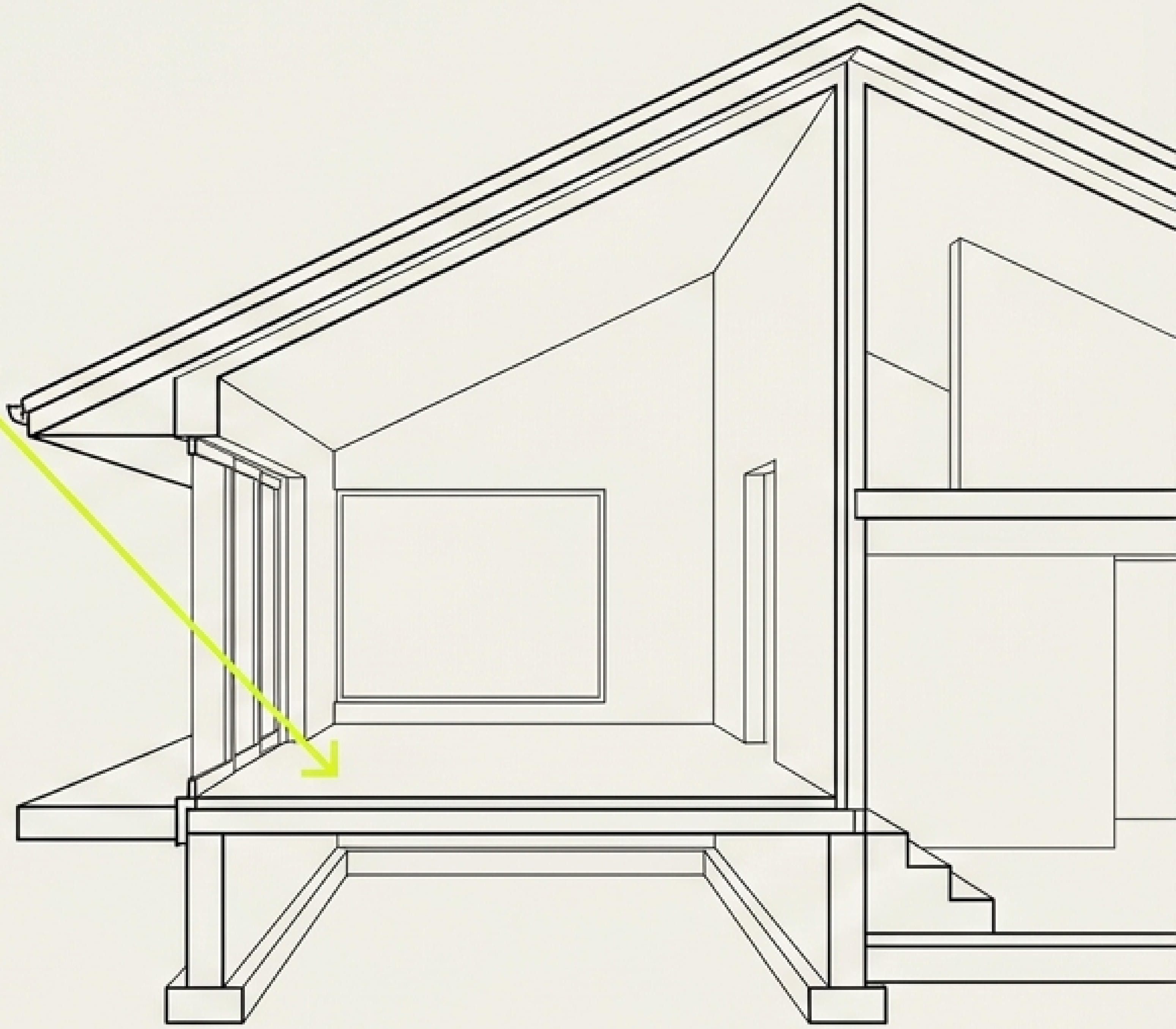
The Architecture of Sun and Site

Why a site-specific passive design mathematically outperforms the off-the-shelf floorplan.



Ecotectural Home Builders — New Zealand

The Illusion of the Standard New Build

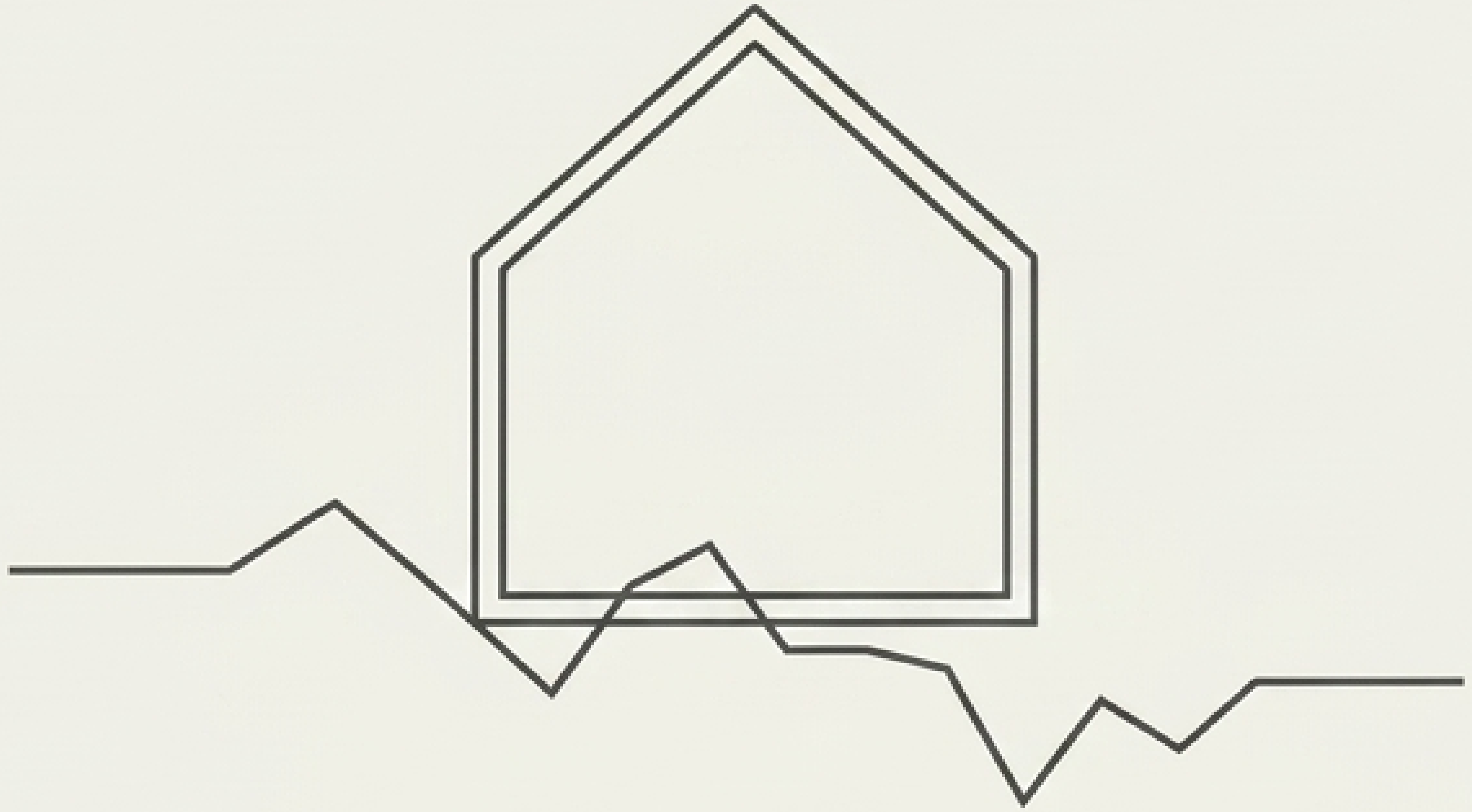
In the BRANZ New House Owners' Satisfaction Survey 2023, fewer than two-thirds of new homeowners strongly agreed that their home stays warm overnight.

Furthermore, homes overheating in summer is a growing structural failure as absolute temperatures rise.

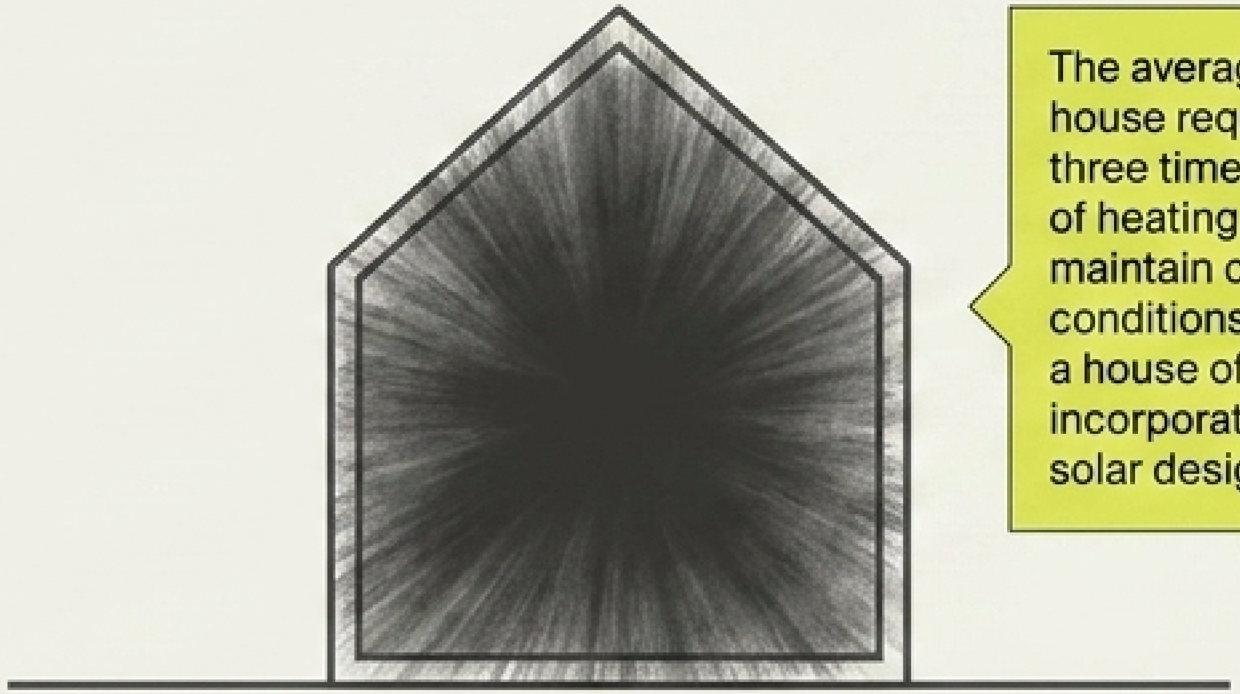
> Staying warm overnight and cool in summer should be a given for a new build. But without site-specific passive design, a new home is just a modern box fighting the climate.

The Cost of 'Anywhere'

A house designed for anywhere functions perfectly nowhere.



The Off-The-Shelf Plan dropped on arbitrary topography.

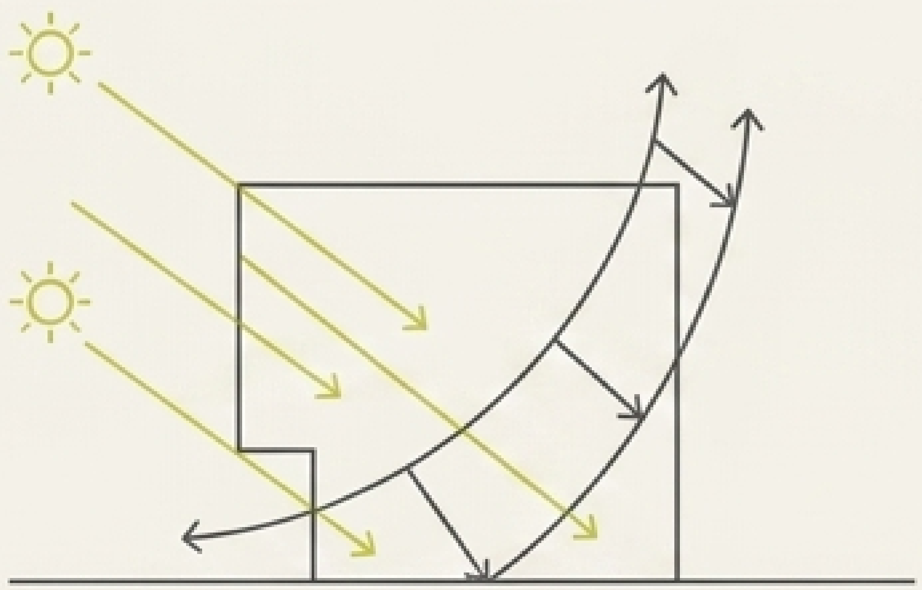


The average off-the-shelf house requires two to three times the amount of heating energy to maintain comfortable conditions compared to a house of similar price incorporating passive solar design.

When evaluating 210 randomly selected new detached houses built to Building Code minimums (without passive design), BRANZ modeling revealed a startling energy penalty.

The Sun as an Architectural Material

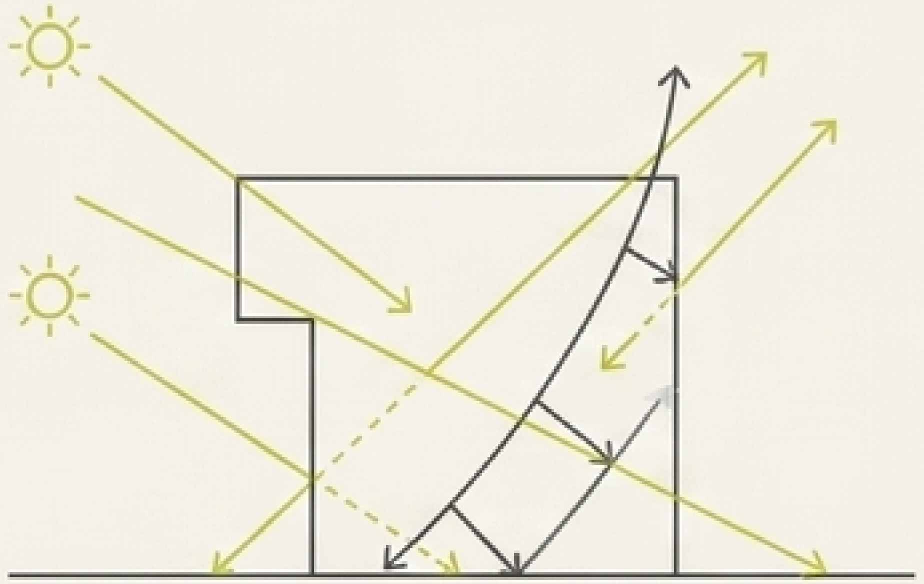
True passive design does not rely on eco add-ons; it relies on spatial geometry and solar access to maintain a natural baseline of 18°C–25°C year-round.



Health Baseline

18°C

The World Health Organization's Housing and Health Guidelines mandate 18°C as the minimum safe indoor temperature.



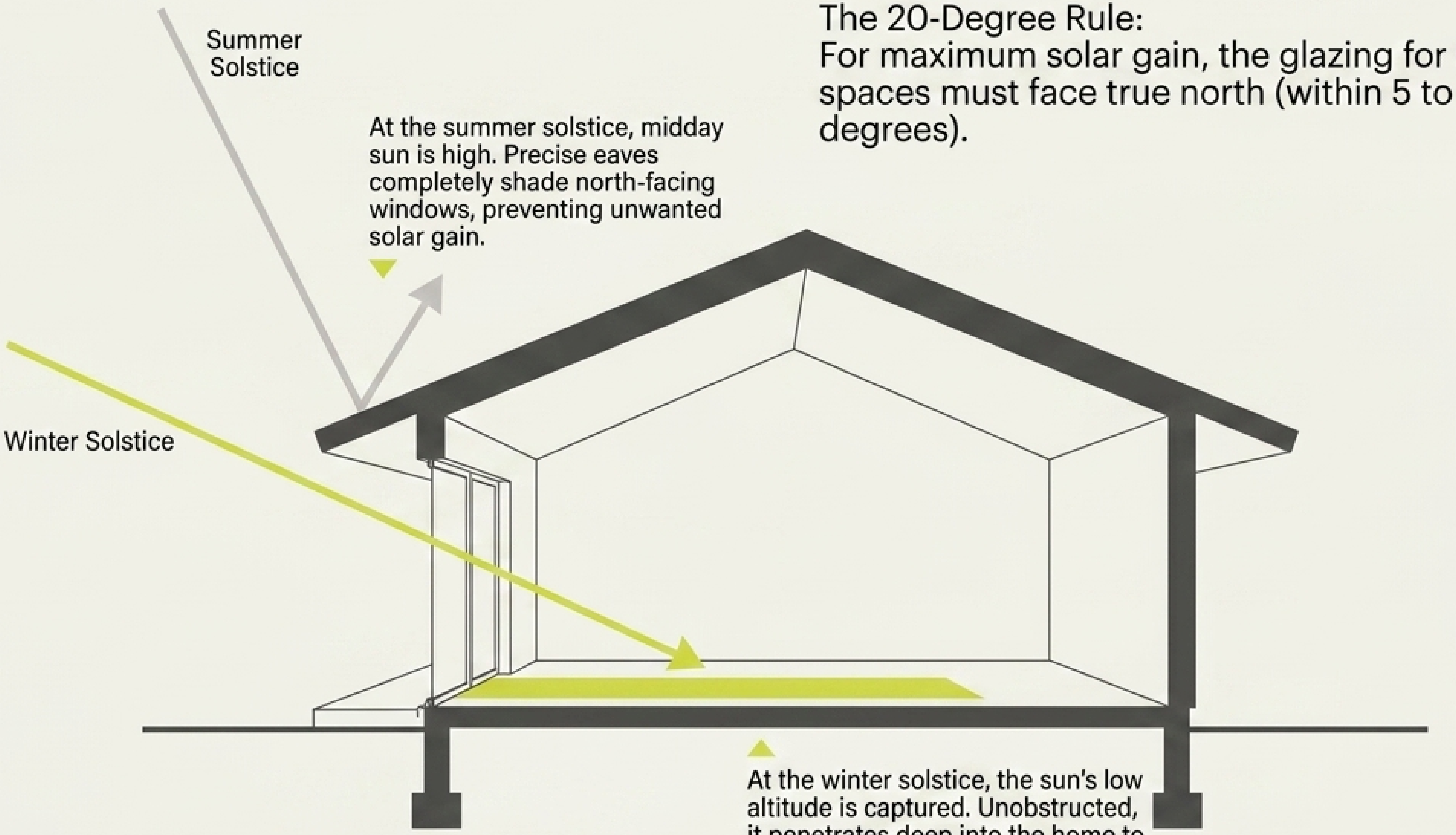
Wealth Baseline

+2.4% Market Value

Motu Economic and Public Policy Research Trust calculates that each additional hour of direct sunlight a house receives per day adds 2.4% to its market value.

The Geometry of Seasonal Control

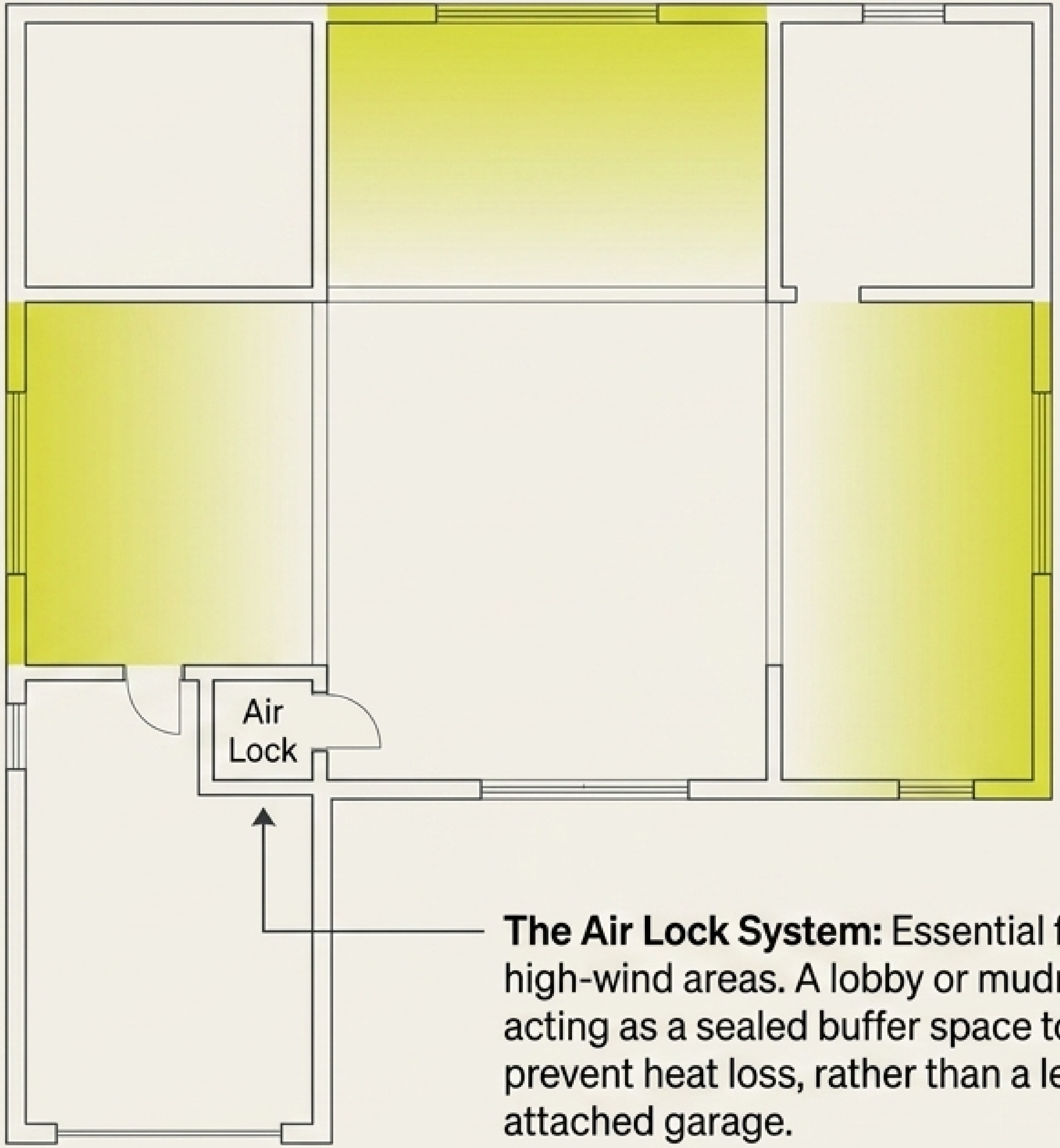
The 20-Degree Rule:
For maximum solar gain, the glazing for living spaces must face true north (within 5 to 20 degrees).



The Solar Aperture Diagram

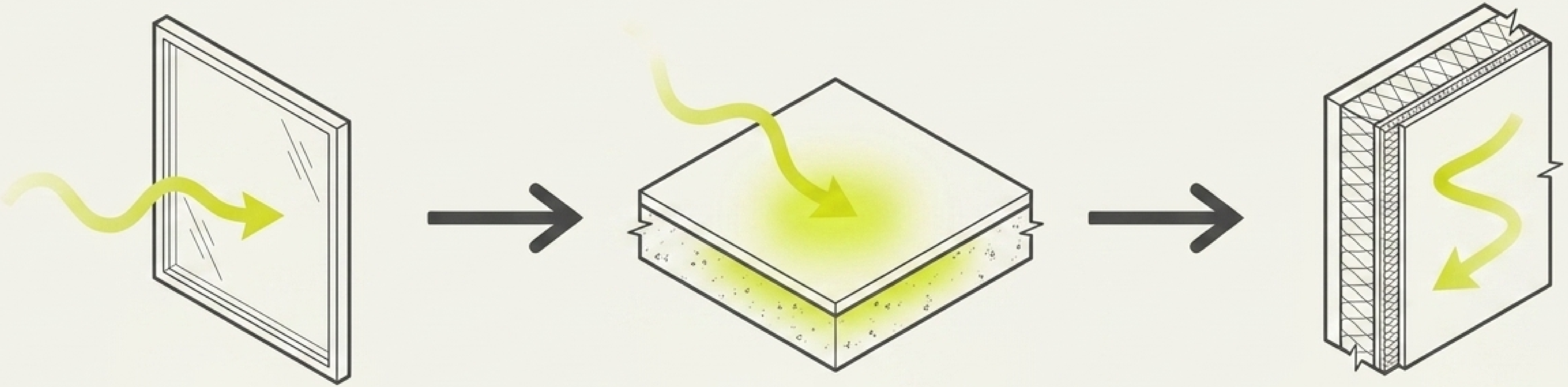
Programmatic Zoning: Form Follows Sun

- **North:** Main living, family, and dining spaces. Maximum daylight and winter solar gain. Horizontal shading required.
- **East:** Kitchens and breakfast areas. Early morning solar gain for initial warming; naturally cools down by late afternoon during meal prep.
- **West:** Evening living spaces. Requires vertical shading to block harsh, low-angle afternoon glare and prevent overheating.
- **South:** Services, garage, laundry, and stairs. Minimal heat gain areas.



The Air Lock System: Essential for high-wind areas. A lobby or mudroom acting as a sealed buffer space to prevent heat loss, rather than a leaky attached garage.

The Anatomy of a Thermal Engine

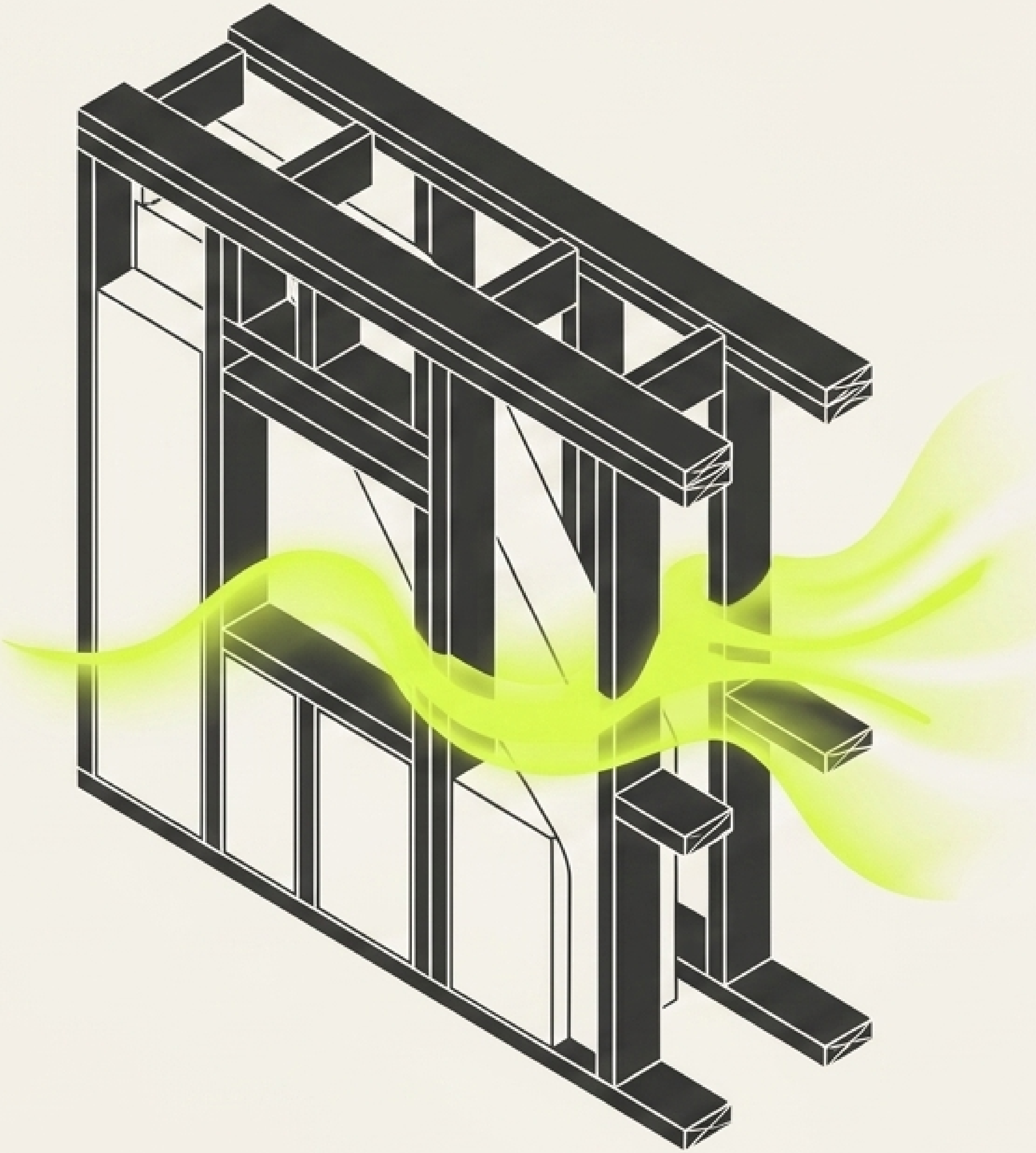


1. Collection (Glazing): High-performing insulating glass units (IGUs) sized heavily on the north face to collect energy, with minimal south-facing glass to prevent bleeding heat.

2. Storage (Thermal Mass): Solar energy lands on dark-coloured hard flooring (concrete or tile). This mass absorbs heat during the day and releases it as ambient temperatures drop at night.

3. Retention (Slab Shape & Envelope): The physical footprint dictates efficiency. A square-ish slab yields the highest R-value (heat retention). Long, highly irregular, or sprawling standard plans bleed heat exponentially.

Slab Shape Efficiency



The Hidden Weakness of Standard Envelopes

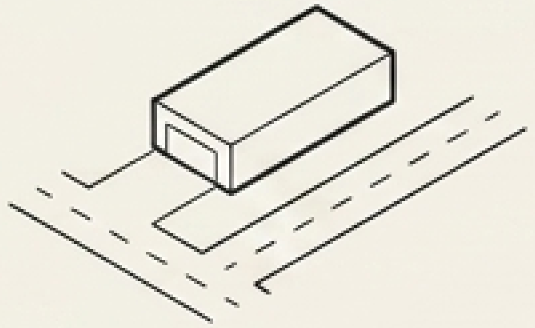
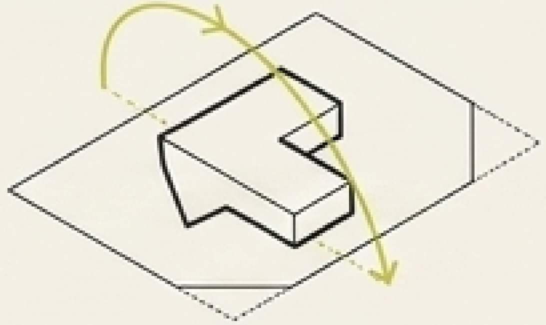
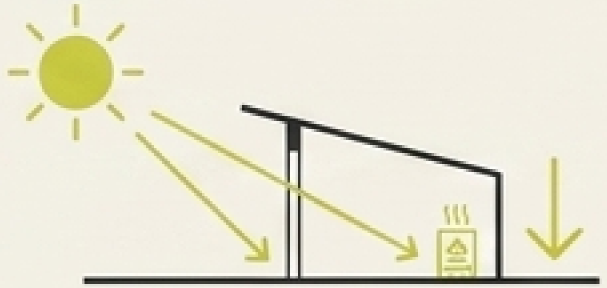
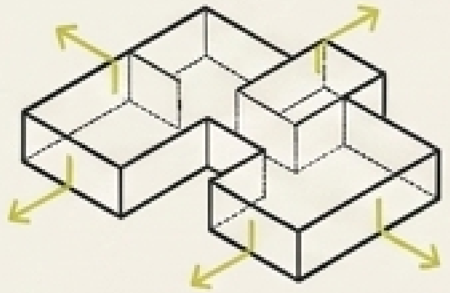
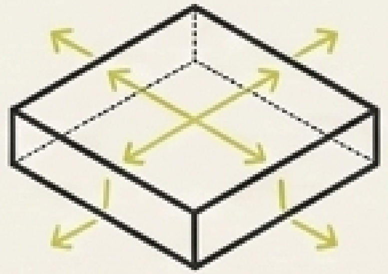
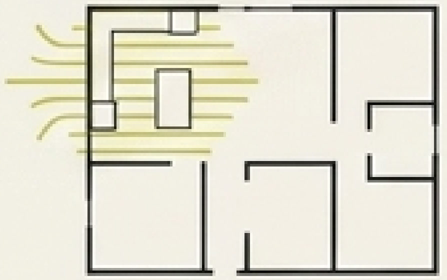
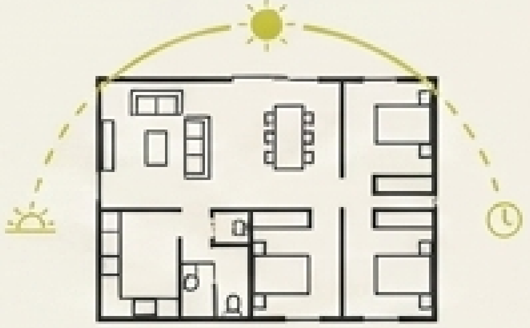
The Framing Penalty: Including high R-value insulation is useless if the structural envelope is poorly designed.

The Data: Recent BRANZ studies show that in modern standard builds, timber framing typically accounts for over a third (33%+) of the net wall area.

The Result: Because timber conducts heat faster than insulation, excessive framing creates massive thermal bridging — literally bleeding the home's warmth straight to the outside, regardless of how much insulation is packed between the studs.

Site-specific architectural design optimizes framing layouts to preserve the thermal envelope.

Standard Construction vs. Architectural Physics

The Off-The-Shelf Plan		The Ecotectural Design	
Orientation Logic Placed to fit the driveway or street frontage.		**Orientation Logic** Anchored near the southern boundary to maximize true-north solar aperture and prevent future shading.	
Heating Load Relies on heavy mechanical heating; costs 2-3x more to run.		**Heating Load** Uses the sun for primary baseline heating; extreme mechanical efficiency.	
Structural Footprint Irregular shapes and sprawling corners that bleed heat and perform poorly in seismic events.		**Structural Footprint** Optimized geometric slabs that maximize R-value and structural resilience.	
Thermal Flow Rooms placed by template; kitchens overheat in the afternoon sun.		**Thermal Flow** Programmatic zoning maps human activity perfectly to the sun's daily arc.	

Engineering for Nelson Tasman

The Local Challenge:

While some parts of New Zealand only require passive heating, the Nelson, Tasman, and Marlborough regions experience a demanding dual-climate: cold winters and harsh, hot summers.

Winter Action: Shallow east-west floor plans and high thermal mass capture scarce winter heat.

Summer Action: Cross-flow natural ventilation, deep calculated eaves, and minimized west-facing glazing intercept overheating before mechanical cooling is even required.

The Dual Strategy: A standard house plan cannot survive this pendulum. It will freeze in July and bake in February.

The Forever Home is a Living System

A true home is not a static box dropped onto a section. It is a **dynamic thermal engine**, locked into the **unique geometry of its site**, breathing with the wind, and tracking the sun.

Do not compromise your site with a house designed for somewhere else.