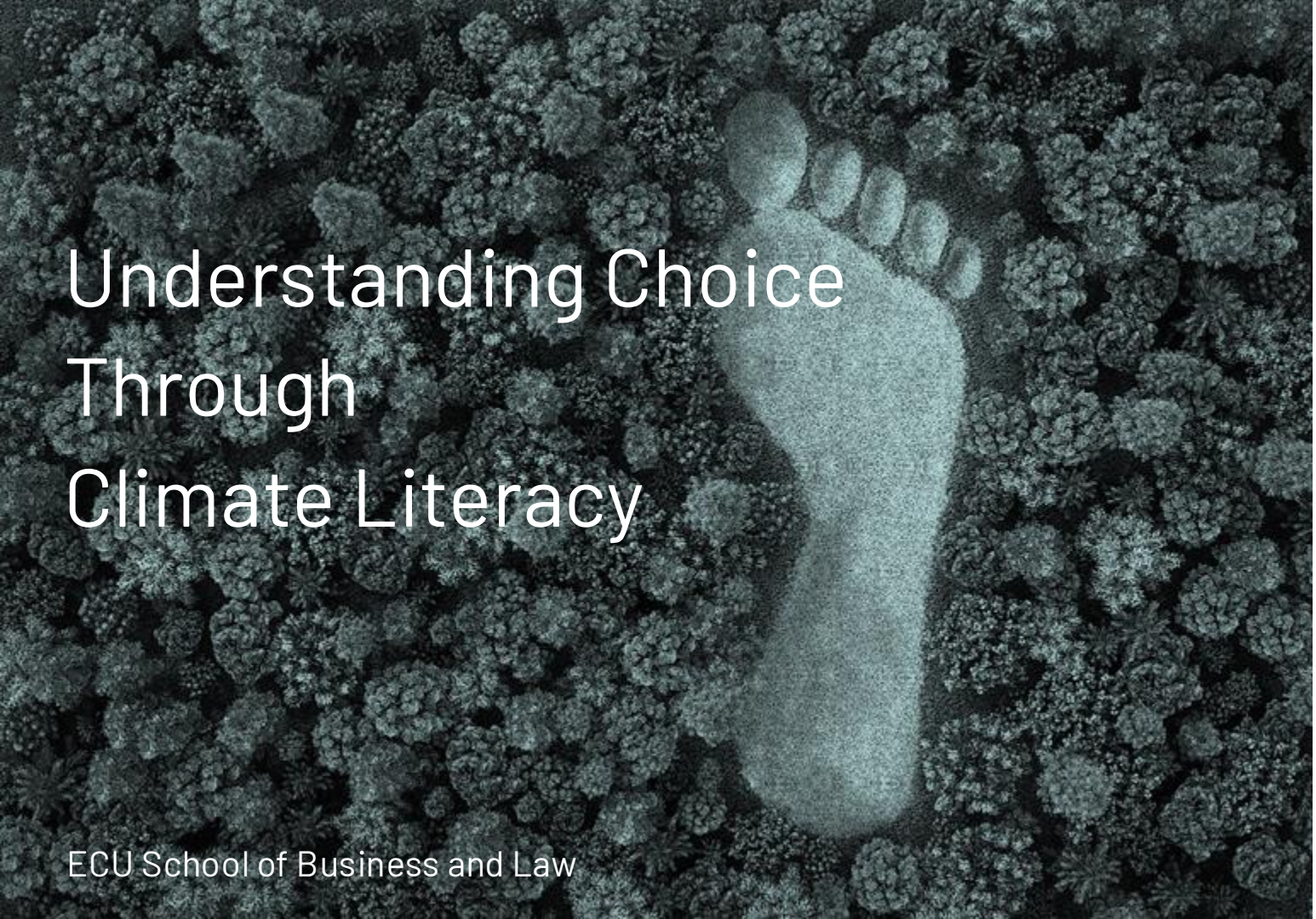


Understanding Choice Through Climate Literacy

ECU School of Business and Law

EDITH COWAN UNIVERSITY

Carbon Literacy Project

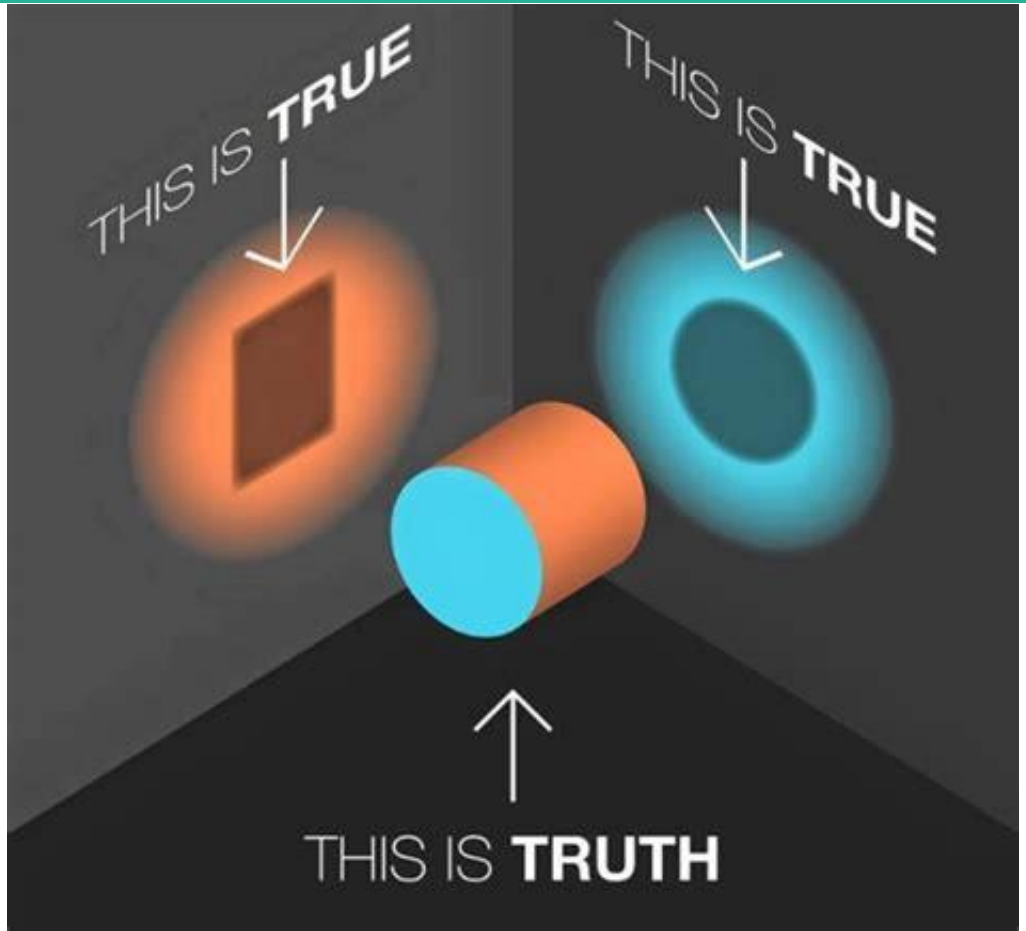
CC000766

Edith Cowan University acknowledges and respects the Whadjuk Boodjar of the Noongar Nation, the traditional custodians of the land upon which this presentation is being delivered.

ECU acknowledges and pays its respect to all Elders, past and present, and embraces their culture, wisdom and knowledge.

We embrace and extend the acknowledgement to all indigenous and Torres Strait Islander people with us heretoday.

Perspectives

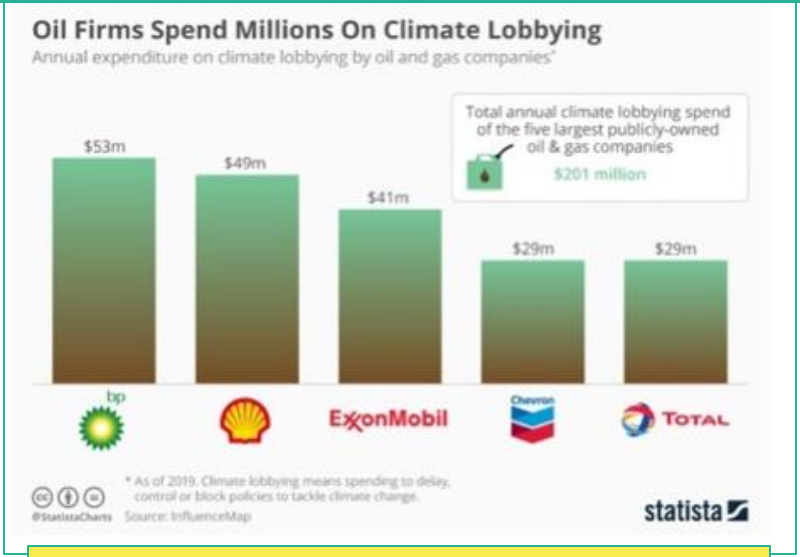


Opinions

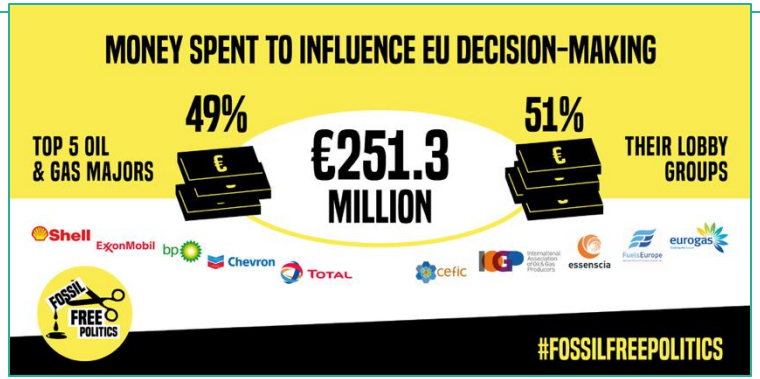
's many extreme weather events, such as floods, just 60% of Australians disruption is human-caused, according to an international poll. Photograph:

G20 summit 2014, Mass head burial at Bondi Beach

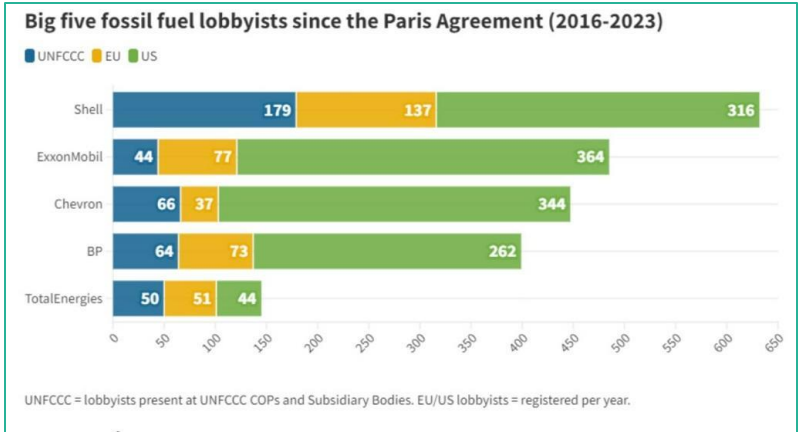
Lobbying



2019

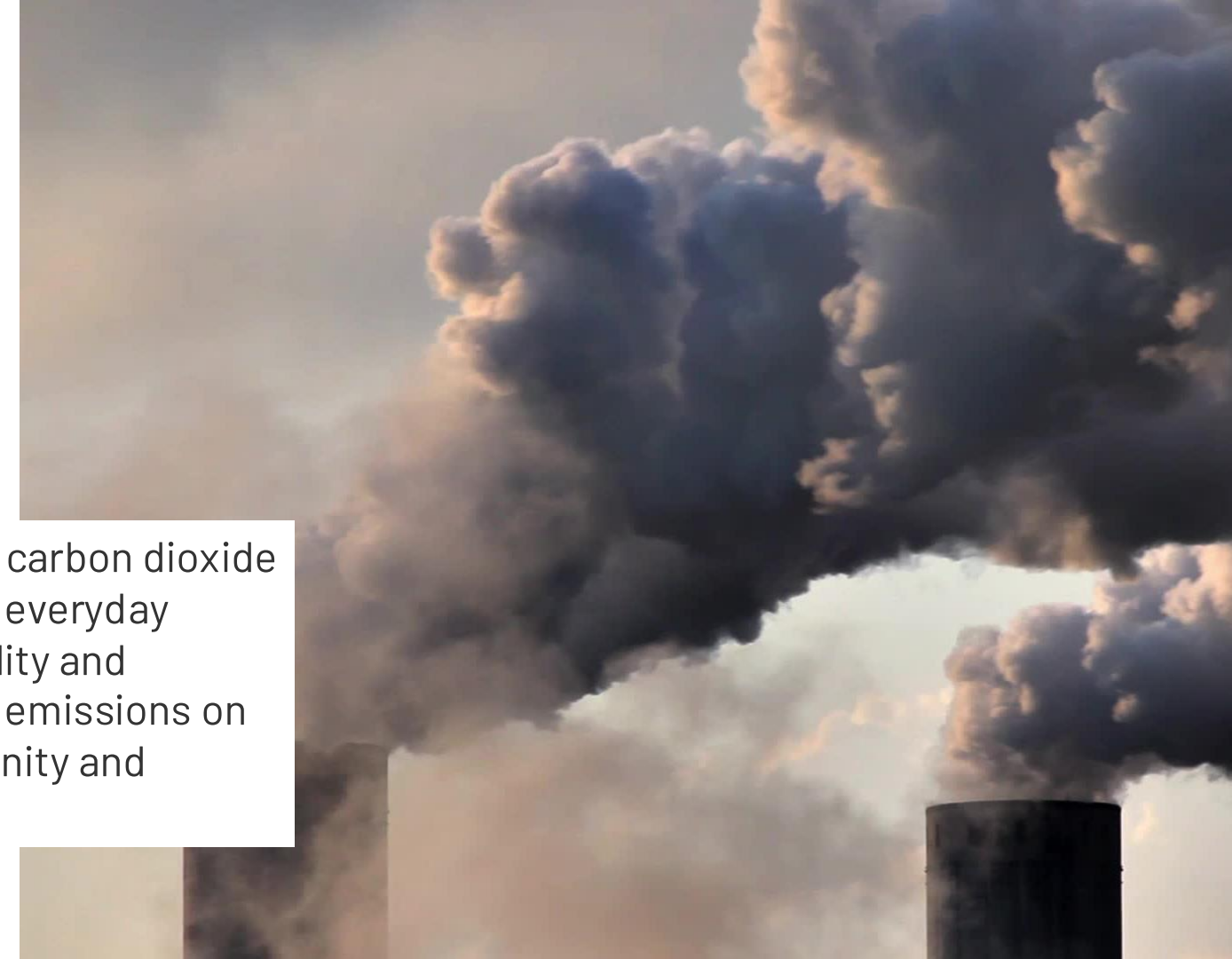


2023



Carbon Literacy is

"An awareness of the carbon dioxide costs and impacts of everyday activities and the ability and motivation to reduce emissions on an individual, community and organisational basis".



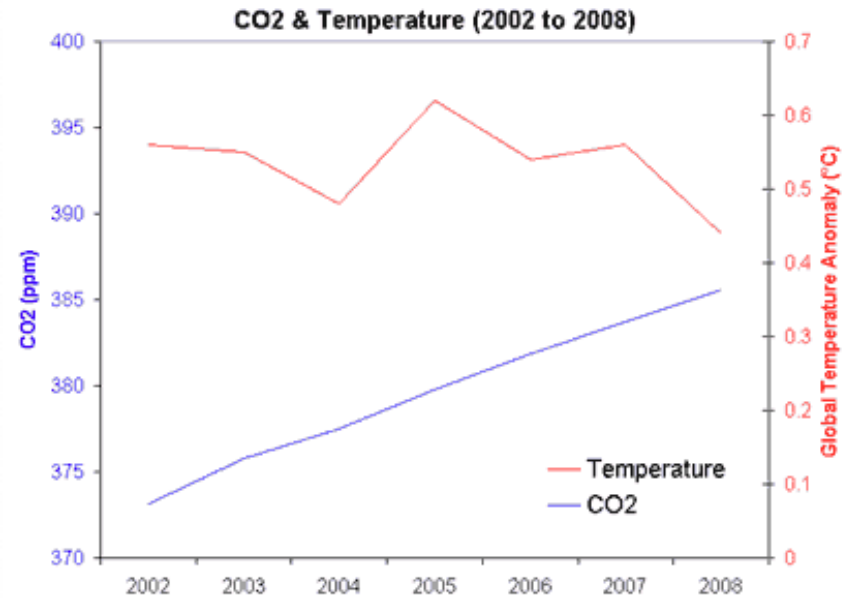
Weather

can change within
a few minutes or hours!

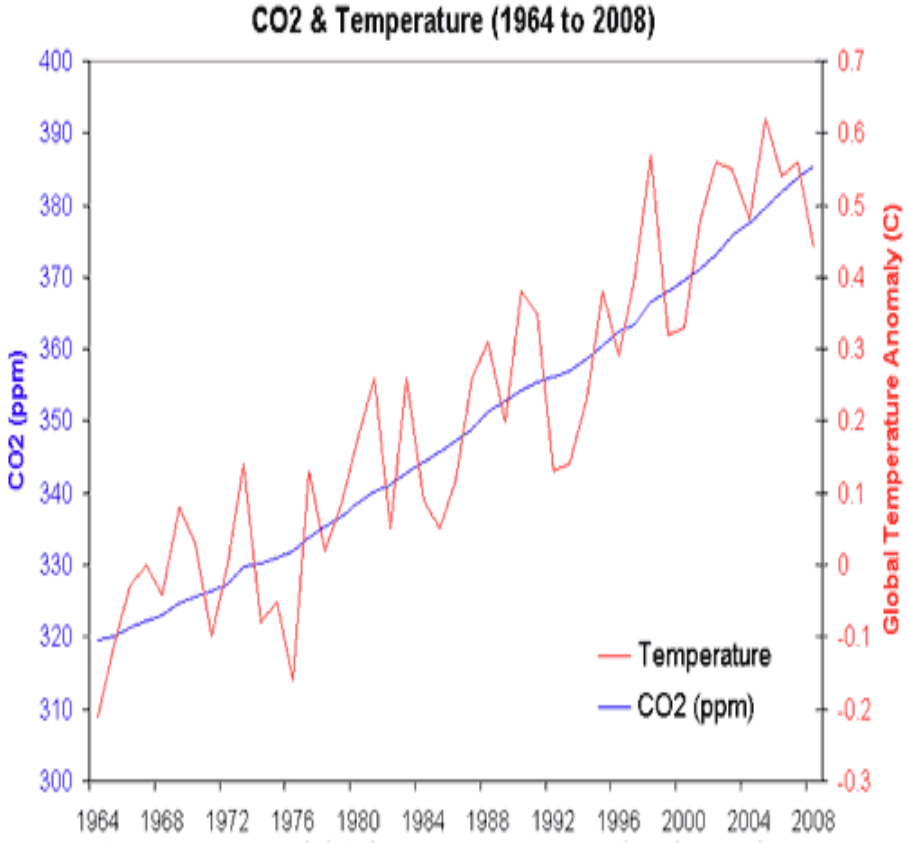
Climate

takes very long time
to change!

Short vs long term view

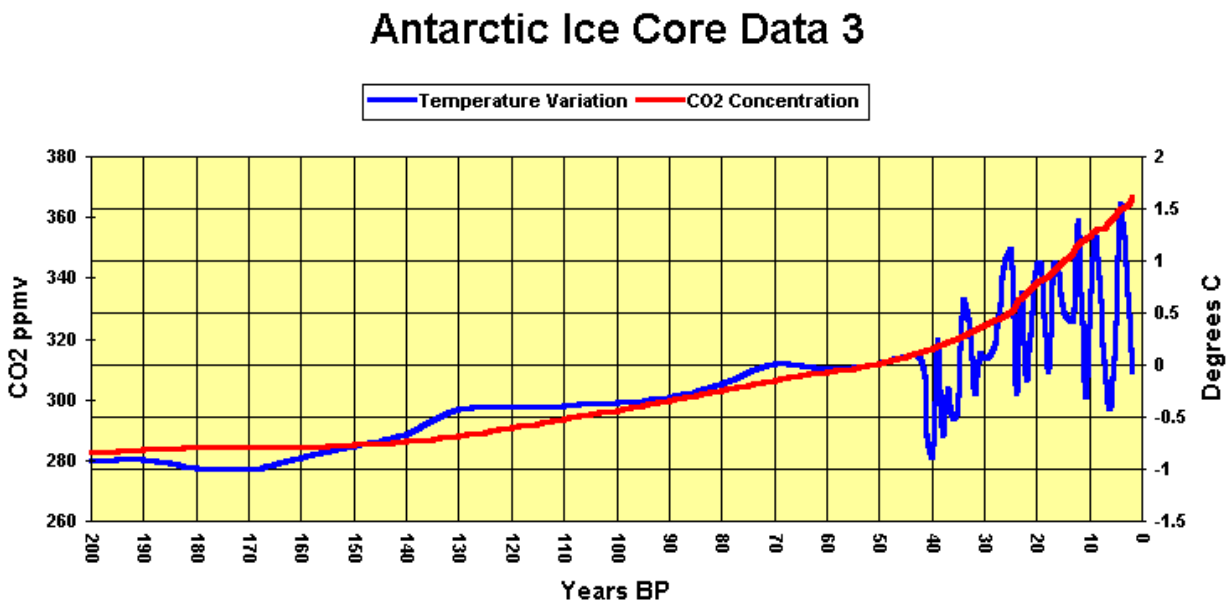


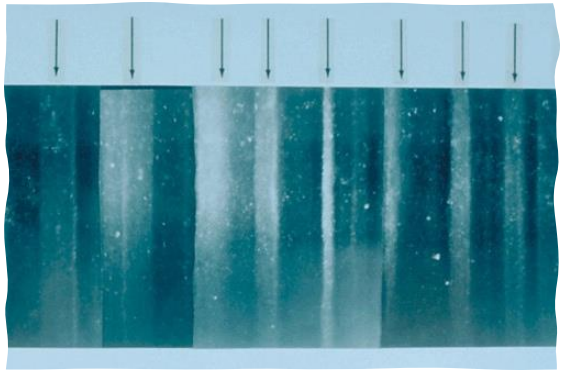
Atmospheric CO2 (parts per million, NOAA) and Global Temperature Anomaly (°C GISS) from 2002 to 2008.



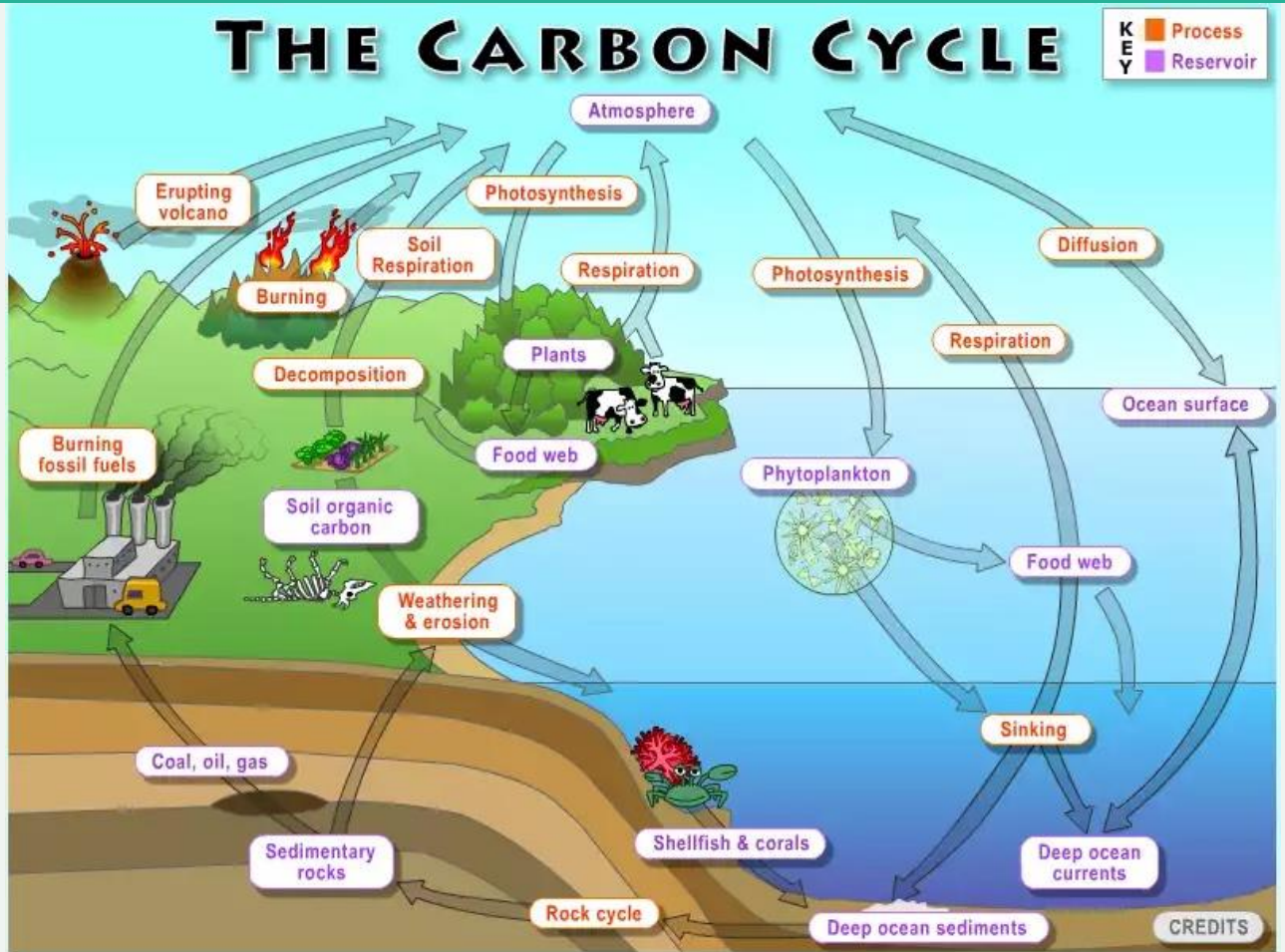
Atmospheric CO2 (parts per million, NOAA) and Global Temperature Anomaly (°C GISS) from 1964 to 2008.

The Science

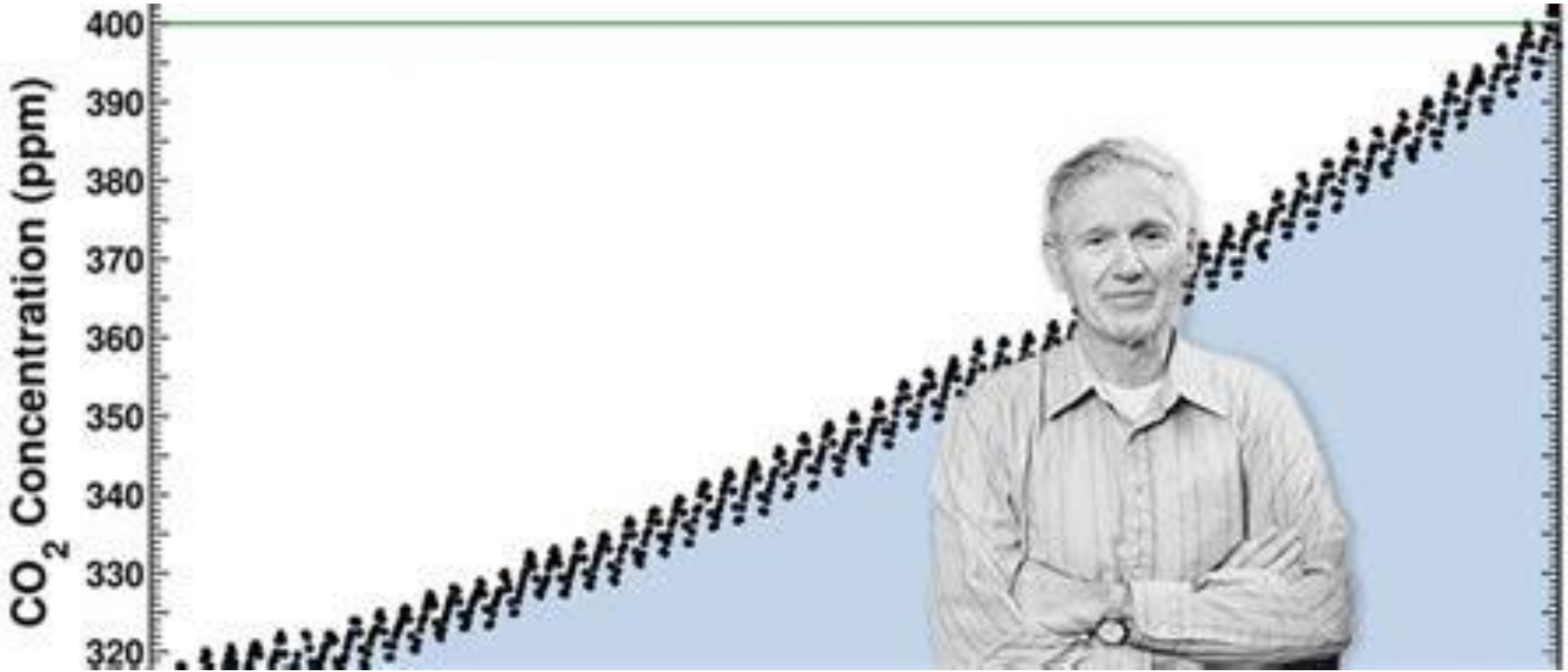

Antarctic Ice Core Data 3
Temperature Variation
CO2 Concentration
CO2 ppmv
Degrees C
Years BP
380
360
340
320
300
280
260
2
1.5
1
0.5
0
-0.5
-1
-1.5
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0



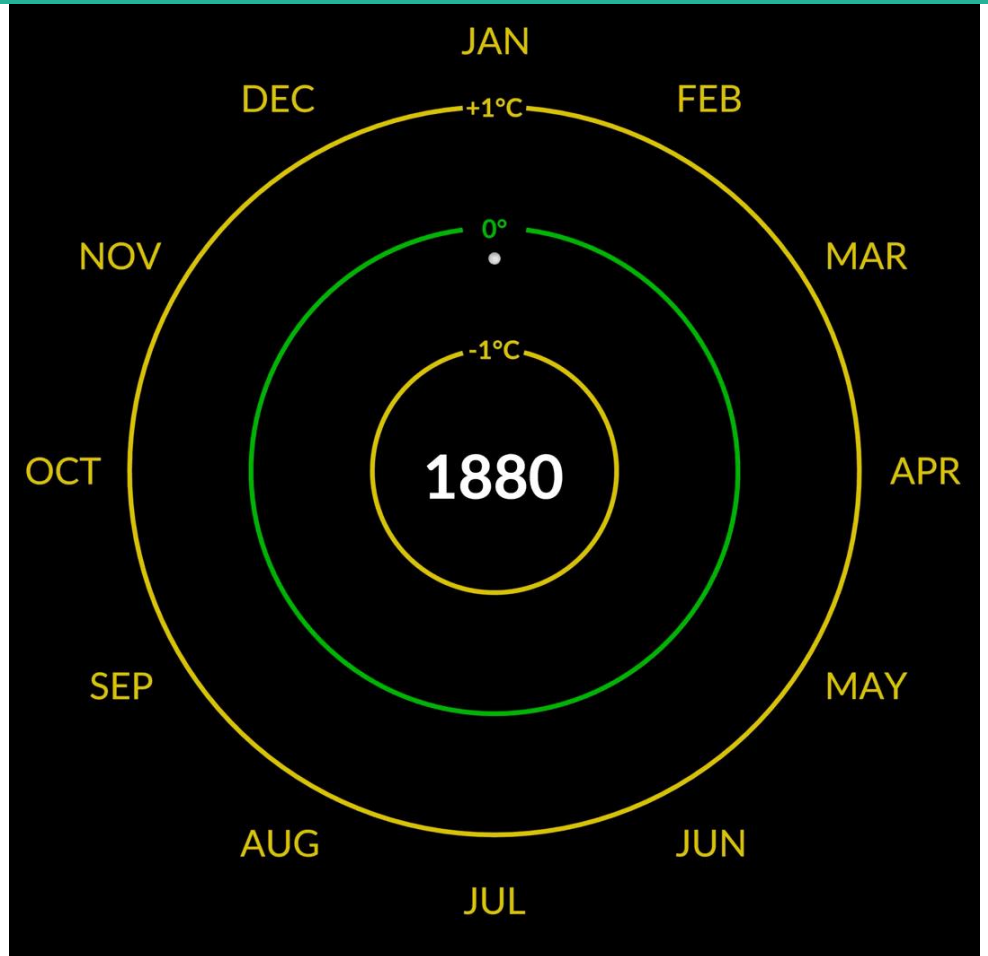
Carbon Life Cycle



The Keeling Curve



It’s getting warmer



Credit:
NASA’s Scientific Visualization Studio


Australia
2018 - 2023

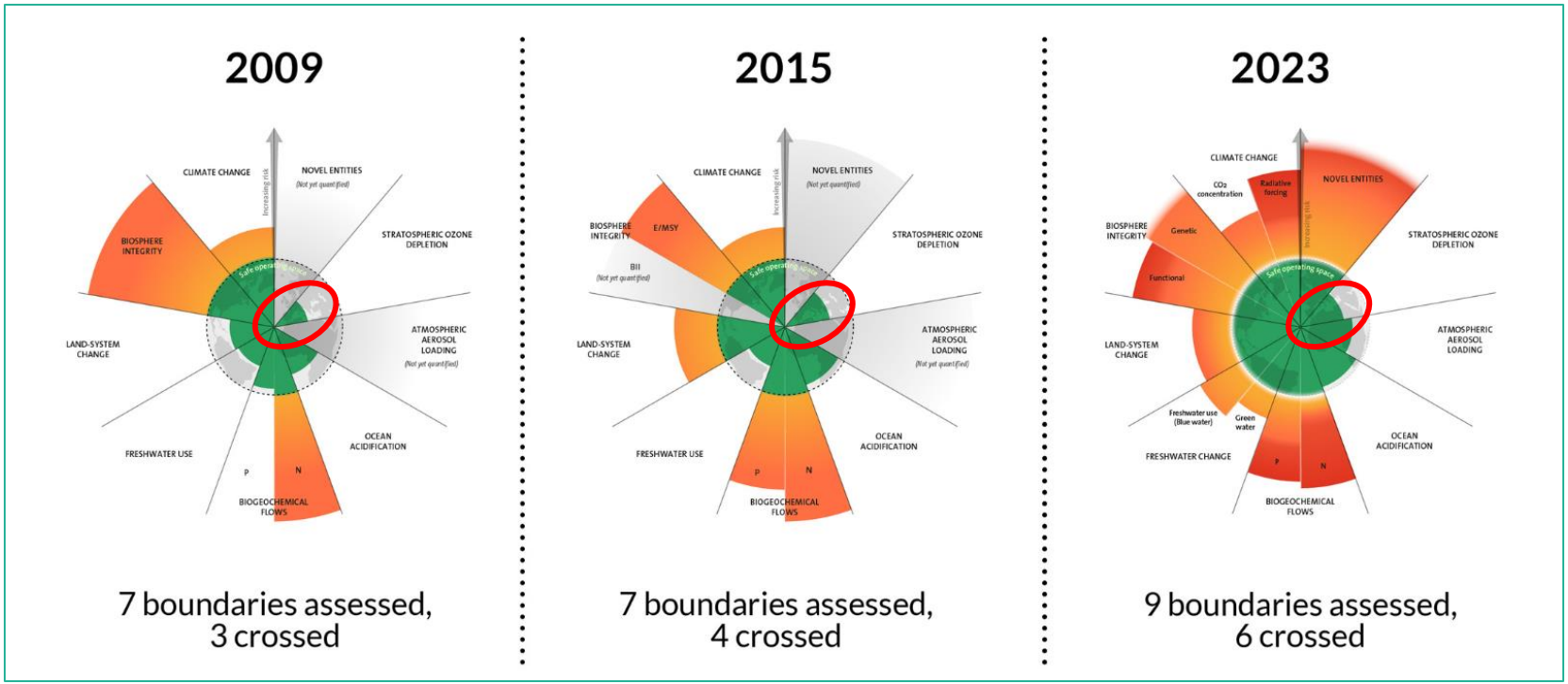

Pakistan 2023


2019


USA
2024


Kenya 2021

Planetary Boundaries



- Climate Change
- Biosphere Integrity
- Biogeochemical Flows

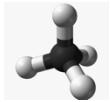
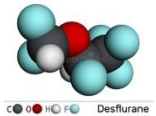
- Land-system Change
- Freshwater Use
- Ocean Acidification

- Atmospheric Aerosol Loading
- Stratospheric Ozone Depletion
- Novel Entities

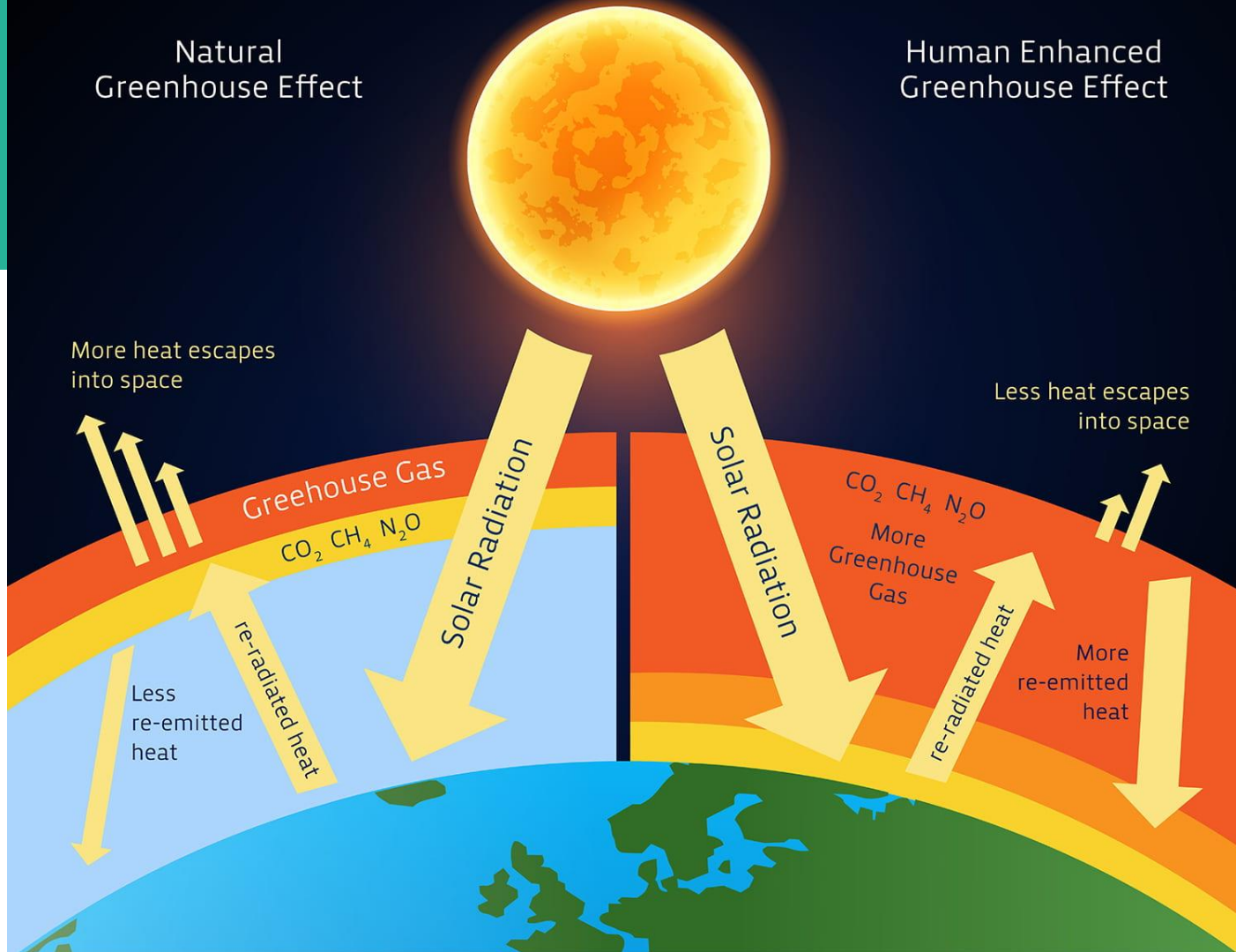
(Credit: Azote for Stockholm Resilience Centre, Stockholm University. Based on Richardson et al. 2023, Steffen et al. 2015, and Rockström et al. 2009)

Greenhouse Gases (GHG)

Potency and Concentrations

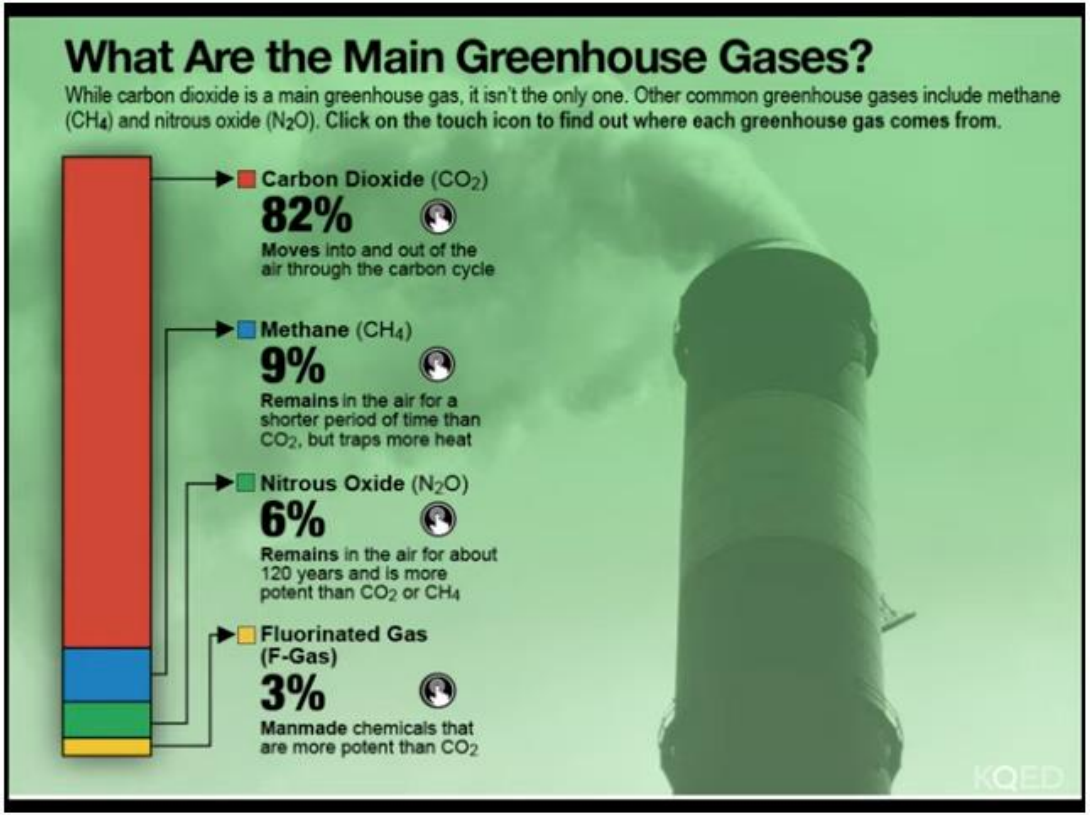
GHG Category	Molecule	Pre-Industrial conc.	2024 conc.	Atmospheric lifetime (yrs)	Global Warming Potential
Water (H_2O)					0.1
Carbon Dioxide (CO_2) *ppm*		280	428	50 – 200*	1
Methane (CH_4) *ppb*		715	1,921	12	28
Nitrous oxide (N_2O) *ppb*		270	336	121	265
Hydrofluorocarbons (HFCs) ppb		-	0.062	1.5 – 222	138 – 12,000
Perfluorocarbon (PFCs) ppb		-	0.079	10,000 – 50,000	6,000 – 11,000
Sulfur Hexafluoride (SF_6) *ppb*		-	0.0114	3,200	23,500
Desflurane ($C_3H_2F_6$)) ppb		-	NA	14	3,700 – 6,800

The Greenhouse Effect

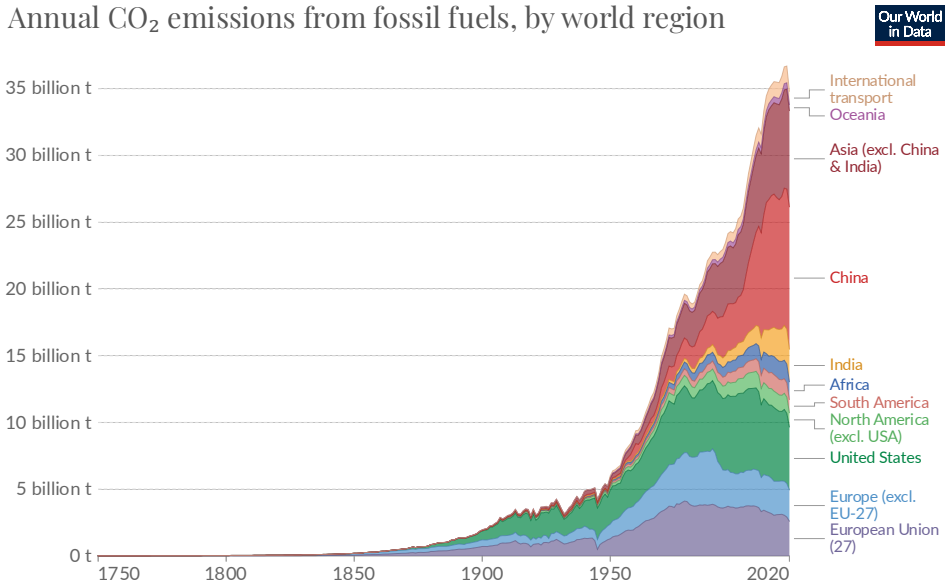


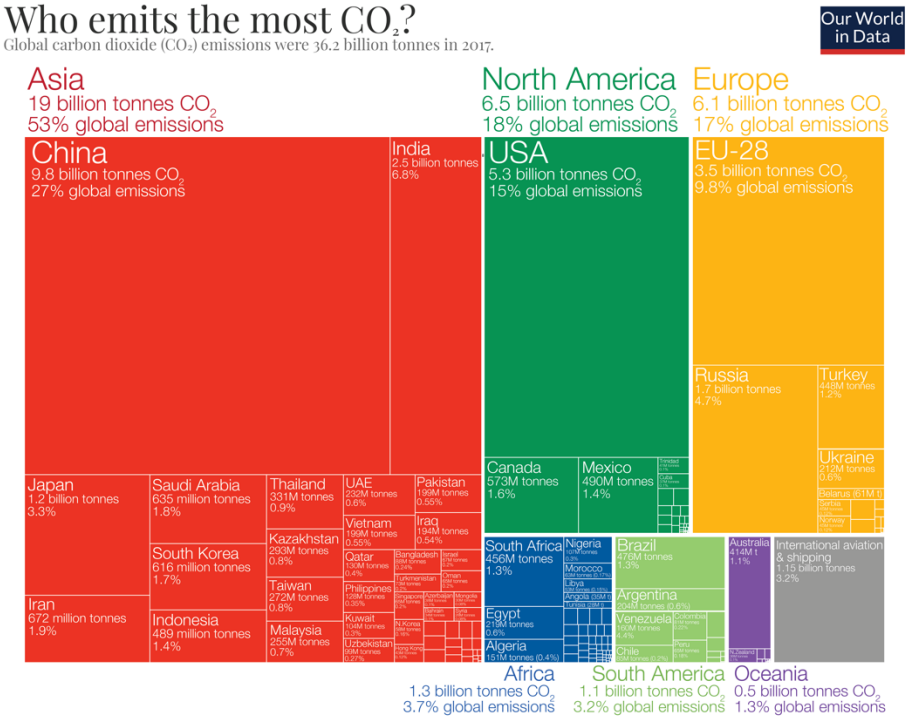
Greenhouse Gases (GHG)

And their sources

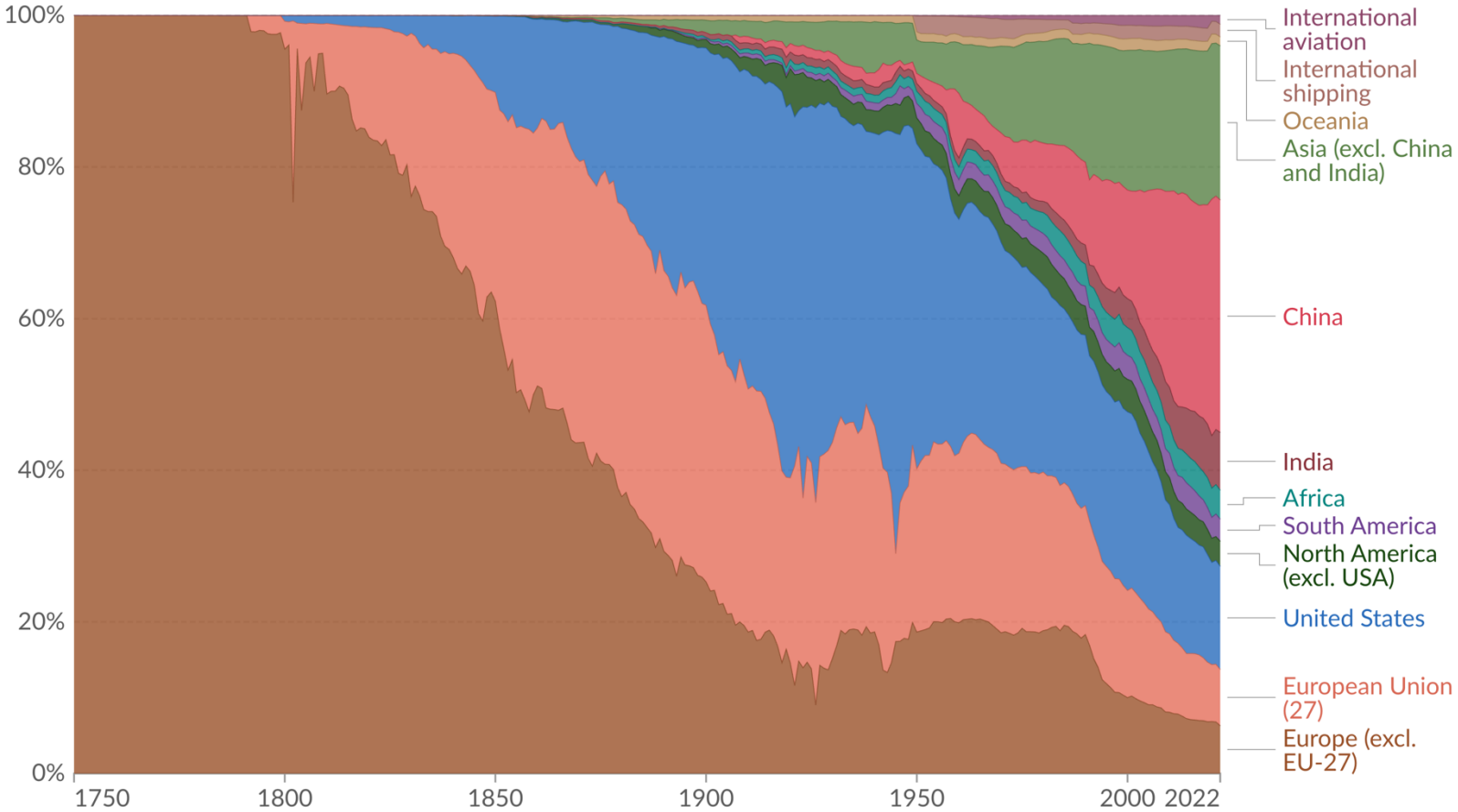


Who is emitting?

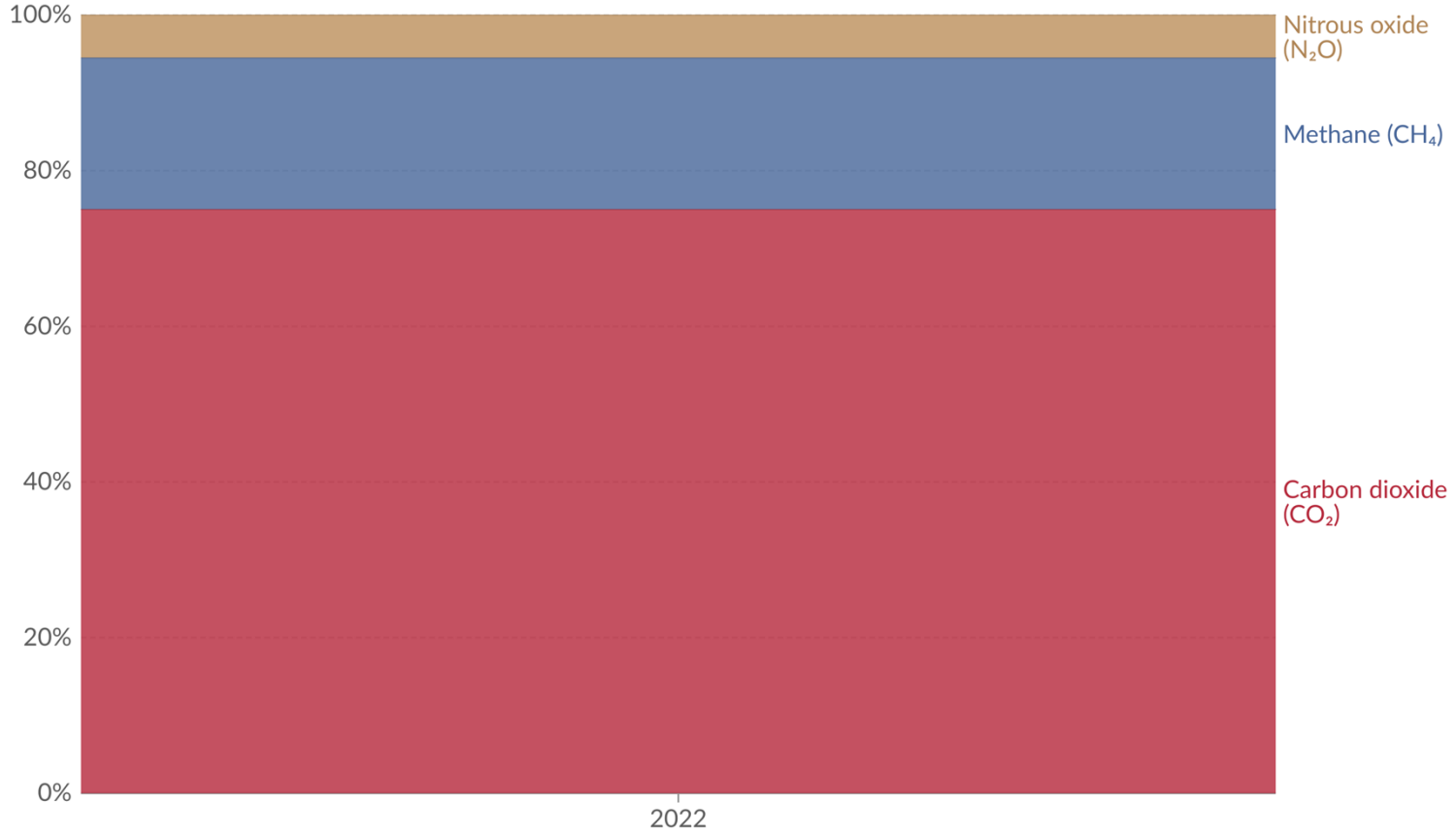




Responsibility is a perspective



Emissions – by gas



Data source: Jones et al. (2024)

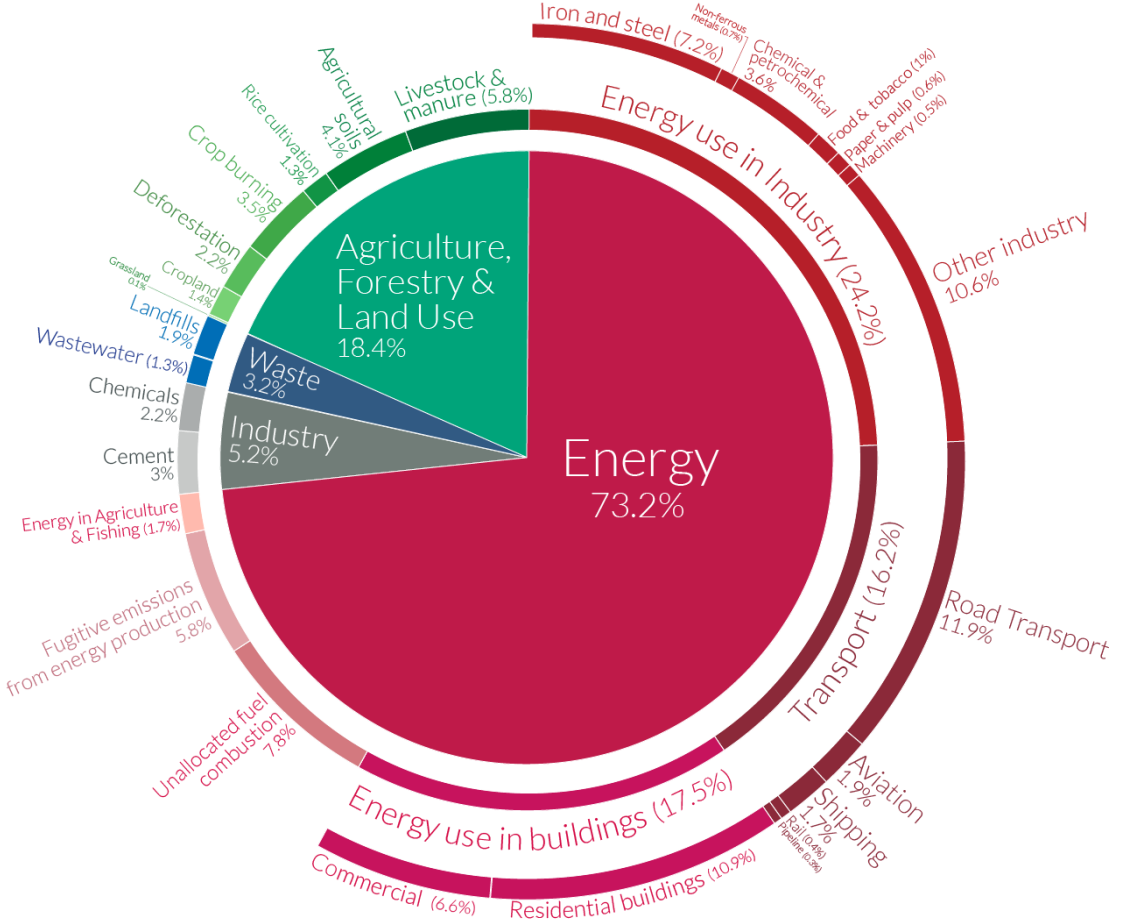
OurWorldInData.org/co2-and-greenhouse-gas-emissions | CC BY

Emissions – by sector

Global greenhouse gas emissions by sector

This is shown for the year 2016 – global greenhouse gas emissions were 49.4 billion tonnes CO_2eq.

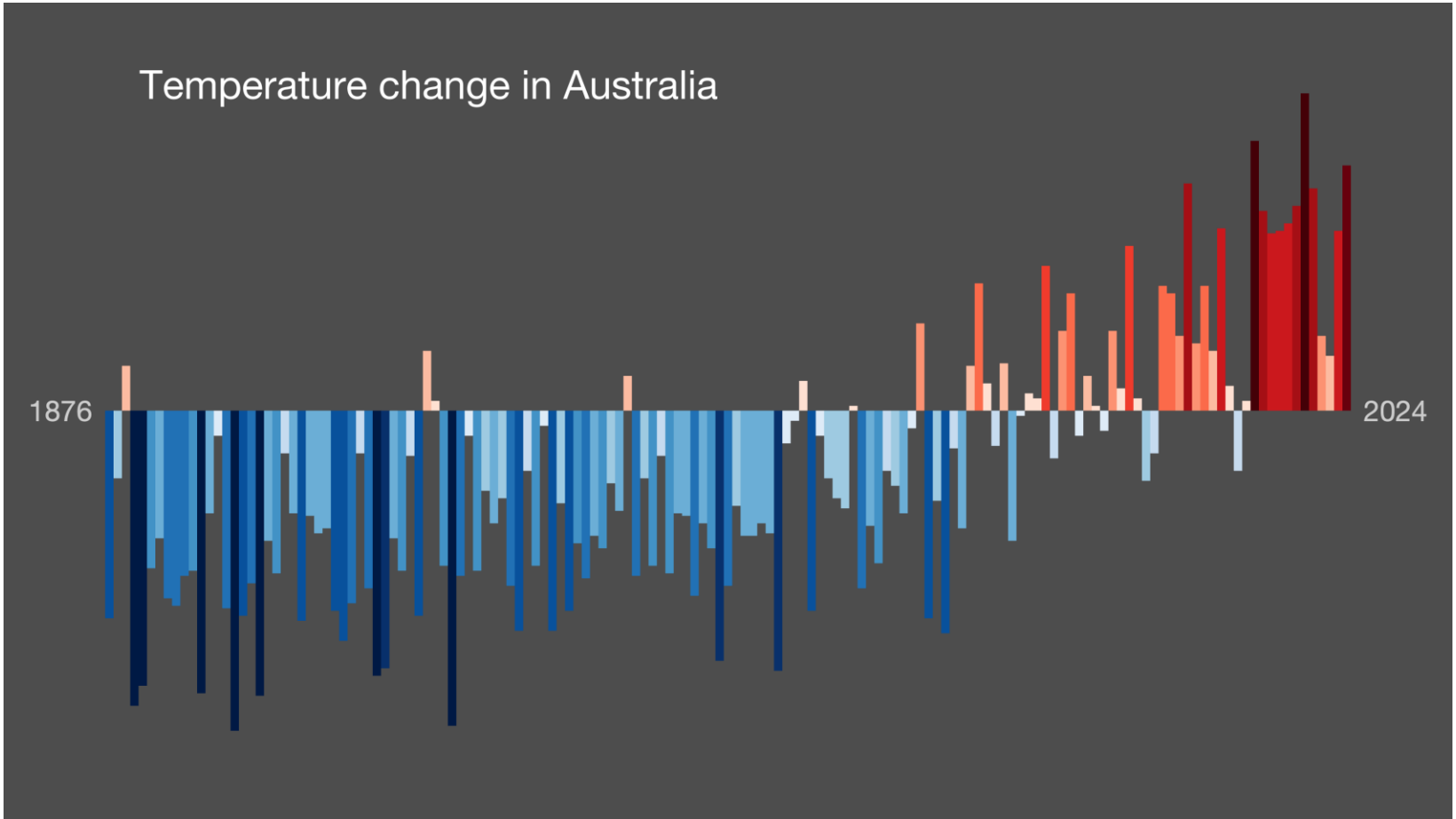
Our World in Data



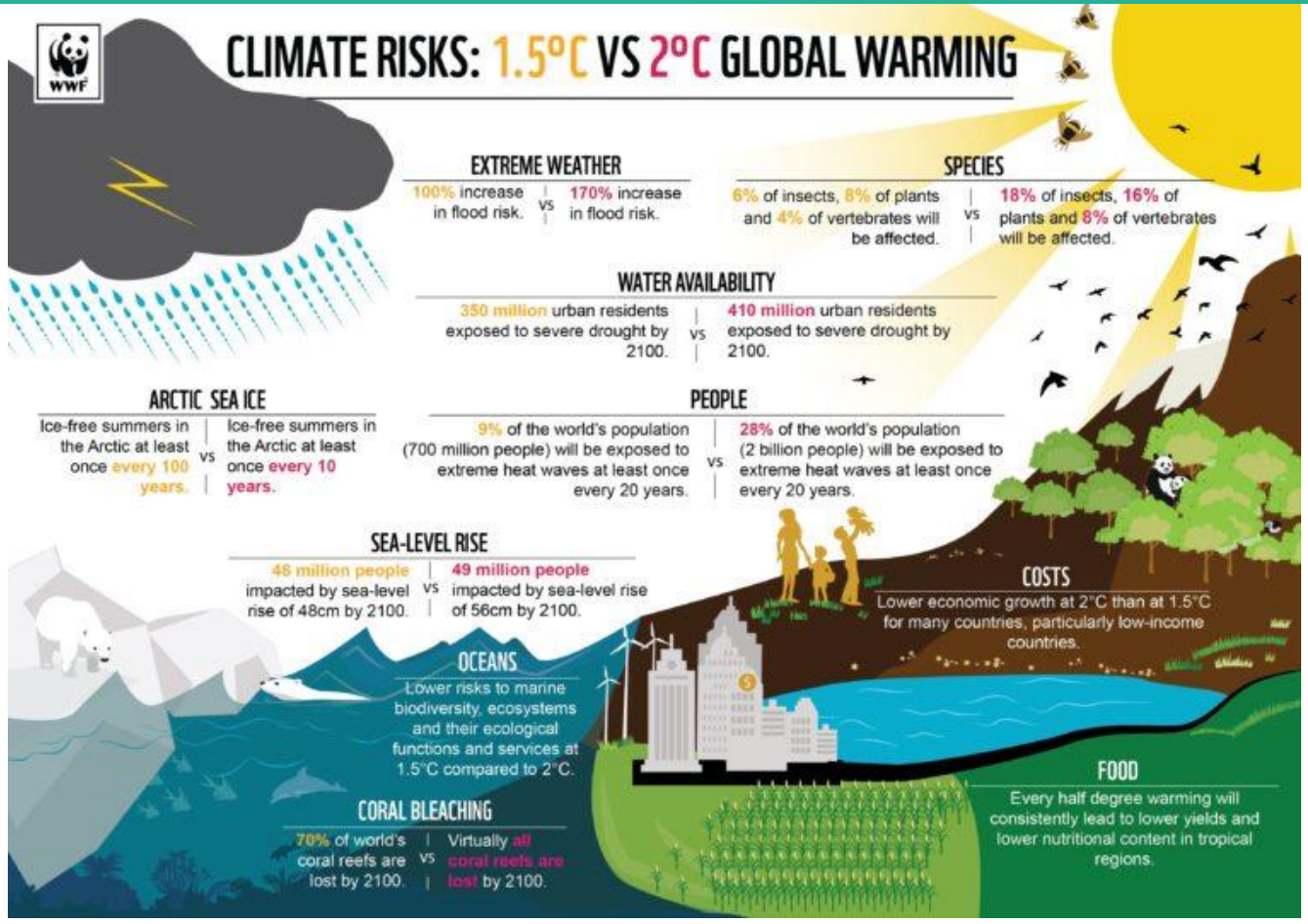
Sectoral emissions in Australia (2023)

1. Energy (256 Mt CO_2e)
2. Transport (98 Mt CO_2e)
3. Agriculture (82 Mt CO_2e)
4. Industry (81 Mt CO_2e)
   (incl. fugitive emissions)
5. Waste (14 Mt CO_2e)
6. Health (7 Mt CO_2e)

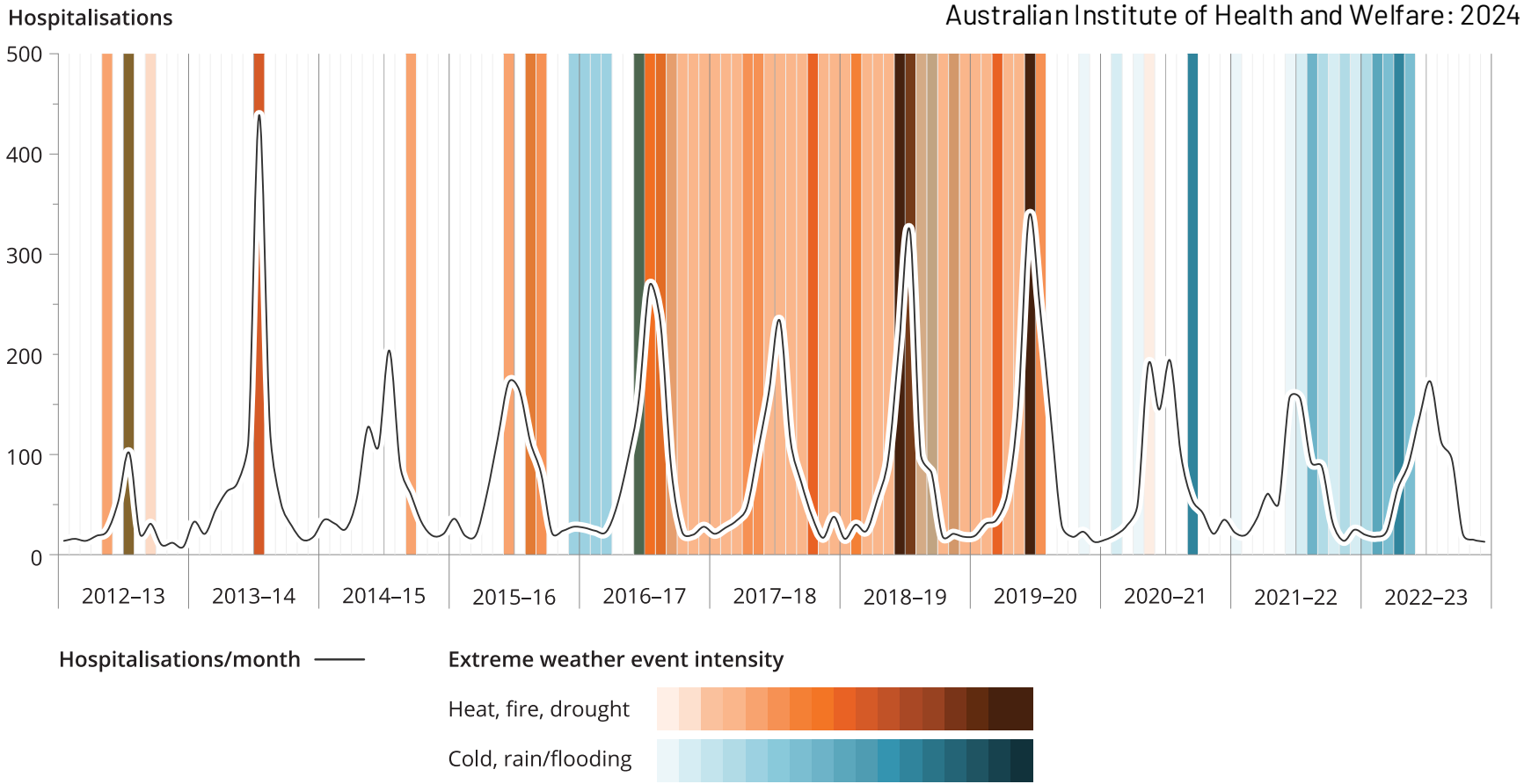
Show your stripes: Australia



Risks – 1.5°C vs 2°C



Risk: Hospitalisation



Risk: Heat

Effects of extreme heat:

- Dehydration
- Heat stroke
- Heat cramps
- Respiratory problems
- Stroke
- Cardiovascular disease
- Fertility complications

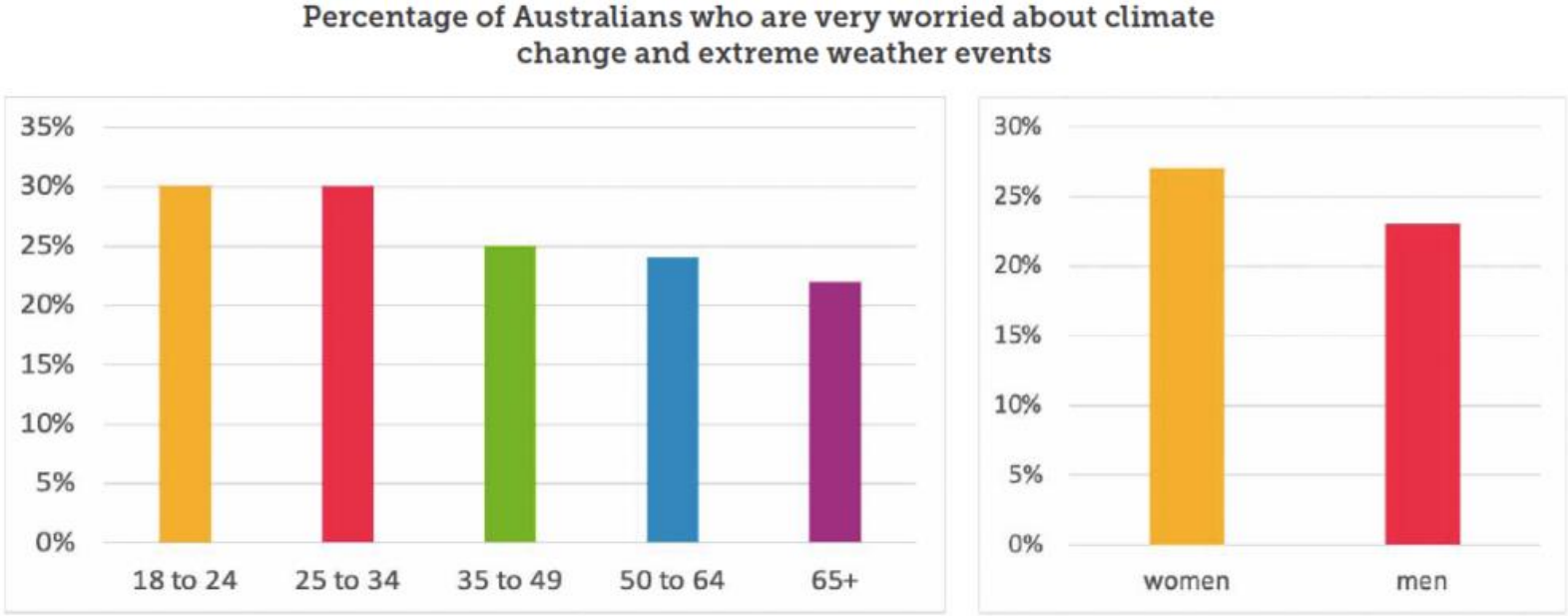
Cost of heat in WA:

Heat-related deaths projected to increase by 61.4% in 2050s from 2010s.

Heat-related healthcare costs projected to increase by $30.6 million.

Up to 5x increase in summers with extreme heat-related mortality.

Risk: Mental health



Eco-anxiety describes the negative feelings – including being anxious, worried, upset, scared, sad, angry, overwhelmed or unsure about the future – many of us have about climate breakdown, nature loss and the future of our planet.

Sometimes called ‘eco-distress’ or ‘climate-anxiety

Transitioning to Net Zero (WA)

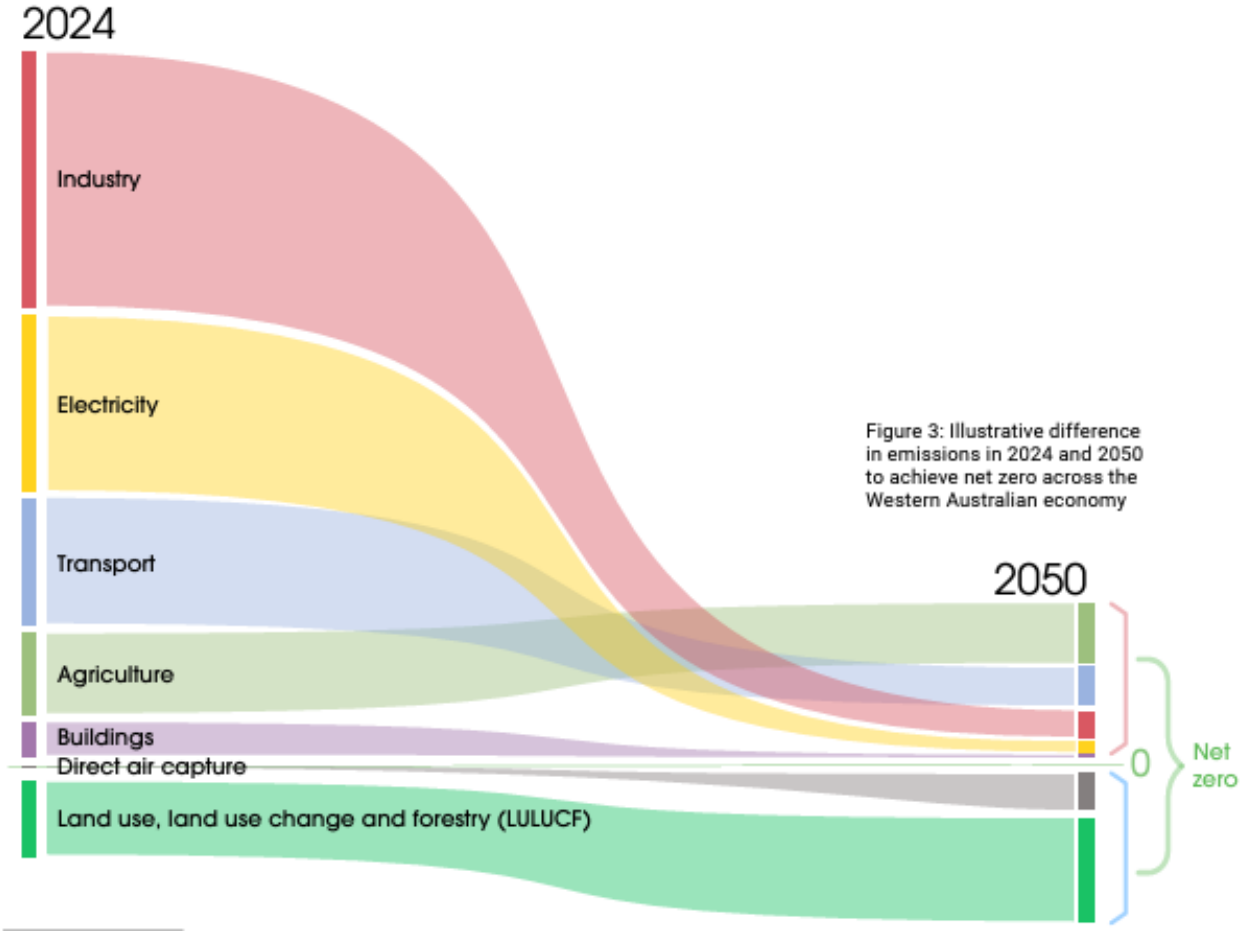
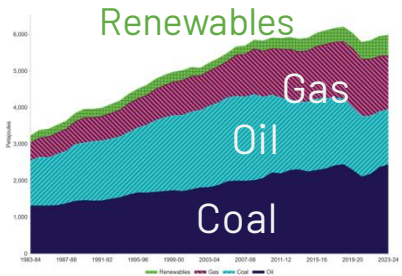


Figure 3: Illustrative difference in emissions in 2024 and 2050 to achieve net zero across the Western Australian economy

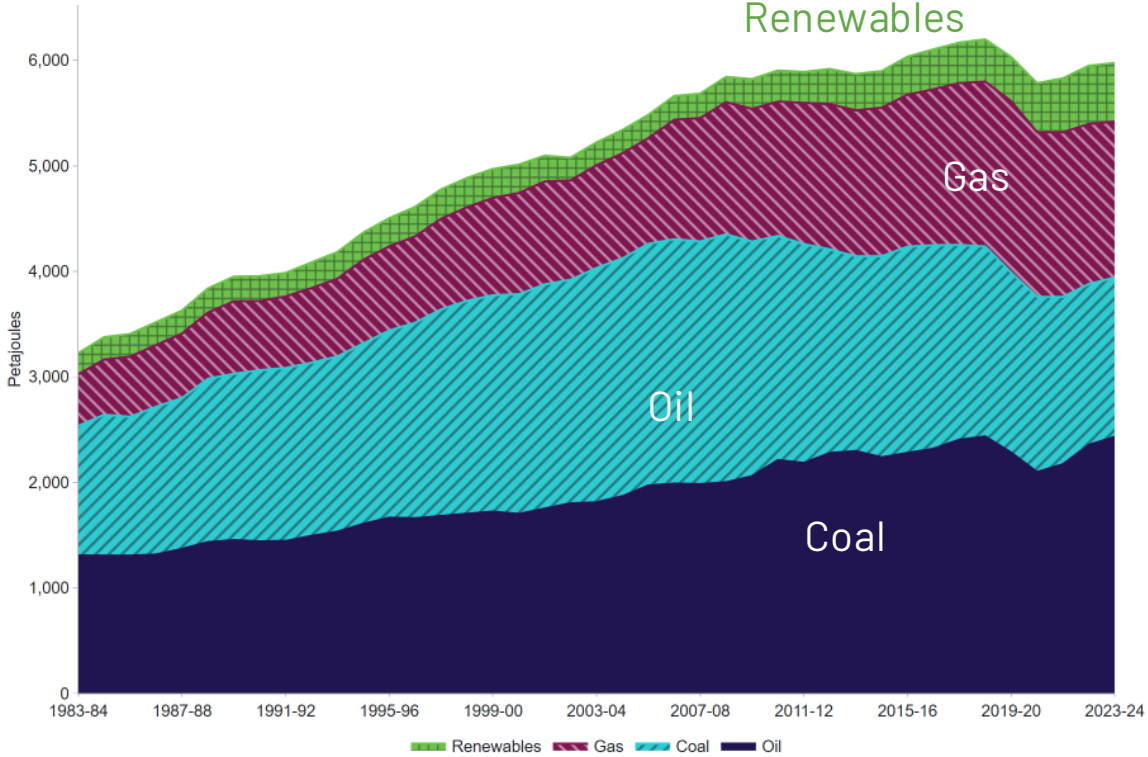
Australian Energy – by fuel type

(1983 – 2024)

Consumption

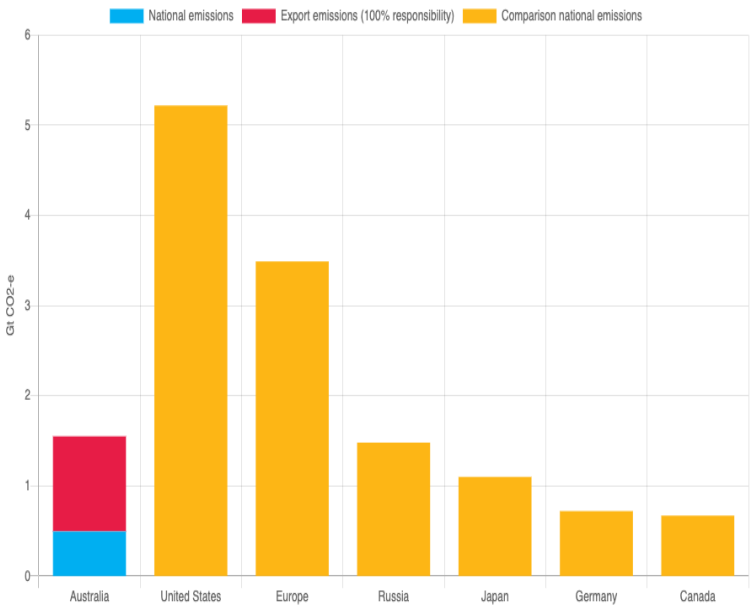


Production

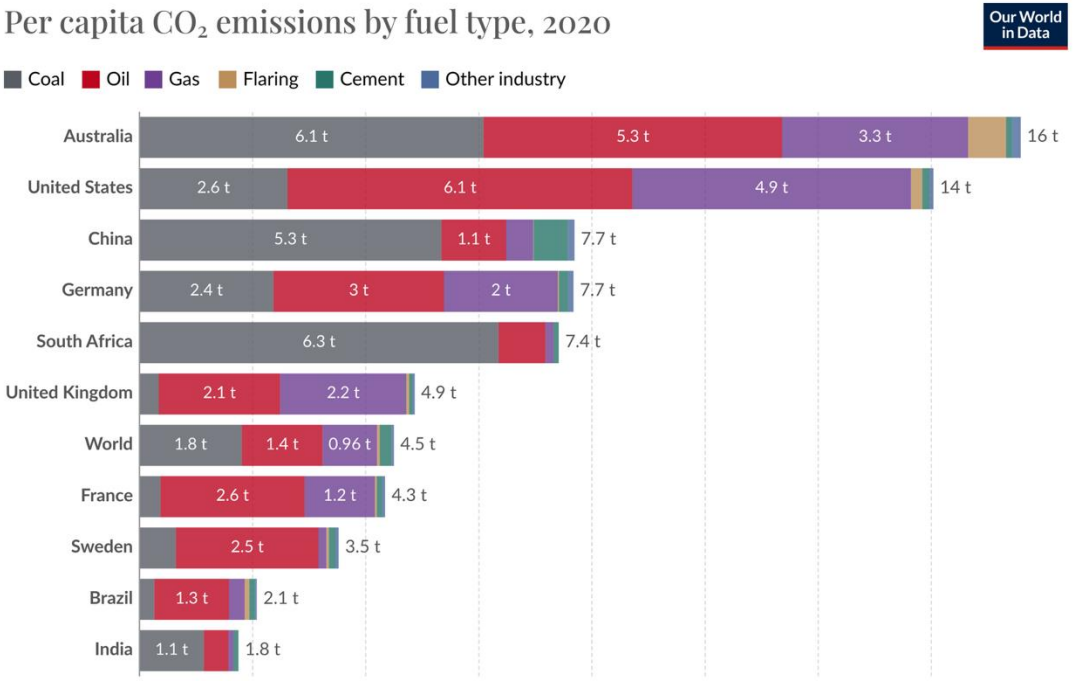


Emissions compared (2020)

Total emissions



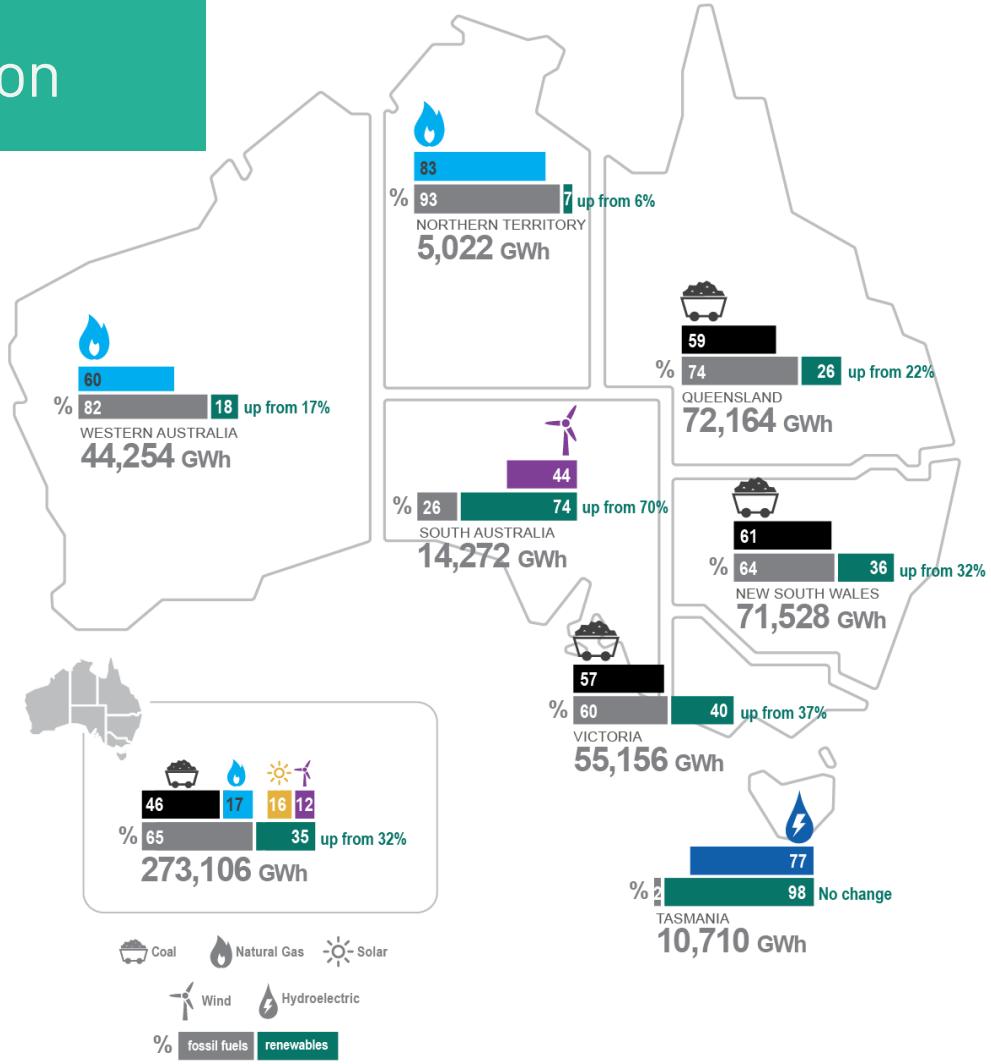
Per capita emissions



Data source: Global Carbon Budget (2022); Population based on various sources (2023)
OurWorldInData.org/co2-and-greenhouse-gas-emissions | CC BY

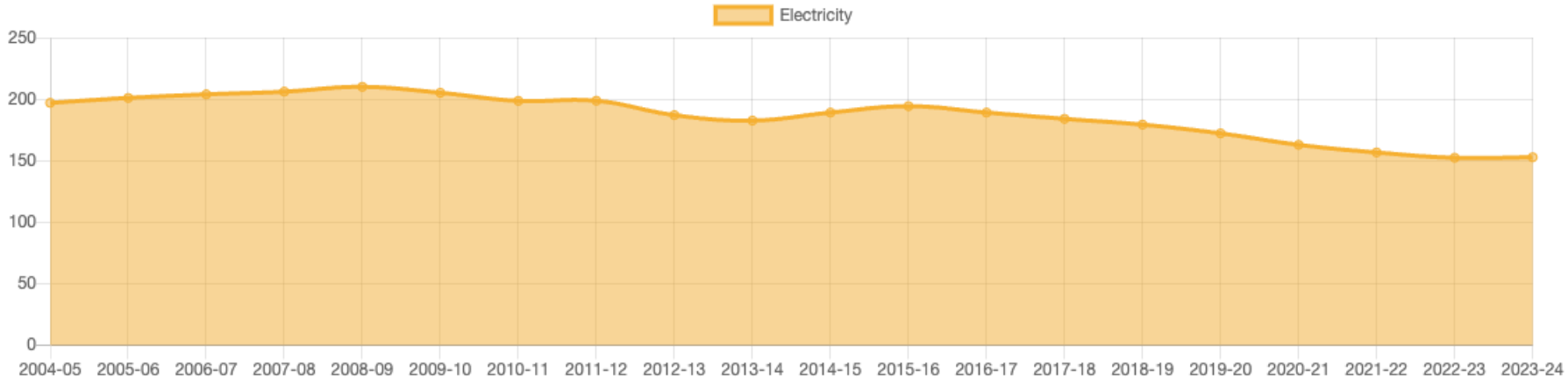
Energy generation

2024



*Up/down from 2023

Energy: the good news



✖ 2030

4,089,303
(of 9.9 million)
Households have solar

39.8%
Clean electricity in the Grid

308,331
Household battery systems
72,500 new installations in 2024

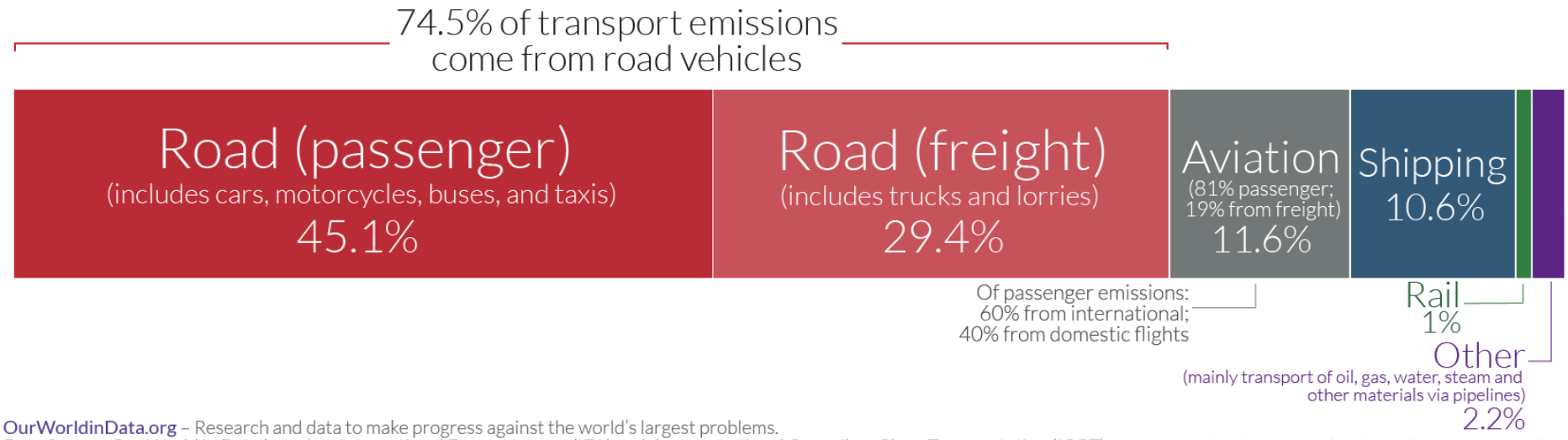
Target:
50% (83%) renewable by 2030

Transport

Global CO_2 emissions from transport

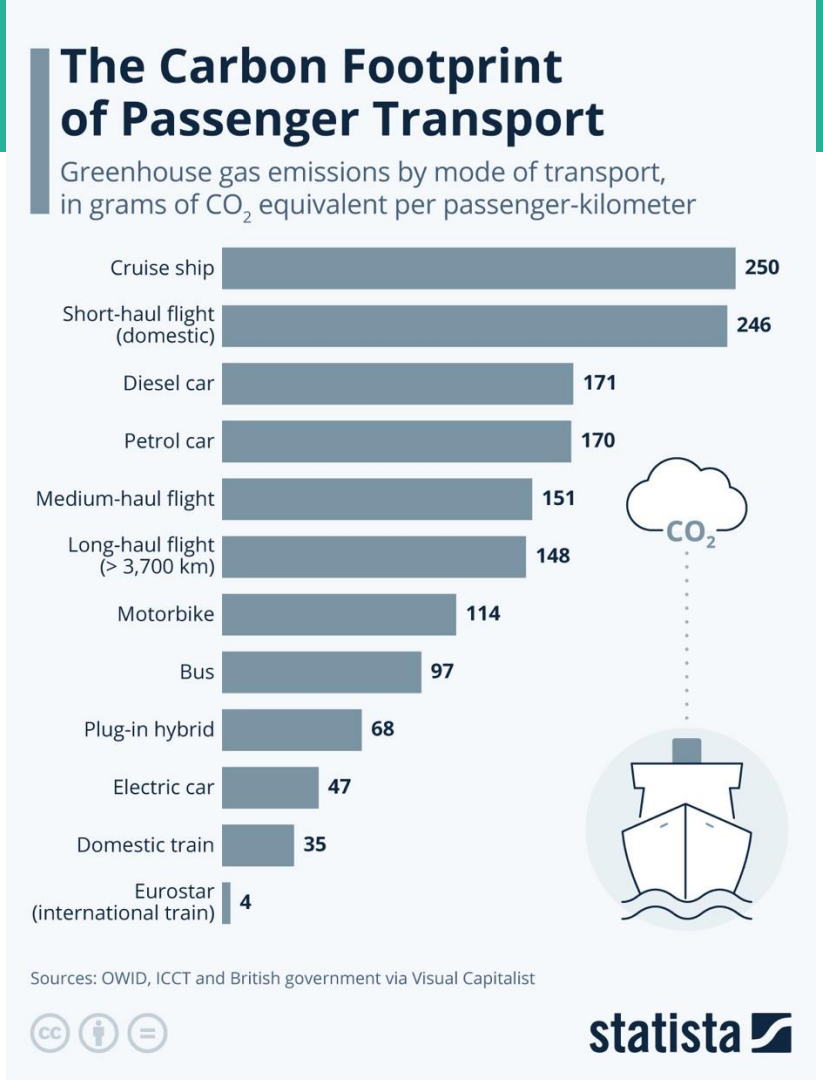
This is based on global transport emissions in 2018, which totalled 8 billion tonnes CO_2.
Transport accounts for 24% of CO_2 emissions from energy.

Our World in Data



Data Source: Our World in Data based on International Energy Agency (IEA) and the International Council on Clean Transportation (ICCT).

Choose your transport



Statista: June 2024

Buildings

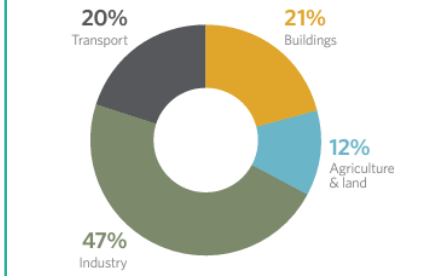


Figure 3: **Australia's emissions by sector, 2018**
Source: ClimateWorks Australia[14]

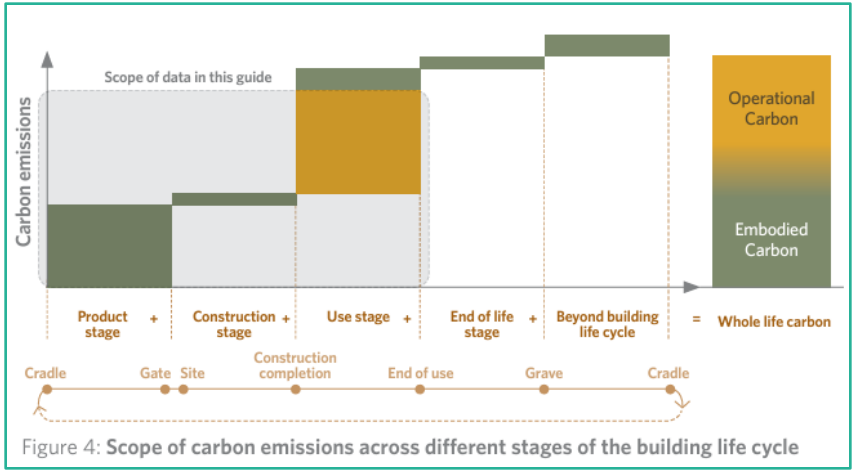
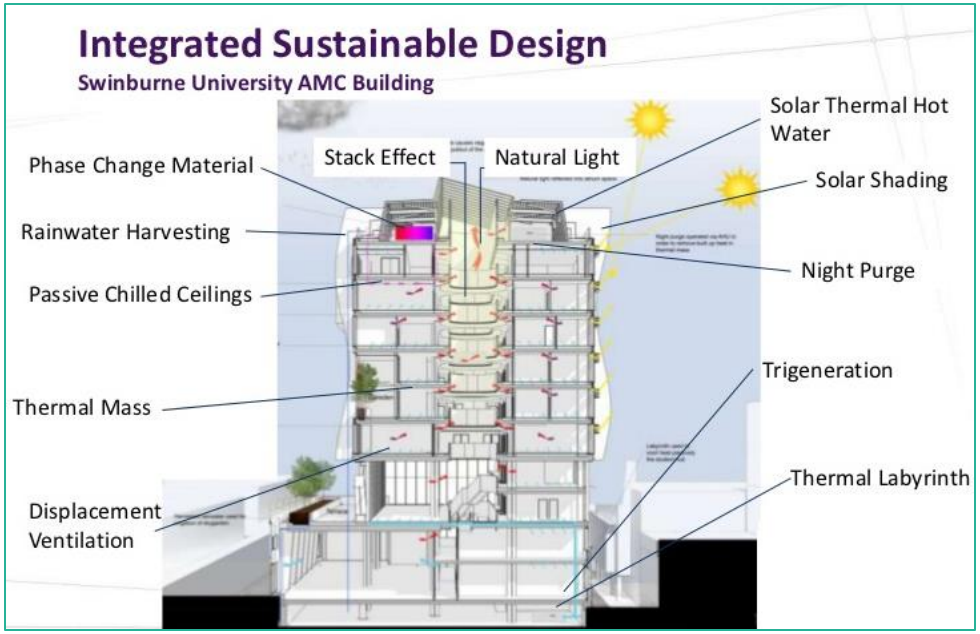


Figure 4: **Scope of carbon emissions across different stages of the building life cycle**



Choose your buildings materials

ROOFING

Nonconventional

Rammed Earth

"Green"

Thatched

Conventional

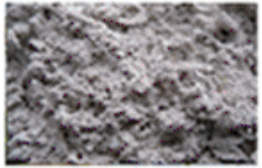
Tar/Asphalt

Metal Sheeting

WALLS

Nonconventional

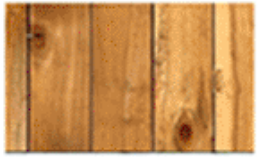
Bamboo



Fiber-Reinforced Mortar

Recycled Plastic

Conventional



Wood

Steel

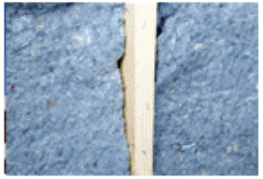
Concrete

INSULATION

Nonconventional

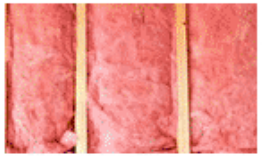
Straw Bale

Adobe



Recycled Cotton

Conventional



Fiberglass

Polyurethane Foam

Textiles

> 1.4 billion items

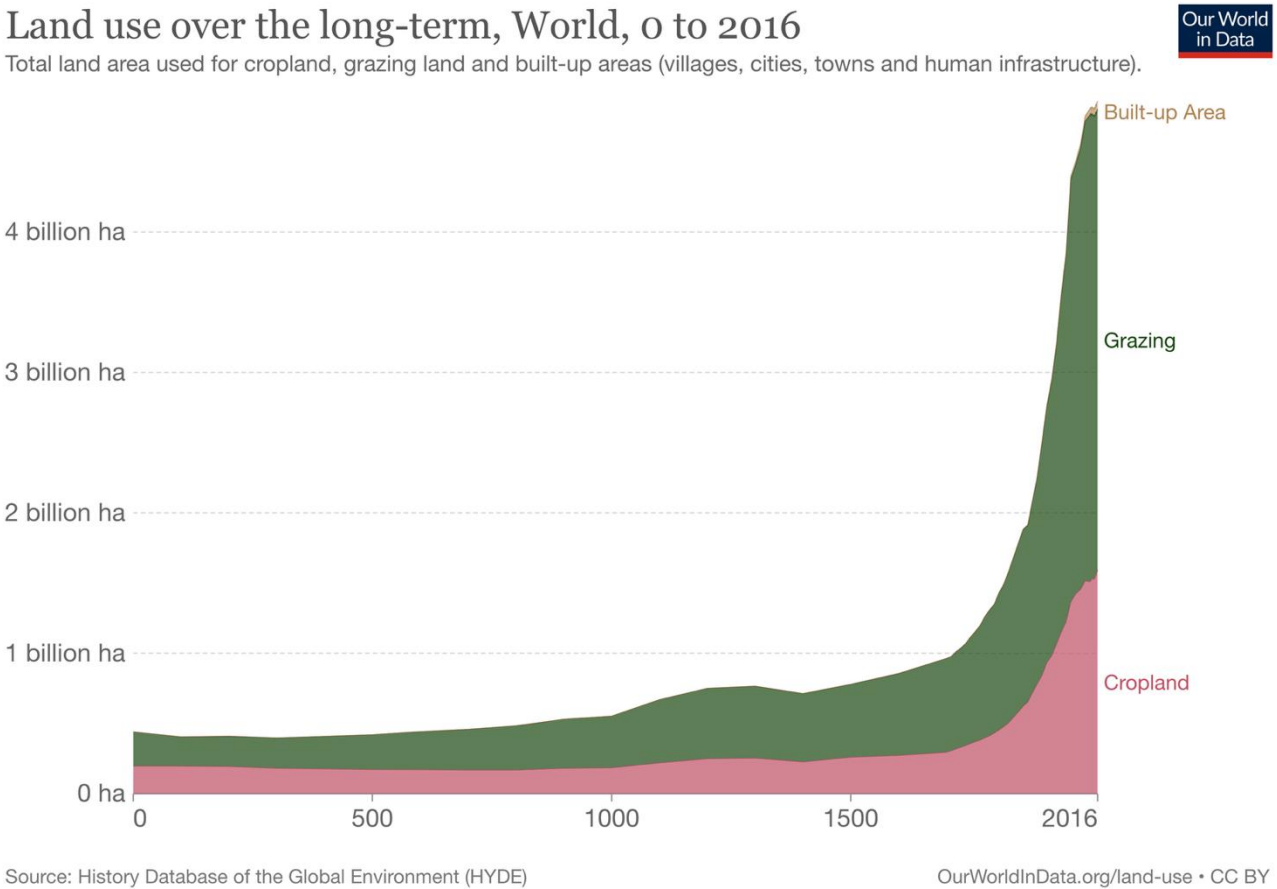
Methane

CH_4

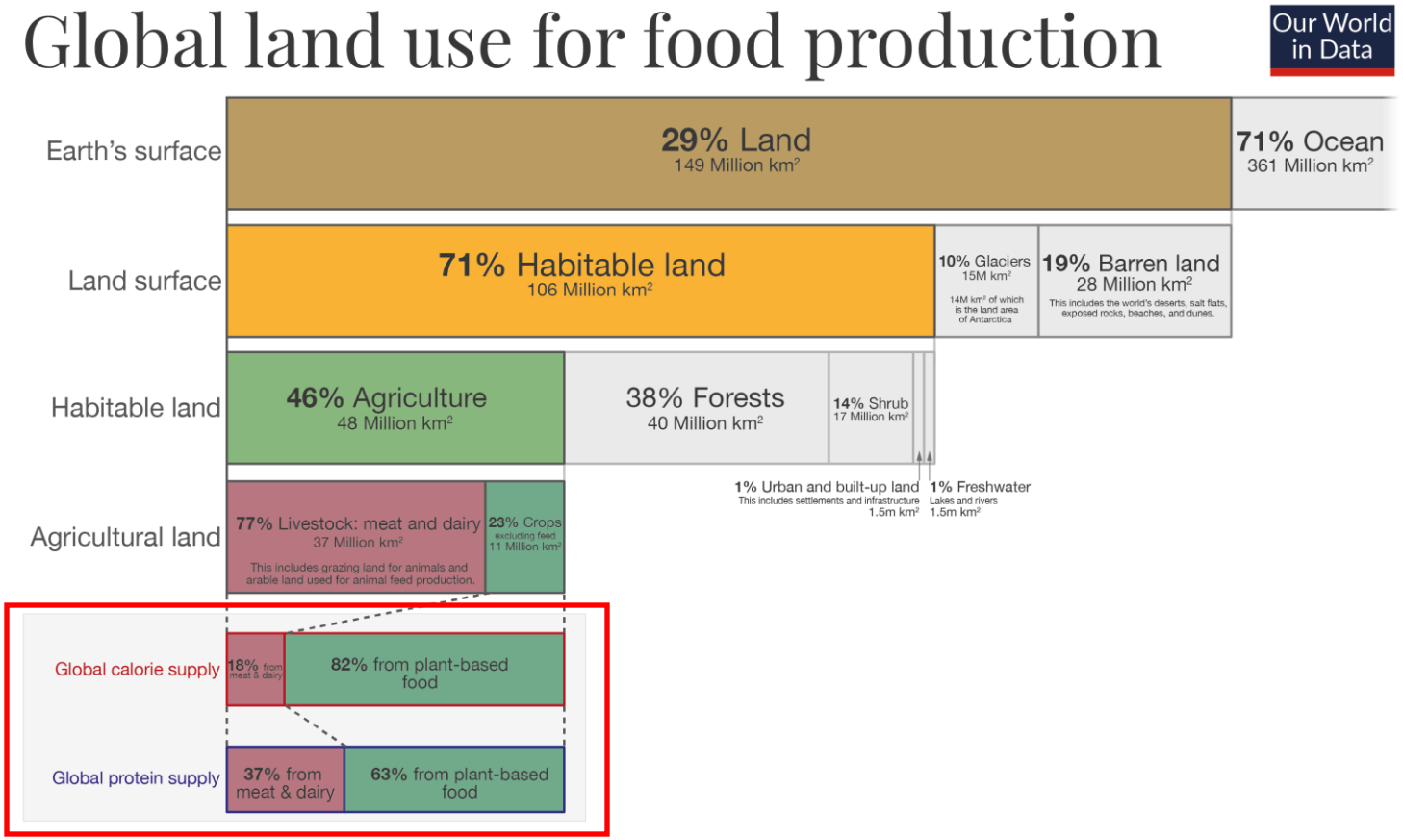
~ 200,000 tonnes

Choose your next look.

Land Use change

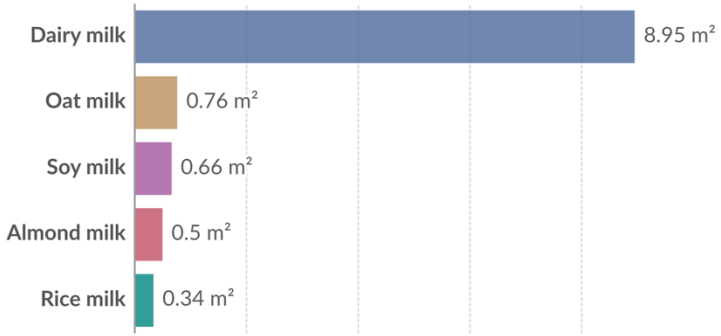


Land Use – Food

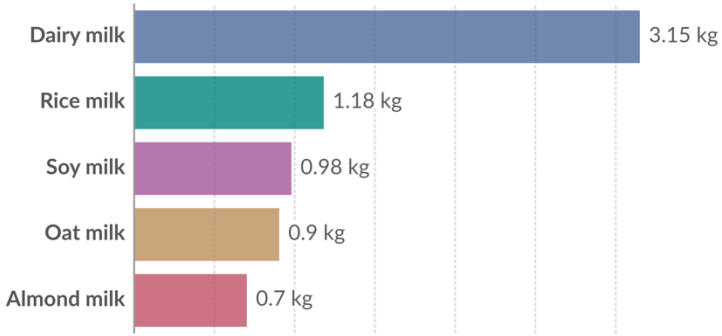


Choose your milk

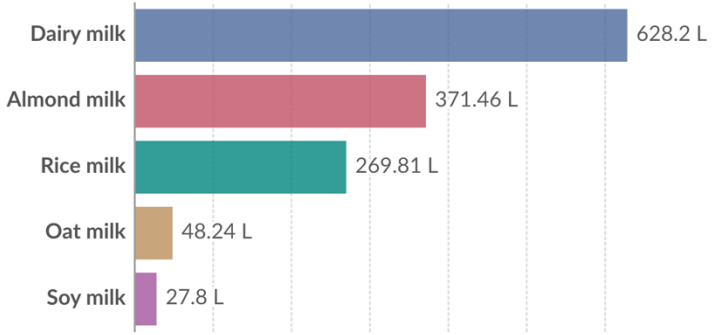
Land use



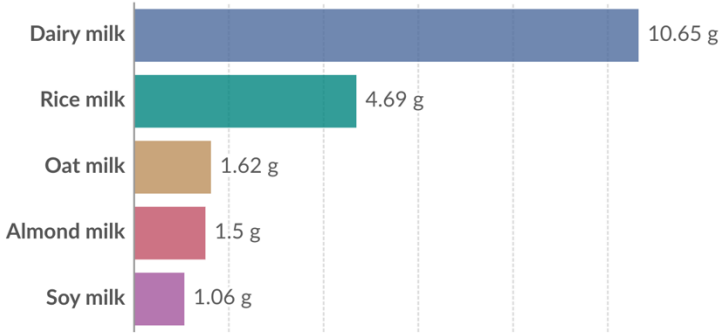
Greenhouse gas emissions



Freshwater use

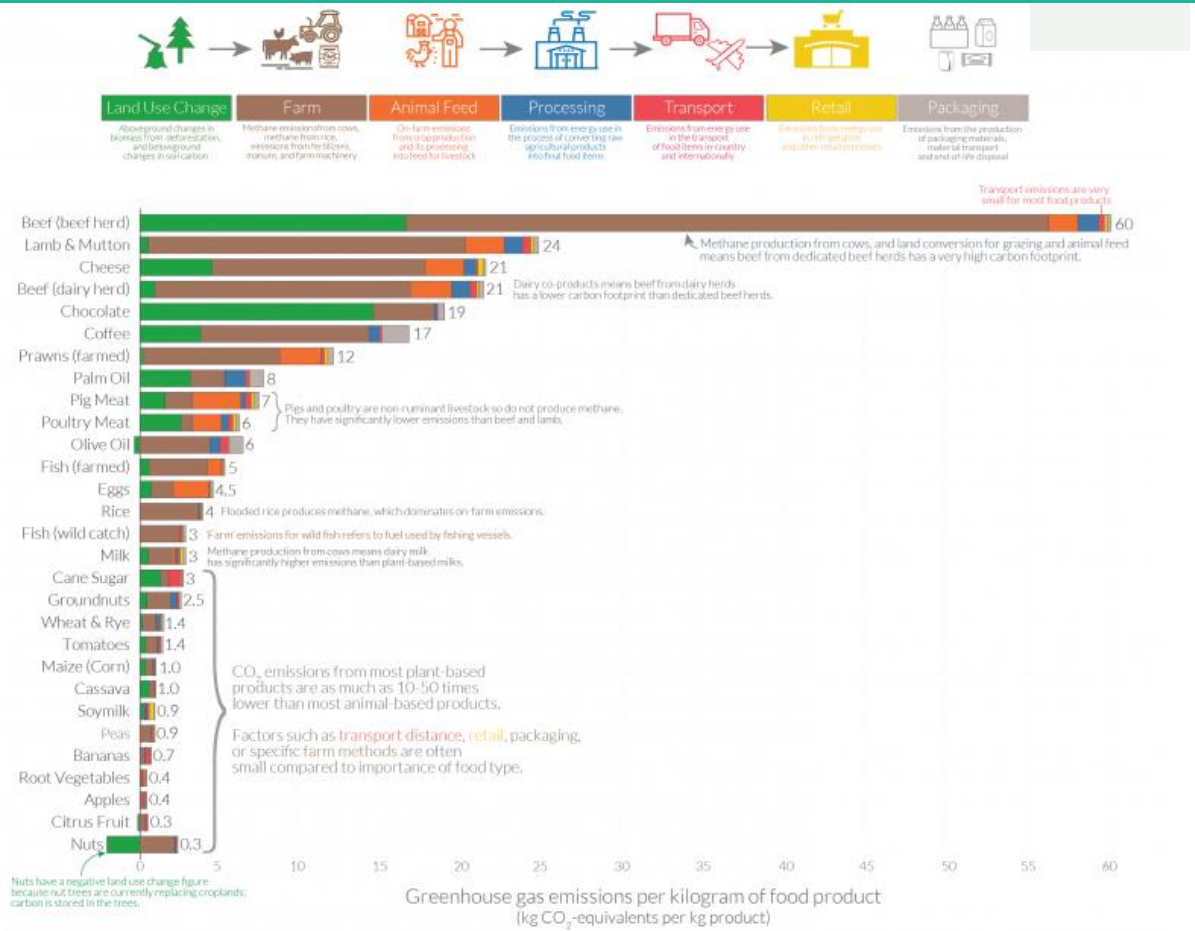


Eutrophication

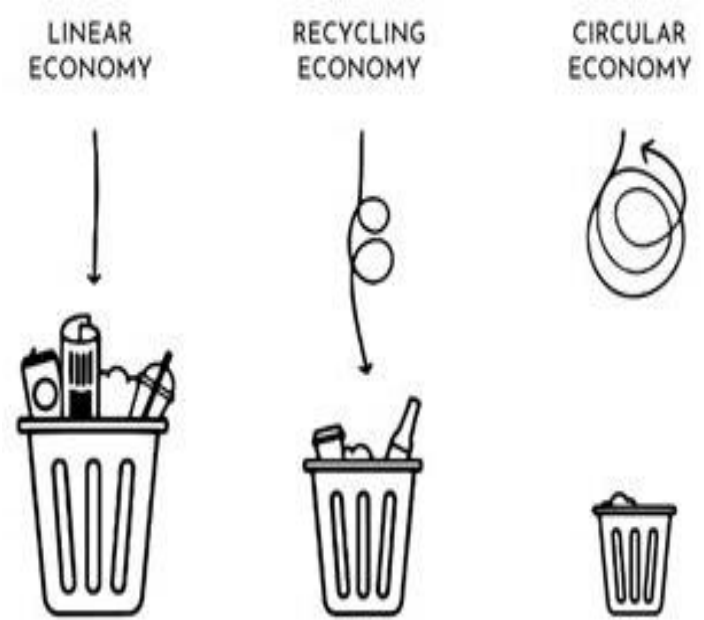


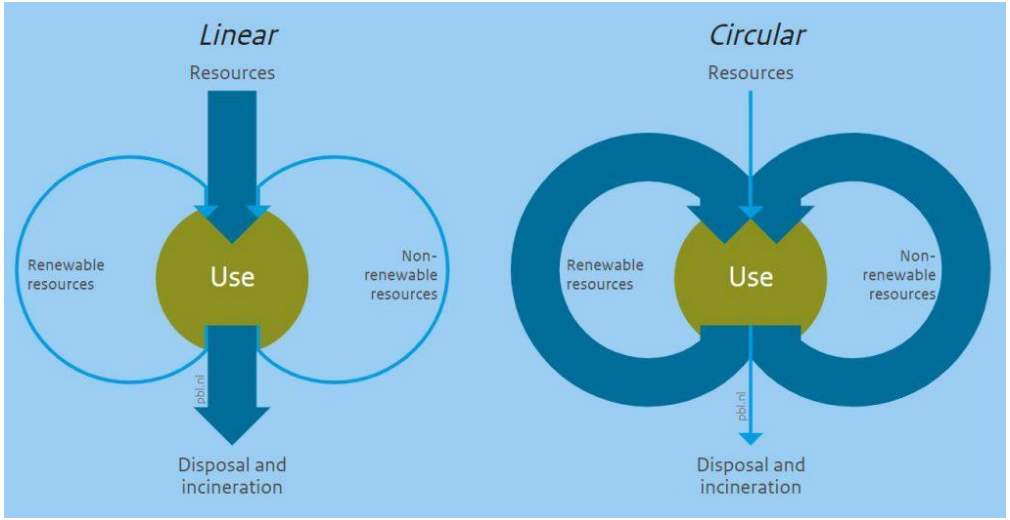
Data source: Joseph Poore and Thomas Nemecek (2018).

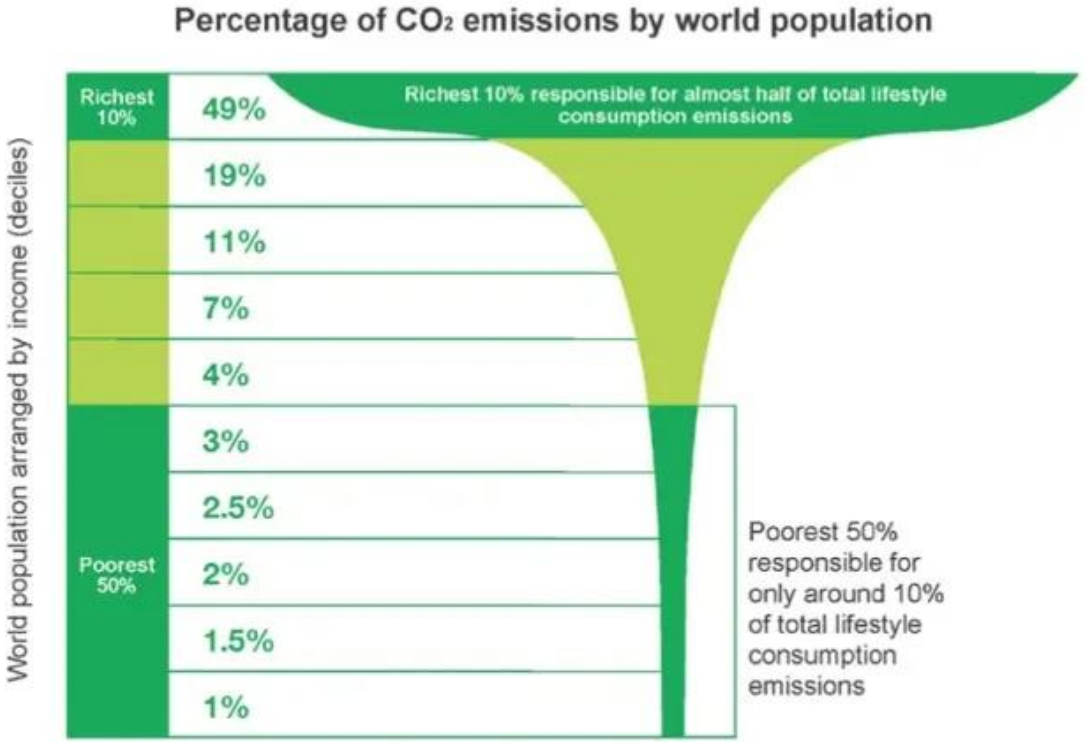
Food: GHG supply chain



Waste – “the best waste is the one that is not created”






Percentage of CO_2 emissions by world population
World population arranged by income (deciles)
Richest 10%
Poorest 50%
49%
19%
11%
7%
4%
3%
2.5%
2%
1.5%
1%
Richest 10% responsible for almost half of total lifestyle consumption emissions
Poorest 50% responsible for only around 10% of total lifestyle consumption emissions

Oxfam 2015

Emission calculators

carbonneutral

carbon footprint™

WWF Footprint calculator

Carbon Positive Australia

BBC Food Calculator

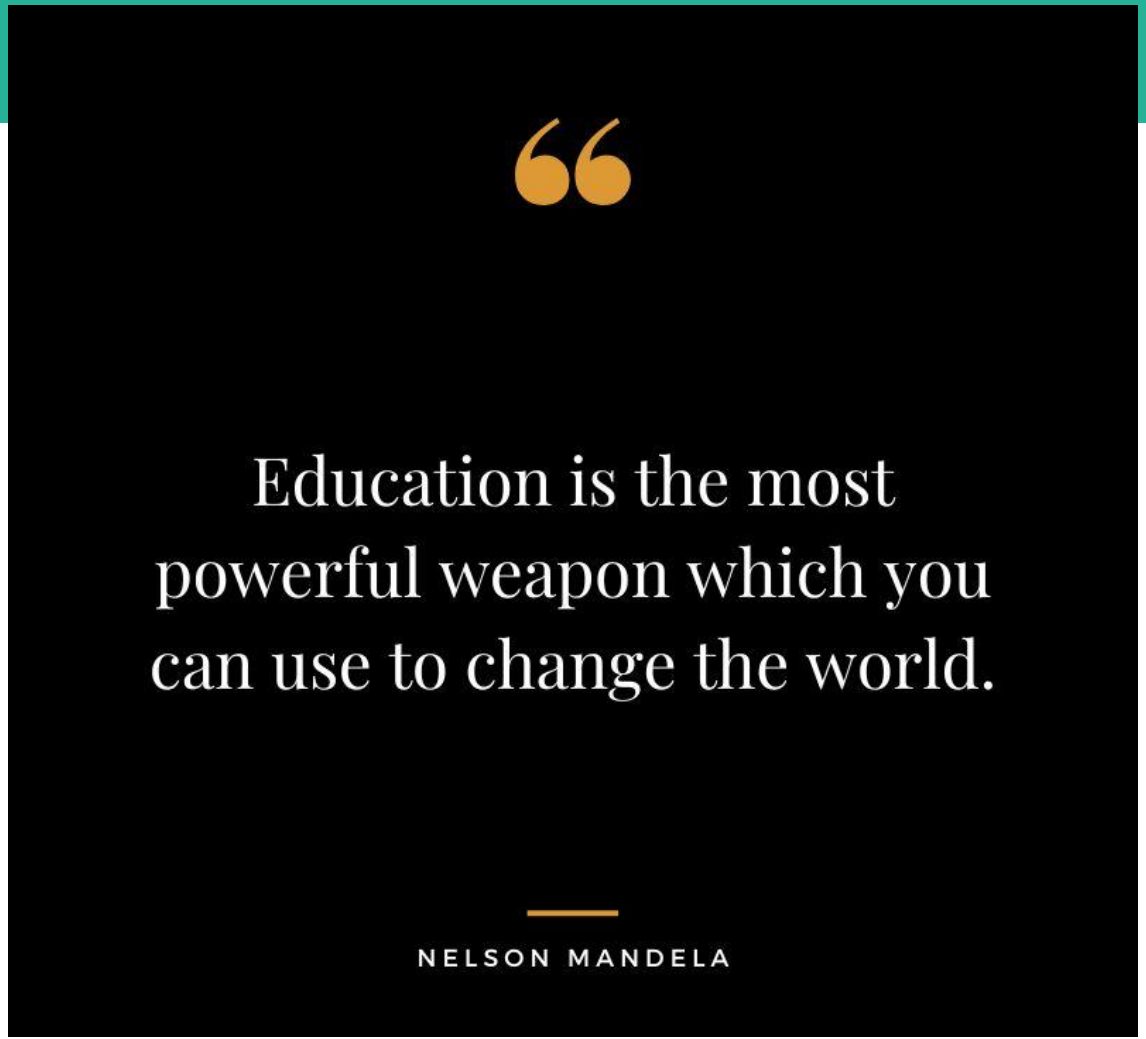
CARBON REDUCTION INSTITUTE WWW.NOCO2.COM.AU

carbonhalo

FLOOP

THREDUP

Literacy = Change



Everyone, everywhere, now

How far into the circles
can you have an effect?

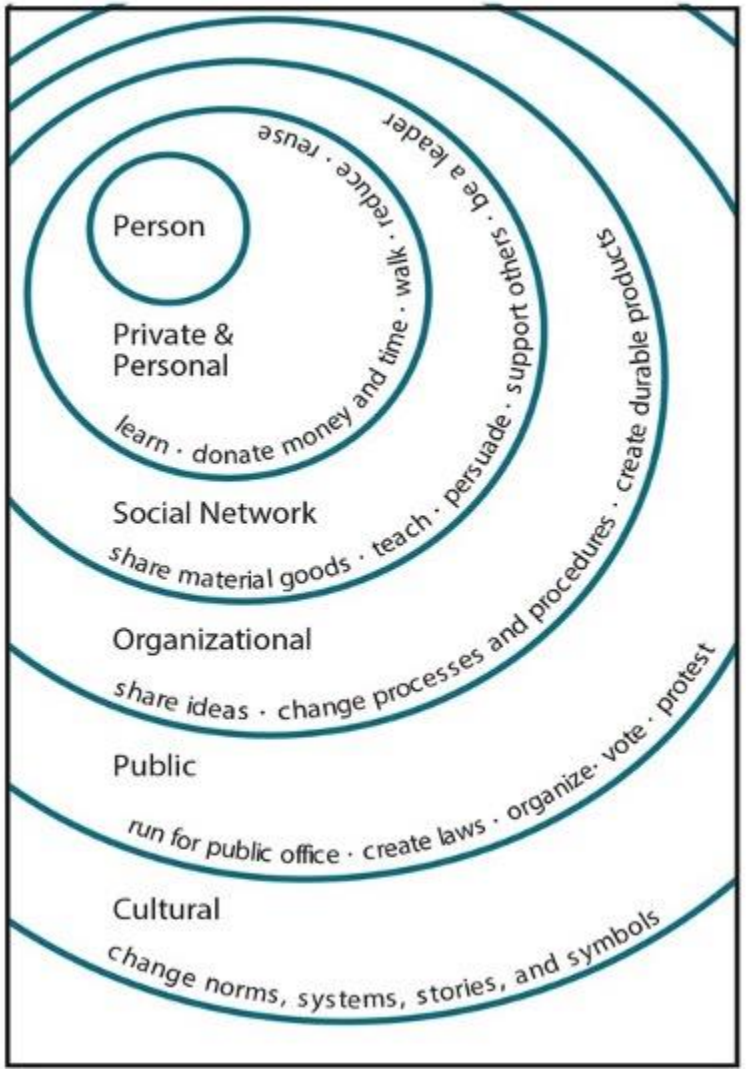


Illustration by Elsie Amel


"We do not inherit the Earth
from our ancestors, we
borrow it from our children."
Native American Proverb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EDITH COWAN
UNIVERSITY
Thank you