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Identifying promising measures that could help reducing near-term forcing

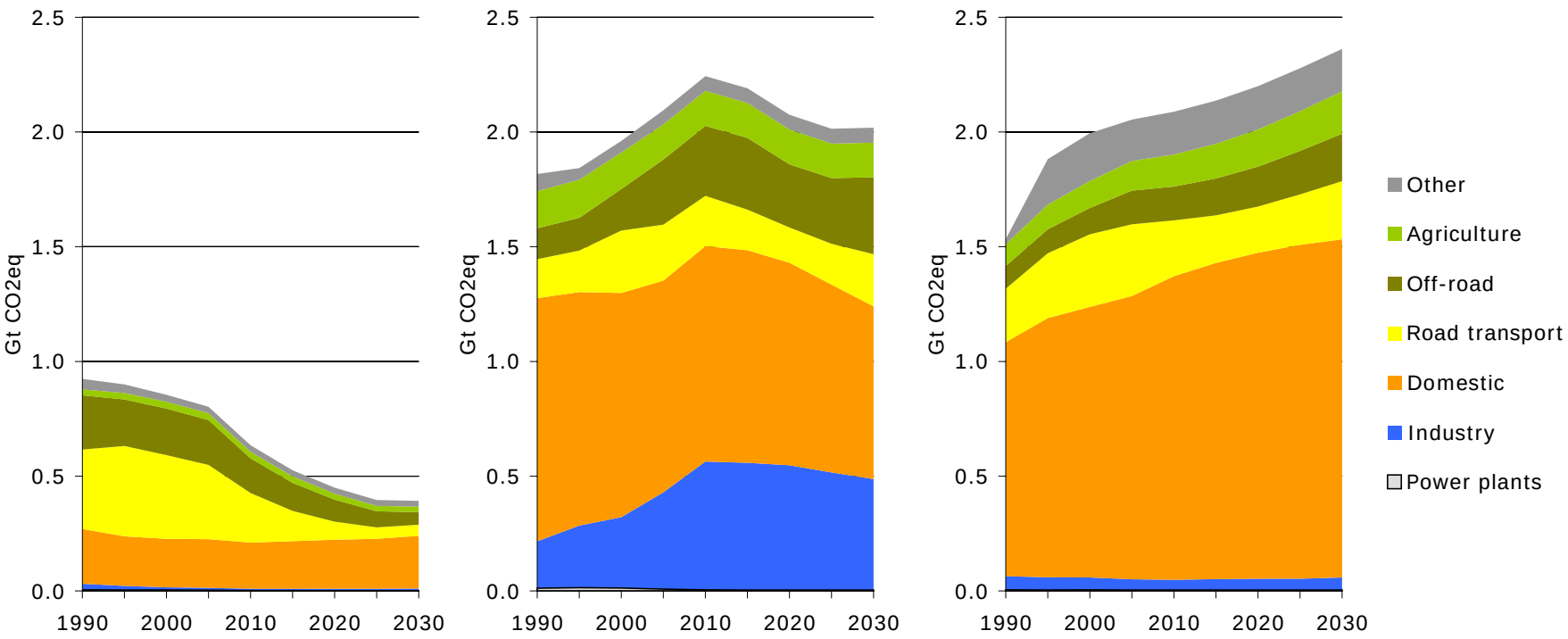
State of play of the UNEP BC assessment

38th Session of the Task Force on Integrated Assessment Modelling, Dublin, May 17-19, 2010

Approach for UNEP BC assessment

1. Develop emission projections for all substances
2. Determine future RF by sector and gas
3. Rank measures by net RF of their BC/OC/CO/CH4/SO2 reduction
4. Choose a set of efficient measures
5. Estimate their overall mitigation potentials

BC inventories 1990-2010 and trends to 2030
GAINS calculation for IEA World Energy Outlook 2009



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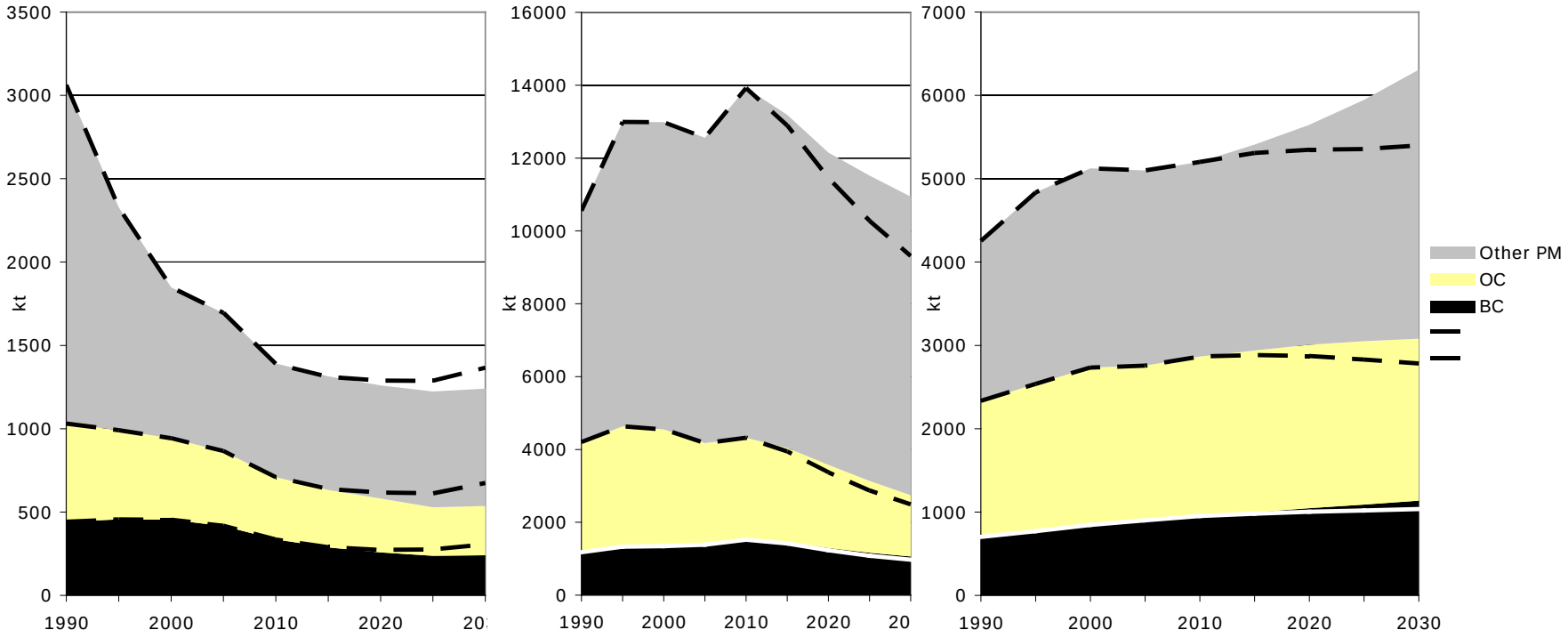
BC, OC and other PM2.5 emissions

IEA baseline and 450 ppm scenario

EU-27 China India



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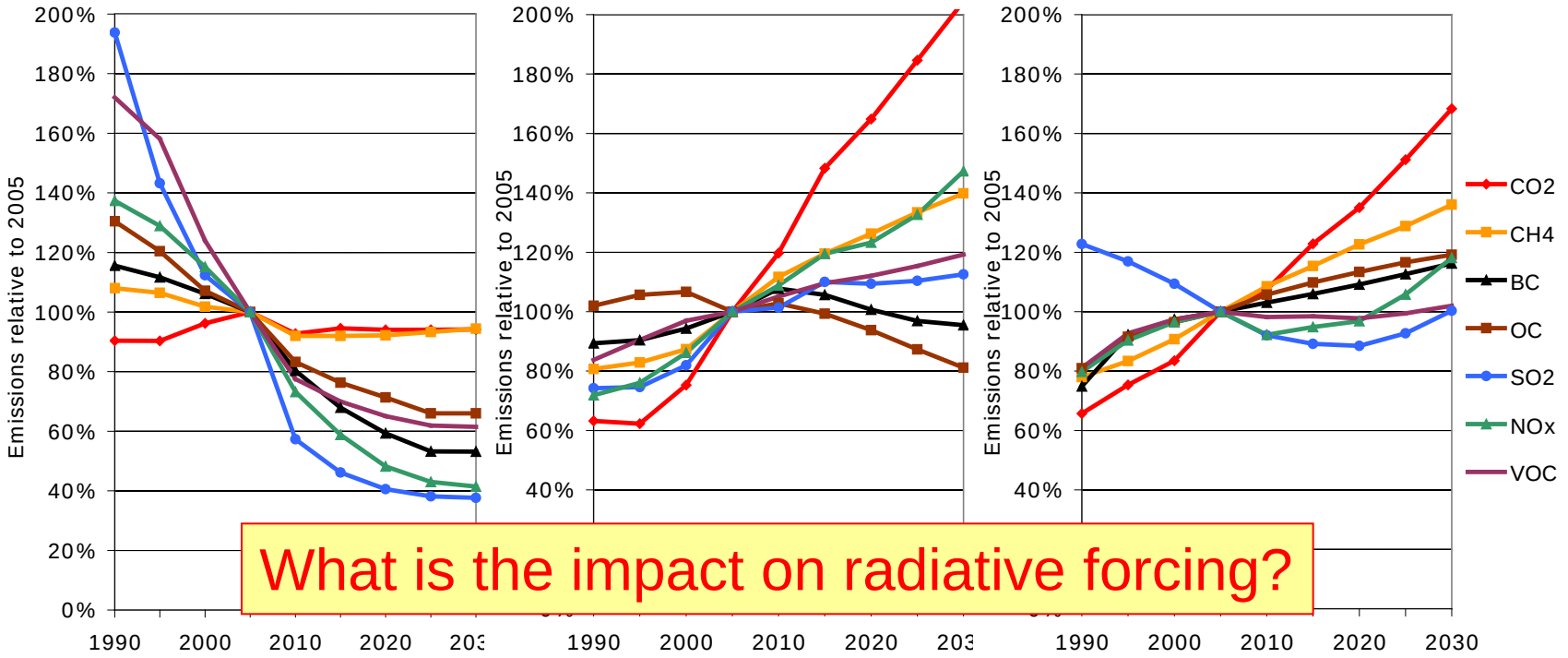
Emission trends 1990-2030

GAINS calculation for IEA World Energy Outlook 2009

OECD BRICS Others



What is the impact on radiative forcing?

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GWPs used for screening of mitigation measures

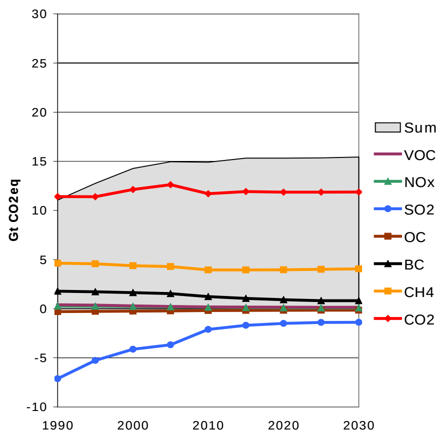
	20 yrs	100 yrs	Source
CO2	1	1	IPCC, AR4
CH4	72	25	IPCC, AR4
N2O	289	298	IPCC, AR4
SO2	-140	-40	Fuglestvedt et al., 2009 (ATTICA)
BC	2200 (690-4700)	680 (210-1500)	Bond and Sun, 2006
OC	-240	-75	Bond et al., 2007
VOC	12	3.4	IPCC, AR4
CO	4.5	1.9	IPCC, AR4
NOx	<0	± 0	various sources

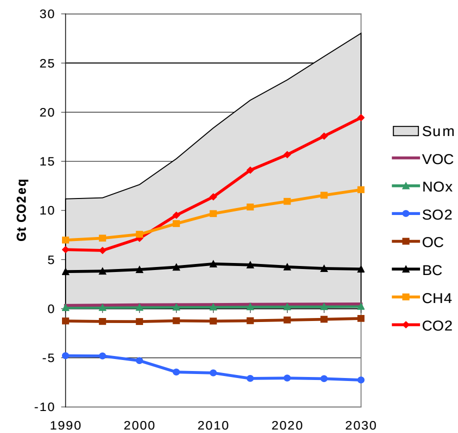
CO_2eq emissions by gas

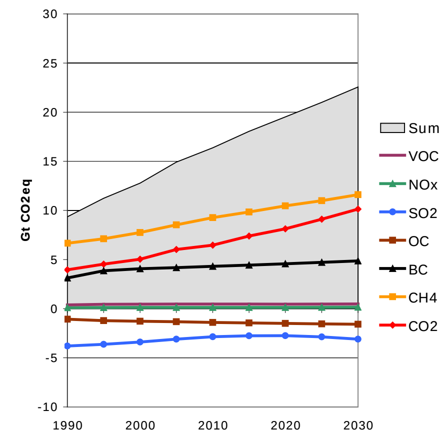
1990-2030, IEA WEO2009 baseline

	OECD	BRICS	Others

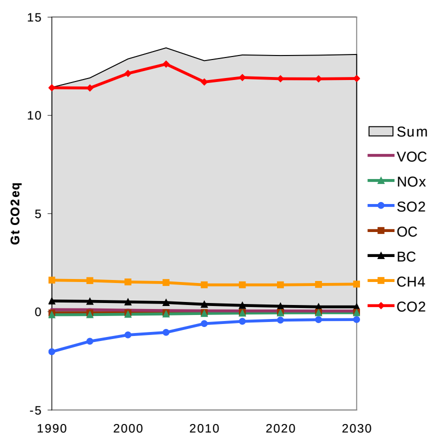
20 yrs GWP

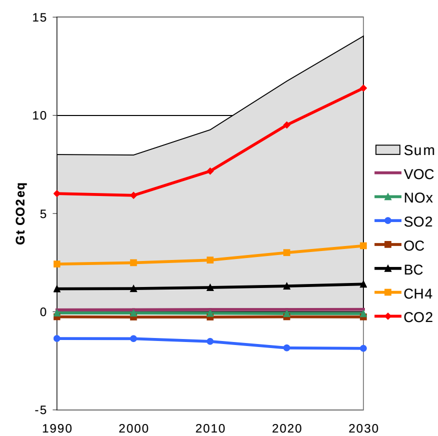


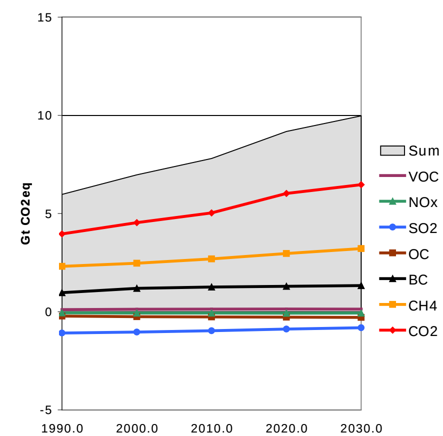




100 yrs GWP







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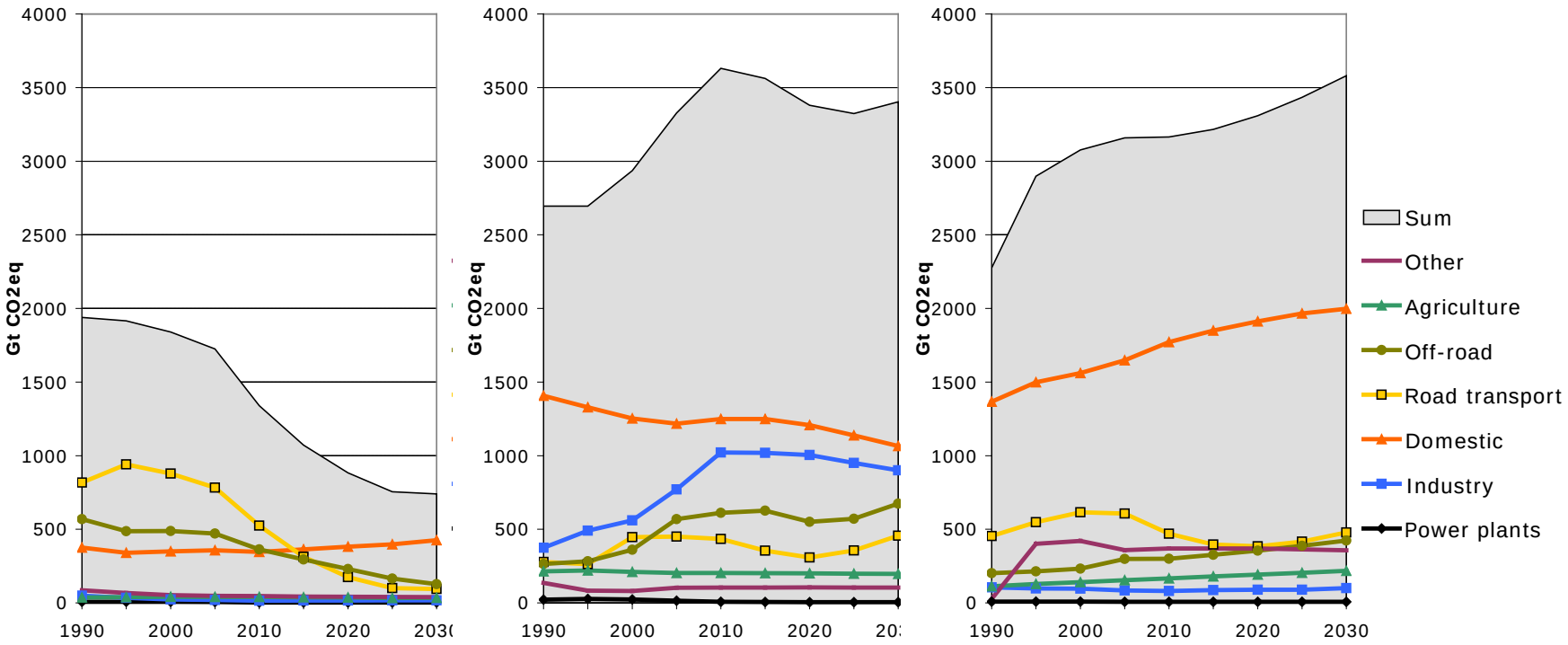
GWP20 from BC+OC by sector

IEA WEO 2009

OECD BRICS Others



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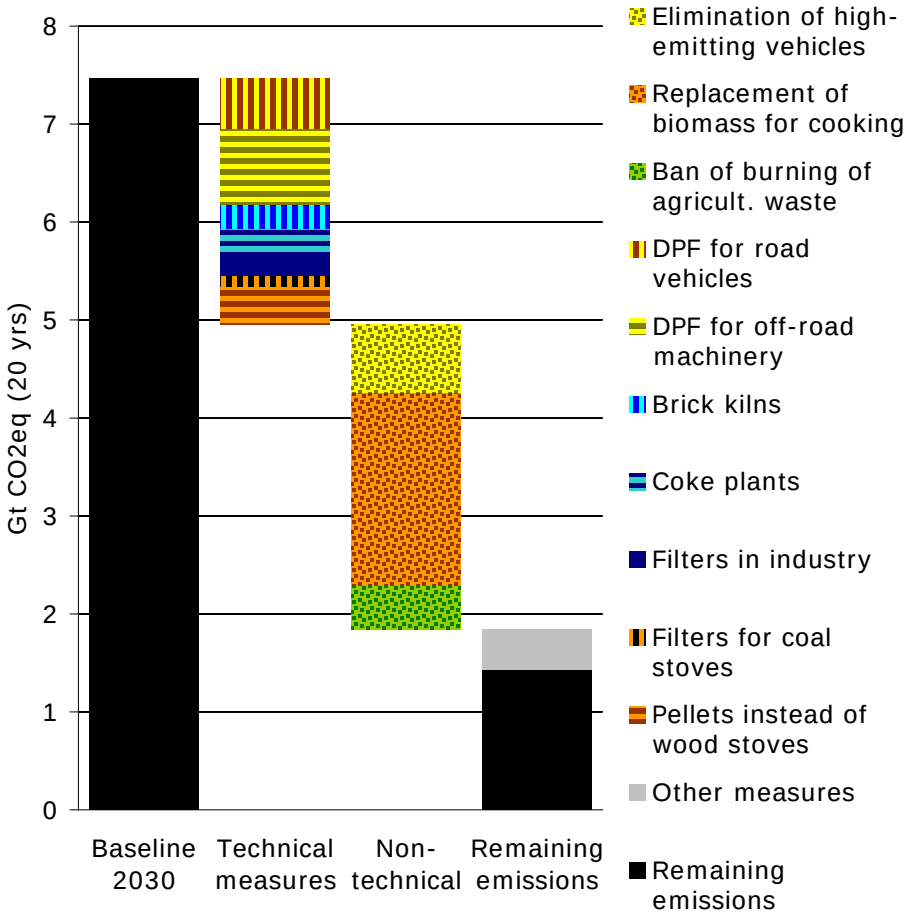
Global mitigation potential for BC+OC in 2030

Net impact on GWP20

for IEA WEO2009 baseline



Assumptions:

- Only realistically available technical measures:
  - No pellets and ESP for households in developing countries
  - No tunnel kilns in India
- Full turn-over of capital stock by 2030
- Feasibility of non-technical measures to be determined

Impacts in 2030:

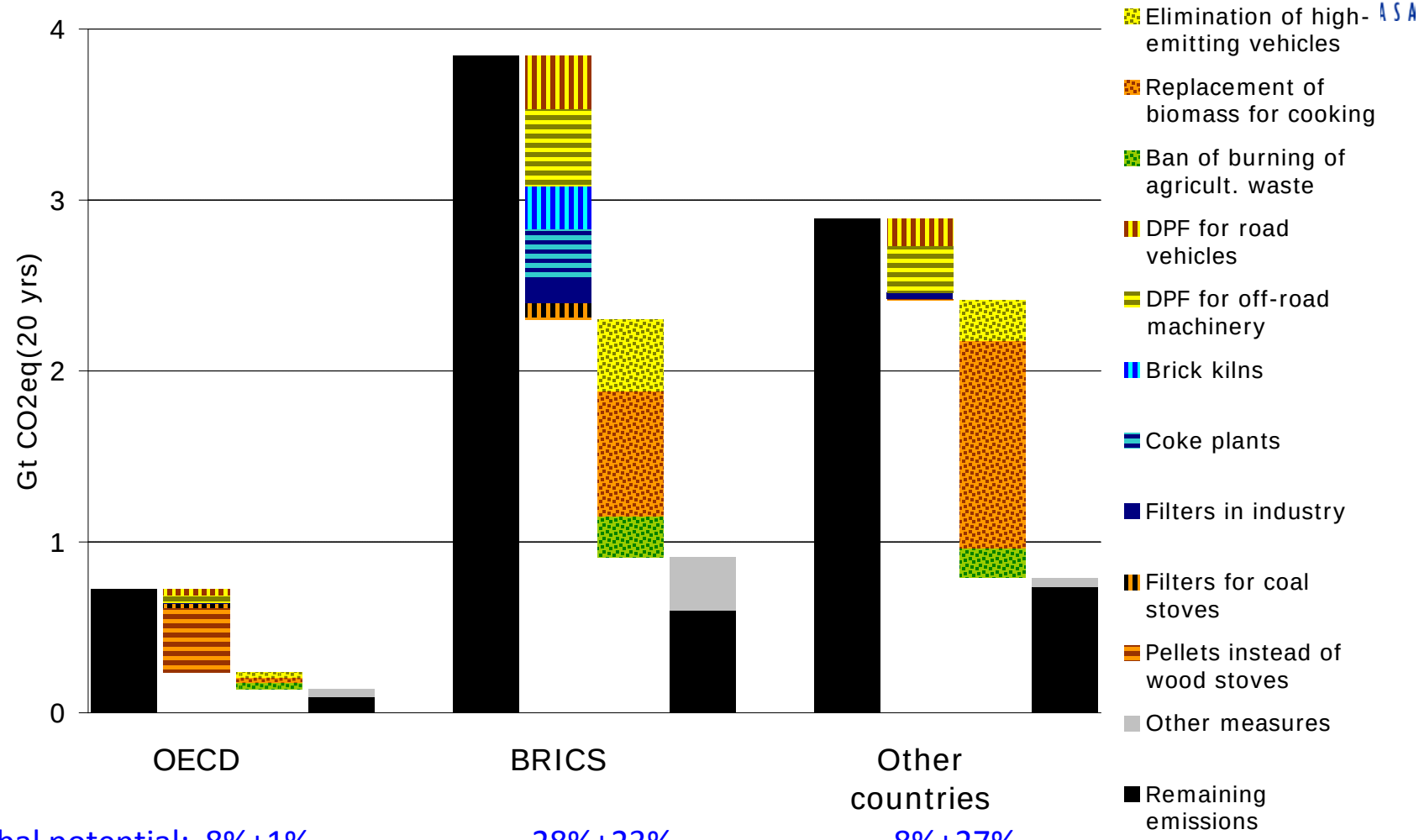
- -35% from technical measures
- -40% from non-technical measures

Work in progress!

Regional mitigation potential for BC+OC in 2030

Net impact on GWP20

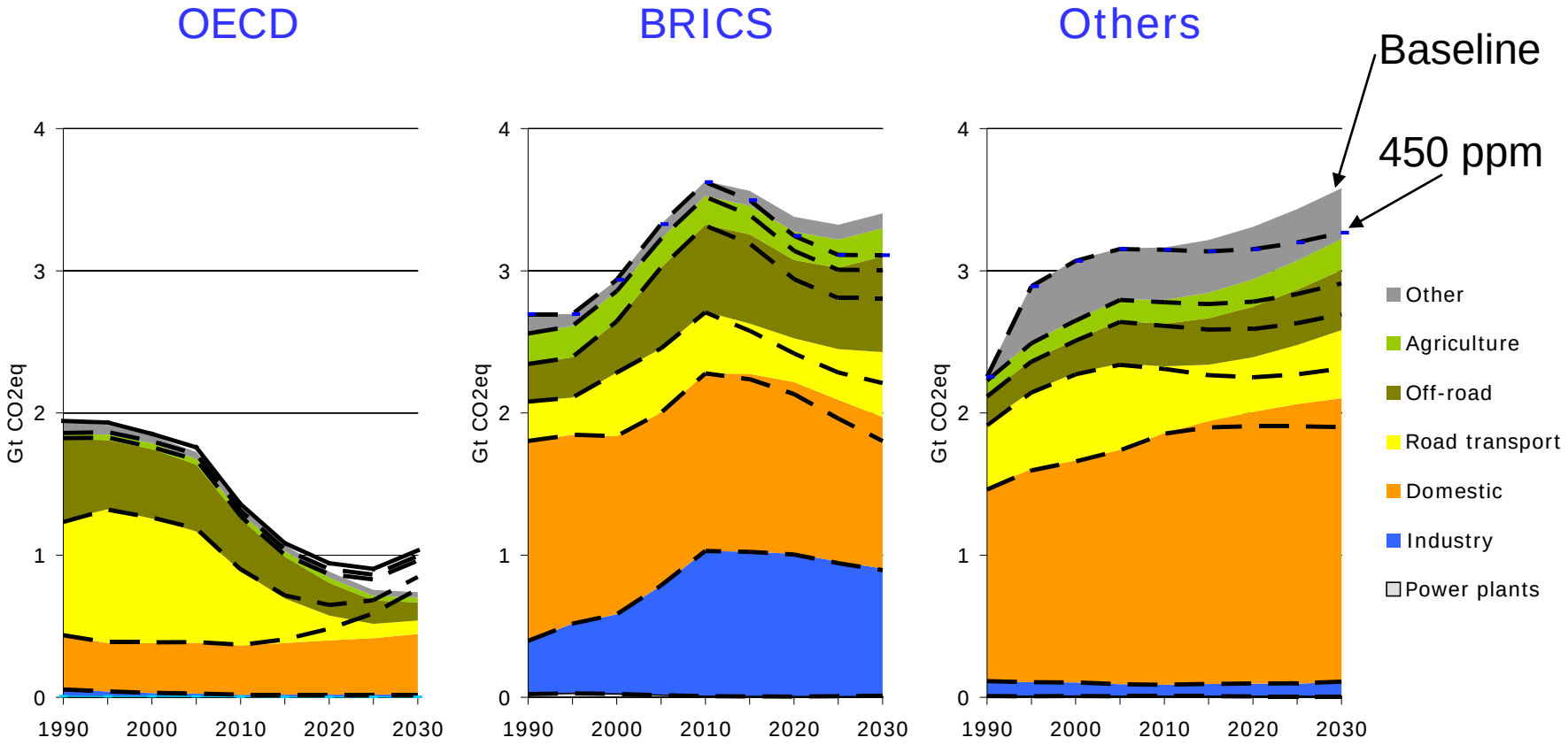
for IEA WEO2009 baseline



Of global potential: 8%+1% 28%+23% 8%+27%

BC/OC mitigation from a low-carbon scenario

GWP20 IEA WEO2009 REF vs 450 ppm scenario

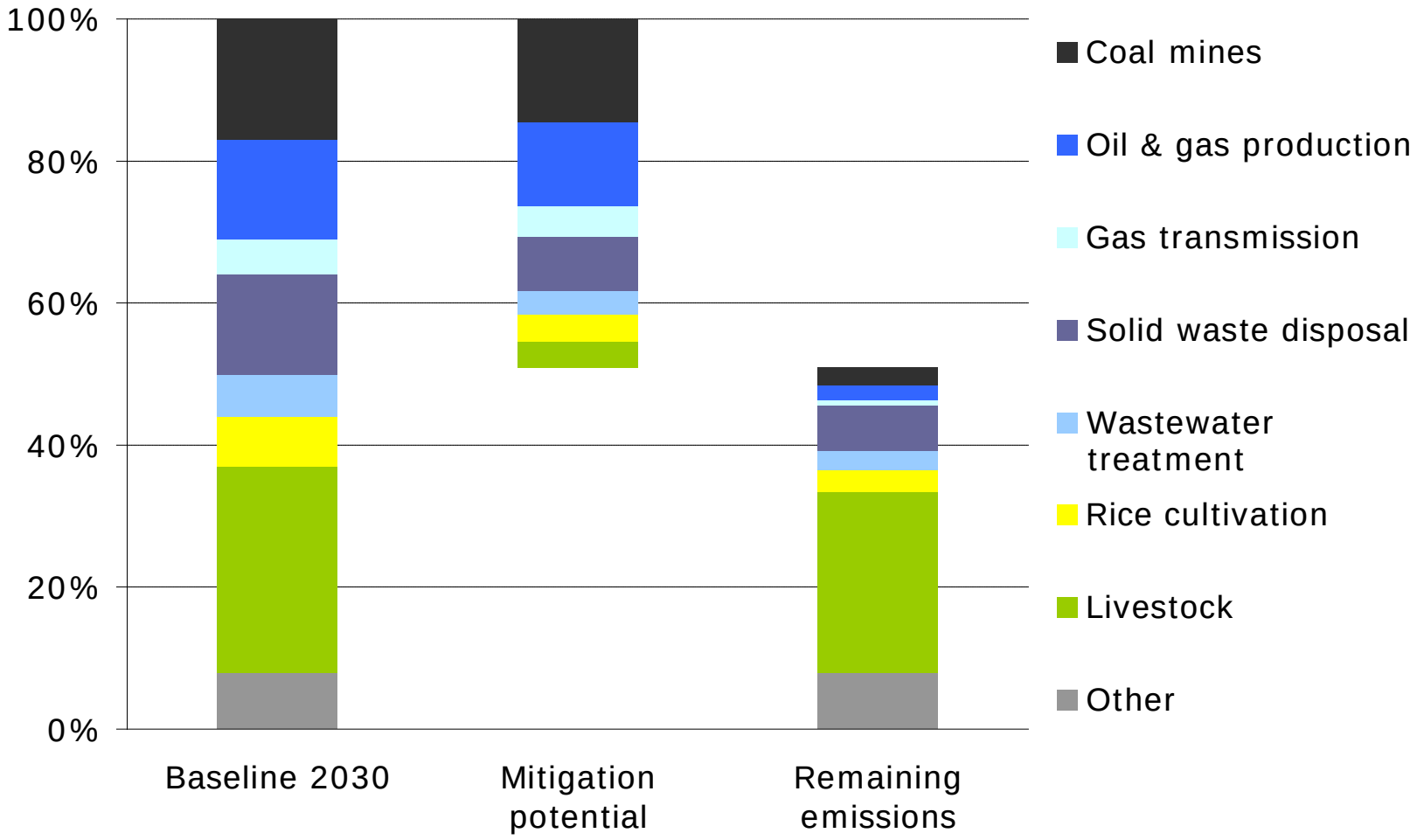


Work in progress!

Top-10 mitigation measures for methane in 2030

for IEA WEO2009 baseline

Source: IIASA GAINS



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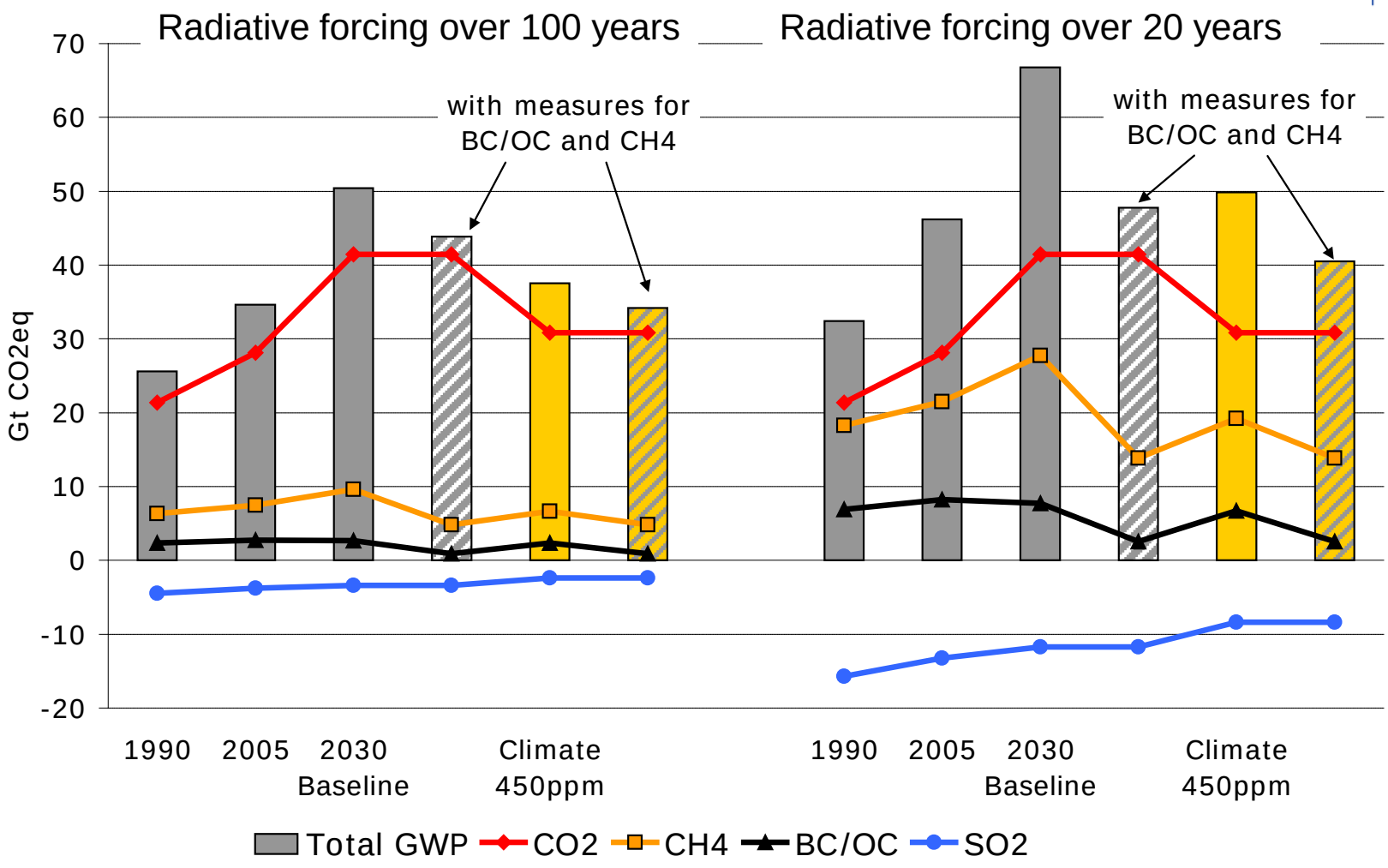
Radiative forcing from long- and short-lived GHGs

IEA WEO 2009, baseline and 450ppm scenarios



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Some key uncertainties

- Reduction efficiency for BC of improved/new biomass cooking stoves in developing countries
- Emission factors for brick kilns and coke ovens
- Some activity data (e.g., open burning of biomass and waste)
- Quantification of super-emitting vehicles (present and future)
- Quantification of radiative forcing of aerosols
- Feasibility of non-technical measures

Conclusions

- Globally, implementation of 10 measures could lead to a 75% reduction in short-term forcing of BC/OC in 2030.
- However, some of these improvements in RF will be compensated by associated reductions in SO_2 emissions (DPF).
- 50% of this potential emerges in BRICS countries, 33% in other developing countries.
- 30% of the potential depends on reduction efficiency of improved biomass cook stoves for BC. Phase-out of biomass as alternative?
- 45% of the mitigation potential could be achieved through technical measures, 55% require non-technical interventions.
- A health-targeted strategy would not necessarily reduce near-term forcing, but all BC measures also reduce health impacts (although not as efficiently).