Estimating the Supply for Greenhouse Gas Offset Mitigation: Investment risk and other market realities

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Capped Abatement and Costs Extremely Sensitive to Offset Supply (& Intl Assumptions)

Source: Derived by S Rose from original and supplemental EPA Analysis H.R. 2454
* See Rose and Sohngen (2011)
Objective

• Generate more market (and policy) realistic estimates of GHG abatement potential
Motivation

- Waxman-Markey (H.R. 2454) and Kerry-Lieberman (S.1733) relied heavily on large-scale domestic and international offsets for “cost containment” and uncertainty management.

- To date, legislative analysis has been based on offset supply estimates of economic potential, some with ad hoc adjustments.

- Actual offset supplies are well below economic potential.

- There is a lack of analytic information available about the market potential of offset supplies, particularly in the critical near-term (2012-2020).

- Broader offsets context – e.g., Australia, EU, California, US regs (CAA, CES), sectoral policies, UNFCCC mechanism.
Need Offset Supply Estimates that are Market and Policy Realistic

China Coal Mine Methane 2010 and 2020 Economic Mitigation Potential

Estimated annual average reductions from China CDM projects thru 2020 approved or at validation = ~ 34 MtCO₂eq at greater than $10/tCO₂eq

Source: USEPA (2006); Delhotal et al. (2006)
Moving from Economic to Market Abatement Potential

- Market Potential
  - Market interpretation of institutions, timing & rules, and differences in countries and technologies

- Economic Potential
  - Legislative modeling based on economic potential or ad-hoc adjustments
  - Policy/program requirements, constraints, & institutions

$/t\text{CO}_2$

Emission reductions
Two Products, Three Innovations

• New investment risk dataset
  1. Country & technology investment delivery likelihood default values that can be flexibly combined and applied (200 countries x 65 technologies)

• “Market Potential” mitigation estimates – improved mitigation supply estimates that better reflect market realities
  2. Accounting for investment risk
  3. Considering optional participation by offset suppliers (i.e., optional mitigation supply participation incentives), but just scratching the surface here
Methods Overview

• Developed investment risk factor data

• Developed overall country-technology investment risk quantifications for different investment policy and institutional contexts

• Implemented investment risk into sectoral economic models
  – Capturing interactions between technologies and regions due to changes in the relative values of activities

• Began exploring *optional participation* by offset suppliers in GHG markets
Mitigation Estimates for these GHG Sources and Carbon Sinks

**Domestic**

**U.S. GHG emissions and sequestration**

- Agriculture & forestry
  - Crops and livestock \((\text{CH}_4, \text{N}_2\text{O}, \text{soil C})\)
  - Forestry (primarily soil and above ground carbon)

- Non-CO\(_2\) GHG sources
  - Landfills \((\text{CH}_4)\)
  - Coal mines \((\text{CH}_4)\)
  - Oil and gas production and transport \((\text{CH}_4)\)
  - Nitric and adipic acid production \((\text{N}_2\text{O})\)

**International**

**GHG emissions and sequestration**

- Agriculture
  - Livestock \((\text{CH}_4\text{ and } \text{N}_2\text{O})\)
  - Cropland soil and fertilizers \((\text{N}_2\text{O} \text{ and soil carbon})\)
  - Paddy rice \((\text{CH}_4, \text{N}_2\text{O}, \text{and soil carbon})\)

- Forests (soil and above ground carbon)

- Non-CO\(_2\) GHG sources
  - Landfills \((\text{CH}_4)\)
  - Coal mines \((\text{CH}_4)\)
  - Oil and gas production and transport \((\text{CH}_4)\)
  - Nitric and adipic acid production \((\text{N}_2\text{O})\)

- Electric and non-electric energy \((\text{CO}_2)\)
Collaborators

• EPRI
  – Adam Diamant, Francisco de la Chesnaye
• Non-CO$_2$ GHG abatement
  – Jeff Petrusa, Robert Beach (RTI International)
• International energy CO$_2$ abatement
  – Kate Calvin, Jae Edmonds, Marshall Wise (PNNL)
  – And, EPRI modeling
• Forest and agricultural abatement
  – U.S. forest and agriculture modeling
    (Bruce McCarl, Texas A&M University)
  – Global forest and land-use modeling
    (Brent Sohngen, Ohio State University)
• Investment Risk Data
  – Rob Youngman, Rich Rosenzweig (Natsource LLC)
Applicability / Utility of this Analysis

1. Inform broad policy space with market potential analysis

2. Inform individual investors with country-technology delivery rates and factors

3. Methodological innovation to provide the foundation for the next generation of analyses
Unfortunately, we are not able to make results available to the public at this time. Final results are forthcoming. Please contact Steven Rose (srose@epri.com) if you would like to be contacted when these results are available.
Thank You

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