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The EPRI Greenhouse Gas Emissions Offset Policy Dialogue

Description of Key Issues in the Design of GHG Emissions Offset Programs

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Technical Update, December 2008

EPRI Project Manager

A. Diamant

ELECTRIC POWER RESEARCH INSTITUTE
3420 Hillview Avenue, Palo Alto, California 94304-1338 ▪ PO Box 10412, Palo Alto, California 94303-0813 ▪ USA
800.313.3774 ▪ 650.855.2121 ▪ askepri@epri.com ▪ www.epri.com

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Natsource LLC
1730 Rhode Island Avenue N.W.
Suite 1015
Washington, DC 20036

Principal Investigators
R. Youngman
R. Rosenzweig

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PRODUCT DESCRIPTION

In 2008, EPRI launched the EPRI Greenhouse Gas (GHG) Emissions Offset Policy Dialogue project. The goals of this project are to inform key constituencies involved in the development of U.S. climate mitigation strategies and policies about GHG emissions offset-related policies and design issues, and to provide a forum in which representatives of key sectors of the U.S. economy and communities involved in the ongoing development and debate on climate change policies can discuss these issues.

This Technical Update summarizes work conducted by EPRI in 2008 on this project and remaining work to be completed in 2009. EPRI anticipates publishing a final project report in 2009 that identifies, describes and assesses key elements of GHG emissions offset programs and their potential impacts on stimulating investments in offset projects while maintaining the environmental integrity of GHG cap-and-trade systems.

Results and Findings

This report provides a summary and compilation of work undertaken by EPRI in 2008 on this project. It incorporates background materials developed by EPRI and Natsource Advisory and Research for three related workshops held in 2008. This report also includes a summary of the discussions that took place at each of these EPRI-sponsored events.

Challenges and Objectives

This EPRI Technical Update provides senior managers and environmental staff of U.S. electric companies and others with a comprehensive understanding of the potentially important role that GHG emissions offsets ("offsets") may play in reducing the costs of complying with requirements to reduce GHG emissions that contribute to global climate change.

The key goals of the EPRI GHG Emissions Offset Policy Dialogue include:

1. ***Informing key constituencies*** – including the policy-making, environmental, industrial, financial and research communities – regarding the performance of existing offset programs;
2. ***Providing a forum*** in which representatives from the communities identified above can discuss important design elements that may be incorporated in possible future offset policies;
3. ***Building a common understanding*** of how key design elements will affect whether an offset system is likely to achieve environmental integrity while simultaneously facilitating investment in activities that create large-scale GHG emissions reductions; and,
4. ***Discussing potential mechanisms*** that may help to reduce various risks that have made it difficult to mobilize capital to develop offset projects.

Applications, Values, and Use

While debate continues regionally, nationally and internationally about how to respond to global climate change, it is becoming increasingly clear that U.S. electric companies may face future requirements to substantially reduce and/or offset their GHG emissions.

The extent to which domestic and international offsets may be used to comply with emission reduction requirements that may be incorporated in evolving GHG cap-and-trade programs has become increasingly controversial in the U.S. as policy makers seek to design climate change policies.

In addition to the potential economic benefits that GHG offsets may offer, well designed offset programs also may provide additional benefits including: (1) stimulating innovation and emission reductions in economic sectors not subject to emission reduction requirements in cap and trade programs; (2) enabling development and deployment of technologies in the U.S. that will be critical to achieving long-term climate policy objectives; (3) rewarding innovative entrepreneurs who develop effective approaches to reduce GHG emissions; and, (4) spurring diffusion of new technologies around the world.

This report provides a comprehensive overview of existing GHG offset systems, key design elements, and their performance. It also explores design alternatives being considered for offset programs that may be incorporated in climate change policies under development.

Finally, this report describes alternative approaches that potentially can be developed to enable offset programs to achieve environmental and economic objectives.

EPRI Perspective

EPRI member companies have a significant interest in the potential role GHG emissions offsets may play in climate change policy. Over the past decade EPRI members have supported fundamental research and development activities related to evaluating and implementing GHG offsets such as forest carbon sequestration and nitrous-oxide (N_2O) emissions reductions associated with altered crop production practices in agriculture.

As climate policy continues to evolve at the state, regional, and federal levels in the U.S., electric companies will need to play a key part in helping to define evolving offset policies, and the role that offsets will play in climate policy.

This report is designed to provide EPRI members and others with a comprehensive understanding of the key design issues that must be addressed in developing a robust offset program as part of more comprehensive efforts to reduce U.S. GHG emissions. We are hopeful that this improved understanding will lead to more thoughtful and productive public policy deliberations regarding these important issues.

Approach

This EPRI project has used a “lessons-learned” approach to identify, describe, and assess the impacts of design elements incorporated in existing and proposed offset systems, and which significantly impact their ability to achieve environmental and economic objectives.

To achieve the project’s goals and explore the myriad of design issues related to the development of offset programs, EPRI hosted a series of three interactive offset workshops in 2008. Participants in these workshops included staff of EPRI member electric companies as well as a wide range of individuals that represent other economic sectors and organizations involved in the development and implementation of offsets and offset policy.

Keywords

GHG offsets
Project-based mechanism
Carbon market
GHG credits
GHG allowances
Climate change

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Also we want to thank the staff of Natsource Advisory and Research for their excellent work in assisting EPRI with developing and implementing the EPRI Greenhouse Gas Emissions Offset Policy Dialogue. This project has been very helpful to EPRI member electric companies and the other organizations who have participated in it, and the project has the potential to impact dramatically the design and implementation of evolving federal and regional GHG mitigation policies and offset programs.

In particular, EPRI would like to thank Richard Rosenzweig, Dirk Forrister and Tom Lawler for their assistance organizing and facilitating each of the three offset dialogue workshops held in 2008, and for their help arranging for the participation of the many expert speakers and individuals who have contributed to making this offset policy dialogue a successful endeavor.

Also, we want to thank Rob Youngman for his tireless efforts preparing the key background materials developed for each of the dialogue workshops as well as this project report.

Finally, we would like to thank Tamara Clark of EPRI and Lynda Lake for their invaluable assistance in planning the logistics for these EPRI workshops.

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1
PROJECT BACKGROUND / OVERVIEW

While debate continues at the regional, national and international levels regarding appropriate responses to global climate change, it is becoming increasingly clear that U.S. electric companies may be required to reduce their GHG emissions in future efforts to address climate change.

The extent to which domestic and international offsets may be authorized for use in complying with emission reduction requirements incorporated in climate change policies has become controversial as policy-makers attempt to develop these policies.

In 2008, the Electric Power Research Institute (EPRI) launched the EPRI Greenhouse Gas Emissions Offset Policy Dialogue project. The goals of this project are to inform key constituencies regarding the performance of existing offset programs; to provide a forum to discuss important offset policy design elements; to build a common understanding of the impacts of key design elements on program performance; and, to discuss potential mechanisms to reduce various risks that deter investment in offset projects. EPRI engaged Natsource Advisory and Research Services to assist with implementation of this project.

The project made substantial progress during 2008. This report is an interim project product that summarizes work conducted in 2008 and describes remaining work to be completed in 2009. During 2009, EPRI envisions holding several additional workshops on offset-related issues and publishing a final project report that identifies, describes and assesses key elements of GHG emissions offset programs and their potential impacts on stimulating investments in offset projects while maintaining the environmental integrity of GHG cap-and-trade systems.

This report provides a summary and compilation of work undertaken by EPRI in 2008 on this project and includes substantial information related to:

1. The design of existing GHG emissions offset systems, key design elements and their performance;
2. The design of GHG offsets programs currently under development and their key design elements that may be incorporated into evolving climate change policies; and,
3. Alternative approaches to address key issues that must be resolved so offset programs may achieve environmental and economic objectives.

Background on Offsets

Emission reduction projects (often called "offset" projects) reduce GHG emissions and create "credits" that regulated parties required to limit their emissions potentially can use to comply with GHG emissions targets.[1] GHG emissions offsets are emission reductions created by projects

[1] For additional information about existing GHG offsets programs and the role that GHG offsets may play in GHG cap-and-trade regulatory programs, please refer to "*A Comprehensive Overview of Project-Based Mechanisms to Offset Greenhouse Gas Emissions*, EPRI, Palo Alto, CA: 2007. 1014085.

and activities at emission sources, and in economic sectors, not covered by a GHG emissions trading program's fixed emissions cap. These sources and activities may be located either within or outside the geographic jurisdiction of the trading program. The quantities of emissions reductions, or offsets, that are attributable to a specific offset project or activity typically represents the difference between projected "business-as-usual" (BAU) emissions and actual or calculated emissions following implementation of the offset project.

The future role of offsets as an element in existing climate change policies and those under development is the subject of intense discussion now. A significant body of research has been developed that concludes the inclusion of GHG offsets into evolving GHG mitigation systems can reduce significantly the economic cost to regulated firms and society to comply with GHG emission limits. This also has been the practical experience of "regulated installations" that have been required to reduce their GHG emissions in the existing European Union Emissions Trading System (EU ETS).[2]

To date, those parties that support inclusion of offsets in climate change policies most often have focused on the economic benefits that offsets may yield. However, well designed offset programs also may provide additional benefits including:

1. Stimulating innovation and emission reductions in sectors not subject to emission reduction requirements in cap and trade programs;
2. Enabling development and deployment of technologies in the U.S. that will be critical to achieving long-term climate policy objectives;
3. Rewarding innovative entrepreneurs who develop effective approaches to reduce GHG emissions; and,
4. Spurring diffusion of new technologies around the world.

Although there has been support for including offset systems in climate change policies under development among some constituencies, there is a growing skepticism and a backlash forming against the potential use of GHG offsets in policies under development among others. Some parties involved in the debate on climate policy are skeptical of the ability of offsets to deliver real GHG emissions reductions and are also concerned about the ability to adequately measure, monitor and verify actual emission reductions. Some parties want to limit or exclude entirely the use of GHG offsets because they believe that access to offsets will reduce the incentive for regulated parties to reduce GHG emissions in their own operations. Others engaged in the debate, particularly those entities that are likely to be required to limit their GHG emissions, argue that an "open" and relatively unconstrained offset policy should be adopted that encourages widespread development and use of GHG offset project both domestically and internationally.

There is a concern among EPRI members and others that restrictions imposed on the use of offsets for compliance with emissions targets incorporated into evolving GHG emissions cap-and -trade programs significantly will reduce the benefits offsets can provide, increase the cost to

[2] To learn more about the EU ETS, please refer to *The EU Emissions Trading Scheme: Key Issues and Future Outlook*. EPRI, Palo Alto, CA:, 2004.1009924

comply with emissions targets, and imperil future implementation of market-based climate mitigation policies.

Goals of the Project

The key goals of the EPRI GHG Emissions Offset Policy Dialogue include:

1. ***Informing key constituencies*** – including the policy-making, environmental, industrial, financial and research communities – regarding the performance of existing offset programs;
2. ***Providing a forum*** in which representatives from the communities identified above can discuss important design elements that may be incorporated in possible future offset policies;
3. ***Building a common understanding*** of how key design elements will affect whether an offset system is likely to achieve environmental integrity while simultaneously facilitating investment in activities that create large-scale GHG emissions reductions; and,
4. ***Discussing potential mechanisms*** that may help to reduce various risks that have made it difficult to mobilize capital to develop offset projects.

The project has used a "lessons-learned" approach to identify and describe design elements incorporated in offset systems that impact their ability to achieve environmental and economic objectives

To achieve these goals, EPRI hosted a series of three interactive workshops on offsets in 2008.[3] These workshops have been attended by staff and executives of EPRI member companies as well as a wide range of individuals that represent other economic sectors and organizations including:

- Entities involved directly in the design of U.S. domestic offset policies (i.e., representatives of state Governments, the U.S. Environmental Protection Agency (EPA), the U.S. Department of Agriculture (USDA), the U.S. Treasury and Congressional staff);
- Entities involved in financing implementation of offset projects (i.e., representatives of major financial institutions);
- Organizations that develop offset projects (so-called offset "project developers");
- Entities interested in using offsets for compliance purposes or in purchasing offsets to facilitate compliance (i.e., representatives from the U.S. electric sector, other industrial sectors, such as oil and gas and the financial sector);
- Organizations directly involved in research and advocacy related to offsets and climate change policy (i.e., representatives from a wide range of non-governmental organizations (NGOs), research institutes and universities).

A complete list of individuals and organizations that have participated in one or more of the 2008 EPRI offsets workshops is shown in Appendix A.

These workshops have focused on how existing offset programs such as the Kyoto Protocol's Clean Development Mechanism (CDM) and others have functioned to date. Through these workshops EPRI has attempted to provide workshop participants with a common understanding

[3] These EPRI workshops were held in Washington DC on June 26, September 10 and November 20, 2008.

of the benefits and risks associated with project-based offsets. In addition, project participants have discussed the potential of other offset mechanisms now under development, including those at the state, regional and federal levels in the U.S.[4] and offset designs included in various legislative bills introduced in the U.S. Congress, and the key design elements required to achieve environmental and economic benefits.

The dialogues held at each of the workshops have been informed by background papers prepared by EPRI and Natsource, and this report incorporates much of the background material developed for the workshops.

Overview of Workshops

The first workshop took place on June 25-26, 2008. Its purpose was to provide workshop participants with a common understanding of provisions incorporated in existing offset systems and those being considered as part of GHG cap-and-trade regulatory systems under development. The first workshop focused on the following topics:

- A description of offsets and the benefits and risks that are associated with emission reduction projects;
- Electric sector options to reduce GHG emissions, potential abatement costs, and potential offset supply in the U.S.;
- The perspective of a large U.S. electric company regarding how offsets may fit into their future GHG compliance strategy;
- A review of the experience to date of the Kyoto Protocol's CDM program; and,
- A description of some of the provisions being incorporated into other offset systems now under development and a discussion of their potential to achieve environmental and economic objectives.

The second workshop took place on September 10, 2008. This workshop addressed the following topics:

- How the CDM determines additionality;
- Other approaches to additionality, including the use of standardized approaches;
- Implementing RGGI's "positive list" for determining additionality and project approvals;
- The perspective of an offset project developer on the positive list approach; and
- Potential impacts of quantitative and qualitative limits on offsets use on compliance costs and technology innovation.

The third workshop took place on November 20, 2008. This workshop addressed the following topics:

- Offset provisions in the House Energy and Commerce Committee draft proposed climate change legislation (i.e., the "Dingell-Boucher bill");

[4] These evolving offset programs include the Regional Greenhouse Gas Initiative (RGGI), the Western Climate Initiative (WCI) and others.

- Offset provisions included in the so-called "Lieberman-Warner bill" (i.e., S. 2191 and S. 3036);
- Offset provisions proposed by the Coalition for Emission Reduction Projects (CERP);
- Final recommendations for the development of an offset system as part of the Western Climate Initiative (WCI);
- Comparison of how existing and proposed offset programs address key issues, including eligible activities, additionality, and quantitative and qualitative limits on offset use; and
- Evaluation of the House Energy and Commerce, Lieberman-Warner and CERP offset proposals.

Agendas and presentations from these three EPRI offset workshops and the original background papers developed for each workshop can be found online at http://www.epri.com/globalclimate .

Next Steps and Project Completion

There is a strong interest in understanding key issues related to forestry and agricultural offset projects given the potential magnitude of supply they may create. These issues include "permanence" and "leakage." In response to this interest, the next (fourth) project workshop will address these and related topics. This workshop is planned to take place in February 2009.

In addition, EPRI is aware that a number of organizations including the U.S. EPA and others have been "road testing" various offset quantification methodologies and protocols to understand better how different methodologies and protocols may yield different quantities of offsets from the very same proposed offset project. At this time, EPRI is planning to hold a fifth workshop during the first half of 2009 to explore the results of the road testing analyses being conducted by EPA and other organizations.

In preparation for the fifth workshop, Natsource and EPRI anticipate developing a draft final project report that will draw on insights from all of the offsets workshops and from practical experiences as to how offset systems have worked in practice. This report will include a description and assessment of different offset policy design elements and whether they can be expected to achieve the environmental and economic goals of an offset program, and improve and stimulate large-scale investment in emission reducing activities. As part of the development of this final report, EPRI and Natsource anticipate soliciting and obtaining input and feedback from a select group of experts involved in the design, development and implementation of offset programs around the world.

The potential role of Reduced Emissions from Deforestation and Degradation (aka REDD) also has become a key issue in both the international and domestic debate about the appropriate role of GHG offsets in climate change mitigation policies. EPRI is considering including an in-depth discussion about REDD-related issues as part of one of the workshops to be held in 2009.

The EPRI GHG Offset Policy Dialogue will conclude with the completion of the final project report in 2009. The conclusions on offset policy design elements will be based on experience to date with offset systems, discussions held at the EPRI offsets workshops, the background papers on existing and proposed systems, and Natsource's own experience on how the design of offset

systems affects investment into emission reducing activities. The final project report is anticipated to be completed in June 2009.

Report Overview

This report incorporates three background papers developed by EPRI and Natsource to prepare participants for the three EPRI offset workshops held in 2008. The background papers are presented as separate chapters of this report, and have been edited to minimize redundancies and to incorporate a few corrections. At the end of each of these chapters there is a section summarizing the discussions and salient topics addressed at each of the workshop. The papers presented in the following three chapters include:

- Chapter 3 – "Overview of Greenhouse Gas Emissions Offset Policies and Provisions in U.S. Cap-and-Trade Programs and Proposals;"
- Chapter 4 – "Overview of Different Approaches for Demonstrating Additionality of Greenhouse Gas Offset Projects;" and
- Chapter 5 – "Comparison of Selected Proposals to Design a Greenhouse Gas Offset Program."

Chapter 6 provides some conclusions that may be drawn from the work of the project to date, including some thoughts on the potential convergence of opinion in a number of areas and on areas for further work and assessment.

Appendix A provides a list of workshop participants.

Appendix B, "Additional Details on the CDM's Approach to Additionality," is an appendix to the paper included in this report as Chapter 4.

Appendix C, "Review of Various Offset Policy Proposals and Provisions," is an appendix to the paper included in this report as Chapter 5.

Appendix D includes a selected glossary of carbon market and offset-related terms.

Appendix E provides references for the original source materials cited in the report.

2
OVERVIEW OF GHG EMISSIONS OFFSET POLICIES AND PROVISIONS IN EXISTING U.S. CAP-AND-TRADE PROGRAMS AND PROPOSALS

This paper was prepared for the first of the three workshops held in 2008 as part of the EPRI GHG Emissions Offset Policy Dialogue. The first workshop was held on June 25-26, 2008 in Washington DC.

Introduction

GHG emissions offsets ("offsets") are emission reductions created by projects and activities at emission sources, and in economic sectors, not covered by a GHG emissions trading program's fixed cap. These sources and activities may be located either within or outside the geographic jurisdiction of the trading program. The amount of reductions attributable to a specific offset project or activity typically represents the difference between "business-as-usual" (BAU) emissions and actual or calculated emissions following implementation of the offset project.

GHG emissions offset markets enable emission sources required to reduce their emissions by legislation or regulation to access and substitute lower cost emissions reductions from a broad array of sources, sectors and geographies not covered by the program. As such, offsets can effectively add to the supply of emissions reductions available in the market, thereby potentially reducing emission allowance prices.

Existing experience with offset programs and a wide body of research suggest that access to offsets can reduce regulated firms' costs to comply with GHG emissions targets. In addition, offsets can help society achieve emissions reduction targets more cost-effectively than otherwise would be the case. In addition, a well-crafted offsets program can stimulate development and deployment of low and non-emitting technologies.

Offsets can be created from domestic or international projects and activities. In the international context, regulatory approvals for the creation of GHG offsets currently are carried out under the Kyoto Protocol's *Clean Development Mechanism* ("CDM") and the *Joint Implementation* ("JI") provisions of the Kyoto Protocol. With limited exceptions, offsets created by CDM and JI projects are valid for compliance with emissions targets in Europe, Japan, and Canada. They may also be valid for use under evolving Australian and New Zealand CO_2 trading programs. Offsets created by CDM projects are called *Certified Emission Reductions* ("CERs") and those created by JI projects are called *Emission Reduction Units* ("ERUs").

Elements of GHG Emissions Offsets Programs

In the U.S., state and regional GHG trading programs and proposals provide authority for offsets to be created at the state level. In particular, the Regional Greenhouse Gas Initiative ("RGGI") –

comprised of ten Northeastern and Mid-Atlantic States[5] – allows for offsets to be used for compliance up to a quantitative limit. In addition, the Western Climate Initiative ("WCI") – currently comprised of seven Western states and three Canadian Provinces – currently is in the process of developing its offset program. At the federal level, a minimum of 12 pieces of legislation which would establish a national GHG cap-and-trade program were introduced in the 110th Congress. The majority of these legislative proposals include offset provisions.

There are many types of provisions that are common to most or all offset programs and proposals. A brief list of key provisions is provided below:

Regulatory authority. All programs propose to provide authority to one or more federal agencies to regulate the offset system. Some of the proposed bills direct the EPA Administrator or the Secretary of Agriculture to establish standards and rules to govern creation and use of offsets. Others propose to delegate this authority to the President.

Eligible activities. Offset provisions incorporated into GHG mitigation programs and proposals typically identify categories of activities that are eligible to create offsets and the rules that must be followed to do so. These eligible activities vary between proposals.

Some proposals have included methane (CH_4) capture and destruction, while others authorize offsets to be created from geological and agricultural sequestration activities, among others. The initial list of eligible categories sometimes is referred to as a "positive list." It is often specified that the EPA Administrator would consider including other types of activities in the positive list on a case-by-case basis and then add them to the list as appropriate.

[5] The RGGI states include: Connecticut, Delaware, Massachusetts, Maine, Maryland, New Hampshire, New Jersey, New York, Rhode Island, and Vermont. Pennsylvania participates as an "observer."

For example, the list of activities specified by the RGGI program as potentially eligible offset categories is an example of the use of such a positive list. This list provides offset project developers with some confidence that the specified project activities will be eligible to create offsets. However, positive lists may be able to provide even greater specificity, and further reduce investor risks by including one or more of the following elements:

1. Eligible baseline, monitoring, and verification methodologies for the list of eligible offset categories;
2. Provisions specifying that pre-defined categories of well-understood, well-tested offset activities qualify for streamlined consideration in the regulatory review and approval process (e.g., the Bingaman-Specter bill adopts this approach as described below); and/or
3. Provisions calling for a standards-based approach to be used to set project baselines and provide the basis for crediting (a WCI working group made a similar preliminary recommendation as described below). This approach stands in contrast to the "traditional" project-by-project approach to offset project approvals that has been the method employed to date in the CDM.

Quantitative limitations on offsets use. Offset systems often establish qualitative and/or quantitative limitations on offsets that regulated entities can use for compliance with GHG emissions targets. In some cases, program rules impose quantitative limits on the use of offsets for compliance. Typically, these limits have been expressed in terms of a percentage of the total annual allocation – or equivalently – a percentage of each year's compliance obligation.

Policy-makers often include such limits out of concern that firms subject to an emissions target will buy offsets to achieve compliance and not take internal actions to reduce their emissions. Recent analysis suggests that such provisions increase compliance costs for firms regulated under a GHG cap-and-trade program by reducing the range of cost-effective emission reductions that can be used for compliance. EPA's analysis of the Lieberman-Warner cap-and-trade proposal concluded that quantitative limits on offset use have a larger impact on allowance prices than assumptions regarding the availability of key technologies such as carbon capture and storage and nuclear power.[6]

Qualitative limitations on offset use. Offset programs also may impose qualitative limits on the activities that can create offsets. For example, qualitative limits may exclude offsets created in certain geographic regions from being used for compliance. An example of such a limit is a prohibition on the use of international offsets.

Other such limits have been discussed to deal with concerns regarding the "permanence" of certain types of activities and difficulties in measuring the volume of offsets potentially created by other types. For example, the European Union's CO_2 Emissions Trading Scheme (EU-ETS) prohibits the use of offsets created by forest carbon sequestration projects, nuclear power and "large" hydropower production.

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[6] See "EPA Analysis of the Lieberman-Warner Climate Security Act of 2008, S. 2191 in 110th Congress," March 14, 2008, United States Environmental Protection Agency, Office of Atmospheric Programs, Washington DC, March 14, 2008.

Offset Elements Incorporated in Federal and Regional Initiatives

This section provides an overview of the offset provisions contained in the following federal and regional GHG cap-and-trade proposals and programs:

- S. 1766 – the "Low Carbon Economy Act of 2007" introduced by Senators Bingaman (D-NM) and Specter (R-PA); and,
- S. 2191 – "America's Climate Security Act of 2007" introduced by Senators Warner (R-VA) and Lieberman (I-CT), and which recently was debated on the Senate floor.
- Regional Greenhouse Gas Initiative (RGGI); and,
- Western Climate Initiative (WCI).[7]

S. 1766 – Low Carbon Economy Act of 2007 (Bingaman-Specter)

General overview of legislation

S. 1766 was introduced on July 11, 2007, and was referred to the Senate Environment and Public Works (EPW) Committee in August but was never brought to a full committee vote. The following discussion provides a general description of the legislative framework of the bill and a more specific discussion of its offsets provisions.

Coverage. The legislation provides coverage for approximately 86% of all U.S. GHG emissions from both upstream sources (petroleum, natural gas, and non-CO_2 GHGs) and downstream sources (facilities that use more than 5,000 tons of coal per year, including electric power generation plants).

Targets. Beginning in 2012, the emissions cap is set at approximately 8% above 2005 levels (6,652 million metric tons CO_2 ($MMtCO_2$)), declining 1% per year until reaching 2005 levels (6,188 $MMtCO_2$) by 2020, and 23% below 2005 levels (4,819 $MMtCO_2$) by 2030 and beyond.[8]

Cost containment. The bill imposes a price ceiling, or "safety valve," referred to as a Technology Accelerator Payment (TAP), When the annual average price of carbon surpasses $12 per ton CO_2 ($12/tCO_2), regulated parties would be allowed to pay a fee into a Climate Change Trust and Energy Technology Fund, which is structured to finance various advanced energy and low-carbon technologies.

Auction / allocation. The legislation initially allocates 76% of allowances (53% goes to covered sectors, and the remaining 23% is used for program cost compensation and incentives). It establishes an auction schedule under which 24% of allowances are auctioned in 2012, increasing to 32% by 2020 and 53% by 2030.

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[7] "Western Climate Initiative Draft Design Recommendations on Elements of the Cap-and-Trade Program," May 16, 2008.

[8] The President is provided authority to reduce the cap to 60% below 2005 levels contingent upon international participation, namely by China and India.

Offset provisions

Regulatory authority. S. 1766 directs the President to establish an offset program.

Eligible activities. Domestic offset credits may be generated from the following activities:

1. Streamlined procedures (for activities with broadly accepted standards and methodologies for quantifying and verifying reductions);
   - Landfill methane use;
   - Animal waste or municipal wastewater methane use;
   - Reduction of SF_6 emissions from electric transmissions and distribution transformers;
   - Coal mine methane use; and
   - Other categories specified by the President.

   It is worth noting that the four activity types cited above are similar to those included in RGGI's eligible activity list. This similarity suggests the emergence of some level of consensus on which types of offset activities are well-understood and have broadly accepted standards and methodologies.
2. Activities taking GHG precursors out of commerce in the U.S. (e.g., using natural gas as an input in chemical manufacturing instead of combusting it, exporting fuels instead of combusting them in the U.S., and exporting industrial gases with high global warming potential (GWP) instead of allowing them to be emitted in the U.S.).[9]
3. Geological sequestration (if the President determines that emissions would be stored for "an extended period of time.")
4. Projects offsetting other GHG emissions (including projects that reduce non-covered GHGs or sequester a GHG, provided that the projects are in compliance with monitoring and reporting provisions and effectively maintain the environmental integrity of the program.)
5. Discounted unclassified projects (other project types, such as agricultural/biological sequestration and other land-use activities, which may be subject to risk-based discounting).

Quantitative limits on offset use. Covered entities can satisfy an unlimited amount of each year's compliance obligation with domestic offsets created by approved projects. Up to 5% of annual allowance allocations can be set aside for agricultural sequestration. The President is authorized to allow up to 10% of a covered entity's annual compliance obligation to be met with international offset credits, contingent upon foreign program approval (see *Qualitative Limits of Offset Use* below).

Qualitative limits on offset use. The President is authorized to allow offsets to be created by GHG mitigation activities outside of the U.S. so long as the same rules and regulations that apply to domestic offsets are met. The President also may allow for the use of foreign offset credits from programs that are comparable to the U.S. program in terms of environmental integrity (e.g., CERs from CDM projects).

[9] Destruction of hydrofluorocarbons (HFCs) also would be allowed contingent upon approval by the President.

S. 2191 / S. 3036 – America's Climate Security Act of 2007 (Lieberman-Warner)

General overview of legislation

The Climate Security Act (S. 2191) initially was introduced on October 18, 2007. It was amended and reported out of the Senate EPW Committee on December 5, 2007 by a vote of 11-8. In May 2008, Chairwoman of the EPW Committee, Senator Barbara Boxer (D-CA), submitted a manager's amendment which revised a number of provisions in the bill. The manager's amendment that was considered on the Senate floor (S. 3036) and its offsets provisions are summarized below.

Coverage. The final version of S. 3036 provides coverage for approximately 87% of all U.S. GHG emissions from both upstream sources (petroleum, natural gas, and non-CO_2 GHGs) and downstream sources (coal facilities that use more than 5,000 tons of coal per year, including electric power plants).[10]

Targets. Beginning in 2012, the emissions cap is set at approximately 7% above 2005 levels (5,575 $MMtCO_2$). The cap decreases to 21% below 2005 levels (4,924 $MMtCO_2$) by 2020, 38% below 2005 levels (3,860 $MMtCO_2$) by 2030, and 72% below 2005 levels (1,732 $MMtCO_2$) in 2050 and beyond.

Cost containment. The bill proposes to create a Carbon Market Efficiency Board and implement annual "Cost-Containment Auctions." The Board is permitted to authorize several cost containment measures if it determines that average annual allowance prices exceed a price limit predetermined by the Board.[11] Cost-Containment Auctions would be held each year between 2012 and 2027. Emissions allowances purchased in the Cost-Containment Auctions would be taken from future compliance periods from 2030-2050. The initial price range for these auctions is between \$22-\$30/tCO_2.

Auction / allocation. The bill initially would allocate 75.5% of allowances (43% goes to covered sectors and the remaining 32.5% is used for program cost compensation and incentives). The auctioning percentage increases from 24.5% in 2012 to 35% in 2022 and eventually to 58.75% in 2032 and beyond. These "regular" auctions, which are separate and distinct from the Cost-Containment Auctions, incorporate a price floor of \$10/tCO_2 starting in 2012 increasing annually at a rate of 5% above inflation.

Offset provisions

Regulatory authority. The bill directs the EPA Administrator in conjunction with the Secretary of Agriculture to promulgate a number of standardized methods concerning offset eligibility, certification, monitoring, and enforcement regulations for domestic offsets.

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[10] S. 3036 covers facilities that produce or import more than 10,000 tCO_2e of GHGs and specifically singles out emissions of HFCs. Title X of the bill establishes a separate, additional allowance account and submission requirement for only HFC producers and importers.

[11] These cost containment measures include the following: i) increasing the limit on "borrowing" GHG allowances allocated in future years and using them for compliance in the current year; ii) expanding the period over which a firm may "repay" any allowances borrowed from future years' allocations; iii) increasing the limit on the use of international allowances for compliance (e.g. EU Allowances from the EU Emissions Trading Scheme); and iv) increasing the limit on the use of domestic offsets for compliance.

Eligible activities. S. 3036 indicates that EPA will consider making the following project activities eligible to create offsets:

1. Agricultural and rangeland sequestration and management, including:
   - Tillage practices;
   - Winter cover/continuous cropping to increase biomass for soil;
   - Cropland to grassland conversion;
   - Reduction of nitrogen fertilizer or increase in efficiency;
   - Reductions from frequency/duration of flooding rice paddies; and
   - Reductions from organic soils.

2. Land-use and forestry, including:
   - Afforestation or reforestation of acreage not forested as of Oct. 18, 2007; and
   - Increasing forest stand volume.

3. Manure management and disposal, including:
   - Waste aeration; and
   - Methane capture and combustion.

4. Terrestrial practices identified by EPA Administrator, including:
   - Capture and reduction of fugitive emissions from uncovered sources;
   - Methane capture and combustion from nonagricultural facilities; and
   - Other approved actions.

5. EPA may issue a list of technologies and associated performance benchmarks that can be considered *additional* in specific applications (valid for maximum of 5 years).

Importantly, the bill also would allow for consideration of other types of offset activities that are not linked to agricultural, forestry, or other land use-related projects, although no specific activities or methodologies are included.

Quantitative limits on offset use. The bill allows up to 15% of each annual emissions cap to be met using eligible domestic offsets. If the full 15% capacity is not used, the shortfall can be made up using international forestry credits or international allowances from a program with comparable stringency to the U.S. program. In addition to the 15% domestic offset limit, another 15% of each annual emissions cap can be met using international offset credits, 5% of which can be project-based credits and 10% can be international forestry credits. If these limits are not fully satisfied, international allowances from a comparable program can be used to meet the shortfall.

Qualitative limits on offset use. EPA must determine whether international project-based offsets meet requirements comparable to the U.S. program, and assure that offset credits do not come from projects that compete directly with a U.S. facility. With regard to international forestry credits, EPA, in conjunction with the Secretary of State, must establish a list of countries from which such credits may be generated.

Other provisions. The EPA Administrator may allow transfer of banked offset credits for compliance purposes provided they meet the standards of the following programs:

- Climate Registry;
- California Climate Action Registry;
- GHG Registry;
- Chicago Climate Exchange (CCX);
- GHG Clean Projects Registry;
- RGGI;[12] and,
- Other Federal, state or private reporting programs or registries approved by EPA.[13]

Regional Greenhouse Gas Initiative (RGGI)

Overview of program

On December 20, 2005, the governors of seven Northeastern and Mid-Atlantic states signed a memorandum of understanding (MOU) creating the Regional Greenhouse Gas Initiative (RGGI), which establishes a multi-state CO_2 emissions cap and trade program for electric power plants.[14] Three additional states have joined RGGI and nearly all participating states have passed, or are in the process of passing, legislation and regulations to implement the program.[15]

Coverage. The program covers emissions from power plants in RGGI states with a generating capacity greater than 25 megawatts (MW) and operating from January 1, 2005 onwards.

Targets. The CO_2 emissions cap for the 2009-2014 period is set at 188 million short tons annually, which is approximately 4% above these sources' annual average emissions in 2000-2004. Starting in 2015, the cap declines 2.5% per year to achieve a 10% reduction below the initial cap by 2019.

Cost containment. RGGI establishes price triggers that are activated by "stage-one" and "stage-two" trigger events. A stage-one trigger event occurs if the twelve-month rolling average CO_2 allowance price is equal to or greater than \$7/tCO_2 (in 2005 dollars). If this happens, regulated entities are permitted to expand their use of offsets (see the subsection *Quantitative Limits on Offset Use* in *Offset Provisions* below).

A stage-two trigger event occurs if the 12-month rolling average CO_2 allowance price is equal to or greater than \$10/tCO_2 (in 2005 dollars). If this happens: (i) the compliance period will be expanded from three years to four; (ii) regulated entities will be permitted to further expand their

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[12] S. 3036 provides that offsets registered under RGGI would be transferrable into the federal program "at an appropriate discount." No further details were included.

[13] This would likely include offsets registered in other emerging regional emissions markets such as the Western Climate Initiative (WCI).

[14] The governors of Connecticut, Delaware, Maine, New Hampshire, New Jersey, New York, and Vermont. Massachusetts established RGGI in 2005, Rhode Island and Maryland joined RGGI in 2007. The District of Columbia, Pennsylvania, the Eastern Canadian Provinces and New Brunswick participate as observers.

[15] Rhode Island, Massachusetts and Maryland joined RGGI in 2007. Connecticut, Maine, Maryland, Massachusetts, New Hampshire, New York, Rhode Island and Vermont have passed or are in the process of passing legislation implementing the RGGI as of the date of this writing.

use of offsets (see discussion below on *Quantitative Limits*); and (iii) regulated entities will be permitted to submit international offset credits from programs approved by the UN Framework Convention on Climate Change, including the CDM and JI programs (i.e., CERs and ERUs).

Auction / allocation. All RGGI states are required to auction at least 25% of their annual emission allowances. A number of RGGI states, however, have committed to auction 100% of their allowances. The first regional allowance auction took place on September 10, 2008.

Offset provisions

Regulatory authority. RGGI designates each state's respective regulatory agency (likely each state's environmental agency) to be responsible for evaluating offset monitoring and verification methodologies, and for awarding "offset allowances" to offset project sponsors.

Eligible activities. RGGI identifies the following five categories of potentially eligible offset activities:

1. Landfill methane capture and destruction;
2. Reduction in emissions of sulfur hexafluoride (SF_6);
3. Sequestration of carbon through afforestation;
4. End-use efficiency projects resulting in the reduction of CO_2 emissions from natural gas, propane and heating oil; and
5. Methane reduction from farming operations.

Quantitative limits. Initially, offset allowances can be used to meet up to 3.3% of a covered source's reported CO_2 emissions in a compliance period. However, the limit on offset use increases to 5% if the rolling average price of emission allowances reaches \$7/tCO_2, and increases to 10% if the rolling average price reaches \$10/tCO_2. In addition, if the \$10/tCO_2 rolling average price threshold is reached, European Union Allowances (EUAs) from the EU ETS and CERs and ERUs under the Kyoto Protocol also can be used for compliance.

Qualitative limits. Eligible RGGI "offset allowances" can be generated from emission reduction projects initiated after December 20, 2005 anywhere in the U.S., provided that a formal MOU has been signed with the proper state authority in the state which the offset project is located.

Western Climate Initiative (WCI)

Overview of program

The WCI was launched on February 26, 2007 by the governors of Arizona, California, New Mexico, Oregon and Washington. Since its inception, Utah, Montana and the Canadian provinces of British Columbia, Manitoba, and Quebec also have signed onto the agreement.[16] The WCI program currently is under development. A number of options have been identified and recommendations made regarding the structure of the program and an offsets system.

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[16] According to the WCI website (http://www.westernclimateinitiative.org/), Alaska, Chihuahua, Coahuila, Colorado, Kansas, Nevada, Nuevo Leon, Ontario, Quebec, Saskatchewan, Sonora, Tamaulipas and Wyoming participate as observers.

Coverage. The WCI's Scope Working Subcommittee and the Electricity Working Subcommittee both have recommended regulating emissions from industrial and commercial sources, transportation fuels, residential and commercial fuel combustion, electricity generators and "first jurisdictional deliverers" of electricity.

Targets. WCI's emission target is 15 percent below 2005 levels by 2020. This regional goal was calculated by aggregating each WCI participant's differentiated GHG reduction target into a regional target. To achieve this target, WCI signatories agreed to design a regional market-based, multi-sector mechanism by no later than August 26, 2008. To expedite this process, the WCI formed five Working Subcommittees to facilitate the development of key design elements of the program.[17]

Cost containment. The WCI has received comments on a number of cost containment options it developed that will be given further consideration as the WCI further develops its market design. These options include:

- Developing an independent Market Oversight Committee to guard against market manipulation;
- Establishing a price "safety valve;"
- Incorporating a price ceiling for a defined period; and/or,
- Allowing only GHG emitters to participate in allowance auctions.

Auction / allocation. WCI's Allocation Working Subcommittee has recommended that allowance budgets be established for each WCI Partner and that they be allocated individually by each Partner rather than issued by a centralized regional organization. The Subcommittee also recommends that each Partner auction a minimum of between 25%-75% of its allowance budget through a coordinated regional auction process.

Offset provisions

Regulatory authority. WCI's Offset Working Subcommittee proposed that WCI consider establishing a regional organization to coordinate review and adoption of offset protocols, coordinate review and issuance of offsets, and provide criteria for accrediting validation and verification service providers. It acknowledged that each jurisdiction may need to retain regulatory authority to develop and approve offset protocols, project approval, and offset issuance and enforcement.

Eligible activities. The WCI proposes to develop an initial set of eligible project types (i.e., a "positive list") and approved offset protocols prior to the program's launch. The Subcommittee also recommended allowing qualifying offset projects to be developed throughout the U.S., Canada, and Mexico and to allow regulated entities to use tradable units (allowances and offsets) from other government-regulated GHG trading programs (e.g., RGGI, EU ETS). It also recommended using offset protocols that are "standardized to the extent possible."

[17] The five Working Subcommittees include Allocations, Draft Reporting, Electricity, Offsets, and Scope.

Quantitative limits on offset use. The WCI initially proposed that the amount of offsets a covered entity could use to meet its annual compliance obligation should be limited, but no limit initially was proposed.[18]

Qualitative limits on offset use. The Subcommittee also proposed that WCI consider developing a method to give priority in some way to offset projects developed within the WCI jurisdiction.

Table 2-1 summarizes key offset provisions contained in proposed federal climate legislation and evolving U.S. regional climate programs.

[18] In September 2008, the states participating in the WCI agreed to limit the use of all eligible offsets and allowances from other jurisdictions (e.g., EU allowances) to no more than 49% of the total emission reductions to be achieved between 2012-2020. This is discussed in more detail in Chapter 4.

Table 2-1
Offset Provisions in US Federal Legislation and Regional Programs

	S. 1766 Low Carbon Economy Act of 2007	S. 3036 America's Climate Security Act of 2007	RGGI Regional Greenhouse Gas Initiative	WCI Western Climate Initiative
Regulatory Authority	President	EPA Administrator / USDA Secretary	Each participating state's environmental agency	Considering a regional authority or individual state agencies
Eligible Activities	1. Landfill methane use	1. Methane capture and combustion from terrestrial activities at non-agricultural facilities	1. Landfill methane capture and combustion	1. Offset Subcommittee recommended establishing a "positive list" of eligible project types
	2. Animal waste / wastewater methane use	2. Manure management and disposal – waste aeration and methane capture and combustion	2. Methane reduction from farming	2. Recommended allowing projects from US, Canada, Mexico
	3. Reductions in SF_6 emissions	3. Agricultural / rangeland sequestration and management	3. Reductions in SF_6 emissions	3. Recommended that WCI consider allowing allowances / offsets from other government-regulated programs (e.g. RGGI, EU ETS)
	4.Coal mine methane use	4. Land-use and forestry	4. Sequestration through afforestation	
	5. Removal of GHG precursors	5. Reductions from other non-covered sources	5. End-use efficiency projects that reduce CO_2 emissions from natural gas, propane and heating oil	
	6. Geological sequestration	6. Other activities identified by EPA		
	7. Reductions from other non-covered sources			
	8. Other activities approved by President and subject to discounting			

	S. 1766 Low Carbon Economy Act of 2007	S. 3036 America's Climate Security Act of 2007	RGGI Regional Greenhouse Gas Initiative	WCI Western Climate Initiative
Quantitative Limits	Domestic offsets: Unlimited; in addition, 5% of total allowance allocation is set aside for agricultural sequestration International offsets: President can authorize use of up to 10% of annual compliance obligation	Domestic offsets: Limited to 15% of annual emissions cap; international forestry credits / international allowances can be used to make up any shortfall International offsets: Limited to 15% of annual emissions cap (5% project-based international offsets, 10% international forestry credits); international allowances can be used to make up any shortfall	Domestic offsets: Limited to 3.3% of compliance obligation Stage-one trigger event ($7/tCO2): Limit increases to 5% Stage-two trigger event ($10/tCO2): Limit increases to 10%, and international allowances / credits also may be used for compliance within the 10% limit (i.e. EUAs, CERs, ERUs)	Recommendation made to limit the amount of offsets a covered entity can use, but no specifics were given on the percentage or origin of offsets allowed
Qualitative Limits	To qualify, international offsets must come from countries with rules / regulations comparable to those in U.S.	International project-based offsets must meet requirements comparable to those in US program, and cannot come from projects at facilities that directly compete with US facilities. International forestry credits must come from countries approved by EPA / Secretary of State	RGGI domestic offset allowances can be generated from projects initiated after December 20, 2005 anywhere in US so long as MOU signed with state where project is located	Considering option of developing a method that gives priority to offset projects located in WCI jurisdictions

Summary of Workshop 1

The first workshop of the EPRI Greenhouse Gas Offset Policy Dialogue was held on June 26, 2008. At the workshop, the wide-ranging discussions touched on many of the issues and challenges inherent to offset policy design, as summarized below.

Competing Challenges in Designing Additionality Provisions

Offset policy design, and additionality provisions in particular, involves competing challenges and tradeoffs. One participant succinctly described a tension that exists between:

1. The need to ensure the environmental integrity of offset projects that create offsets, which must be additional to business-as-usual activities so as to maintain the integrity of the emissions cap in a cap-and-trade program;
2. The difficulty of determining project additionality; and
3. The regulatory risks for investors and project developers that can be created by approaches for determining and demonstrating additionality.

This participant characterized the CDM's regulatory framework governing project approvals as being "out of phase" with the investment decisions that offset project developers must make. In particular, project eligibility is difficult to ascertain in advance (i.e. at the time of investment).

Impermanence

Topics relating to the issue of impermanence – e.g., the impermanence of emission reductions derived from forest carbon and agricultural soil sequestration projects – and challenges associated with accurately measuring carbon sequestration were among the topics most discussed at the workshop. Related questions and comments addressed the advantages and disadvantages of an allowance "set-aside" for terrestrial sequestration projects, and other potential approaches for addressing concerns relating to sequestration projects. In view of the complexity of and significant interest in these issues, as well as the importance of sequestration as a potentially large-scale, cost-effective abatement option, EPRI has decided to address these issues in detail at the fourth EPRI offset workshop to be held in February 2009.

Impacts of GHG Targets on the Electric Power Sector

Given that the electric power sector likely will bear much of the burden of GHG emission reduction requirements, there is significant concern that cost-effective compliance options may not be available. One participant communicated that in the near term, electric companies would need to redispatch from coal generation to existing natural gas generation to achieve GHG emission reduction targets, and that this could cost approximately $128/metric ton of carbon dioxide (tCO_2) given current fuel prices.[19] Given such potentially high internal emission abatement costs in the electric sector, it may be imperative for electric companies to have access to cost-effective offsets to contain the cost of compliance with GHG cap and trade programs.

[19] Based on $16/MWh variable costs for coal-based power generation and $80/MWh variable cost for natural gas-fired power generation, and an effective emission reduction of 0.5 tons CO_2 for every MWh of power generation redispatched from coal-fired generation to gas-fired generation.

According to this participant, the greatest value of offsets likely would be in the early years of the implementation of a mandatory GHG emissions reduction program when GHG abatement options are likely to be limited. He also pointed out the importance of establishing well-defined rules for creation and use of GHG offsets as early as possible.

Economic Modeling of Offsets

EPA's economic modeling of different cap-and-trade legislative proposals, including the Lieberman-Warner bill (S. 2191), suggests that a large share of U.S. domestic emission reductions can be achieved by afforestation, reforestation, and landfill gas offset projects. Internationally, EPA estimated that most abatement is likely to be achieved through forest management, afforestation, and agricultural soil sequestration projects, up to certain prices. In this context, it is worth noting that some of the categories accounting for the largest portion of offsets in EPA's economic analysis currently are not eligible to generate offsets under existing programs. However, the CDM and other offset programs could evolve over time to include these and related categories of offsets (e.g., avoided deforestation).

The EPA's modeling illustrates the cost-saving benefits associated with widespread access to offsets. Relative to S. 2191 as originally written (which would impose quantitative limits of 15% for domestic offsets and 15% for use of international offsets):

- Allowing unlimited domestic and international offsets would reduce the marginal cost of GHG abatement in 2030 by 71%;
- Allowing unlimited domestic and 15% international offsets would reduce costs by 26%;
- Allowing 15% domestic and no international offsets would increase costs by 34%; and;
- Prohibiting the use of domestic and international offsets for compliance could be expected to increase costs by 93% over the reference analysis case.

Congressional Staff Perspectives

One Congressional staff member involved in developing climate change legislation in the 110th Congress suggested that several committees likely will be involved in moving climate change related legislation in parallel in the next Congress. In the context of climate legislation, he pointed out that offsets policy is an important issue and likely will require its own consensus building process. The staff member also warned that international offsets are a "political orphan," particularly in the U.S. Senate. He cautioned that if industry wishes to have access to international and domestic offsets, it will need to advocate strongly for their inclusion in future climate legislation. He pointed out that this situation is particularly salient in light of recent news stories questioning the environmental integrity of certain CDM projects and offsets. According to participants in each of the three workshops, these negative news stories have resonated loudly with the public and members of Congress.

The Clean Development Mechanism

A number of speakers and workshop participants provided their views on the CDM and its approach to approving projects and determining additionality. In one presentation, a participant noted that a divergence of views with respect to additionality and project baselines is natural, given that assessing additionality requires the estimation of a counter-factual case – i.e., what would have happened in the absence of the project – which cannot be known with certainty. In

his view, a "top-down" approach to establishing additionality and baselines (e.g., using an emissions intensity benchmark) could help and is sometimes needed (e.g., for demand side energy efficiency projects and transportation sector projects).

Responding to criticism that has been levelled against the CDM, another presenter defended its performance in several areas. For example, he noted that significant CDM-related investment in China should be expected, as China accounts for 40% of the developing world's GHG emissions and it has established a stable regulatory environment for implementation of CDM projects. In addition, the carbon market was effective in identifying and incentivizing HFC-23 related emissions reductions in the absence of other policies to address HFC-23 emissions. Finally, he asserted that while a few examples of non-additional CDM projects could be found, in the aggregate, and on average, CDM projects are additional. In response to these and other comments, another participant cautioned that if offsets are unlimited and permanence and additionality are not managed, an offset program could end up causing an inadvertent increase in the overall GHG emissions cap.

One lesson learned from another participant's experience with CDM is that the Executive Board (EB) should (in his words) "pick an answer" (e.g., with respect to determining additionality and project-related baselines) and "stick with it." In the future, the CDM EB should accept input in its decision-making from all stakeholders, including offset project developers. Moreover, the rules that are in place when a project investment decision is made should apply for the life of the investment. This view was echoed by others in the workshop, as was the view that changes to regulations after they are in place can cause problems for project investors, project developers and others if these regulations are then applied *ex post* to offset projects.

Closing Remarks

In closing comments, three additional points were highlighted by the workshop participants:

- The challenge for developing and implementing a positive list approach is in determining how to add additional types of projects to the initial list in a manner that is not too burdensome;
- Some parties have concerns with both the quality of potential offsets and the potential for the widespread use of GHG offsets for compliance purposes to provide a powerful disincentive for regulated parties to deploy new emission-reducing technologies; and
- It will be important to redefine additionality in the process of developing GHG offset a policy.

3
OVERVIEW OF DIFFERENT APPROACHES FOR DEMONSTRATING ADDITIONALITY FOR GHG EMISSION OFFSET PROJECTS

Background

During the first EPRI GHG offsets workshop held in June 2008, the workshop participants expressed significant interest in the concept of "additionality" and different approaches that might be used to determine project-related additionality as part of existing and evolving GHG offset programs. Given this interest and the importance of determining project-related additionality for the implementation of any GHG offsets program, EPRI decided that the second offset workshop would focus on this and related issues.

The material presented below was prepared as background material for the second EPRI GHG offsets workshop held in Washington DC on September 10, 2008.

Introduction

A GHG emission reduction project designed to create offsets is considered to be "additional" if the reductions created by the project activity would not have occurred ***but for*** the implementation of the project and the incentives created by the offset program. This means that the project activity creating the offsets would not have been implemented under "business-as-usual" (BAU). It is generally agreed that GHG offsets should not be awarded to non-additional emission reduction projects because this would provide credit for emission reductions that otherwise would be expected to occur anyway under BAU. Providing "non-additional" projects with offsets would jeopardize the environmental integrity of the GHG emissions cap in a cap-and-trade program because doing so effectively would allow the emissions gap to increase.

The concept of additionality is easy to understand in theory, but difficult to apply in practice because there is no analytic way to *prove* additionality. A number of different "additionality tests" – i.e., tests designed to demonstrate that an offset project is additional – have been developed and used in existing programs or proposed for use in offset programs under development.

An offset program could utilize one test or a series of tests to make an additionality determination. The decision on which additionality test, or combination of additionality tests, to include in an offset program will have a significant impact on the nature and effectiveness of the offset program in addition to the supply and cost of offsets. More stringent additionality tests may be more effective in screening out non-additional projects, thereby helping to ensure the environmental integrity of the emissions cap. At the same time, they may also screen out projects that truly are additional, thereby restricting offset supply and increasing prices and compliance costs in a cap-and-trade program. Each additionality test has different strengths and

weaknesses. As discussed below, a variety of tradeoffs need to be considered in selecting the additionality test or tests to be incorporated in an offsets program.

While this chapter focuses on additionality tests, as did the majority of discussion at the second EPRI offset workshop, it is important to note the separate but closely related issue of baselines.

A project "baseline" consists of its GHG emissions that would be expected to occur in the BAU scenario and in the absence of the project activity. In general, the quantity of offsets awarded to a project is calculated as the difference between baseline emissions and emissions after implementation of the project. In practice, establishing a project baseline can be very challenging, as it requires a counter-factual determination of emissions in the absence of the project, which cannot be known with certainty. In addition, project baselines may change over the time the project is in operation, given that different variables impacting emissions in the "without-project" scenario change over time.

The relationship between baselines and additionality is that if a baseline is calculated and set higher than the "correct" level of BAU emissions, some of the offsets issued for the project will be "non-additional." That is, some of the associated emission reductions would have happened anyway in the absence of the project. Baseline-setting is a critical element in the implementation of GHG offset projects and is closely related to additionality.

However, setting a baseline only becomes relevant once a project is determined to be additional. Baseline measurement may be addressed in baseline methodologies for different project types, as is the case for projects implemented under the CDM. Alternatively, it may be addressed in conjunction with project eligibility requirements, as is the case under the offset rules in RGGI and as discussed in this paper.

This chapter provides an overview of different approaches that can be used to demonstrate project additionality within GHG emissions offset programs. It is not meant to be an exhaustive review. It describes the following approaches and topics:

- How the CDM determines additionality;
- Overview of other additionality tests;
- Statistical concepts related to additionality and the selection of additionality tests;
- Performance standards used by the EPA's Climate Leaders program to determine additionality;
- Proportional additionality; and
- Approaches to offset project additionality in RGGI.

How the Clean Development Mechanism (CDM) Determines Additionality

The CDM, one of the "project-based mechanisms" created by the Kyoto Protocol, is the largest offset program in the world that has been developed to date.[20] It has stimulated billions of

[20] The other project-based mechanism created by the Kyoto Protocol is Joint Implementation (JI), which allows industrialized countries or emitters in those countries to invest in projects located within other industrialized countries to generate Emission Reduction Units (ERUs). Given that the volume of reductions created under JI is far

dollars in investment in reducing GHG emissions, and many observers believe it has contributed to significant levels of emission reductions in developing countries. At the same time, it has played an important role in reducing firms' and governments' costs of complying with emission reduction targets under the Kyoto Protocol.

The overwhelming majority of offsets created by the "Kyoto mechanisms" have been created by CDM projects. This is due to several factors. One important factor is that offsets created by CDM projects (called Certified Emission Reductions, or "CERs") of 2000-2012 vintages can be used for compliance with both Phase 1 (2005-07) and Phase 2 (2008-12) CO_2 emissions targets imposed under the EU ETS. As a result, rules governing the CDM and the creation and use of offsets created by these projects have been in effect for many years now. In contrast, only offsets of 2008-2012 vintage created under the JI program (called Emission Reduction Units, or ERUs) can be used for compliance with Phase 2 of the EU ETS. Investment in JI projects has been increasing more recently, in part because the rules governing the program have become clearer.

The CDM has established an "additionality tool" which provides guidance to project developers regarding the demonstration of additionality. Generally speaking, offset projects must demonstrate their additionality using:

- An investment test (often referred to as a financial additionality test); *or*
- A barrier test; *and*
- A common practice test.

If a project is deemed to meet the requirements of two tests – either 1 *or* 2, *and* test 3 – it is considered to be additional under the CDM. These three tests are described below. A more detailed summary of the CDM's additionality tests is provided in Appendix B.

Investment test: In an investment test, the project developer must demonstrate that if revenue associated with offset credits to be created by the proposed project were not available, the project would not be economically feasible, or its rate of return would not be attractive. This approach assumes that CERs created by the project are a decisive reason for undertaking a proposed project. It assumes that the project would not be viable or attractive absent the revenue created by the sale of offsets.[21]

Barrier test: A barrier test considers whether there are significant barriers to implementing a project – such as local resistance to new technologies – in the absence of revenue from GHG reductions. If such barriers exist, the project is assumed to be additional. The barrier test applied by the CDM requires that at least one realistic alternative to the project must not confront these barriers for the project to be additional. This approach assumes that GHG reductions are decisive for the project to be able to overcome existing barriers.

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lower than that under CDM, this paper focuses on the CDM's approach to determining additionality. In practice, additionality determinations under JI are very similar to those under the CDM. JI projects must be assessed according to procedures administered by the JI Supervisory Committee (JISC) under the United Nations Framework Convention on Climate Change (UNFCCC).

[21] See Table 1 in Trexler, Broekhoff and Kosloff, "A Statistically-Driven Approach to Offset-Based GHG Additionality Determinations: What Can We Learn?" in *Sustainable Development Law & Policy*, Winter 2006. Other definitions of additionality tests in this paper are derived from this table.

Common practice test: This test typically compares the emissions performance of the project to that associated with "common practice" technologies or activities in the relevant sector and region. If the project does not achieve greater emission reductions than other technologies/activities, it is assumed that they were not a decisive reason for undertaking the project. Consequently the project is not considered to be additional. The CDM's application of this test differs somewhat. It identifies other technologies/activities operating in the region that are similar to the project activity, and considers whether those activities faced barriers or enjoyed benefits that were not applicable to the project in order to make an additionality determination.

An illustration of how the CDM's additionality tool is used to determine the additionality of proposed CDM projects is provided in Appendix B.

Other Approaches to Determining Additionality

Overview of Other Additionality Tests

A number of other approaches for determining whether offset projects are additional have been described and proposed in the literature. Table 3-1 summarizes several of these additionality tests and is derived from Trexler, Broekhoff, and Kosloff, 2006.[22]

As discussed above, the CDM utilizes the investment test, the barrier test, and the common practice test. In addition, it also implicitly applies a legal, regulatory or institutional test (although this is not presented in the additionality guidance document as a separate test, per se). If the only way to comply with mandatory laws and regulations is to implement the proposed project activity, the activity is not considered additional under the CDM.

Similarly, the CDM implicitly applies a "project in, project out" test; the very notion of an emissions offset project is that emissions are lower with the project than in the absence of the project. Thus, in practice the CDM incorporates at least five additionality tests.

Statistical Concepts Related to Additionality and Selection of Additionality Tests

One way to assess additionality tests is to consider their performance in correctly assessing when a project is additional and when it is not. Trexler et al. (2006)[23] describe a number of statistical concepts and provide other insights in an attempt to clarify the issues and tradeoffs involved in the choice of additionality tests for use in an offset program. Some of these concepts and insights are summarized below.

[22] Ibid.
[23] Ibid.

Table 3-1
Examples of Additionality Tests

Test	Basis for Determining Additionality
Legal, Regulatory, or Institutional Test	Does the project reduce GHG emissions below the level required by official policies, regulations, guidance, or industry standards? If not, it is not additional. If so, it may be additional (typically other tests are used to determine additionality).
Technology Test	Does the project involve a technology that is specifically identified as not being "business as usual?" If so, it is additional.
Investment Test	Chapter 3 and Appendix B discuss these additionality tests used in the CDM.
Barrier Test	
Common Practice Test	
Timing Test	Was the project initiated after a certain date? If not, it is not additional. If so, it may be additional (typically other tests are used to determine additionality). The assumption is that projects starting before the specified date must have had motivations other than GHG reductions.
Performance Benchmark Test	Does the project have an emissions rate that is lower than a predetermined benchmark emissions rate for the particular technology or activity? If so, it is additional. See discussion in Chapter 3 below.
"Project In, Project Out" Test	Does the project have lower GHG emissions than a scenario in which the project has not been implemented? If so, it is additional.

False positive rate and false negative rate

An additionality test's "false positive" rate is a measure of how often the test assesses that a project is additional when it is not – i.e., when it would have happened anyway without consideration to achieving emission reductions. Trexler et al. (2006) refer to reductions that are credited as a result of a false-positive additionality assessment as "phantom reductions." These kinds of emissions reductions also are sometimes referred to as "anyway tons."

A "false negative" rate is the opposite – a measure of how often an additionality test assesses that a project is not additional when it actually is additional. Reductions that are not credited as a result of a false-negative additionality assessment are referred to as "lost opportunities." Every

additionality test can be considered in terms of its false positive rate and its false negative rate, at least from a qualitative perspective.[24]

Tradeoffs in selecting additionality tests

A challenge in choosing an additionality test for an offset program is that there are inevitable tradeoffs. Trexler et al. (2006) conclude that seeking to rule out all non-additional projects by using one or more additionality tests will result in many additional projects being rejected. They cite the example of a technology test that is so restrictive that it only includes project types that have "no conceivable purpose besides climate change mitigation," such as flaring coal mine methane at an abandoned coal mine. By excluding all other types of projects, this test would "exclude a whole universe of truly additional projects."

This conclusion leads to two broader points made by the authors: 1) there is no such thing as a "technical solution to the additionality conundrum;" and 2) choosing additionality tests is a policy decision and a matter of determining the appropriate balance.

For example, the authors suggest that some parties may be "willing to trade off near-term environmental integrity in favor of getting a trading system into place." Others may seek a solution such as the highly restrictive technology test cited above to eliminate the possibility that any project that is not additional would be accepted. This objective may be pursued even if it means that many additional projects will be excluded and many of the potential benefits of an offsets program will be lost – benefits that include incentivizing emission reductions in sectors not covered by a trading program, and reducing compliance costs and overall costs to the economy of a trading program. These examples highlight the challenge to policymakers in establishing the appropriate balance. In the authors' view, the selection of additionality tests can accomplish policy objectives, but only if those objectives are specified carefully upfront.

Considerations in establishing a balance identified by the authors include the following:

- The integrity of the emissions cap versus establishing a trading system and creating incentives for technologies and practices that create climate benefits;
- The acceptable costs of offset credits (i.e., more stringent additionality tests will raise the cost of offset credits); and,
- The size of the pool of offset credits needed.

The authors posit that the ideal level of stringency of an additionality test (or multiple tests) depends on the stringency of the cap-and-trade program's emission reduction requirements. They note that "the rate of 'phantom reductions' for additionality tests is paramount when demand is low," while "[c]ompliance costs are a major issue when emissions targets are ambitious and demand is high. Every additional project that is erroneously rejected by an additionality test means higher costs as buyers have to move further up the supply curve."

[24] An assessment of the false positive and false negative rates of different additionality tests is provided in Trexler et al. (2006).

Recommended approaches: technology test or performance benchmark test

In light of their view that additionality tests should evolve over time if and as market conditions change, the authors believe a good approach for determining offset project additionality would be to implement a technology test that initially focuses on carefully selected sectors. Under this approach, only pre-defined categories of technologies and activities that are seen as *de facto* additional (because they are not common practice) qualify to create offsets, and all other categories are excluded. The list of technologies deemed additional could be expanded to include other sectors and technologies as market demand increases due to more stringent emission reduction requirements. In the authors' view, this approach would avoid the complexity of using multiple additionality tests to attempt to exclude non-additional projects. On the other hand, as noted elsewhere in the article, a technology test can exclude many additional projects. This would limit offset supply and result in higher prices and fewer emission reductions in sectors not covered by a trading program.

Another approach the authors see as being more versatile than a technology test is the performance benchmark test. Such tests would allow for a single benchmark to apply to multiple projects using the same technology or implementing the same activity, thereby eliminating the need for detailed project-specific additionality determinations. This approach would significantly reduce transaction costs relative to a project-by-project additionality test in which project proponents must provide a detailed demonstration of additionality. The authors acknowledge that this test would impose greater demands on regulators. This is because it involves determining current practice for various technologies and the level at which the performance benchmark should be set. However, they believe that, over time, such tests "would prove preferable to requirements of barriers and investments tests for extended weighing and interpretation of evidence of each and every project."

Performance Standards Used in EPA's Climate Leaders Program

Performance benchmarks similar to those advocated by Trexler et al. (2006) currently are used by the Environmental Protection Agency's (EPA's) Climate Leaders program to determine whether a project is additional. Under this program, specific performance standards are established for different project types.[25] The standards are comprised of performance thresholds (or benchmarks), which determine additionality, and baselines for quantifying emission reductions. The performance (i.e., additionality) benchmark may be an emissions rate, a technology standard or a practice standard. It is set at a level of performance that, "with respect to emission reductions or removals, or technologies or practices, is significantly better than average compared with similar recently undertaken practices or activities in a relevant geographic area." For example, the benchmark may be set at the top 25th percentile of performance, or the top 10th percentile. If a project meets or exceeds the benchmark, it is considered to be additional.

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[25] Information in this section was derived from "Climate Leaders – Accounting for External Reductions – Federal GHG Workshop," January 15, 2008, http://www.fedcenter.gov/_kd/go.cfm?destination=ShowItem&Item_ID=8924, and "Climate Leaders Greenhouse Gas Inventory Protocol Offset Project Methodology for Project Type: Landfill Methane Collection and Combustion Additionality Determination," Climate Protection Partnerships Division/Climate Change Division, Office of Atmospheric Programs, U.S. Environmental Protection Agency, August 2008, Version 1.3, http://epa.gov/climateleaders/documents/resources/draft_landfill_offset_protocol.pdf .

To determine the performance benchmark, EPA analyzes public data on "recent, similar activities in the relevant sector in a specific geographic area." Benchmarks are periodically updated to ensure continuous performance improvements, and to reflect changes in regulations, market trends and technology developments. These updates drive technological improvements and create greater volumes of emission reductions.

Some of the potential advantages and disadvantages in using a performance standard-type approach as compared to project-specific additionality tests as cited by EPA and the Offset Quality Initiative (OQI)[26] include the following:

- Avoids imposing high costs on project developers for data collection and quantification and demonstrating additionality. However, the program (i.e., the regulator) bears the (high) initial costs of collecting data and developing standards.
- Provides certainty to project developers and investors regarding the additionality of a project and the amount of offset credits it will generate, provided that the project is eligible and its performance is better than the benchmark. Under project-specific additionality testing, the project developer may have significant uncertainty regarding whether the project will be ruled to be additional, and may not know the volumes of offsets that will be awarded until the methodology is submitted for approval and reductions are quantified.
- Provides standards that are applicable to most project types, but may exclude project categories for which standards can be developed. In contrast, project-specific additionality tests are applicable to all project types, but may be subjective and must be undertaken for every project to be assessed.
- May allow for the approval of some non-additional projects to create offsets (depending on the stringency of the standard) due to the use of generalized additionality assessments and quantification processes. In contrast, project-specific additionality tests may be able to more accurately determine additionality and quantify additional emission reductions due to the specific project analysis that is undertaken. However, project-specific additionality tests may still allow for the approval of non-additional projects. In addition, making project-specific additionality tests more stringent can result in the exclusion of additional projects increasing programs compliance costs.
- Imposes low verification costs, as the verifier only needs to check project emissions and the eligibility of the project against the standard. In comparison, verification costs are high under a project-specific additionality test, as all project-specific barriers and financial data must be verified.

The approach used by EPA to determine additionality – as well as Trexler et al.'s benchmark test, proportional additionality, and RGGI's performance standards – may be characterized as "standardized" approaches for determining additionality, estimating baselines, and quantifying the emission reductions of an offset project, as defined in a paper by OQI.[27, 28] The OQI's paper

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[26] A discussion on the Offset Quality Initiative is provided below.

[27] "Ensuring Offset Quality: Integrating High Quality Greenhouse Gas Offsets Into North American Cap-and-Trade Policy," Offset Quality Initiative, July 2008, http://www.pewclimate.org/docUploads/OQI-Ensuring-Offset-Quality-white-paper.pdf .

[28] OQI is an initiative of The Climate Trust, Pew Center on Global Climate Change, California Climate Action Registry, Environmental Resources Trust, Greenhouse Gas Management Institute and The Climate Group.

describes three approaches that can be used to determine additionality, estimate baselines, and quantify the emission reductions achieved by a project:[29]

- ***Project-specific assessments***. These are "individual or case-by-case examinations of the unique circumstances of a proposed offset project. Individualized assessments may be made regarding a project's additionality, baseline, quantification, and crediting period."
- ***Standardized approaches***. "These approaches credit reductions on the basis of uniformly applicable criteria." These include performance standards (e.g. emission rates, energy use rates, market penetration rates) and technology benchmarks.
- ***Hybrid approaches***. These approaches combine "elements of both project-specific and standardized methodologies to balance the strengths and weaknesses of both."

OQI recommends the adoption of a hybrid approach, which "strikes the best balance between transparency and standardization, while taking into account the consideration of project-specific circumstances."[30] Although OQI does not provide specific examples of a hybrid approach, one could hypothesize that a hybrid approach might combine a performance standard with other tests, such as a timing test or another test that takes other project-level specifics into consideration.

Proportional Additionality

Proportional additionality is a concept proposed by Gordon Smith of Ecofor and the Nicholas Institute for Environmental Policy Solutions. It has some similarities to a performance standard.[31] While this approach was proposed for application to soil and forest sequestration projects, in principle it also could be applied to other offset project types. Under proportional additionality, it is assumed that

"…in the absence of the project, project lands would have been managed like comparable lands in the region. Thus, outcomes on other lands provide the benchmark for measuring the GHG benefits, or offsets, produced by the project."

To implement this approach, comparable lands would need to be identified and GHG fluxes and carbon stocks would need to be assessed. To the extent possible, comparison lands would closely resemble the lands on which projects are implemented with respect to weather, soil, and topography. Land management practices at the outset of the project would need to approximate those of the region as a whole so that any subsequent changes in practices could be considered representative of the region as a whole.

One proposed approach for determining the volume of offsets that would be issued for a project is to calculate this volume as the difference between the emissions and sinks on comparison lands and those on project lands.

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[29] Ibid.
[30] Ibid.
[31] Gordon Smith was a principal contributing author to the paper "Harnessing Farms and Forests in the Low-Carbon Economy: How to Create, Measure, and Verify Greenhouse Gas Offsets," Nicholas Institute for Environmental Policy Solutions, Zach Willey and Bill Chameides, editors, 2007. The discussion on proportional additionality in this section is derived from chapter 5 ("Step 2: Determining Additionality and Baselines") and Appendix 5 of the paper.

An alternative approach that more intuitively captures the concept of proportionality is to assess the "fractional additionality" of the project at the outset. For example, "[i]f a project plans to pursue no-till farming of small grains, and 40 percent of the farmers of small grains in the region already use no-till farming, the amount of GHG benefits the project achieves is discounted by 40%." In other words, total emission reductions attributable to the project would be discounted by 40% to determine the volume of offsets that would be issued for the project. The regulatory authority would need to update the percentage on a regular basis (e.g., every two years) to ensure an accurate discount is applied if "fractional additionality" is utilized for offset crediting purposes. The only condition for eligibility would be that the project would need to be considered a new action – i.e., the project owner could not be provided offsets for an activity that was already being undertaken.

In the author's view, this approach could be criticized for allowing non-additional projects to receive offset credits.[32] Accordingly, it may be best suited for project types in which the motivation for undertaking a project is difficult to determine, and the environmental benefits of the project are clear. Proportional additionality avoids the significant challenges of determining project developers' intentions and the validity of input assumptions in additionality determinations (e.g., a firm's required rate of return in a barrier test). At the same time, it provides incentives to undertake activities that have not yet become common practice.

Project Additionality in the Regional Greenhouse Gas Initiative (RGGI)

The RGGI program has established CO_2 emission reduction requirements and is in the process of implementing a CO_2 cap and trade program covering electric power plants operating in ten Northeastern and Mid-Atlantic States to achieve these reductions. RGGI will become fully operational starting in January 2009.

The RGGI program includes a "positive list," or an initial list of eligible offset categories.

It identifies the following five categories of eligible offset activities:[33]

1. Landfill methane capture and destruction (LFG);
2. Reduction in emissions of sulfur hexafluoride (SF_6);
3. Sequestration of carbon through afforestation;
4. End-use efficiency projects resulting in the reduction of CO_2 emissions from natural gas, propane and heating oil; and
5. Methane reduction from farming operations.

This list provides project developers with some confidence that the specified project activities will be eligible to create offsets. The RGGI Model Rule's positive list goes further, however, and provides more specificity on offset project eligibility requirements (i.e. additionality), how the emissions baseline for each project type is to be calculated, how emission reductions are to be calculated and monitoring and verification requirements. This additional specificity provides additional certainty to project developers and investors in offset projects regarding project

[32] Based on a telephone discussion with Gordon Smith, August 19, 2008.
[33] Other project categories may be considered for eligibility in the future.

eligibility/additionality determinations and the level of offset crediting that can be expected from a project. This is likely to make it easier for project developers to secure financing for projects, as it reduces many of the risks that can confront project developers under such offset programs as the CDM.

Additionality is addressed in baseline definitions, eligibility requirements, emission reduction measurement methodologies and performance standards in the Model Rule. Some examples are provided below.

- A landfill methane capture and destruction project is eligible if the landfill is not subject to New Source Performance Standards (NSPS) for municipal solid waste landfills.
- For SF_6 emission reduction projects, a performance standard for the SF_6 emissions rate is established. To be eligible, projects must have an emissions rate in the baseline year that is lower than the performance standard (with some specified exceptions). Emission reductions are then measured relative to those in the baseline year. This approach may be meant to avoid rewarding projects that have a high emissions baseline.
- For afforestation projects to be eligible, the land must have been non-forested for at least 10 years preceding the initiation of the project. Projects must be managed "in accordance with widely accepted environmentally sustainable forestry practices and designed to promote the restoration of native forests by using mainly native species and avoiding the introduction of invasive nonnative species." In addition, if there will be commercial timber harvest activities on the land, certification must be obtained prior to harvest activities from pre-approved certification organizations.
- Projects that reduce or avoid CO_2 emissions from natural gas, oil, or propane end-use combustion due to end use energy efficiency must meet various performance criteria to be eligible. For example,
    - Commercial buildings must exceed the energy performance requirements of ANSI/ASHRAE/IESNA Standard 90.12004: Energy Standard for Buildings Except Low Rise Residential Buildings by 20% or 30%, depending on the type of building.
    - Residential buildings must exceed the energy performance requirements of the 2004 International Energy Conservation Code by 30%.
    - For energy conservation measures commenced before January 1, 2009 to be eligible, they must have a market penetration rate of less than 5%.

- For the offset project category of agricultural manure management,
    - Projects must be located in a state that has a market penetration rate for anaerobic digester projects of 5% or less.
    - Eligible projects are defined as consisting of "the destruction of that portion of methane generated by an anaerobic digester that would have been generated in the absence of the offset project through the uncontrolled anaerobic storage of manure or organic food waste."
    - Other eligibility requirements also apply, including a requirement that the project employ "only manure-based anaerobic digester systems using livestock manure as the majority of digester feedstock."
    - The project may be located at a farm with 4,000 or less head of dairy cows, or a farm with equivalent animal units (based on assumptions on the average weight of cows).

Conclusion

As policymakers in the U.S. consider the design of an offset system for inclusion in a GHG cap-and-trade system there are a wide range of options that can be used to make additionality determinations. A number of considerations and tradeoffs will need to be considered in selecting the tests and methods ultimately chosen.

If an offset program is to achieve environmental and economic objectives, priorities need to be defined and a corresponding balance needs to be achieved. Different programs have utilized different approaches. The CDM has utilized several project-specific additionality tests. The RGGI program is utilizing a positive list and providing guidance on other key issues regarding additionality and offset creation. EPA's Climate Leaders program has opted to use performance standards in making additionality determinations, rather than project-specific approaches.

Experience with these programs and others can help guide policymakers and affected parties as they attempt to devise approaches that can maximize the potential environmental and economic benefits of a GHG offset program.

Summary of Workshop 2

The second workshop of the EPRI Greenhouse Gas Offset Policy focused predominantly on the issue of additionality. Topics covered in presentations and participants' comments and questions included, but were not limited to:

1. The concept of additionality and its determination in the context of the CDM;
2. Alternative approaches to determining additionality and eligibility of projects to create offsets such as performance standards, benchmark rates or a positive list approach, as incorporated in EPA's Climate Leaders program and RGGI;
3. A project developer's views on the feasibility of using a positive list approach: and,
4. Qualitative and quantitative limits on the use of offsets for compliance, and their impact on compliance costs.

The discussions that took place on these and other topics are summarized below.

Congressional Staff Perspectives

Confirming views expressed in the first workshop, a congressional staff member said there is some divisiveness in the U.S. Congress over offsets, and a tremendous need for education around "the basics of offsets" and related concepts. The agricultural community in particular is not fully aware of the benefits that an offset program could provide for the agriculture sector, although the staff member indicated that progress is being made in this regard. Specifically, an amendment to the Climate Security Act (S.3036) offered by Senator Debbie Stabenow's (D-MI) included a list of particular offset project types. Some participants suggested that such positive lists, if approved in the near term, may spur the development of the offset market. To ensure timely development of an offset market, one participant suggested that a positive list be proposed for consideration by Congress in 2009. Project developers would be able to use the list to guide project development in anticipation of the future passage and eventual implementation of a federal climate change mitigation program.

CDM and Additionality

Determining additionality in the CDM requires proof that an offset project is not the most financially attractive option, or that the CDM helped the project overcome existing barriers. Additionally, projects need to demonstrate that the CDM was considered when the project was undertaken, and that the project is not common practice. Some participants noted that a case-by-case approach to additionality, like the approach employed by the CDM, can be problematic and resource-intensive. Furthermore, the outcome of a case-by-case analysis directly depends on certain variables that are very difficult to estimate accurately.

The definition of additionality in the CDM has been subject to interpretation and extensive debate since the mechanism was initiated. One participant noted that the EB's view in the early years of the CDM was that any project that emitted below a selected (plausible) baseline was additional and eligible to generate offset credits. Subsequently, the EB established financial benchmarks to determine additionality. Such a project-specific approach may have been adopted by the negotiators of the Kyoto Protocol out of fear that developing a list of eligible projects would not result in achieving significant volumes of emission reductions, according to another participant. Based on experience with the CDM's project-specific approach, a participant pointed to a need to improve the CDM in the short term and move beyond it in the medium term by introducing a new type of "sectoral" trading mechanism.

Interest in Standardized Approaches to Additionality Based on CDM Experience

A number of participants expressed significant interest in using standardized approaches to determine project additionality. One noted that benchmarking had not been utilized by the CDM (except in the case of one project-specific methodology) and that there are significant concerns at the UN about implementing a benchmarking approach because of a lack of access to the data required to implement effectively such an approach. In his view, a positive list could work in the U.S. or another jurisdiction in which there is a homogeneous level of industrial development, although he thought that implementing a standardized approach (such as benchmarking rates) without practical experience would be difficult. According to some workshop participants , the CDM currently is delivering about 150 $MtCO_2e$ per year of registered GHG offsets. In contrast to this quantity, 800-1,000 $MtCO_2e$ of offsets may be required to achieve emissions targets being

discussed in the context of U.S. legislation. Achieving these large volumes of emissions reductions likely will require a more standardized approach towards determining additionality.

Views on Creating a Balanced Additionality Policy

A recurring theme in participants' comments was the need for additionality policy to balance a number of objectives and perspectives. One participant said that policy makers need to recognize that offsets are a cost containment mechanism and that they have the potential to stimulate investment in sectors where there are no existing incentives to reduce emissions.

Another participant asserted that a standardized approach has several benefits, including:

1. Lower transaction costs;
2. Greater certainty for investors (who can know in advance if the project will be eligible);
3. Greater transparency in making additionality decisions; and,
4. Providing external parties with the ability to test environmental outcomes.

However, a standardized approach might not be applicable to all projects. In addition, all tests are prone to error. There will be false positives (non-additional projects that pass the additionality test) and false negatives (truly additional projects that will not pass the additionality test) and the rate of error will depend on what is being tested and the stringency of the test. The overall outcome depends on the size of the market. Non-additional reductions are likely to be the least expensive and will likely flood a market that has limited demand. In conclusion, he expressed the view that the key issue in additionality policy is to strike the right balance between environmental integrity and cost containment.

Other participants also acknowledged several challenges to implementing a standardized approach to determining additionality, including the need for regulators to undertake a significant amount of work upfront, and requirements for periodic updates and revisions of the established benchmarks which may be resource intensive.

Participant Recommendations on Additionality Policy

A number of participants offered recommendations on how to establish approaches for determining project additionality. For example, past experience could be used to differentiate additionality tests based on technologies and sectors, and to expand the current additionality tool box. For instance, benchmark or technology standards could be used for new technologies that are not yet widely deployed and standards could be updated over time as technology advances. Renewable-based technologies potentially could be credited against national benchmarks in regions like the U.S., where the "grid"-related data necessary to establish an accurate avoided GHG emissions benchmark is readily available and can be updated regularly. Positive lists could be established for "no-recourse" projects such as agricultural methane capture (i.e., projects that would not be undertaken for any purpose other than reducing GHG emissions), For other project types a simple additionality test involving three questions could be used:

1. Is the project a least cost option?
2. Is it common or a long established practice?
3. Is it mandated by existing law or regulations?

Under this suggested approach, if the answer to any of these questions is "no," then the offset project should be considered to be additional. Otherwise, the project would require a more rigorous additionality test.

Impacts of CDM's Current Additionality Approach on Project Development

Another pervasive theme expressed at the workshop was the stifling effect on project development of CDM's project-specific approach to making additionality determinations. Some participants noted that there have been few CDM projects in some sectors and activities, such as large-scale energy efficiency, due to continuous changes in the interpretation of additionality.

Some participants noted that regulatory uncertainty in the CDM process was particularly frustrating and vexing to offset buyers, and requires that significant due diligence be undertaken for each project, which adversely affects the supply side of the market. It also makes it difficult to finance projects, and reduces investment in potentially important projects – particularly projects that are economically marginal and that may create sustainable development benefits, which is one key objective of the CDM. In contrast, one participant said that the use of "benchmarking" would provide certainty regarding the regulatory outcome, facilitate investment decisions and allow for a focus on project performance.

Description of Approaches for Determining Additionality in Existing Programs

EPA's Climate Leaders program has developed guidance for determining additionality which is based on a top-down performance-based benchmarking approach. Under this approach, projects that meet the applicable performance threshold are considered additional. The performance standard or benchmarking approach to additionality determinations requires projects to exceed business-as-usual (BAU) performance either in a specific sector or geographic location. Performance standards are defined for specific project types and are updated periodically.

A significant benefit attributed to performance standards for additionality determinations is that accounting rules are known in advance, reducing the complexity and costs of project assessment. The approach can be applied to a range of project types across sectors and locations including:

1. Commercial boiler projects;
2. Anaerobic digesters for manure management; and,
3. Afforestation/reforestation projects.

Data collection is the most challenging element of implementing a performance-based standard approach.

Offset Policy Design in the Context of the Need to Achieve Deep Emission Reductions Globally

Amidst the workshop's detailed discussions on additionality, some participants sought to maintain a broader perspective with respect to global emission reduction objectives. Some participants pointed to fundamental problems inherent in a project-by-project approach, and the need to achieve large-scale emissions reductions from developing countries. In one participant's view, it is necessary to get developing countries to agree on commitments and actions (not necessarily binding emissions targets) and move away from a project-by-project approach toward a cap-and-trade model, as it would impose lower transaction costs. Another suggested

"sectoral baselines," and emphasized that additionality tests could discourage investment in activities that reduce emissions, which is counter-productive. For countries that do not take on binding emissions limits, offsets were seen by other participants as a bridge to achieve emission reductions while lowering costs. In the view of one presenter, agricultural offsets in particular are a necessary part of any carbon regime because of their significant abatement potential.

Comments on the RGGI Positive List

In his presentation on the design of the RGGI offset program and its standardized approach to additionality, one participant noted that RGGI's list of eligible project types were selected based on a qualitative review of the environmental and economic co-benefits of different project types (e.g., a specific project type's potential for wider market adoption). Several general additionality criteria in RGGI's offset program were described, as well as the category-specific additionality rules contained in the RGGI "Model Rule" for three particular project types – landfill gas, sulfur hexafluoride (SF_6) and energy efficiency projects. Participants in RGGI's stakeholder process generally favored a performance/benchmark standard approach for determining project additionality.

While a "positive list" approach appears to be favored by many stakeholders, it may still pose challenges. One participant noted that a positive list is not simply a list of eligible project types – it is a set of streamlined procedures for petition, approval, verification and issuance of offset credits. In her view, the objective of a positive list is to reduce the risk that a project might not get registered. Furthermore, positive lists can be too restrictive if they omit or deter the inclusion of certain project types that have great potential to reduce emissions.

In response to the expert presentations at the workshop, some participants expressed the view that RGGI's eligibility requirements are too restrictive. One said that in many instances a project type included in RGGI's positive list will not be RGGI-eligible (although no specific reason for this assertion was provided), which in this participant's view illustrates the fact that "the devil is in the details" when it comes to additionality rules. In this participant's view, RGGI's positive list and offset rules are too restrictive and have deterred project development to date. Another participant had encountered significant difficulties in trying to enter RGGI's offset market, and found that in spite of the prescriptive guidelines contained in the Model Rule, there were still many uncertainties that made it difficult to negotiate emissions reduction purchase agreements (ERPAs).

Closing Comments

In closing comments for the workshop, it was reiterated that different approaches to additionality determinations, and the details of different proposals, will significantly impact offset market development. As such, it will be important for stakeholders to fully understand the details of U.S. offset policy proposals with respect to additionality provisions as well as provisions relating to qualitative and quantitative restrictions on offset use.

4
COMPARISON OF SELECTED PROPOSALS TO DESIGN A GHG EMISSIONS OFFSET PROGRAM

Background

The material presented below was prepared as background material for the third EPRI GHG offsets workshop held in Washington DC on November 20, 2008.

The purpose of this chapter is to describe and compare and contrast current offset programs and policy proposals with respect to how each one addresses:

- Eligible offset project categories;
- Additionality, project baselines, and measurement of emission reductions;
- Limits on the use of offsets for compliance; and,
- Other issues that may be important for overall performance of an offset system.

The material presented below describes in detail the following offset policy proposals:

1. Offset provisions in legislation developed by ***Senators Lieberman (I-CT) and Warner (R-VA) (S. 3036)*** and considered on the Senate floor in June 2008;
2. Offset provisions contained in the draft ***Dingell-Boucher legislation*** developed by Representatives John Dingell (D-MI), Chairman of the House Energy and Commerce Committee, and Rick Boucher (D-VA), Chairman of the Subcommittee on Energy and Air Quality in October 2008;
3. Offset rules for the Northeast states' ***Regional Greenhouse Gas Initiative (RGGI)***;
4. The Kyoto Protocol's ***Clean Development Mechanism*** **(CDM);**
5. Recommendations on offset policy design for the ***Western Climate Initiative (WCI)*** issued in September 2008;
6. Recommendations on offset policy design provided by the ***Nicholas Institute for Environmental Policy Solutions*** at Duke University; and
7. Offset policy design recommendations provided by the ***Offset Quality Initiative (OQI)***.

A summary table providing a side-by-side comparison of these offset policy proposals is provided in Appendix C.

Important Design Issues That Affect Offset System Performance

This chapter considers how existing offset systems and those being developed address key issues that are common to most or all offset programs and proposals. We focus on the issues described below because they have significant impact on offset system performance.

The range of ***eligible offset activities*** is important because wider eligibility can result in more low-cost emissions abatement opportunities being accessed. In addition, "positive lists" of eligible offset project types provide regulatory clarity to offset project developers and can help jump start development of an offset market.

Provisions addressing ***additionality, baselines and measurement of emission reductions*** help ensure the environmental integrity of an offset program, and reduce the risk that the use of offsets will undermine the integrity of the emissions cap in a cap-and-trade system.

Quantitative limits on offset use sometimes are included in offset programs to ensure that a certain portion of emission reductions are achieved by entities regulated under a cap-and-trade program.

Finally, ***qualitative limits*** on offset use may be included to limit offsets to those within desired geographic areas (e.g., to promote regional or domestic emissions abatement) or technology types. However, as shown in economic modeling, quantitative and qualitative offset limits can significantly increase the economic cost of cap-and-trade programs.

Eligible Activities

In some cases, offset provisions incorporated into GHG mitigation programs and proposals identify categories of project activities that are eligible to create offsets, and specific rules for determining eligibility of projects within those categories. Eligible activities vary between proposals.

Additionality, Baselines, and Measurement of Emission Reductions

A GHG emission reduction project designed to create offsets is considered to be "additional" if the reductions created by the project would not have occurred but for the implementation of the project and the incentives created by the offset program. A number of different "additionality tests" have been developed and used in existing programs (i.e., tests designed to demonstrate an offset project is additional). Others have been proposed for use in offset programs under development.

A project "baseline" consists of its estimated GHG emissions under a business-as-usual (BAU) scenario that assumes the absence of the project activity. In general, the volume of offsets awarded to a project is calculated as being equal to the difference between baseline emissions and emissions after implementation of the project. Baseline measurement may be addressed in baseline methodologies for different project types, as is the case for projects implemented under the Clean Development Mechanism (CDM). Alternatively, it may be addressed in conjunction with project eligibility requirements, as is the case for the RGGI offset rules.

Standardized Approaches to Additionality and Baselines

The term "standardized approach" often arises in discussions on additionality and baselines. As described by the OQI, standardized approaches "credit reductions on the basis of uniformly applicable criteria." These include performance standards (e.g., emission rates, energy use rates, market penetration rates) and technology benchmarks (specific technologies in certain sectors and locations that are automatically deemed additional). It is important to highlight that a

standardized approach can mean several things because standards can be applied in different contexts, and with differing project-specific data requirements.

For example, performance standards and technology benchmarks may be used to determine additionality. For energy efficiency offset projects, RGGI requires that new commercial buildings must exceed specific energy performance requirements by 20%. Similarly, projects in EPA's Climate Leaders program demonstrate additionality by achieving "a level of performance [an emissions rate, a technology standard or a practice standard] with respect to emission reductions and/or removals that is significantly better than business as usual."[34]

In contrast to standardized approaches, the CDM determines additionality using a case-by-case approach for each project (i.e., a "project-specific" approach). It requires that each project apply: 1) an investment test (i.e., a financial additionality test); *or* 2) a barrier test; *and* 3) a common practice test. The Lieberman-Warner bill's requirement for each offset project to apply a financial additionality test also can be described as project-specific.

A standardized approach also can be used to set an emissions baseline.[35] For example, baselines under the Climate Leaders program are calculated either from an historic project baseline for a retrofit (e.g., equal to the average annual emissions of a boiler prior to the retrofit) or based on data sets from similar recently undertaken or planned practices, activities, or facilities in the same geographic region depending on the specific project type. Potential GHG emission reductions from the offset project may be estimated by comparing emissions from the baseline with emissions from the proposed project.

A standardized approach for baseline setting can incorporate default assumptions (e.g., BAU emissions factors) established by the regulator, thereby streamlining the baseline calculation process and reducing the amount of project-specific data required to calculate the baseline. In contrast, RGGI's offset system requires the calculation of project-specific baselines, and provides methodologies for doing so. This approach is similar to the one used by the CDM. It may be the case, however, that even under a standardized baseline approach, some project categories will require a significant amount of project-specific data and assessment.

Many market participants believe project-specific approaches such as those used by the CDM are too burdensome and inefficient, allow for subjective decision-making, create risks that discourage investment and project development and increase transaction costs. On the other hand, others may be concerned that standardized approaches may not provide the same level of assurance that non-additional projects will be rejected.

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[34] U.S. EPA, "Climate Leaders Greenhouse Gas Inventory Protocol Optional Module Guidance: Using Offsets to Help Climate Leaders Achieve Their GHG Reduction Goals," discussion draft, August 2008, http://www.epa.gov/stateply/documents/resources/OffsetProgramOverview.pdf

[35] In the Climate Leaders program, the benchmark(s) used for the baseline generally appears to be distinct from those used to determine additionality. To provide a simplified example, a project may need to achieve a performance standard equal to the top 20th percentile of performance to be considered additional and therefore eligible, but its baseline may be based on a lower performance standard or may simply be the project's actual emissions prior to the project.

Quantitative Limitations on Offsets Use

Offset program rules may impose quantitative limits on the use of offsets for compliance by entities regulated under a cap-and-trade program. Typically, these so called "supplementarity" limits have been expressed in terms of a percentage of each year's emissions compliance obligation.

Qualitative Limitations on Offset Use

Offset programs also may impose qualitative limits on the activities that can create offsets. For example, qualitative limits may exclude offsets created in certain geographic regions from being used for compliance. An example of this kind of limit is a prohibition on the use of international offsets in the context of U.S. climate change legislation. Other qualitative limits have been discussed to deal with concerns regarding the "permanence" of certain types of offset activities and difficulties in measuring the volume of offsets potentially created by other types of projects. For example, the EU-ETS prohibits the use of offsets created by forest carbon sequestration projects, nuclear power and "large" hydropower production.

Other Key Provisions

This paper uses "other issues" as a catch-all category to capture other types of offset provisions the authors believe are important to the effective functioning of an offset system. Examples of "other" types of provisions include the project review and approval process, measures to address impermanence and the risk of project reversals for terrestrial sequestration projects and provisions related to appropriate offset crediting periods.

Description of How Various Offset Proposals and Offset Systems Address Key Issues

This section describes key design elements incorporated into existing GHG emissions offset systems and in proposed systems under development. We have chosen to focus on existing GHG emissions offset programs, others under development in the U.S. and a limited number of stakeholder proposals. We also note that throughout this chapter, the author's commentary is provided on certain provisions, particularly to compare and contrast approaches taken by different offset policy proposals. Commentary is provided in *italics and parentheses*.

Existing and Proposed Government Offset Programs

The Kyoto Protocol's Clean Development Mechanism (CDM)

The CDM is the largest existing GHG emissions offset system in the world. It has been operating since 2001. It has achieved significant results, but also has been criticized by many observers and participants for several reasons described below.

Eligible activities

The CDM has no restrictions with respect to consideration of baseline and monitoring methodologies for any project type. Methodologies for virtually any type of project can be proposed by project developers for consideration by the CDM EB and its Methodologies

("Meth") Panel.[36] Once a methodology has been approved, an offset project using that methodology may be considered for *registration*, subject to other requirements. To date, over 100 methodologies have been approved. The absence of restrictions on potentially eligible project types provides significant flexibility to allow for consideration of a wide range of project types. However, delays in approving CDM methodologies and changes to methodologies subsequent to approval impose significant risks and uncertainties on project developers. The need to review and approve each project-based methodology has led to a very large backlog of proposed CDM projects awaiting review and registration.

Additionality, baselines, and measurement of emission reductions

Additionality. The CDM has established an "additionality tool" which provides guidance to project developers on how to demonstrate additionality. The CDM considers additionality on a case-by-case, project-specific basis. This approach is intended to ensure that offset projects demonstrate convincingly that associated emission reductions would not have taken place in the absence of the project. However, many project developers view the CDM's approach to additionality as being too burdensome, subjective and unpredictable. Others have criticized it for failing to ensure that non-additional projects are not approved.

Generally speaking, offset projects must demonstrate their additionality using:

1a. An investment test (often referred to as a financial additionality test); *or*

1b. A barrier test; *and*

2. A common practice test.

If a project is deemed to meet the requirements of two tests – either 1a *or* 1b, *and* test 2 – it is considered to be additional under the CDM. A more detailed summary of the CDM's additionality tests and an illustration of how the CDM's additionality tool is used to determine the additionality of proposed CDM projects are provided in Appendix B to this report.

Baselines. Methodologies for calculating project emissions baselines are established in baseline and monitoring methodologies, which must be approved by the CDM "Meth" Panel and the CDM EB. The approach is project-specific and detailed. In some cases, methodologies have been revised subsequent to their initial approval. Subsequently, project developers using the original methodologies have been required to conform to the updated methodology.

Quantitative limits on offset use

The CDM does not set firm quantitative limits on the use of CERs for compliance with national GHG emissions caps under the Kyoto Protocol, but does call for the use of CERs to be "supplemental to domestic policies and measures." In the EU, this formulation has been interpreted to mean that no more than 50% of each country's effort to meet its Kyoto emissions target can be achieved through the use of so-called "flexible mechanisms" – i.e., through purchases of CERs from the CDM, ERUs from JI or Assigned Amount Units (AAUs). This limit

[36] The CDM currently excludes nuclear and avoided deforestation based offset projects and limits potentially eligible hydroelectric offset projects.

is not seen to be legally binding for countries. However, it is used to calculate the legally binding limit on the volume of CERs and ERUs that may be used by covered installations for compliance under the EU ETS.[37]

Qualitative limits on offset use

Countries with binding emissions caps under the Kyoto Protocol "are to refrain from using certified emission reductions generated from nuclear facilities to meet their commitments."[38] The EU ETS sets additional qualitative limits on the use of CERs for compliance. Hydroelectric projects of over 20 MW in capacity must meet relevant international criteria and guidelines, including those established by the World Commission on Dams.[39] In addition, CERs and ERUs from land use, land use change, and forestry (LULUCF) activities (e.g., forest carbon sequestration projects, avoided deforestation projects and other terrestrial carbon abatement projects) may not be used for compliance.

Other issues

Project review and approval process. The following steps must be taken for an offset project to be approved by the CDM and CERs to be issued for the project.[40]

- *Project activity design*. Project participants must submit information on their proposed CDM project using the Project Design Document (CDM-PDD), including information describing the project activity, how baseline and monitoring methodology is being applied, the duration of the project activity and crediting period, environmental impacts, and stakeholders' comments.
- *Validation of the CDM project.* Projects utilizing baseline and monitoring methodologies that have been approved by the CDM Executive Board can proceed to validation – i.e., the independent evaluation of a project by a "designated operational entity" (an approved auditing firm known as a DOE) against the requirements of the CDM, based on the PDD.
- *Registration of the CDM project*. Registration is the formal acceptance by the Executive Board of a validated project as a CDM project. Registration is the prerequisite for the verification, certification and issuance of CERs related to that project activity.
- *Verification / certification of the CDM project.* Verification is the periodic independent review and *ex-post* determination by the DOE of the monitored reductions in GHG emissions that have occurred as a result of a registered CDM project during the verification period. Certification is the written assurance and confirmation by the DOE that a project activity

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[37] The limit on CER and ERU use is established for EU ETS sectors in each EU Member State based on the country's overall CER/ERU use limit (approximately 50% of its Kyoto compliance effort), and the volume of CERs/ERUs that the Member State government will need to purchase.

[38] United Nations Framework Convention on Climate Change, Report of the Conference of the Parties on its Seventh Session, Held at Marrakesh from 29 October to 10 November 2001, FCCC/CP/2001/13/Add.2, 21 January 2002.

[39] See "Dams and Development: A New Framework for Decision-Making," World Commission on Dams, November 2000.

[40] http://cdm.unfccc.int/Projects/pac/index.html

achieved the emission reductions documented in the verification report.

Issuance of CERs. The DOE requests issuance of CERs on behalf of a project developer. If three members of the CDM EB or a Party involved in the project do not request a review of the request for issuance, the EB instructs the CDM Registry administrator to issue the specified CERs for the specified time period.[41]

Crediting period. Project developers may opt to use a seven-year renewable crediting period, or a ten-year, non-renewable crediting period.

Regional Greenhouse Gas Initiative (RGGI)

The RGGI program officially becomes operational on January 1, 2009 at which time binding limits on CO_2 emissions by electric power plants in the Northeast region of the U.S. will take effect. We have included a discussion of the RGGI offset program here because 10 states in the Northeast U.S. participate in this CO_2 emissions cap and trade program and RGGI uses an approach to determine additionality that many believe is preferable to the case-by-case, project-specific approach utilized by the CDM.

Eligible activities

The following five categories of offset activities are eligible to generate offsets in the RGGI program:[42]

1. Landfill methane capture and destruction (LFG);
2. Reduction in emissions of sulfur hexafluoride (SF6);
3. Sequestration of carbon through afforestation;
4. End-use efficiency projects resulting in the reduction of CO2 emissions from natural gas, propane and heating oil; and,
5. Methane reduction from farming operations.

Additionality, baselines, and measurement of emission reductions

In RGGI, potentially eligible offset projects also must be "surplus to existing requirements" and "surplus to other mandates or support" and must be commence before a certain date. These issues are described briefly below.

Surplus to existing requirements. For all RGGI offset project types, offsets will not be issued for activities that are required to be implemented under local, state or federal law, regulation, or administrative or judicial order. If the activity becomes mandatory after an offset project has been approved, the project will receive offsets until the end of its current crediting period but will not be extended to the next period.

Surplus to other mandates or support. Developers of offset projects that include an electricity generation component must transfer legal rights to the appropriate regulatory agency for any

[41] Ministry of the Environment, Japan, and Institute for Global Environmental Strategies, "CDM and JI in charts," version 6, August 2008, http://enviroscope.iges.or.jp/modules/envirolib/upload/835/attach/charts.pdf
[42] Other activities may be considered for eligibility in the future.

"attribute credits." Such credits include renewable energy credits (RECs) that may be created by the proposed project, and which may be used for compliance with renewable portfolio standards or similar requirements.

Also, projects that receive funding from any "system benefit" fund or other incentives provided through RGGI's consumer benefit or strategic energy purpose allocation are not eligible to receive offset credits.

Timing. Eligible offset projects must commence on or after December 20, 2005.

Additionality. In RGGI, project additionality is addressed through eligibility requirements (which include performance standards) as defined in the RGGI Model Rule, and baselines (which are project-specific) are addressed in detailed emission reduction measurement methodologies, as summarized below.

Landfill methane projects

- A landfill methane capture and destruction project is eligible if the landfill is not subject to New Source Performance Standards (NSPS) for municipal solid waste landfills.
- The baseline is the amount of potential fugitive landfill emissions, as represented by the methane captured and metered for thermal destruction in the project. Reductions are equal to the amount of fugitive landfill emissions that would have occurred if the methane captured by the project were not destroyed. Detailed methodologies are provided. (*This approach, in which captured methane (measured by meters) is equal to creditable emission reductions, simplifies the determination of additionality and measurement.*)

SF_6 reduction projects

- A performance standard for the appropriate SF_6 emissions rate is established for projects that reduce SF_6 emissions from electricity generation and transmission equipment through capture and storage, recycling or destruction. Projects consist of incremental actions beyond those taken in the baseline year (the year before the consistency application is filed.[43] To be eligible, projects must have an emissions rate in the baseline year that is lower than the performance standard (with some specified exceptions). Emission reductions are then measured relative to those in the baseline year (detailed methodologies are provided). This approach may be meant to avoid rewarding projects that have a high emissions baseline.

Afforestation projects

- Project land must have been non-forested for at least 10 years preceding project initiation.
- Projects must be managed "in accordance with widely accepted environmentally sustainable forestry practices and designed to promote the restoration of native forests by using mainly native species and avoiding the introduction of invasive nonnative species." In addition, if

[43] The consistency application includes project description, emissions baseline determination, explanation of quantification, monitoring and verification approach, and a monitoring and verification report. See discussion under "other issues" below.

there will be commercial timber harvest activities on the land, certification must be obtained prior to harvest activities from pre-approved certification organizations.

- Project land must have a permanent, enforceable conservation easement that requires the land to be maintained in a forested state in perpetuity.
- Baseline emissions must be measured prior to commencement of the project (detailed methodologies are provided). Measurement procedures must be consistent with March 2006 protocols published by the Department of Energy under the 1605(b) program.[44] (*RGGI does not require estimation of GHG fluxes or carbon stock on comparable land, as does the Lieberman-Warner bill, which also requires for all emission reduction projects that emissions be measured at comparable facilities. The Dingell-Boucher draft does not appear to address this topic.*)
- The amount of carbon sequestered is measured as the net increase in carbon relative to the baseline, minus 10% to account for potential losses of sequestered carbon. The 10% discount is not required if the project sponsor retains insurance that guarantees to replace any lost sequestered carbon for which offsets were awarded. (*This standardized use of discounting contrasts with the Lieberman-Warner bill's requirements for calculating uncertainties and discounting for uncertainties (for all eligible project types) based on an exaggerated proportional discount that increases relative to uncertainty, and the Dingell-Boucher draft's requirements for standardized methods for conservative discounting for uncertainty in biological sequestration projects.*)

Energy efficiency

Projects that reduce or avoid CO_2 emissions from natural gas, oil, or propane end-use combustion due to end-use energy efficiency (i.e., improvements in energy efficiency of fuel use and/or energy efficient delivery of energy services) in a new or existing commercial or residential building must meet various performance criteria to be eligible, including those that follow.

- To be eligible, new buildings must be built to replace an existing building on the project offset site or must be designed to be zero net energy buildings.
- Commercial and residential heating, ventilating, and air conditioning (HVAC) systems must meet specified sizing and installation requirements.
- Eligible new commercial buildings or whole-building retrofits for commercial buildings must exceed the energy performance requirements of ANSI/ASHRAE/IESNA Standard 90.12004: Energy Standard for Buildings Except Low Rise Residential Buildings by 20% or 30%, depending on the type of building.
- Eligible new residential buildings or whole-building retrofits for residential buildings must exceed the energy performance requirements of the 2004 International Energy Conservation Code by 30%.

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[44] U.S. Department of Energy, Technical Guidelines Voluntary Reporting of Greenhouse Gases (1605(b)) Program; Chapter 1, Emissions Inventories; Part 1 Appendix: Forestry; Section 3: Measurement Protocols for Forest Carbon Sequestration, March 2006.

- Energy conservation projects involving commercial boilers and residential boilers, furnaces and water heaters, and that commenced before January 1, 2009, must meet or surpass specified performance standards.
- Energy conservation projects commenced after January 1, 2009 must demonstrate that the energy conservation measures to be implemented have a market penetration rate of less than 5%. (*This appears to be the only example of market penetration being used as a benchmark for eligibility in the proposals considered in this paper.*)
- Methodologies and standards are specified for calculating baselines for energy conservation projects, baseline energy usage in existing and new commercial buildings and existing and new residential buildings, and annual energy savings.
- The impact of each eligible conservation measure must be isolated through direct metering or energy simulation modeling.
- Offset projects that implement similar measures in multiple residential buildings can employ representative sampling of buildings to determine aggregate baseline energy usage and energy savings, based on sound statistical methods such that there is 95% confidence that the reported value is within 10% of the true mean.

Agricultural manure management

- For projects that capture and destroy methane (CH_4) from animal manure and organic food waste using anaerobic digesters, eligible projects are defined as consisting of "the destruction of that portion of methane generated by an anaerobic digester that would have been generated in the absence of the offset project through the uncontrolled anaerobic storage of manure or organic food waste."
- Projects must employ "only manure-based anaerobic digester systems using livestock manure as the majority of digester feedstock." Organic food waste used by an anaerobic digester must be limited to that which would have been stored in anaerobic conditions in the absence of the offset project.
- The emissions baseline is the methane emissions that would have been produced under uncontrolled, site-specific anaerobic storage conditions and released directly to the atmosphere in the absence of the offset project (detailed assumptions and methodologies are provided).
- Emissions reductions may not exceed the potential emissions of the anaerobic digester.
- If the project is a regional-type digester, CO_2 emissions from manure and organic food waste transportation must be subtracted from project emission reductions.
- To monitor emissions, projects must use a system that provides metering of biogas volumetric flow rate and determination of methane concentration.

Quantitative limits on offsets use

Initially, offsets can be used to meet up to 3.3% of a covered source's total reported CO_2 emissions in a three-year long compliance period. However, the use of offsets is allowed to increase to 5% if the rolling average price of CO_2 emission allowances (calculated based on the most recent twelve-month period) reaches \$7/tCO_2, and increases to 10% if the rolling average price for a twelve-month period reaches \$10/tCO_2. In addition, if the \$10/tCO_2 rolling average

price threshold is reached, RGGI allows European Union Allowances (EUAs) from the EU ETS and CERs and ERUs under the CDM and JI mechanisms to be used for RGGI compliance.

Qualitative limits on offsets use

Eligible RGGI "offset allowances" can be generated from GHG emission reduction projects initiated after December 20, 2005 anywhere in the U.S., provided that a formal Memorandum of Understanding (MOU) has been signed with the proper state authority in the state which the offset project is located. At this time, it is not clear what terms and requirements need to be contained in such MOU's nor the process for how such MOU's are to be negotiated between RGGI and interested states that are not part of RGGI.

Other issues

Crediting period. The initial crediting period for offset projects is ten years. Offsets may be issued for a second 10-year period if the project sponsor has submitted a "consistency application" for the project that received approval. For afforestation projects, the crediting period is 20 years and also is renewable.

Process for offset issuance

- *Consistency application*. This includes project description, emissions baseline determination, explanation of quantification, monitoring and verification approach, and a monitoring and verification report. An independent accredited verifier must sign a verification report and certification statement that addresses whether the project meets eligibility requirements, baseline measurement requirements, and monitoring and verification plan requirements.
- *Consistency determination*. This is a determination by the regulatory agency that the offset project is consistent with all relevant standards and requirements in the RGGI Model Rule. It must be performed within 120 days following receipt of the application).
- *Approval of a monitoring and verification report*. Such reports must be submitted annually for all project types except afforestation, for which total carbon stock within the project boundary must be calculated at least every 5 years. For projects undertaken after January 1, 2009, the monitoring and verification report must be submitted within 6 months after the last year in which emission reductions took place.
- *Offset issuance*. Following approval of a monitoring and verification report, the regulatory authority issues offsets for the project for the applicable period.

Audit. The implementation of projects, including monitoring and verification, may be audited by the regulatory authority or its agent.

S. 3036 – "America's Climate Security Act of 2007" (aka "Lieberman-Warner")

The Lieberman-Warner bill was selected for evaluation here because it was considered on the Senate floor in June 2008, and because it contains detailed offset program design provisions which may be incorporated into subsequent Federal legislative proposals.

Eligible Activities

EPA will consider making the following project activities eligible to create offsets:

1) Agricultural and rangeland sequestration and management, including:
   - Tillage practices;
   - Winter cover/continuous cropping to increase biomass for soil;
   - Cropland to grassland conversion;
   - Reduction of nitrogen fertilizer or increase in efficiency;
   - Reductions from frequency/duration of flooding rice paddies; and
   - Reductions from organic soils.
2) Land-use and forestry, including:
   - Afforestation or reforestation of acreage not forested as of Oct. 18, 2007; and
   - Increasing forest stand volume.
3) Manure management and disposal, including:
   - Waste aeration; and
   - Methane capture and combustion.
4) Terrestrial practices identified by EPA Administrator, including:
   - Capture and reduction of fugitive emissions from uncovered sources;
   - Methane capture and combustion from nonagricultural facilities; and
   - Other approved actions.
5) EPA may issue a list of technologies and associated performance benchmarks that can be considered additional in specific applications (valid for maximum of 5 years).

Other project types. The bill also would allow for consideration of other types of offset activities that are not linked to agricultural, forestry, or other land use-related projects and that are proposed by petition.

Additionality, baselines, and measurement of emission reductions

S. 3036 delegates the development of methodologies for additionality determinations and baselines to the EPA, but imposes several requirements. Methodologies must specify rules and methods for:

- Determining project eligibility and additionality (including a test to assess whether the project would have taken place in the absence of revenues from the sale of offsets – i.e., a financial additionality test). (*Note that RGGI does not contain a financial additionality test, and the Dingell-Boucher draft legislation also does not call for the inclusion of such a test in offset regulations.*)
- Determining project baselines that ensure additionality. The project developer is required to establish the project baseline. EPA may issue a list of technologies and associated performance benchmarks the achievement of which will be considered to be additional in specific project applications. Such a list would be valid for 5 years. (*This suggests that the Lieberman-Warner bill, like RGGI, could incorporate performance standards in eligibility and additionality tests, although the bill does not require the use of performance*

benchmarks. The bill does not explicitly call for standardized baselines, although it also does not preclude them.)

- Monitoring, verification and reporting;
- Determining leakage;
- Determining whether an offset project receives support from an allowance allocation under the bill or any other government incentive, subsidy or mandate, and whether offsets are not double-counted under any other program.
- Quantifying uncertainty in measurements of changes in emissions and sequestration;
- Determining whether a project receives support from an allowance allocation, subsidy, incentive or mandate;
- For sequestration projects:
    - Measuring and accounting for reversals and managing the risk of reversals. (*Note that managing the risk of reversals could entail mandatory contributions of a portion of offsets from sequestration projects to a reserve pool, as recommended by the Nicholas Institute. Other proposals, such as the Dingell-Boucher draft, do not incorporate measures to manage the risk of reversals. The latter requires all reversals be compensated*.)
    - Determining whether the amount of sequestration occurring on project land changed significantly during the 10 years prior to project initiation (to ensure that cropland converted to grassland or rangeland has been in non-forest use for at least 10 years prior to the project);[45]
    - Estimating GHG fluxes or carbon stock for the project for 4 years prior to the enactment of offset regulations (to ensure that land is not converted, cleared or managed differently in anticipation of an offset regime);
    - Estimating GHG fluxes or carbon stock on comparable land based on similarity in current management practices, similarity of state, regional or local programs, and similarity of geographical and biophysical characteristics. (*This requirement suggests that sequestration projects must develop a dynamic emissions baseline based on emissions on comparable land under BAU. In contrast, RGGI does not appear to require the development of a dynamic baseline involving analysis of emissions on comparable land*.)
    - Discounting for uncertainty in monitoring and quantifying changes in carbon stocks in agricultural and forestry projects, and in determining additionality and leakage (based on an "exaggerated proportional discount that increases relative to uncertainty"). (*The Dingell-Boucher draft has a somewhat similar provision calling for the use of a "conservative [discounting] coefficient that accounts for uncertainty.")*
- For emission reduction projects,
    - Estimating GHG fluxes on comparable land or facilities. (*Other programs and proposals do not appear to require such estimates.*)

[45] RGGI also requires that afforestation project land must have been non-forested for at least 10 years preceding the initiation of the project.

- A threshold of uncertainty above which an offset project will not be eligible to receive offsets. (*This provision is similar to a recommendation of the Nicholas Institute with respect to sequestration projects.*)

Timing. Eligible projects that commence operations after the promulgation of offset regulations will be eligible to generate offsets. Banked offsets that are registered or meet the standards of The Climate Registry (TCR), the California Action Registry (CCAR), the GHG Registry, the Chicago Climate Exchange (CCX), the GHG Clean Projects Registry, or any other Federal, State or private reporting programs or registries may be allowed to transfer into the program's offset registry if the Administrator determines that they meet all relevant requirements under the bill.

Quantitative limits on offset use

The Lieberman-Warner bill sets a *program-wide limit* on domestic offset use at 15% of each annual emissions cap, rather than each covered entity's compliance obligation. It is not clear whether or how the program-wide limit would potentially flow down to covered entities; possible approaches include a first-come-first-served approach, pro-rating the limit to entities or some other approach. The bill also sets an additional program-wide limit on international offsets at 15% of each annual emissions cap, 5% of which can be project-based credits and 10% of which can be international forestry credits. If these limits are not fully satisfied, international allowances from a comparable program can be used to meet the shortfall.

Qualitative limits on offset use

As noted above, offset categories eligible for consideration include those specified in the bill. Other categories that are proposed by petition also may be considered. With respect to international project-based offsets, EPA must determine whether such offsets meet requirements comparable to the U.S. program, and assure that offset credits do not come from projects that compete directly with a U.S. facility. (Other proposals and programs do not appear to include a similar provision.)

With regard to international forestry credits, EPA, in conjunction with the Secretary of State, must establish a list of countries from which such credits may be generated. Selection criteria include the availability of historical data on changes in national carbon stocks, relevant technical capacity and institutional capacity to participate in international forestry activities, a credible national baseline, the achievement of reductions below the baseline, the implementation of an emission reduction program for the forestry sector, and demonstration of the reductions using remote sensing technology, taking into account international standards. *(These provisions are similar to those in the Dingell-Boucher draft legislation. One exception is that the latter would impose a discount of at least 10% on offsets from countries deemed not to have a credible baseline after 10 years, and would discontinue allowing offsets to be generated from countries deemed not to have a credible baseline after 15 years.*)

Other issues

Crediting period. An emission baseline approved for an offset project shall be valid for a period of 5 years before being subject to revision. However, the length of the offset crediting period is left to the discretion of the EPA Administrator. (*This compares with a potentially renewable 10-*

year allocation period for emission-reducing offset projects under RGGI, the Nicholas Institute's recommendation of a 7- to 10-year crediting period, and the Dingell-Boucher draft's 5- to 10-year potentially renewable crediting period.)

Methodology testing and approval. Methodologies will only be approved if they have been tested by three (3) independent expert teams on at least three (3) different offset projects, and if their estimates of emission reductions or sequestrations do not differ by more than 10 percent. (*This provision is similar to a recommendation by the Nicholas Institute. RGGI and the Dingell-Boucher draft do not appear to contain a similar provision.*)

Project review and approval process

- A project developer may submit a petition for approval of an offset project any time after the issuance of offset program regulations. The petition must include: 1) a copy of the monitoring and quantification plan; and 2) a GHG "initiation certification" (a certification that seeks to exclude activities that undermine the integrity of the offset program, such as the conversion or clearing of land, or marked change in management regime, in anticipation of offset project initiation).
- Within 180 days, EPA must determine if the monitoring and quantification plan satisfies all requirements, determine whether the GHG initiation certification indicates a significant deviation, and notify the project developer of the determinations.
- The monitoring and quantification plan must be prepared prior to offset project initiation; the EPA Administrator and the Secretary of the Department of Agriculture will specify requirements for the plan, including those relating to:
    - Determination of accounting periods;
    - Content and timing of public reports;
    - Delineation of project boundaries;
    - Selection and description of monitoring and quantification tools to monitor and quantify changes in GHG carbon fluxes and carbon stocks associated with a project; and,
    - Selection and description of standardized methods for determining additionality and uncertainty, estimating the baseline, and discounting for leakage.

House Energy & Commerce Committee Draft Climate Change Legislation dated October 7, 2008 ("Dingell-Boucher Draft")

This proposal was introduced after Congress went out of session in October 2008. This draft legislation may receive significant attention in 2009 since it was introduced by the Chairman of

the committee[46] and the Chairman of the subcommittee[47] with jurisdiction over climate change policy in the U.S. House of Representatives.[48]

Eligible activities

The list of eligible project types will include:

- Methane collection and combustion projects at active underground coal mines;
- Methane collection and combustion projects at landfills;
- Methane collection and combustion projects involving manure management; and
- Afforestation or reforestation of acreage not forested as of January 1, 2008.

The following additional project types will also be considered for eligibility:

- Practices that increase agricultural soil carbon sequestration
- Conversion of cropland to rangeland or grassland;
- Reduction of nitrogen fertilizer use or increase in nitrogen use efficiency;
- Forest management resulting in an additional increase in forest stand volume;
- Reduced deforestation;
- Methane reduction from reclamation of abandoned surface mines;
- Recycling and waste minimization;
- Controlled wastewater treatment; and
- Categories proposed to the EPA Administrator by petition.

Additionality, baselines, and measurement of emission reductions

Emissions reductions, avoided emissions or sequestration are not considered additional if they are common practice in a relevant geographic area, or if they are required or undertaken to comply with any Federal, State or local law or regulation.

The Dingell-Boucher draft calls for a standardized methodology to be used for determining additionality "relative to a performance threshold or baseline for the eligible project category." (*In addition to calling for a standardized approach for determining additionality, it also appears to call for the use of standardized baselines. RGGI uses standardized methodologies for determining eligibility and additionality (all eligible projects are considered additional), but provides detailed baseline methodologies that generally require the preparation of a fair amount of project-specific data (although they also provide other standardized data inputs). The Lieberman-Warner is silent on the topic of standardized baselines.)*

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[46] John Dingell (D-MI) is the Chairman of the Committee on Energy and Commerce, United States House of Representatives.

[47] Rick Boucher (D-VA) is the Chairman of the Subcommittee on Energy and Air Quality, United States House of Representatives.

[48] On November 20, 2008, Henry Waxman (D-CA) successfully challenged Mr. Dingell for the Chairmanship of this powerful committee. Mr. Waxman will be the new Chairman of the committee in the upcoming 111th Congress.

Other issues

Discounting for uncertainty in sequestration projects. The protocol(s) addressing measurement of emission reductions, avoidance or sequestration must incorporate standardized methods for determining and discounting for uncertainty in biological sequestration projects. The methods must take into account the robustness and rigor of methodologies for determining measurement, additionality, leakage, and permanence, and must use a "conservative coefficient that accounts for uncertainty." (*This is somewhat similar to the Lieberman-Warner bill's "exaggerated proportional discount that increases relative to uncertainty."*)

Project review and approval process. Project design plans must be submitted to the EPA Administrator prior to initiation of an offset project, and must include a monitoring and quantification plan, and a certification that the project will not have adverse impacts on the environment. The Administrator must determine within 60 days whether it meets all requirements, notify the project representative, and, if the plan has been approved, register the project. A process will be established to provide for appeal and review of rejected project plans. Within 90 days of receiving a verification report regarding the project's performance from an accredited verifier, the Administrator must approve or reject the project, notify the project representative of this ruling, and if appropriate, "register the offset credits," (i.e., assign them unique serial numbers in the registry), and issue the offset credits.

Crediting period. The crediting period for offset projects is to be no less than 5 and no more than 10 years for project types other than afforestation or reforestation, which will have a crediting period of 20 years. Offset projects can petition to renew the crediting period subject to the most recent standards, protocols, and project eligibility requirements. A petition may not be submitted more than 18 months before the end of the pending crediting period.

Updating of methodologies. Methodologies, protocols and standards must be reviewed and updated as needed at least every 5 years.

Sequestration reversals. Regulations will be developed to account for and address reversals in sequestration projects. They will include sanctions for failure to report reversals, provisions assigning liability and responsibility for mitigating and fully compensating reversals, and any other provisions necessary to address reversals. (*While the Dingell-Boucher draft calls for compensation for reversals, it does not explicitly call for measures to manage the risk of reversals, as does the Lieberman-Warner bill. Such measures might include requiring a set-aside of sequestered tonnes to create an insurance pool that could be drawn upon in case of reversals, as recommended by the Nicholas Institute.*)

Quantitative limits on offset use

The Dingell-Boucher draft proposal would allow a covered entity to meet up to 5% of its annual compliance obligation (i.e., its covered GHG emissions) with a combination of both domestic offsets and international offsets from 2012 to 2017, and up to 15% from 2018 to 2020. From 2021-2024, a covered entity would be able to meet up to 15% of its compliance obligation with domestic offset credits and an additional 15% with international offset credits. From 2025 and beyond, domestic offset limits are increased to 20% while international credits and allowances remain at 15%. There is no limit on the use of hydrofluorocarbon (HFC) destruction allowances and international allowances from approved programs. (*Unlike the Lieberman-Warner bill,*

which proposes an offset limit based on a fixed percentage of compliance, the Dingell-Boucher draft expands the volume of offsets allowed to be used for compliance over time as emission reduction requirements become more stringent.)

Qualitative limits on offset use

The list of eligible activities and activities to be considered are described above under "Eligible activities." With respect to the inclusion of international offset credits and allowances, EPA in consultation with the Secretary of State must determine whether a foreign climate change program implements comparably stringent requirements to those established in the U.S. proposal. Allowances from qualifying international climate change programs (i.e., that impose absolute emission caps and are at least as stringent as the U.S. program) may be used for compliance, provided they are not "in the nature of an offset credit or allowance awarded" for reductions or sequestrations that are not subject to coverage under the absolute emissions cap. With respect to international offset credits (as distinct from international allowances), regulations will be developed regarding listing and approval of qualifying international offset credits. Such regulations must be as stringent as those applying to U.S. domestic offsets. Credits from international offset projects that destroy hydrofluorocarbons would not be eligible.

Timing

- Offset projects that commenced operations after January 1, 2002 but before the date of enactment of the bill, and that meet the standards of existing Federal, State, or regional GHG registries, may be eligible to receive "early action" emission allowances.
- Projects meeting these standards and that started: 1) before 2006, or 2) after 2008 but before promulgation of offset regulations, would be eligible to generate offset credits for emission reductions that occur after the promulgation of offset regulations. Regulations are required to be promulgated within 2 years of enactment of the bill.

Offsets from international forest carbon activities. Provisions relating to offsets from international forest carbon activities in the Dingell-Boucher draft are very similar to those included in the Lieberman-Warner bill. In addition, the Dingell-Boucher draft states that, within 10 years of enactment of the bill, a discount of at least 10% may be applied to international offsets to be generated from projects located in specific countries if: 1) the country accounts for more than 0.5% of global GHG emissions; and 2) it is determined that the country has not established a credible national deforestation baseline or has not reduced total emissions from deforestation and forest degradation. After 15 years, if a similar determination is made, the country will be disqualified from generating offset credits from international forest carbon activities under the U.S. program.

Western Climate Initiative (WCI)

On September 23, 2008, the Western Climate Initiative (WCI) issued its "Design Recommendations for the WCI Regional Cap and Trade Program.[49]" According to the WCI, the proposed cap and trade program will be considered by WCI participants ("participants" here

[49] "Design Recommendations for the WCI Regional Cap-and-Trade Program," Western Climate Initiative, September 23, 2008

refers to the individual states and provinces who are WCI members) and steps will be taken to implement it in time to start the program in 2012.

Phase 1 of the program will run from 2012 to 2014, and will cover GHG emissions from electricity generation (including emissions from electricity imported into WCI jurisdictions), combustion at industrial and commercial facilities, and industrial process emission sources, including oil and gas process emissions.

In Phase 2, program coverage is proposed to expand to include transportation fuels and residential, commercial and industrial fuels. As discussed below, the design recommendations also include provisions on the design of the WCI offset program. However, some of the key details of the proposed offset program, such as the standards and processes for approving offset projects, have not yet been fully developed.

Eligible activities

WCI has identified the following types of offset activities as priorities to investigate and develop further as WCI offsets, but at this point the WCI does not guarantee that they will be included in the final offsets program.

- Agriculture (soil sequestration and manure management);
- Forestry (afforestation/reforestation, forest management, forest preservation/conservation, forest products); and
- Waste management (landfill gas and wastewater management).

Protocols for eligible activities will be developed by the WCI participants starting in 2009. WCI participants will use protocols that are "standardized to the extent possible and make use of (or adapt if needed), existing protocols as appropriate." They also will establish a process to review and approve other offset project types and protocols proposed by project developers.

Additionality, baselines, and measurement of emission reductions.

WCI will address these design elements in its offset protocols which will be developed prior to the start of the trading program in 2012.

Quantitative limits on offset use

The states participating in the WCI have agreed to limit the use of all eligible offsets and allowances from other jurisdictions (e.g., EU allowances) to no more than 49% of the total emission reductions to be achieved between 2012-20 so as to ensure that a majority (at least 51%) of reductions are achieved at WCI covered entities and facilities. The limit is based on aggregate reductions over the 2012-2020 period, rather than based on annual reductions to provide additional flexibility to covered entities. The participating WCI states may opt to set lower percentage limits.

Qualitative limits on offset use

All offsets and allowances from other jurisdictions must meet rigorous criteria to be established by the WCI participants. These include additionality requirements, the requirement that offset projects must be enforceable by the WCI jurisdiction that issues the credit, and the requirement

that offsets must be verifiable by the WCI jurisdiction that accepts the credit for compliance. In addition, criteria must ensure that offsets and allowances from other jurisdictions are not double-counted.

Offset projects located throughout the U.S., Canada and Mexico may be approved and certified if they are subject to "comparably rigorous oversight, validation, verification, and enforcement and those located within the WCI jurisdictions."

Offset credits from CDM projects may be accepted. WCI participants may opt to establish "added criteria to ensure similar rigor to WCI approved/certified offset projects or other requirements, such as international offset standards, as appropriate to enable use of these offset credits in the cap-and-trade program."

WCI participants may not approve offset credits from projects in developed countries that reduce, remove or avoid emissions from sources that within WCI jurisdictions are covered by the cap-and-trade program.

Stakeholder Proposals

Nicholas Institute for Environmental Policy Solutions[50, 51]

After working with a number of U.S. Senate offices to develop a domestic forest and agricultural offsets provision, the Nicholas Institute set the goal of developing a complete offset policy framework "that has enough rigor and transparency to meet environmental goals without creating a process so onerous that it discourages participation."[52] A working group of experts in GHG offsets and policy worked with the Institute to develop the proposed policy framework.

Eligible activities

The Nicholas Institute recommends that in addition to the offset activity categories included in the Lieberman-Warner bill, the following categories of activities should be considered for inclusion in an offsets program:

- Carbon capture and geological storage for emissions not covered under the cap;
- Unregulated and uncapped fuel cycle efficiency activities;
- Composting of municipal solid waste to avoid methane production; and
- Emission reductions from entities in sectors which include covered facilities, but where the entity does not qualify as a facility to be covered under the trading program (e.g., facilities that do not meet the minimum emissions threshold to be covered).

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[50] The Nicholas Institute is "a nonpartisan institute founded in 2005 to engage with decision makers in government, the private sector, and the nonprofit community to develop innovative proposals that address critical environmental challenges." More information is available at http://www.nicholas.duke.edu/institute/about.html.
[51] "Designing Offset Policy for the U.S.," Nicholas Institute for Environmental Policy Solutions, Duke University, Lydia Olander, T. Profeta, C. Galik, B. Murray and M. Dawson, May 2008, NI R 08-01.
[52] "Designing Offset Policy for the U.S.," Nicholas Institute for Environmental Policy Solutions, op. cit.

Additionality, baselines, and measurement of emission reductions

Additionality tests. The Nicholas Institute recommends that eligibility and additionality requirements be based on such criteria as the following:

- *Performance benchmark*. The project activity must perform at a rate (e.g., methane emissions per ton of hog waste stored) that is lower than a benchmark defined by the EPA Administrator.
- *Regulatory*. The project activity is not required by existing government regulations or commonly accepted industry (sector) standards as determined by the Administrator.
- *Technology-specific*. Technologies are predetermined by the Administrator to be additional or eligible.
- *Common practice*. The project activity must utilize technologies or practices that are not in common use (e.g., 85th percentile above mean or better) within a particular jurisdiction or industry as defined by the Administrator.
- *Initiation date*. The project activity must be initiated by a certain date to be determined by the Administrator.
- *Financial*. Revenue from the sale of offset allowances can be shown to contribute to the financial viability of the project and the project is not the least-cost alternative, as defined by the Administrator. This test cannot be used exclusively, but must be used to corroborate one of the others."

(*While these recommendations are not prescriptive, they are generally more specific than those in the Lieberman-Warner bill, which gives the Administrator authority to "issue a list of technologies and associated performance benchmarks the achievement of which will be considered to be additional in specific project applications." On the other hand, the Lieberman-Warner bill does prescribe that the eligibility and additionality test must include a financial additionality test. In contrast, the Nicholas Institute only suggests that a financial additionality test be considered.*)

Baselines. The Nicholas Institute report states that "where a new technology reduces or avoids emissions, the "baseline can simply be the emissions at the facility when using the standard existing technology or a performance standard X% below the industry-wide average emission rate for this activity." (*This language appears to support at least some use of standardized baselines.*) For sequestration projects, "historical reference periods projected forward in time or the initial standing carbon stock are the simplest methods and are commonly used," but may be less accurate if management practices change. The report notes another alternative would be to assume a dynamic emissions baseline reflecting evolving technologies and forest growth over time.

Quantitative limits on offset use

The Nicholas Institute recommends that quantitative limits on offset use be imposed at the national level and not the entity level. (*This approach was adopted in S. 3036, the version of the Lieberman-Warner bill that was considered on the Senate floor. The original version of the Lieberman-Warner bill (S.2191) imposed offset limits at the entity level).*

Other issues

Crediting period. The Nicholas Institute recommends that projects should be guaranteed a crediting period of 7 or 10 years at their approved baseline. In contrast, the Lieberman-Warner bill leaves the matter of crediting periods to the Administrator.

Methodology testing and approval. Each methodology should be tested by three independent expert teams on at least three different projects, and estimates of reductions or sequestration for a given project must be within 10% of each other. (*This approach was adopted in the Lieberman-Warner bill.*)

Quantification of uncertainty. Sequestration project methodologies incorporate "tables (or certified tools) that provide a threshold of uncertainty for quantification of emissions reduction or increases in sequestration and for baseline estimation above which no emissions reductions or sequestration will be compensated." (*This is similar to a provision in the Lieberman-Warner bill.*)

Mitigation of reversal risk. All sequestration projects should have a set-aside of offset allowances withdrawn from their account to guarantee that all offset project reversals (i.e., the loss of sequestered tonnes after they have been credited due to such causes as flooding or fire) are fully compensated. The set-aside would be proportional to risk, and would be calculated in the monitoring and quantification plan for sequestration projects based on certified methods. (*The Lieberman-Warner bill calls for the development of regulations to manage the risk of project reversal, and requires annual certification to determine and compensate for any project reversal, but does not prescribe any approach for mitigating project reversal risk. While the Dingell-Boucher draft calls for compensation of reversals, it does not explicitly call for measures to manage the risk of reversals. RGGI also does not require such measures.*)

Offset Quality Initiative (OQI)

The Offset Quality Initiative (OQI) is an initiative of six non-governmental organizations (NGOs), including The Climate Trust, Pew Center on Global Climate Change, California Climate Action Registry, Environmental Resources Trust, Greenhouse Gas Management Institute and The Climate Group. In July 2008, OQI published a "white paper" to provide guidance to U.S. policymakers on the design of offset policies.[53]

Eligible activities

OQI does not recommend inclusion of specific offset categories, although it believes that "biological sequestration, particularly avoided deforestation, is a vital category of mitigation opportunity." However, OQI notes that *direct emission reductions* should be the preferred source of offset credits, while *indirect emission reductions*[54] should not be included in a U.S. offset program unless problems of double-counting and ownership issues are resolved.

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[53] "Ensuring Offset Quality: Integrating High Quality Greenhouse Gas Offsets Into North American Cap-and-Trade Policy," Offset Quality Initiative, July 2008, http://www.pewclimate.org/docUploads/OQI-Ensuring-Offset-Quality-white-paper.pdf.

[54] Indirect emissions reductions occur at a location other than the project site. Examples include: i) energy efficiency and ii) renewable energy projects that cause power plants to generate less electricity and thereby emit less carbon

Additionality, baselines, and measurement of emission reductions

The OQI paper describes three approaches that can be used to determine project additionality, estimate baselines, and quantify project emission reductions:[55]

- ***Project-specific assessments***. These are "individual or case-by-case examinations of the unique circumstances of a proposed offset project. Individualized assessments may be made regarding a project's additionality, baseline, quantification, and crediting period." The CDM utilizes this approach.
- ***Standardized approaches***. "These approaches credit reductions on the basis of uniformly applicable criteria." These include performance standards (e.g., emission rates, energy use rates, market penetration rates) and technology benchmarks (specific technologies in certain sectors and locations that are automatically deemed additional). To a large extent, EPA's voluntary Climate Leaders program utilizes standardized approaches.
- ***Hybrid approaches***. These approaches combine "elements of both project-specific and standardized methodologies to balance the strengths and weaknesses of both."

OQI recommends the adoption of a hybrid approach, which "strikes the best balance between transparency and standardization, while taking into account the consideration of project-specific circumstances."[56] It notes that "[r]egulation should strive to integrate the transparency and consistency of standardized approaches, while capitalizing on the flexibility and adaptability of project-specific approaches."

For this reason, OQI recommends the hybrid approach to developing regulations for the assessment of offset project additionality, baseline establishment, quantification, and crediting periods." It further notes that while standardized approaches are often advocated, "all approaches will in reality be some hybrid of standardized and case-by-case assessments… [because] individualized expert judgment is often required to ensure that reasonable and accurate estimations of a project's reductions are properly credited."

Although OQI does not provide specific examples of a hybrid approach, one can imagine a hybrid approach might combine a performance standard with other tests, such as a timing test or another test that takes other project-level specifics into consideration.

The Lieberman-Warner bill, RGGI and the Dingell-Boucher draft can all be viewed as hybrid approaches. The Dingell-Boucher draft may represent the greatest use of standardization relative to RGGI and the Lieberman-Warner bill as it allows the potential use of standardized baselines. RGGI does not use standardized baselines, but does standardize additionality tests by equating eligibility to additionality. The Lieberman-Warner bill states that EPA may propose standardized additionality tests, but the bill's position on standardized baselines is not clear. It is possible that the Lieberman-Warner bill would be the most project-specific approach of the three proposals, as it would require project-specific financial additionality tests, and may require a project-specific approach for baselines with limited use of default values or standards.

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dioxide; and, iii) and material displacement that avoids emissions, e.g., the use of fly ash in concrete that reduces demand for cement and lowers cement sector emissions.

[55] Ibid.

[56] Ibid.

With respect to crediting periods, OQI recommends "conservative, multiyear and potentially renewable" crediting periods, and notes that initial crediting periods are usually five or ten years. (*This is similar to crediting provisions in the Lieberman-Warner bill, RGGI and the Dingell-Boucher draft.*)

Quantitative limits on offset use

OQI recommends offset programs avoid quantitative limits on offset supply and use.

Qualitative limits on offset use

OQI recommends offset programs not restrict offset eligibility by geographic location. It notes that "policy should be crafted to distort the market as little as possible, and to ensure that emission-reduction goals can be met in the most efficient, credible, and cost-effective manner possible."

Other issues

OQI recommends against the use of "temporary offsets" for sequestration project activities "due to its barriers to inter-market fungibility, additional administrative requirements, and movement towards a globally tradable and credible commodity." Instead, OQI states that measures should be taken to ensure replacement of offset credits in the event of project reversal. Options include: "insurance and bonding mechanisms to secure funding for replacement tons in the event of underperformance or reversal; buffer accounts that provide additional reductions that can be tapped in the event of underperformance or reversal; and strict covenants and easements on the use of land and forested areas, as well as long-term leases."

Summary of Workshop 3

The third workshop of the EPRI Greenhouse Gas Offset Policy Dialogue was held on November 20, 2008. Building on discussions from the first two workshops, in which participants developed a shared understanding of such key offset policy design elements as additionality and positive lists, the third workshop took a close look at the specific provisions incorporated in existing and proposed offset programs. The discussion addressed several topics, including but not limited to:

1. Offset provisions in the House Energy and Commerce Committee climate change draft legislation and the Lieberman-Warner bill;
2. Offset policy proposals by the Coalition for Emission Reduction Projects (CERP) and the Western Climate Initiative;
3. A comparison of how existing and proposed offset programs address key issues, including eligible activities, additionality, and quantitative and qualitative limits on offset use; and,
4. An evaluation of the House Energy and Commerce, Lieberman-Warner and CERP offset proposals.

Discussions on these and other topics are summarized below.

Dingell-Boucher Draft Legislation

On the morning of November 20 during the third workshop, a vote was held in the House of Representatives to select the new Chairman of the Energy and Commerce Committee. Representative Henry Waxman (D-CA) was successful in his challenge, and will replace Rep. John Dingell (D-MI) the longstanding Chairman of the Committee in the next Congress. As noted by a Congressional staff member, climate change likely will become a top priority in the next congressional session, along with the economy and health care. He mentioned recent comments from Senator Jeff Bingaman (D-NM) that suggest a continuing skepticism regarding the validity of offsets as a cost-containment option.

The staff person reviewed provisions in the recent Dingell-Boucher draft legislation, the fate of which is now in question, as it is not known whether the new Chairman will use the draft as a starting point for further legislative activity or will prefer to start fresh with his own legislative proposal. The draft legislation incorporates a 3-tiered positive list that consists of:

1. A "standard" list of projects that will be eligible (i.e., project types eligible under RGGI);
2. A list of other projects that will receive further consideration (i.e., agricultural and forestry sequestration approaches); and,
3. Other project types which may be proposed for consideration by petition.

Several provisions of the draft legislation are still "under construction," such as those relating to "credit for early action," reduced deforestation and additionality. With respect to additionality provisions, the staff person said that the "common practice element" (i.e., a provision stating that projects would not be considered additional if they are "common practice" in a relevant geographic area) was under discussion, and that he believed this approach made sense for some offset project types but could prevent other valuable offset projects from being developed in some cases.

Questions were raised regarding the draft bill's provision allowing project developers to request an initial project approval from EPA on a voluntary basis. The staff person responded that initial EPA approval would not be legally binding and so could later be reversed. Two respondents noted that this provision would create uncertainty for project investors.

The Lieberman-Warner Bill and Next Steps for Climate Legislation in 2009

A congressional staff person involved with the drafting of this legislation said the bill was instrumental in educating key members of Congress and moving the climate policy debate forward in Congress. However, he noted that there were difficulties in engaging colleagues to fully address some critical issues. In addition, he noted that many decisions on key provisions were relegated to the Executive Branch or left open for debate for future Congresses. He stressed the importance of involving members of Congress from agricultural states in future discussions about climate policy legislation, for example by promoting the inclusion of agricultural sequestration as an eligible offset category.

In response to questions, this staff person noted that:

- The Senate Environment and Public Works (EPW) Committee was likely to take action on climate legislation before the new Obama Administration takes any significant action, given the new administration's likely initial focus on the state of the nation's economy and other issues;
- The EPW Committee will focus on elements in the bill that are solely within the committee's traditional jurisdiction – i.e., Clean Air Act issues;
- Other elements of the bill such as those involving technology and fiscal policy would be addressed in other committees or through other legislative vehicles;
- The Senate Agriculture Committee likely will play a much more important role in shaping future climate legislation than previously has been the case; and,
- The issue of federal pre-emption of existing state and regional climate change mitigation programs likely will be very contentious and it may not be resolved until proposed legislation is the focus of debate on the Senate floor.

Offset Proposal of the Coalition for Emission Reduction Projects (CERP)

CERP's core principles and goals include (but are not limited to):

1. Facilitating certainty in project planning, especially with respect to project eligibility;
2. Providing project positive lists and standards upfront;
3. Establishing limits on the *use* of offsets versus limits on the *issuance* of offsets;
4. Addressing reversal / permanence risks inherent in forestry and some agricultural offset projects by creating a "buffer reserve;" and,
5. Allowing for the largest amount of offsets to be used at the beginning of any mandatory climate mitigation program.

With respect to project eligibility, CERP believes that if a project is approved, the only remaining task should be to verify that emissions reductions occurred, as opposed to additional reviews of the project. With respect to offset limits, it was noted that the Dingell-Boucher bill's expansion of offset use over time seems counter-intuitive, as offsets likely will be needed in the early years of program implementation, prior to the availability of next-generation emissions abatement technologies like carbon capture and storage (CCS).

CERP's position on offset use limits versus issuance limits triggered some debate, with some participants arguing that setting issuance limits would create year-to-year risk for project developers. Specifically, an issuance limit would force developers to submit a bid to receive offset credits for emission reduction projects in each year. As such, developers potentially could lose a year's worth of credits if their bid were received after the year's issuance limit had been reached. Others argued that use limits set at the firm level could result in under-utilization of the overall offset limit, as some firms likely would not need to fully use their offset limit. Still others responded that the market would find a way to resolve this problem (as suggested by experience in the EU ETS, where electric companies and other covered entities that need more CERs than allowed by their CER use limits are swapping secondary CERs for emissions allowances (EUAs) from industrial firms that will not exceed their CER use limit).

Western Climate Initiative (WCI)

The workshop included a presentation on the WCI offset program recommendations that were released on September 23, 2008. The presenter explained that the program's offsets limit of 49% of emission reductions to be achieved between 2012-2020 was similar to the supplementary limit employed in the EU ETS, and that each jurisdiction would be permitted to tighten the limit if deemed necessary.

A number of the WCI's offset program details will not be finalized until late 2009 or early 2010 including:

1. Whether or not the full amount of available offsets could be used right away, or at any other time during the program;
2. Establishing a definitive list of eligible projects as opposed to a list of "potential projects;" and,
3. Determining how early action credits may be treated.

The speaker also pointed out that the WCI would allow for indirect linkage with the RGGI program by allowing the purchase of and submission of RGGI offset credits for compliance with the WCI's emissions reduction goals. One workshop participant noted that RGGI prices likely would increase as a result of purchases from covered entities within the WCI jurisdictions. In response, it was noted that RGGI would not "sit idly by" if this occurred *en masse* and that the political consequences of such a "one-way linkage" were being considered.

Comparison of Provisions in Existing and Proposed Offset Systems

To facilitate the comparison and contrasting of key provisions contained in different offset programs and proposals, another speaker presented the side-by-side table presented in the background paper for the third workshop. This table is shown in Appendix C. The discussion compared and contrasted provisions in the CDM, RGGI, the Lieberman-Warner bill, the Dingell-Boucher discussion draft, and the WCI relating to:

1. Additionality determination (including the use of standardized approaches);
2. Quantitative and qualitative limitations on offset use; and,
3. Other key provisions relating to project review processes, crediting periods, treatment of reversal risks, and discounting for uncertainty.

It was noted that both federal bills left many questions open with respect to their potential use of standardized approaches to additionality determinations. One participant expressed the view that standardized baselines could be used to determine the appropriate standard for additionality, and that this may be more appropriately addressed in regulation than in legislation.

Evaluation of the House Energy and Commerce, Lieberman-Warner and CERP Offset Proposals

Three workshop presenters offered their preliminary evaluations of the Dingell-Boucher, Lieberman-Warner and CERP proposals. Two of these presentations also focused on

recommendations of the Offset Quality Initiative (OQI) and the Nicolas Institute for Environmental Policy Solutions.

With respect to additionality and eligibility, one presenter noted that eligibility must be based on BAU, as called for in the Dingell-Boucher draft's "common practice" requirement. He and other participants also noted a trend toward the use of a buffer reserve.

With respect to project-related discounting, he discussed the possibility of allowing "opt-ins" (i.e. allowing sectors to voluntarily opt in to a cap-and-trade program) for certain economic sectors if including them in an offset program necessitates the use of multiple discounts to account for uncertainties relating to additionality, measurement and/or leakage. He recommended that a short positive list be proposed for Congressional approval in 2009 in order to avoid delays in securing approval and allow for the timely development of the offset market.

The presentation prompted some discussion on early offset projects, with two participants expressing the view that such projects should receive recognition to reward early movers and encourage new project development. In response, it was noted that crediting for early offsets will depend largely upon the methodologies used and on the programs/registries in which they were approved, and highlighted that only a very small supply of domestic early offsets exist at this point.

The final presenter emphasized that investment capital cannot and will not be available for project development without a clear understanding of the details of the offset project approval process. To date, current legislative proposals do not offer clear approval process details and thus it remains unclear where and how financing might be engaged for offset projects. In his view, the Lieberman-Warner proposal tilts toward a project-by-project approval process as the applicable standards for individual projects are unclear. In addition, while the three-tired project evaluation list (positive list, potential projects, and petition) contained in the Dingell-Boucher draft is a good approach, there are uncertainties regarding project criteria and the binding (or non-binding) nature of regulatory decisions on eligibility. He also mentioned that tight quantitative limits early in program would lead to the necessity of creating bankable credits for future years.

Issues Relating to Terrestrial Sequestration Projects

During the workshop several questions and comments relating to terrestrial-based carbon sequestration projects were raised, particularly with respect to reversal risks and buffer reserves. One participant asked what would happen when the reserve "goes broke," noting that if the buffer is used in cases where a project stops reporting, it could be drawn down quickly. Another participant said that the government is the best entity to "own" reversal risks, particularly if such risks are linked to country-level international emission reduction obligation. He proposed an alternative to a buffer reserve in which forest owners could voluntarily opt-in, and could be given credits (e.g., sinks credits under the Kyoto Protocol – so-called Removal Units or "RMUs") when carbon stocks increase. If entities' carbon stocks decline, they would be required to purchase allowances to cover the associated carbon emissions. This approach would eliminate the need to demonstrate additionality. In response to this "opt-in" proposal, a question was raised whether it would give credit to those entities that likely would have undertaken such offset projects as part of their BAU activities.

In other remarks, one participant questioned whether many international forestry projects would be credible. Another emphasized that despite the challenges posed by agricultural and sequestration projects, they could supply up to 80-90% of offset volume and therefore simply could not be ignored.

Closing Comments

At the end of the third workshop, one participant emphasized the need for offset proponents to be more effective in addressing negative public perceptions about GHG emissions offsets by leveraging the real experience gained in the CDM. He noted that when Senator Bingaman and others question the quality of offsets in general, supporters of offsets need to pay attention. Concluding remarks noted that many important issues (e.g., permanence risk) had been raised during the workshop related to implementation of terrestrial sequestration projects, and many participants reiterated that a separate workshop focusing on these issues would be valuable.

Given the interest in terrestrial sequestration projects, EPRI has decided that the fourth offsets workshop scheduled for February 2009 will focus on terrestrial GHG emissions offsets and will try to address key issues such as permanence and leakage that must be resolved if these types of projects are going to be the source of large-scale GHG offsets in the future.

5
KEY INSIGHTS

The key insights that follow are based insights gleaned from the three EPRI GHG Emissions Offset Policy Dialogue workshops held in 2008, participants' comments at those workshops and the background papers prepared in advance of each of the three events. Given that additional information and insights will be gleaned from the workshops to be held in the first half of 2009, the following key insights and conclusions should be considered to be preliminary. These insights also do not reflect the complete range of discussions and topics addressed in the workshops to date. Rather, they are intended to highlight areas in which there appears to be some potential convergence of views and related topics which require further consideration.

Determining Additionality

Discussions held at the three workshops provided the opportunity to discuss participants' views on a wide range of topics related to offset policy design. Despite the range of perspectives represented at the workshop, convergence could be seen on one issue at the center of discussions on offset policy. Participants seem to agree that additionality determinations need to be rationalized if offset systems under development are going to be able to create substantial environmental and economic benefits.

More specifically, many participants seemed to agree that although the CDM has produced benefits, its project-by-project approaches to determining additionality adversely impact project development. It appears that many participants holding this view believe that properly designed offset systems that incorporate standardized approaches to additionality would work better and have a greater potential to deliver large-scale GHG emissions reductions.

Disadvantages of a Project-Specific Approach

Many Dialogue participants communicated that the CDM's project-specific approach to making additionality determinations and determining offset project eligibility was inefficient and resource-intensive, and resulted in increased transaction costs. The CDM approach also appears to impose significant uncertainty on offset developers, which has increased regulatory risk, thereby making it difficult to finance and develop offset projects.

Others noted that this approach can be subjective, as certain variables are very difficult to estimate accurately. It also can be resource-intensive for those working to assess and make additionality determinations, which could result in a backlog of projects waiting to be reviewed, as has occurred under the CDM. This is a challenge given that some economic models estimate that a U.S. domestic climate change mitigation program may require 800-1000 million metric tons CO_2e of offsets annually to achieve emissions targets as compared to the 150 Mt CO_2/year of offsets that are expected to be issued under the CDM.

Potential Benefits of Standardized Approaches

Workshop participants articulated that a well designed standardized approach to making additionality determinations could provide several benefits. Some participants noted that such an approach would be more efficient, and could result in larger numbers of offset projects being reviewed and approved thereby creating larger volumes of offsets that could be used to meet emission reduction targets. The availability of cost-effective offsets will be particularly important in early years of the program when abatement options for the electricity generation sector will be limited. Participants cited other benefits associated with using standardized approaches, including lower transaction costs, greater certainty for developers and buyers, and increased transparency in making additionality decisions. One workshop participant with significant experience as a regulator implementing the CDM expressed the view that a U.S. offset system would benefit from using a more standardized approach to making additionality determinations.

Challenges to Standardized Approaches

Workshop participants also identified and described several challenges associated with using standardized approaches for making additionality determinations. For example, a standardized approach might not be applicable to all kinds of projects. It may be prone to false positives (non-additional projects that pass the test) and false negatives (additional projects that will not pass the test). A standardized approach can be resource intensive for regulators, as it requires significant work up-front to collect data and set standards, as well as ongoing work to collect the data required to update standards on a regular basis. In addition, there is limited experience to date with standardized approaches.

There remains a considerable amount of skepticism among some policy-makers and representatives of environmental groups and the research community as to whether a system can be developed that assures the environmental integrity of offset projects. In this context, it will be particularly important to ensure that the process and standards used to determine the additionality of offset projects are thought to be sufficiently stringent to guarantee the integrity of the GHG emissions cap in a cap-and-trade program.

However, as was noted several times during the workshops, “the devil is in the details” with respect to additionality rules and offset policy design more broadly. If standards are overly stringent, the number of “false negatives would increase,” reducing supply and significantly increasing the costs of the cap-and-trade program for regulated firms and the economy as a whole. In the view of one participant, RGGI’s eligibility requirements are overly restrictive. Specifically, landfill gas “expansion” projects that increase gas capture from current levels are required to install a separate system of wells and pipes to measure incremental gas capture, rather than being able to use the existing system. According to this participant, this is cost prohibitive and prevents the development of potentially good projects.

It may be difficult to achieve the appropriate balance prior to market participants and policy-makers gaining actual implementation experience. However, as with any long-term issue, “learning-by-doing” will be extremely valuable in understanding the impacts of alternative approaches on the offset market. EPA’s and others views of the eligibility of a range of offset projects under different programs and the potential quantities of offset that would be created will be considered in the upcoming fifth EPRI offsets workshop and may provide additional insights I in this regard.

Participants made a number of interesting suggestions on ways to design additionality tests to achieve environmental and economic goals. One participant suggested that additionality tests be differentiated based on technologies and sectors. Benchmarks or technology standards could be used for new technologies that are not yet widely deployed, and standards could be updated over time as technology advances. Positive lists could be established for no-recourse projects such as methane capture projects in the agricultural sector. For other project types a streamlined additionality test could be developed based upon the following questions:

1. Is the project a least cost option?
2. Is it common or a long established practice?
3. Is it mandated by existing laws or regulations?

If the answer to any one of these questions is "no," then the proposed offset project could be considered additional. Otherwise, the project would require a more rigorous additionality test.

These and other suggestions will be considered in the development of the final project report.

Positive Lists

Positive lists of eligible, pre-qualified project types, and provisions for considering additional project types to be added to the list over time, is another area in which the participants in the EPRI offset workshops appear to be developing a convergence of views. This approach can facilitate project development, investment and financing, as it provides up-front certainty regarding offset project eligibility.

A suggestion by one workshop participant to propose a positive list of eligible offset project types for consideration by Congress in 2009 appeared to attract support from several workshop participants, who agreed that providing certainty to project developers regarding eligibility may be required to ensure that the offsets market is sufficiently robust if a comprehensive GHG cap-and-trade program is implemented in the future. This proposal might involve a relatively narrow list of offset project types for which there is widespread support, and this list could be expanded in the future.

However, some participants noted that a positive list may not always deliver the intended benefits, depending on particular design details. For example, one participant noted that while the Dingell-Boucher draft legislation's three-tiered positive list (i.e., eligible projects, projects to be considered and other projects that may be considered by petition) is useful, however, if a project developer opted to receive a project pre-approval from EPA – and if that pre-approval is not legally binding and later can be reversed – this will create uncertainty regarding project eligibility and discourage investment and project development.

Another participant noted that positive lists can be overly restrictive if they omit or deter the inclusion of certain project types that have great potential. A related point raised by one participant was that the challenge of a positive list will be to determine how additional project types can be added to the list in a manner that is not too burdensome. This suggests that combining a positive list of eligible projects with an option for project developers to submit for approval methodologies for other project types may provide the necessary flexibility to

implement and access more emission reductions. These and other ideas will be considered further in the development of the final project report in 2009.

Issues Related to Terrestrial Sequestration Projects

Over the course of the three project workshops, participants expressed significant interest in agricultural and forestry sequestration projects and the issues that will have to be addressed to facilitate and encourage such projects. Given the complexity of these issues (e.g., permanence and leakage), we decided the fourth workshop to be held in February 2009 would be devoted exclusively to these topics.

This workshop will explore the potential of these project types, key issues that require resolution if these offset project types are going to be included in offset programs in the future and how various existing offset programs have attempted to address these issues to date. Several participants noted that there appeared to be interest in the use of a "buffer reserve" to address project reversals, although one participant noted that there was a risk of the reserve being depleted, depending on the design of the program.

Another point of discussion related to the use of set-asides for terrestrial sequestration projects. One participant expressed the view that if various discounts were deemed necessary to minimize the risks inherent in certain types of sequestration projects, it might become preferable for those categories to be addressed through the creation of an allowance "set-aside," rather than through an offset program. This approach would negate concerns about permanence, allow for experience with these categories to be gained that may help to reduce uncertainties over time while ensuring that important categories of emissions reduction projects are developed. However, other participants expressed the view that using set-asides would make the emissions cap more stringent for regulated sectors, and therefore would conflict with the objective of cost containment. Many participants agreed that terrestrial sequestration offsets potentially are a large potential source of cost-effective reductions in the U.S.

These issues will be discussed in greater detail at the fourth EPRI offset workshop scheduled for February 2009. Insights gleaned from this next workshop will be incorporated into the final project report.

A
LIST OF EPRI GHG EMISSIONS OFFSET POLICY DIALOGUE PARTICIPANTS AND ORGANIZATIONS

First Name	Last Name	ORGANIZATION
Krista	Sweigert	AES Planet Solutions
Shawn	Shucker	Ameren
Scott	Weaver	American Electic Power (AEP)
Louis	Redshaw	Barclays Capital
Annika	Colston	Blue Source
Rob	Fowler	Booz Allen Hamilton
Rachel	Miller	BP
Derik	Broekoff	California Climate Action Registry (CCAR)
Martin	Hession	CDM Executive Board / UK Designated National Authority
John	Shinn	Chevron
Chris	Hunter	Climate Change Capital
Brian	Jones	Climate Change Capital / MJ Bradley
Alexia	Kelley	Climate Trust
Tom	Baumann	ClimateCheck & GHG Management Institute
William	Slide	Consolidated Edison
Val	Angelkov	Constellation Energy
Ross	Warner	Credit Suisse
George	Kramer	Deutsche Bank Securities Inc.
Brett	Orlando	Deutsche Bank Securities Inc.
Greg	Ryan	DTE Energy
Mariann	Quinn	Duke Energy
Gordon	Smith	EcoFor
Aimee	Barnes	EcoSecurities
Marc	Stuart	EcoSecurities
Dan	Chartier	Edison Electric Institute (EEI)
Eric	Holdsworth	Edison Electric Institute (EEI)
Francisco	de la Chesnaye	Electric Power Research Institute (EPRI)
Adam	Diamant	Electric Power Research Institute (EPRI)
Delavane	Diaz	Electric Power Research Institute (EPRI)
Vic	Niemeyer	Electric Power Research Institute (EPRI)
John	Novak	Electric Power Research Institute (EPRI)
Steve	Rose	Electric Power Research Institute (EPRI)
Tina	Taylor	Electric Power Research Institute (EPRI)
Tom	Wilson	Electric Power Research Institute (EPRI)
Jeffrey	Williams	Entergy
Ruben	Lubowski	Environmental Defense Fund (EDF)
Dick	Kempka	Equator Envrionmental, LLC
Tiffany	Potter	Equator Envrionmental, LLC
James	Mellody	First Energy
Mike	Saer	Great River Energy
Adam	Penque	Greenhouse Gas Services, LLC (AES-GE)

First Name	Last Name	ORGANIZATION
Michalene	Reilly	Hoosier Energy
Patrick	Courier	Hunton & Williams
David	Hunter	International Emissions Trading Association (IETA)
Doug	Stillwell	International Paper
Ben	Feldman	JP Morgan Chase
Alexander	Taft	Keyspan Energy
Einar	Telnes	Kolibri Group
Paul	Jun	Merrill Lynch
Parker	Weil	Merrill Lynch
Georg	Borsting	Ministry of Environment, Norway
Tamara	Thies	National Catteleman's Beef Association
Joe	Kruger	National Commission on Energy Policy (NCEP)
Dirk	Forrister	Natsource
Tom	Lawler	Natsource
Eric	Nelson	Natsource
Richard	Rosenzweig	Natsource
Rob	Youngman	Natsource
David	Doniger	Natural Resources Defense Council (NRDC)
Jake	Schmidt	Natural Resources Defense Council (NRDC)
Milo	Sjardin	New Energy Finance
Patricia	Meehan	New York Power Authority (NYPA)
Kolli	Rau	New York Power Authority (NYPA)
Brian	Murray	Nicholas Institute for Environmental Policy Solutions
Lydia	Olander	Nicholas Institute for Environmental Policy Solutions
Tim	Profeta	Nicholas Institute for Environmental Policy Solutions
Marty	Gitlin	Noble Carbon Credits, Ltd
Ben	Hengst	Office of Congressman John Dingell (D-MI)
David	Mcintosh	Office of Senator Joseph Lieberman (I-CT)
Steve	Black	Office of Senator Salazar (D-CO)
Elaine	Ulrich	Office of Senator Salazar (D-CO)
Phillip	Ovitt	Office of Senator Sam Brownback (R-KS)
Chris	Adamo	Office of Senator Stabenow (D-MI)
Ellen	Cohen	Office of Senator Joseph Lieberman (I-CT)
Jae	Edmonds	Pacific Northwest National Laboratory (PNNL)
Timothy	Juliani	PEW Center on Global Climate Change
Janet	Peace	PEW Center on Global Climate Change
Jeanette	Pablo	PNM Resources
Michael	Gillenwater	Princeton University
Steve	McDowell	Progress Energy
Brian	McQuown	Reliant Energy, Inc.
Chris	Sherry	RGGI / New Jersey Department of Environment
Jonathon	Black	Senate Energy & Natural Resources Committee
Joe	Goffman	Senate Environment and Public Works Committee
Tom	Hassenboehler	Senate Environment and Public Works Committee
Howard	Gollay	Southern California Edison (SCE)
Mike	Hertel	Southern California Edison (SCE)
Josh	Hale	Southern Company
Vicky	Sullivan	Southern Company
Michael	Lazarus	Stockholm Environmental Institute
Janet	Watts	Tennessee Valley Authority (TVA)
Sara	Hessenflow Harper	The Clark Group
Evan	Juska	The Climate Group

First Name	Last Name	ORGANIZATION
Eric	Hauxthaussen	The Nature Conservancy (TNC)
Michael	Wolosin	The Nature Conservancy (TNC)
William	Hohenstein	U.S. Department of Agriculture
Mark	Heil	U.S. Department of the Treasury
Keith	Kozloff	U.S. Department of the Treasury
William	Pizer	U.S. Department of the Treasury
Chris	Soares	U.S. Department of the Treasury
Dina	Kruger	U.S. Environmental Protection Agency (EPA)
Allen	Fawcett	U.S. Environmental Protection Agency (EPA)
Maurice	Lefranc	U.S. Environmental Protection Agency (EPA)
Kimberly	Todd	U.S. Environmental Protection Agency (EPA)
Melissa	Weitz	U.S. Environmental Protection Agency (EPA)
Kai Uwe	Schmidt	UNFCCC Secretariat
Kyle	Danish	Van Ness Feldman
Todd	Wooten	Van Ness Feldman
Marissa	Buchanan	Verdeo Group
Josh	Green	Verdeo Group
Donna	Danihel	WE Energies
Cameron	Prell	Williams Mullen
Franz	Litz	World Resources Institute (WRI)

B
DETAILS ON THE CLEAN DEVELOPMENT MECHANISM (CDM) APPROACH TO ADDITIONALITY

This appendix provides additional details on the CDM's additionality tests.

All GHG emission reduction projects submitted for approval (i.e., "registration" in the language of the CDM program) under the CDM must demonstrate that they are "*additional*." The CDM Executive Board (EB) has issued guidance on how CDM projects can demonstrate additionality, entitled "*Tool for the demonstration and assessment of additionality*." The guidance document was issued initially in 2004, and has since been periodically revisited and revised (the latest revision, issued as version 5, was published in May 2008).[57]

The four steps for demonstrating additionality under the CDM are:

- Step 1: "Identification of alternatives to the project activity"
- Step 2: "Investment analysis to determine that the proposed project activity is either: 1) not the most economically or financially attractive, or 2) not economically or financially feasible" (i.e. the "financial additionality" test)
- Step 3: "Barrier analysis"
- Step 4: "Common practice analysis" [58]

As discussed below, after undertaking step 1, a project developer may choose to demonstrate additionality by using the investment test *or* barrier analysis or both, *and* the common practice analysis. A summary of these steps follows.

Step 1: Identification of Alternative Scenarios.

This step identifies "realistic and credible" alternative scenarios to the project activity that are in compliance with mandatory legislation and regulations taking into account enforcement in the region or country. These scenarios must include:

- The activity itself without being registered as a CDM project activity;
- Alternatives that have been or are currently being implemented in the country/region that deliver outputs (e.g., cement) or services (e.g., electricity) of comparable quality, properties and application areas; or
- Continuation of the without-project scenario.

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[57] UNFCCC, CDM Executive Board, "Methodological Tool, "Tool for the demonstration and assessment of additionality," (Version 05), EB 39 Report, Annex 10, http://cdm.unfccc.int/EB/039/eb39_repan10.pdf .

[58] An additional requirement for demonstrating additionality applies to projects starting implementation prior to "validation" of the project by a qualified auditing or technical firm (a "Designated Operational Entity"). Such projects must provide evidence that the project was undertaken with the intention of submitting it as a CDM project.

If the only way to comply with mandatory laws and regulations is to implement the project activity, the activity will not be considered additional.

Step 2: Investment Analysis (also referred to as the "financial additionality" test)

The Investment analysis is used to determine whether the project activity is not the most economically or financially attractive scenario, or is not economically or financially feasible without revenue from the sale of emission reductions (Certified Emission Reductions - CERs) created by the project. (Importantly, project developers may choose between using the investment analysis and the barrier analysis, or may opt to use both to demonstrate additionality. In practice, some project developers do opt to undertake both tests in an attempt to strengthen their case that the project is additional.)

If the CDM project activity does not generate financial or economic benefits other than revenue from CER sales, the investment analysis is limited to a simple cost analysis (i.e., cost comparison of the with-project scenario and alternative scenarios). If at least one alternative is less costly than the project activity, then the additionality determination proceeds directly to Step 4 (common practice analysis). If this is not the case, then further barriers (Step 3) must first be identified.

If the CDM project activity creates other financial benefits (e.g., revenue derived from power sales in the case of a LFG-to-energy project), one of two analytical approaches must be employed. An investment comparison analysis compares all alternatives using a financial/economic indicator such as internal rate of return (IRR) or Net Present Value (NPV) that is most suitable for the project type and decision context. A benchmark analysis also identifies a financial/economic indicator such as IRR, calculates the IRR or other indicator for the project, but compares it to a benchmark rate in the market. A number of rules are used to determine discount rates and benchmark rates. The analysis and assumptions must be presented in a transparent manner in the Project Design Document (PDD) so that a reader can reproduce the analysis and obtain the same results. In addition, a sensitivity analysis must be performed to illustrate that the conclusion of the analysis is robust to different assumptions. If the analysis concludes that the project is unlikely to be the most financially/economically attractive among alternatives considered in the investment analysis, or is unlikely to be financially/economically attractive (i.e. it has a less favorable indicator (e.g. lower IRR) than the market benchmark), then the project proceeds to Step 4 (Common practice analysis). If the investment analysis indicates that from a financial perspective, the project would have been carried out in any case, then further barriers must be identified (Step 3).

Step 3: Barrier analysis

This step determines whether there are barriers that: i) prevent the implementation of the project specifically, and this type of project activity more generally; and ii) do not prevent the implementation of at least one of the alternatives. If the barriers prevent the undertaking of the project if it is not registered as a CDM project activity, and if the CDM would alleviate the barriers, then the project is additional. Otherwise, it is not additional. Barriers must be realistic and credible, and may include:

1. ***Investment barriers*** (e.g., similar activities only have been implemented in the relevant country/region with grants or non-commercial finance terms; or a lack of private capital available due to real or perceived country investment risks, as demonstrated by the country's credit rating or reputable country investment reports)
2. ***Technological barriers***. Examples include lack of skilled and/or properly trained labor in the country/region, creating a high risk of underperformance; lack of infrastructure for implementation and logistics for maintenance of the technology (e.g., lack of a gas transmission and distribution network); the risk of technology failure resulting from local circumstances is greater for the project than for alternatives; or the technology is not available in the country/region).
3. ***Barriers due to prevailing practice*** (e.g., the project is the first of its kind).
4. ***Other barriers*****.** These would be preferably specified in the underlying project methodology as examples.

Evidence must be transparent and documented from independent sources. Acceptable evidence includes legislation, market studies or surveys, national or international statistics, and expert judgments from industry. If one or more barriers to the project's implementation are identified, and if these barriers are shown not to prevent the implementation of at least one of the alternatives to the project, the additionality determination proceeds to Step 4 (Common practice analysis).

Step 4: Common Practice Analysis

This test is considered a "credibility check" for Steps 2 and/or 3. For projects that are not demonstrated to be the first of their kind in Step 3, an assessment is made of whether the project type has already diffused in the relevant sector and region. The assessment involves identifying (using documented and quantitative evidence) other activities that are operational and similar to the project activity (not including other CDM project activities). If similar operational activities are identified, the PDD must include information that explains and documents why those activities faced barriers or circumstances, or enjoyed benefits making them more financially attractive (e.g., subsidies), which the project activity did not face or cannot use. If this can be demonstrated, the project meets the requirements of Step 4.

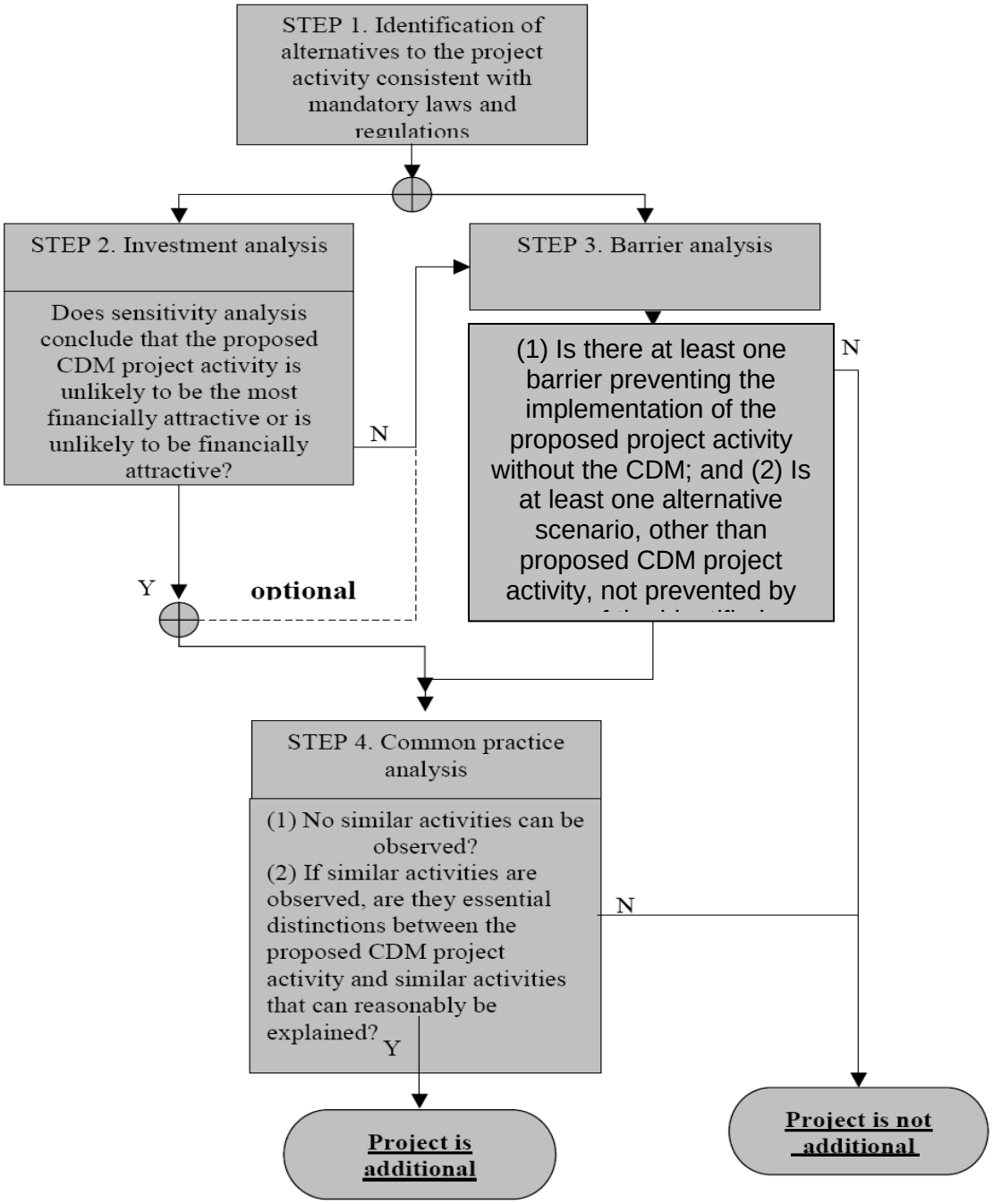

Figure B-1:
Tool for the demonstration and assessment of additionality (version 05)
Source: UNFCCC, CDM Executive Board, EB 39 Report, Annex 10, http://cdm.unfccc.int/EB/039/eb39_repan10.pdf.

C
REVIEW OF VARIOUS OFFSET POLICY PROPOSALS AND PROVISIONS

The various offset policy proposals and provisions reviewed in this paper are briefly summarized in the following table, which allows for a side-by-side comparison.

Table C-1
Summary Table Comparing Design Elements of Existing and Proposed Offset Programs

	Clean Development Mechanism (CDM)	Regional Greenhouse Gas Initiative (RGGI)	Lieberman-Warner bill (S. 3036, America's Climate Security Act of 2007)	Dingell-Boucher draft climate change legislation (House Energy and Commerce Committee)	Western Climate Initiative (WCI)
Eligible Activities	• No restrictions • Methodologies for any project type may be proposed by project developers and considered for approval • Over 100 approved methodologies • Methodologies may be subject to later modification by regulatory authority, which creates risks for project developers.	• Landfill methane capture and destruction; • SF_6 emission reductions; • Afforestation; • End-use efficiency reducing emissions from natural gas, propane and heating oil; • Methane reduction from farming operations	• Agricultural and rangeland sequestration and management; • Land-use and forestry (afforestation, reforestation, and increasing forest stand volume); • Manure management and disposal; • Terrestrial practices identified by EPA Administrator (includes fugitive emissions capture and combustion from uncovered sources, methane capture and combustion from non-agricultural facilities)	• Methane collection and combustion projects: 1) At active underground coal mines; 2) At landfills; and 3) Involving manure management. • Afforestation or reforestation • Other project types listed for consideration include: 1) agricultural soil carbon sequestration; 2) conversion of cropland to rangeland or grassland; 3) reduction of nitrogen fertilizer use or increase in nitrogen use efficiency; 4) forest management resulting in increased forest stand volume; 5) reduced deforestation; 6) methane reduction from reclamation of abandoned surface mines; 7) recycling and waste minimization; 8)controlled wastewater treatment	• Agriculture (soil sequestration and manure management); • Forestry (afforestation/ reforestation, forest management, forest preservation/ conservation, forest products), • Waste management (landfill gas and wastewater management).

	Clean Development Mechanism (CDM)	Regional Greenhouse Gas Initiative (RGGI)	Lieberman-Warner bill (S. 3036, America's Climate Security Act of 2007)	Dingell-Boucher draft climate change legislation (House Energy and Commerce Committee)	Western Climate Initiative (WCI)
Additionality, Baselines and Measurement of Emission Reductions **Additionality, Baselines and Measurement of Emission Reductions (Continued)**	• Additionality is demonstrated through; 1) a financial additionality test; OR 2) a barrier test; AND 3) a common practice test. • Additionality and baselines are determined on case-by-case, project-specific basis.	• Additionality is addressed in eligibility requirements, which include performance standards. • Baselines are project-specific, but baseline methodologies are detailed and include some standardized inputs.	• Additionality determination to include project-specific financial additionality test. • Additional tests could include standardized approaches (e.g. performance benchmarks). • No indication of position on use of standardized baselines. • Sequestration projects must develop a dynamic baseline based on emissions on comparable land (in contrast, RGGI does not require a dynamic baseline).	• Calls for EPA to develop standardized methodologies (e.g. performance threshold) for determining additionality, and appears to call for consideration of standardized baselines.	• Protocols will be "standardized to the extent possible and make use of (or adapt if needed), existing protocols as appropriate." • Protocols to be developed prior to start of program in 2012.
Quantitative Limits on Offset Use	• Kyoto Protocol (KP) has no firm quantitative offset limits, but calls for use of CDM and JI credits for compliance to be "supplemental" to domestic action. • EU countries and other countries aim to use CDM and JI credits to meet no more than 50% of their Kyoto emission reduction obligation.	• Offset limit increases as CO_2 allowance price increases. • 3.3% of a covered source's emissions. • Limit increases to 5% and 10% if rolling annual average price reaches $7 and $10/tonne, respectively.	• Domestic offset limit equal to 15% of each annual emissions cap. • International offset limit also 15%, 5% of which may be project-based, and 10% of which may be international forestry credits.	• 2012-17: Up to 5% of a covered entity's compliance obligation (i.e. emissions) may be met using combination of domestic or international offsets. • 2018-20: Up to 15% may be met using this combination. • 2021-24: Up to 15% may be met using domestic offsets, and an additional 15% using international offsets. • 2025 and beyond: Up to 20% may be met using domestic offsets, and an additional 15% using international offsets. • There is no limit on the use of HFC destruction allowances and international allowances from approved programs.	• Use of eligible offsets and international allowances limited to no more than 49% of total emission reductions in 2012-20.
Qualitative Limits on Offset Use	• Kyoto Protocol forbids nuclear project offsets. • EU ETS requires that large hydro projects must meet sustainability criteria, and forbids use of offsets from land use, land use change and	• At $10/tonne, EU Allowances and CDM and JI credits also can be used for compliance. • Projects must be initiated after	• Projects must commence operations after offset regulations are promulgated. • International project-based offsets must meet requirements comparable to domestic offsets. • Projects at facilities that compete directly with a U.S. facility are	• Projects that commenced after 2001 but before bill enactment may be eligible to receive early action allowances. • Projects that started before 2006, or after 2008 but before promulgation of offset regulations, are eligible to	• Offsets projects throughout U.S., Canada and Mexico may be eligible if subject to comparably rigorous oversight, validation, verification, and enforcement. Offsets

	Clean Development Mechanism (CDM)	Regional Greenhouse Gas Initiative (RGGI)	Lieberman-Warner bill (S. 3036, America's Climate Security Act of 2007)	Dingell-Boucher draft climate change legislation (House Energy and Commerce Committee)	Western Climate Initiative (WCI)
Qualitative Limits on Offset Use (Continued)	forestry activities (LULUCF).	December 20, 2005 for offsets to be eligible. • Projects in all U.S. states eligible, but Memorandum of Understanding must be in place for non-RGGI states.	disallowed. • Countries hosting international forestry activities must meet various data, capacity and emission reduction requirements.	generate offset credits for reductions occurring after regulations are promulgated (e.g. 2011). • International allowances may be used from programs that are of comparable stringency to the U.S. program. • International offsets (e.g. CDM credits) must meet requirements of comparable stringency to U.S. requirements for domestic offsets. • International offsets from HFC destruction projects will not be eligible. • Countries hosting international forestry activities must meet various data, capacity and emission reduction requirements.	and allowances from other jurisdictions must meet rigorous criteria to be developed with respect to additionality, and the ability of WCI to enforce and verify reductions. • CDM credits may be accepted, but may be subject to international offset standards to be established by WCI participants. • Offset credits are disallowed from projects in developed countries involving sources that within WCI jurisdictions are covered by the cap-and-trade program.
Other	• Project review and approval process involves multiple approvals at different stages; • Precedents on decisions (e.g. rationales in additionality determination for a given project type) are not binding; • Decision-making is not transparent. • Option to choose 7-year, renewable crediting period or 10-year, non-renewable crediting period.	• Reversal risk in afforestation projects is addressed through standardized 10% discount on offset credits or valid insurance that guarantees replacement of lost tonnes. • Crediting period is for 10 years (20 for afforestation) and may be renewed.	• EPA will develop methodologies to manage the risk of sequestration reversals. • This could involve a reserve pool, as recommended by the Nicholas Institute. • Monitoring and quantification uncertainty in sequestration projects will be addressed through an "exaggerated proportional discount that increases relative to uncertainty." • Crediting period to be determined by EPA Administrator. • Methodologies must be tested by 3 independent expert teams, and will be rejected if estimates differ by more than 10% (similar to Nicholas Institute recommendation).	• Methodologies for sequestration projects must apply conservative discount factor that accounts for uncertainty in measurement, additionality, leakage and permanence. • Crediting period is between 5 and 10 years, except for forestry projects (20 years), and may be renewed subject to most recent protocols and standards.	N/A

D
GLOSSARY

1605(b)	The U.S. Department of Energy's program for *Voluntary Greenhouse Gas Reporting*. This program was created pursuant to Section 1605(b) of the Energy Policy Act of 1992 (42 U.S.C. 13385(b)).
Additionality	The degree to which GHG benefits achieved by an emission mitigation project would not have occurred in the absence of the added incentive of creating GHG emission mitigation.
Afforestation	An activity included under Article 3.3 of the Kyoto Protocol; more generally, establishing new forests on land that has not ever, or in recent times, been forested.
Annex I countries, non-Annex I countries	Countries listed, or not listed, in Annex I of the UNFCCC; Annex I is a list of industrialized countries, non-Annex I countries are developing countries.
Annex B countries	Annex B of the Kyoto Protocol is a list of industrialized countries; they must also then ratify the Kyoto Protocol.
A,R & D	Afforestation, Reforestation and Deforestation.
Assigned amount	The number of emission units that an Annex B country holds; the initial amount for the first compliance period of 2008-2102 equals the emissions target for the country times five.
Assigned Amount Unit (AAU)	An emissions unit under the Kyoto Protocol; AAUs are issued by Annex B countries equal to their "initial assigned amount."
A&R Activities	Afforestation and Reforestation activities.
Baseline	The schedule of GHG emissions related to a project that would be expected to occur in the absence of a project.
BAU	Business As Usual.
Clean Development Mechanism (CDM)	A provision described in Article 12 of the Kyoto Protocol that allows tradable credits, called CERs, to be generated through projects in developing countries that can be used by industrialized countries for compliance with their Kyoto commitments.
CDM Executive Board (EB)	The executive body that is charged by the UNFCCC COP to oversee the operation of the CDM.

Certified Emission Reduction (CER)	An emissions unit under the Kyoto Protocol that is issued under the procedures of the CDM.
Conference of the Parties (COP)	The main operational body of the UNFCCC, representing all countries that have ratified the Convention. It meets annually.
Deforestation	An activity included under Article 3.3 of the Kyoto Protocol; more generally, the conversion of forested land to some other land use following forest clearance (e.g., by harvesting or forest fire).
Emission Reduction Unit (ERU)	An emissions unit under the Kyoto Protocol from projects under the Joint Implementation (Article 6) mechanism.
FCS	Forest carbon sequestration, including removals of CO_2 from the atmosphere by the growth of woody plants that break the CO_2 molecules into carbon and oxygen and retain carbon in plant tissues, and avoided conversion of carbon in plant tissues into atmospheric CO_2.
Forest management	An activity included under Article 3.4 of the Kyoto Protocol; more generally, the management of forests to reduce emissions of carbon and/or increase the sequestration of carbon.
GHG	Greenhouse gas. This term usually is used to refer to the collection of all six types of GHGs regulated by the Kyoto Protocol (CO_2, CH_4, N_2O, SF_6, PFCs and HFCs)
Joint Implementation (JI)	A provision described in Article 6 of the Kyoto Protocol that allows tradable credits called ERUs to be generated through projects in Annex B (industrialized) countries that can be used by Annex B countries for compliance with their Kyoto commitments.
Kyoto Protocol (KP)	A protocol under the UNFCCC where, *inter-alia*, industrialized countries took on binding commitments to reduce their greenhouse gas emissions in a first commitment period (cp1), 2008-2012.
Indirect Emissions	Indirect emissions reductions occur at a location other than the project site. Examples include: i) energy efficiency and ii) renewable energy projects that cause power plants to generate less electricity and thereby emit less carbon dioxide; and, iii) and material displacement that avoids emissions, e.g., the use of fly ash in concrete that reduces demand for cement and lowers cement sector.
lCER	Long-term CER; a particular form of CER issued under the CDM for LULUCF A&R projects.
Leakage	A GHG effect occurring outside the boundary of what is being reported or accounted for a project or activity that, however, is caused by the project or activity and reduces its environmental benefit.

LULUCF	Land use, land use change and forestry, a sector covered under Articles 3.3 and 3.4 of the Kyoto Protocol; becoming used more generally than just related to the Kyoto Protocol.
NGO	Non-governmental organization. For example, environmental (ENGO), business and industry (BINGO), or research institute (RINGO).
Offset	Emission reduction projects (often called "offset" projects) reduce GHG emissions and create "credits" that regulated parties required to limit their emissions potentially can use to comply with GHG emissions targets. GHG emissions offsets are emission reductions created by projects and activities at emission sources, and in economic sectors, not covered by a GHG emissions trading program's fixed emissions cap. These sources and activities may be located either within or outside the geographic jurisdiction of the trading program.
Permanence, non-permanence, reversal	Generally, the issue that removals of carbon from the atmosphere by biological processes, such as the growing of forests, are not permanent and can be reversed (i.e., sinks can become sources) as a consequence of fire, disease, die-off, timber harvesting, and other activities.
REDD	Reduced Emissions from Deforestation and Degradation.
Reforestation	An activity included under Article 3.3 of the Kyoto Protocol; more generally, establishing forests on land that has in recent past times been forested but in more recent times has been under some other land use.
Removals	The sequestration of carbon from the atmosphere (the opposite of emissions); a process that does this is a "sink."
Removal Unit (RMU)	An emissions unit under the Kyoto Protocol that is issued by Annex B countries for LULUCF activities under Articles 3.3 and 3.4.
RGGI	Regional Greenhouse Gas Initiative.
Sequestration	The absorption of carbon from the atmosphere by some process; normally of CO_2 but can be for other greenhouse gases (e.g., methane).
Sink	A process that removes carbon from the atmosphere (e.g., a growing forest).
Storage	Keeping sequestered carbon out of the atmosphere.
tCERs	Temporary CER; a particular form of CER issued under the CDM for LULUCF A&R projects.
The Carbon Market	An emissions trading market for greenhouse gas (GHG) emission units, sometimes limited to just CO_2. Several distinct carbon "markets" operate around the world today, such as the EU's Emissions Trading Scheme (EU ETS).

UNFCCC	United Nations Framework Convention on Climate Change, the multilateral environmental agreement to address the risk of global climate change.
US DOE	U.S. Department of Energy.
USDA	U.S. Department of Agriculture.
US EPA	U.S. Environmental Protection Agency.
WCI	Western Climate Initiative

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