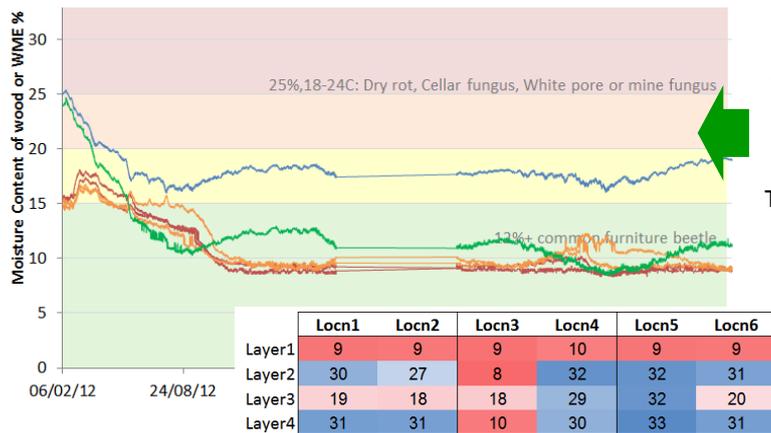


The AECB monitors 10 sites for the Carbonlite Retrofit course and 2 more for commercial clients. The AECB has considerable experience in monitoring and interpretation and is now extending this service to AECB members. Essentially there are main questions: (1) Is the insulation working safely? and (2) If not, where is the moisture coming from and how? We can look at walls, ceilings and floors, internal insulation is typically the most vulnerable. These two questions are answered through sub-questions:

1) Firstly for "Is it working" we need to evaluate the condition of the building. We also want to identify any leaks.

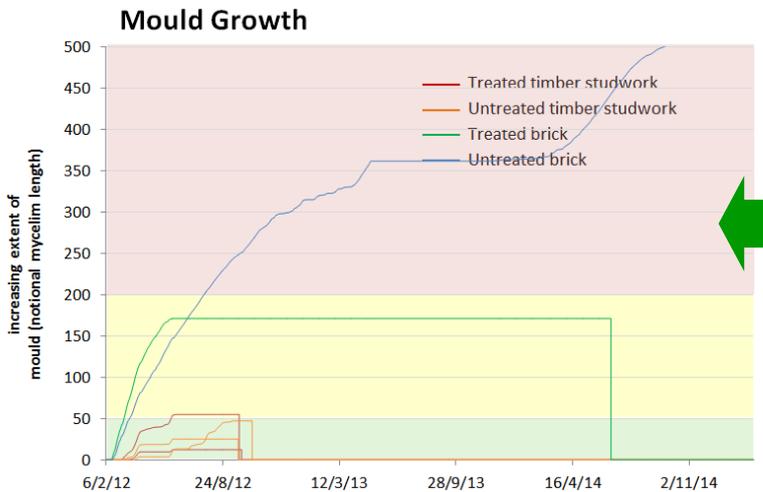


a) What is the moisture content inside the wall and what is the rot risk for any timbers?

This graph and table shows Moisture Content (MC) or Wood Moisture Equivalent (WME) is measured using resistance between sensor pins.

This graph can also answer:

- Are there any unusual leaks?
- How fast is the wall drying out?
- Is there any rot risk for timbers in the wall?
- Is the DPC effective?
- Are joist ends in good condition?



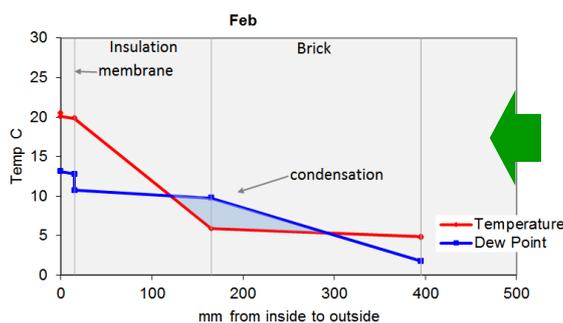
b) What is the risk of mould?

We use an algorithm for this similar to the one used by the Fraunhofer Institute in WUFI-BIO and we are trying to calibrate this against observations where possible. Risk can suddenly drop to zero if the mould dries below 65%, but spores will survive and they can germinate again in the future. We are developing a calibration of these calculations against in-situ observations for mould.

This graph can also answer:

- Where is mould risk most likely?
- How does mould risk change over time?

2) "If not, where is the moisture coming from and how?" is about the sources and mechanisms. Knowing the source and mechanism allows something to be done about it, e.g. apply a brick treatment, repair a DPC.

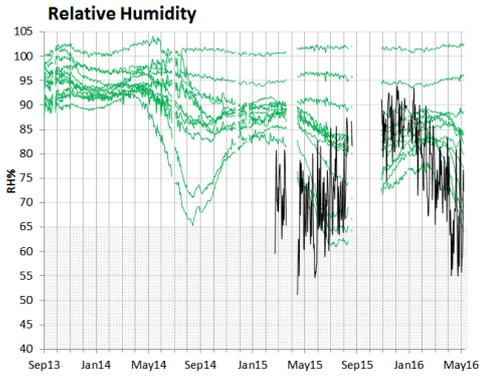


a) What would we expect to happen from simple vapour calculations (Glaser method)?

The Glaser method over simplifies but it is the basis for condensation risk calculations in the UK so it is a simple rough indicator. We use measured data for the internal and external conditions which gives a more accurate result.

This graph can also answer:

- Is this construction likely to produce problems, in the absence of rain, ground or existing moisture?"

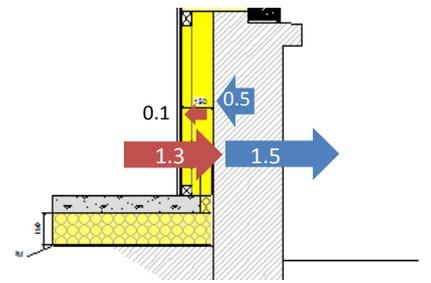
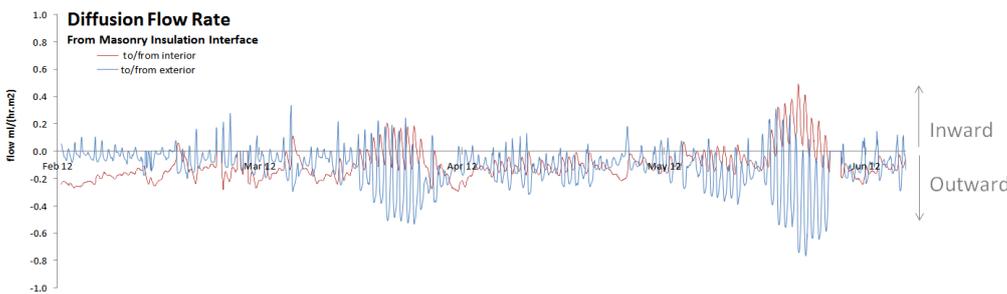
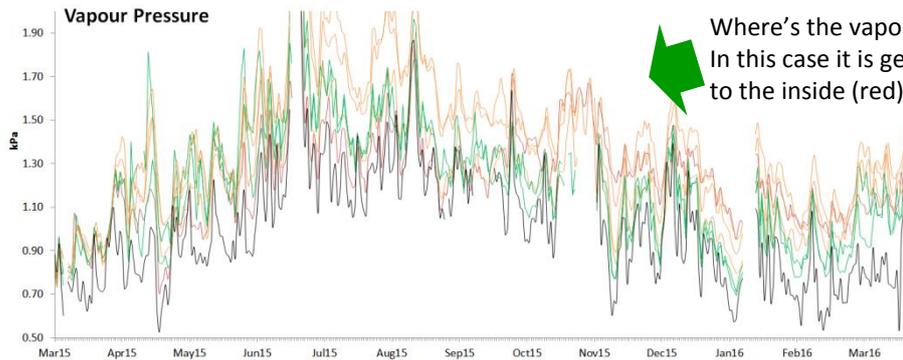


b) Can we distinguish between moisture sources?

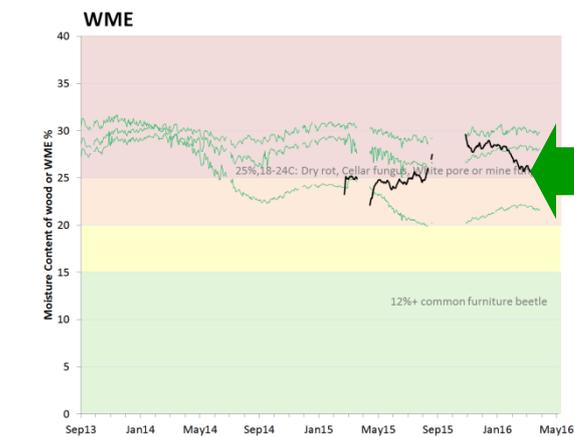
We can estimate what the RH would be from just the vapour effects of internal and external moisture (black line). If sensors are a long way from this line then there must be an additional influence from rain/ground sources or existing moisture. Ground moisture can be identified because it has a limited range beyond ground level.

c) In what direction is the building drying by vapour diffusion and how much?

Sometimes it is not obvious which way vapour is travelling. Comparing vapour pressures over time indicates the direction. We calculate vapour pressure, diffusion flows and total flows.



Total Flows
We also add up total diffusion flows inwards and outwards over time and represent them as scaled arrows



d) How much could hygroscopic effects contribute?

Hygroscopic materials readily take up moisture from the air. Bricks take in a surprising amount this way. This process can prevent a building drying out beyond a certain point. We are developing a method that estimates the part of a material's moisture content that arises from hygroscopic adsorption of atmospheric moisture (black line). Separate capillary wetting as a result of other liquid water sources e.g. rain ingress or rising damp, can then be identified.

To answer the questions given here a very specific sensor pattern is required, we give advice on that too. Typically we install 15-30 sensors measuring moisture content, temperature, and Relative Humidity (RH). The sensor plan is based on a hand held moisture meter survey to identify the higher risk areas.



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