background note
information briefing service for members of Parliament
Parliamentary Library

2002/10 06 November 2002

Leaky buildings

Executive Summary

- The problem of 'leaky buildings' has emerged as an issue of concern to many New Zealand homeowners. It appears to be a systemic problem, in that compliance with individual procedures and standards may have been achieved, while the overall result is a building which is not weathertight.
- Responses to the problem to date have included a major report to the Building Industry Authority, local government conferences, and several initiatives by central government, including an adjudication process for affected homeowners.
- Over the past decade, over 220,000 building consents have been issued, with an average value of $132,000 per consent. In the year to June 2002, 42% of building consents have been issued in the Auckland region. The costs of repair for affected buildings have been variously estimated at between $120 million and $1.8 billion. In British Columbia, Canada, the same type of problem has been variously estimated at costing between C$500 million to C$3 billion, with an average repair bill per 'leaky condo' unit of C$23,300 (around NZ$30,000 at 1998 prices).
- The statutory and regulatory environment for the building industry changed in 1991 with the passing of the Building Act, which allowed a less prescriptive set of regulations for the issuing of building consents, and allowed private sector building certifiers to compete with territorial authority building inspectors for inspection work and the issuing of consents.
- Major claims regarding weathertightness have yet to be pursued through the courts.
- 'Home Warranty' insurance schemes operating in Australia have been increasingly unprofitable for insurance companies, who are moving out of this particular market, in particular after the collapse of HIH Insurance in 2001.
- Consumer preferences for more complex building forms and newer construction methods have resulted in buildings which have a reduced tolerance for the vagaries of wind and rain, and fewer 'second lines of defence' should water enter the exterior cladding of the building.

Introduction

The problem of 'leaky buildings' or the extent to which buildings are weathertight has recently emerged as an issue of concern to many New Zealand home owners. This concern is understandable given that buying a house is the single largest investment most New Zealanders will make in their lives.

The ramifications of the problem are wide-ranging. These include the undermining of confidence in an industry central to the New Zealand economy, the risk to the health and safety of homeowners from toxic mould and structural failure, the lack of clarity in the roles of central and local government regulators, and the extent to which developers, architects, builders, planners, the insurance industry, and manufacturers were aware of, and have some responsibility for, this problem. It is also possible that the leaky building problem may be symptomatic of failures at a systemic level. While compliance with individual procedures and standards may have been achieved, the overall system appears to be failing those with most at stake – the individual homeowner.

While the scale of the problem is as yet unknown, the potential for significant fiscal implications in coming years is high. Responses to date include a Building Industry Authority (BIA) inquiry (the Overview Group Report)[1], a select committee inquiry, a ministerial committee to co-ordinate the response to the matters raised in the Overview Group Report, and a dispute adjudication process, with a toll-free help line and web site for concerned homeowners.[2]

This paper defines what is meant by 'leaky buildings', identifies why this is an important issue, outlines factors contributing to the recent emergence of the problem, discusses liability and insurance aspects, and comments on the international dimensions of the problem and the responses taken by other countries. A timeline is included on page 18.

Definition

Leaky buildings are those that both allow water to penetrate the building envelope or cladding system *and* that then hold the water in the wall cavity, where it may remain for some time. This results in the building's timber framing staying wet, raising its moisture content to levels that then allow fungal growth.[3] It is fungal growth that literally eats away at the timber framing that creates the structural and health risks for the inhabitants. There can also be extensive water damage to plaster walls, carpets, interior fittings, and so on.

---

[1] D. Hunn, I. Bond, and D. Kernohan, *Report of the Overview Group on the Weathertightness of Buildings to the Building Industry Authority*, Building Industry Authority, Wellington, August 2002.

[2] http://www.weathertight.org.nz These latter services from the Department of Internal Affairs will also register homeowners who have problems and collect data that will enable the government to determine the extent of the leaky building problem.

[3] It should be stressed that although the Building Code requires framing timber to be durable for 50 years, any timber, regardless of the standard to which it is treated (including the 'H3' standard) will decay if it remains wet. See Frame and Truss Manufacturers of New Zealand at http://www.ftma.co.nz/ .

The building types most affected generally appear to be new constructions using monolithic cladding systems with design features that compromise water management. Water management (rather than water proofing) requires deflection (using eaves and flashings), drainage (using drainage cavities), drying (ventilation), and durability (treated timber). It is now mandatory, for example, to use drainage cavities in new multi-storey apartment units in Vancouver, Canada – one of the first countries to experience and address the problem of leaky buildings (see Appendix B).[4] It is also important to note that water management aims at *minimising* water leakage, not eliminating it, since it is generally accepted that all buildings will experience water intrusion at some stage.

Nevertheless, if it is accepted that wooden framing has been used in New Zealand buildings for over a century in a variety of high rainfall and high wind situations without the level of problems being seen today, then the causes of leaky buildings needs to be investigated.

The sections below outline some of the factors contributing to the current situation: economic issues, industry products and practices (the use of new cladding systems, sealants, and sub-contracting); consumer preferences for particular deign features (low maintenance, low-cost, Mediterranean-style homes); design practices (construction complexity, loss of roof eaves, omission of flashings); and the regulatory environment (the Building Act, industry oversight, local council practices and insurance issues). While this paper offers no immediate answers, the overseas experience in British Colombia[5] in the late 1990s is illustrative of one approach to the problem, and further useful links and reading are also provided.

The '4Ds' of weathertightness

This is a building concept that originated in Canada in 1999 in relation to weathertightness and rain water control. It is increasingly being used within New Zealand.

The concept follows the following philosophy regarding which materials should be used in the construction of dwellings, in order to make the dwelling weathertight:

Deflection – The ability to deflect or shed water either into the gutters or onto the ground around the building.

Drainage – The ability of water lodged behind the cladding to drain back outside the building.

Drying – The ability of any residual moisture to evaporate through ventilation and drying.

Durability – The use of materials with the sufficient level of durability for the environment within which they operate, including those designed to manage water in areas where contact with water is likely.

Source: BRANZ, Build - August/September 2002, pp. 18-19.

[4] W. Sharman, Leaking buildings: lessons from North America, *Build*, January/February 2001, p. 18.
[5] Ibid. p 18.

Economic issues

New Zealand is a nation of home-owners, with approximately two-thirds of households owning their dwelling with or without the aid of a mortgage. In the 2001 Census, there were a total of 1,287,888 permanent private occupied dwellings within New Zealand, an increase of 119,805 over the 1991 Census[6]. The total estimated value of New Zealand's housing stock is between $180 billion to $185 billion. Statistics New Zealand's Household Savings Survey (released earlier this year) estimated that the housing stock was worth $182.4 billion (including rental and holiday properties), while the WestpacTrust's quarterly Household Savings Indicators for the June 2002 quarter estimated the total value of the housing stock at $180.2 billion.

Building consents issued

During the decade to June 2002 there were approximately 220,000 new dwelling building consents issued. This equates to an average of 22,000 consents issued per year with an average value of $132,000. A large proportion of these have been within the Auckland region, with approximately 42 percent of total new dwelling consents issued there in the year ended June 2002. Over the past five years, approximately 3,000 building consents per year have been issued for new apartment buildings throughout New Zealand.

Estimated cost of the current '*leaky buildings*' problem

Estimating the total cost of fixing leaky buildings is difficult due to the hidden nature of the problem. Tell-tale signs only become apparent in the later stages of building decay. The Overview Group Report estimated that 6,000 to 12,000 apartment dwellings may be suffering from problems with weathertightness (based on an estimate that 40 to 80 percent of apartments were built using monolithic materials, and 50 percent of those built over the last decade are experiencing problems). Using an average cost of $20,000 to repair each apartment, the total estimated cost ranges from $120 million to $240 million.

The *Consumer* magazine in its October 2002 issue suggests that, based on approximately 220,000 homes built in New Zealand over the last decade, an estimated 35 to 40 percent of these have used monolithic cladding materials, resulting in 75,000 to 90,000 homes at risk.[7] When this figure is combined with findings from Porteous[8] (that the cost of claims from dampness are usually 15 percent or less of the construction price), it provides an estimate of the cost of repairs to buildings at risk of $1.5 to $1.8 billion[9].

In British Columbia (see Appendix B), the cost has been variously estimated at between C$500 million to C$3 billion, with an average repair bill per condominium unit at around C$23,300 (NZ$30,290 at 1998 exchange rates).

---

[6] Of these, 1,030,077 (81.3%) were separate houses, with a further 132,111 (10.4%) being either two flats, units, townhouses or apartments joined together. Another 78,513 included three or more residences in a 2 or 3-storied structure. A further 47,187 residences adjoined a business or shop, holiday homes, or were not further defined. Source: Statistics New Zealand.

[7] Watergate! Consumers need compensation : It's time for the Government to act *Consumer*, October 2002, pp. 5-8.

[8] William Porteous, Identification, evaluation, and classification of building failures, Unpublished PhD thesis, Victoria University of Wellington, 1992, p. 153.

[9] The calculation of costs is 15% of the average dwelling consent ($132,000) multiplied by the number of homes affected (75,000 – 90,000).

Statutory and regulatory environment

The Building Act 1991 provides the framework for the regulatory control of building work in New Zealand.

The intent of the Act is to provide a flexible building compliance regime by outlining minimum performance criteria for building work, which can be achieved in various ways, but which ensures the health and safety of building occupants. Its enactment reformed a previously prescriptive building environment; controlled by local body bylaws and a variety of building controls, by providing for a uniform performance based building code administered by the Building Industry Authority (BIA).

The purpose of the Act is to provide for:

> 1. Necessary controls relating to building work and the use of buildings, and for ensuring that buildings are safe and sanitary and have means of escape from fire; and
>
> 2. The co-ordination of those controls with other controls relating to building use and the management of natural and physical resources[10].

Controls

As prescribed by the Building Act,[11] the building code[12] defines the mandatory requirements for building activities. All building work must comply with the code, whether or not a building consent is required, although the means of compliance is wide-ranging. The Act also states that, in undertaking any building work, no person shall be required to achieve performance criteria additional to or more restrictive than the criteria prescribed in the code. [13]

The building code contains technical provisions that outline required achievement standards on matters such as stability, fire safety, access, moisture, safety of users, services and facilities, and energy efficiency. Each clause of the code consists of an objective, a functional requirement, and a performance statement. For example, in provisions relating to external moisture, the objective requirement[14] is to:

> "safeguard people against illness or injury which could result from external moisture entering the building."

The functional requirement states:

> "that buildings shall be constructed to provide adequate resistance to penetration by, and the accumulation of, moisture from the outside."

The performance statement includes the requirement that:

> "roofs and exterior walls shall prevent the penetration of water that could cause undue dampness, or damage to building elements."

While the code sets out the standards that must be achieved, it also provides mechanisms that outline how those standards can be achieved.

[10] Building Act 1991 s. 6 (1).
[11] Ibid, s. 48 (1).
[12] Building Regulations 1992 First Schedule.
[13] Building Act 1991 s. 7(2).
[14] Building Regulations 1992 First Schedule, clause E2 – External Moisture, E2.1, E2.2, E2.3.2. See clauses E2.31-E2.36 for all external moisture performance requirements.

Approved documents published by the BIA are part of this regulatory regime and provide a non-mandatory instrument for approving non-standard or innovative building solutions.[15] 'Acceptable solutions' outlining building methods, which comply with the code[16] and 'verification methods', which demonstrate compliance by calculation, tests and 'engineering' construction methods, are included in approved documents.

Compliance may also be established by utilising an 'alternative solution'; a design solution which complies with the building code, but is neither an acceptable solution nor a design in accordance with a verification method.

Under s58 (1) of the Act, a certificate of accreditation issued by the BIA, for either material, a method of construction, or a design or component relating to building work, assures building code compliance. Alternatively, a building certifier has authority to establish building compliance under Part 7 of the Act. The BIA can also determine by formal ruling, on a matter of doubt or dispute, whether building work complies with the code to the required extent.[17]

Territorial authorities and building certifiers can accept producer statements from suitably qualified or experienced authors, outlining technical specifications, as a means of establishing whether alternative solutions comply with the code.[18]

Roles and Responsibilities in the regulatory environment

Building Industry Authority

The Building Industry Authority (BIA) is a Crown entity established by the Building Act 1991, funded through building consent levies (2001: $3.6 million) and interest earned (2001: $700,000), on reserves of $11 million.[19] It was established to oversee and manage the overall operation of the building control system.[20] The functions of the BIA include:

- Advising the Minister of Internal Affairs on matters relating to building control
- Approving documents for use in establishing compliance with the provisions of the building code
- Determining matters of doubt or dispute in relation to building control
- Undertaking reviews of the operation of territorial authorities and building certifiers in relation to their functions under the Act
- Approving building certifiers
- Granting accreditations of building products and processes.

[15] Building Act 1991 s. 49 (1).
[16] See Building Industry Authority Approved Documents E2/AS1 External Moisture.
[17] Building Act 1991, s. 17.
[18] Ibid, ss. 33 (5), 56 (3a).
[19] Building Industry Authority *Annual Report to 30 June 2001* Building Industry Authority, Wellington, 2001.
[20] Building Act 1991, Part 3.

Territorial authorities

The function and duty of a territorial authority[21] is to administer the building control regime in its area.[22] This includes:

- Receiving and considering applications for building consents
- Approving or refusing applications for building consents
- Determining whether an application for a waiver or modification of the building code, or any document for use in establishing compliance with the provisions of the building code, should be granted or refused
- Enforcing the provisions of the building code and regulations
- Issuing project information memoranda, code compliance certificates, and compliance schedules.

No building or construction work may be undertaken without a building consent from a territorial authority, unless that work is exempt under the Act.[23] Territorial authorities are the only bodies who may grant building consents. Based on a standard of reasonableness, the authority must grant consents where:

> "… It is satisfied on reasonable grounds that the provisions of the building code would be met if the building work was properly completed in accordance with the plans and specifications submitted with the application."[24]

In granting consents, territorial authorities have the ability to waive or modify provisions of the building code. [25]

Building certifiers

The Act allows building certifiers to perform similar functions to territorial authority building officers in respect of the certification and inspection of building work. The requirements for approval as a building certifier are set out in the Act[26] and include appropriate qualifications, relevant experience and sufficient knowledge of the building code. Building certifiers are authorised by the BIA to issue building certificates, code compliance certificates and inspection reports. Territorial authorities must accept a building certificate or a code compliance certificate issued by a building certifier as establishing compliance with the building code.[27]

In carrying out functions that a territorial authority would otherwise perform, the Act imposes a civil liability in tort[28] rather than contract on building certifiers in respect of losses arising out of the negligent issue of a building certificate or code compliance certificate.[29]

---

[21] Ibid, Part 2 Interpretation, 'territorial authority has the meaning ascribed to it by section 2 of the Local Government Act 1974; and includes any organisation which is authorised to permit structures pursuant to section 12(1)(b) of the Resource Management Act 1991.
[22] Ibid, s. 24.
[23] Ibid, s. 32.
[24] Ibid, s. 34 (3).
[25] Ibid, s. 34 (4).
[26] Ibid, ss. 51,52.
[27] Ibid, ss. 43, 50, 56.
[28] For example, negligence, breach of statutory duty, failure to warn.
[29] Building Act 1991 s. 90.

The regulatory environment and weathertightness of buildings

The building code requires buildings to be constructed in such a way as to resist penetration and accumulation of external moisture.[30] However, while the code provides for required achievement standards in relation to weathertightness, the Overview Group[31] suggested that inadequacies in the methods sanctioned by the building code had contributed to weathertightness problems.

The Overview Group made several recommendation regarding the operation and interpretation of provisions of the building code and associated approved documents. These include:

- Improved guidance on the interpretation of the Building Act and companion documents, particularly in relation to the building code provisions of objective, functional requirement and performance and terms such as "satisfied on reasonable grounds" and "adequate".[32]

- Upgrading the criteria for what constitutes a reasonable level of detail to be provided with building consent applications with respect to weathertightness.[33]

- Investigating the split responsibilities of building certifiers and territorial authorities with respect to building consents, inspection and code compliance certification.[34]

The Overview Group was critical of the external moisture standards set out in approved documents.[35] It stated:

> "The focus is on the performance of individual products rather than their role in the overall building system, or more particularly in the case of weathertightness, their role and function in the building envelope or building façade."[36]

Similarly, it suggested that acceptable solutions and verification methods relating to external moisture standards were inadequate and recommended that methods and solutions be developed that were more prescriptive.

Remedies

Contract

Building and construction contracts generally include express or implied terms relating to quality of work and materials. Where a claimant establishes a breach of contract the courts can award damages or order specific performance in respect of the required standard.

---

30 Building Regulations 1992, Schedule 1 B2 Durability, E External Moisture.
31 Hunn, Bond and Kernohan, p.18 .
32 Ibid, p.23.
33 Ibid, p.21.
34 Ibid, p.23.
35 Building Industry Authority, Approved Documents B2/AS1 Durability and E2/AS1 External Moisture.
36 Hunn, Bond and Kernohan, p.19. New Zealand Building Code clauses B2, E2 and E3 are currently being reviewed by the BIA.

Tort

Liability in negligence can be established where it is determined by a court, that it is just and reasonable to impose on one party to the proceedings a duty of care to another and where it is found that the first party has been in breach of that duty and that the second party has suffered consequent and foreseeable loss as a result.[37] Claims for economic loss may also be made where a duty of care has been established.

The standard of care required in these situations is that which is objectively reasonable in all circumstances of the case. Relevant factors include; the risk of foreseeable damage and the degree of skill and care required to avoid the risk. Whether a person has demonstrated the requisite degree of skill and care is to be judged by what was reasonable at the date of the activity.

Territorial authorities and building certifiers owe a duty of care in respect of the issue of building consents, inspection and approval of work, and may be liable to home owners and subsequent owners where a breach of that duty is established.

Statutory duties in relation to standard of work or conduct may also apply under the Building Act 1991, the Consumer Guarantees Act 1993 (in limited circumstances) or the Fair Trading Act 1986.

Adjudication

The Government has recently announced the establishment of a new adjudication service to deal with disputes between owners affected by weathertightness problems and relevant parties. Legislation to establish the disputes process will be introduced by way of a Supplementary Order Paper to the Construction Contracts Bill currently before the House[38].

Home owners' insurance.

"Generally speaking, a leak which causes damage is not covered by insurance policies"[39]

Insurance companies operate around definable and time bound incidents. The majority of insurance policies in New Zealand do not include gradual damage as an insurable risk. The only way in which homeowners might get insurance redress would be if they could prove liability for poor workmanship from the builder, or the cladding manufacturer or applicator, who would then be covered by the cost of repairs through their own indemnity insurance, if they have it. Issues of liability concerning homeowners' insurance and builders have usually been settled out of court.

[37] For a comprehensive discussion see Tomas Kennedy-Grant, *Construction Law in New Zealand*, ch.3, p.111-176, Butterworths, Wellington, 1999.
[38] Hon. Dr Michael Cullen, Website, free toll line, disputes procedures for homeowners affected by 'leaky building syndrome', Media statement, 17 October 2002.
[39] Chris Ryan, Insurance Council Chief Executive, quoted in Insurers not losing any sleep, *MG Business*, 8 July, 2002, p. 6.

The insurance industry is monitoring the present situation closely – but according to the Insurance Council the issue "is increasingly about risk management, not claims management."[40]

Defect liability ("Home Warranty") insurance is currently available in Australia. This insurance provides homeowners with cover on residential buildings for financial loss arising from defective work or incomplete work when a builder becomes insolvent, dies or disappears. The Home Warranty insurance business is increasingly unprofitable, and since the collapse of HIH Insurance, (a major Australian insurance company), in 2001, the reinsurance possibilities are becoming increasingly difficult to find. In New South Wales for example, only three companies now offer this type of cover. In Australia overall, for every A$1 collected in premiums, at least A$1.60 is paid out in claims. In 2001, over A$30 million was paid out in claims.[41]

The Master Builders Association in New Zealand have a guarantee scheme, which can offer limited protection to homeowners purchasing a new home from a registered master builder, for three or five years.[42]

Professional indemnity insurance

Home Warranty premiums in Australia are paid by the builder. This type of insurance is designed to help the homeowner get the builder back on site to remedy the fault, rather than to provide the builder with insurance against claims for faulty workmanship. It is therefore not regarded as a form of professional indemnity insurance for the builder.

The major area for indemnity insurance in New Zealand is for independent building certifiers.

The Building Act 1991 provided for the introduction of building certifiers authorised to certify that building plans and specifications or completed buildings comply with the building code. In other words, building certifiers compete with territorial authorities for the tasks of checking and inspecting building work in the public interest.[43]

When a building certifier does any work that would otherwise be done by the local territorial authority, the building certifier must accept legal liability on the same basis as that authority. While territorial authorities have a reasonable capacity to meet any award of damages from their own resources even if they are not in fact insured against such liabilities, the same cannot be said for building certifiers. It is therefore mandatory for building certifiers to carry insurance in respect of their potential liabilities.

The BIA ensures that building certifiers carry adequate indemnity insurance, plus a bond to secure funding for run-off insurance when the building certifier ceases practice. However, this type of insurance is becoming increasingly difficult to purchase for private companies, and recently one Auckland certifier went out of business through being unable to renew her insurance cover.[44]

[40] Ibid.
[41] Insurance Council of Australia, Some facts on home warranty insurance, http://www.ica.com.au/warranty_facts/home_warranty.asp.
[42] Master Builders Federation, The master build guarantee, 2002 http://www.masterbuilder.org.nz/Guarantee.asp
[43] Building Industry Authority, Building certifiers : building certifier applications, http://www.bia.co.nz/about/bldgcert.php#applications.
[44] Council to plug inspection gap, *New Zealand Herald*, 3 October 2002, p. A4.

The size of the risk for insurers is difficult to estimate. According to Sir Barry Curtis, mayor of Manukau City, since 1997 the council issued around 20,000 consents and had only 14 claims relating to weathertightness, of which eight were settled without legal action.

House building – traditional and modern

New Zealand is situated at a latitude where competing warm tropical and cold polar air ensures abundant wind and rain. It is wind driven rain and pressure differentials between the inside and outside of a building that will often force or draw water through very small openings.

Traditional methods of homebuilding accepted that water could and would, on occasion, get past the building envelope or skin. The traditional response was to provide a level of detailing that could cope with the water that inevitably would get in – a cavity behind the cladding to drain water away and ventilation features to allow framing timber to dry out. In the past, moisture in traditional homes was eliminated through passive vents such as chimneys or through less than airtight cladding that provided a reasonable air exchange rate for a home. Although older homes typically did not have moisture problems, they were often uncomfortable (draughty) and expensive to heat.

Modern construction methods appear to place more emphasis on energy efficiency and waterproofing than on water management or ventilation. Modern homes rely on a waterproof skin with sealed joints between panels, rather than on a second line of defence against moisture such as drain cavities in exterior walls and ventilation. Demands for energy efficiency also require insulation, which further reduces the ability of the home to dry out.

While such practices ensure homes are draught free and less expensive to build and heat, they also result in homes with high indoor humidity. Although modern homes may be safe, comfortable, and energy efficient, to be durable requires both weather tightness *and* ventilation.

Consumer preferences and design practices

Changing consumer preferences are resulting in more complex building forms. For example, it is apparent that today's home buyer has a preference for more 'flow' between indoors and outside. Homeowners often demand contiguous floor levels from inside the house to the outside balconies, decks, and patios. These create opportunities for water ingress.

At the same time, increased building complexity and new construction materials and methods imply lower building tolerances (margins for error) than traditional building methods. The materials must be appropriate for the location and conditions – topography, elevation, shelter, exposure, and building height must all be considered. New building materials such as cladding and sealants also require expertise in their assembly, and they must be regularly checked and maintained. This is not always easy on multi-storey buildings, and difficult to encourage when materials are advertised as 'low maintenance'.

Building industry products and practices

"We've traditionally regarded building components as products: now we must regard them as systems that require full documentation".[45]

A lack of understanding

The use of monolithic cladding systems has been promoted as being both low maintenance and providing a sealed, waterproof outer skin to the building. Materials which have been causing problems are not only those which are new, or difficult to use; one of the key 'culprits' has been the use of traditional plaster as a 'monolithic look' cladding material. The weak points in materials used are generally not the products themselves, but where they join other materials, such as windows or doors, or where there are cracks due to settlement, earthquakes, or existing problems with damp. The problem is therefore not so much the performance of particular products as the way in which they are put together, particularly on-site. The Overview Group commented that:

> " the performance of flashings, sill trays, sealants and joining materials and compounds and their proper application is not well understood. ….In addition, there is a lack of understanding of the science relating to issues of different thermal conductivity between materials; and the relationship between rigid panel and flexible framing and the need for special control (movement) joints…"[46]

Use of untreated kiln-dried timber

Until the mid-1990's radiata pine used for house framing was usually treated with boron salts (boric treated) to protect against insect attack, but it was discovered that the treatment also provided resistance to fungal decay. But boric treated timber cannot easily be kiln-dried, drying takes time and adds to the cost of building. In 1995 the regulations were changed to allow the use of non-treated or LOSP-treated (insecticide-only), kiln dried radiata framing. This timber reduces the tolerance of buildings to moisture, according to both the Overview Group and Consumer magazine.[47] Such use of untreated timber included the exterior framing. There were a number of reasons for the acceptance of untreated timber, including:

1. Until the mid-1990s, treated timber needed time to dry before the building's lining could be attached, increasing the overall construction time.

2. There were complaints that as the treated timber dried, it moved, causing various levels of distortion.

3. Treated timber is more expensive and could impact upon the competitiveness of a builder's tender for a construction project.[48]

[45] Adrian Bennett, convenor of the BRANZ Weathertight Building Steering Group, 2 May 2002, press release http://www.weathertight.org.nz/ww210B%20afb.pdf .
[46] Hunn, Bond and Kernohan, p.10.
[47] Watergate!, *Consumer* 419, October 2002, pp.7-8.
[48] Where the rot really set in, *New Zealand Herald*, 10 October 2002, http://www.nzherald.co.nz/storyprint.cfm?storyID=2998461 .

Untreated kiln-dried timber is vulnerable to rot and decay when it becomes wet. However, it should be stressed that although the building code requires framing timber to be durable for 50 years, any timber, regardless of the standard to which it is treated (including the 'H3' standard) will decay *if it remains wet*. Although untreated kiln dried timber will deteriorate rapidly if wet, even treated framing timber that remains wet will fail – according to the Frame and Truss Manufacturers, after a period of two to five years.[49]

Once a certain level of moisture content within wood is reached, then decay is common. Forest Research estimate that wood with a moisture content over 30 percent is susceptible to decay.

Cladding materials currently used

The use of cladding materials has changed quite remarkably over the last 40 to 50 years. For those houses built prior to the 1960s, approximately 60 percent used weatherboard, with the remainder mainly using brick veneer and stucco. Nowadays, a range of cladding products is in use within the building industry. According to a recent BRANZ survey,[50] brick veneer is used in about 39 percent of new dwellings, while timber weatherboard is used in approximately three percent of new dwellings. Fibre-cement sheets now make up approximately 19 percent of cladding used on new dwellings, while Exterior Insulation and Finish Systems (EIFS) cladding materials are used on 17 percent of new dwellings. Figure 1. below details the cladding types used in new dwellings for the year ending December 2001.

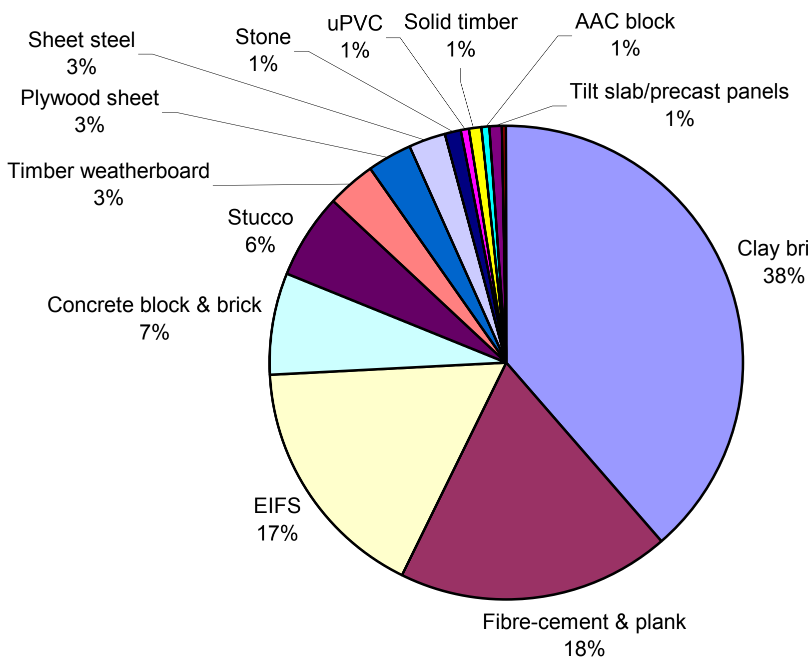

Figure 1. Cladding types used in new dwellings, year ended 31 December 2001. Source: BRANZ, August/September 2002. "Cladding types in use today", pp. 6-7. Note: EIFS is coated polystyrene and includes polystyrene slabs attached to timber framing and concrete-filled polystyrene blocks.

[49] See Frame and Truss Manufacturers of New Zealand http://www.ftma.co.nz/ .
[50] Cladding types in use today, *Build*, August/September 2002, pp. 6-7.

While new cladding materials have entered the industry, timber framing remains the predominant material used for the structural framing of new dwellings. In a recent survey (year ended September 2001) approximately 94 percent of new house framing was timber, followed by 2.4 percent using concrete masonry, 1.5% wood panels, 0.8% solid wood, 0.6% polystyrene block, 0.3% steel, and 0.3% other materials.[51]

Areas of concern in current buildings

The building industry has identified the following risk areas in regards to leaky buildings:

- The absence of flashings around windows and doors. Flashings help divert water away from the structure.
- Complex roof structures
- The lack of eaves. Overhanging eaves help keep water off the tops of the walls, limiting the amount of leakage of water from the roof into the external wall structure.
- The use of parapets
- EIFS, monolithic and stucco cladding systems
- The common use of sealants instead of flashings – If not applied properly, sealants can fail, causing the buildings to leak.
- Internal and external balconies. With recessed balconies, the building is more prone to wind driven rain penetration.
- Building in exposed or strong wind zones, such as hill ridges, where the wind can channel water past the cladding into the structure of a dwelling[52].

On-site practices and training

The Building and Construction Industry Training Organisation[53] is the key organisation responsible for the training of building personnel, particularly in carpentry. It runs several Apprenticeship Training Options, including both theory and on-site training. The Certified Builders Association (CBA)[54] is currently developing courses in applied Technology with its members and training institutions. The Master Builders Federation (MBF) is also involved in education and training. However, membership of the two organisations totals around 3,700, out of a total of nearly 20,000 companies and individual builders working on-site.

The Overview Group recommended exploring the issues around advocating for a national registration of builders and building related trades.

---

51 Altering and reusing buildings, *Build*, January/February/March 2002, p. 8.
52 Forum brings industry up to date, *Build*, August/September 2002, pp.38-40.
53 Building and Construction Training Industry Organisation, http://www.bcito.org.nz/ .
54 New Zealand Certified Builders Association, http://www.certified.co.nz/ .

With the growth in 'labour-only' contracting in the building trade, there appears to be a decline in the overall quality monitoring on-site, which used to be the responsibility of the main contractor. The growth of 'project managers', rather than the architect or Clerk of the Works supervising building standards on-site has, according to the Overview Group,

> "had an adverse effect on the quality of the overall building product"[55]

A major impact of the changes in building practice has been the blurring of responsibilities of the various players. The Overview Group has commented that in the past, there was a better recognised set of responsibilities for the owner, the architect and the main contractor. One possibility they have suggested is to adopt legislation similar to that being promulgated in Tasmania, which will give accreditation to "Building Practitioners", including architects, builders, and engineers, amongst others. The purpose of the legislation is stated to be to:

> "protect consumers who use building practitioners"[56]

Currently, the infrastructure for the certification and monitoring processes are being put in place in Tasmania, and this section of the Tasmanian Building Act should be in force by early next year.

Lack of independent research in local conditions

Research in the building industry is primarily carried out by the Building Research Association of New Zealand (BRANZ), an industry association. Research is also carried out by Universities and by product manufacturers. Research into timber for the building industry is carried out also by Forest Research in Rotorua, a Crown Research Institute.

While the research currently being undertaken across various agencies is contributing to a better understanding of the problem, the Overview Group noted that:

> "there is a perception that….there is little research and testing in the building industry that can be deemed to be wholly independent"[57].

The Overview Group recommended that independent research needed funding, promotion and coordination across agencies, and suggested a list of issues regarding materials and systemic concerns which might usefully be tackled as part of a programme of public good research, including the building envelope, monolithic claddings and timber treatment. In particular, one research proposal suggesting a survey of 400 houses built since 1990 in five main centres, was considered to have merit. The Overview Group suggested that some of the accumulated reserves from the building levy could be used for this public good research.

Health issues

> "At present the acceptable solution for controlling mould in houses is very simplistic and unsatisfactory for all industry groups."[58]

[55] Hunn, Bond and Kernohan, p.37.
[56] Building Act 2000 (Tasmania) (not yet in force), http://www.wst.tas.gov.au/node/wstbuilding-1.htm
[57] Hunn, Bond and Kernohan, p.32.
[58] M. Cunningham, Healthy Buildings Research in New Zealand, *Build*, September/October 2001, p. 59.

A number of health issues are associated with mould growth on timber framing. These occur because most fungi produce mycotoxins (natural organic compounds that initiate a toxic response in vertebrates), and volatile organic compounds (VOCs), which are responsible for the musty odours found in homes with high moisture levels. Moulds that are important potential producers of toxins indoors are certain species of Fusarium, Penicillium, and Aspergillus. In water-damaged buildings Stachybotrys chartarum and Aspergillus versicolor may also produce toxic metabolites. A 40-unit apartment complex in inner-city Wellington, for example, has apparently been contaminated with stachybotrys, a toxic mould.[59]

While exposure to mould – through ingestion, skin contact, or inhalation – does not always lead to poor health, a range of health problems have been associated with the presence of mould.[60] These include allergic reactions, the aggravation of asthma conditions, headaches, cold and flu-like symptoms, sore throats, eye irritation, coughing, shortness of breath, dermatitis, diarrhoea, impaired or altered immune function, and constant fatigue and exhaustion.[61] Alleged linkages between indoor airborne exposures to moulds and Sudden Infant Death Syndrome, bleeding from the lung, or to memory loss, have not yet been scientifically substantiated.[62]

It is estimated that up to 15 percent of the New Zealand population is allergic to the moulds that are present in New Zealand houses.[63] The most vulnerable to the health consequences of mould are those people whose immune systems are undeveloped or already compromised, such as children and the elderly. One example of these health consequences is the increasing prevalence of asthma in New Zealand children and young adults during the last 20 years. It is estimated that 44 percent of New Zealand children now experience asthma symptoms at some time in their lives.[64] Increased asthma rates may be explained by both increased susceptibility as well as increased exposure to allergens such as dust mites and moulds.

Perversely, there may be an increased risk of exposure to mould allergens in modern housing that is more weather tight, than in traditional New Zealand homes. The energy efficiency concerns that were prompted by the oil crises of the 1970s saw the use of new construction materials and building techniques to ensure that New Zealand houses were more tightly constructed than previously. Although this resulted in modern homes being warmer and better insulated, it may also have meant less natural ventilation. Consequently, many new homes, especially apartments, may have higher levels of internal humidity (that can foster mould growth) when compared to traditional building forms.[65]

[59] A. Gibson and A. Perrot, Major Refit for Leaky Tower as Investors Head to Court, *New Zealand Herald*, 14 August 2002, p.A3.
[60] Asthma triggers : molds, United States Environmental Protection Agency, 2002, http://www.epa.gov/iaq/asthma/triggers/molds.html.
[61] It is estimated that a significant proportion (10-32%) of all asthmatics are sensitive to fungi. See S. V. McNeel, R. A. Kreutzer, Molds in Indoor Air and Health Effect, Fungi & Indoor Air Quality, *Health & Environment Digest,* Vol.10(2), 1996, pp. 9-12, http://www.dhs.cahwnet.gov/org/ps/deodc/ehib/EHIB2/topics/fungi_indoor.html
[62] S. C. Redd, *State of the Science on Molds and Human Health,* Centers for Disease Control and Prevention, U.S. Department of Health and Human Services, 2002, p.10. http://www.cdc.gov/nceh/airpollution/images/moldsci.pdf
[63] R. Phipps, Wet Winter Housing Woes Wafted Away, *Build*, September/October 2001, p. 61.
[64] Ministry of Health, *Our Children's Health: Key Findings on the Health of New Zealand Children*, Ministry of Health, Wellington, 1998, p.9.
[65] Ministry of Health, *Asthma and the Indoor Environment : Current Issues and Potential Strategies*, Ministry of Health, Wellington, 1996, p.187.

In its report, the Overview Group stated that there was a clear potential risk from toxic fungal growth for house occupiers and repair workers. It recommended that the Ministry of Health resolve the best manner by which the health risks associated with fungal decay could be identified and the precautions that needed to be taken.[66]

Systemic failure

It is apparent from the preceding discussion that there is no single factor that can be determined to be solely or primarily responsible for the building envelope failures currently being seen in New Zealand. The regulatory environment, consumer preferences, design and industry practices may all be identified as broad contributing factors. These issues have been discussed above.

It is, however, precisely because there are multiple causes for the leaky buildings problem that suggests the issue may be alerting us to a problem of systemic failure. In other words, it is a concern not just because there are economic costs, safety issues, and health concerns, but because the collective system (of regulations, the building industry, and the housing market) appears to be failing those with most at stake – the individual homeowner. The report of the Overview Group on Weathertightness notes the paradox of a "formidable paper trail" on the one hand and the "apparent lack of accountability on the other – either for the process as a whole or its constituent parts".[67]

Evidence of the systemic nature of the problem is also supported by the fact that international experience of this issue has been well documented for a decade. British Colombia alone has had two public inquiries during the 1990s. Indeed one Auckland barrister has been representing the owners of rotten and leaky homes since 1997.[68] It is unlikely therefore that New Zealand regulators, developers, architects, builders, planners, the insurance industry, and manufacturers have been unaware of this problem for this length of time (see Timeline below).

While the problems are beginning to be well documented, the answers are less easily found. There will no doubt be a series of legal precedents required through the New Zealand courts before these issues are finally resolved.

Suggestions for further reading / links

Toll free phone line for homeowners affected by the leaky building syndrome:

0800-116-926. Website: http://www.weathertightness.govt.nz/

Weathertightness Building project: Weathertight.org.nz

Glossary of helpful terms:
http://www.weathertightness.govt.nz/diawebsite.nsf/wpg_URL/Resource-material-Weathertightness-Glossary-of-terms?OpenDocument

BIA / Hunn Weathertightness Report:
http://www.bia.co.nz/publicat/weathertightness.php

Commission of inquiry into the Quality of condominium construction in British Columbia 1998, *The renewal of trust in residential construction,*(David Barrett, Chair) Victoria, Canada, Ministry of Municipal Affairs.

http://www.qp.gov.bc.ca/condo/

---

[66] Hunn, Bond, Kernohan, p.13.
[67] Hunn, Bond, Kernohan, p.33.
[68] B. Ansley, How the rot set in, *Listener*, 5th October 2002, p. 22.

Timeline

- 1991 The Government passes the Building Act 1991 which is intended to reduce compliance costs through a focus on achieving outcomes rather than stipulating the methods to achieve them.
- 1994 Building surveyor warns of ‘time bombs’ being created by fixing cladding directly on to framing. (*New Zealand Herald,* ‘Where the rot really set in’).
- 1995 The Government and the BIA approve regulation changes to the building code, allowing the use of kiln-dried untreated timber for framing.
- 1996 North Carolina Building Code requires manufacturers to provide a 20-year warranty on barrier/cladding systems, which must contain an internal water drainage system.
- 1998 Building consultant describes to the BIA the problems he was finding with leaks and rot in new buildings and suggests a coordinated response. (*New Zealand Herald,* ‘Where the rot really set in’).
- 1999 Canadian Wood Council releases ‘Best Practice Guide for Wood-frame Envelopes’ that recommends water management systems in building envelopes involve the use of cavities and drainage planes.
- 1999 Timber Industry Federation chairman calls for a review of the 1995 changes to building practices that allowed the use of untreated framing timber, seen as increasing the risk of decay from water leakage. (*New Zealand Herald,* ‘Where the rot really set in’).
- 1999 Building consultant issues warning of a "Cave Creek" disaster involving rotting decks and balconies. (*New Zealand Herald,* link as above).
- 2000 Building consultant recommends to the BIA the implementation of a gap between the cladding and framing – enabling water to drain away – and a return to treated timber. (*New Zealand Herald,* ‘Where the rot really set in’)
- 2000 Forest Research scientist publishes research showing boric treated timber resists rot but untreated timber does not – contrary to industry-funded research and advertising.
- 2001 The New Zealand Herald reveals huge industry concern over the problem.
- Feb 2002 An independent inquiry begins, chaired by former State Services Commissioner Don Hunn, and reporting to the BIA.
- May 2002 The inquiry warns in its interim report of a potential ‘systemic breakdown’ across the building industry.
- Aug 2002 The Building Industry Authority releases its weathertightness report that makes 20 recommendations aimed at improving the building industry overall, including a national safety warning over rotting balconies.
- Oct 2002 The Government announces a Select Committee Inquiry into the leaky buildings’ problem. Its terms of reference include: the level of detail to be provided with building consent applications, the inspection regime as part of the code compliance certification process, the decline in the level of skills in the building sector, and the divisions of responsibility with respect to building consents, inspection, and code compliance certification.
- Oct 2002 Ministerial Committee formed to co-ordinate the response to the matters raised in the Hunn report on the weathertightness of buildings. A disputes resolution process, a website, and a toll free phone line for homeowners affected by 'leaky building syndrome' are established.

Appendix A

Glossary of terms

Building Certifier

A person or organisation approved and registered by the Building Industry Authority to check plans and specifications and building work during construction. Owners have the choice of employing private building certifiers as alternatives to council (territorial authority) building inspectors.

Building Envelope

The building envelope comprises the roof, wall claddings, windows, and doors and often other structures such as balconies. The fabric that protects the structure from the ravages of the weather and provides the outward appearance of the building.

Building wrap

A building paper or underlay placed over framing and behind cladding systems to assist the control of moisture by ensuring that any condensation or moisture behind the cladding system is directed to the exterior of the building.

Cladding
External wall coverings such as timber or plaster.

- Lightweight - timber, fibre-cement, plywood, plastic, preformed sheet steel, EIFS.
- Medium weight - Stucco.
- Heavyweight - brick, concrete, block, stone veneers.

Drainage plane

The plane, generally formed from a cavity, immediately behind a cladding system. This allows water that penetrates the cladding system to drain to the exterior of a building.

Eaves

That part of the underside of a roof that extends beyond the external walls of a building.

Exterior Insulation and Finish System (EIFS)

Has a monolithic appearance and are widely used with shaped polystyrene blocks to provide surface features.

Fibre cement

Manufactured from Portland cement, finely ground sand and cellulose fibre.

Flashings

A flashing occupies a joint between two materials and is designed to catch and drain rainwater to a weep hole or drainage opening in the cladding.

Hazard Class 3 (H3)

H3 is a type of hazard class used for defining a level of treatment used with framing timber. H3 status can be achieved using a variety of chemicals, including a treatment called Light Organic Solvent Preservative (LOSP) that provides protection against fungal decay and insect attack. Although the building code requires 50 year durability for framing timber, treatment up to H3 level does not protect wet timber against decay for 50 years. The treatment is only effective for protecting wet framing for 2-5 years while the source of moisture is repaired. H3 treated timber has not traditionally been used for wall framing in New Zealand houses. (See p.12 for further information).

Monolithic

Something that resembles a large block of stone, gives the appearance of a seamless cladding, often imitating concrete, masonry or plaster.

Parapet

A low wall or railing along the edge of a balcony, roof, etc.

Stucco

A solid plaster cladding of Portland cement and sand (often with lime, plasticisers, and other additives) reinforced with wire mesh or lath and applied over either a rigid or non-rigid backing fixed to the timber framing.

Weep hole

A drainage point in the cladding linking to a building wrap or flashing designed to drain water from a joint or cavity.

For further details, see:

http://www.weathertight.org.nz/TermsDefinitions.pdf

Appendix B

International experience: British Columbia

Problems of water-related damage of houses built with synthetic cladding are not unique to New Zealand. Several regions of North America have also been afflicted since the mid 1980s, including a major failure of EIFS cladding in the US state of North Carolina, water leakage problems in Seattle, Washington apartments, and large-scale deterioration of low-rise apartment blocks in British Columbia, Canada. This case study focuses on the British Columbia situation.

British Columbia's 'leaky condo' crisis

In the early to mid 1980s the coastal lower mainland region of British Columbia experienced an economic boom. This boom generated high demand for new housing, creating both a huge expansion of residential construction activity and a surge in land prices.[69] An outcome of these factors was strong growth in construction of low-rise multi-unit residential apartment buildings (condominiums) using wood-framed structures and EIFS cladding. Between 1980 and 1995 over 800 low-rise condominiums were built in Vancouver alone.[70] The 1996 Canadian Census calculated around 17% of all homeowners (157,000 households) in British Columbia lived in condominiums.[71]

The scale of the problem

From the early 1990s major water leakage problems in condominium units began to emerge at a dramatic rate. Typical problems have been water penetrating through joins of EIFS envelope cladding and getting trapped, causing decay and rotting of internal wood structures. Over half of the 800 plus condominiums built in Vancouver from the early 1980s were severely affected by water infiltration damage by the end of the 1990s.[72] A widely cited estimate for the overall cost to repair leaky condominiums in British Columbia is C$1billion (NZ$1.3 billion)[73]. An official estimate produced in 1998 was lower, calculating total repair costs at between C$500m and C$800m, with an average repair bill for individual units of C$23,300[74] (NZ$30,290). However, the emergence of more cases over time may mean this is a conservative estimate; a recent estimate by an advocate group for affected homeowners—the Coalition of Leaky Condo Owners—claims to have identified over 1,200 leaky apartment blocks containing around 52,000 homes with a total repair cost of up to C$3bn.[75]

Provincial government response

In April 1998 the British Columbia provincial government ordered a Commission of Inquiry into the leaky condos crisis. Headed by a former province premier, Dave Barrett, the commission produced a first report in June 1998. The 'Barrett Commission' was then reappointed by the government in August 1999 to produce a follow-up report concentrating in more detail on specific issues. This

[69] D. G. Kayll, The Role of the Building Envelope Professional in the Aftermath of Vancouver's Leaky Condominium Crisis, *Buildings VIII/Wall Design and Building Science : Practices*, 2001 p.1. http://www.morrisonhershfield.com/papers/BuildingEnvelopeProfessional.pdf
[70] W. Sharman, Leaky Buildings : lessons from North America, *Build*, January/February 2001, p.19.
[71] Commission of inquiry into the Quality of condominium construction in British Columbia 1998, *The renewal of trust in residential construction,*(David Barrett, Chair) Victoria, Canada, Ministry of Municipal Affairs. http://www.qp.gov.bc.ca/condo/c1_iv.htm
[72] Sharman, p.19.
[73] Based on exchange rate as at 1st June 1998 of C$1:NZ$1.30
[74] Commission of inquiry into the Quality of condominium construction in British Columbia 1998, *The renewal of trust in residential construction,*(David Barrett, Chair) Victoria, Canada, Ministry of Municipal Affairs. http://www.qp.gov.bc.ca/condo/c1_v.htm
[75] B. Ansley, Condolences : how Canada could have warned New Zealand of the Crisis, *The Listener*, 5 October 2002, p.20.

second report was released in two volumes in January and March 2000.

The Barrett Commission identified a number of factors contributing to the cause of British Columbia's leaky condos, including the wet climate of the region and the impact of the economic boom creating excessive demand for development professionals and qualified tradespeople. However, the first Barrett Report (1998) was particularly critical of systemic failures of both the building process and building science:

> "Residential construction, during the past 15 years, has become an industry dependent more upon business finesse and marketing techniques, than on down-to-earth building basics."[76]

Among the failures identified by the Barrett Commission were: insufficient monitoring and inspection of construction projects, poor interpretation of the building code, inadequate warranty programmes, weak training skills and qualifications within the building industry, and inappropriate designs for the lower mainland coastal region of British Columbia.[77]

An outcome stemming from the recommendations of the Barrett Commission was the provincial Homeowners Protection Act 1998. The main aims of this legislation are to strengthen home buyer protection and to improve the quality of the residential construction industry.[78] Under the Act, a provincial Crown corporation called the Homeowner Protection Office (HPO) was established in late 1998.

The HPO is responsible for:

- licensing builders and monitoring the provision of compulsory third party home warranty insurance that was mandated under the Act. Among the requirements of this mandatory warranty programme is five year insurance for water penetration. Residential builders must register with an approved warranty insurance provider

- administering a no-interest repair loan programme available to some leaky home owners

- running a research and education programme.[79]

By the end of 2000, the HPO was involved with around 500 condominium buildings containing nearly 32,000 residential units.[80] However, the interest free loan programme has fallen short of the recommendations of the Barrett Commission. The second Barrett Report (2000) called for prompt 100% compensation for repairs up to $25,000 per unit, with the costs shared equally between the provincial government, the federal government and the British Columbia condominium residential construction industry.[81]

---

[76] Commission of inquiry into the Quality of condominium construction in British Columbia 1998, *The renewal of trust in residential construction,*(David Barrett, Chair) Victoria, Canada, Ministry of Municipal Affairs.
[77] It has been noted that condominium designs were based on styles prevalent in the warm dry climate of south-western United States. The removal of eaves and minimising of wall thickness (to maximise space/land use) as part of this design mimicry failed to account for the climatic differences of the wet temperate coastal areas of British Columbia (Kayll p.2).
[78] Realty Times, British Columbia's Leaky Condos, 10 August 1999, http://realtytimes.com/rtnews/printrtpages/19990810_leakycondo.htm ; Homeowner Protection Office website, http://www.hpo.bc.ca
[79] Homeowner Protection Office website, www.hpo.bc.ca
[80] J. Williams, Home Wrecked, *Vancouver Magazine*, November 2000. http://www.vanmag.com/0010/condo.html
[81] Ibid.

In contrast, the no-interest loan programme adopted provides assistance to only the most financially strapped households; which equates to only around 10 percent of affected households.[82]

City-level and industry-level responses

Another key recommendation of the Barrett inquiries was for building envelope design and construction to be reviewed by a specialist.[83] This recommendation was preceded and reinforced by actions of the city authorities of Vancouver. In 1995 the City established a list of approved “building envelope specialists” and mandated that they must be involved in the inspection and review of building envelopes in all residential developments. This move was formalised by industry officials in 1999 with the creation of qualified “building envelope professionals” by the Architectural Institute of British Columbia and Association of Engineers and Geoscientists of British Columbia. In another industry-level initiative, the Building Envelope Research Consortium (BERC) was established in 1996 as a coordinating agency for research and education into building envelope performance.

An on-going problem

Although the incidence of leaky condominium problems appeared to peak in the late 1990s in British Columbia, by early 2002 there were reports of high-rise apartment buildings in the region encountering similar water leakage problems.[84] Most high-rises built in the region since the 1980s have concrete structures, but many have EIFS decorative claddings on their outer walls. It is more expensive to fix high-rise buildings than low-rise condominiums (even though their concrete structures remove the risk of collapse in a worst-case scenario). One estimate has suggested high-rise repairs will cost around C$50,000-$55,000 per unit to repair, compared with around C$25,000 for low-rise units.[85] The emergence of high-rise water leakage problems has also been tipped to prolong British Columbia’s leaky building crisis by an additional 10-15 years.[86]

Parliamentary Library, November 2002
For more information contact:
Reference@parliament.govt.nz
Extn 9888

[82] Ibid.
[83] Commission of inquiry into the Quality of condominium construction in British Columbia 1998, *The renewal of trust in residential construction,*(David Barrett, Chair) Victoria, Canada, Ministry of Municipal Affairs, Recommendation 15.
[84] New Wave of Leaky Condos Strikes B.C. – this time it is highrises, *Vancouver Sun*, 18 February 2002, p.A05
[85] Ibid.
[86] Ibid.