



International Institute for
Applied Systems Analysis
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science for global insight

Co-benefits of Near-Term Climate Change Mitigation

Zbigniew Klimont

Mitigation of Air Pollution & Greenhouse Gases (MAG)

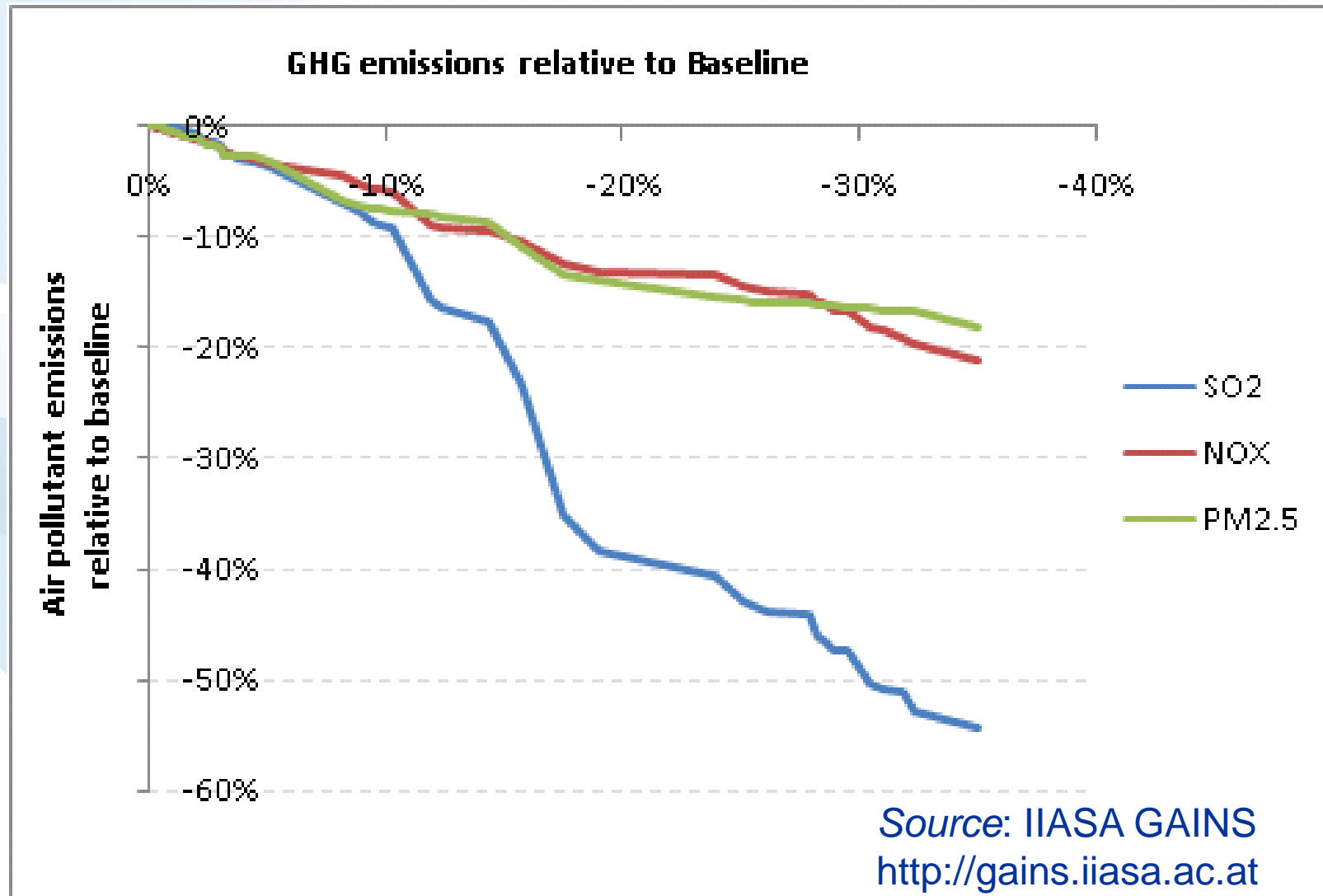
IIASA 40th Anniversary Conference,
Vienna-Laxenburg, 24-26th October 2012



IIASA, International Institute for Applied Systems Analysis

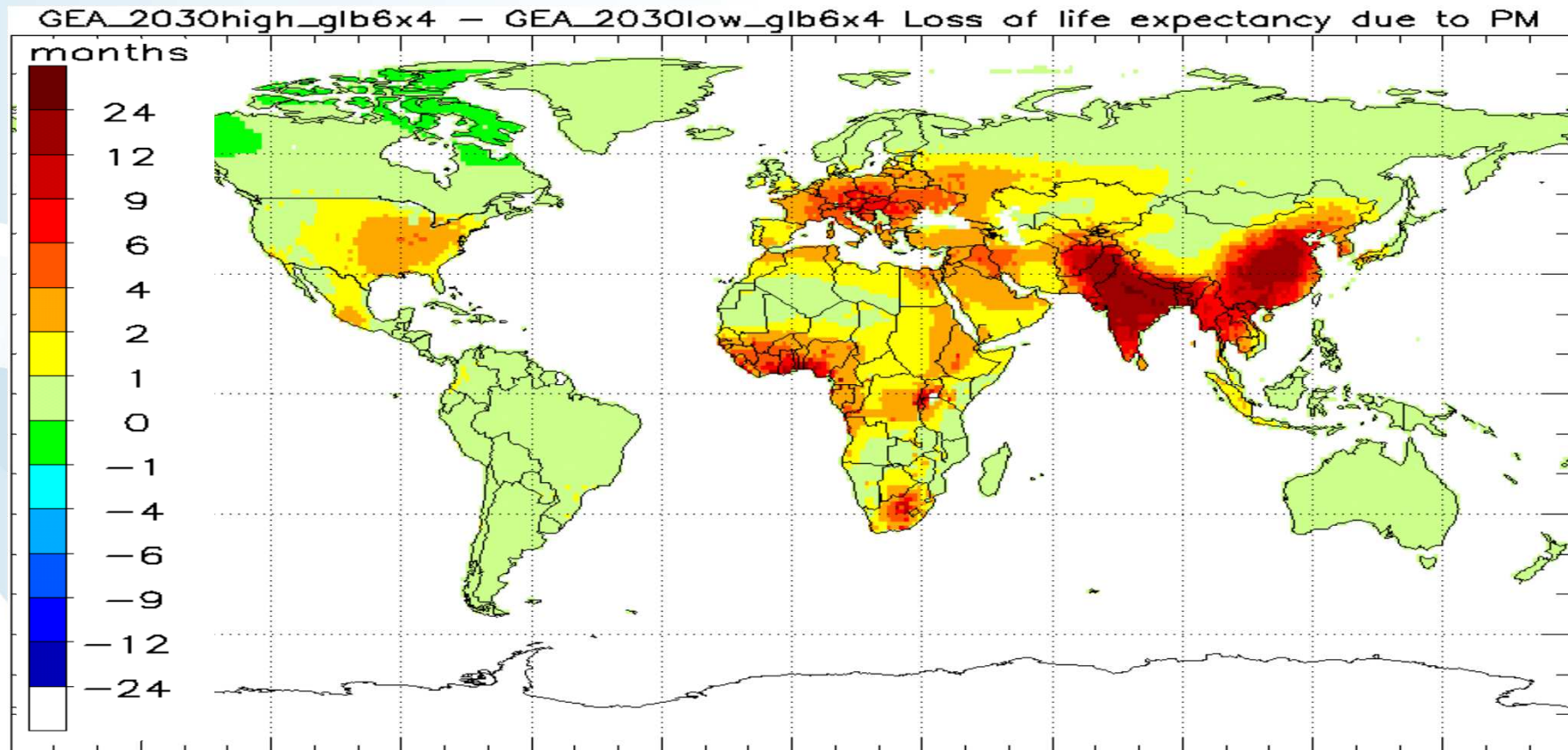
Co-control of GHGs and air pollutants

Annex I parties of UNFCCC, 2020



Health Benefits of Pollution Control

(Loss of statistical life expectancy due to particulate matter (PM))



Source: Global Energy Assessment (GEA, 2012)

The **BAINS** model pollutant/multi-effect framework

(**B**oundary **A**ssessment **I**nteraction **S**ynergies)

Emissions occur largely from common sources

Air pollutants

Health impacts:

Particulate matter and ozone

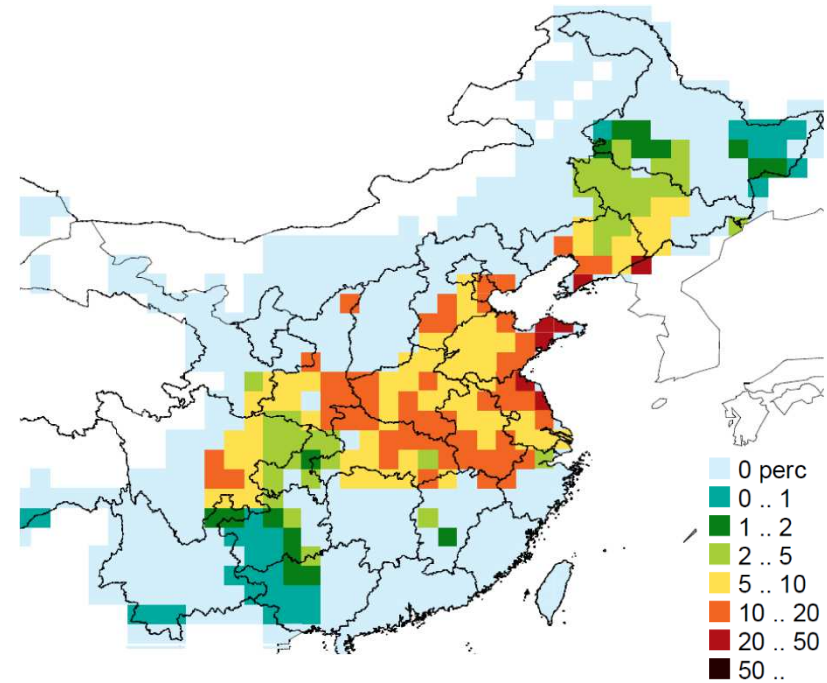
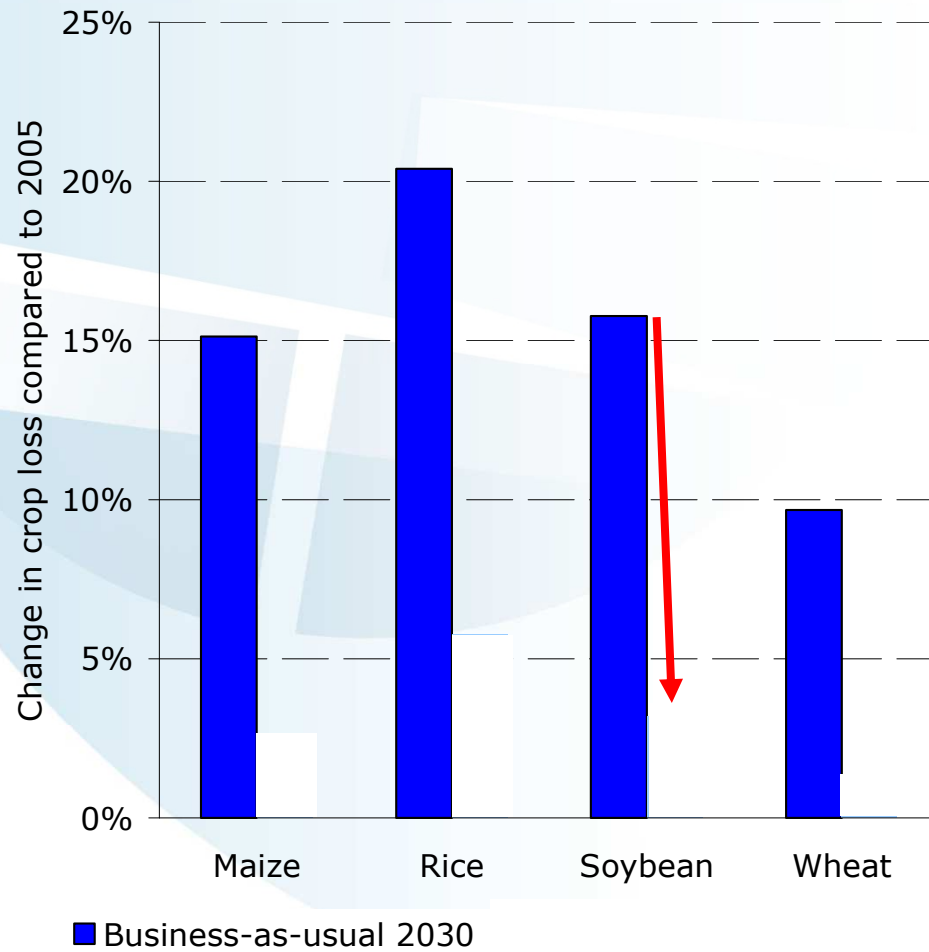
+

Vegetation damage:

Ozone, acidification,
eutrophication

+

Co-benefits of GHG mitigation on crop losses due to ozone in China



Soybean:
Crop loss calculated for 2030 baseline and 450ppm scenario (IEA, 2009)

Source: GAINS-Asia <http://gains.iiasa.ac.at>

The **GAINS** multi-pollutant/multi-effect framework (**G**reenhouse gas and **A**ir pollution **I**nteractions and **S**ynergies)

Emissions occur largely from common sources

	Air pollutants	Greenhouse gases
Health impacts: Particulate matter and ozone	+	
Vegetation damage: Ozone, acidification, eutrophication	+	
Climate impacts: Long-term (+100 years)	+ -	+

e.g., Ozone,
Black Carbon

e.g., Sulfur
Dioxide

• Rates of change in ecosystems and ecosystems
• Hot spots (Arctic ice, Himalayas)

16 'Win-win' *air quality* measures with co-benefits on *climate change*

CH₄ measures

1. Recovery of coal mine gas
- ② Production of crude oil and natural gas
3. Gas leakages at pipelines and distribution networks
4. Waste recycling
5. Wastewater treatment
6. Farm-scale anaerobic digestion
7. Aeration of rice paddies

Black Carbon measures

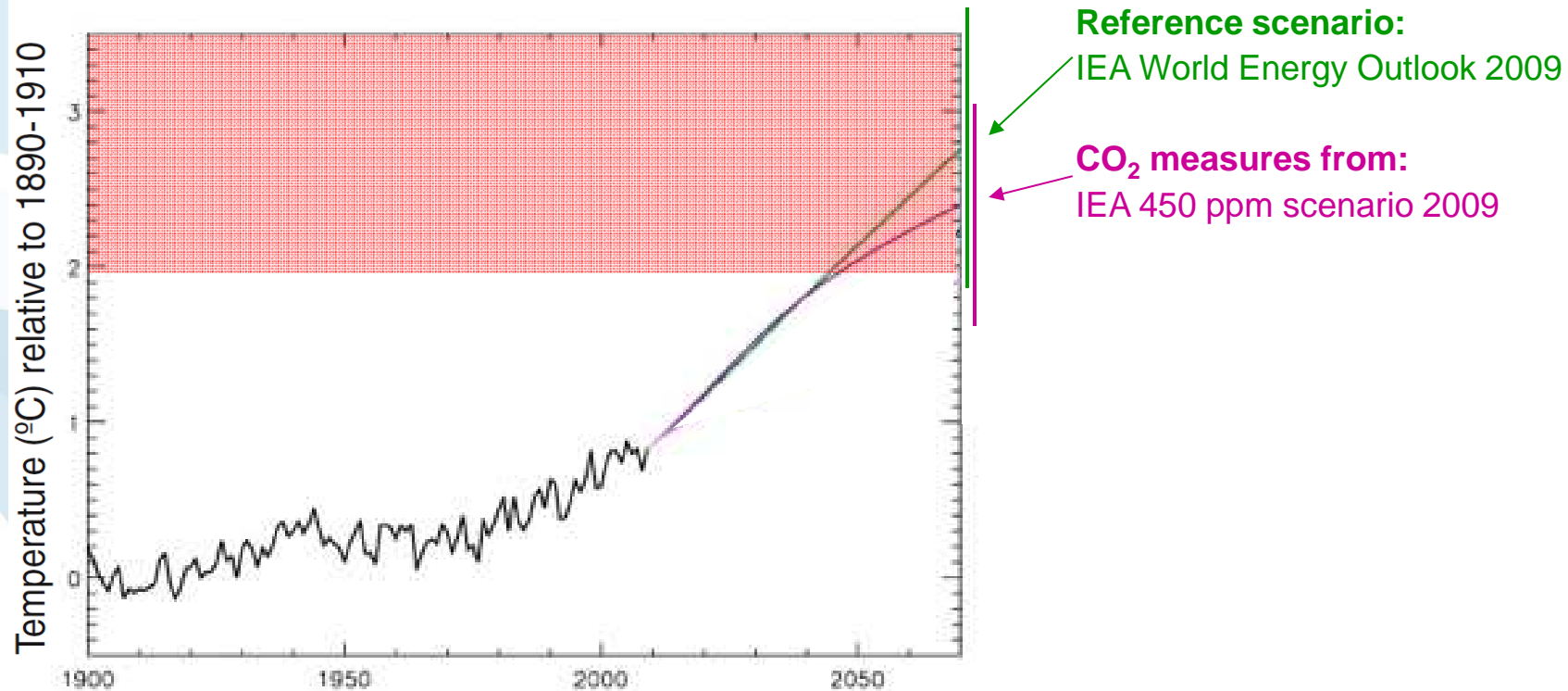
1. Modern coke ovens
2. Modern brick kilns
- ③ Diesel particle filters
4. Briquettes for coal stoves
- ⑤ Improved biomass cookstoves
6. Pellet stoves and boilers
7. Elimination of high-emitting vehicles
- ⑧ Ban of cropland burning
9. Elimination of biomass cookstoves



UNEP/WMO, 2011

Control of long-lived GHGs is unlikely to reduce temperature increase in the near-term

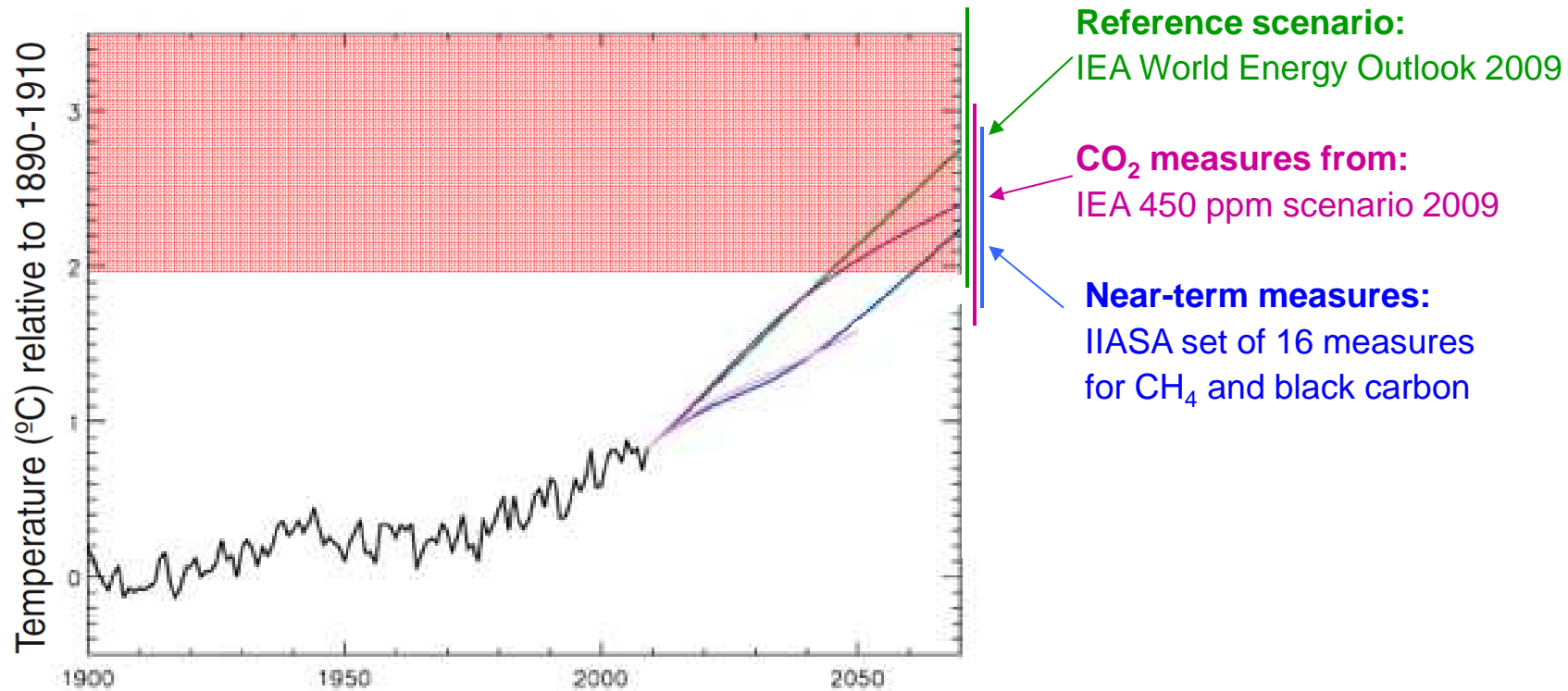
Global temperature 1900-2070



Source: UNEP/WMO Black Carbon and Tropospheric Ozone Assessment (2011)
Shindell et al., Science **335** 183 (2012)

These measures could significantly reduce the rate of temperature increase in the next decades

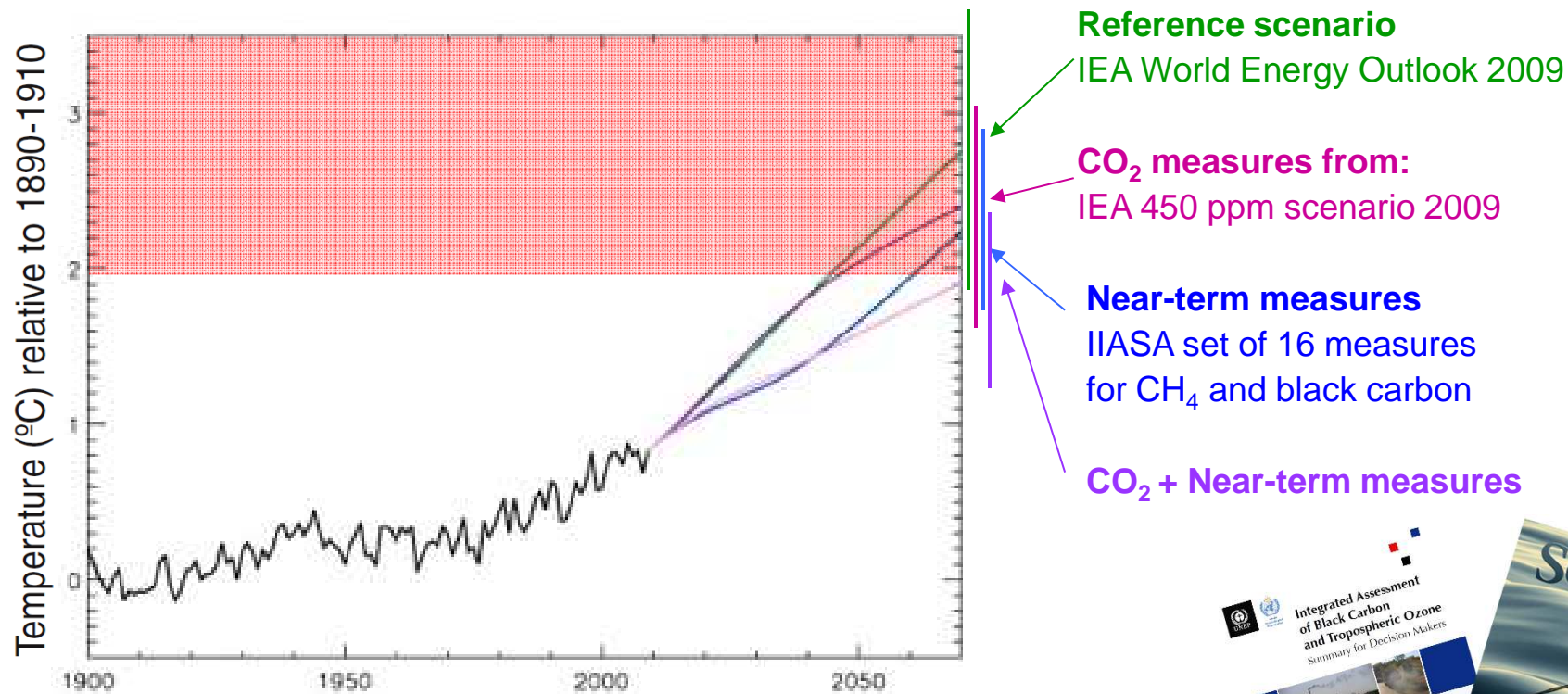
Global temperature 1900-2070



Source: UNEP/WMO Black Carbon and Tropospheric Ozone Assessment (2011)
Shindell et al., Science **335** 183 (2012)

Together with aggressive CO₂ strategies, they increase chances to stay below the 2° target

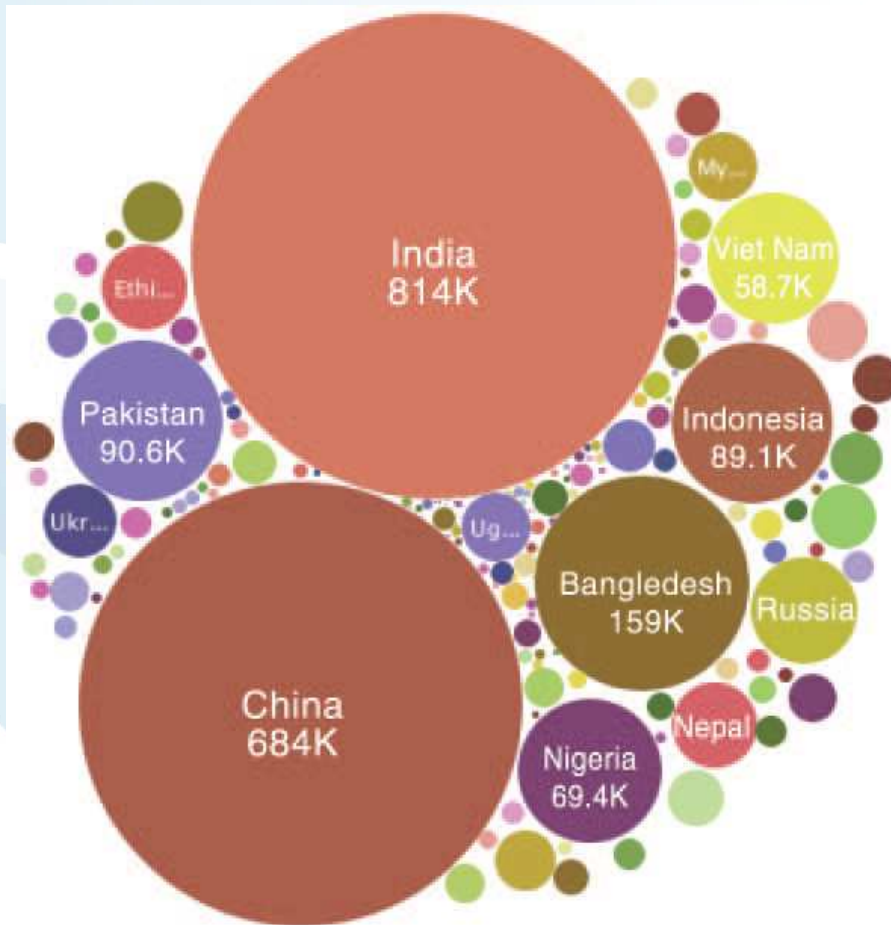
Global temperature 1900-2070



Source: UNEP/WMO Black Carbon and Tropospheric Ozone Assessment (2011)
Shindell et al., Science **335** 183 (2012)



1 to 4.5 million annually avoided premature deaths from full implementation of 16 measures in 2030 compared to the reference scenario



Highest health benefits in developing countries



Source: Shindell et al., Science 335 183 (2012)

In the news

- 'A Quick (Partial) Fix for an Ailing Atmosphere'
*News and Analysis, **Science** 335, 2012*
- 'Pollutants key to climate fix'
*News in Focus, **Nature** 481, 2012*
- 'Climate change in black and white'
***The Economist**, 19 February 2011*
- 'A renegade climate idea that could work'
***International Herald Tribune**, 18 January 2012*
- 'Schneller Klimaschutz mit erheblichem Zusatznutzen'
***der Standard**, 12 January 2012*



CLIMATE AND CLEAN AIR COALITION
TO REDUCE SHORT-LIVED CLIMATE POLLUTANTS

www.unep.org/ccac



- In February 2012, an international platform to implement these 16 measures to mitigate emissions of Short Lived Climate Pollutants was announced; currently supported by 18 countries, European Union and 14 non-state organizations, including World Bank
- CCAC recognize that action on Short Lived Climate Pollutants must complement and supplement, not replace, global action to reduce CO₂, in particular efforts under the UNFCCC