



BRANZ
Warm roof retrofit

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Ventilation research building

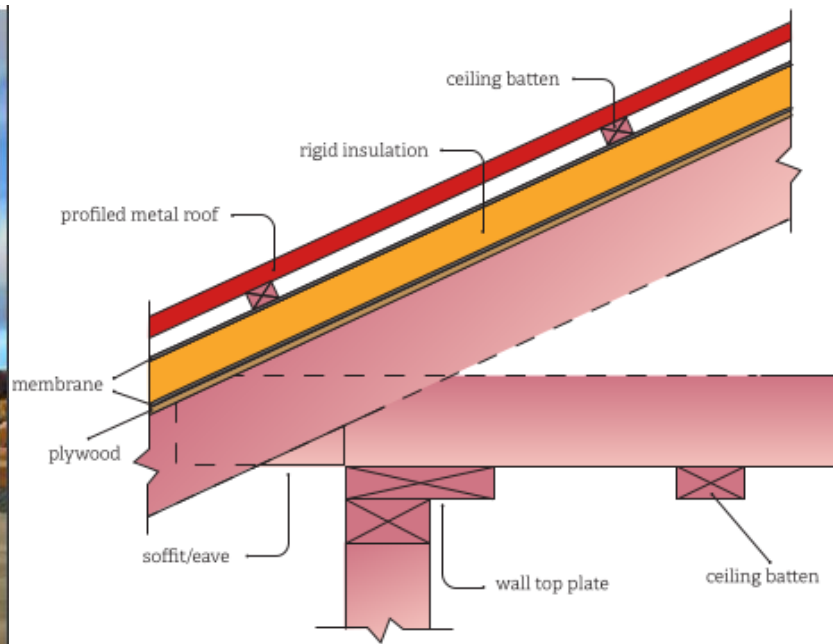


Variable airtightness
From < 1 to over $12 \text{ ach}@50 \text{ Pa}$

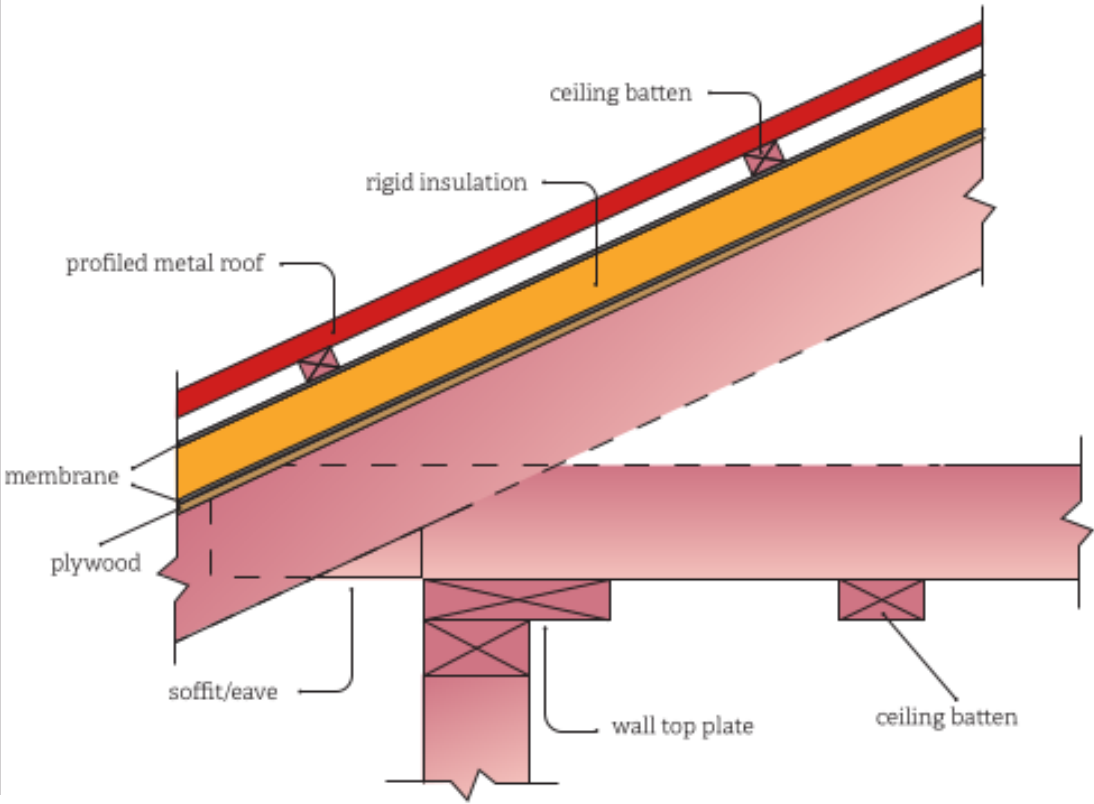
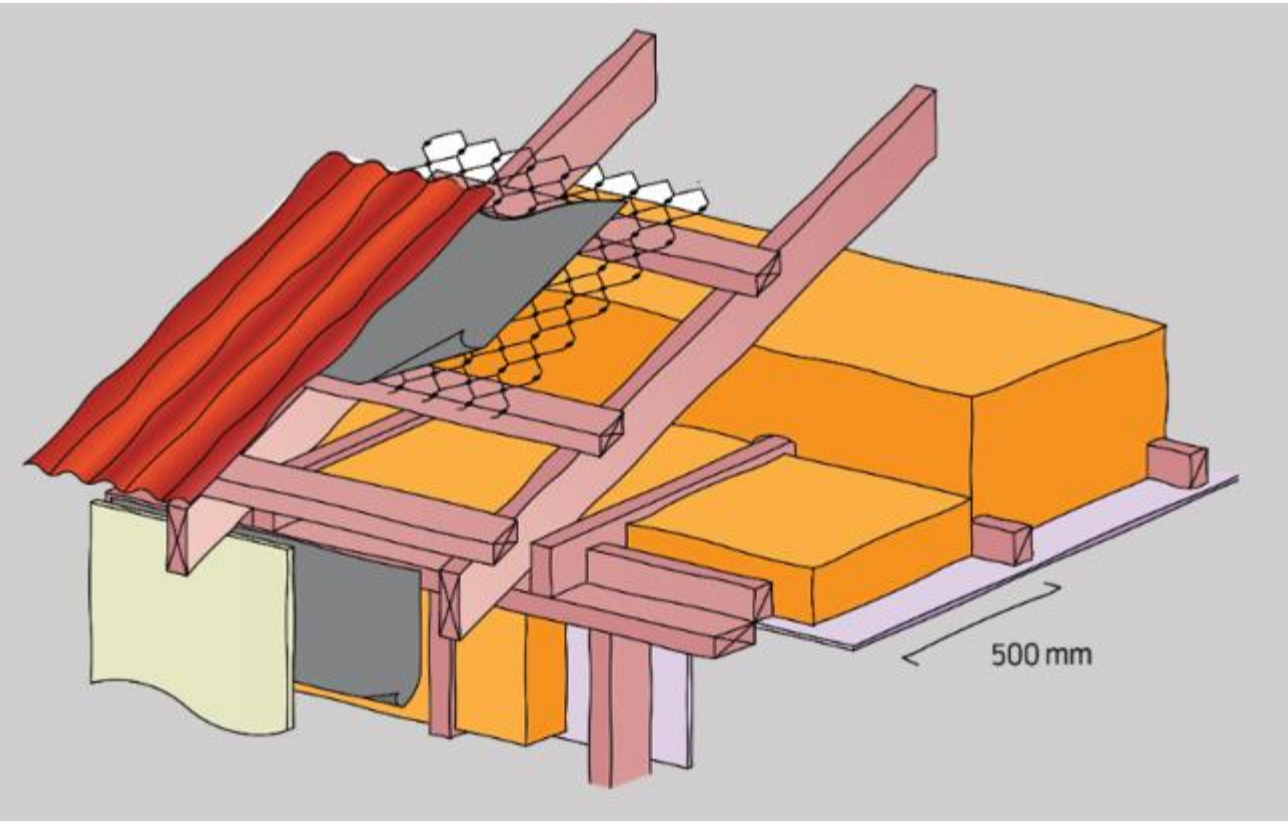
Used for multiple projects:
MVHR efficiency, subfloor moisture, indoor
moisture, corrosion and wind pressure studies



The retrofit process...



Functional differences



Challenges with conventional roof construction



- Moisture accumulation
- Durability and mould
- Uncertainty with design:
 - a) do we ventilate?
 - b) how much?
 - c) what about coastal areas – corrosion risk?

This is *not* a new issue

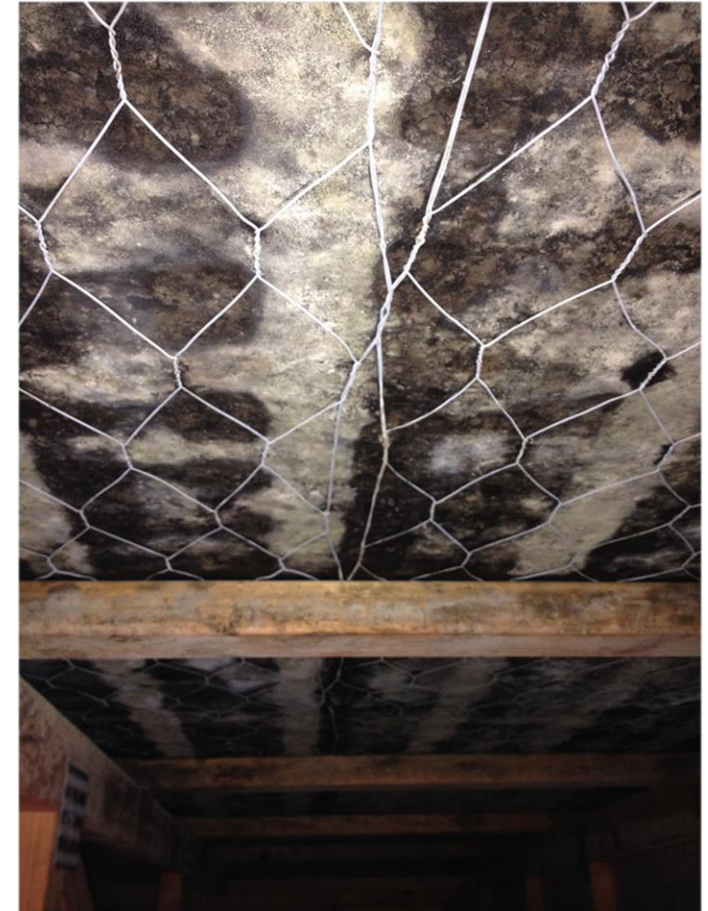
Issues will typically have multi-factor causes

- Site shading
- Orientation
- Ceiling air leakage
- Poor ventilation in living spaces
- Roof colour



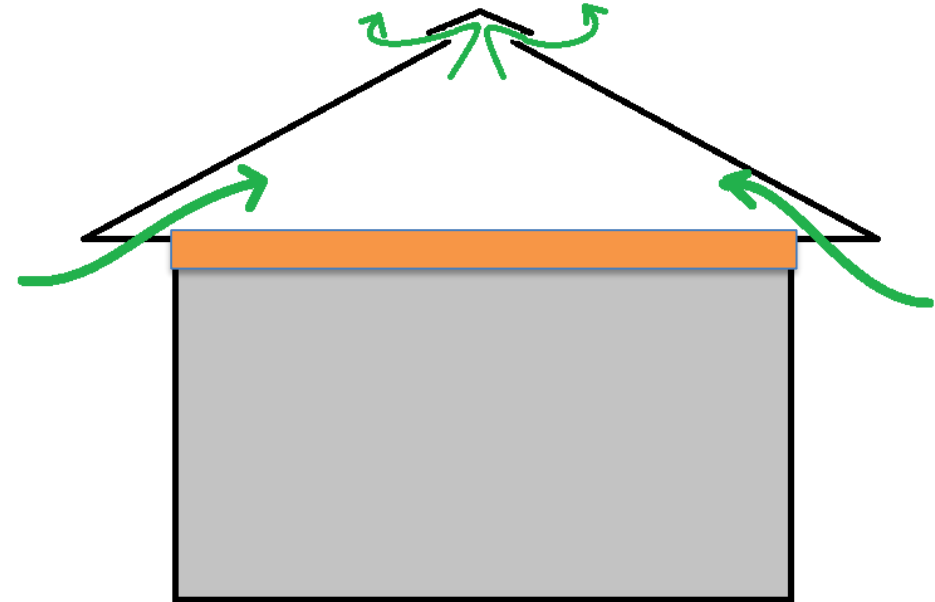
Additional factors specific to roofs:

- Greater overcooling effect – night sky radiation
- Ceiling penetrations – both a heat and moisture funnel
- 2-4Pa stack effect
- Ventilation can make it worse



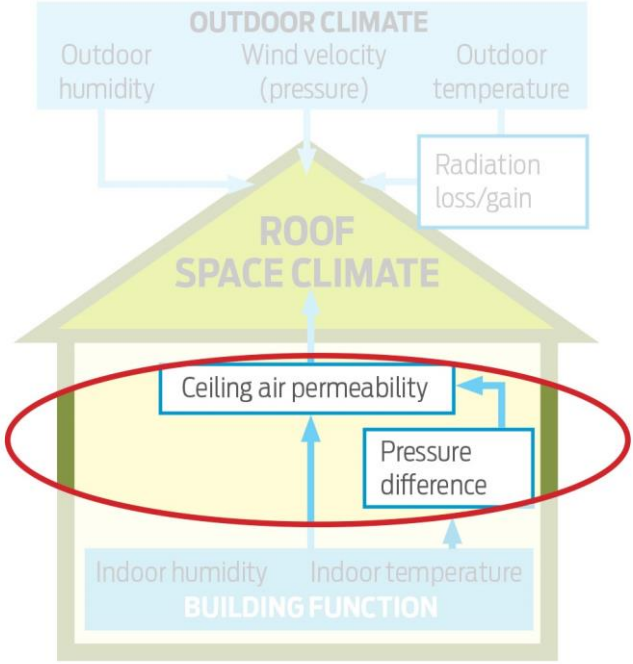
Cold roof ventilation

Needs careful consideration – greater inlet area at eaves than ridge
Site shading a significant determinant of performance

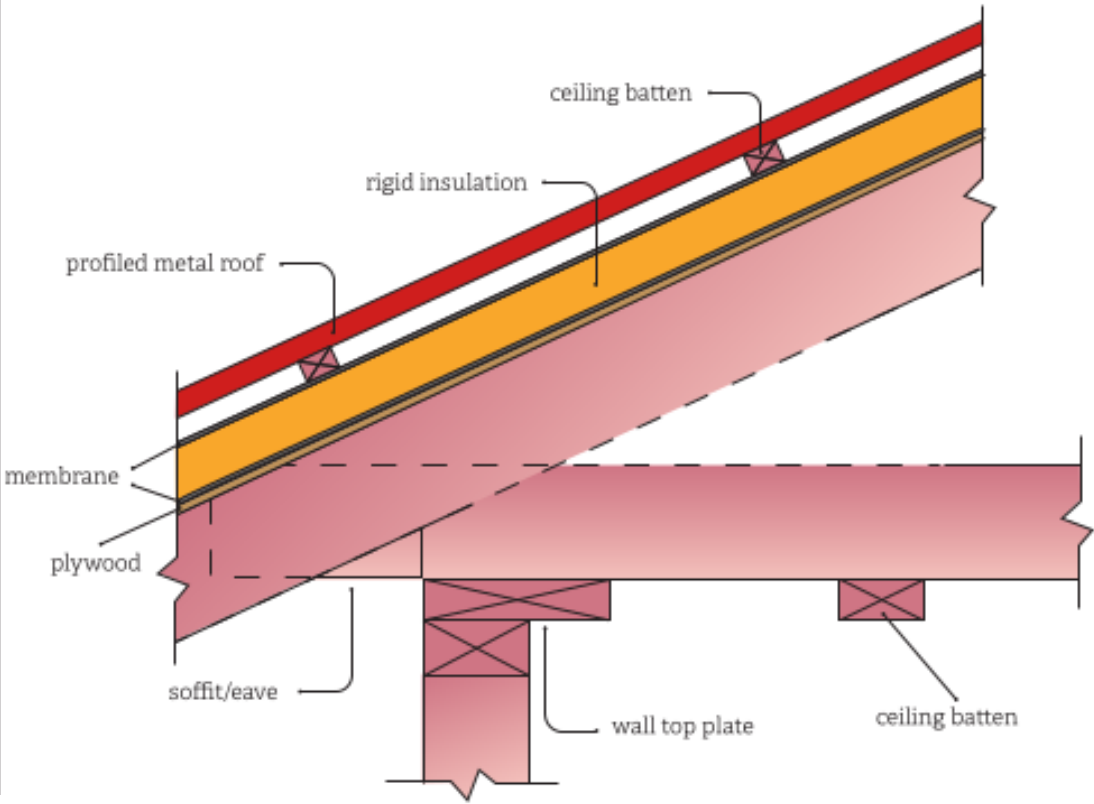
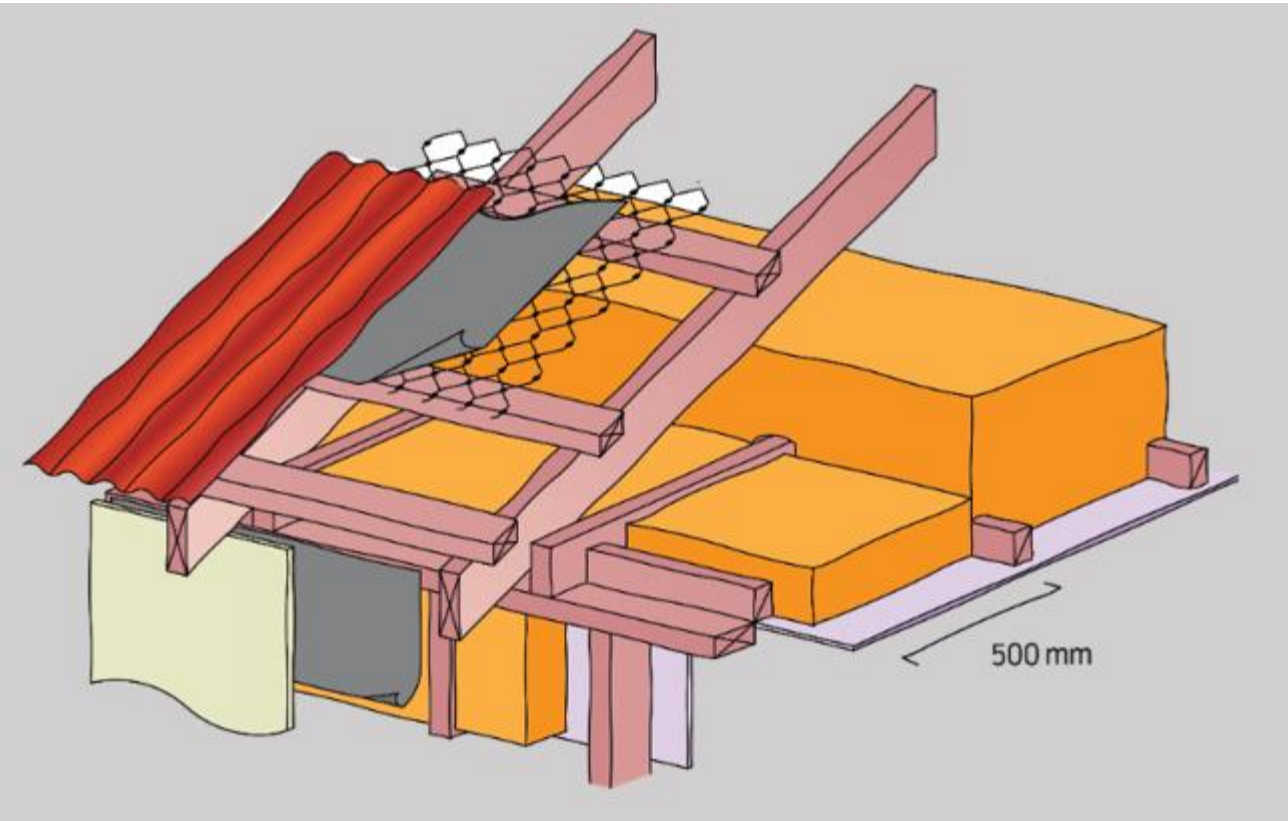


Influences on roof space moisture:

Ceiling air leaks

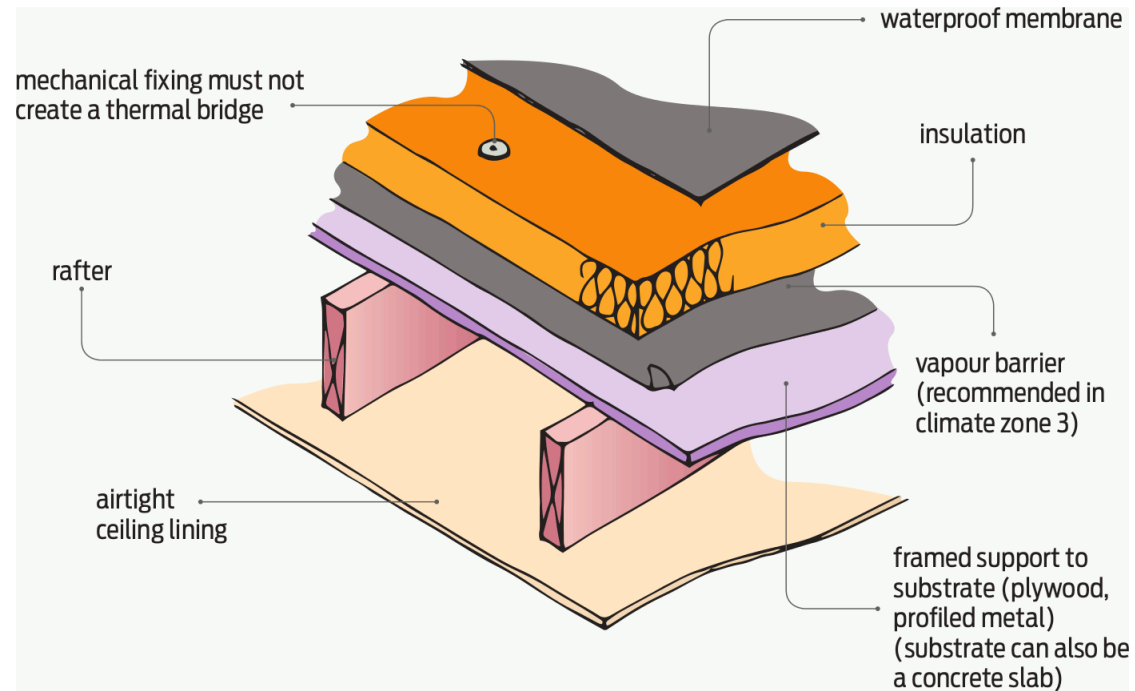


Functional differences



Warm roof options – there are several

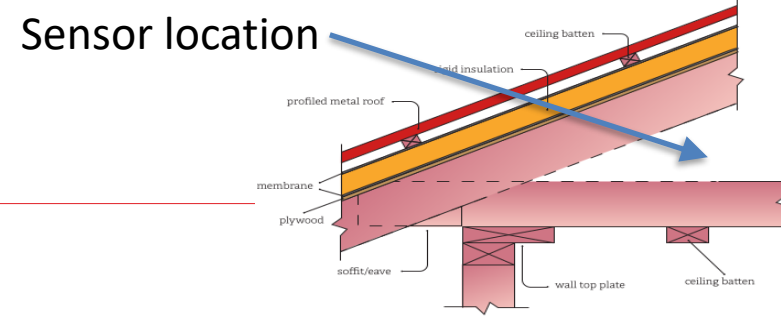
The assembly on this building designed to be installed by a wide cross section of industry
– roof deck should see longer service life than usual



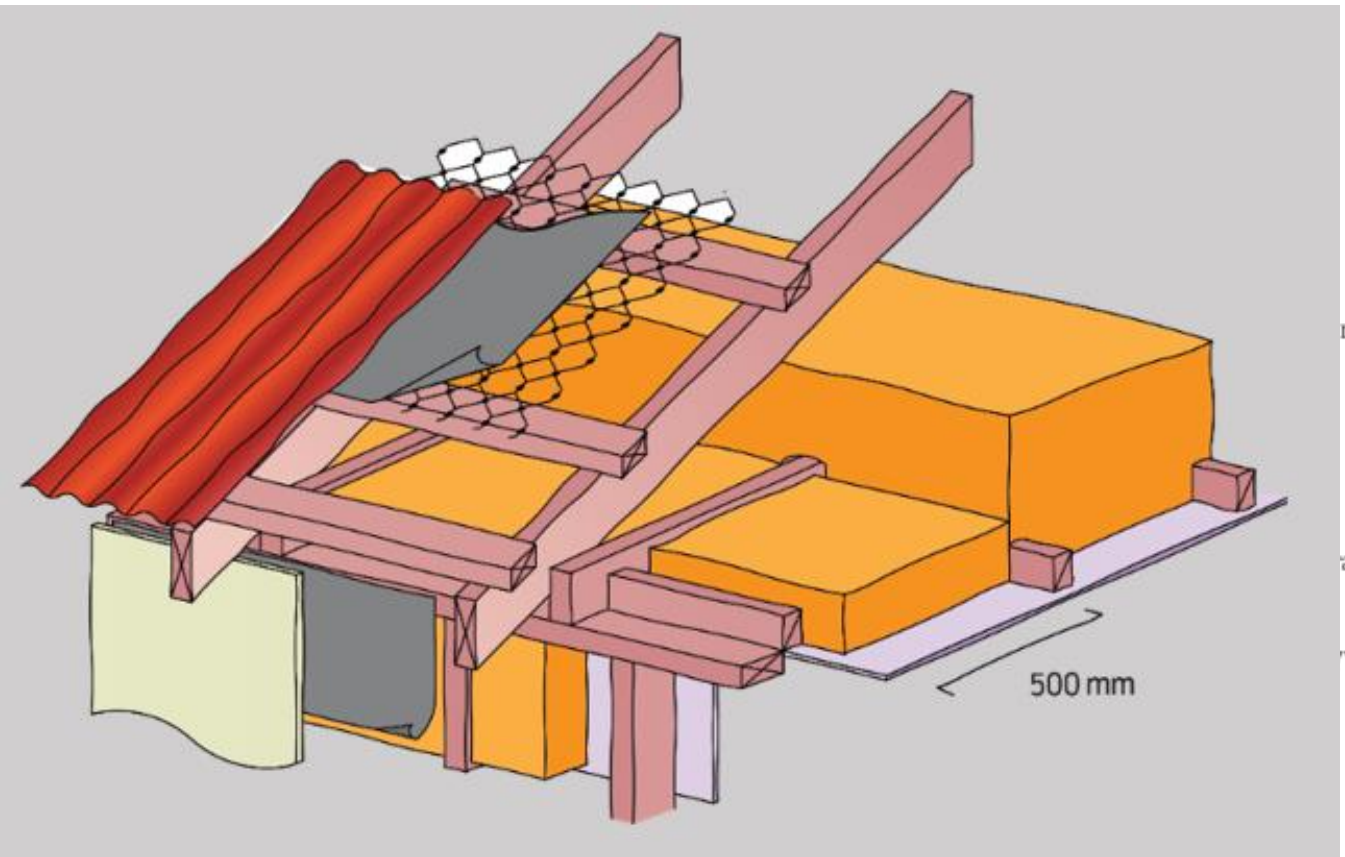
Things to watch:
Hybrid risk
Airtightness planning

Performance in the warmer months

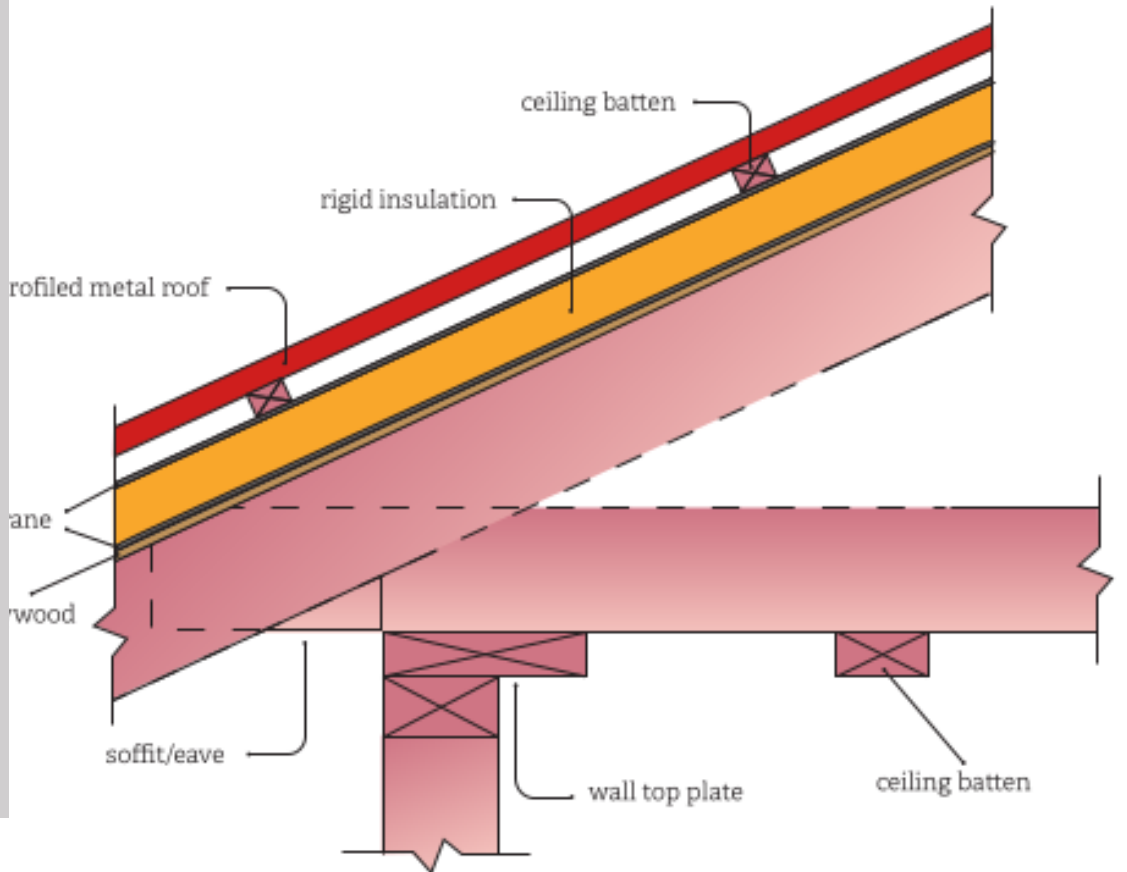
Ventilation system performance improved substantially
Reduced overheating risk
Services subject to fewer extremes



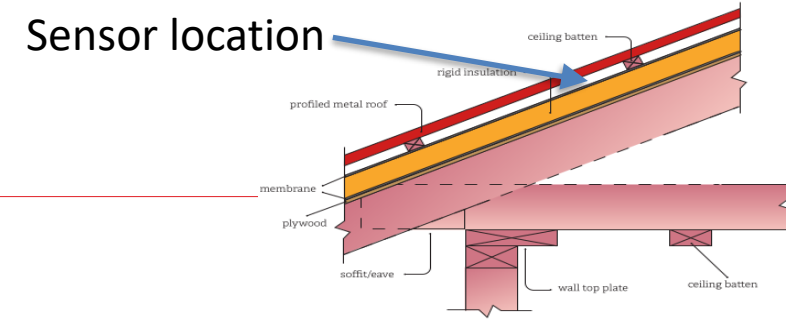
Pre retrofit 'cold' roof



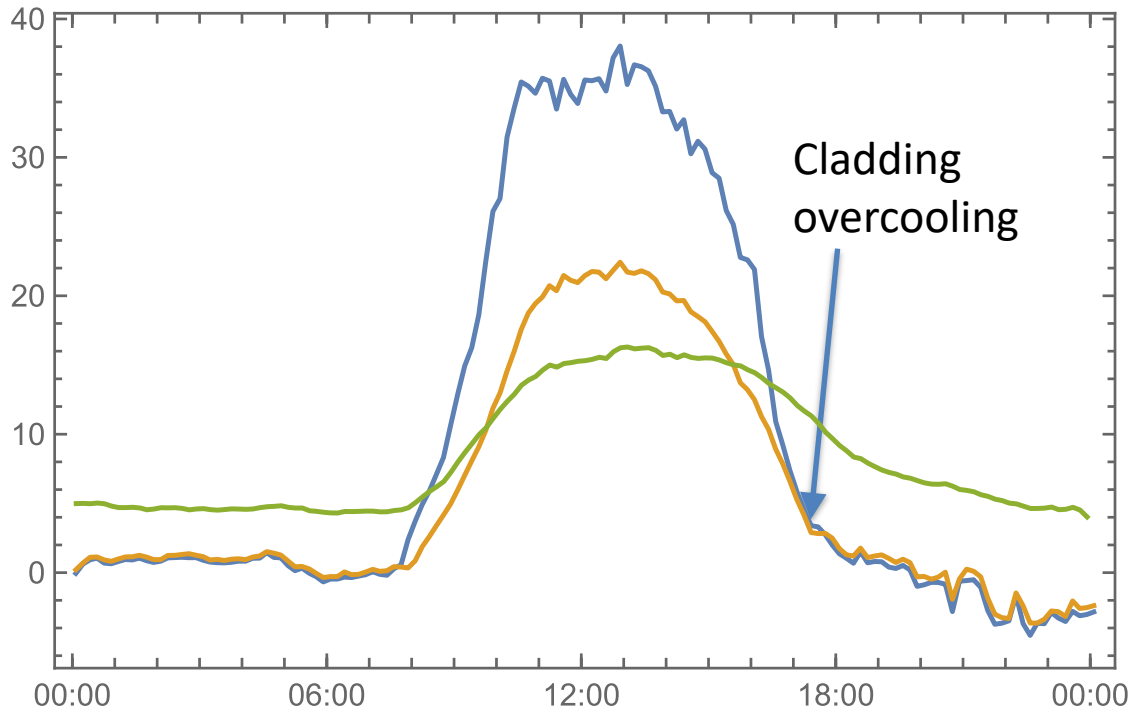
Post retrofit 'warm' roof



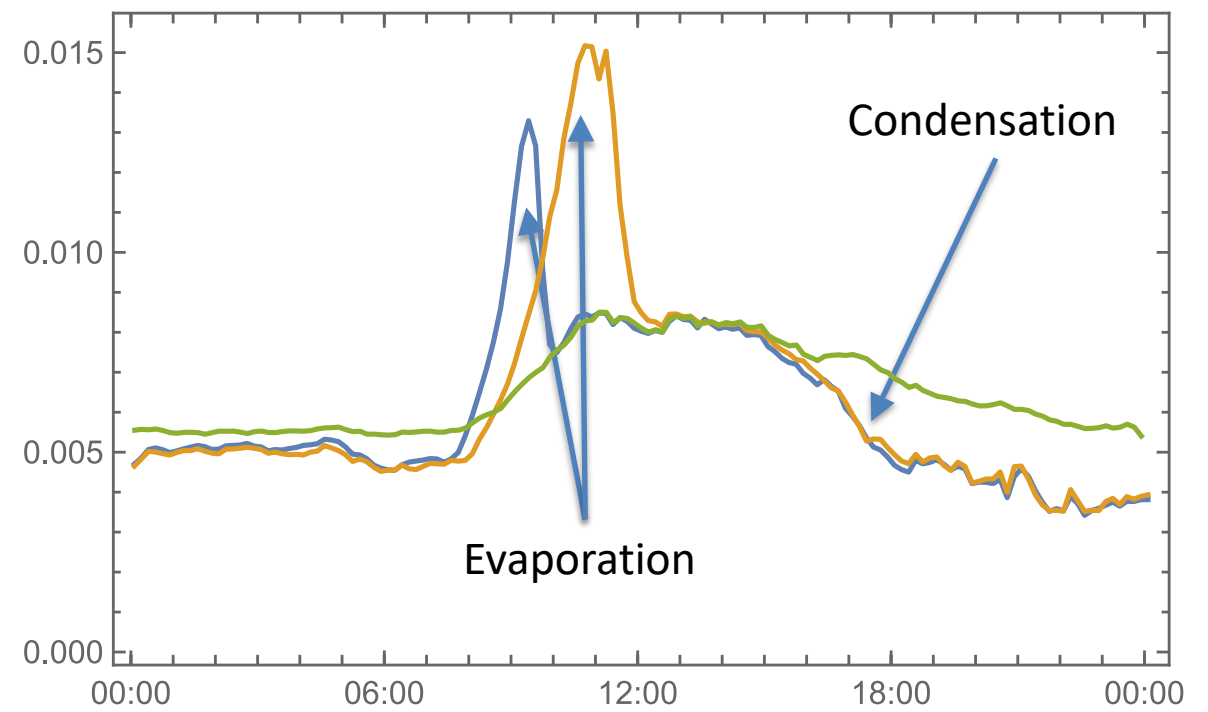
Cladding temps and cavity moisture



Roof cladding temps – 6th August



Absolute humidity – 6th August



— Roof cladding north — Roof cladding south — Outdoors

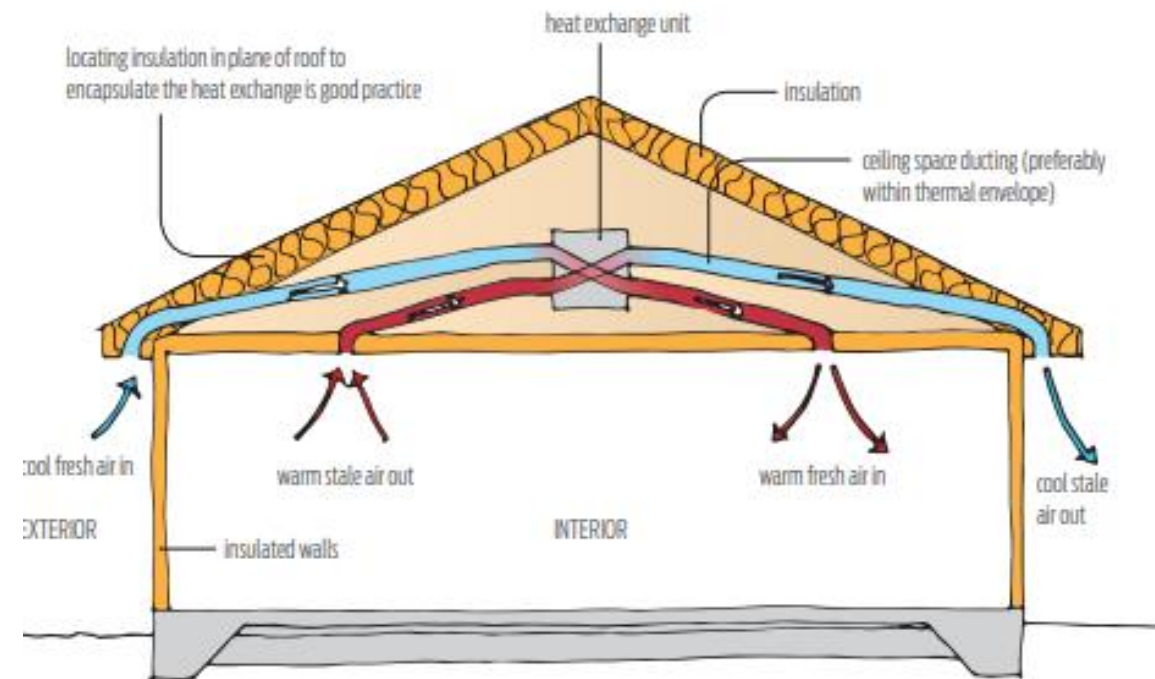
Warm roof benefits

Ventilation system performance improved substantially
MVHR in a cold roof can be as low as 40% - warm roof improves this to close to 70% (depends on core type)

Services (plumbing, heatpump ducts, extracts etc) subject to fewer extremes

Almost non-existent condensation risk

Reduced overheating risk



Thank you!, Questions?

In summary:

Warm roof structures keep the roofspace inside the thermal envelope, are warmer in winter, cooler in summer and make it easier to build a healthy, durable home