SIDE EVENT:

BRIEFING, DISCUSSION AND RECEPTION

Victoria University of Wellington
Te Whare Wānanga o te Ūpoko o te Ika a Māui

eci

Oxford Martin School

University of Oxford

The Science and Policy of Short-Lived Climate Pollutants

The role of methane, black carbon and other short-lived climate pollutants in meeting temperature goals

Friday 30 November 2012, 8.15pm
QNCC Side Event Room 6

8.15pm – Expert Briefings *(broadcast live)*
8.45pm – Plenary Q&A *(interactive online)*
9.15pm – Catered Reception with Panelists

SIDE EVENT:

BRIEFING, DISCUSSION AND RECEPTION

Victoria UNIVERSITY OF WELLINGTON
Te Whare Wānanga o te Ūpoko o te Ika a Māui

eci

OXFORD MARTIN SCHOOL

UNIVERSITY OF OXFORD

The Science and Policy of Short-Lived Climate Pollutants

The role of methane, black carbon and other short-lived climate pollutants in meeting temperature goals

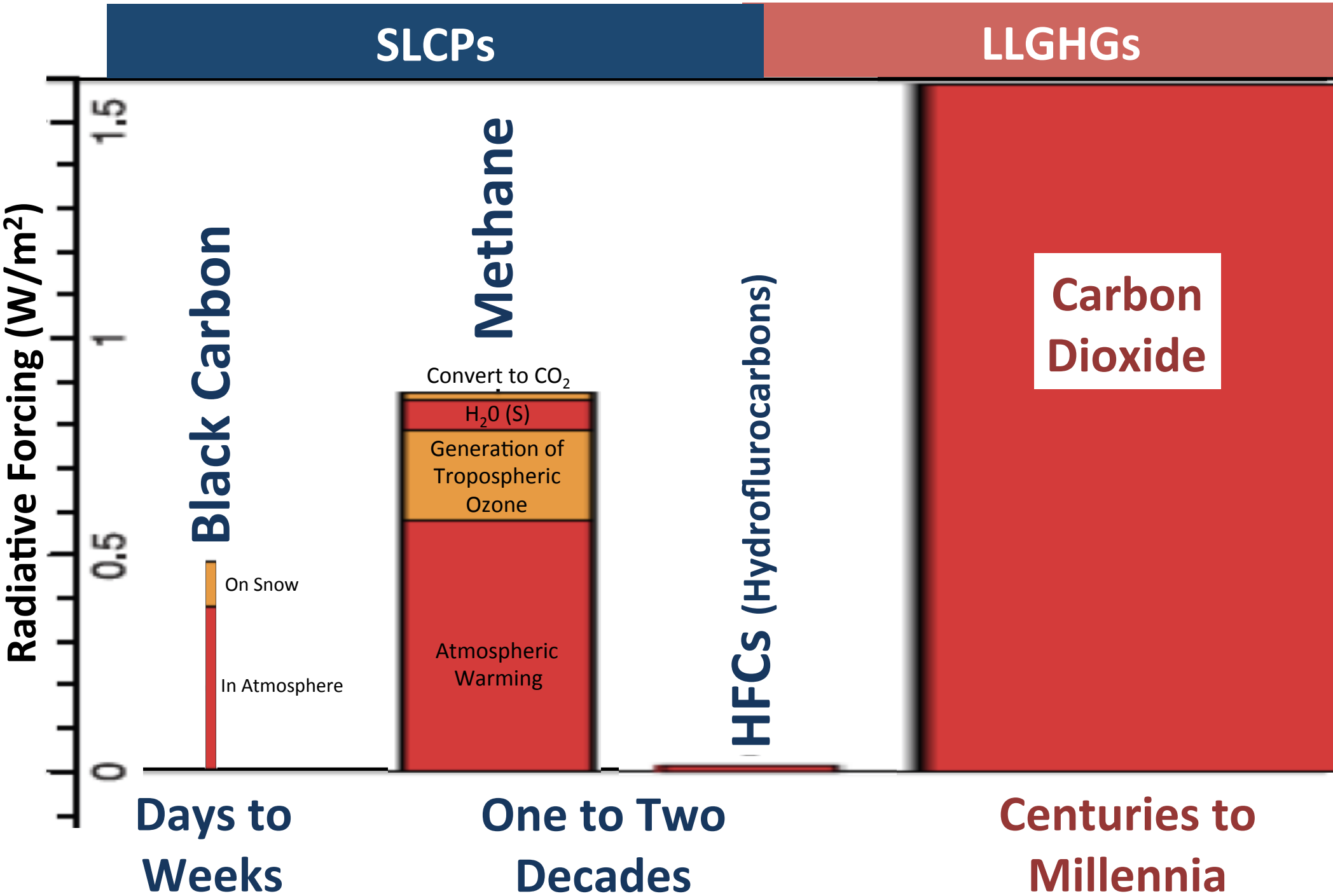
With expert briefings from:

- **Drew Shindell** (NASA GISS) is the author of the UNEP report and the key scientific paper making the case for near term reductions in short-lived pollutants. Drew will provide a briefing on the climate inmpact and considerable co-benefits of immediate action to reduce short-lived climate pollutants.
- **Myles Allen** (Oxford Martin School, Oxford University), author of the first paper to observe that cumulative carbon dioxide emissions over all time are the principal determinant of dangerous climate change. Myles will explain how the impact of reductions in short-lived climate pollutants on the risk of dangerous climate change depends heavily on near-term progress in reducing carbon dioxide emissions.
- **Eduardo Calvo** (National University of San Marcos) will discuss the implications of the geographical concentration of sources of short-lived and long-lived climate pollutants, and how this raises important questions of international equity.
- **Adrian Macey** (University of Victoria, Wellington), former Chair of the Kyoto Protocol. Adrian will discuss the challenges of addressing short-lived and long-lived climate pollutants in single or multiple international policy frameworks.

This side event is led by the **Environmental Change Institute** of the University of Oxford and **New Zealand Climate Change Research Institute** of the University of Victoria, Wellington, and supported by the **Oxford Martin Programme on Resource Stewardship** of the **Oxford Martin School,** University of Oxford.
The Interactive LIVE Webcast is organised by the **Interdisciplinary Global Working Group on SLCPs,** and a video of the event will be available afterwards on its website.

Further information: www.oxfordmartin.ox.ac.uk/event/1498

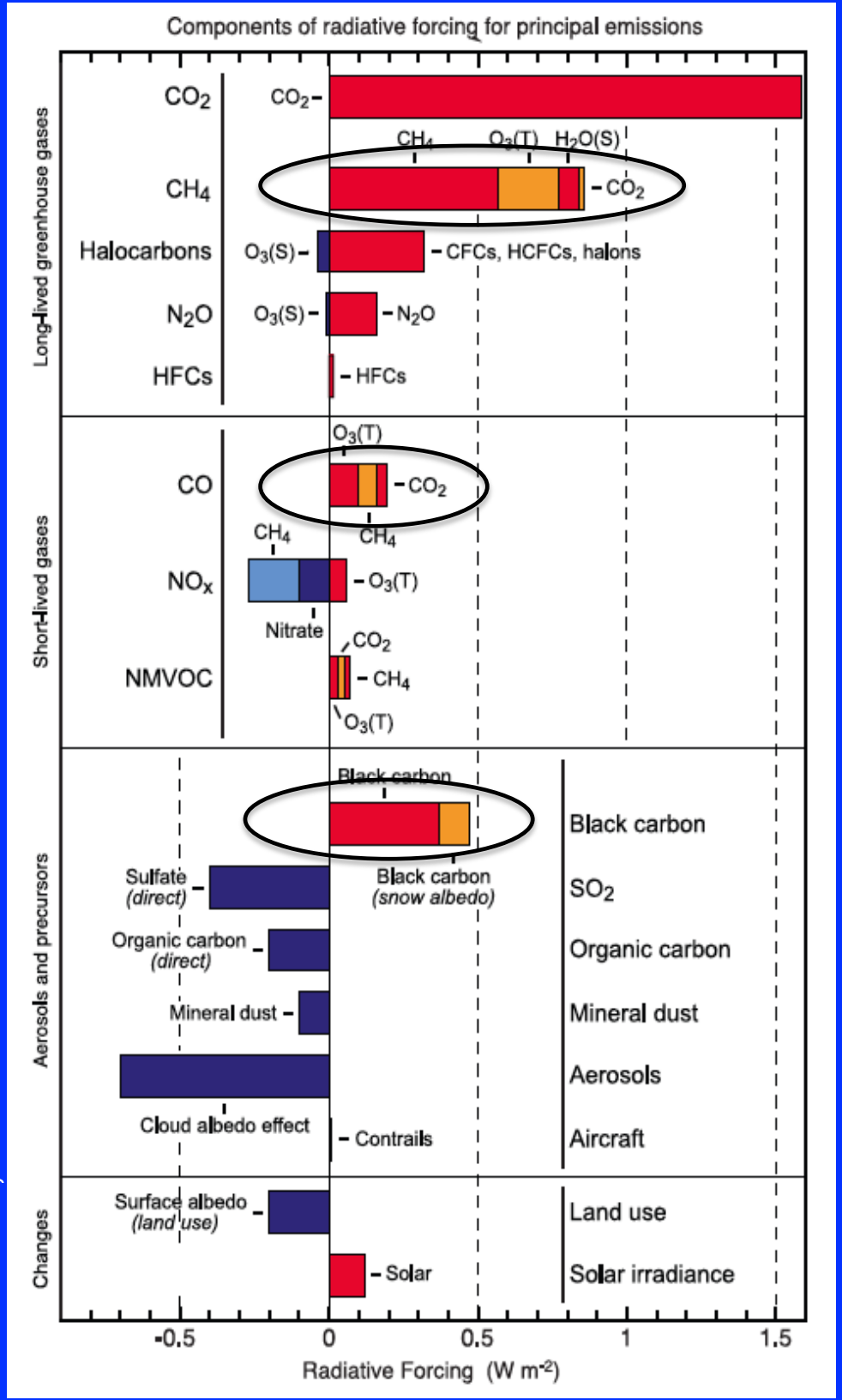
Quick Definition of SLCPs…



Mitigating Near-Term Climate Change while Advancing Human Development

Drew Shindell, NASA GISS

Acknowledgments:
UNEP/WMO, IIASA, JRC, US EPA, SEI, Scripps, Middlebury, U York, Harvard School of Public Health, & many other collaborators; NASA Applied Sciences & ACMAP, UNEP/WMO & CATF for funding.



IPCC AR4, 2007

Climate change is driven by many agents

Historical forcing from methane + CO + BC approx. equal to CO2

Physical differences: Methane, CO and BC all lead to degraded air quality and are relatively short-lived

Emission Control Measures for SLCPs

'Methane measures'

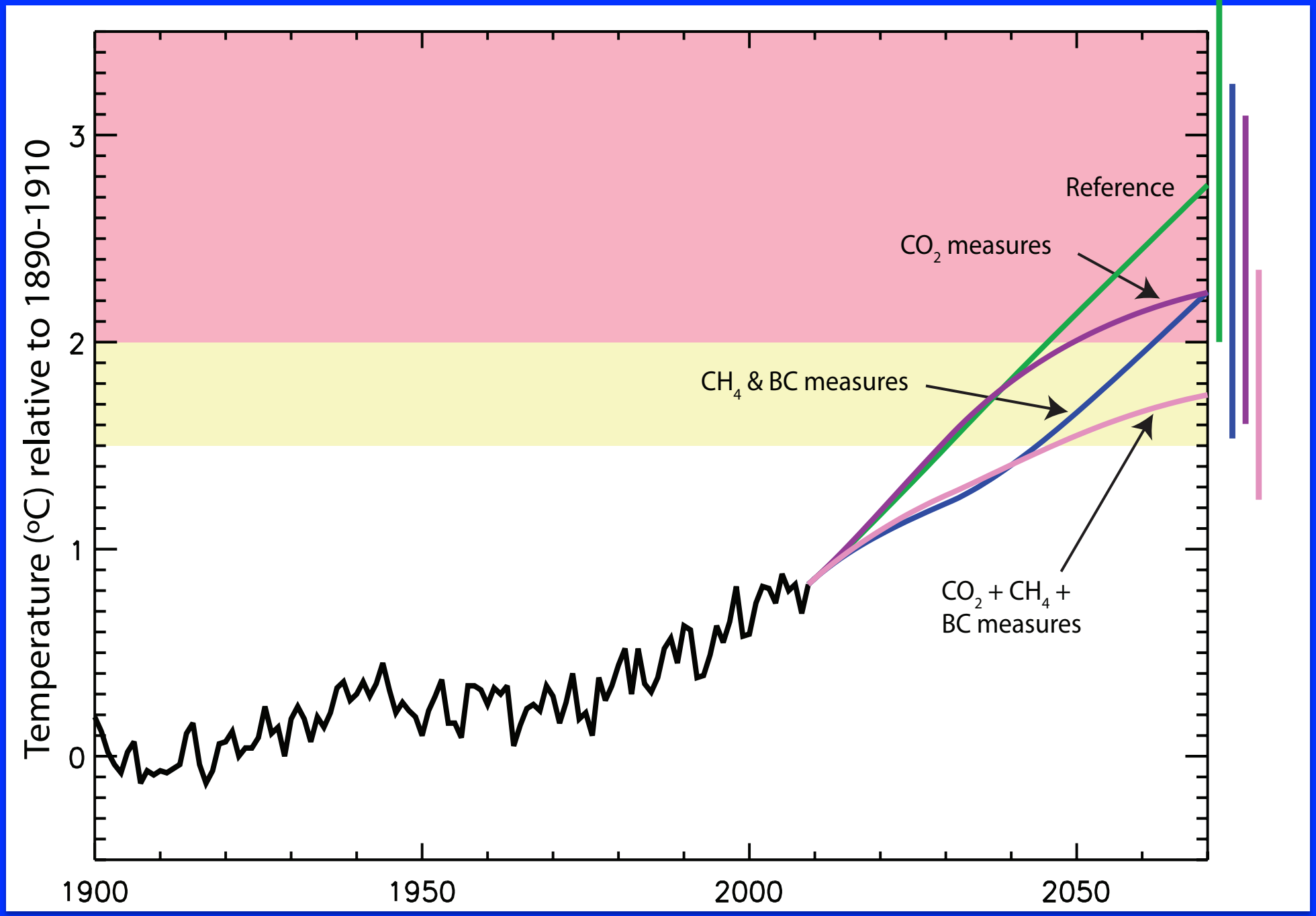
- extraction and long-distance transport of fossil fuels
- waste management; municipal, landfills & wastewater
- agriculture; livestock manure & intermittent rice aeration

'BC Measures': those that reduce emissions of black carbon and co-emissions (e.g. OC, CO)

- Diesel vehicles (particle filters+)
- Coal briquettes replacing coal in residential stoves
- Pellet stoves & boilers replacing residential wood burning in Industrialized countries
- Clean-burning cookstoves in developing countries
- Modern brick kilns
- Modern coke ovens
- Ban of open burning of agricultural waste

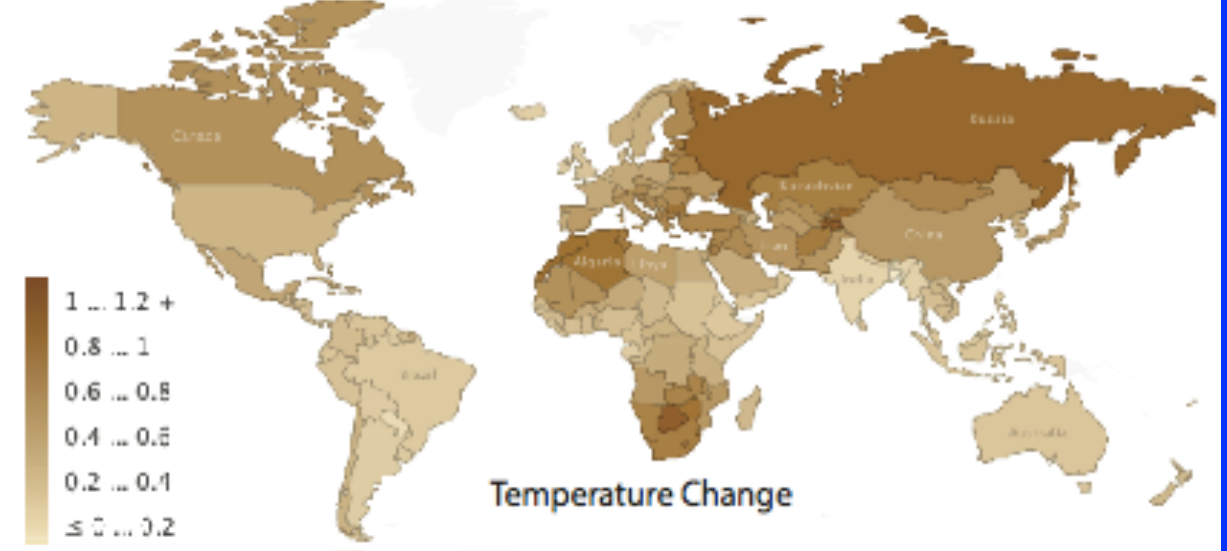
Different than CO_2 mitigation measures

Global Temperature Change (hybrid of results from GISS and ECHAM models and assessment of literature) added to the historical record

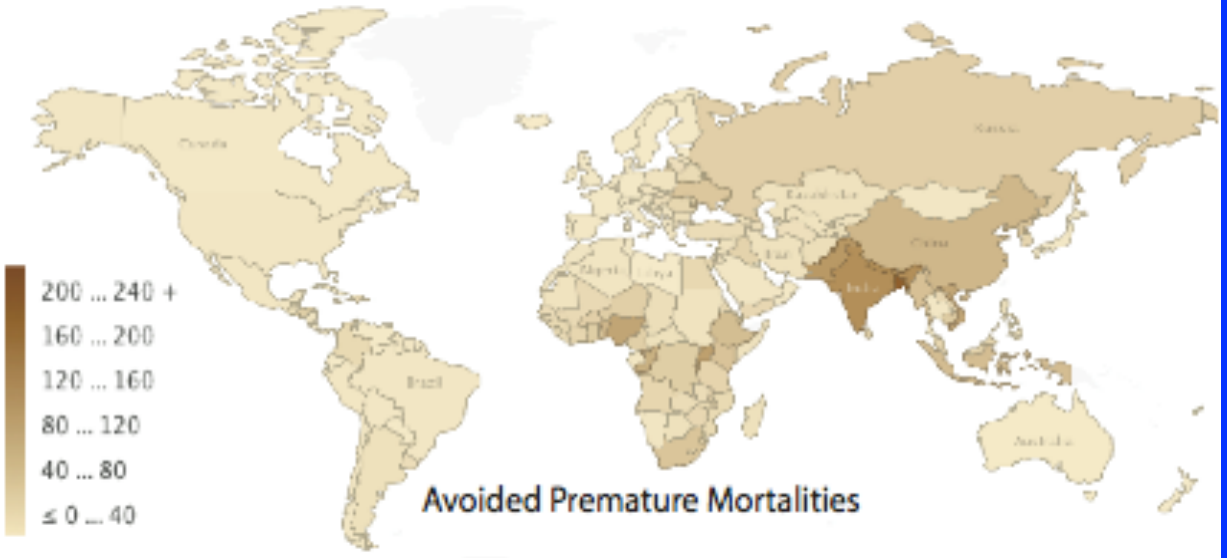


Shindell et al, Science, 2012

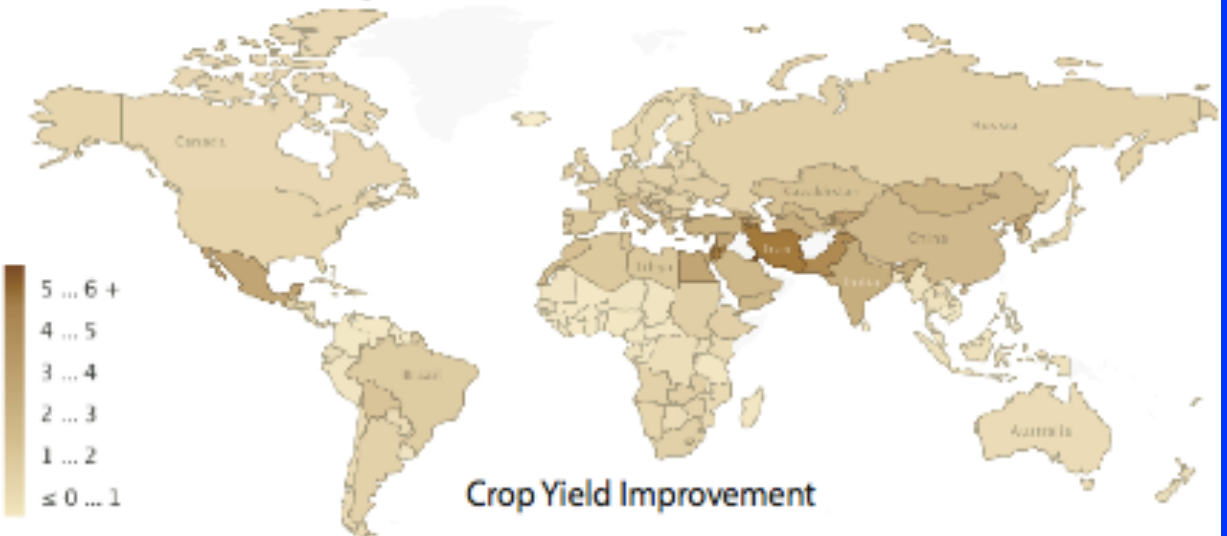
Shindell et al, Science, 2012



Projected 2010-2050 warming cut by half



More than 3 million premature deaths prevented every year



More than 50 million tons of crop yield increases every year

Summary & Implications

- Physical Science differences
  - CO_2 long-term, SLCPs near-term
- Mitigation differences
  - CO_2 from power, large industry, transportation sectors
  - SLCPs largely distinct activities
- Impact differences
  - CO_2 for long-term climate stabilization; global benefits
  - SLCPs for near-term climate change, human health, agriculture and human development; regional benefits
- Reducing the SLCPs is important to:
  - those already suffering from the impacts of climate change
  - preventing biodiversity loss
  - providing additional time for adaptation
  - realize the associated health and agricultural benefits
- Tackling both near-term and long-term climate change worthwhile
  - Near-term for our children's generation
  - Long-term for our great-grandchildren's generation

How the impact of Short-Lived Climate Pollutants depends on mitigation of Long-Lived Climate Pollutants

Myles Allen

School of Geography and the Environment and Department of Physics

University of Oxford

Thanks to: Niel Bowerman & David Frame & others

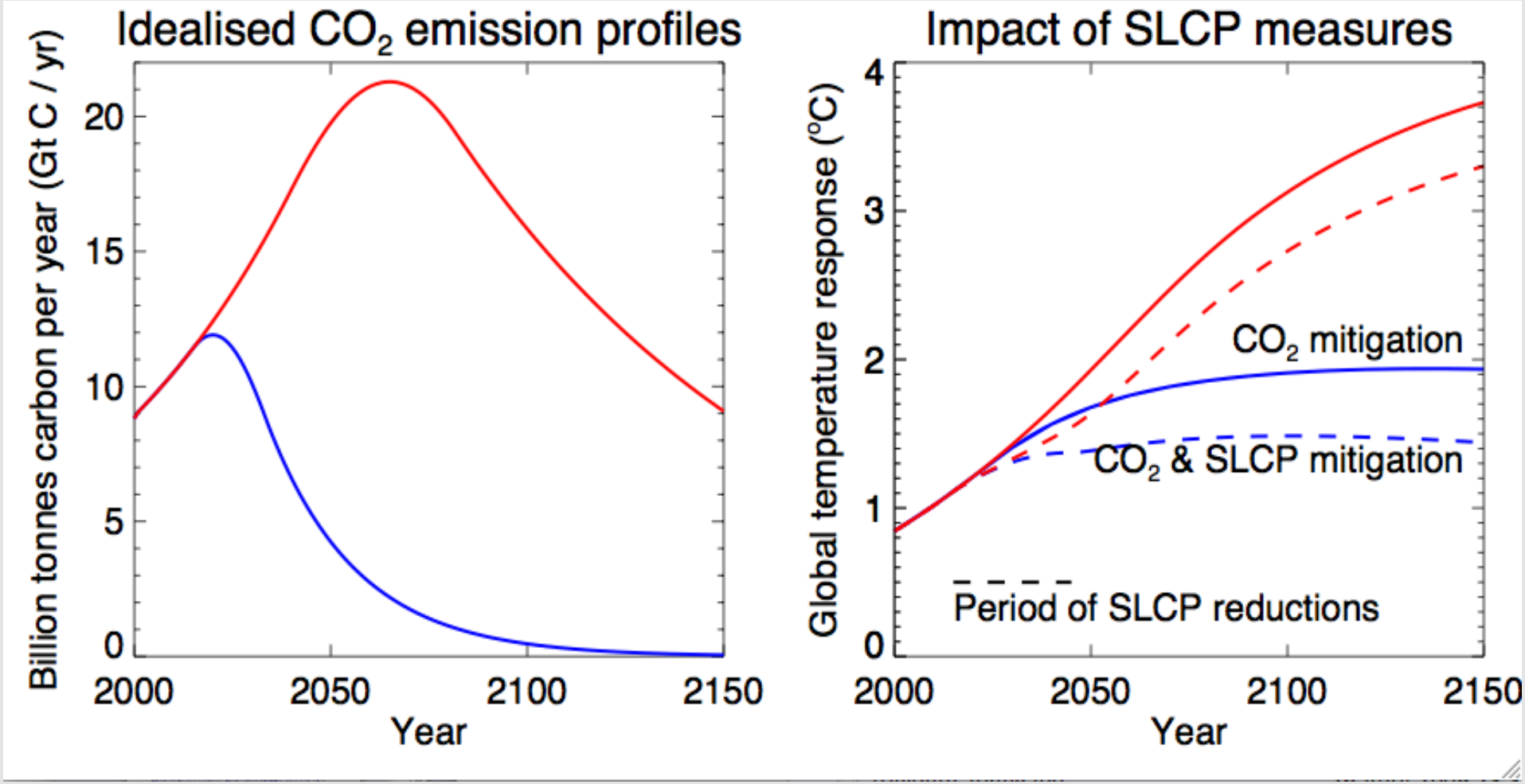
trillionthtonne.org

Explaining the need to limit cumulative emissions of carbon dioxide.

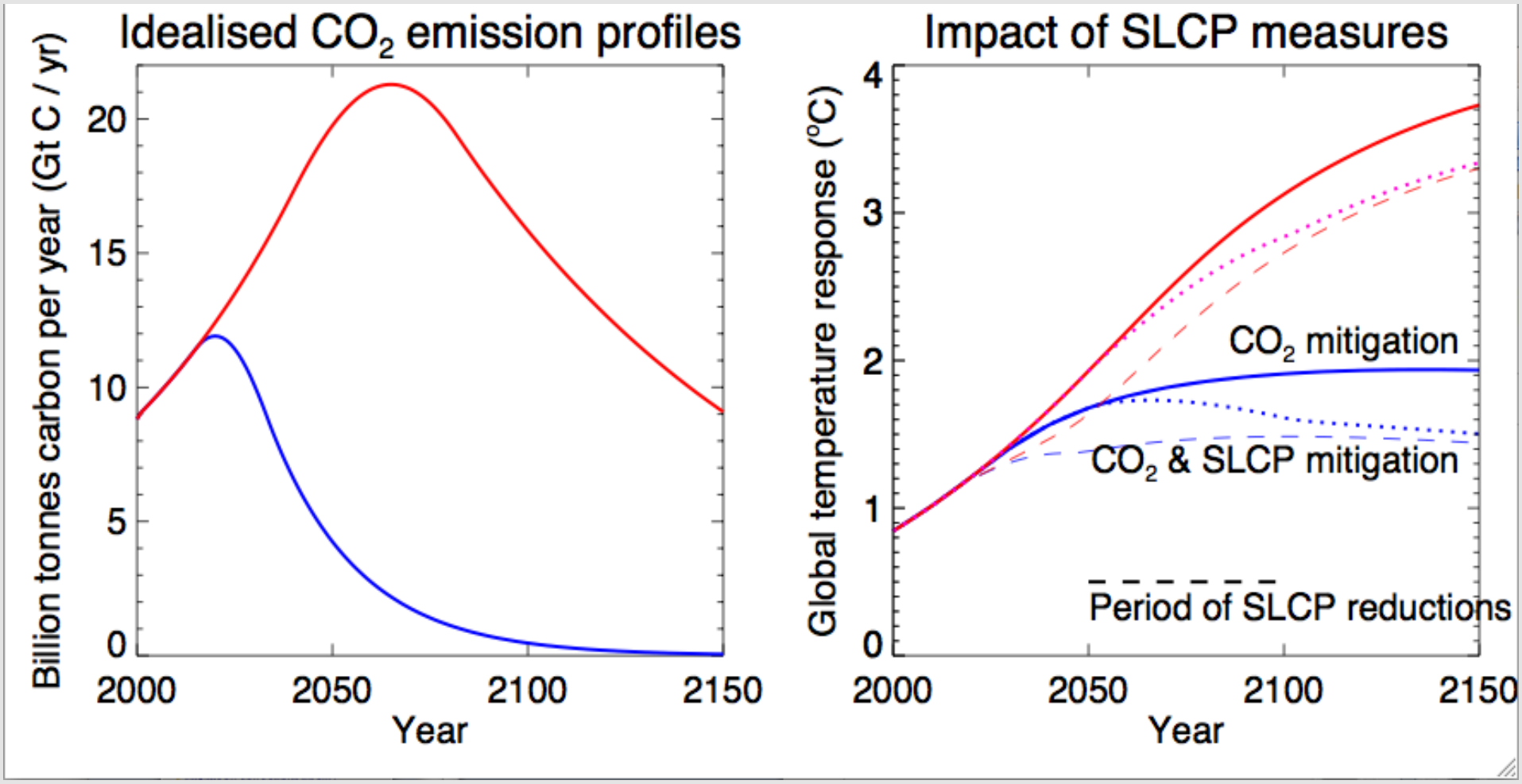
OXFORDMARTIN SCHOOL

UNIVERSITY OF OXFORD

Impact of idealised SLCP mitigation



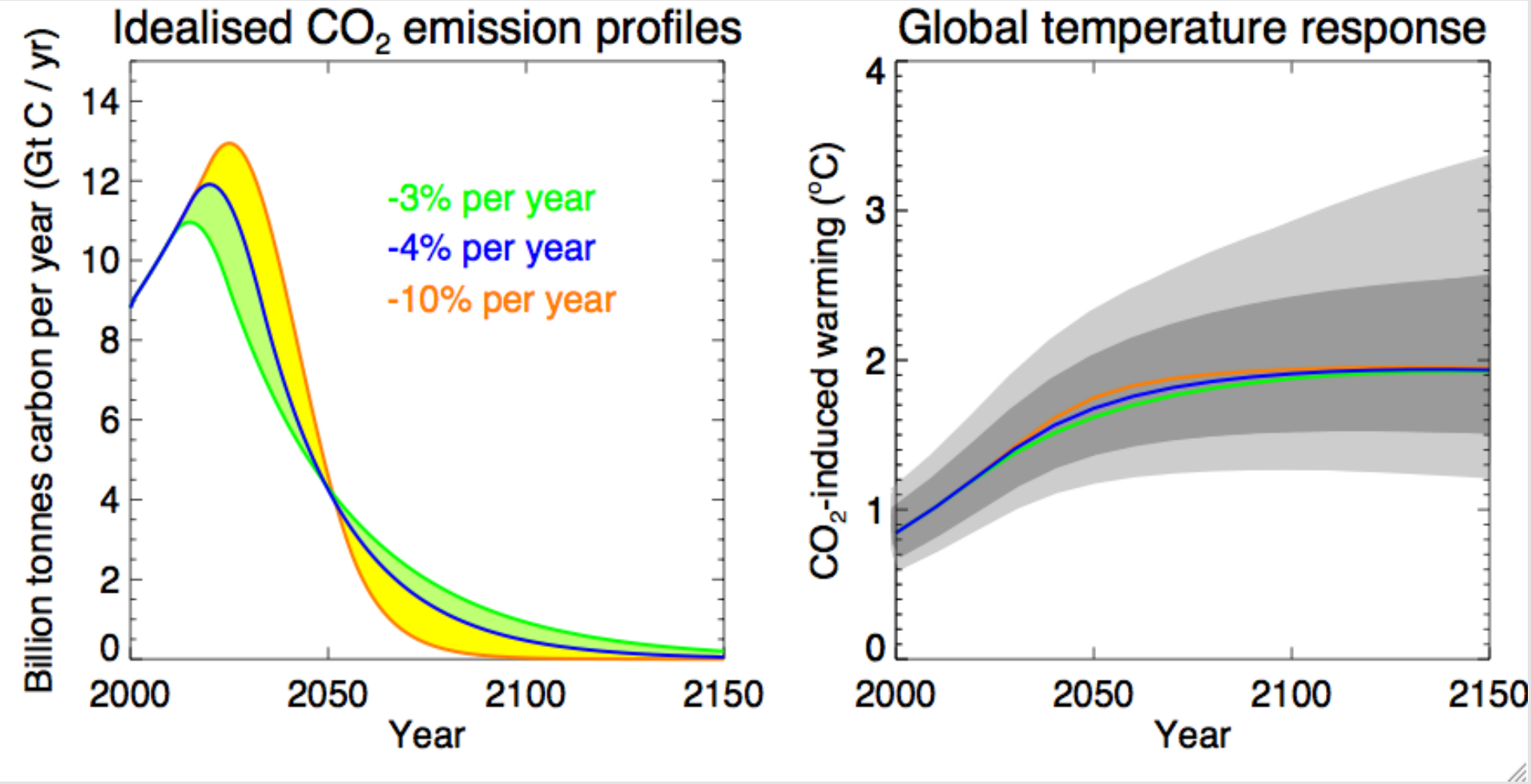
Impact of deferring SLCP mitigation to after 2050



Peak warming under various scenarios

	Early and aggressive SLCP mitigation	Late and slower SLCP mitigation
Early and aggressive CO_2 mitigation	1.5 ^oC	1.7 ^oC
Late and slower CO_2 mitigation	3.6 ^oC	3.6 ^oC

CO_2 emissions matter most because they accumulate, unlike SLCPs



Take home messages

- SLCP emissions only affect peak warming under aggressive mitigation scenarios when CO_2 emissions are falling rapidly.
- Unless temperatures approach their peak in the next few decades, it makes no difference to *peak* warming whether SLCPs are cut now or after 2050
  - (it does make a difference to warming by 2050).
- The main factor determining peak warming is cumulative emissions of CO_2.
- Focusing *exclusively* on the 2°C (or 1.5°C) goal automatically focuses attention on the next few decades: potentially a problem if the goal is *not* met.

Regional and global climate

Eduardo Calvo

Peru

Table of contents

Air quality management

- A 20th century story
- London
  - Great Smog of 1952,
  - 4,000 additional deaths over a couple of days, actual death toll now believed to be around 12,000
  - Clean Air Act 1956
  - Ban of the use of coal for domestic fires in urban areas (1306).
- Los Angeles
  - LA smog
  - 60´s smog alerts
  - California Motor Vehicle Pollution Control Board
  - Clean Air Act 1970
  - Best available technology approach

Air quality management (2)

- Industrial interests pleaded for less-stringent standards.
- Claimed that air pollution control is expensive and economically damaging.
- Industries blamed the inflation of the 1970s on environmental protection legislation.
- EPA delayed requirements and devised strategies for reducing pollution without placing undue burdens on manufacturers.
- The "bubble" concept was formally adopted in a 1979 amendment to the Clean Air Act

Bubble concept

- Placed an imaginary bubble over an entire region and required the air in the bubble to meet Clean Air Act levels.
- Firms in the same bubble could trade pollution rights with each other, allowing excess pollution at one source as long as it was offset by lower emissions at another.
- The previous approach had forced each individual "stack" to meet national standards.
- By defining each factory as part of a larger air shed, the bubble concept was a step toward an ecosystem-oriented approach.
- Along these lines, the Clean Air Act of 1990 capped the nation's total sulfur oxide emissions and allowed firms to set up a nationwide market in pollution permits.

Global bubble

- On the eve of COP 3, the Russian Federation put forward a new proposal for what it termed a “universal bubble”; that is, each Annex I Party would undertake the commitment it had proposed, and the total reduction achieved would become a collective target.

Emissions trading

- At COP 2, the issue of emissions trading gained greater importance when Mr. Timothy Wirth, then US Under-Secretary of State for Global Affairs, formally announced that the US would advocate such a system in the context of legally binding targets.
- During the COP 2 sessional period, emissions trading was mentioned as a means of promoting flexibility.
- Five proposals were supporting emissions trading, from Australia, France, New Zealand et al.,60 Norway and the US (the only one in legal text). A more detailed proposal in legal text was subsequently received from New Zealand.
- Both the Islamic Republic of Iran et al. and Kenya made submissions against the adoption of emissions trading in the protocol, with Kenya specifying that emissions trading should not be adopted until it had been considered by the SBSTA and its environmental benefits demonstrated.
- The proposals from New Zealand and the US were similar. Both were simple, advocating provisions relating to reporting and verification and participation of "domestic entities". The US added that a "meeting of the Parties" could elaborate further guidelines.
- A more detailed proposal on emissions trading was put forward by the US, stipulating cases where trading would be restricted (for example if a Party was over its emissions "budget" it could no longer sell).

Fungibility

- Fungible : being of such a nature that one part or quantity may be replaced by another equal part or quantity in the satisfaction of an obligation; interchangeable
- Synonym: exchangeable
- New Latin *fungibilis,* from Latin *fungi* to perform
- First Known Use: 1818

Fungibility of gases

- An exchange rate was established by the Kyoto protocol (GWP).
- Unprecedented measure.
- Acid Rain Program established in the U.S. created an allowance market system only for sulfur dioxide.
- A NOx market was also created later.
- There is no pH or acidity exchange rate.

Kyoto protocol's basket of gases FCCC/TP/2000/2

- Australia, the EU, Iceland, New Zealand, Norway, the Russian Federation, Switzerland and the US, among others, all argued in their proposals for the so-called "basket" approach.
- This means that all gases covered by the target would be considered together for the achievement of the target according to their carbon dioxide (or carbon) equivalence based on their global warming potentials (GWPs), rather than the target applying to each gas individually (known as the "gas-by-gas" approach).
- Opponents to the basket approach included AOSIS and, initially, Japan, both of whom advocated CO2-only targets (AOSIS proposed that gas-by-gas targets should be developed for other gases by the "MOP" to the protocol).
- Germany, in an early proposal, also called for single-gas targets .
- The G-77 and China opposed the basket approach, partly because they were against the use of GWPs, pointing to inaccuracies in the use of this methodology. When the Group announced its proposed emission targets , it adopted the gas-by-gas approach. On Dec. 3, 1997, G-77 and China withdrew their opposition to the basket approach.

Short lived climate pollutants: issues for policymakers

Adrian Macey, November 2012

Status quo – 2013-2020

- List of gases – amended for CP2
- A common metric – 100 year GWPs
- A basket of gases – fungibility for accounting, trading

Current action

- Some second thoughts from scientists
- UNFCCC to address metrics:
  - Kyoto Protocol – SBSTA to review from 2015
  - Convention – SBSTA to review + an “event”
- IPCC AR5 addressing metrics – but how well?
- Note inertia of status quo
- A window of opportunity to incorporate any revisions into the post 2020 ADP outcome

Policy questions

- Common metric – is there a better alternative to 100 yr GWP?
- Keep the basket, or take one or more gases (e.g. CH_4)out?
  - Distinguish between biological and other methane?
- Should there be more concentration on CO_2?
- How far should action on SLCPs be incorporated into UNFCCC ?

Thoughts…

- SLCP action must not be at the expense of CO2 reduction
- Action on short lived pollutants more important if global peaking and reduction goals are defined (peaking year; X% reduction by year Y)
- Balance between simplicity and scientific exactitude needed
- Potential implications for agricultural producing countries need assessing
- Need a stronger science-policy dialogue to unlock these issues

SIDE EVENT:
BRIEFING, DISCUSSION AND RECEPTION

Victoria University of Wellington
Te Whare Wānanga o te Ūpoko o te Ika a Māui

eci

Oxford Martin School

University of Oxford

The Science and Policy of Short-Lived Climate Pollutants

The role of methane, black carbon and other short-lived climate pollutants in meeting temperature goals

Thank you! Questions?

Please follow up online at:
www.oxfordmartin.ox.ac.uk/event/1498