

# Stirling Soil & Nutrient Network



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# Welcome

**Aucheneck Estates**  
**10/10/2019**



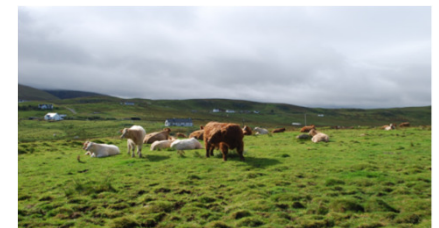
**Zach Reilly**  
**SAC Consulting**



Scottish Government  
Riaghaltas na h-Alba  
gov.scot

# Today's talk:

- What is climate change and is it real?
- How does agriculture contribute?
- What can we do to reduce emissions?

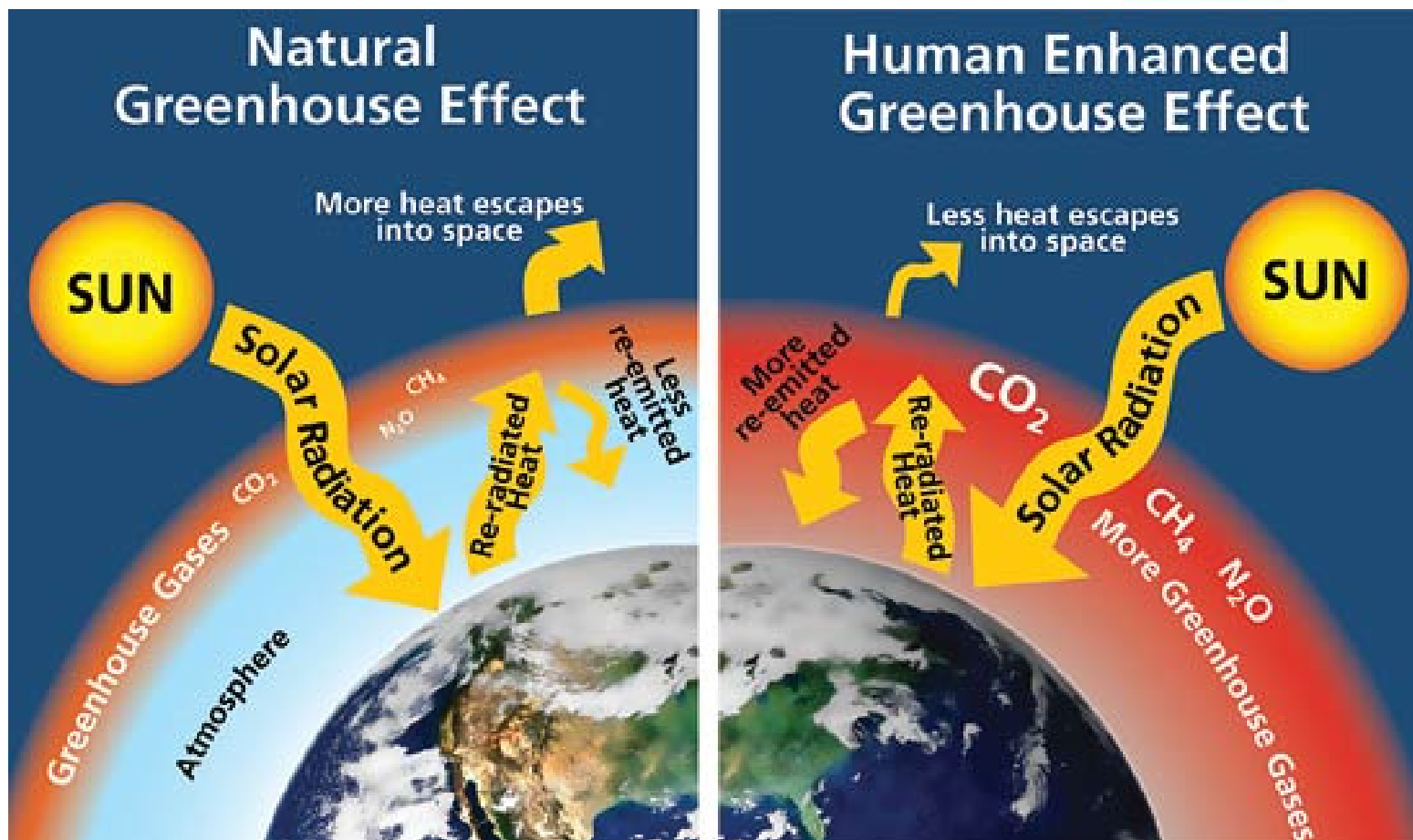


# First... some rules!



- No anti-vegan ranting
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- Please ask questions!

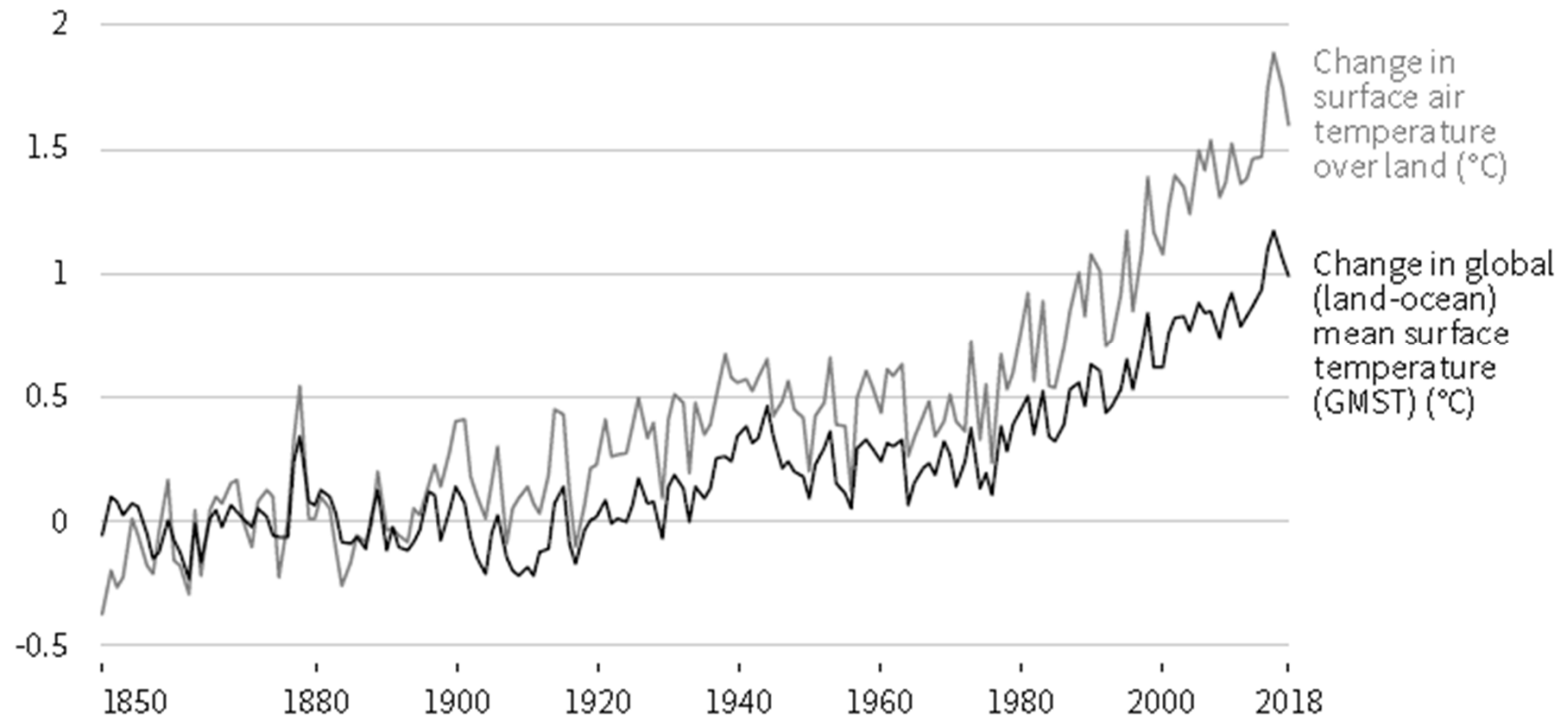
# The Greenhouse Effect



(Kate and Ernest, 2015)

# Observed warming

CHANGE in TEMPERATURE rel. to 1850-1900 (°C)

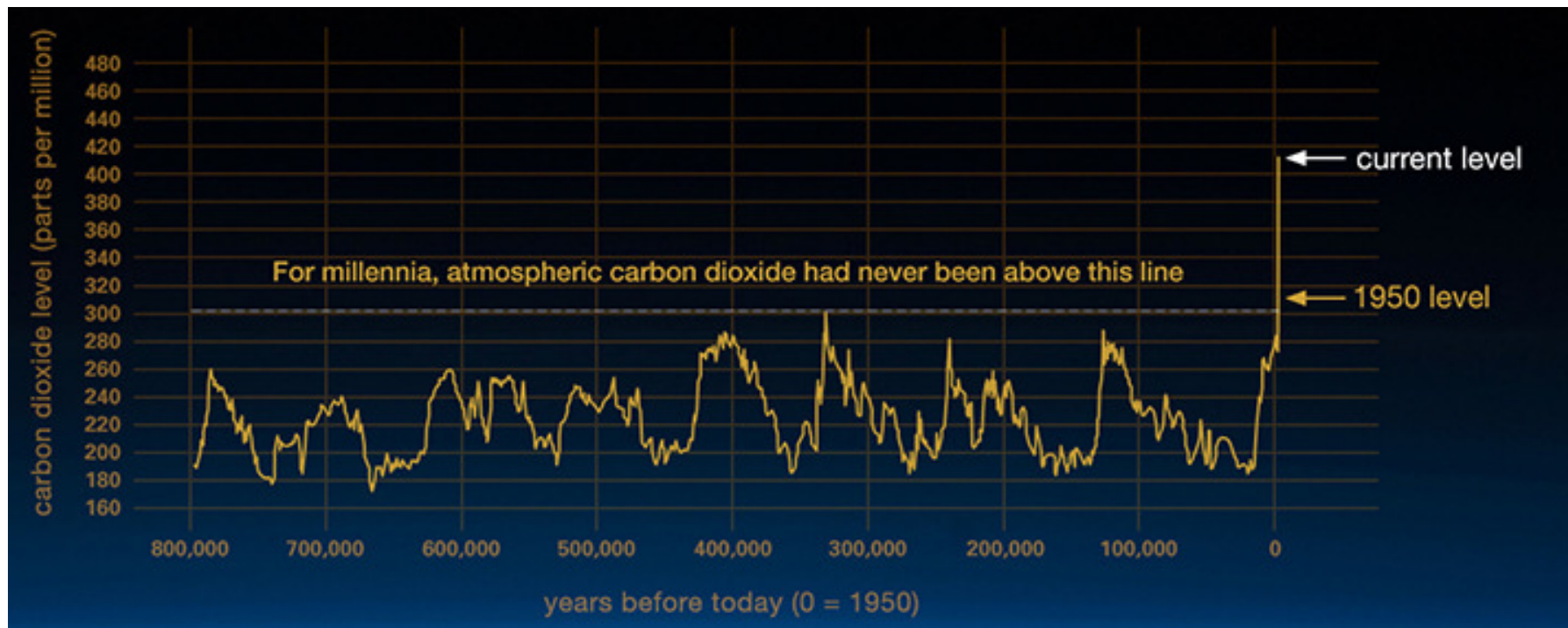


(IPCC, 2019)



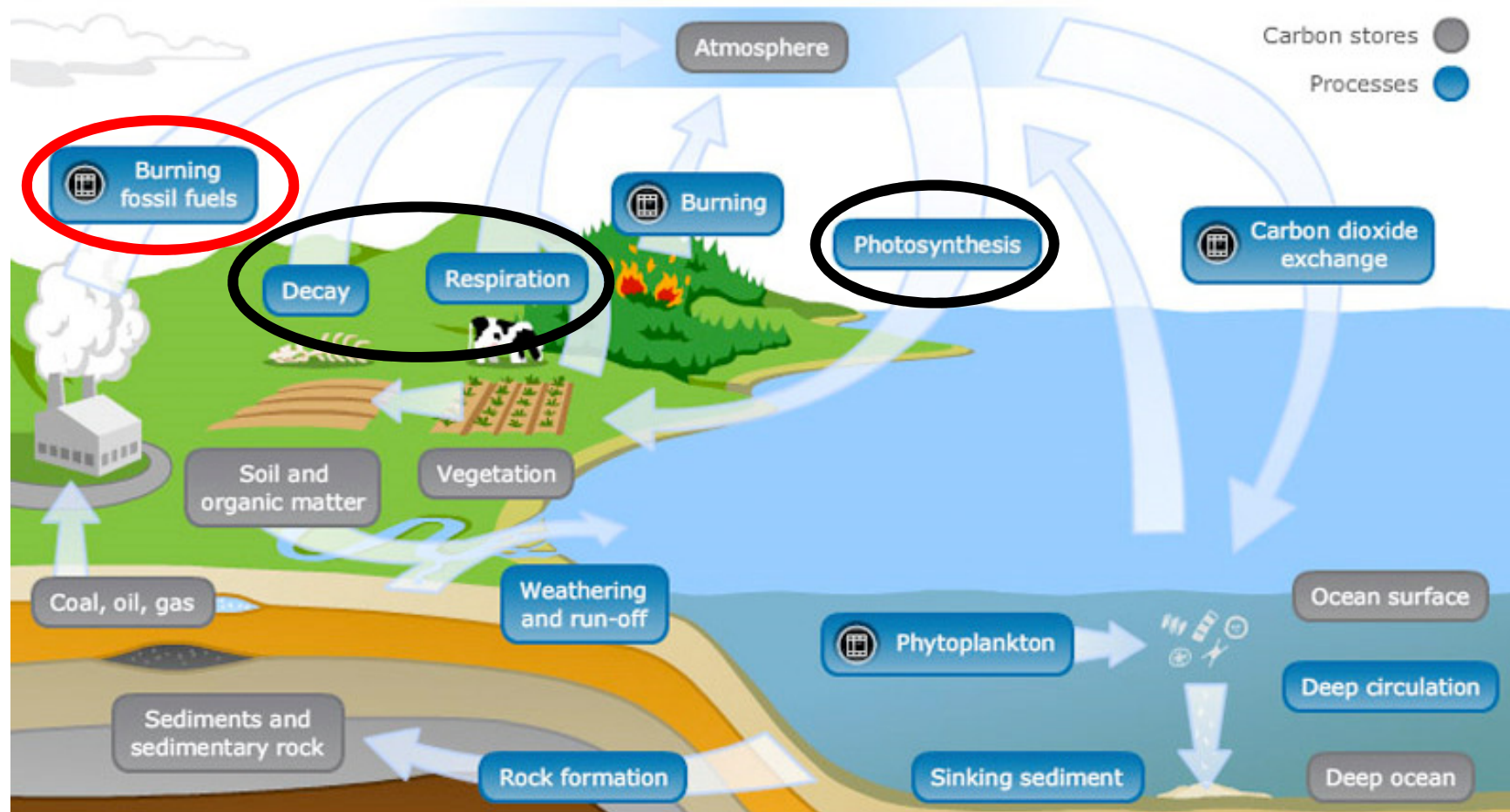
# Is it real?

- Rate of change



(NASA, 2019)

# Carbon cycle



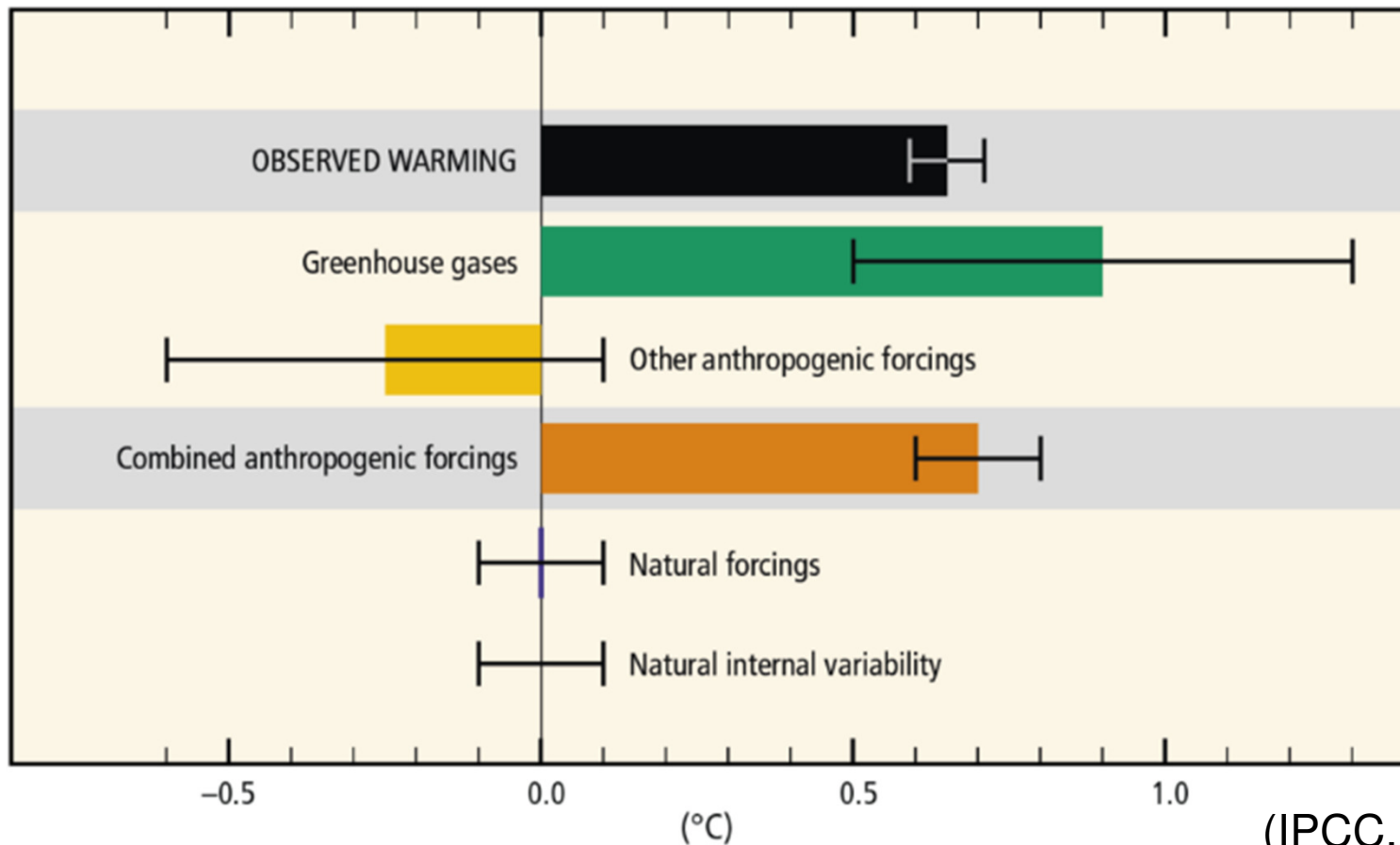
(University of Waikato, 2007)

# But that's CO<sub>2</sub> not temperature?



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Contributions to observed surface temperature change over the period 1951–2010

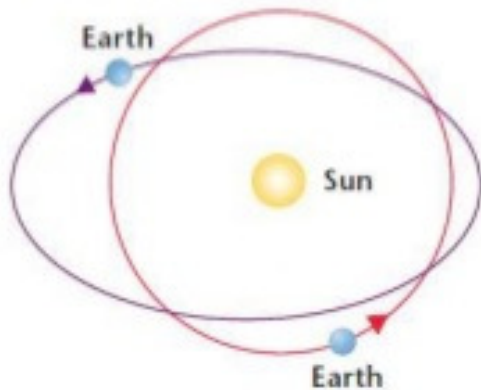


(IPCC, 2014)

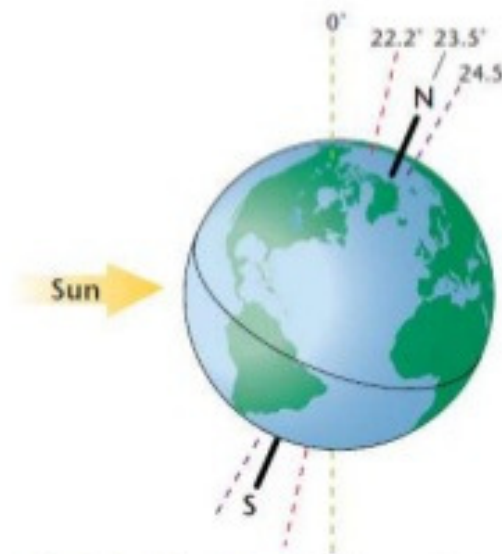


# What about natural change?

- Milankovitch cycles



**Eccentricity** Earth encounters more variation in the energy that it receives from the sun when Earth's orbit is elongated than it does when Earth's orbit is more circular.



**Tilt** The tilt of Earth's axis varies between  $22.2^{\circ}$  and  $24.5^{\circ}$ . The greater the tilt angle is, the more solar energy the poles receive.



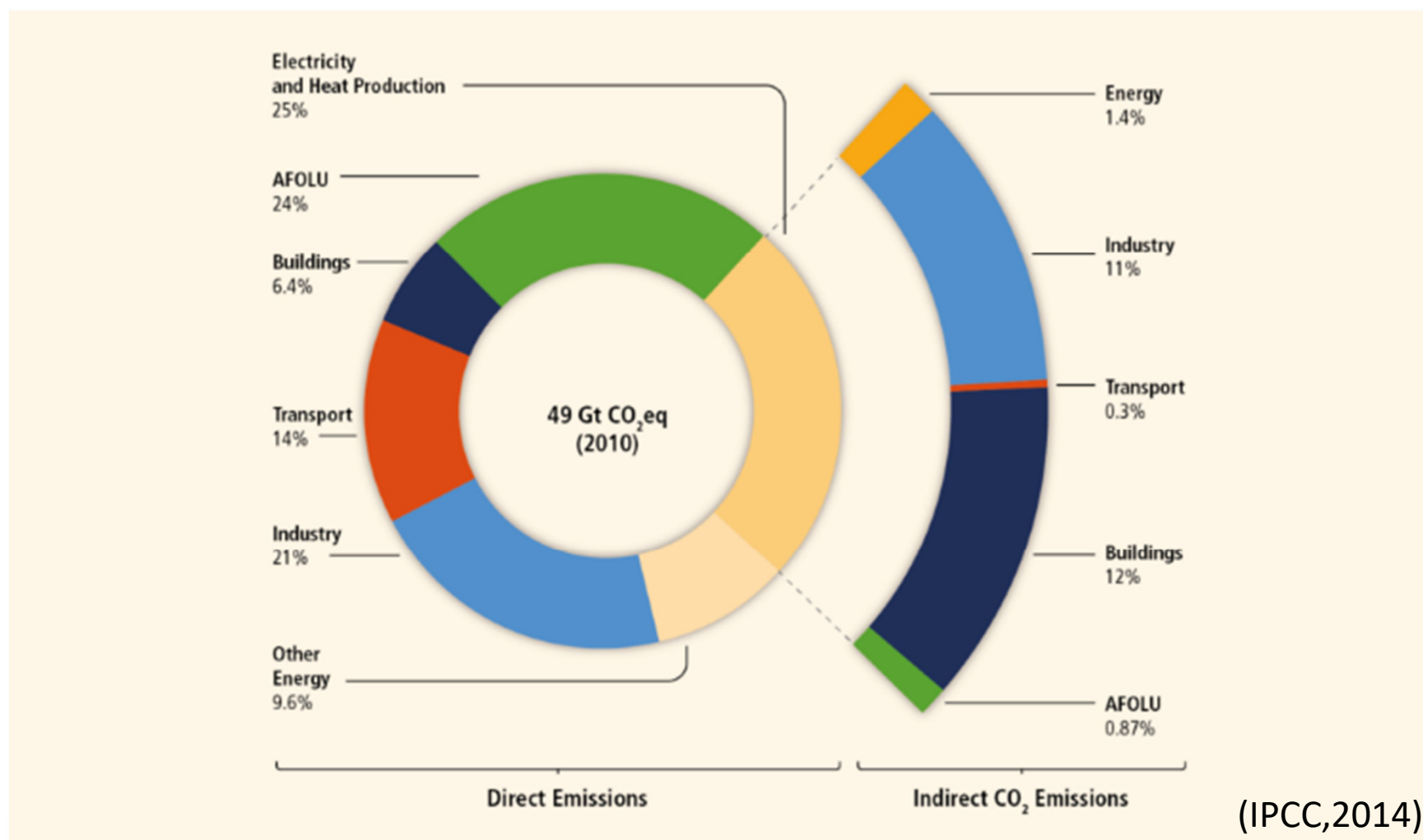
**Precession** A gradual change, or "wobble," in the orientation of Earth's axis affects the relationship between Earth's tilt and eccentricity.

# What about Agriculture?

Greenhouse Gas Emissions by Economic Sectors



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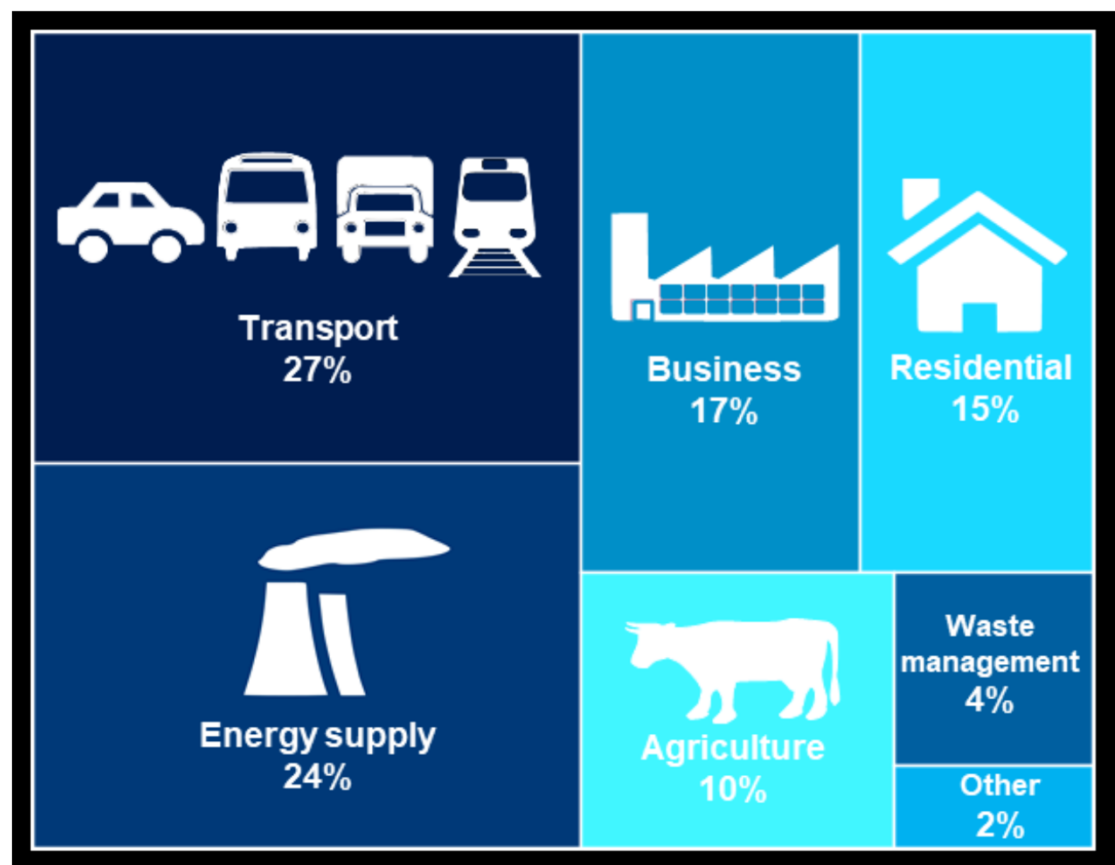


(IPCC,2014)

# What about UK Agriculture?



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(ONS, 2019)

# Agriculture – what and how?



- Carbon Dioxide – fuel,
- Methane – enteric fermentation, manure management, wetlands
- Nitrous oxide – fertiliser, compacted soils,



# The global warming potential



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*A measure of how much energy the emissions of 1 ton of a gas will absorb over a given period of time, relative to the emissions of 1 ton of carbon dioxide (CO<sub>2</sub>) (usually 100 years)*

# So... what can we do?



Within agriculture without changing land use

- Increased food productivity
- Agro-forestry
- Improved cropland management
- Improved livestock management
- Improved grazing land management
- Reduced grassland conversion to cropland
- Forest management

# So... what can we do?



Across all soils without changing land use

- Increased soil organic carbon content
- Reduced soil erosion
- Reduced soil salinization
- Reduced soil compaction

# So...what can we do?



Within Agriculture but changing land use

- Bioenergy and BECCS
- Reforestation
- Afforestation
- Biochar



# Conclusion



- Its real and it isn't going away
- Its extremely complex, start by understanding your own emissions (Carbon Audits)
- We have the potential to make a huge difference

Need more information?



Visit the website for ways to become more efficient:

<https://www.farmingforabetterclimate.org/>

Or

<https://www.ipcc.ch/srccl-report-download-page/>

# Any questions?

