

1. Methane (CH₄) – why is it important?

- Methane absorbs energy in the form of infrared radiation reflected from the Earth's surface and reduces the amount escaping into space. This is the greenhouse effect which warms the planet.
- CH₄ concentration in the atmosphere has risen from around 700 parts per billion (ppb) in 1750 to 1860 ppb at present.
- This rise in atmospheric concentration is contributing to climate change.
- CH₄ is produced in wetland soils and closed landfill sites where there is no oxygen present (anaerobic environments).

3. Aims – applying the tree methane pathway to landfill

Quantify emissions: do trees on closed landfill sites in the UK emit CH₄ from their stems?

Spatial variations: do CH₄ emissions vary with stem height?

Temporal variations:

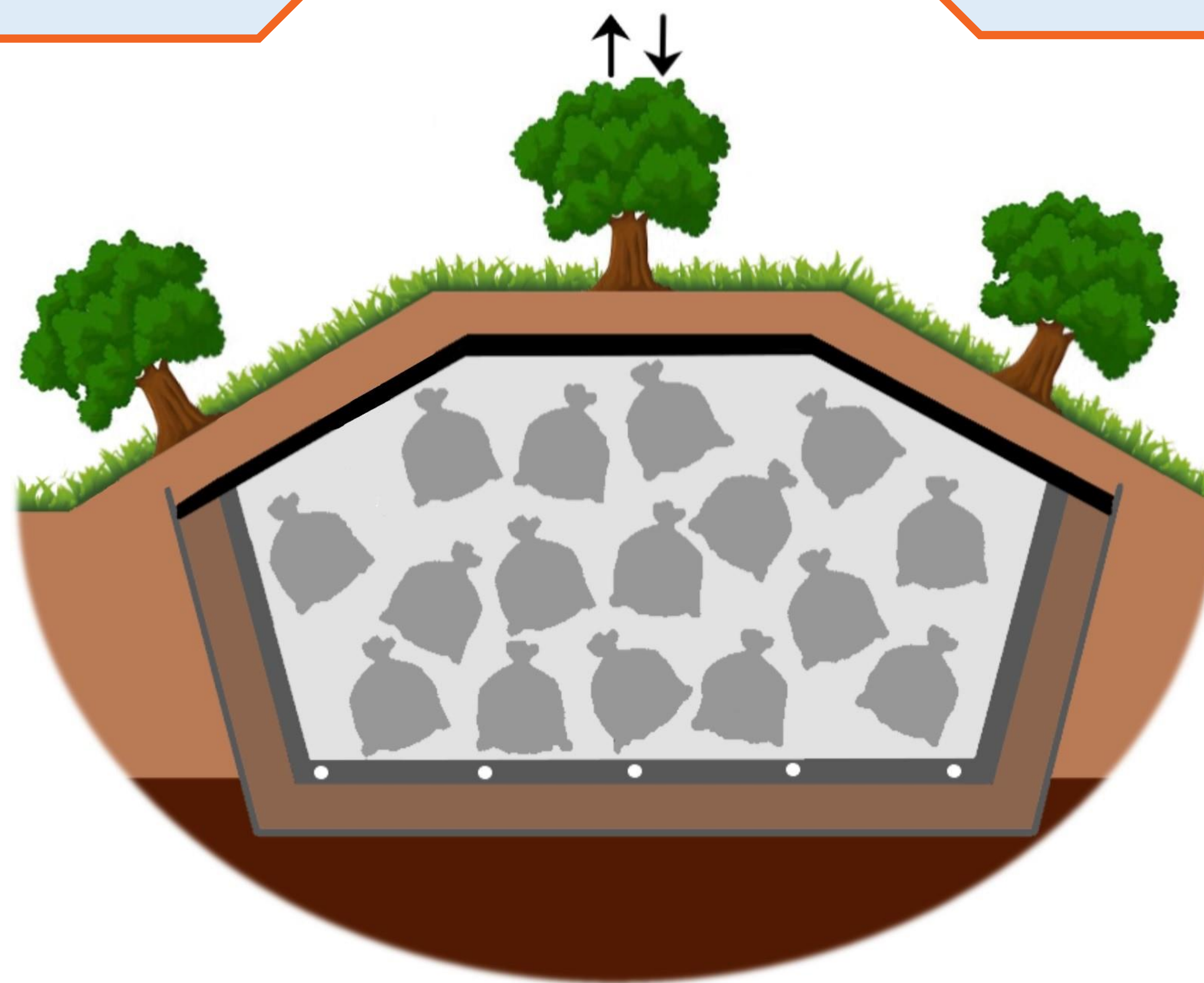
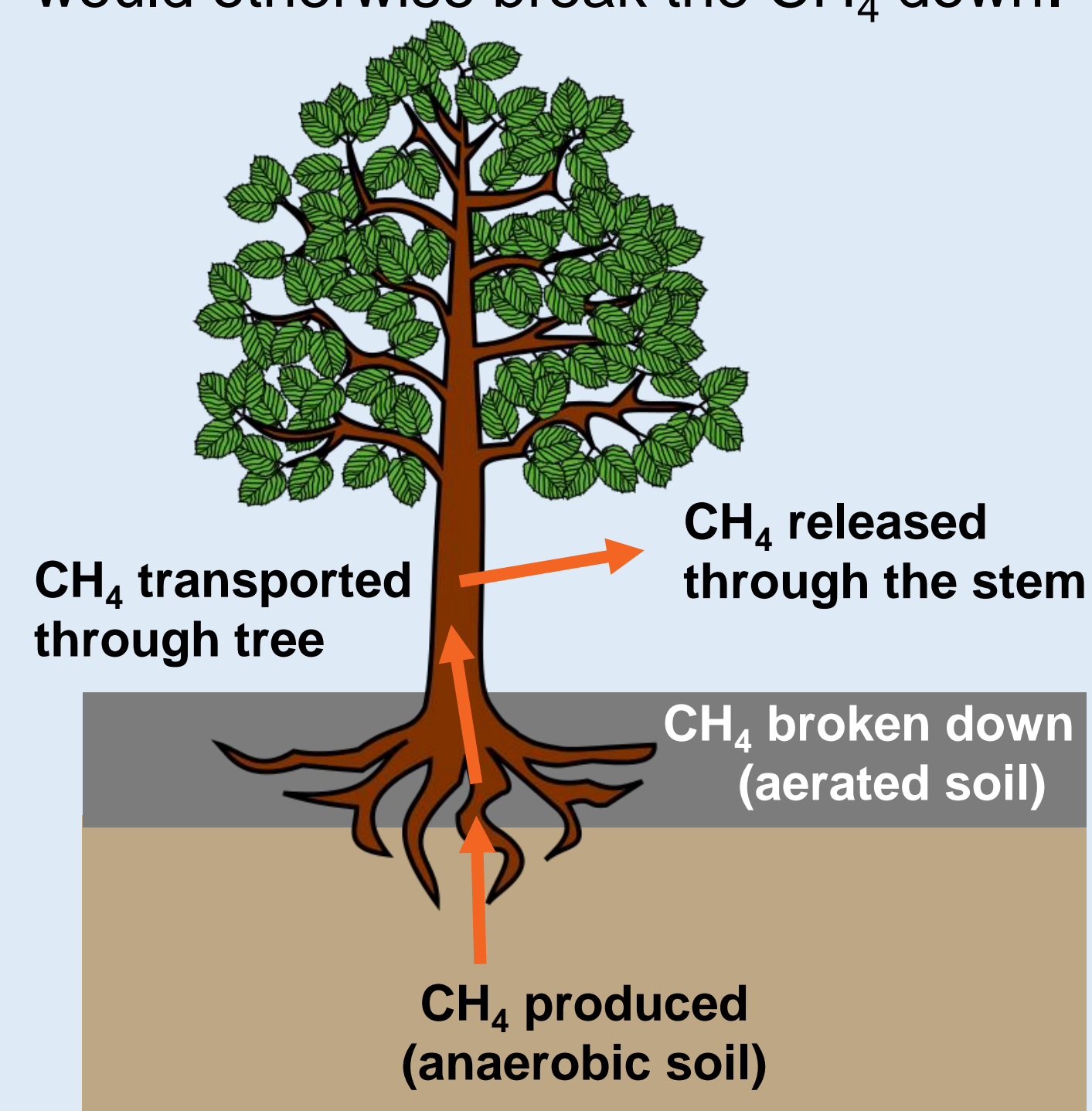
- do CH₄ emissions vary seasonally?
- do CH₄ emissions vary between closed landfill sites with different management histories?

Species variations: do different tree species emit varying amounts of CH₄?

CH₄?

2. The Tree Methane Pathway

- Trees can contribute to CH₄ emissions from wetlands as they provide a pathway from the soil to the atmosphere through the roots and stems.
- This route of CH₄ emission could be highly significant because it bypasses bacteria in the uppermost, aerated soil layer which would otherwise break the CH₄ down.



Applying the tree methane pathway to trees on closed landfill sites will determine whether they are taking in CH₄, thereby mitigating the effects of landfill gases, or amplifying the effects by channelling emissions from the waste.

4. Quantifying CH₄ Emissions

- Data will be collected from closed landfill sites in the UK which have woodland areas.
- Chambers will be secured around the tree stem and connected to an Ultraportable Greenhouse Gas Analyser (Los Gatos Research).
- The greenhouse gas analyser will measure the concentration of CH₄ in the chamber.



- This can be used to determine the amount of CH₄ emitted or taken in by a tree over time.