

Global Imperative



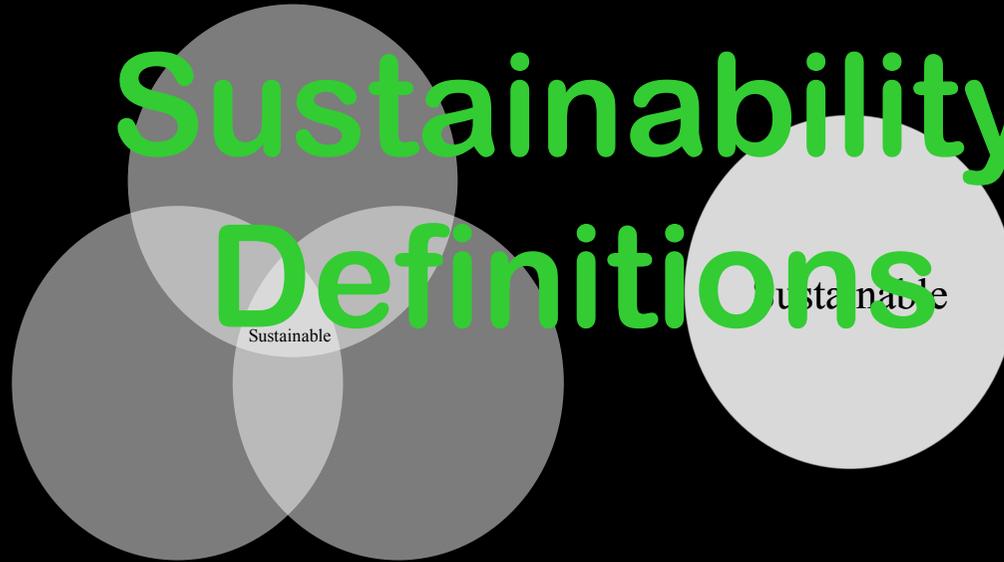


From Global Imperative To Retrofit Objectives





Sustainability Definitions



01/03/2011

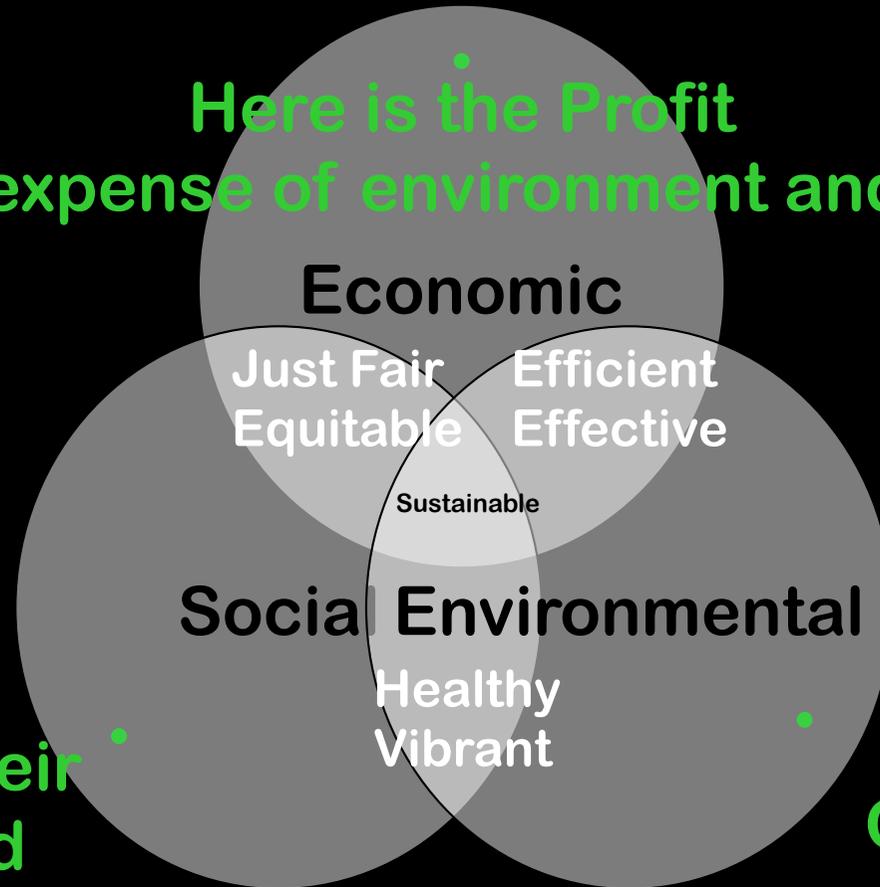
© NGS 2004-09 Brian Murphy Sustainability Definition

1

Another NGS CPD to download soon

How Sustainability is presented

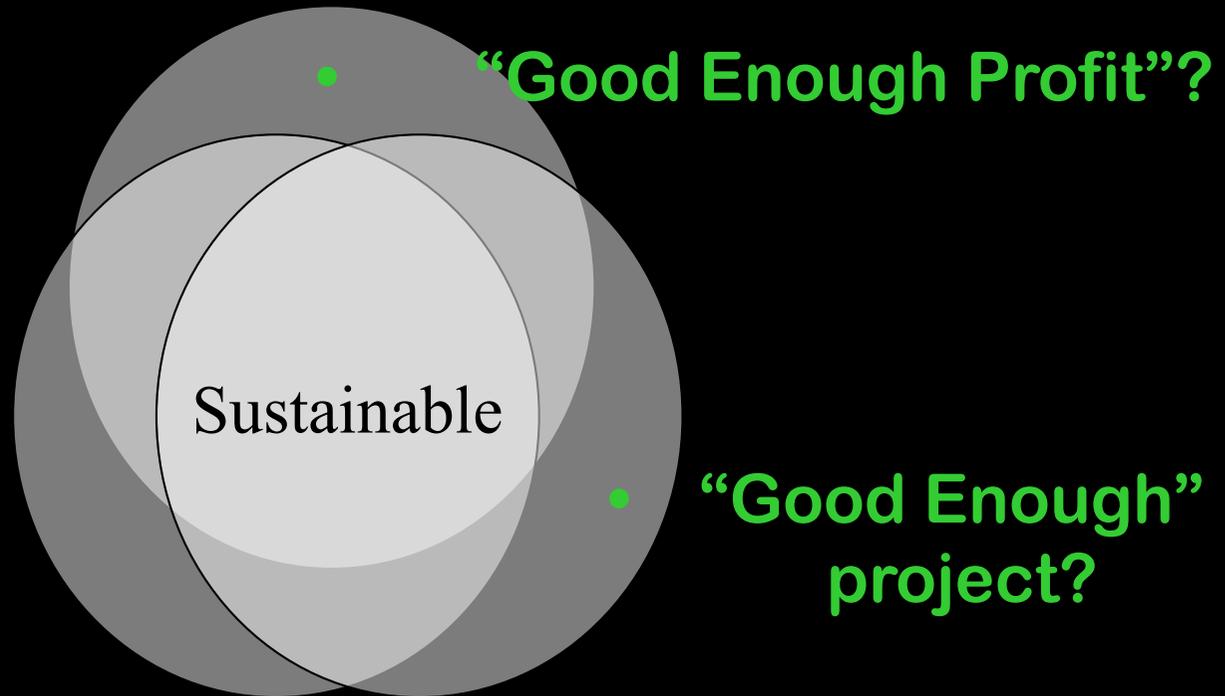
Here is the Profit
at the expense of environment and society



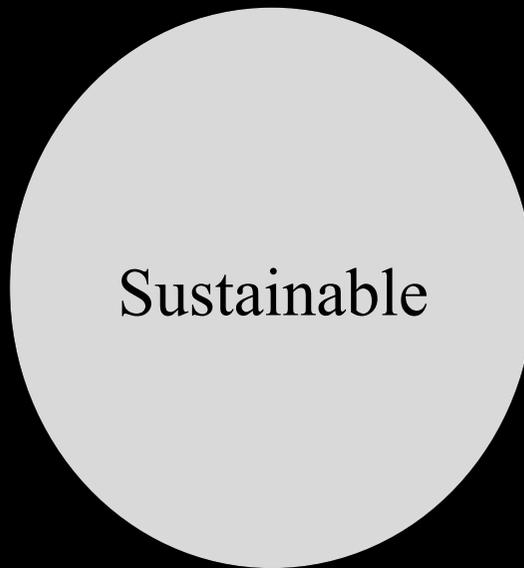
Surviving in their
own little world

Carrying on
on our own
precious world

Towards sustainability

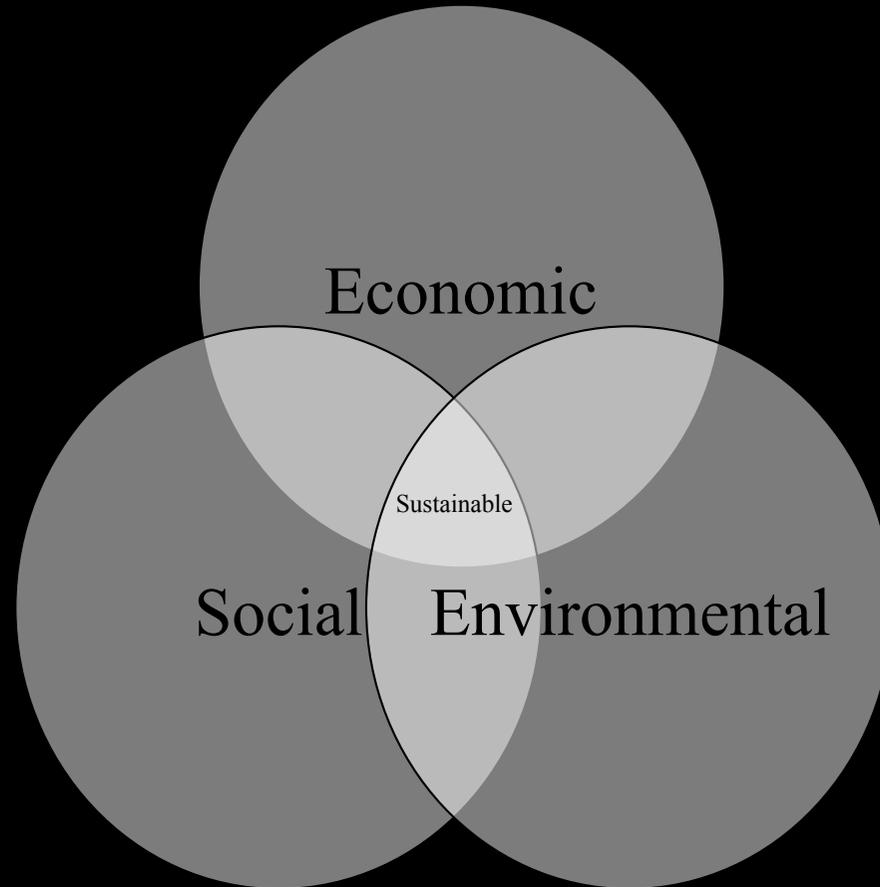


**Sustainable: where all three are
present in all activities**

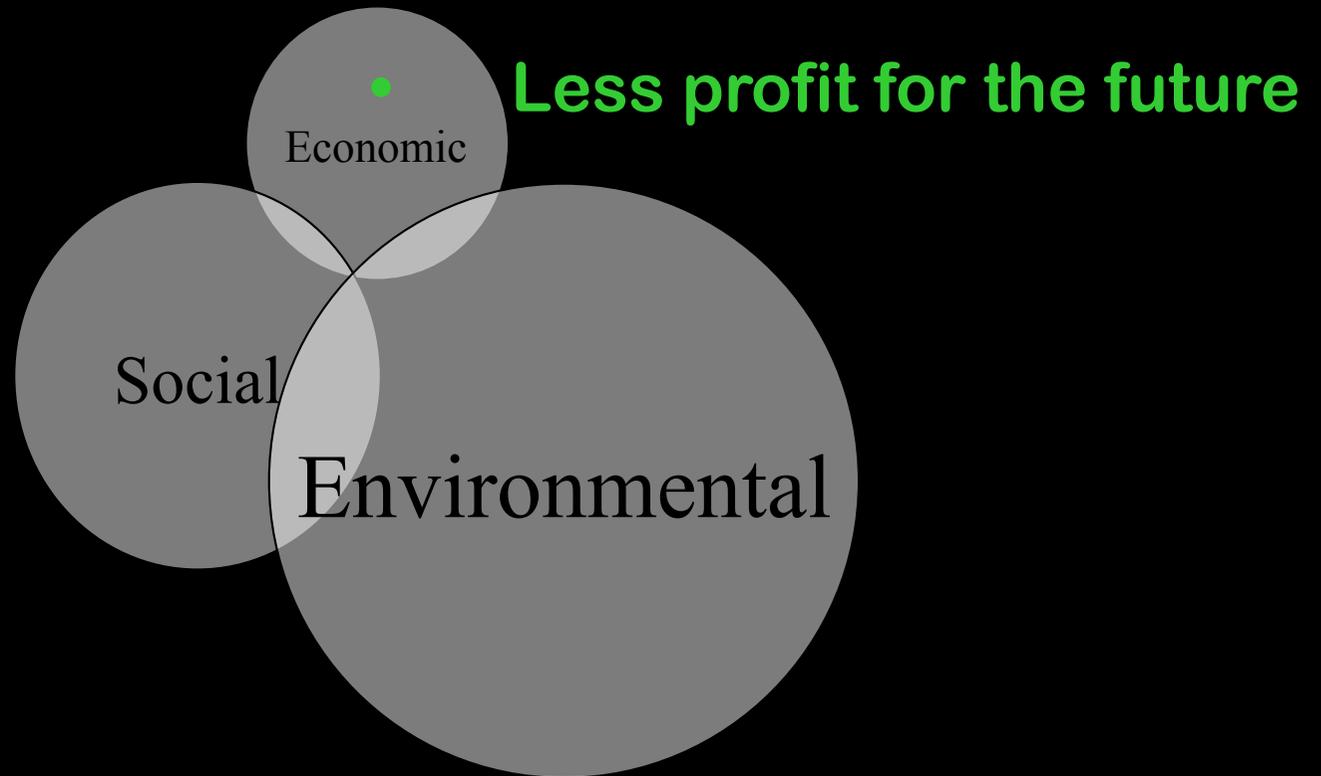


What we need to strive for

Where we are today



What is needed right now and for a few decades



for Human survival

Once we have got past the crisis



then lets get it & keep it in balance



Changes?

Global Imperative

- Imperative
- No more BAU Business As Usual
- No more Status Quo Prevails
- No more Fiduciary Rules
 - Obligation to make shareholders a profit
- Principles of environmental development

Climate change & Resource Depletion

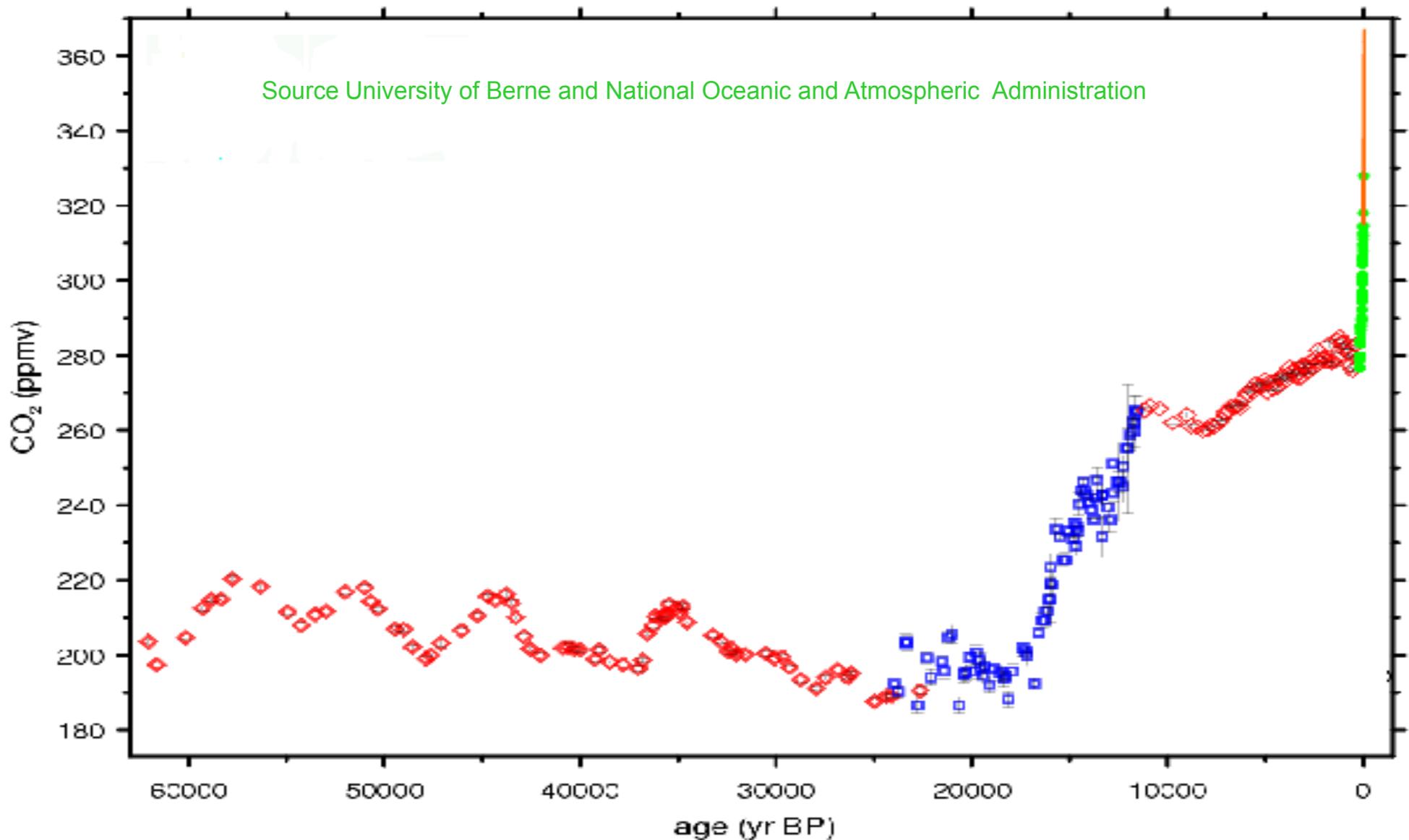
- Climate change is the biggest problem facing humanity today
- We need to be aware of how we produce and use resources: energy materials water
- And the consequence of our current habits
- We squander without thought
- We must adapt & we need to mitigate
- Any Sceptics in the room?

Jargon Buster

- **Mitigation & Adaptation**

**Knowledge > Risk > Business as usual > More Adaptations
inadequate action > Adaptations
Mitigate > Less Adaptation
Some Adaptation inevitable**

CO2 levels over 60,000 years



Simulated global warming

Source: Hadley Centre

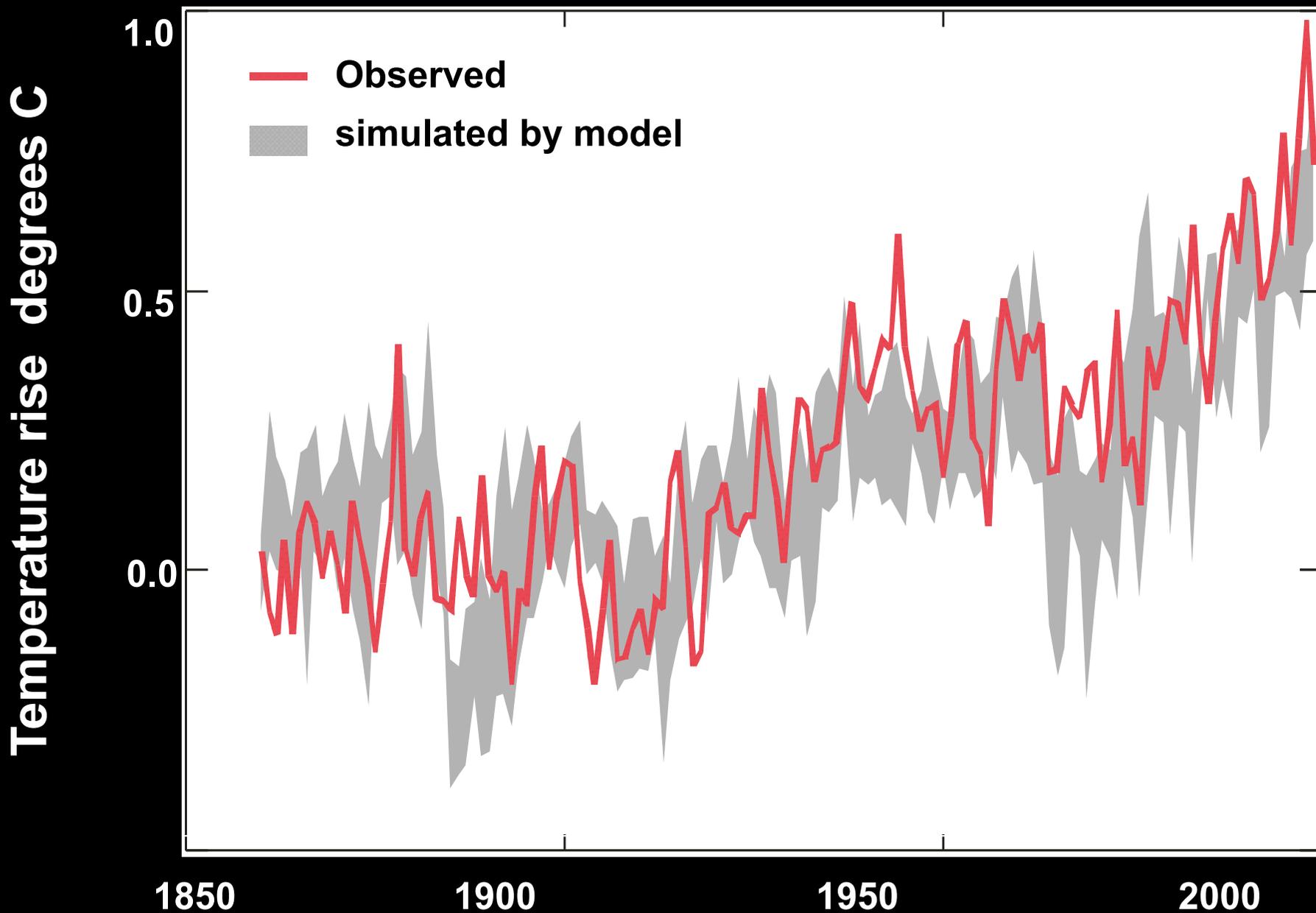
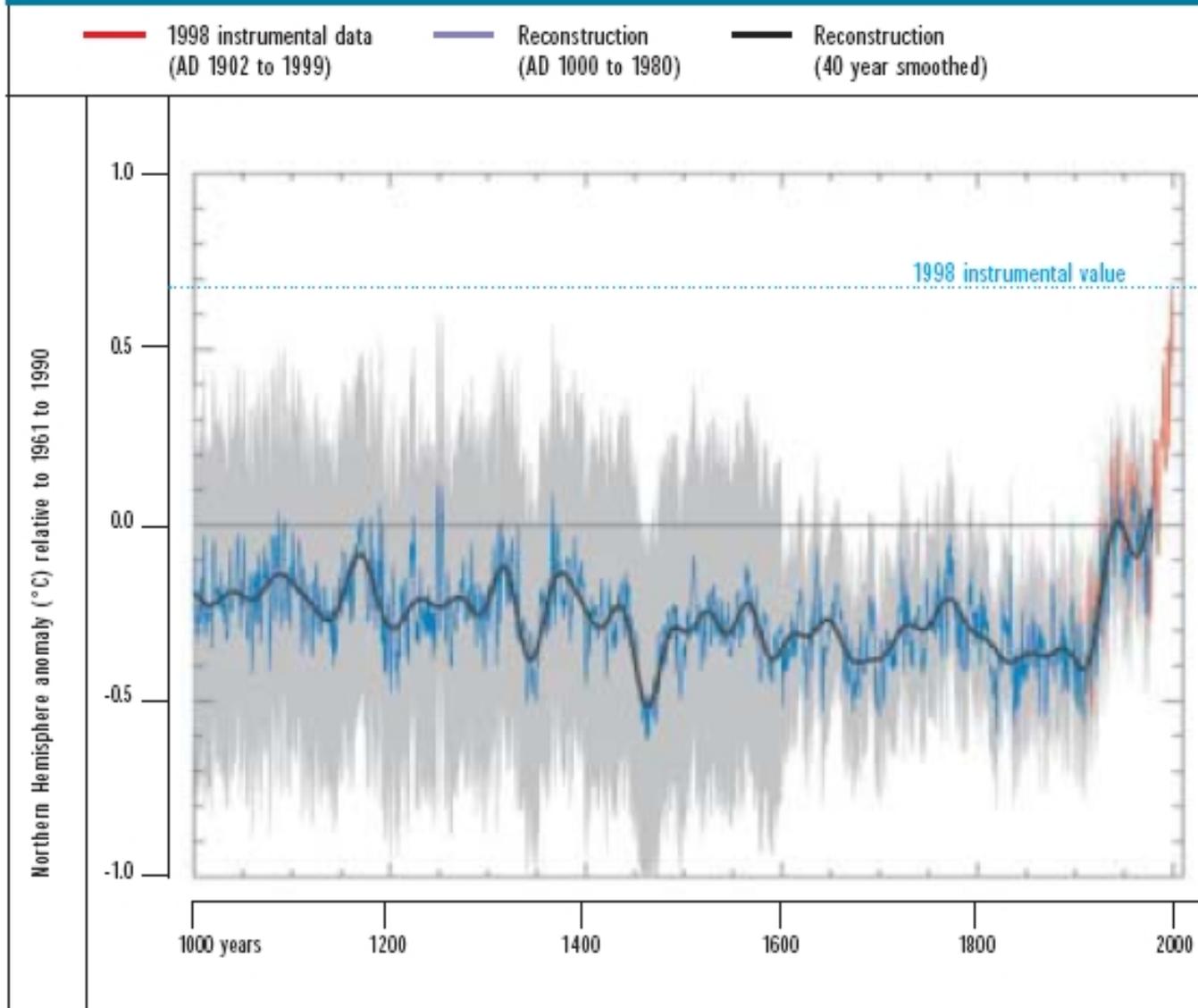
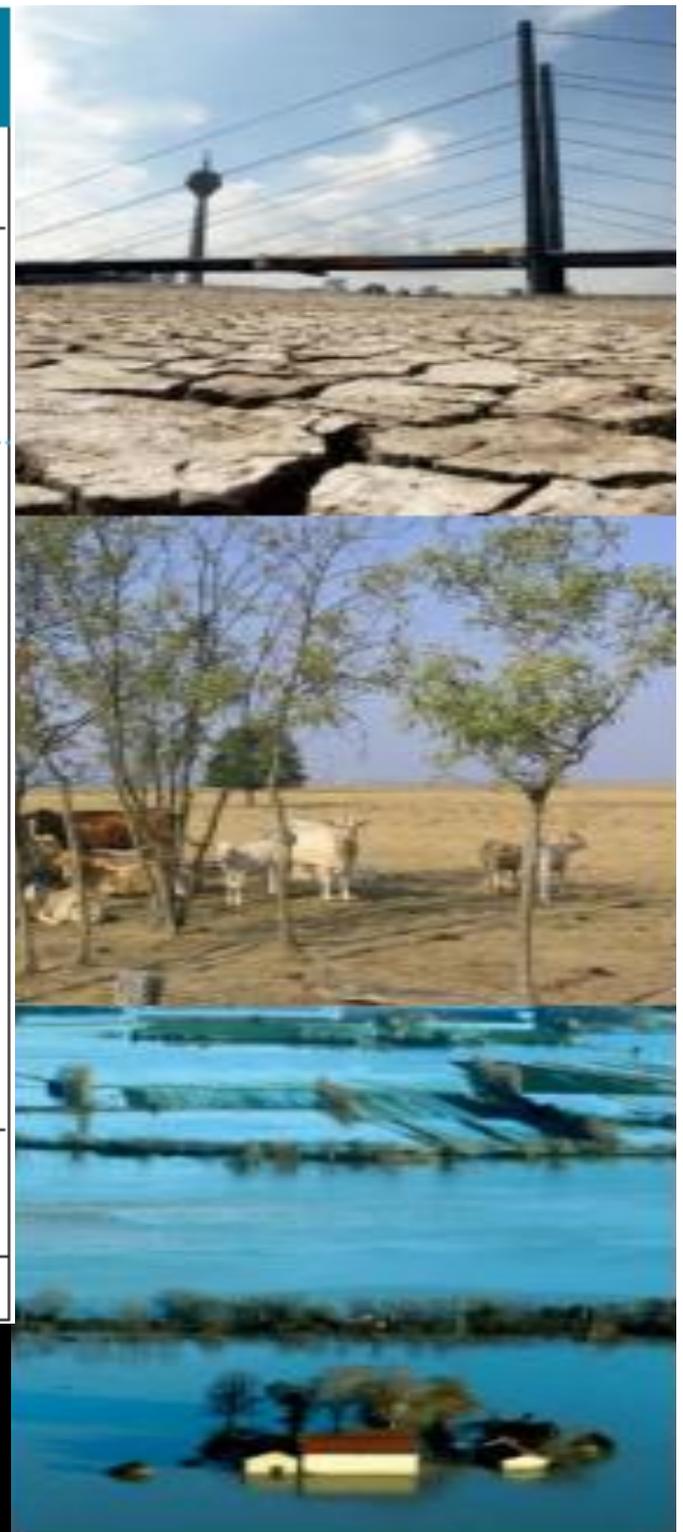


Fig. 1. Variation of the surface temperature of the Northern Hemisphere over the last millennium



Source: Houghton et al. (2001).





Consequences of no action

Another NGS CPD to download soon



WWF

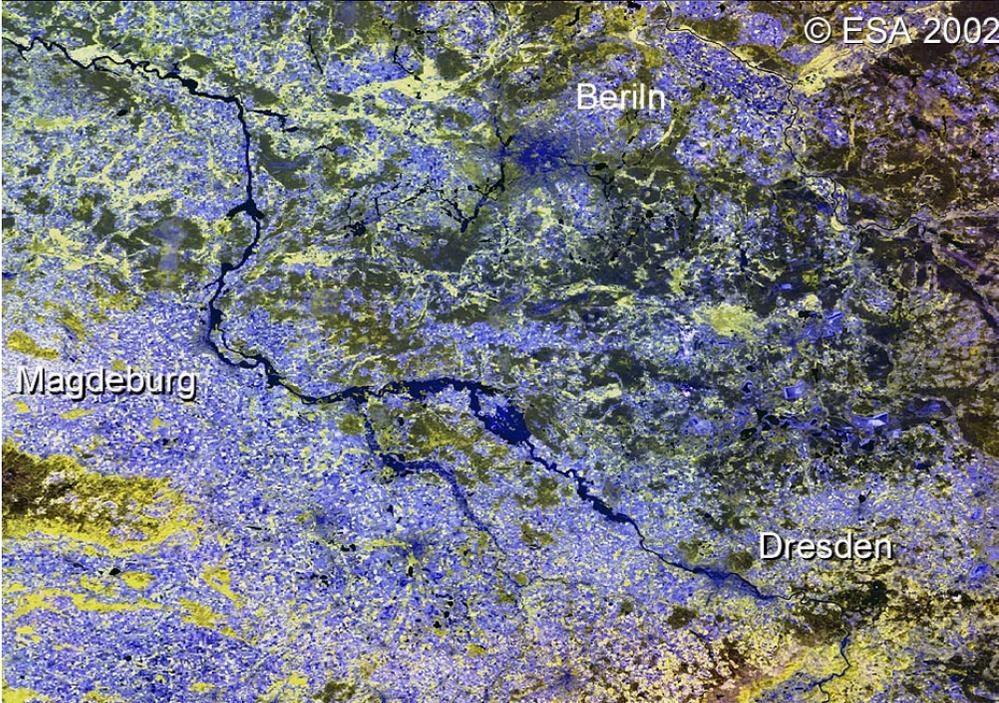
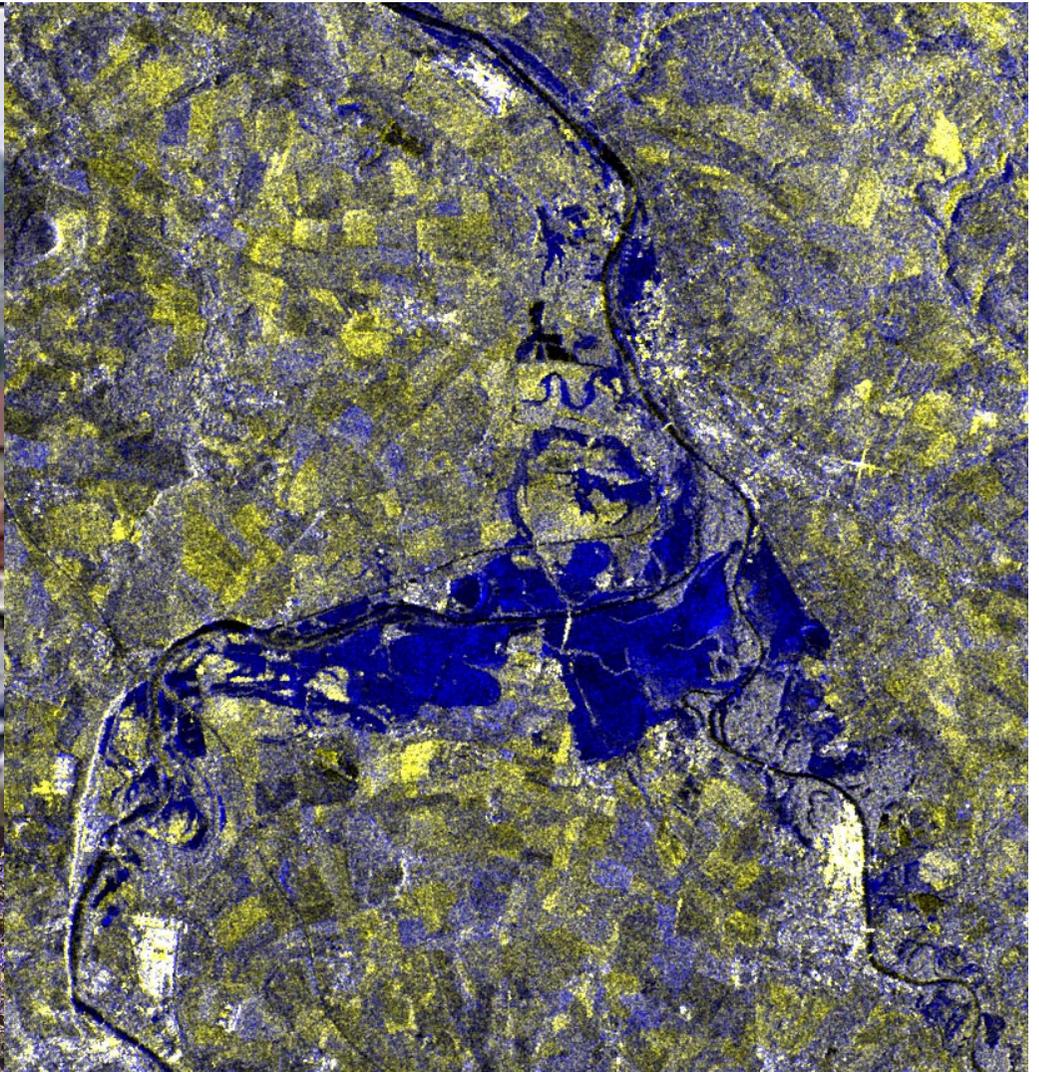
Taking action for a living planet

Extreme weather events

- UK floods, autumn 2000
 - Insurance pay-out £1bn

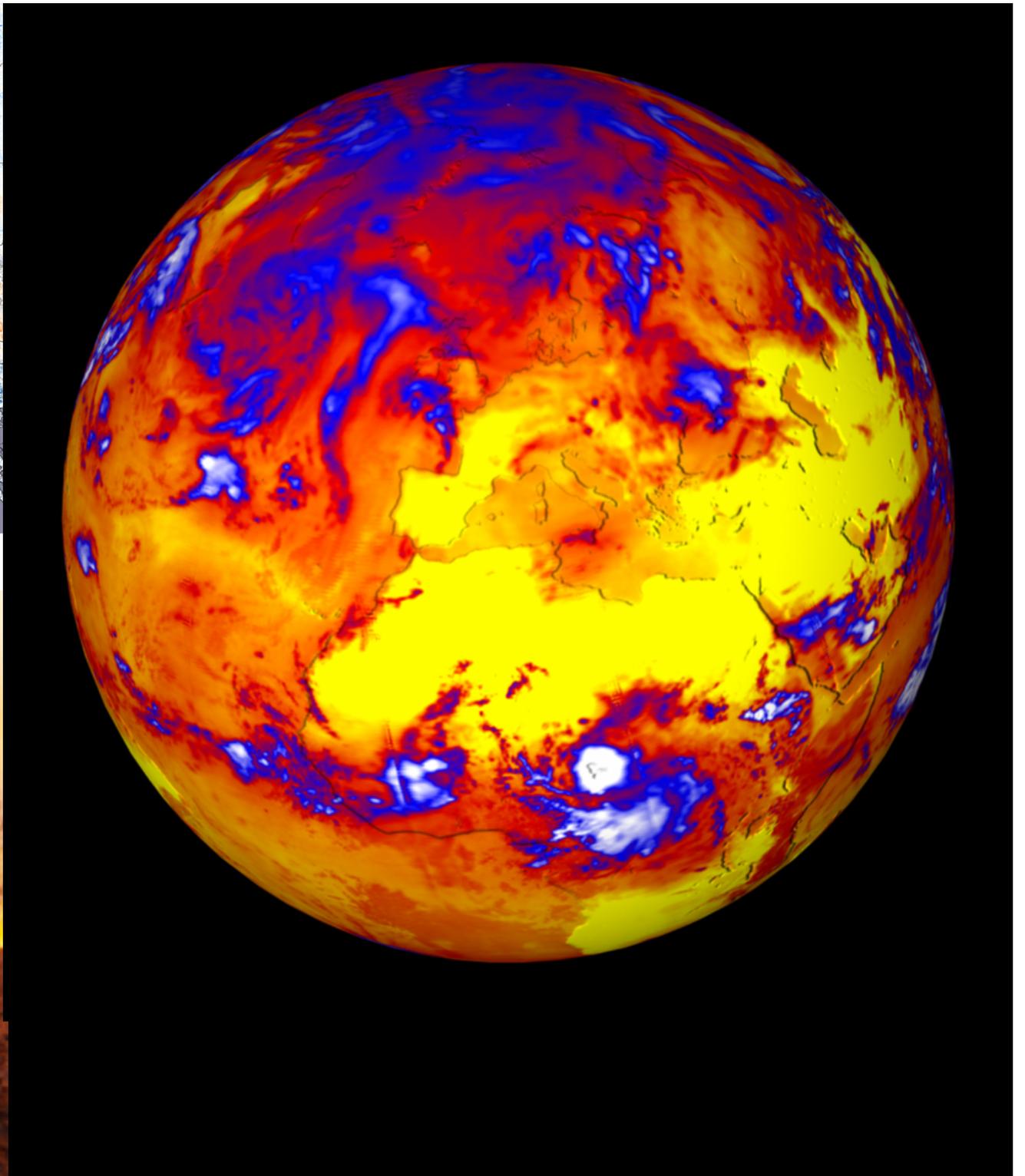
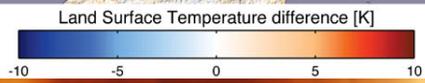
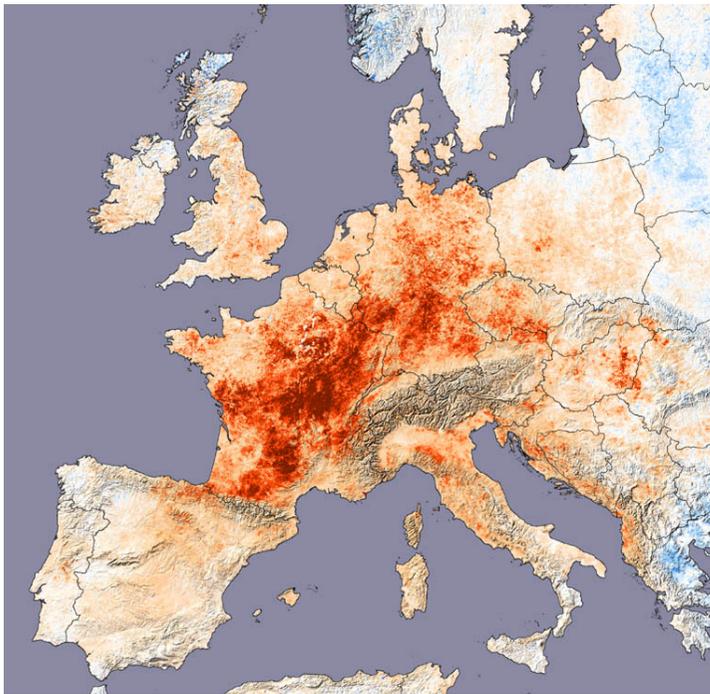
Extreme weather events

- **European floods 2002**
 - 37 deaths
 - \$16bn direct costs



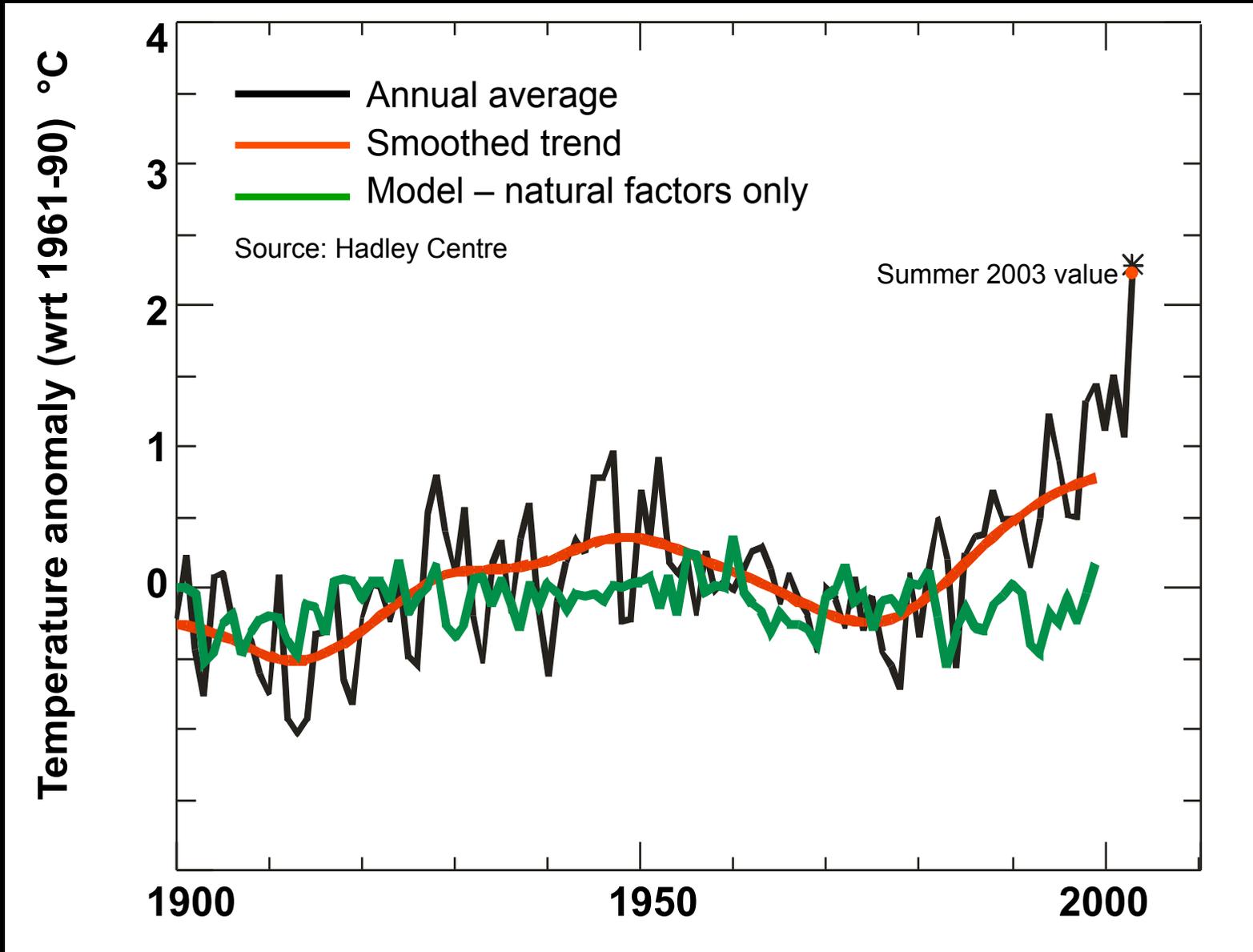
Extreme weather events

- European heat-wave 2003
 - 30,000 deaths
 - \$13.5bn direct costs



Extreme Record events every month and year

Annual EU summer temperatures



Extreme weather events

- UK flooding – one village Boscastle 2004
 - £50m estimate of costs



Extreme weather events

- UK floods, June July 2007
 - Insurance pay-out estimate £ 2.5 bn

Hull June 2007

- 1/6th of annual rainfall fell in one day
- 1 in 400 year event
- 7000 homes flooded
- 27,000 people affected
- £1.5 bn damage done
- 1/4 of the people not insured adequately
- £14m from Government Crisis Fund

Severn Estuary July 07

- Tukesbury, Gloucestershire
- 10,000 flooded homes
- 8,000 insurance claims made
- 340,000 people affected by water cut off
- 250,000 power supply at risk
- £1 bn damage done
- £10m from Government disaster fund



Severn Estuary July 07



EA Flood Team

- Had the kit to deploy to protect the towns
- Had to bring it from the west
- Could not get to the site of the floods because of the closed roads
- Flood defence must be part of the infrastructure
- Or buildings must be able to cope

October 2013 – March 2014

- **Extremely warm Pacific ocean and cold west coast of N American continent**
- **accelerated the high level jet stream, driving it south, east across the Gulf or Mexico and north east up the gulf stream across the Atlantic towards UK and turning towards the North Sea**
- **Relentless wind, creating storm surges on the SW coast of UK dumping excess rain for 6 months leading to flooding**

Fuel Poverty: Heating

- Rising fuel costs since 2003
- Poor cannot afford to heat their homes
- Paying more than 10% of income
- Government plan to eradicate FP by 2010
- 3m more may fall into FP by then
- Failure is inevitable

Fuel Poverty: Cooling

- 100% glazed façade offices have become the norm
- Solar shading is not normal
- Offices need cooling
- Air conditioning is the norm
- Rising fuel costs
- Offices cooling will not be affordable

**Changes or
Business as usual?**

Climate change cost \$55b in 2002

- Climate change may have cost the world over \$55 billion in 2002
- U.N. Environment Program (UNEP)

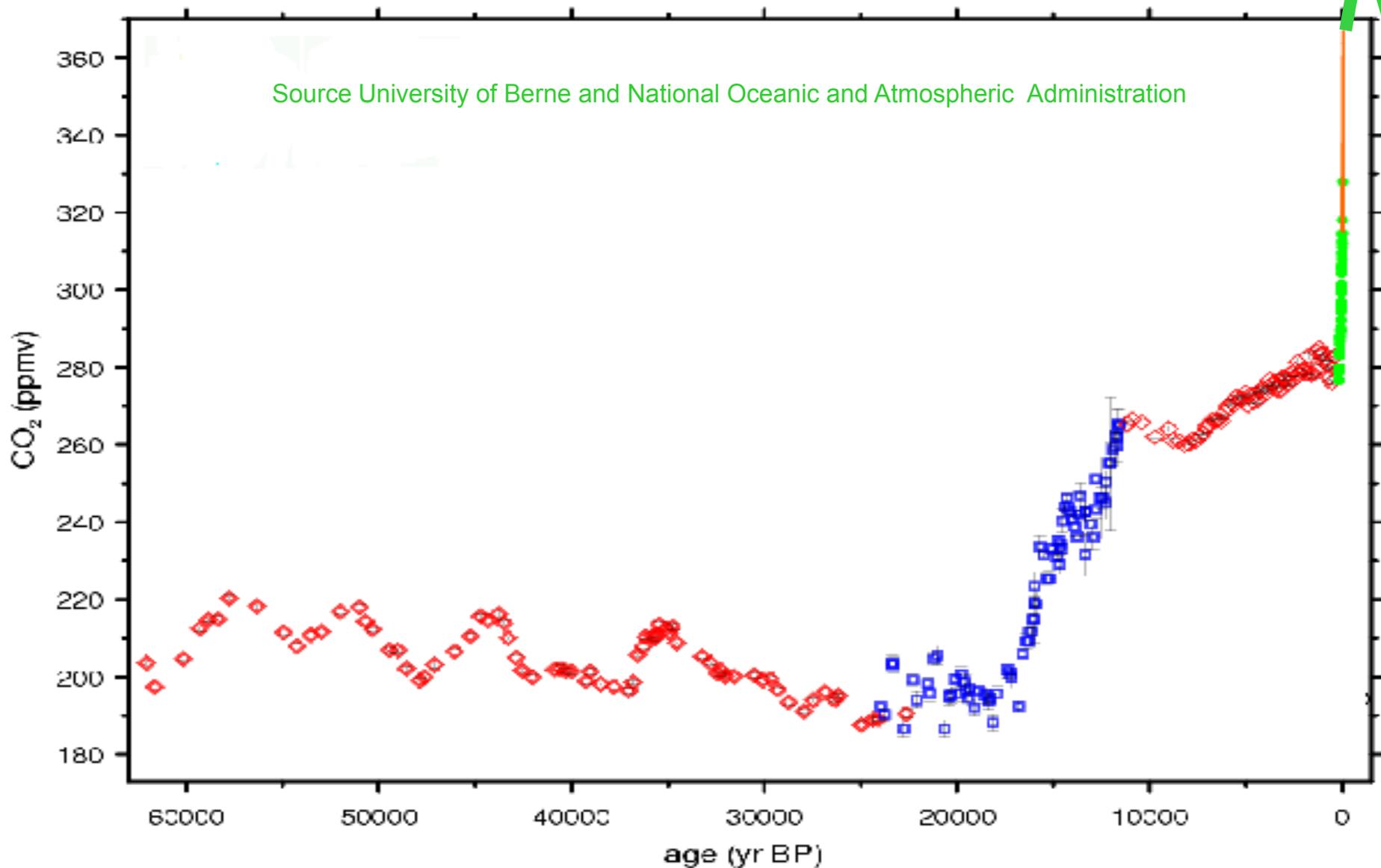
Climate change cost \$60b in 2003

- Climate change may have cost the world over \$60 billion in 2003
- triggering a spate of natural disasters
- a deadly heat wave in Europe
- massive flooding in China
- U.N. Environment Program (UNEP)
- cost of natural disasters had risen 10 percent from 2002
- is part of a worrying trend of climate change.

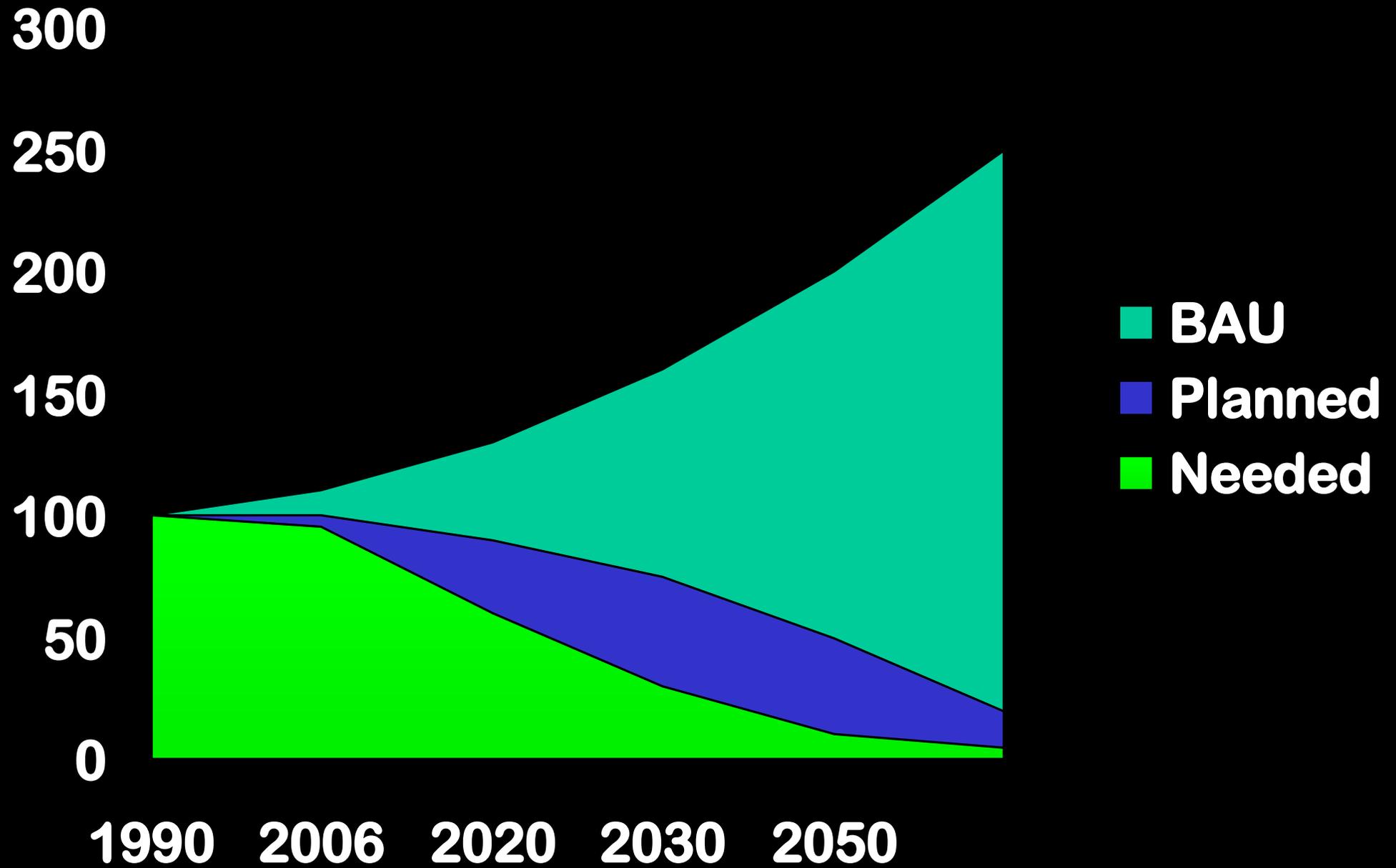
Creating a low carbon economy

- Energy White Paper February 2003
- Overall objectives:
 - UK to cut CO₂ emissions by 60% by 2050 (QS)
 - real progress by 2020 (not in Queen's Speech 2006)
 - Maintain reliability of energy supplies
 - Promote competitive markets in the UK and beyond
 - To tackle fuel poverty by 2010
 - poor unable to heat inadequately insulated homes
 - (Coincides with Decent Homes Programme Completion)
 - (rich unable to cool 100% glazed façade offices)

CO₂ levels over next 34 years? How do we get there?



CO₂ output based on 1990 levels



Expansion & Divergence

- Some economists insist the economy as a whole will continue to grow at a constant rate due to efficiency gains.
- 8 of the richest people have 50% of global wealth
- 1/3 of global population have 94% of the global purchasing power
- 2/3 of the global population have 6% of the global purchasing power
- 80% of emissions accumulated in the atmosphere have come from 20% of the global population in industrialised countries
- Global Growth at 3%, China reached >20%
- Global Damages at 6% (Re-insurance industry)
- When they cross (current prediction is 2070)
- Global Economic Catastrophe awaits us.

Global Financial Instability

- Oil Barrel costs send ripples around globe
- Financial institution melt downs send ripples around globe
- US Mortgage crash, a US problem that became global
- Food shortage or rising costs causing riots
- Large national economy turn down affects many other countries
- UK Housing market failing locals but foreign buyers keep pushing the prices up
- Eventually they crash too or rules change

the rhino cometh



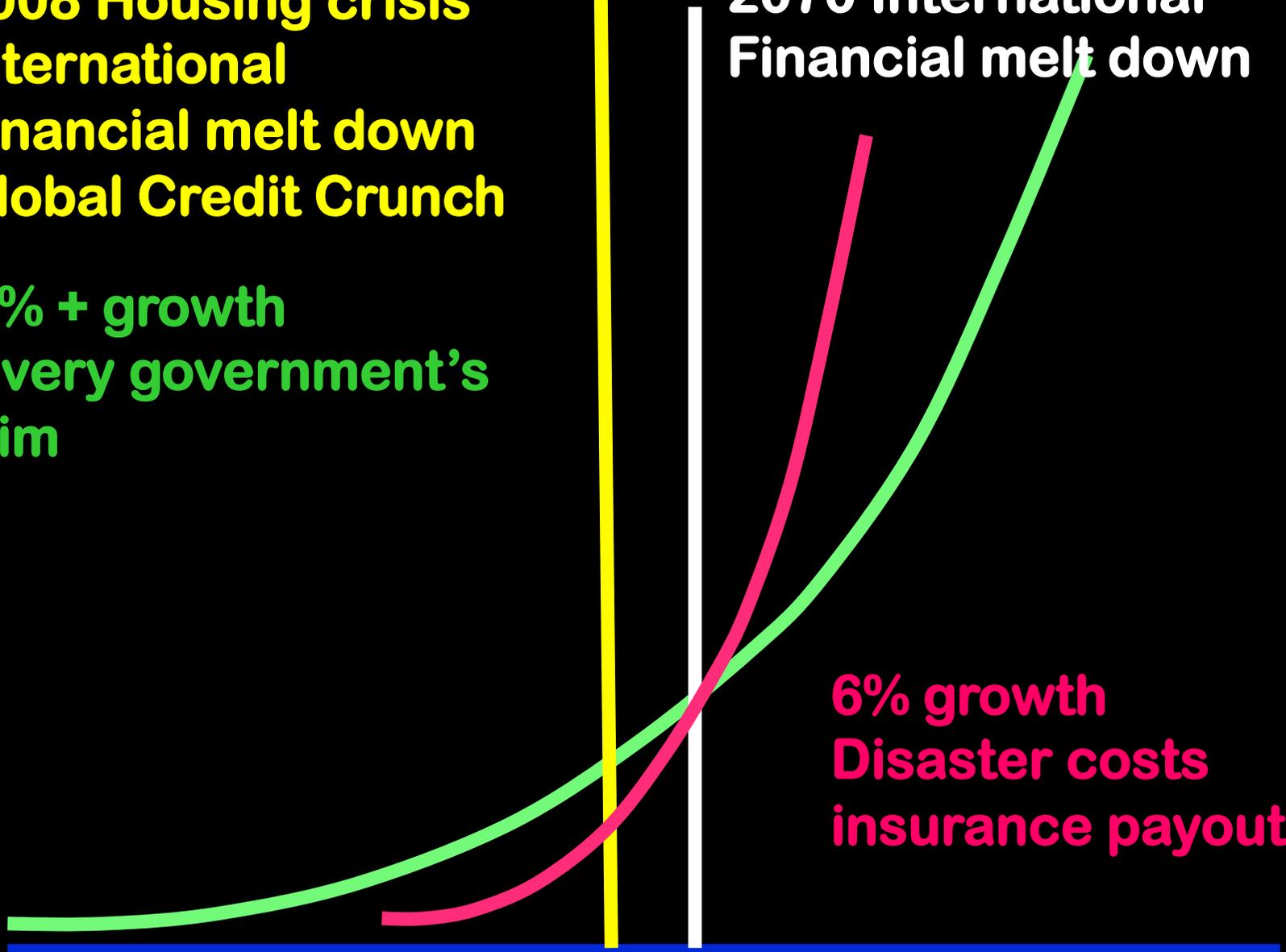
Andrew Meyer

**2008 Housing crisis
International
Financial melt down
Global Credit Crunch**

**3% + growth
Every government's
aim**

**2070 International
Financial melt down**

**6% growth
Disaster costs
insurance payouts**



Other Crises

- US Mortgage crisis, ripples round the globe
- After decades of encouragement by financial institutions to live off credit,
- Personal bankruptcy becomes easy
- Credit squeeze in the UK
- Government bail out the banks
- Financial institutions go into free fall

Ecological credit crunch

- The world is heading for an ecological credit crunch
- as demands on the world's natural capital reaches nearly one-third more than Earth can sustain
- That is the stark warning contained in the latest edition of WWF's Living Planet Report
 - the leading assessment of the planet's health.

WWF Living Planet Report

- Living Planet Report
- <http://mail.panda.org/inxmail0/url?vjvx0c0bjpyb0bixz3a7>
- How to reduce your ecological debt
- <http://mail.panda.org/inxmail0/url?vgrx0c0bjpyb00hj33a7>

Ecological Debt

- more than $\frac{3}{4}$ of the world's people are now living in nations that are ecological debtors,
- where national consumption has outstripped their country's biological capacity.
- The good news is that if we have the will,
- we can live within the means of our planet,
- while securing our well-being and the ecosystems on which this depends.

Ecological Dependency

- Environment Agency say if we let the Bee populations die off
- The human race has got 4 years left
- No pollination means we have no more grown food: fruit and vegetables, nuts, legumes, pulses, seeds, grains
- And the pesticide sector is doing its best to kill the pollinators
- Lobbying governments to permit continuity

Efficiency Drive?

- PPS1 suggests local/regional targets should be set
- 2006 Code for Sustainable Homes and Building Regulations Part L in conflict
- 2007 GO-East prevents Cambridge CC T&C Planners from requiring improved efficiency of future development above Building Regulations
- National legislation now prevents regional or local differences

The real scientists are in agreement

- Number of peer reviewed articles in scientific press in previous 10 years: 928
- Percentage of articles in doubt about the cause of global warming: 0%
- Consensus on this scale is rare indeed in the scientific community

Public Awareness of issues

- The media promotes another story
- Number of articles in popular press about global warming in past 14 years: 636
- Percentage of articles in doubt about the cause of global warming: 53%
- No wonder the public are confused
- And politicians too

Globalisation of Consciousness

- **Social reaction to inept BAU Government**
 - Comic Relief
 - Band Aid
 - Live Aid
 - Live Earth
 - G8 Summit Protests
 - Globalisation Revolts
 - Fairtrade popularity market penetration
 - Supporting Local Producers (Food)
- **Social Media campaigning is widespread and very effective and relentless**
- **Anti government policy or anti-leader protests**
 - But Sunday peaceful protests have little effect on Government or Business
 - Weekday Disruptive Civil Disobedience stops them getting to work then they notice
- **But negative reactions happen**
 - Ill prepared government gambles (UK EU Referendum)
 - All Woman protests
 - get kneejerk anti-female policies driven through by male government
- **And positive ones too**
 - Muslim travel bans and immigration bans
 - Immediate Global reaction
 - Business profit and continuity focussed anti-climate change national policy
 - Withdrawal from international agreements
 - Gets many state policy aligned with global policy

Procurement Rules

- Anti Local Procurement
- EU European Union Procurement Directive V2 (improvement)
- WTO World Trade Organisation Rules
- Encourage Fairtrade and non-FSC

UK gets many goods from abroad

- We love £1 shops, Everything sold for a pound
- We love cheap
- Made by cheap labour in east and far east
- Using fuel and power from coal fired power-stations
- Products shipped to the UK
- And we complain that China and India must address CO2 or our efforts are worthless
- Much of CO2 used to maintain our UK lifestyles is not created in the UK but in India and China

Shipping

- is argued to be environmentally sound
- The fuel used to ship good gets more miles per gallon than vehicles on the road
- But what we forget to mention is that the goods need to be:
 - trucked to the ports to be loaded
 - Unloaded and trucked from the ports to the site or shop

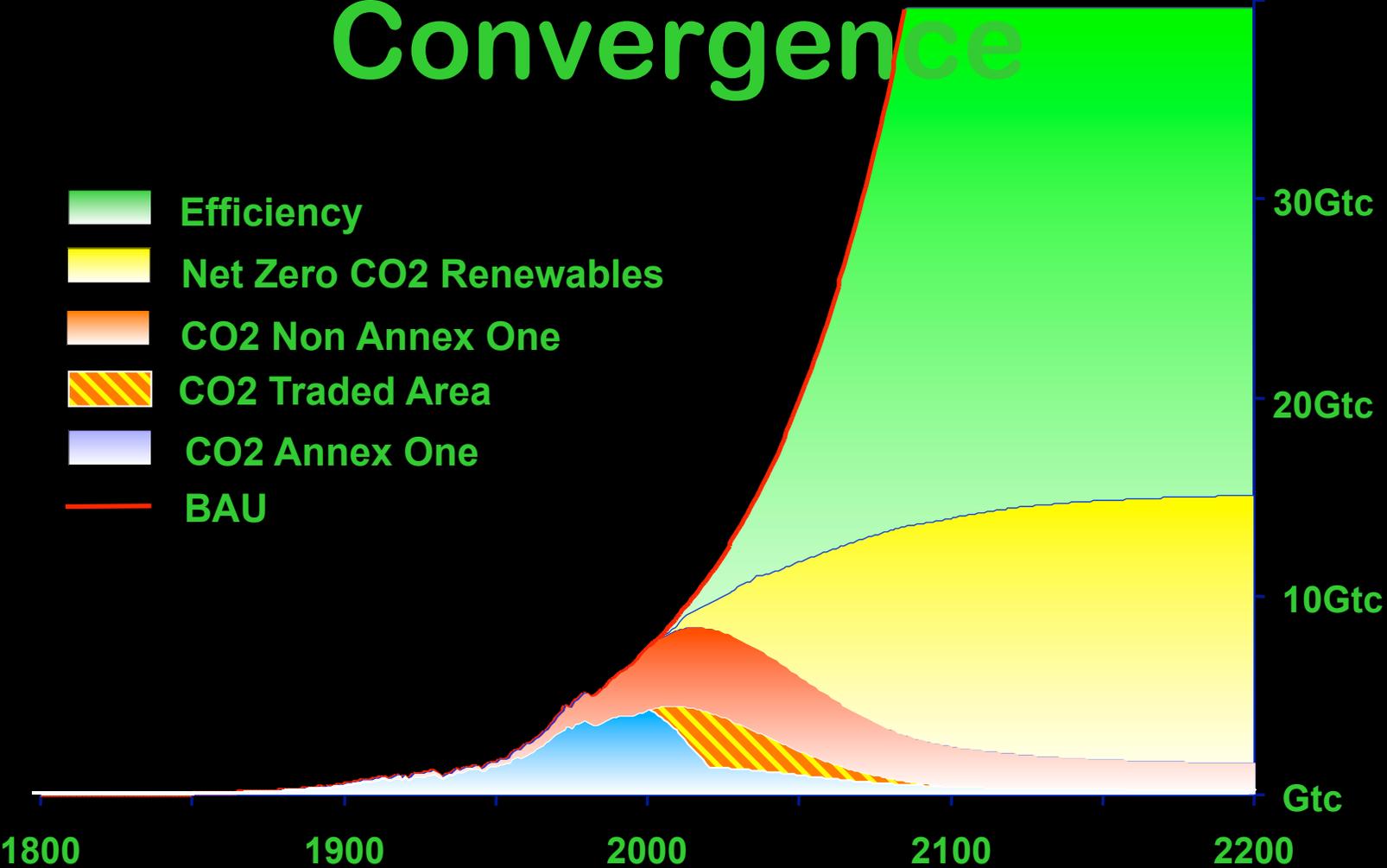
Shipping and Air freight

- These have an unfair advantage
- These are not penalised by having to be in global carbon statistics
- And are not taken into account in national Carbon Targets.

Procurement Rules: FSC Forest Stewardship Council

- Government advice: FSC is best
- Industry pressure: Government cave in
now FSC = PEFC
- But PEFC established to oppose FSC
- in the past PEFC campaigned for FSC to
lower their standards to = PEFC
- FSC will not compromise

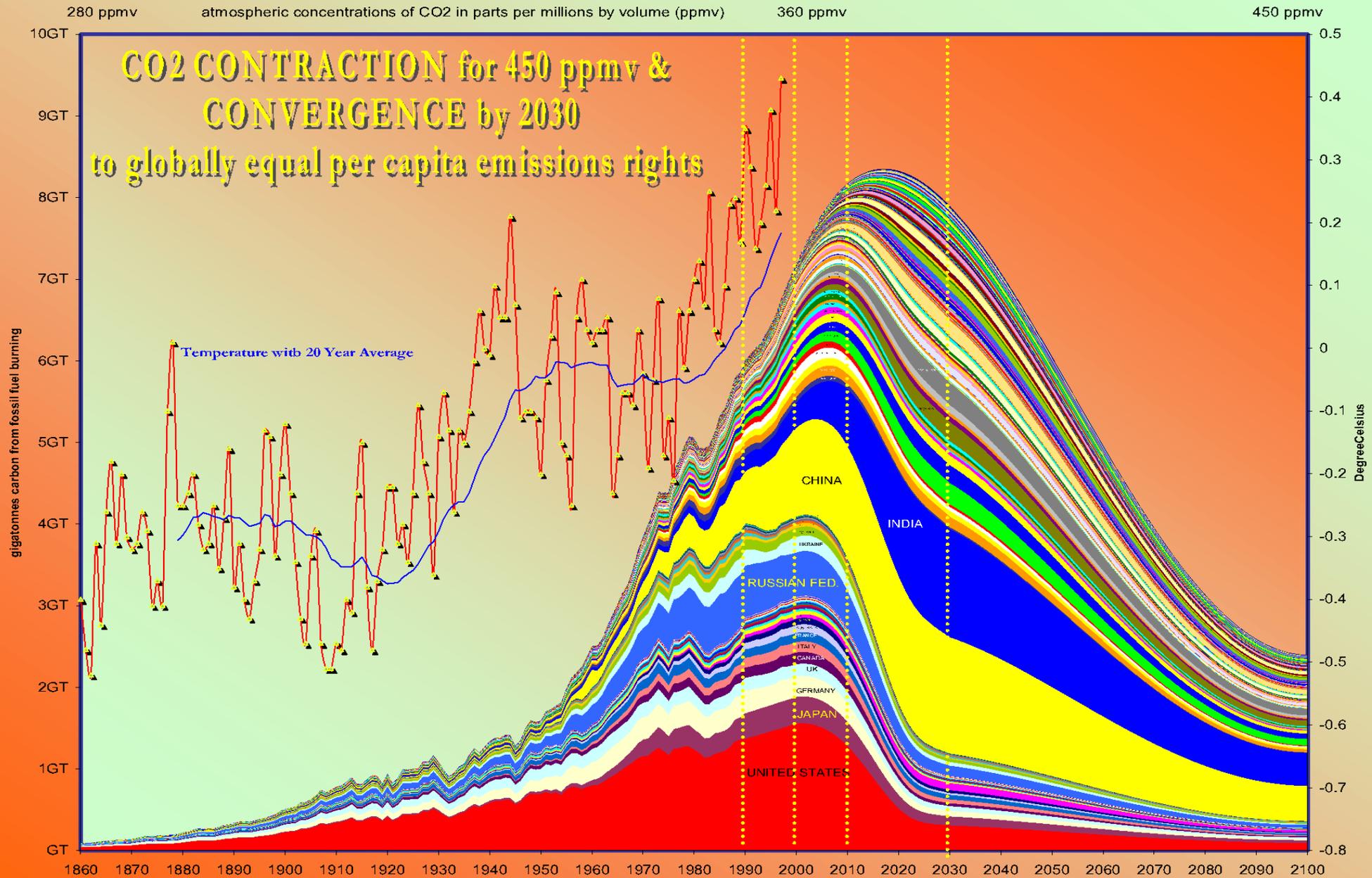
Contraction & Convergence



Contraction & Convergence

- **Contraction by 2100**
- **Convergence negotiated between 2020 & 2100**
- Efficiency is sensibly the global property of avoiding dangerous climate change through recourse to C&C.
- It is the surplus beyond the constraints of C&C with trade and the development and diffusion of clean replacement technology.
- Whatever rate is negotiated the shares created thereby should be internationally tradable, and ideally redeemed for net zero emissions energy technology.
- The tradable shares of this budget are the difference between convergence to equal per capita emissions by an agreed date and population base year (here 2020 and 2100 and 100 billion tonnes worth of permits).
- If this is invested in net-zero-emissions energy technology, risk and damages are lowered further as the budget will then be net of these emissions as well.
- The investment opportunity in this agenda for renewable energy systems is worth trillions of dollars per annum - the biggest market in history.
- Success is survival.
- Failure is not.

“C & C” – The Classic Image



The 'classic' image of "*Contraction & Convergence*" (C&C)

- created by GCI in 1996.
- It was 1st presented at the 2nd Conference of the Parties (COP-2) to the UNFCCC.
- The UNFCCC objective is, "*stabilisation of rising atmospheric greenhouse gas concentration*".
- Its principles are "*precaution & equity*".
- Together, the objective and the principles become C&C, with rates to be agreed.

Contraction & Convergence

- On the left, the rise in global temperature, 1860 - 2000.
- The data (red line) is averaged (20 year, blue line).
- The rise is 0.07 degrees Celsius (axis on the right).
- This is partly the result of the emissions from fossil fuel burning by all countries, of the greenhouse gas carbon dioxide.
- With data from the CO₂ Information Analysis Centre (CDIAC) Oakridge, these are shown on the left axis in gigatonnes (GT) carbon.
- Countries upwards are from largest to smallest emitter (1990) in 3 groups:
 - (1) the industrial countries of the OECD
 - (2) the industrial countries of the former Soviet Union
 - (3) the industrialising countries everywhere else.
- With 186 countries in all, many (e.g. Tuvalu) are too small to be seen.
- On the right a *projection* of all countries future CO₂ emissions 'entitlements' (2000 – 2100) in a global framework of "*Contraction and Convergence*".

Contraction

- by 2100 emissions are 60% less than in 1990.
- Concentrations of ghg in the global atmosphere are an accumulation of on-going emissions.
- So emissions must actually fall for rising concentrations to stabilise.
- The axis for atmospheric CO₂ concentrations is across the top.
- In 1860 they were 280 parts per million by volume (ppmv).
- By 2000 they had risen to 360 ppmv.
- At the rate of contraction shown, they will stabilise at 450 ppmv, helping to stabilise the upward global temperature trend.
- But, the reddening background reminds us that according to the climate models, temperature and damages will continue to rise throughout, albeit more slowly than without contraction.

Convergence

- future emission entitlements converge to equal per capita by the base year 2030.
- Entitlements are assumed to be tradable within and between countries.
- Other base years could be set.
- Other methods of international pre-distribution (emissions capping) are stochastic and so quite unpredictable.

C&C - The Most Merit

- Professor Sir David King now declares about the Climate Change dilemma, that
- "Contraction and Convergence (C&C) is the approach with the most merits."
- April 2008

- Dr King recently stated he had been gagged by Government when he was their Chief Scientist
- He communicated this news by letter to the Global Commons Institute (GCI) www.gci.org.uk through the legal counsel representing the publishers of his book on climate change, "The Hot Topic".
- www.allenandunwin.com/default.aspx?page=94&book=9780747593959

2004

- Centre of Alternative Technology
- Members conference
- Presenter cited a paper that had been reviewed by scientific peers with overwhelming consensus
- It argued that if we have not done anything significant by 2015 then 2050 is melt down day

Sir Nicholas Stern Report

- **The Economics of Climate Change**
 - Nov 2006
- **Investment in environment now**
- **Short term cost:**
 - 1% of Global GDP (gross domestic product)
- **Long term cost:**
 - 11-14% of Global GDP if not dealt with now

The Stern review

- examines the economics of climate change and stabilising of greenhouse gasses.
- It estimates that the cost will be high – about 1% of global GDP
- but that the cost of not doing so will be significantly higher, estimated to be between 5% and 20% of global GDP.

The Green package

- Dec 2006
- Code for Sustainable Homes
- Zero Carbon Homes by 2016
- Currently a voluntary code of practice for many
 - Level 1 = Building Regulations Part L
 - Level 6 = Low Carbon
- Code for Sustainable Homes has now been dropped

The 'Greenhouse Effect'



flooding

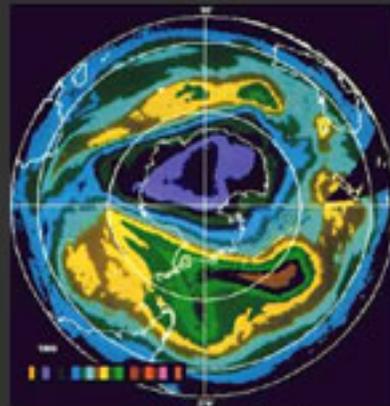


desertification



melting ice caps

Pollution



ozone depletion



acid rain



river pollution

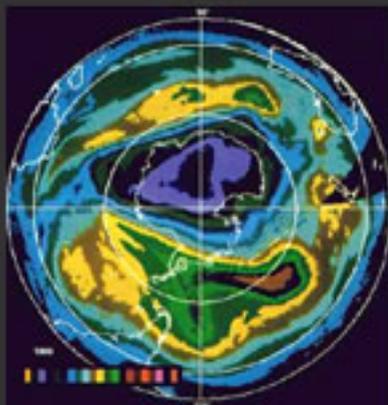


toxicity

Resource depletion



Pollution



ozone depletion



acid rain



river pollution



toxicity

Resource depletion



fossil fuels



forests

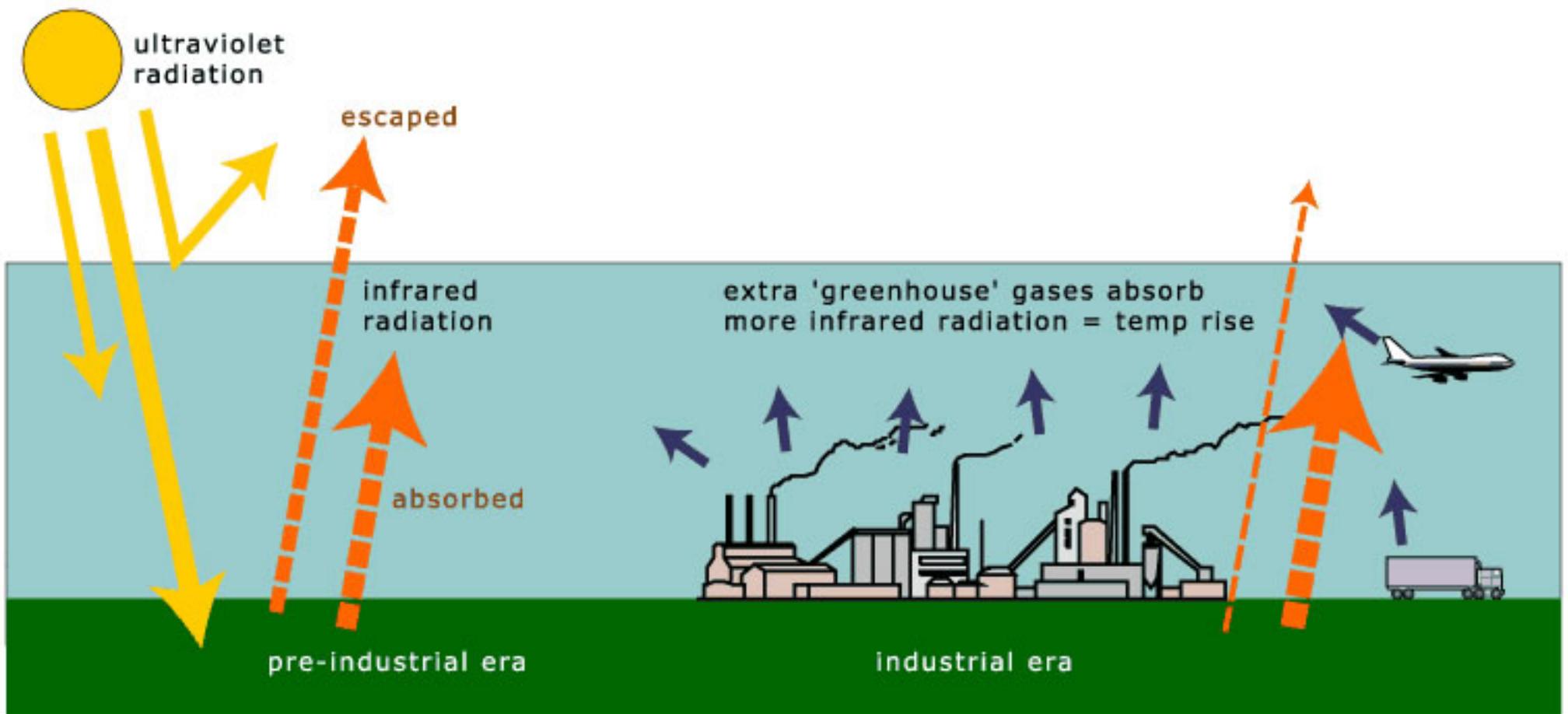


minerals

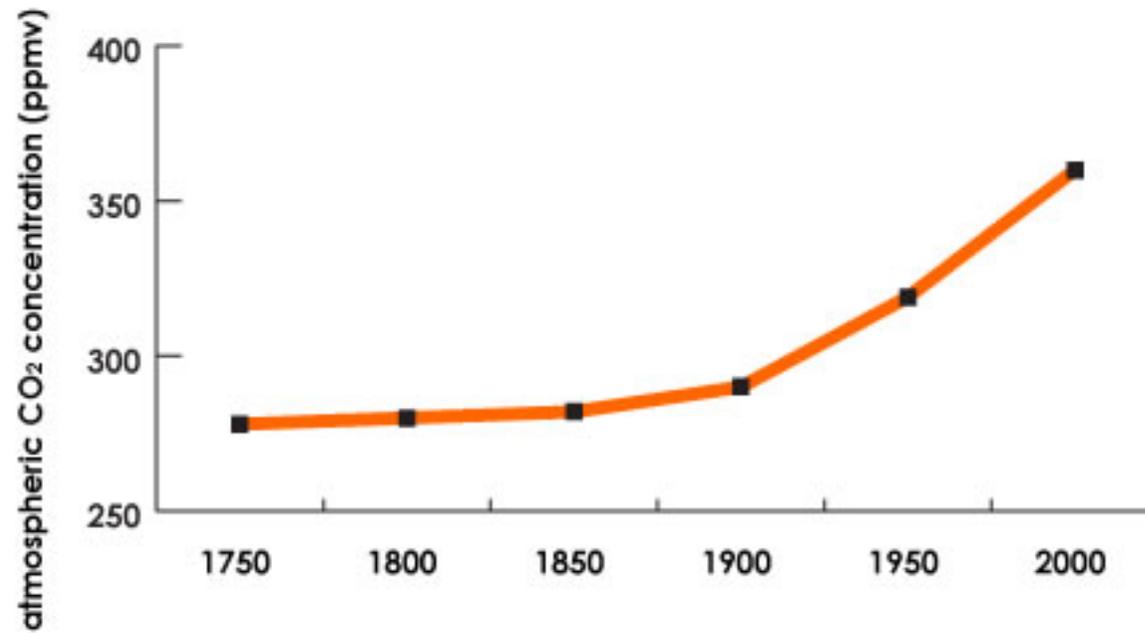


water

Greenhouse gases



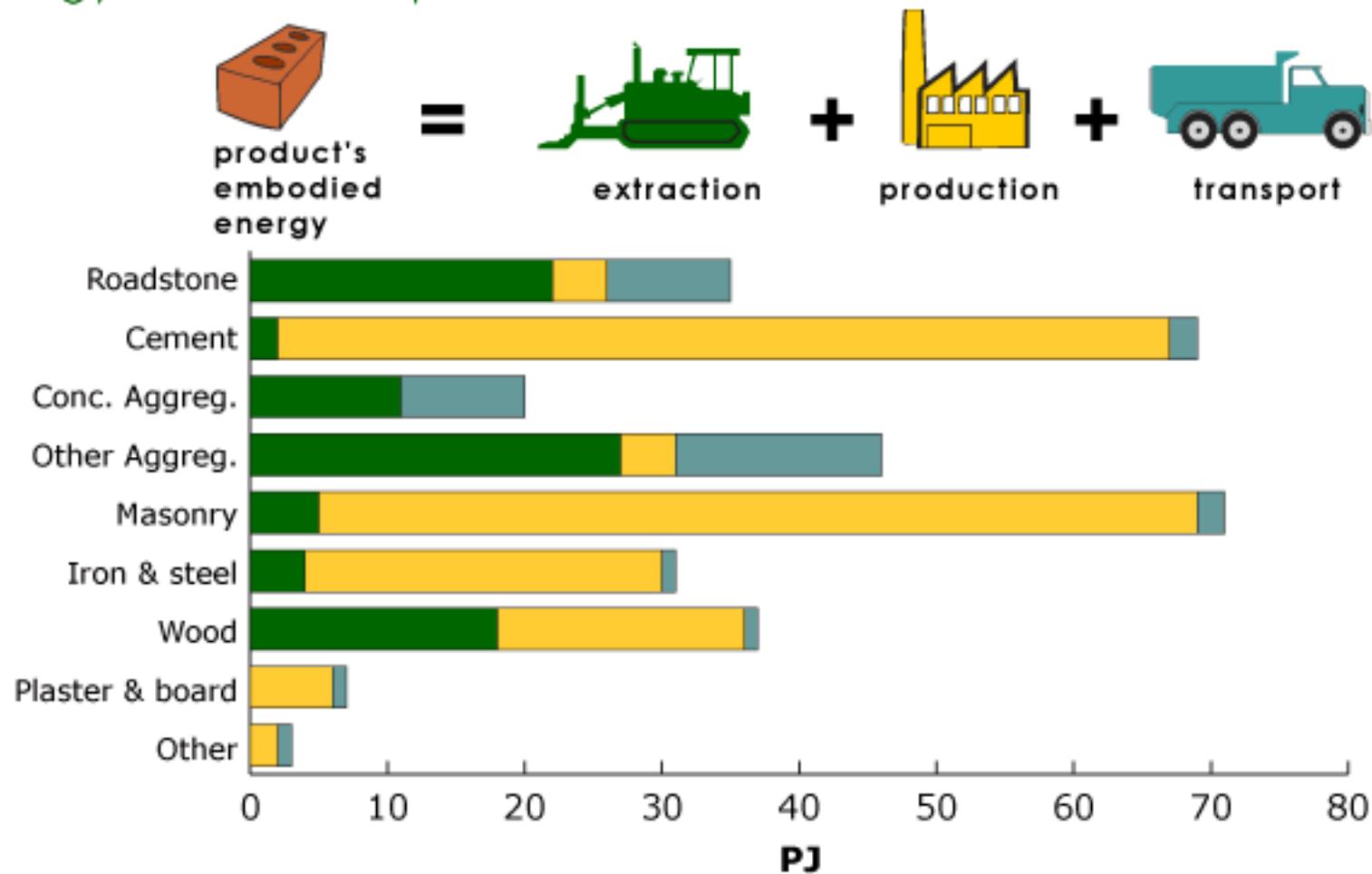
The rise in atmospheric concentration of CO₂



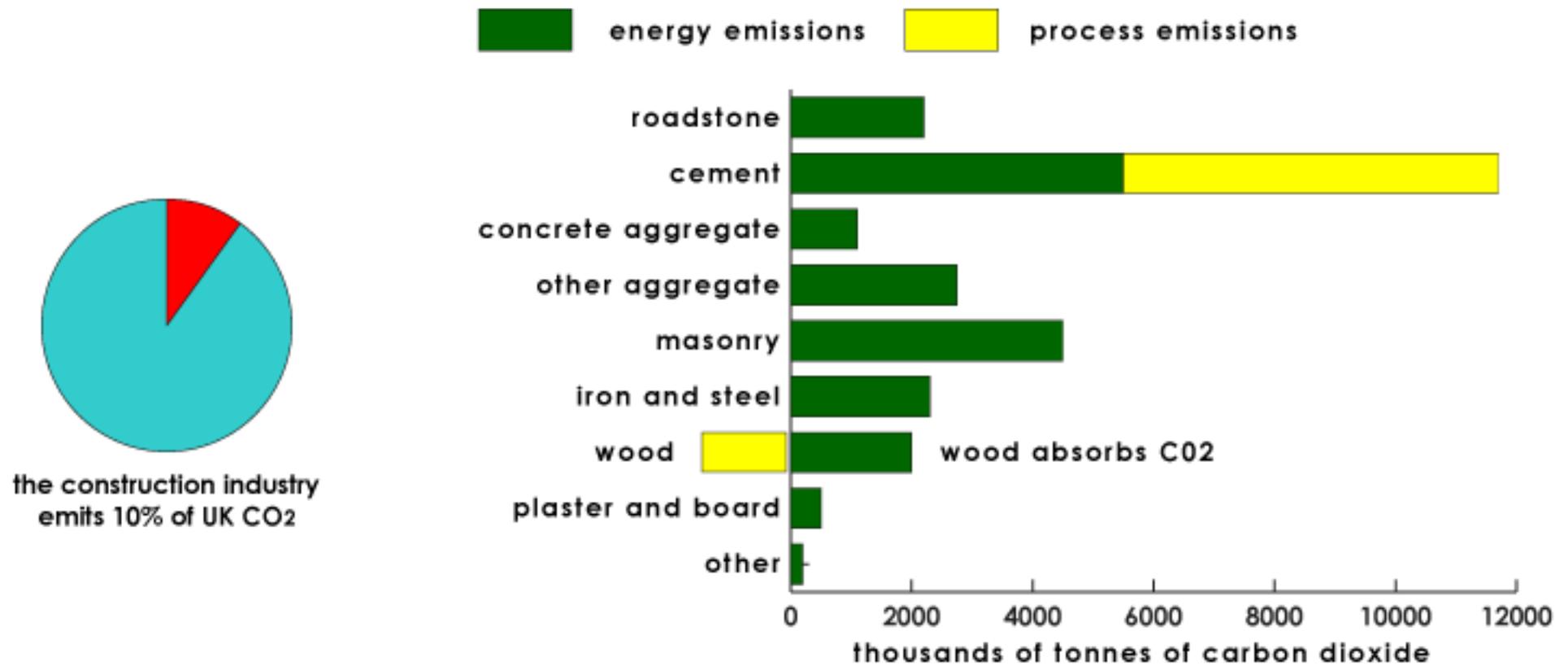
next 

Energy in the UK

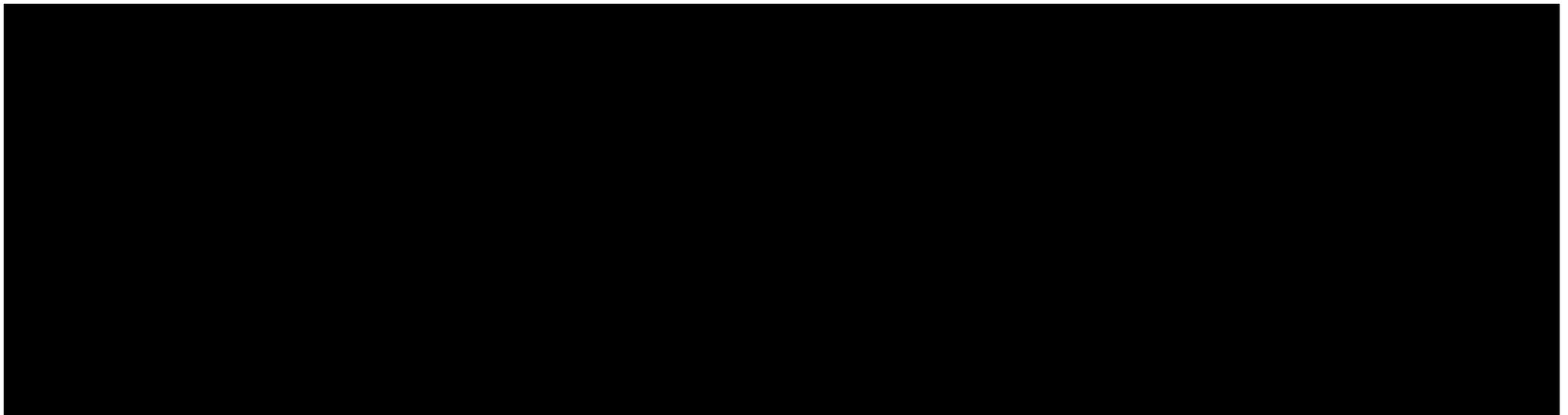
Energy used in the production of construction materials



CO₂ emissions from the production of construction materials



What are greenhouse gases?



Where the energy comes from

currently

33%



oil

41%



gas

16%



coal

9%



nuclear

1%



renewable

in 2020

37%

47%

8%

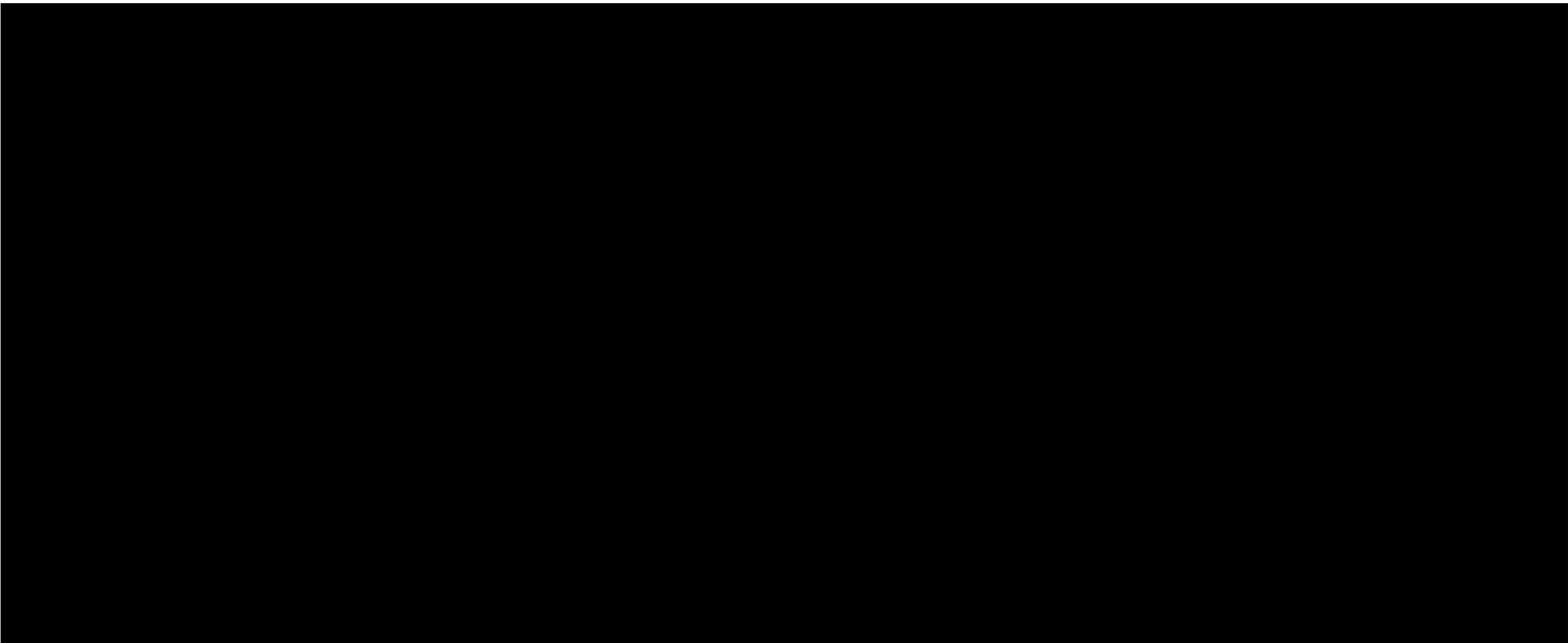
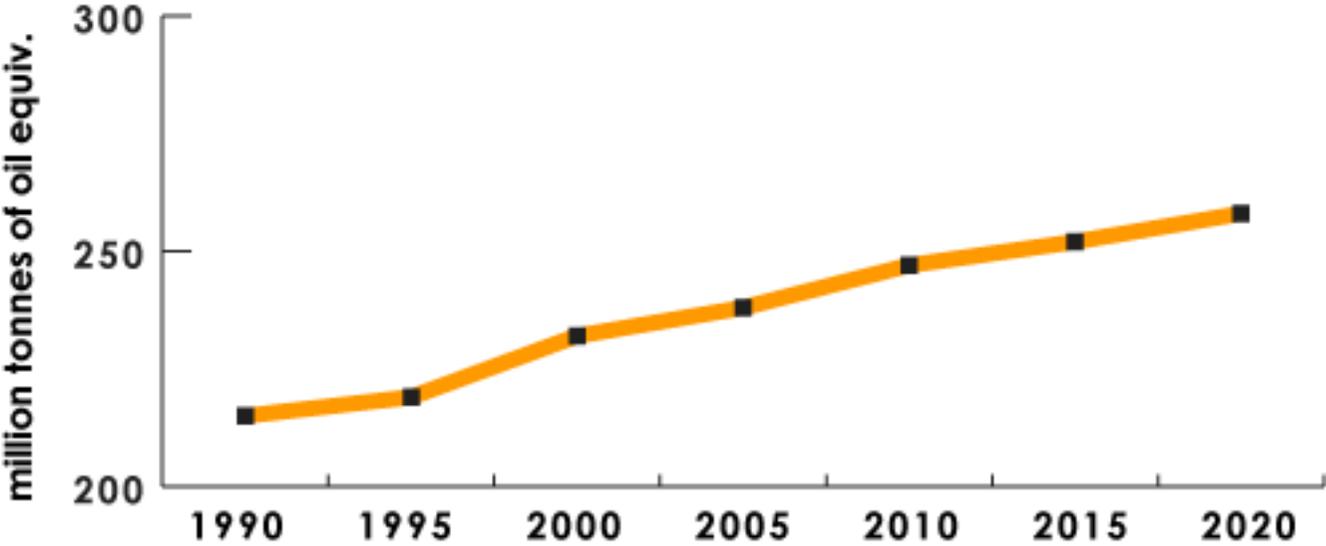
3%

5%

The UK's declining energy reserves

- By 2006, the UK is expected to be importing around 15% of its gas.
- By 2006 the UK is likely to be a net oil importer
- Nuclear power stations will be progressively decommissioned
- Coal is likely to have only a limited role
- On current policies, initiatives to promote domestic renewable energy demand will be insufficient to reduce dependence on imported gas & oil

The UK's increasing energy demand



Lighting



- UK lighting consumes 20% of electricity demand
- More in many other countries
- 40% in Thailand



**Light Pollution =
Energy Wastefulness**



Waste



Site Strip



Wasteful practice



Over ordering



Embodied energy



Refurbishment



Reusable furniture



False economy



Late change



Reusable Off-cuts

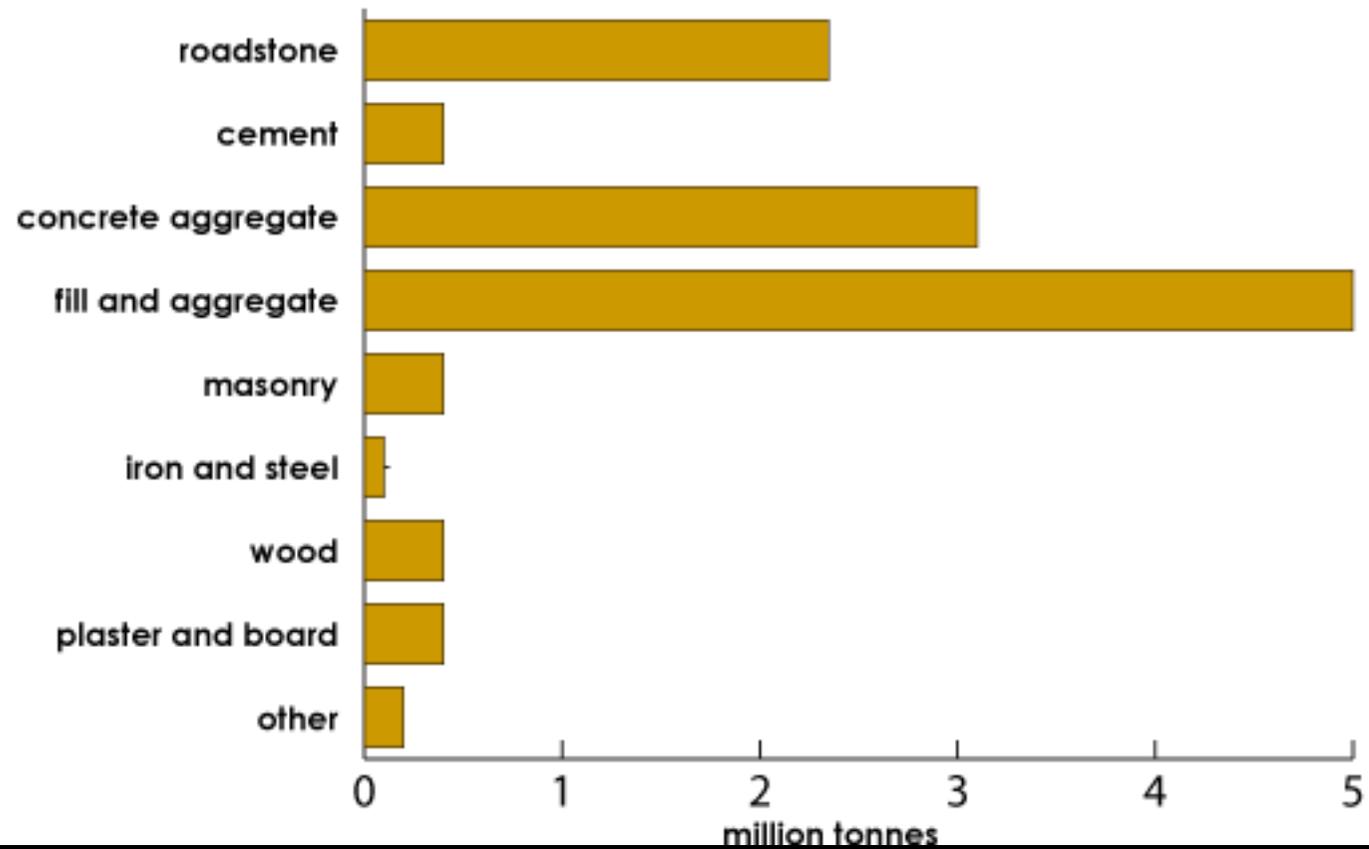
Construction waste



- landfill contributes 46% of the total UK methane emissions
- methane is 21x more potent a greenhouse gas than CO₂

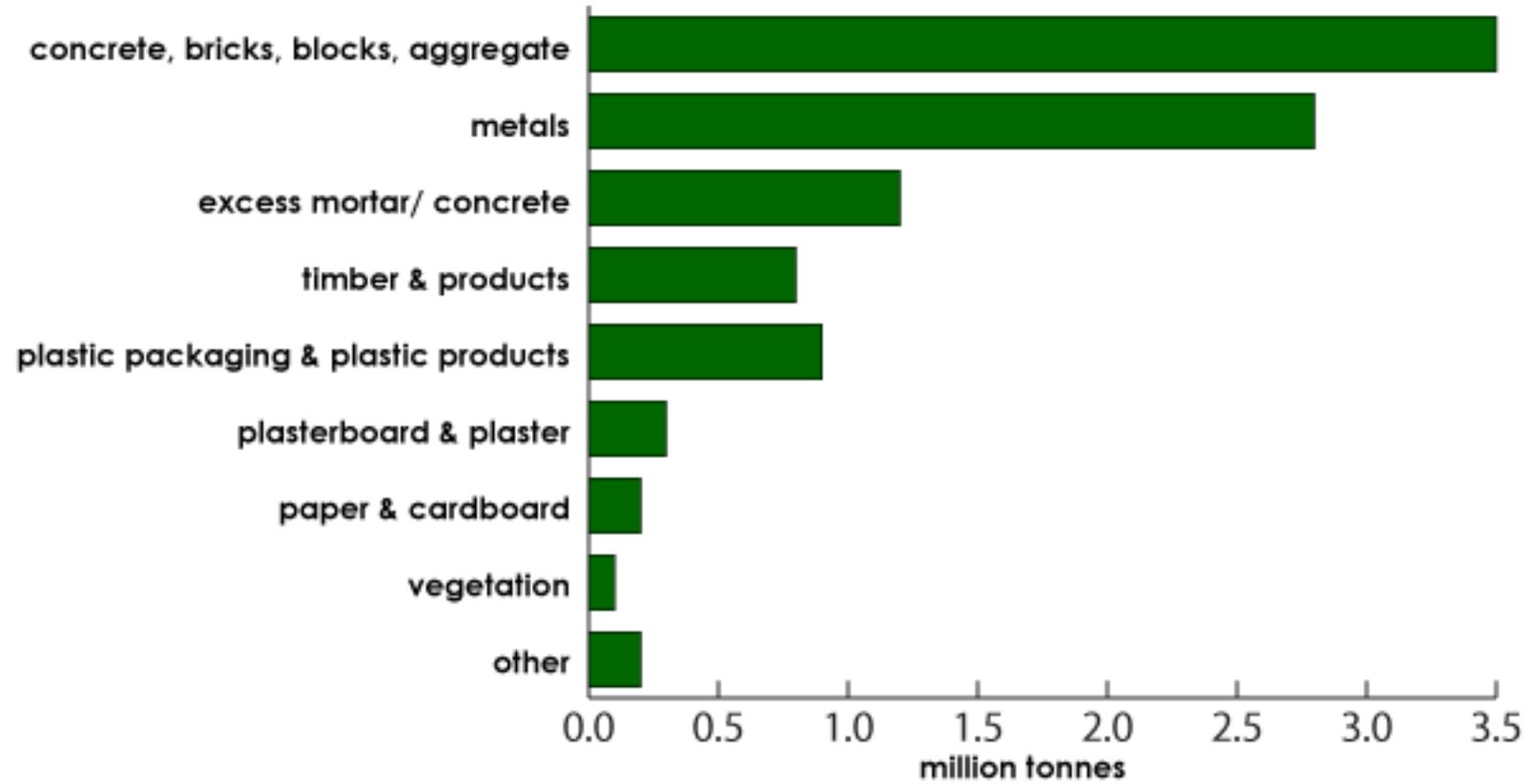
Construction waste

breakdown of waste from materials production



Construction waste

breakdown of waste from the construction process





Timber Waste Segregation?

Greenwich Millennium Village Phase 2a © NGS (School in view)



Concrete Waste Segregation?

Greenwich Millennium Village Phase 2a © NGS (Inert > mixed)

The built environment

- Consumes about 50% of energy produced (transport 25% and industry 25%)
- Nearly 50% of CO₂ emissions in the UK are caused by building, maintaining and occupying buildings
- Improvement in building design would have a significant impact on emissions and energy consumption

How does this affect me?

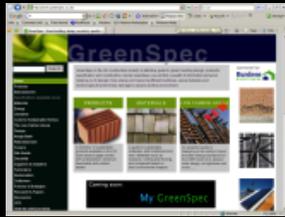
- How can I have any influence on it all?
- EA: don't wait for the other person to start, you show the way, they will follow
- Environment is everybody's responsibility
- All the contracts, conversation and contacts you have, you will show the other parties what they can copy.



Are you Green
or Violet?



Another NGS CPD to download soon



Route to the Future



© Forum for the Future

Idea from Forum for the Future

Another NGS CPD to download soon

Decreasing resources

Now

Sustainable/Environmental Decisions
Apparent Choice is broad
If we choose S/ED now, choice remains broad
But will we continue to let economics dictate?

Future

Increasing demand for resources

Past next
day

The longer we take to start
taking decisions for the environment
the narrower the choices
available to us becomes

Future

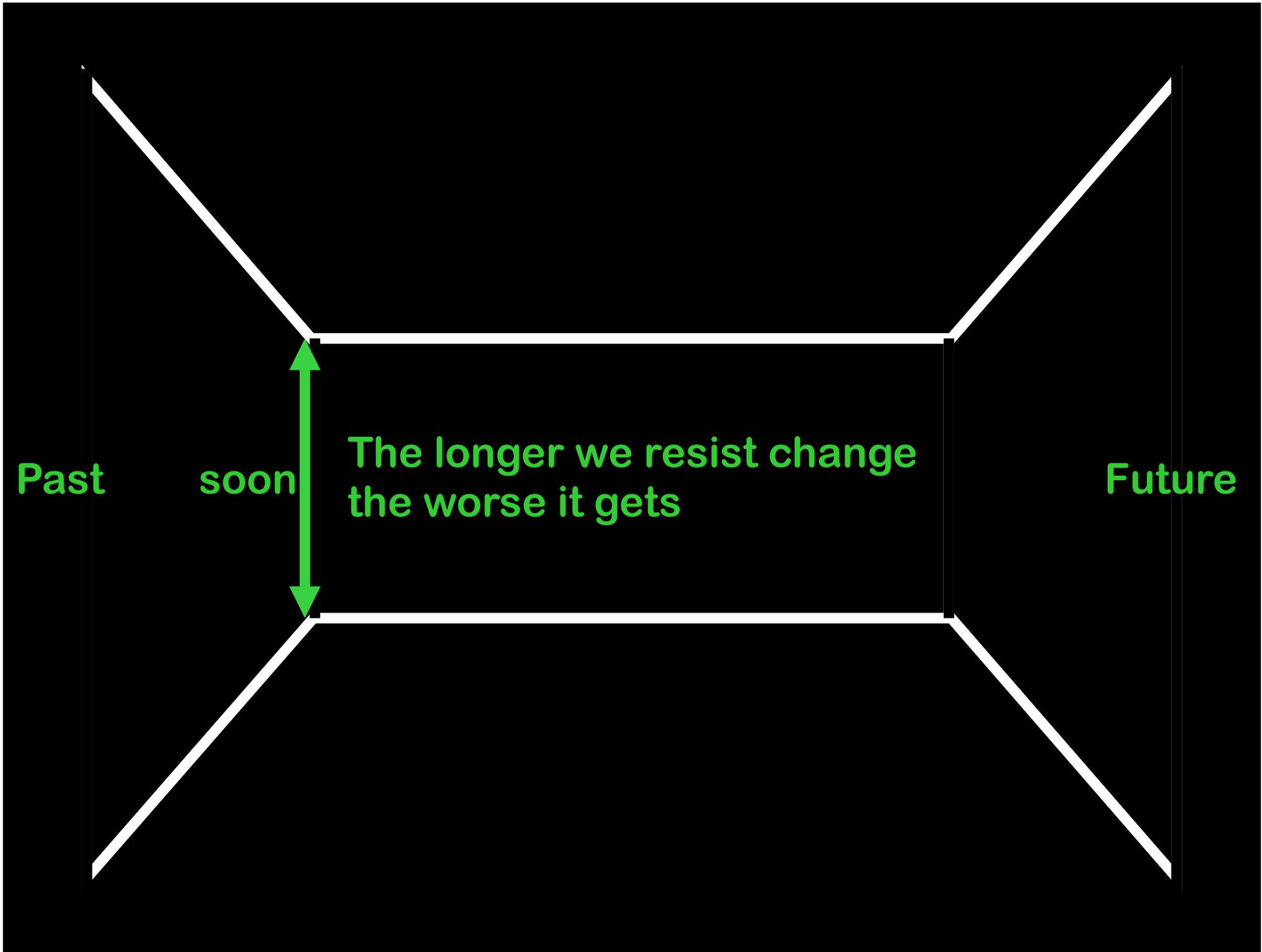


Past

soon

The longer we resist change
the worse it gets

Future



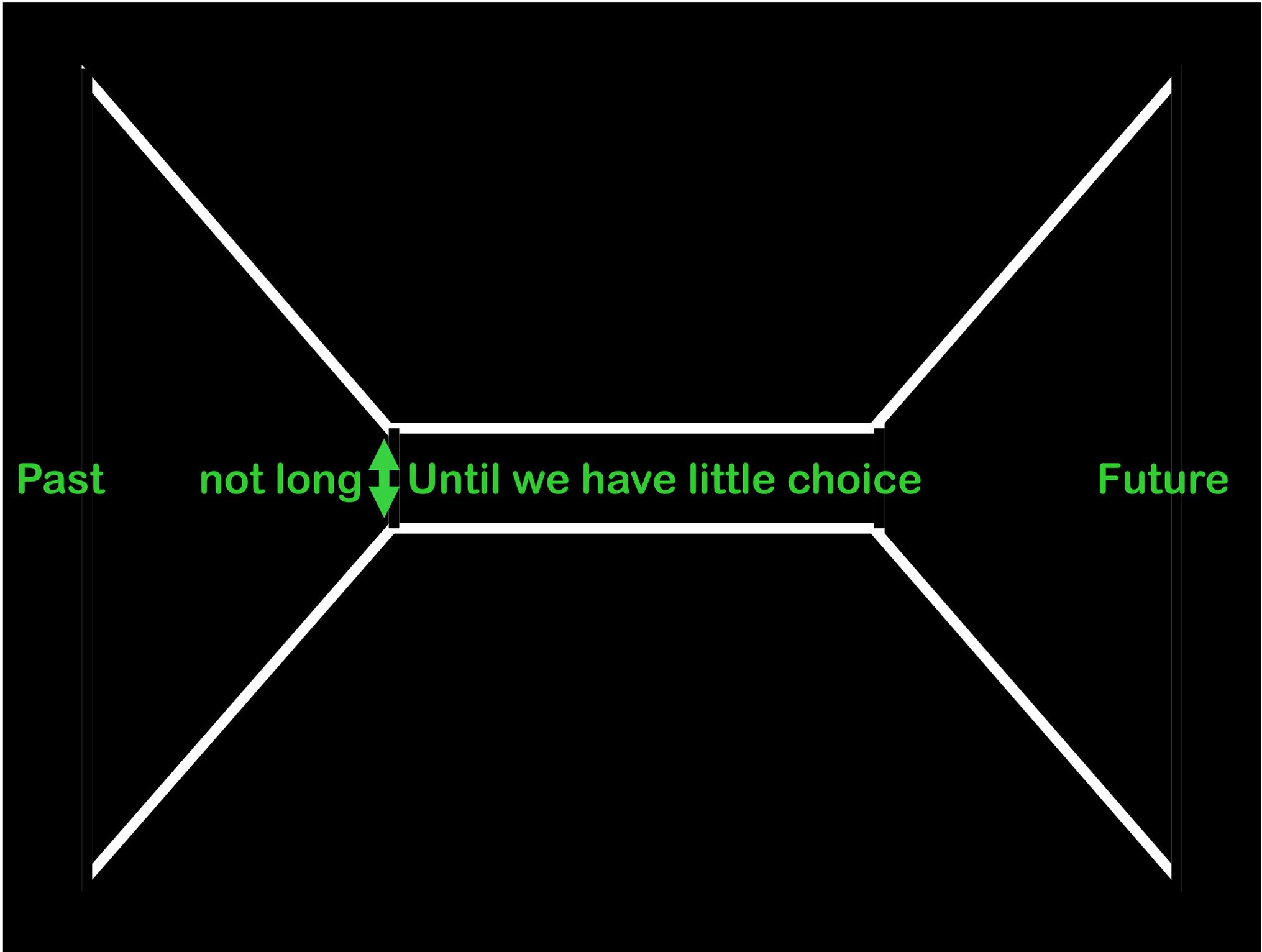
Past

not long



Until we have little choice

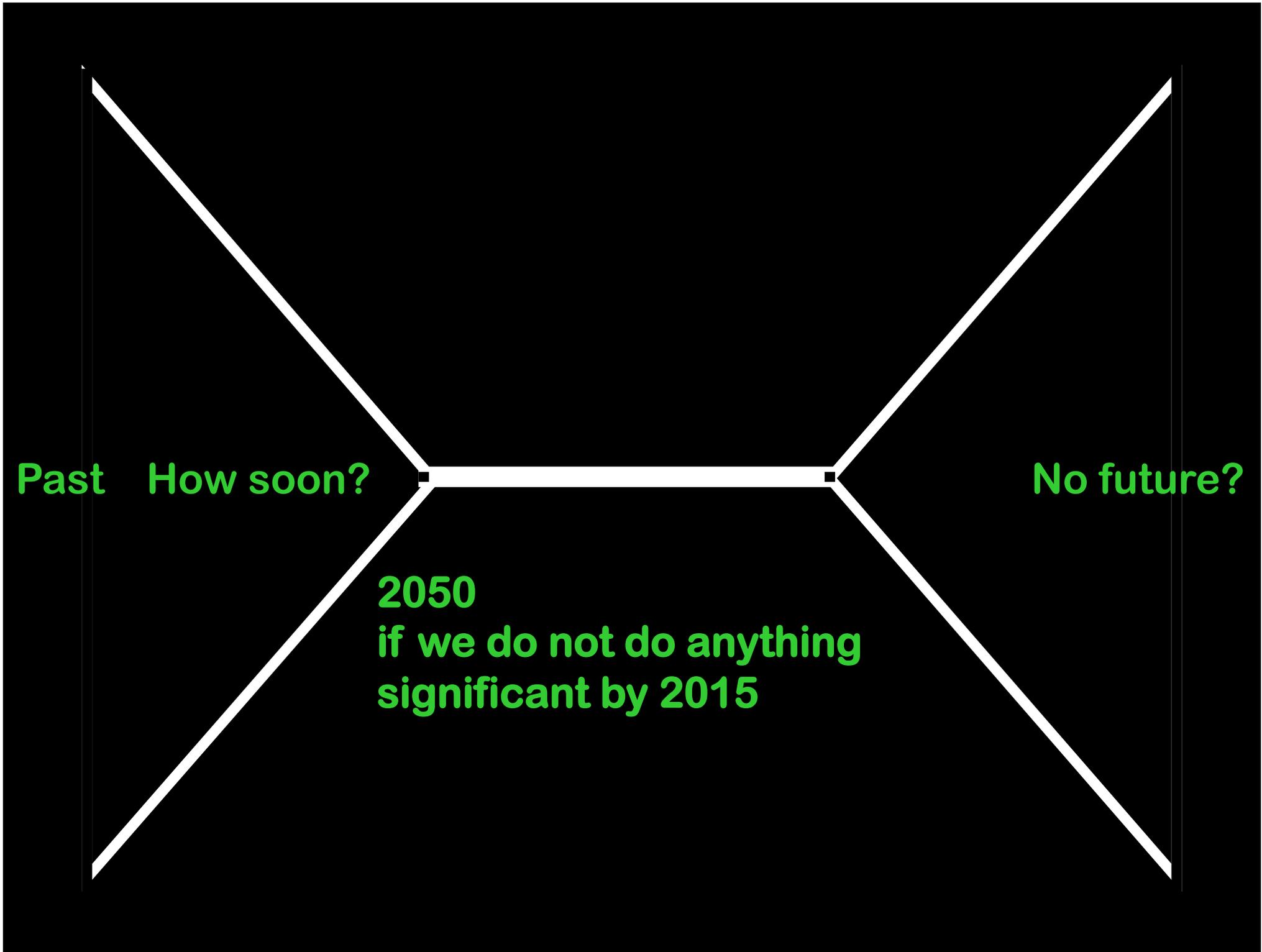
Future



Past How soon?

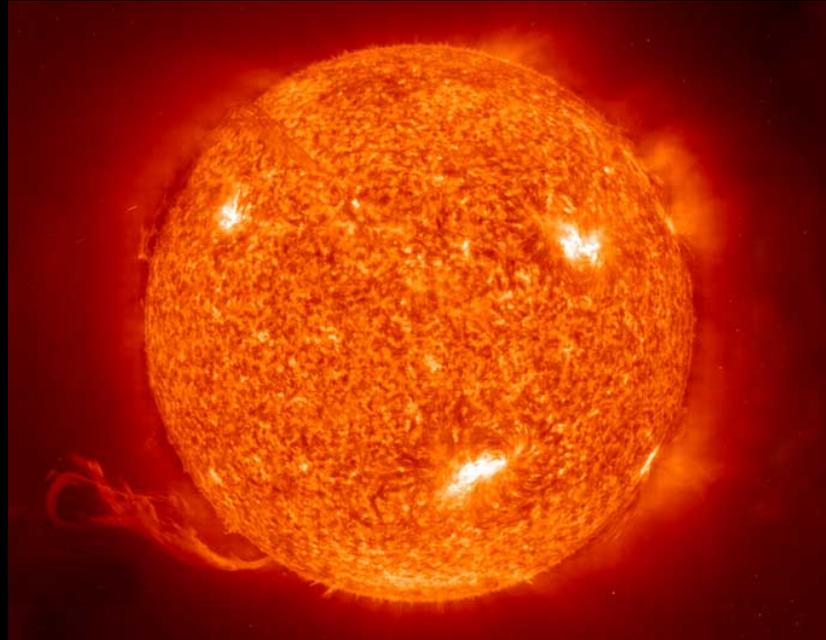
No future?

2050
if we do not do anything
significant by 2015

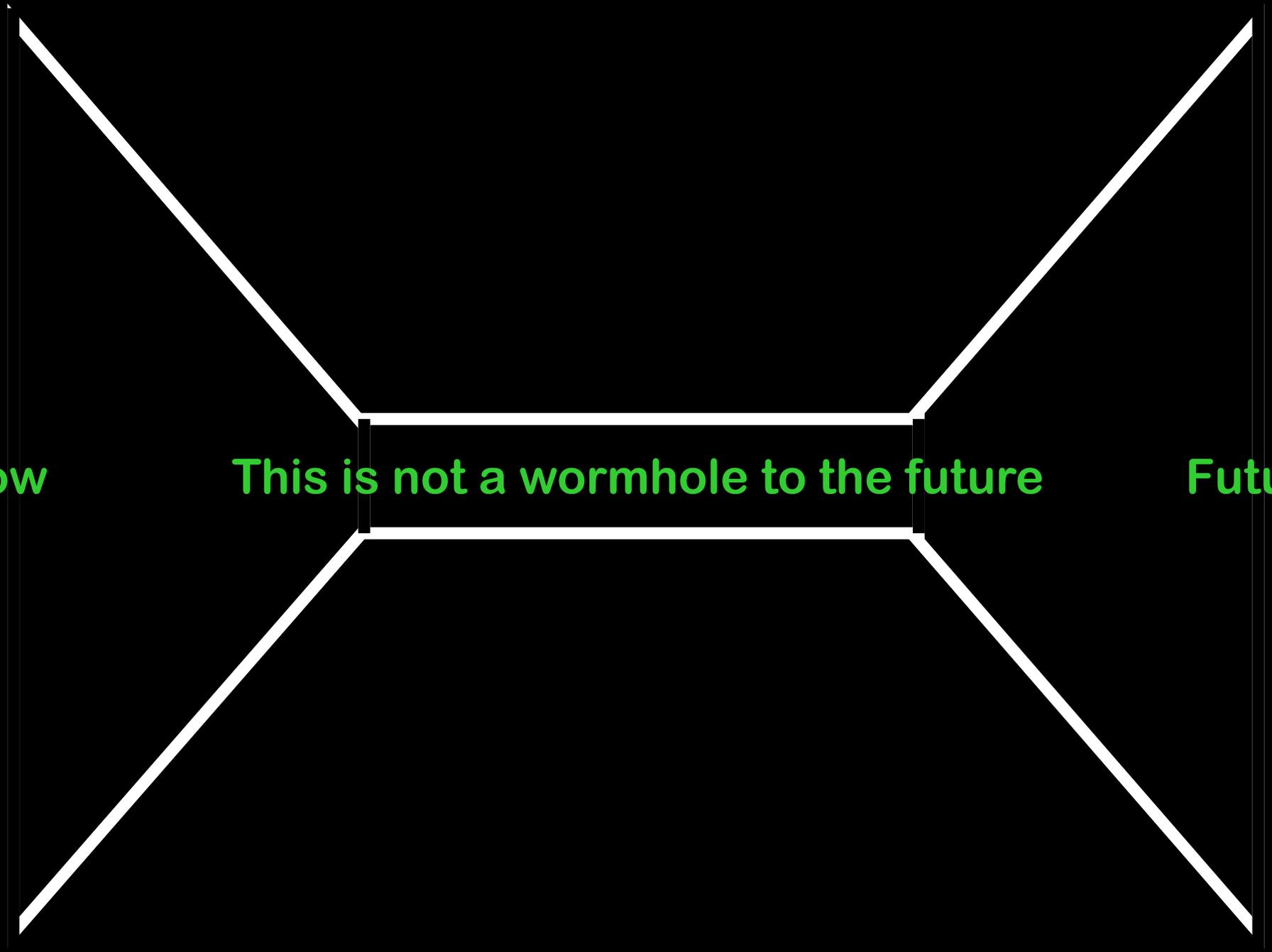




**If nothing significant by 2015
2050 is melt down day**



**The planet will survive us
but will no longer support us**



Now

This is not a wormhole to the future

Future

Now This is not a NASA Discovery route to Mars Future

**USA NASA think they can create
a new planet fit for humans by doing
global warming there
it took ours a few billion years**

We (average UK Citizen) live a 3 planet lifestyle, we only have one



**For every one us to continue to do so
2 other people have to live a zero planet life style.
Ethiopia has already been there Darfor is there now and
there are not enough of them to share between us.
We each need to sponsor two Darforians to keep them on the
brink of death to maintain our lifestyles**

Challenges

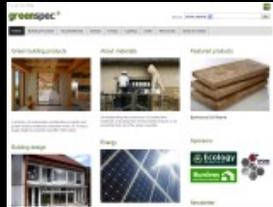
- On the face of it buildings would seem to be the first most important things for those interested in 'green' design.
- But in fact it is a tricky issue for many designers and their clients.
- Client's are not asking for change
- We haven't seen a need to change
- We don't want to change
- We wouldn't know how to change
- So we don't change

Fresh Intake

- LSBU and many others are training students to go out into the world to design buildings
- The Construction Industry needs you to come and sort us out
- We need a fresh new look at the way we do things
- We need to radically change
- Are you up for the challenge?

Alumni Awakened

- CEM and many others are training students to go out into the world to design buildings
- Sustainability was missing
- Their past students now see recruits with new skills and feel they missed out
- They need to catch up, add sustainability to their considerable experience, to take a fresh new look at the way they do things
- The need to radically change
- Are you up for the challenge?



Community Consultation & Participation

The Good, the Bad and the Ugly
And now the Government T&CP laws

Another NGS CPD to download soon



Greening Your Home

Food, Waste,
Home-Office IT,
Kitchen, WCs, Cleaning

Another NGS CPD to download soon



Greening your own Office

**ISO 14001, FM & MOBS,
Sick Building Syndrome, Transport,
IT, Food, Stationery, Paper,
Office, Kitchen, WCs, DDA**

Another NGS CPD to download soon

Current situation

100% today

Halve the demand

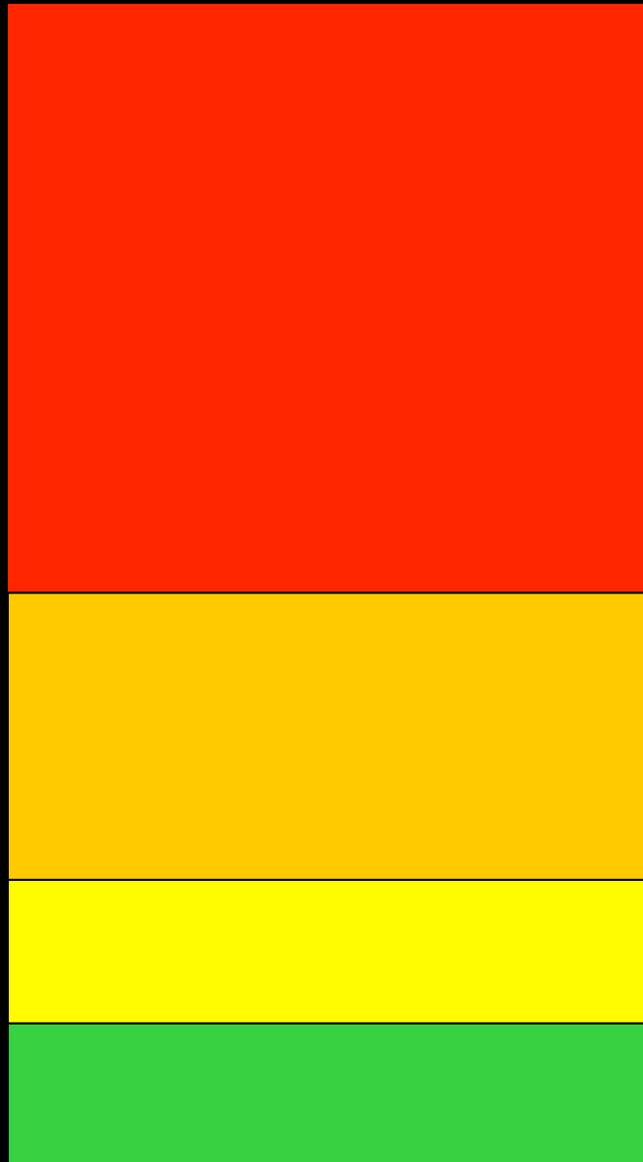
50% (-50%)

Double efficiency

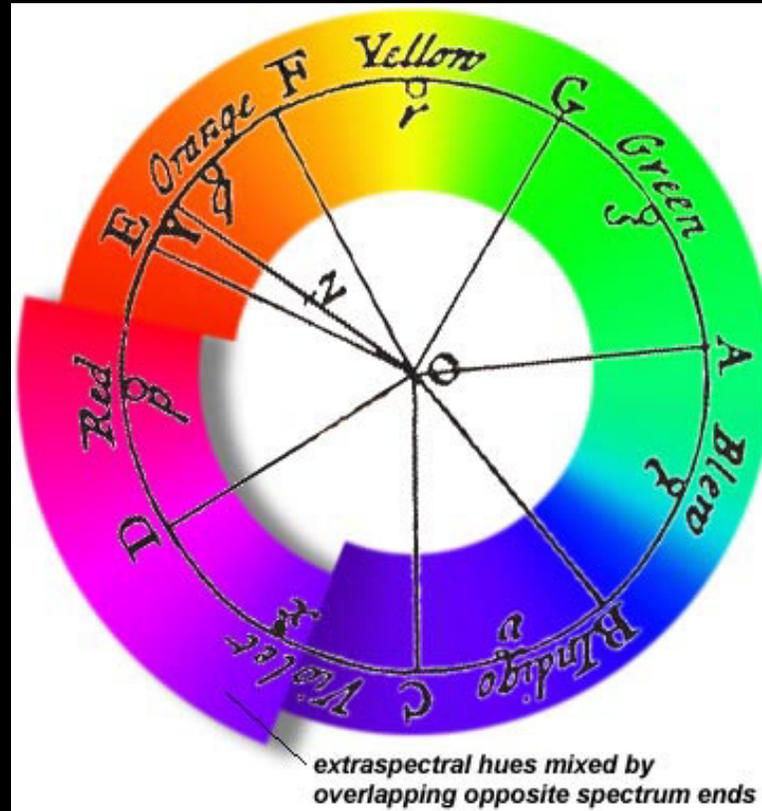
25% (-75%)

Halve the carbon

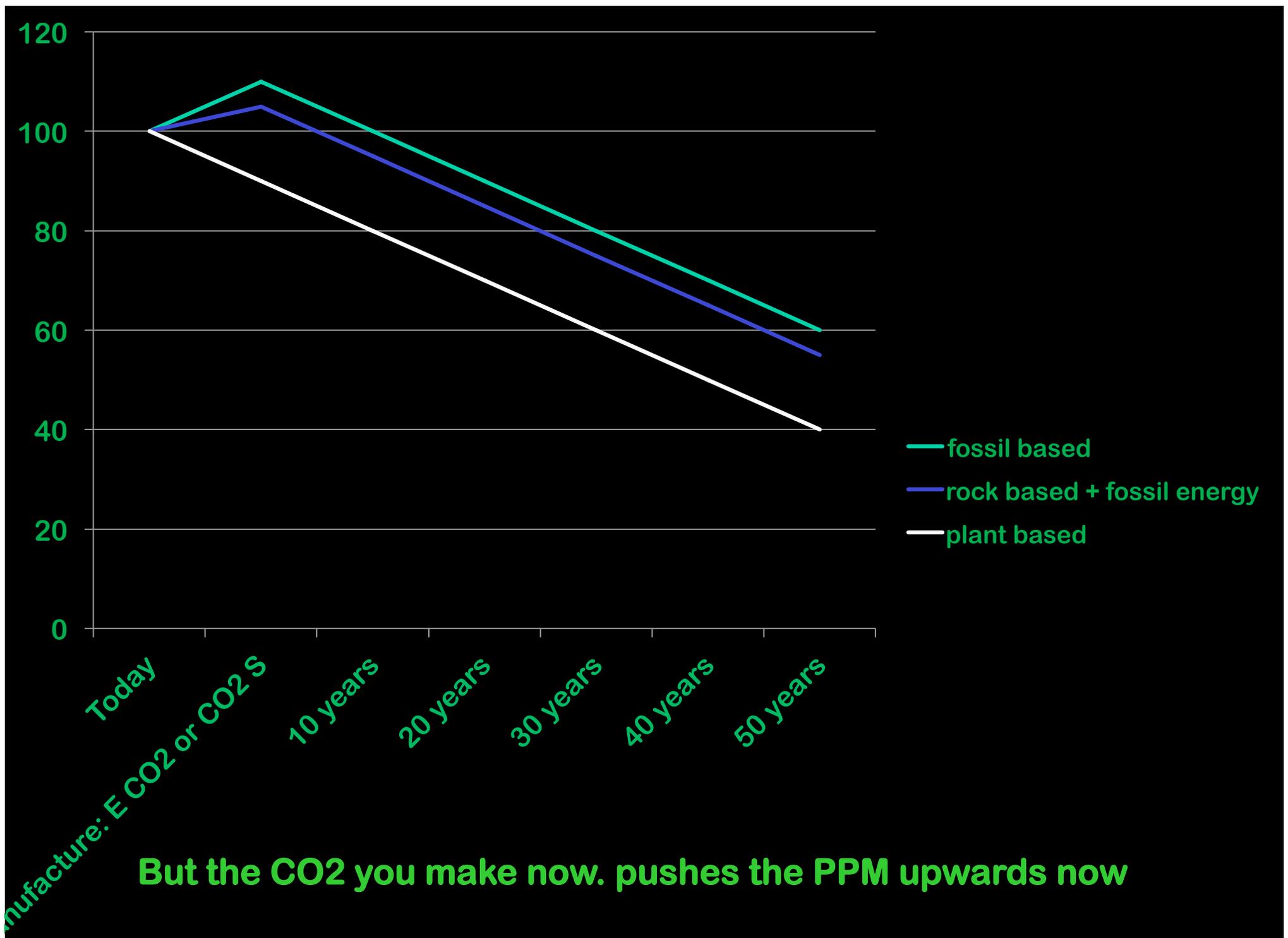
**12.5% (-82.5%)
Some time soon**



Sustainable
Eco
Green



Violet
Violent
Violate



Manufacture: E CO2 or CO2 S

But the CO2 you make now. pushes the PPM upwards now

100%

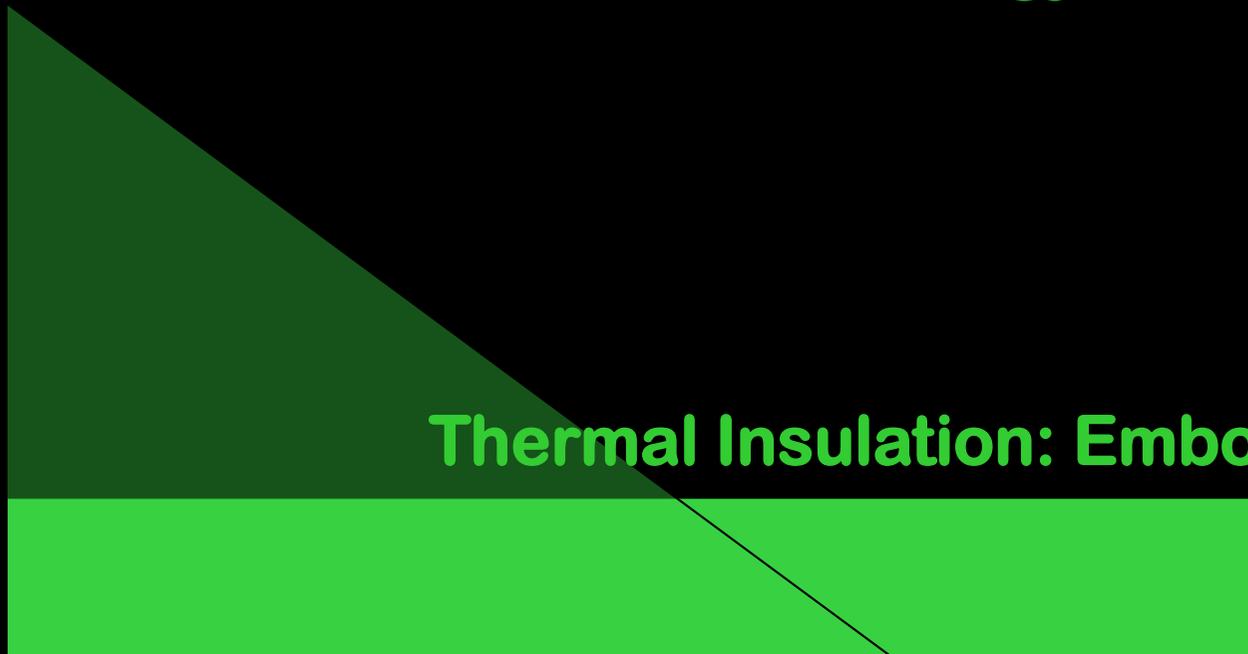
Thermal Insulation: Energy in use in building

Thermal Insulation: Embodied energy

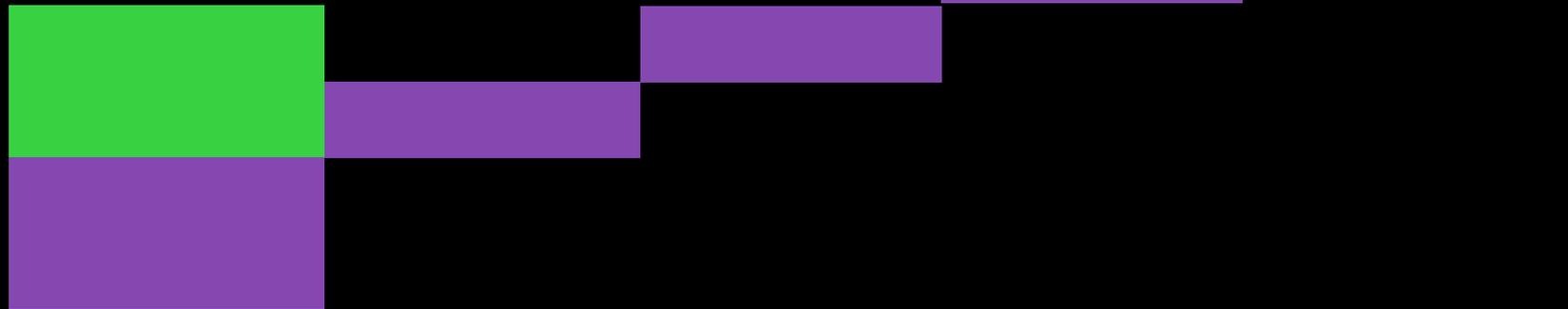
5 -20%

100%.....

0% **Zero carbon Homes by 2016!**.....



**High initial cost: Higher performance, long life materials:
low running costs**



**Low initial cost: Lesser performance, shorter life materials:
Frequent maintenance, repair, refurbishment, replacement
High long term costs**

BRE Elemental EP +ve issues

+ve

0



-ve

Manufacturer

Negative impacts in
and
of materials

disposal

BRE Elemental EP -ve issues

NGS interests +ve attributes

+ve

Positive contribution of
in use performance of
materials or products or elements
in buildings in use
Over life of the building (60 years)

0

Construction

Use

Deconstruction

Negative impacts in
and
of materials

Manufacturer

disposal

-ve

BRE Elemental EP -ve issues

Green materials +ve attributes

+ve

Positive contribution of
in use performance of
materials or products or elements
in buildings in use
Over life of the building (60 years)

Construction

Use

Deconstruction

Positive attributes and Negative impacts in
Growing, Manufacturer and Reclaim, Reuse, Recovery
of materials

-ve

BRE Elemental EP -ve issues



Green Construction & Materials

Global Population

- Reached 7 billion in 2011/12

Population

- 13.04.12
- Source: Unicef
- Interactive graphic by Unicef, depicting growing populations between 1950 – 2050
- <http://www.unicef.org/sowc2012/urbanmap/>

1950

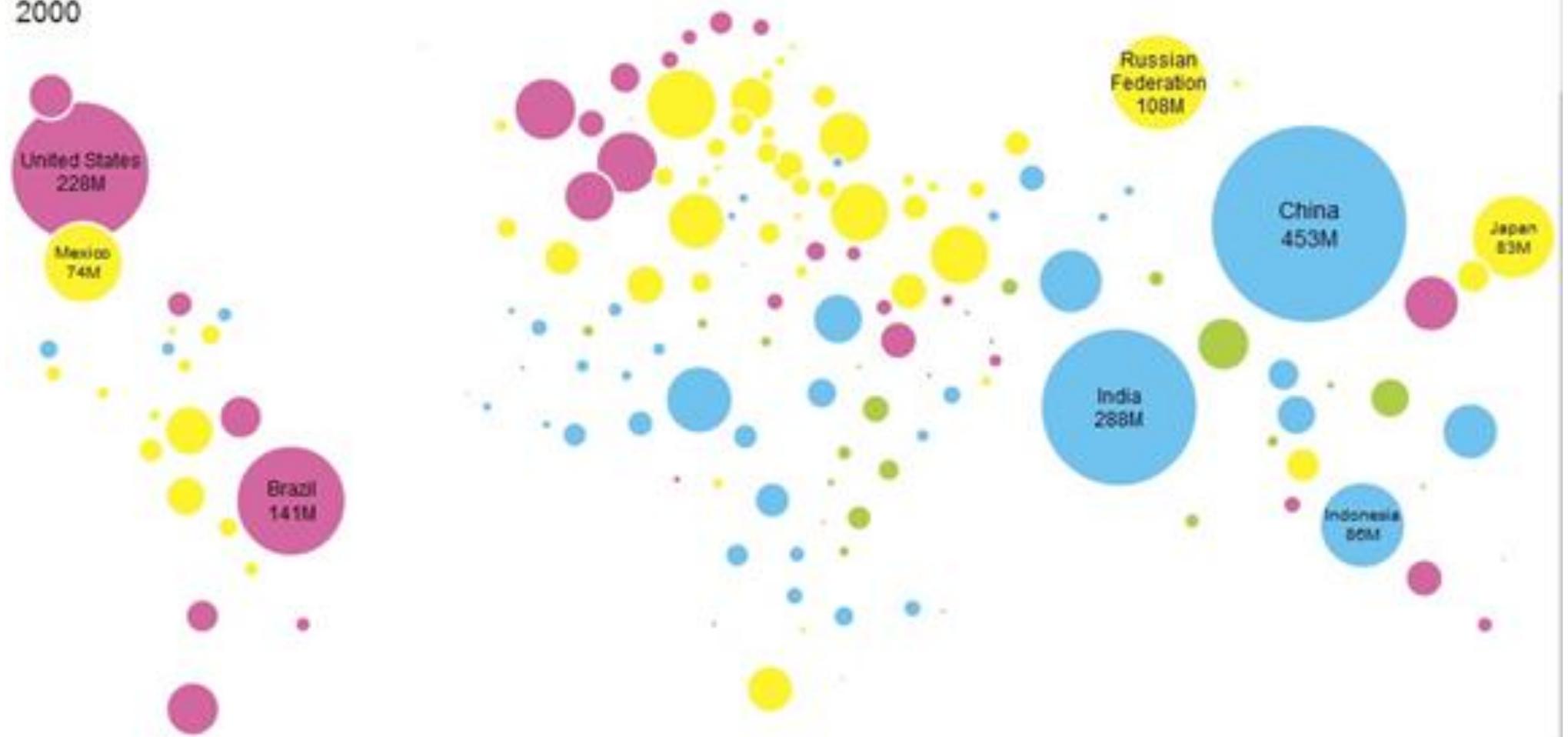
United States
101M

China
64M

India
63M



2000



2050

