



DHPS | NY

DOCUMENTARY HERITAGE
& PRESERVATION SERVICES
FOR NEW YORK

Thanks for joining us! Today's presentation will begin shortly.

If you have questions or want to report any technical issues,
contact us at info@dhpsny.org or (215) 545-0613 ext.317



Sustainable Heritage



kkrish@lesscarbonmoreculture.com



Today's outline

- Review of temperature, RH, and what is dew point?
- Passive and mechanical controls
- How dew point determines actions
- Interpreting profiles
- Tips and other considerations



Temperature

- Measure of the speed of the molecules
- Avoid sustained highs
- Largely irreversible “natural aging”
 - Visual or structural
 - Accelerates processes





Relative humidity (*Relative to what?*)

- Measure of the water vapor content of air
- Generally maintain between 30-60%
- Variety of types of damage
 - Mechanical
 - Biological
 - Corrosion



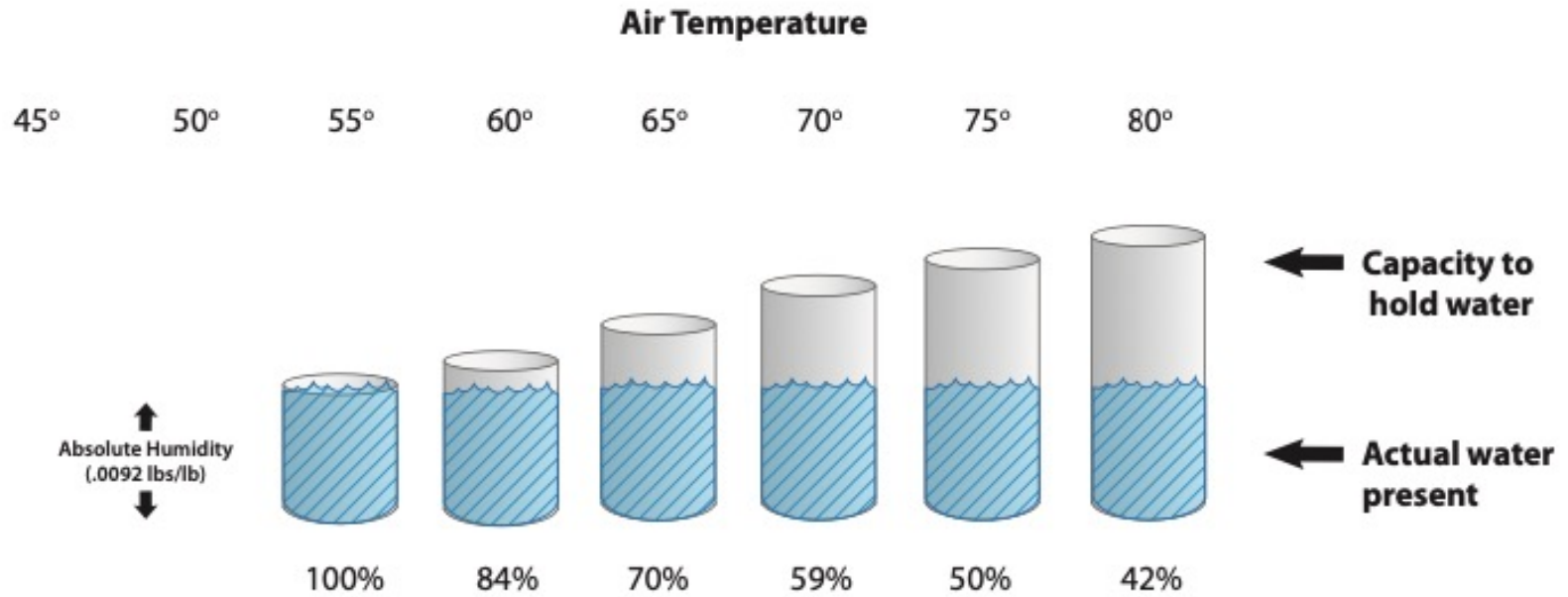
Dew point

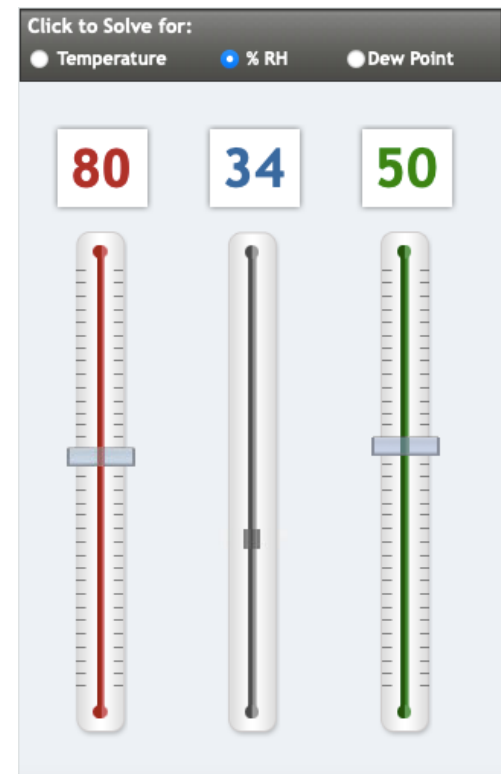
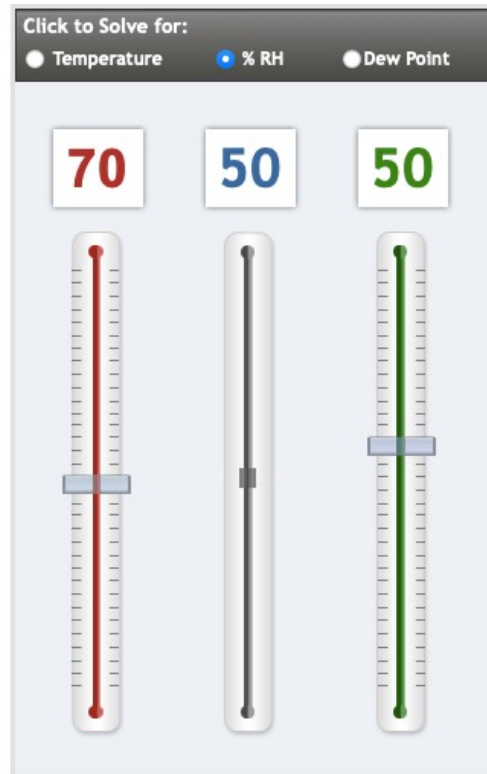
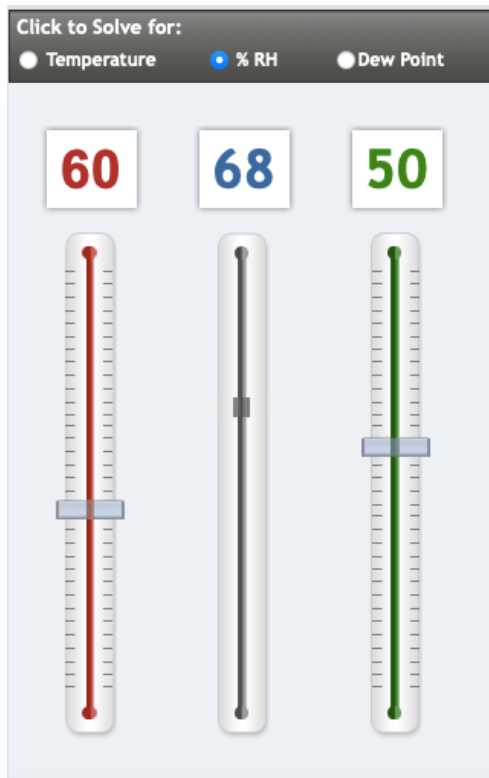
The temperature at which water vapor in the air becomes saturated and water droplets begin to form

Dew point

From *Image Permanence Institute*

https://s3.cad.rit.edu/ipi-assets/publications/dew_point.pdf



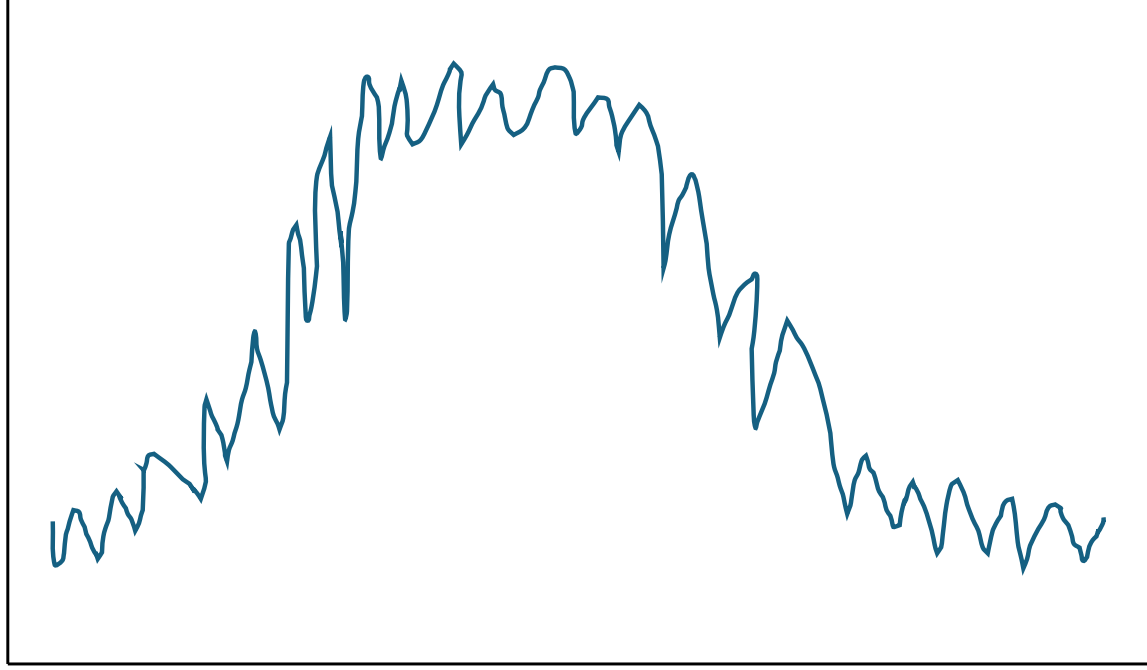


<http://www.dpcalc.org/>

(At a constant dew point,) temperature and relative humidity have an inverse relationship



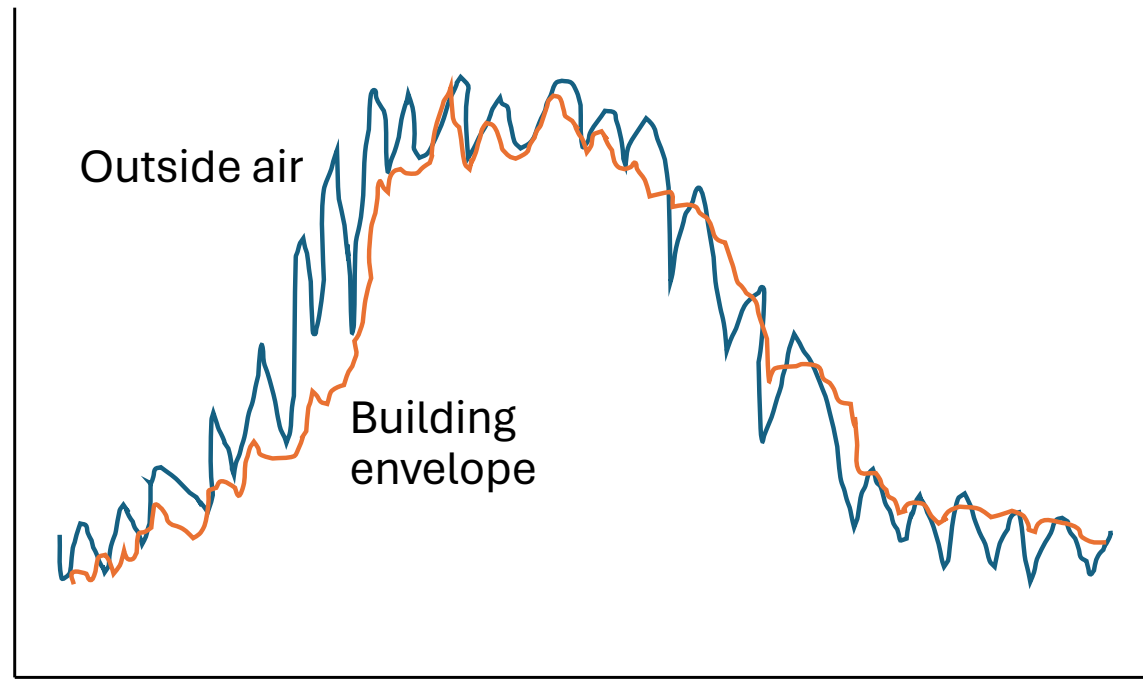
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Passive and mechanical controls

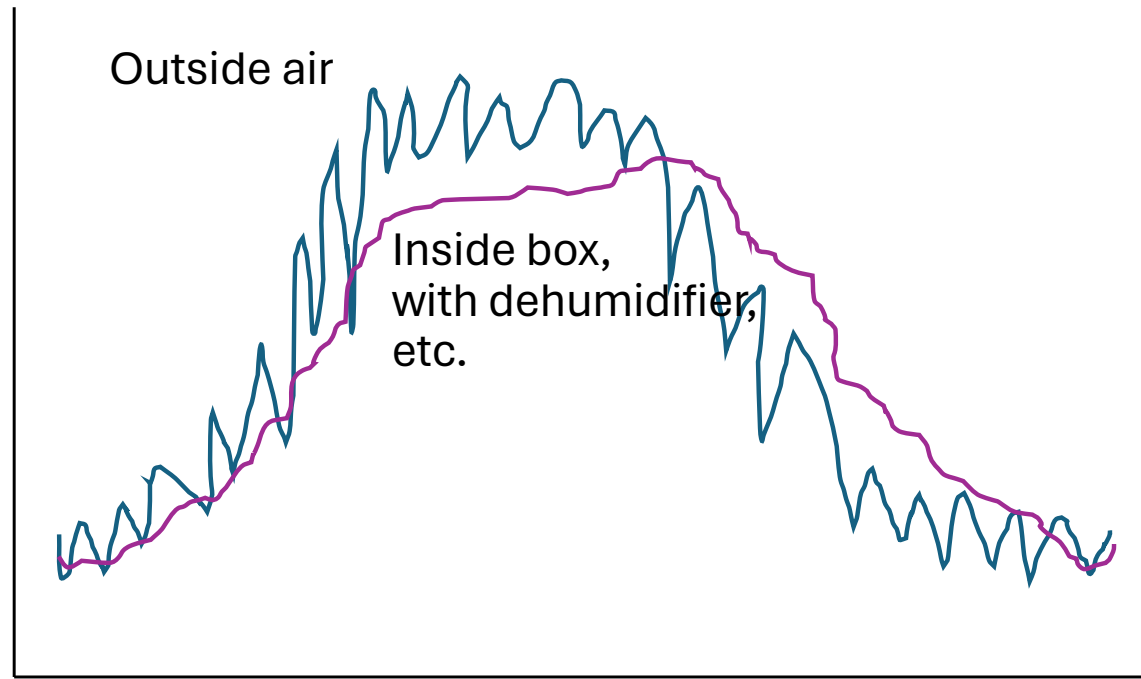


If you do not have mechanical control:





If you do not have mechanical control:

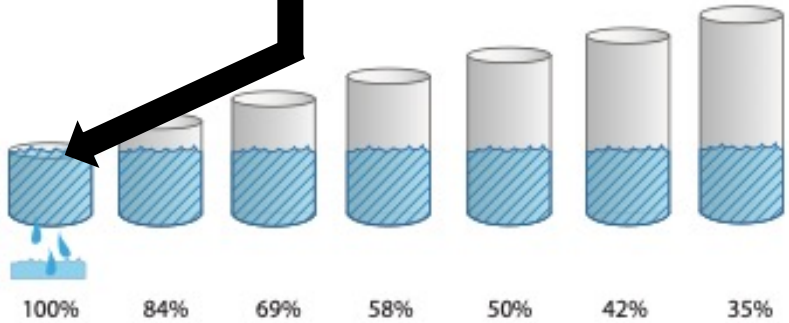
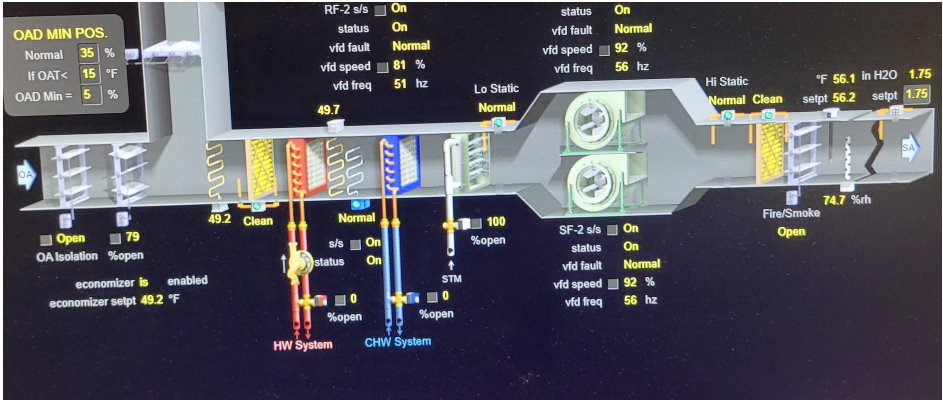




If you have mechanical control:



Cooling coil operation



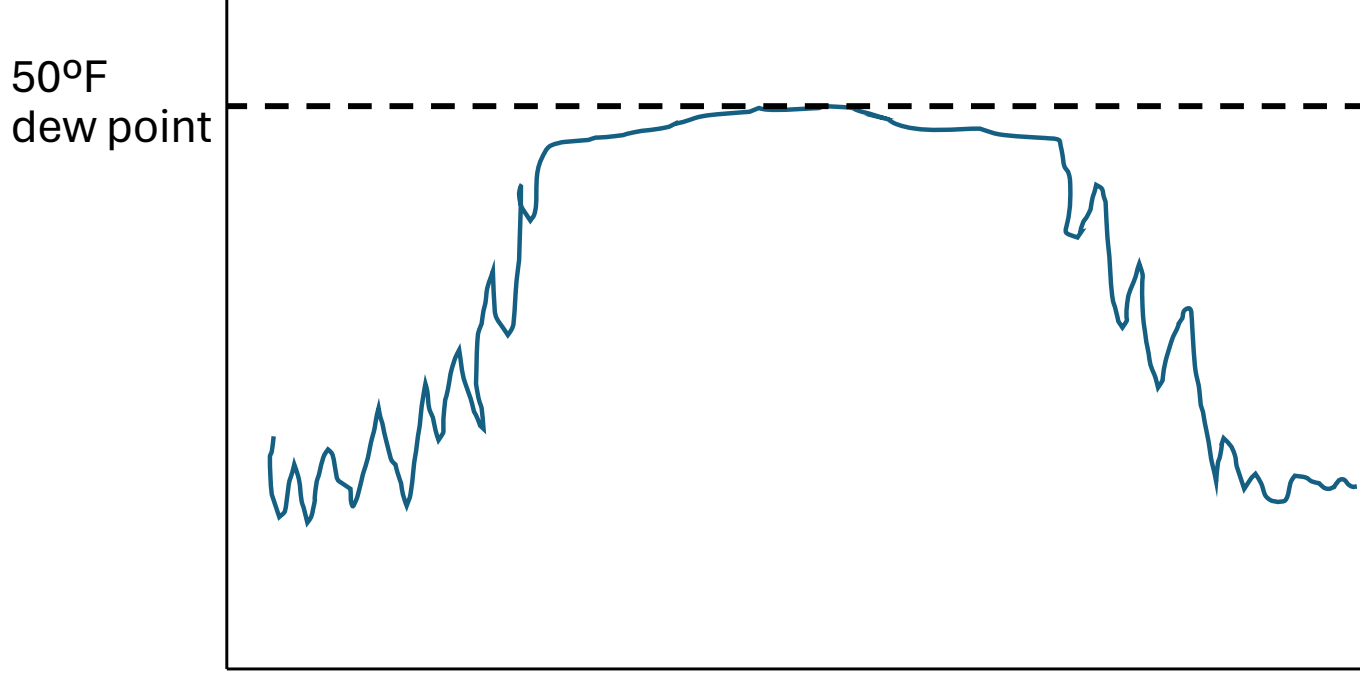
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Passive and mechanical controls





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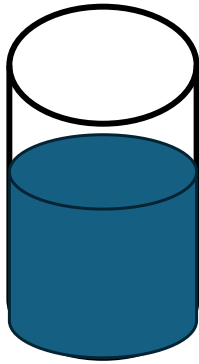


Passive and mechanical controls

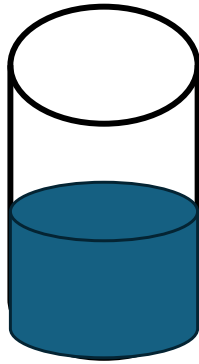


Which dew point gives you more options?

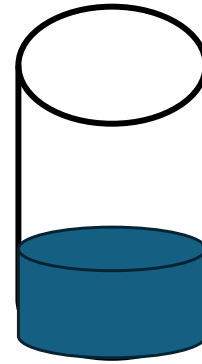
60°F
dew point



50°F¹
dew point

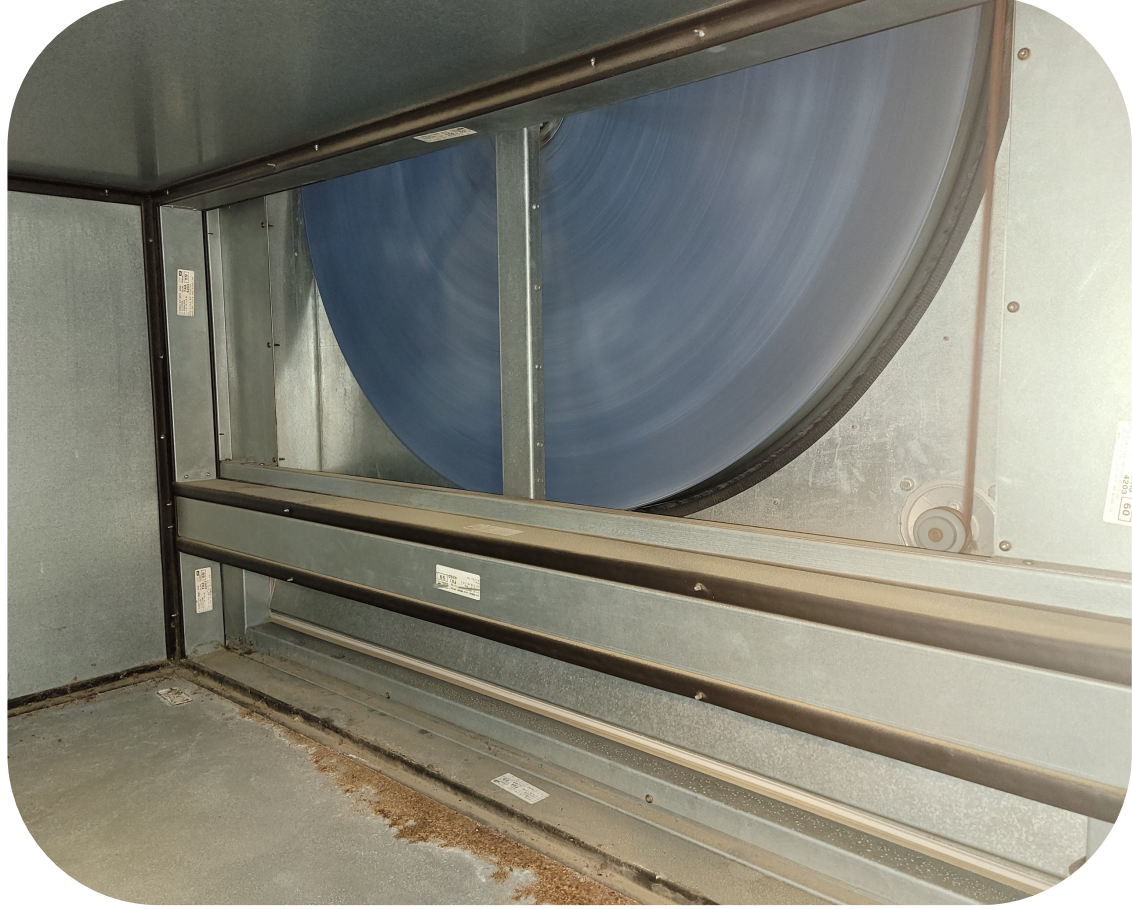


40°F²
dew point





The difference with desiccant wheels



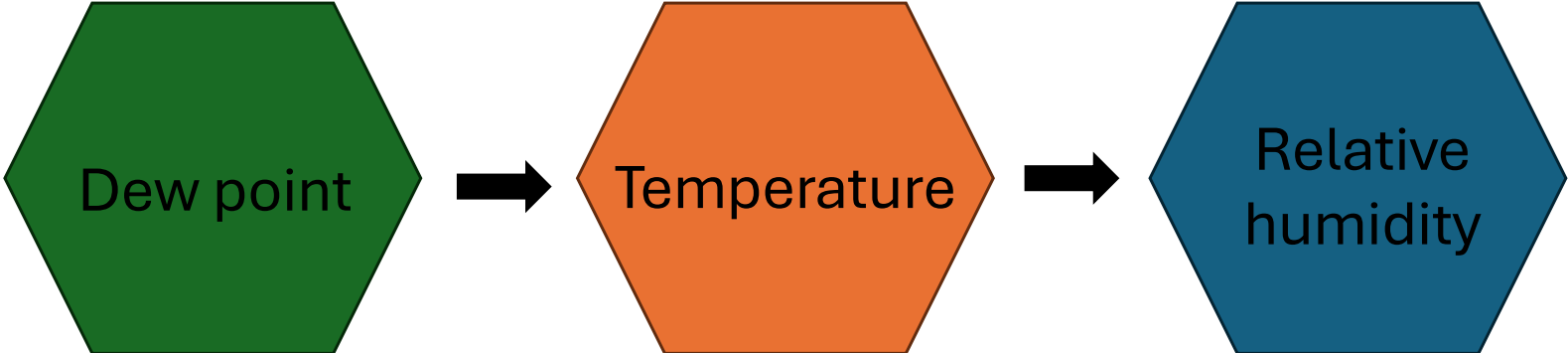


Humidifiers



Passive and mechanical controls

From the perspective of mechanical control:



- Is the starting point
 - Determined mechanically (“locked in”)

- Is the decision
 - Determined by “occupants”

- Is the consequence
 - Determined by psychrometrics

How dew point determines actions



Using dew point to determine set points

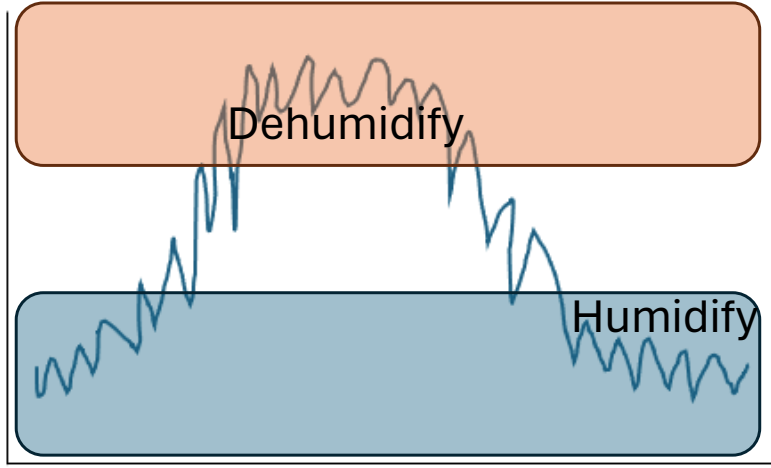
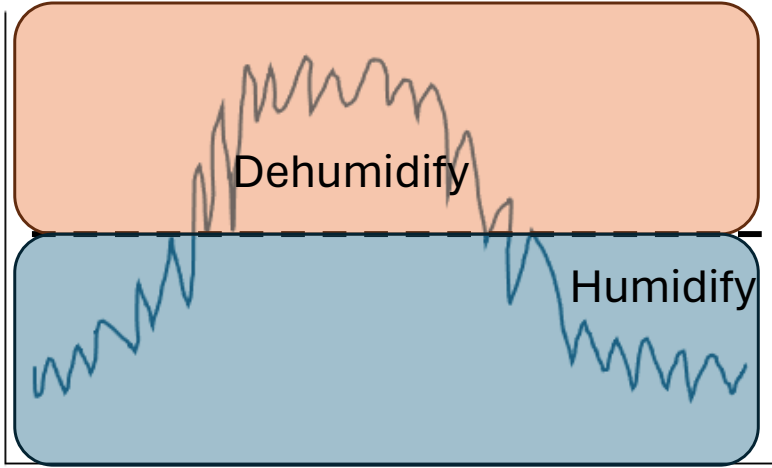
<http://www.dpcalc.org/>



How dew point determines actions



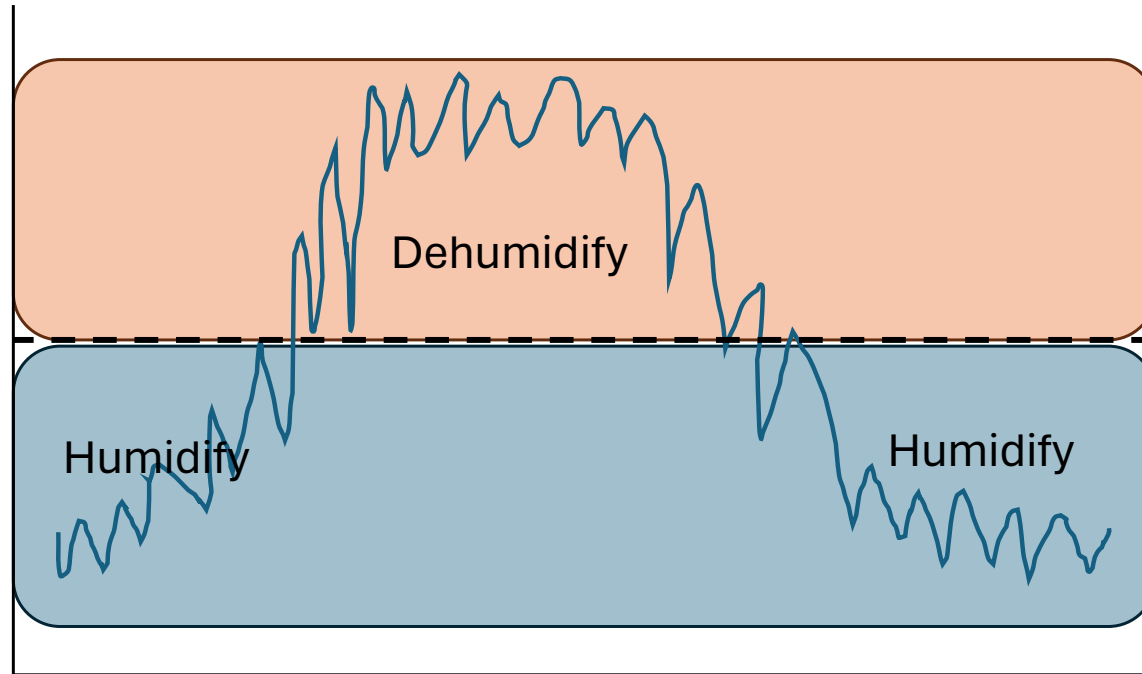
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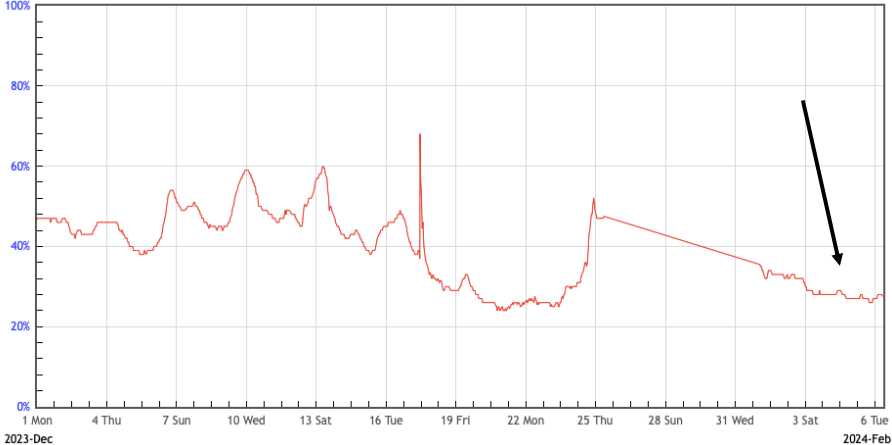
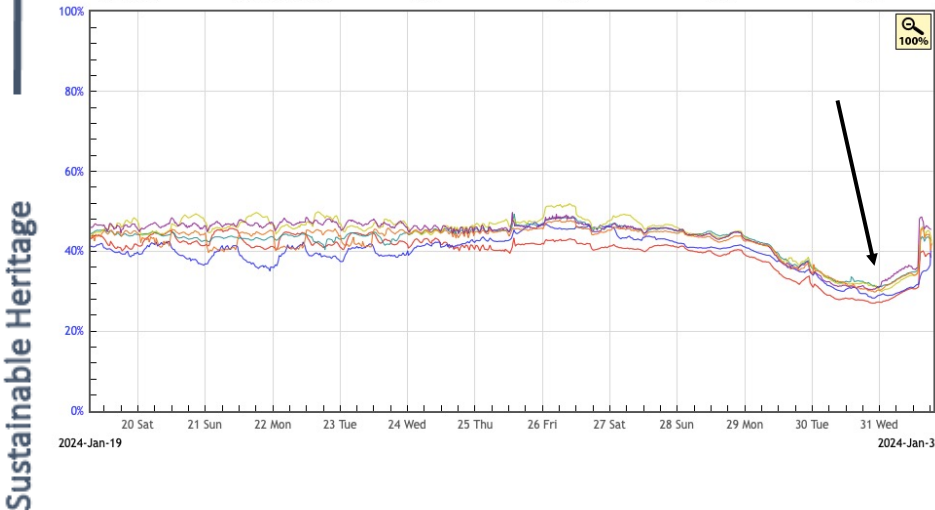
How dew point determines actions



Using dew point to determine timing of set points



Using dew point to determine response to RH

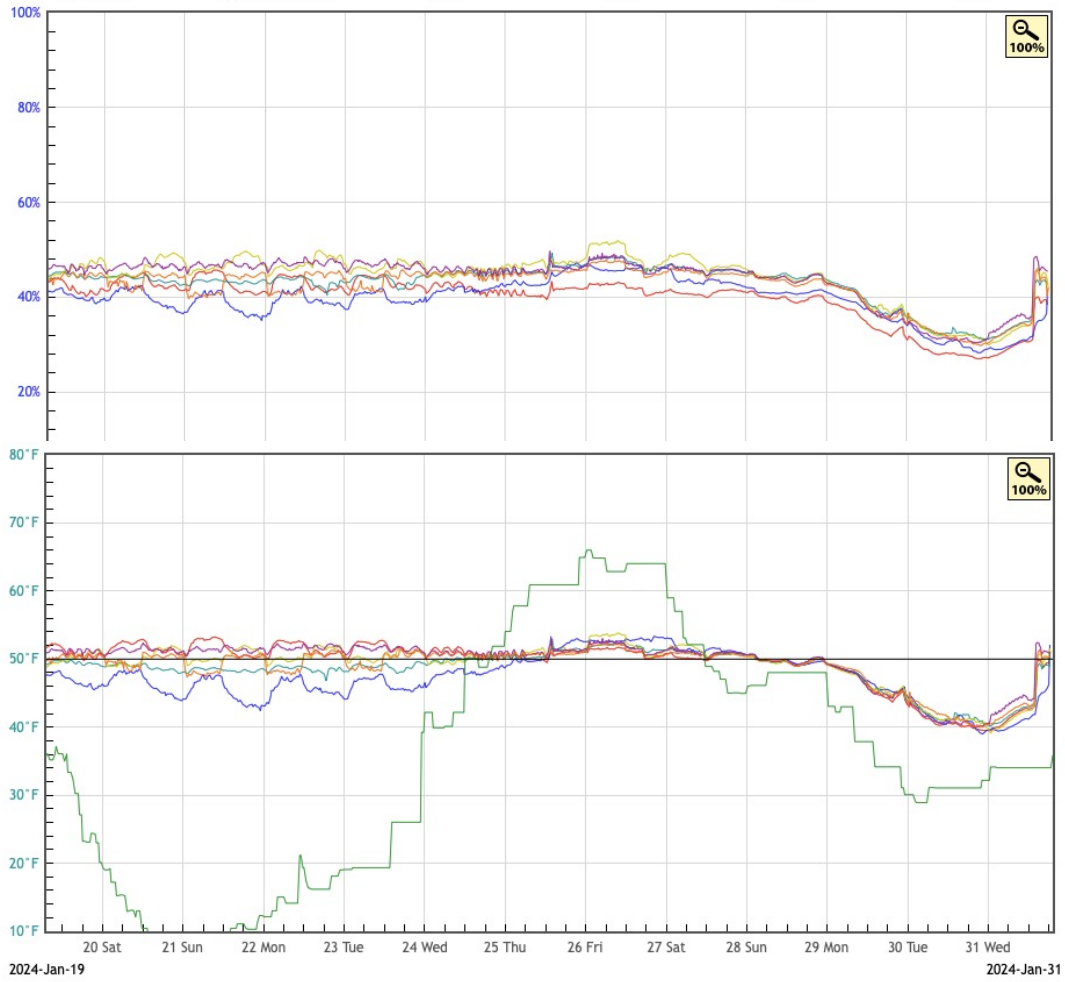


A tale of two RHs...



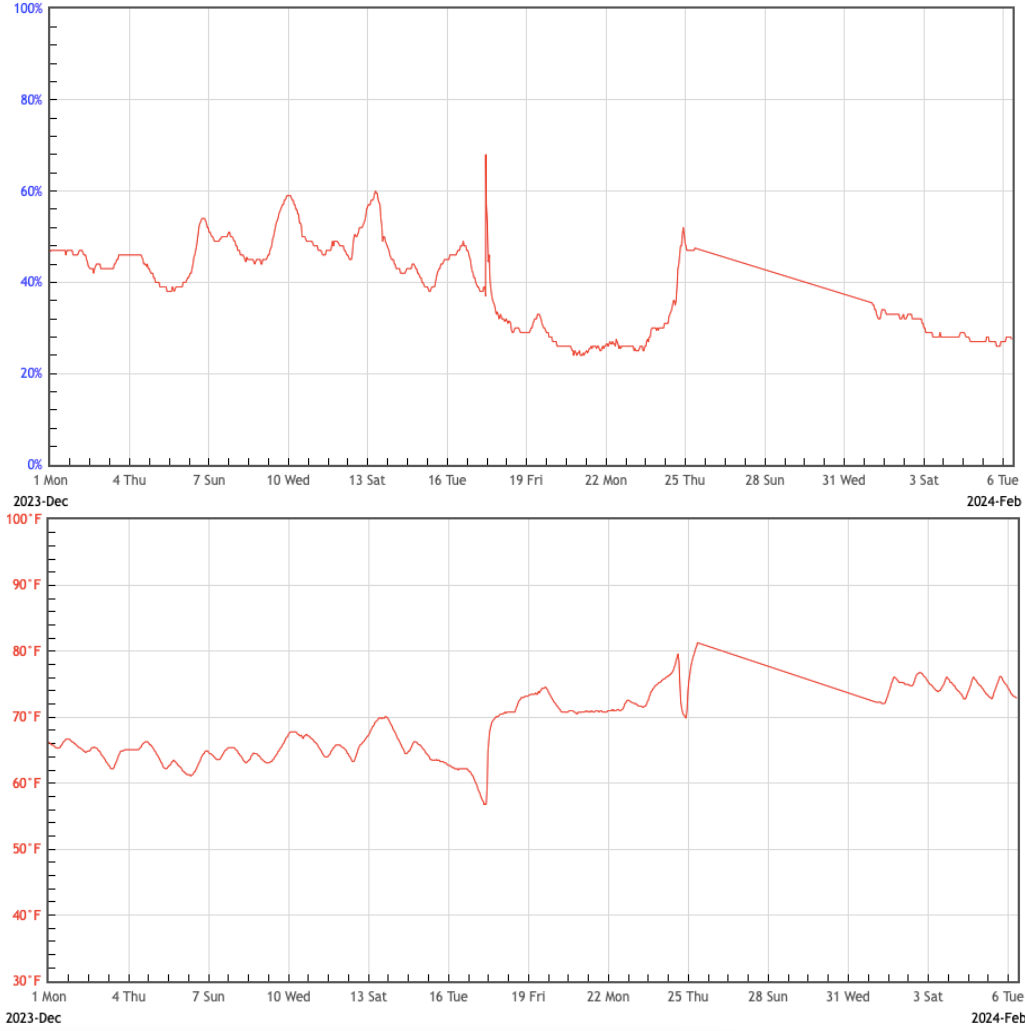


Dew point (absolute moisture) change





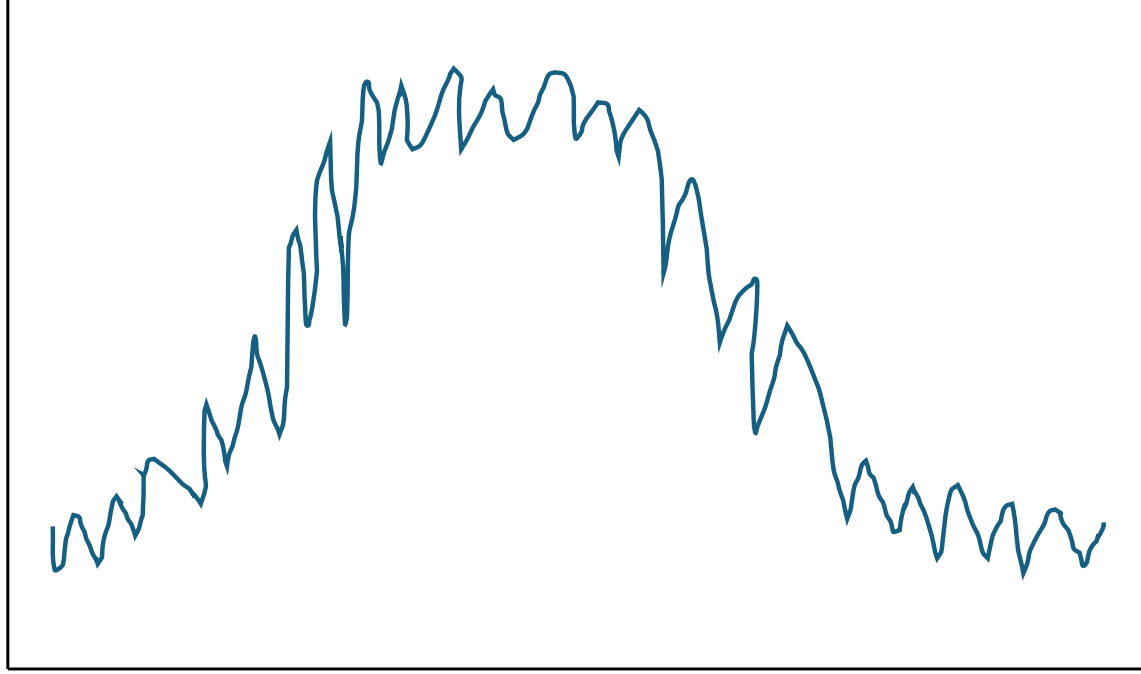
Temperature (“artificial”) change





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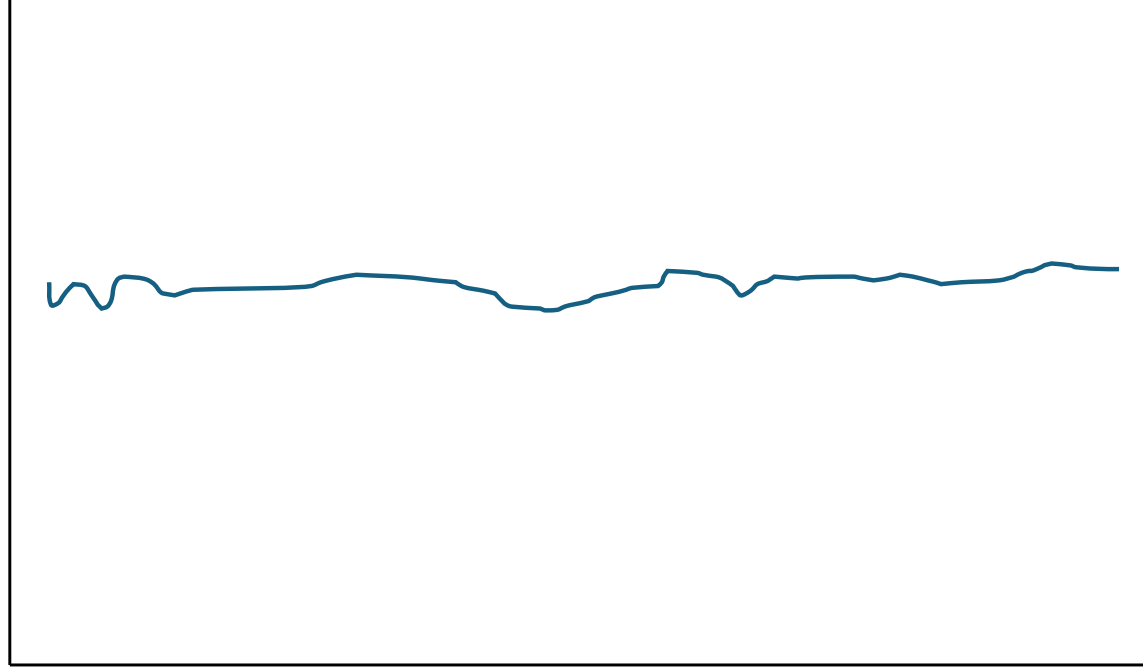
Profile: Curved



Interpreting profiles

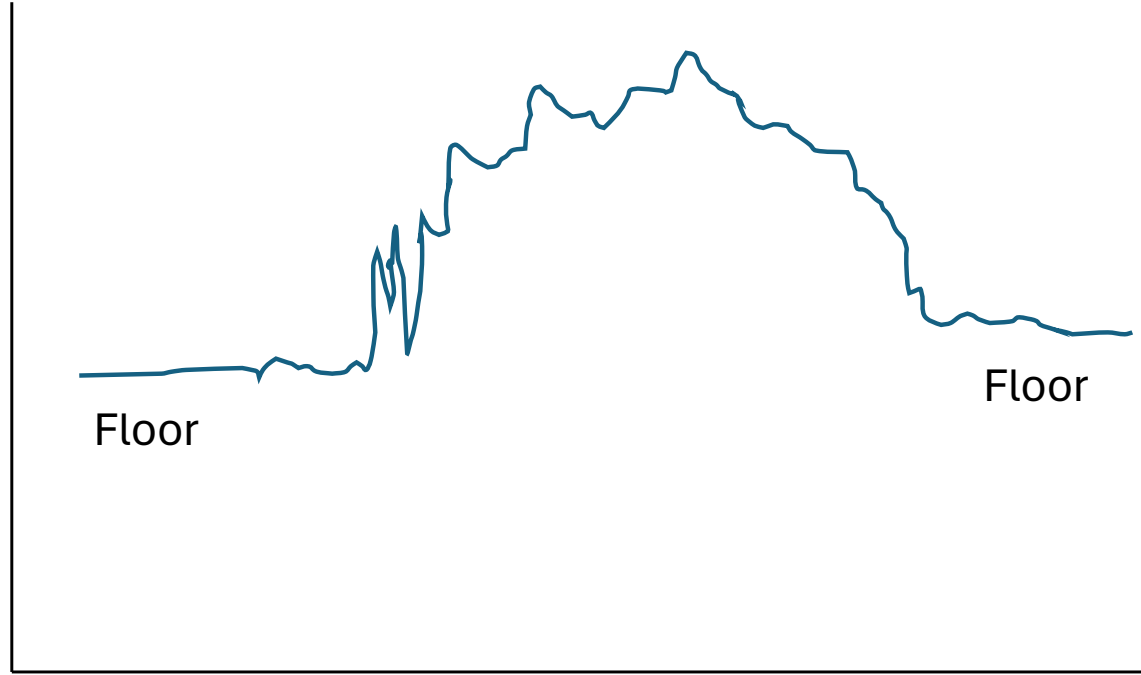


Profile: Flat



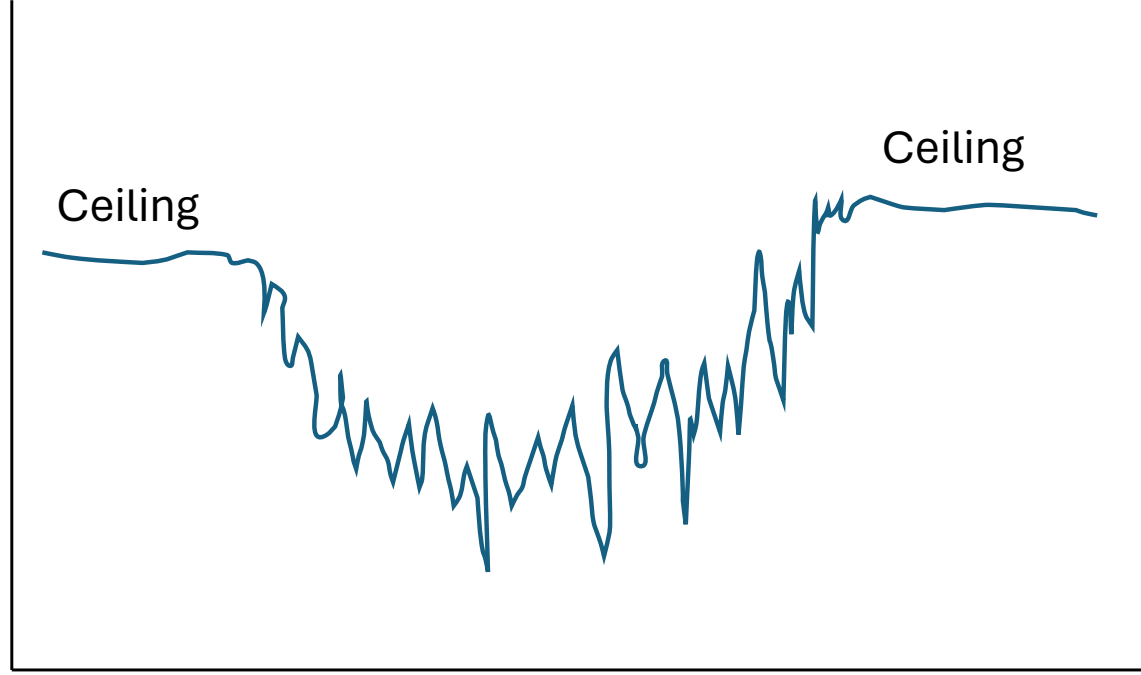


**Profile:
Curved
with flat
portions**



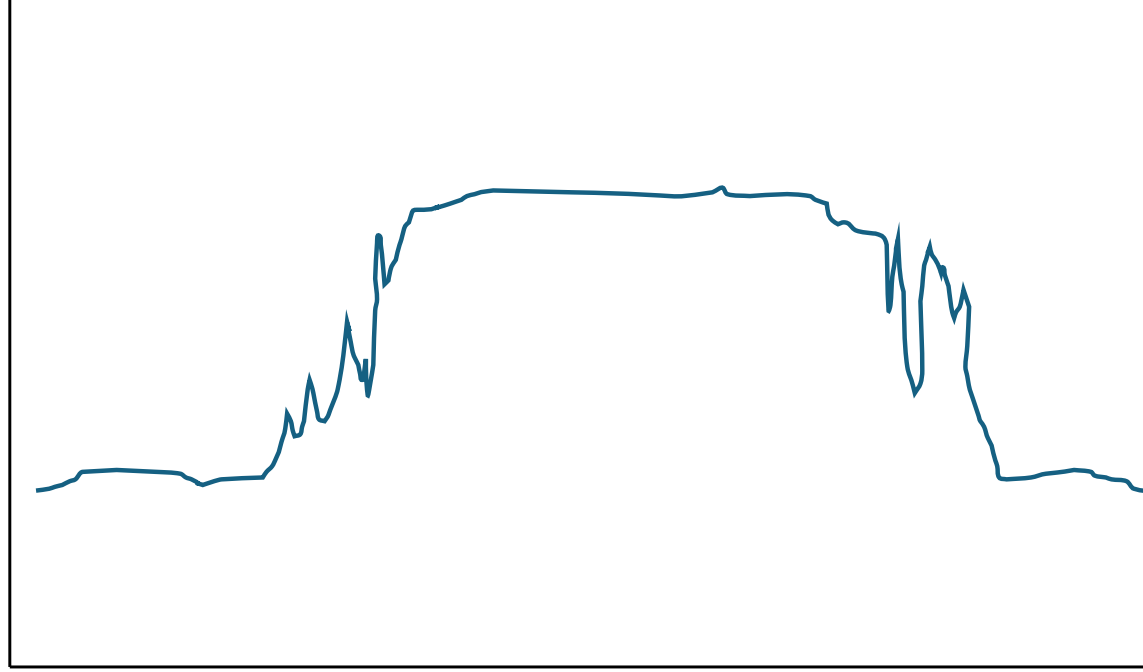


Profile: Curved with flat portions



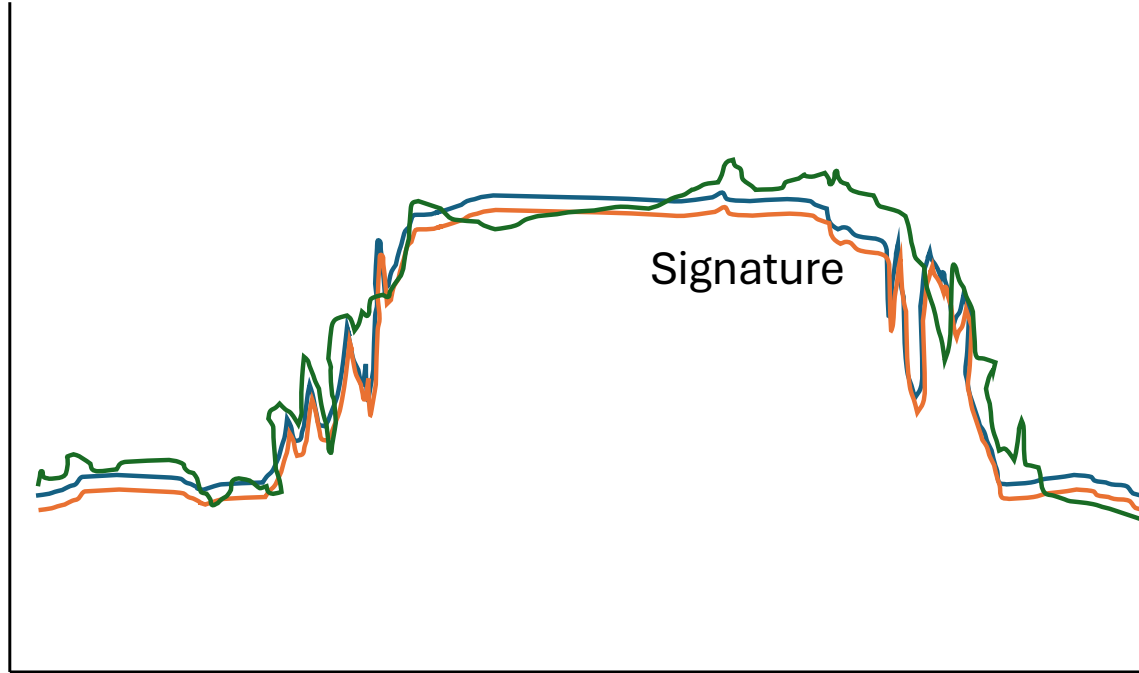


**Profile:
Flat with
fluctuating
portions**



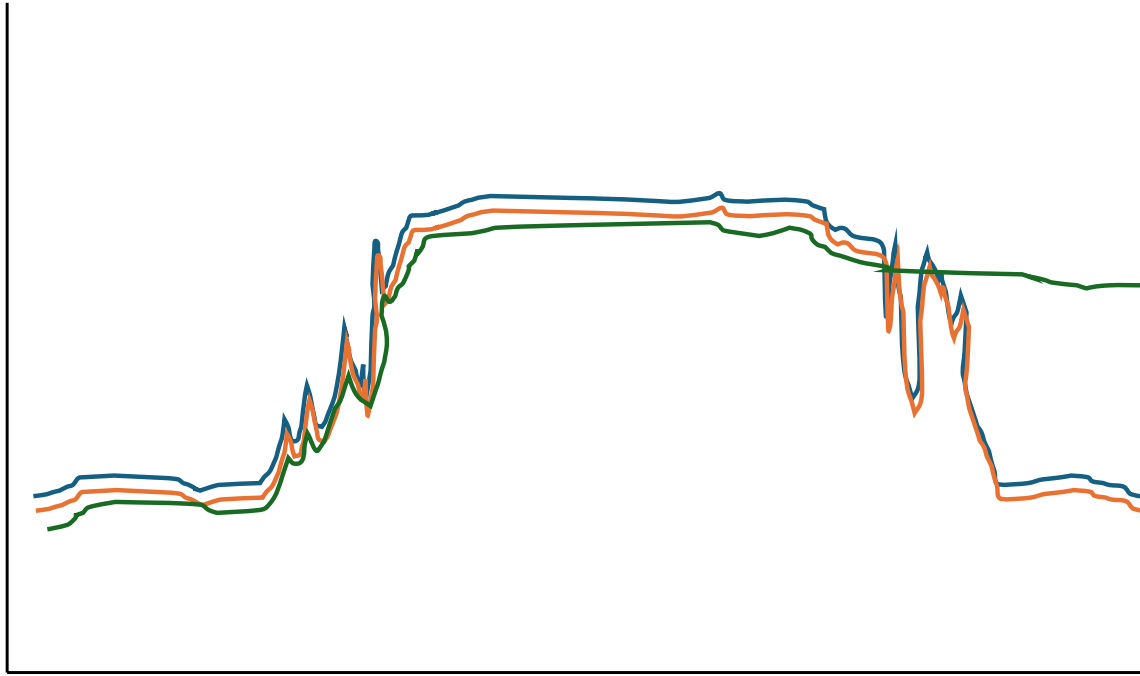


Profile: Multiple mechanical systems





With an additional moisture load:





Side note: Crossing the dew point

Can be an issue when:

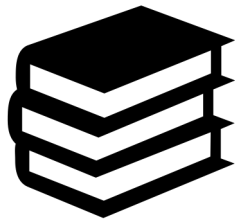
- There is no insulation/vapor barrier in the walls
 - Result- condensation occurs on or within the wall cavity, often leading to mold germination
- Moving an object from a space with one set point to a space with different set points
 - Result- condensation occurs on object



Crossing the dew point

Risk present when the temperature of the object is lower than the dew point of the space it is entering

65F
50%RH
45DP



68F
50%RH
49DP

45F
50%RH
27DP



68F
50%RH
49DP



Tips for analysis

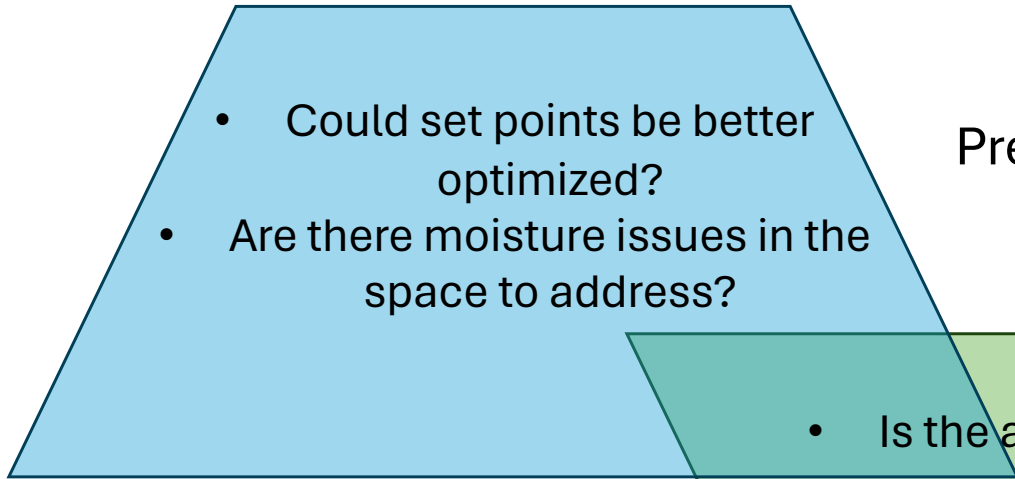
- Try starting your data analysis with dew point- what information can you get before going to temperature and RH?
 - Look at different combinations of datasets
 - Build relationships with Facilities department
 - Gather documentation



Tips for analysis (cont.)

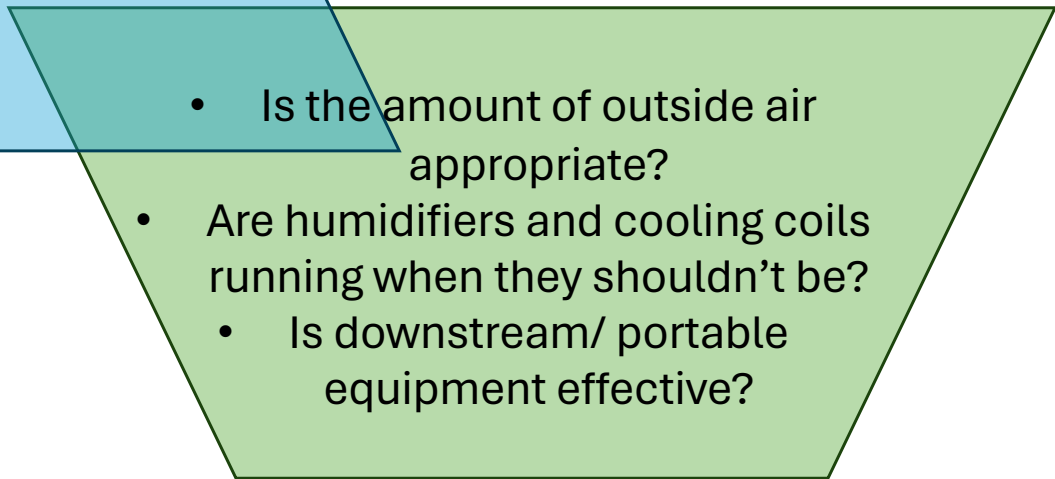
- Keep an eye on what your dew point is doing for the next six months:
 - In spring, do you see more fluctuations in moisture/RH than usual?
 - In summer, does the RH go higher than you want?
 - In winter, does the RH go lower than you want?

Think critically



- Could set points be better optimized?
- Are there moisture issues in the space to address?

Preservation quality



- Is the amount of outside air appropriate?
- Are humidifiers and cooling coils running when they shouldn't be?
- Is downstream/ portable equipment effective?

Energy and cost savings

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Tips and other considerations



Summary

- Dew point is the basis for controlling moisture in the environment for preservation
- Consider passive means first, and mechanical to the extent necessary
- Dew point can be used to determine set points, seasonal changes, and response to issues





Summary (cont.)

- Dew point curves can be described through different profiles along a spectrum
- Different features and combinations of datasets tell how the system is running to address preservation and energy efficiency



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Questions



kkrish@lesscarbonmoreculture.com