Non-CO_2 GHG Mitigation
World Energy Outlook 2008

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Outline

- Introduction
- World Energy Outlook 2008 Background
- EPA non-CO_2 GHG mitigation analysis
- Non-CO_2 representation in the WEO 2008 model and analysis
- Future analyses and publications
- Resources for non-CO_2 GHG mitigation and projections

Introduction

- IEA and EPA have collaborated before on non-CO_2 GHGs
  - Energy Technology Perspectives
- Goal is to incorporate EPA's emissions projections and mitigation response for non-CO_2 gases (CH_4, N_2O, HFCs, PFCs and SF_6) into the WEO model and analysis

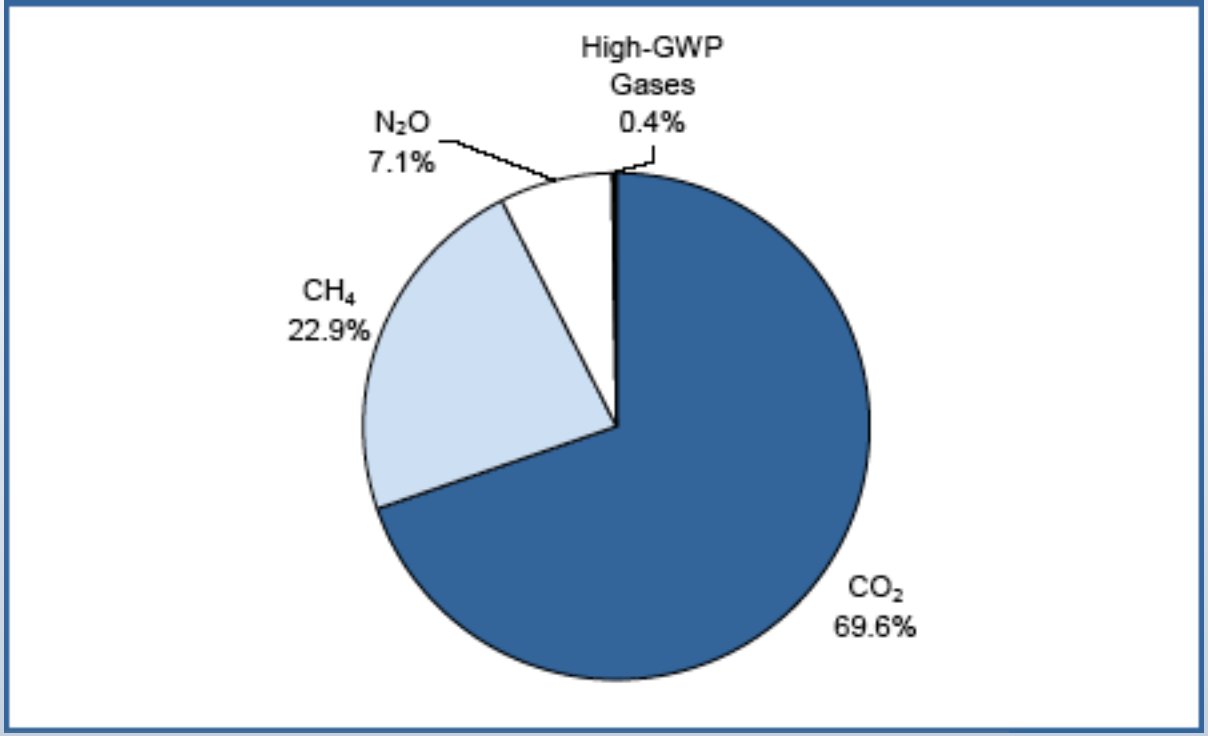
World Energy Outlook 2008

- Even years in the *WEO* series provides detailed medium- to long-term energy demand and supply projections by fuel and by region.
  - Draws lessons for energy security, trade and investment
  - Quantifies energy-related carbon-dioxide emissions
  - Assesses policies designed to reduce emissions and enhance energy security
- For the 2008 edition:
  - Will examine climate change in more detail than previously

Why Non-CO_2 Gases

- Trap more heat in the atmosphere than CO_2 per unit weight
- 30% of the anthropogenic greenhouse effect since preindustrial times can be attributed to non-CO_2 greenhouse gases
- In terms of CO_2e, non-CO_2 GHGs represent relatively inexpensive mitigation opportunities

Figure 1: Contribution of Anthropogenic Emissions of Greenhouse Gases to the Enhanced Greenhouse Effect from Preindustrial to Present (measured in watts/meter2)



Global Warming Potentials for Select Non-CO_2 Gases

Gas	Global Warming Potential
Methane	21
Nitrous oxide	310
HFC-22	2,900
HFC-23	4210
SF6	23,900

Source: IPCC 2nd Assessment Report

EPA Non-CO_2 GHG Analysis

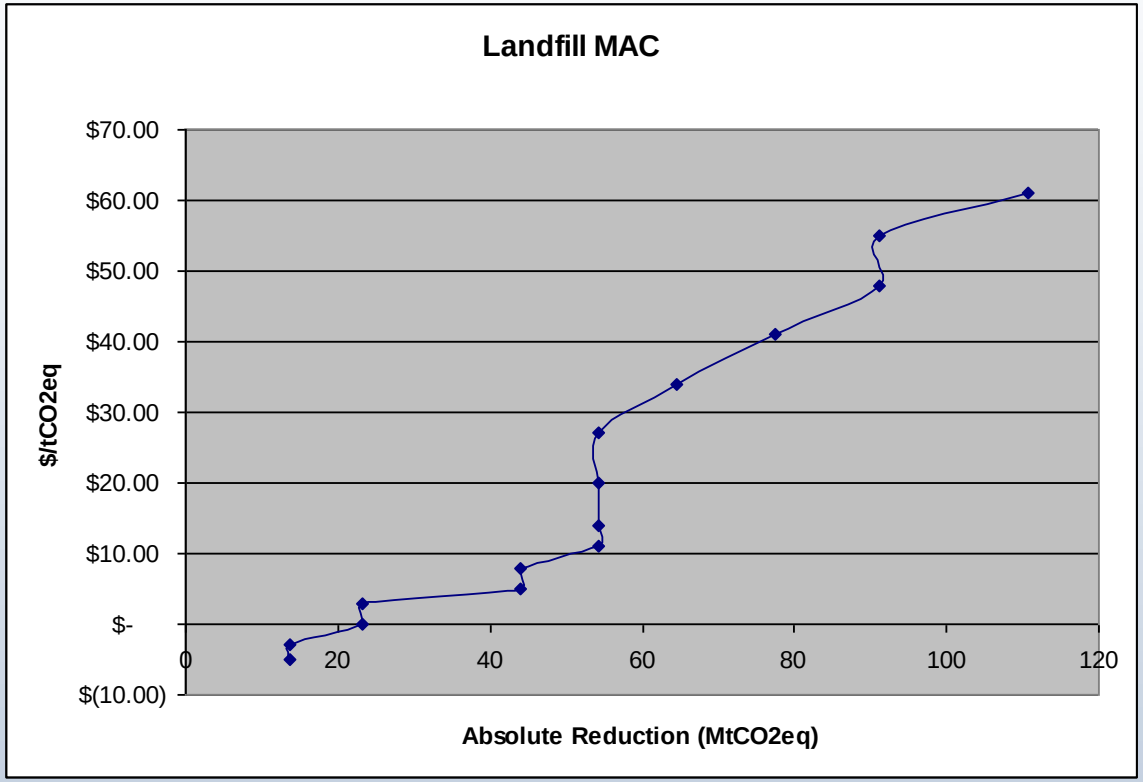
- Non-CO_2 mitigation estimates reported in 2006 EPA publication
  - Global Mitigation of Non-CO_2 Greenhouse Gases (USEPA, 2006)
- This analysis builds from EPA baseline non-CO_2 emission projections
  - *Global Anthropogenic Non-CO_2 Greenhouse Gas Emissions: 1990–2020* (USEPA, 2006)
- Applies mitigation options to the emission baseline of each economic sector
- Cost/benefit analysis for each mitigation option
  - Breakeven price is calculated

EPA Non-CO_2 GHG Analysis (2)

- Bottom-up analysis of mitigation option breakeven prices
- Determines at what carbon price a mitigation option become economically viable
- Breakeven price is where NPV of benefits (of the option) = NPV of costs (of the option)
- Breakeven price points form a marginal abatement curve (MAC), reflecting the economic potential for mitigation at various carbon prices

CH_4 MAC Example

- U.S. Landfill sector 2020 marginal abatement curve



Representation of Non-CO_2 Emissions and Mitigation in WEO 2008

- Update non-CO_2 emissions projections and mitigation using WEO reference scenario data
  - Primary Energy Demand by fuel & the related CO2 emissions by fuel for the Reference Scenario for all regions from 1971 to 2030
  - GDP assumptions for all regions from 1971 to 2030
  - Energy price assumptions (nominal & real) from 1971 to 2030

Representation of Non-CO_2 Emissions and Mitigation in WEO 2008 (2)

- Updated non-CO_2 emissions and projection to be used in the WEO model and analysis.
- Inclusion of non-CO_2 gases with the energy data and CO_2 assessments normally analyzed in the WEO publication in order to put that data in better perspective
- Results are forthcoming and will appear in the WEO 2008 publication

Future Analyses and Publications

- Working toward publishing updated marginal abatement curves (MACs) for methane sectors
- Exploring upgrades to MAC model to allow for dynamic analyses
  - Perhaps using GAMS as a modeling platform
  - Technology change representation
- Possible collaboration with IEA on updating and publishing global emissions data

Further Resources

- For more information regarding data and analyses available please visit out website:

http://www.epa.gov/climatechange/economics/

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