Greenhouse Gas Offsets in a Domestic Cap-and-Trade Program

This brief presents the key issues and identifies options for the incorporation of greenhouse gas (GHG) offsets into emerging U.S. climate change policy. A GHG offset represents a reduction, avoidance, destruction, or sequestration of GHG emissions from a source not covered by an emission reduction requirement. The elimination of GHG emissions can be converted into tradeable offset credits, and cap-and-trade programs can be designed to permit firms to use these credits to meet their compliance obligations. A carefully crafted and implemented offset program can significantly reduce cap-and-trade compliance costs by providing lower cost emission reduction options. Yet, while economic modeling has shown that incorporation of offsets into a cap-and-trade program can significantly reduce costs and allowance prices, their inclusion is not without controversy or complication. Some are concerned that offset inclusion will reduce the price signal to the point that the innovation and technological change needed to address the climate problem will be diminished. Others focus on the difficulty associated with substantiating offsets as real emission reductions. Important considerations in designing offset programs include the way in which offsets are defined; the types, location and quantity of offsets allowed; and the methods for assessing and crediting projects. Generally speaking, offset projects come in three distinct types: 1) direct emission reductions, 2) indirect emission reductions, and 3) sequestration. Before a project can create an offset credit, the emission reductions should meet all of the following criteria: they must be real, measurable, additional, permanent, monitored, independently verified, measured from a credible baseline, not represent leakage, and be able to convey as a clear property right. Additionality is perhaps the most important yet complicated issue, as it requires an assessment of what would have happened in the absence of the project. Offset project assessments can be either project specific or standardized. A hybrid assessment approach, which uses some standardization methodologies but allows for a degree of flexibility in assessing projects, may be the most effective. Each of these important factors for creating high quality offsets are discussed in this brief.

A cap-and-trade program for greenhouse gases (GHGs) is often pointed to as an important policy tool for addressing climate change because of its cost effectiveness and ability to spur technology innovation. The environmental effectiveness of such a program is not affected by where emission reductions take place. Trading allows the lowest cost reductions to occur first, which helps reduce the overall costs of the program. Unfortunately, not all GHG emissions can be effectively addressed through cap and trade. Some emissions are from small sources (e.g., agriculture); others lack good data or are not easily measured (e.g., coal mine methane); and still others may be more effectively dealt with through other policies (e.g., building efficiency standards). Including these types of sources in a cap-and-trade program could create excessive administrative burdens and significantly raise the overall program costs. Some of these sources can, however, be included in the program by allowing them to participate as emission offsets (also commonly called carbon offsets or offset credits).[1]

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An offset represents a reduction, avoidance, destruction, or sequestration of carbon dioxide (CO_2) or other GHG emissions that: 1) is from a source not covered by an emission reduction requirement; 2) can be measured and quantified; and 3) can be converted into a credit if it meets established eligibility criteria. This credit can then be sold and used by another party to meet its compliance obligation under a cap-and-trade program.[2]

A few examples of activities that could potentially generate offsets include planting trees on land not previously forested, capturing methane at landfills or livestock operations and using it to generate electricity, and capturing and destroying high global-warming-potential[3] industrial gases that would otherwise be emitted. GHG offsets from these types of activities are components of some emissions trading programs, including the Regional Greenhouse Gas Initiative (RGGI) in the United States and the Kyoto Protocol.

This Congressional Policy Brief outlines the benefits and concerns associated with offsets. It presents criteria that must be met to ensure offset quality, provides an overview of the types of offset projects and program design considerations, and highlights how existing and proposed regulatory programs incorporate these options.

The Benefits of Including Offsets

Integrating offsets into a cap-and-trade program can substantially reduce the overall cost of achieving emission reduction objectives because regulated entities have access to lower cost compliance options. Economic modeling by the U.S. Environmental Protection Agency (EPA) and the U.S. Energy Information Agency (EIA) confirmed that as the use of high quality offsets increases, the price of emission allowances decreases. For example, in EPA's modeling of the Lieberman-Warner Climate Security Act of 2007 (S. 2191), excluding the use of international offsets (which was otherwise authorized by the bill) raised the price of allowances by 34 percent, while not allowing offsets at all increased the price by 93 percent.[4]

In addition to increasing the cost effectiveness of the program, offsets can benefit program goals by:

- stimulating emission reduction opportunities and technology innovation in sectors outside of the capped sectors;
- encouraging early emission reduction activities while providing a transition period for industry to develop and deploy low carbon technologies;
- promoting technology and knowledge transfer between developed and developing countries; and
- providing environmental, social, and economic co-benefits, such as reduced air or water pollution and improved wildlife habitat.

Concerns Over Offsets

Including offsets in a cap-and-trade program is not without controversy. One common concern is that because offset programs lower the cost of compliance for covered sources, the resulting price signal on GHG emissions may be too low to induce the level of innovation and technological change in capped sectors necessary to address the climate problem. Some argue that the necessary transition to a low-carbon economy will be delayed if long-term investment decisions are made in the context of a very low carbon price. On the other hand, some argue that keeping costs low in the near term through mechanisms such as offsets will provide time for the development of new technologies enabling lower future reduction costs.

Another criticism is that the use of offsets by a firm forgoes any environmental co-benefits (such as reduced sulfur dioxide emissions) that would be associated with making an emissions reduction on site. This concern was central to the position of the environmental justice community as a stakeholder in California's program in response to AB32 (climate legislation).

Finally, because offsets exist only in comparison to what "would have otherwise happened" (this is often referred to as the counter-factual), there is a fundamental concern about whether they can be substantiated as representing real emission reductions. Real reductions must be permanent and go beyond reductions that would have occurred without the offset project. Notably, the environmental goals of the program can be compromised if offset credits are granted to projects that do not credibly reduce emissions. Ensuring the environmental integrity of offset credits is a major issue associated with including them in a cap-and-trade program. The following section discusses the key criteria needed to ensure high quality offsets.

Integrating offsets into a cap-and-trade program can substantially reduce the overall cost of achieving emission reduction objectives.

Criteria for Offsets Integrity

The following criteria are often cited as essential to ensure that offsets are of high enough quality to be credibly included in a cap-and-trade program.[5]

- **Real.** GHG emission reductions should represent actual emission reductions and not simply be artifacts of incomplete or inaccurate accounting.

- **Measurable.** Emission reductions from offset projects must be accurately quantified. In some cases direct measurement may be difficult, but imprecise and/or unreliable accounting will reduce the credibility of the offset.

- **Additional.** Offset project reductions must be shown to be "in addition to" reductions that would have occurred without the offset project or the incentives provided by offset credits. This criterion is often considered not only the most important attribute, but also the most difficult to determine. To be considered additional, the revenue gained from selling the project's emission reductions should be one of the main incentives behind the project's implementation. Determining additionality is an essential but imperfect process. No single approach is the best for all project types. The Clean Development Mechanism of the Kyoto Protocol (CDM) allows project developers to utilize a combination of two out of three different tests for additionality. The Boxer-Lieberman-Warner bill (S. 3036) uses the same type of tests, but requires a project to meet them all.

- **Permanent.** Offset emission reductions can sometimes be reversed either by human activity and/or by acts of nature (the most common example being a fire that destroys a forest-based project). Because offset credits in emissions trading programs will be used for compliance in lieu of an on-site reduction, it is important to ensure that the offset credits either represent a permanent reduction or contractually require

replacement if they are reversed. Mechanisms to address permanence include: pooling, aggregation, and insurance.

- **Monitored.** Offset projects must be monitored to ensure that emission reductions are occurring. Each project must have a unique monitoring plan that defines how, when, and by whom data will be collected and emissions quantified. These plans should be developed with experts familiar with the specifics of a project and should use established standards.

- **Independently Verified.** All GHG reductions should be verified by either a third party or a government agency according to accepted methodologies and regulations.[6] Monitoring reports issued after the emission reductions have occurred (*ex-post*) should be used as the basis for issuing offset credits. For credibility purposes, verifier compensation should not in any way depend on the outcome of the verifier's decisions.

- **Measured From a Credible Baseline.** A credible baseline, or "without-project" emissions estimate, must be established in order to measure an offset project's reductions. The difference between this baseline case and the actual emissions level represents the reductions achieved by the offset project, and determines the amount of offset credits issued.

- **Address Leakage.** Leakage is defined as an increase in GHG emissions outside of the project's boundary that occurs as a result of the project. For example, avoiding deforestation through an offset project in one area could simply push the deforestation (and resulting emissions) to a different region or country. Leakage minimization through monitoring and verification plans and protocols should be addressed in offset program design.

- **A Clear Property Right.** Clear and uncontested title to offset credits is necessary, and transfer of ownership must be unambiguous and documented. Once sold, the original owner must cede all rights to claim future credit for the same reductions in order to avoid double counting. Offset credits should be serialized and accounted for in a registry or other approved tracking system.

Direct emission reduction projects are generally the least complicated to incorporate into an offset program.

Overview of the General Types of Offset Projects

While there are potentially an unlimited number of creative offset efforts that could reduce GHG emissions outside of a cap-and-trade program, these projects generally fall into three specific categories. Direct emission reductions occur at the site of a project; indirect emission reductions occur when onsite actions cause emission reductions elsewhere; and sequestration projects store carbon in biological systems such as trees and soils, or in geological systems such as underground formations.

Whether an emission reduction project should generate an offset strongly depends on the regulatory environment of the nation, state, or locality where the reduction occurs. Not all

of the emission reductions that fall into the three main categories below would be eligible to generate offsets in all jurisdictions. An emission reduction required by law, for instance, would not be "additional" nor typically allowed as an offset. Specific considerations for international offsets are also discussed below.

Direct Emission Reductions

Direct emission reduction projects are generally the least complicated to incorporate into an offset program. Examples of direct emission reduction projects include:

- fuel switching from higher GHG fuels, such as coal, to lower GHG fuels, such as natural gas or biomass;
- capture and destruction or use of methane at landfills, coal mines, wastewater treatment plants and agricultural operations;
- performance and efficiency improvements at power plants and industrial facilities;[7] and
- installation of idle reduction devices on heavy duty equipment like semi-trucks and trains.

Because these reductions occur at the site of emissions, they can be more easily measured and monitored, and there is less risk that an entity other than the project developer will claim ownership of the reduction. Thus, direct reductions are unlikely to be double counted or double claimed. Most direct emission reduction projects have a lower potential for leakage. However, certain direct emission reductions, while easily measured, monitored, and attributed, may still be ineligible to generate offsets. For example, fuel switching by firms covered by the cap would likely not be eligible to receive offsets.

Indirect Emission Reductions

Indirect emission reductions occur at a location other than the project site, a characteristic that has important ownership and accounting implications. The majority of such projects occur in the electricity sector, either through the implementation of energy efficiency measures or through the addition of renewable energy to the grid. These types of projects reduce emissions in one of two ways: 1) by reducing the demand for existing generation that serves an electricity grid, or 2) by reducing the need for additional fossil fuel generating capacity.

While these types of efforts are clearly important, they present a challenge as offset projects as it is often difficult to determine the legal ownership of the reduction.[8] For example, if the addition of a wind turbine to the grid results in a reduction of fossil fuel generation (and its associated emissions), both the wind turbine owner and

Box 1 *Why Location Doesn't Matter*

Unlike many other pollutants that concentrate near their source, GHGs accumulate uniformly across the earth's atmosphere. A ton of GHGs emitted in the United States has the equivalent impact of a ton emitted anywhere else in the world. Therefore, a ton of emissions reductions has the same benefit regardless of its location.

From a strictly scientific perspective, the location of emissions—or emission reductions—is immaterial to its climate change impacts. This fact is critical to the offsets debate; if an offset project results in an emissions reduction that otherwise would not have occurred, that reduction has the same environmental benefit as an equivalent reduction within a capped sector.

the fossil fuel generator could potentially claim the reduction, leading to competing ownership claims and "double counting."

Furthermore, the interconnected nature of electricity grids—which can include both fossil and non-fossil-based generation—makes it virtually impossible to determine where particular electrons originated, and thus offset buyers and sellers often cannot accurately determine which power generating units were affected by the implementation of an indirect emissions reduction project. This makes it very difficult to either determine the reduction level or assign clear and uncontested title—a necessary criterion to avoid double counting.[9]

Sequestration

The sequestration of GHGs is commonly defined as any natural process or human-induced activity that removes and stores CO_2 or other GHGs from the atmosphere, or permanently captures and prevents them from being emitted into the atmosphere, or avoids the release of stored carbon into the atmosphere.

There are two primary types of sequestration offset projects: biological and geological. Biological sequestration projects are the most common and occur through the acceleration or protection of natural processes that remove CO_2 from the atmosphere. Projects involving forests, grasses, and rangelands could potentially be eligible to generate offset credits when they meet established criteria.

Examples of biologically-based emission sequestration projects that have been used as offsets include:

- the cultivation of new forests and/or grasslands;
- forest management that increases carbon storage, such as the optimization of harvest schedules; and
- changes in agricultural practices, such as conversion from conventional to no-till farming and reduced use of nitrogen-based fertilizers.

Providing incentives for activities that avoid the release of biologically-sequestered carbon (such as avoided deforestation), rather than sequestering additional carbon, has emerged as an important yet controversial component of comprehensive climate change mitigation policy.[10]

Geological sequestration refers to the capture of CO_2 from anthropogenic sources and its storage in saline formations, oil wells, or other geologic formations. Large-scale geological sequestration is anticipated to be critically important in efforts to address climate change. (See Pew Center brief in this series, *Addressing Emissions From Coal Use in Power Generation*.)

Permanence is the primary concern with both biological and geological sequestration. The carbon stored in biological matter (e.g., wood, grasses, crops, soil organic matter) is only sequestered until the matter decomposes or is combusted. For instance, forests can burn, or they can be logged legally after a change in ownership or government, or even illegally logged. In the case of geological sequestration, if the storage is not properly sealed, some of the sequestered carbon could be released into the atmosphere. Any of these eventualities would cause a reversal of the sequestration benefits

of the project. From a regulatory perspective, permanence can be addressed through risk mitigation tools such as discounting offset credits, establishing buffer accounts that require a project to sequester additional carbon, or requiring the use of insurance.

Projects involving forest management or avoided deforestation are also commonly faced with a concern over leakage. If the demand for wood products remains constant, managing forests or avoiding deforestation in one area could merely cause the logging to shift to another area, thus resulting in no net emission reduction.

Offset projects are likely to originate from a wide variety of activities involving multiple GHGs and multiple sectors.

Timing can also be a concern. Afforestation and reforestation projects can take many years, sometimes decades, to achieve a significant level of carbon sequestration. In order to make these projects financially feasible, project proponents often need to sell forward streams of offset credits, which pose their own risks from a market perspective (though not from an environmental perspective). This issue is discussed further in the sections below on project crediting.

International

International offsets are commoditized emission reductions that occur outside of U.S. national boundaries. The reductions could be credited in a U.S. program through the same mechanism as domestic offsets, or policymakers could accept offsets credited as part of other climate-related programs.[11] The most prominent existing mechanism that generates international offsets is the Kyoto Protocol's Clean Development Mechanism (see the Pew Center's fact sheet on CDM).[12] This program facilitates the development of emission reductions in developing countries where national economy-wide emission reduction targets may not be feasible.

International offsets may be any of the previous types described above in this section—direct, indirect, or sequestration. It is important to realize that because offsets must be generated outside the scope of a GHG regulatory system and because international offsets will originate in countries with very different regulatory requirements or levels of technology development, specific projects might be eligible as international offsets that would not be eligible domestically. For example, in the United States, large coal-fired electricity generators are included in all proposed domestic cap-and-trade systems, which would likely make any efficiency effort on their part ineligible as an offset. However, if a developing country did not regulate emissions from similar plants, efficiency upgrades to those plants could possibly generate valid offsets.

Program Design Considerations: Project Assessment

From the above section it should be apparent that offset projects are likely to originate from a wide variety of activities involving multiple GHGs and multiple sectors. While a central program authority is needed to assure program consistency, a broad scope of knowledge will be needed to determine how differing types of reductions are quantified. Some type of cross-cutting or shared relationship between agencies like EPA, the Department of Agriculture, the Department of Energy, and potentially others will likely be necessary.

For each project type, program administrators will need to make a number of determinations regarding eligibility criteria, additionality, baselines, crediting periods (the period of time during which projects should receive credits), and the point at which offset credits should be distributed.

In making these assessments, there are two distinct approaches: project specific and standardized. Project-specific assessments are individual or case-by-case examinations of the unique circumstances of a proposed offset project. Standardized assessment methodologies establish offset project eligibility by providing consistent means of determining a baseline, additionality, and quantifying the emission reductions resulting from a particular type of project activity.

Project-specific and standardized methodologies represent the ends of a spectrum—each with its own distinct advantages and disadvantages.

Project-Specific Assessment

As mentioned above, in this type of assessment, individualized determinations are made regarding a project's baseline, additionality, quantification, and crediting period. The advantages of this approach are a greater likelihood of both correctly determining additionality and accurately quantifying emission reductions, since a very specific review is completed of a project's unique circumstances.

The disadvantages of project-specific assessments include a greater risk of subjectivity and less consistency across projects of a similar type. Subjectivity can also result in reduced transparency in the approval process, which may result in fewer project applications. This approach can also be time- and labor intensive, thereby increasing the transaction costs of a project—both for project developers and for government regulators.

The CDM assesses offset project activities using project-specific assessments but is moving toward more standardized approaches through the use of "Combined Methodologies," to streamline its process.[13]

Standardized Assessment

Standardized assessment methodologies provide a uniform means of assessing project baselines, additionality, quantification, and crediting periods by adopting a set of eligibility criteria. Standardized methodologies vary widely in their application and can be used for entire sectors or for specific project types in specific locations.

Standardized assessment is attractive due to its administrative simplicity, increased transparency, and minimized subjectivity and investment uncertainty. On the other hand, it can be costly and time consuming for the program administrator to develop rigorous standardized criteria and methodologies for the wide variety of potential project types on an upfront basis—or it may limit the types of offset projects allowed in the market to only those for which standardized criteria and methodologies are developed.

Standardized approaches also accept a certain amount of free-riding (i.e., false-positives) and inaccuracy by generalizing additionality assessments and quantification processes. Finally, it can be difficult to account for different market and environmental conditions in various regions and regulatory systems.

The Voluntary Carbon Standard (VCS), RGGI, EPA's Climate Leaders program, and the California Climate Action Registry all use standardized assessment methodologies.

Hybrid Assessment

In their pure forms, project-specific and standardized methodologies represent the ends of a spectrum—each with its own distinct advantages and disadvantages. To harness the benefits of both assessment strategies, a hybrid approach can also be used where standardized methodologies are developed that have a degree of flexibility built into them. All projects would have to meet some general criteria established by a specific standard for that type of project, but slight differences between projects could also be allowed.

Program Design Considerations: Crediting

Policymakers must address several questions regarding the timing of actions that reduce emissions, such as whether to credit projects that have already started, how long to credit projects, and whether to assign credit for future reductions.

Project Crediting Start Date

The project crediting start date is the date from which offset projects are eligible to generate and be awarded offset credits. This date has important implications for project investors wishing to act in advance of regulation. Ideally, the project crediting start date would be set such that legitimate early actors are recognized for their pre-regulatory activities, while not awarding excessive credits for activities that potentially would have occurred regardless of the expectation of a GHG regulation.

Project Crediting Periods

The crediting period is the time during which a specific offset project is eligible to generate offset credits. These periods are intended to reflect the duration for which a project is considered to be additional. During the credit period, therefore, the project developer can earn credits if it demonstrates that the project has achieved reductions, without the need to re-demonstrate additionality. Predefined project crediting periods send important market signals to project developers and other market participants. They should be long enough to ensure project developers receive a sufficient return on investment, yet short enough to encourage them to bring new and improved projects to the market and to respond to new circumstances.

Policymakers must address several questions regarding the timing of actions that reduce emissions.

The period can vary depending on the project's type or sector, ranging from as little as two years to as many as 100 years. (Generally, project crediting periods greater than 25 years are used only for sequestration projects, in which CO_2 is removed from the atmosphere over many years.) For instance, within RGGI, all project types except afforestation are eligible for an initial ten-year crediting period with the option to reapply for a second ten-year period. Afforestation projects are eligible for up to a sixty-year crediting period because of the time it takes to grow trees to a size necessary for significant carbon storage.

Forward Crediting

Forward crediting is defined as issuing tradable offset credits before the actual emission reduction occurs (*ex-ante*) and is verified. This issue arises particularly in response to the extended timeframe of projects such as those in the forest sector. The practice of issuing credits before reductions occur or are verified poses a significant credibility challenge. In addition, this mechanism transfers the delivery (and ultimately the environmental integrity) risk from the seller to the government that issues the credit. Policymakers must weigh these concerns as offset programs are developed.

Forward Selling

In contrast to forward crediting, which is the issuing of fully fungible offset credits before reductions occur, forward selling refers to the practice of selling the *rights* to future offset credits. This type of contractual agreement to buy or sell a future good is a common practice in commodity markets. Forward selling can provide project developers critical up-front capital in the case of projects where emission reductions accrue over long periods of time (like many forestry projects). Forward selling can thus be the deciding factor in a project's financial viability and ultimately its implementation. Unlike forward crediting, forward selling does not typically present policy concerns.

Program Design Considerations: Quantitative & Geographic Limitations

Quantitative Limits

From a strictly environmental and economic perspective there is no reason to limit offset credits, as long as those credits represent high quality, real, and additional reductions. However, concerns exist that there will be a disincentive for innovation and technology transformation in capped sectors if large amounts of emission reductions—even if they meet high standards for quality—are allowed to come from sources outside of the cap.

From a strictly environmental and economic perspective there is no reason to limit offset credits, as long as those credits represent high quality, real, and additional reductions.

There are several options available to limit the number and type of offsets eligible for compliance. Policymakers can establish numerical limits on the amount of offsets that can be used to meet compliance obligations, essentially putting a limit on the demand for offsets. This is the approach that both the EU Emissions Trading System (ETS) and RGGI have adopted. Limiting the types of offsets allowed in the program and/or setting stringent quality criteria

(e.g., strict additionality and very conservative quantification requirements) can also serve to restrict the supply of offsets credits available in the market.

A different type of supply-side limit was proposed in S. 3036, the Boxer substitute to the Lieberman-Warner Climate Security Act of 2008. The Act would have issued only a set number of offset credits in a given compliance period. When the supply objective was met, no more offset credits could be issued in that period—even to very high quality offset projects.

There are often political pressures to limit the geographic source of offset credits.

Constraining supply in this manner could create investment uncertainty for project developers and could be problematic for projects with a multi-year crediting period—particularly if projects must reapply for crediting approval on a yearly basis.

Geographic Limits

Because GHGs accumulate both uniformly and globally in the atmosphere, the location of an emission reduction is immaterial to its climate change impacts (see Box 1 "Why Location Doesn't Matter"). Nonetheless, there are often political pressures to limit the geographic source of offset credits. The reasons most often stated include:

- a concern over the ability to ensure the quality of another jurisdiction's offset program if international offset credits are allowed, and
- a desire for the economic and environmental co-benefits from offset projects to occur domestically.

Quantitative and geographic limits can also interact with each other. For instance, if a quantitative limit is imposed, but both domestic and international offset projects are eligible, international offsets (particularly those from developing countries) may "crowd out" domestic offsets because of their potentially lower cost. Imposing separate international and domestic limits may protect domestic projects but will likely increase the costs for those under the cap.

In the end, establishing either quantitative or geographic limits has the effect of increasing the cost of available offsets. This diminishes the cost containment benefits offsets offer to cap-and-trade programs. As illustrated above, if limits are imposed, the manner in which it is done will have a significant impact (see the Pew Center's Congressional Policy Brief, *Containing the Costs of Climate Policy*).

The Current State of Offset Programs

Regulated GHG Markets

Offsets are an established component of international emissions reduction programs, including the Kyoto Protocol, the EU ETS, the Canadian GHG program, and the emerging Australian regime. Several regional programs in the United States either currently allow, or are considering offset use, including the Northeast's RGGI, Oregon's Carbon Dioxide Standard, and the Western Climate Initiative. Several U.S. domestic cap-and-trade programs proposed in the 110th Congress include offsets as well. Table 1 provides a brief overview of the role of offsets in these existing and emerging programs.

Table 1 *Greenhouse Gas Offset Programs or Proposals*

Program or Proposal	Offset Types Allowed	Quantitative and Geographic Limits	Regulatory Authority	Project-Specific or Standardized Assessment	Tests for Financial Additionality
Boxer-Lieberman-Warner S. 3036 – June 2008 Climate Security Act of 2008 [Substitute amendment] originally introduced in October 2007 as S. 2191	1. Methane capture and destruction from terrestrial activities at non-agricultural facilities 2. Manure management and disposal—waste aeration and methane capture and combustion 3. Agricultural/rangeland sequestration and management 4. Land-use/forestry 5. Reductions from other non-covered sources 6. Others as identified by EPA	Domestic: limited to 15% of annual emissions cap; international forestry credits can be used to make up shortfall International: limited to 15% of annual emissions cap (5% project-based international offsets; 10% international forestry credits); international allowances can be used to make up shortfall Int. project-based credits must meet comparable requirements to U.S. program; cannot come from projects that compete directly with U.S. facility. Int. forestry credits must come from projects approved by EPA/Sec. of State	EPA	Not specified	Not specified
Bingaman-Specter S. 1766 – July 2007 Low Carbon Economy Act	1. Landfill methane capture and destruction 2. Animal waste/wastewater methane use 3. SF_6 reductions 4. Coal mine methane capture and destruction 5. Removal of GHG precursors 6. Geological sequestration 7. Reductions from other non-covered sources 8. Other activities approved by President and subject to discounting	Domestic: Unlimited; 5% of total allowance allocation set aside for agricultural sequestration International: President can authorize up to 10% of annual compliance obligation (must come from programs with comparable regulation)	President	Not specified	Not specified
Lieberman-McCain S. 280 – January 2007 Climate Stewardship and Innovation Act	1. International offsets 2. U.S. forest sequestration (forest management, afforestation) 3. Agricultural soil sequestration 4. Methane capture and destruction (agricultural activities, oil sector, gas sector, landfills) 5. EPA to determine other eligible project types	Up to 30% of compliance obligation from both domestic and international sources. If offsets account from more than 15% of compliance obligation, at least 1.5% must be from agriculture sequestration projects	EPA	Not specified	Not specified

Table 1 *Greenhouse Gas Offset Programs or Proposals (continued)*

Program or Proposal	Offset Types Allowed	Quantitative and Geographic Limits	Regulatory Authority	Project-Specific or Standardized Assessment	Tests for Financial Additionality
Kerry-Snowe S. 485 – February 2007 Global Warming Reduction Act	Above-ground and below-ground biological sequestration of carbon dioxide	None specified	Secretary of Agriculture, with concurrence of the EPA Administrator	Standardized	Not specified
Sanders-Boxer S. 309 – January 2007 Global Warming Pollution Reduction Act	Above-ground and below-ground biological sequestration of carbon dioxide	None specified	Secretary of Agriculture, with concurrence of the EPA Administrator	Standardized	Not specified
Markey H.R. 6186 – June 2008 Investing in Climate Action and Protection Act	1. Agricultural projects that reduce GHGs resulting from enteric fermentation or manure management in soils, or that increase biological sequestration of carbon through afforestation or reforestation 2. Projects that reduce fugitive GHGs from petroleum and natural gas systems in the U.S. 3. Projects that reduce GHG emissions from coal mines (Agricultural and coal mine projects are only eligible if not subject to other performance standards in the bill)	Domestic: up to 15% of compliance obligation with domestic offsets International: up to 15% of compliance obligation with international offsets	EPA	Standardized	To be developed by the EPA Administrator; Guidelines provided by project type
Waxman H.R. 1590 – March 2007 Safe Climate Act of 2007	Not specified	Not specified	Not specified	Not specified	Not specified
Olver-Gilchrest H.R. 620 – January 2007 Climate Stewardship Act	Sequestration in agricultural soils	Covered entities may satisfy up to 15% of their compliance obligation through any combination of domestic offsets, allowances from foreign markets, and projects in developing countries. If an entity takes advantage of the full 15%, it must satisfy 1.5% of its compliance obligation by submitting registered net increases in sequestration in agricultural soils.	EPA	Not specified	Not specified

Table 1 *Greenhouse Gas Offset Programs or Proposals (continued)*

Program or Proposal	Offset Types Allowed	Quantitative and Geographic Limits	Regulatory Authority	Project-Specific or Standardized Assessment	Tests for Financial Additionality
Regional Greenhouse Gas Initiative (RGGI)	1. Landfill methane capture and combustion 2. Methane capture and destruction from manure decomposition 3. SF_6 reductions 4. Biological sequestration (currently afforestration) 5. End-use efficiency projects that reduce onsite consumption of propane, natural gas, heating oil	Limited to 3.3% of total compliance obligation. Projects must be located in RGGI states or other states that have signed an MOU and assumed enforcement and monitoring responsibility If allowance prices increase to \$7/ton CO_2, offsets limit increases to 5% If allowance prices increase to \$10/ton CO_2, offsets limit increases to 10% and international allowances/credits may also be used	Each participating state's environmental agency; some powers assigned to RGGI and the non-profit regional program administrator	Standardized; quantification and additionality assessments written into model rule and adopted through rulemaking or the legislative process in each member state	None due to strict standardization of eligibility
Western Climate Initiative	Not yet determined; Initial priority list: 1. Waste management: landfill gas and wastewater treatment methane gas destruction 2. Agriculture sector: soil sequestration and methane capture and destruction 3. Forest sequestration (afforestation, reforestation, forest management, forest preservation/conservation & forest products)	Not yet determined, considering 10% of regulated entities' total compliance obligation	Individual member jurisdictions (states and provinces); considering establishment of a regional coordinating body	Standardized to the extent possible	Not yet determined
European Emissions Trading System (EU-ETS)	No domestic offset program per se. All project types approved through CDM and JI	Limited to 13.5% of each member state's cap [each member state has varying cap as determined by their National Allocation Plan (NAP)]	EU commission and CDM/JI administration	Same as CDM	Same as CDM
Kyoto Protocol Clean Development Mechanism (CDM)	Over 100 project quantification methodologies approved For a complete list see: cdm.unfccc.int/methodologies/PAmethodologies/approved.html	See EU-ETS	CDM Executive Board	Project-specific, moving towards combination of project-specific and standardized (hybrid)	Yes, must pass two of three basic tests:[14] 1. Investment analysis 2. Barriers analysis 3. Common practice assessment
Kyoto Protocol Joint Implementation (JI)	Same as CDM	See EU-ETS	JI Supervisory Committee	Same as CDM	Same as CDM

The Voluntary Carbon Market

In the absence of a mandatory GHG reduction program in the United States, an active voluntary emissions reduction market has emerged over the past several years. The global voluntary carbon market was estimated to be valued at $331 million in 2007, up from $97 million in 2006 and $44 million in 2005—an over seven-fold increase in the past two years.[15]

Currently, the United States has no national offsets standards or regulation, and thus there are no official federal quality criteria to ensure consistency and legitimacy of claims by either buyers or sellers. While several voluntary standards have arisen, the offsets market has come under increasing scrutiny by both the media and regulators, like the Federal Trade Commission, as reports of fraudulent or misleading activities have surfaced.

Doubts raised regarding the efficacy of offsets in the voluntary market as a source of real, additional, and verified emission reductions have the potential to impact the optimal incorporation of offsets into emerging climate regulation. While the voluntary offsets market can indeed provide important insights for regulatory design, it is critical to understand that its operation is very different than that of a rigorous, regulated offsets market.

Key Design Questions

Climate policymakers have the challenge of striking the appropriate balance between stringency and flexibility, environmental certainty and economic costs, and administrative feasibility. Lowering program costs while preserving environmental integrity is paramount to successfully integrating offsets into a cap-and-trade program.

Careful consideration and analysis of the issues and options discussed in this brief can help craft an effective, fair, and adaptable offset program. A carefully designed program will allow offsets to play an important role as the United States transitions to a low carbon economy.

This Congressional Policy Brief distills the key issues under consideration by policymakers as they move forward with the design and implementation of GHG reduction policy. When crafting cap-and-trade programs that include an offset mechanism, a number of complex and interrelated questions must be assessed including:

- What types of offset projects should be allowed, and should this be legislated or left to agency discretion?
- What type of assessment methodology should be used—project-specific, standardized, or a hybrid approach?
- Should there be quantitative limits on offsets? If so, how should those limits be imposed?
- Which federal agency (or agencies) should manage the offset program? Should multiple agencies oversee specific sectors where offset projects are expected to originate, or should it be a single agency with broader sector coverage?
- Should there be geographic limits to where offsets projects may originate (e.g., U.S.-only, North America-only)?
- What date should be used as a start-date for project crediting? How long should subsequent project crediting periods be?

End Notes

1 A variety of names are used to refer to offset credits—carbon credits, compliance credits, offset allowances, or even simply offsets. This brief will use the term offset credits.

2 While this brief is focused on a discussion of the issues surrounding offsetting emissions in a regulatory program, many of the same issues also exist when offsets are used in a voluntary context.

3 The power of some gases to warm the earth, per unit of mass, is much larger than that of CO_2. These high global-warming-potential (high-GWP) gases are often measured as a CO_2-equivalent amount, obtained by multiplying the amount of a gas times its global warming potential relative to CO_2.

4 See www.epa.gov/climatechange/downloads/s2191_EPA_Analysis.pdf.

5 These criteria were developed in conjunction with the Offset Quality Initiative, a consensus organization of offsets stakeholders that includes the Pew Center. See *Ensuring Offset Quality: Integrating High Quality Greenhouse Gas Offsets Into North American Cap-and-Trade Policy*, July 2008, available at www.offsetqualityinitiative.org.

6 Verification by qualified and pre-approved third parties could reduce the administrative burden of the program on the oversight agency—much like CPAs reduce the burden on IRS—as the onus and cost of ensuring verification would be placed on the project developer. Independent random audits would be necessary for quality control.

7 As long as these entities are not subject to a cap on GHG emissions they may be eligible to generate and sell GHG offset credits.

8 As climate change policy is promulgated, a high priority will likely be placed on funding and encouraging the wide-scale deployment of renewable energy and energy efficiency. Mechanisms such as allowance set-asides under an emissions cap-and-trade scheme, Renewable Portfolio Standard legislation, and tax credits or feed-in tariffs are alternative means of stimulating the wide-scale deployment of energy efficiency measures and renewable energy.

9 An exception would be a large industrial user of electricity that contracts directly with a generator for its power supply. In this case, contractual language could potentially assign the value of emission reductions that result from the user's efficiency projects uniquely to one party or the other.

10 See Stavins, Robert N. and Kenneth Richards, *The Cost of U.S. Forest-Based Carbon Sequestration,* Pew Center on Global Climate Change, January 2005.

11 Emission allowances issued under another country's cap-and-trade system could also in some sense be considered international offsets, if domestic emitters are allowed to submit them to meet some of their domestic compliance obligation. These, however, differ from traditional "offsets" in that they represent an ex-ante government sanctioned right to emit rather than an ex-post recognition of an emission reduction. For this reason, the issues surrounding their creation, verification and use are significantly different than more traditional offsets.

12 See Pew Backgrounder on CDM available at www.pewclimate.org/intl/cdm.

13 The UNFCCC's CDM process currently includes 14 combined methodologies avalable at http://cdm.unfccc.int/methodologies/PAmethodologies/approved.html.

14 Additional explanation of the additionality tests required by a CDM project can be found at: cdm.unfccc.int/methodologies/PAmethodologies/AdditionalityTools/Additionality_tool.pdf.

15 Ecosystem Marketplace & New Carbon Finance, *Forging a Frontier: State of the Voluntary Carbon Markets 2008*, May 2008.

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