

Climate Change Considerations in Project Level NEPA Analysis

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Introduction

Forest Service Chief Abigail R. Kimbell characterized the Agency's response to the challenges presented by climate change as "one of the most urgent tasks facing the Forest Service" and stressed that "as a science-based organization, we need to be aware of this information and to consider it any time we make a decision regarding resource management, technical assistance, business operations, or any other aspect of our mission."¹ The Forest Service mission is to "sustain the health, diversity, and productivity of the Nation's forest and grasslands to meet the needs of present and future generations."²

Ongoing climate change research was summarized in reports by the United Nations Intergovernmental Panel on Climate Change (IPCC) (www.ipcc.ch), US Climate Change Science Program's Science Synthesis and Assessment Products and the US Global Change Research Program. These reports concluded that climate is already changing; that the change will accelerate, and that human greenhouse gas (GHG) emissions, primarily carbon dioxide emissions (CO₂), are the main source of accelerated climate change.

Projected climate change impacts include air temperature increases; sea level rise; changes in the timing, location, and quantity of precipitation; and increased frequency of extreme weather events such as heat waves, droughts, and floods. These changes will vary regionally and affect renewable resources, aquatic and terrestrial ecosystems, and agriculture. While uncertainties will remain regarding the timing and extent magnitude of climate change impacts, the scientific evidence predicts that continued increases in GHG emissions will lead to increased climate change.

This document provides initial Forest Service guidance on how to consider climate change in project-level National Environmental Policy Act (NEPA) analysis and documentation. The following are the basic concepts outlined in this paper:

1. Climate change effects include the effects of agency action on global climate change and the effects of climate change on a proposed project.
2. The Agency may propose projects to increase the adaptive capacity of ecosystems it manages, mitigate climate change effects on those ecosystems, or to sequester carbon.
3. It is not currently feasible to quantify the indirect effects of individual or multiple projects on global climate change and therefore determining significant effects of those projects or project alternatives on global climate change cannot be made at any scale.
4. Some project proposals may present choices based on quantifiable differences in carbon storage and GHG emissions between alternatives.

¹ Abigail R. Kimbell, Chief, USDA Forest Service, February 15, 2008, letter to Forest Service National Leadership Team

² [USDA Forest Service Strategic Plan, FY 2007 - 2012](#)

This guidance will be revised as more scientific literature is published, climate change management experience is gained, and government policies are established.

Types of Climate Change Effects

Consider two types of climate change effects when appropriate.

- **The effect of a proposed project on climate change** (GHG emissions and carbon cycling). Examples include: short-term GHG emissions and alteration to the carbon cycle caused by hazardous fuels reduction projects, GHG emissions from oil and gas field development, and avoiding large GHG emissions pulses and effects to the carbon cycle by thinning overstocked stands to increase forest resilience and decrease the potential for large scale wildfire.
- **The effect of climate change on a proposed project.** Examples include: effects of expected shifts in rainfall and temperature patterns on the seed stock selection for reforestation after timber harvest and effects of decreased snow fall on a ski area expansion proposal at a marginal geographic location, such as a southern aspect or low elevation.

Climate Change Considerations in Pre-NEPA Analyses, Purpose and Need Statements, and Proposed Actions

Pre-NEPA analyses and identifying a purpose and need are important first steps in developing a proposed action. Typically, land management plan components (especially the desired conditions and objectives) provide a basis for developing the underlying purpose and need for projects.

Future revised plans are likely to recognize climate change influences on local natural resource management and the ecological, social, and economic environments. The comprehensive evaluation report developed for a land management plan revision and its successive updates provide information on conditions and trends, including climate change. These conditions and trends provide the basis and important underpinnings for designing project purpose and need statements, proposals, and alternatives. In the absence of comprehensive evaluation reports, the Resources Planning Act (RPA) assessments³ include climate change discussions that may provide some relevant information for considering climate change in project analysis.

Pre-NEPA analyses and assessments often consider existing and projected stresses on the environment (e.g., insect and disease epidemics) and should include the potential effects of climate change on our ability to achieve the desired conditions. This analysis may lead to developing purpose and need statements and proposed actions designed to address climate change effects on the local environment.

The effects of climate change on natural resource management are best considered when developing a proposal prior to initiating NEPA. In this way it is efficient to integrate climate change considerations together with the Agency mission objectives. It is possible, and in some projects likely, that proposals may meet the Agency's mission while also enhancing the resilience or adaptive capacity of resources to the potential impacts of climate change. For

³ Since 1990, the effects of climate change on forest resources have been included as a focus of assessment research. The RPA assessment results are used by public and private land managers to set a broad-scale context for evaluating future changes in renewable resources (see <http://www.fs.fed.us/research/rpa/2005rpa/2000-RPA-Assessment-Update.pdf> for the April 2007 interim update to the 2000 RPA Assessment).

example, projects designed to restore the health, resilience, and productivity of forested ecosystems may also improve the capability of the stands or landscape to withstand climate change stresses. Also, consider whether climate change may affect the ability to reach a desired condition. For example, the success of the proposal to restore aspen in a particular location may be reduced by expected warmer temperatures and lower rainfall during the next century.

Climate change mitigation⁴ could be an objective or a complementary objective for a particular proposal. Also, proposals may include adaptation⁵ proposals and adaptive management strategies to allow for uncertainties in environmental conditions resulting from climate change.

Scoping and Climate Change Issues

Scoping is an integral part of environmental analysis and is used, in part, to identify and refine issues, establish analysis criteria, and explore possible alternatives and their probable environmental effects (Forest Service Handbook (FSH) 1909.15, sec. 11).

Scoping is useful to determine if climate change issues are specifically related to the proposed action. Refrain from prematurely dismissing climate change issues as “outside the scope” of the analysis and use the interdisciplinary team and other sources to identify potential cause-effect relationships (if they exist) between the proposal and climate change. Also, refrain from prematurely assuming that NEPA documentation for every proposal must include a climate change discussion.

Determining whether there is a cause-effect relationship is the first step in identifying a potential issue. Consider whether some element of the proposal will result in direct, indirect, or cumulative effects on GHG emissions or the carbon cycle and the direction of effects (e.g., increase, decrease, or combination of both). Consider this example.

The proposal to underburn 30,000 acres of ponderosa pine stands to maintain a Fire Regime Condition Class 1 (FRCC 1) condition will directly release CO₂ during the burning operation, which contributes to increasing the atmospheric greenhouse gas concentration. However, research indicates that restoration (or maintenance) of a FRCC 1 condition will result in a lower risk of uncharacteristically severe wildfire for those treated acres. This reduced risk has a two-fold effect on GHG emissions or the carbon cycle:

- 1) There is a direct beneficial effect on climate change of decreased GHG emissions from these acres because the risk of acres being burned by uncharacteristically severe wildfires would be reduced, and
- 2) There is an indirect beneficial effect by treating these acres because live stands of trees will retain higher capacity to sequester carbon dioxide compared to stands killed by uncharacteristically severe wildfires, especially if not immediately reforested.

Some proposals will not have cause-effect relationships to GHG emissions or the carbon cycle, or are at such a minor scale that the direct effects would be meaningless to a reasoned choice

⁴ To paraphrase the IPCC definition (IPCC, 2007) in this context, mitigation is defined as “A human intervention to reduce the **sources** or enhance the **sinks** of **greenhouse gases**.”

⁵ In this context, adaptation is defined by the IPCC Fourth Assessment Working Group as “Initiatives and measures to reduce the vulnerability of natural and human systems against actual or expected climate change effects.”

among alternatives. Examples include: installing a water guzzler for wildlife habitat improvement, approving a use by a commercial outfitter for guided hunting trips, removing hazardous trees in a campground, and chipping brush along a roadside. All NEPA documentation needs to be relevant to informing the decisionmaker and the public about pertinent environmental effects relevant to the decision being made. The scoping process is designed to facilitate relevant analysis, including relevant climate change analysis.

Developing Alternatives Responding to Climate Change Issues

The President's Council on Environmental Quality (CEQ) directs agencies to consider and evaluate reasonable alternatives to proposals (Title 40, Code of Federal Regulation, Part 1502.14 (40 CFR 1502.14)). Alternatives proposed to address climate change issues need to be relevant to the proposed action's purpose and need as well as technically and scientifically feasible. Alternatives may include mitigation measures to reduce GHG emissions, affect carbon cycling, or enhance adaptive capacity. Alternatives developed to respond to climate change issues should clearly relate to the cause-effect relationship between the proposal and climate change and have meaningfully different climate change-related effects when compared to the proposal and other alternatives.

Direct & Indirect Effects Analysis

The CEQ regulations at 40 CFR 1508.7 and 1508.8 and FSH 1909.15, section 15 provide direction and guidance for assessing direct, indirect, and cumulative effects caused by the proposed action and alternatives. In addition to CEQ and agency NEPA requirements, it is important to understand that individual state laws and programs may require reduction, regulation, or monitoring of GHG emissions.

As presented in the discussion on scoping, an analysis of GHG emissions and carbon cycles is not always appropriate for every NEPA document. As with any environmental impact, GHG emissions and carbon cycling should be considered in proportion to the nature and scope of the Federal action in question and its potential to either affect emissions or be affected by climate change impacts. As with any environmental effects analysis, the scope of effects needs to be established in timing and geography relative to the scope of the actions being considered in the alternatives. There will be some situations where quantitative analysis will be useful and others where qualitative analysis will best serve decisionmaking. The following sections provide guidance on considerations for when to use quantitative and qualitative analyses.

Quantitative Effects of Projects on GHG Emissions & Carbon Cycle Climate Change

Many proposed projects and programs will emit greenhouse gases (direct effect) and, thus, contribute to the global concentration of greenhouse gases that affect climate (indirect effect).

Quantifying greenhouse gases emitted and/or sequestered may help choose between alternatives based on relative direct effects trade-offs. Forest Service decisions having the potential to emit or sequester more greenhouse gases; such as, energy facilities, transmission lines, oil & gas development or leases, and some Federal permitting decisions may be best informed by quantitative analyses. Also, quantitative analysis may be best when addressing applicable requirements for reducing, regulating, or monitoring GHG emissions.

Because greenhouse gases mix readily into the global pool of greenhouse gases, it is not currently possible to ascertain the indirect effects of emissions from single or multiple sources (projects). Also, because the large majority of Forest Service projects are extremely small in the global atmospheric CO₂ context, it is not presently possible to conduct quantitative analysis of actual climate change effects based on individual or multiple projects.

Currently the Agency does not have an accepted tool for analyzing all GHG emissions. Models used by the Agency such as *FOFEM 5.5*⁶ and *Consume 3.0*⁷ can estimate the conversion of fuel loads into emissions (CO₂, Methane, nitrogen oxide (NO₂)), though these tools are for projects which include prescribed burning of vegetation only. These two models are not used to estimate emissions for other project categories such as oil & gas development, transportation, and so on.

Other models that are being or have been developed include carbon life cycle calculators. For example, the Forest Vegetation Simulator (FVS) is a forest growth and yield model that can produce per acre estimates of total stand carbon and removed carbon over time and under various management scenarios and forest disturbances such as fire, insects, and disease. The FVS also tracks how much of the merchantable carbon is stored in products or is emitted with or without energy capture. Efforts are under way to make FVS growth projections sensitive to changes in climate. Guidance and analysis methods will continue to be developed for estimating GHG emissions and carbon sequestration from activities by federal, state and local governments, and non-governmental organizations which the Agency will continue to evaluate for applicability to its environmental analysis.

It is not necessary to calculate GHG emissions for most projects; however, in situations where the responsible official finds the information useful for decisionmaking, such data and conclusions developed through quantitative analysis would normally only be used for comparing alternatives related to direct effects or addressing any applicable regulatory requirements related to GHG emissions. Without enough scientific understanding to draw conclusions about the significance of the quantitative results, qualitative discussions about the potential for greenhouse gases sequestered and emitted are more appropriate for disclosing climate change implications.

Consider the effects of no action frames, the effects tradeoffs of the proposed action and other action alternatives on GHGs emissions. The projected environmental baseline of the no action alternative can be used to compare quantitative impacts of the alternatives with respect to GHG emissions (when applicable); however, because it is not possible to predict the actual effects of a particular project on global climate change, a baseline comparison cannot be made using the no action alternative relative to climate change.

Qualitative Analysis Methods: GHG Emissions & Carbon Cycle

Qualitative effects disclosure for a project's impacts on GHG emissions and carbon sequestration should be couched in the ecosystem's role in the carbon cycle. In this context, descriptions of

⁶ *FOFEM 5.5*. is First Order Fire Effects Model, a public domain computer program for predicting tree mortality, fuel consumption, smoke production, and soil heating caused by prescribed fire or <http://www.fire.org/index.php?option=content&task=category§ionid=2&id=12&Itemid=31>.

⁷ *Consume v. 3.0* is a software application used to predict fuel consumption, pollutant emissions, and heat release based on a number of factors including fuel loadings, fuel moisture, and other environmental factors <http://www.fs.fed.us/pnw/fera/research/smoke/consume/index.shtml>.

qualitative impacts should disclose the nature and direction (short-term and long-term) of the impact as opposed to the specific magnitude of the impact.

Forests play a major role in the carbon cycle. The carbon stored in live biomass, dead plant material, and soil represents the balance between CO₂ absorbed from the atmosphere and its release through respiration, decomposition, and burning. Over longer time periods, indeed as long as forests exist, they will continue to absorb carbon. Qualitative discussions about these relationships can show the implications of agency decisions about climate change.

The RPA assessment, literature, and national and regional web sites can provide information about general carbon sequestration and GHG implications of various categories of project activities. These resources describe concepts and provide language explaining general connections between management activities and the carbon cycle that can be incorporated by reference in qualitative discussions.

Cumulative Effects Analysis

As GHG emissions are integrated across the global atmosphere, it is not possible to determine the cumulative impact on global climate from emissions associated with any number of particular projects. Nor is it expected that such disclosure would provide a practical or meaningful effects analysis for project decisions.

Where a proposed project would be anticipated to emit relatively large amounts of greenhouse gases (e.g., large-scale oil and gas development project), the following may be appropriate.

1. Quantify the expected annual and total emissions from the project, where possible, using already generated data from air quality analyses;
2. Provide context for these numbers by comparing to other emission sources (e.g., individual, regional, national, global); and
3. Qualitatively describe the effects of GHG emissions on climate change.

A qualitative cumulative effects discussion could incorporate a summary of local, regional, or national climate change scientific assessments to recognize overall climate change effects expected as a result of all contributions to climate change. However, it will not be possible and it is not expected that the effects of a particular project or multiple projects can be specifically attributed to those effects. The land management plan comprehensive evaluation and RPA Assessment may include information that would help in this summary.

Uncertainty Regarding Climate Change

Although it is possible to quantify a project's direct effects on carbon sequestration and GHG emissions, there is no certainty about the actual intensity of individual project indirect effects on global climate change. Uncertainty in climate change effects is expected because it is not possible to meaningfully link individual project actions to quantitative effects on climatic patterns.

Complete quantifiable information about project effects on global climate change is not currently possible and is not essential to a reasoned choice among alternatives. However, based on climate

change science, we can recognize the relative potential of some types of proposals and alternatives to affect or influence climate change and therefore provide qualitative analysis to help inform project decisions. .

Findings of No Significant Impact Related to Climate Change

Context considerations together with 10 intensity factors are used to determine whether a proposed action's environmental impact may be significant (40 CFR 1508.27). A Finding of No Significant Impact documents a Federal agency's reasons why a proposed action will not have a significant effect on the quality of the human environment and an environmental impact statement (EIS) will not be prepared (40 CFR 1508.13).

The responsible official determines the "significance" of effects of a proposal, given the context and intensity of the effects. Significance varies with the context or setting of the proposed action. For a site-specific action, significance usually depends on the effects in the locale rather than the world as a whole. Therefore, actions potentially having effects on climate change that are not discernible at the global scale are unlikely to be determined significant from a climate change standpoint for that reason. The determination is relative to the scope of the environmental effects described in an environmental assessment. Because the context of individual projects and their effects cannot be meaningfully evaluated globally to inform individual project decisions, it is not possible and it is not expected that climate change effects can be found to be "significant" under NEPA and therefore require EIS preparation.

Of the 10 "intensity" factors in the CEQ definition of significance, 5 may be questioned or raised as reasons for requiring an EIS. Factors 2, 4, 5, and 7 can be addressed by explaining the context of the actions and the scope of the effects:

Factor 2 – The degree to which the proposed action affects public health or safety.

Factor 4 – The degree to which the effects on the quality of the human environment are likely to be highly controversial.

Factor 5 – The degree to which the possible effects on the human environment are highly uncertain or involve unique or unknown risks

Factor 7 – Whether the action is related to other actions with individually insignificant but cumulatively significant impacts. Significance exists if it is reasonable to anticipate a cumulatively significant impact on the environment. Significance cannot be avoided by terming an action temporary or by breaking it down into small component parts.

We can recognize that global climate change may affect human health, that there is uncertainty and unknown risks associated with global climate change, and that the ultimate effects on climate change are indeed the results of incremental cumulative effects of many actions, most of which are outside the Agency's control. However, we should also recognize in our findings that we cannot discern significant climate change effects of our proposals, given the context of projects and plans and the lack of effects that can be meaningfully evaluated under current science, modeling, and policies.

Factor 10 – Whether the action violates or threatens a violation of Federal, state, or local law or requirements imposed for the protection of the environment.

Under this factor, it would be difficult to determine the significance of effects of one project on greenhouse gases directly, and therefore climate change indirectly, as there are currently no Federal statutes, regulatory standards, or policy direction on the significance of such effects. Until meaningful, accepted thresholds are adopted against which to weigh any project-related GHG emissions, it will not be possible to determine whether a specific project will have a significant effect under this factor.

If a state does have a threshold in law or regulation for GHG emissions, then the environmental analysis needs to address the project's relationship to that threshold (40 CFR 1508.27 (b)(10)). As states and counties begin to develop such thresholds, NEPA practitioners must be aware of their current local situation and how factor 10 should be addressed in a finding of no significant impact.

Decision Documents

It may be appropriate for the decision document rationale to include some indication of how climate change considerations (if any) were weighed during decisionmaking. These statements should reference relevant NEPA documents, assessments, and science to substantiate findings.

In recognizing agency responsibility to consider climate change, the responsible official can cite the Forest Service mission to "sustain the health, diversity, and productivity of the Nation's forests and grasslands to meet the needs of present and future generations" and state how their decision considered climate change issues. They can explain how climate change was considered to the extent possible given the scope of the project, the scope of the effects, and how all the effects were weighed along with the benefits in arriving at a decision. This would convey Chief Kimball's intent that we need to be aware of climate change information and to consider it when making decisions.

Responding to Comments Regarding Climate Change

The CEQ regulations (40 CFR 1503.4) provide direction that is applicable when responding to comments about climate change.

1. Modify alternatives including the proposed action.
2. Develop and evaluate alternatives not previously given serious consideration by the Agency.
3. Supplement, improve, or modify the analysis.
4. Make factual corrections.
5. Explain why the comments do not warrant further agency response, citing the sources, authorities, or reasons which support the Agency's position and, if appropriate, indicate those circumstances that would trigger agency reappraisal or further response.

Though some examples may help, no standard list of responses to comments can work across all national forests or grasslands. However, given the context of global climate change, there are

some elements of individual responses that can be standardized. The following are potential information sources to use in response to comments:

- EPA State of Knowledge on Climate Change Science.
- Regional appeal websites contain responses to appeal issues, including those related to climate change <http://www.fs.fed.us/appeals/>.
- Agency climate change science syntheses and assessments to support forest plan revisions and projects expected to be completed by January 1, 2009.

Tools, Resources, Literature, and Websites

- Examples - Purpose and need, proposed action, issue statement, alternative development, effects analysis, and response to comments examples are available on Regional intranet sites.
- Inter-governmental Panel on Climate Change
- US Climate Change Science Program
- Climate Impacts Group, University of Washington
- Climate Change Resource Center
- Climate Assessment for the Southwest, University of Arizona
- Southern Global Climate Change Program
- EPA Greenhouse Gas Equivalencies Calculator
- EPA Climate Change & Forests
- Regional Integrated Sciences and Assessments Program, National Oceanic and Atmospheric Administration
- United States Climate Action Partnership
- Forest Plan Implementation (1900-1) Training Materials
- Consortium for Research on Renewable Industrial Materials
- Forest Vegetation Simulator (FVS)
- CONSUME
- Tools for Carbon Inventory, Management, and Reporting
- Climate, Fire, and Carbon Cycle Sciences

References & Literature

- Science and Assessment Program (SAP 4.3), The Effects of Climate Change on Agriculture, Land Resources, Water Resources, and Biodiversity in the United States
- Science and Assessment Program (SAP 4.4), Adaptation Options for Climate-Sensitive Ecosystems and Resources, U.S. Climate Change Science Program.
- Silviculture and Forest Management Under a Rapidly Changing Climate, Millar, et al, Ecol. Applications, 2007.
- British Columbia Department of Forests Research Publications by Dave Spittlehouse for the Pacific Northwest.
- Intergovernmental Panel on Climate Change's Fourth Assessment Report.
- Climate change and Forests of the Future: Managing in the Face of Uncertainty, *Ecological Applications*, 17(8), 2007, pp. 2145–2151.
- April 2007 interim update to the 2000 RPA Assessment.

Links for Forest Service Employees

- Region 1 and Region 9 Forest Service internal websites include sample comments.
- The Project, Appeals and Litigation System (PALS) Forest Service internal website is designed to track appeal issues, including those for climate change.