

Analysis of climate drivers and mitigation options within the Energy, Transportation and Agriculture sectors using GISS modelE2

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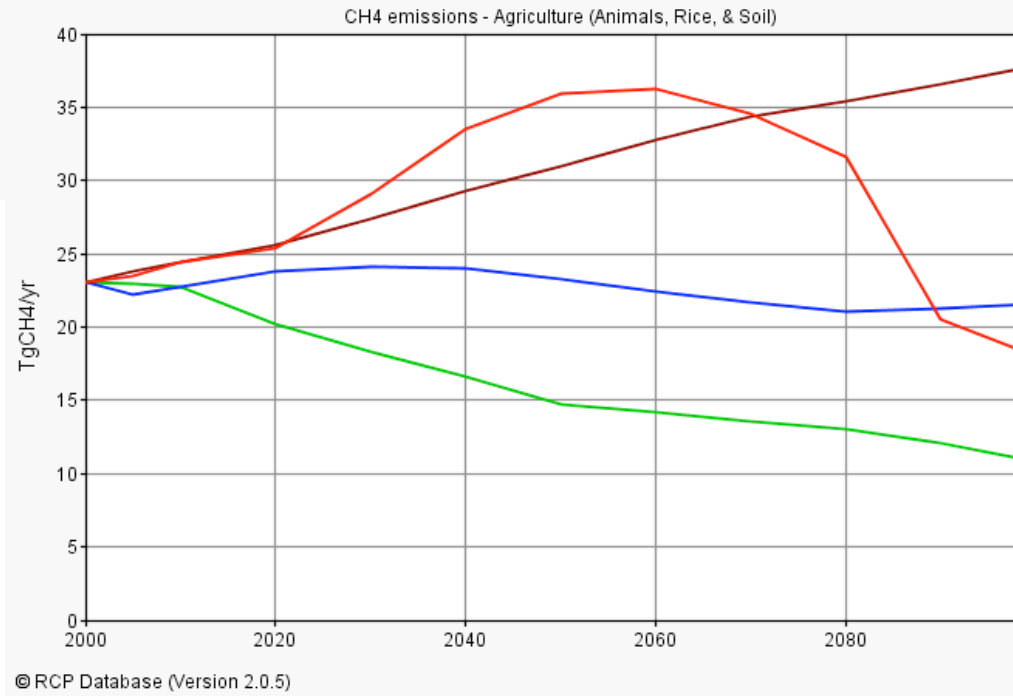
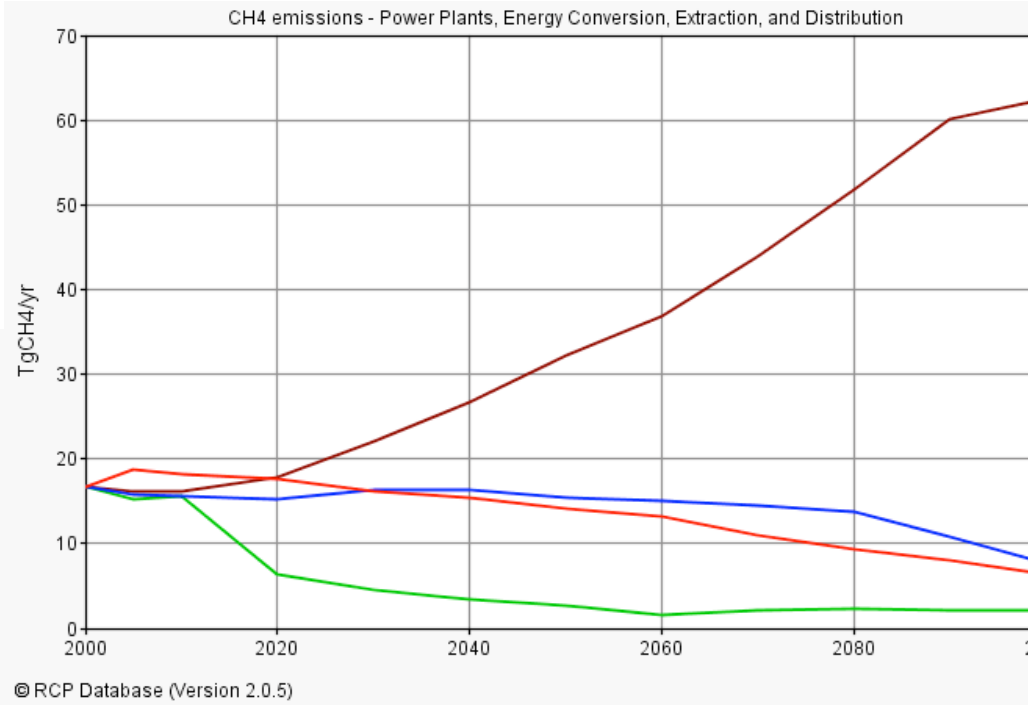
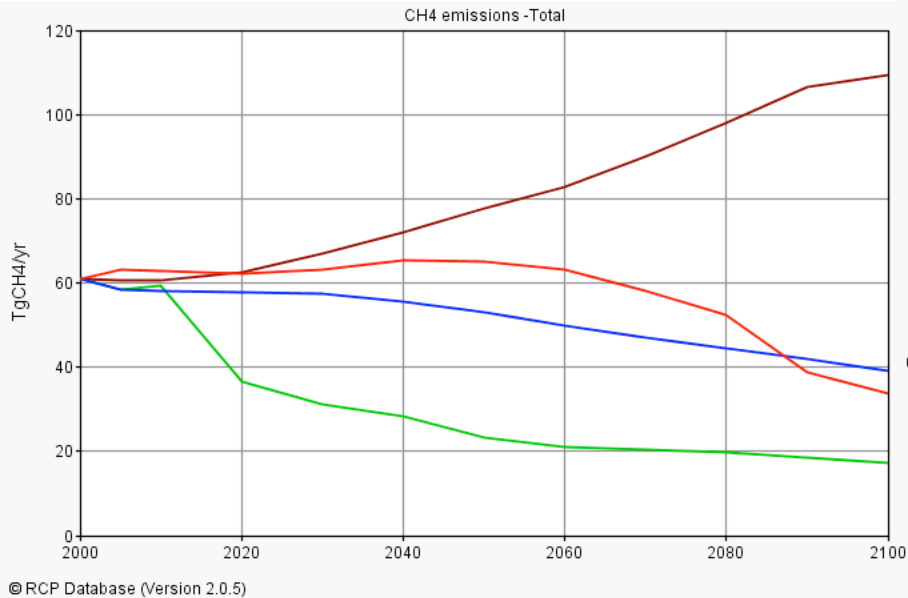
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David Streets, Argonne National Laboratory (emissions)

Project Objectives

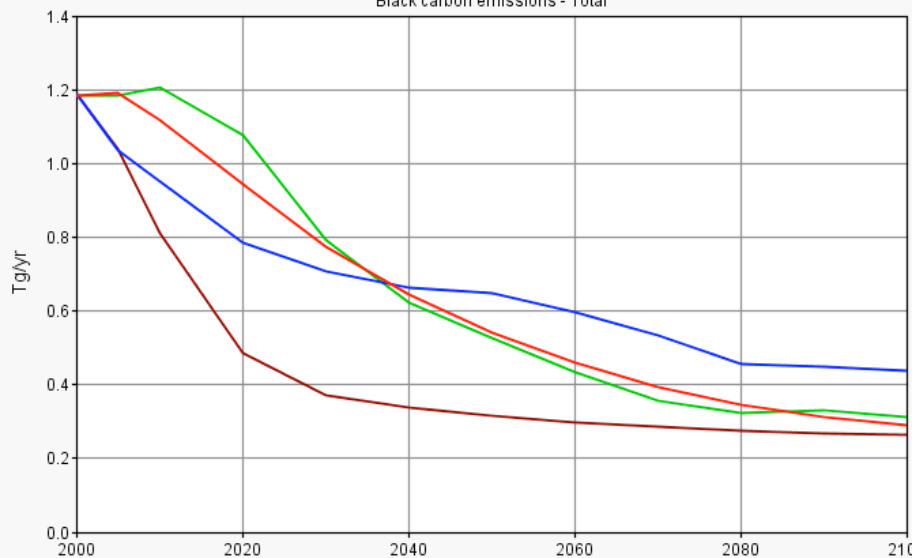
- For the US, the energy, transportation and agriculture sectors play major roles in current and projected emissions.
- These emissions influence climate on multiple timescales, and also affect air quality. Ozone and aerosols affect human health & crop yields.
- Role of these sectors not isolated in climate projections.
- We will look at the multiple impacts of emissions from these sectors, including
 - Current emissions
 - AR5 RCPs
 - UNEP/WMO mitigation scenarios
 - Administration's goals

Emissions Projections (OECD emissions, 4 RCPs)

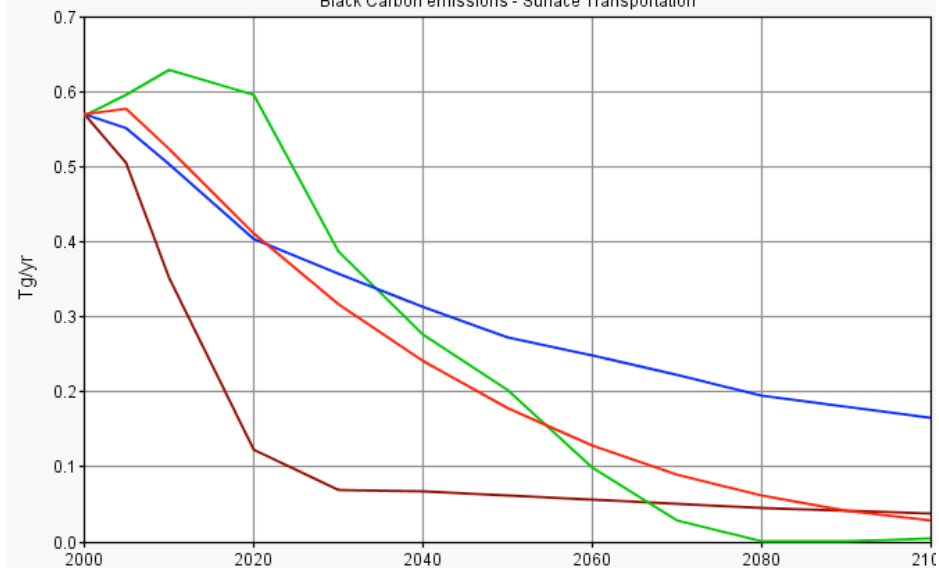


Emissions Projections (OECD)

Black carbon emissions - Total

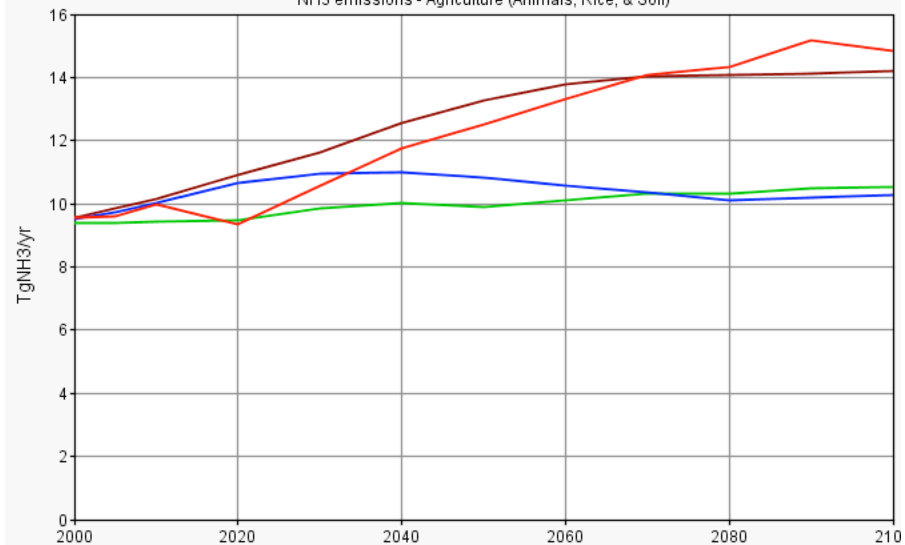


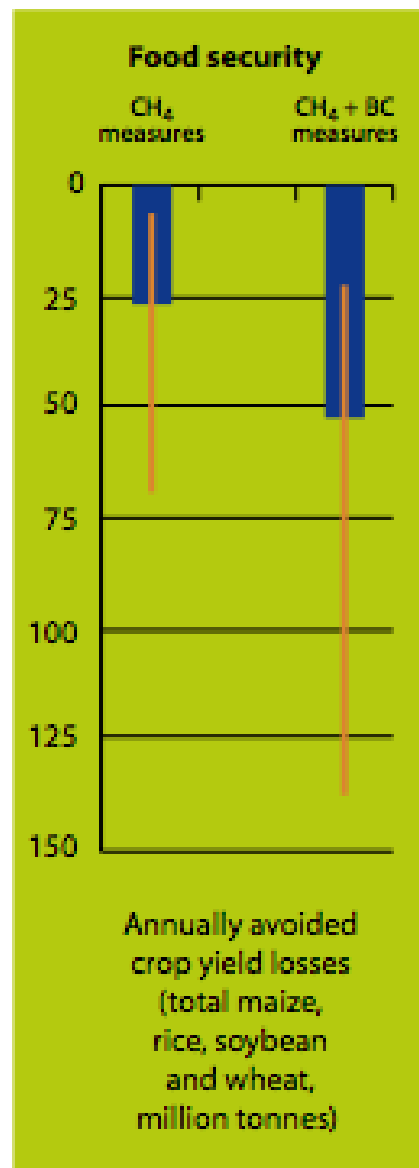
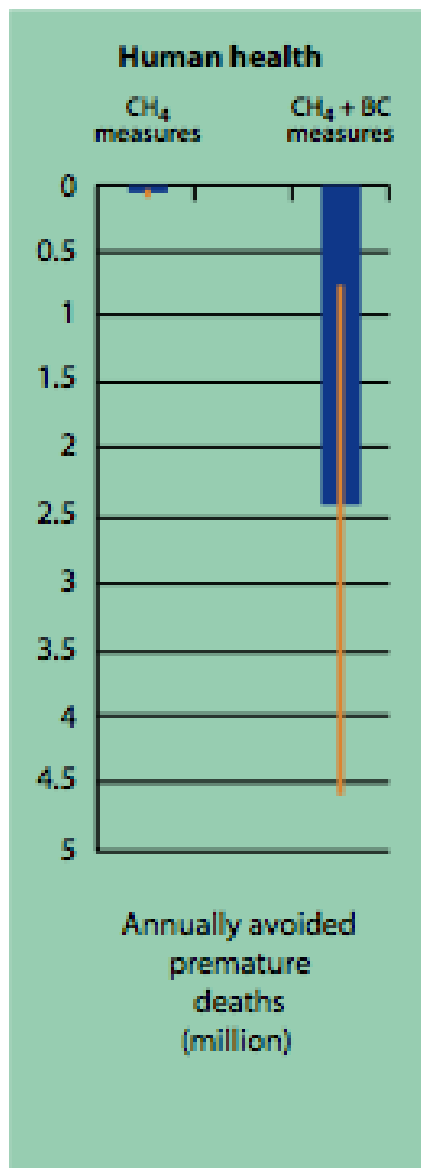
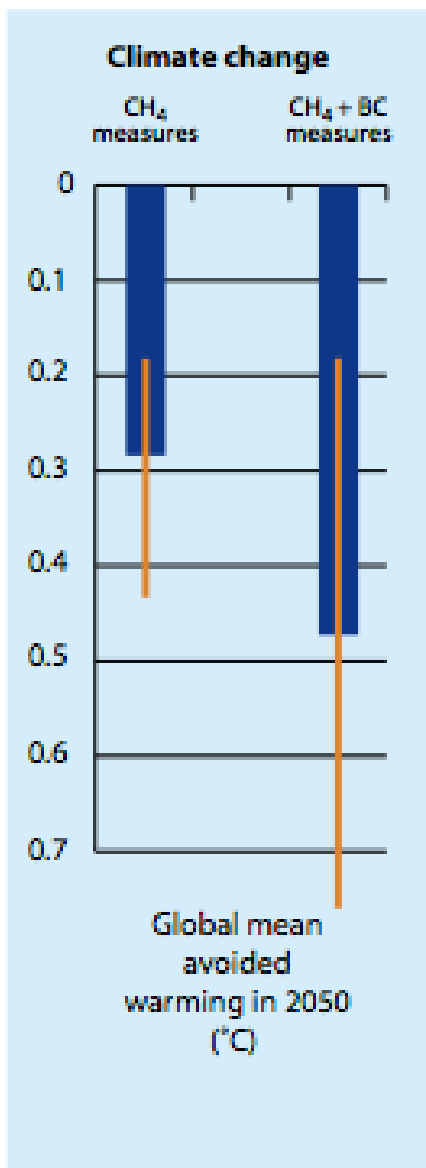
Black Carbon emissions - Surface Transportation



© RCP Database (Version 2.0.5)

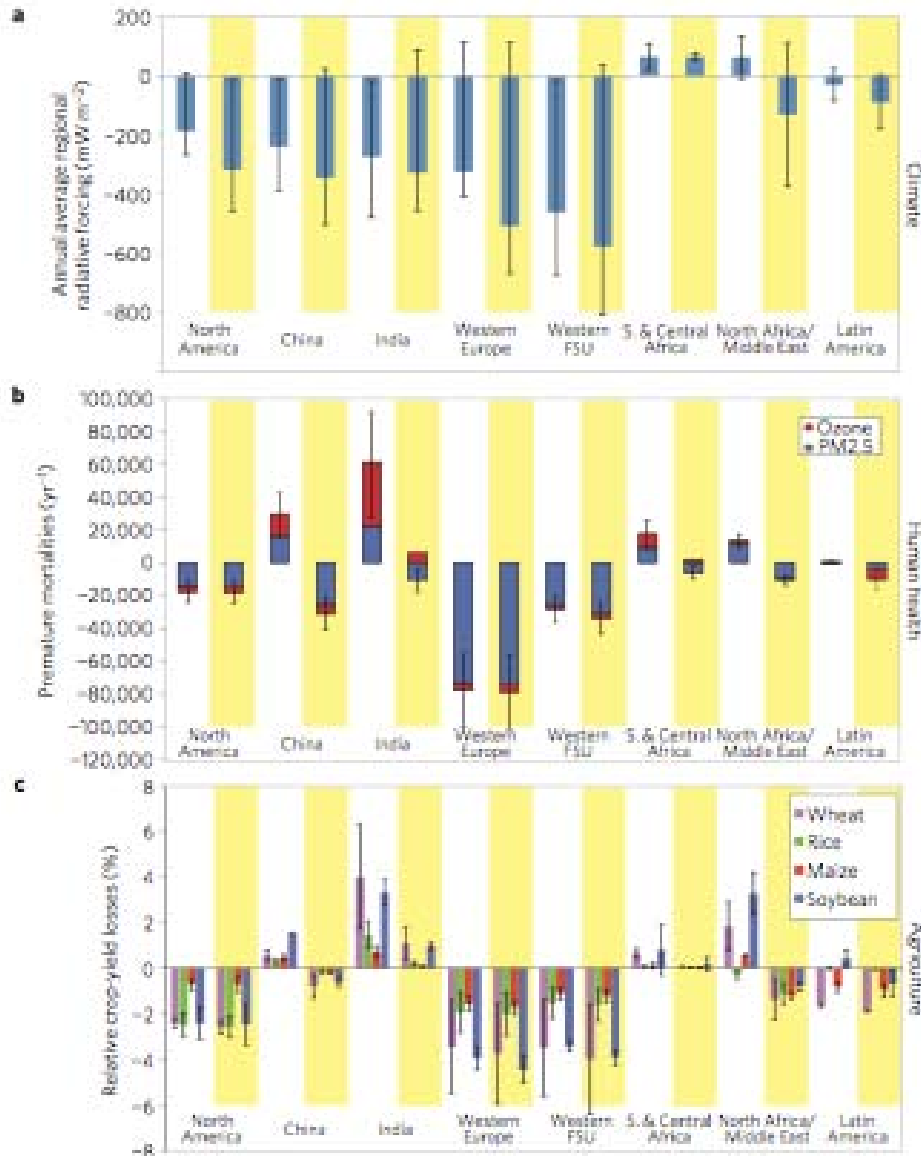
NH3 emissions - Agriculture (Animals, Rice, & Soil)



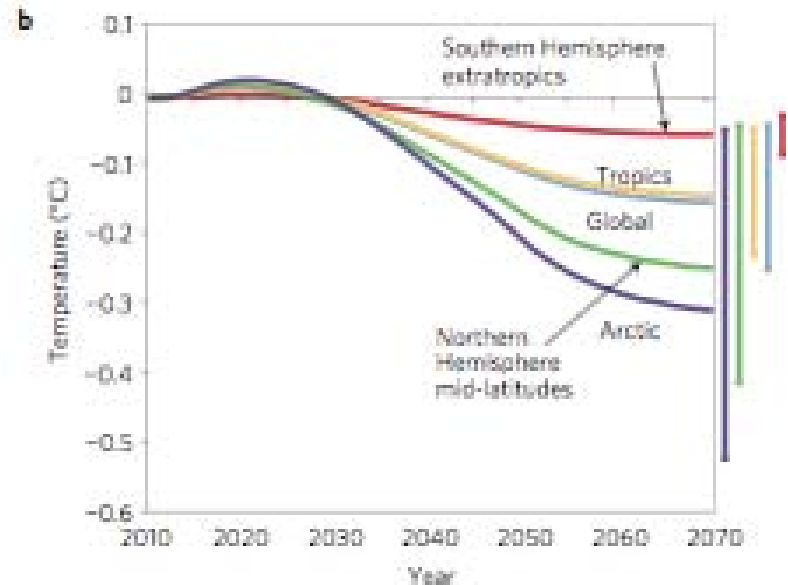


Air quality benefits for 2030 and beyond.
Health & crop benefits greatest in regions that reduce emissions.

Impact of tightening vehicle emissions standards



Impact of tight standards on vehicles imposed; current policies (white background) and tighter standards (yellow background)



Simulations

- CMIP5/ACCMIP runs for AR5 and GISS/WRF analysis for the US (under existing plans): 2010-2050 RCP2.6, RCP4.5, RCP6.0 and RCP8.5

Proposed new scenarios to be simulated

- *Impact of projected emissions by sector:*
 - *RCP X.X but 2010 US Energy OR Transportation OR Agriculture (3 simulations, where X.X are RCPs 2.6, 4.5, 6.0 and 8.5 (All RCPs at 2050, only RCP 2.6 and 6.0 at 2030, as RCPs still fairly similar at that time)*
- *Impact of emissions mitigation using current technologies at 2030:*
 - *RCP 6.0 but IIASA/UNEP/WMO US emissions mitigation for methane*
 - *RCP 6.0 but IIASA/UNEP/WMO US emissions mitigation for BC and co-emissions*
- *Impact of Administration's goals by sector:*
 - *RCP 6.0 projected US electricity generation but US Energy following Administration's clean-energy ambition (80% zero-emission electricity sources for 2035)*
 - *RCP 6.0 projected US vehicle utilization but US Transportation following Administration's fuel economy standards ambition (doubled efficiency in 2030)*

Analysis

- Initial simulations to diagnose radiative forcing and concentrations using GISS AR5 model with fixed ocean conditions
- Largest impacts repeated with GISS high-resolution cubed-sphere and with GISS/WRF combination (at EPA)
- Output data made publically available on GISS web interface