Realizing the Benefits Of Greenhouse Gas Offsets: Design Options to Stimulate Project Development and Ensure Environmental Integrity

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Executive Summary

Offset programs can help to control costs and maintain economic competitiveness. An offset is distinct from an emissions allowance (or a permit), which represents a government-sanctioned right to emit, and is issued to sources covered under a GHG cap-and-trade program. Allowances are allocated from an overall cap on emissions, while offsets are created from projects and activities outside of a GHG program's cap. In addition to providing cost control, offset programs can provide important environmental benefits.

Some of the potential benefits that well-designed offset programs can provide include: 1) cost control by enabling sources in a GHG program (i.e. "covered sources") to access lower-cost reductions from a broad array of sectors across geographic locations; 2) incentivizing investment and innovation in sectors not covered by a GHG program, thus providing environmental benefits that may not occur otherwise; 3) avoiding costly premature retirement of economic assets before the end of their useful lives; and 4) allowing time to develop lower carbon-emitting technologies (by providing covered sources with access to low-cost compliance options in the near term).

There are challenges in effectively designing an offset program. For example, in order for the environmental integrity of a GHG program to be maintained, offsets should only be provided to activities that are "additional" to business as usual (BAU). To address this concern, offset programs incorporate "additionality" requirements to ensure that offset credits are issued only for reductions that go beyond those that would have occurred in the absence of the project. If emission reductions from a project are not "additional," there is a risk that these credits could undermine an emissions cap and lead to increased emissions compared to a case in which no offsets are allowed. Finally, offset programs may incorporate other provisions to address environmental concerns, including provisions to restrict the creation or use of certain types of offsets, provisions to ensure that emission reductions from offsets are permanent, and provisions to ensure that emission reductions are adequately monitored and verified.

An offset program must effectively address environmental integrity concerns. However, to be successful in creating affordable emission reductions, an offset program also must enable developers to mobilize private capital to finance projects and activities that create offsets. It must provide incentives to stimulate investment in projects, and provide as much certainty as possible to project developers as they plan and undertake a project activity. If investors determine that the risks to offset creation are significant, offset programs cannot succeed. Risks that can discourage investment in offset projects include project eligibility risk, offset eligibility/value risk, offset quantity risk, and offset permanence risk.

Unfortunately, in many offset programs, the policy design elements that are intended to address environmental risks also impose investor risks. Thus, the dilemma faced by

policy makers is how to balance the real environmental concerns associated with offsets with the need to provide certainty for investors. This paper provides additional details on different types of investor and environmental integrity risks and proposes an approach for balancing these two sets of considerations.

The paper reviews offset programs that have been planned or implemented to date and concludes that they have generally not been successful in achieving environmental or economic objectives due to a failure to address environmental integrity risk in a manner that maintains economic incentives for developers. For example:

- The Clean Development Mechanism (CDM)'s project approval process imposes significant project eligibility and offset quantity risk on developers. It sets a high burden of proof for demonstrating additionality and offset creation (i.e. Certified Emission Reductions – CERs), and has an inefficient and uncertain project approval process. While developers bear up-front costs to secure host country approvals and prepare detailed project documentation, it can take as long as 3 years to secure registration, which is required for a project to be able to create CERs. As a result, project eligibility risk and offset quantity risk is resolved late in the process, making it difficult for developers to secure project finance, and creating disincentives for investment.
- New Jersey's Open Market Emission Trading (OMET) program and the U.S. Acid Rain Program's conservation and renewable energy reserve provide other examples in which programs did not successfully achieve environmental or economic objectives.
- Finally, although it is too soon to evaluate the results of the Regional Greenhouse Gas Initiative's offset program (RGGI), the program has a provision that has raised concerns among project developers. The program creates offset eligibility/value risk by imposing quantitative limitations on the use of offsets -- limitations which change based on the rolling average price of allowances. As a result, developers cannot determine in advance the demand for offsets, and buyers cannot know how many offsets they will be able to use, and if they will be available. This reduces buyer willingness to contract for offsets, which in turn discourages investment in projects.

On the other hand, an offset program *could* be designed in a manner that would simultaneously maintain environmental integrity and minimize risk for investors. While diverse offset activity types pose different challenges, design elements can be incorporated into a program in order to effectively address these challenges. The policy options discussed below provide a means for including several key offset activities -- including forest and soil sequestration and many other activities -- that have the potential to create a significant volume of low-cost offsets and achieve significant environmental and economic benefits, while ensuring that environmental risks are minimized. These options include a positive list, a two-step approval process, a deemed savings approach, discounting to account for uncertainty, and an insurance pool to address impermanence risk, funded by a set-aside from the GHG program's emissions budget.

A **positive list** identifies activities generally considered additional and eligible to create offsets   This partly eliminates project eligibility risk. If approved measurement and verification (M&V) protocols are included in the positive list, this also eliminates the risk that a project will be rejected because the developer's M&V plan is not accepted.

A **two-step process** would allow developers to receive a determination of eligibility and M&V requirements in advance of investment. Issuance of offsets would take place after investment in and implementation of the project. Such a process can be utilized to address project eligibility risk and reduce offset quantity risk in all types of offset activities. It avoids a worst-case scenario for an investor of building a project only to discover that it will not receive any offsets because it was ruled ineligible. This resolves uncertainties that create difficulties in securing project financing.

A **deemed savings** approach fixes the level of crediting for an activity in advance for activities where M&V and quantification is known with certainty. This provides investors with up-front certainty regarding offset eligibility and quantity, and reduces the cost of measurement, thereby facilitating investment.

Risk-based discounting can be used to reduce offset quantity risk, and to address quantification risks for offset activities in which M&V is imperfect (e.g. transportation-related projects), and for activities in which there are significant quantification uncertainties (e.g. soil carbon sequestration). Under this approach, a discount factor is applied to best estimates of offsets created by an activity. The factor is established at a level that would provide a margin of safety to ensure that activities are not over-credited. Discounting levels can be adjusted as measurement and verification techniques improve.

A **standard offset set-aside** can address offset impermanence risk (i.e. the risk of unexpected loss from project failure, which is distinct from the risk of over-crediting). This risk applies to soil carbon sequestration and afforestation/reforestation, which have the potential to create significant volumes of low-cost offsets. In a standard set-aside approach, a portion of the GHG program's emissions budget would be set aside (e.g. 10 million tons (Mt)). Reductions created by sequestration projects would secure allowances from the set-aside, and would be limited to the amount of the set-aside. This approach would eliminate environmental risk, because even if all projects failed, allowances granted to sequestration activities come from within the program's fixed emissions budget.

I. Background / Overview

One of the most significant concerns in the design of greenhouse gas (GHG) programs has been controlling costs and maintaining economic competitiveness. In response to these concerns, policy-makers and affected interests have proposed that GHG control programs include offset provisions. A well-designed offset program could provide several benefits including but not limited to: (1) controlling costs by enabling sources that are required to comply with GHG emissions targets to seek least-cost reductions from a broad array of source sectors across geographic locations; and (2) incentivizing investment in activities that provide climate-related and other environmental benefits in sectors not required to make reductions. In addition, investments in project activities that create offsets mobilize private capital rather than secondary investment through government programs.

Despite the potential benefits, emission offsets have been used with only limited success to date. In large part, this is because there have been concerns that if offsets are not handled correctly, these programs could threaten the environmental integrity of GHG control programs. Policy-makers' attempts to manage the tension between ensuring strict environmental integrity and stimulating investment in beneficial activities have largely failed to achieve the second objective. This paper considers ways to stimulate private investment in GHG reduction projects while preserving environmental integrity. It is divided into six sections. The first provides background information on offsets. The second briefly describes the benefits and challenges of offset systems. Section III discusses the types of risks that can discourage investment in offset projects. Section IV addresses how offset programs to date have increased investor risk. Section V concludes with a set of policy options to improve the performance of offset programs by reducing investment risk while ensuring environmental integrity.

II. Offsets: Benefits and Challenges

The term "offset" usually applies to a class of tradable emission reductions that are distinct from emission allowances (or permits). In many existing emissions trading programs, a total emissions cap is defined prospectively by policy-makers and allocated to sources that will be regulated under the program. (These sources are called "regulated" or "covered" sources throughout the paper.) An allowance represents a government-sanctioned right to emit, and is the instrument of regulatory compliance. Allowances are either provided for free or sold to regulated sources prior to a compliance period. Except in limited circumstances, sources are authorized to trade their allowances from the inception of the program. To demonstrate compliance with their emissions cap, sources are required to surrender to regulatory authorities an amount of allowances equal to their actual emissions at a specified point in time. Allowance surrender is usually required on an annual basis. If regulated sources hold more allowances than required to cover their emissions, they can save or "bank" them for future use or sale.

In contrast to allowances/permits, offsets are generally created by project activities that reduce emissions not covered under a trading program from a baseline that is either a business-as-usual scenario or a pre-defined allowable level of emissions. The creation of offsets and their use for compliance is authorized by government rules that define eligible offset activities, measurement and verification, and other details. Almost without exception, offsets are awarded on an *ex post* basis. Typically, they are awarded after capital has been deployed and the reduction activity is underway. Once created, offsets can usually be used by or sold to sources seeking to comply with emission reduction requirements.

1. Benefits of offsets

Several analyses, the most recent of which was prepared by the Massachusetts Institute of Technology (MIT), Stanford University and Battelle Memorial Institute for the U.S. Department of Energy (DOE)[1], have noted the value of "where", "what" and "when" flexibility. These terms are used to define the location and timing of emission reductions, and the GHGs that can be controlled. The study, and several others that it cites, concludes that these elements of flexibility can reduce the costs of control programs "by an order of magnitude" compared to those that do not provide for such flexibility. This has also been the view of regulated sources that must comply with emission reduction requirements. By expanding the types and locations of activities that can generate emission reductions that can be used for compliance, offset programs effectively increase the "where" and "what" flexibility of trading programs. Some of the potential benefits of offsets include:

- Allowing covered sources to continue utilizing economic assets until the end of their useful lives, thereby reducing the premature retirement of such assets;
- Providing covered sources with low-cost compliance options in the near-term while lower carbon-emitting technologies are developed;
- Avoiding deployment of long-lived capital assets using technologies that are only marginally better than existing ones; and
- Stimulating innovation in sectors not usually subject to emission reduction requirements, thus providing important environmental benefits that may not occur otherwise.

A further elaboration of these benefits follows.

One of private firms' primary concerns with GHG control programs is that compliance with emission reduction requirements could cause the shutdown of assets prior to the end of their useful lives. This phenomenon is often called premature capital stock turnover. It can occur if economical compliance options are not available to firms subject to GHG emissions reduction requirements. Governmental programs requiring emission reductions can limit sources' compliance options to emission reductions from regulated sources, or

[1] Scenarios of Greenhouse Gas Emissions and Atmospheric Concentrations, Synthesis and Assessment Product 2.1 – Draft version dated August 2006, US DOE, page 4-24.

(in an extreme case) to reductions within each source owner's physical plant. Such limitations can eliminate many economic compliance options. If compliance costs are greater than the cost of asset retirement in these cases, the reduction requirement may result in the early closure of important assets.

Programs that limit compliance flexibility can also create situations in which a source's only option is to invest in a relatively costly on-system abatement measure that provides only a marginal improvement in emissions performance. This has the effect of locking-in sub-optimal technologies and increasing the costs of GHG control programs.

In contrast, a well-designed, effective offset program can help to avoid these outcomes by providing sources with the flexibility to secure lower-cost compliance options. Offsets create incentives for firms to seek out and secure compliance options throughout the economy that may be available at a lower cost than emission reductions within other sources covered by the program or within a source's own assets. As a result, offsets can reduce premature retirement of assets that could occur when sources lack cost-effective internal abatement options. In addition, by providing a cost-effective means of compliance, offsets allow covered sources to avoid investing in (and locking-in) long-lived assets that achieve only marginal emissions improvements. An offset program also allows for development of new technologies in two ways. First, it creates economic incentives (i.e. through a market price signal) for developing technologies used in offset projects. Second, the availability of cost-effective offsets provides time for new control technologies and processes to be developed and brought to market (through Research & Development efforts, for example). Such new technologies will be needed to enable steeper reductions in GHG emissions during the course of the century. Ultimately, more stringent reductions will be essential to stabilizing concentrations of GHGs in the atmosphere.

2. Challenges of offsets

Because offset programs increase the total quantity of compliance instruments available to covered sources, environmental integrity can only be maintained if offsets are only granted to activities that are additional to business as usual (BAU). If activities that would occur under BAU are provided offsets, this effectively increases the emissions budget above the level set in the original cap, adversely impacting the environmental integrity of the program. To address this concern, offset programs incorporate design elements intended to ensure that offsets are only granted to activities that are "beyond BAU." Considered together, these elements are often referred to as an "additionality requirement," as they help ensure that offset credits are issued only for emission reductions that are additional to those that would have occurred in the absence of the project. Determining how best to ensure additionality is an important challenge in designing offset programs.

At the same time, additionality requirements should be designed in ways that maintain the environmental integrity of offsets without creating disincentives for investment. The following two sections discuss the difficulties of maintaining this type of balance in an offset program.

III. Stimulating Investments in Offset Related Activities: Achieving Investment and Environmental Objectives

The large majority of offset programs to date have been designed to address environmental integrity concerns. These concerns include the risk that project baselines do not adequately address additionality concerns, the risk of over-crediting due to measurement uncertainties, and impermanence risk -- the risk that offsets that have already been credited (and potentially used) are lost as a result of unexpected events (fires, flooding, disease, etc.). The latter concern applies to sequestration offset projects. Effectively addressing these concerns is critical to the success of offset programs. However, these programs must also be designed to enable developers to mobilize private capital into projects that can create offsets. If design elements incorporated in offset programs impose insurmountable barriers to private investment, investment will not occur and cost-effective reductions in sectors outside of the trading program will not be realized. In short, the environmental and economic objectives of offset programs will not be achieved. This has been and continues to be the experience with such programs.

In a typical offset project, a developer or project proponent recognizes the investment potential of an offset project. The developer may own the facility at which the project activity will be implemented or it may contract with the asset owner to implement the project activity. Prior to fully funding the reduction activity, the developer may attempt to secure a contingent contract to sell the offsets to a buyer. This revenue stream can assist the developer to secure debt or equity financing from a financial institution to implement the project. If the effort to secure financing is not successful, the developer may still attempt to complete the project and seek to find a buyer. In either case, the developer would complete the project and apply for offsets.

In order for an offset system to be effective in creating affordable emission reductions, it should be designed to: 1) provide as much certainty as possible as the developer plans and undertakes a project activity; and 2) provide incentives to stimulate project development. For the system to work, investors need to believe that there is real and predictable demand, and that the ability to create offsets is certain. Buyers need to believe that there will be a supply of offsets, and that they will be able to rely on their eligibility for use. A description of the different types of risks that discourage investment follows.

- *Project eligibility risk.* This is the risk that a project will be deemed ineligible to create offsets. A major impediment to project development is created if investors/developers do not have upfront certainty that their projects will be eligible to create offsets. Clear rules defining eligible project activities and procedures for pre-qualifying projects for offset creation can eliminate this risk.
- *Offset eligibility/value risk.* This is the risk that offsets will not be eligible for compliance use, or will have less compliance value than expected, due to restrictions imposed on their use s for compliance. These encumbrances can be

implemented in several ways. For example, quantitative limits may be imposed on the amount of offsets that covered sources can use to comply with emissions targets. This limitation was referred to as the "supplementarity rule" within the negotiations of the Kyoto Protocol. Similarly, the Regional Greenhouse Gas Initiative (RGGI) limits use of offsets for compliance at 3.3% of actual emissions. The percentage increases to 5% if rolling average allowance prices exceed $7, and 10% if they exceed $10. Another type of encumbrance is a discount factor imposed on the compliance value of a particular offset activity (e.g. 2 offsets equal 1 compliance instrument) based upon the geographic location in which it was undertaken or the activity that created it. Alternatively, the compliance value of certain activities could be made contingent on the price of allowances, similar to the RGGI program as it was originally proposed in the Memorandum of Understanding (the Model Rule eliminated this discounting provision). The practical effect of these encumbrances is that project developers and covered sources confront a high degree of uncertainty as to the eligibility and compliance value of offsets. This creates a disincentive to project development. It can also discourage covered sources from entering into forward purchase contracts with sellers. The inability of project developers to enter into such contracts is a major impediment to securing project finance. Clear rules defining offset use can alleviate much of this risk.

- *Offset quantity risk.* This is the risk that the quantity of offsets a project will be eligible to receive will be different than expected because monitoring and verification (M&V) requirements are not clearly defined at the outset of the activity. This risk is separate and distinct from the risk that a project simply does not operate as planned. Explicit M&V protocols and other mechanisms can be used to address this risk.
- *Offset impermanence risk.* This is the risk that offsets that have already been credited (and potentially used) are lost as a result of unexpected events (fires, flooding, disease, etc.). This concern applies to sequestration offset projects. If developers are liable for such potential losses, a further barrier to investment is created. If, on the other hand, regulated sources that purchase offsets bear this liability, they may be hesitant to enter into purchase contracts for offsets that have permanence risk. Insurance or other risk mitigation approaches can be used to manage permanence risk and encourage investment in sequestration activities.

The investment risks described above result from policy design choices that were made to reduce environmental integrity risks. Section IV discusses how existing programs have attempted to address these risks, and how policy design choices to date have often created unnecessary risks and uncertainties for investors. Based on this experience, Section V considers how policies can be designed to address, in a targeted fashion, the environmental integrity issues associated with specific offset types, while simultaneously minimizing investor risk It provides examples of the types of environmental integrity issues associated with different offset types, and the policy design solutions that can address those issues without creating disincentives for offset development.

IV. Offset Programs Have Not Been Successful in Mitigating Investor and Environmental Risk

Offset programs are not new. Such programs have been incorporated in emissions trading programs in the U.S. and in international GHG emissions trading through the Clean Development Mechanism (CDM) and Joint Implementation (JI) mechanisms incorporated in the Kyoto Protocol. Many offset programs have achieved limited success. While the reasons for the lack of success varies, the most prevalent underlying causes are limits imposed on offset use and/or provisions designed to ensure that offset projects meet an exceptionally high standard of additionality and that they are not over-credited. Offset programs that incorporate such provisions in order to minimize environmental risk have often increased investor risk. Some specific examples follow:

- ***The CDM's*** project approval process imposes significant project eligibility and offset quantity risk on developers. This risk is created by: (1) the high burden of proof required to demonstrate additionality and create offsets from CDM projects, which are known as certified emission reductions (CERs); (2) the inefficient and highly uncertain process for securing regulatory approval of projects from the CDM Executive Board (EB); and (3) an additional approval process imposed by the host country government. Project developers bear a significant up-front cost to secure necessary approvals but can only generate CERs after the projects have secured registration with the CDM EB—a process which can take as long as three years. As a result, project eligibility risk and offset quantity risk is resolved fairly late in the process, creating disincentives for investment. In addition, despite significant demand for CERs from CDM projects, it has been extremely difficult to use CER sales contracts to secure project finance because lending institutions are concerned with project eligibility and offset quantity risk. On the other hand, the CDM does provide a two-step approval process which avoids one type of project eligibility risk – i.e. a scenario in which the project developer must implement the project before knowing whether credits would be generated.
- ***New Jersey's Open Market Emission Trading (OMET)*** attempted to mitigate project eligibility risk through a user-driven offset registration process. Instead of indicating which activities could create offsets, regulators determined the acceptability of specific offsets after a source had purchased them and indicated its intent to use them for compliance through a permit application. If the regulatory authority denied the use of the offset, the regulated source would have to secure acceptable offsets in the market. Thus, project eligibility risk simply was shifted from project developers to offset buyers/users, who could not know whether their offsets were valid until after they had been purchased.
- ***The Acid Rain Program (ARP)***, incorporated as Title V of the Clean Air Act Amendments (CAAA) of 1990, set aside 300,000 allowances from its cap in a conservation and renewable energy reserve (CRER). Although the CRER is an allowance set aside, it does provide some lessons that are relevant to the design of offset provisions. Since the program's inception (for activities dating back to 1992), only a little more than 10% of these allowances have been claimed. The

transaction costs and complexities associated with securing a relatively small volume of allowances adversely impacted participation. In addition, lower than expected allowance prices and a relatively stingy statutory formula for awarding allowances diminished financial incentives to participate in the program. Finally, since the program was limited to utilities covered by the program, there was no incentive for sectors outside the program to invest in activities that improved end-use efficiency or increased investment in renewable energy.

- ***The Regional Greenhouse Gas Initiative (RGGI***) is the newest of the trading programs that incorporates an offset program. While the program has not yet been implemented, preliminary analysis reveals that it has features that both decrease and increase investor risk. For example, the program reduces investor risks by incorporating a positive list of measures that generally do not represent BAU activities. This provides investors with assurance that certain project activities are acceptable. On the other hand, the program creates uncertainty regarding offset eligibility and value, and thus market demand for offsets, through its incorporation of three design elements. These are: (1) an emissions cap that requires minimal levels of reductions; (2) limitations on the creation and use of offsets; and (3) a mechanism for changing the limitations based on the average market price of allowances. The RGGI program allows regulated sources to use offsets generated from pre-defined sectors in an amount equal to a small percentage of their actual emissions. If average prices exceed a trigger level, sources will be allowed to use more offsets for compliance than if the trigger were not met. In this scenario, demand for offsets would increase. Because of these provisions, developers cannot determine demand for their offsets and buyers cannot know with any certainty how many offsets they will be able to use, whether they will need them, and if they will be available. Therefore, buyers are unlikely to contract for offsets even if they believe that offsets would provide a less expensive or more flexible form of compliance. The difficulty in securing end-use contracts, in turn, adversely impacts project development and limits investment in beneficial activities. While these provisions do increase investor risk, the program does mitigate project eligibility risk and offset quantity risk by being very clear about what qualifies as an offset and how it must be measured.

The restrictive provisions incorporated in offset programs to date suggests an implicit assumption that environmental integrity is best achieved through a case-by-case review using subjective standards, and otherwise through limiting offset use. This assumption ignores two important points. First, offsets will only serve their intended purpose if developers invest in offset projects. If investors determine that the risks to offset creation are significant, offset programs cannot succeed. Second, the risk that investors will not invest in offset projects must be compared to the risk of a relatively small number of "bad" project receiving offsets. The latter is certainly not a desirable outcome. However, these issues must be considered in the context of getting started in addressing climate change, which is a century-scale problem.

For the most part, offset programs have not been successful in achieving environmental or economic objectives due to a failure to address environmental integrity risk in a manner that preserves the economic attractiveness of investing in offsets. The authors believe that an offset system can be designed to minimize investor risk while preserving the program's environmental integrity. We believe that a program that accomplishes these objectives can help to achieve more significant benefits than seen to date in terms of emission reductions, compliance cost reductions and savings to the economy.

V. Options to Reduce Investment Risk And Ensure Environmental Integrity

An offset program that is implemented as part of a domestic U.S. GHG control program could be designed in a manner that would simultaneously minimize investor and environmental risks and maximize environmental and economic benefits. In order to achieve these objectives, it is important to recognize that the diverse activity types that create offsets pose different challenges. Alternative policies can be used to effectively address these differences while minimizing investor risk.

A large volume of low-cost abatement options in the U.S. lie in offset activities such as forest and soil sequestration. Bringing these and other offset opportunities into an offset program will provide significant compliance cost savings to sectors covered by a trading program, generate experience with and cost-reductions in these offsets, and provide time for the development of the next generation of abatement options. A robust and effective offset program could also help avoid the costly premature retirement of assets or the lock-in of sub-optimal technologies. It also will help mitigate emissions growth in sectors with diffuse sources that are not likely to be covered by a trading program and which may be difficult to address with other measures. In contrast, taking these options off the table will significantly diminish the economic and environmental effectiveness of an offset program and eliminate needed learning.

As noted in Section III, not all potential offset projects share the same environmental risks. The types of environmental risk posed by any particular offset project category can be summarized in the following scenarios.

- *Quantification of emission reductions when the amount of reductions is well-understood and easy to measure*. In this scenario, there is little risk of over-crediting. Typically these projects involve well-known offset-related activities such as landfill gas management where there has been significant experience in defining baselines and developing acceptable measurement protocols. This category may also include projects that are less well-known but that have discrete, easily measured sources.
- *Quantification of emission reductions when uncertainties are limited and understood.* In this scenario, there is some risk of over-crediting. It can be addressed by utilizing conservative crediting assumptions until better measurement practices are developed. For example, precise quantification of emissions reductions from transportation-related projects such as adding bus lanes or encouraging telecommuting is not available at present. Sampling techniques

using control groups can be used to develop conservative crediting levels for this type of activity until more precise measurement techniques are developed.

- *Quantification when uncertainties are significant and reductions cannot be known precisely*. In this scenario, there is the greatest risk of over-crediting. Factors that contribute to uncertainty are a lack of experience with the proposed project activity, concerns with determining baselines, and challenges to accurately measuring emissions (such as indirect or fugitive emissions). In these instances, conservative practices can be used until more precise M&V techniques are developed.
- *Impermanence.* There are risks that projects involving storage of carbon dioxide (CO_2), such as soil sequestration and reforestation projects, will release CO_2 to the atmosphere as a result of fire, disease, flooding or some other unplanned event – after offsets have been issued. If there is no mechanism for addressing "impermanence", released CO_2 from such activities would increase global emissions and undermine the achievement of environmental objectives. Direct set-asides can foster investment in sequestration while reducing environmental integrity risks.

Each of these distinct environmental risk scenarios associated with specific offset project types can be effectively addressed in a targeted manner without creating disincentives for investors. However, as discussed in Section IV, the policy choices to address environmental risk in offset programs to date have often created investor risk, thereby reducing overall program effectiveness. Policies can and should be designed to minimize investor risk while also assuring environmental integrity. The policy options discussed below provide a means to do so.

Table 1 summarizes the different characteristics and challenges of offset activities relating to quantification and permanence, corresponding offset types, and policy options that can address each type of challenge. These policy options include a positive list, a two-step approval process, a deemed savings approach, different levels of discounting to account for uncertainty, and an insurance pool funded by a set-aside in the allowance budget. These options are briefly introduced below, and are discussed in more detail following the table. We note that several of these options are not mutually exclusive. In some cases, these approaches may be used in combination to address different characteristics of specific project activities.

- A positive list identifies activities eligible to create offsets, provided they are additional. Such a list reduces project eligibility risk, particularly when approved measurement and verification (M&V) protocols are included in the list.
- A two-step process would allow project developers to receive a determination of eligibility and M&V requirements in advance of investment. Issuance of offsets would take place after investment in and operation of the project. Importantly, a "certificate of eligibility" in step 1 could be a valuable means for developers to attract financing and buyers.
- Deemed savings is an approach in which the level of crediting for an activity is fixed in advance and no post-installation measurement is required (although the

developer would likely need to demonstrate that the activity was installed and operating).

- In a discounting approach, the quantity of offsets granted to an activity is lower than the measured reduction achieved by the activity. This "discount" is used to address risks due to measurement uncertainty.
- A set-aside from the capped trading program can be devoted to sequestration projects in order to address offset impermanence risk.

Table 1: Policy options to address the challenges of specific offset-related activities

Applicable Project Activities	***Offset Characteristics***	***Environmental Integrity Challenge(s)***	***Policy Options to Address Challenge***
• Landfill gas capture and destruction; • Coal mine methane capture and destruction; • Anaerobic digester and flare at agriculture and wastewater treatment facilities; • SF_6 leak reductions from transformers; and • Catalytic or thermal destruction of N_20	• Measurement and verification (M&V) is understood and highly accurate	• Ensuring additionality	• Positive list/ two-step approval process to determine eligibility; • Prescribed M&V protocol
• Afforestation/reforestation • Transportation-related projects (telecommuting initiatives, fleet efficiency improvements, mass transit improvements); • Home and building insulation improvements; • Natural gas and oil fired furnaces; and • Water heater efficiency improvements	• Imperfect measurement and verification accuracy but uncertainties are reasonably well understood	• Ensuring additionality and controlling for over-crediting (due to inaccuracies and uncertainties related to measurement)	• Two-step approval process; • Deemed savings based upon control group sampling and or statistical software with appropriate discounting for uncertainty
• Soil carbon sequestration; • Gas pipeline leak detection and repair (low pressure); and • Process venting reductions/fugitives	• Significant quantification uncertainties inherent to activities	• Ensuring additionality and controlling for over crediting	• Two-step approval process; • M&V requirements/ crediting levels for activity; • Use of conservative discount factors to reduce over-crediting risk
• Soil carbon sequestration and afforestation/reforestation	• Permanence	• Previously stored (and credited) carbon is released to atmosphere	• Set aside

In order to incorporate the largest number of activities that create offsets in a program and effectively mitigate environmental and investor risks, we would recommend that these options be considered together. This approach could be compatible with a tiered approach, as discussed in Section V.3.

1. Two-step approval process

A two-step approval process can be utilized to address project eligibility risk and reduce offset quantity risk in all types of offset activities. It can be used for offset activities where M&V is well understood (e.g. landfill gas capture). It also can be used in conjunction with discounting to address quantification risks for offset activities in which M&V is imperfect (e.g. transportation-related projects), and for activities in which there are significant quantification uncertainties (e.g. soil carbon sequestration). The first step in a two-step approval process is a determination of whether a project activity is eligible to create offsets and how they would be quantified. Projects activities that pass the first step (i.e. that are pre-qualified because they demonstrate that they: 1) are additional; 2) are not required by federal, state or local regulation or condition of permit; and, 3) are under the ownership or control of the applicant), and which are subsequently implemented, then proceed to the second step. In the second step of the process, the project is reviewed to determine if it was undertaken, and if the emission reductions were measured, as required. Offsets are then awarded consistent with the findings of the review.

Such a process avoids a worst-case scenario for an investor of building a project only to discover that it will not receive any offsets because it was ruled ineligible. This problem limited the effectiveness of New Jersey's Open Market Emission Trading (OMET) program, as noted above. A two-step process is designed to enable project proponents to know that a project activity is eligible, and how the amount of credits will be determined, in advance of project implementation. This allows them to manage risk more efficiently, and resolves uncertainties that create difficulties in securing project financing.

The Clean Development Mechanism provides an example of a two-step approval process. Before investing in a project and generating emission reductions, project developers can prepare a project design document (PDD) which describes the emission reduction activity, the baseline and approach for measuring reductions, and a monitoring plan. Once the PDD is prepared, project developers can seek to have the project registered at the UN (i.e. Step 1), at which point it has official standing as a project eligible to generate CERs. Once the project is registered and the developer is assured the project is eligible to generate CERs, the developer can invest in the project without project eligibility risk.[2] The CDM process is extremely cumbersome and securing registration can take a year or longer, which severely limits participation in the program. A two-step process that

[2] To simplify, the rest of the CDM process involves undertaking the project, monitoring and measuring emission reductions as per the PDD, and submitting a verification report for review. If the report is approved, CERs are issued by the CDM Executive Board (i.e. Step 2).

facilitates investment should be designed to review project applications more expeditiously – especially for offset types with minimal risks.

2. Positive lists and the deemed value approaches

Positive lists provide one method of addressing project eligibility risk, while a deemed value approach goes further and also eliminates offset quantity risk. A discussion of these approaches follows.

A positive list would identify activities that are "additional" and eligible to create offsets. Establishing a list eliminates the risk that a developer will choose a reduction activity that ultimately is ruled ineligible to create offsets. However, a positive list that does not include approved M&V protocols still leaves developers vulnerable to the risk that their M&V plan will not be accepted, and that offsets will not be issued until an acceptable plan is submitted.

A positive list could be incorporated in an offset program as a "tier" of project types that are easiest to quantify, and that generally do not represent BAU activities. For example, Tier 1 could be comprised of projects that are well-known, are generally "additional", and have generally accepted M&V plans. The RGGI program, for example, includes a list of acceptable reduction activities. These activities include, among others, landfill methane utilization, reduction of SF_6 emissions from transformers, and projects to utilize methane from animal waste. The program could also provide regulators with the authority to add project categories to Tier 1 as activities/measurement protocols mature.

A positive list can be used to reduce offset quantity risk and uncertainty if it includes not only acceptable activities but also acceptable M&V protocols. This approach provides investors with certainty that if they undertake a project and use accepted protocols, they will receive offset credits in an amount that can be estimated in advance based on the protocols.

In addition, a positive list can incorporate a "deemed savings" approach for a list or sub-list of activities for which measurement and quantification of emission reductions is known with certainty. For these activities, the list stipulates, *ex ante*, a fixed crediting value per unit of activity and a fixed period. For example, it could be stipulated that installing a specific type and number of light bulbs will result in 1 offset. This approach provides investors with up-front certainty regarding offset eligibility, and the quantity and the duration of the offset stream associated with a defined list of activities. It also reduces the cost of measurement. Up-front certainty regarding offset eligibility, quantity and duration minimizes offset quantity risk and further facilitates investment.

3. Risk-based discounting

Risk-based discounting can be used to reduce offset quantity risk, and to address uncertainties in quantifying offsets from technologies or activities that have clear emission reduction benefits but for which emission reductions cannot be quantified at a level of precision that some believe is necessary to maintain environmental integrity. It can be used to address quantification risks for offset activities in which M&V is imperfect (e.g. transportation-related projects), and for activities in which there are significant quantification uncertainties (e.g. soil carbon sequestration).[3] The goal of such an approach is to encourage investment in technologies or activities that are in their nascent stages and/or difficult to measure but are likely to provide benefits. The level of discount would be commensurate with the level of uncertainty in quantifying the reductions, and the associated level of risk.

Under a risk-based discounting approach, a discount factor would be applied to best estimates of offsets that could be created by a project activity or technology. It would apply to a category of activities, and would not have to be developed on a case-by-case basis for each project. The factor could be based upon statistical measures of estimated or historic performance, and would provide a margin of safety to ensure that activities for which reductions are difficult to quantify are not over-credited. It could be reduced over time as methods for measuring reductions from such projects improve and experience accumulates. As this occurs, the risk of over-crediting declines. Such an approach could enable emerging technologies to be included in an offset system. As new technologies are utilized in such projects, they could be discounted while measurement protocols mature. Presumably, the discount favors the environment while also creating an incentive for project developers to improve their protocols.

A risk discounting approach can also be incorporated into a “tiered” offset system. As discussed above, Tier 1 would be comprised of activities that are easiest to quantify and that do not represent BAU activities. Tier 2 offsets could consist of project types that are less easy to quantify than those in Tier 1, and could be “discounted” to address uncertainties in measurement methods or baselines.

Two examples of activities that could benefit from a risk-based discount approach include transportation and agriculture. For example, the creation of a bus lane can reduce idling time and associated emissions by allowing buses to pass through traffic unimpeded.[4] This activity will reduce emissions but quantification is difficult because it would be costly and impractical to measure the reductions directly and precisely. Similarly, offsets created by agricultural soil sequestration projects are difficult and expensive to measure with certainty. Both of these activities lend themselves to a discount approach. This would ensure that such activities are not

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[3] As discussed in sub-section 4 below, it can also be used in conjunction with an insurance pool to address impermanence issues.
[4] A CDM methodology has been created for this type of emission reduction activity.

over-credited and could reduce offset quantity risk for investors, encouraging investment in these desirable activities.

a) Discounting levels, and adjustments over time

In establishing discounting levels, a balance needs to be achieved between setting a sufficiently conservative margin of safety to guard against over-crediting, while ensuring that that margin is not so conservative that it imposes costs that are greater than those associated with actual measurement techniques, or creates other disincentives to invest.

Excessively conservative discounting levels can be found in some CDM project methodologies. For example, the CDM consolidated baseline methodology for landfill gas project activities stipulates that for open flares, if the efficiency of the flare is not measured, a conservative destruction efficiency factor of 50% should be used.[5] In practice, it is nearly impossible that an open flare would have an efficiency factor of 50%. This excessively conservative factor may have the effect of forcing project developers to absorb the cost of measuring flare efficiency, with negligible gain in terms of additional environmental certainty. As experience grows with the number of projects, and measurement of emission reductions improves, discount rates can be adjusted to reflect increased understanding and reduced uncertainty.

4. Set-aside for addressing "high-risk" offset categories

The previous policy options address project eligibility risk and challenges relating to quantification of offsets. In order to address offset impermanence risk (i.e. the risk of unexpected loss from project failure – which is distinct from the risk of over-crediting), different approaches may be required. Offset impermanence risk applies to soil carbon sequestration and afforestation/reforestation, which have the potential to create significant volumes of low-cost offsets.

One potential mechanism for addressing impermanence would be to set-aside a portion of the overall cap (e.g. 10 million tons (Mt)). Reductions created by sequestration projects would secure allowances from the set-aside. This approach would completely eliminate environmental risk, because even if all projects failed, allowances granted to sequestration activities come from within the program's fixed emissions budget. Conversely, successful projects would achieve emission reductions over and above those expected to be achieved by the cap.

[5] CDM Executive Board, Revision to the approved consolidated baseline methodology ACM0001, July 28, 2006.