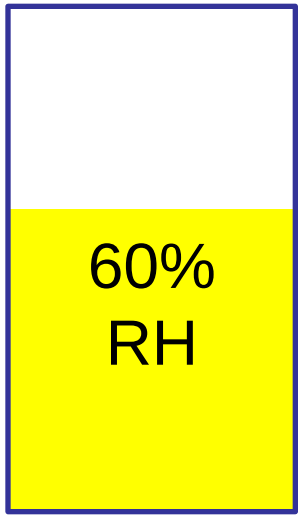
Understanding Condensation

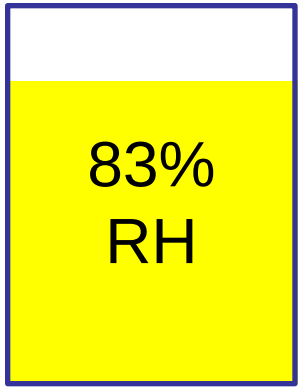
~ water vapor in the air

The warmer the air the more moisture air can hold

At **20°C**



When the temperature drops from 20°C to **15°C** the capacity to hold moisture is reduced



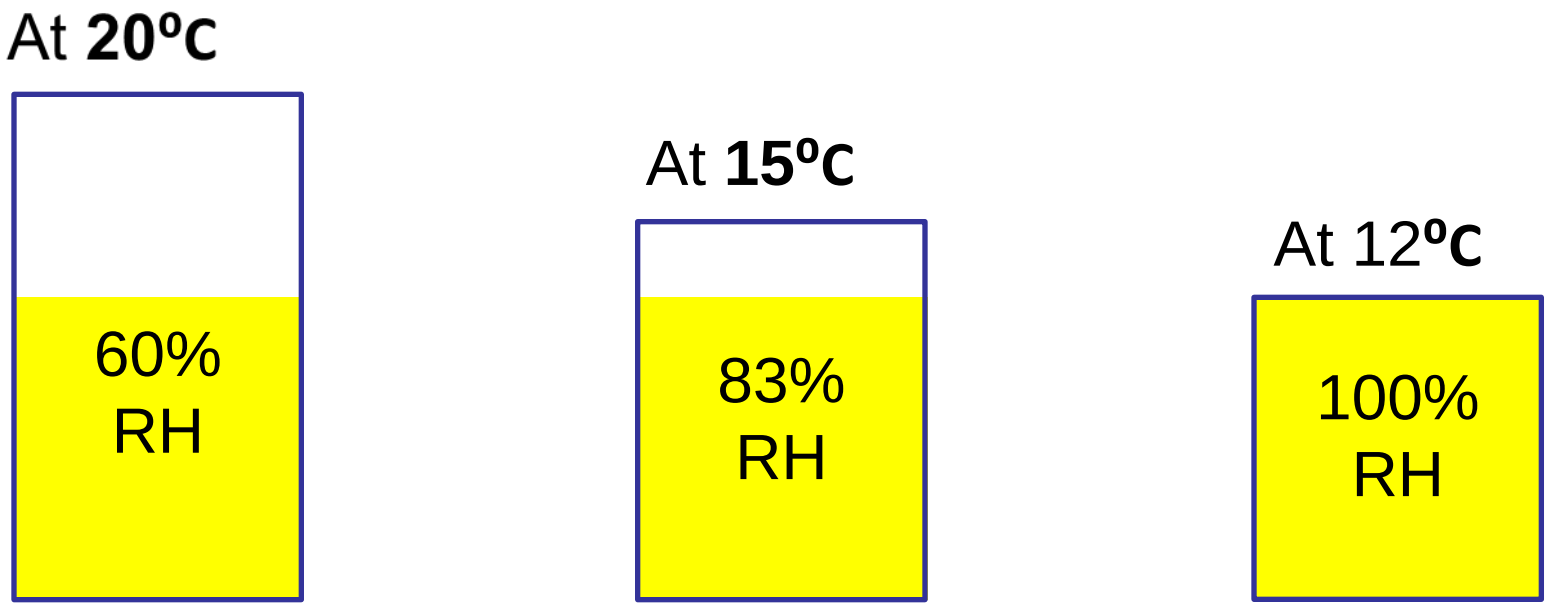
When the temperature is reduced to **12°C** the capacity to hold moisture is reduced further

Note the amount of moisture stays the same

Understanding Condensation

~ water vapor in the air

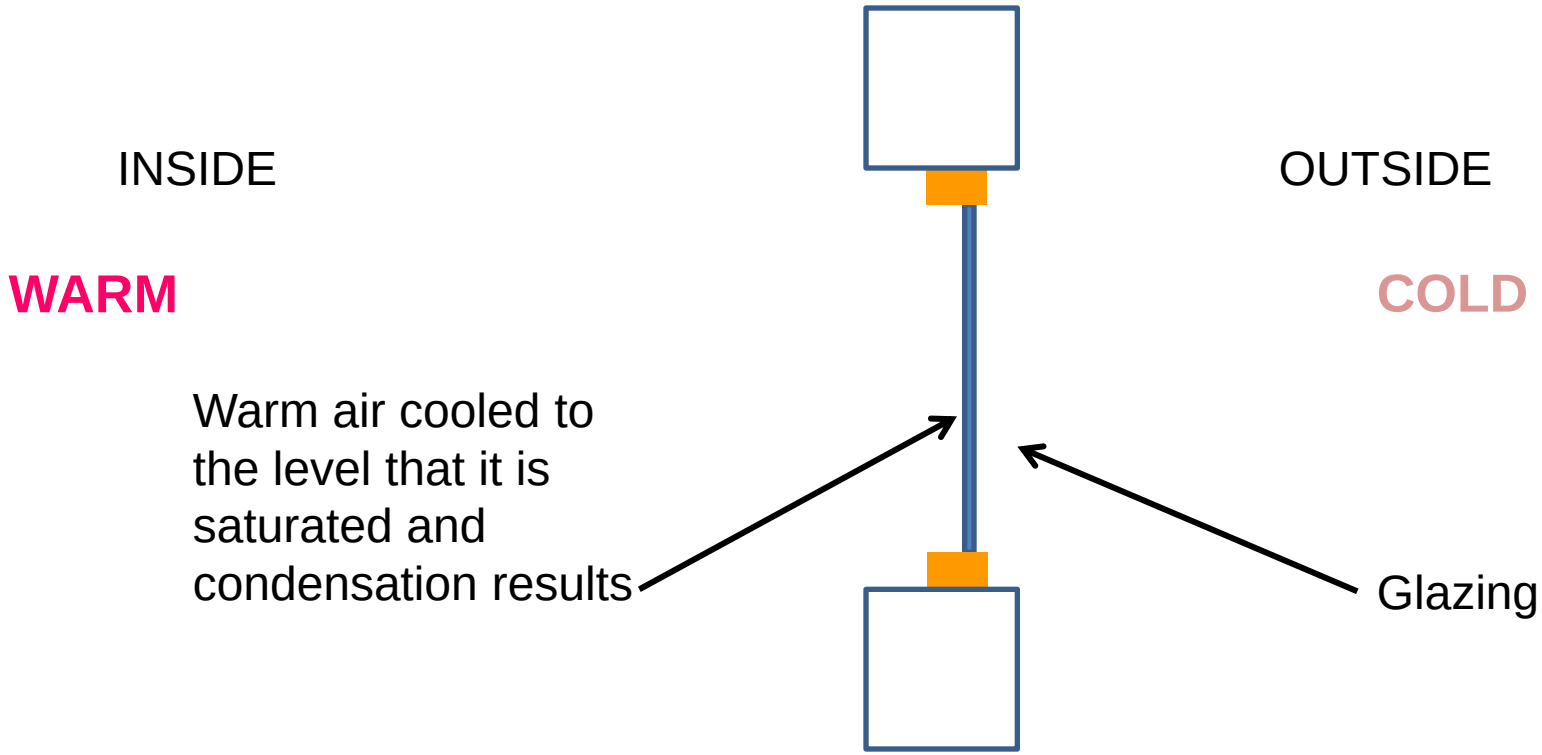
Temp ^{0}C	Water Vapour g/kg dry air	RH
20	8.7	60%
15	8.7	83%
12	8.7	100%



Note the amount of moisture stays the same

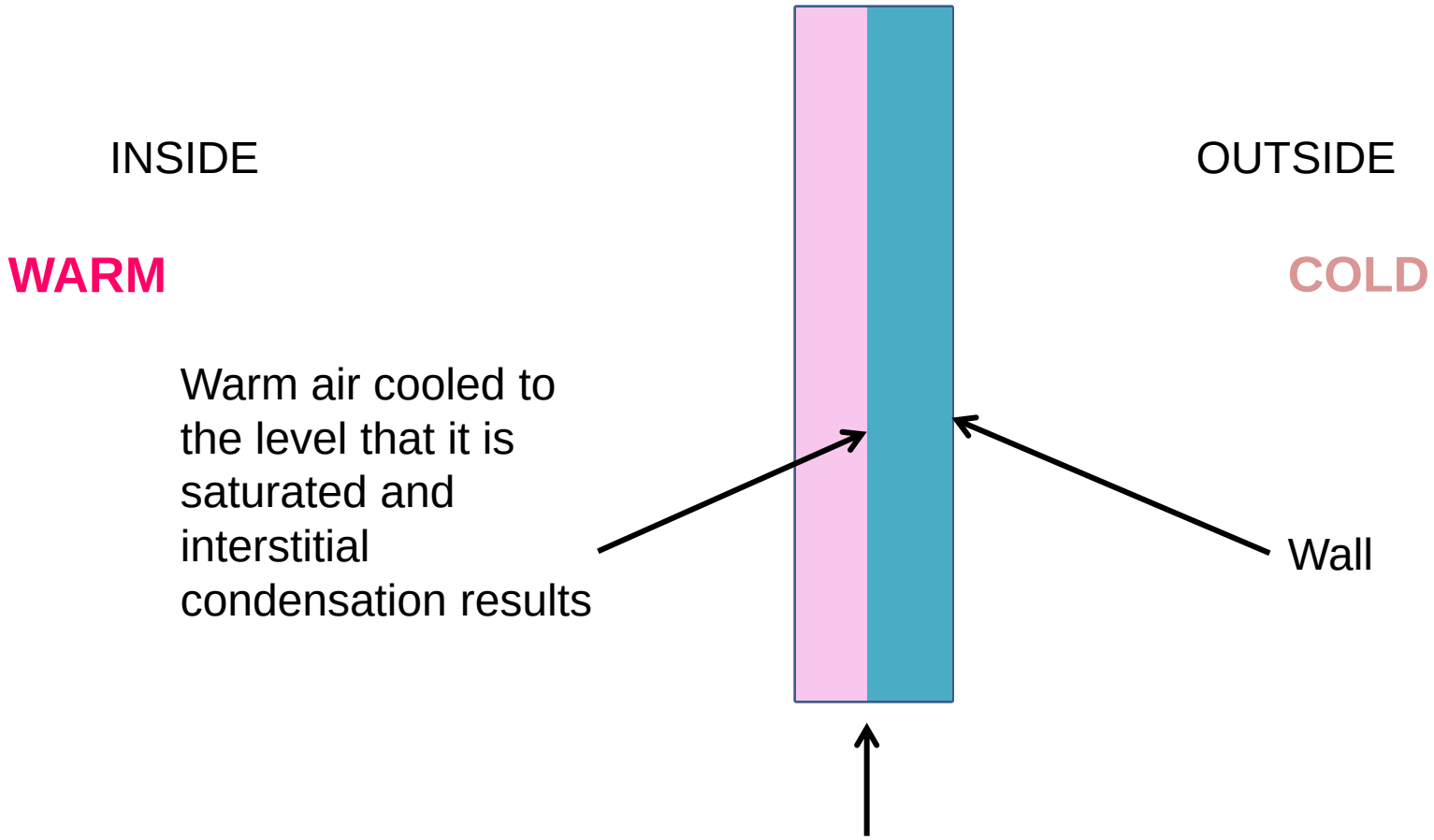
Understanding Condensation

~ *a thermal bridging*



Understanding Condensation

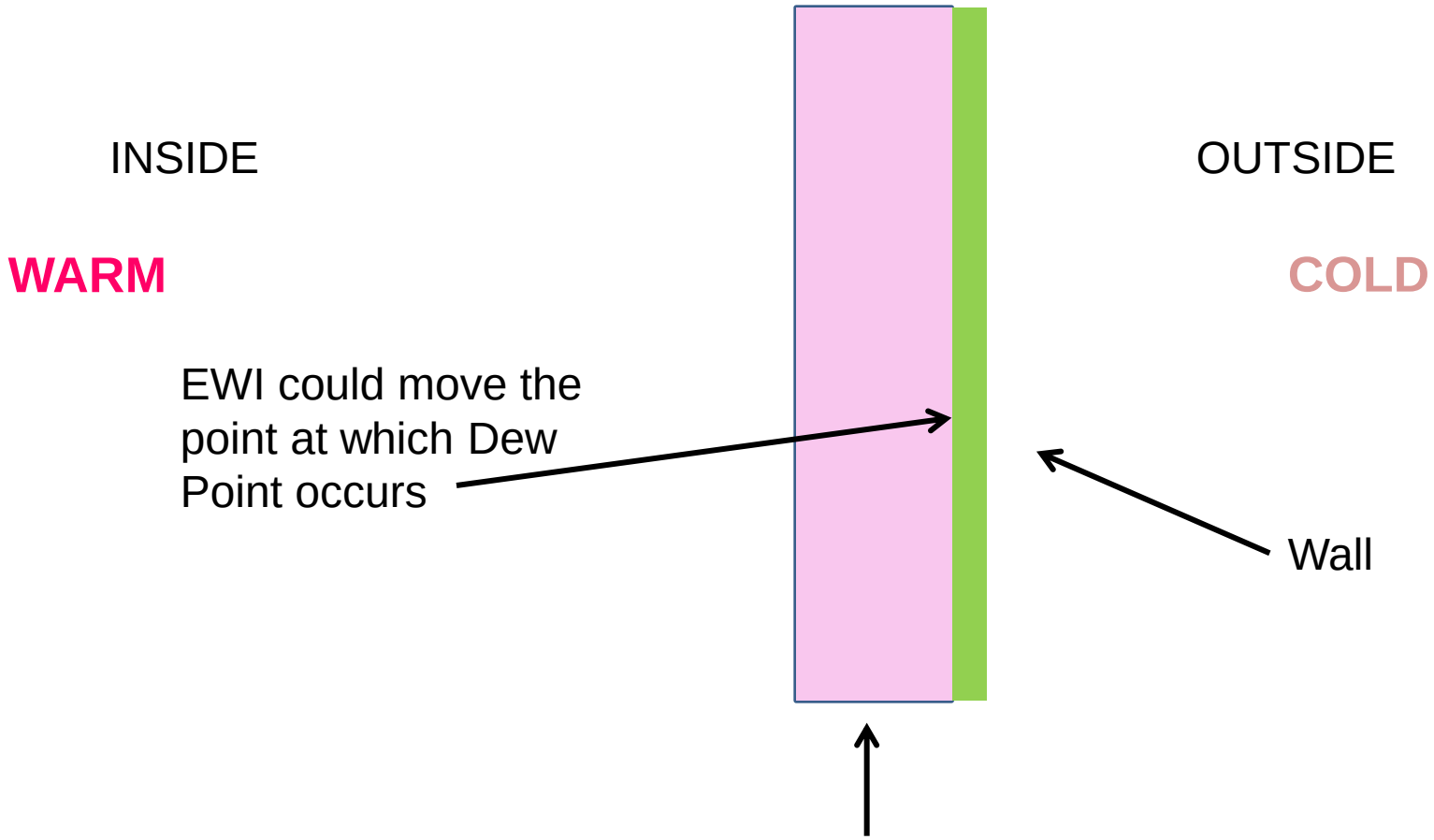
~ *interstitial… within building fabric*



The location where saturation (Dew Point) could be somewhere within the thickness of the wall – where the temperature of the building fabric reaches a low enough temperature to create Dew Point

Understanding Condensation

~ *interstitial… but now its changed!*



The location where saturation (Dew Point) could be somewhere within the thickness of the wall – where the temperature of the building fabric reaches a low enough temperature to create Dew Point

Understanding Condensation

~ interstitial… but now its changed!

Understanding Condensation

~ interstitial… but now its changed!

Understanding Condensation

~ *it's a thermal bridge*

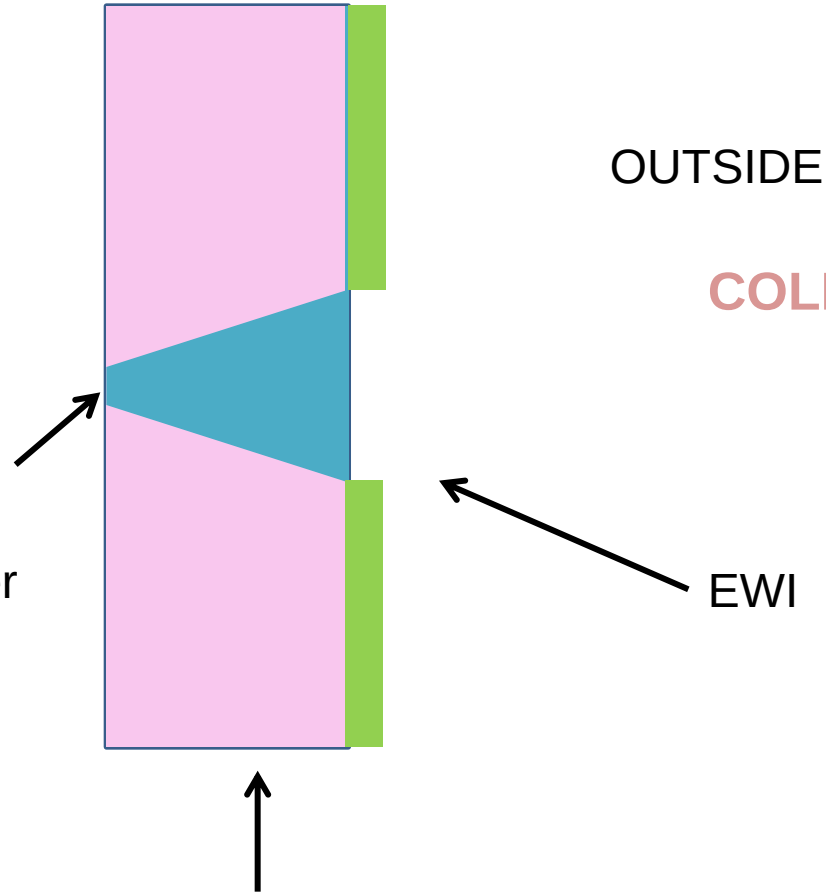
INSIDE

WARM

OUTSIDE

COLD

A break in EWI would create a thermal bridge and move Dew Point in a concentrated area which could be at or much nearer the internal surface of the wall – relative coldness resulting in condensate on surface creating conditions for mould



The location where saturation (Dew Point) could be somewhere within the thickness of the wall – where the temperature of the building fabric reaches a low enough temperature to create Dew Point

Building Surveys

and Building Pathology…

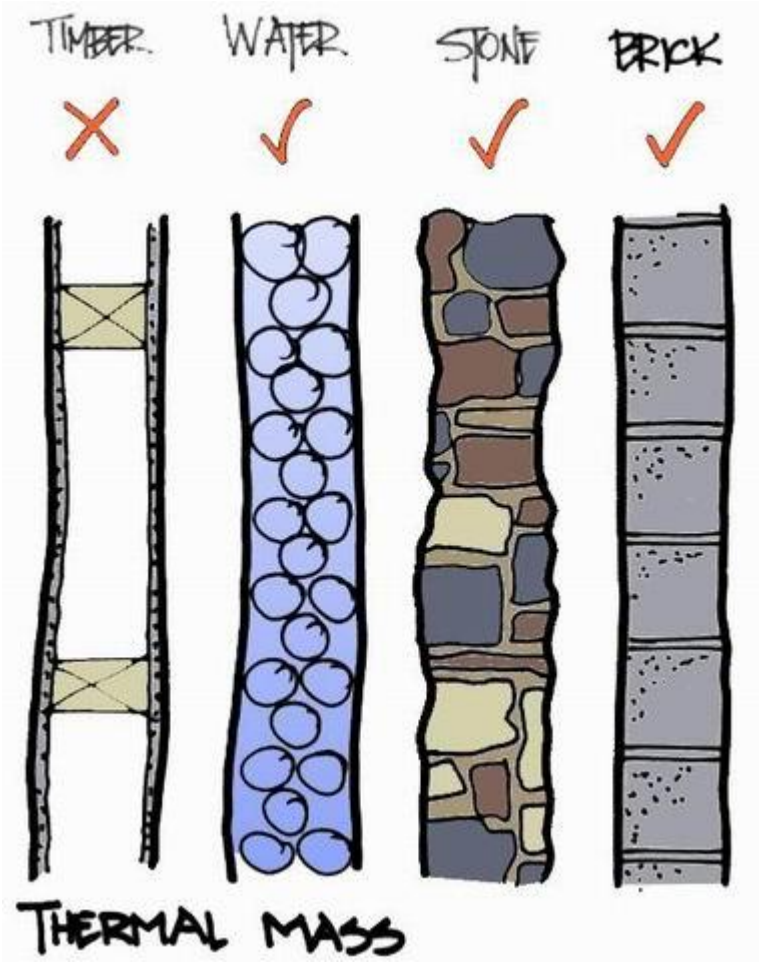
All data can be used in our analysis and help us understand the effects on building occupants and building fabric. For example:

a) Above 45% RH is the minimum comfort levels for humans.
b) From 45% RH to 50% RH is the minimal survival level for dust mites.
c) 65% RH maximum optimal comfort level for humans.
d) Above 70% RH the viability of mould increases markedly, but note that some mould can be established at just above 60% RH.
e) 85% RH is the dampness stage and surfaces will become visibly damp and damp to touch. This is when timber will become affected.

Bedroom 2

- Temperature: 11.5°C
- RH 70%
- AH 5.84g/m³
- DP 6.1°C
- Condensation YES

Thermal Mass and Dew Point Temp

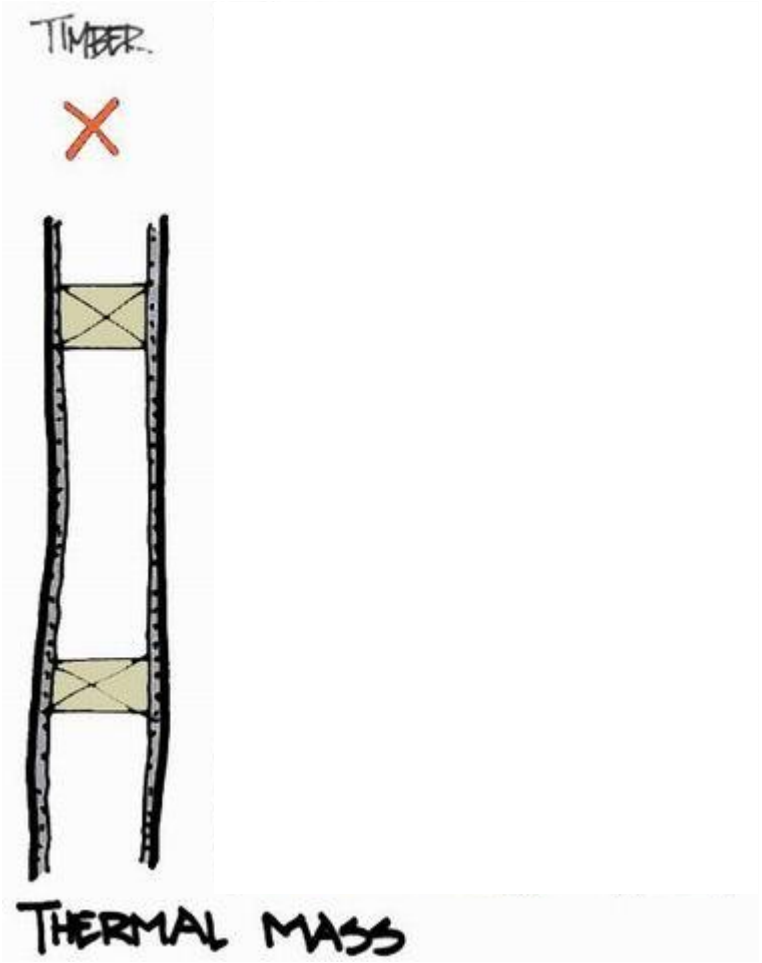


Timber - NO - Cellular construction – no heat retention

Water - YES - absorbing heat which is stored and lasts for a period.

Stone and Brick - YES - absorbing heat which is stored and lasts for a period.

Thermal Mass and Dew Point Temp

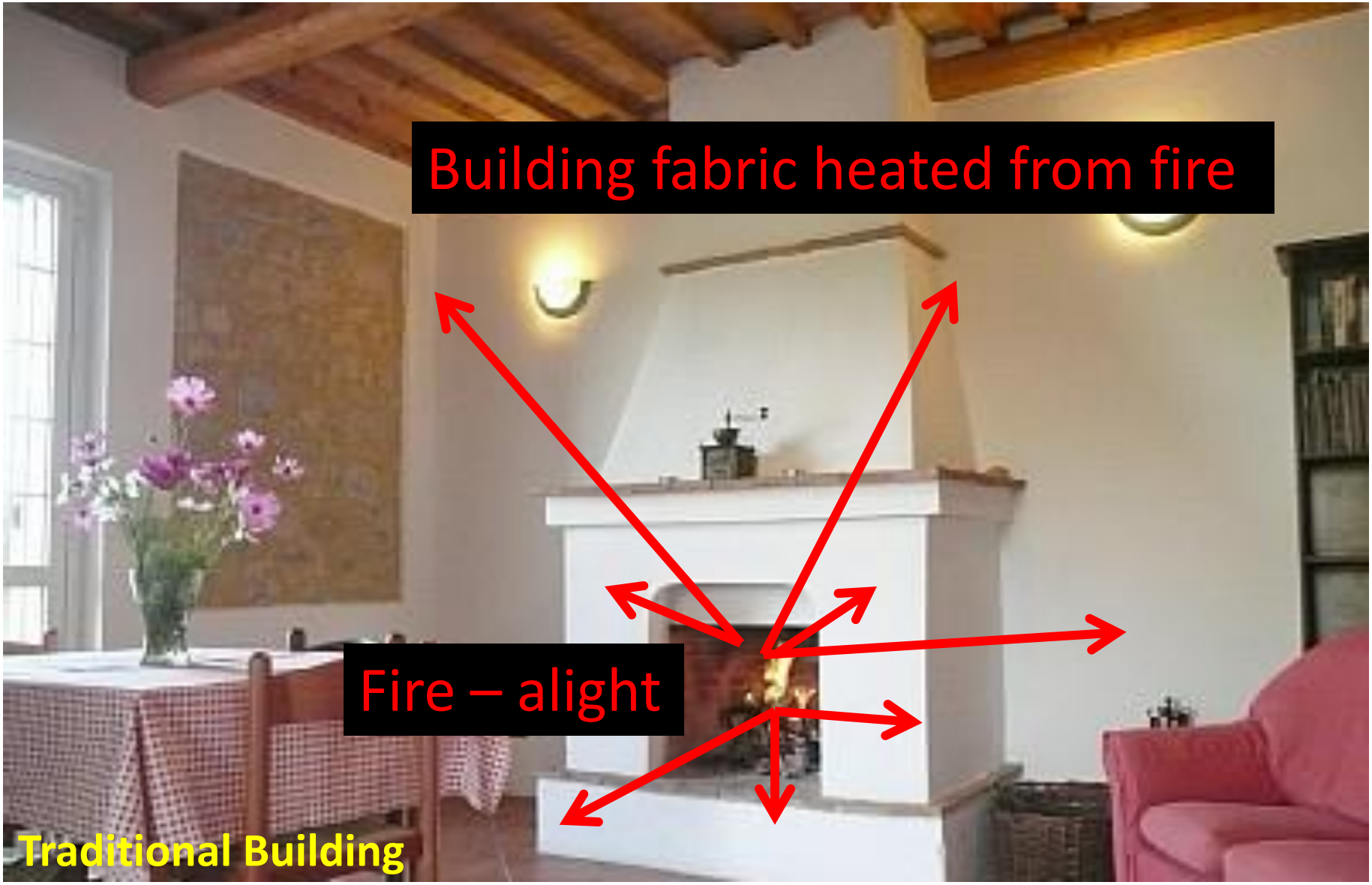


Timber - NO - Cellular construction – no heat retention

Internal Wall Insulation!

External Wall Insulation!

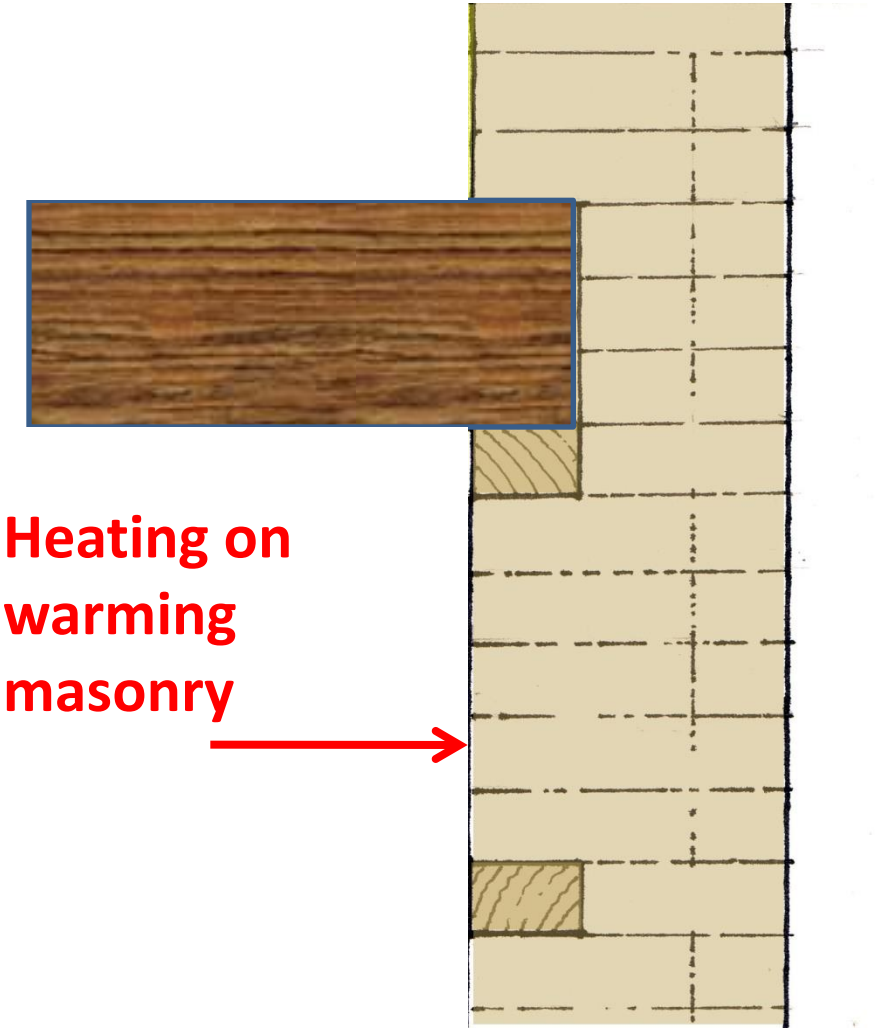
Thermal Mass and Dew Point Temp



Thermal Mass and Dew Point Temp

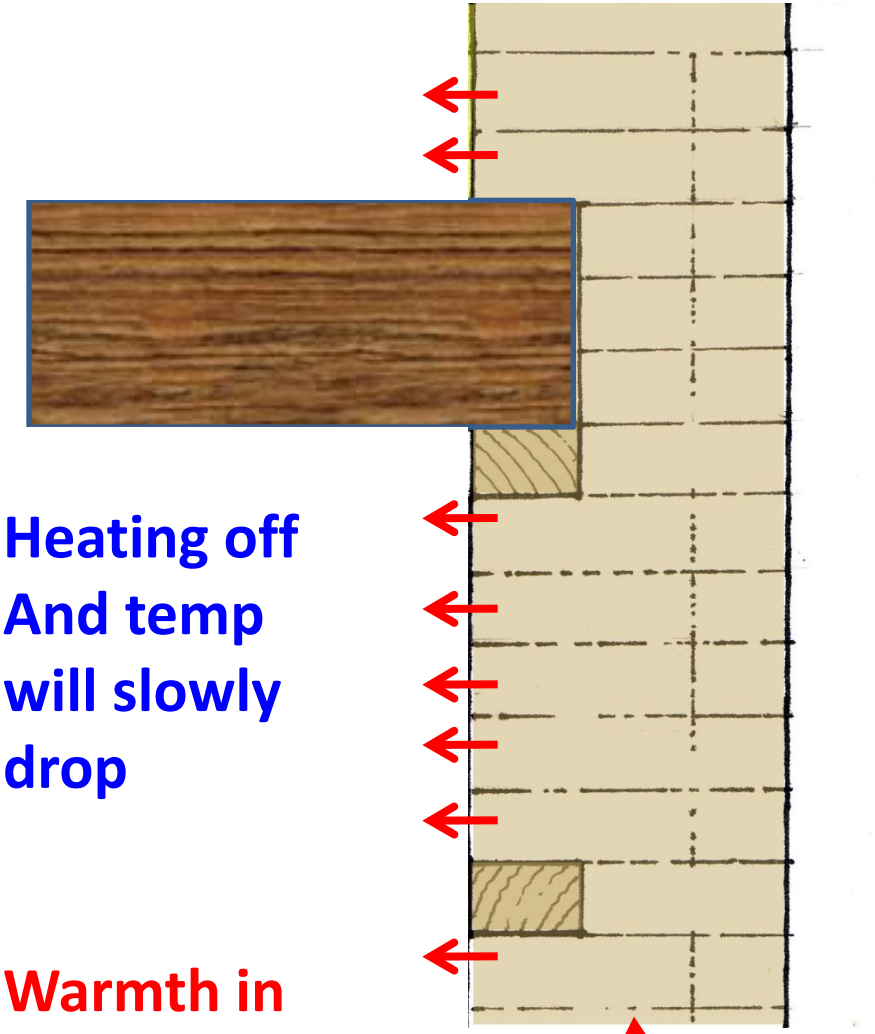
Thermal Mass and Dew Point Temp

Thermal Mass and Dew Point Temp



Heating on warming masonry

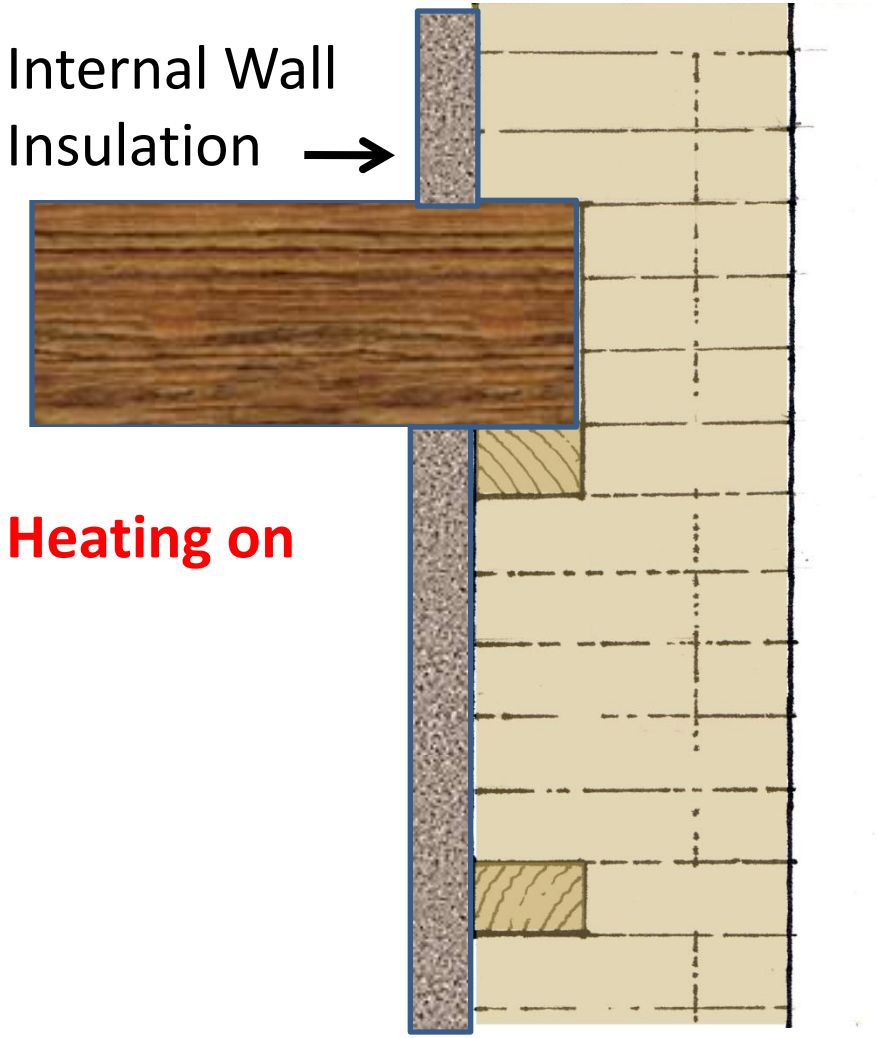
Thermal Mass and Dew Point Temp



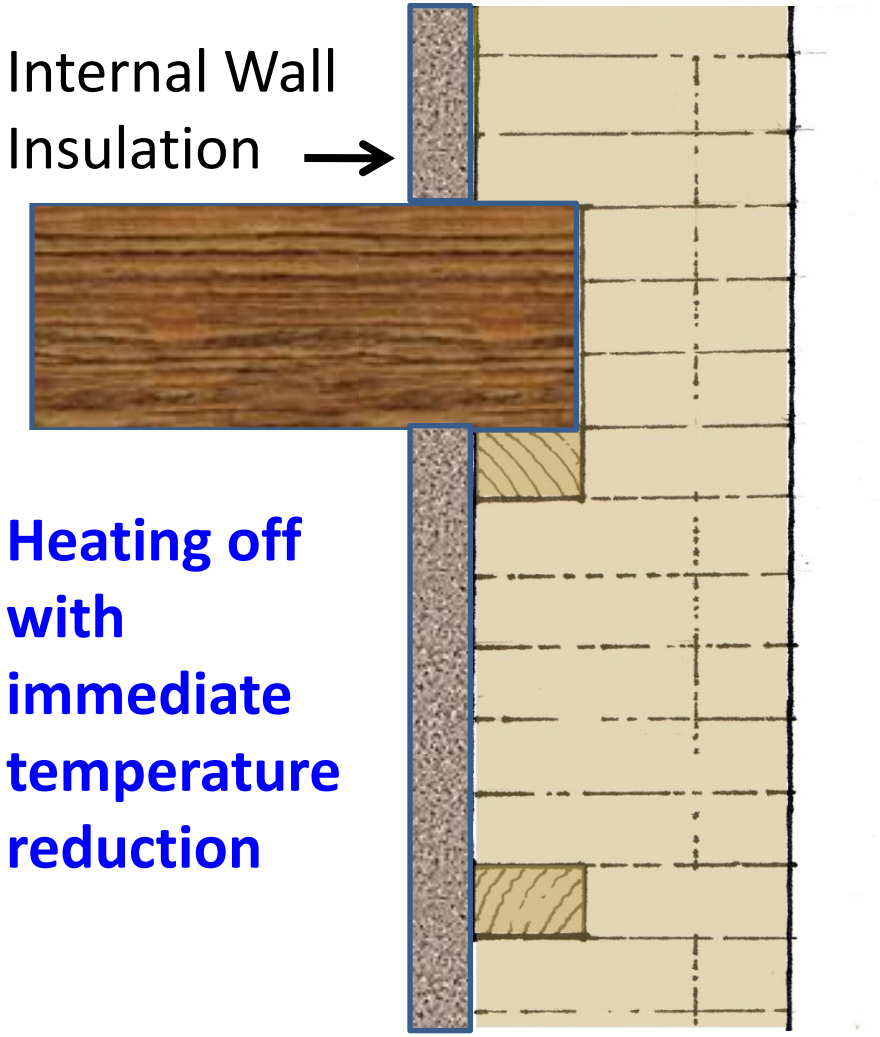
Heating off
And temp
will slowly
drop

Warmth in
masonry
dispersal

Thermal Mass and Dew Point Temp



Thermal Mass and Dew Point Temp



Heating off with immediate temperature reduction

Also important to understand…

1. **Building survey process**
2. **Moisture movement mechanisms – all sources of moisture**
3. **Equipment necessary**

Essentially…

1. **Its not just retrofit – damp building fabric can be 30% less energy efficient than dry (BS7913: 2013)**
2. **Improving the condition of existing building fabric can improve energy efficiency**
3. **A need to put the building in good condition before we retrofit.**