

Taking Credit for GHG Emissions Reduction Activities of the EPA's State and Local Capacity Building Branch

Lynn Price, Lawrence Berkeley National Laboratory
Emily Bartholomew, Lawrence Berkeley National Laboratory
Denise Mulholland, U.S. Environmental Protection Agency

ABSTRACT

The Environmental Protection Agency's (EPA's) State and Local Capacity Building Branch (SLCBB) contains programs that help states voluntarily develop and implement comprehensive environmental programs at the state and local levels intended to reduce air pollution, improve energy efficiency, promote economic development and reduce greenhouse gas (GHG) emissions. Throughout the 1990s, the Branch worked with state and local governments to achieve GHG emissions reductions through the provision of information about climate change impacts and mitigation opportunities, guidance documents, outreach and marketing support, and financial assistance to conduct analysis or demonstration projects¹.

Each year the EPA prepares an Annual Performance Plan and Congressional Justification as part of its proposed budget. One of the EPA's strategic goals contained in this report is "Reduction of Global and Cross-Border Environmental Risks". Programs designed to reach this goal include those with the objective to "Reduce Greenhouse Gas Emissions". The programs designed to meet this objective for which performance measures are calculated include EPA's buildings, industry, and transportation sector programs, as well as the carbon removal, international capacity building, global change research, and state and local programs. Annual metric tons of carbon equivalent savings from these programs are documented in each year's Annual Performance Plan.

Lawrence Berkeley National Laboratory was commissioned by EPA's SLCBB to develop and implement a methodology for calculating the GHG emissions reductions in each partner state and locality that can be attributed to SLCBB capacity building efforts, specifically to avoid "double-counting" with other EPA programs. This paper provides a description of the methodology, issues encountered, and results of estimating GHG emissions reductions attributed to the SLCBB for 2000, 2001, and 2002.

Introduction

The Environmental Protection Agency's State and Local Capacity Building Branch (SLCBB) encourages the voluntary development and implementation of comprehensive environmental programs at the state and local levels. One program, the State and Local Climate Change Program (SLCCP), was created in the early 1990s. It was designed to help state and local governments achieve multiple economic and environmental goals while voluntarily achieving greenhouse gas (GHG) emissions reductions.

¹ The Branch currently supports the states' efforts by providing technical and analytic assistance tools, monitoring current state efforts, serving as a gateway to various federal programs, and through other efforts designed to improve the exchange of quality information and enhance decision-making.

Throughout the 1990s, the SLCCP provided funding and technical assistance to state partners interested in developing GHG emission inventories and/or action plans to reduce their emissions, and implementing demonstration projects to test out potential policies. Often, participation in the program represented the first time a state or locality had comprehensively assessed their contribution to GHG emissions, convened a group of multi-interest stakeholders to explore the issue as it pertains to their jurisdiction, and developed policy recommendations as to how the state might reduce their GHGs. This experience led states and local governments to acquire a better understanding of their potential vulnerability to climate change and the costs and benefits of limiting that vulnerability.

The intellectual capacity built during their experience with EPA's program enabled many state and local governments to move beyond their action plan recommendations to implement and/or strongly promote actions that reduce GHGs. For example, in 1997, after years of being a leader within the program, Oregon became the first state to pass legislation requiring carbon dioxide (CO₂) emissions offsets from new power plants (Oregon Department of Energy, 2003). After developing the EPA-supported *New Jersey Sustainable Greenhouse Gas Action Plan*, New Jersey's Environmental Commissioner issued Covenant of Sustainability/New Jersey Greenhouse Gas Initiative in 2000 calling for the state to achieve a 3.5% reduction in GHGs by 2005 (New Jersey Department of Environmental Protection, 2000). Many other states have implemented portions of their action plans. In addition, more than 140 cities have joined the EPA-supported Cities for Climate Protection Campaign and committed to achieving a voluntary GHG emission reduction target (ICLEI, 2001). These state and local actions facilitated by EPA's State and Local Climate Change Program have undoubtedly contributed to the reduction of GHGs. Quantification of this reduction, however, presents quite a reporting challenge for EPA.

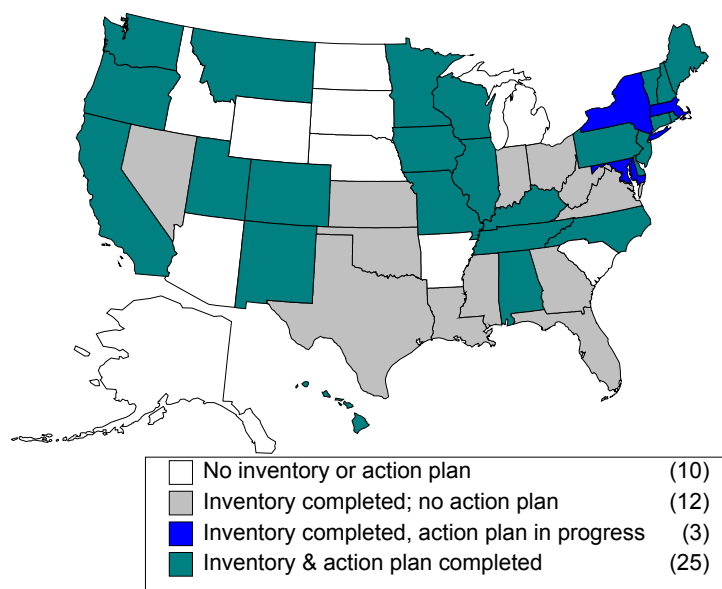
Each year the EPA prepares an Annual Performance Plan and Congressional Justification as part of its proposed budget. One of the EPA's strategic goals contained in this report is "Reduction of Global and Cross-Border Environmental Risks". Programs designed to reach this goal include those with the objective to "Reduce Greenhouse Gas Emissions". The programs designed to meet this objective for which performance measures are calculated include EPA's buildings, industry, and transportation sector programs, as well as the carbon removal, international capacity building, global change research, and state and local programs (U.S. EPA, 2001). Savings from these programs are documented in each year's Annual Performance Plan.

Lawrence Berkeley National Laboratory was commissioned by EPA's SLCBB to develop and implement a methodology for calculating the GHG emissions reductions in each partner state and locality that can be attributed to SLCBB capacity building efforts, specifically to avoid "double-counting" with other EPA programs (Price and Bartholomew, 2004).

State Inventories, Action Plans, and GHG Assessments

Between 1992 and 2002, the SLCBB's SLCCP provided funding and technical assistance to state and local governments to develop 40 GHG emissions inventories, prepare 28 state climate change action plans, implement more than 15 demonstration programs, and develop more than 30 outreach and education programs. Figure 1 provides information on the status of state inventories and action plans that have been developed through March 2004. To date, 39 states and Puerto Rico have completed GHG inventories and 28 states and Puerto Rico have initiated action plans to reduce their GHGs. Twenty-five of those plans were completed between 1994 and 2004.

Figure 1: Status of State and Local GHG Inventories and Action Plans



In 2001 and 2002, the SLCBB undertook surveys of seven states in order to more fully understand the GHG emissions reductions, if any, associated with actions taken related to the state climate change action plans. In addition, the SLCBB also evaluated the GHG emissions associated with programs of the Land and Water (LAW) Fund² Demonstration Project and the International Council for Local Environmental Initiatives (ICLEI), both of which received financial support from the EPA's SLCBB. In 2003, Berkeley Lab undertook surveys of eight additional states and worked with ICLEI to understand their estimates of GHG emissions reductions.³

² Now renamed Western Resource Advocates.

³ LBNL sent surveys to California, Colorado, Delaware, Kentucky, Maine, New Hampshire, North Carolina, and Wisconsin. Colorado, Kentucky, and Maine have responded that they cannot provide the requested information at this time. California provided a response which is partially incorporated in this report. Responses are still expected from Delaware, New Hampshire, North Carolina, and Wisconsin.

Methodology

In order to calculate the GHG emissions reductions attributable to the SLCBB, potential reductions must be evaluated in terms of whether the GHG emissions reductions came from actions included in the state action plans, whether these were new actions, and whether the actions overlap with other EPA climate protection programs.

First, it must be determined whether the GHG emissions reductions came from implementation of a policy or program that is identified in the SLCBB-funded state action plan. The rationale is that the SLCBB funding and guidance provided the framework for development of a cohesive plan that identified realistic actions that could be adopted by a given state, thus raising awareness within the state to a level that could lead to implementation of such an action. Each state action plan was reviewed in detail to make such a determination. Second, it must be determined if the GHG emissions reductions were the result of new actions taken, not simply the continuation of existing programs, unless these programs were slated to be discontinued. Finally, the reductions must come from actions that are not associated with other EPA-funded Climate Protection Programs covered in the Annual Performance Plan (e.g. ENERGY STAR[®]). In some cases, only a portion of the GHG emissions reductions was allocated to the SLCBB due to overlap, while in other cases no credit was given to SLCBB. Berkeley Lab did not independently verify the GHG emissions reductions reported by the states, the LAW Fund, and ICLEI. For those states that provided GHG emissions reduction estimates in terms of electricity savings (e.g. in kWh), Berkeley Lab re-calculated the million metric tons of carbon equivalent (MMTCE)⁴ savings using a marginal electricity emissions factor.

Electricity Emissions Factors

Since many of the GHG emissions reduction actions involve reducing electricity consumption, appropriate electricity emissions factors (EFs) to use in the calculations must be identified. Associating CO₂ emissions with electricity consumption can be difficult because electricity can be generated from a number of different primary energy sources. Some sources, such as coal, are major sources of CO₂ emissions while others, such as hydroelectric power stations, result in virtually no CO₂ emissions. Since electricity typically must be generated at the time of consumption, the mix of generation resources used to meet demand may vary at different times of day or in different seasons.

Multiple fuels are used to produce electricity including coal, nuclear, natural gas, hydro, and other renewables. Typically, the least expensive combination of resources is used to meet the electricity demand at any given moment and the most expensive generator is the one that is varied on the margin to meet changes in demand. Depending on what type of plant serves as this *marginal* generator, the marginal EF can vary from zero to the high values associated with coal-fired generation. Therefore, using an average electricity EF may provide a poor estimate of the impact of GHG emission reduction actions on actual emissions compared to a marginal electricity EF. To calculate average electricity EFs, total emissions are simply divided by total

⁴ The principal GHGs are CO₂, methane (CH₄), and nitrous oxide (N₂O). Because these gases differ in their ability to trap heat, one ton of emissions of CO₂ has a different effect than one ton of emissions of CH₄. To express emissions of the different gases in a comparable way, atmospheric chemists use a weighting factor called *global warming potential*. The heat-trapping ability of one metric ton (1,000 kilograms) of CO₂ is taken as the standard, and emissions may be expressed in terms of metric tons of CO₂ equivalent (abbreviated MTCDE), metric tons of carbon equivalent (MTCE), or million metric tons of carbon equivalent (MMTCE) (U.S. EPA, 2003)

generation. Marginal EFs represent the emissions generated by the electricity source or sources used to produce the last kilowatt-hour of electricity demanded at any given time (Marnay et al., 2002).

Electricity EFs are available from a number of sources⁵. The Clean Air and Climate Protection Software (CACPS) database was used for this evaluation because it provides both average and marginal EFs by year. In contrast, the Cadmus marginal EFs are only provided for 2000 and are based on a modeling exercise, not actual 2000 electricity production patterns. e-GRID is also only available for 2000 and only provides average EFs. By relying on the CACPS database for electricity EFs, the SLCBB can easily calculate comparable average and marginal electricity rates, if desired.

Results

LBNL evaluated GHG emissions reductions reported in California, Hawaii, Illinois, Iowa, New Jersey, Oregon, Vermont, and Washington surveys, along with information on the LAW Fund Demonstration Project and ICLEI Cities for Climate Protection initiatives. LBNL did not independently verify the reported GHG emissions reductions.⁶ Table 1 provides the GHG emissions reductions associated with the actions reported by the states, the LAW Fund, and ICLEI for 2000 to 2002.

The *Greenhouse Gas Emissions Reduction Strategies for California* report addressed the residential and commercial emissions reductions from publicly-financed efficiency programs, developing and integrating renewable generating technologies, and reducing GHG emissions from transportation (CEC, 1998). LBNL found that the transportation projects overlapped with other EPA programs, so the emissions reductions attributed to these projects were eliminated. Since California had active energy efficiency programs prior to the state action plan and some of these programs overlap with ENERGY STAR, only 50% of the GHG emissions reductions reported for these efforts were attributed to the SLCBB. Development of renewable energy facilities is not covered by any of the other EPA climate protection programs and thus 100% of the GHG emissions reductions were allocated to SLCBB.

⁵ These sources include The Cadmus Group (Cadmus, 1998; ICF Consulting, 1999), the EPA's e-GRID (EPA, 2003), the Clean Air and Climate Protection Software (CACPS) (STAPPA/ALAPCO and ICLEI, 2003), the U.S. Energy Information Administration (U.S. DOE/EIA, 2001), and the e-Mission Greenhouse Gas Strategy Software (Torrie Smith Associates, 2001).

⁶ For those states that provided GHG emissions reduction estimates in terms of electricity savings (e.g. in kWh), Berkeley Lab re-calculated the MMTCE savings using a marginal electricity emissions factor from the Clean Air and Climate Protection Software (CACPS) database (STAPPA/ALAPCO and ICLEI, 2003).

**Table 1. GHG Emissions Reductions Associated with Actions Reported by States, the LAW Fund,
and ICLEI for 2000, 2001, and 2002**

State Action Plan Programs	2000			2001			2002		
	MMTCE/yr	% Attributable to SLCCP	Carbon Savings Attributable to SLCCP	MMTCE/yr	% Attributable to SLCCP	Carbon Savings Attributable to SLCCP	MMTCE/yr	% Attributable to SLCCP	Carbon Savings Attributable to SLCCP
California									
Renewable Energy Facilities	0.44988	100%	0.44988	0.41269	100%	0.41269	0.36467	100%	0.36467
Energy Efficiency Programs	0.24376	50%	0.12188	0.36810	50%	0.18405	0.24688	50%	0.12344
Local Parking Cash-Out Program	0.00020	0%	0.00000	0.00020	0%	0.00000	0.00020	0%	0.00000
Alternative Fuel Vehicles	0.00000	0%	0.00000	0.10100	0%	0.00000	0.10100	0%	0.00000
Total	0.69384		0.57176	0.88200		0.59674	0.71275		0.48811
Hawaii									
State of Hawaii Performance Contracting Initiatives	0.00407	75%	0.00305	0.00407	75%	0.00305	0.00407	75%	0.00305
County Govt Performance Contracting Initiatives	0.00139	75%	0.00104	0.00139	75%	0.00104	0.00139	75%	0.00104
Use of Existing Renewable Energy	0.17107	25%	0.04277	0.15074	25%	0.03768	0.15074	25%	0.03768
Utility Solar Water Heating + State Income Tax Credit	0.00246	25%	0.00061	0.00221	25%	0.00055	0.00221	25%	0.00055
Improvements in Generation Efficiency	-0.02515	0%	0.00000	-0.01498	0%	0.00000	-0.01498	0%	0.00000
Utility Comm/Ind DSM Programs	0.00886	0%	0.00000	0.01171	0%	0.00000	0.01171	0%	0.00000
Model Energy Code	0.01911	0%	0.00000	0.02184	0%	0.00000	0.02184	0%	0.00000
Total	0.18180		0.04747	0.17697		0.04233	0.17697		0.04233
Illinois									
Expand Forestry Program	0.02000	100%	0.02000	0.02000	100%	0.02000	0.02000	100%	0.02000
Total	0.02000		0.02000	0.02000		0.02000	0.02000		0.02000
Iowa									
Nitrogen Fertilizer Reduction Program	0.12323	100%	0.12323	0.15336	100%	0.15336	0.15336	100%	0.15336
Top of Iowa Wind Farm				0.01821	100%	0.01821	0.01691	100%	0.01691
2 Wind Farms	0.09714	100%	0.09714	0.08500	100%	0.08500	0.07893	100%	0.07893
3 Wind Turbines	0.00023	100%	0.00023	0.00020	100%	0.00020	0.00019	100%	0.00019
2 Wind Turbines				0.00038	100%	0.00038	0.00035	100%	0.00035
Rebuild Iowa	0.00021	50%	0.00011	0.00023	50%	0.00011	0.00022	50%	0.00011
Energy Bank	0.00319	0%	0.00000	0.00135	0%	0.00000	0.00130	0%	0.00000
Methane Recovery (hog lots)				0.00004	0%	0.00000	0.00004	0%	0.00000
Total	0.22400		0.22071	0.25875		0.25725	0.25128		0.24983

	2000			2001			2002		
	MMTCE/yr	% Attributable to SLCCP	Carbon Savings Attributable to SLCCP	MMTCE/yr	% Attributable to SLCCP	Carbon Savings Attributable to SLCCP	MMTCE/yr	% Attributable to SLCCP	Carbon Savings Attributable to SLCCP
State Action Plan Programs									
New Jersey									
Natural Resource Conservation				0.12400	100%	0.12400	0.12400	100%	0.12400
Renewable Energy Programs	0.00004	100%	0.00004	0.00007	100%	0.00007	0.00007	100%	0.00007
Residential Energy Efficiency				0.05400	60%	0.03240	0.05400	60%	0.03240
Commercial/Industrial Energy Efficiency				0.06333	40%	0.02533	0.06333	40%	0.02533
Energy Cons. & Innov. Tech – Transp.				0.54000	40%	0.21600	0.54000	40%	0.21600
Waste Mgmt. Improvement				1.10000	0%	0.00000	1.10000	0%	0.00000
Total	0.00004		0.00004	1.88140		0.39780	1.88140		0.39780
Oregon									
CO2 Standards	0.02800	100%	0.02800	0.02800	100%	0.02800	0.02800	100%	0.02800
Tree Planting	0.00002	100%	0.00002	0.00002	100%	0.00002	0.00002	100%	0.00002
State Tax Credit and Loan Incentives	0.27835	50%	0.13917	0.29690	50%	0.14845	0.53442	50%	0.26721
Business Tax Credits	0.01000	35%	0.00350	0.01000	35%	0.00350	0.01000	35%	0.00350
Total	0.31637		0.17069	0.33492		0.17997	0.57244		0.29873
Vermont									
Efficiency Vermont	0.01658	70%	0.01161	0.01548	70%	0.01084	0.01437	70%	0.01006
Net metering/renewable energy							0.00423	50%	0.00211
Total	0.01658		0.01161	0.01548		0.01084	0.01860		0.01217
Washington									
Wind Power							0.00006	100%	0.00006
Residential Building Practices	0.01180	50%	0.00590	0.01180	50%	0.00590	0.01180	50%	0.00590
Commercial Building Energy Efficiency	0.00003	50%	0.00002	0.00007	50%	0.00004	0.00013	50%	0.00007
Natural Gas Power Plant offsets							0.00312	0%	0.00000
LFG projects	0.23410	0%	0.00000	0.23410	0%	0.00000	0.44200	0%	0.00000
Total	0.24593		0.00592	0.24597		0.00594	0.45712		0.00603
LAW Fund Demonstration Project	0.00668	100%	0.00668	0.01188	100%	0.01188	0.02208	100%	0.02208
ICLEI Cities for Climate Protection	1.85150	36%	0.65740	2.07767	35%	0.72733	2.30384	35%	0.79727
TOTAL	3.55674	48%	1.71228	5.90503	38%	2.25007	6.41648	36%	2.33435

The *Hawaii Climate Change Action Plan* recommended continuation of state and county performance contracting, increased use of existing renewable energy and solar water heating through utility DSM and state tax credits, improvements in generation efficiency, expansion of commercial and industrial DSM utility programs, and the adoption of model energy codes for buildings (Hawaii DBEDT, 1998). LBNL found that while the performance contracting could overlap with some ENERGY STAR programs, implementation of the projects may not have occurred without the financing mechanism and thus 75% of the emissions reductions were attributed to SLCCB. The state energy tax credits were extended in part because of inclusion in the state action plan discussion, so 25% of the savings related to the increased use of renewable energy and the state tax credit was attributed to the SLCBB. Since all of the commercial and industrial DSM utility programs were in place before the action plan and there is also potential overlap with ENERGY STAR programs, none of the GHG emissions reductions associated with these programs were attributed to SLCBB. Since the utility was already participating in the Climate Challenge Program at the time of the action plan, none of the savings associated with improvement in generation efficiency were attributed to the SLCBB. Finally, the action plan recommended that the commercial energy code be adopted in Maui and the residential energy code be adopted in all counties. The code has not yet been adopted in Maui, and although the residential code was adopted by the City and County of Honolulu in 2002, no GHG emissions reductions have been reported.

The *Climate Change Action Plan for Illinois* recommends expansion of reforestation and forest management programs, use of landfill methane to reduce methanol emissions, a recycling project, and installing benchmark weather stations to track climate change indicators (Illinois DENR, 1994).⁷ Forestry programs are not covered by any other EPA climate protection programs and thus 100% of the GHG emissions reductions were allocated to SLCBB. GHG emissions reductions from methane gas recovery from landfills potentially overlap with the EPA's Landfill Methane Outreach Program and thus are not attributed to the SLCBB. The information collected from weather stations in Illinois has not directly led to a reduction in GHG emissions, so no carbon savings were attributed to the SLCBB. GHG emissions reductions from the recycling project were not included in the action plan and even if they had been, these reductions could overlap with EPA's WasteWise program.

The *Iowa Greenhouse Gas Action Plan* recommends reduction of nitrogen fertilizer applications, wind power development, reclamation of methane gas at large hog lots, and retaining state voluntary programs including the Energy Bank and Rebuild Iowa (Ney et al., 1996). The emissions reductions associated with the nitrogen fertilizer and wind power development programs in Iowa are not covered by any other EPA climate protection programs and thus 100% of the GHG emissions reductions were allocated to SLCBB. The Rebuild Iowa Program funds retrofits of existing buildings and energy efficiency (Iowa DNR, 2003). Since there are potential overlaps with other EPA programs such as ENERGY STAR, only 50% of the GHG emissions reductions associated with this program were allocated to SLCBB. The Iowa Energy Bank, which was established before the state's action plan, is one component of Iowa's Building Energy Management Program which is implemented in concert with ENERGY STAR Buildings. Since this program was initiated prior to the action plan and it includes ENERGY STAR components, the GHG emissions reductions were not included. The methane reclamation program could be considered part of EPA's methane emissions reduction programs, so the GHG emissions reductions were not included.

⁷ Emissions reduction data were only provided for the forestry project.

The New Jersey *Sustainability Greenhouse Action Plan* includes energy conservation strategies for buildings, industry, and transportation as well as investment in innovative technologies, waste management through recycling of municipal solid waste and landfill gas recovery, and tree planting (New Jersey CCWG, 1999, 2000, 2002). The tree planting and renewable energy programs were not covered by any other EPA climate protection programs and thus 100% of the GHG emissions reductions were allocated to SLCBB. LBNL calculated that approximately 60% of the savings related to residential buildings and 40% of the commercial/industrial savings were not from actions that overlapped with EPA programs. For transportation, there is some overlap with other EPA climate protection programs, so LBNL estimated that 40% of the emissions reductions were attributable to SCLBB. New Jersey's waste management improvement programs focus on reduction of municipal solid waste and landfill gas recycling, but both of these areas are also addressed by EPA's WasteWise, so none of the emissions reductions were allocated to SLCBB.

The *Report on Reducing Oregon's Greenhouse Gas Emissions* recommends consideration of GHGs in facility siting,⁸ tree planting, and retaining the state's core energy efficiency and renewable resources incentive programs (Oregon Office of Energy, 1995). The CO₂ standards for new power facilities and the tree planting programs were not covered by any of the other EPA climate protection programs and thus 100% of the associated GHG emissions reductions were allocated to SLCBB. Oregon's core energy efficiency and renewable resources incentive programs include the "State Tax Credit and Loan Initiatives". LBNL reviewed the levels of investments made using these loans and estimated that 50% of savings were attributable to SLCCB (Oregon Office of Energy, 2001). The types of investments made with the Business Energy Tax Credit include rental weatherization and other conservation projects, recycling projects, and investments in renewable resources. Assuming that the savings from the other conservation and the recycling projects overlap with other EPA climate protection programs, the share of savings attributable to the remaining programs is estimated to be 35% based on the shares of business energy tax credits issued.

Fueling Vermont's Future: Vermont's Comprehensive Energy Plan and Vermont Greenhouse Gas Action Plan recommends that energy efficiency programs continue and that net metering be expanded (Vermont DPS, 1998). The state's energy-efficiency program, Efficiency Vermont, promotes the installation of energy-efficiency equipment and provides design assistance, information on water conservation, and fuel switching (Efficiency Vermont, 2003). In 2001, about 30% of Efficiency Vermont program expenditures were aimed at ENERGY STAR products and services. The remaining 70% of program expenditures do not overlap with other EPA climate protection programs and thus were allocated to SLCBB. Since the initial net metering legislation was established prior to the state action plan, only a portion of the related GHG emissions reductions are attributable the expansion of net metering. Since no itemization of savings from these specific programs was provided, it was estimated that 50% of the GHG emissions reductions are the result of actions taken based on the expansion of net metering and can be attributed to SLCBB.

The *Greenhouse Gas Mitigation Options For Washington State* provided recommendations related to existing residential retrofits and new home building practices, efficiency improvements for public sector commercial buildings, and electricity production from landfill gas and wind resources (Garcia, 1996). The state action plan did not, however, provide recommendations related to purchased offsets for new natural gas power plants, so

⁸ This recommendation included studying ways to incorporate CO₂ standards for new facilities.

these emissions were not included. The emissions reductions associated with the wind power project are not covered by any other EPA climate protection programs and thus 100% of the GHG emissions reductions were allocated to SLCBB. Since the improved residential building practices and efficiency improvements for public sector commercial buildings have some potential overlap with ENERGY STAR, only 50% of the savings were attributed to SCLBB. The EPA supports landfill gas combustion projects through the Industry Methane Programs, so the SCLBB cannot claim any emission reduction credit for this program. The use of purchased offsets for electricity production by natural gas power plants was not included in the state action plan, so none of the GHG emissions reductions were attributed to SCLBB.

The LAW Fund project to encourage development of renewable energy sources began by eliciting the support of about 18,000 residential customers and 500 commercial, industrial, state, and municipal customers to show their enthusiasm for purchasing green power. This support led to the development of a 25 MW wind farm in Colorado as well as a commitment by Colorado utilities to add an additional 80 MW of wind power capacity by 2004 (U.S. EPA, 2000). The LAW Fund extended its efforts to Utah and New Mexico, where GHG emissions reductions from wind projects were reported to begin in 2002. All of the savings from the LAW Fund efforts are related to development of wind power projects, which are not covered by any of the other EPA climate protection programs and thus 100% of the associated GHG emissions reductions are allocated to SLCBB.

The SLCBB has provided financial support to the ICLEI since 1993. ICLEI's Cities for Climate Protection program works with more than 140 U.S. cities and counties to reduce GHG emissions. The actions taken by the local governments cover a wide range of activities and GHG emissions reductions for each activity are reported for 2000 (ICLEI, 2001). LBNL divided these activities into three categories: 1) no overlap with other EPA programs, 2) approximately 50% overlap, 3) range from 100% to 50% overlap with other EPA programs. 100% of GHG emissions reductions associated with the programs that fall into the first category were attributed to the SLCBB, while only 50% of the reductions from the second category and 0% of the reductions from the third category were attributed to the SLCBB.

Overall, for the 8 states, the LAW Fund, and ICLEI, 1.7 MMTCE, or 48% of the total savings of 3.6 MMTCE, were attributed to the SLCBB in 2000 (see Table 1). While the total emissions reductions increased to 5.9 MMTCE and 6.4 MMTCE in 2001 and 2002, respectively, the share attributed to the SLCBB fell to 38% and 36% due to increased overlap with other programs. Even so, savings of 2.3 MMTCE were attributed to the SLCBB for those two years.

Acknowledgments

Support for Lawrence Berkeley National Laboratory was provided by the State and Local Capacity Building Branch, Global Programs Division, Office of Air and Radiation, U.S. Environmental Protection Agency under contract number DE-AC03-76SF00098.

References

Cadmus Group, 1998. *Regional Electricity Emission Factors: Final Report*. Prepared for U.S. EPA, APPD. Washington, DC.

- California Energy Commission, 1998. *1997 Global Climate Change Report: Greenhouse Gas Emissions Reduction for California. Appendix A: Historical and Forecasted Greenhouse Gas Emissions Inventories for California*, Sacramento, CA: CEC
- Efficiency Vermont, 2003. *The Power of Efficient Ideas: Efficiency Vermont: Preliminary Report 2002*. Burlington, VT: Efficient Vermont.
- Garcia, N., 1996. *Greenhouse Gas Mitigations Options for Washington State*. Olympia, WA : Washington State Energy Office. WSEO 96-28.
- Hawaii Department of Business, Economic Development, and Tourism, Energy, Resources, and Technology Division and Department of Health, Clean Air Branch, 1998. *Hawaii Climate Change Action Plan*. Honolulu, HI: DBEDT.
- Hawaii Revised Statutes, 2000. *Chapter 226-18. Objectives and Policies for Facility Systems – Energy*. http://www.hawaii.gov/dbedt/ert/e_law.html
- ICF Consulting, 1999. *Emissions Factors, Global Warming Potentials, Unit Conversions, Emissions, and Related Facts*.
- Illinois Department of Energy and Natural Resources, 1994. *A Climate Change Action Plan for Illinois*. Springfield, IL: Illinois DENR.
- International Council for Local Environmental Initiatives, 2001. *U.S. Communities Acting to Protect the Climate: Achievements of ICLEI's Cities for Climate Protection – U.S. 2000*. Berkeley, CA: ICLEI.
- Iowa Department of Natural Resources, 2003. *Focus on Rebuild Iowa*. Des Moines, IA.
- Marnay, C., Fisher, D., Murtishaw, S., Phadke, A., Price, L., and Sathaye, J., 2002. *Estimating Carbon Dioxide Emissions Factors for the California Electric Power Sector*. Berkeley, CA: Lawrence Berkeley National Laboratory (LBNL-49945).
- New Jersey Climate Change Working Group, 1999. *Sustainability Greenhouse Action Plan*. Trenton, NJ: New Jersey Department of Environmental Protection.
- New Jersey Climate Change Working Group, 2000 and 2002. *New Jersey Climate Change Action Plan*. Trenton, NJ: New Jersey Department of Environmental Protection.
- New Jersey Department of Environmental Protection, 2000. Covenant of Sustainability/New Jersey Greenhouse Gas Initiative, <http://www.state.nj.us/dep/dsr/gcc/gcc-covenant.htm>
- New York State Energy Planning Board, 2002. *New York State Energy Plan And Final Environmental Impact Statement*. <http://www.nyserda.org/sep.html>

- Ney, R.A., Schnoor, J.L., Foster, N.S.J., Forkenbrock, D.J., 1996. *Iowa Greenhouse Gas Action Plan*. Iowa City, Iowa: Center for Global and Regional Environmental Research, Public Policy Center, The University of Iowa.
- Oregon Department of Energy, 2003. *Oregon's Carbon Dioxide Standard*. <http://www.energy.state.or.us/siting/co2std.htm>
- Oregon Office of Energy, 1995. *Report on Reducing Oregon's Greenhouse Gas Emissions*. Salem, OR: Oregon Office of Energy. <http://www.energy.state.or.us/climate/gggas.htm>
- Oregon Office of Energy, 2001. *Conservation Program Savings*. Salem, OR: Oregon Office of Energy. <http://www.energy.state.or.us/Consavings.pdf>
- Price, L., and Bartholomew, E., 2004. *Assessment of State and Local Greenhouse Gas Emissions Reductions Related to Programs Funded by the State and Local Capacity Building Branch, Global Programs Division, Office of Air and Radiation, U.S. Environmental Protection Agency*, Berkeley, CA: Lawrence Berkeley National Laboratory (LBNL-54712).
- STAPPA/ALAPCO and ICLEI, 2003. *Clean Air and Climate Protection Software*. Produced by Torrie Smith Associates, Inc. for the State and Territorial Air Pollution Prevention Administrators and Association of Local Air Pollution Control Officials and the International Council for Local Environmental Initiatives.
- Torrie Smith Associates, 2001, *e-Mission Greenhouse Gas Strategy Software*. www.torriesmith.com
- U.S. Department of Energy, Energy Information Administration, 2001. *Updated State-Level Greenhouse Gas Emissions Factors for Electricity Generation*, Washington, DC: USDOE.
- U.S. Environmental Protection Agency, 2000. *Climate Change Solutions: Land and Water Fund of the Rockies Markets Green Power*. EPA-430-F-00-022.
- U.S. Environmental Protection Agency, 2001. *FY 2002 Annual Performance Plan and Congressional Justification*. Washington, DC: USEPA.
- U.S. Environmental Protection Agency, 2003. *e-Grid: Emissions and Generation Resource Integrated Database*. <http://www.epa.gov/cleanenergy/egrid/index.html>
- Vermont Department of Public Service, 1998. *Fueling Vermont's Future: Vermont Comprehensive Energy Plan and Vermont Greenhouse Gas Action Plan*. Montpelier, VT: Department of Public Service.