Air Quality-the Global Challenge

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Achieving Sustainable Air Quality for London
King's College, London
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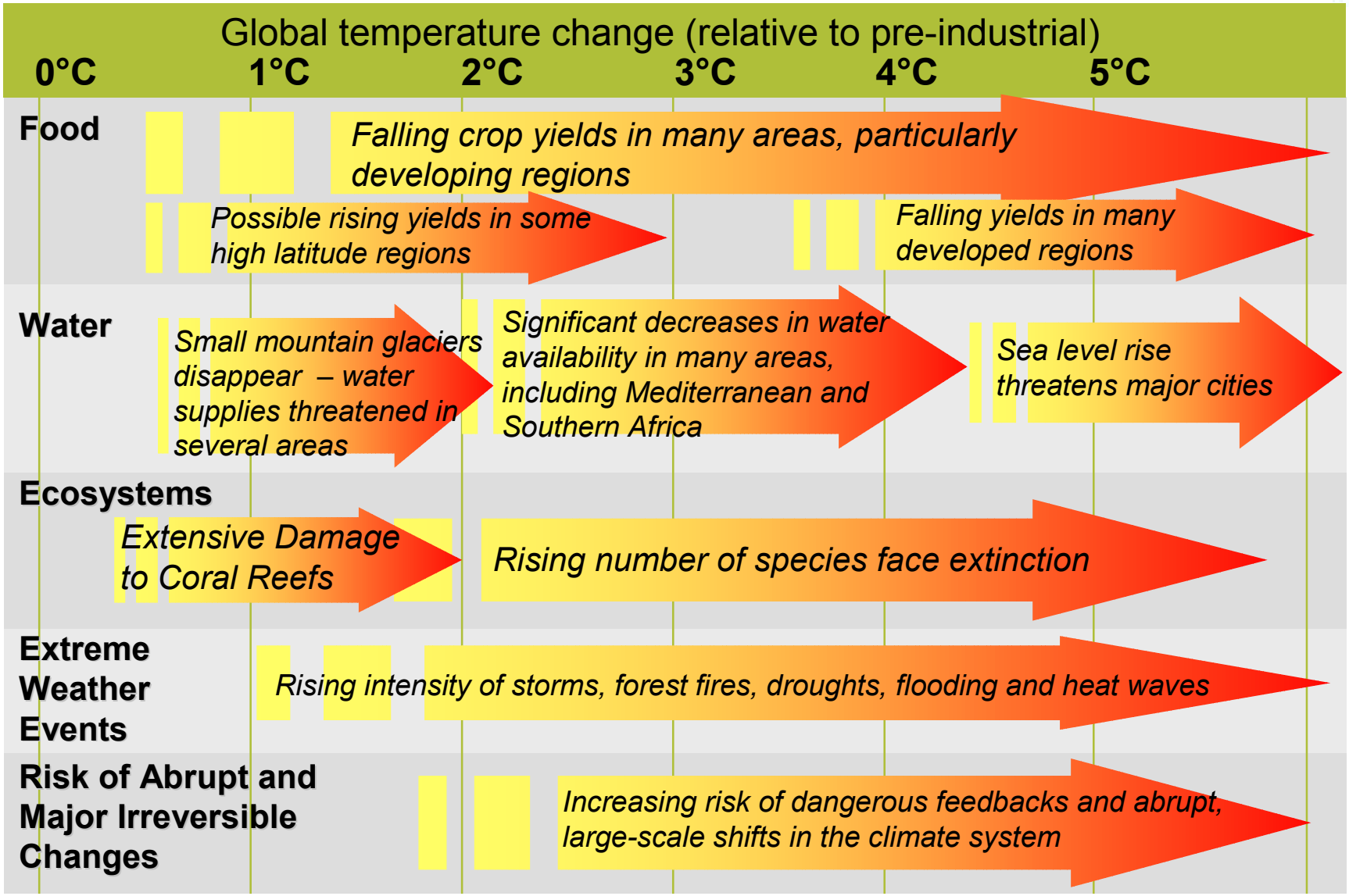
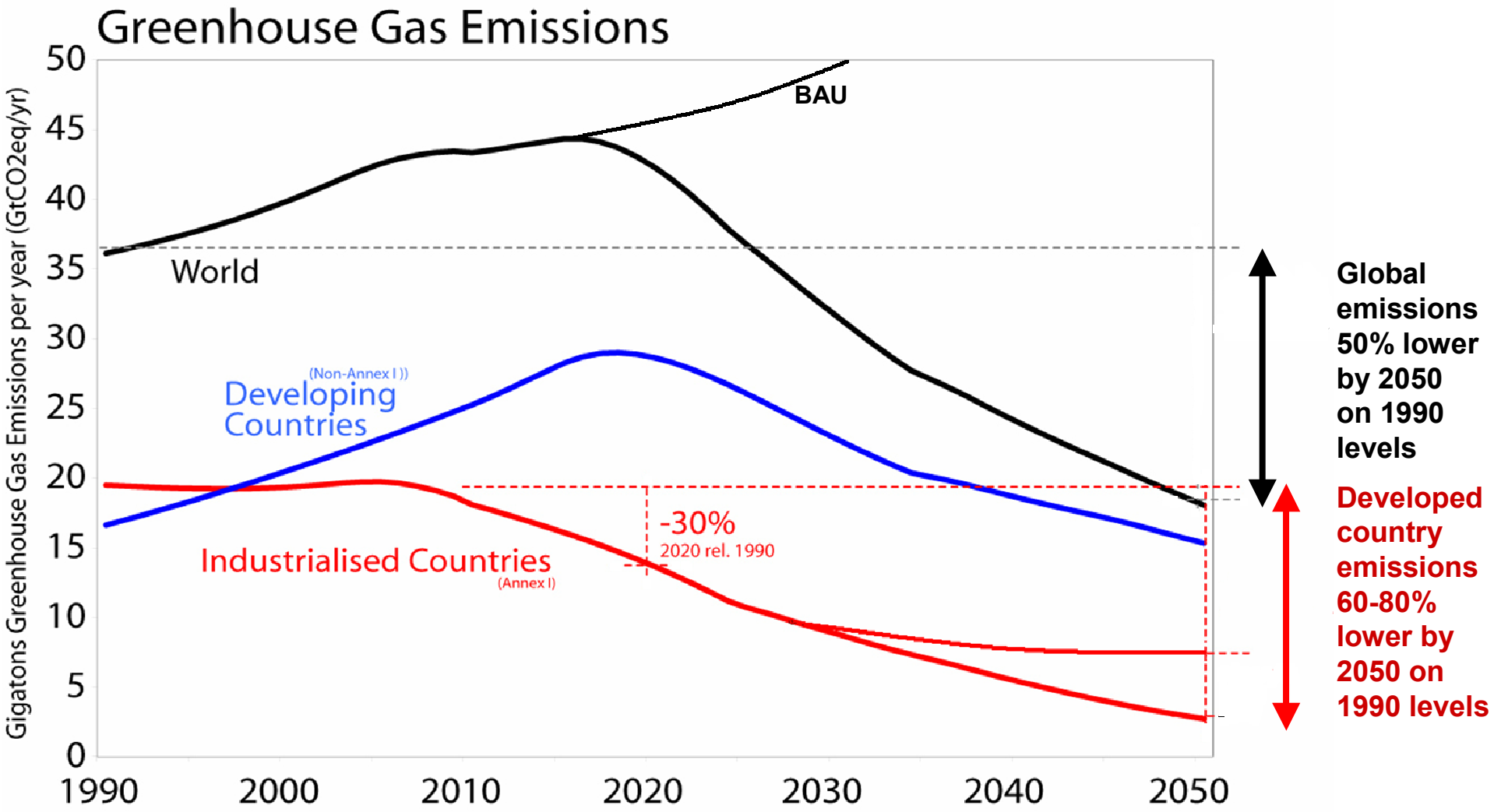
Structure of Talk

- Climate Change context
- Future air quality in London
- Synergies and trade-offs

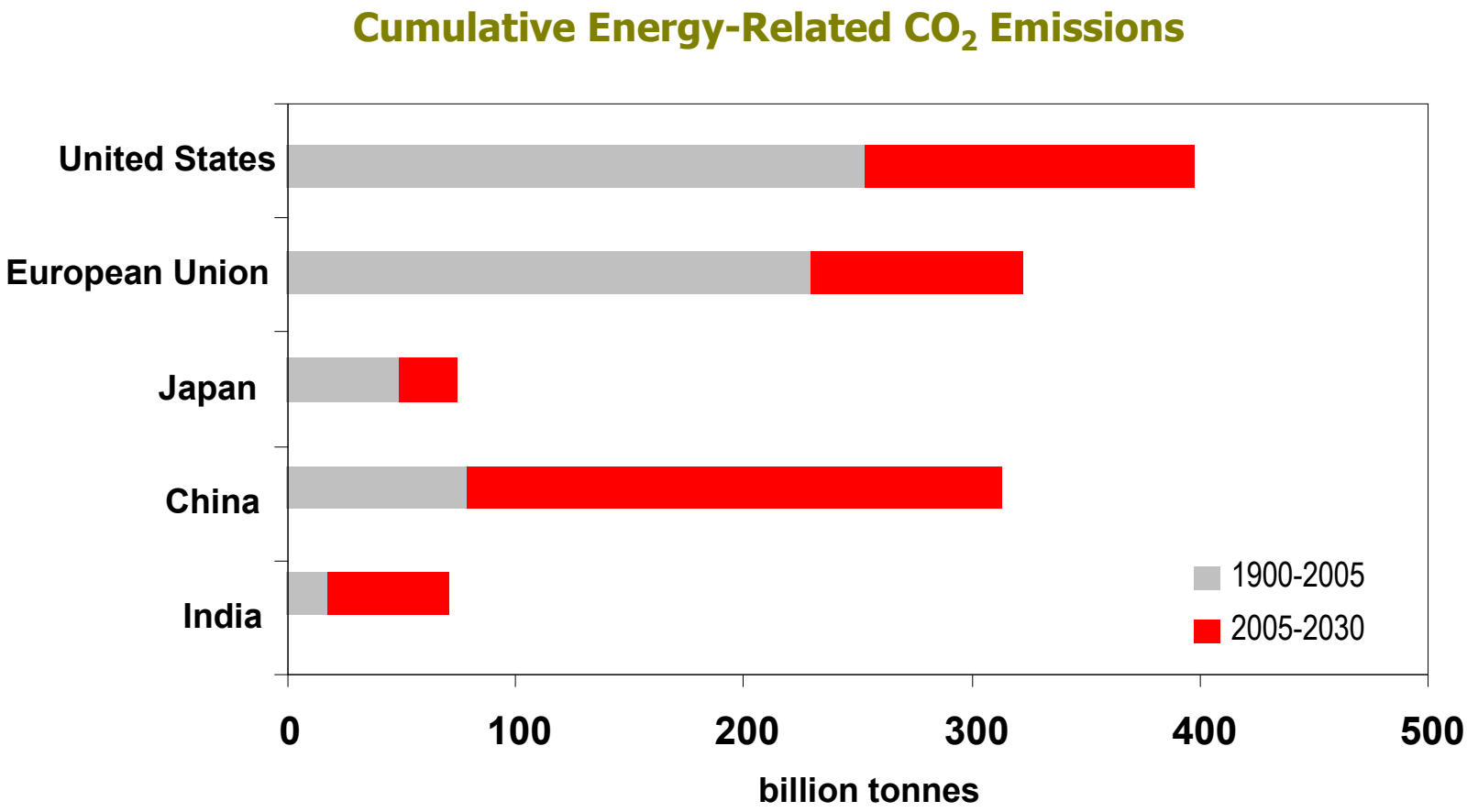
If we don't take sufficient action, impacts of climate change could be felt across the board



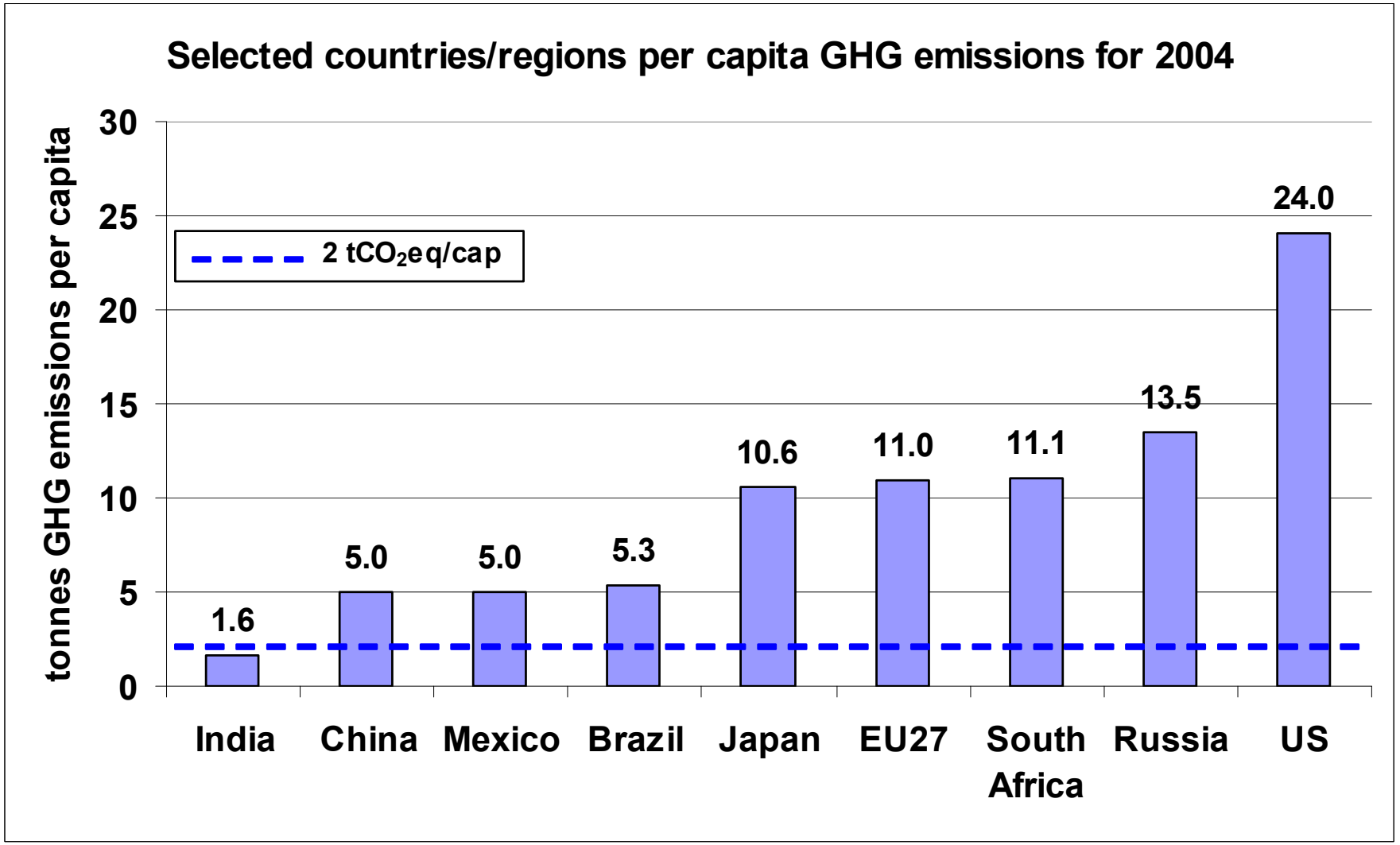
So how do we stay below 2° Celsius?



Where will future emissions come from?



Global emissions are very unevenly distributed



EU Spring Council agreed a number of targets:

- Unilateral target of a 20% reduction in GHGs by 2020 increasing to 30% reduction in the light of a global and comprehensive agreement for the period post 2012
- A binding target of a 20% share of renewable energies in overall EU energy consumption by 2020
- A 10% minimum target to be achieved by all Member States for the share of the biofuels in overall EU transport petrol and diesel consumption
- An increase in energy efficiency, saving 20% by 2020.

Key elements of the Climate Change Bill

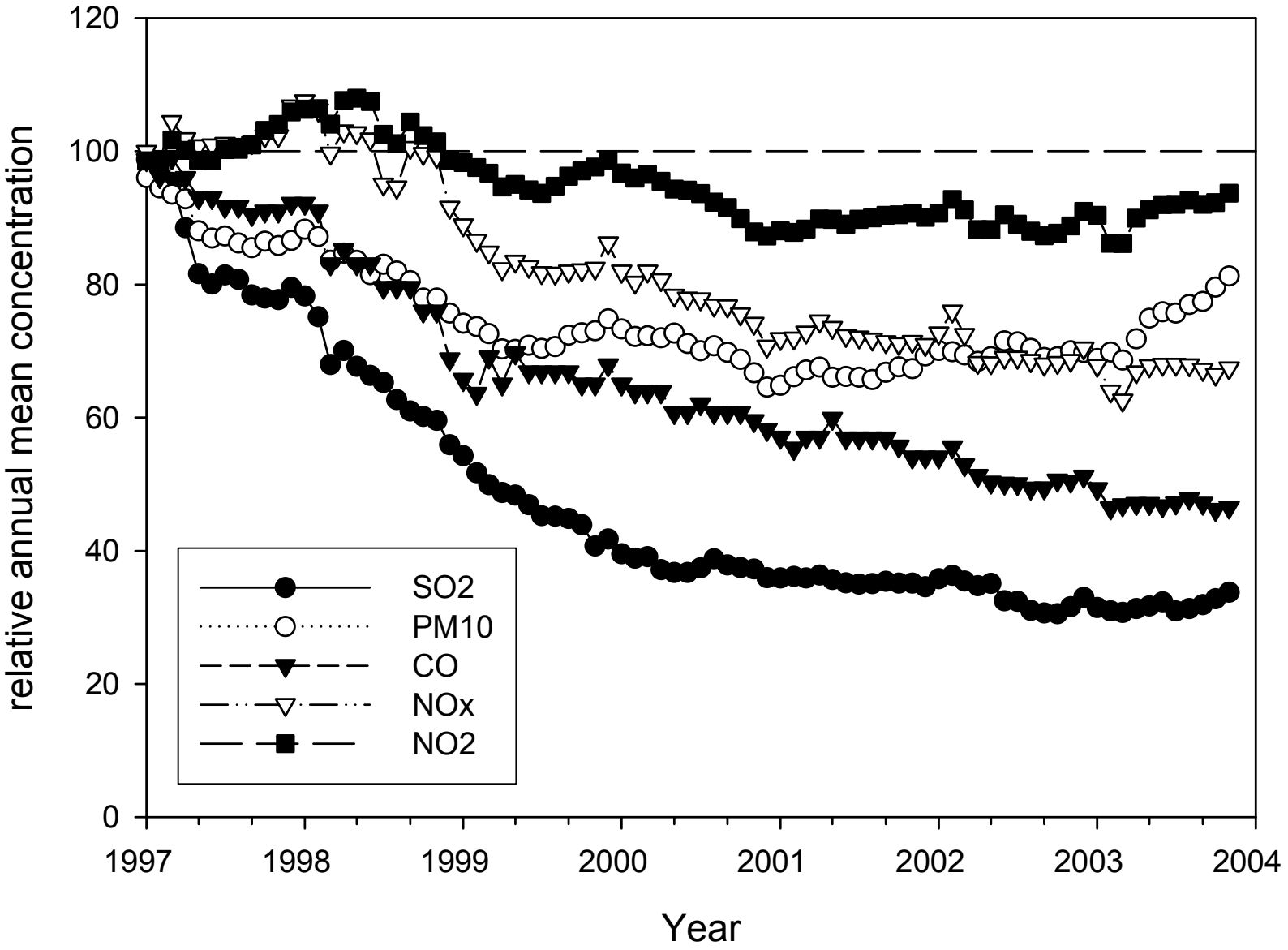
Targets	Long and medium term targets: CO2 emission reductions of at least 60% by 2050 and 26-32% by 2020, through action in the UK and abroad
Budgets and accountability	Five-year carbon budgets to set out our trajectory, backed by annual progress reporting to Parliament
Committee on Climate Change	New independent body to advise Government on carbon budgets and where least cost savings could be made
Measures to reduce emissions	Powers to introduce emissions trading schemes more quickly and easily, including new Carbon Reduction Commitment. Biofuels. Waste.
Adaptation	Government to report at least every five years on climate change risks, and programme to address them

In the UK context, we have world-leading evidence base on climate change impacts and adaptation

- UK Climate Impacts Programme (UKCIP) established in 1996, based at Oxford University and working closely with the Hadley Centre
- Produces “UK Scenarios” – last set in 2002, next in October 2008. Overall message: hotter, drier summers & warmer, wetter winters. But with significant regional variations.
- Also produces range of adaptation tools – such as advice to businesses on how to carry out cost benefit analysis of climate change risks

London’s Air Quality

Relative Annual Means London, 1997=100



The Air Quality Strategy
for England, Scotland,
Wales and Northern Ireland

A consultation document
on options for further
improvements in air quality

Volume 1
April 2006

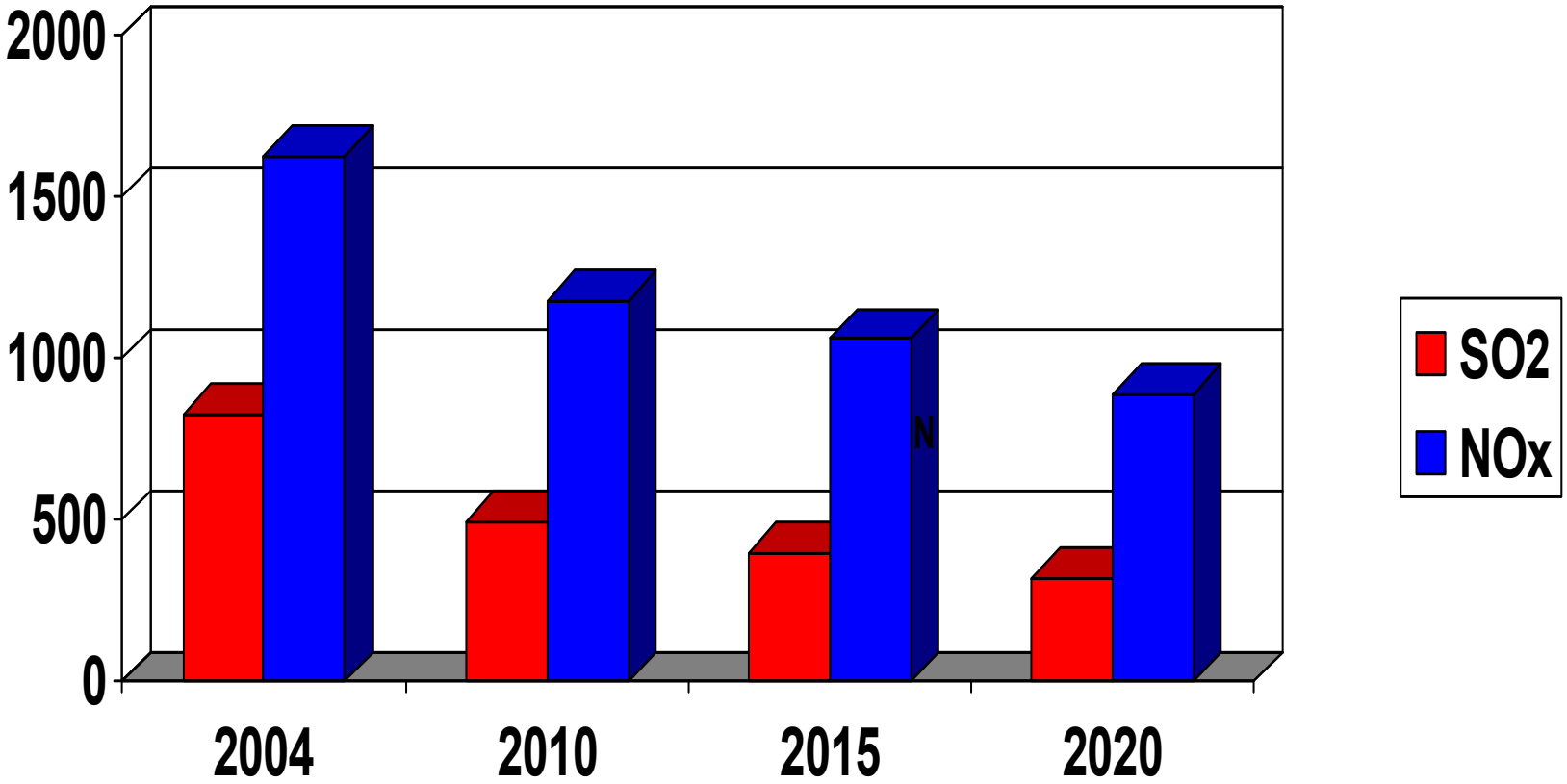
Llywodraeth Cynulliad Cymru
Welsh Assembly Government

Department of the Environment

SCOTTISH EXECUTIVE

defra
Department for Environment
Food and Rural Affairs

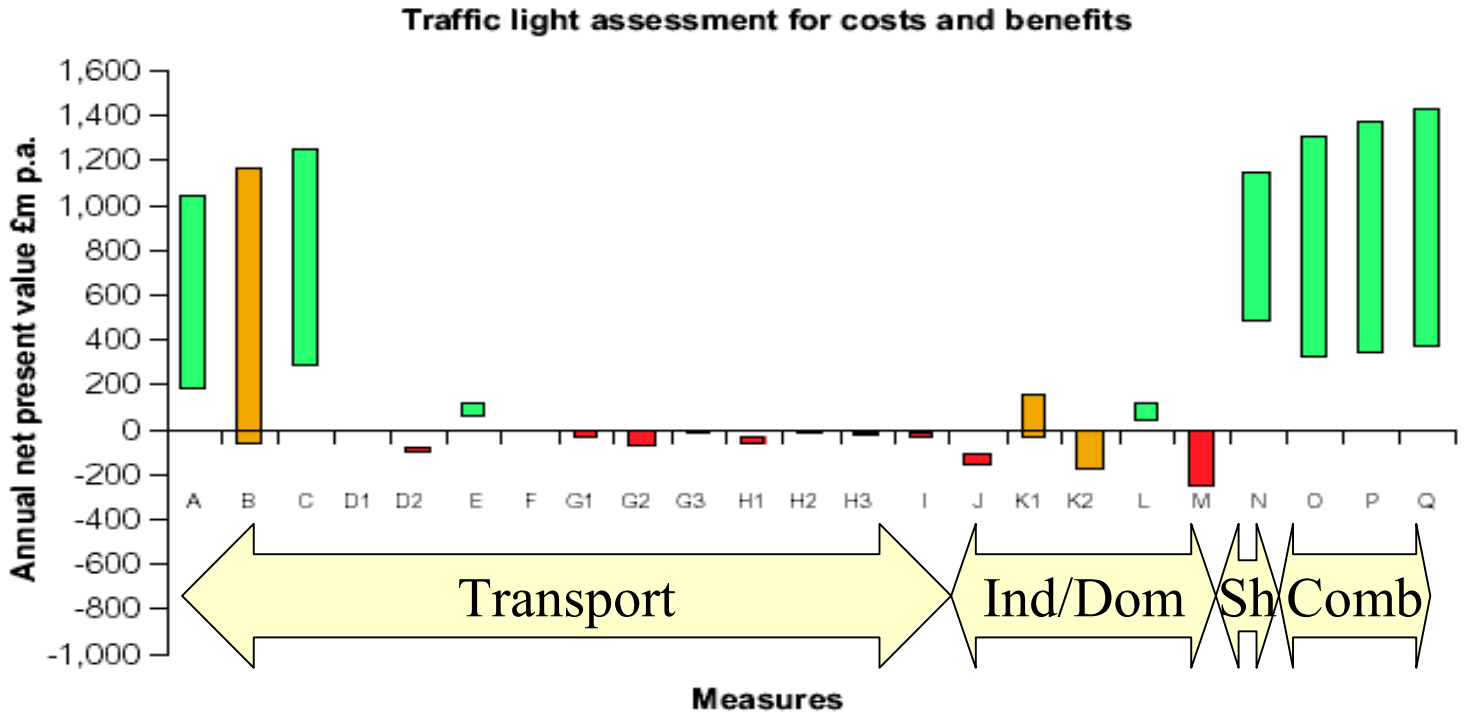
Future Projections – UK SO_2 and NOx Emissions (kt/yr)



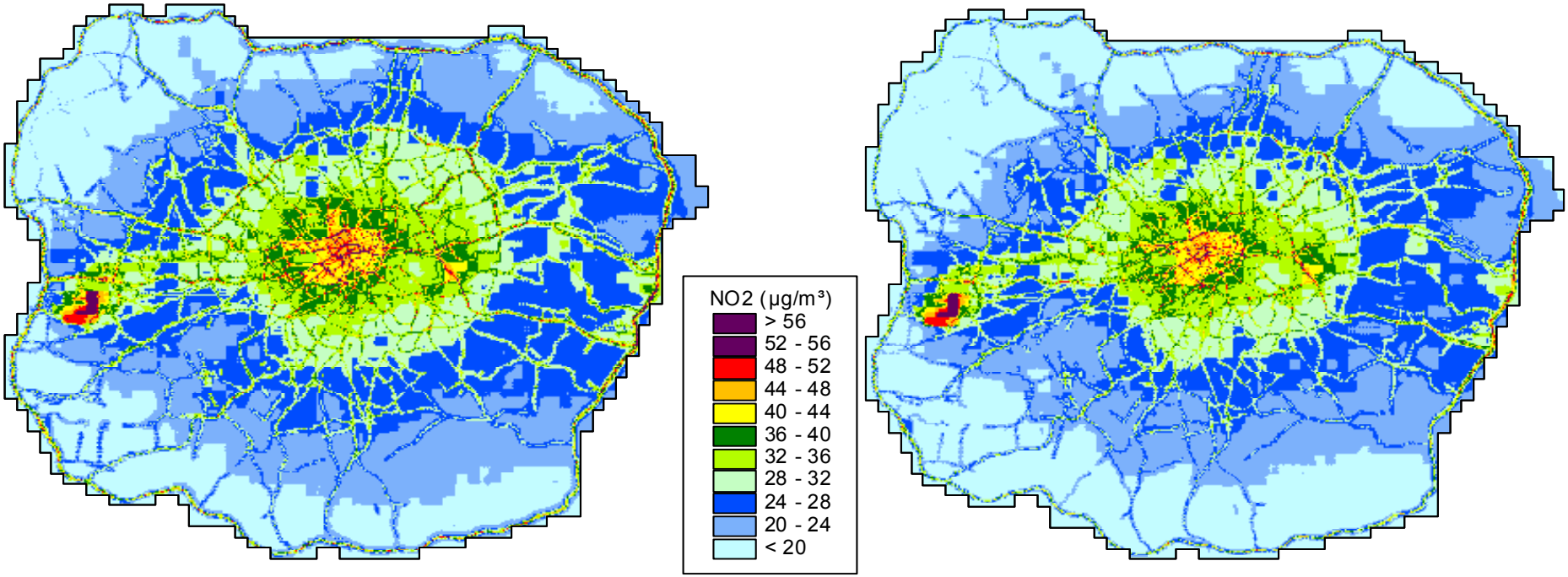
Measures: Costs & Benefits

Figure 3.5

Summary of monetary costs and benefits assessment[19,20]

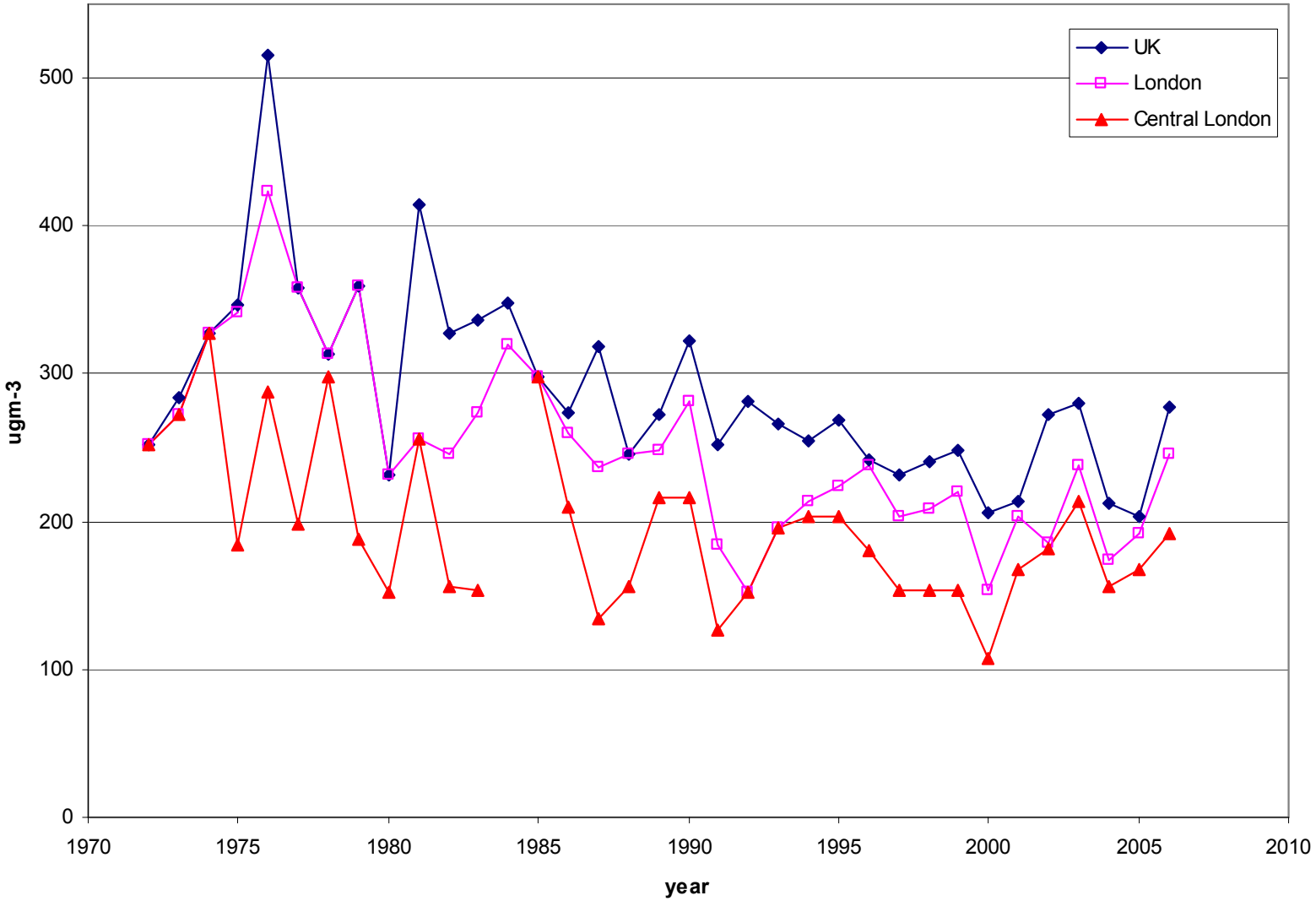


Impact of Measure Q on annual average NO_2 concentrations 2020

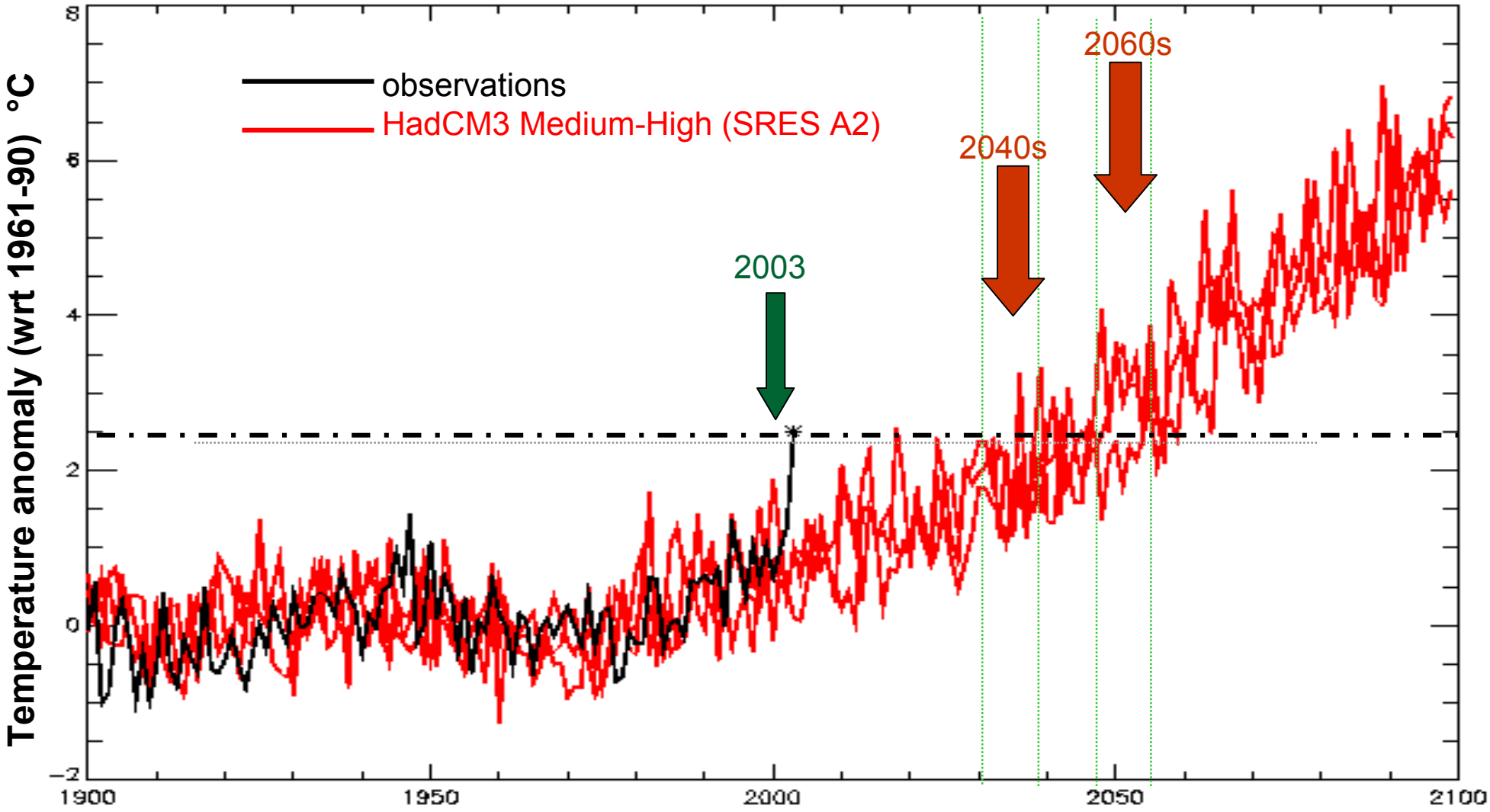


CERC

Maximum 1-hour mean Ozone in UK

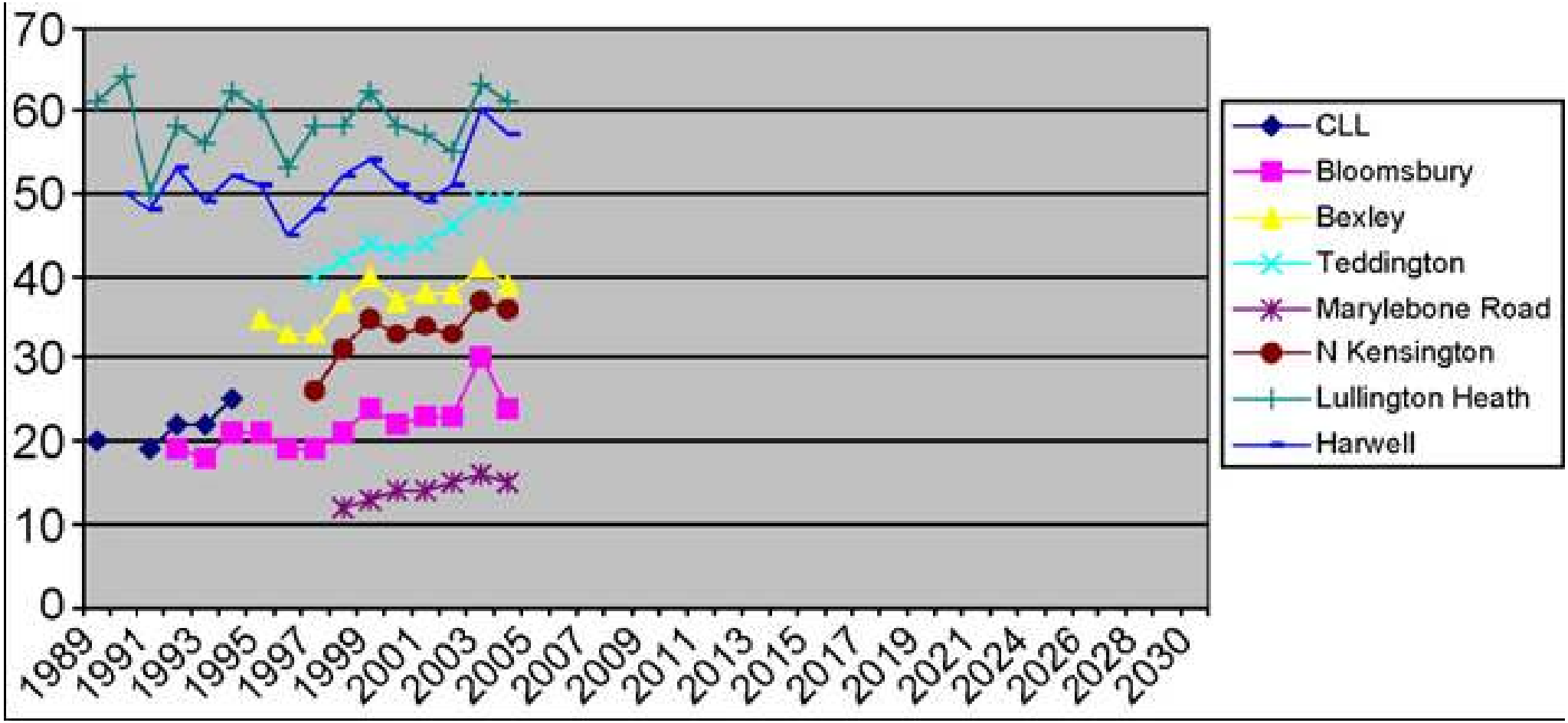


Anticipated Increase in UK Summer Temperatures: By the 2040s "normal" will be 2003

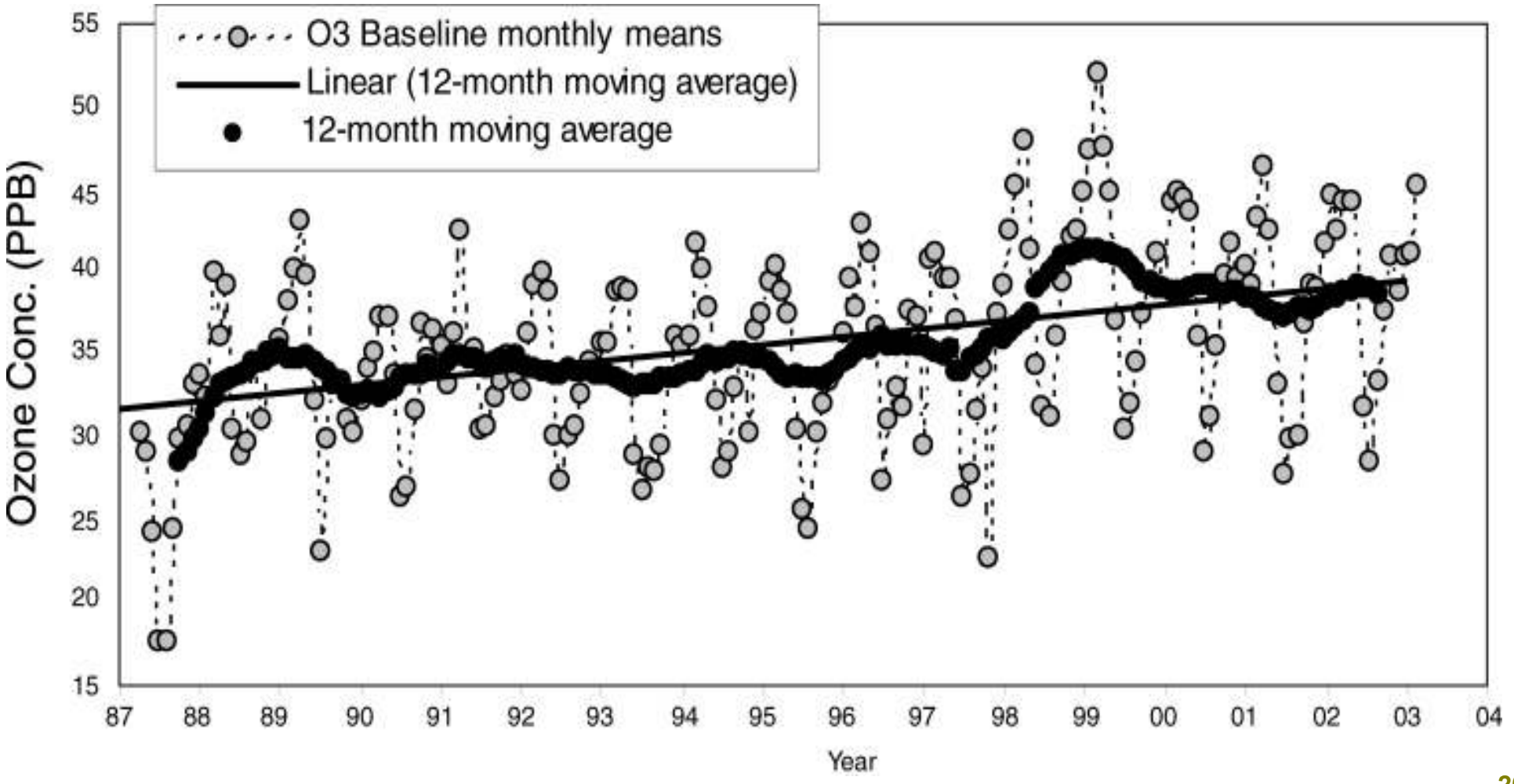


Hadley Centre

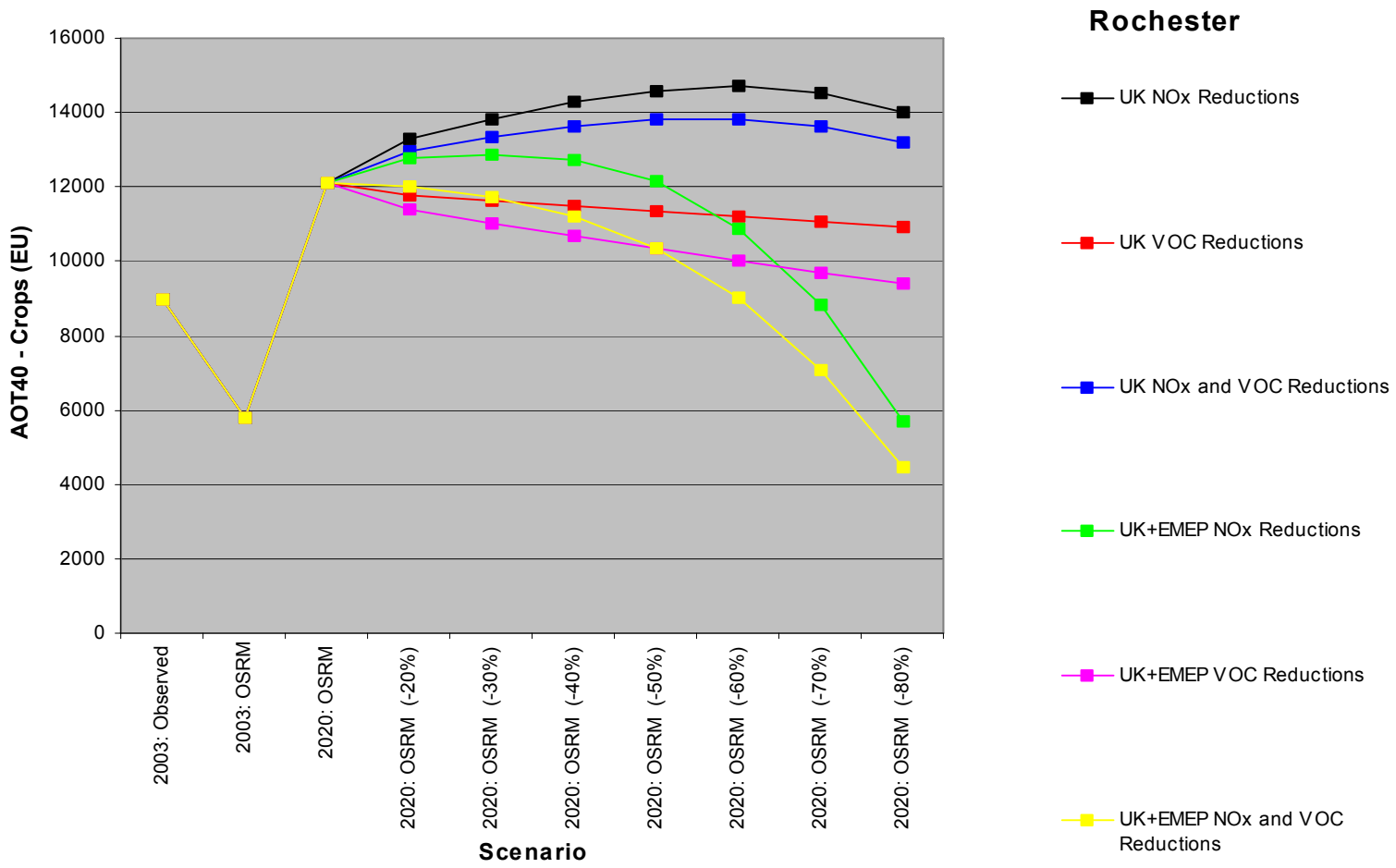
Annual Mean Ozone at Urban and Rural sites in London and SE England (µg/m^3)



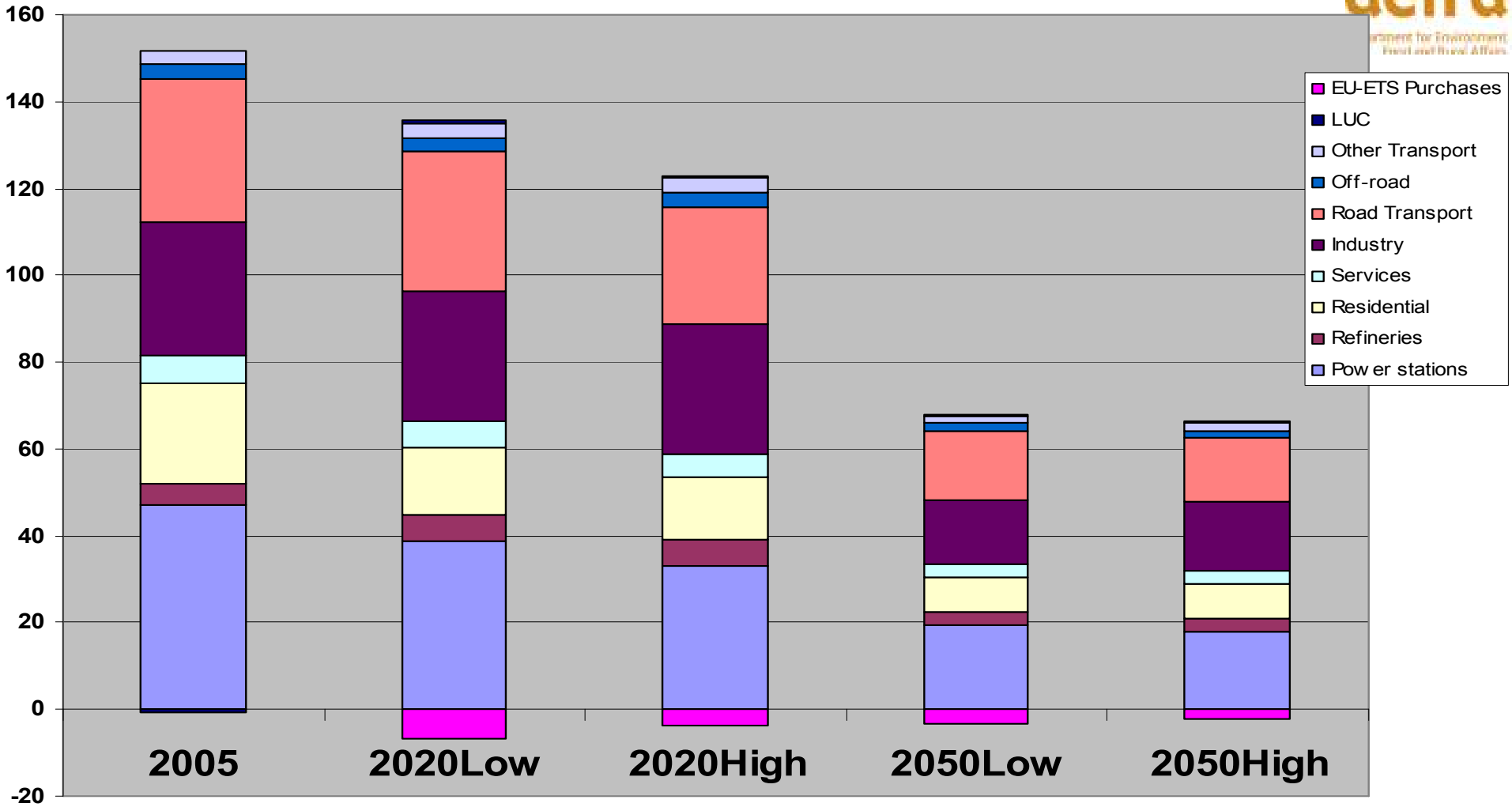
How will the tropospheric ozone baseline change?



Future Ozone Controls



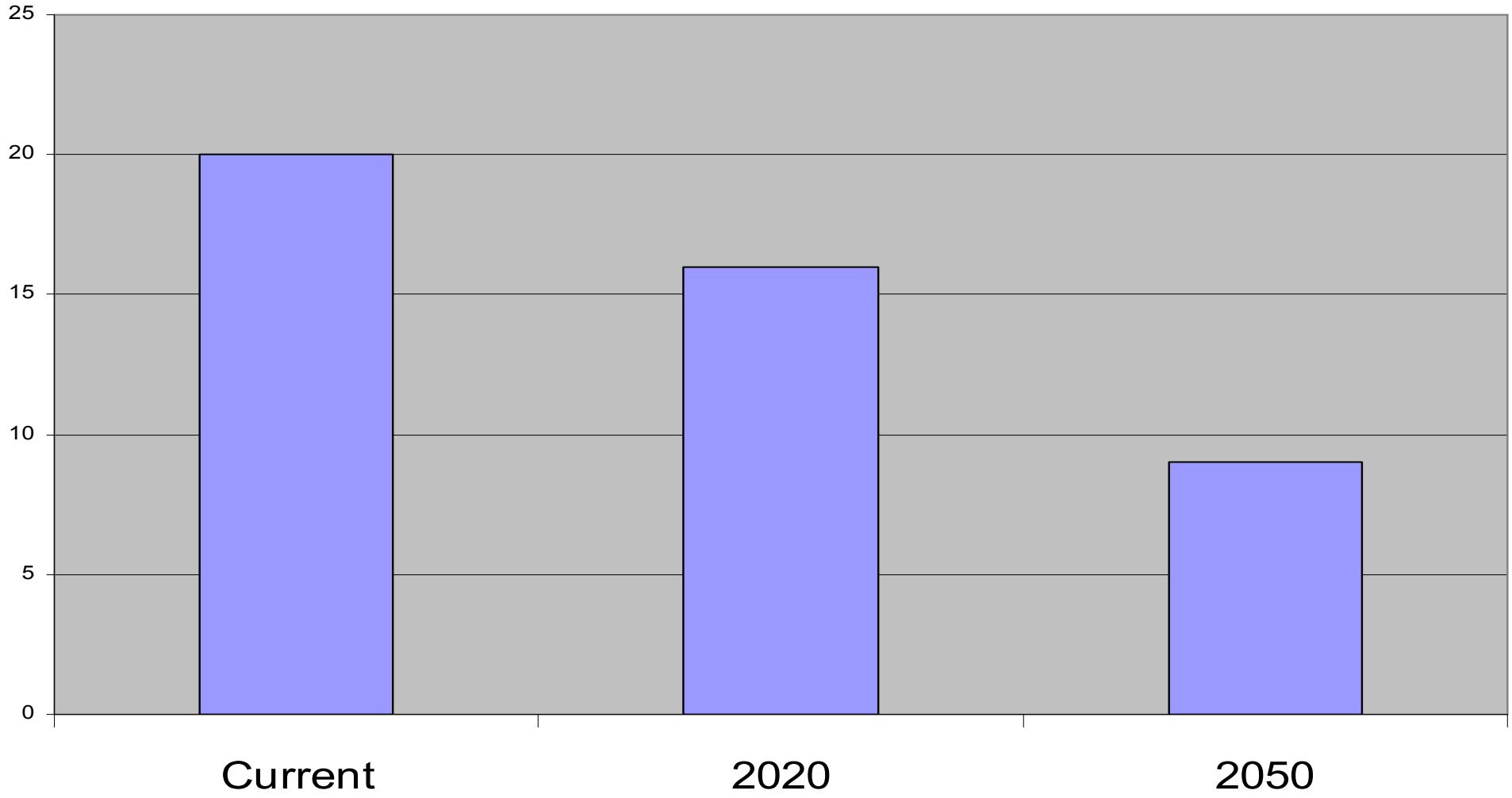
CO2 Emissions (MtC) UEP30



London's Air Quality in 2050

- With optimal measures on climate change and air quality, it is possible to achieve improvements in air quality significantly greater than incremental measures on each
- Williams(2007) estimated future London air quality in 2050 resulting from an aggressive pursuit of the UK long-term goal of a 60% reduction in CO_2 emissions
- Made assumptions of significant penetration of zero-carbon energy generation and in the transport sector
- Concluded that with optimal win-win policies for climate change and air quality, $PM_{2.5}$ and NO_2 urban background levels in London could decrease by ~55% compared to current levels

Potential Future PM2.5 in London at urban background sites (ug/m3)



WIN/WIN POLICIES

- Measures which reduce fuel use – energy efficiency, less transport activity
- Lower carbon intensity energy generation – 'pure' renewables (ie wind, wave, solar…), nuclear
- Low emission vehicles (hybrids…)
- Hydrogen economy IF generation of hydrogen is low carbon
- Carbon Capture and Storage
- Reducing aviation NOx ?
- Reducing global ozone

TRADE-OFFS?

- Most aftertreatment techniques – FGD, particulate filters, (but note SCR can give the opportunity to optimise fuel consumption)
- Production of low sulphur fuels
- Diesel vs Petrol (Black carbon and CO_2 issues)
- Combined Heat and Power
- Biofuels and biomass burning
- Shipping emissions reduction?

- The key point is that the potential trade-offs and win-wins should be

  (i) Identified

  (ii) Quantified

  (iii) Managed

- Thank You!