



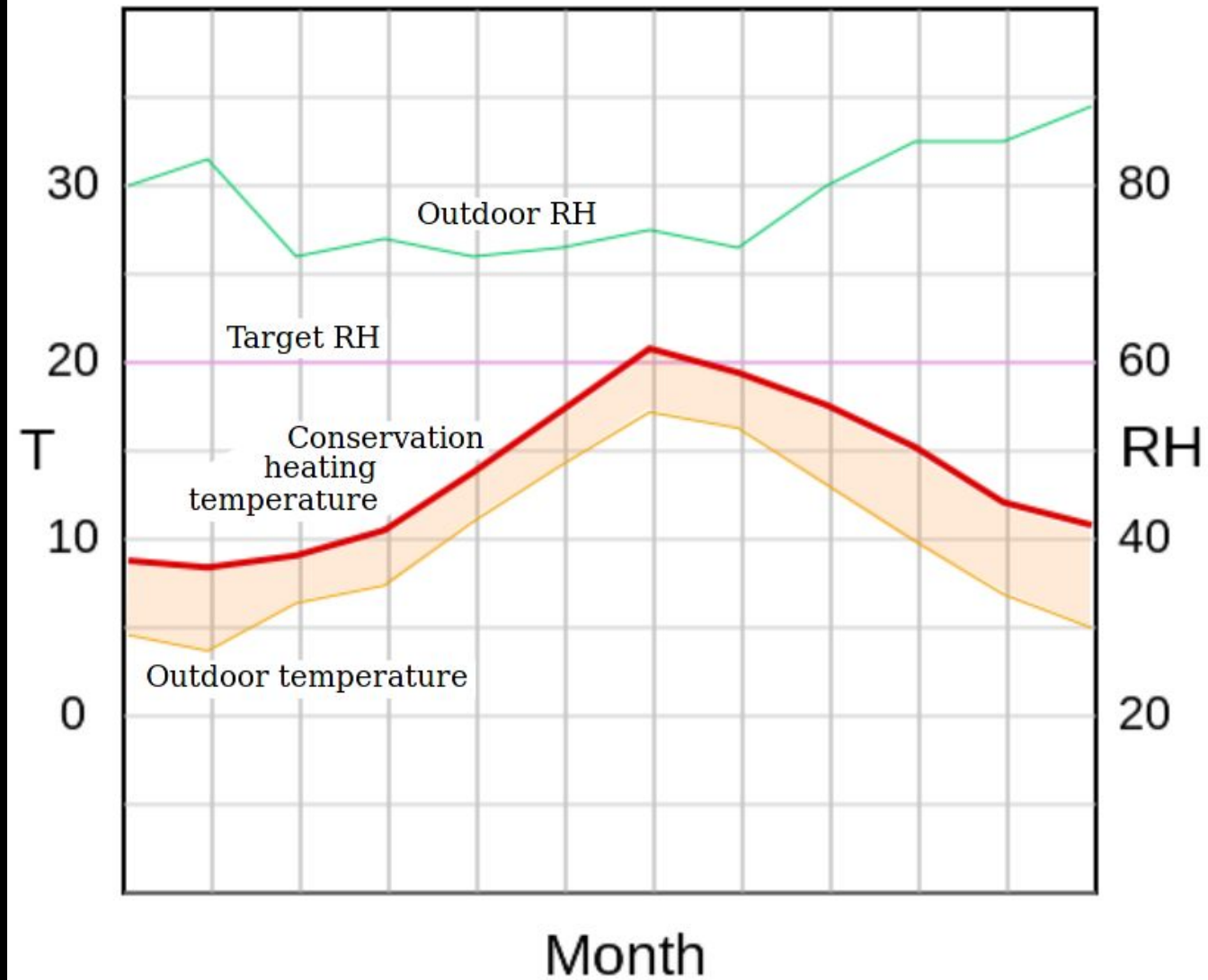
Reduced  
complexity  
air conditioning

Museum stores are  
easily controlled by  
simple methods but  
popular museums  
need more research  
and demonstration  
buildings



# Conservation heating

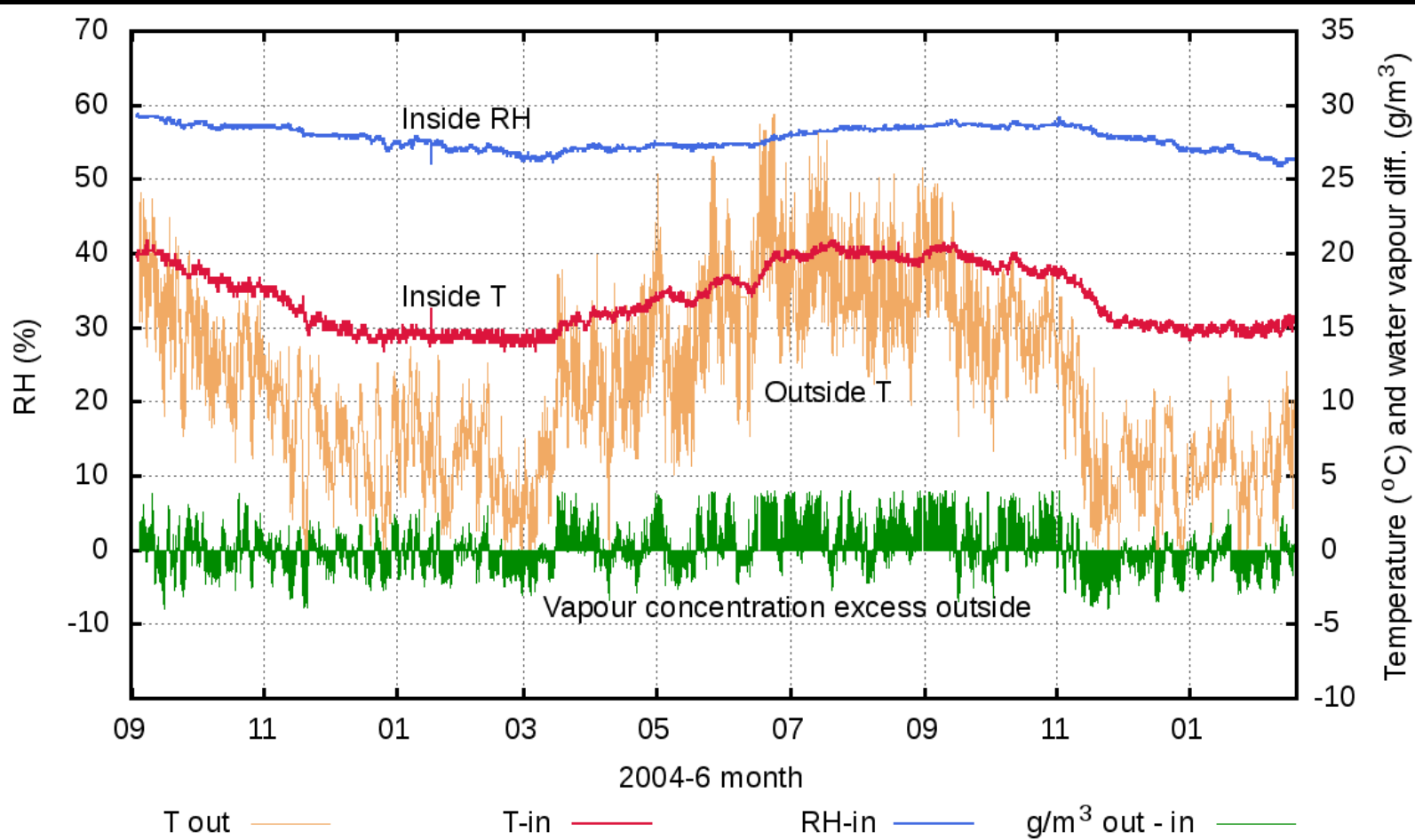
Used to keep RH moderate in ancient buildings with unstoppable ventilation

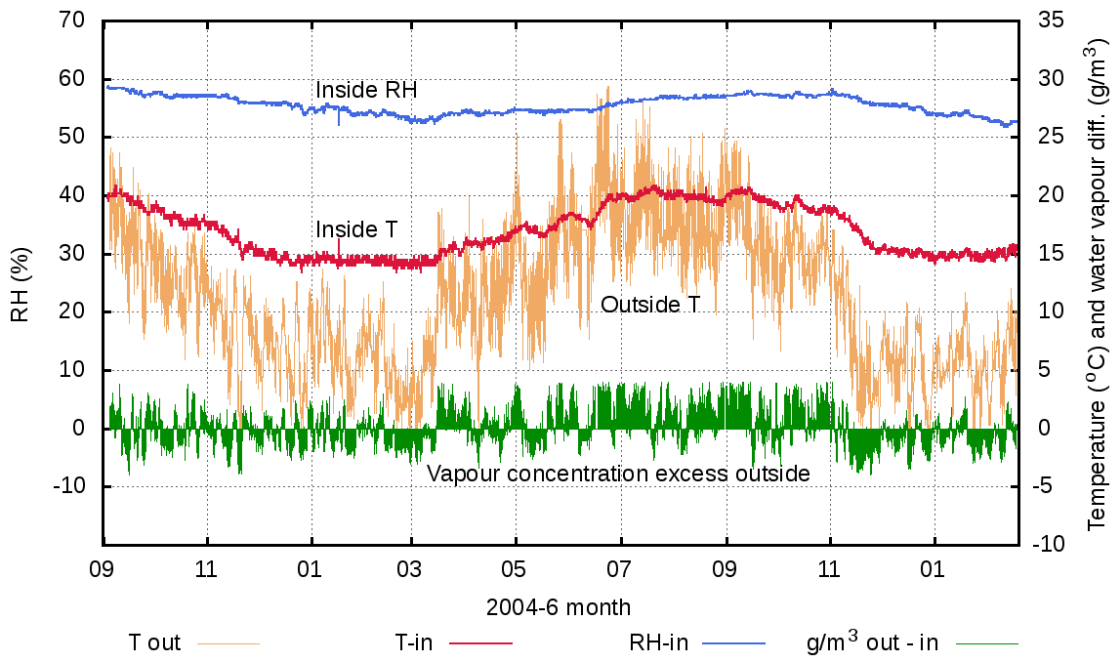




# Buffered conservation heating at the Suffolk County Record Office

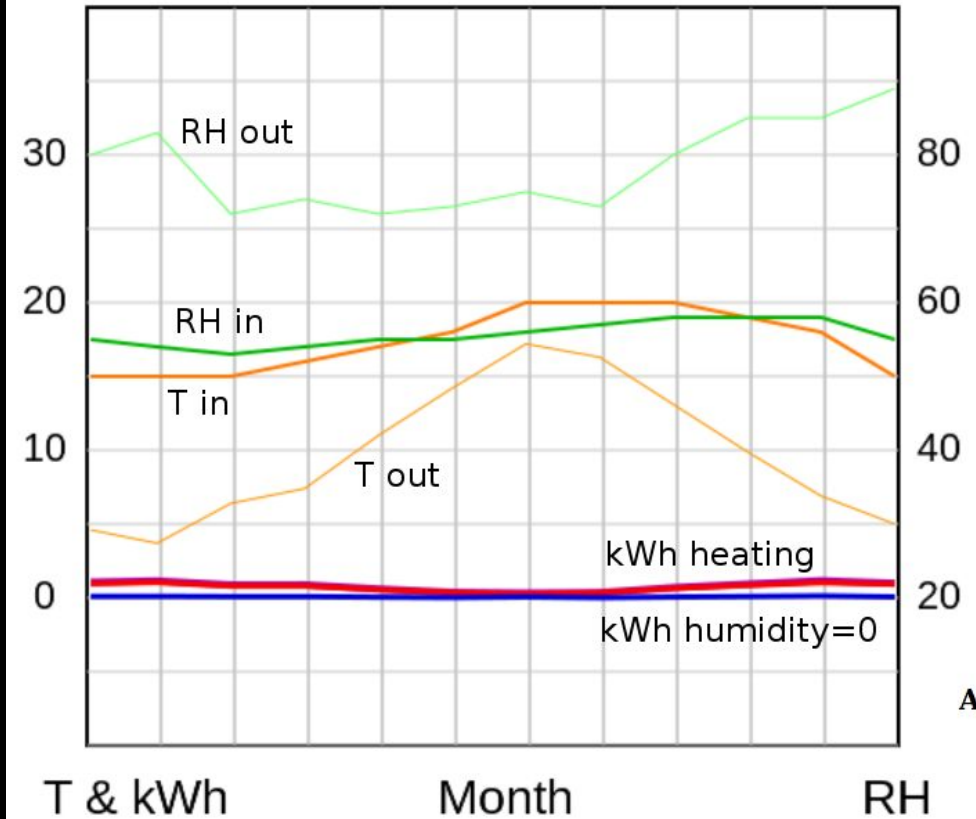
The only climate control is winter heating



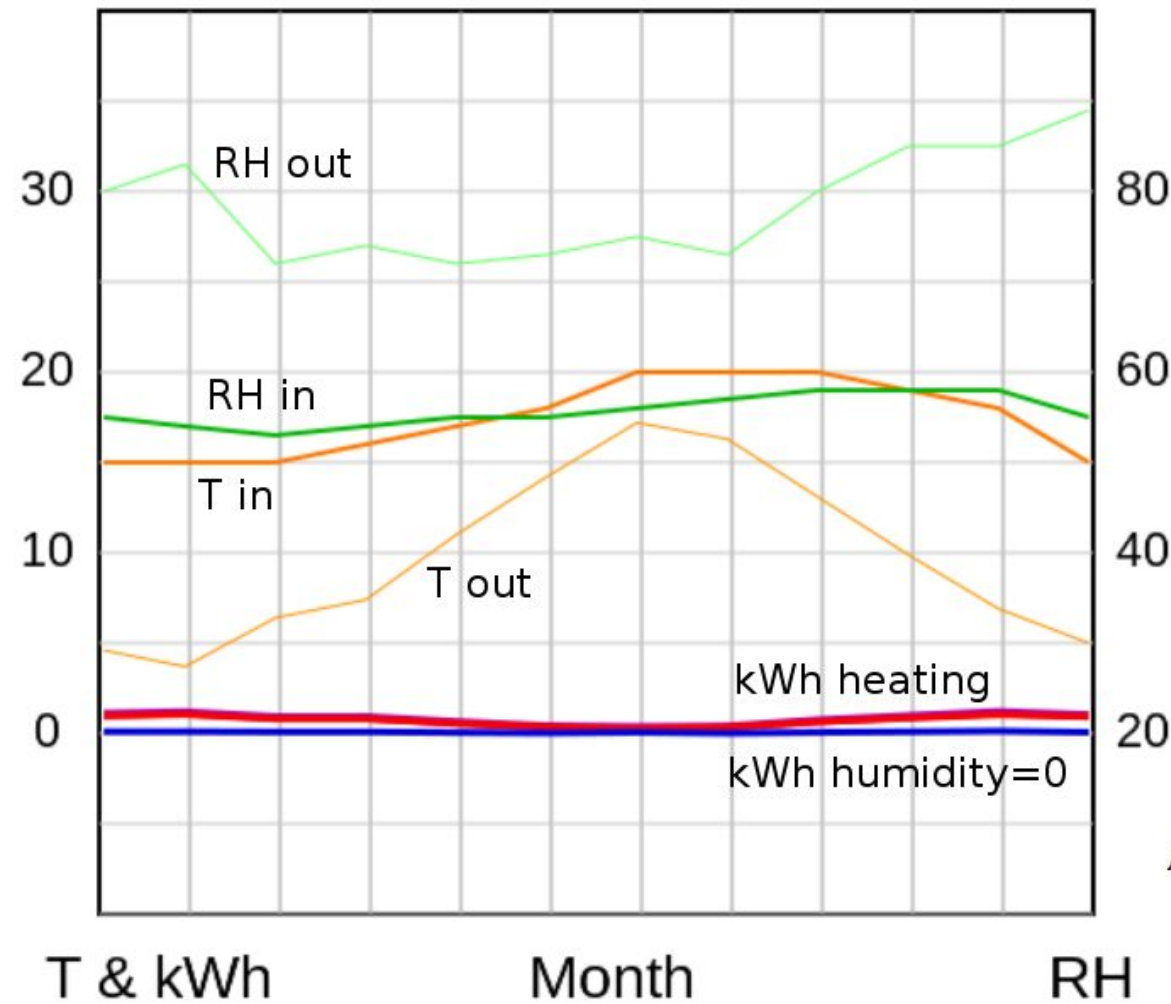


# The climate in the archive

Energy analysis of the actual climate, assuming no RH buffering







Month	kWh/m <sup>3</sup>
January	1.1
February	1.1
March	0.88
April	0.88
May	0.60
June	0.37
July	0.32
August	0.35
September	0.69
October	0.93
November	1.2
December	0.99

**Annual energy for climate control (kWh/m<sup>3</sup>)**

**Surface to volume ratio:**

**U-value:**

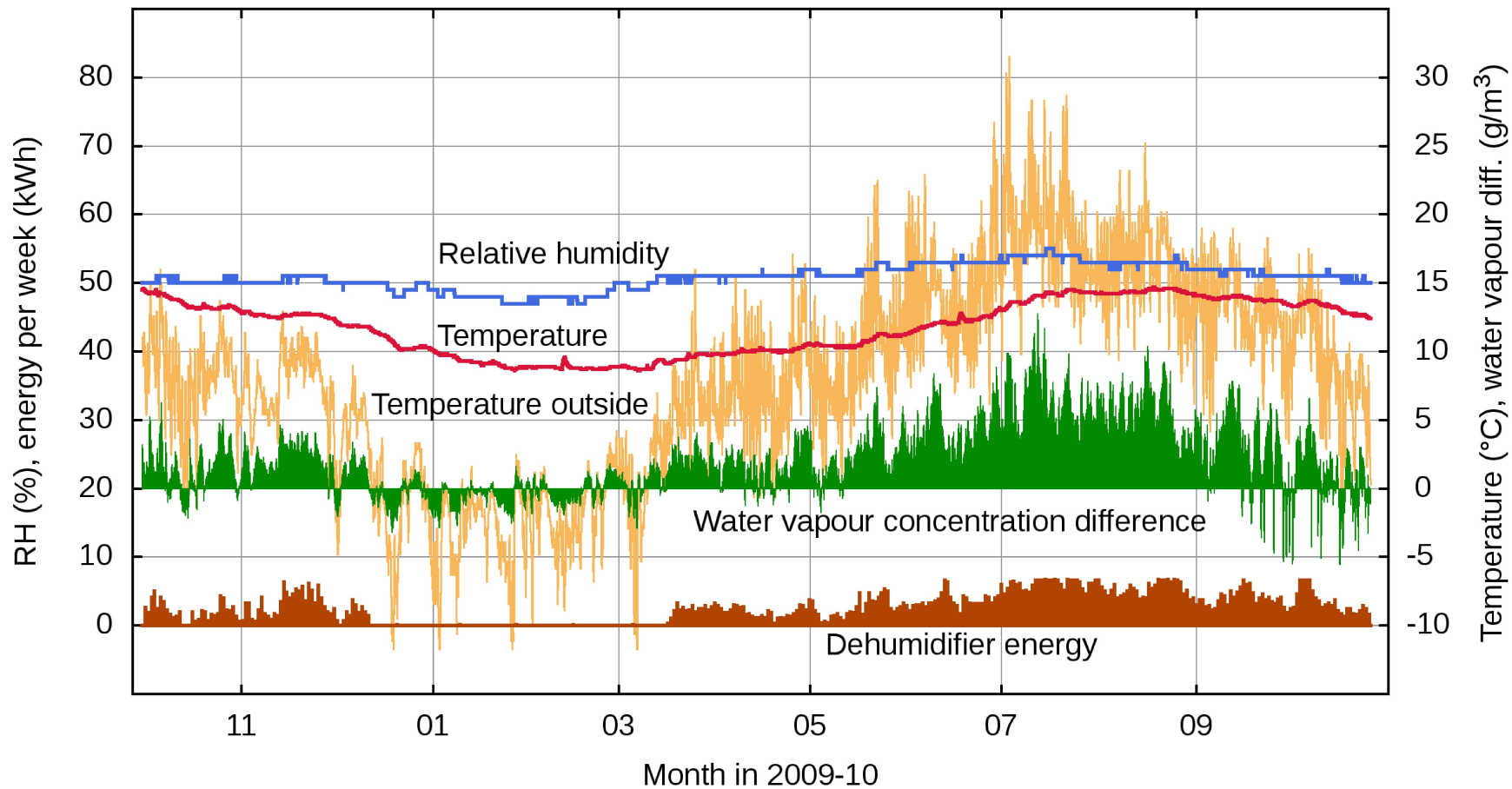
**Air changes per hour:**

With RH buffering, the summer heating energy is shifted to the winter heating. This provides the latent heat to dehumidify the archive, which is released again in summer



# Climate control by dehumidification alone

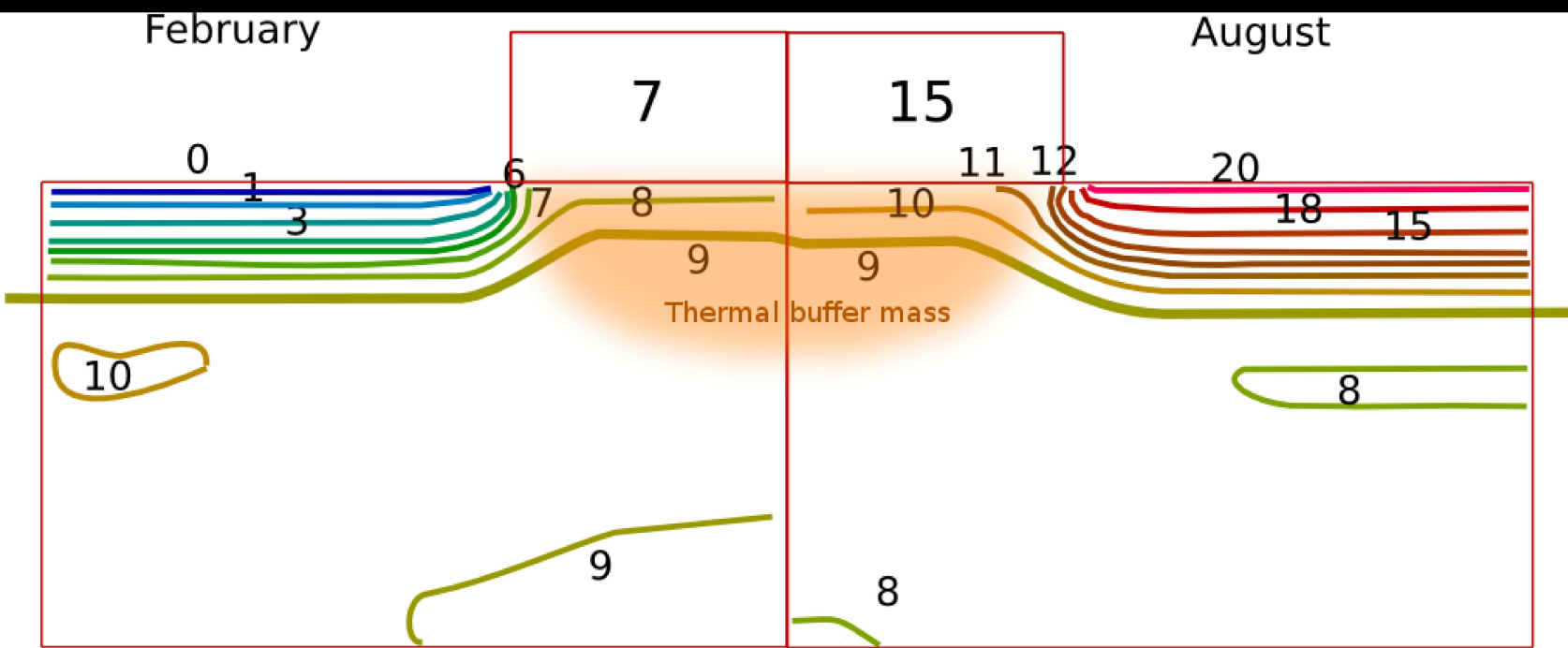
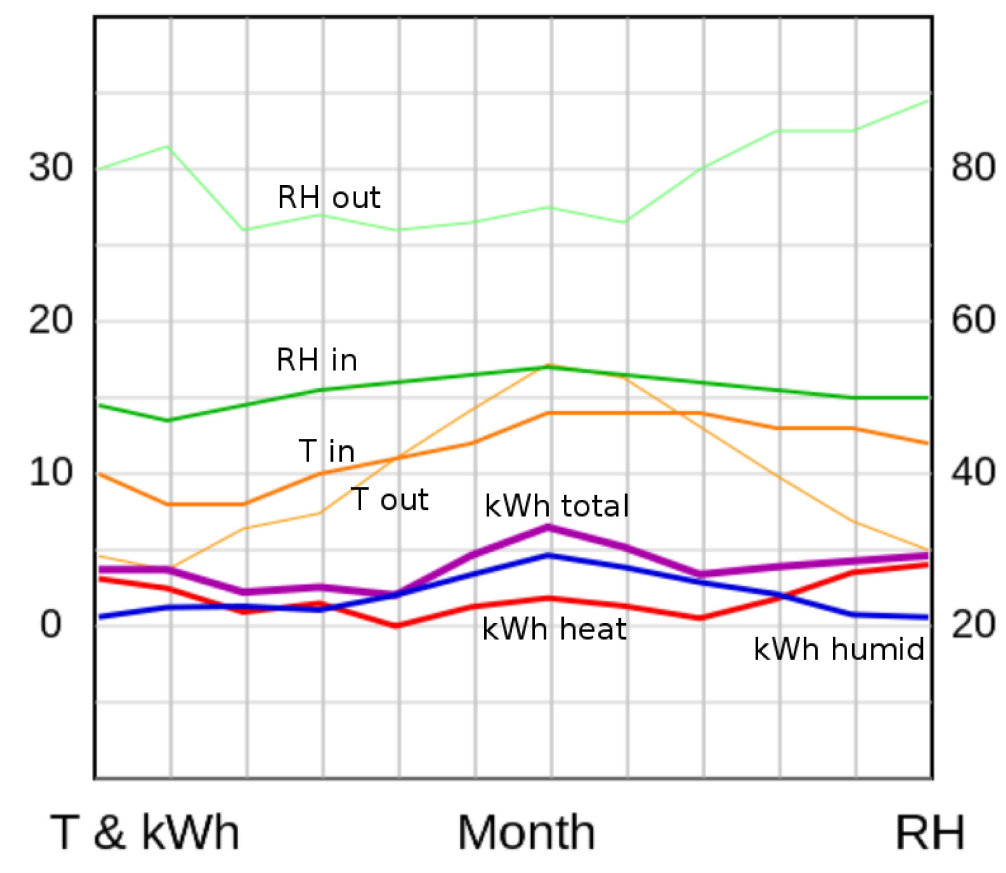
Temperature allowed  
to drift; summer  
dehumidification



The energy cost has been exaggerated by setting a high air exchange rate

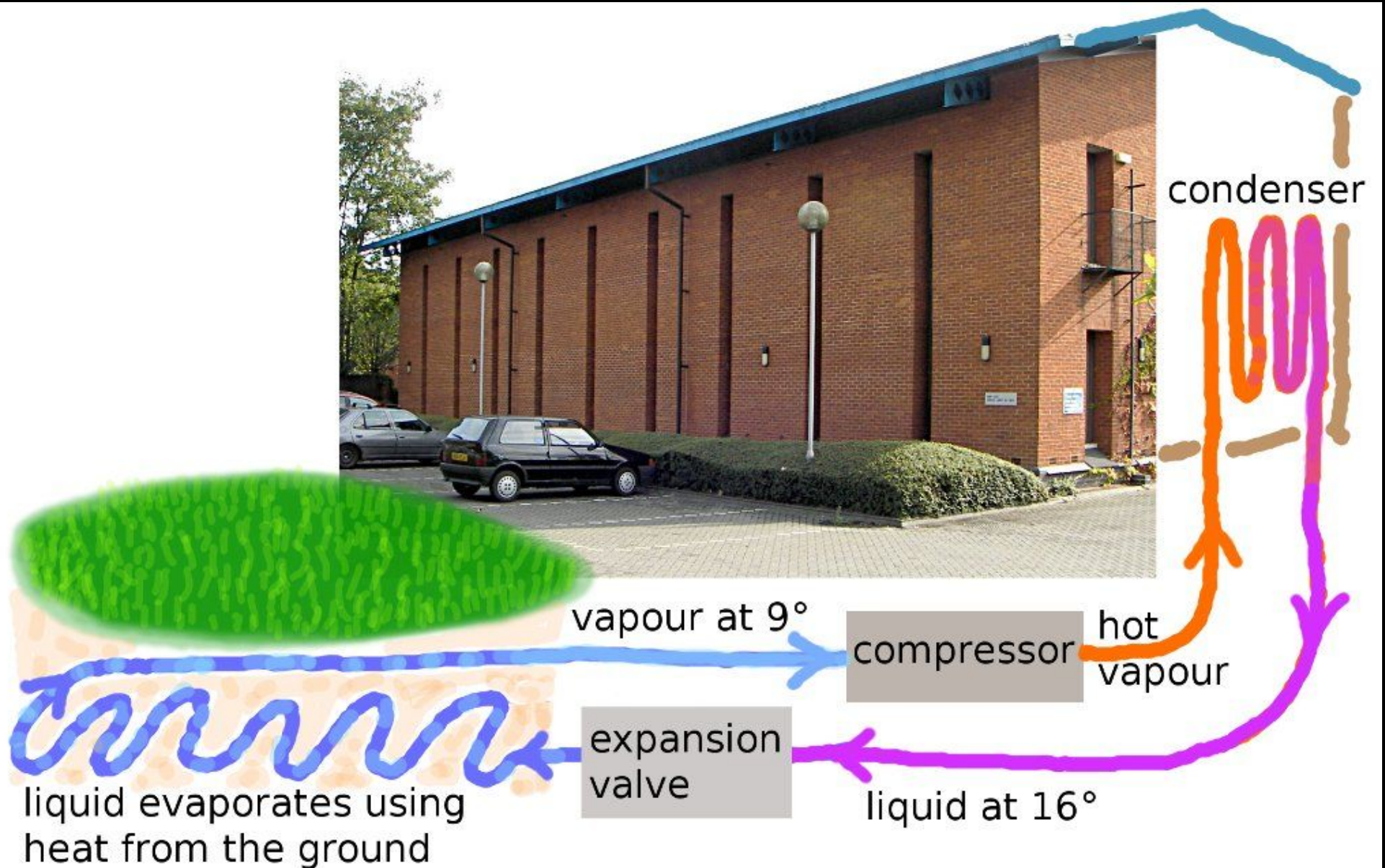
Dehumidification load peaks in summer

Heating load is taken by thermal buffering from the ground





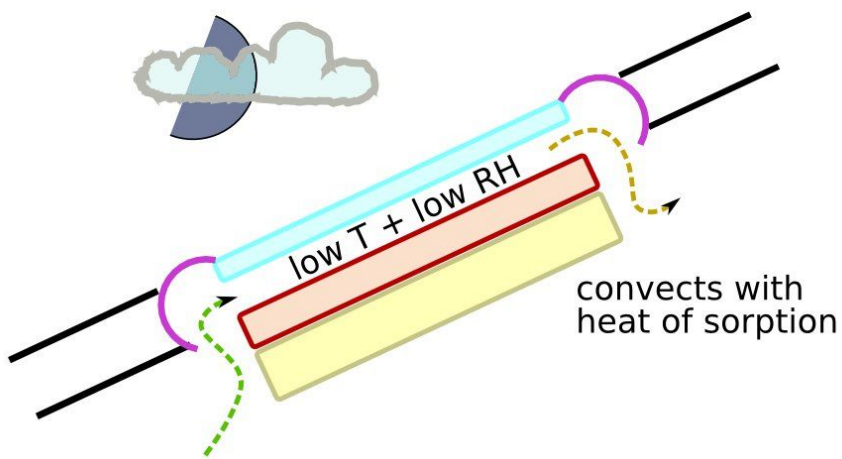
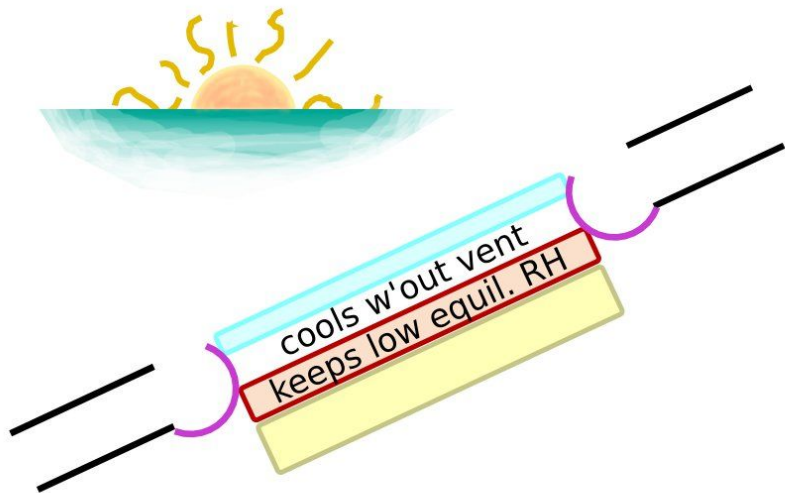
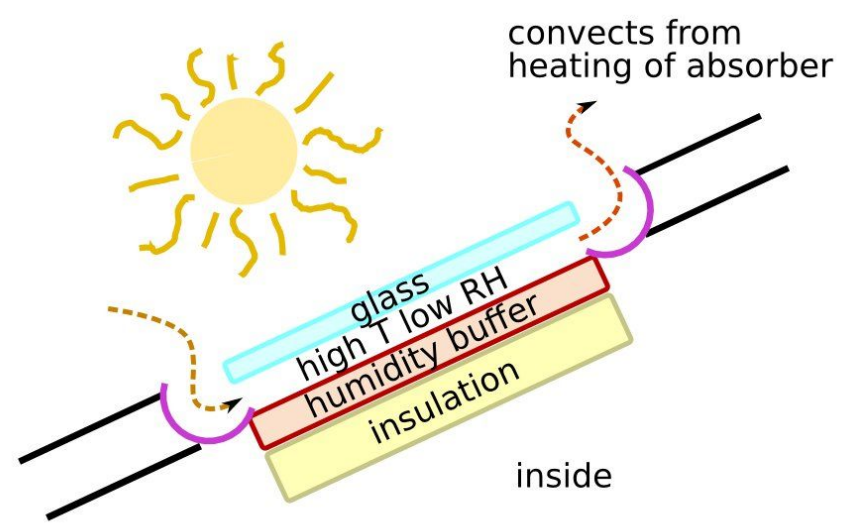
Heat pumps are most efficient over a small temperature difference, as in winter in the Suffolk County Record Office







Dehumidification can be achieved by condensation as already explained but it can also be done by sorption into a desiccant which is intermittently regenerated by passing hot air from outside through it. With a rotating desiccant drum the process can be made continuous



Because dehumidification is needed only in summer, solar energy can be used

The method sketched here depends on the fact that the equilibrium RH around absorbent materials hardly changes with temperature, so it is possible to pump humidity against the gradient





Applying simple climate control to modern museums will require a considerable change in engineering practice