic information including date of death if applicable
Cost benefit evaluation continued

- key result: under favoured model assumptions:
  - net benefit of the programme NZ$951 million
  - benefit: cost ratio of NZ$5.20:1
- result driven largely by value of changes in mortality attributed to insulation
- model assumed insulation retrofits have a working life of 30 years and heating retrofits a working life of 10 years
Modelling changes in health costs

• key result: savings in monthly hospitalisation costs as a result of receiving **insulation** retrofit
  – saving of NZ$5.37 per household per month for total hospitalisations
  – evidence that benefits greater in low-income households

• savings observed in total monthly pharmaceutical costs per household following **insulation** retrofit
  – saving of NZ$0.92 per household per month
Modelling changes in mortality

- looked at changes in mortality rates for vulnerable elderly individuals
- found treatment resulted in a reduction in mortality rates for elderly individuals with pre-existing heart disease relative to comparable control group individuals
- these benefits were valued at the household level, using figures adapted from the transport sector:
  - NZ$613 annual saving for low-income household
  - NZ$216 annual saving for non-low-income household
Previous research on health benefits

• New Zealand research was a valuable source of information - randomised controlled trials of insulation retrofits and heating retrofits for low income households with asthmatic child occupants
• enabled the evaluation of changes in GP visits and changes in days off school or work attributable to insulation or heating
• predicted annual value of total benefits a typical study household might gain:
  • $47.75 from insulation retrofit
  • $4.64 from heating retrofit
Employment and industry impacts

- report looked at impact of Warm Up New Zealand: Heat Smart on employment and industry impacts, found:
  - increase in employment resulting from the first year of the programme of 64 – 431 full-time equivalent jobs.
  - additional producer surplus (revenue and profit) of $44 – 62 million dollars during first year of the programme
Limitations

- could not directly account for wood and coal use – a key area for potential health savings for asthmatics from air pollution and particulate matter
- full access to all meter data from energy companies not provided
- limited time period after installation of insulation in some cases
- reasons for heat pump increase in electricity consumption unclear
- limited data on changes in days off work or GP visits
- collecting data on cause of death would have strengthened evaluation of mortality data
Summary

• significant benefits of NZ$5.20:1 ROI
• strong quality assurance component
• programme specified appropriate products
• quality programme evaluation can leverage further funding
• strong private/public partnership
• the smaller nature of the industry – 70 suppliers means building good relationships, which ensures great customer satisfaction
Further information

www.eeca.govt.nz/

Acknowledgements

Health research organisations:

– He Kainga Oranga (Housing and Health programme of the Public Health Department of the University of Otago, Wellington)
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– Covec
– led by Philippa Howden-Chapman Winner the Prime Minister’s Science Prize, chair of the WHO Housing and Health Guideline Development Group and was a member of the Children’s Commissioner’s Expert Advisory Group on Solutions to Child Poverty