

# UK CLIMATE ADAPTATION

Ian Hawker

UK temperatures are rising

1.2C/2023, 1.5C/2030, 2C/2050, 3C/2100

More heat waves, droughts & floods affecting water & food supply

The CCC has identified 61 major risks in UK (water, food, services...)

UK Government mandated to produce National Adaptation Plan (NAP)

NAP1 2013, NAP2 2018, NAP3 2023...

NAP Progress Report to Parliament in Mar 2023

*“An ineffective responses to the climate adaptation challenges with inadequate actions, insufficient scope & lacking ambition” – CCC Evaluation*

NAP3 due late 2023 needs to demonstrate:

Vision of a warmer UK – what will have to change?

An Adaptation Plan with clear objectives & targets

Policies to achieve targets across all sectors

Financial plan to pay for adaptation (government & private sector)

Why is climate adaptation progress slow?

Low priority - no effective government leadership

Actions reactive not strategic

Adaptation is often localised, difficult to measure & not attractive to private investment

June 2021

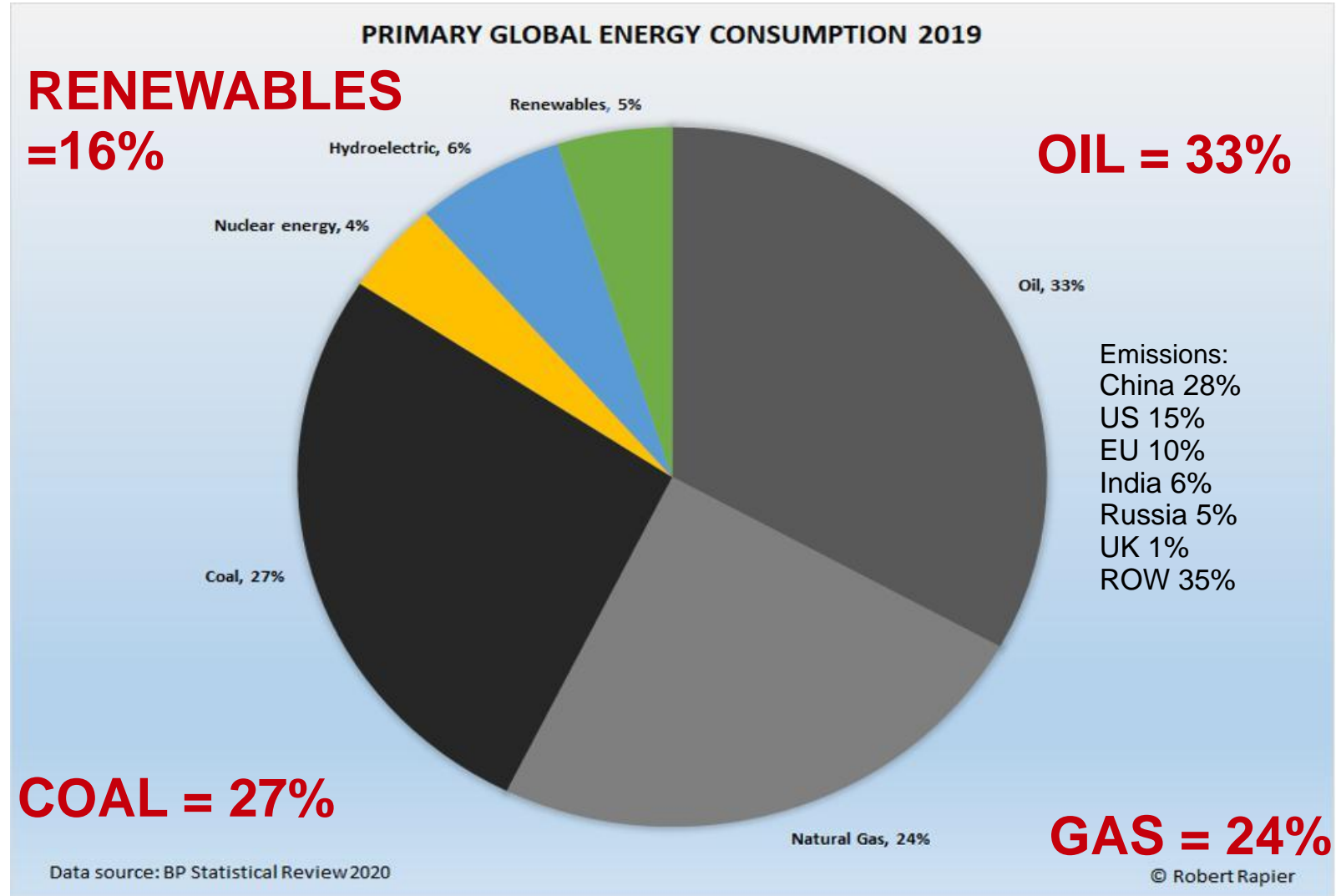
Independent Assessment of  
UK Climate Risk

Advice to Government  
For the UK's third Climate Change Risk Assessment (CCRA3)

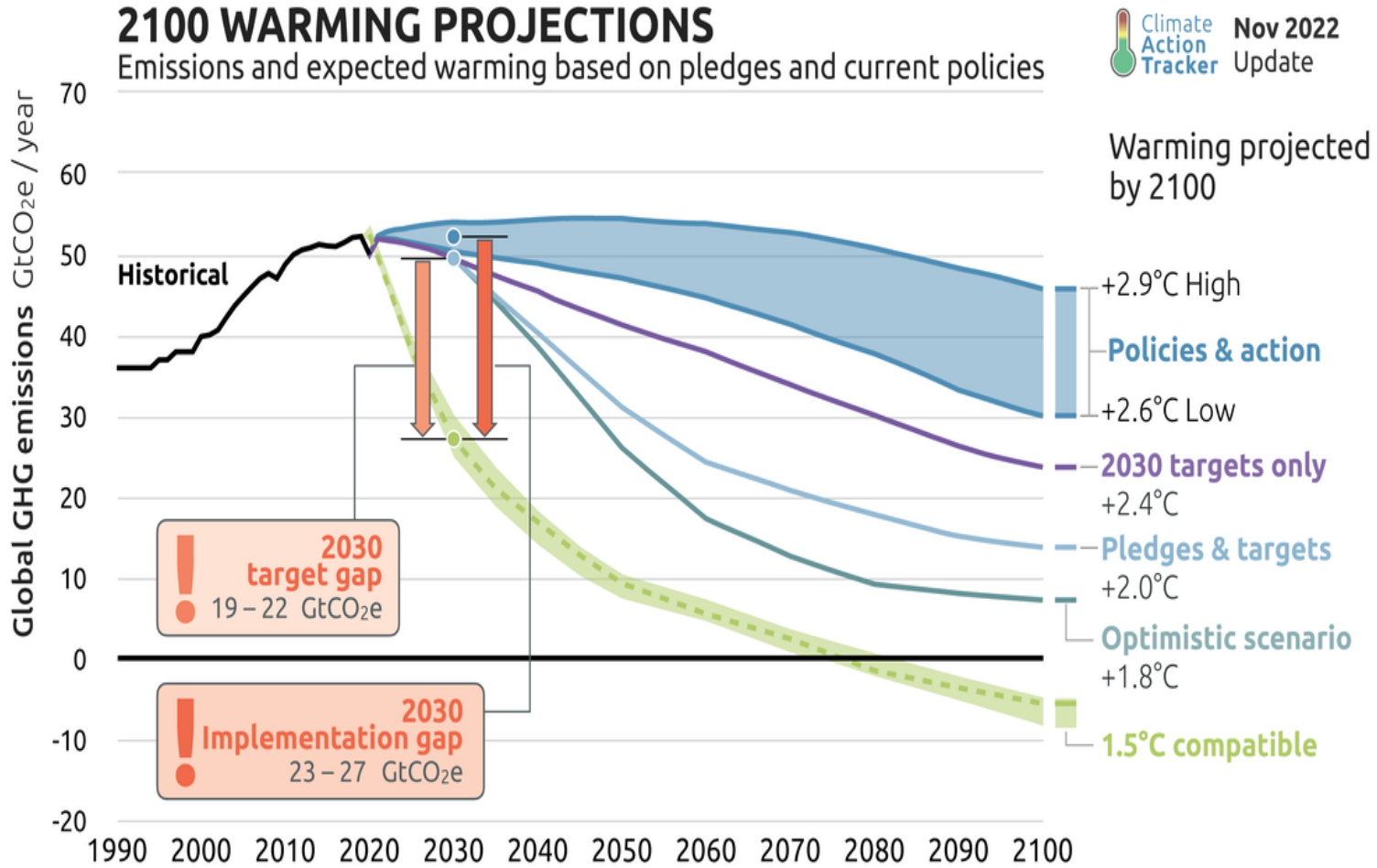


# WHY CLIMATE CHANGE?

Because we are using fossil fuels to produce energy



# GLOBAL WARMING PROJECTIONS



Temperature projections:

1.2C/2023, 1.5C/2030, 2C/2050, 2.6-2.9/2100, +3C/2100+

# FUTURE 3C WORLD 2100+

Parts of the Earth become uninhabitable due to heat & water scarcity  
Increase from 0.8% to 18%

Desertification, extreme weather



What about world food production?

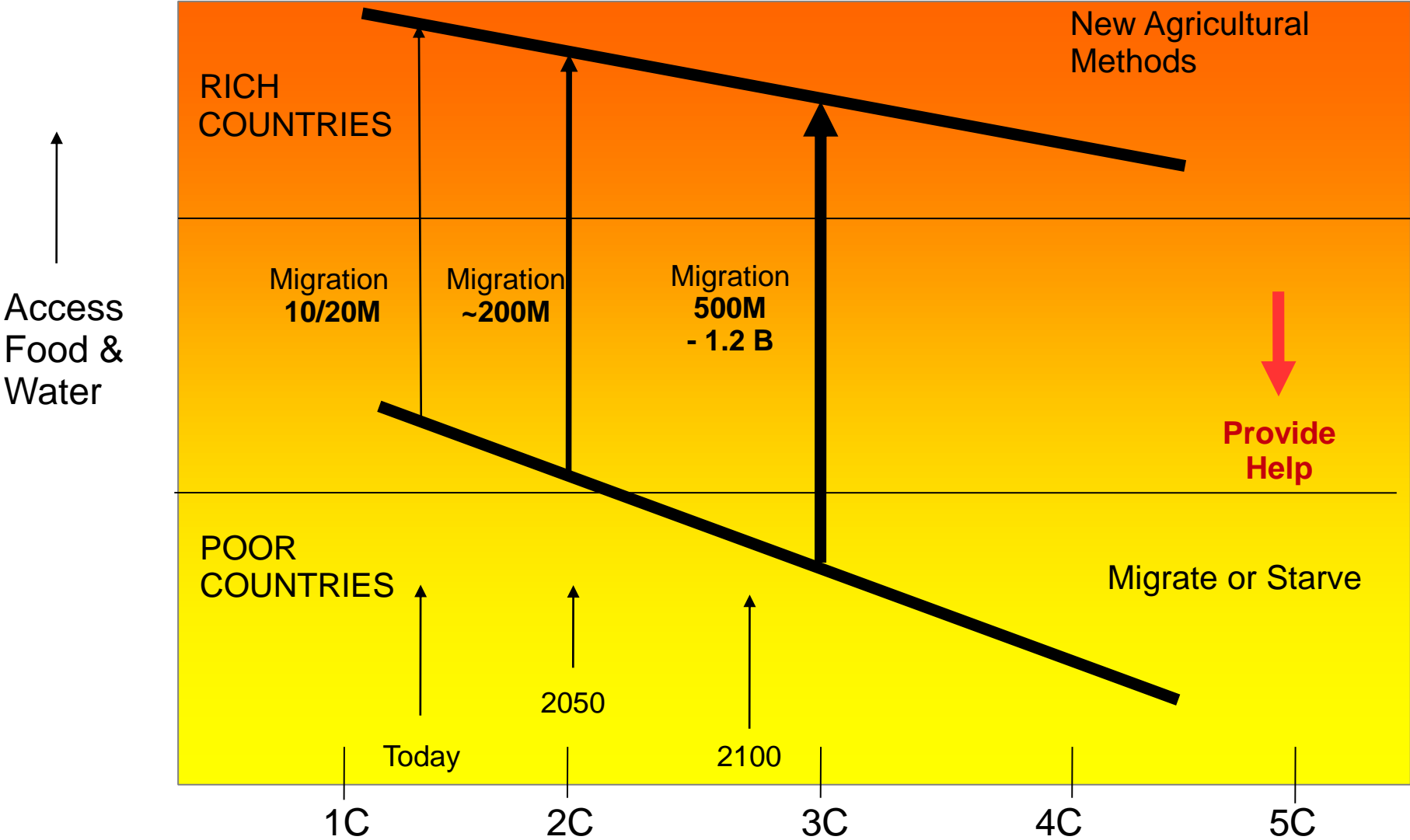
What about water supply?

Mass migration from equatorial regions

Sea level rise affecting coastal towns & cities

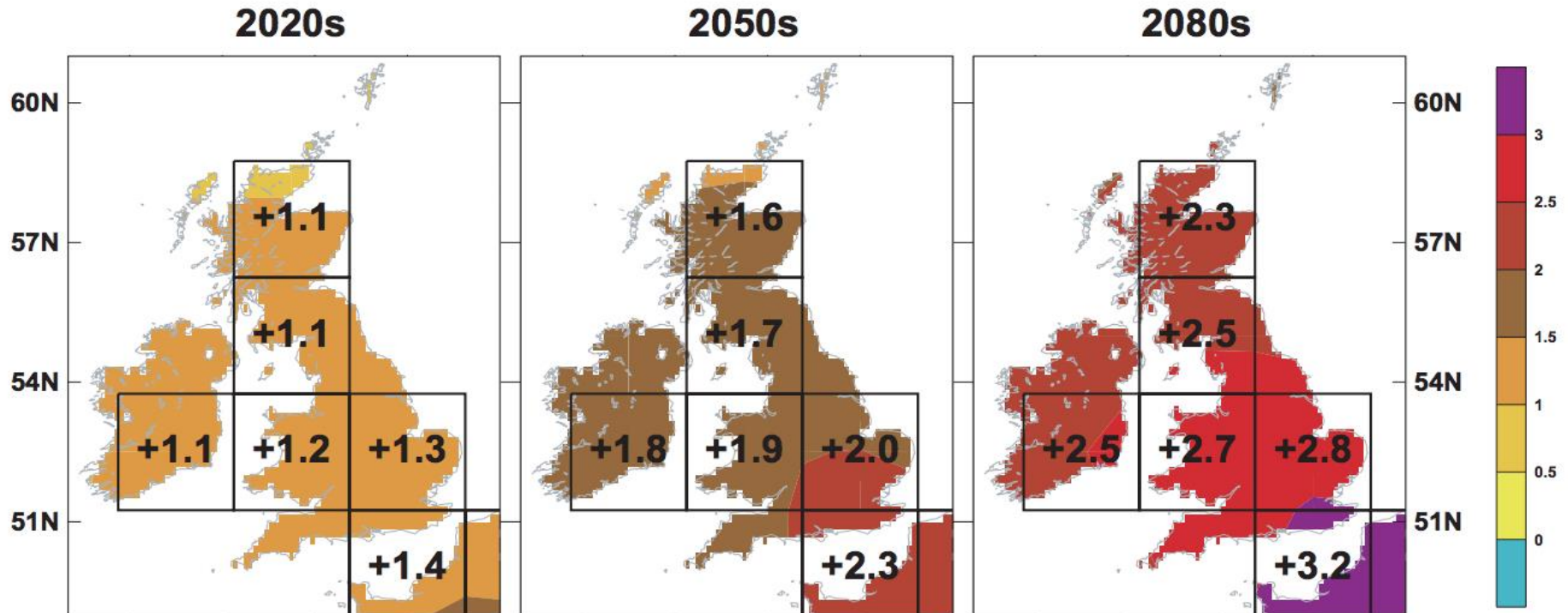
# MASS MIGRATION FROM EQUATORIAL COUNTRIES

International Environmental Partnership (IEP)



# PREDICTED UK TEMPERATURE RISE – Met Office

Temperature rise from pre-industrial levels



Temperature rises will impact:  
Weather patterns (long dry summers, storms)  
Food & water supply affected  
Health risk (heat & infestation)  
**We need to adapt to climate change**



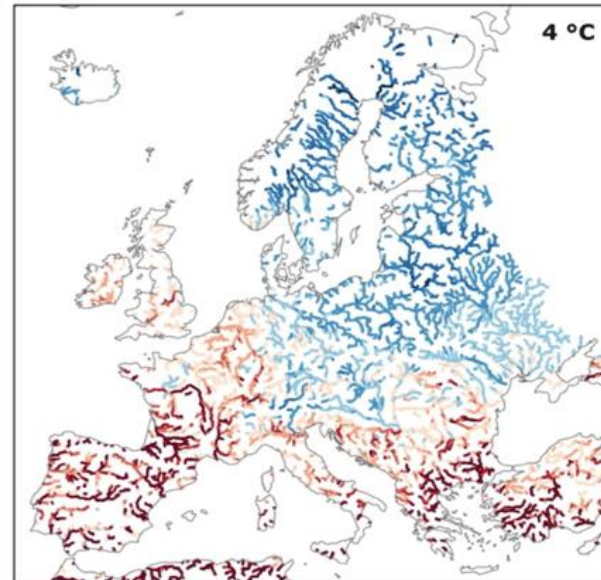
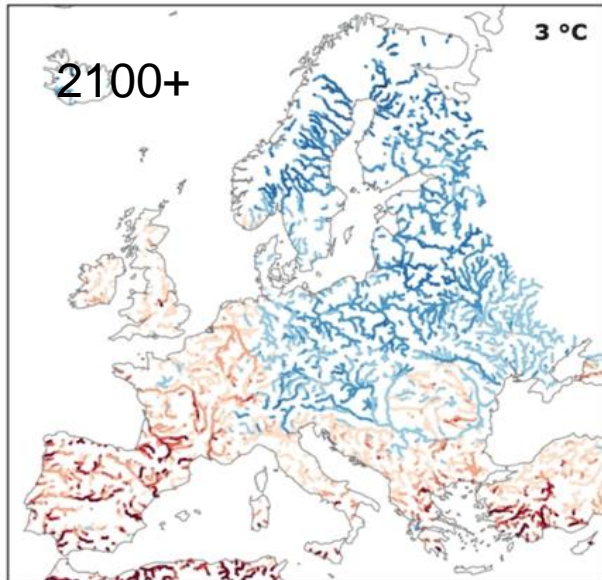
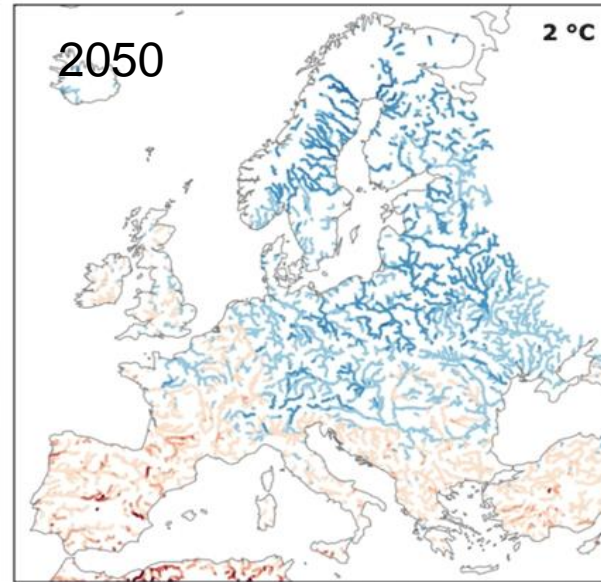
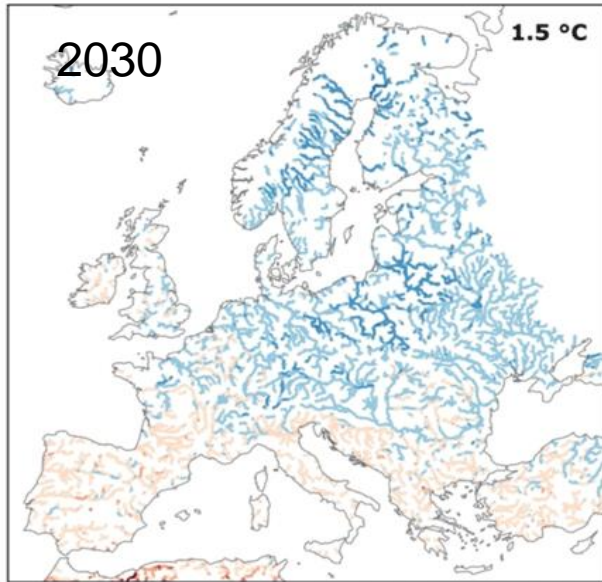
# LONDON WILL FEEL LIKE BARCELONA BY 2050

2C Temperature Rise

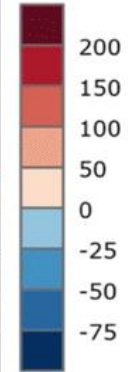


*Crowther lab report July 2019 based on Climate Modelling*

# RAIN FALL MODELLING PREDICTIONS



% change in drought frequency



Sahara migrating into southern Europe

European Water Grid?

UK Water Grid



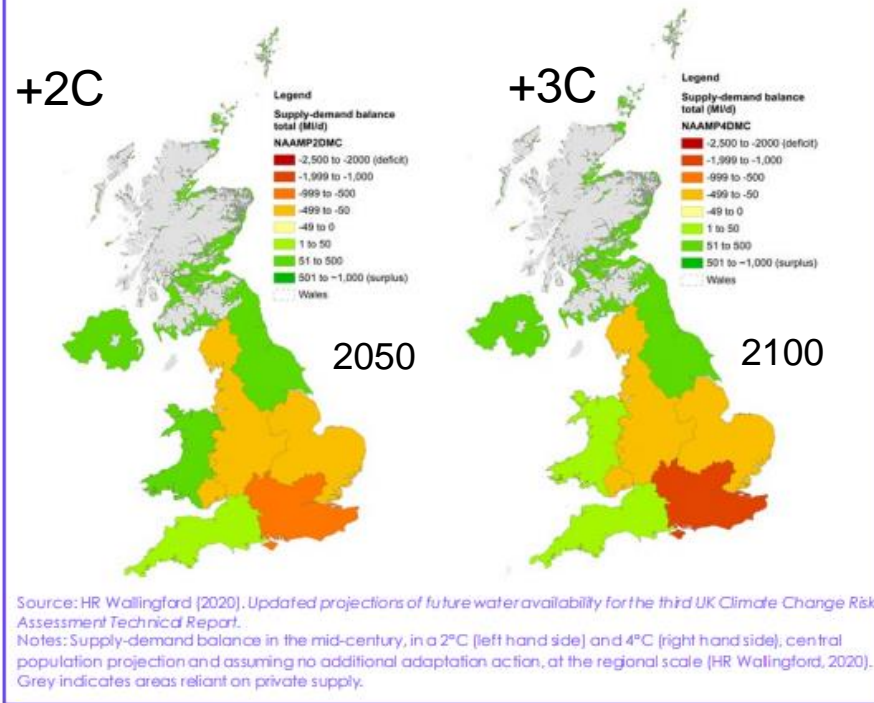
# UK KEY RISKS & IMPACT CCC Risk Report 2021

<u>Top Risks</u>	2020	2050	2100	<u>Impact</u>
Risks to diversity of land & freshwater habitats				Continued decline in animal & plant biodiversity
Risks to soil health from flooding & drought				By 2050 pressure on agriculture especially in SE England
Risks to natural carbon stores bogs & forests				Essential to achieve Net Zero
Risk to crops & live stock due to drought				Reduced food supply & Increased prices
Risks to industry supply chains				Increased cost of goods & services
Risk to power supply due to more extreme weather				Power outages
Risks to human health due to overheating				x3 heat related deaths by 2050 2,000 to 7,000 each year
Risk to imports				Supply of overseas goods become less reliable

*Government accepted 36 of the 61 risks to include in National Adaptation Plan (NAP3)*

# WATER SUPPLY - CCC

Figure 3.9 Mid-century supply-demand balance for UK Water Resource Regions



Projections indicate water shortages in the South East region by 2050

National Plan to increase water supply essential

# UK WATER SUPPLY INDUSTRY

There are 11 regional water & wastewater companies

Private companies owned by mainly overseas investors

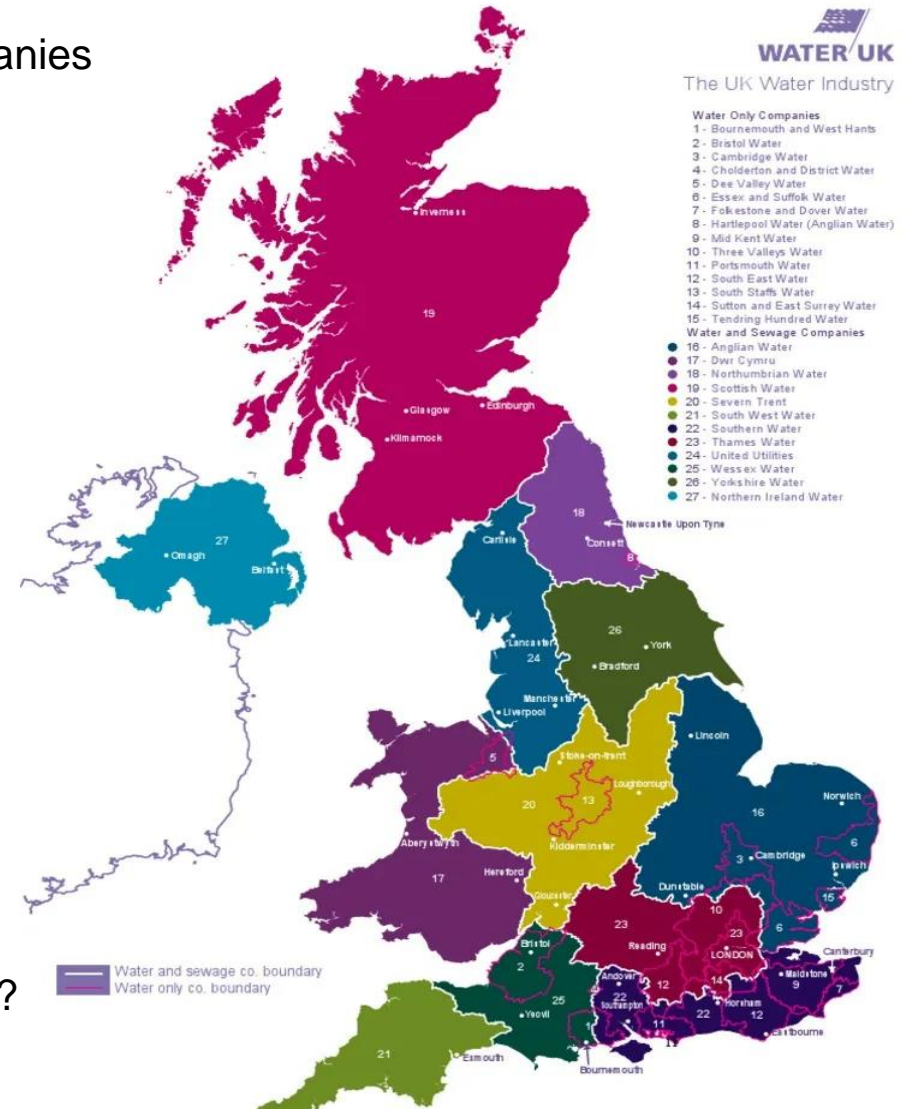
British tap water is good quality but 25% is lost through pipe leakage

Sewage spills into rivers & sea due to insufficient capacity from under investment  
2022 raw sewage was dumped into rivers and seas 825 times a day on average

The water sector faces challenges from increased demand, leakage 25%, population growth & climate change

Significant investment & performance regulation needed

Integrated national water grid including Scotland?



# INDIVIDUALS CAN SAVE WATER

The average household, using 350 gallons per day  
Could save estimated 125 gallons of water per day

The average individual, currently using 70 gallons per day  
Could save 25 gallons of water per day

## **Imagine you are paying for each drop of water**

Install a water meter Increased awareness of water usage

Switch to showers 1 Minute shower

Fit low flow aerators on taps and showers

Install high-efficiency toilets ~ 20% saving

Outside water capture & storage Vegetables, plants





# UK HEAT DEATHS

UK Heat related deaths expected to rise from 2000/yr in 2020 to 7000/yr in 2050 *Journal of Public Health Report June 21*

Local authorities have a crucial role in preparing for the predicted health impact of climate change (heat, infestation...)

Where they exist strategies & plans vary in scope across Health Authorities

Public health consultants do not have an explicit remit to plan for climate change adaptation

Current actions are aligned to existing public health emergency planning functions  
not climate change

Key barriers to health-related adaptation are:

Limited public and professional awareness of the health impacts of climate change

Financial

Lack of leadership



# CLIMATE RESISTANT AGRICULTURE

Currently we plough allowing water & nutrients to escape into the atmosphere

Regenerative agriculture is a different approach more resilient to climate change

Maintain ground cover all year to protect the soil & absorb carbon dioxide through photosynthesis

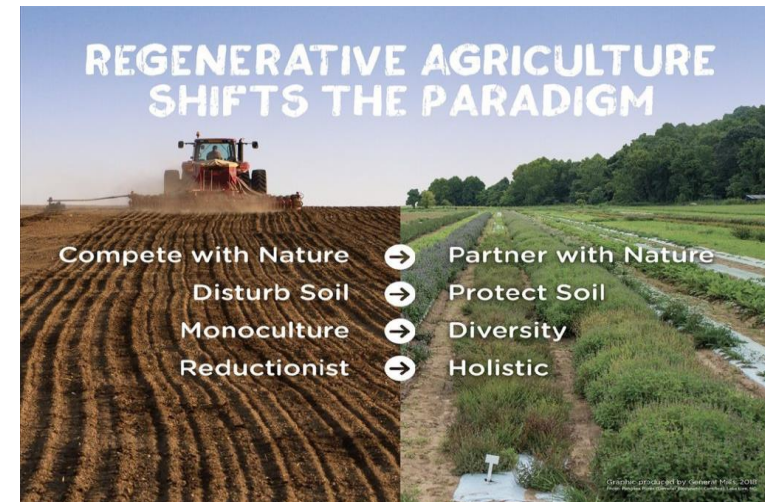
Minimize soil disturbance to keep water & carbon in the ground

Reduce use of fertilizers (which generate green house gases)

Reduce use of pesticides to increase biodiversity

Food may be more expensive due to investment needed

But agriculture will be more resistant to climate change



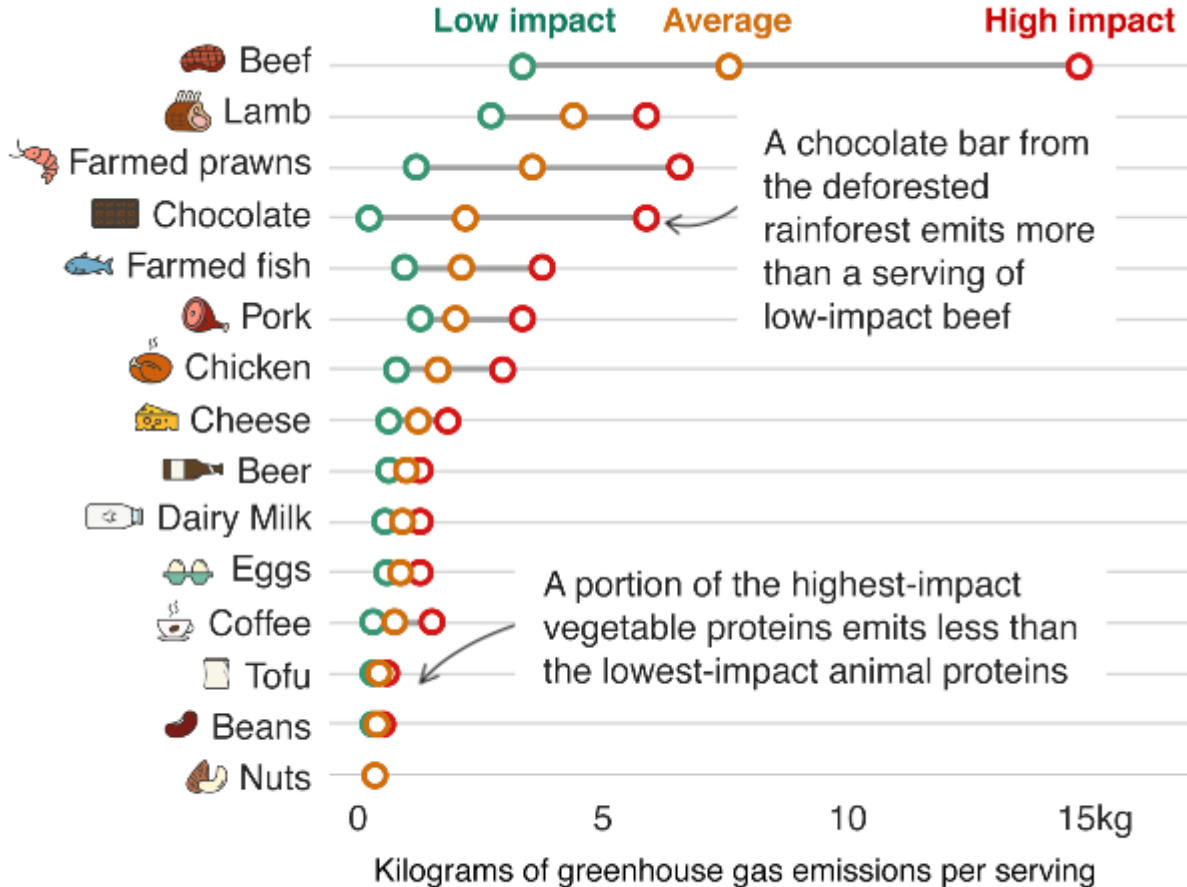
# REGENERATIVE FARMING

Wakelyns Agro Farm Suffolk



# ADAPTATION: EAT LOW CARBON FOODS

↓  
LOW CARBON  
FOOD



Source: Poore & Nemecek (2018), Science



# ADAPTATION: FOOD DIVERSITY

Climate change increases the risk of severe 'food shocks' worldwide where crops fail & prices rise

Improve food security by increasing the range of food types we consume

Of more than 7,000 edible plants worldwide only 417 are widely grown and used for food & only 3 wheat, grain & maize are mass produced

Examples:

## Wild Cereals

Cereals, which come from grasses have huge diversity, with more than 10,000 species

## Sea Vegetables

Aonori, Arame, Badderlocks, Dulse, Gim/Nori...

## Beans

Beans are cheap, high in proteins and B-vitamins, and adapted to a wide range of environments from ocean shores to mountain slopes



# ADAPTATION: VERTICAL FARMING

Grow many products locally in vertically stacked layers using soil, hydroponics or aeroponics

Includes lettuce, micro-greens, kale, basil, chives, mint, and strawberries (not wheat, rice & corn)



Health benefits are fresher food, pollution reduction and no chemical use

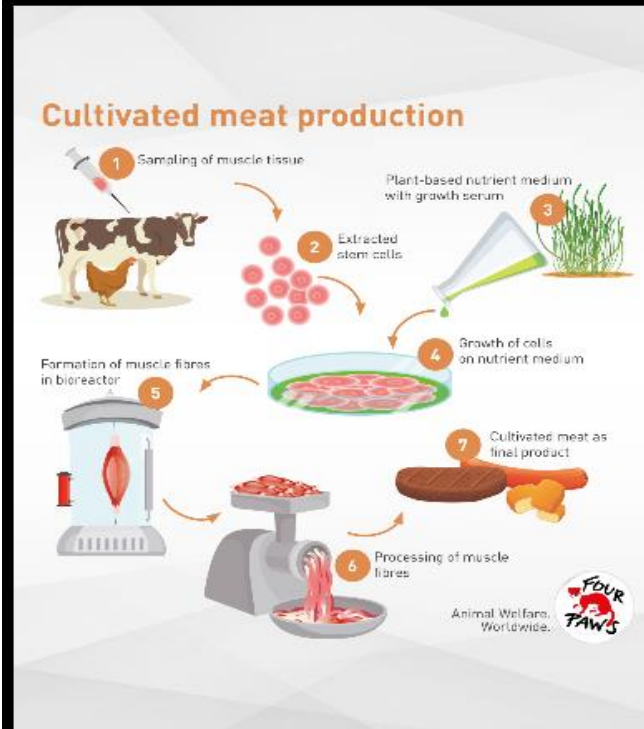
Vertical farms produce average x500 produce per square metre than traditional agriculture

Several vertical farms under construction in the UK

# ADAPTATION: MEAT FROM VEGETABLES

Low carbon footprint, reduced land use & no animal slaughter

## Agriculture – Cellular Meat Culture



1. Take extracted cells from animals
2. Add plant based nutrient with growth serum

3. Ferment in bioreactor
4. Produce meat products

# ADAPTATION: UK ENERGY SUPPLY

CCC predicts x2 UK energy demand by 2050

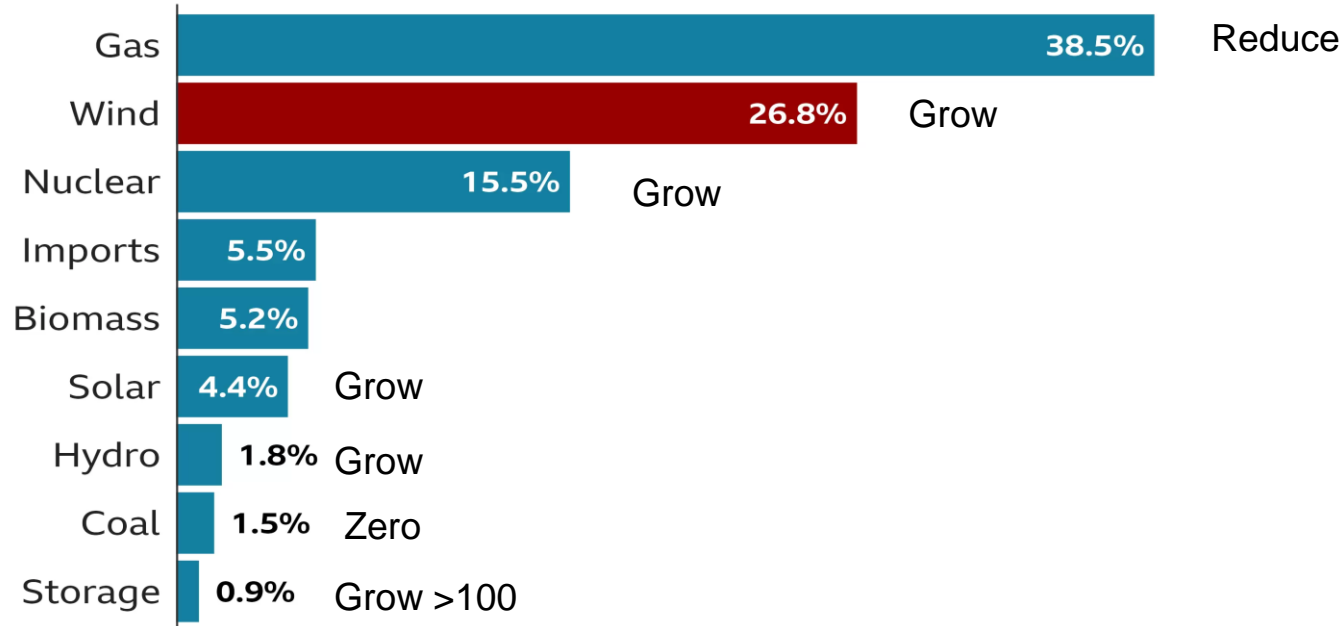
Driven by electrification of vehicles, houses, industry, power...

Government committed to 95% energy from low-carbon sources by 2030

Fully decarbonise by 2035

## Wind was the second largest source of electricity in 2022

Total generation by source, Great Britain



Source: National Grid Electricity System Operator



# CAR PARKS & SOLAR POWER

Solar car parks enable electricity production in open spaces positioned near to energy-guzzling facilities such as hospitals, shopping centres or offices.

The canopies also protect cars from hot sun in the summer.

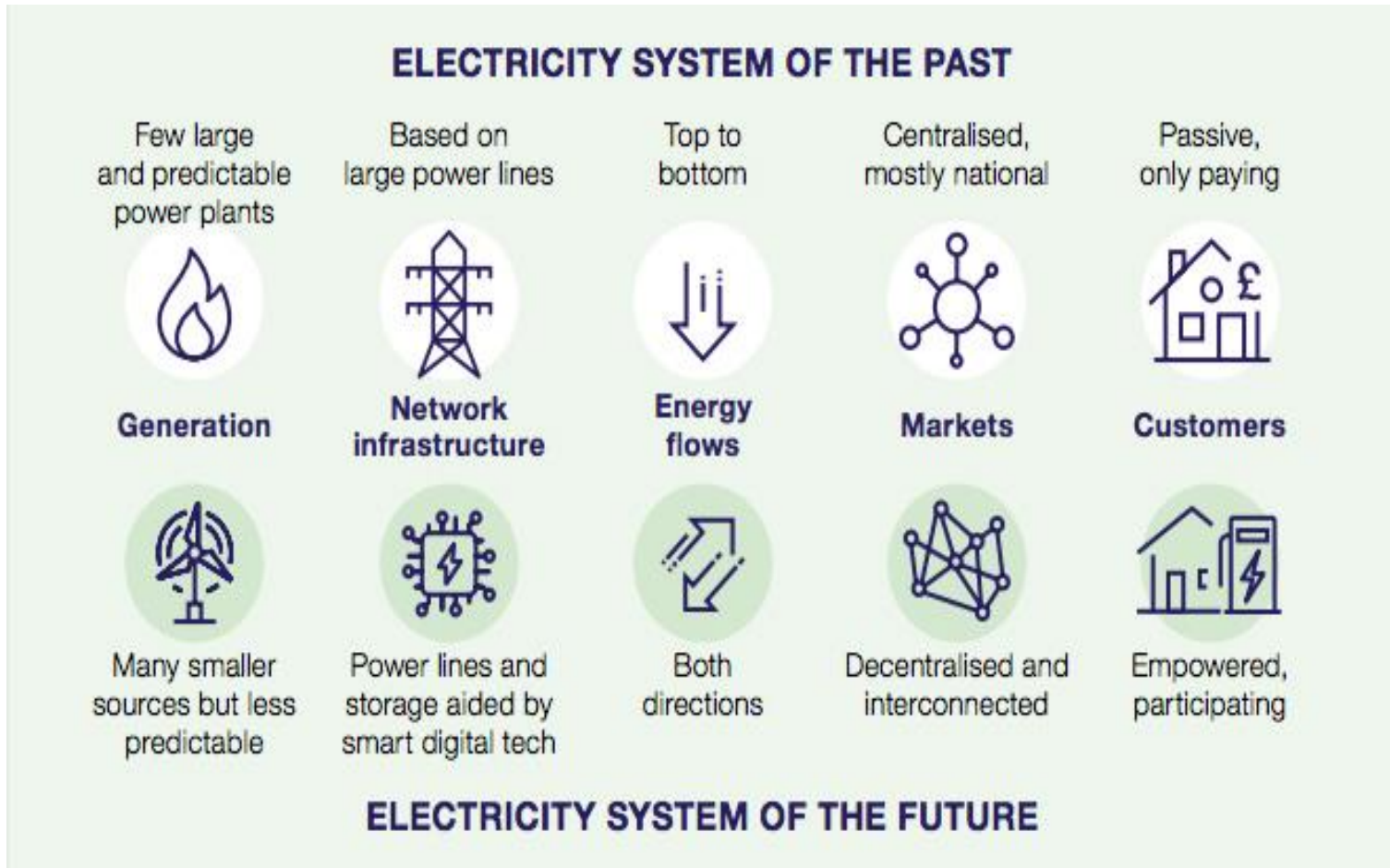


A major car manufacturer in the south of England has >2,000 panels with a peak capacity of 1 megawatt (MW).

French legislation makes it mandatory for all existing and new car parks with >80 spaces to be covered by solar panels

# ADAPTATION: NATIONAL GRID

Currently delays of 1-15 years for connection to an ageing national grid



Intelligent high capacity national grid supporting multiple energy sources

Jul 22 National Grid announced plans for a £54bn upgrade?

# ADAPTATION: UK WILDFIRES



2022 heatwaves produced > wildfires than in recorded history .

2023 has already seen hundreds of grass fires

The UK's largest ever wild fire burned for several months in the Scottish Highlands

Currently only 5 specialist fire units in the UK

Fire crews are being trained in skills from southern Europe and the US

Rapid response wildfire teams to be made available

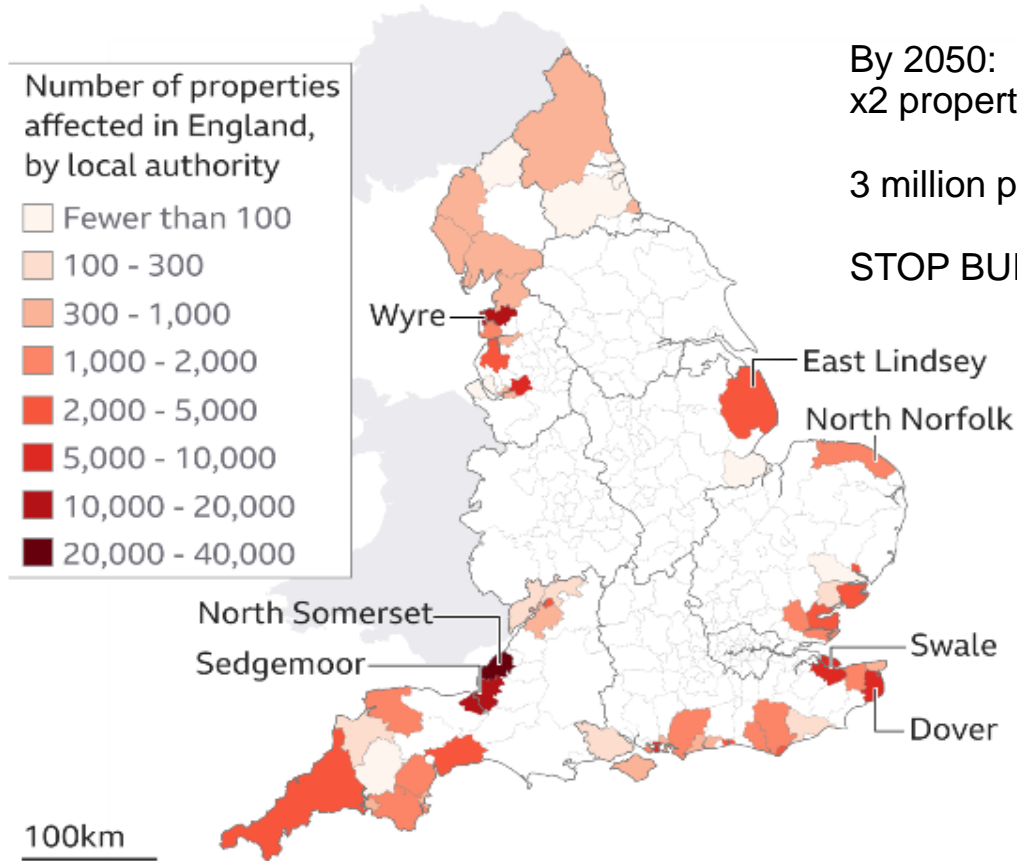
# Properties at risk from flooding from sea level rises (by 2050)

Sea level rise 0.5 – 2.0 m by 2100

By 2050:  
x2 properties on the floodplain

3 million properties at risk of flooding

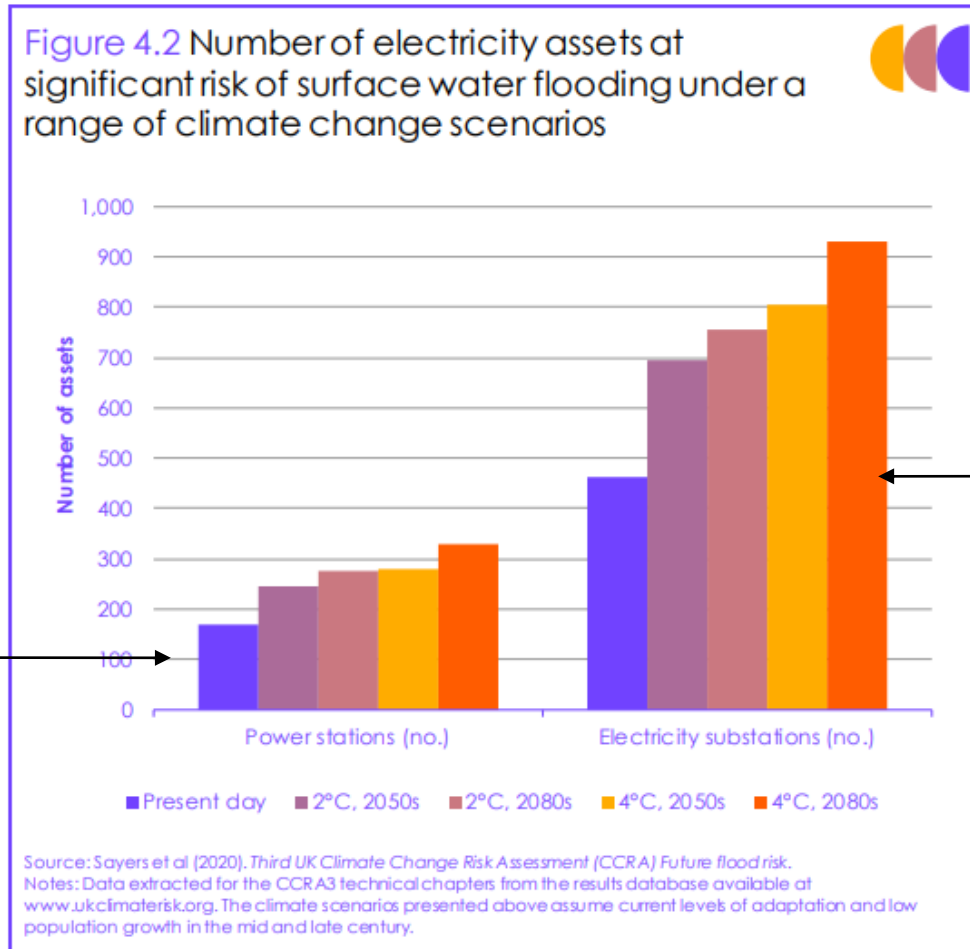
**STOP BUILDING ON FLOOD PLAINS!**



Source: Sayers et al/UEA

BBC

# POWER STATIONS AT RISK FROM FLOODING



Electricity Substations

Power Stations

2023 risk of surface water flooding to 170 power stations & 463 electricity substations

Climate change will increase the risk by 100% by 2080



# HOUSING - CLIMATE RESISTANT HOMES

From 2025 new builds must meet Future Homes Standard

80% emissions reduction

Low carbon heating & cooling

Heat pumps for new build

Insulation

Heat loss through windows, walls, roofs

Ventilation

Maintain air flow

Prevention of over heating

Includes cross-ventilation to remove excess heat

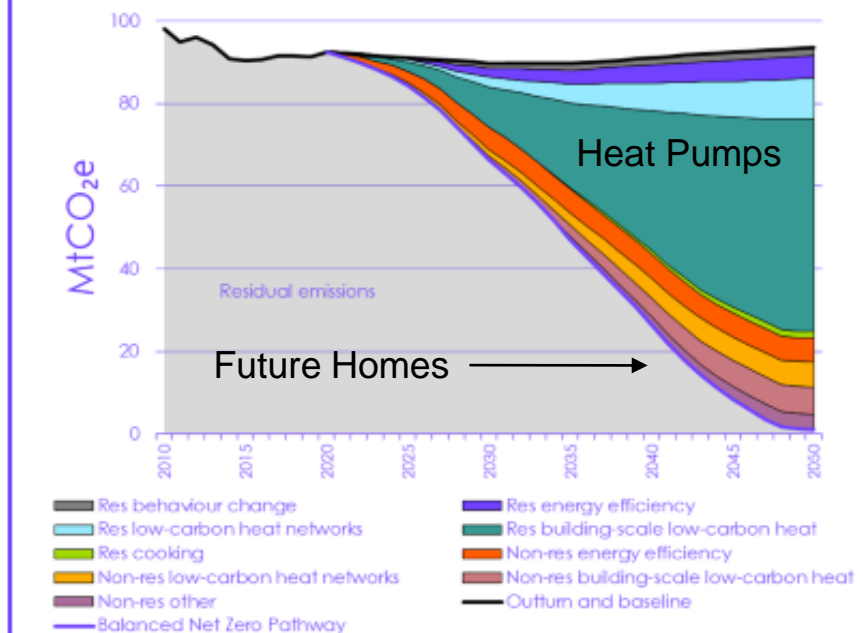
Electric vehicle charging points

Upgradable for net zero carbon emissions by 2050

At owners expense

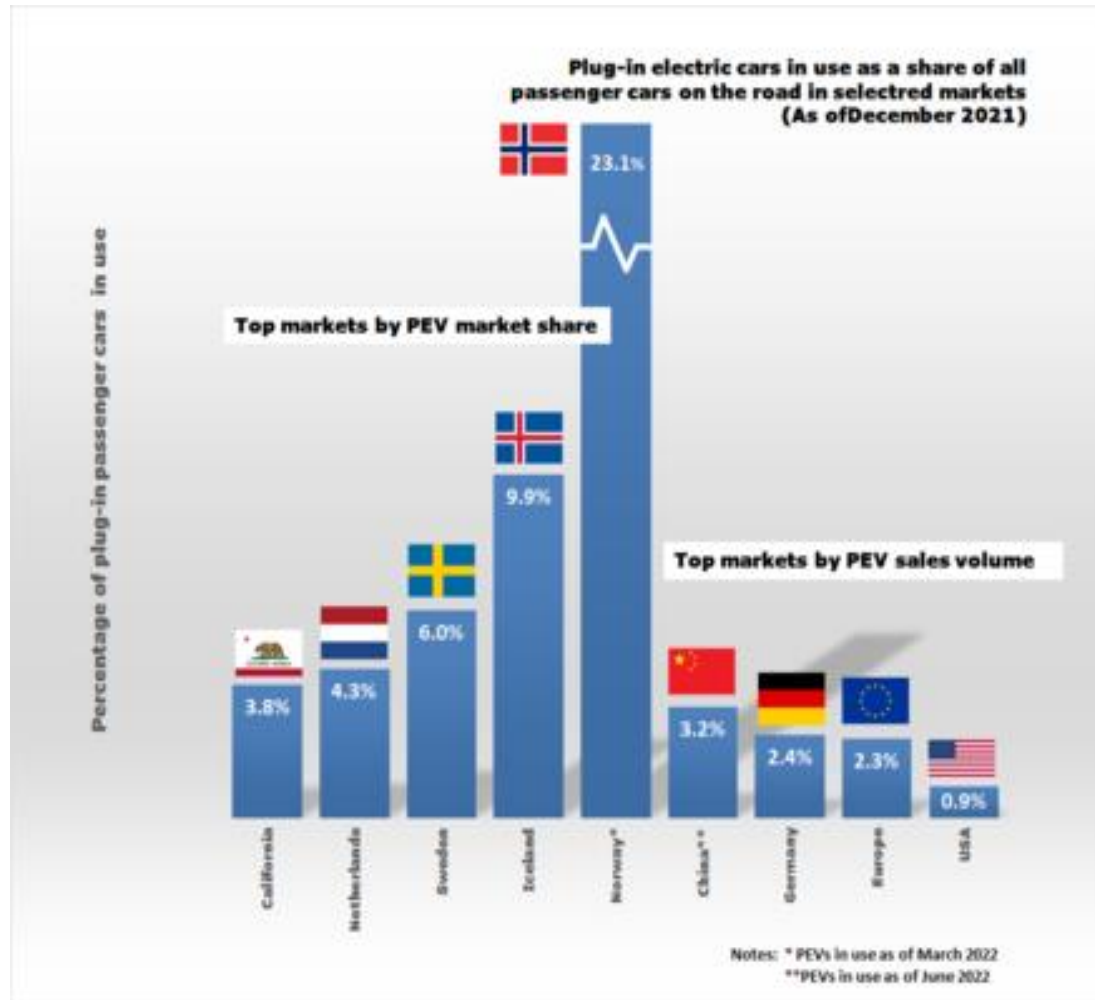
What about existing homes?

Figure 3.2.a Sources of abatement in the Balanced Net Zero Pathway for Buildings



Source: BEIS (2020) Provisional UK greenhouse gas statistics 2019; Element Energy for the CCC (2020) Development of trajectories for residential heat decarbonisation to inform the sixth carbon budget; CCC analysis.  
Notes: Residential low-carbon heat includes some efficiency associated with new homes. Non-residential energy efficiency also includes some behavioural measures. Non-residential other includes catering and other non-heat fossil fuel uses.

# TRANSPORT - ELECTRIC VEHICLES



Zero emissions

65% reduction in Whole Life Carbon footprint

Status:

660K electric cars on UK roads in 2022 (~2%)

Insufficient public charging points (x10 needed)

Local driving/home charging

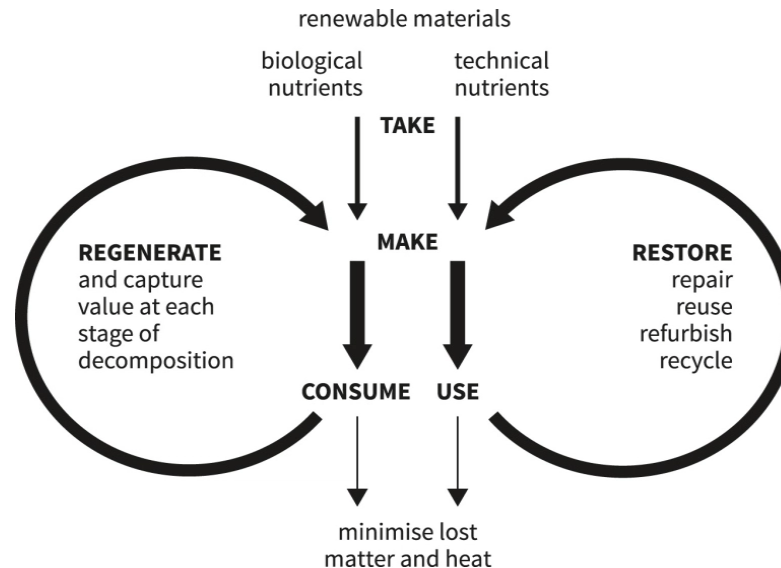
Long distance driving



# ADAPTATION: PRODUCE LESS WASTE

Food, products, services

Circular Economy designed for Re-use, Repair, Refurbish & Recycle



Product Whole Life Plan to allow regeneration & restoration

In 2021 UK waste recycling rate of 45%

Goal to reach 50% in 2023

# ADAPTATION: IMPROVE ENVIRONMENT

UK one of the most nature-depleted countries in Europe.

15 per cent of UK species are now threatened with extinction

The abundance of UK species has declined by 50% since 1970  
Global average is 25%

Of the 218 countries assessed for biodiversity the UK is ranked 189

UK Environment Act 2021 will:

Restore 75% of protected sites on land (including freshwaters) to favourable condition

Create/restore 500,000 hectares of additional wildlife-rich habitat outside of protected sites

Recover threatened plant species by providing more, diverse and better-connected habitats

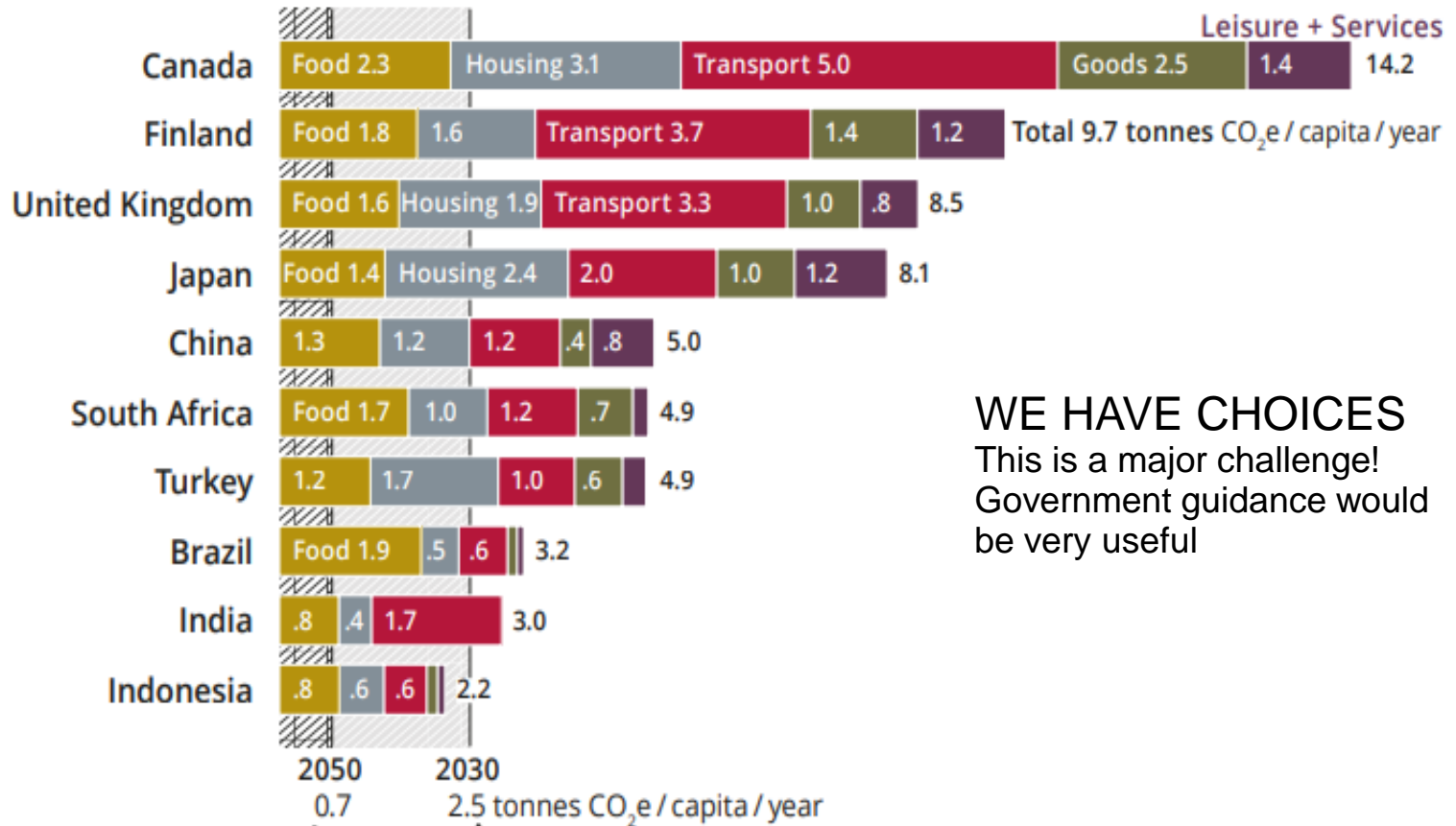
Increasing tree-planting to 30,000 hectares per year

Progress?



# ADAPTATION: REDUCE CARBON FOOTPRINT

In UK need to reduce from 8.5 tonnes to 0.5 tonnes per person per year by 2050



## WE HAVE CHOICES

This is a major challenge!

Government guidance would be very useful



# NATIONAL ADAPTATION PLANNING

## Nature

Thriving natural ecosystems

## Food Security

Resilient supply chains (national/international)

## Energy

Resilience power supply & distribution

## Transport

Electrify

## Buildings

Warm in winter, cool in summer

## Business

Incentives to adapt to climate change

## Agriculture

Regenerative farming

## Water Supply

Reduce demand & increase supply

## Telecommunications

Robust telephone, mobile & internet services

## Towns & Cities

Heatwaves, flooding & sea level rise

## Health

Heat & disease control

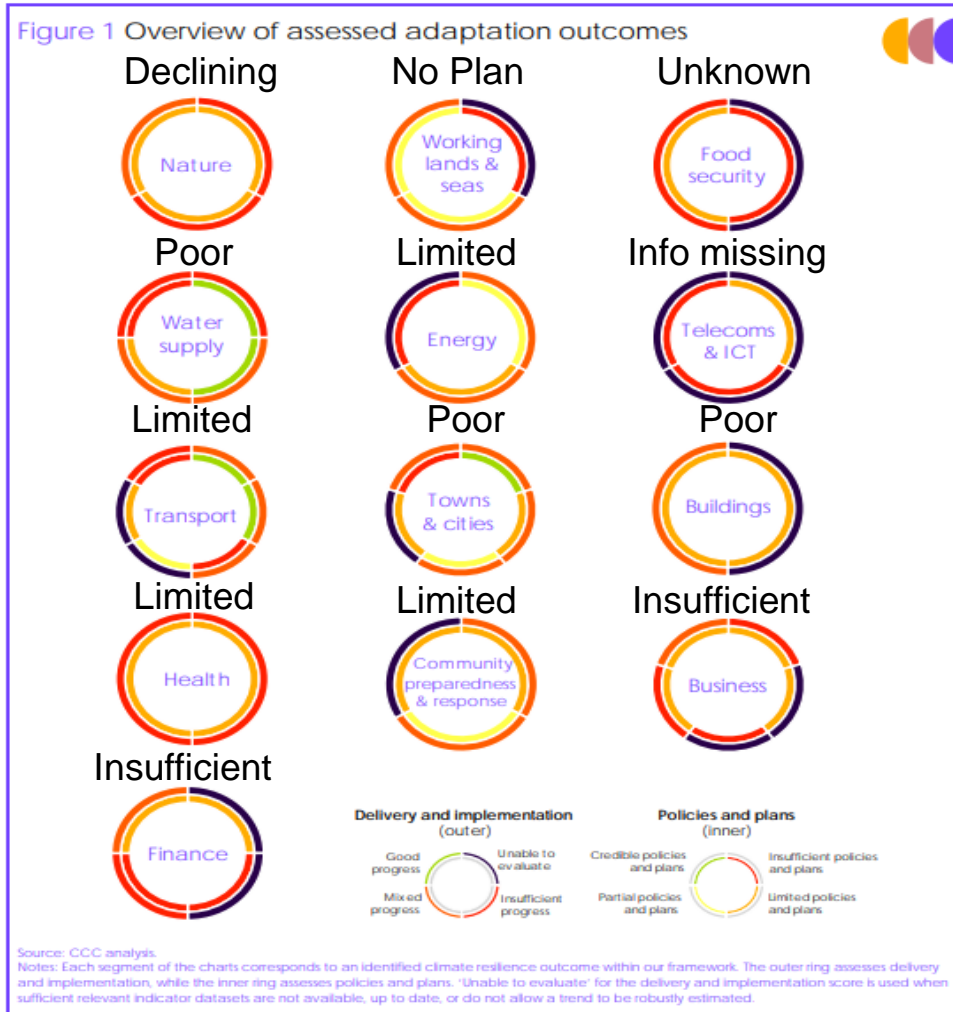
## Finance

Resilience to food shocks

*The National Adaptation Plan NAP3 includes All Of These*

# CCC NAP3 PROGRESS REPORT TO PARLIAMENT March 2023

Implementation is poor



**The Adaptation Plan is not being implemented**

Inner ring = Plan  
 Outer ring = Progress

Green = adequate progress  
 Brown = limited progress  
 Red = no progress  
 Black = not measured

Only 5/45 policy areas have climate change adaptation plans

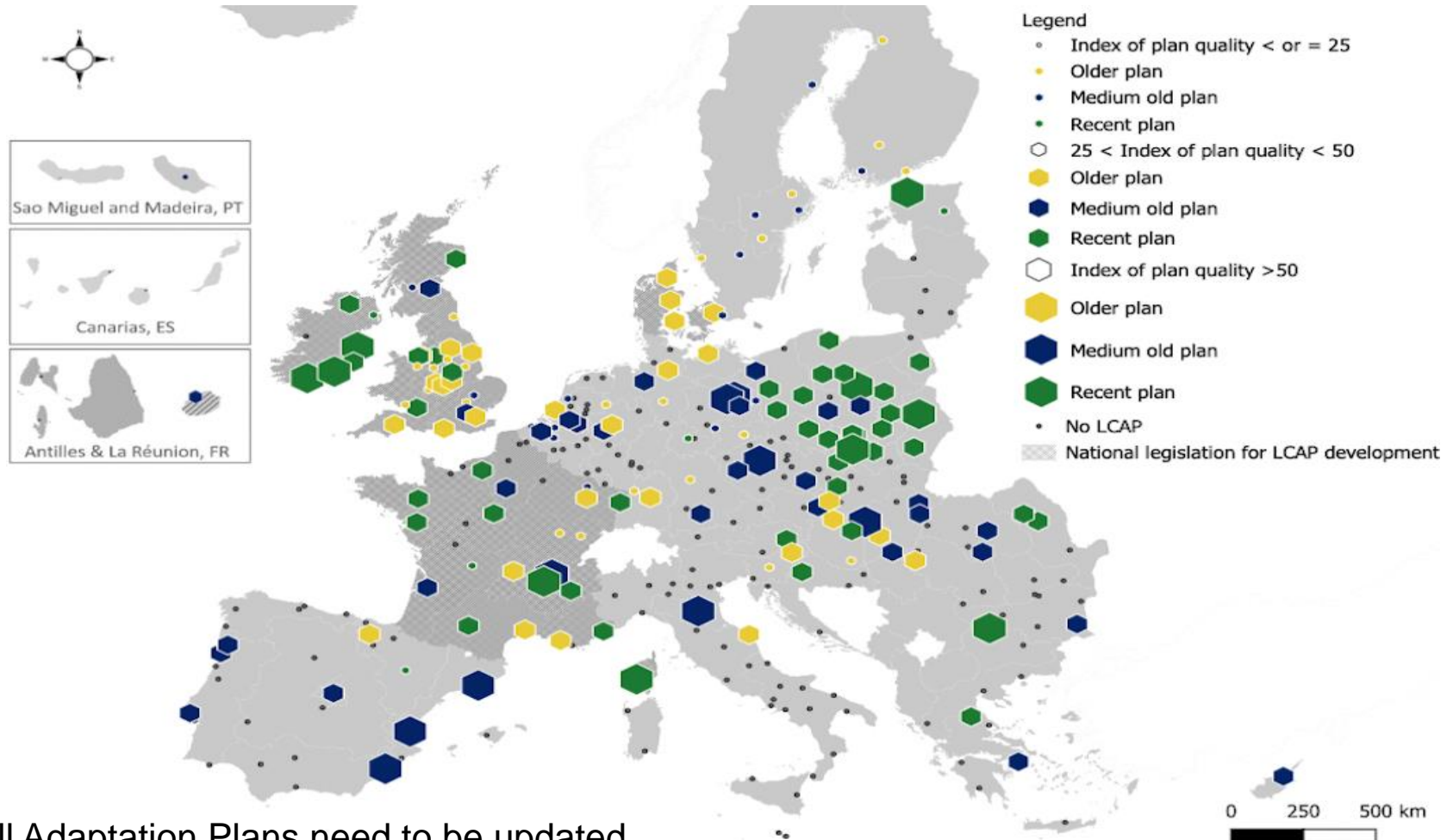
Expect some improvement in final version of NAP3?

CCC Quote “NAP3 is an ineffective responses to the climate adaptation challenges with inadequate actions, insufficient scope & lacking ambition”

# ADAPTATION PLANNING IN EUROPE

Climate change in European cities affecting 300 million people in 167 cities

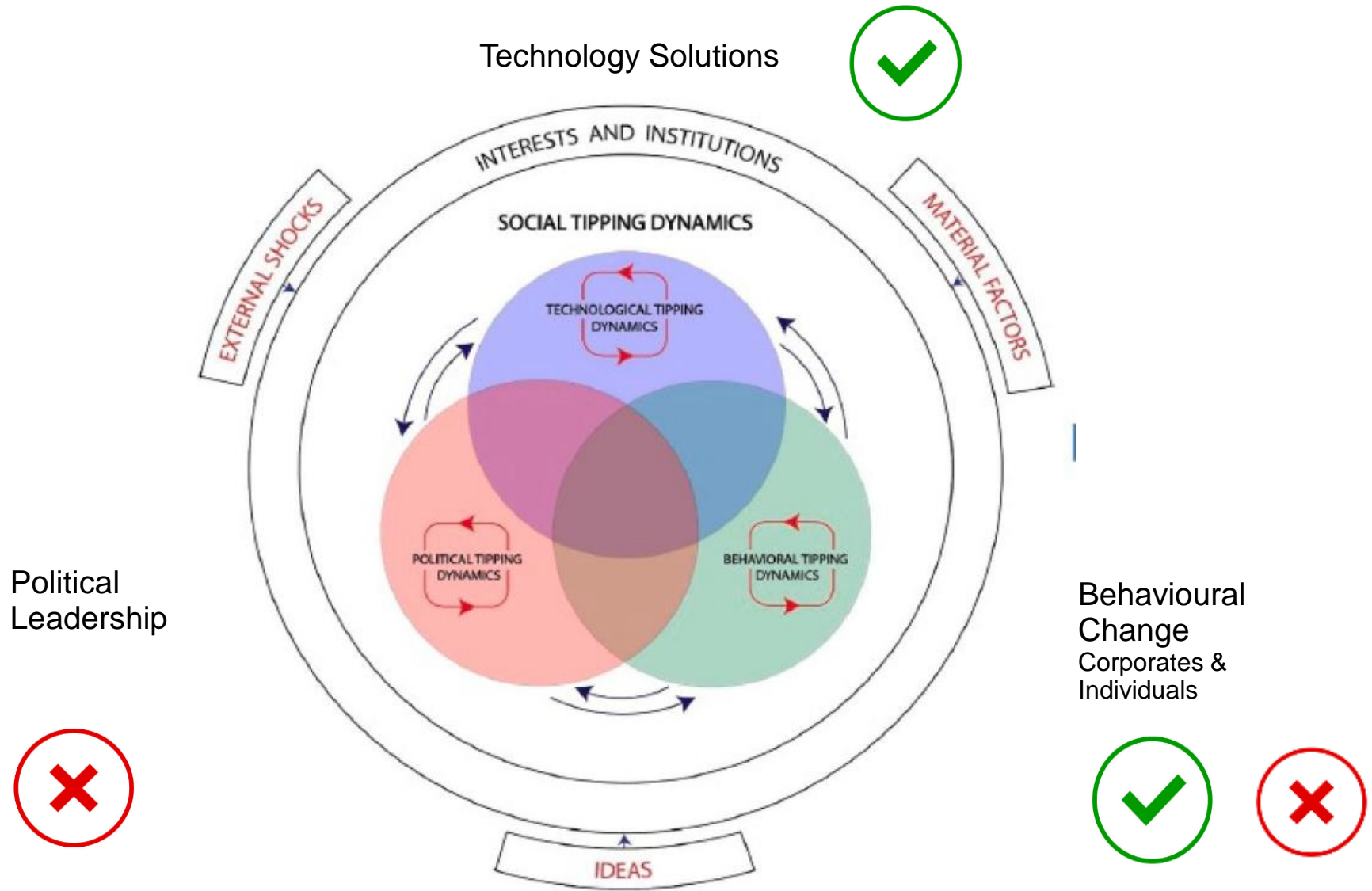
A mix of recent and older Climate Adaptation Plans exist



All Adaptation Plans need to be updated

# CLIMATE ADAPTATION

A combination of technology, political, and behavioural change



# WHAT NATIONAL ADAPTATION PLANNING NEEDS

Strong government leadership

Make climate change top priority

A vision for a well adapted UK

What the UK will look like in a warmer climate

Co-ordinated delivery across all government departments

PM Leadership

Focus on all climate risks

Currently 61 identified by CCC

Funding

Estimated 20-30 billion pounds per year of public/private funding

Effective monitoring & progress reporting

Public Education

Getting public involved

Regulation & Market Incentives

Regulate as necessary

Clear objectives & plans