

CLIMATE EMERGENCY

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Climate Change is a Large Issue

Majority of the sciences and engineering disciplines are involved.

Social sciences are interested.

Business/Industry has a stake.

Involves citizens, politicians, public policy experts, and advocates.

Every sector of the economy affected.

All aspects of our lives touched: environment, jobs, health, politics, national security, arts, religion...

Where are we?

Why should we care? How can we avoid dangerous impacts?

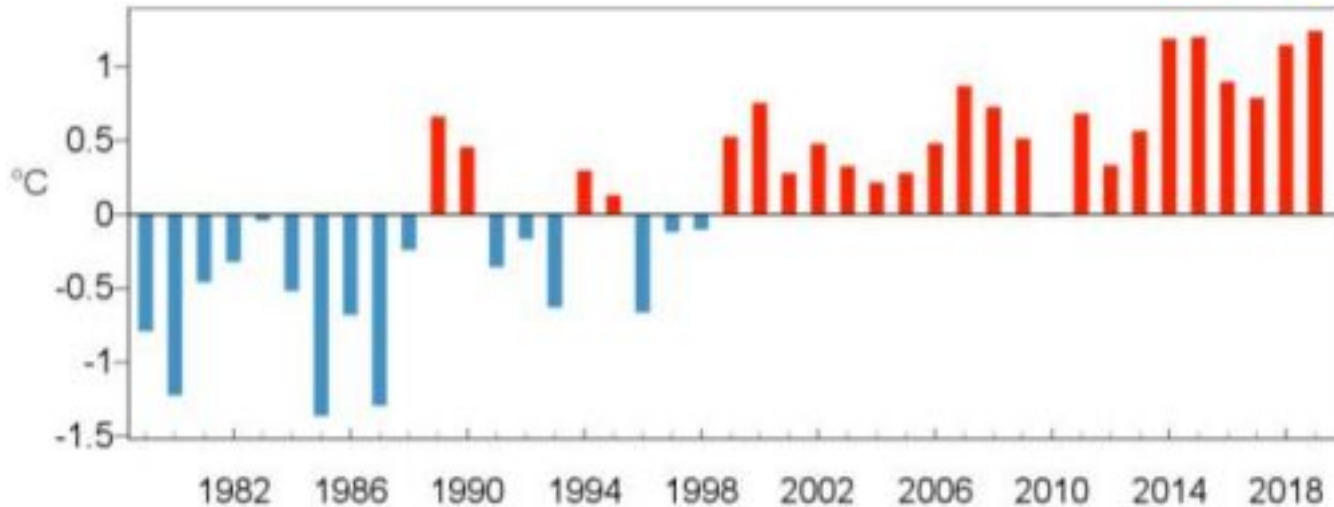
1 Where are we ?

Climate change caused by

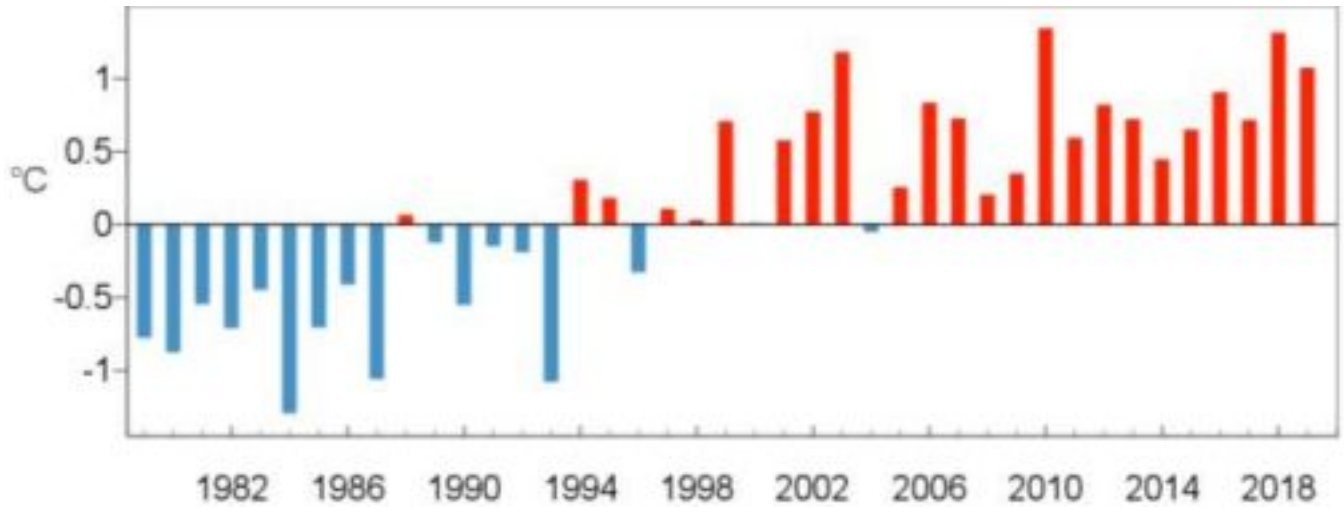
humans is no longer a future threat:

it has arrived,
it is dangerous and
it will get worse.

European temperature anomalies
relative to 1981-2010



annual T

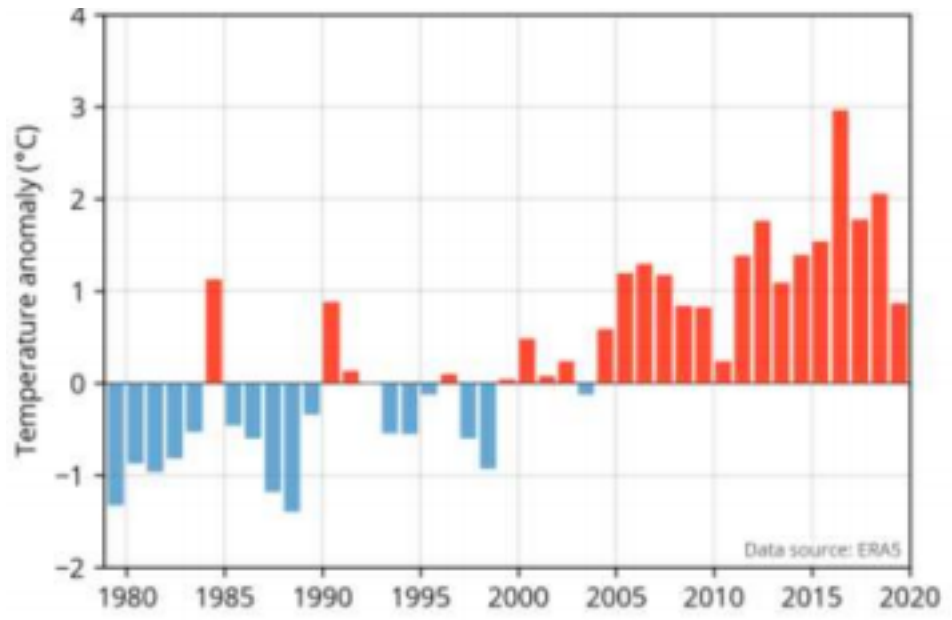


Summer T

European Arctic
air temperature



European Arctic
sea ice extent





1938



2000



2013



2016

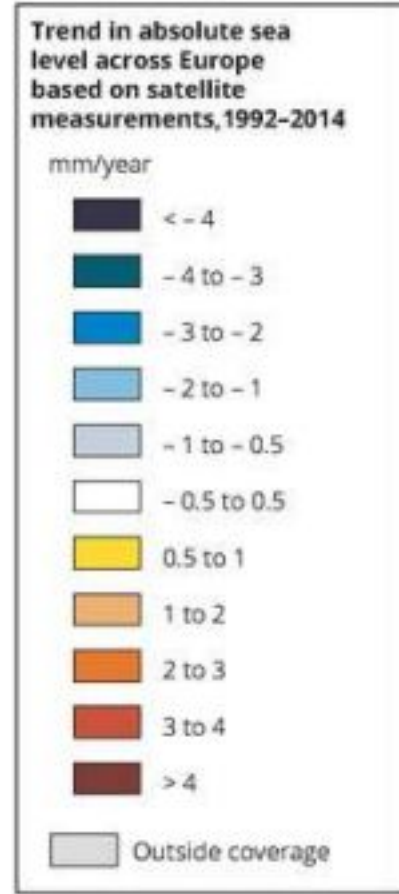
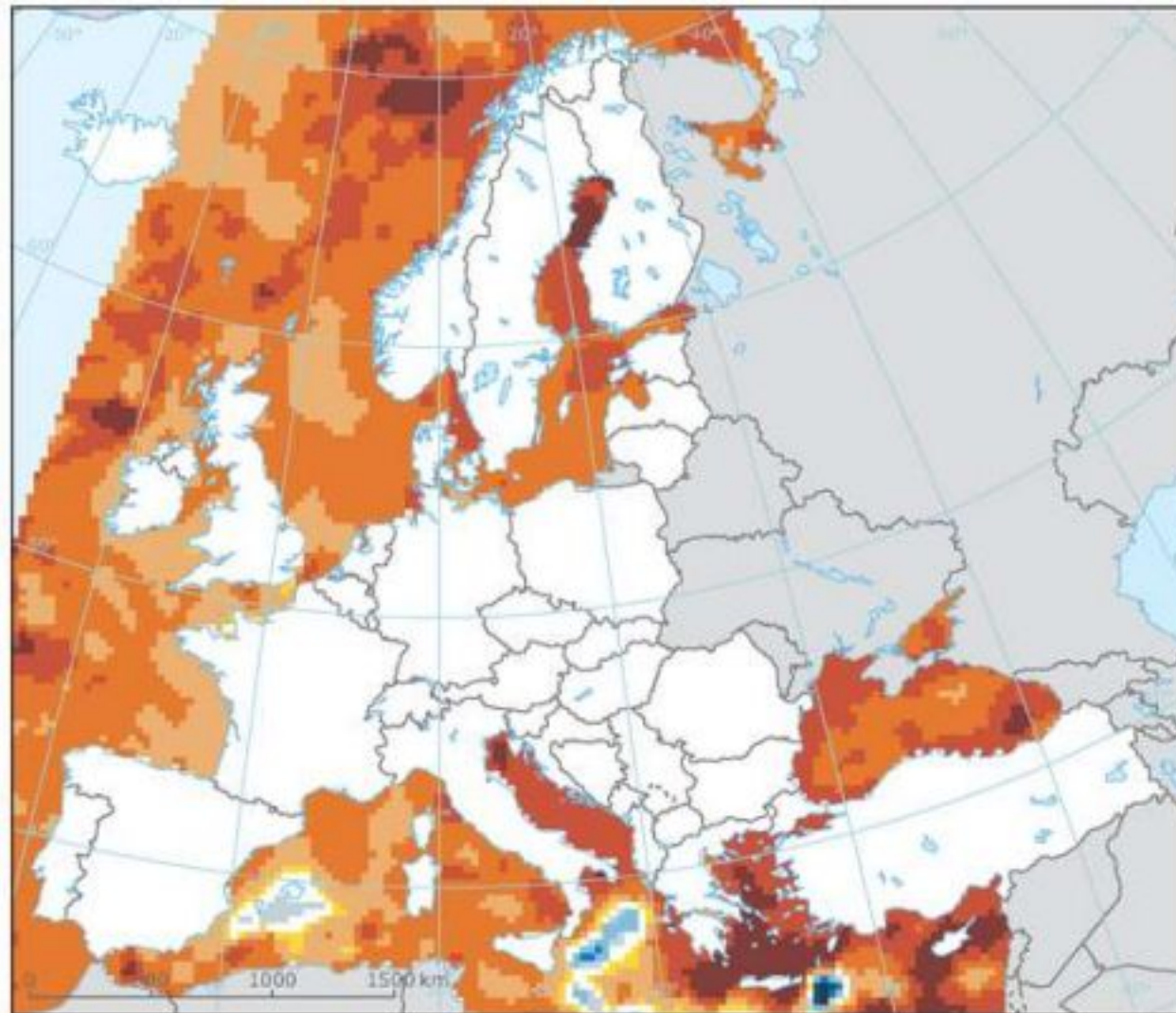


2019

Austri

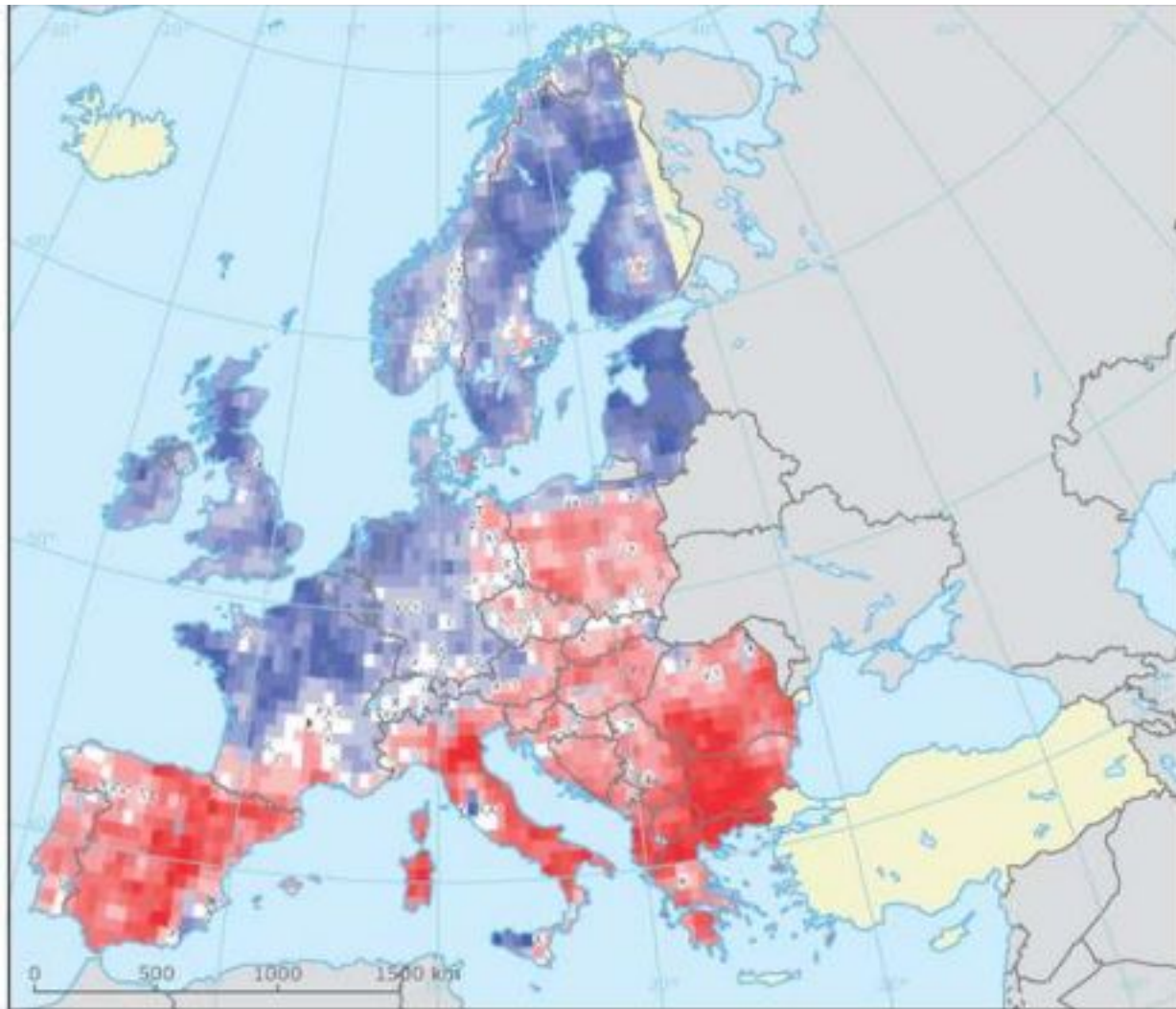
a
Glacier
Pasterze

Trend in sea level
nasatellite measurements



Change in river flows

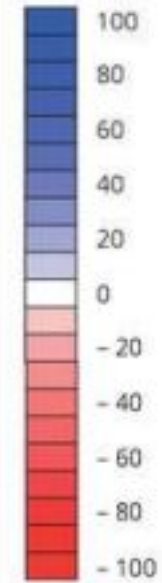
model - beased



Model-based estimate of past change in annual river flows

x < 75 % of models agree on sign of trend

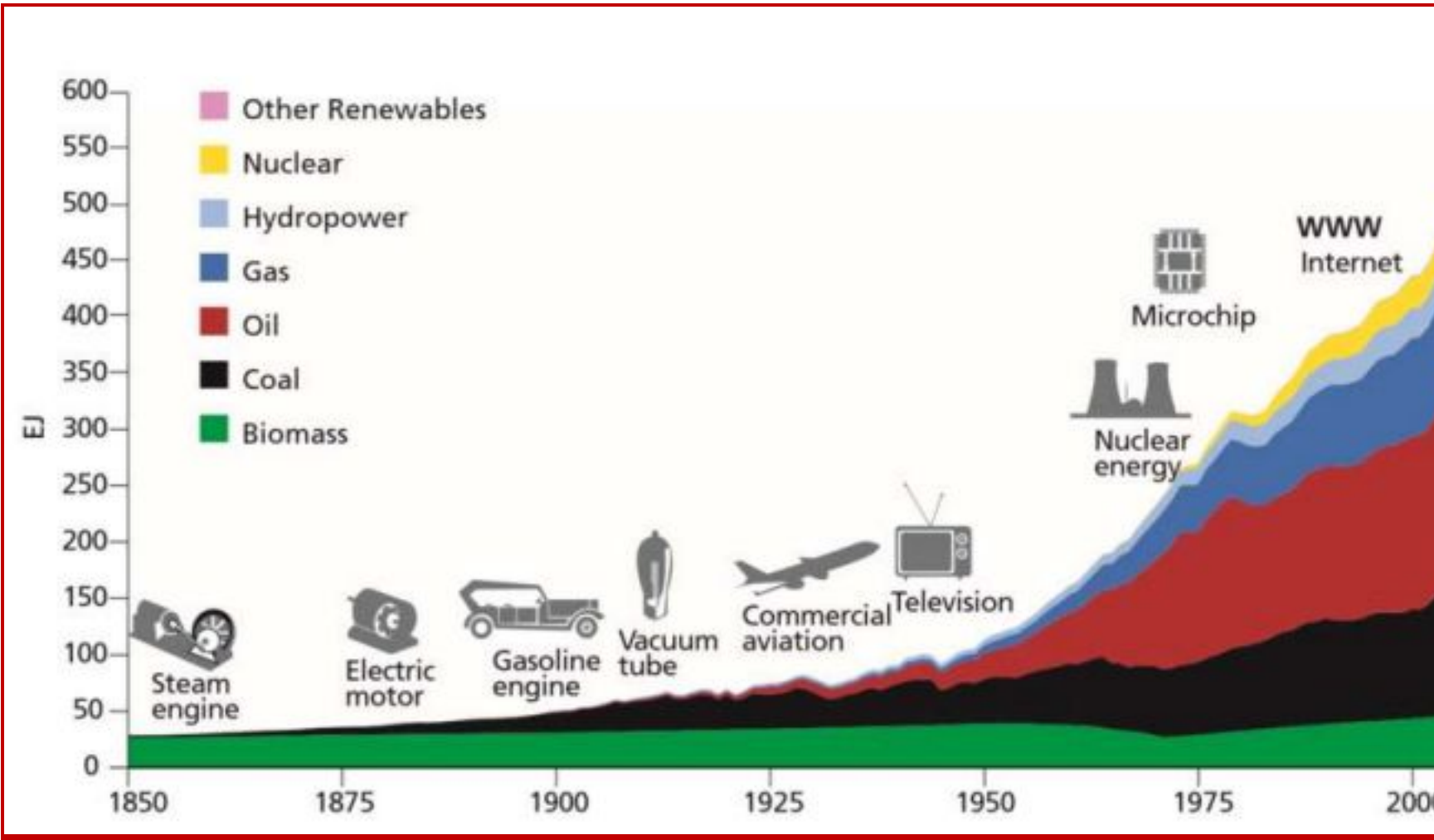
Percentage



Outside model coverage

Outside coverage

Evolution of primary energy



Fate of Anthropogenic CO₂ Emissions

32.4 ± 1.6 GtCO₂/yr 91%





44% 3.3 ± 1.8

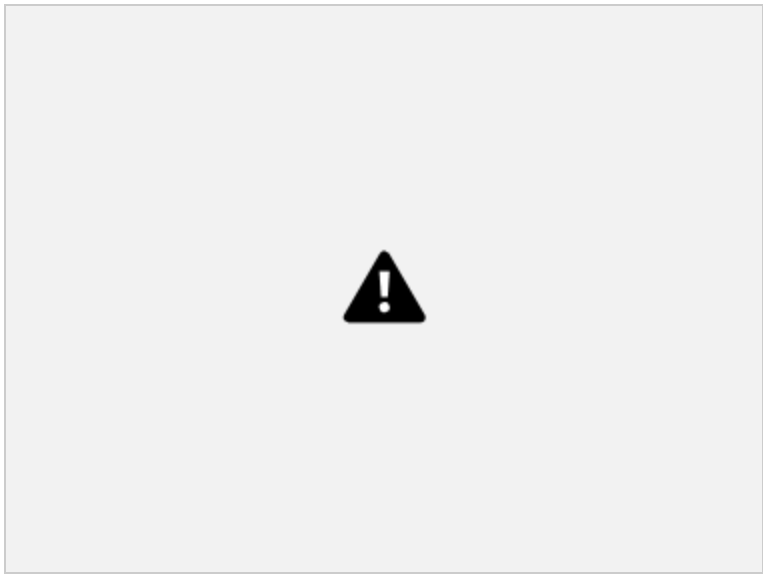


GtCO₂/yr 9% 29%



26%

If the EARTH had no atmosphere, it would be very cold



-18°C $+15^{\circ}\text{C}$

$+ 33^{\circ}$



C Earth without air

without



Our planet

<1 °C

2 °C

+15°C

31 °C

33 °C

-18°C

BUT THE COMPOSITION OF

AIR IS CHANGING RAPIDLY

due to human activities:

→ more GHG (CO_2 , CH_4 ,
 NO_x ...) → more aerosol (air
pollution)

CO_2 (ppm) in the air

410 2020 **+47%**

1850 280 180

800.000 years

+16°C

+ 1 °C

-18°C

<1 °C

2 °C + 1°C

33 °C

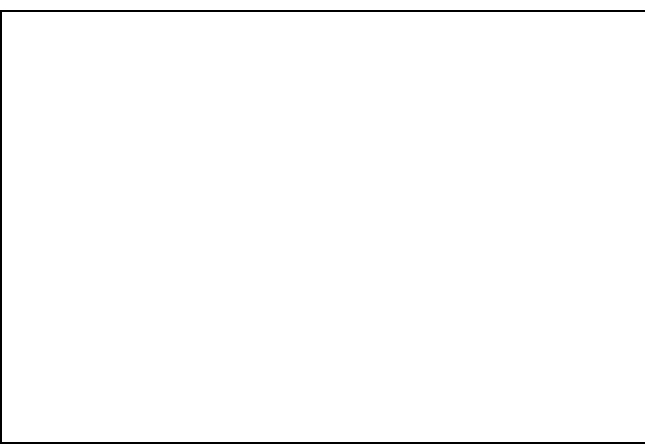
31 °C

In a number of regions, impacts are already underway

Tropics to the poles, on all continents and in the ocean, affecting rich and poor countries



- decrease in cold temperature extremes
- increase in warm temperature



- increase in extreme high sea levels
- increase in the number of heavy precipitation events

extremes

Understanding Climate Change Scenarios



WINTER temp. change SUMMER temp. change WINTER

precipitation change SUMMER precipitation change

A global shift southward



PRUDENCE project; Results based on
HadRM3H

Five human development tipping points

- Reduced agricultural productivity
- Heightened water insecurity
- Increased exposure to extreme weather
- Collapse of ecosystems
- Increased health risks



Increased displacement of people
Increased poverty

Where do we stand?



Where do we stand?



Mitigation Measures



More efficient use of energy

Greater use of low-carbon and no-carbon energy • Many of these technologies exist today

Improved carbon sinks

- Reduced deforestation and improved forest management and planting of new forests
- Bio-energy with carbon capture and storage

Lifestyle and behavioural changes

ELLEN MACARTHUR FOUNDATION



2020



2019

Circular scenario **for buildings** could reduce CO₂ emissions by 38% in 2050



Circular economy could reduce CO₂ emissions from key industrial materials by 40% in 2050



Carbon-negative building?





low-carbon energy

Greater use of





Lifestyle and behavioural changes



SUMMARY

- Climate change is here, it is dangerous and it is going to get much worse.
- **Every year matters** and **Every choice matters** : so ambition must increase substantially.
- If we are serious about “saving the planet”, then this requires a fundamental rethinking in economy model

