

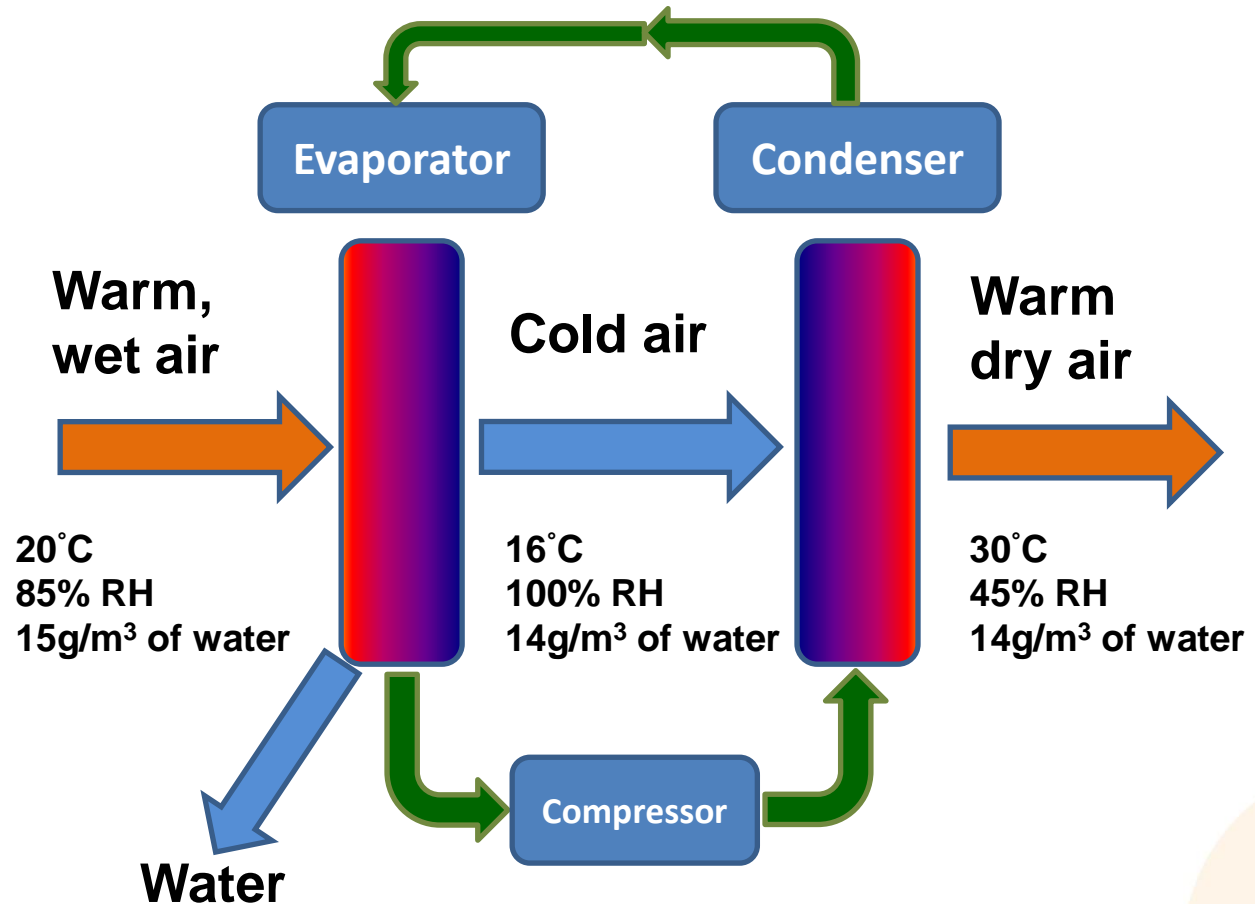
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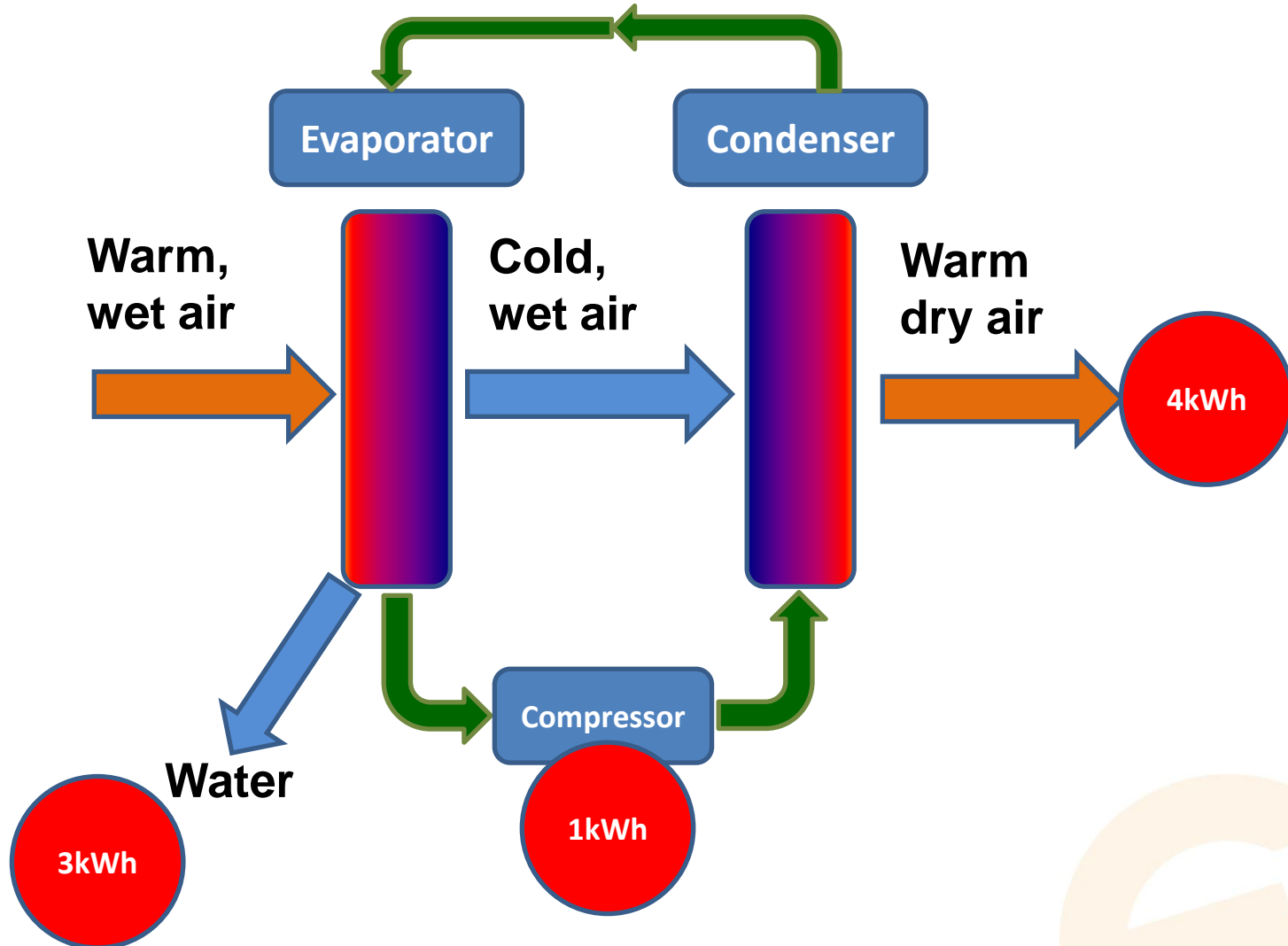
Refrigerant based dehumidification

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Farm Energy Centre



They're just a decent size refrigeration unit





Cost of electricity	Cost of heat (CoP of 4.0)	Equivalent cost of gas (85% efficient boiler)
9 p/kWh	2.3 p/kWh	1.9p/kWh (56p/Therm)
6p/kWh	1.5p/kWh	1.3p/kWh (37p/Therm)

But there's more....





- **What happens when the vents are open?**
 - Lose the energy in the water vapour (latent heat)
 - Lose the energy in 20°C air that is replaced with say 10°C air (specific heat)
 - This adds 1 to the CoP
 - New CoP is 5.0

Cost of electricity	Cost of heat (CoP of 5.0)	Equivalent cost of gas (85% efficient boiler)
9 p/kWh	1.8 p/kWh	1.5p/kWh (45p/Therm)
6p/kWh	1.2p/kWh	1.0p/kWh (30p/Therm)

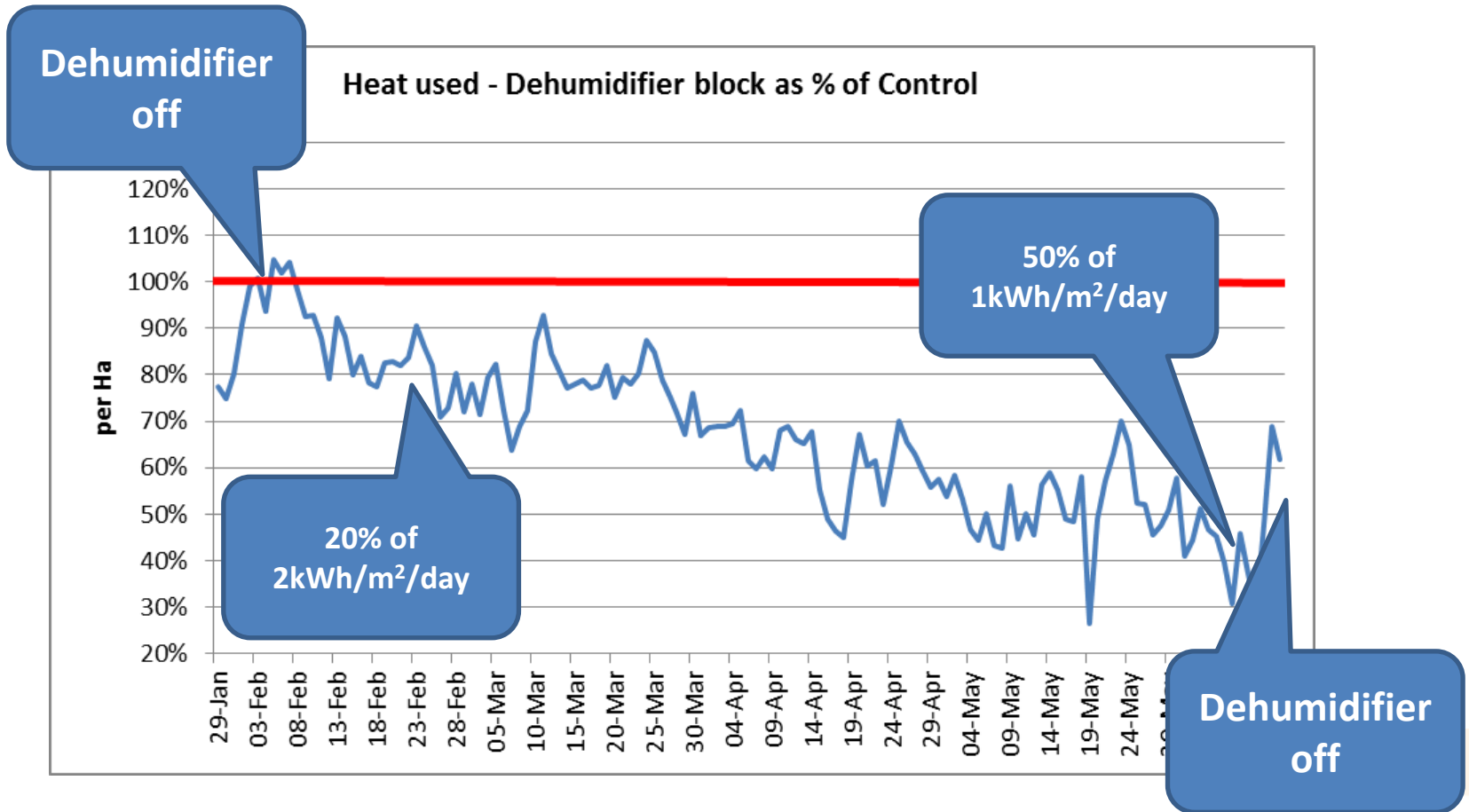
The project at Red Roofs Nursery



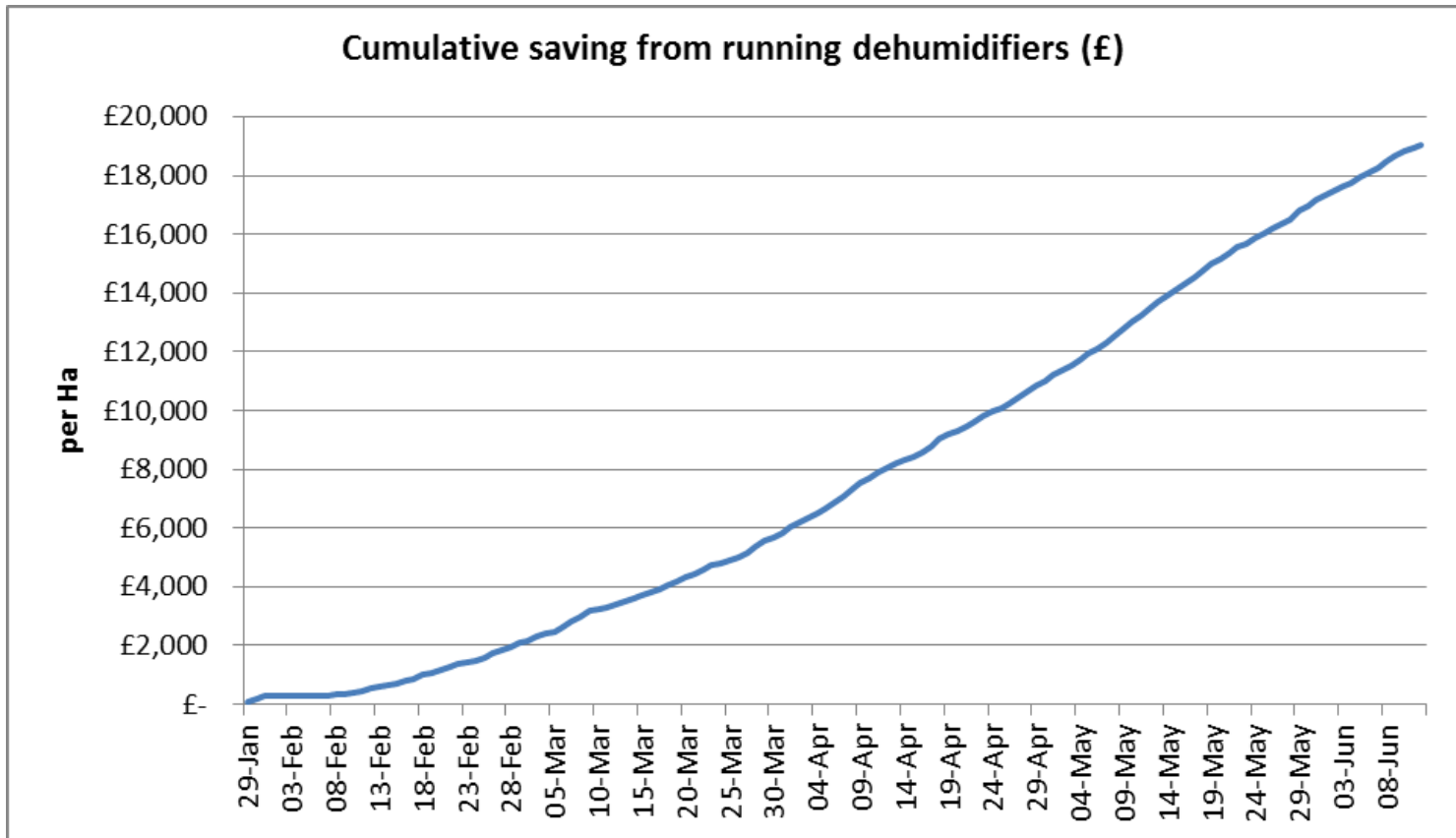
- **4 dehumidifiers in 6,000 m²**
- **Each unit**
 - Consumes 10 kW electricity
 - Removes 45 litres/hr of water



- Heat use comparison



- **Financials**
 - Electricity 6.0p/kWh (bit kind)
 - Gas 67.5p/Therm (fair)
 - 1 Ha

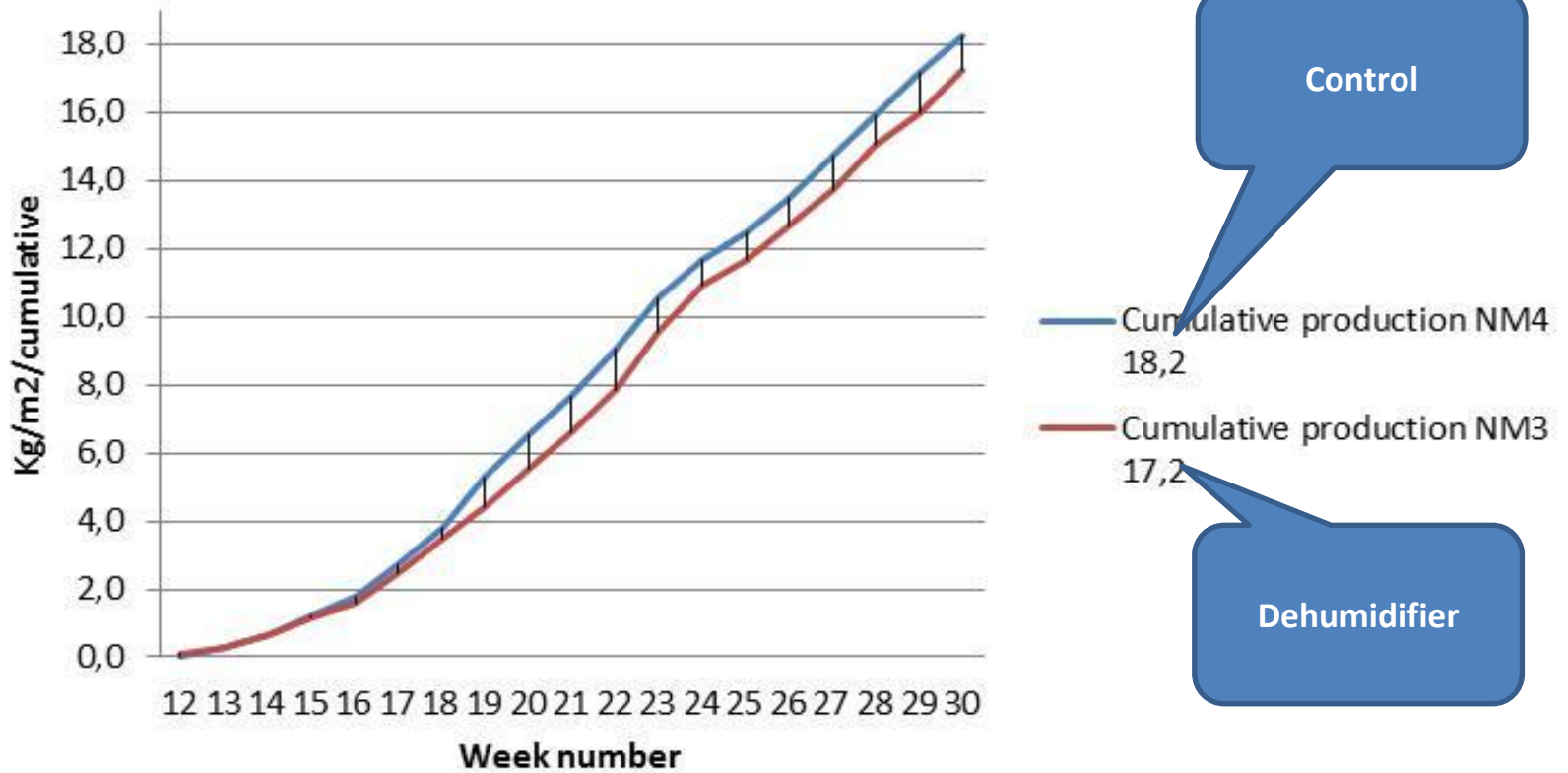


To end of May 2013

- Conventional block used 255 kWh/m² of heat
- Dehumidifier block used 202 kWh/m² of heat
- Saved 53 kWh/m² of heat / 62 kWh/m² of gas
-
- Used 13 kWh/m² of electricity
- Season-long CoP of 4.8



Production cumulative



Control

Dehumidifier

Optimise the production with the Drygair concept

- **Plant model more generative as traditional plant model.**
 - Remove more leaves.
 - Arrange a more generative climate as in the traditional compartment.

Optimise the Drygair concept with the correct plant model

- **The Drygair concept have a positive effect on the reduction of the botrytis.**
 - The humidity can be in a higher range: 80–85 %.
 - The more generative plant model can handle the higher humidity without a lost of yield.



- **Assume the yield reduction can be resolved**
 - Capital cost: £130–£150k per Ha
 - An energy saving of £30,000 per Ha seems possible
 - Simple return in 5 years
- **And**
 - What if we can use fewer breathable screens as a result?....