Greenhouse gases in agriculture

Under Australia's National Greenhouse and Energy Reporting scheme, carbon dioxide (CO2), methane (CH4), nitrous oxide (N2O), sulfur hexafluoride (SF6) and some hydro-fluorocarbons and perfluorocarbons are reported. Emissions are measured and reported as CO2 equivalents.

For example, one tonne of CH4 released into the atmosphere will cause the same warming as 25 tonnes of CO2 – so one tonne of methane is expressed as 25 tonnes of CO2 equivalence.

Nitrous oxide

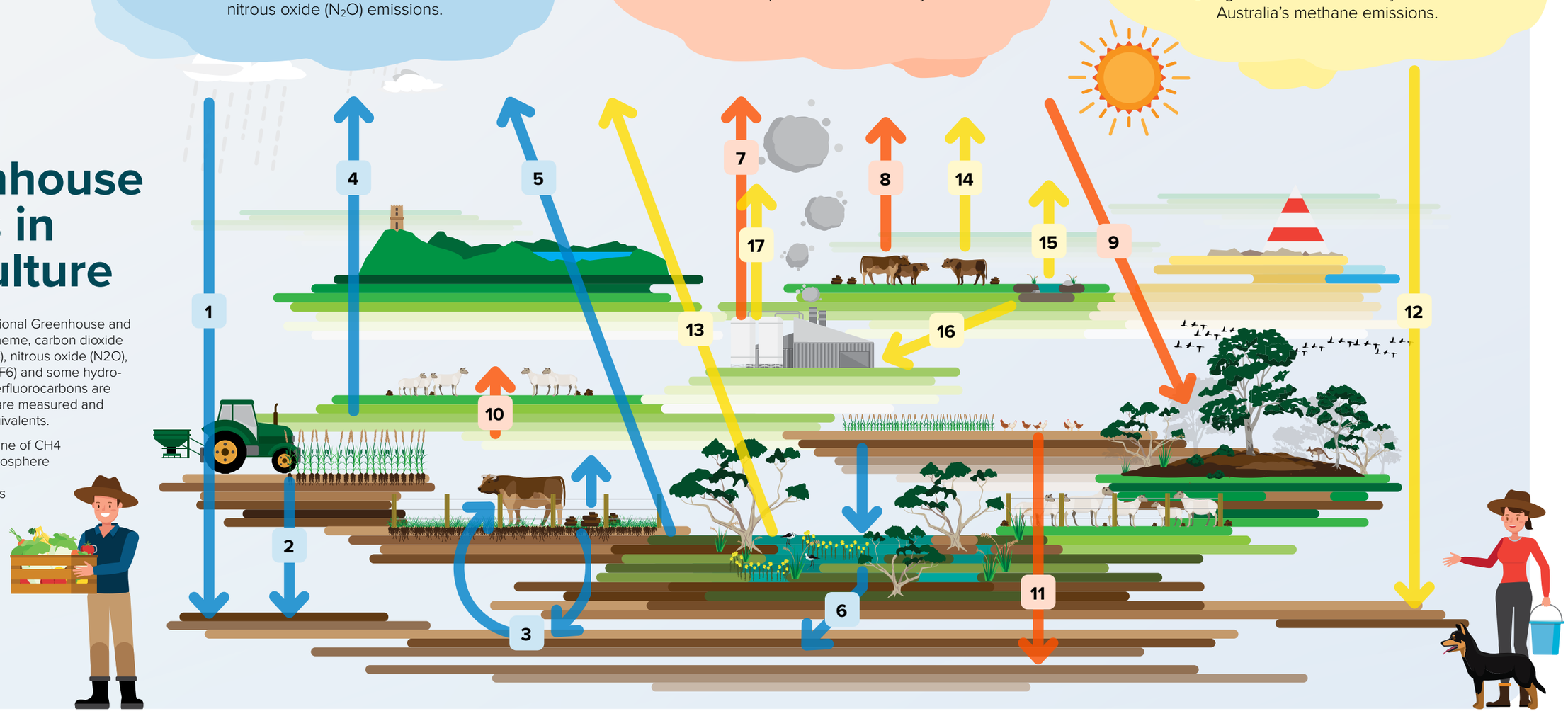
Nitrous oxide (N_2O) persists in the atmosphere for an average of 110 years and has a global warming potential about 300 time greater than carbon dioxide. Agriculture is the principal source of human-induced nitrous oxide (N_2O) emissions.

Carbon Dioxide

Carbon dioxide (CO_2) is the most common greenhouse gas and persists in the atmosphere for 300–1000 years.

Methane

Methane (CH_4) has a global warming potential 25 times that of CO_2, but only persists in the atmosphere for about 10 years before cycling back to CO_2. Agriculture accounts for just over half of Australia's methane emissions.



1. N2 within soil can be converted ('fixed') by species of bacteria to NH4+. In addition, the energy from lightning can break apart the N-N bond in atmospheric N2, resulting in the formation ('fixation') of various nitrogen compounds, which can then enter the soil with rain.
2. N2 atmospheric gas can be artificially heated and pressurised to form N-fertiliser, including urea (CH4N2O). This fertiliser is applied to crops and pastures.
3. N is converted into plant-available mineral forms by microbial processes, which can then be taken-up by plant roots. N can be cycled from plants to animals when animals eat, and can then re-enter the soil in the form of manure and urine. Some of the N in urine and manure is 'lost' to the atmosphere as N2O emissions via nitrification and denitrification pathways.
4. Some N from fertiliser is lost into the air through chemical volatilisation as NH3 – which can be an indirect source of N2O via atmospheric oxidation of NH3.
5. Nitrous oxide released through process of denitrification.
6. N lost via surface runoff or soil erosion. This N can then enter waterbodies, or can be leached away from the soil profile and root zone as nitrate-N and potentially enter into groundwater – these are potential sources of N2O emissions.
7. CO2 released by burning fossil fuels to produce fuel and energy.
8. CO2 released by animals via the process of respiration.
9. CO2 from the atmosphere is absorbed by vegetation through photosynthesis and acts as a carbon sink or offset.
10. Animals consume carbon when they consume plant material. This is a temporary uptake of carbon which cycles back into CO2 via respiration, or is captured in the soil when the animals decompose.
11. Carbon enters the soil as dead plant material, dead animals, roots, manure and urine and can act as a CO2 sink, but can also be emitted as CO2 via respiration by soil microbes.
12. Soil absorbs CH4 from the air, and bacteria consume it as a carbon source.
13. In waterlogged soils and wetlands, CH4 is produced as a result of microbial activity under anaerobic conditions.
14. CH4 released by cows, sheep and other ruminants, largely through burping after enteric fermentation, and to a lesser extent from farting.
15. CH4 is released from effluent ponds from dairy and pig farms as a result of anaerobic fermentation.
16. CH4 from effluent ponds can be collected and used as a natural gas substitute or used to generate electricity.
17. CH4 is emitted from fossil fuel extraction and production processes and also from landfill sites.

LANDSCAPE SOUTH AUSTRALIA LIMESTONE COAST