

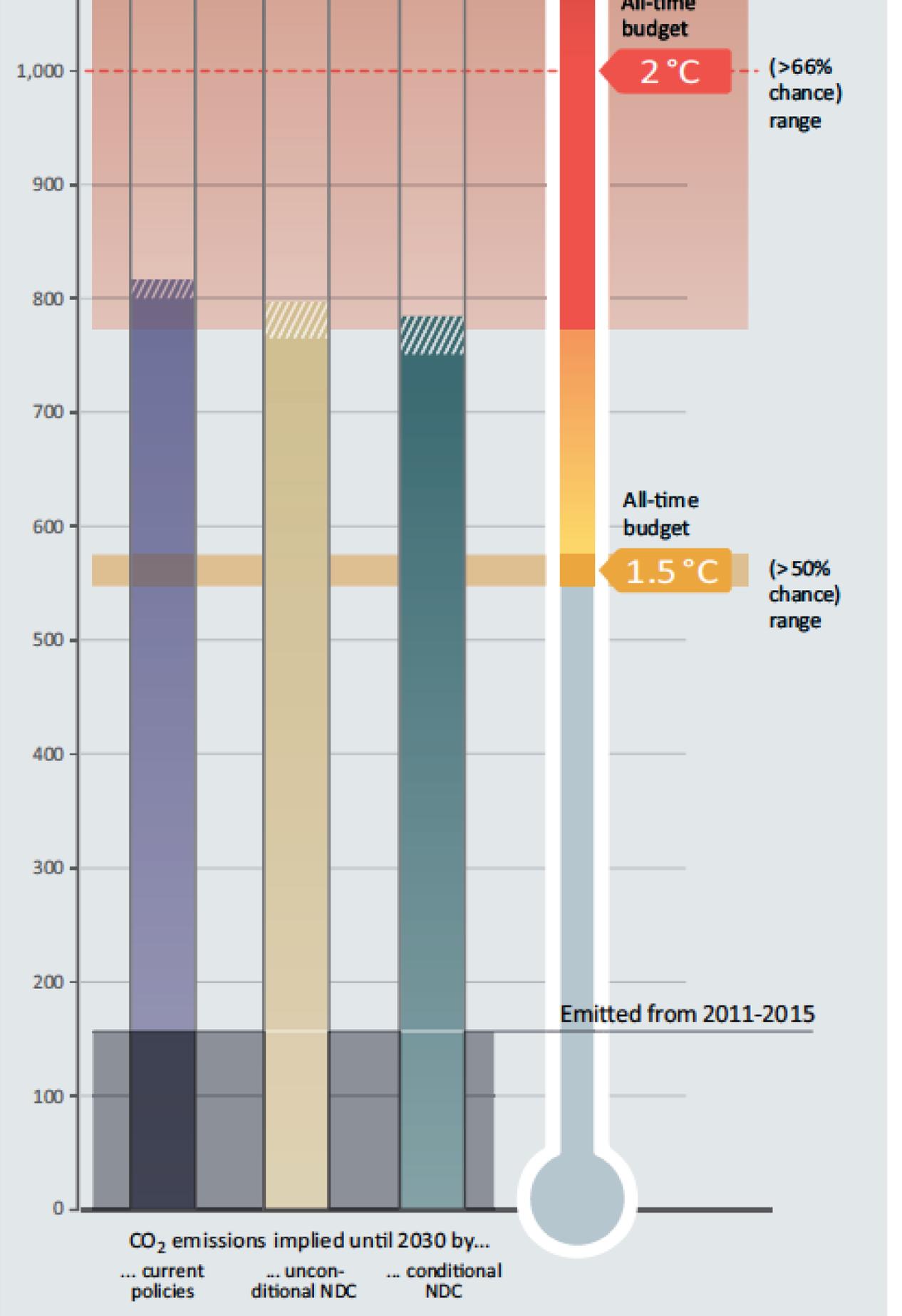
The Social Cost of Methane: Valuing Emissions to Reflect their Full Environmental Impact

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Multiple benefits



Long-term climate: 0.001°C corresponds to 1.2 GtCO₂

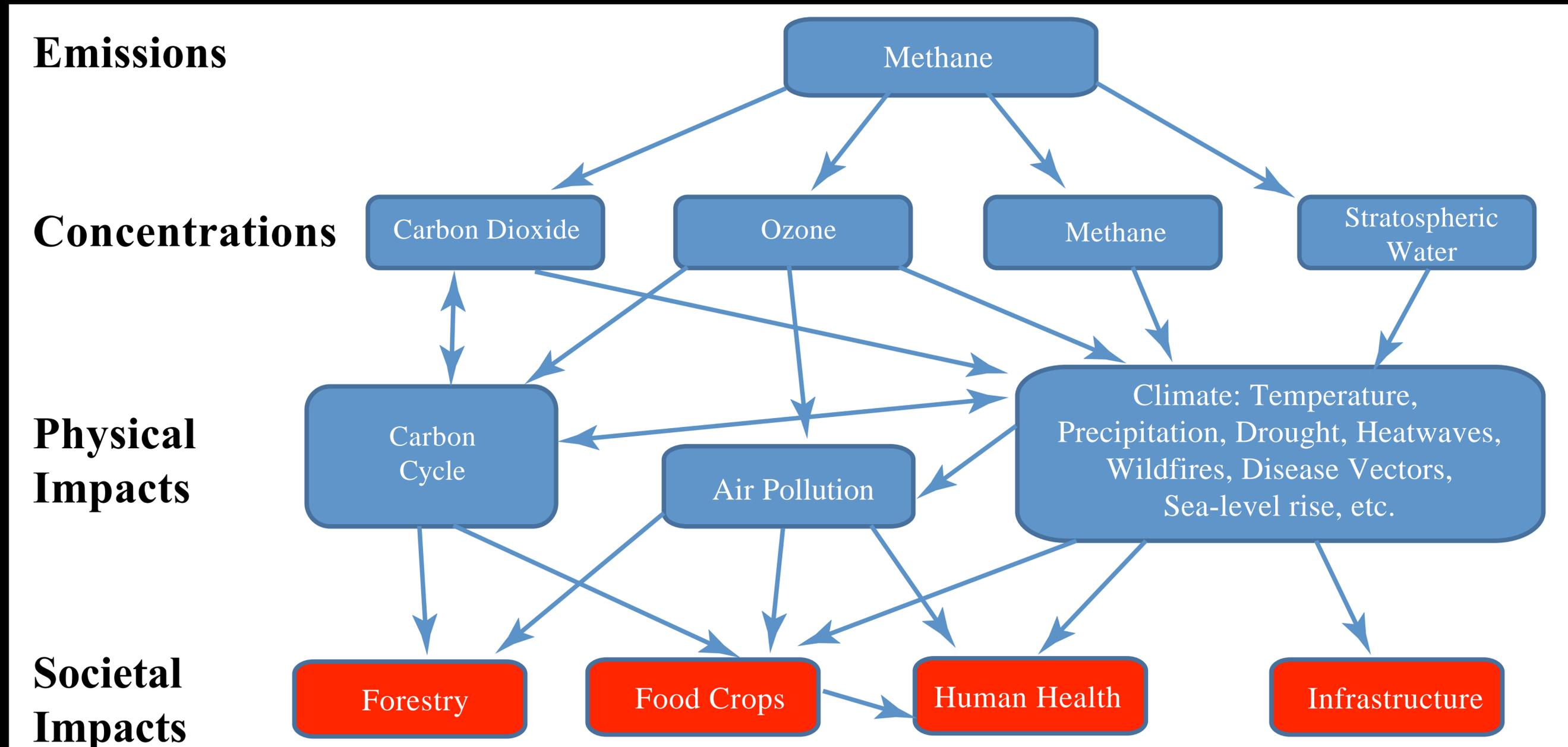
Rate & magnitude of warming over next 20-40 yr

Health: mortalities, morbidities

Crops: tons of yield

Valuing Emissions

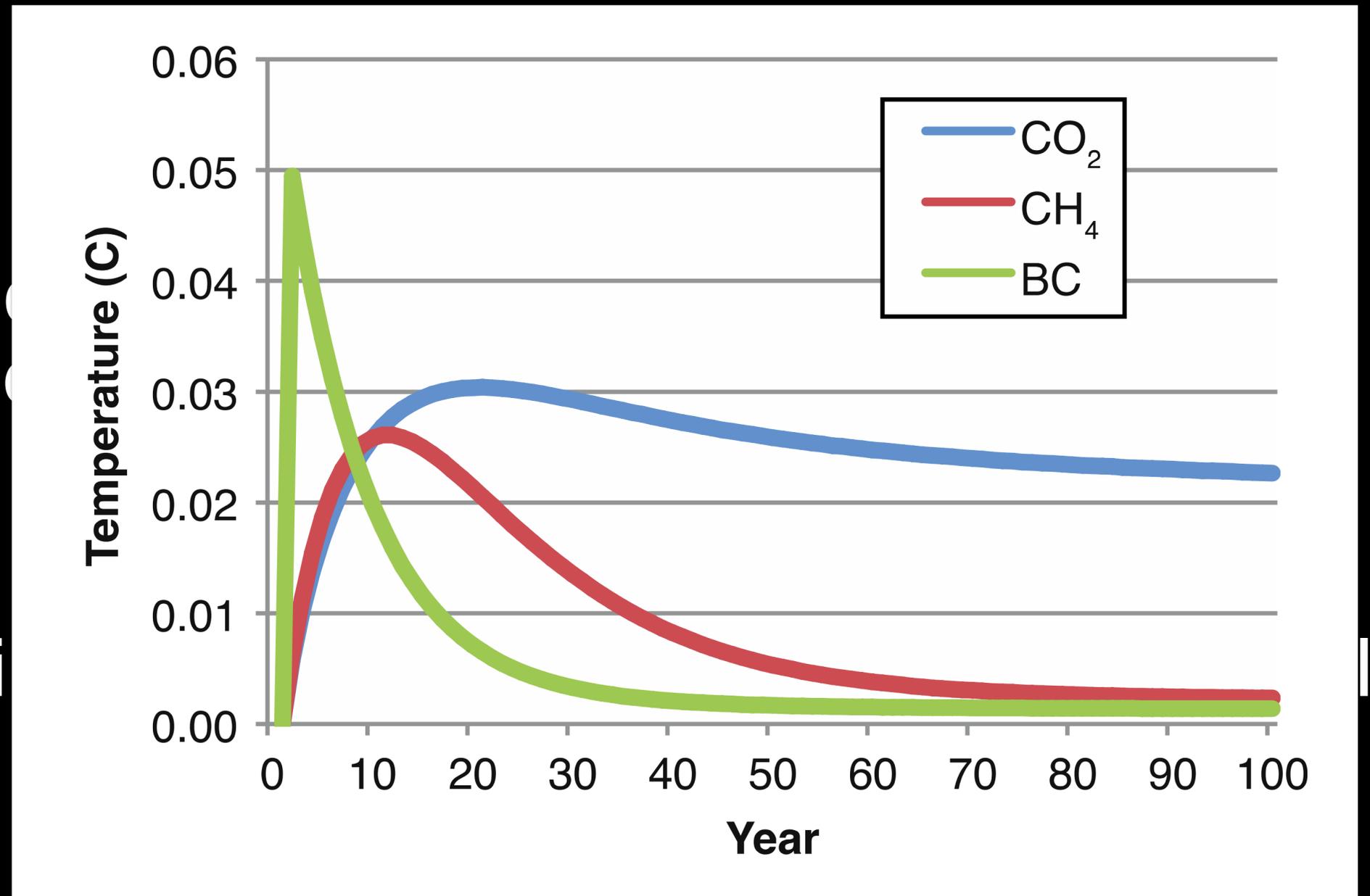
Develop a broad Social Cost of Methane that includes impacts on human health, agriculture, etc., via climate & air quality



Valuing Emissions

Social Cost of Methane includes
impacts with consistent methane

Values over all times are included
impacts included



Radiative forcing update included, ozone-health update not yet

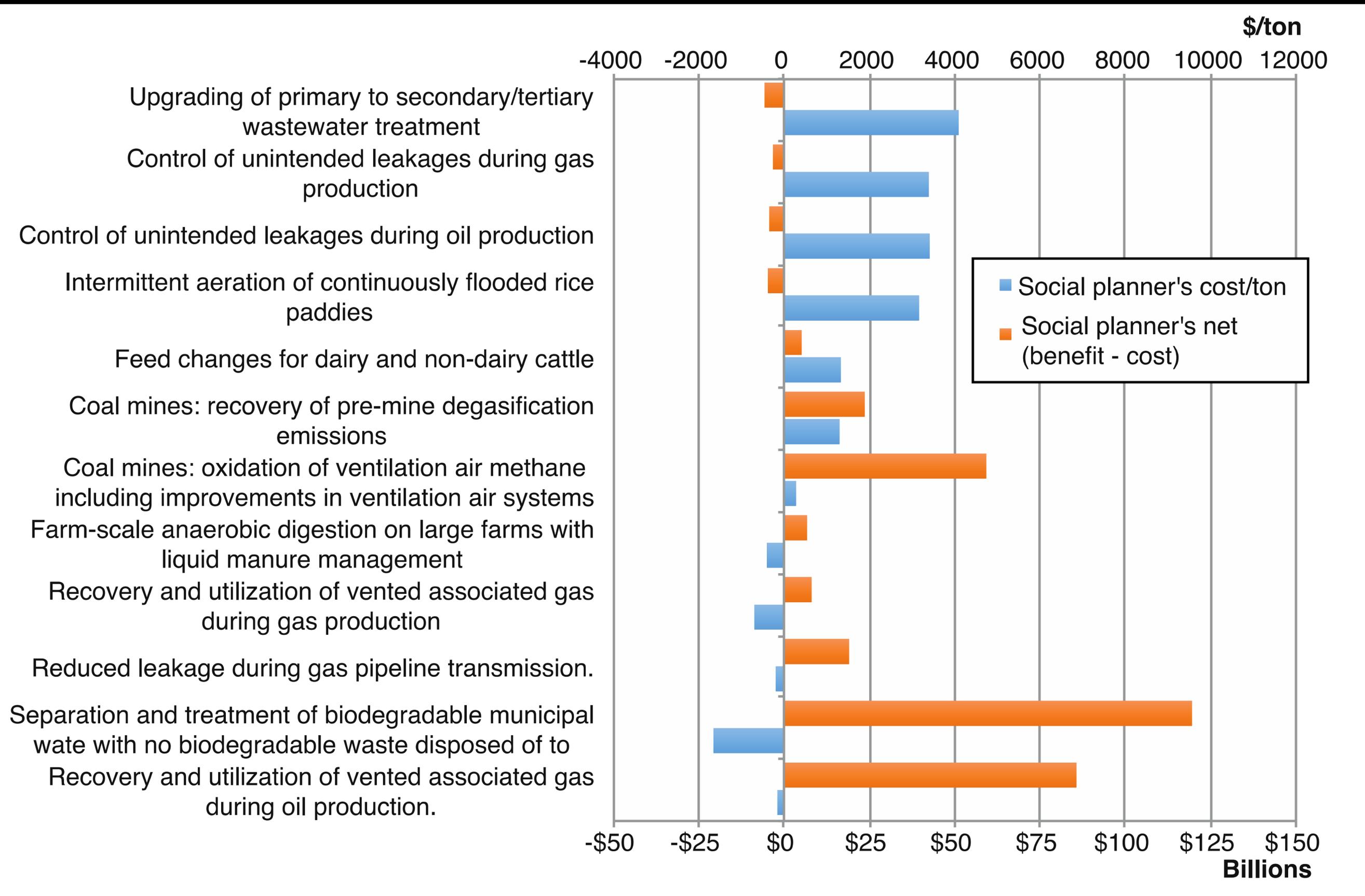
Valuing Emissions:

Methane (4% discounting, CO₂ total \$38/ton)

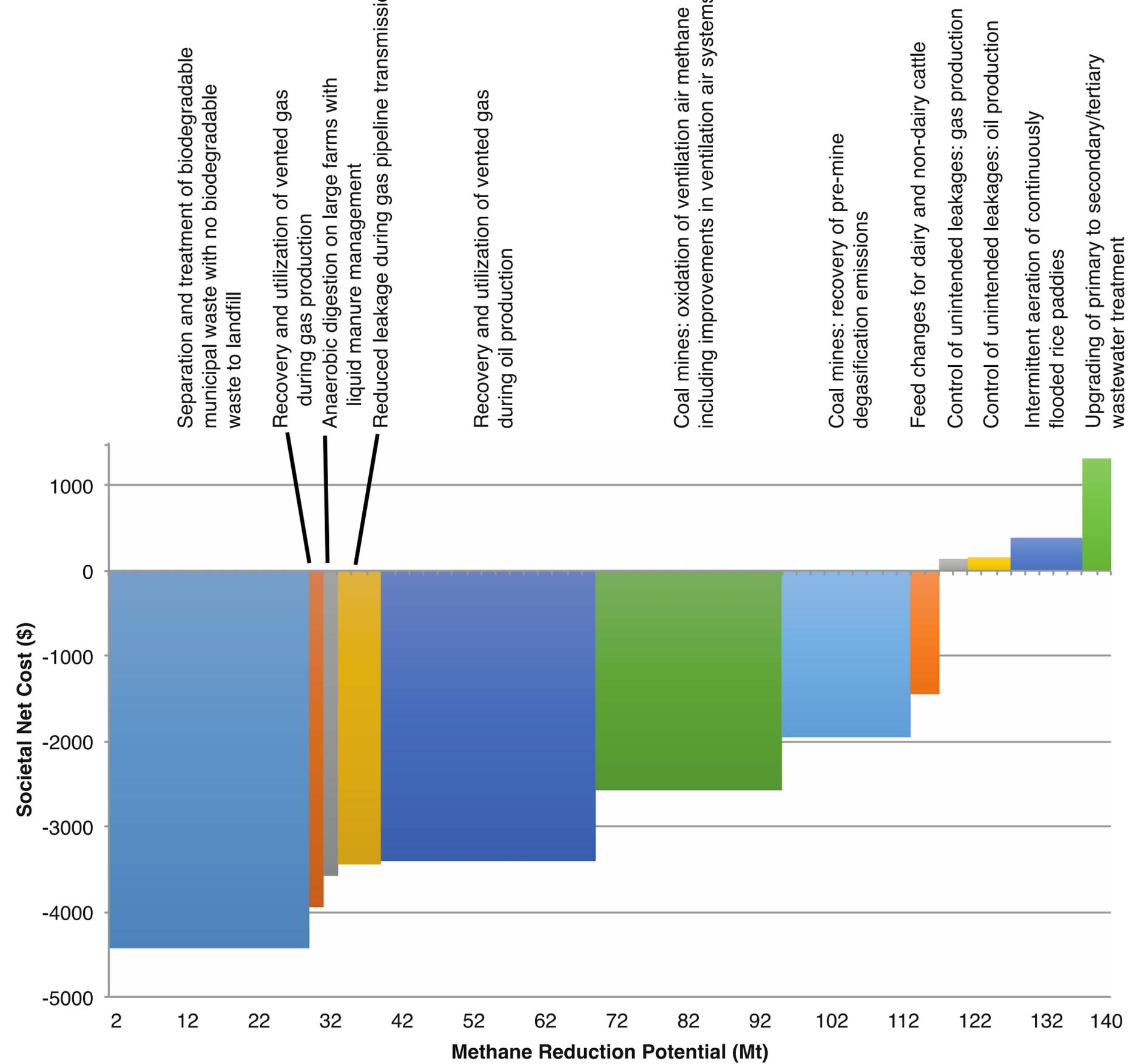
Total \$2900 (1300-4900)

Ratio vs CO₂ 76 (50 and 180 with 3% and 10% discounting, respectively)

Control measures & costs from UNEP, 2011

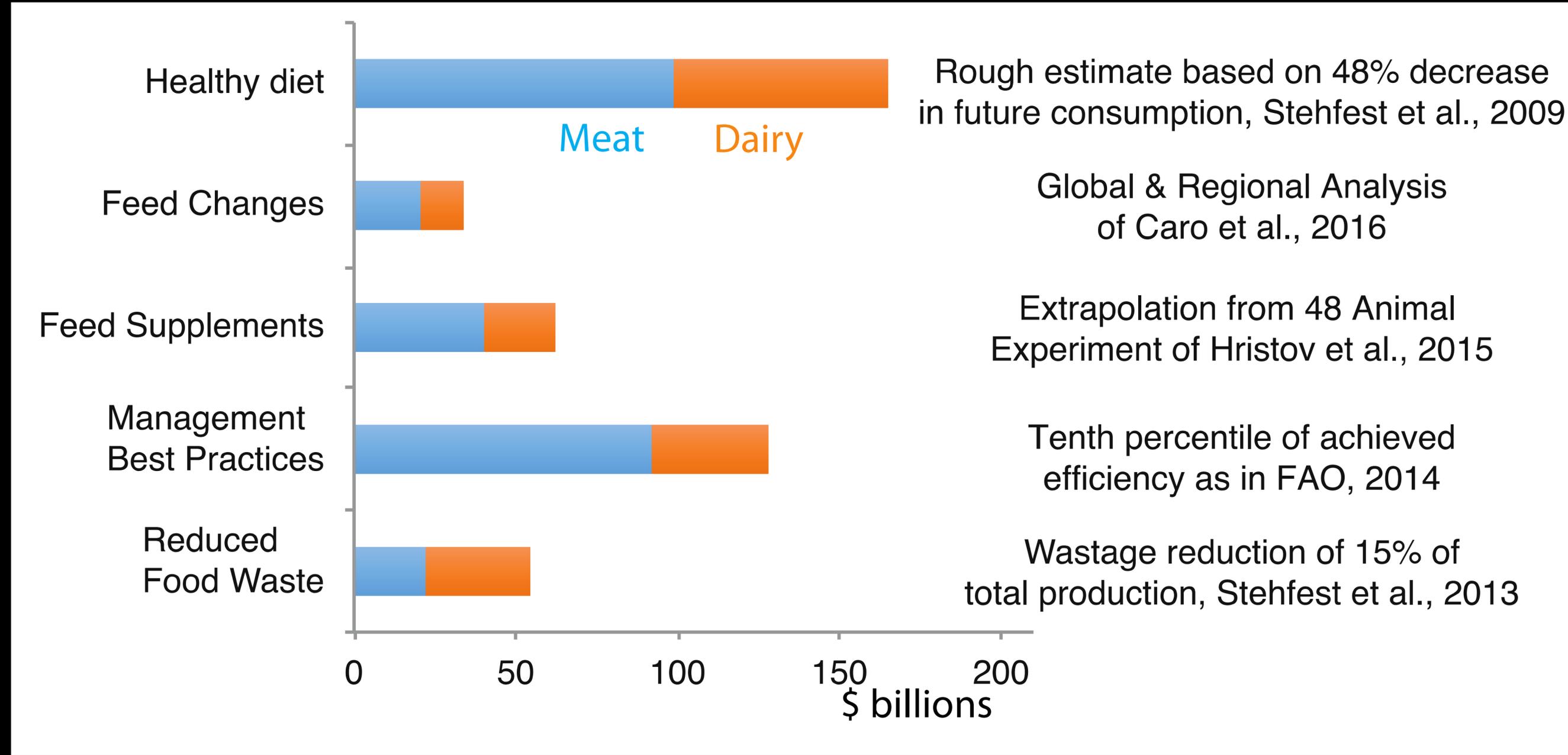


Cost curves for in-use methane abatement measures



Livestock-related emissions

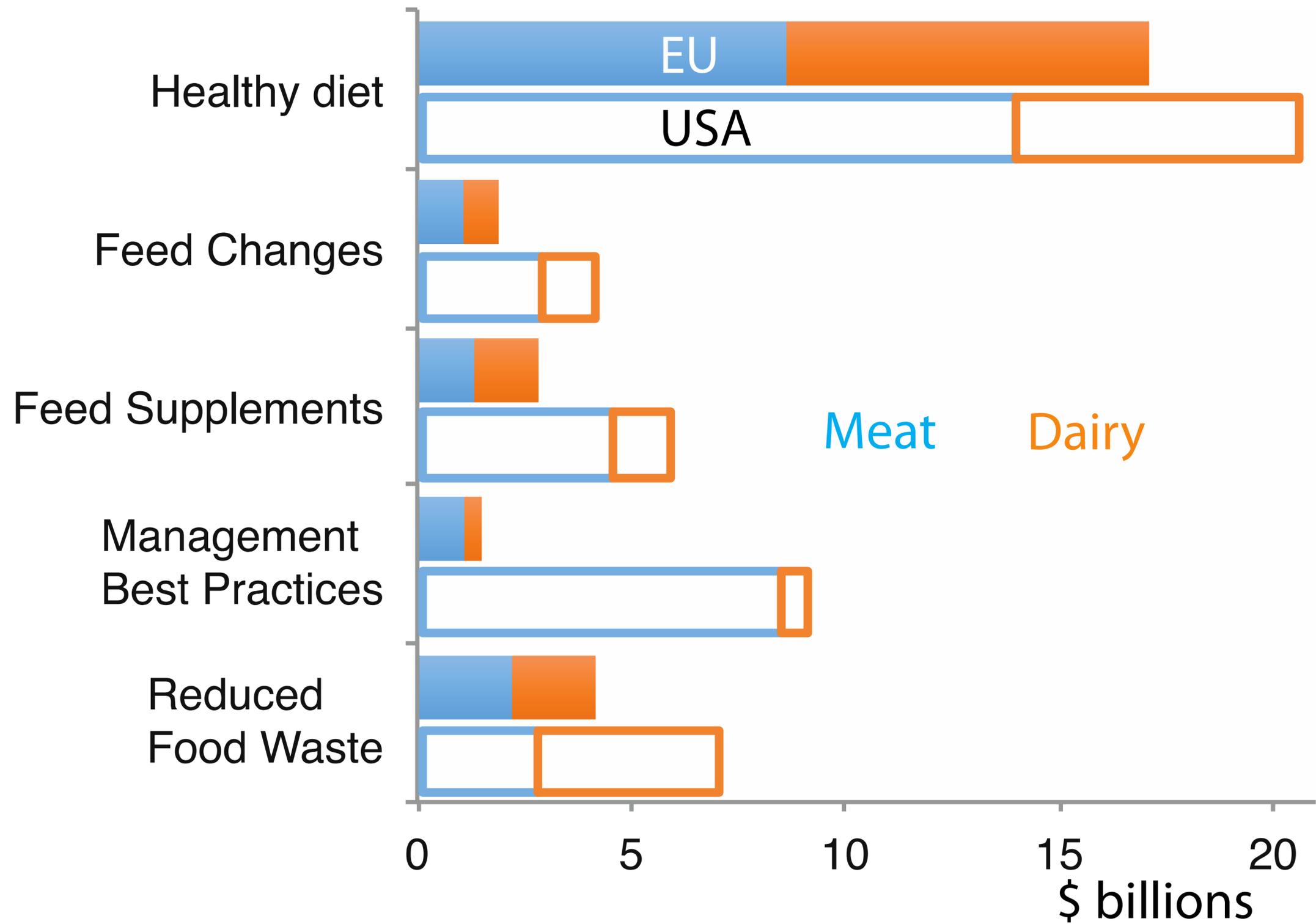
Benefit Valuation due to Emissions Reductions



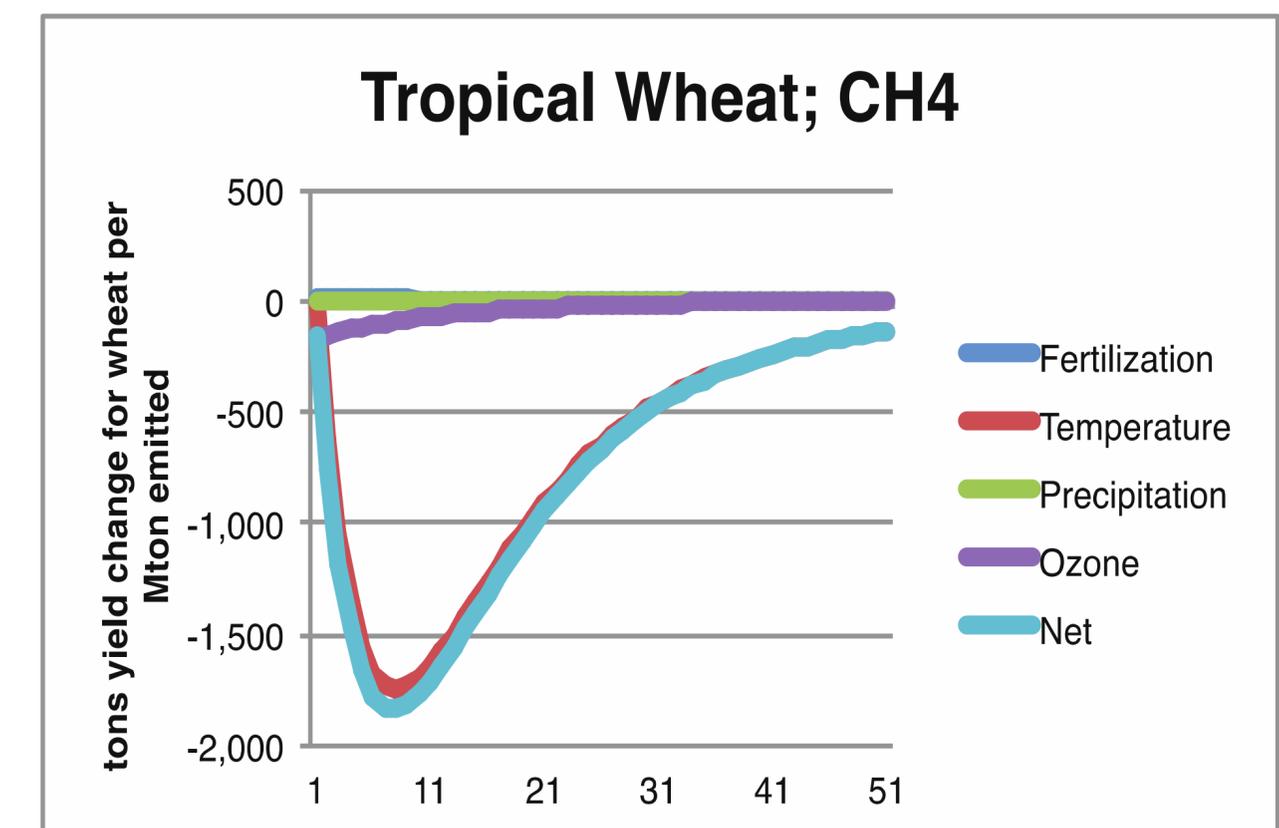
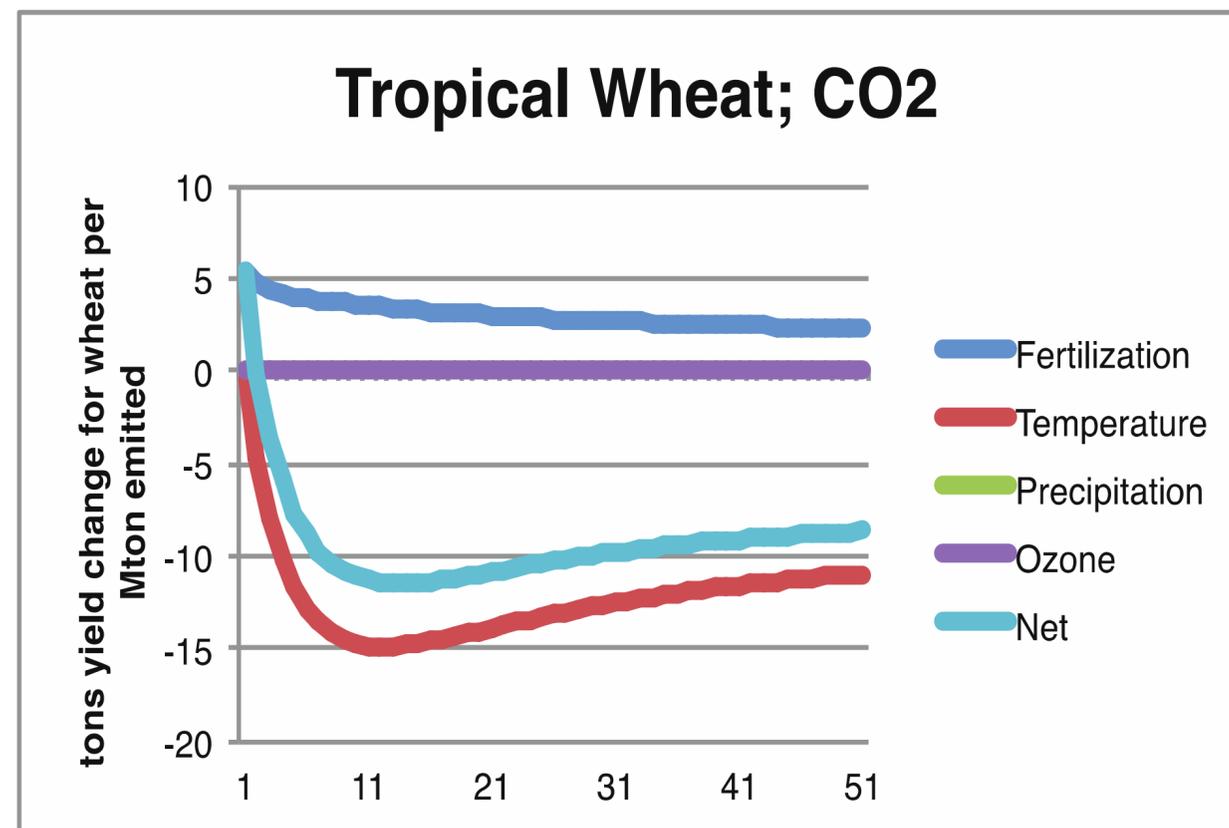
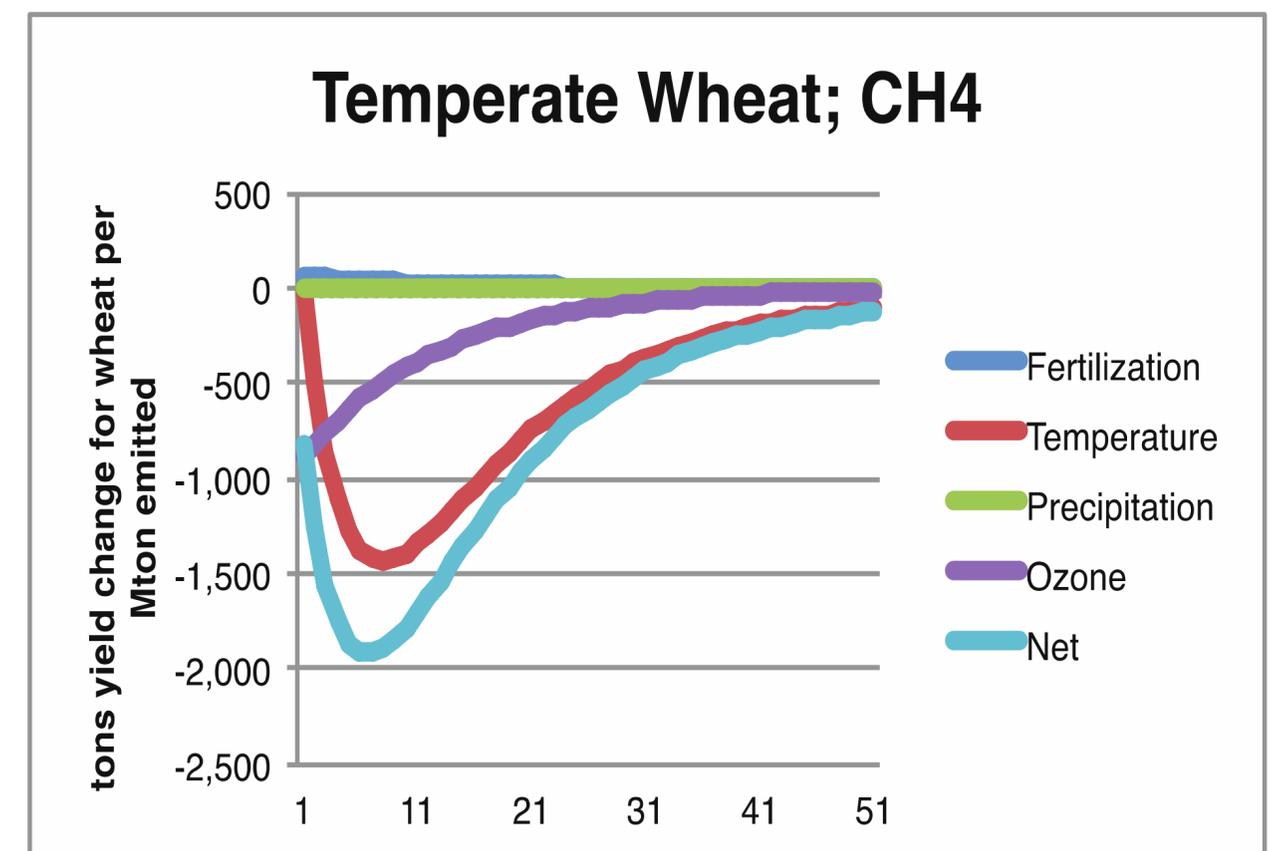
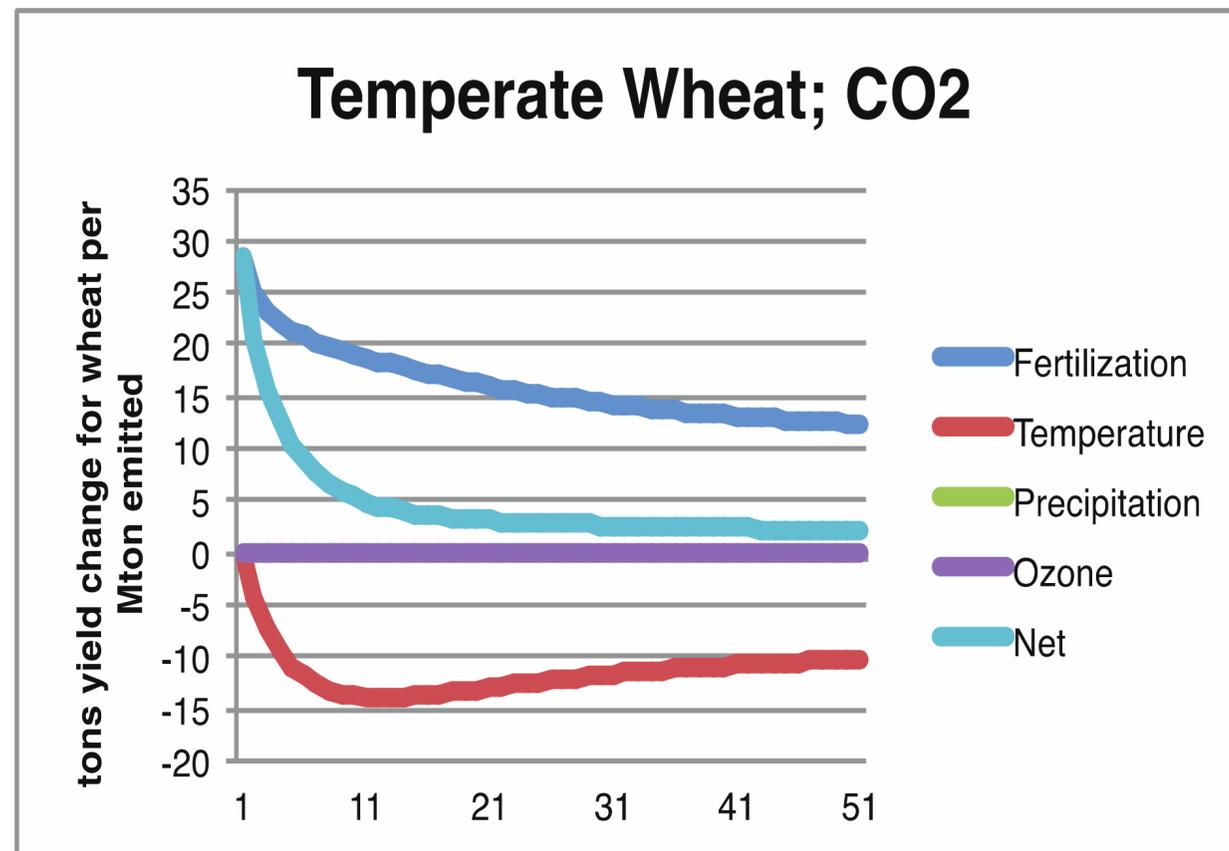
~\$270 billion for healthy diet due to reduced health care cost + lost work days (Springmann et al., PNAS, 2016)

Agriculture-related emissions

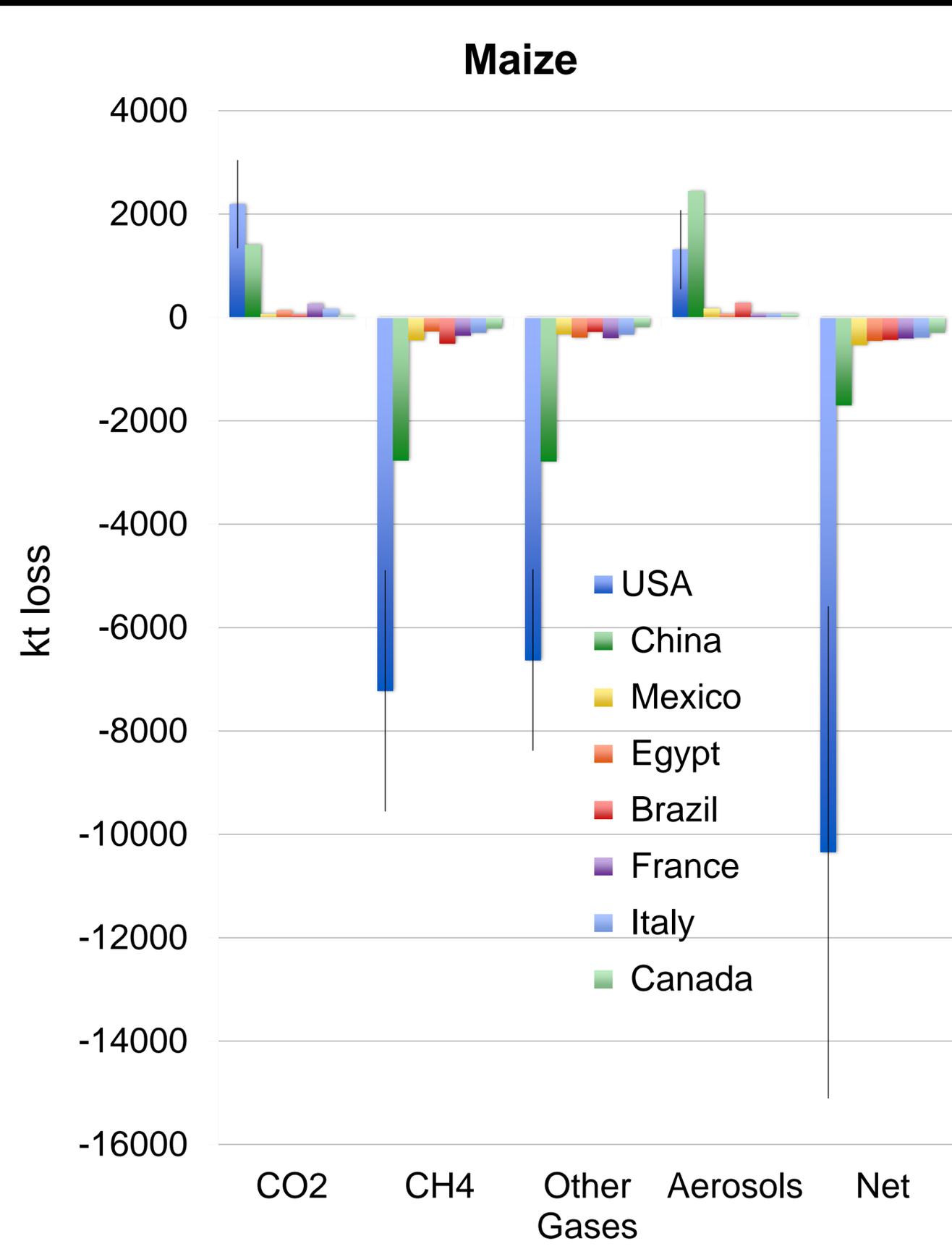
Societal benefits of potential interventions



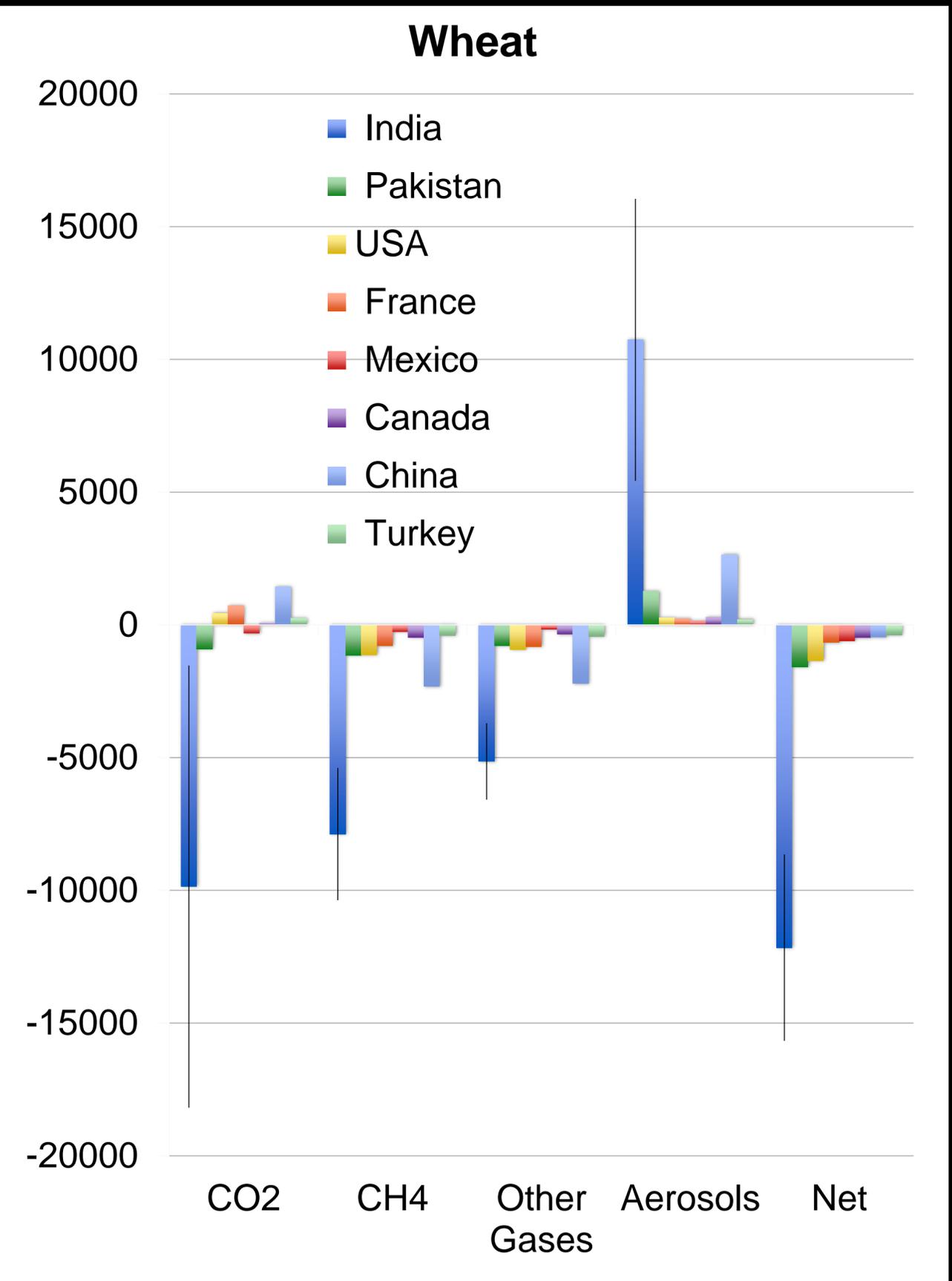
Crops; Impacts per emission



Crops; Impacts of emissions to date



Shindell et al, in progress, 2018



Thanks to Pisces Foundation!

Conclusions

Methane valuation including climate and air quality impacts substantially larger (of course!) than climate alone (~~CO₂e~~)

Impacts not sensitive to emission location

Results coming: new ozone-health impacts, spatial distribution of crop impacts, market economic impacts (both air quality & climate)

Another facet of impacts along mitigation pathway