MAINE CLIMATE ACTION PLAN 2004

VOLUME TWO: APPENDICES

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APPENDIX 1: AN ACT TO PROVIDE LEADERSHIP IN ADDRESSING THE THREAT OF CLIMATE CHANGE (L.D. 845, 2003)

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PUBLIC LAWS OF MAINE
First Regular Session of the 121st

CHAPTER 237
H.P. 622 - L.D. 845

An Act To Provide Leadership in Addressing the Threat of Climate Change

Be it enacted by the People of the State of Maine as follows:

Sec. 1. 38 MRSA c. 3-A is enacted to read:

CHAPTER 3-A
CLIMATE CHANGE

§574. Definitions

As used in this chapter, unless the context otherwise indicates, the following terms have the following meanings.

1. Greenhouse gas. "Greenhouse gas" means any chemical or physical substance that is emitted into the air and that the department determines by rule may reasonably be anticipated to cause or contribute to climate change. "Greenhouse gas" includes, but is not limited to, carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons and sulfur hexafluoride. Rules adopted by the department pursuant to this subsection are routine technical rules as defined in Title 5, chapter 375, subchapter 2-A.

2. Sector. "Sector" means one of the 5 sectors identified in the climate change action plan adopted by the Conference of New England Governors and Eastern Canadian Premiers in August 2001. The 5 sectors are the transportation, industrial, commercial, institutional and residential sectors.

§575. Lead-by-example initiative

The department shall establish a lead-by-example initiative under which the department shall:

1. Greenhouse gas emissions inventory for state-owned facilities and state-funded programs. Create an inventory of greenhouse gas emissions associated with state-owned facilities and state-funded programs and create a plan for reducing those emissions to below 1990 levels by 2010;

2. Carbon emission reduction. By January 1, 2006, seek to establish carbon emission reduction agreements with at least 50 businesses and nonprofit organizations;

3. New England greenhouse registry. Participate in a regional effort to develop and adopt a greenhouse gas registry that includes 3rd-party verification; and

4. Statewide greenhouse gas emissions inventory. Create an annual statewide greenhouse gas emissions inventory.

§576. Reduction goals

The State's goals for reduction of greenhouse gas emissions within the State are as follows:

1. Reduction by 2010. In the short term, reduction to 1990 levels by January 1, 2010;

2. Reduction by 2020. In the medium term, reduction to 10% below 1990 levels by January 1, 2020; and

3. Long-term reduction. In the long term, reduction sufficient to eliminate any dangerous threat to the climate. To accomplish this goal, reduction to 75% to 80% below 2003 levels may be required.

§577. Climate action plan

By July 1, 2004, the department, with input from stakeholders, shall adopt a state climate action plan to meet the reduction goals specified in section 576. The action plan must address reduction in each sector in cost-effective ways and must allow sustainably managed forestry, agricultural and other natural resource activities to be used to sequester greenhouse gas emissions. The department shall submit the action plan to the joint standing committee of the Legislature having jurisdiction over natural resources matters.

§578. Progress evaluation

By January 1, 2006 and by that date every 2 years thereafter, the department shall evaluate the State's progress toward meeting the reduction goals specified in section 576 and shall amend the action plan as necessary to ensure that the State can meet the reduction goals. Starting no earlier than January 1, 2008, the department may recommend to the joint standing committee of the Legislature having jurisdiction over natural resources matters that the reduction goals specified in section 576 be increased or decreased.

Effective September 13, 2003, unless otherwise indicated.

APPENDIX 2: ECONOMIC AND MODELING ASSUMPTIONS

2.1 Economic Assumptions

2.2 Tellus Institute Modeling Description

2.3 Production / Consumption in the Electricity Sector

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Appendix 2.1

MEMORANDUM

TO: Maine GHG Stakeholder Group
FROM: Center for Clean Air Policy
DATE: April 1, 2004

RE: Population and Economic Forecasts, Discount Rates

The intent of this memo is to outline the Work Group discussions and recommendations regarding (1) the underlying population and economic assumptions that will be used to forecast greenhouse gas emissions and (2) the selection of a discount rate that will be used to analyze the cost-effectiveness of the priority measures to reduce GHG emissions.

Population Forecast

The population forecast will be used in the baseline forecast of greenhouse gas emissions and in evaluation of mitigation options. Several Work Groups discussed the forecast of population growth and considered the following sources: EIA's Annual Energy Outlook (national), 2004; Charles Colgan, University of Southern Maine; and the Maine State Planning Office (SPO). The Buildings, Facilities and Manufacturing Work Group felt most comfortable with the Charles Colgan medium forecast because it used Maine data and covered the time period of the analysis. This was supported by the Energy and Solid Waste Work Group.

	EIA's Annual Energy Outlook 2004 [1]	Charles Colgan, USM [2,3]	Maine State Planning Office [2]
Forecast Period	2004-2025	2004-2025	2004-2017
POP (low)	0.60%	1.00%	
POP (med)	0.80%	1.15%	0.70%
POP (high)	1.00%	1.30%	

[1] National

[2] State of Maine

[3] Preliminary

Economic Forecast

The economic forecast will be used in the baseline forecast of greenhouse gas emissions and in evaluation of mitigation options. The forecast of economic growth was discussed in the Buildings, Facilities and Manufacturing Work Group and the Energy and Solid Waste Work Group. The Work Groups considered the following forecasts: EIA's Annual Energy Outlook (national), 2004; Charles Colgan, University of Southern Maine; and the Maine State Planning Office (SPO) (see table below). The EIA GDP forecast extends from 2004 to 2025, as does the Charles Colgan GSP forecast. However, the SPO only has a short-term economic forecast to 2007. The Buildings, Facilities and Manufacturing Work Group felt most comfortable with the Charles Colgan medium forecast because it used Maine data and covered the time period of the analysis. This was supported by the Energy and Solid Waste Work Group.

	EIA's Annual Energy Outlook 2004 [1]	Charles Colgan, USM [2,3]	Maine State Planning Office [2,3]
Forecast Period	2004-2025	2004-2025	2004-2007
GDP (low)	2.40%	3.0%	
GDP (med)	2.97%	3.5%	2.85%
GDP (high)	3.45%	4.0%	

[1] National Gross Domestic Product

[2] Gross State Product

[3] Preliminary

The BFM Work Group is in the process of investigating the industrial sector component of this economic forecast. The BFM WG believes that the economic indicator for industrial growth should be constant or declining over time (with the exception of the tourism sector). Once forecast is determined, it will be used to estimate future emissions from fossil fuel combustion in Maine's industrial sector.

Discount Rate

The Maine Department of Environmental Protection has recommended the use of a consistent discount rate across all sectors (e.g., transportation, industry, residential, etc.). Consistency is important for policy analysis as it allows decision-makers to compare the cost-effectiveness of different measures across various sectors.

One option for a consistent discount rate is the Federal Reserve Prime Rate, the average over the last five years (1999-2003) is 6.58% and the 2003 rate is 4.12%. The US Federal Government Office of Management and Budget recommends using a discount rate of 7% for regulatory analysis. The 7% rate, an estimate of the average before-tax rate of return to private capital in the US economy, reflects the returns to real estate and small business capital as well as corporate capital.

Due to their tax exempt status, states have a lower discount rate – about 5%. Note that the Maine State Planning Office does not currently have a recommended discount rate that they use for policy analysis. As a point of reference, Rhode Island used a discount rate of 5% in analysis of greenhouse gas mitigation options that the Rhode Island Legislature's Policy Offices uses for all legislative and policy analysis, whereas Connecticut used a discount rate of 7%.

The Buildings, Facilities and Manufacturing Work Group had a lengthy discussion regarding the selection of a discount rate. They pointed out that the private sector uses higher discount rates to evaluate investments. This discount rate reflects the capital constraints and preference for short payback periods, and high internal rates of return that are often required by the private sector. For example, the BFM Work Group suggested a 12% discount rate for the residential sector, 30% discount rate for the commercial sector, and a 50% discount rate for the industrial sector. However, this process will not delve into the details of which sectors the investments will come from (i.e. government v. private). Therefore, application of a private discount rate might be more appropriate in the future during the stage of final program design as a check regarding whether expected levels of customer investment/contribution are likely to occur.

Appendix 2.2

Electricity Sector Modeling Approach

The Tellus Institute worked with the Center for Clean Air Policy in developing the baseline emissions for the electric sector and to estimate the emissions and costs for the following policies: Renewable portfolio standard, system benefits charge, energy efficiency, combined heat and power, GHG emission standards and GHG emission offsets.

Develop preliminary electricity supply baseline. Tellus developed the baseline for the electric sector in Maine using the output from the National Energy Modeling System (NEMS). NEMS is the primary mid-term modeling tool used by the Energy Information Administration. CCAP worked with members of the Maine electricity working group to review and identify any changes to the assumptions in NEMS for the performance characteristics (capacity, costs, efficiency, fuel mix) of existing and potential new plants. Tellus applied the identified adjustments to NEMS and ran the model under reference case conditions (ie. assuming no additional policies). Tellus then calculated the GHG emissions for Maine (accounting for both emissions that occur in-state and net emissions from imports or exports). See next section for further details on this approach for calculating electricity emissions at the state-level. In addition to GHG emissions Tellus used NEMS output to estimate electric sector generation and capacity (including new builds), fuel consumption, and costs. All results were calculated for the 2005 to 2025 period.

Modeling of key policies. Tellus used NEMS (including the adjustments from the base case) to model the set of electric supply policies identified by the working group. NEMS allows the user to change parameters for total electricity demand, incentives for renewables, and disincentives for GHG emissions. Tellus adjusted these parameters to reflect each of the electric supply policies. Emission reductions and costs reflect the differences between each policy case and the base case, based on changes in Maine, rather than to the whole NERC region. As in the base case, the policy case results account for any changes in net exports.

Appendix 2.3

Production and Consumption Emissions:
The Implications for Greenhouse Gas Mitigation in the Electricity Sector

Center for Clean Air Policy
March 2004

Introduction

The decision of whether to measure emissions from the electric power industry on the basis of production or consumption has important implications for greenhouse gas (GHG) mitigation programs. It can significantly impact the total reductions required and the estimation of the performance of GHG mitigation measures such as renewable portfolio standards. This memo presents an analysis of these issues.

The issue of production versus consumption arises in restructured electricity markets, where electric power plants all generate and sell power into a single local grid. Unlike traditional commodities, after electricity is produced, it is physically impossible to track from individual power plants to the final destination. It therefore cannot physically be identified as meeting the demand of particular customers. The total generation of each individual plant and of the entire region, state or locality can be determined, however, as can the total demand in aggregate.[*] In some self-contained electricity markets, the total demand is equal to the total generation. In most markets, however, electricity is transmitted for sale across borders, and the total generation within the territory therefore differs from the total demand. In cases where the generation exceeds total demand the state is a net exporter selling power to other regions; where generation is lower than demand the state is importing power.

Total emissions can be estimated based either on total generation or total demand. When transmission of electricity between states is significant, these production and consumption emissions will in general be different due to the difference in total kilowatt-hours. They will also differ if the fuel mix of generation in the state and the surrounding areas has different emissions characteristics. The estimation methods and the issues associated with production and consumption emissions are discussed below.

Production versus Consumption Emissions

Production-based emissions are based on the total level of electricity generation within a state. They are estimated by taking 100% of emissions from all electric generating units located within the state. The production approach is the generally accepted method for estimating emissions. All emission trading systems implemented thus far in the United States and elsewhere to regulate SO_2, NO_x and CO_2 have been production-based. Since it is based on taking all emissions within a given territory, the production standard is also consistent with the methodology used by the Intergovernmental Panel on Climate Change (IPCC) for estimating national GHG emissions, as well as with computer models used for national and regional analysis of the US electric power industry (e.g., ICF Consulting's Integrated Planning Model (IPM), US Energy Information Administration's National Energy Modeling System [NEMS]). Its key strength is that the methodology used

[*] In this memo, to avoid confusion it is assumed that the electricity market is an individual state that may also export or import power to or from surrounding states or regions.

is simple, accurate and widely accepted, and the data required (usually total fuel consumption) is readily available. In states where the number of emission sources is small, production-based estimation may allow for independent verification of emission estimates: emissions calculated from fuel use can be verified using continuous emissions monitoring at the exhaust stack, and vice versa.

Another advantage of using a production-based standard at the state or regional level concerns its compatibility with a potential national GHG regulation program. While the exact structure of a future US GHG cap and trade program is uncertain, based on the experience of the SO_2 and other programs in the United States it is expected that national GHG regulation would employ a production-based standard. Each individual generating unit would therefore be responsible for 100% of its total GHG emissions, regardless of consumption levels. The use of a production standard by states would therefore be consistent with the national program, while a consumption approach would not. This could ease the transition from state to national regulation, and could potentially reduce the costs incurred by the states in the process.

Despite the strengths of the production approach, it may nonetheless be deemed unsuitable for some GHG mitigation programs. In states with significant interstate transmission, the production approach will fail to account for all emissions (and therefore the environmental impact) from the total consumption of electricity within the state. Electricity consumption within a state that imports power, for example, will account for some of the emissions produced in the exporting areas, but this impact will not be captured under a production approach. In the case of a state that exports power, generation will exceed demand, so a production approach would cause the state to account for emissions that have been produced to meet the demand of consumers in other regions. In such cases the use of a production approach may give rise to questions of equity and responsibility for emissions. The use of a consumption approach may be more appropriate in such cases.

Consumption emissions are based on total electricity demand within a state, and thus account for imports (or exports) of power from (or to) other areas. As discussed above, the key benefit of a consumption approach is that in cases where electricity transmission flows are significant, it provides a method of estimating and accounting for a level of emissions representing all and only those that arise from consumption within the state itself. A consumption approach has drawbacks, however. One issue is that the consumption standard is controversial. It has not been employed for GHG regulation, and no generally accepted estimation method exists. The data required is also likely to be more difficult to obtain than in the case of production emissions. A consumption approach may give rise to responsibility questions of its own, since an exporting state could employ consumption-based estimates to hold other states or regions accountable for some of the emissions from the exporting state. In all but a few special cases (e.g., power plants are connected to a single transmission line sending all of the power into a neighboring state), the total electricity consumption and emissions cannot be traced to a group of specific plants, so consumption emissions cannot be verified. Emission estimates based on consumption therefore typically represent allocations on paper rather than actual physical emissions that can be measured.

In restructured markets, at least two general methods for estimating emissions on a consumption basis exist:

- One approach is to treat the state market as a unified part of a larger market to or from which it imports or exports power (e.g., the Maine market is taken as a component of the New England Power Pool). The annual emissions are then taken as the product of the total state demand and the average regional emission rate (method #1). This is the approach that the Tellus Institute appears to have used in developing Rhode Island's GHG Plan.

- A second approach treats the state as a distinct unit, with emissions from the power imported or exported added or subtracted from the total production emissions (method #2). In states that import power it is assumed that all of the generation in the state is consumed within the state, and the emissions for imports only are estimated by adding the product of the net power imports and the average regional emission rate to the production emissions. In exporting states all of demand is assumed met by in-state generation, and the product of the net power exports and the average state emission rate is subtracted from the production emissions to obtain the consumption emissions. Unlike the first approach, with this approach the consumption emissions will always exceed production emissions in importing states, and will be lower than them in exporting states.

These two approaches will produce different estimates of consumption emissions due to differences between the average emission rate of the state and that of the surrounding region. For example, in the case of an exporting state that has an average emission rate that is lower than the regional rate (perhaps due to a higher level of renewable energy generation), the consumption emissions estimated using method #1 will be higher than those obtained with method #2. (This has typically been the case with Maine in most years since 1990, as will be discussed below.)

Implications for GHG Mitigation

The decision of whether to adopt a production versus a consumption approach for estimating emissions will have significant implications for a state, as well as for the surrounding region. In New England, for example, the regional effort to regulate GHG emissions to meet the NEGA/ECP targets ultimately will need to ensure that each state adopts a consistent standard for estimating GHG emissions. In selecting a standard for a GHG reduction program a state may wish to consider the level of total reductions required and the mitigation measures to be employed. Goals for GHG mitigation programs are typically set in terms of emission levels to be achieved in a future year (e.g., 2010) equal to a share of the total emissions in a past baseline year (typically 1990). Since the selection of a production or consumption approach will typically produce different estimates in any given year, the total reductions that would be required in a GHG program may be significantly different under each approach. It should be further noted that with a consumption approach, the estimated reductions required may also vary depending upon the particular method used to estimate the consumption emissions.

The table below displays estimates of the annual emissions in the state of Maine from 1990 through 2000. The emissions have been estimated using a production approach, a consumption approach using method #1, and a consumption approach using method #2. The total kilowatt-hours associated with both approaches are displayed as well. Consumption emissions with method #1 exceed production emissions in all years due to the much higher regional (compared to the state) emission rate. Maine was a net exporter of power in most years, and consumption emissions with method #2 were typically lower

than production emissions. It should also be noted that the consumption emissions are significantly higher when estimated using method #1 than with method #2, again due to the difference between the regional and state emission rates.

The table shows that over the 1990-2000 period, GHG emissions are estimated to have increased by 1.2 $MMTCO_2e$ under the production approach, by less than 0.1 $MMTCO_2e$ under a consumption approach using method #1, and by 1.5 $MMTCO_2e$ using method #2. Therefore, if the state had adopted a policy of lowering electric power emissions in 2000 to 1990 levels, the reductions required under each approach would have been significantly different. It should be noted that under a consumption approach using method #2, the total reductions required would have been 0.3 $MMTCO_2e$ higher than under a production approach even though the annual emissions are lower in both 1990 and 2000 in the former case. The use of a consumption approach with method #1 would have enabled the state to meet the 1990 target with only minimal reductions.

Maine CO_2 Emissions and Generation ($MMTCO_2e$)					
Year	**From Production**		**From Consumption**		
	Generation (million MWh)	**Emissions ($MMTCO_2e$)**	**Generation (million MWh)**	**Emissions ($MMTCO_2e$) #1**	**Emissions ($MMTCO_2e$) #2**
1990	15.9	3.1	11.5	4.8	2.2
1991	17.3	2.6	11.4	4.8	1.7
1992	15.7	2.6	11.5	4.5	1.9
1993	15.6	2.3	12.0	4.2	1.7
1994	16.5	2.4	11.6	4.2	1.6
1995	9.8	2.3	11.6	4.4	3.0
1996	14.9	2.0	11.7	4.6	1.5
1997	10.3	2.8	12.0	6.0	3.6
1998	11.0	3.3	11.6	5.6	3.6
1999	12.7	4.6	11.9	5.2	4.4
2000	14.0	4.3	12.2	4.9	3.7
Total	153.8	32.2	128.9	53.2	28.9

Another important issue concerns the impact of the emissions standard selected on the performance of the specific GHG mitigation measures. Measures taken to reduce GHG emissions within a given state will often affect the electric power industry in surrounding areas. In such cases, the use of a production approach may not capture the full emission impacts in these areas. For example, the adoption of a state renewable portfolio standard may alter the structure of the regional power market, perhaps by encouraging the development of new renewable facilities in other areas hoping to export power to the state. Another example would be the adoption of a generation performance standard on all plants within the state. Such a policy would likely increase the cost of generating electricity from in-state plants, and could therefore decrease in-state generation and increase the level of power imported from surrounding areas. In such a case the use of a production approach would show a drop in total emissions even if total state demand

does not change. Consumption-based emissions may therefore allow a state to better estimate the total regional impact of in-state programs. In all cases, however, the specific impacts of selecting a production or consumption approach will depend upon the structure of the electricity market and the interactive effects of the policies adopted. Thus, while in many cases a consumption standard may be a more appropriate method of estimating the regional impacts of in-state GHG policies or programs, in others a production standard may be just as useful.

The key attributes of production and consumption emissions are summarized in the following table.

Estimate	Basis	Imports/ Exports Included	Benefits	Drawbacks	Accounts for Out-of-State Activities
Production	Generation	Exports only	Simple, direct estimation method; widely accepted; consistent with other emission regulation programs and computer models; can be verified	Does not account for interstate or interregional transmission	Typically not
Consumption	Demand	Imports Only	Accounts for interstate transmission; allows responsibility for all and only those estimated emissions from in-state consumption	No generally accepted method of estimation; cannot be independently verified; more difficult to obtain data	Yes

APPENDIX 3: ISSUE DISCUSSIONS

3.1 Black Carbon

3.2 Carbon Accounting for Bio-mass

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Appendix 3.1

Memorandum

TO: Stakeholder Group, Maine GHG Initiative
FROM: CCAP, Environment Northeast
SUBJ: Overview of Black Carbon
DATE: 4/1/2004

This memo provides an overview of black carbon (BC) emissions, which are the result of incomplete combustion of carbon-based material, including transportation, power generation and biomass combustion.

Sources of Black Carbon

Black carbon is defined as the absorbing component of carbonaceous aerosols (fine particles in the air) in soot (particulate matter or PM). The latest science on BC indicates it may be responsible for as much as 25% of global warming to date.[1] Up to half of BC emissions result from transportation, with the remainder occurring from power plants, industrial processes and the burning of vegetation.[2] Estimating transportation BC emissions is more straightforward than in other sectors. BC emissions arise from solely from diesel fuel (e.g., trucks, buses and off-road/construction equipment), and the data is more readily available. Of the remainder (e.g., black carbon in the electric power industry), more research is necessary determine the amount of BC generated, including industrial boilers and commercial home heating, where wood-burning stoves and heating oil may contribute significant BC emissions. Finally, biomass burning likely has a considerable impact on BC, but defining specific sources and relative contributions has proven challenging and has not yet been addressed.

Baseline and Emissions Forecasts

Developing a black carbon baseline requires three steps, including: 1) calculating historic BC emissions, developing a forecast of BC emissions and, 3) converting BC emissions to CO_2-equivalent emissions. Roughly speaking, black carbon warming impacts are determined by estimating the insoluble organic fraction of carbon-based PM generated by combustion of diesel fuel in Maine's transportation sector and converting to equivalent metric tons of CO_2.[3] Given the uncertainty inherent surrounding BC production from electricity generation and residential and commercial it may be necessary to adjust these GHG sector baselines in the future, as data become more precise. At that time, it is anticipated that the GHG baselines will need to be adjusted using the process likely to be adopted by the NEG/ECP (i.e., every three years).[4]

[1] Jacobson, M.Z. (2002). Control of fossil-fuel particulate black carbon and organic matter, possibly the most effective method of slowing global warming. Journal of Geophysical Research, 107(D19), ACH 16, 1-22. Other leading climate scientists (e.g., James Hansen) have measured atmospheric conditions driven by black carbon aerosols that generally support Jacobson's modeling-based estimates of the magnitude of BC climate impact.

[2] Recent research from has found that up to half of black carbon is from the transportation sector (Streets, Bond).

[3] While much work has been done on this by Environment Northeast, Energy and Environmental Analysis, Inc, and others, such estimates are still a source of uncertainty. Further refinement will be necessary as the scientific understanding of black carbon evolves.

[4] The issue of black carbon will be taken up formally at the upcoming NEG/ECP meeting scheduled for summer 2004.

Potential for Control Technologies to Reduce Transportation BC

Recent federal engine and fuel regulations will play a role in reducing black carbon emissions. Specifically, these include: 1) current U.S. Environmental Protection Agency (EPA) rules which set standards for all new on-road engines that will achieve 90 percent reductions in PM beginning in 2007; 2) pending EPA rules requiring similar reductions for all new nonroad engines (to phased in between 2008 and 2014); and 3) federal fuel standards for low sulfur and ultra low sulfur. This combination of engine and fuel standards will allow for the use of new advanced retrofit technologies, which can reduce BC emissions by 90% (and in some cases up to 99%). Successful integration and use of new PM-control technologies can maximize the BC benefits in Maine while providing health benefits from reduced exposure to diesel exhaust, which is linked to lung cancer and respiratory ailments.

For Maine to achieve these levels of BC reduction from transportation sources will require the adoption of advanced technologies such as particulate traps and catalyzed filters and allow the state to achieve the levels of BC reductions as a result of new federal engine and fuel regulations mentioned above.[5] Doing so will require a statewide process (e.g., a system of incentives and regulations) that incorporates engine turnover rates, the availability of low sulfur fuels and the market availability of the various control technologies.[6] However, the climate benefits from such initiatives will still take considerable time to achieve, given that average vehicle turnover for heavy-duty trucks is 30 years. Of interest, the Maine Transportation Working Group has raised the fact that Maine truck engine turnover rates may be considerably lower, (i.e., 10 year lifetime) which may offer further incentive to reduce transportation BC emissions in the state.

Black Carbon in the Connecticut GHG Reduction Process

The Governor's Steering Committee (GSC) asked Connecticut (CT) stakeholders to formulate policy recommendations to help the State to make progress toward or beyond GHG targets established by the New England Governors/Eastern Canada Premiers (NEG/ECP) Climate Change Agreement of 2001. As part of this process, stakeholders formulated recommendations to include black carbon as another GHG toward NEG/ECP targets. The CT Transportation Working Group agreed to make an adjustment to the baseline to include BC emissions, which increased the absolute baseline but total percentage difference between 1990 and 2020 transportation GHG emissions remains the same. Other sectors did not account for BC due to the lack of data.

Black Carbon Questions for Maine Stakeholders

Stakeholders must decide whether or not to quantify BC in the state and if so,

- Should we include BC in the Transportation sector baseline?
- Given data limitations, is it appropriate to analyze BC in the Transportation sector and not in the others?

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[5] Cost estimates developed during in the Connecticut GHG process indicate an estimated cost of \$6 – 14 per $MTCO_2e$ reduced.

[6] Environment Northeast, which contributed to this memorandum, has developed a suggested approach to integrate new PM control technologies into Maine's current fleet of on-road and off-road vehicles. This will be shared with the Transportation Working Group and other interested parties.

- If BC is included in the baseline, should BC savings be estimated from all existing options?
- Should we formulate new options specifically designed to reduce BC?

Appendix 3.2

TO: Maine DEP, Maine GHG Initiative
FROM: Thomas D. Peterson, LLC, Agriculture and Forestry Working Group consultant
SUBJ: Maine Forestry Carbon Accounting
DATE: 11/18/2004

This memo details the accounting systems used in the Forestry Technical Working Group in the Maine Stakeholder Advisory Group process, including consistency with and adjustments to IPCC and US National Communications guidelines.

The Maine Stakeholder Advisory Group (SAG) and Technical Working Groups (TWGs) used generally accepted accounting principles and guidelines from other state and substate greenhouse gas mitigation plans (CT, NY, Puget Sound, RI) with adjustments for specific new issues in Maine. These guidelines are based upon and consistent with emissions inventory guidelines of the Intergovernmental Panel on Climate Change (IPCC) and US National Communications of mitigation actions.[7] However, in key areas the IPCC guidelines and National Communications are incomplete or inconsistent when applied at a state level (*e.g.*, treatment of imports and exports, treatment of displacement effects across sectors).[8] The Forestry TWG worked closely with the US Forest Service Northern Global Change Research program to apply and develop accounting practices consistent with national forest carbon inventory and modeling systems, and to create adjustments for state application that can be institutionalized in future by the US Forest Service.[9]

The Maine SAG process augmented or adjusted existing principles and guidelines based on the generally accepted principal that *states are responsible for emissions and emissions reductions that occur as a result of actions taken within the state boundary*, even if the emissions impacts occur outside the boundary. Conversely, states are not responsible for exported emissions associated with import actions by other states. For instance, emissions from electricity consumption within a state are counted even if they result from the import of power or raw material generated outside the state (a consumption based system). States are not responsible for emissions from exported electricity that is generated in the state. As a consequence, emissions associated with imports were included, and emissions associated with exports were excluded in the inventories and mitigation analyses for all sectors in the Maine SAG process.[10] For information purposes calculations of production-based emissions were developed in some sectors.

[7] See following memo, pp. 24 ff. from Wiley Barbour, Managing Director, Environmental Resources Trust, Washington DC, 2004.
[8] K. Pingoud a, B. Schlamadingerb, S. Grönkvistc, S. Brownd, A. Cowiee, and G. Marland. *Task 38: Greenhouse Gas Balances of Biomass and Bioenergy Systems Approaches for inclusion of harvested wood products in future, GHG inventories under the UNFCCC, and their consistency with the overall UNFCCC inventory reporting framework.* IEA Bioenergy, July 13, 2004. See footnote 7 and the description of double counting problems that exist under current IPCC guidelines.
[9] Jim Smith, US Forest Service Northern Global Change Research Program, initial Maine data available at: http://www.fs.fed.us/ne/global/pubs/books/epa/states/ME.htm
[10] See Maine SAG *Boundary and Timing Issues (Including Biomass) Memo* available at: http://maineghg.raabassociates.org/events.asp?type=grp&event=Stakeholder%20Advisory%20Group

Mitigation analysis in the Maine SAG and Forestry and Agriculture TWG used full life cycle analysis[11] of emissions reductions to ensure comprehensive accounting of positive and negative emissions impacts of policy actions, including direct and indirect impacts across sectors (also known as displacement effects),[12] all greenhouse gases, and the full impact of actions taken during the 2005-2020 compliance period time period even if they resulted in impacts beyond 2020 (also known as the duration of impacts). This approach is consistent with principles and guidelines for cost benefit analysis established in guidelines from the US EPA Science Advisory Board.[13] The EPA guidelines are not entirely conclusive on the use of discounting,[14] and the Maine SAG process chose to discount monetized costs of policy actions but not non-monetized benefits of emissions reductions.[15]

In the Maine forestry sector, a number of important accounting procedures were used to measure emissions impacts of policies affecting pre harvest and post harvest biomass from Maine forests. Pre harvest and post harvest biomass carbon accounts were integrated as needed for forest preservation and management options. For sensitivity analysis, all forest management options were evaluated using two distinct time periods for analysis. Scenario 1 only included impacts through 2020 and is, therefore, not a full life cycle analysis. Scenario 2 included full life cycle impacts past 2020, including a full 58 year generation of new tree growth (based on Maine FORCARB estimates of the average age of Maine forests).

Pre-Harvest Biomass[16]

Full life cycle accounting was used to determine net impacts of policies affecting the size and configuration of the state's forest ecosystem, including the impact of biomass removal and growth. Analysis was based on regional FORCARB data recalibrated to Maine using best available state data developed by the Forest Experts Group, including the US Forest Service, and the Technical Consultant. Forest preservation measures (land use change) included estimation of direct biomass emissions impacts of land clearing and associated above ground and below ground biomass carbon disturbance using Maine FORCARB data. Indirect effects of post harvest biomass for the merchantable portion of cleared biomass were also included using HARVCARB[17] and other data (dis-

[11] Full life cycle analysis (FLCA) is well developed in theory but not widely practiced for forestry greenhouse gas mitigation. This approach counts both positive and negative emissions for all carbon accounts over the full time period of affects from actions, and estimates transfers of carbon between accounts.
[12] Displacement effects can result in *increased or decreased* greenhouse gas flows outside the compliance boundary of the action, including impacts to other sectors or jurisdictions. Displacement effects (sometimes referred to as "leakage") should be addressed in comprehensive accounting of *direct and indirect* benefits and costs.
[13] EPA Guidelines for Preparing Economic Analyses EPA 240-R-00-003 Environmental Protection Agency, September 2000.
[14] The EPA guidance identifies several options and issues related to discounting, and recommends that discounting be applied symmetrically to costs and benefits, both monetized and non-monetized.
[15] See Maine SAG *Population Economic and Discount Rate Forecasting Memo*, Appendix 2.1.
[16] A full description of Maine Forestry Options can be found Appendix 5.4.
[17] HARVCARB (Skog and Nicholson, US Forest Service model) provides post harvest biomass accounts for pulp and saw timber wood products, landfill storage, energy recapture, and direct

cussed below). A new protocol was developed for estimation of the carbon impacts of acreage conversion from forested cover to cleared residential land cover using data from Maine FORCARB augmented with the Natural Resource Inventory (NRI) and American Housing Survey (AHS). For forest management options (e.g. density management) net impacts of biomass carbon removal, decay and regrowth were included for a full generation of tree growth (estimated at 58 years) using Maine FORCARB data for all forest carbon accounts.[18] Increased stocking options also used a full time period of tree growth for analysis. Import and export issues do not affect pre harvest biomass management.

Post-Harvest Biomass[19]

Full life cycle accounting was used to determine net impacts of policies that increase or decrease flows of wood products or biomass energy feedstocks into the market. Emissions impacts of imported biomass were included, and emissions impacts of exported biomass were excluded based on detailed data found in the Maine Wood Processor Reports from 1990 forward.[20] This adjustment to IPCC and National Communications guidelines is needed at the state level to ensure that forestry emissions are treated consistently with other sectors (particularly energy supply and manufacturing), and with other states in the region, to avoid double counting.[21]

Biomass energy emissions (from biomass combustion for electricity or direct heat) were reported in the energy supply sector, and the carbon storage associated with biomass regrowth following harvest was counted in the forestry sector under a statewide inventory framework. This is consistent with IPCC Guidelines and National Communications and allows full life cycle calculation of direct and indirect emissions impacts of biomass energy use across sectors. Direct carbon storage and emissions impacts of harvested wood products (pulp and saw timber) were estimated by use of the US Forest Service HARVCARB model using Maine specific rates, and indirect energy displacement effects were calculated using the CORIIMM model.[22] The HARVCARB model provides emissions estimates over a 100 year time period for the disposition of harvested biomass to four greenhouse gas accounts: wood products storage (the manufacturing sector); landfill storage (the waste sector); energy recapture (the energy supply sector); and direct emissions from on site combustion and decay (the forestry sector).

It should be noted that this full life cycle analysis did not assume in advance that emissions of biomass combustion for energy use would automatically be offset by equal regrowth of biomass in the future (typically referred to as a “carbon neutral” assumption). Instead, a full life cycle analysis was used to estimate *all positive and negative emissions impacts*. In sustainably managed forest system (however elusively that term is de-

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emissions from burning and or decay. Imports and exports of post harvest biomass are incorporated through supplemental data, such as state wood processor reports.

[18] FORCARB (Jim Smith, US Forest Service model) contains pre harvest biomass (ecosystem) accounts for live trees, standing dead and dying trees, forest floor and coarse woody debris, and soils.

[19] A full description of Maine Forestry Options can be found in Appendix 5.4.

[20] At present 24 percent of Maine electricity is generated from biomass feedstocks, with significant potential for increased supplies in the future that could reduce net carbon emissions.

[21] IEA Bioenergy, July 13, 2004.

22 Perez-Garcia, John, Bruce Lippke, Jeffrey Comnick, and Carolina Manriquez. CORRIM: Phase I Final Report, Module N. TRACKING CARBON FROM SEQUESTRATION IN THE FOREST TO WOOD PRODUCTS AND SUBSTITUTION. March 25, 2004.

fined) it is assumed that future conditions will allow a full regrowth of biomass that is harvested and combusted for energy recapture. A number of conditions must be met for this assumption to be realized in the future, including permanent protection of the forest from conversion to developed land uses, no long term reduction in productivity associated with forest health and or climate change, and no net carbon impact of forest harvest practices.

In addition, indirect impacts of durable wood products use are important. In the typical case of forest harvest in Maine, part of the harvested biomass is used for wood products, and part is used for biomass energy (typically logging and mill residue, or live tree chips). Harvested wood products result in long-term carbon storage in the form of durable wood, as well the displacement of energy-based emissions when wood building materials replace steel and concrete.[23] Therefore, it is critical to integrate the direct and indirect impacts of all uses of biomass from a given forestry option to fully understand its net greenhouse gas emission impact.

In summary, the use of a carbon neutral assumption in Maine would have precluded a full analysis of direct and indirect impacts, or a specific understanding of the effect of sustainability assumptions. The final analysis of forest inventories and policy options in Maine did not assume carbon neutrality, but did include an assumption of future sustainability that allowed full regrowth of harvested biomass.

[23] CORRIM, March 25, 2004.

Greenhouse Gas Accounting at the State and Regional Level: Applying International Norms for Reporting Biomass Energy

Wiley Barbour, Managing Director, Environmental Resources Trust

October 2004

Officials in state and local governments are actively developing emission inventories for greenhouse gas pollutants. In the US there are a number of different views on the best ways to measure and report emissions, and this has led to some confusion. In order to develop emission inventories in a comparable manner many have turned to the international reporting and accounting rules to ensure consistency. This paper provides some background on international accounting and reporting practices related to biomass energy and explains how international accounting practices may provide a useful model for domestic reporting.

Introduction

Over the last decade global climate change has become an important issue in Statehouses and State Agencies across the United States, prompting a number of state agencies to begin developing inventories of sources and sinks of greenhouse gas (GHG) emissions within their state boundaries. These emission inventories are used for both basic reporting and for tracking emissions performance over time to assess the effects of policies and measures.

In an effort to ensure compatibility with reporting initiatives developed by other states, many states are developing state level emission inventories that follow the rules for national-level emissions reporting under international agreements. This paper provides insight into the appropriate application of international GHG reporting practices to state inventories.

National Emission Inventory Reporting under International Rules

All of the Parties to the United Nations Framework Convention on Climate Change (UNFCCC) are responsible for periodic reporting of all sources and sinks of greenhouse gases. Developed nations are required to report this information on an annual basis. The Kyoto Protocol, which is an offspring of the UNFCCC, is designed to use the annual inventory report to determine compliance with the binding limits on GHG emissions set forth by the treaty. The rules and procedures to be followed when assembling and reporting emission inventory data are spelled out in detail in UNFCCC Reporting Guidelines.[24]

In addition, the Intergovernmental Panel on Climate Change (IPCC) has developed a solid body of scientific and technical guidance related to the estimation and modelling of emissions.[25] The guidance prepared by the IPCC specifically applies to national level

[24] *Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual inventories*

[25] The IPCC guidance is contained in three key documents: The Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories; The IPCC Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories; and The IPCC Good Practice Guidance

reporting, but forms the basis for estimating emissions at the project, company and local level as well.

Fundamentally, an emission inventory is a policy relevant but policy neutral document that provides a solid basis for scientific understanding, decision making, and policy development. Distinct from a policy plan or proposal, the emission inventory in the international context is devoid of political spin and does not include projections of future emissions or scenarios of avoided emissions. It is simply an objective statement of what actually happened over the last reporting period, supported by transparent documentation.

National Action Plan Reporting under International Rules

In addition to annual inventories, Parties to the UNFCCC also are required to develop National Communications on a periodic basis (approximately every 4-5 years).[26] The National Communication is in essence a national *action plan* that describes national circumstances, identifies existing and planned policies and measures, indicates future trends in greenhouse gas emissions, outlines expected impacts and adaptation measures, and provides information on financial resources, technology transfer, and climate research. These action plans go far beyond the impartial "just the facts" approach employed by emission inventories; in fact, action plans are inherently policy documents that are analogous to the state-level action plans adopted by some northeastern States. In order to develop projections of future emissions under a given action plan, it is necessary to develop assumptions about what is likely to happen in a "business-as-usual" scenario. This business-as-usual outcome is then contrasted with projections that include assumptions about the likely effectiveness of policies and measures. The result is a policy statement that predicts the consequences of proposed actions.

An emission inventory is a fundamental element in any climate strategy. The emission inventory provides the starting point for planning and analysis and is a required input for action plans. The linkages between inventory data and policy development are important to understand for domestic and international activities, and States that develop both emission inventories and action plans would be well advised to keep a clear distinction between the two activities.

Biomass Energy Generation

The IPCC Guidelines require that net GHG emissions due to land use change and forestry activities on managed lands should be included in national GHG emissions accounting.[27] From a scientific perspective, it is important to recognize the uptake of carbon into forests and plant biomass pools as well as the subsequent release of that carbon as a result of harvesting or combustion of biomass fuels. The fundamental principle used in the IPCC methodology assumes that changes on the ground (i.e. emissions and sequestration) are equal to the changes in the atmosphere. This principle re-

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for Land Use, Land-Use Change and Forestry. All of the IPCC reports are available at http://www.ipcc-nggip.iges.or.jp

[26] The most recent version of the US national Communication can be found on EPA's website at: http://yosemite.epa.gov/oar/globalwarming.nsf/content/ResourceCenterPublications.html

[27] In the continental United States, all forested lands are considered managed.

quires *complete accounting for all emissions and sequestration*, so that atmospheric impact may be accurately calculated.

Accordingly, under international reporting standards, the CO_2 released during biomass energy generation **is** accounted for as an emission. These CO_2 emissions are not accounted for as a fuel-related energy source; instead, CO_2 releases due to the use of biomass energy are captured in the *Land Use Change and Forestry* category as emissions from the land use sector. The *non*-CO_2 gases emitted as a result of biomass combustion are to be included in the *Energy* category. In summary, biomass energy is not considered "carbon neutral" under international reporting guidelines; the emissions accounting is split between the land use sector and energy sector accounts.

Harvested Wood Products

When forest fires rage through timbered areas, the carbon combusted is released immediately, but when commercial timber operations harvest wood from forests the result is a complex and time dependent pattern of net fluxes to the atmosphere. The rules for accounting for uptake or loss of carbon from forests are based on the concept of a measurable change in the amount of carbon stocks in a given "pool."

Forest harvesting could result in a net uptake of carbon if the wood that is harvested is used for long-term products such as building lumber, and the regrowth is relatively rapid. This may in fact has become a response strategy identified in state action plans.

Under the IPCC Guidelines, national level emission inventories account for carbon in all wood products produced in the country, including exported products, whereas carbon in imported wood is not counted. As states develop action plans some have proposed a "life cycle" approach to carbon accounting of harvested wood products. It may be possible to track the fate of harvested wood products as they cross state boundaries but this is not a practice that is authorized under the current IPCC Guidelines.

APPENDIX 4: STAKEHOLDER PROCESS DOCUMENTS

4.1 Ground Rules

4.2 Stakeholder Membership Lists

4.3 Stakeholder Meeting Attendance Lists

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Appendix 4.1

Maine Greenhouse Gas Action Plan Development Process
Purpose, Charge, and Ground rules

11/6/03

Purpose and Charge:

The purpose of the Stakeholder Advisory Group is to advise the Department of Environmental Protection (DEP) on creating a state climate action plan to meet the following reduction goals as specified in section 576 of state law L.D. 845:

1. **Reduction by 2010.** In the short term, reduction to 1990 levels by January 1, 2010.
2. **Reduction by 2020.** In the medium term, reduction to 10% below 1990 levels by January 1, 2020.
3. **Long Term Reduction.** In the long term, reduction sufficient to eliminate any dangerous threat to the climate. To accomplish this goal, reduction to 75% to 80% below 2003 levels may be required.

The plan will include a portfolio of program and policy options. "The action plan must address each sector (i.e., transportation, industrial, commercial, institutional, and residential) in cost-effective ways and must allow sustainably managed forestry, agricultural, and other natural resource activities to be used to sequester greenhouse gas emissions."

The final output of the Stakeholder Advisory Group will be a set of recommendations to the DEP on which program and policy options to include in it's plan. The specific recommendations will likely include a portfolio of options, and for each option, the following information:

- Description of the Option, including key design elements, implementation mechanisms, and key implementers;
- Estimated GHG savings, cost of saved carbon equivalent, and other key benefits and costs as appropriate and data is available;
- Other critical factors deemed germane to assessing the feasibility of implementing a given option.

The DEP will finalize its proposed action plan and submit it to the joint standing committee of the Legislature having jurisdiction over natural resources matters.

Stakeholder Advisory Group Members:

Membership

1. Membership to the Stakeholder Advisory Group will be determined by the DEP.

2. Each member organization of the Stakeholder Advisory Group will designate a lead representative, and, at their discretion, an alternate.

3. Only the lead representative, or the alternate in the case of the representative's absence, will participate in formal decision-making.

Roles and Responsibilities

4. Stakeholder Advisory Group members (including alternates), will make every attempt to attend all Stakeholder Group meetings, to be on-time, and to review all documents disseminated prior to the meeting. Members who can not make a meeting should let the Facilitator know prior to the meeting (by voice or e-mail).

5. Stakeholder Advisory Group members will be expected to participate in the process in good faith, including focusing on the Purpose and Charge of the process, to achieve the goals and objectives of the legislation. Members also agree to act respectfully toward each other as well as being truthful and communicative.

6. It is the responsibility of the Stakeholder Advisory Group members to keep their organizations and constituencies fully informed on the developments of the Stakeholder Group process.

7. Stakeholder Advisory Group members will not speak (e.g., to the press) on behalf of the Stakeholder Advisory Group or its members, intentionally or otherwise, without the Group's expressed permission. DEP will otherwise be the point of contact for the process.

8. Stakeholder Advisory Group members are encouraged to confer with each other, the Facilitators and the Technical Consultants in and between meetings.

9. The members of the Stakeholder Advisory Group will advise DEP on the focus, charge, and membership of the Working Groups .

Decisionmaking

10. The primary task of the Stakeholder Advisory Group will be to prepare recommendations for DEP's consideration consistent with the Purpose and Charge of the process.

11. The goal of the process will be to make major substantive recommendations including a set of individual GHG policy actions by consensus of the Stakeholder Advisory Group (excluding Ex-Officio representatives), where consensus shall mean that everyone is at least willing to live with a decision and chooses not to dissent.

12. The Group's final Report to DEP at the end of the process will include all areas of consensus, and a description of the alternative policy designs and implementation approaches preferred by Group members in areas where consensus was not reached, if any. For non-consensus issues, the Stakeholder Advisory Group members supporting each alternative approach will be listed under each alternative.

13. If unable to consent on a particular recommendation or decision, a representative

will be expected to explain why and to try and offer a positive alternative. Representatives are responsible for voicing their objections and concerns, and silence or absence will be considered consent.

14. Stakeholder Advisory Group members will be listed in the Report along with their organizational affiliations. Members should seek the endorsement from their respective organizations.

Ex-Officio Members:

Members

15. The Ex-Officio Members to the Stakeholder Advisory Group will consist of: 1) State Legislators and 2) the co-chairs of the Technical and Economic Policy Resource Panel[28], (See attached Ex-Officio List).

Roles and Responsibilities

16. Ex-Officio Members are invited and encouraged to participate in discussions in all Stakeholder Meetings, but will not be formal voting members.

17. Ex-Officio Members will be expected to participate in the process in good faith, including focusing on the Purpose and Charge of the process, to achieve the goals and objectives of the legislation. Members also agree to act respectfully toward each other as well as being truthful and communicative.

Working Groups:

Membership

18. With advice from the Stakeholder Advisory Group, membership of the Working Groups will be determined by DEP.

19. Working Group representatives can be members of the Stakeholder Advisory Group, others from member Stakeholder organizations, or other individuals with relevant interest and expertise.

Roles and Responsibilities

20. Working Group members will make every attempt to attend all workgroup meetings, to be on time, and to review all documents disseminated prior to the meeting. Members who can not make a meeting should let the Facilitator know prior to the meeting (by voice or e-mail).

[28] The Technical and Economic Policy Resource Panel, comprised of Maine based Academics, plus Federal Agency representatives, will be available to advise the various working groups as well as the Stakeholder Advisory Group, and review policy recommendations. The panel will be co-chaired by Dr. Robert Kates, a member of the Intergovernmental Panel on Climate Change, and Dean Karl Braithwaite of the Muskie School of Public Service at the University of Southern Maine.

21. Working Group members will be expected to participate in the process in good faith, including focusing on the Purpose and Charge of the process, to achieve the goals and objectives of the legislation. Members also agree to act respectfully toward each other as well as being truthful and communicative.

22. It is the responsibility of the Working Group members to keep their organizations and constituencies fully informed on the developments in the Working Group process.

23. Working Group members are encouraged to confer with each other, the Facilitators, and the Technical Consultants in and between meetings

24. Working Groups will work under direction of the Stakeholder Advisory Group and DEP.

Decisionmaking

25. The primary task of each Working Group is to identify and analyze GHG mitigation options and alternative policy designs within the scope of that Working Group, to assist the Technical Consultants and Facilitators in a collaborative fashion, and prepare recommendations for the Stakeholder Advisory Group, and ultimately the DEP's consideration consistent with the Purpose and Charge of the process.

26. Each Working Group's recommendations to the Stakeholder Group will include all areas of consensus, and a description of the alternative options or approaches preferred by Group members in areas where consensus was not reached, if any. Consensus shall mean that everyone is at least willing to live with a decision and chooses not to dissent. Representatives are responsible for voicing their objections and concerns, and silence or absence will be considered consent. For non-consensus issues, the Working Group members supporting each alternative approach will be listed under each alternative.

Department of Environmental Protection (DEP):

Roles and Responsibilities

27. DEP is the convenor of the process and has ultimate responsibility to submit the State Climate Change Action Plan to the Legislature. The Plan will be primarily based on the recommendations from the Stakeholder Advisory Group (including all supporting analysis and documentation), especially where consensus is reached.

28. The DEP will designate a representative to participate as an active and voting member of the Stakeholder Advisory Group as well as each Working Group. Given its special role in the process, DEP may from time-to-time abstain from specific recommendations.

29. DEP will assign staff members to each Working Group to provide support and to liaise with the DEP.

30. DEP will adhere to all of the other groundrules established for both the Stakeholder Advisory Group and the Working Groups.

31. DEP will also have final oversight responsibility for the Facilitators (Raab Associates, et al.) and Technical Consultants (CCAP et al.), as well as Stakeholder Advisory and Working Group process issues (e.g., schedule, structure, etc.,).

Public Involvement:

32. The Stakeholder Advisory and Working Group meetings are open to the public. Members of the public will be given a chance to express their opinions and make suggestions at appropriate junctures as appropriate and time allows, as determined by DEP with advice from the Stakeholder Advisory Group and Working Groups and the Facilitators.

Facilitators' and Technical Consultants':

Roles and Responsibilities

33. The Facilitators' primary function is to help design and manage a productive process, including stakeholder and working group meetings. The Technical Consultants primary function is to provide technical support to the Stakeholder Advisory Group and Working Groups, including identification of options, alternative policy designs, and analysis

34. Facilitators will facilitate all meetings of the Stakeholder Group and the Working Groups to provide a constructive forum where diverse points of view are voiced and examined in a professional and balanced way. Personal attacks are not permitted.

35. The Facilitators will draft all agendas and meeting summaries and distribute to Stakeholders and Working Group members in a timely fashion (ideally, 1 week in advance, and 1 week after meetings respectively). Facilitators will also distribute documents prepared by Technical Consultants. All documents will be distributed once via email, and will then be available on a web site maintained by the Facilitators for the duration of the process.

36. Technical Consultants will prepare all memos, documents, results of analysis, and reports in a timely manner and for distribution by the Facilitators prior to meetings.

37. Facilitators and Technical Consultants will act in an impartial and non-partisan manner, and will treat confidential discussions with parties confidentially.

Appendix 4.2: Stakeholder Membership Lists

STAKEHOLDER ADVISORY GROUP

Affiliation	Representative Name
American Lung Association of Maine	Norm Anderson
American Lung Association of Maine	Ed Miller
Androscoggin Valley Council of Governments	Robert Thompson
Chewonki Foundation	Peter Arnold
Coalition for Sensible Energy	Pam Person
Department of Agriculture	Ned Porter
Department of Conservation	Donald Mansius
Department of Economic and Community Development	Brian Dancause
Department of Environmental Protection	Dawn Gallagher, Commissioner
Department of Environmental Protection	James Brooks (alternate)
Department of Human Services / Bureau of Health	Andy Smith, (alternate)
Department of Human Services / Bureau of Health	Phil Haines
Department of Transportation	Duane Scott (alternate)
Department of Transportation	Greg Nadeau
Dragon Products	Ann Thayer
Energy Independence and Security	Beth Nagusky
Environment Northeast	Michael Stoddard
FPL Energy	Allen Wiley
Industrial Energy Consumers	Tony Buxton
Independent Energy Producers	David Wilby
Interface Fabrics Group	Wendy Porter
J.D. Irving, Limited	Bill Borland
Legislative Representative	Ted Koffman
Legislative Representative	Bob Daigle
Legislative Senator	Christopher Hall
Legislative Senator	Tom Sawyer
Maine Automobile Dealers Assoc., Inc.	Tom Brown
Maine Automobile Dealers Assoc., Inc.	Virginia Davis (alternate)
Maine Better Transportation Association	Maria Fuentes
Maine Center for Economic Policy	Lisa Pohlmann
Maine Chamber & Business Alliance	Christopher Hall
Maine Council of Churches	Andy Burt
Maine Farm Bureau Association	Jon Olson
Maine Global Climate Change	Robert W. Kates, Ph.D.
Maine Municipal Association	Jeff Austin
Maine Oil Dealers Association	Jamie Py
Maine Oil Dealers Association	Pattie Aho (Alternate)

Maine Public Health Association	Saskia Janes
Maine Pulp & Paper Association	John Williams
Maine Pulp & Paper Association	Michael Barden (Alternate)
MOFGA	Russell Libby
Muskie School of Public Service	Karl Braithwaite, Dean
Natural Resources Council of Maine	Sue Jones
Public Utilities Commission	Tom Welch, Commissioner
Public Utilities Commission	Angela Monroe
The Nature Conservancy	Kate Dempsey
University of Maine	Janet Waldron

BUILDINGS, FACILITIES, AND MANUFACTURING WORKING GROUP

Affiliation	Representative Name
American Lung Association	Norm Anderson
Dead River Company	Leslie Anderson
Dragon Cement	Ann Thayer
Environment Northeast	Mike Stoddard
Industrial Energy Consumers Group	Tony Buxton
Interface Fabrics Group	Shannon Cox
International Paper Corporation	Chuck Kraske
Maine Council of Churches	Andy Burt
Maine Oil Dealers Association	Patti Aho / Jamie Py
Maine Pulp and Paper Association	Mike Barden
National Semiconductor	Dick Hall
Natural Resources Council of Maine	Sue Jones
Northeast by Northwest	Doug Baston
Public Utilities Commission	Denis Bergeron
University of Southern Maine	Dudley Greeley
Independent consultant	Brian Hubbell

Consultants, Facilitators, and Staff

Maine DEP	Mike Karagiannes
Center for Clean Air Policy	Karen Lawson
Gosline & Reitman	Ann Gosline

ENERGY AND SOLID WASTE WORKING GROUP

Affiliation	Representative Name	
Androscoggin Valley Council of Governments	Carol Fuller	
Calpine	Donald Neal	
Casella Waste Systems, Inc.	Ted Reeves	
Chewonki Foundation	Peter Arnold	
Coalition for Sensible Energy	Pam	Person
Dept. of Economic and Community Development	Brian	Dancause
Energy Research Center	John	Bastey
Energy Director	Beth	Negusky
Environment Northeast	Michael	Stoddard
FPL Energy	Doug	Whittier
FPL Energy	Al	Wiley
Independent Energy Producers	David	Wilby
Interface Fabrics	Dave	Walker
International Paper - Androscoggin Mill	Chuck	Kraske
Maine Center for Economic Policy (MECEP)	Lisa	Pohlmann
Maine DEP	Jeff	Crawford
Maine MEP	Joan	Saxe
Maine Oil Dealers Association	Patti	Aho
Maine Pulp and Paper	Dixon	Pike
Maine Power Options	Mary Lou	Gallup
Maine State Senate	Tom	Sawyer
Maine State Senate	Christopher	Hall
Natural Resources Council of Maine (NRCM)	Sue	Jones
NESCAUM	Suzanne	Watson
Physicians for Social Responsibility	Paul	Liebow
Public Utility Commission (PUC)	Angela	Monroe
Regulatory Assistance Project	David	Moskovitz
State Planning Office	George	MacDonald

Consultants, Facilitators, and Staff

Raab Associates, Ltd.,	Jonathan	Raab
Raab Associates, Ltd.,	Peter	Wortsman
Center for Clean Air Policy	Matt	Ogonowski
Tellus Institute (via phone)	Bill	Dougherty
Tellus Institute (via phone)	Alison	Bailie
Maine DEP	Mike	Karagiannes
Maine DEP	Dave	Burns

TRANSPORTATION AND LAND USE WORKING GROUP

Affiliation	Representative Name
Alliance of Auto Manufacturers	Greg Dana
Androscoggin Valley COG	Bob Thompson
Coalition for Sensible Energy	Pam Person
Dragon Products	Ann Thayer
Environment Northeast	Michael Stoddard
Greater Portland COG	Steve Linnell
Maine Automobile Dealers Assoc.	Ginger Davis (alt.)
Maine Better Transportation Assoc.	Maria Fuentes
Maine Council of Churches	Andy Burt
Maine Legislature	Rep. Ted Koffman
Maine Senate	Tatiana Brailovskaya (for Sen. Chris Hall)
Maine Department of Transportation	Duane Scott / Greg Nadeau / Anna Price / Ed Hanscomb
Maine Lung Association	Chuck Hazzard / Norm Anderson
Maine Motor Transport Association	Dale Hanington
Maine Oil Dealers Association	Patti Aho (alt.)
Maine Tourism Association	Carolyn Manson
Maine Turnpike Authority	Conrad Welzel
Natural Resources Council of Maine	Sue Jones
Physicians for Social Responsibility	Raina Rippell
State Planning Office	Paula Thomson
The Nature Conservancy	Kate Dempsey

Advisory Panel Members, Staff, Consultants

University of Maine	Jonathan Rubin
Maine DEP	Lynn Cayting
Maine DEP	John Wathen
Maine DEP	Mike Karagiannes
Maine DEP	Malcolm Burson
Center for Clean Air Policy	Steve Winkelman
Gosline & Reitman Associates	Jonathan Reitman

FORESTRY AND AGRICULTURE WORKING GROUP

Affiliation	Representative Name
Maine Farm Bureau Association	Jon Olson
International Paper	Chuck Kraske
The Nature Conservancy	Kate Dempsey
Maine Forest Service	Donald Mansius
Maine Department of Agriculture	Jonathan Chalmers
MOFGA	Russell Libby
Wild Blueberry Commission of Maine	David Bell
Environment Northeast	Dan Sosland
Environment Northeast	Mike Stoddard (alt)
Mainewatch Institute	Sherry Huber
Maine Potato Board	Timothy Hobbs
Small Woodlots Owners of Maine	Judith Merck
J.D. Irving, Ltd.	Walter Emrich
Natural Resources Council of Maine	Sue Jones
Maine Pulp & Paper Association	John Williams

Facilitators, Technical Consultants, Staff

Center for Clean Air Policy/Penn State University	Tom Peterson
Muskie School – USM	Jack Kartez
Muskie School – USM	Hugh Coxe
DEP – Commissioner's Office	Malcolm Burson
DEP – Bureau of Air Quality	Mike Karagiannes
DEP – Bureau of Air Quality	James P Brooks
DEP – Bureau of Air Quality	Kevin McDonald
Maine Forest Service	Ken Laustsen
Bowdoin College	Dr. Mark Battle
University of Maine	Dr. Ivan Fernandez
US Forest Service	Dr. Jim Smith

Guests

Independent Energy Producers of Maine	Dave Wilby
NRCM	Cathy Johnson
Maine Forest Products Council	Patrick Strauch
Unaffiliated	Bill Ferdinand
NRCM / Environmental Defense	Melissa Carey

EDUCATION AND PUBLIC AWARENESS WORKING GROUP

Affiliation	Representative Name
Chewonki Foundation	Peter Arnold
Nereus Communications	Tatiana Bailovskaya
University of Maine – Machias	Jon Reisman
Natural Resources Council of Maine	Mark Hays
Maine Council of Churches	Andy Burt
Maine Public Health Association	Saskia Janes
Advanced Management Catalyst, Inc.	Dan Thompson
Maine DEP, Green Campus Initiative	Peter Cooke
Maine DEP, Education/Outreach Committee	Debbie Avalone-King
Maine DEP Commissioner's Office	Malcolm Burson

SCIENCE, TECHNOLOGY AND ECONOMICS RESOURCE PANEL

Name	Affiliation	Subject area/ expertise
Robert Kates, co-chair	Professor Emeritus, Brown University Member, IPCC	General climate change
Karl Braithwaite, co-chair	Dean, Muskie School of Public Service, University of Southern Maine	Public policy
Bill White	EPA-New England	Energy efficiency
Jonathan Reisman	Assistant Professor Economics University of Maine - Machias	Economics, public policy
Robert Sanford	Associate Professor Of Environmental Studies, University of Southern Maine	Env. Science & policy
Charles Fitts	Associate Professor Of Geoscience, USM	Geo sciences
Lani Graham, M.D.	Former Director, Maine Bureau of Health	Public health
Tom Tietenberg	Professor of Economics, Colby College	Policy; trading
Charles Colgan	Muskie School of Public Service, USM	Public policy
Richard Barringer	Muskie School of Public Service, USM	Public policy
George Jacobson	Professor of Biology and Climate Studies, Climate Change Institute, University of Maine	Climate science; forest ecology

Mark Battle	Assistant Professor of Physics, Bowdoin College	Carbon cycle
Jonathan Rubin	Margaret Chase Smith Center for Public Policy, University of Maine	Resource economics and policy; alt. fuels
Gary King	Clare S Darling Prof. of Oceanography; Darling Center, University of Maine	Ocean science
George Hurtt	Institute for the Study of Earth, Oceans, and Space, University of New Hampshire	Land sequestration; metrics
Ivan Fernandez	Professor of Plant, Soil & Environmental Sciences; Coop Prof. of Forest Resources, University of Maine	Land sequestration
Chris Cronan	Professor of Biology and Ecology, University of Maine	Emissions baseline
Suzanne Watson	Energy and Climate Team Leader, NESCAUM	Electricity generation sector

Appendix 4.3: Attendance Lists

STAKEHOLDER ADVISORY GROUP

Attendance List

Affiliation	Name	11/6/03	12/17/03	4/8/04	6/30/04	9/29/04
American Lung Association of Maine	Norm Anderson	X				X
American Lung Association of Maine	Ed Miller				X	
Androscoggin Valley Council of Governments	Robert Thompson			X	X	X
Chewonki Foundation	Peter Arnold	X	X	X	X	X
Coalition for Sensible Energy	Pam Person	X	X	X	X	X
Department of Agriculture	Ned Porter	X			X	
Department of Conservation	Alec Giffen (alternate)					
Department of Conservation	Donald Mansius	X		X	X	X
Department of Economic and Community Development	Brian Dancause	X	X	X	X	X
Department of Environmental Protection	Dawn Gallagher, Commissioner	X	X	X	X	X (phone)
Department of Environmental Protection	James Brooks (alternate)	X	X	X	X	X
Department of Human Services / Bureau of Health	Andy Smith, (alternate)	X				
Department of Human Services / Bureau of Health	Phil Haines		X			
Department of Transportation	Duane Scott (alternate)	X	X	X	X	X
Department of Transportation	Greg Nadeau		X		X	
Dragon Products	Ann Thayer	X	X		X	X
Energy Independence and Security	Beth Nagusky	X	X	X	X	X
Environment Northeast	Michael Stoddard	X	X	X	X	X
FPL Energy	Allen Wiley	X	X	X	X	X
Industrial Energy Consumers	Tony Buxton				X	
Independent Energy Producers	David Wilby	X	X	X	X	X
Interface Fabrics Group	Wendy Porter			X	X	X
Interface Fabrics Group	Shannon Cox (alternate)		X			
J.D. Irving, Limited	Bill Borland	X	X	X	X	X
Legislative Representative	Ted Koffman	X			X	
Legislative Representative	Bob Daigle		X			
Legislative Senator	Christopher Hall	X	X			
Legislative Senator	Tom Sawyer					
Maine Automobile Dealers Assoc., Inc.	Tom Brown			X		
Maine Automobile Dealers Assoc., Inc.	Virginia Davis (alternate)	X	X	X	X	
Maine Better Transportation Associa-	Maria Fuentes	X	X	X		X

tion						
Maine Center for Economic Policy	Lisa Pohlmann	**X**	**X**	**X**	**X**	**X**
Maine Chamber & Business Alliance	Christopher Hall	**X**	**X**	**X**		**X**
Maine Chamber & Business Alliance	Kristine Ossenfort				**X**	
Maine Council of Churches	Andy Burt	**X**	**X**	**X**	**X**	**X**
Maine Farm Bureau Association	Jon Olson					
Maine Global Climate Change	Robert W. Kates, Ph.D.	**X**			**X**	
Maine Municipal Association	Jeff Austin	**X (PM)**				
Maine Oil Dealers Association	Jamie Py	**X**	**X**	**X**	**X**	**X**
Maine Oil Dealers Association	Pattie Aho (Alternate)	**X**	**X**		**X**	**X**
Maine Public Health Association	Saskia Janes	**X**		**X**	**X**	**X**
Maine Pulp & Paper Association	John Williams	**X**	**X**	**X**	**X**	**X**
Maine Pulp & Paper Association	Michael Barden	**X**	**X**	**X**		**X**
MOFGA	Russell Libby	**X**		**X**		
MOFGA	Andrew Marshall				**X**	
Muskie School of Public Service	Karl Braithwaite, Dean		**X**		**X**	**X**
Natural Resources Council of Maine	Sue Jones	**X**	**X**	**X**	**X**	**X**
Public Utilities Commission	Tom Welch, Commissioner	**X**	**X**		**X**	
Public Utilities Commission	Angela Monroe					**X**
The Nature Conservancy	Kate Dempsey	**X**	**X**	**X**	**X**	**X**
University of Maine	Janet Waldron	**X**	**X**		**X**	**X**

Other Attendees

Clean Air – Cool Planet	Bob Sheppard					**X**
Department of Transportation	Anna Price				**X**	**X**
Environmental Defense	Melissa Carey					**X**
ExxonMobil	Dan Horton					**X**
Maine Forest Products Council	Patrick Strauch					**X**
New England Petroleum Council	John Quinn					**X**

Facilitators / Technical Consultants / Staff

Raab Associates, Ltd.,	Jonathan Raab	X	X	X	X	X
Raab Associates, Ltd.,	Peter Wortsman	X	X	X	X	X
Muskie School – USM	Jack Kartez		X		X	X
Muskie School – USM	Hugh Cox			X		
Gosline and Reitman DRS	Ann Gosline			X		
Gosline and Reitman DRS	Jonathan Reitman					
Center for Clean Air Policy	Steve Winkelman			X	Phone	
Center for Clean Air Policy	Karen Lawson			X		
Center for Clean Air Policy	Matt Ogonowski			X	Phone	
Consultant	Tom Peterson	X	X	X	X	
Tellus Institute	Allison Bailey			X	Phone	
DEP	Malcolm Burson	X	X	X	X	X

DEP	Mike Karagiannes	X	X	X	X	X
DEP	Don Anderson	X				
DEP	Kevin MacDonald		X	X	X	X
DEP	Lynne Cayting		X			
DEP	Deb Avalone – King			X		
DEP	David Littell					X
DEP	Deb Garnett					X

TRANSPORTATION AND LAND USE WORKING GROUP

Attendance List

Affiliation	Name	2/5/04	3/9/04	5/20/04
Alliance of Auto Manufacturers	Greg Dana	x	x	
Androscoggin Valley COG	Bob Thompson	x	x	x
Coalition for Sensible Energy	Pam Person	x	x	x
Dragon Products	Ann Thayer	x	x	
Environment Northeast	Michael Stoddard	x	x	x
Greater Portland COG	Steve Linnell	x	x	
Maine Automobile Dealers Assoc.	Ginger Davis (alt.)	x	x	x
Maine Better Transportation Assoc.	Maria Fuentes	x	x	x
Maine Council of Churches	Andy Burt	x	x	x
Maine Legislature	Rep. Ted Koffman	x		
Maine Senate	Tatiana Brailovskaya (for Sen. Chris Hall)		x	
Maine Department of Transportation	Duane Scott / Greg Nadeau / Anna Price / Ed Hanscomb	x	x	x
Maine Lung Association	Chuck Hazzard / Norm Anderson	x	x	
Maine Motor Transport Association	Dale Hanington	x	x	x
Maine Oil Dealers Association	Patti Aho (alt.)	x		x
Maine Tourism Association	Carolyn Manson	x	x	x
Maine Turnpike Authority	Conrad Welzel	x	x	x
Natural Resources Council of Maine	Sue Jones	x	x	x
Physicians for Social Responsibility	Raina Rippell	x	x	x
State Planning Office	Paula Thomson	x	x	x
The Nature Conservancy	Kate Dempsey	x	x	

Advisory Panel Members, Staff, Consultants

University of Maine	Jonathan Rubin	x	x	x
Maine DEP	Lynn Cayting	x	x	
Maine DEP	John Wathen	x	x	x
Maine DEP	Mike Karagiannes	x	x	x
Maine DEP	Malcolm Burson	x		
Center for Clean Air Policy	Steve Winkelman	x	x	x
Gosline & Reitman Associates	Jonathan Reitman	x	x	x

ENERGY AND SOLID WASTE WORKING GROUP
Attendance List

Affiliation	First Name	Last Name	1/28/04	3/8/04	6/17/04
Androscoggin Valley Council of Governments (AVCOG)	Carol	Fuller	X	X	X
Calpine	Donald	Neal	X	X	
Casella Waste Systems, Inc.	Ted	Reeves			
Chewonki Foundation	Peter	Arnold	X	X	X
Coalition for Sensible Energy	Pam	Person	X	X	X
Dept. of Economic and Community Development	Brian	Dancause	X	X	PM
Energy Research Center	John	Bastey	X		X
Energy Director	Beth	Negusky			X
Environment Northeast	Michael	Stoddard	X	X	X
FPL Energy	Doug	Whittier		X	
FPL Energy	Al	Wiley	X		X
Independent Energy Producers	David	Wilby	X	X	
Interface Fabrics	Dave	Walker			
International Paper - Androscoggin Mill	Chuck	Kraske	X	X	
Maine Center for Economic Policy	Lisa	Pohlmann	X		X
Maine DEP	Jeff	Crawford	X	X	X
Maine MEP	Joan	Saxe	X		
Maine Oil Dealers Association	Patti	Aho	X	X	
Maine Pulp and Paper	Dixon	Pike		X	
Maine Power Options	Mary Lou	Gallup	X	X	X
Maine State Senate	Tom	Sawyer			
Maine State Senate	Christopher	Hall	X	X	
Natural Resources Council of Maine (NRCM)	Sue	Jones	X	X	X
NESCAUM	Suzanne	Watson	X	X	X
Physicians for Social Responsibility	Paul	Liebow	X	X	
Public Utility Commission (PUC)	Angela	Monroe	X	X	X
Regulatory Assistance Project	David	Moskovitz	X	X	
State Planning Office	George	MacDonald	X	X	X

Facilitators / Technical Consultants / Staff

Raab Associates, Ltd.,	Jonathan	Raab	X	X	X
Raab Associates, Ltd.,	Peter	Wortsman	X	X	X
Center for Clean Air Policy	Matt	Ogonowski	X	X	X
Tellus Institute (via phone)	Bill	Dougherty		X	
Tellus Institute (via phone)	Alison	Bailie		X	X
Maine DEP	Dawn	Gallagher			X
Maine DEP	Jim	Brooks			X
Maine DEP	Malcolm	Burson	X	X	
Maine DEP	Mike	Karagiannes	X	X	X
Maine DEP	Dave	Burns	X	X	X

BUILDINGS, FACILITIES, AND MANUFACTURING WORKING GROUP

Attendance Summary

Stakeholders:	Meetings Present	1/23	2/26	3/25	5/26
Anderson, Leslie	Dead River Company	X			
Anderson, Norm	American Lung Association			X	
Barden, Michael	Maine Pulp & Paper Association	X	X	X	X
Baston, Doug	Northeast by Northwest	X	X	X	X
Bergeron, Denis	Public Utilities Commission		X	X	X
Burt, Andy	Maine Council of Churches		X		X
Buxton, Tony	Independent Energy Consumers	X	X	X	X
Cox, Shannon	Interface Fabrics Groups	X	X	X	X
Greeley, Dudley	University of Southern Maine	X	X	X	X
Hall, Dick	National Semiconductor	X	X	X	X
Hubbell, Brian	independent consultant	X	X	X	
Jones, Sue	Natural Resources Council of Me	X		X	X
Karagiannes, Mike	DEP Air Quality	X	X	X	X
Kraske, Chuck	International Paper - Androscoggin	X	X	X	X
Py, Jamie/				X	
Aho, Pattie	Maine Oil Dealers	X	X		X
Stoddard, Michael	Environment Northeast	X	X	X	X
Thayer, Ann	Dragon Products	X	X	X	X
Gosline, Ann	Facilitator	X	X	X	X
Lawson, Karen	CCAP	X	X	X	X

Notes:
Ms. Lawson attended the 3rd and 4th meetings by teleconference
Working Group members who did not attend any meetings are not listed.

AGRICULTURE AND FORESTRY WORKING GROUP

Affiliation	Name	1/29/04	3/19/04	5/27/04	7/29/04
MEMBERS					
Maine Farm Bureau Association	Jon Olson	X			
International Paper	Chuck Kraske	X	X	X	X
The Nature Conservancy	Kate Dempsey	X	X	X	X
Maine Forest Service	Donald Mansius	X	X	X	X
Maine Department of Agriculture	Jonathan Chalm-ers	X	X		X
MOFGA	Russell Libby	X	X	X	
Wild Blueberry Commission of Maine	David Bell	X		X	
Environment Northeast	Dan Sosland	X	X	X	
Environment Northeast	Mike Stoddard (alt)				X

Mainewatch Institute	Sherry Huber			X	
Maine Potato Board	Timothy Hobbs	X		X	
Small Woodlots Owners of Maine	Judith Merck	X	X	X	X
J.D. Irving, Ltd.	Walter Emrich	X	X	X	
NRCM	Sue Jones	X		X	X
Maine Pulp & Paper Association	John Williams	X		X	X

Facilitators/Technical Consultants					
Center for Clean Air Policy/Penn State University	Tom Peterson	X	X	X	X
Muskie School – USM	Jack Kartez	X	X	X	X
Muskie School – USM	Hugh Coxe		X	X	
DEP Staff					
DEP – Commissioner's Office	Malcolm Burson	X			
DEP – Bureau of Air Quality	Mike Karagiannes	X	X	X	X
DEP – Bureau of Air Quality	James P Brooks				X (am)
DEP – Bureau of Air Quality	Kevin McDonald	X		X	X
Others (Science Advisors)					
Maine Forest Service	Ken Laustsen	X			
Bowdoin College	Dr. Mark Battle	X		X	X
University of Maine	Dr. Ivan Fernan-dez	X	X	X	X
US Forest Service	Dr. Jim Smith	X	X		

Guests					
Ind Energy Prod Me, and MeGHG-SAG	Dave Wilby			X	X
NRCM	Cathy Johnson				X
Me Forest Products Council	Patrick Strauch				X
unaffiliated	Bill Ferdinand				X
NRCM / Environmental Defense	Melissa Carey		X	X	X

APPENDIX 5: WORKING GROUP FINAL REPORTS

The weblinks for the Final Working Group Reports are below:

5.1 Transportation and Land Use

http://maineghg.raabassociates.org/Articles/Final_TLU_Reportv1.final.pdf

5.2 Buildings, Facilities, and Manufacturing

http://maineghg.raabassociates.org/Articles/BFM%20Memo%20to%20SAG_June%2015v1.pdf

5.3 Energy and Solid Waste

http://maineghg.raabassociates.org/Articles/ESW%20Memo%20to%20SAG_June%2021v5.doc

5.4 Agriculture and Forestry

http://maineghg.raabassociates.org/Articles/MEAFWG_memoto_SAG_6-21.pdf

5.4.2 Forestry Calculations, 8-25-04, from Tom Peterson

http://maineghg.raabassociates.org/Articles/Appendix%205.4%20Pt%20%20(Forestry%20calcs).pdf

5.4.3 Draft Memo on Forestry Options Costs

http://maineghg.raabassociates.org/Articles/Appendix%205.4%20Pt%203%20(Forestry%20Cost%20Table).pdf