The Challenge of Scaling Up Domestic and International Offset Supplies

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Today’s Discussion

- Critical role of offsets for CO$_2$ cost containment
- Potential to scale-up offset supplies
  - The Clean Development Mechanism (CDM)
  - “Sectoral” Offsets
  - Reduced Emissions from Deforestation and Degradation (REDD)
Most legislative proposals would require rapid and dramatic cuts in GHG emissions. In the near-term (2010-2015), there are no large-scale, low-cost CO$_2$ abatement options.
Implications of Near-term CO₂ Reductions

- CO₂ prices likely will rise to force natural gas to displace coal
- CO₂ allowance prices will be “high” (≥ $30/tCO₂) in early years of a new CO₂ cap-and-trade program unless...
  - “Safety valve,” “price collar,” or other price-control mechanism(s)
  - Massive GHG reductions in other regulated sectors and/or EE
  - Abundant offsets are available
Offset Supply is a Critical Issue in Evolving U.S. Climate Policy

• Critical role of offsets in containing future carbon costs has been recognized in federal legislation
  – “Waxman-Markey” (HR 2454)
  – “Kerry-Boxer” (S.1733)
  – Kerry-Lieberman draft (released 5/12/10)
  – Each would allow 2 GtCO₂e of offsets for compliance

• The WCI would permit 49% of emissions reductions to be achieved with offsets

How can offsets mechanisms be scaled-up to provide robust supplies?
Offsets Substitute GHG Reductions in Uncapped Sectors & Regions for Internal Reductions

Offsets transfer emission reductions from "high" to "low" cost sectors and regions, but offsets do not increase the quantity of GHG reductions.
### CBO Estimates of the Effects of HR 2454 “With” and “Without” Offsets in 2030

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<thead>
<tr>
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<th>With Offsets</th>
<th>Without Offsets</th>
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<tbody>
<tr>
<td>CO₂ allowance price ($/tCO₂e)</td>
<td>$40</td>
<td>$138</td>
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“The cost savings to the economy generated by offsets could be substantial...between 2012 and 2050 average annual savings from offsets could be about 70 percent under ACESA.”

(CBO Analysis of HR 2454, p. 8)

Offsets are a Key Source of Compliance with “Waxman-Markey” (HR 2454)

Figure 4. Sources of Cumulative Compliance in ACESA Main Cases, 2010-2030 (million metric ton CO₂-equivalent)

“...Given the potential of offsets as a low-cost compliance option, the amount of reduction in covered emissions is exceeded by the amount of compliance generated through offsets in most of the main analysis cases...In the ACESA Basic Case, domestic abatement...represents only 39% of cumulative compliance.” (US DOE, ACESA Analysis, 8/09, p. ix.)
Carbon Price Estimates for “Waxman-Markey” with “Kerry-Boxer” Price Collar

Offset availability and costs have the greatest impact on expected carbon prices.
Sources of “Off-system” GHG Abatement

- Domestic offsets
- International non-CO₂ offsets
- Afforestation / REDD from Brazil, Indonesia & other
- Sectoral offsets from China, India & other large DCs
- Trading with other OECD
Domestic Offsets in HR 2454: Will Enough Come in the Near Term?

- Limited potential
- EPA estimates ~170MtCO$_2$e per year through 2020 @ $15/tCO$_2$e
- Largest sources are forest management & afforestation
- LFG, CMM, NatGas offsets may not be available due to NSPS
  - Could add ~130MtCO$_2$e
- Need time to develop offset rules, protocols and methodologies

Limited sectoral eligibility and difficulty implementing agricultural and forestry offsets, means domestic offsets will be limited in the near term.

Aggregate U.S. Offset Supply Forecast to be Limited in the Near Term

Figure 16: Aggregate US offset supply to 2020

Early supply is expected to be dominated by “forest management” and “afforestation” which are complex to implement and may not be able to scale up.

Growing Trees in the U.S. Cannot Scale Sufficiently to Mitigate Climate Change

- “Good quality” land sequesters ~350 tCO₂ / acre over 100 yrs (3.5 tCO₂/ac-yr)
- A “standard” 1,000 MW coal plant emits 7.5 MtCO₂ / year
- 2 million acres of land are needed to offset annual CO₂ emissions from one 1,000 MW coal-fired power plant.
- In 2008, total installed U.S. coal-fired generation:
  - 313,000 MW capacity
  - 1,445 generators

International Offsets in HR 2454 & “K-L”
Will Enough Come in the Near Term?

• Large potential, but challenging to implement
  – International offsets (e.g., CDM)
  – “Sectoral” offsets
  – Reduced Emissions from Deforestation and Degradation (REDD)
• All three categories are problematic!!!

It is very difficult to see how international offsets can yield ~1.0 GtCO₂ per year, particularly at the “low” prices assumed by EPA.
Existing CDM Has Significant Limitations and Cannot Scale Up Significantly

• It took many years to develop CDM (1997-2005)
• CDM has issued fewer offsets than expected
  – ~400 MtCO$_2$e of offsets issued since inception
  – ~1.0 GtCO$_2$ expected over the “Kyoto” period (2008-2012)
• “Ton-by-ton” approach is inefficient and cannot scale
  – Offset methodologies are very complex
  – Current CDM registration cases < 500 – 700 / year
  – Not possible to process 1000 – 2000 / year
• It currently takes more than 3 years to develop a CDM project from inception to offset credit issuance
• U.S. buyers will face international competition
What is a Sectoral Crediting Mechanism?

• A developing country voluntarily establishes an “emissions baseline” below BAU for a sector.

• If actual emissions are **below** the baseline at the end of the sectoral crediting period, the country / sector would earn **tradable credits ex-post**.

• Under a **“no lose”** approach, if actual emissions are **above** the baseline at the end of the crediting period, the country / sector would **not receive any tradable credits** and would **not be penalized**.
Offsets *Shift* Emission Reductions, but Sectoral Approaches Can Reduce Emissions

Sector “crediting” is designed to achieve additional emissions reductions, *not just transfers* as is the case with “pure” offsets.

Source: Based on presentation by Richard Baron of the IEA at the EPRI GHG Offsets Workshop 7: Sectoral on Feb. 25, 2010.
Developing an International “Sectoral” Crediting Program Will be Challenging

• Never been done before anywhere in the world
  – No existing international or domestic architecture
  – Requires multi- or bi-lateral agreements (HR 2454)

• Could take a long time, based on CDM experience

• Not clear how “compliance parties” pay for and receive sectoral-based offsets

• Sectoral “hammer clause” in W-M will curtail project-based offsets from China, India, Brazil, South Korea and Mexico
Key Role of LULUCF in Climate Change

• LULUCF is the 2nd largest source of annual global CO₂ emissions after fossil fuel consumption.¹
  – Annual fossil CO₂ emissions = 26.4 GtCO₂ (2000-2005)
  – Annual LULUCF CO₂ emissions = 5.8 GtCO₂ (since 1990)

• LULUCF accounts for ~20% of annual global CO₂ emissions!

• FAO estimates global deforestation at 13 million ha/yr (1990-2005)².
  – Brazil accounted for ~50% of global deforestation in the humid tropics 2000-05
  – Amazonian deforestation accounted for ~60% of the total 2000-05

LULUCF is the Source of a Large Portion of Key Country GHG Emissions

Carbon Emissions of Top 30 Countries in 2000

- Indonesia & Brazil are the world’s 3rd & 4th largest carbon emitters
- 70-80% of these two countries carbon emissions are from deforestation

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LULUCF Emissions
Fossil Fuel Emissions
REDD Mitigation Potential
Comparison to US and ROW (Estimates for 2020)

At $15/t CO_2 

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<thead>
<tr>
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<th>MMtCO_2/yr</th>
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<tr>
<td>US</td>
<td>271</td>
</tr>
<tr>
<td>REDD</td>
<td>3,312</td>
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<tr>
<td>ROW</td>
<td>2,530</td>
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Source: Global Timber Model (Sohngen and Mendelsohn, 2007; Sohngen and Sedjo, 2006)
REDD Could Comprise More than 70% of Abatement Potential Over the Next 25 Years

Cumulative Carbon Abatement
(for 550 PPM Stabilization)

Source: Tavoni, Sohngen, and Bosetti (2007)
Availability of REDD-based Offsets Will Depend on Baseline and Targets

Nepstad et al. 2009 Science
Restricted or Delayed **Comprehensive** Forest Policies Cause Emission Leakage

$15/tCO_2$ (in 2010) + 5%/yr

Source: Rose and Sohngen, *(forthcoming 2010)*.
Challenges for REDD-based Offsets

• Many REDD projects are located in “risky” countries
• Many potential host countries lack essential expertise, institutional capacity and governance
• In W-M and K-L, REDD-based offsets must be supplemental to “deforestation emissions baselines” which require “zero net deforestation” in 20 years
• “Domestic” GHG abatement commitments made by key countries like Brazil are likely to limit future supply of low-cost REDD-based offsets
• Lack of a “comprehensive” policy for forest-based carbon sequestration will lead to significant near-term leakage.
Forward Progress on Scaling Up Offsets

• CDM reform is happening now, albeit slowly
  – Programmatic CDM
  – Standardized baselines
  – Simplified methodologies

• REDD is moving forward in the international negotiations and may be the first “sectoral” program

• Growing U.S. domestic “voluntary” market may help soften the transition to a compliance market
  – “Early action” offset credits
  – Existing and evolving protocols and methodologies
Key Insights

• The option to use offsets for compliance combined with robust offset supplies are critical for achieving CO$_2$ cost containment.

• The massive scale envisioned in federal legislation will be difficult to realize in the near term (2012-2016), so CO$_2$ prices could rise to a level that stimulates gas-for-coal fuel switching.

• Existing options to scale up offset supplies are not sufficient. New designs & approaches are needed.

• Sector-based offset supplies could be large, but these policies are complex and could take years to negotiate and implement.

• There is a “zero-sum game” between developing country mitigation actions and the potential supply low-cost offsets from these countries.
Thank You

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