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## **GHG Emissions Offsets: *Key Issues and Potential Solutions***

**Adam Diamant**

Senior Project Manager

Electric Power Research Institute (EPRI)

Global Climate Change Research Program

**Workshop on Biological Sequestration  
through Greenhouse Gas Offsets**

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# Today's Topics

1. Overview of Offsets and Potential Benefits
2. Additionality & Baselines
3. Leakage
4. Permanence
5. Measurement, Monitoring & Verification (MMV)



# The Potential Benefits of Offsets

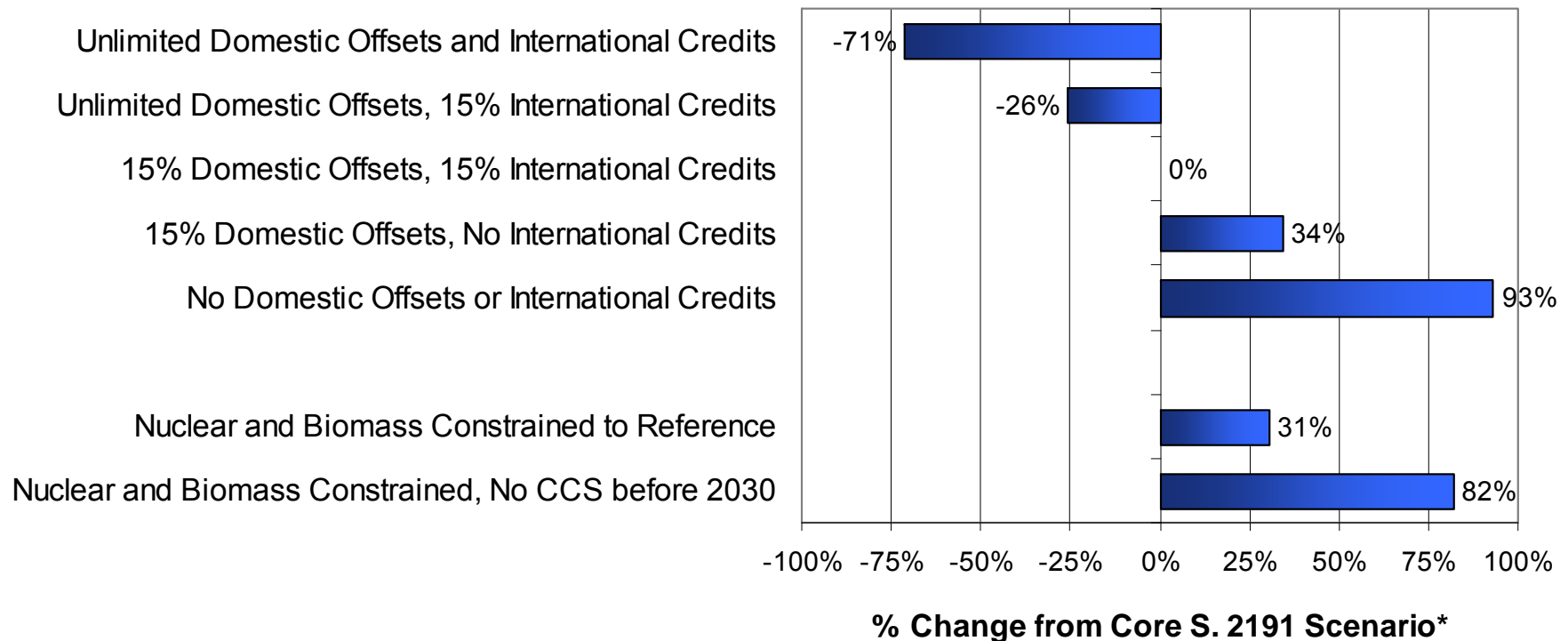


# The Potential Benefits of GHG Offsets

- Reduce the cost of compliance
- Reduce GHG emissions in uncovered economic sectors and regions
- Provide an incentive to develop new GHG abatement approaches and technologies
- A mechanism to “link” global carbon markets
- A “bridge to the future” that includes a broader array of sectors and nations in GHG mitigation efforts.

# Emission Offset Provisions of S. 2191 Significantly Influence Costs (Source: US EPA)

## Marginal Cost of GHG Abatement in 2030 - Sensitivity Cases



## Availability of Offsets and Technology Significantly Influence Costs

Source: EPA Analysis of the Lieberman-Warner Climate Security Act of 2008, S. 2191 in 110th Congress March 14, 2008.

# Potential Risks Associated with Offsets

- Offset projects may turn out *not* to be **additional** so credits may be issued for “phantom” GHG emissions reductions.
- Project **baselines** may turn out to be incorrect so an offset project may yield more or less GHG emissions reductions than expected.
- Offsets may turn out not to be **permanent** so emissions reductions in one period may be re-emitted later.
- Offset projects may cause **leakage** and not be permanent leading to credits being issued for “phantom” reductions.
- The “cost containment” provided by offsets reduces compliance costs, but also may reduce the incentive to invest in low-carbon technologies in the near term.

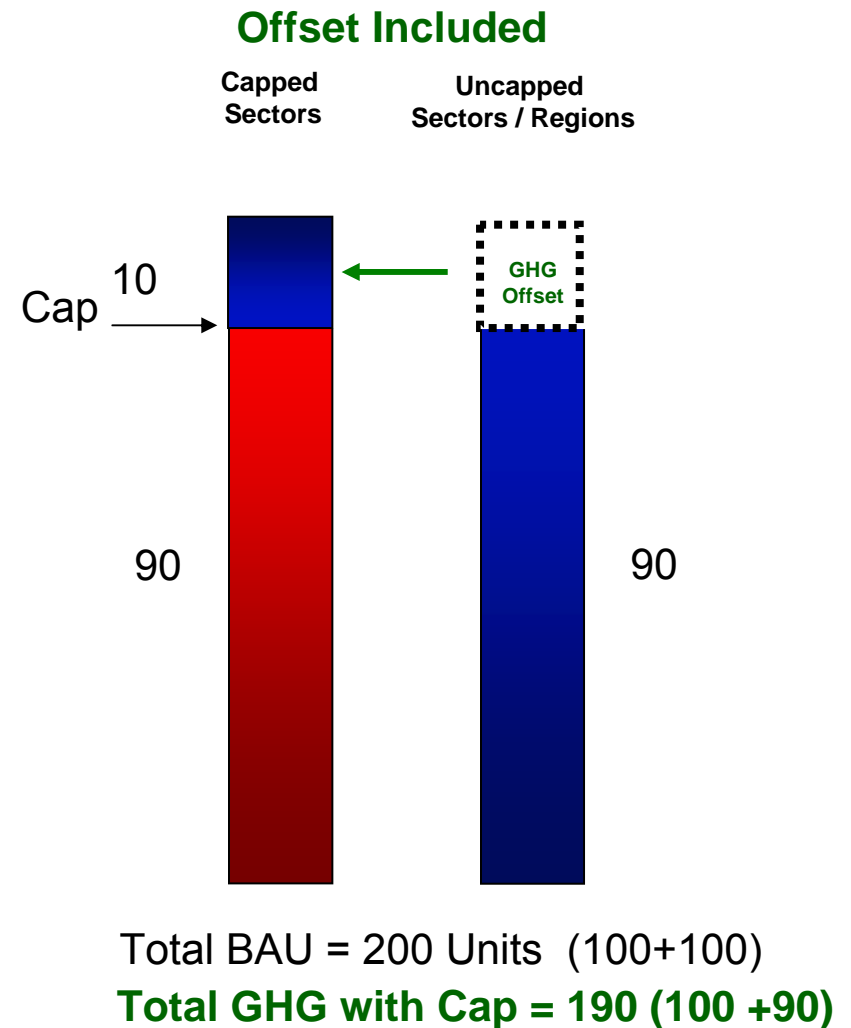
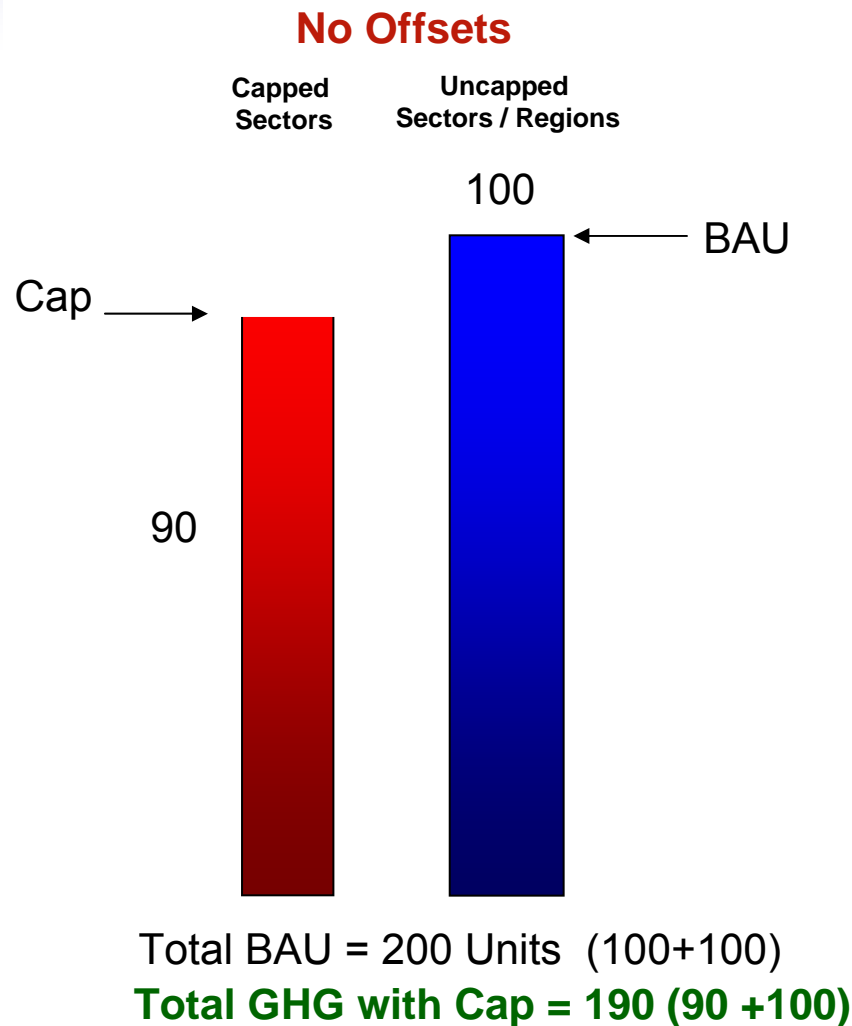
# Key Offset Concerns

- **Additionality** – A GHG abatement project is considered “additional” if it *would not have occurred* without the added incentives provided by the carbon market.
- **Project Baselines** – A project “baseline” is the schedule of GHG emissions related to a project that would be expected to *occur in the absence of the project* (aka “Business-as-Usual” (BAU) emissions).
- **Leakage** – Refers to a shift of GHG emissions to a location or sector outside of a GHG abatement project’s boundary where *they remain uncontrolled or uncounted*.
- **Permanence** – Refers to the *potential to reverse GHG emissions reductions* achieved by an abatement project.

# Additionality & Baselines



# GHG Offsets Can Substitute Emissions Reductions in Uncapped Sectors & Regions for “Internal” Reductions



# Additionality – What Are We Really Asking?

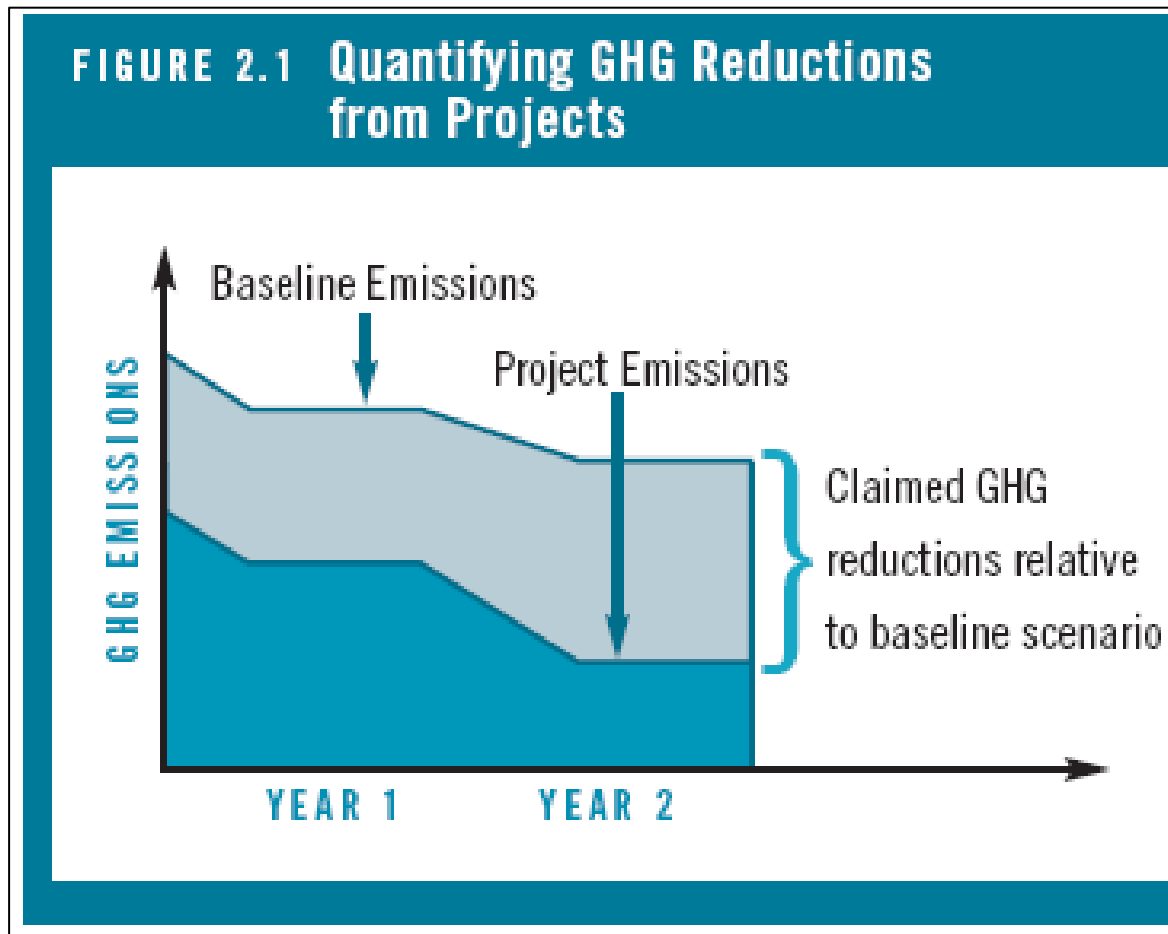
- **Additionality:** Would the project have happened *in the absence of the offset market?*
  - Yes or No ?
- **Baseline:** What would have happened *in the absence of the offset market?*
  - The proposed offset project?
  - Another alternative project?
  - Continuation of current BAU activities?

Adapted from presentation by Derik Broekoff, CA Climate Action Registry,  
at 2<sup>nd</sup> EPRI GHG Offsets Workshop, 9/10/2008.

# GHG Project Baselines (1 of 2)

- A project “baseline” is the schedule of GHG emissions related to a project that would be expected to occur in the absence of the project.
  - Could be “Business-as-Usual” (BAU) emissions
  - Some alternative baseline (e.g., National Deforestation Baseline in W-M Draft)
- A GHG abatement project may generate recognized GHG “credits” or “offsets” to the extent it reduces GHG emissions below an agreed-upon project baseline.
  - Baseline setting can be very problematic
  - Requires establishing a reference time period
  - Project baselines are not necessarily fixed and may change over the project’s time horizon

# GHG Project Baselines Cont. (2 of 2)



Source: *The Greenhouse Gas Protocol: Guidelines for Quantifying GHG Reductions from Grid-Connected Electricity Projects*, World Resources Institute (WRI) and World Business Council for Sustainable Development (WBSCD), 2007.

# Additionality in Practice

- There are no perfect tests or empirically correct answers to the question – What is Additional?
- Two basic approaches:
  - ***Project-Specific Assessments***
    - Barriers tests (e.g. institutional barriers)
    - Investment tests (i.e., “financial” additionality)
    - “Project-in, Project-out” Tests
  - ***“Standardized” Criteria***
  - ***“Positive List”***

Adapted from presentation by Derik Broekoff, CA Climate Action Registry,  
at 2<sup>nd</sup> EPRI GHG Offsets Workshop, 9/10/2008.

# Alternative Definitions of “Additionality”

- **Environmental**

Projects must result in net reductions in GHG emissions that differ from “business as usual.” This is the “traditional” meaning of additionality.

- **Financial**

Projects are not commercially viable in the absence of carbon market funding, or at least are not the “most economically attractive” option.

- **Technology**

Projects must use the best available technology.

- **Non-CO<sub>2</sub> Environmental**

Projects must demonstrate environmental benefits *in addition to* GHG reductions.

- **Regulatory**

Projects must exceed current local environmental regulations.

# Additionality: Theory and Practice

## Additionality - Vague

- Concept difficult and approach in decisions vague:
- Politics – Guidance developed; CDM tool is non-binding or non-exclusive
- Proof that projects and emissions not the baseline (business as usual)

## Three baseline alternative approaches

- **Historic emissions**
- **Projection** – what would have happened in the absence of the proposed project?
- **Benchmark** – performance-based (e.g., top 20% of projects in 5 years)

Adapted from presentation by Martin Hession, CDM Executive Board, 2<sup>nd</sup> EPRI GHG Offsets Workshop, 9/10/2008.

# Standardized Additionality Tests

- Screen projects based on a combination of objective criteria...
  - Involves a predefined technology/practice
  - Does not involve predefined “common practice” technologies/practices
  - Is not mandated by law
  - Started after date X
  - Has lower emissions than a predefined benchmark (i.e., a “performance standard”)
  - Is below/above a certain size
  - Is not a (pre-specified) “least-cost” option
  - Other....
- Objective
  1. Projects that meet the criteria will be (mostly) additional
  2. Projects that don't will be (mostly) not additional

Adapted from presentation by Derik Broekoff, CA Climate Action Registry,  
2<sup>nd</sup> EPRI GHG Offsets Workshop, 9/10/2008.

# Why use standardized tests?

- Lowers transaction costs for offset project developers
- Provides greater certainty for project developers and investors
- Increases transparency
- Simplifies validation of projects
- Makes regulators' jobs easier
- Allows observers to assess environmental integrity based on the rules rather than second-guessing regulatory decisions

Adapted from presentation by Derik Broekoff, CA Climate Action Registry, 2<sup>nd</sup> EPRI GHG Offsets Workshop, 9/10/2008.

# Challenges for Standardized Tests

- **Standardized additionality tests work best where:**
  - There are clear dividing lines between baseline activities and “additional” activities
  - Those dividing lines can be clearly specified using objective criteria
- **Options:**
  - Focus on project types amenable to standardized tests (CCAR, Climate Leaders)
  - Adopt “hybrid” additionality tests (i.e., combine objective criteria with barrier or investment tests (Offset Quality Initiative))

Adapted from presentation by Derik Broekoff, CA Climate Action Registry, 2<sup>nd</sup> EPRI GHG Offsets Workshop, 9/10/2008.

# Different Approaches Can Be Used to Create “Approved” Categories of GHG Offsets

- Pre-approval of GHG offset types (i.e., “Positive List”)
  - The relevant regulatory entity determines *a priori* the types of offsets affirmatively to be allowed for compliance purposes.
  - Typically involves development of approved “project protocols”
  - GHG offsets awarded based on application of protocols
  - NSW-GGAS and RGGI use this approach
- “Project-based” methodology development
  - Offset project proponents submit project-specific methodologies to the relevant regulatory entity for review, evaluation and approval.
  - GHG offsets awarded based on application of specific methodology
  - Potentially more flexible than a simple “positive list,” but can require very substantial efforts by both regulators and project proponents.
  - Adopted by the UN’s CDM and JI programs.

# Offsets in USEPA Climate Leaders Program

- EPA program that works with companies to develop comprehensive climate change strategies
  - Partner companies (>200) commit to setting aggressive GHG reduction goals and annually reporting progress to EPA
  - An important objective of the *Climate Leaders* program is to focus corporate attention on achieving cost-effective reductions within the boundary of the organization
- Partners may reduce GHG emissions outside of their corporate boundary (i.e., [external reductions or offsets](#)) to meet their goals
- EPA's Climate Change Division has developed offset guidance based on a [top-down performance standard approach](#) to address additionality and to select and set the baseline

Adapted from presentation by Maurice LeFranc, U.S. Environmental Protection Agency, 2<sup>nd</sup> EPRI GHG Offsets Workshop, 9/10/2008.

# Additionality Defined – USEPA Climate Leaders Program

- Proposed projects are required to demonstrate that they are additional by achieving a level of performance that, with respect to emission reductions or removals, or technologies or practices, is significantly better than business-as usual
- Business-as-usual is determined by assessing performance of similar, recently undertaken or planned practices, activities or facilities in a relevant geographic area

Adapted from presentation by Maurice LeFranc, U.S. Environmental Protection Agency, 2<sup>nd</sup> EPRI GHG Offsets Workshop, 9/10/2008.

# Performance Standard Approach

- Additionality based on an analysis of a relevant sector in a specific spatial area
  - Data from (1) historic, (2) planned or (3) projections
  - Proxy for barriers, financial decisions and “intent” tests
- Recent historic performance is proxy for “near” future performance
- Performance standard is specific to project type
  - Comprised of performance threshold (additionality determination) and baseline
  - Emissions rate, practice standard, technology standard
- Performance standard is periodically updated
  - Reflects continuous performance improvements in sector (e.g., changes in regulations, market trends, and technology developments)
  - Adjustments made to “proposed projects,” not to existing

Adapted from presentation by Maurice LeFranc, U.S. Environmental Protection Agency,  
2<sup>nd</sup> EPRI GHG Offsets Workshop, 9/10/2008.

# Advantages of Performance Standard Approach

- Project developers are aware of the accounting “rules” in advance
  - Methodologies prepared for specific set of project types
  - Equations needed for estimating and calculating emissions and reductions/removals are provided
- Reduces the complexity, cost and subjectivity of constructing individual project-specific arguments and subsequent review
- Historic “performance” is a proxy for what will occur; periodically update to reflect improvements
- Overall, consistent with WRI/WBCSD GHG Project Protocol, CCAR, RGGI
- Can be used for a variety of project types (sectors and geographic areas)

Adapted from presentation by Maurice LeFranc, U.S. Environmental Protection Agency,  
2<sup>nd</sup> EPRI GHG Offsets Workshop, 9/10/2008.

# RGGI Offset Design Approach

- Guidance from agency heads and stakeholders to pursue a **benchmark/performance standard** approach to additionality
- Allows project developers and interested stakeholders to **understand program requirements up-front**
  - sets a **transparent standard** for project evaluation
- **Avoids administrative case law approach**, increasing process transparency and reducing transaction costs

Adapted from presentation by Chris Sherry, Christopher Sherry. New Jersey Department of Environmental Protection. 2<sup>nd</sup> EPRI GHG Offsets Workshop, 9/10/2008.

# Rationale for Pursuing Standardized Approach

- Case-by-case evaluation of additionality can be problematic
  - Process can be resource intensive, both for project developers and regulatory agency staff
- Selection of case-specific scenarios and variables is critical to outcome
- Subject to potential gaming: “tell me a good story”
- Difficult to accurately gauge the investment calculus of individual investors
  - Threshold investment decisions, such as IRR benchmarks, vary among investors and types of projects

Adapted from presentation by Chris Sherry, Christopher Sherry. New Jersey Department of Environmental Protection. 2<sup>nd</sup> EPRI GHG Offsets Workshop, 9/10/2008.

# RGGI Standardized Approach

- Use benchmarks / performance standards as proxies to infer financial additionality
- Examples:
  - **Benchmark:** *qualitative eligibility criterion* that reasonably ensures that a proposed project is unlikely under standard market practice
    - For example, prohibition of receipt of both offset allowances and other attribute credits, such as RECs, to address likely current market drivers for categories of projects
  - **Performance standard:** projects that *exceed the standard qualify as additional*
    - Emission rate
    - Energy efficiency criteria
    - Market penetration rate

Adapted from presentation by Chris Sherry, Christopher Sherry. New Jersey Department of Environmental Protection. 2<sup>nd</sup> EPRI GHG Offsets Workshop, 9/10/2008.

# Challenges to Standardized Approach

- Potential for **false positives and false negatives** (also true for the case-by-case review approach)
  - Approval of non-additional projects
  - Rejection of additional projects
- **Refinement of benchmarks and performance standards** may be required over time to optimize balance of false positives and negatives.
  - The goal is to provide reasonable assurance that approved projects significantly exceed standard market practice
  - Requires continuing evaluation of market conditions and periodic revisions to benchmarks and performance standards as market conditions change
- **Can't escape resource intensive nature of ensuring offset project quality**

Adapted from presentation by Chris Sherry, Christopher Sherry. New Jersey Department of Environmental Protection. 2<sup>nd</sup> EPRI GHG Offsets Workshop, 9/10/2008.

# Proportional Additionality

- Proportional additionality is based on the idea that the amount an offsets project is “additional” should reflect the actual market-penetration of a technology / application proposed to be used in an offset project:
  - If 10% of livestock producers are engaged actively in manure methane destruction projects, than an offset project proposing to engage in livestock methane destruction would be considered to be 90% additional.
  - Offsets would be granted based on the % of market penetration of the proposed technology / program
  - The level of project additionality would shift over time as technologies and practices come into more common usage.
  - Eventually current offset project types would no longer be additional.

Based on ideas originally presented by Dr. Gordon Smith, EcoFor.

# Permanence



# Permanence

- **Permanence** refers to the potential to reverse GHG emissions reductions
  - Unintentional (e.g., fire, disease...)
  - Intentional (e.g., timber harvests)
- Of particular concern for terrestrial sequestration projects
  - Sequestered forest carbon may be re-emitted due to timber harvesting, forest fire & disease.
  - Sequestered soil carbon may be re-emitted when farmers revert from no-till to standard tillage
- In contrast, some GHG abatement activities are **permanent because they avoid or destroy** GHG emissions
  - CH<sub>4</sub> destruction projects (LFG, digesters, CMM)
  - N<sub>2</sub>O reductions in agricultural crop production



Source: Courtesy of Sam Sandburg, USDA Forest Service

# Important Considerations Related to Permanence and Offsets

- Physical storage of CO<sub>2</sub> over long periods of time
- Need to develop regulatory and/or other approaches to ensure sequestered carbon remains stored permanently
- Need to develop approaches to handle the registration and possible cancellation of offsets that may be impermanent in an offset program's official accounting registry

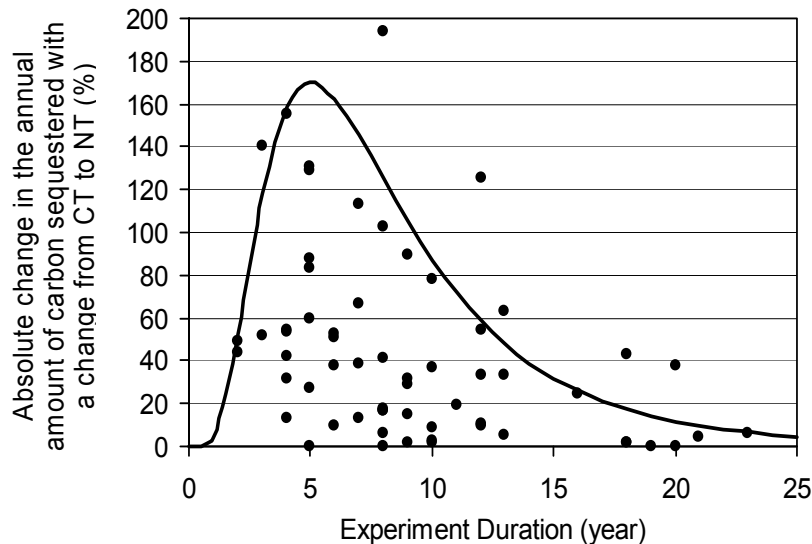
# Why is Permanence an Issue?

- **Volatility of sequestered carbon** - sequestered carbon can be rapidly released back to the atmosphere on reversal of practices, fire etc...
- **Saturation / New Equilibrium** - differential rates of accumulation over time and a long run decline to a near zero rate of net sequestration
- **Sustainability of Practices** – crop rotations and herbicide resistance plus land diversion
- **Contract Duration & Liability Terms** - project payment terms, liability and duration influence offset value including leasing
- **Uncertainty** – how much carbon is sequestered and retained (not entirely a permanence issue, but closely related)

Source: Bruce McCarl, Ph.D., Texas A&M University

# Saturation / New Equilibrium of Sequestration in Agricultural Soils and Forests

Soil C sequestration over time with change from conventional to no-till operations



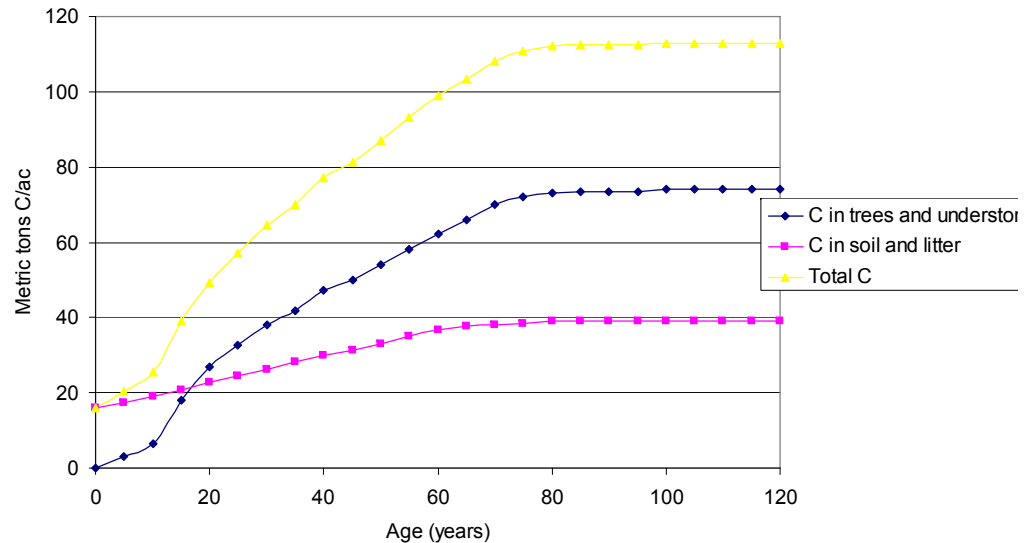
West and Post 2002 Soil Organic Carbon Sequestration by Tillage and Crop Rotation: A Global Data Analysis Soil Science Society of America Journal 66:1930-1946 (2002)

**Note saturation by year 20**

Source: Adapted from Bruce McCarl, Ph.D., Texas A&M University, EPRI GHG Offsets Workshop, 2/19/09.

Forest C sequestration over time based on afforestation

Figure 2. Cumulative Carbon sequestration in a Southeastern U.S. pine plantation  
Source: Data Drawn from Birdsey (1996)



Birdsey et al, USFS, FORCARB

**Note saturation by year 80**

# Some Possible Ways to Address Permanence

- Market price differentiation
- Risk-based discounting of offsets
- Operational & legal liability
  - Buyer / seller / negotiated liability
  - System-wide liability
- Insurance requirements / maintenance fees
- Regulatory differentiation (e.g., tCERs and ICERs)
- Creation of “buffer reserves”
  - Withhold a portion of each project’s offsets based on an assessment of the project’s permanence risk and place retained offsets in a “buffer reserve”
  - Project-specific or community-wide?

# Permanence Should Affect Offset Prices

- If non-permanent offsets are allowed in the marketplace should permanence issues associated with sequestration alter the value or quantity of the resulting carbon offset?
- **Impermanent offsets are not fungible** – from an offset buyer's perspective, an impermanent sequestration asset may be worth a different amount than a permanent offset
- Offset price may be differentiated based on permanence characteristics like a **grading standard**

Source: Adapted from Bruce McCarl, Ph.D., Texas A&M University, EPRI GHG Offsets Workshop, 2/19/09.

# Fungibility

- Grading standards (e.g., #2 Yellow corn, CD plywood, Long staple cotton)
- Products receive a price premium/discount depending on product characteristics and consumer cost of use
- GHG offset (especially C sequestration) may have consumer cost effects because they are not fully “claimable” due to permanence (also additionality, leakage, and uncertainty)

## Sources:

“Smith, G.A., B.A. McCarl, C.S. Li, J.H. Reynolds, R. Hammerschlag, R.L. Sass, W.J. Parton, S.M. Ogle, K. Paustian, J.A. Holtkamp, and W. Barbour, Harnessing farms and forests in the low-carbon economy: how to create, measure, and verify greenhouse gas offsets, Edited by Zach Willey and Bill Chameides, Durham, NC: Duke University Press, 229 p, 2007.

McCarl, B.A., "Permanence, Leakage, Uncertainty and Additionality in GHG Projects," Paper developed as input to book Quantifying Greenhouse Gas Emission Offsets Generated by Changing Land Management, A book developed by Environmental Defense, 2006. <http://agecon2.tamu.edu/people/faculty/mccarl-bruce/papers/1149.pdf> .

# What is the Permanence Discount?

- Permanence discount can arise in terms of either a
  - **Price discount / premium** where one needs to pay more for a more permanent item (e.g., 3 grades of gasoline)
  - **Quantity discount** where the saleable quantity is reduced to a quantity that one can permanently count on or is discounted for its impermanent terms
- Using either approach, a seller receives less than would be paid for a more permanent asset like capturing and burning methane from a landfill or a manure lagoon

Source: Kim, M-K., B.A. McCarl, and B.C. Murray, "Permanence Discounting for Land-Based Carbon Sequestration", Ecological Economics, vol. 64, issue 4, 763-769, 2008.

# Do We Include Non-Permanent Offsets?

- Contract terms (e.g., leasing and liability) can handle non-permanent characteristics
- Emissions trading is designed to encourage least-cost GHG abatement such as offsets. Are impermanent offsets cheaper despite their lack of permanence?
- C sequestration strategies may provide a bridge to a future in which new technologies may or other developments may lead to lower-cost permanent emissions reductions (e.g., CCS)
- C Sequestration also can yield other co-benefits, including water quality improvement, reduced erosion, and it is not competitive with food production in some ways

Source: Adapted from Bruce McCarl, Ph.D., Texas A&M University, EPRI GHG Offsets Workshop, 2/19/09.

# Allowance Set Asides

- Set aside an amount of *emission allowances* under the overall emissions cap to be issued to qualifying projects
  - Could solve both permanence and leakage
  - Incorporated into S.1766 (Bingaman-Specter)
  - If projects “succeed” in reducing emissions, than actual GHG emissions will be below the cap
  - If projects “fail” the emissions cap would still be maintained
- But....Implementing a set-aside is highly contentious
  - If the overall emissions cap is reduced to create a “set-side,” this will force regulated emitters to reduce their emissions even further, increasing costs for them and society at large
  - If the overall cap is increased to create the set aside, this may lead to the concern that GHG emissions are not being reduced enough to contribute to climate change mitigation

# Another Option – Put the Agriculture and Forestry Sectors Under the GHG Cap

- Help to create an **economy-wide CO<sub>2</sub> price signal** to force GHG emissions reductions to take place in sectors and regions where it would be most cost effective
- Need to incorporate **both GHG emissions as well as GHG sequestration**
- **Difficult to implement** given the challenges in measuring and monitoring GHG emissions and sinks across the agriculture and forestry sectors and the large number of potentially covered entities
- The New Zealand ETS has adopted this approach
  - The first covered sector in the NZ ETS is forestry
  - Livestock-related emissions will be covered in future years as part of the phased expansion of the NZ ETS

# CCAR's Approach to Permanence (1 of 4)

- Forestry protocols consider a GHG emissions reduction or removal permanent when it is maintained out of the atmosphere for **100 years**
  - All reductions for all project types are required to meet this definition.
- Managing for Permanence includes:
  - Ability to **detect a reversal** (monitoring);
  - **Compensation** for reversals to ensure system integrity
- Monitoring
  - **Annual monitoring** includes accounting for estimated fluctuations in carbon pools.
  - **Periodic monitoring by third-party** independent verifiers to oversee inventory methodology, quantification, and measurement.
  - A separate Verification Protocol will guide verification bodies.

Source: Adapted from John Nickerson, CA Climate Action Reserve, EPRI GHG Offsets Workshop 2/19/09.

# CCAR's Approach to Permanence (2 of 4)

## *Project Obligations*

- CCAR will require all projects to enter into a Project Implementation Agreement (PIA):
  - Obligates landowner/project developer to comply with the CCAR protocol for life of the project
  - Requires monitoring, risk management, and reversal compensation
  - Addresses reversals not covered by buffer pool (i.e., “intentional losses”).
  - Is “recorded” and “runs with the land”
  - Is a legal agreement enforced by CCAR

Source: Adapted from John Nickerson, CA Climate Action Reserve, EPRI GHG Offsets Workshop 2/19/09.

# CCAR's Approach to Permanence (3 of 4)

## *Insurance Buffer Pool*

- Each project must undergo a risk assessment to determine the risk of reversal
  - Natural disturbances (wildfire, disease, insects, etc...)
  - Social (changing policies, political instability, etc...)
  - Management (overharvesting, illegal logging, conversion, etc...)
- Projects must contribute verified GHG emissions reductions into a CCAR-administered buffer pool.
  - Pool will be used to compensate system for any reversals to ensure overall program integrity.
- CCAR will be re-insured and may seek third-party insurer to administer the pool.
  - Reduces need for bilateral insurance between buyers and sellers of credits.

Source: Adapted from John Nickerson, CA Climate Action Reserve, EPRI GHG Offsets Workshop 2/19/09.

# CCAR's Approach to Permanence (4 of 4)

## *In the Event of a Reversal...*

	Project Proponent Not Responsible	Project Proponent Is Responsible
Within Project's Buffer Pool	Project proponent's buffer pool used to compensate for loss.	Project proponent obligated through PIA contract to remedy loss through financial restitution including possible penalties.
Exceeds Project Buffer Pool	Project proponent's buffer pool plus other pooled reductions used to compensate for loss.	Project proponent obligated through PIA contract to remedy loss through financial restitution including possible penalties.

Source: Adapted from John Nickerson, CA Climate Action Reserve, EPRI GHG Offsets Workshop 2/19/09.

# Leakage



# Emissions “Leakage”

- **Leakage** refers to a shift of GHG emissions to a location or sector outside of a GHG abatement project’s boundary where *they remain uncontrolled or uncounted*.
  - Leakage has been a contentious issue in the design of RGGI and CA climate policies
  - CA experimented with adoption of a “load-serving entity” approach rather than a “source-based” approach to reduce leakage.
- Examples:
  - Forest preservation may be offset by timber harvesting elsewhere
  - Reduced crop yields resulting from no-till farming may be offset by conversion of farmland elsewhere to make up for the lost yields.

# Leakage: An Example



Afforestation project on agricultural land



Increased deforestation elsewhere to clear land For agriculture



Source: Adapted from Brian Murray, Duke University, EPRI GHG Offset Workshop 4, 2/19/09.

# Why Does Leakage Occur?

- “Whenever the **spatial scale** of the intervention is inferior to the full scale of the targeted problem” (Wunder 2008)
- **Rules, regulations, and incentives** for action affect only part of the potential participants or emissions sources
- **Economic forces** – supply/demand supplanted by GHG abatement is made up elsewhere

Source: Adapted from Brian Murray, Duke University, EPRI GHG Offset Workshop 4, 2/19/09.

# Why Do We Care About leakage?

- Erodes the GHG benefits/offset value of a project
- Impacts can be difficult to measure
- Difficult to enforce against leakage due to incomplete contracts
- Has the potential to undermine a project-based offset system

Source: Adapted from Brian Murray, Duke University, EPRI GHG Offset Workshop 4, 2/19/09.

# Some Approaches to Handling Leakage

- Reduce issuance of offsets for projects based on quantification of expected leakage
- Address leakage directly as part of project design
  - e.g., grow a new forest plantation associated with a forest preservation-based offset project to “make up” the expected amount of “lost” timber supply
- Focus activity where land use being displaced is declining.
  - Conversion of pastureland to forest where total pasture use regionally already is declining
  - Afforestation projects done on marginal farmland that is falling out of production

Source: Adapted from Brian Murray, Duke University, EPRI GHG Offset Workshop 4, 2/19/09.

# Leakage Myths

- Leakage is the same as “activity shifting”
  - This is only the case if the “activity shifting” causes GHG emissions to shift outside of the accounting/policy boundaries
- All leakage is bad
  - You can get positive spillover effects (but they appear to be rarer)
- Leakage does not occur if projects are too small to affect the market price
  - This is incorrect. Work to date suggests comparatively more leakage occurs on smaller projects than larger ones
  - Small projects don’t affect market prices because of leakage, and lots of other market participants exist who can replace the project’s contribution to the market without disruption

Source: Adapted from Brian Murray, Duke University, EPRI GHG Offset Workshop 4, 2/19/09.

# What Can We Do About Leakage?

- Ignore it!
- Adjust the overall cap to account for leakage
- Make the emissions cap comprehensive
  - All emissions get counted
  - Nothing leaks
- Minimize leakage through project design
  - Focus offsets on activities with low leakage potential
  - Minimize local leakage through contracts (is this possible?)
- Discount all offset credits
  - Estimate leakage (e.g., econometrically) and hold back offset credits accordingly
  - Option: true-up *ex-post* with system-wide accounting

Source: Adapted from Brian Murray, Duke University, EPRI GHG Offset Workshop 4, 2/19/09.

## Another Way: System-wide True-up

- Set aside a leakage buffer for offsets
- Measure net changes nationally
- Reconcile project and national accounts
- Challenge:
  - Separating out leakage from natural variation of carbon in the system
  - Still a work in progress.....

Source: Adapted from Brian Murray, Duke University, EPRI GHG Offset Workshop 4, 2/19/09.

## CCAR's Approach to Leakage (1 of 2)

- All projects required to undergo risk assessment for potential leakage:
  - **Reforestation**: Assessment based on displacement of grazing and agriculture.
  - **Improved Forest Management**: Assessment based on activities that reduce historic timber production over long periods of time.
  - **Avoided Conversion**: Assessment based on risk of shifting conversion to alternative forested site.

Source: Adapted from John Nickerson, CA Climate Action Reserve, EPRI GHG Offsets Workshop 2/19/09.

## CCAR's Approach to Leakage (2 of 2)

- Protocol provides prescriptive guidance for assessing potential leakage
  - Each project type has its own worksheet to determine corresponding leakage risk factor based on best available data.
  - Assessment is conducted annually.
- Risk factor or leakage percent is deducted from the calculations of net carbon sequestration or avoided emissions.

Source: Adapted from John Nickerson, CA Climate Action Reserve, EPRI GHG Offsets Workshop 2/19/09.

# Measurement, Monitoring & Verification (MMV)

- Critically important elements to creating recognized GHG offsets
- MMV usually requires 3<sup>rd</sup>-party
- GHG offsets typically are recognized only for GHG reductions that have been measured and verified.
- GHG abatement projects need to be monitored to ensure they are being implemented as designed.
- Verification is necessary to assure that reported GHG emissions reductions have been accounted for in a manner consistent with the underlying project methodology or protocol.



# Key Insights

1. GHG emissions offsets offer key policy benefits including cost containment, sectoral engagement, and entrepreneurship.
2. GHG offsets face a variety of real and potentially serious operational challenges including additionality, baselines, permanence and leakage that will have to be address if offsets are going to play a key role in near-term climate mitigation.
3. A variety of approaches are being considered to address leakage and permanence, but all of them either increase the cost of offsets and/or reduce the available quantities.
4. Some types of terrestrial offsets are complex to implement, and few protocols and methodologies have been adopted that will make it possible to realize them at large scale.
5. We need an offsets approach and policies designed to engage private-sector capital on a massive scale to invest in large-scale GHG emissions reduction projects and provide a needed “bridge” to a carbon-constrained future.



## Contact Information

### **Adam Diamant**

Electric Power Research Institute  
Senior Project Manager  
Global Climate Research Program  
3420 Hillview Avenue  
Palo Alto, CA 94304 USA  
Tel: 510-260-9105  
Email: [adiamant@epri.com](mailto:adiamant@epri.com)

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