

CAMBRIDGE ZERO₂

How can we create a resilient, sustainable future?

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@CambridgeZero



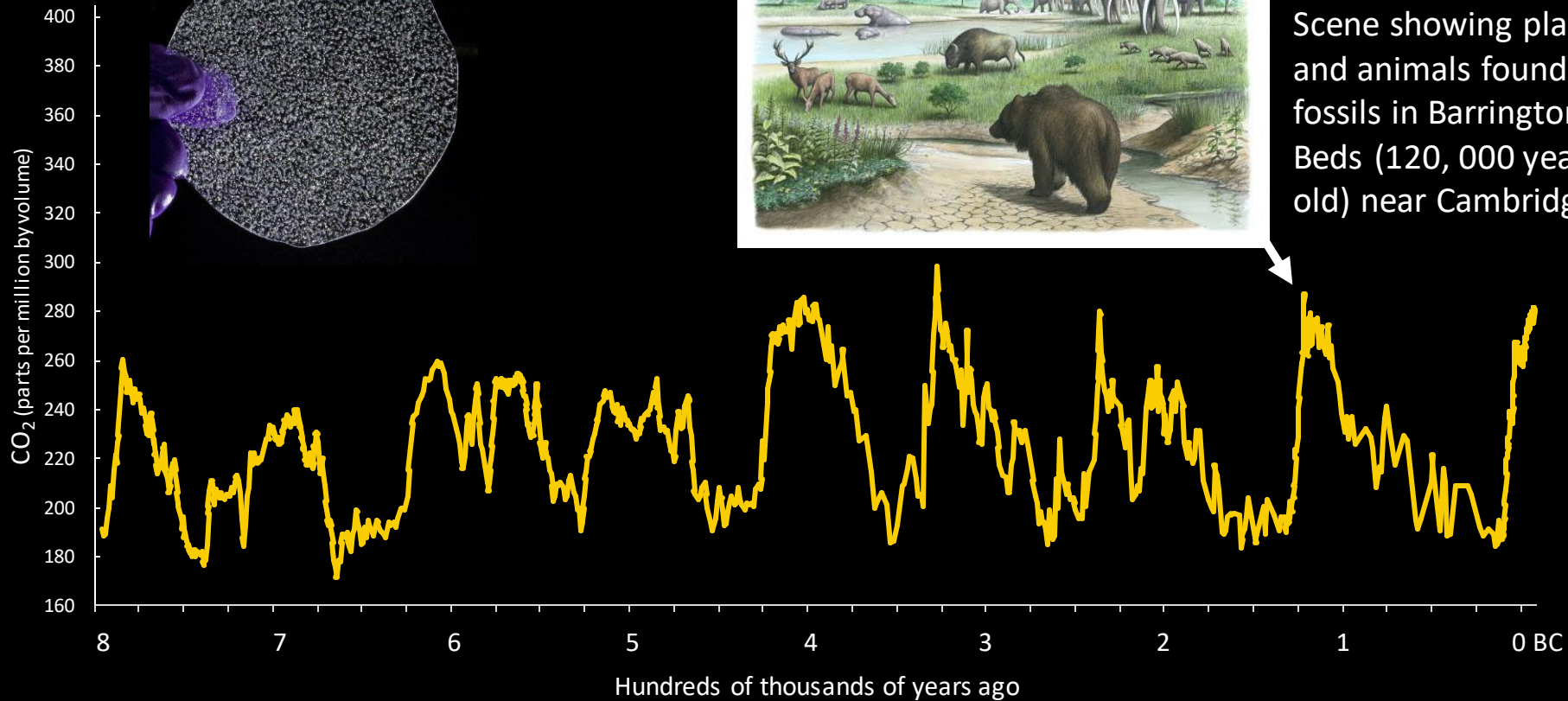
The world's richest 1% have more than **twice as much wealth** as 6.9 billion people.



1 million species at risk of **extinction** in the next decades



Today's atmospheric CO₂ is **unprecedented** in human history, prehistory & beyond





Greenland & Antarctic ice
loss and global sea level
rise are **accelerating**



Temperatures are reaching **extremes**



Ocean acidification is **soaring**



We are seeing
increased risk of
extreme weather around
the world

Role of computer science & technology

Assessing &
monitoring
the risks



Contributing
to sustainable
solutions

**Vast datasets from satellites,
networked sensors,
computer simulations,
crowd sourcing...**

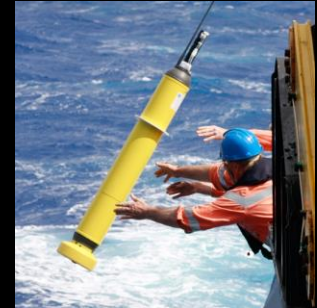
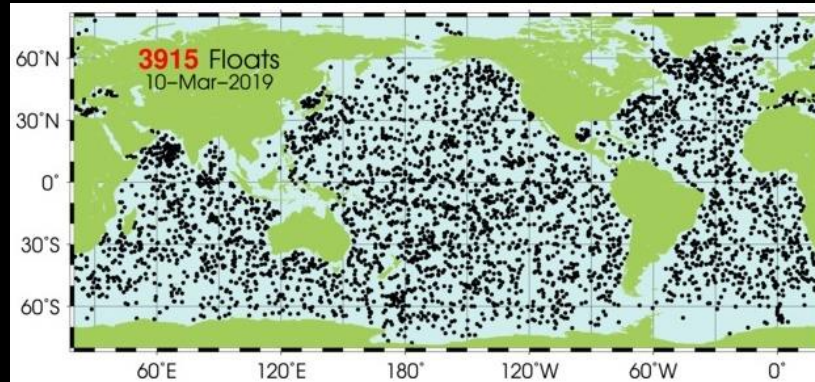
The infographic illustrates the planned expansion of Earth observation satellites over a 20-year period. It is divided into three main categories: Science (green), Copernicus (blue), and Meteorology (orange). The timeline shows a steady increase in the number of satellites, with a significant boost in the Copernicus program starting around 2020. A large image of Earth is on the left, and the background features a blue orbital path.

Year	Category	Satellite Name
2010	Science	Proba-1, GOCE, SMOS, Cryosat
2015	Science	Minisat-10, Minisat-11, Sentinel-1A, Sentinel-1B, Sentinel-2A, Sentinel-2B, Sentinel-3A, Sentinel-3B, Sentinel-5P, Sentinel-6, Sentinel-7, Sentinel-8, Sentinel-9, Sentinel-10, Sentinel-11, Sentinel-12, Sentinel-13, Sentinel-14, Sentinel-15, Sentinel-16, Sentinel-17, Sentinel-18, Sentinel-19, Sentinel-20, Sentinel-21, Sentinel-22, Sentinel-23, Sentinel-24, Sentinel-25, Sentinel-26, Sentinel-27, Sentinel-28, Sentinel-29, Sentinel-30, Sentinel-31, Sentinel-32, Sentinel-33, Sentinel-34, Sentinel-35, Sentinel-36, Sentinel-37, Sentinel-38, Sentinel-39, Sentinel-40, Sentinel-41, Sentinel-42, Sentinel-43, Sentinel-44, Sentinel-45, Sentinel-46, Sentinel-47, Sentinel-48, Sentinel-49, Sentinel-50, Sentinel-51, Sentinel-52, Sentinel-53, Sentinel-54, Sentinel-55, Sentinel-56, Sentinel-57, Sentinel-58, Sentinel-59, Sentinel-60, Sentinel-61, Sentinel-62, Sentinel-63, Sentinel-64, Sentinel-65, Sentinel-66, Sentinel-67, Sentinel-68, Sentinel-69, Sentinel-70, Sentinel-71, Sentinel-72, Sentinel-73, Sentinel-74, Sentinel-75, Sentinel-76, Sentinel-77, Sentinel-78, Sentinel-79, Sentinel-80, Sentinel-81, Sentinel-82, Sentinel-83, Sentinel-84, Sentinel-85, Sentinel-86, Sentinel-87, Sentinel-88, Sentinel-89, Sentinel-90, Sentinel-91, Sentinel-92, Sentinel-93, Sentinel-94, Sentinel-95, Sentinel-96, Sentinel-97, Sentinel-98, Sentinel-99, Sentinel-100
2020	Copernicus	Sentinel-1A, Sentinel-1B, Sentinel-2A, Sentinel-2B, Sentinel-3A, Sentinel-3B, Sentinel-5P, Sentinel-6, Sentinel-7, Sentinel-8, Sentinel-9, Sentinel-10, Sentinel-11, Sentinel-12, Sentinel-13, Sentinel-14, Sentinel-15, Sentinel-16, Sentinel-17, Sentinel-18, Sentinel-19, Sentinel-20, Sentinel-21, Sentinel-22, Sentinel-23, Sentinel-24, Sentinel-25, Sentinel-26, Sentinel-27, Sentinel-28, Sentinel-29, Sentinel-30, Sentinel-31, Sentinel-32, Sentinel-33, Sentinel-34, Sentinel-35, Sentinel-36, Sentinel-37, Sentinel-38, Sentinel-39, Sentinel-40, Sentinel-41, Sentinel-42, Sentinel-43, Sentinel-44, Sentinel-45, Sentinel-46, Sentinel-47, Sentinel-48, Sentinel-49, Sentinel-50, Sentinel-51, Sentinel-52, Sentinel-53, Sentinel-54, Sentinel-55, Sentinel-56, Sentinel-57, Sentinel-58, Sentinel-59, Sentinel-60, Sentinel-61, Sentinel-62, Sentinel-63, Sentinel-64, Sentinel-65, Sentinel-66, Sentinel-67, Sentinel-68, Sentinel-69, Sentinel-70, Sentinel-71, Sentinel-72, Sentinel-73, Sentinel-74, Sentinel-75, Sentinel-76, Sentinel-77, Sentinel-78, Sentinel-79, Sentinel-80, Sentinel-81, Sentinel-82, Sentinel-83, Sentinel-84, Sentinel-85, Sentinel-86, Sentinel-87, Sentinel-88, Sentinel-89, Sentinel-90, Sentinel-91, Sentinel-92, Sentinel-93, Sentinel-94, Sentinel-95, Sentinel-96, Sentinel-97, Sentinel-98, Sentinel-99, Sentinel-100
2025	Meteorology	MTG-1, MTG-2, MTG-3, MTG-4, MTG-5, MTG-6, MTG-7, MTG-8, MTG-9, MTG-10, MTG-11, MTG-12, MTG-13, MTG-14, MTG-15, MTG-16, MTG-17, MTG-18, MTG-19, MTG-20, MTG-21, MTG-22, MTG-23, MTG-24, MTG-25, MTG-26, MTG-27, MTG-28, MTG-29, MTG-30, MTG-31, MTG-32, MTG-33, MTG-34, MTG-35, MTG-36, MTG-37, MTG-38, MTG-39, MTG-40, MTG-41, MTG-42, MTG-43, MTG-44, MTG-45, MTG-46, MTG-47, MTG-48, MTG-49, MTG-50, MTG-51, MTG-52, MTG-53, MTG-54, MTG-55, MTG-56, MTG-57, MTG-58, MTG-59, MTG-60, MTG-61, MTG-62, MTG-63, MTG-64, MTG-65, MTG-66, MTG-67, MTG-68, MTG-69, MTG-70, MTG-71, MTG-72, MTG-73, MTG-74, MTG-75, MTG-76, MTG-77, MTG-78, MTG-79, MTG-80, MTG-81, MTG-82, MTG-83, MTG-84, MTG-85, MTG-86, MTG-87, MTG-88, MTG-89, MTG-90, MTG-91, MTG-92, MTG-93, MTG-94, MTG-95, MTG-96, MTG-97, MTG-98, MTG-99, MTG-100
2030	Science	Proba-2, GOCE-2, SMOS-2, Cryosat-2

Currently > 10 TB data
per day



fleet of 100+ satellites
~ 10 PB data



Autonomous instrumentation & sensor networks

Cambridge Climate Change Business Risk Index Specification

- Provides future likelihood of extreme events that exceed specific weather thresholds

- Measured as **Disruption Days per year**

- With a **likelihood** of occurrence in a given year

90%	50%	10%	5%	1%
P90	P50	P10	P5	P1

- Heatwave thresholds:** Variable disruptive temperature thresholds

25°C	30°C	35°C
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- Three **analysis views** (levels of business concern)

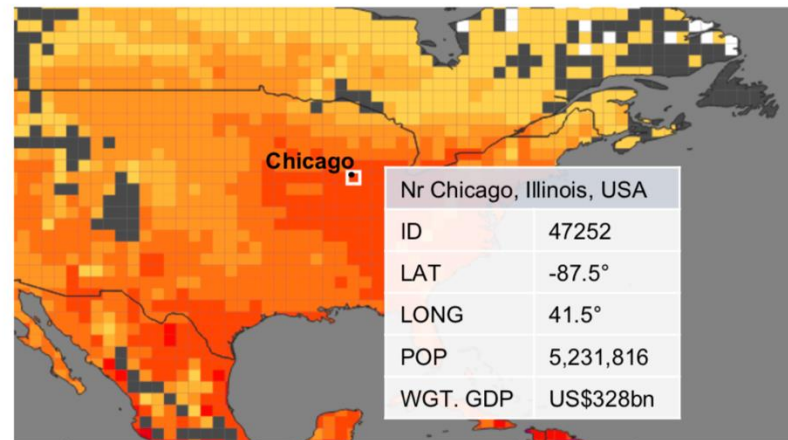
Level 1	Recent historical baseline from 1979-2019 local weather data	ERA5
Level 2	Climate Change Modelled View; four outlooks from RCPs	CMIP5
Level 3	Climate Change Model Stress Test accounting for tail risk	CMIP5

- Multiple **time horizons**

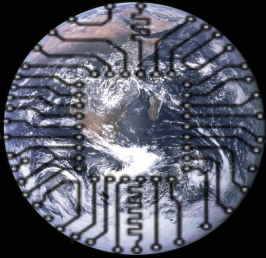
5 Years	20 Years
2025	2040

- Global geography**

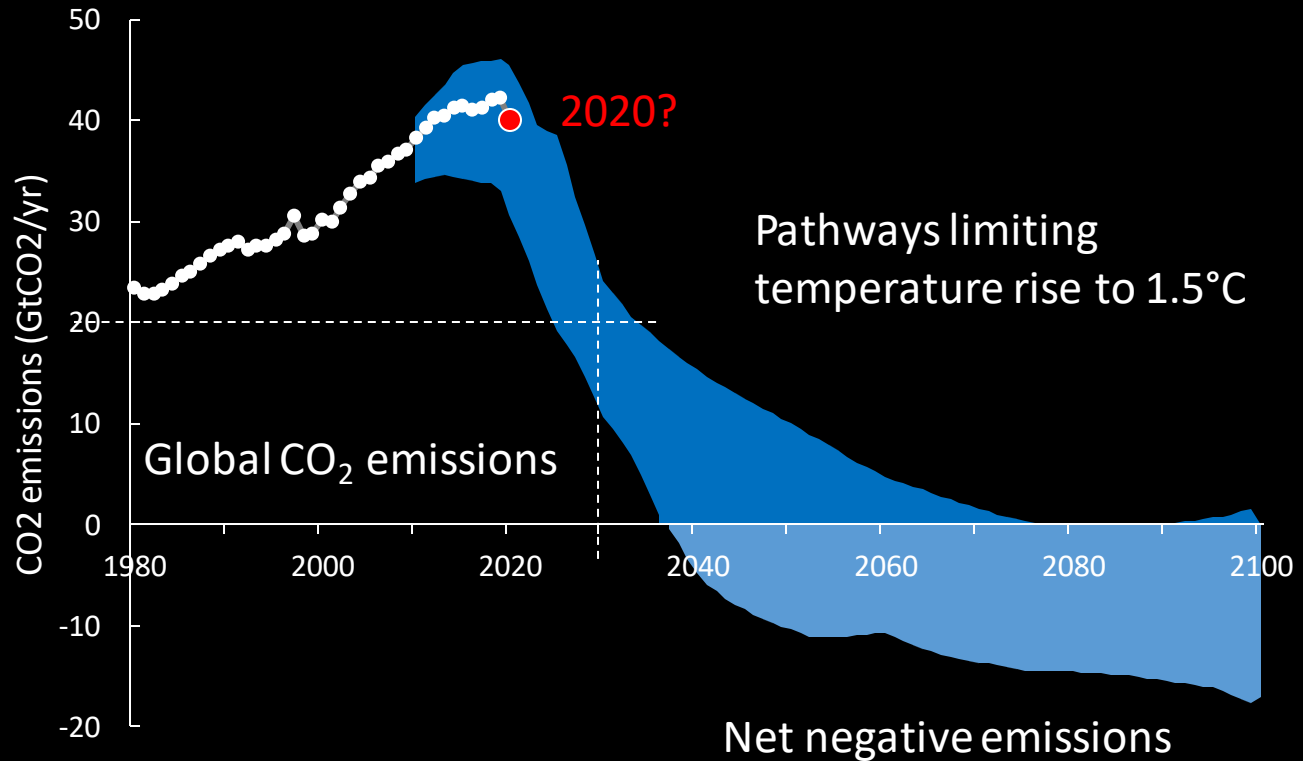
- Global land coverage at 1° grid resolution
- 18,800 grid squares
- Referenced by lat-long coordinates of grid centre

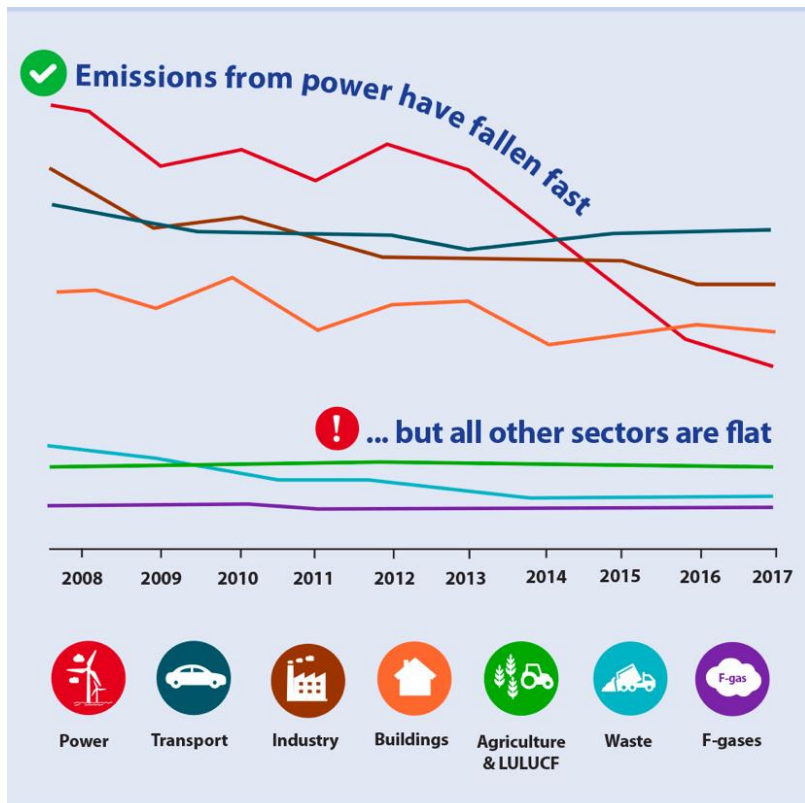


Contributing to sustainable solutions



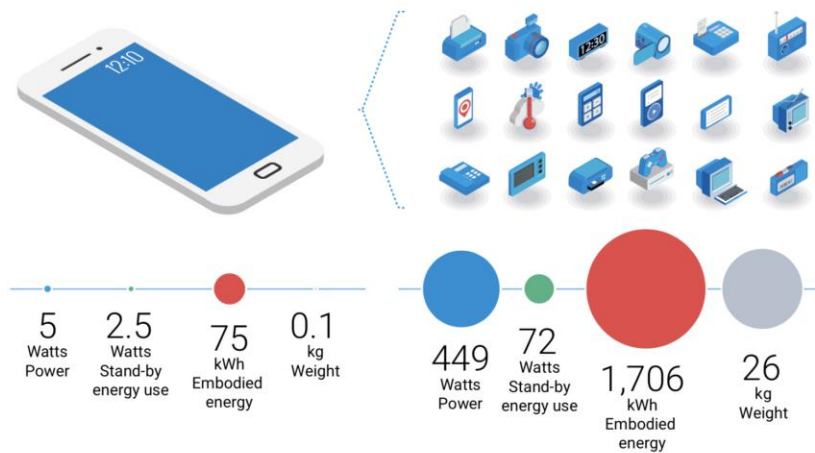
Dramatic emissions reductions are required over next three decades





Source: Committee on Climate Change

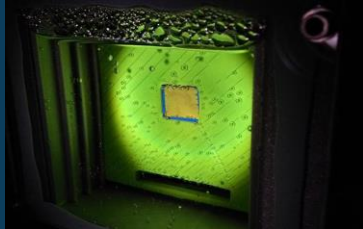
Figure 5.2. The energy and material benefits of accessing services via a multipurpose smartphone (left) over owning an array of single-purpose goods (right)



Source: UN Emissions Gap Report, 2019

Responding through pioneering research

Zero-carbon energy transitions



Health and society



Resources and production



Resilient futures



Transport, cities and infrastructure



Carbon drawdown and climate repair





Research

Education

Engagement

Decarbonisation

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To find out more visit: www.zero.cam.ac.uk



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