ASBP The Alliance for Sustainable Building Products

# Condensation risk analysis and when to use dynamic simulation tools

ASBP The Alliance for Sustainable Building Products | NATURAL FIBRE INSULATION GROUP

Airtightness, Breathability and Condensation Risk

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**Soprema Group**

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**Airtightness, Breathability and Condensation Risk in Buildings**

NATURAL FIBRE INSULATION GROUP

backtoearth | CELTIC | ecological BUILDING SYSTEMS | ecomerchant | IndiNature | lime|green | MIKE WYE | SCHOOL OF NATURAL BUILDING | SOPREMA | STEICO engineered by nature | therma fleece Nature's finest insulation | Tŷ-Mawr

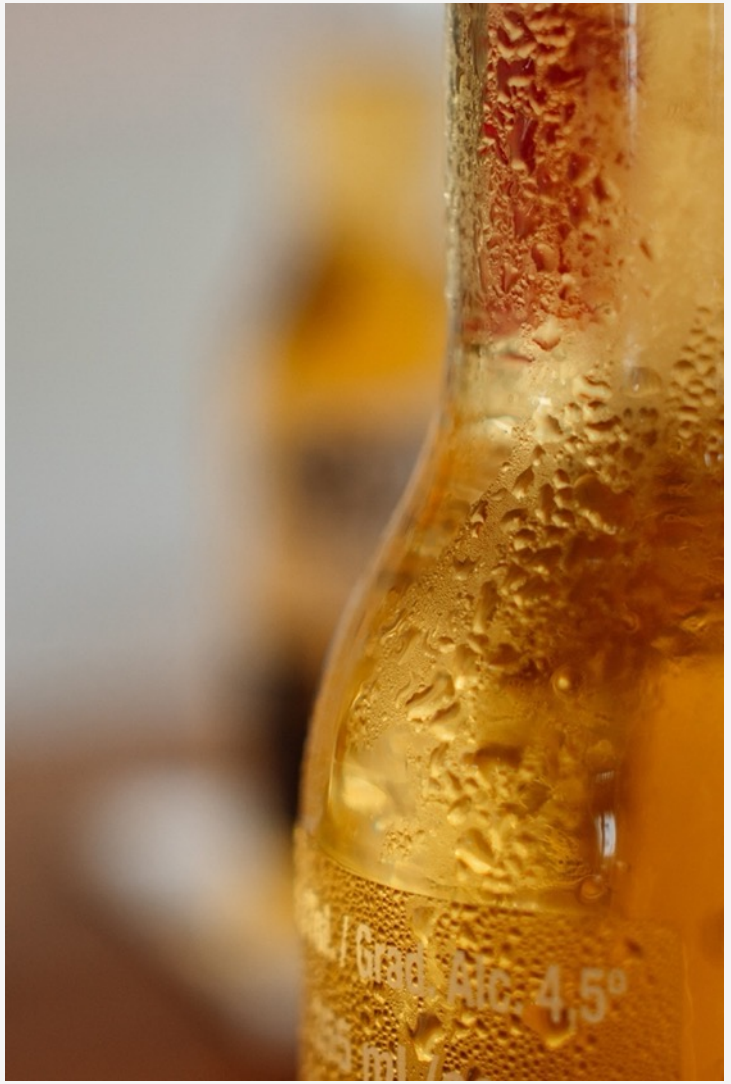
# Why.

- Increased insulation thickness have changed the building physics
- Moisture risk is no secret
- Understanding the key principles are important for the effective avoidance strategy

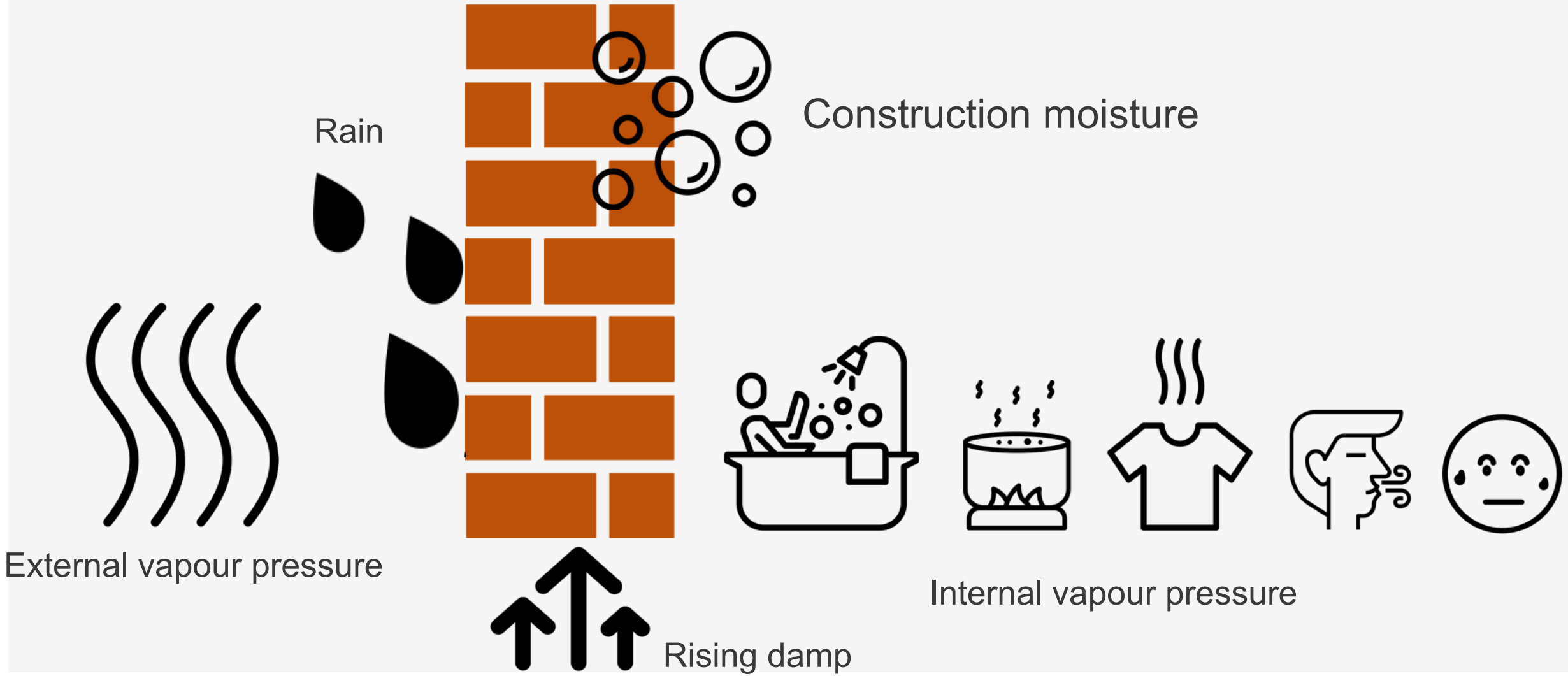
Source: Credit: Anonymous, posted on GBA by Peter Yost

# Take away.

- Moisture risk & condensation
- When do you need condensation risk analysis (CRA)
- Static vs Dynamic method (what, why & when)



# Type of moisture in buildings.

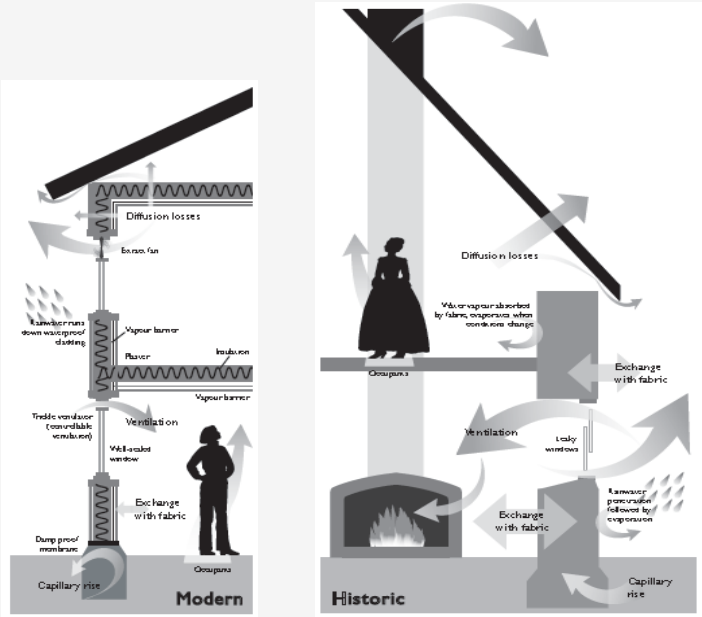


# Moisture Mayhem: The Unspoken Enemy.

**80%**

80% of building failure is related to moisture (Kumaraperumal et al.,2006)

The WHO makes a clear connection between dampness in building and a range of respiratory and other problems. (BRE, 2010)




Moisture risk in airtight building is of a different nature to the risk in leaky buildings. (Moisture in buildings, N. May, C. Sanders, BRE 2006)

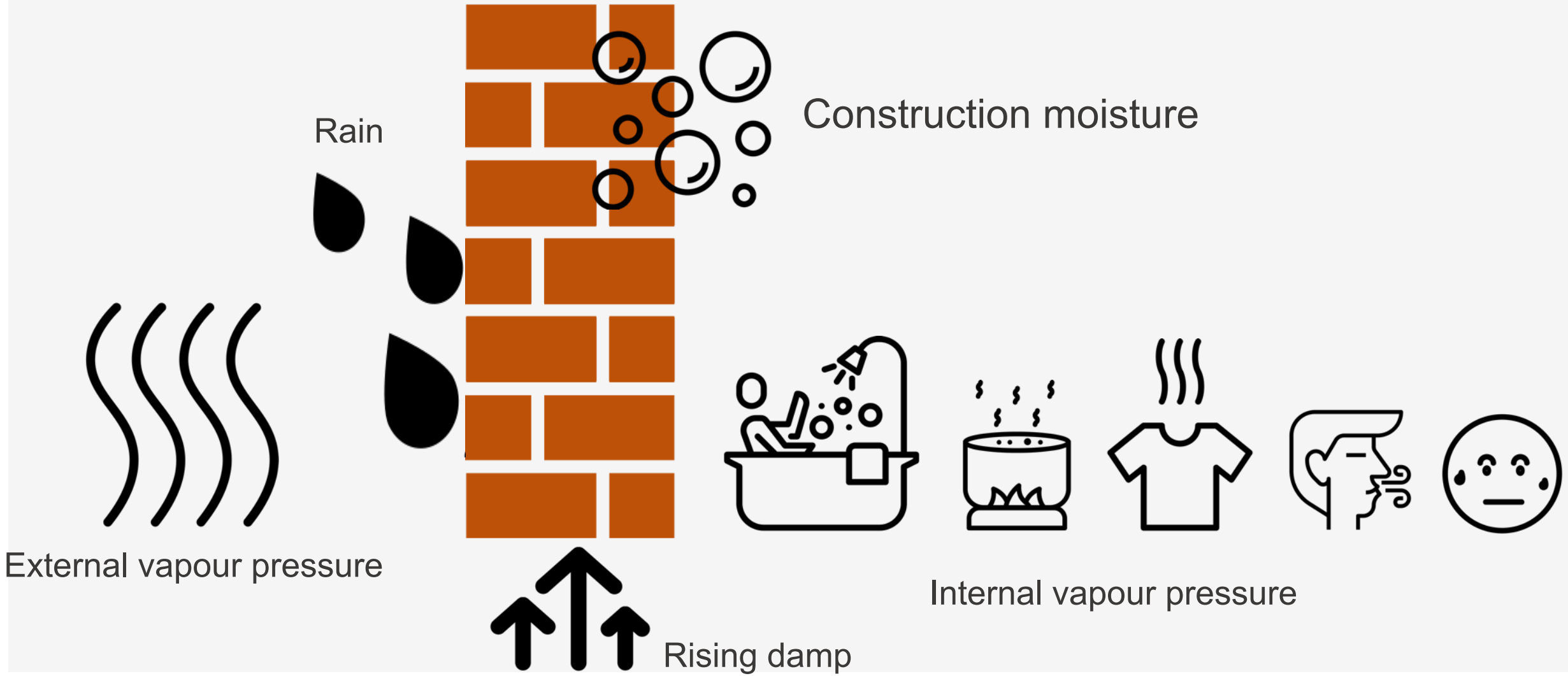
Source: https://www.express.co.uk/life-style/health/882435/mould-damp-condensation-lung-disease-effects

# Mastering Moisture Management for Happier Building.

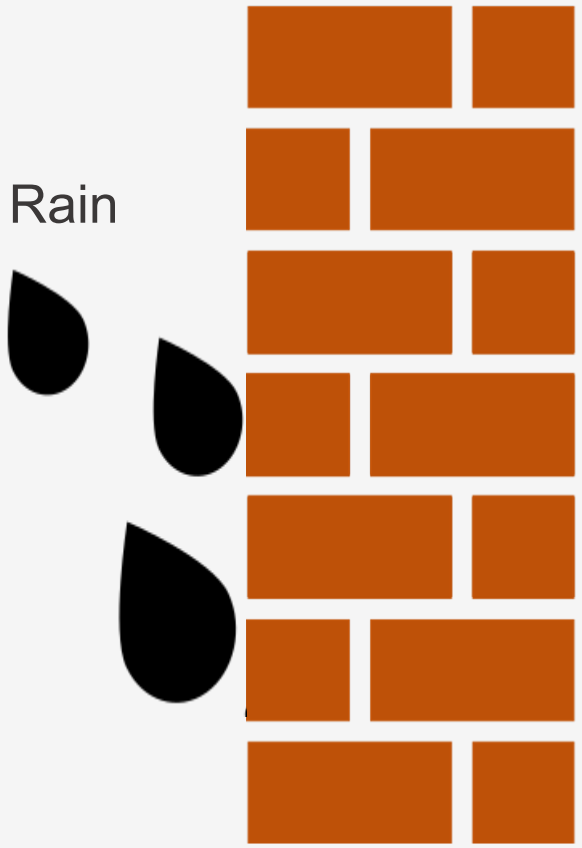
Knowledge about the risks

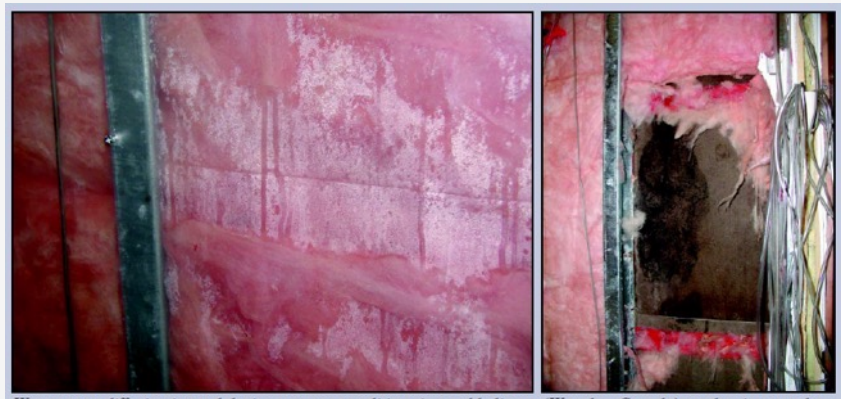
Risk management

# The Risks and Mitigating Risks in Buildings



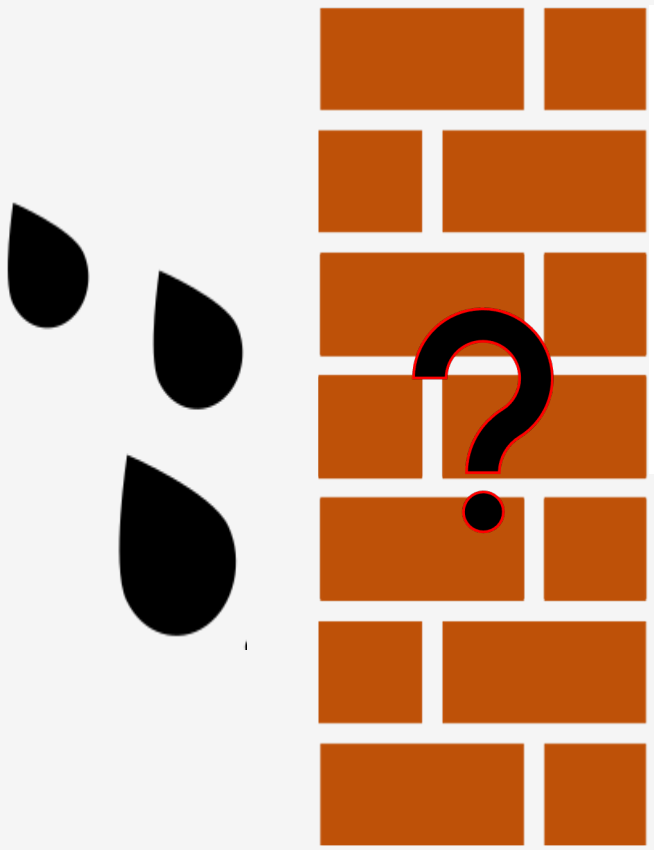
# (1) The Risks: Rain

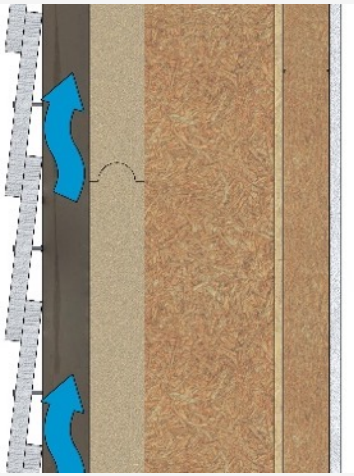


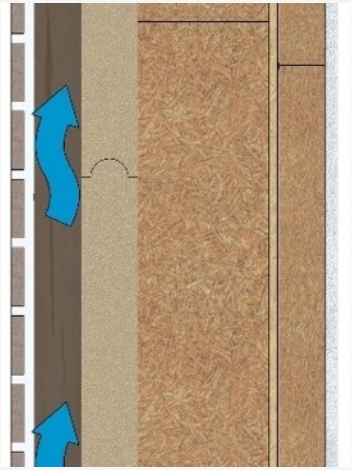



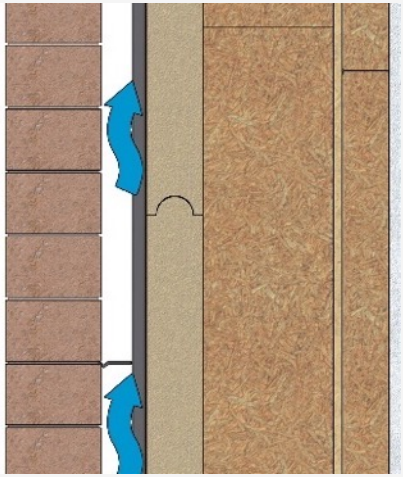
*Water vapor diffusing inward during summer conditions in a cold climate (Waterloo, Canada) condensing on a low-permeance vapor barrier. The resulting damage is shown at right.*

# (1) Mitigating Risks: Rain

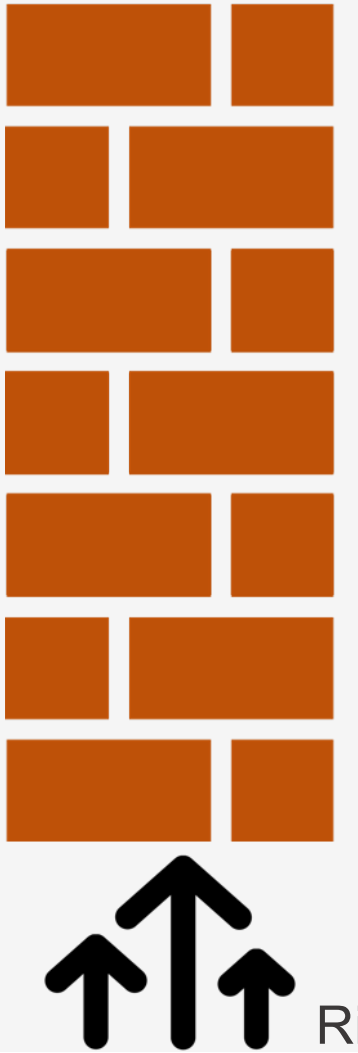








# (2) The Risks: Rising damp



Rising damp

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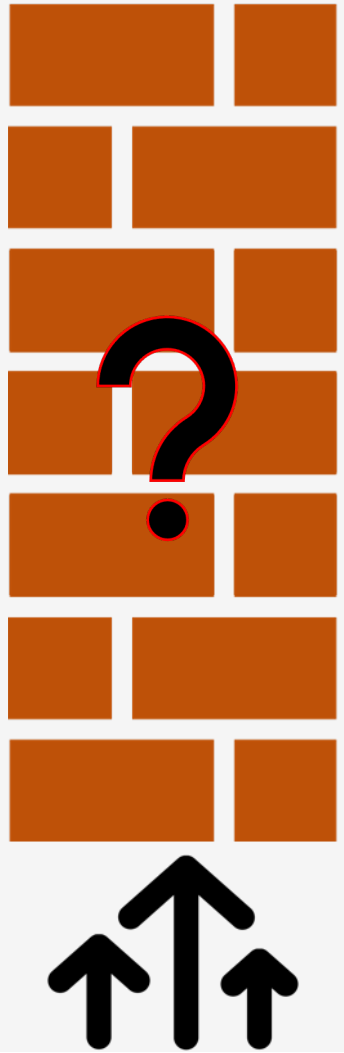
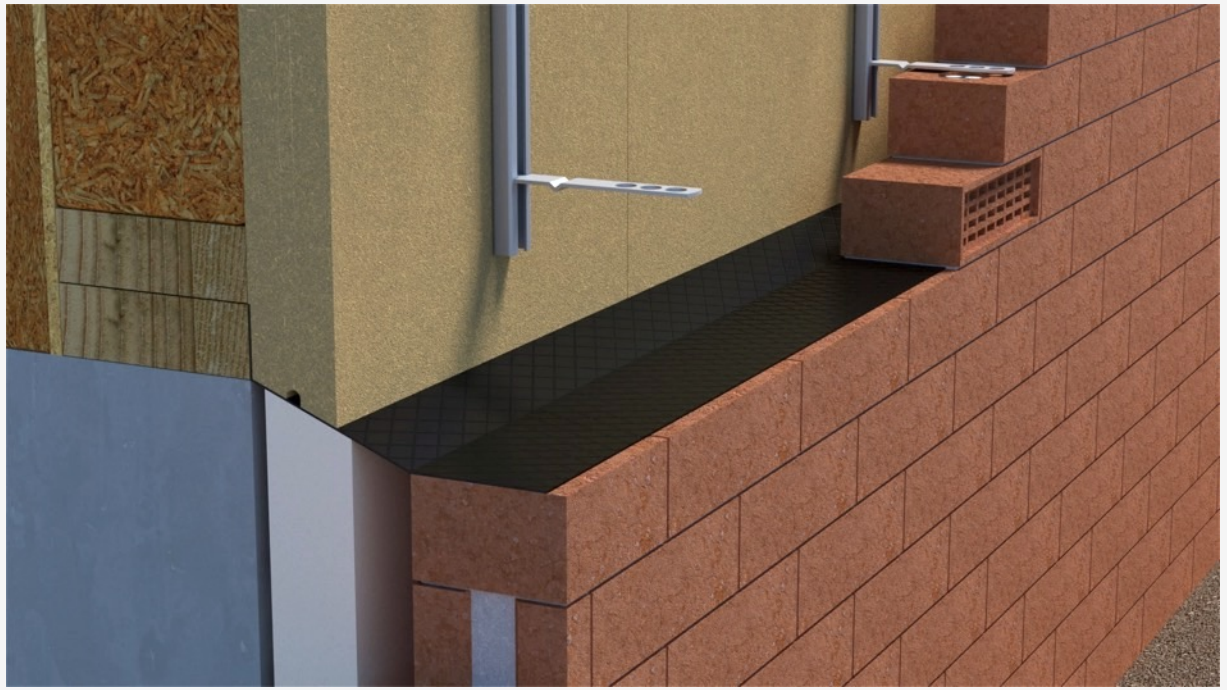
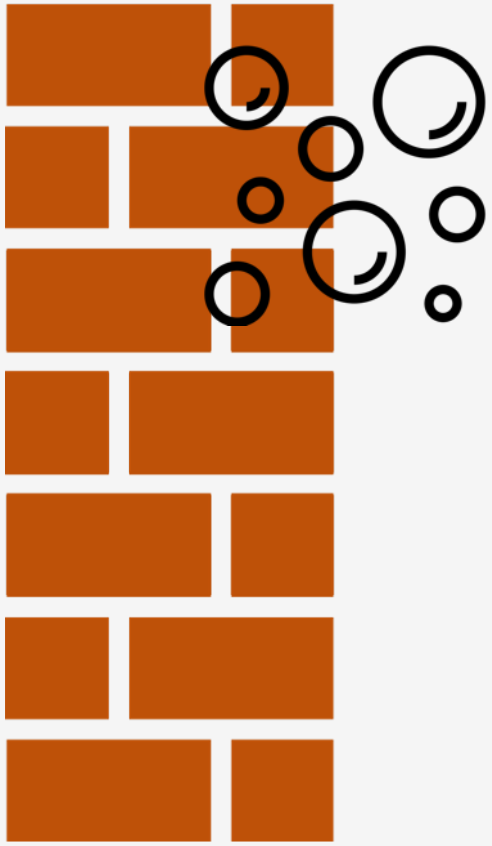




# (3) The Risks: Construction Moisture



Construction moisture

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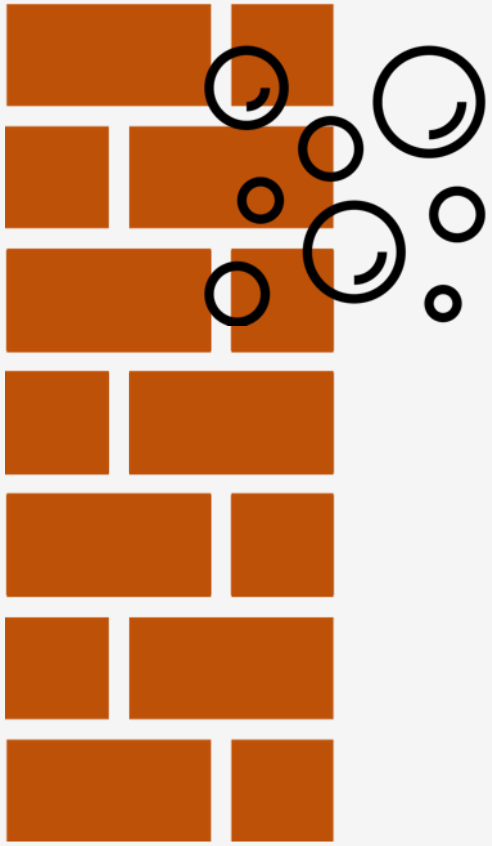
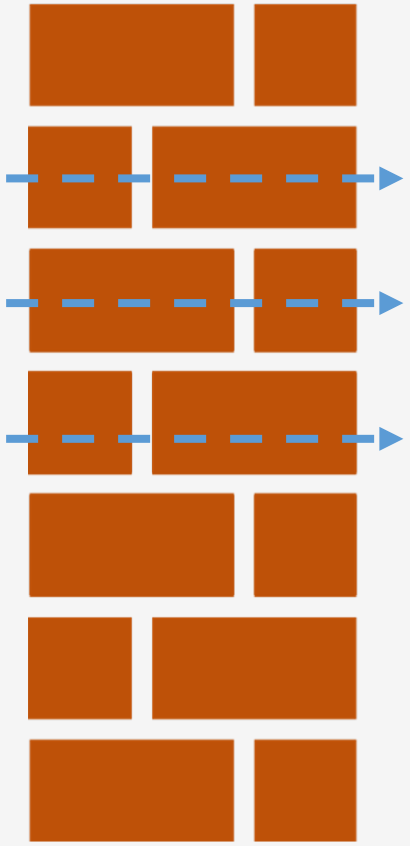


Construction moisture

Vapour open or Breathable build-up

# (4) The Risks: External Vapour pressure

External vapour pressure



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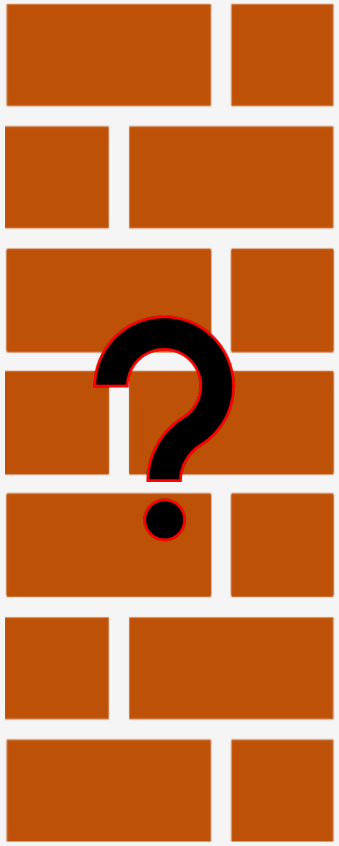
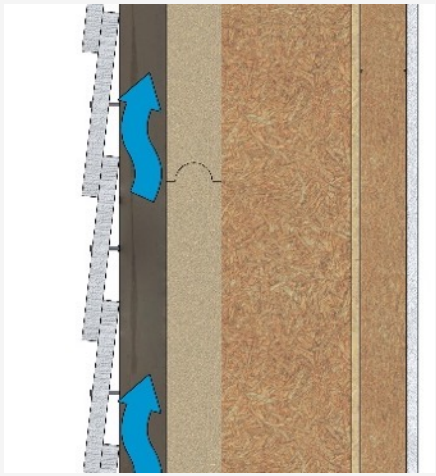
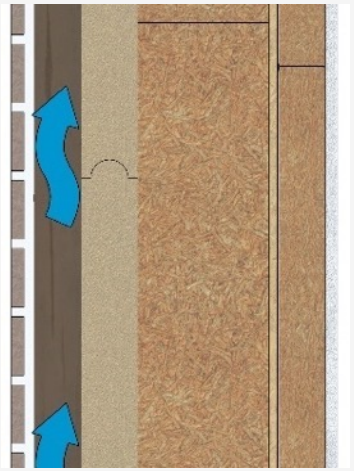
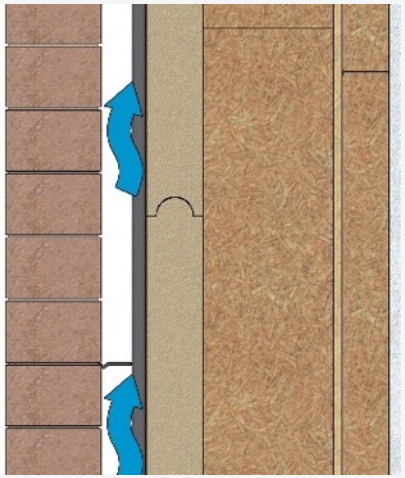
External vapour pressure





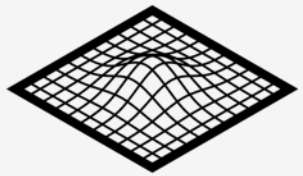




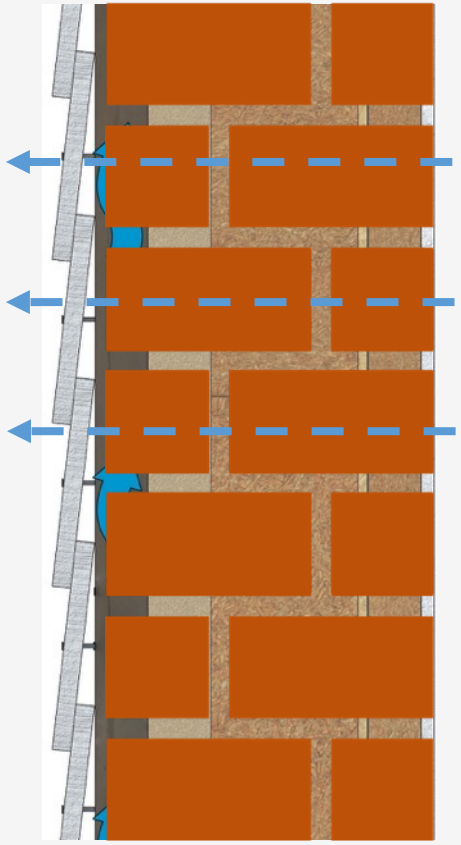
# (5) The Risks: Internal Vapour Pressure

Humidity

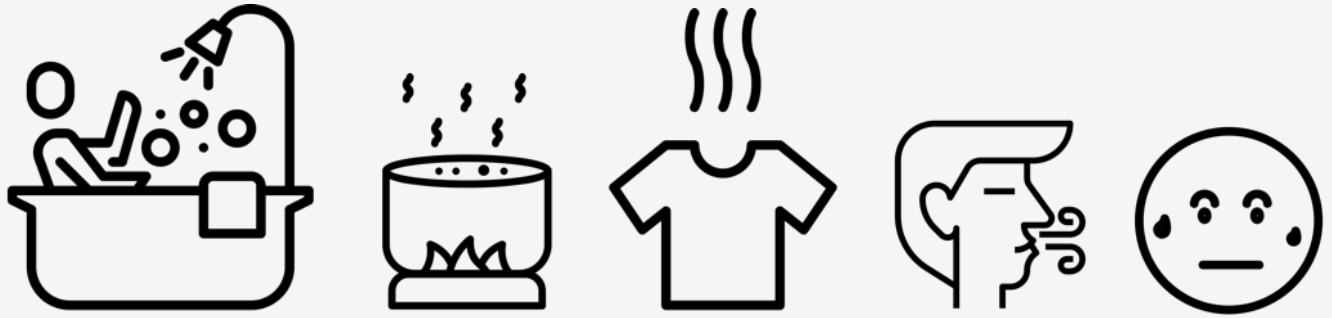
Temperature



Surface

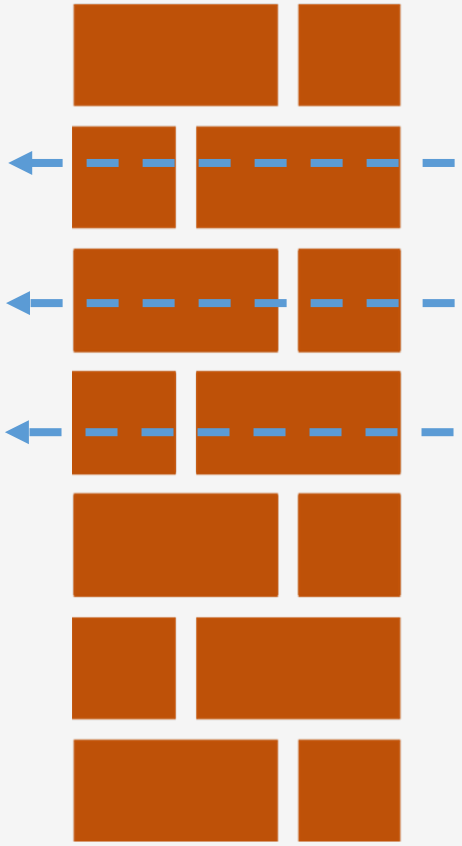


Main cause of condensation



Internal vapour pressure

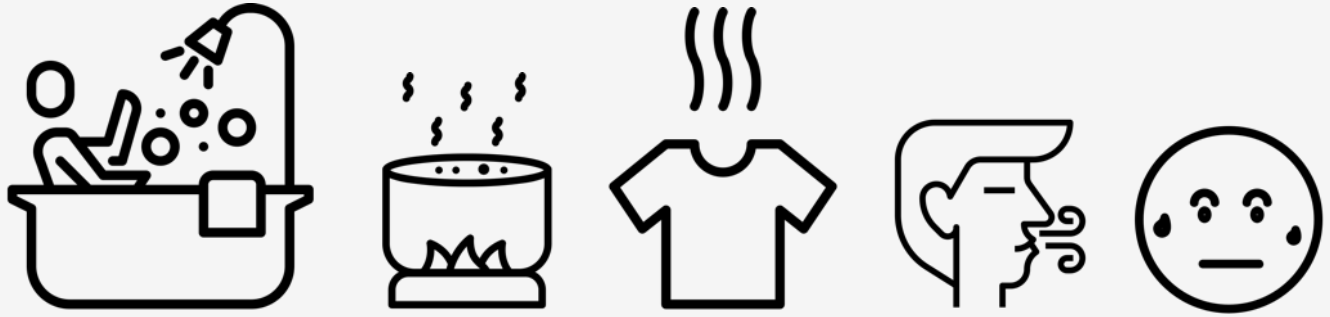
# (5) Mitigating Risks: Internal Vapour pressure




Airtightness

Ventilation

Breathable



Internal vapour pressure

# Moisture Risk Assessment or Condensation Risk Analysis (CRA): The tools

| Static | Dynamic |
| --- | --- |
| **Dewpoint methods** also known as Glaser Method (based on EN ISO 13788) | **Hygrothermal numerical simulation** method (based on EN 15026) |

BuildDesk U

jpatechnical

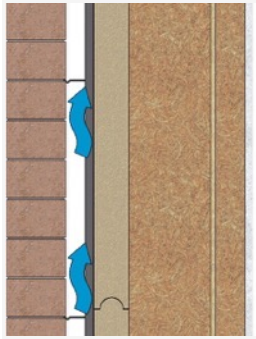
WUFI®

DELPHIN

# Static vs Dynamic, the difference.

**Dewpoint methods** also known as Glaser Method (based on EN ISO 13788)

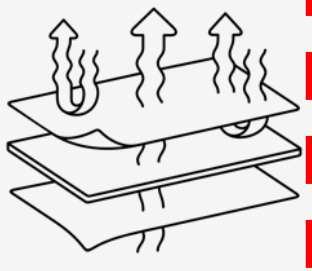
**Hygrothermal numerical simulation** method (based on EN 15026)



Build-up

Location

Building use



Physical properties

Vapour resistivity,

Porosity, Moisture storage function, Suction, Redistribution, Vapour resistivity dependent on RH.

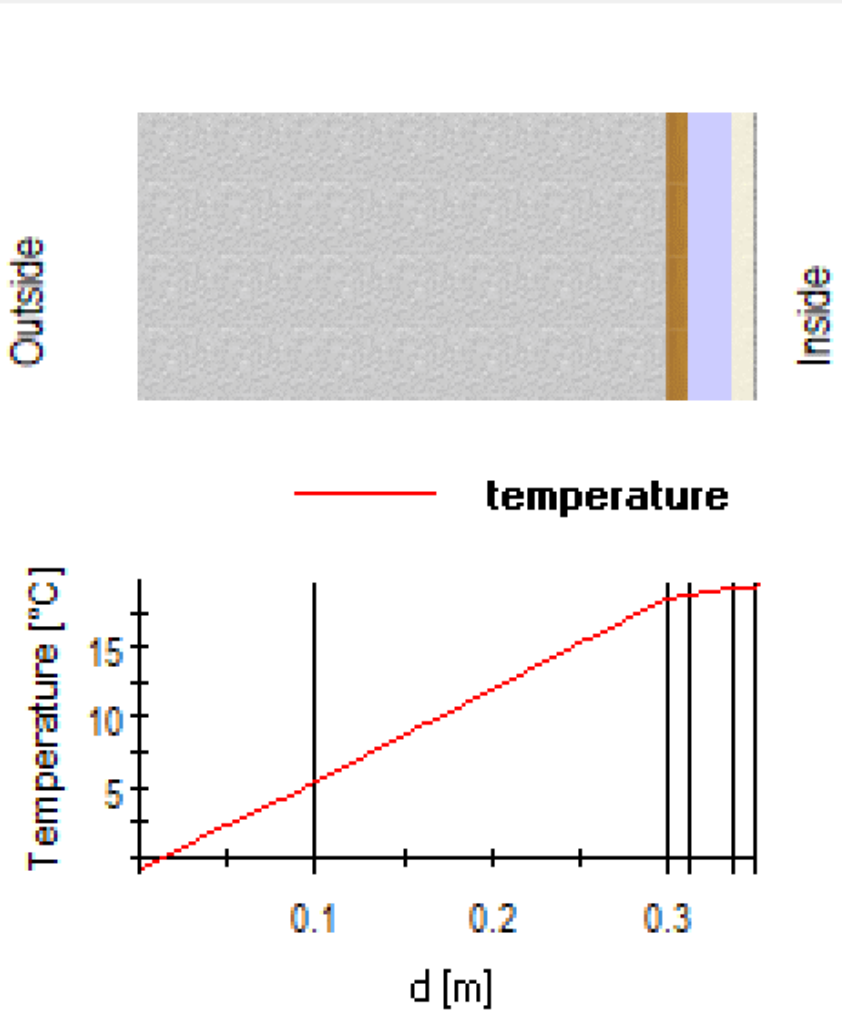
Weather Data. Dynamic hourly data

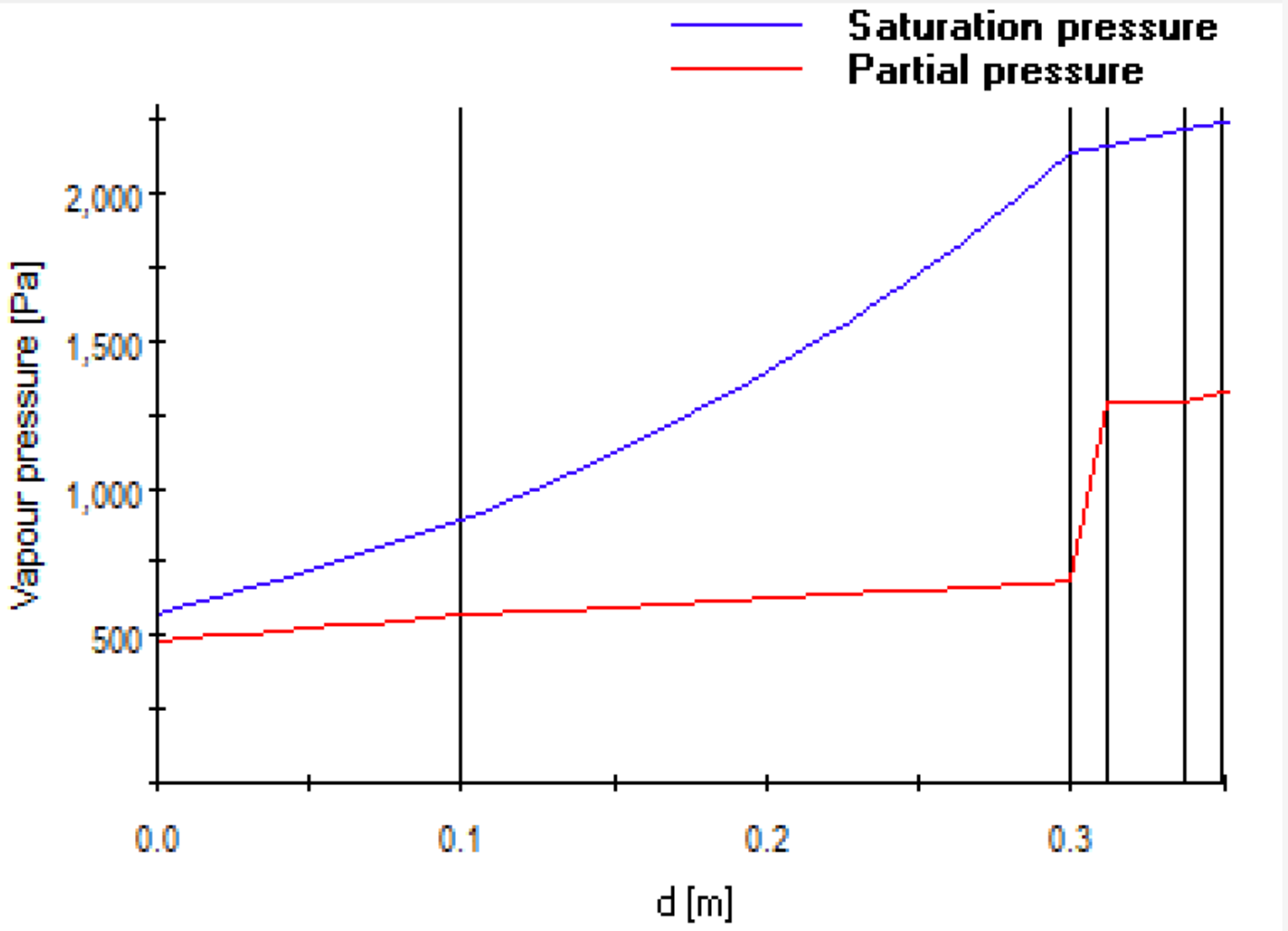
Orientation, height, angle & colour of the exposed surface

Initial humidity (construction moisture)

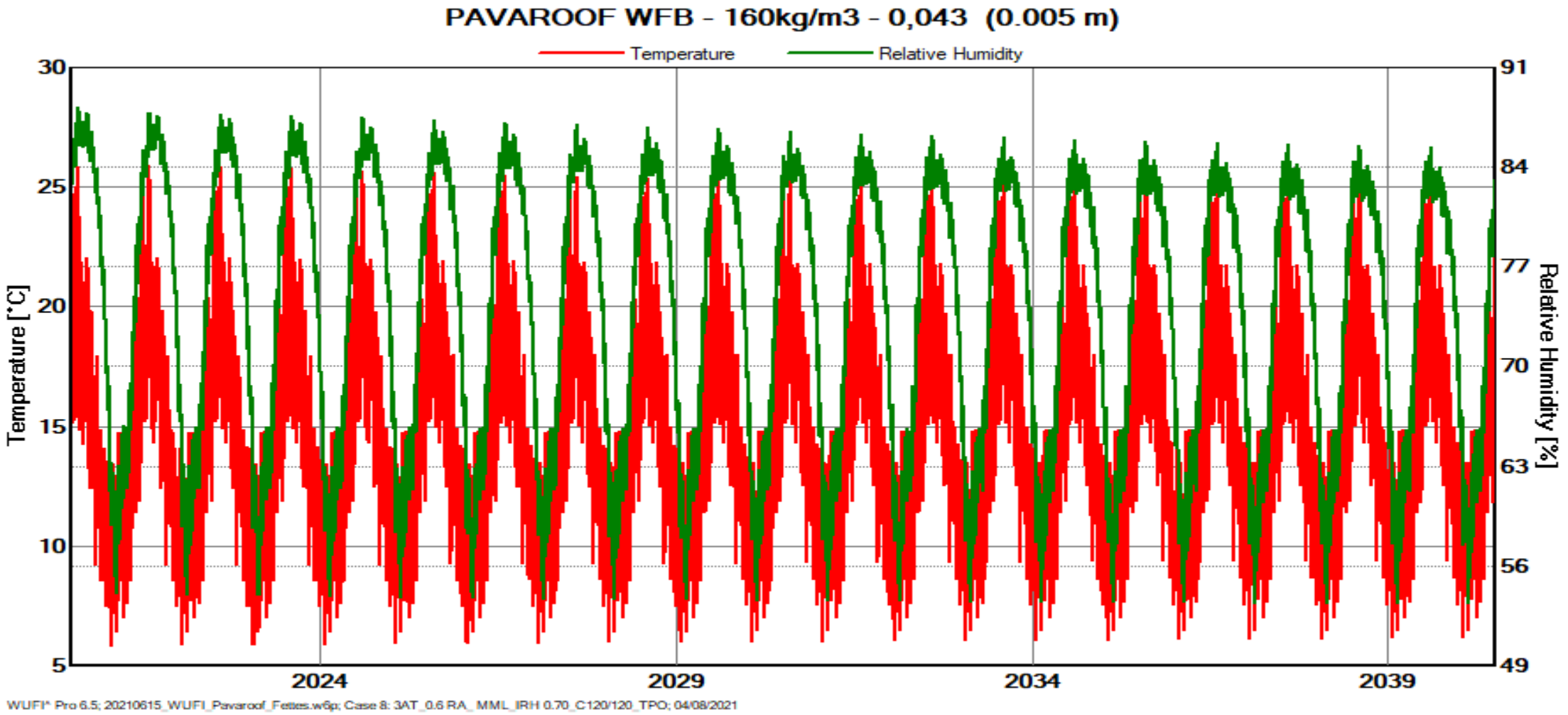
Dynamic Internal moisture load.

# **Dewpoint methods**: Glaser Method (based on EN ISO 13788)

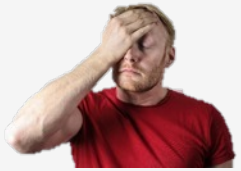


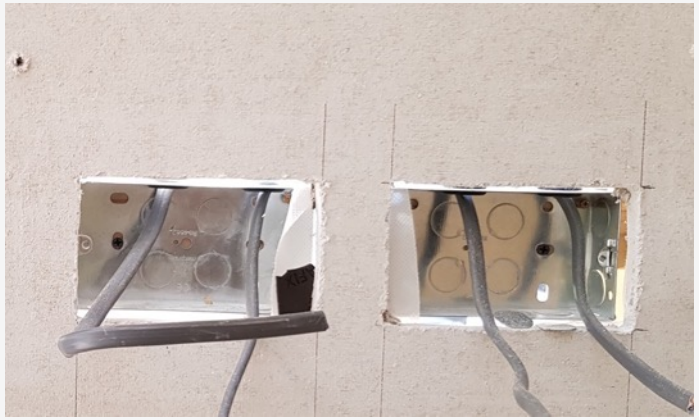
# **Hygrothermal numerical simulation**: WUFI (based on EN 15026)



# Hygrothermal numerical simulation, the best.



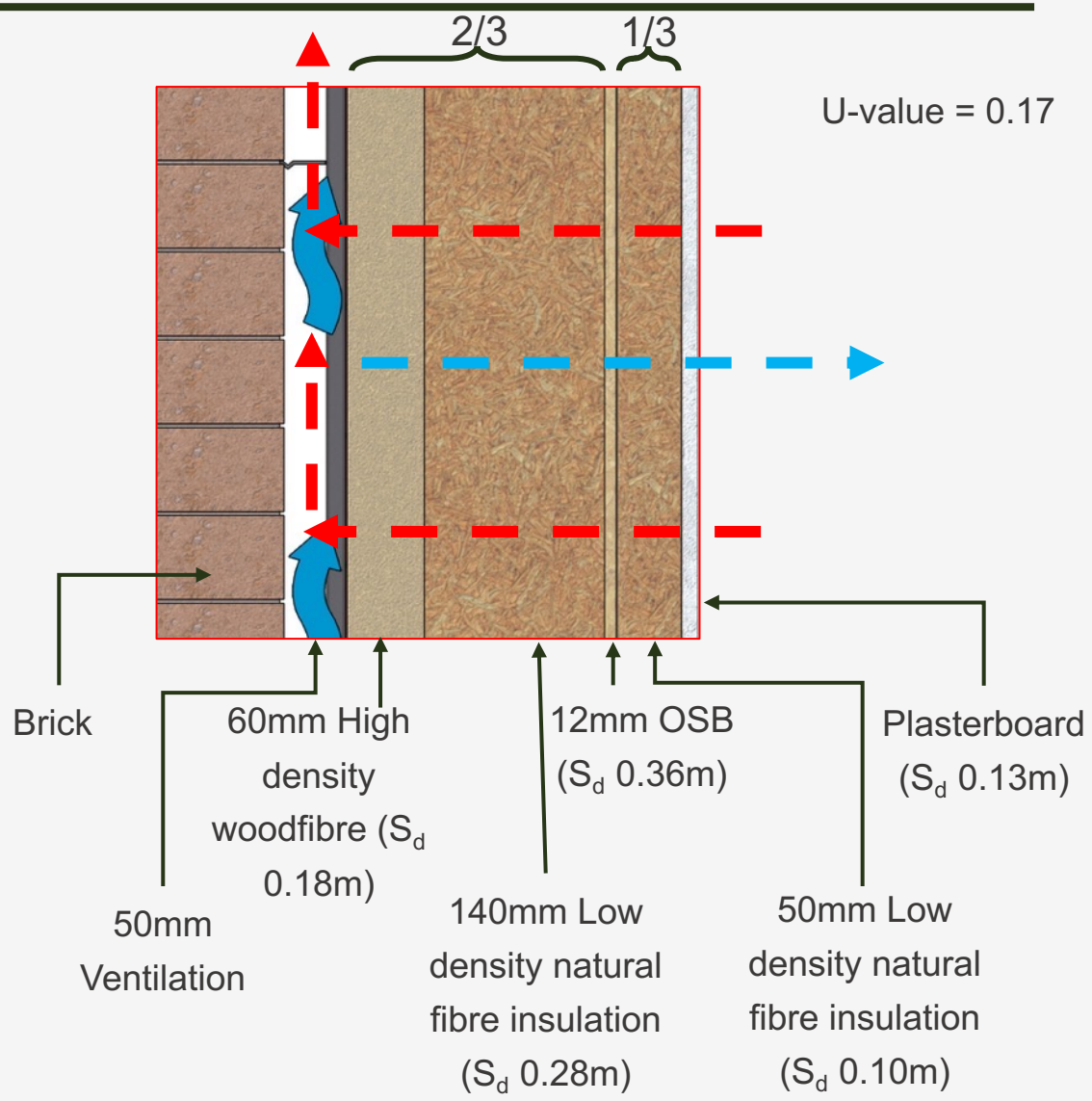
Human errors can be simulated!



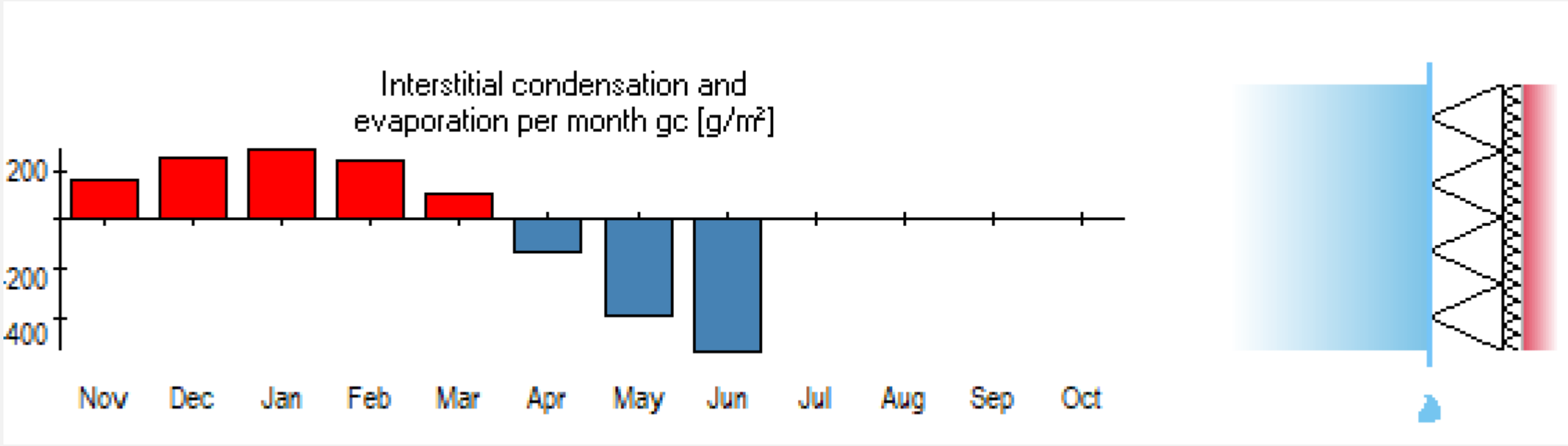
Mould and fungal growth can be predicted!

# When to use Static simulation method.

- Rain
- Rising damp
- Construction moisture
- External vapour pressure
- Internal vapour pressure
- Human error



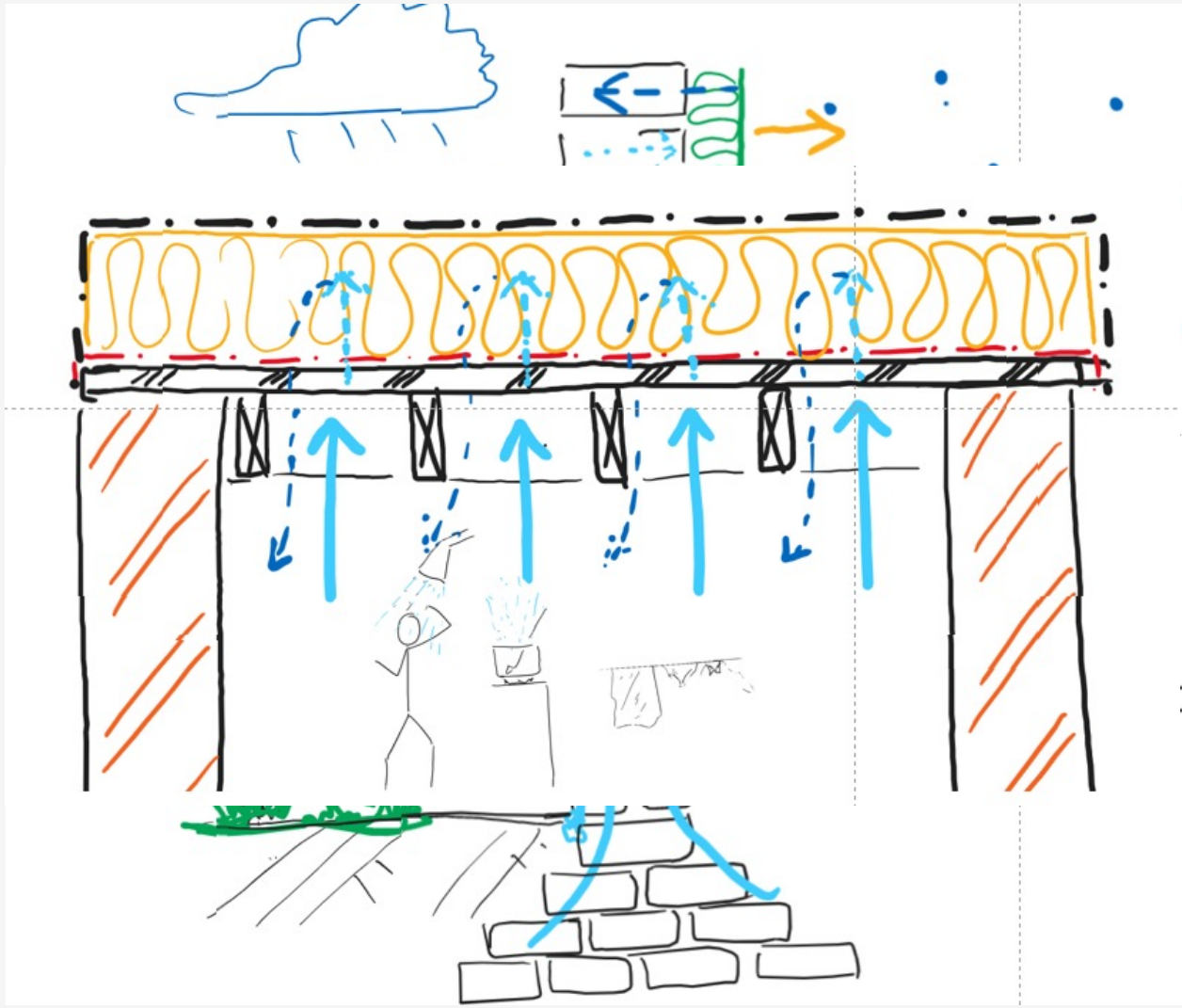
# Conventional case.




Human error

# When to use Dynamic simulation method (WUFI or DELPHIN).

- Rain ✗
- Rising damp ✓
- Construction moisture ✗
- External vapour pressure ✗
- Internal vapour pressure ✗
- Human error ✗



# Minimise the risk
# Thank you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