

BACKGROUND ISSUE PAPERS

Agriculture and Forestry Voluntary Greenhouse Gas
Reporting Workshops

-- January, 2003 --

VOLUNTARY GREENHOUSE GAS REPORTING WORKSHOPS

Introduction

Public Workshop on Accounting Rules and Guidelines for Agriculture and Forestry Greenhouse Gas Activities

The following Voluntary Greenhouse Gas Reporting Workshops background papers identify issues and options involved in developing revisions to the agriculture and forestry sections of the Department of Energy's Voluntary Greenhouse Gas Reporting Program (VGGRP). The background papers do not represent official government views, but are intended to stimulate discussion on a range of issues relating to agriculture and forestry accounting rules and guidelines. The background papers were prepared for two workshops to be held in January, 2003. The background papers and workshops are intended to foster an open dialog to assist in improving the current agriculture and forestry reporting guidelines as authorized by existing law and directed by the President. We hope the workshops can provide as much constructive input to this process as possible. We also encourage written comments on these papers. Comments can be sent to William Hohenstein, Director, Global Change Program Office, 1400 Independence Avenue, Washington, DC 20250-3810 or emailed to GHGCOMMENTS@oce.usda.gov

The VGGRP was created pursuant to Section 1605(b) of the Energy Policy Act of 1992 and has been in operation since 1994. The VGGRP records voluntarily submitted data on greenhouse gas emissions and the results of actions to reduce, avoid, or sequester greenhouse gas emissions. On February 14, 2002, the President announced his Climate Change Initiative which includes a greenhouse gas intensity target, research programs and tax incentives to advance the development and adoption of new technologies, voluntary programs to promote actions to reduce greenhouse gases, and improvements to the existing VGGRP. Specifically, the President:

Directed the Secretary of Energy, in consultation with the Secretary of Commerce, the Secretary of Agriculture, and the Administrator of the Environmental Protection Agency, to propose improvements to the current voluntary emissions reduction registration program under section 1605(b) of the 1992 Energy Policy Act within 120 days. These improvements will enhance measurement accuracy, reliability, and verifiability, working with and taking into account emerging domestic and international approaches.

Directed the Secretary of Energy to recommend reforms to ensure that businesses and individuals that register reductions are not penalized under a future climate policy and to give transferable credits to companies that can show real emissions reductions.

Directed the Secretary of Agriculture, in consultation with the Environmental Protection Agency and the Department of Energy, to develop accounting rules

and guidelines for crediting sequestration projects, taking into account emerging domestic and international approaches.

On May 6, 2002, the Department of Energy solicited comments on various issues relevant to its efforts to implement the President's directives. On July 8, 2002, after considering public comments, the Secretaries of Energy, Commerce and Agriculture, and the Administrator of the Environmental Protection Agency provided the President with ten recommended improvements to the VGGRP:

1. *Develop fair, objective, and practical methods for reporting baselines, reporting boundaries, calculating real results, and awarding transferable credits for actions that lead to real reductions.* Developing such methods is central to achieving the objective of “measurement accuracy, reliability, and verifiability,” as specified in the February 14, 2002, announcement.

2. *Standardize widely accepted, transparent accounting methods.* In 1994, when DOE’s voluntary greenhouse gas reporting program was launched, accounting methods were deliberately flexible to promote broad participation. Since then, a large body of work on corporate and project-level emissions, reductions, and sequestration accounting has been developed. The revised and standardized voluntary reporting program will take these methods into consideration and establish a systematic and transparent approach for updating accounting rules as they evolve.

3. *Support independent verification of registry reports.* As the current voluntary program evolves from a reporting program toward a crediting program, it is important to ensure that reports are accurately and consistently prepared and in compliance with specified accounting rules. Requiring independent verification of reports, particularly those that qualify for transferable credits, will enhance the accuracy, acceptability, and credibility of the program.

4. *Encourage reporters to report greenhouse gas intensity (emissions per unit of output) as well as emissions or emissions reductions.* Reporting emissions intensity allows firms to take growth into consideration and is consistent with the overall goal of achieving an improvement in greenhouse gas intensity by 2012. To verify the intensity measures, reporters will need to submit the data necessary to calculate emissions intensity.

5. *Encourage corporate or entity-wide reporting.* The revised voluntary reporting program should encourage corporate or entity-wide reporting. However, many important prospective emission reductions actions, such as those relating to sequestration, energy efficiency, small-scale renewable energy, or actions that reduce greenhouse gases other than carbon dioxide may be difficult to accommodate within the context of entity-wide emissions reporting. Encouraging entity-wide reporting while allowing for opportunities to report by projects

acknowledges the importance of recognizing a broad range of actions and facilitating cost effective ways to reduce direct and indirect emissions.

6. Provide credits for actions to remove carbon dioxide from the atmosphere as well as for actions to reduce emissions. Sequestration activities can provide a valuable contribution to meeting our 2012 goal. Providing incentives and recognition for actions to reduce the concentration of greenhouse gases in the atmosphere will facilitate their adoption.

7. Develop a process for evaluating the extent to which past reductions may qualify for credits. A process needs to be developed for evaluating these past efforts against the criteria now being developed for consistent and accurate reporting.

8. Assure the voluntary reporting program is an effective tool for reaching the 18 percent goal. The enhanced registry and reporting program is one piece of a broad domestic effort to reach our 18 percent goal. It is important to link voluntary programs, such as the Environmental Protection Agency's Climate Leaders and Business challenges, with reporting guidelines to encourage consistency between private actions and public goals.

9. Factor in international strategies as well as State-level efforts. As directed on February 14, 2002, we need to carefully review emerging international approaches, including other national efforts such as those of Australia, Canada, Japan, Denmark, and the United Kingdom (and other Member States of the European Union). In addition, public and private domestic approaches should be closely considered.

10. Minimize transactions costs for reporters and administrative costs for the Government, where possible, without compromising the foregoing recommendations.

In addition to these recommendations, the Secretaries of Energy, Commerce and Agriculture, and the Administrator of the Environmental Protection Agency proposed a process leading to revising the guidelines by January 2004. The process includes the workshops for which the following background papers are prepared. The background papers are meant to be stand-alone pieces. As a result, there is considerable overlap among the papers. The ideas discussed in the papers reflect comments received from the public, previously published reports, and interactions with a wide range of government and private sector representatives. These papers are also available at: <http://www.usda.gov/agency/occe/gcpo/greenhousegasreporting.htm>.

We also suggest reviewing the documents prepared by the Department of Energy for Stakeholder meetings held in November, 2002. These papers discuss a broader set of issues and options involved in developing revisions to the VGGRP. A complete set of

the DOE background papers is available at:
<http://www.pi.energy.gov/enhancingGHGregistry>.

I. AGRICULTURAL GREENHOUSE GAS ACTIVITIES

Agriculture and Forestry Voluntary Greenhouse Gas
Reporting Workshops

VOLUNTARY GREENHOUSE GAS REPORTING WORKSHOPS

Background Paper

Public Workshop on Accounting Rules and Guidelines for Agriculture Greenhouse Gas Activities

January 14-15, 2003

I. Introduction

In February of this year, President Bush announced the framework for U.S. climate change policy. In part, the Administration's approach to climate change challenges the private sector to take actions to voluntarily reduce greenhouse gas emissions. The President's plan directs the Department of Energy, in partnership with the Environmental Protection Agency, the Department of Commerce, and the Department of Agriculture, to improve the existing Voluntary Greenhouse Gas Reporting Program (VGGRP), and develop recommendations for providing transferable credits to businesses that show real reductions in greenhouse gas emissions and to ensure that companies that act now will not be penalized under a future climate policy. In addition, the President directed Secretary Veneman, in consultation with the Department of Energy and the Environmental Protection Agency to develop accounting rules and guidelines for crediting carbon sequestration projects. Specifically, the President:

Directed the Secretary of Agriculture, in consultation with the Environmental Protection Agency and the Department of Energy, to develop accounting rules and guidelines for crediting sequestration projects, taking into account emerging domestic and international approaches.

While several companies, organizations, and individuals are already taking actions to reduce greenhouse gas emissions on farms, others are reluctant to report emissions or emissions reductions, in part, because of the lack of clear guidelines for reporting on agricultural practices. In 2000, only seven agricultural projects were reported under the existing DOE VGGRP. Five projects reduced methane emissions from agricultural activities and two projects reported carbon sequestration resulting from conservation tillage practices. Clear accounting and reporting guidelines will make it easier to register voluntary actions on agricultural lands. Cost effective measurement systems will not only increase the attractiveness of agricultural greenhouse gas projects to investors, but can also provide information to individual landowners in optimizing the management of carbon and other greenhouse gases in the context of other management objectives.

On July 8, 2002, after considering public comments, the Secretaries of Energy, Commerce and Agriculture, and the Administrator of the Environmental Protection Agency provided the President with ten recommended improvements to the VGGRP (for a complete list of the recommendations, see pages 3 - 4 in the Introduction). These recommendations noted that sequestration activities can provide a valuable contribution to meeting our 2012 goal of reducing greenhouse gas intensity by 18%.

This background paper provides a discussion of options for reporting and quantifying greenhouse gas emissions, emissions reductions, and sequestration from agriculture and integrating these activities into the overall VGGRP. The document also raises options for addressing other issues that are unique, or highly relevant, to the agricultural sector. Agriculture presents some unique challenges and opportunities because of the diversity of operations (e.g. size and location of operations), the variety of practices that can address greenhouse gases, and year-to-year variability in emissions and sequestration associated with agricultural activities. The types of potential activities include:

1. Reducing greenhouse gas emissions directly by changing current production practices. Examples of these activities include improving fuel economy, changing fertilizer application practices, and changing livestock management practices. Note, the accounting rules and guidelines for some emissions reduction activities are not covered under the agriculture accounting rules and guidelines, but are covered in other sections of the accounting rules and guidelines.
2. Conserving existing carbon pools (e.g., maintaining conservation tillage practices) and therefore preventing the release of carbon into the atmosphere.
3. Sequestering carbon in soils and biomass (e.g., enhanced land management, agro-forestry). Carbon sequestration reduces the amount of carbon in the atmosphere by increasing the amount of carbon stored in terrestrial ecosystems.
4. Substituting bio-based products (e.g., biofuels for gasoline and diesel fuels) for fossil fuels. Note, the accounting rules and guidelines for the use of biofuels are not covered under the agriculture accounting rules and guidelines, but are covered in other sections of the accounting rules and guidelines.

Some of the issues and options raised in this paper are relevant for all agricultural activities and greenhouse gases. Others are relevant only to a sub-set of the activities or greenhouse gases. In particular, actions to increase and maintain carbon in soils and biomass have unique issues that will need to be addressed in the context of the greenhouse gas registry.

II. Emissions Reporting

Setting procedures for identifying, measuring, and verifying greenhouse gas emissions, emissions reductions, and sequestration is an important step to any reporting program. DOE's existing VGGRP records voluntarily submitted data on greenhouse emissions and

the results of actions to reduce, avoid, or sequester greenhouse gas emissions; enables reporters to determine the scope of their reports and the specific greenhouse gases covered by these reports; and provides other types of flexibility. To comply with the President's directives to "enhance measurement accuracy, reliability, and verifiability," the current program needs to be revised. While these objectives are clear, a number of questions must still be addressed.

A. Organizational and Geographic Boundaries

As one of the ten recommended improvements to the VGGRP, the Secretaries of Energy, Commerce and Agriculture, and the Administrator of the Environmental Protection Agency noted that the revised voluntary reporting program should encourage corporate or entity-wide reporting while allowing for opportunities to report by projects to acknowledge the importance of recognizing a broad range of actions and facilitate cost effective ways to reduce direct and indirect emissions.

If the revised guidelines specify reporting all of an entity's (e.g, farm, corporation) emissions, how should the guidelines define the entity boundaries? For example,

- i) Should partnerships or corporate entities be determined by equity share (or ownership), operational control (financial responsibility) or lines of business activity?
- ii) Under what circumstances should program participants be given flexibility to define their own boundaries?
- iii) How can entity-wide reporting be most effectively encouraged? If entity-wide reporting is the basis for reporting, should the guidelines place any constraints on how participants define sub-entity or project boundaries for the purpose of reporting emissions?

Many opportunities for emission reductions and carbon sequestration may be difficult to accommodate within the context of entity-wide emissions reporting. For example, changing agricultural practices may, overall, significantly affect emissions or carbon sequestration. However, the opportunity for reducing emissions or increasing carbon sequestration may be quite small for any individual farm or landowner. These "small distributed sources and sinks" pose challenges in any program aimed at registering greenhouse gas emissions and emissions reductions. Allowing agricultural land owners and agricultural project developers to report on a project level would simplify reporting requirements and create an incentive to undertake specific projects that can demonstrate real greenhouse gas reductions or increases in carbon sequestration. However, allowing less than full entity-wide reporting would, in some cases, fail to capture the overall change in emissions. Options for addressing this include allowing:

- i) Reporting of individual agricultural projects even if comprehensive reports are not filed for the agriculture entities.
- ii) Reporting of agricultural projects only if they are accompanied by comprehensive reports for the entire entity.
- iii) Reporting project-based emissions reductions or carbon sequestration only if it can be demonstrated that the change in practices did not affect the overall net emissions profile of the entity. In many cases, a specific project will not otherwise affect the overall greenhouse gas profile of the entity.

B. Minimum Size Requirements

The second issue in the area of reporting is whether minimum emissions requirements should be established for agriculture entities. Options within this area include:

- i) Establishing minimum amounts for reporting emissions.
- ii) Establishing minimum amounts, but allowing entities that are smaller than the cutoff to be aggregated for reporting.
- iii) Allowing any entity to report regardless of size.

C. Types of Activities

A third issue is the type of agricultural activities that can qualify for reporting. Agricultural activities include a broad range of management practices and technologies, exist on a varied array of lands, and generate numerous goods and services. A range of activities are eligible under the existing DOE VGGRP including carbon sequestration or reduced emissions through improved crop and grazing land management, windbreaks and shelterbelts, reduction of manure methane emissions, irrigation water management, efficient nutrient management for crop production, and growing biomass. While it may be feasible to develop reasonable default calculations for a number of agricultural activities and agricultural management practices, it is not practical to provide defaults for all activities. Options include:

- i) Only allowing reporting of activities that have specific accounting rules and guidelines associated with them and can be credibly monitored. (If so, which activities are they?)
- ii) Developing protocols for estimating greenhouse gas benefits for generic practices. These protocols could be applied to the full

range of agricultural operations if default calculations do not exist or are inappropriate.

D. International and Domestic Activities

Treating emissions, emissions reductions, and sequestration reported by U.S. companies that occur outside the United States raises a range of issues that are not limited to agricultural activities (See DOE *Background Paper: International Emissions Reporting*). Under the current VGGRP reporters have the option to report either domestic or overseas emissions, emissions reductions, and sequestration. However, reporters are required to distinguish between their domestic and overseas activities and to report them as separate categories. In practice, relatively few firms report emissions from their operations overseas, but reporting of international projects is common. This is particularly true for carbon sequestration projects. There are several possible options for international reporting, including:

- i) Allowing reporting of emissions reductions outside the U.S. (including avoided emissions and sequestration) only if they are not subject to a foreign regulatory regime.
- ii) Allowing reporting of emissions reductions outside the U.S. but not projects outside the U.S. (including sequestration projects).
- iii) Allowing but not requiring reporting of emissions reductions outside the U.S. (including avoided emissions and sequestration).

III. Measurement and Accounting Methods

A. Methods

Area sources and sinks for greenhouse gases have been traditionally more difficult than point sources to measure. The uncertainties associated with their estimation have, in general, been higher than those associated with point sources of greenhouse gas emissions of similar magnitude. In addition, the practices can provide variable benefits when applied to different crops, land types, and soil conditions. Practices can also provide variable benefits over time, in response to changes in temperature, rainfall, pests and other disturbances. Options for measuring emissions, emissions reductions, and sequestration in the agricultural sector include:

- i) Requiring actual measuring of emissions and emissions reductions for each activity and sampling of carbon stock changes.

- ii) Providing default emission or sequestration rates for practices and actions. (If so, at what level of detail - by crop/region/soil type/condition?)
- iii) Providing both default emission or sequestration rates and protocols for entities to develop specific emission or sequestration rates for specific practices and conditions.
- iv) Varying the method by activity, depending on the confidence of the method, costs, and complexity of measuring emission or sequestration rates.

Regardless of the method chosen, is it important that an estimate of uncertainty be provided? Should the estimates of uncertainty be quantitative?

B. Baselines and Base Years

In addition to the general issues associated with baselines (e.g. new firms/activities, changes in production levels, etc.) concerns over temporal variability in emissions and sequestration are particularly important to agriculture. While research has indicated consistent benefits over time from practices such as conservation tillage and other management practices, actual rates of emissions and sequestration of greenhouse gases from these activities can be highly variable from year-to-year and from place-to-place. Variable climatic and resource conditions can also create difficulties in establishing baselines, benchmarks, and reference cases. Baselines could be established as emissions, emissions reductions, sequestration, or emissions/sequestration per unit of output. Options include:

- i) Establishing a reference case from base year conditions. This option is feasible for agricultural activities that tend not to vary significantly from year-to-year.
- ii) Establishing regional (or multi-project) baselines, benchmarks, or performance standards. Such approaches would review analyses of performance by activities in a sub-sector (e.g., conservation tillage in corn production) over a region (e.g., the Corn Belt), set a performance-based threshold benchmark (e.g., sequestration per acre), and then define that as the baseline or reference case for a given number of years before review.
- iii) Allowing/requiring reference cases to be established on a 3, 5, or 10-year historic average to account for some temporal variation.

- iv) Allowing reporters to base reference cases on one year of information, but allowing/requiring them to use models to normalize variable conditions.
- v) Allowing reporters to estimate emissions, emissions reductions, or carbon sequestration from a dynamic baseline (e.g., projected).

C. Comprehensiveness

Allowing reporting on specific greenhouse gases such as carbon, methane, or nitrous oxide would simplify reporting requirements and encourage specific projects. In this case, entities could report on the greenhouse gases of most interest or which they had the most information. However, less than comprehensive reporting of all greenhouse gases would, in some cases, fail to capture the overall change in emissions. Options include:

- i) Allowing projects to only report on selective greenhouse gas emissions.
- ii) Setting *de minimus* quantities for other greenhouse gases. For example, if a project aimed at reducing methane emissions had only a small impact on other greenhouse gas emissions, the reporter would not be required to report changes in the other emissions.
- iii) Reporting all greenhouse gases for which there are reasonable data or default values available by the time the reporting program would begin.
- iv) Requiring all greenhouse gases be reported.

IV. Other Accounting Issues

A. Permanence

Carbon that is conserved in existing pools or sequestered in soils or vegetation is not necessarily permanently removed from the atmosphere. Carbon stores can be reversed if landowners return to carbon depleting practices such as returning to conventional tillage. In addition, short-term climatic conditions can alter the amount of carbon stored annually because flux rates - the amount of carbon moving between the soil/vegetation complex and atmosphere - are sensitive to seasonal weather. If a reversal happens, many of the benefits to the atmosphere can be lost. However, even short-term carbon sequestration has important climate benefits. At a minimum, carbon sequestration reduces the amount of greenhouse gases currently in the atmosphere and in some cases the storage can be long enough to provide similar atmospheric benefits compared to permanent emissions

reductions. Also, carbon sequestration provides an important economic benefit in that it reduces carbon dioxide in the atmosphere while providing time for cost effective emissions reduction alternatives to be developed.

There are several basic ways to address the duration associated with carbon sequestration and carbon storage projects. We present the following options to represent the scope of options available. These include:

- i) Delaying the decision about how to treat permanence until a future date.
- ii) Only allowing temporary crediting: in effect, carbon is rented for the time it remains sequestered.
- iii) Only allowing permanent carbon easements: only carbon sequestration projects that permanently store carbon or displace more energy intensive products would qualify. The list of acceptable projects would be limited to landowners who voluntarily enter into a long-term contract to not harvest timber (in the case of tree planting on agricultural land), employ land management practices over a long-period of time, or verify that harvested biomass would be used as a replacement for fossil fuels.
- iv) Allowing flexible carbon contracts: any carbon sequestration project could qualify, but markets would dictate the terms of the contract and the prices for carbon. In this case, liability is critical, but buyers and sellers would be allowed to negotiate on who would bear the risk of carbon release and over what time period the carbon would be stored.
- v) Requiring insurance: any carbon sequestration project could qualify, but projects would need to be insured, either through financial insurance or carbon insurance.
- vi) Creating a government backed carbon bank: any carbon sequestration project could qualify, but the government (or an entity backed by the government such as a cooperative or insurance company) would act as a clearinghouse for trades and pool the risks of potential carbon losses.
- vii) Discounting.

B. Leakage

Leakage is defined as a condition where the reported emissions reduction or sequestration caused by an activity is offset, in whole or in part, by a resulting

increase in emissions that occurs outside the project boundary. Leakage is not unique to agricultural activities. Leakage may be internal to the entity undertaking the activity, or it may be external, i.e. the offsetting increases may be undertaken by other actors. For example, a farmer may decide to remove some land from production, thereby reducing emissions and sequestering carbon. This activity may cause another farmer to bring additional land into production, causing emissions to increase. Leakage can be addressed in several ways:

- i) Requiring entities to demonstrate the absence of leakage.
- ii) Estimating leakage directly.
- iii) Developing leakage default values (by activity or by region)
- iv) Limiting the use of activities where leakage is likely.

Alternatively, one can decide that leakage is either: a) such a big problem that it makes reporting emissions, emissions reductions, and sequestration from projects undesirable; or b) such a small problem that it can safely be ignored.

V. Verifying Emissions and Reductions (See DOE Background Paper: Verification Issues and Background Paper: Confidentiality of Reported Data).

A. Types and Frequency of Verification

- i) Should independent verification be required for each (annual) report, less frequently or only if challenged?
- ii) Should program participants independently verify process and methods; the actual data upon which emission reports and emission reduction estimates are based; and/or the physical means by which emissions are measured (e.g. meters for fuel consumption or monitors that measure actual emissions)?
- iii) Even after they have been independently verified, should all participants be required to maintain records of the data, measurement and testing methods used to develop emissions inventories and to calculate emission reductions and carbon sequestration so that these records could be audited if a report is challenged?

B. Verification Methods

Should independent verification include on-site inspections of processes, data and/or equipment? Should the verification methods used be comparable to those

used by financial auditors, or should they be comparable to those used by facility health or safety inspectors?

C. Approving/Certifying Verifiers

- i) Should all participants be required to have an independent organization verify their emissions inventory and their estimated emission reductions and carbon sequestration?
- ii) If it is decided to use independent verifiers, what types of organizations are qualified to serve as independent verifiers? How might these organizations be identified, certified, regulated?

D. Confidentiality Issues

- i) Should all data be available for review by government representatives?
- ii) Should the public be able to review the data upon which emission reports or claimed emission reductions and carbon sequestration are based?

VI. Managing the DOE Registry of Emission Inventories and Reductions

A. Certifying Real Reductions

Once DOE has received a report that has been independently verified to be in compliance with the revised guidelines, what actions should it take? What should DOE provide to entities that have successfully met the requirements of the new, more rigorous guidelines?

B. Tracking and Transferring Reductions

How should DOE identify the entity responsible for specific emission reductions? Should DOE have a role in recording this transfer to a different entity? For DOE to transfer responsibility for a credited emission reduction from one entity to another, what should DOE require from the entities involved?

C. Confidentiality Issues

Should data submitted to DOE be made publicly available? Can DOE effectively protect confidential data?

D. Prior Year Reports

What should DOE do with the reports already submitted under the existing guidelines? Should previous reporters be permitted to redo prior-year reports to comply with the revised guidelines? Should DOE permit entities to document prior year emission reductions (under the new guidelines), regardless of the year in which they were achieved? Should DOE keep separate records for those reports under existing guidelines and new records for those reports under the new guidelines?

E. Schedule for Revisions to Accounting Rules and Guidelines

Given the rapid improvements in our understanding of land management systems on greenhouse gas emissions and carbon sequestration, it is likely that we will improve methods and emission/sequestration coefficients in the future. Recognizing the importance of maintaining a stable and predictable reporting and crediting system should be balanced against the need to employ the latest science, should the Government plan in advance a schedule for improvements in methods and reporting requirements? If so, when should this occur? 5 years, no set schedule, no changes before 2012.

II. FORESTRY GREENHOUSE GAS ACTIVITIES

Agriculture and Forestry Voluntary Greenhouse Gas
Reporting Workshops

VOLUNTARY GREENHOUSE GAS REPORTING WORKSHOPS

Background Paper

Public Workshop on Accounting Rules and Guidelines for Forestry Greenhouse Gas Activities

January 23, 2003

I. Introduction

In February of this year, President Bush announced the framework for U.S. climate change policy. In part, the Administration's approach to climate change challenges the private sector to take actions to voluntarily reduce greenhouse gas emissions. The President's plan directs the Department of Energy, in partnership with the Environmental Protection Agency, the Department of Commerce, and the Department of Agriculture, to improve the existing Voluntary Greenhouse Gas Reporting Program (VGGRP), and develop recommendations for providing transferable credits to businesses that show real reductions in greenhouse gas emissions and to ensure that companies that act now will not be penalized under a future climate policy. In addition, the President directed Secretary Veneman, in consultation with the Department of Energy and the Environmental Protection Agency to develop accounting rules and guidelines for crediting carbon sequestration projects. Specifically, the President:

Directed the Secretary of Agriculture, in consultation with the Environmental Protection Agency and the Department of Energy, to develop accounting rules and guidelines for crediting sequestration projects, taking into account emerging domestic and international approaches.

While several companies, organizations, and individuals are already taking actions to reduce greenhouse gas emissions on forestlands, others are reluctant to report emissions or emissions reductions, in part, because of the lack of clear guidelines for reporting on forestry practices. Sixty-six entities reported 494 projects involving forestry or natural resources that sequestered carbon or reduced emissions in 2000. Afforestation and reforestation projects accounted for almost 70 percent of the total forestry projects with urban forestry, modified forest management, and forest preservation projects accounting for much of the remaining total. Clear accounting and reporting guidelines will make it easier to register voluntary actions on forestlands. Cost effective measurement systems will not only increase the attractiveness of forestry greenhouse gas projects to investors, but can also provide information to individual landowners in optimizing the management of carbon and other greenhouse gases in the context of other management objectives.

On July 8, 2002, after considering public comments, the Secretaries of Energy, Commerce and Agriculture, and the Administrator of the Environmental Protection Agency provided the President with ten recommended improvements to the VGGRP (for a complete list of the recommendations, see pages 3 - 4 in the Introduction). These recommendations noted that sequestration activities can provide a valuable contribution to meeting our 2012 goal of reducing greenhouse gas intensity by 18%.

This background paper provides a discussion of options for reporting and quantifying greenhouse gas emissions, emissions reductions, and sequestration from forestry and integrating these activities into the overall VGGRP. The document also raises options for addressing other issues that are unique, or highly relevant, to the forest sector. Forestry presents some unique challenges and opportunities because of the diversity of operations (e.g. size and location of operations), the variety of practices that can address greenhouse gases, and year-to-year variability in emissions and sequestration associated with forest activities. The types of potential activities include:

1. Increasing the amount of afforestation and reforestation.
2. Reducing greenhouse gas emissions directly by changing current production practices. Examples of these activities include improving fuel economy in harvesting and transportation operations, changing fertilizer application practices, and changing wood production and processing technology. Note, the accounting rules and guidelines for many emissions reduction activities are not covered under the forestry accounting rules and guidelines, but are covered in other sections of the accounting rules and guidelines.
3. Conserving existing carbon pools (e.g., low impact harvesting, maintaining forest preservation areas) and therefore preventing the release of carbon into the atmosphere.
4. Sequestering carbon in soils, biomass, and wood products (e.g., enhanced land management, increased forest productivity, improved utilization, agro-forestry). Carbon sequestration reduces the amount of carbon in the atmosphere by increasing the amount of carbon stored in terrestrial ecosystems and wood products.
5. Substituting bio-based products for fossil-fuel intensive/high emission products and fossil fuels (e.g., biofuels for gasoline and diesel fuels). Note, the accounting rules and guidelines for biofuels are not covered under the forestry guidelines, but are covered in other sections of the accounting rules and guidelines.
6. Increasing the proportion and retention of carbon in durable wood products. This avoids release of carbon as products are discarded and decompose, and can reduce the need for new timber harvesting for replacement products.

Some of the issues and options raised in this paper are relevant for all forestry activities and greenhouse gases. Others are relevant only to a subset of the activities and greenhouse gases. In particular, actions to increase and maintain carbon in soils, biomass, and wood products have unique issues that will need to be addressed in the context of the greenhouse gas registry.

II. Emissions Reporting

Setting procedures for identifying, measuring, and verifying greenhouse gas emissions, emissions reductions, and sequestration is an important step to any reporting program. DOE's existing VGGRP records voluntarily submitted data on greenhouse emissions and the results of actions to reduce, avoid, or sequester greenhouse gas emissions; enables reporters to determine the scope of their reports and the specific greenhouse gases covered by these reports; and provides other types of flexibility. To comply with the President's directives to "enhance measurement accuracy, reliability, and verifiability," the current program needs to be revised. While these objectives are clear, a number of questions must still be addressed.

A. Organizational and Geographic Boundaries

As one of the ten recommended improvements to the VGGRP, the Secretaries of Energy, Commerce and Agriculture, and the Administrator of the Environmental Protection Agency noted that the revised voluntary reporting program should encourage corporate or entity-wide reporting while allowing for opportunities to report by projects to acknowledge the importance of recognizing a broad range of actions and facilitate cost effective ways to reduce direct and indirect emissions.

If the revised guidelines specify reporting all of an entity's (e.g, forest landowner, corporation) emissions, how should the guidelines define the entity boundaries? For example,

- i) Should partnerships or corporate entities be determined by equity share (or ownership), operational control (financial responsibility) or lines of business activity?
- ii) Under what circumstances should program participants be given flexibility to define their own boundaries?
- iii) How can entity-wide reporting be most effectively encouraged? If entity-wide reporting is the basis for reporting, should the guidelines place any constraints on how participants define sub-entity or project boundaries for the purpose of reporting emissions?

Many opportunities for emission reductions and carbon sequestration may be difficult to accommodate within the context of entity-wide emissions reporting. For example, changing forestry practices may, overall, significantly affect

emissions or carbon sequestration. However, the opportunity for reducing emissions or increasing carbon sequestration may be quite small for any individual forest landowner. These “small distributed sources and sinks” pose challenges in any program aimed at registering greenhouse gas emissions and emissions reductions. Allowing forest land owners and forest project developers to report on a project level would simplify reporting requirements and create an incentive to undertake specific projects that can demonstrate real greenhouse gas reductions or increases in carbon sequestration. However, allowing less than full entity-wide reporting would, in some cases, fail to capture the overall change in emissions. Options for addressing this include allowing:

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- iii) Reporting project-based emissions reductions or carbon sequestration only if it can be demonstrated that the change in practices did not affect the overall net emissions profile of the entity. In many cases, a specific project will not otherwise affect the overall greenhouse gas profile of the entity.

B. Minimum Size Requirements

The second issue in the area of reporting is whether minimum emissions requirements should be established for forest entities. Options within this area include:

- i) Establishing minimum amounts for reporting emissions.
- ii) Establishing minimum amounts, but allowing entities that are smaller than the cutoff to be aggregated for reporting.
- iii) Allowing any entity to report regardless of size.

C. Types of Activities

A third issue is the types of forestry activities that can qualify for reporting. Forestry activities include a broad range of management practices and technologies, exist on a varied array of lands, and generate numerous goods and services. A range of activities are eligible under the existing DOE VGGRP, including afforestation, short rotation woody biomass plantations, agroforestry, reforestation, forest management, forest preservation, wood products, and urban forestry. While it may be feasible to develop reasonable default calculations for a number of forestry

activities and forest management practices, it is not practical to provide defaults for all activities. Options include:

- i) Only allowing reporting of activities that have specific accounting rules and guidelines associated with them and can be credibly monitored. (If so, which activities are they?)
- ii) Developing protocols for estimating greenhouse gas benefits for generic practices. These protocols could be applied to the full range of forestry operations if default calculations do not exist or are inappropriate.

E. International and Domestic Activities

Treating emissions, emissions reductions, and sequestration reported by U.S. companies that occur outside the United States raises a range of issues that are not limited to forestry activities (See DOE *Background Paper: International Emissions Reporting*). Under the current VGGRP reporters have the option to report either domestic or overseas emissions, emissions reductions, and sequestration. However, reporters are required to distinguish between their domestic and overseas activities and to report them as separate categories. In practice, relatively few firms report emissions from their operations overseas, but reporting of international projects is common. This is particularly true for carbon sequestration projects. There are several possible options for international reporting, including:

- i) Allowing reporting of emissions reductions outside the U.S. (including avoided emissions and sequestration) only if they are not subject to a foreign regulatory regime.
- ii) Allowing reporting of emissions reductions outside the U.S. but not projects outside the U.S. (including sequestration projects).
- iii) Allowing but not requiring reporting of emissions reductions outside the U.S. (including avoided emissions and sequestration).

III. Measurement and Accounting Methods

A. Methods

Area sources and sinks for greenhouse gases have been traditionally more difficult than point sources to measure. The uncertainties associated with their estimation have, in general, been higher than those associated with point sources of greenhouse gas emissions of similar magnitude. In addition, the practices can provide variable benefits when applied to different forest types and soil conditions. Practices can also provide variable benefits over time, in response to

changes in temperature, rainfall, pests and other disturbances. Options for measuring emissions, emissions reductions, and sequestration in the forestry sector include:

- i) Requiring actual measuring of emissions and emissions reductions for each activity and sampling of carbon stock changes.
- ii) Providing default emission or sequestration rates for practices and actions. (If so, at what level of detail -- by forest type/region/soil type/condition?).
- iii) Providing both default emissions or sequestration rates and protocols for entities to develop specific emissions or sequestration rates for specific practices and conditions.
- iv) Varying the method by activity, depending on the confidence of the method, costs, and complexity of measuring emission or sequestration rates.

Regardless of the method chosen, is it important that an estimate of uncertainty be provided? Should the estimates of uncertainty be quantitative?

B. Baselines and Base Years

In addition to the general issues associated with baselines (e.g. new firms/activities, changes in production levels, etc.) concerns over temporal variability in emissions and sequestration are particularly important to forestry. While research has indicated consistent benefits over time from practices such as tree planting and intermediate management practices, actual rates of emissions and sequestration of greenhouse gases from these activities can be highly variable from year-to-year and from place-to-place. Variable climatic and resource conditions can also create difficulties in establishing baselines, benchmarks, and reference cases. Baselines could be established as emissions, emissions reductions, sequestration, or emissions/sequestration per unit of output. Options include:

- i) Establishing a reference case from base year conditions. This is feasible for forestry activities that tend not to vary significantly from year-to-year.
- ii) Establishing regional (or multi-project) baselines, benchmarks, or performance standards. Such approaches would review analyses of performance by activities in a sub-sector (e.g., afforestation) over a region (e.g., the Southeast), set a performance-based threshold benchmark (e.g., expected acres of afforestation), and then define that as the baseline or reference case for a given number of years.

- iii) Allowing/requiring reference cases to be established on a 3, 5, or 10-year historic average to account for some temporal variation.
- iv) Allowing reporters to base reference cases on one year of information, but allow/require them to use models to normalize variable conditions.
- v) Allowing reporters to estimate emissions, emissions reductions, and carbon sequestration from a dynamic baseline (e.g. projected).

C. Comprehensiveness

Allowing reporting on specific greenhouse gases such as carbon, methane, or nitrous oxide would simplify reporting requirements and encourage specific projects. In this case, entities could report on the greenhouse gases of most interest or which they had the most information. However, less than comprehensive reporting of all greenhouse gases would, in some cases, fail to capture the overall change in emissions. Options include:

- i) Allowing projects to only report on selective greenhouse gas emissions.
- ii) Setting *de minimus* quantities for other greenhouse gases. For example, if a project aimed at increasing carbon sequestration had only a small impact on other greenhouse gas emissions, the reporter would not be required to report changes in the other emissions.
- iii) Reporting all greenhouse gases for which there are reasonable data or default values available by the time the reporting program would begin.
- iv) Requiring all greenhouse gases be reported.

D. Natural Disturbances

While variable climatic and resource conditions can also create difficulties in establishing baselines and benchmarks and reference cases, natural disturbances such as forest fires are also part of baselines and reference cases and make carbon sequestration difficult to quantify. Questions also arise with respect to the liability associated with natural disturbances. Several options for dealing with natural disturbances are available, including:

- i) Not adjusting for natural disturbances. This is based on the assumption that project developers should be rewarded for their action and should not be penalized for natural disturbances.
- ii) Adjusting the baseline for the probability of natural disturbances and reporting emissions reductions/sequestration based on actual events compared to an estimated baseline.
- iii) Adjusting both the baseline and the project for the probability of natural disturbances. This option would base emissions reductions/sequestration entirely on model generated or estimated outcomes.
- iv) Allowing the reporter to accept and manage the risk of natural disturbances. Project accomplishments are adjusted accordingly.

IV. Other Accounting Issues

A. Permanence

Carbon that is conserved in existing pools or sequestered in soils, vegetation, or wood products is not necessarily permanently removed from the atmosphere. Carbon stores can be reversed if landowners return to carbon depleting practices or timber is harvested and subsequently burned as waste rather than as a fossil fuel offset or decomposes. In addition, short-term climatic conditions can alter the amount of carbon stored annually because flux rates - the amount of carbon moving between the soil/vegetation complex and atmosphere - are sensitive to seasonal weather. If a reversal happens, many of the benefits to the atmosphere can be lost. However, even in the short-run carbon sequestration has important climate benefits. At a minimum, carbon sequestration reduces the amount of greenhouse gases currently in the atmosphere and in some cases the storage can be long enough to provide similar atmospheric benefits compared to a permanent emissions reductions. Also, carbon sequestration provides an important economic benefit in that it reduces carbon dioxide in the atmosphere while providing time for cost effective emissions reduction alternatives to be developed.

There are several basic ways to address the duration associated with carbon sequestration and carbon storage projects. We present the following options to represent the scope of options available. These include:

- i) Delaying the decision about how to treat permanence until a future date.
- ii) Only allowing temporary crediting: in effect, carbon is rented for the time it remains sequestered.

- iii) Only allowing permanent carbon easements: only carbon sequestration projects that permanently store carbon or displace more energy intensive construction products and biomass for fossil fuels would qualify. The list of acceptable projects would be limited to landowners who voluntarily decided to enter into a long-term contract to not harvest timber, employ land management practices over a long-period of time, or verify that harvested biomass would be used in long-term wood products or as a replacement for fossil fuels.
- iv) Allowing flexible carbon contracts: any carbon sequestration project could qualify, but markets would dictate the terms of the contract and the prices for carbon. In this case, liability is critical, but buyers and sellers would be allowed to negotiate on who would bear the risk of carbon release and over what time period the carbon would be stored.
- v) Requiring insurance: any carbon sequestration project could qualify, but projects would need to be insured, either through financial insurance or carbon insurance.
- vi) Creating a government backed carbon bank: any carbon sequestration project could qualify, but the government (or an entity backed by the government such as a cooperative or insurance company) would act as a clearinghouse for trades and pool the risks of potential carbon losses.
- vii) Discounting.

B. Leakage

Leakage is defined as a condition where the reported emissions reduction or sequestration caused by an activity is offset, in whole or in part, by a resulting increase in emissions that occurs outside the project boundary. Leakage is not unique to forestry activities. Leakage may be internal to the entity undertaking the activity, or it may be external, i.e. the offsetting increases may be undertaken by other actors. For example, a landowner may decide to afforest a tract of land, thereby sequestering carbon. This activity may cause another landowner to harvest part of their land, causing emissions to increase. Leakage can be addressed in several ways:

- i) Requiring entities to demonstrate the absence of leakage.
- ii) Estimating leakage directly.
- iii) Developing leakage default values (by activity or by region)

- iv) Limiting the use of activities where leakage is likely.

Alternatively, one can decide that leakage is either: a) such a big problem that it makes reporting emissions, emissions reductions, or sequestration from projects undesirable; or b) such a small problem that it can safely be ignored.

V. Verifying Emissions and Reductions (See DOE Background Paper: Verification Issues and Background Paper: Confidentiality of Reported Data).

A. Types and Frequency of Verification

- i) Should independent verification be required for each (annual) report, less frequently or only if challenged?
- ii) Should program participants independently verify process and methods; the actual data upon which emission reports and emission reduction estimates are based; and/or the physical means by which emissions are measured (e.g. meters for fuel consumption or monitors that measure actual emissions)?
- iii) Even after they have been independently verified, should all participants be required to maintain records of the data, measurement and testing methods used to develop emissions inventories and to calculate emission reductions and carbon sequestration so that these records could be audited if a report is challenged?

B. Verification Methods

Should independent verification include on-site inspections of processes, data and/or equipment? Should the verification methods used be comparable to those used by financial auditors, or should they be comparable to those used by facility health or safety inspectors?

C. Approving/Certifying Verifiers

- i) Should all participants be required to have an independent organization verify their emissions inventory and their estimated emission reductions and carbon sequestration?
- ii) If it is decided to use independent verifiers, what types of organizations are qualified to serve as independent verifiers? How might these organizations be identified, certified, regulated?

D. Confidentiality Issues

- i) Should all data be available for review by government representatives?
- ii) Should the public be able to review the data upon which emission reports or claimed emission reductions and carbon sequestration are based?

VI. Managing the DOE Registry of Emission Inventories and Reductions

A. Certifying Real Reductions

Once DOE has received a report that has been independently verified to be in compliance with the revised guidelines, what actions should it take? What should DOE provide to entities that have successfully met the requirements of the new, more rigorous guidelines?

B. Tracking and Transferring Reductions

How should DOE identify the entity responsible for specific emission reductions? Should DOE have a role in recording this transfer to a different entity? For DOE to transfer responsibility for a credited emission reduction from one entity to another, what should DOE require from the entities involved?

C. Confidentiality Issues

Should data submitted to DOE be made publicly available? Can DOE effectively protect confidential data?

D. Prior Year Reports

What should DOE do with the reports already submitted under the existing guidelines? Should previous reporters be permitted to redo prior-year reports to comply with the revised guidelines? Should DOE permit entities to document prior year emission reductions (under the new guidelines), regardless of the year in which they were achieved? Should DOE keep separate records for those reports under existing guidelines and new records for those reports under the new guidelines?

E. Schedule for Revisions to Accounting Rules and Guidelines

Given the rapid improvements in our understanding of land management systems on greenhouse gas emissions and carbon sequestration, it is likely that we will improve methods and emission/sequestration coefficients in the future. Recognizing the importance of maintaining a stable and predictable reporting and

crediting system should be balanced against the need to employ the latest science, should the Government plan in advance a schedule for improvements in methods and reporting requirements? If so, when should this occur? 5 years, no set schedule, no changes before 2012.