Energy Efficient Homes

The Hidden Moisture Problem in Modern Homes

What every Canterbury homeowner and future homeowner should understand about moisture, mould, and how a well built home should really perform.

Most people assume moisture problems come from outside. In reality, the biggest risk to a home often comes from within: cooking, showering, and breathing release far more water vapour into a house than most people realise.

Without the right building science in place, that vapour travels through walls, condenses inside insulation, and creates the conditions for mould and dust mites to thrive... with real consequences for family health.

In this guide, we review the key points made by Energy Efficient Homes founder and CEO Robert Whitehouse in his discussion with the House 2.0 series.

WATCH THE FULL INTERVIEW

The Hidden Moisture Problem in Modern Homes

House 2.0, Episode 1 · Featuring Robert Whitehouse, Founder & CEO of Energy Efficient Homes

youtube.com/watch?v=7DR6J9c83jw

Robert founded Energy Efficient Homes in Christchurch and has spent decades studying and building high performance, passive, and energy efficient homes. The points in this guide are drawn directly from his firsthand experience designing homes that are healthier, more comfortable and built to last.

THE PROBLEM

Moisture is coming from *inside* your home, not just outside

Building codes are designed to keep water out. They do far less to manage the moisture your household creates every day.

Everyday life produces more water vapour than most people expect

Cooking, showering, and breathing all release moisture into the air. Overnight, two adults sleeping in a room breathe out roughly one and a half pints of water between them.

That moisture does not disappear. It moves through the home as vapour, a gas that behaves much like the humidity inside a cloud, until it meets a cold surface and turns back into water.

1.5 pints
of water breathed out overnight by two sleeping adults

35 to 55%
the healthy relative humidity range for a home

65%+
humidity level at which mould growth becomes likely

Condensation on your windows is a visible clue to an invisible problem

Morning condensation on windows shows where warm, moist air has met a cold surface and turned to water. The same process happens inside external walls.

As heat moves from a warm interior toward a cold exterior, it carries vapour with it. Once that vapour cools to around 14 degrees, it condenses - this time inside the insulation, where nobody can see it and nothing can wipe it away.

> **WHY THIS MATTERS FOR HEALTH**
>
> Once insulation is wet, it stops performing and becomes a breeding ground for mould and dust mites. Dust mites, which feed on shed skin found in bedding and furniture, are considered the single biggest trigger of asthma. Mould exposure has also been linked to a range of symptoms that are easily mistaken for unrelated illnesses, since it can affect the body in ways that mimic other conditions.

Extractor fans alone rarely solve the problem

An extractor fan can only remove air from a room if fresh air is allowed back in to replace it, much like a keg that will not pour unless air can enter from the top.

Kitchen extractors typically capture only a small fraction of the steam produced while cooking. Studies have found that bathroom extractor fans work properly only when a window is also open, something most households rarely do in winter.

THE FRAMING PROBLEM

Standard timber framing works *against* your insulation

A wall's insulation rating on paper and its real-world performance are often two very different numbers.

Timber is a weak point in the wall, known as a thermal bridge

A standard New Zealand wall uses a 90-millimetre stud, which can hold insulation rated up to R2.8. Timber itself, however, only has an insulation value of around R0.7. Every stud, dwang, lintel and doorway frame in a wall is effectively a gap in the insulation, allowing heat - and the cold that follows it - a direct path through.

38%
of an average external wall is timber, not insulation, according to industry research

R2.8 vs R0.7
insulation rating between the cavity and the timber framing itself

11.8°C
recorded corner temperature in a heated room where the mid wall surface measured 20°C

This is why mould so often appears in corners first

Corners, window surrounds, and doorways require additional studs and lintels for structural support, which means even more timber is concentrated in these areas. Thermal imaging of a standard heated New Zealand home found the wall surface in the middle of a room measuring 20 degrees, while the corner measured just 11.8 degrees, below the point where moisture in the air begins to condense.

FACTOR	STANDARD TIMBER FRAME
Stud insulation rating	Up to R2.8
Timber insulation rating	Around R0.7
Average timber content of wall	Approximately 38%
Vapour barrier fitted as standard	Not currently required by the building code

> **A COMMON MISCONCEPTION**
> Simply switching to a thicker 140-millimetre stud does not solve the problem on its own. A deeper wall cavity can hold more insulation, but without a proper vapour barrier it also holds more moisture, which can make the underlying problem larger rather than smaller.

THE HOUSE 2.0 APPROACH

Building science can eliminate the problem entirely

International best practice combines two membranes, a counter batten cavity, and balanced mechanical ventilation to manage both moisture and heat.

An external moisture barrier

Unlike standard building paper, a true moisture barrier stops water entering from outside while still allowing vapour from inside the home to escape, working in a similar way to breathable outdoor fabric.

An internal vapour barrier

Fitted on the inside of the frame, this layer stops moist household air from reaching the cold zone of the wall in the first place, so it never gets the chance to condense inside the insulation.

A counter batten cavity adds a second layer of insulation over the framing

Horizontal battens fitted over the vapour barrier create an additional 45-millimetre cavity that holds its own layer of insulation, positioned in front of the timber studs. This dramatically reduces the thermal bridge, shrinking it from running the full length of every stud to only the small points where batten and stud physically cross.

Balanced mechanical ventilation manages moisture without wasting heat

A heat recovery ventilation system continuously draws fresh air into bedrooms and living areas while extracting moist air from kitchens, bathrooms, and laundries. Incoming and outgoing air pass by each other without mixing, so outgoing warmth is transferred into the incoming fresh air before it enters the home.

94%

of outgoing heat energy recovered and returned to incoming fresh air

~$2,200

total annual energy bill for a 220 square metre passive home, covering heating and cooking

2028

year the next major building code update, including mandatory home energy ratings, is expected

LOOKING AHEAD

A mandatory home energy rating system, similar to the labels used on appliances, is expected as part of the next major building code update. Homes that do not perform well on moisture, heat retention, and ventilation are likely to be rated poorly, which may affect resale value in the years ahead. Homes built to a higher standard today are positioned to perform well under that future rating.

ENERGY EFFICIENT HOMES

Why build energy efficient - and how we can help

A home should keep a family comfortable, healthy, and protected from rising running costs. Here is what that looks like in practice.

Healthier air, fewer triggers

Continuous fresh air and moisture extraction reduce the conditions mould and dust mites need to thrive.

Every room, evenly comfortable

Consistent temperatures throughout the home mean no more closing off cold rooms in winter.

Lower running costs

Reduced heat loss and 94% heat recovery ventilation mean less energy is needed to stay warm.

A future-proofed investment

Built ahead of upcoming building code changes and mandatory home energy ratings.

TALK TO OUR TEAM

Thinking about your next build?

Let's talk about what House 2.0 could look like for you.

SCHEDULE A CALL

HEAR IT FROM ROBERT

Watch or share the full interview

Decades of building science experience, explained in plain terms.

WATCH THE INTERVIEW

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