

# Rhode Island Greenhouse Gas Action Plan

*Developed by*  
The Rhode Island Greenhouse Gas Stakeholder Process

*Convened by*  
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Rhode Island State Energy Office

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July 15, 2002

*Dedication*

We dedicate this Plan to  
the memory of Mary Kilmarx  
for her decades of service to Rhode Island on energy and environmental issues  
and for helping to launch this Rhode Island Greenhouse Gas Process.

## I. Executive Summary

In the fall of 2001, the Rhode Island Department of Environmental Management and the State Energy Office convened a group of over 30 diverse stakeholders from business, industry, citizen groups, environmental organizations, and other government agencies to develop a Greenhouse Gas Action Plan for Rhode Island.

The convening of this group was largely precipitated by the growing international consensus among scientists and policymakers that carbon dioxide and other greenhouse gases are warming the planet at a rapid rate. If this trend continues, it could have adverse impacts on Rhode Island's environment and economy. More immediately, the Rhode Island process builds on a recent agreement among all the New England Governors and Eastern Canadian Premiers to reduce greenhouse gases in the region to 1990 levels by 2010, 10% below those levels in 2020, and by as much as 75% over the longer-term.

The Rhode Island Greenhouse Gas Process is funded by the U.S. Environmental Protection Agency, the U.S. Department of Energy, the Institute for Environmental Conflict Resolution, and the State of Rhode Island. The state hired Raab Associates, Ltd. to provide facilitation and project management services, and Tellus Institute to provide consulting and modeling services on technical and policy issues.

The process has three distinct phases:

- Phase I - Stakeholders developed a GHG Action Plan and prioritized and evaluated a list of greenhouse gas reduction options.
- Phase II - In the Fall of 2002, the Stakeholders will further research, analyze, and (as warranted) design implementation strategies for key high priority program and policy options.
- Phase III - Actual program implementation of the highest priority options, and development of implementation plans for other options.

During the course of Phase I the Stakeholder Steering Committee met five times. Three additional Working Groups – 1) Buildings and Facilities; 2) Transportation and Land

### Stakeholder Members

Associated Builders and Contractors  
 Audubon Society of Rhode Island  
 Brown University  
 Business Roundtable  
 Conservation Law Foundation  
 Department of Administration  
 Governor's Policy Office (ex officio)  
 Narragansett Electric  
 Nat. Fed'n of Independent Businesses  
 New England Gas Company  
 Northern RI Chamber of Commerce  
 Oil Heat Institute  
 Providence Chamber of Commerce  
 RI Builder's Association  
 RI Dept. of Environmental Management  
 RI Dept. of Transportation  
 RI Economic Development Corporation  
 RI House, Policy Office (ex officio)  
 RI League of Cities and Towns  
 RI Petroleum Institute  
 RI Public Interest Research Group  
 RI Public Transit Authority  
 RI Division of Public Utilities and Carriers  
 RI Senate, Policy Office (ex officio)  
 RI Society of Environmental Professionals  
 RI State Energy Office  
 RI Statewide Planning  
 Save The Bay  
 Sierra Club  
 Sustainability Coalition  
 The Energy Council of Rhode Island  
 US EPA (ex officio)  
 US DOE (ex officio)

Use; and 3) Energy Supply and Solid Waste - met three times each, for a total of 14 meetings between October 2001 and July 2002.

Over 60 individuals participated actively in the Working Groups. Each of the Working Groups discussed multiple greenhouse gas reduction initiatives, programs, and policy options. Tellus Institute analyzed these options in Scoping Papers, detailing potential carbon emissions reductions, net costs and savings, and other benefits. Each of the Working Groups ultimately made recommendations to the Stakeholder Steering Committee regarding the prioritization of the options, as well as additional comments and considerations for certain options. The Stakeholders shaped this Plan with the assistance of the consultants and facilitator.

The Stakeholders accept the New England Governors and Eastern Canadian Premiers' regional Greenhouse Gas Reduction target of reducing GHG emissions to the 1990 level by 2010 and 10% below 1990 levels by 2020 as a reasonable goal for now, on which to base a Rhode Island GHG Action Plan. Thus this Plan adopts Rhode Island's proportional share of these regional targets as its own targets, i.e., the same percentage reductions below Rhode Island's Baseline emissions path.

Fig. ES1: Baseline Emissions Scenario Compared to Governors'/Premiers' Target

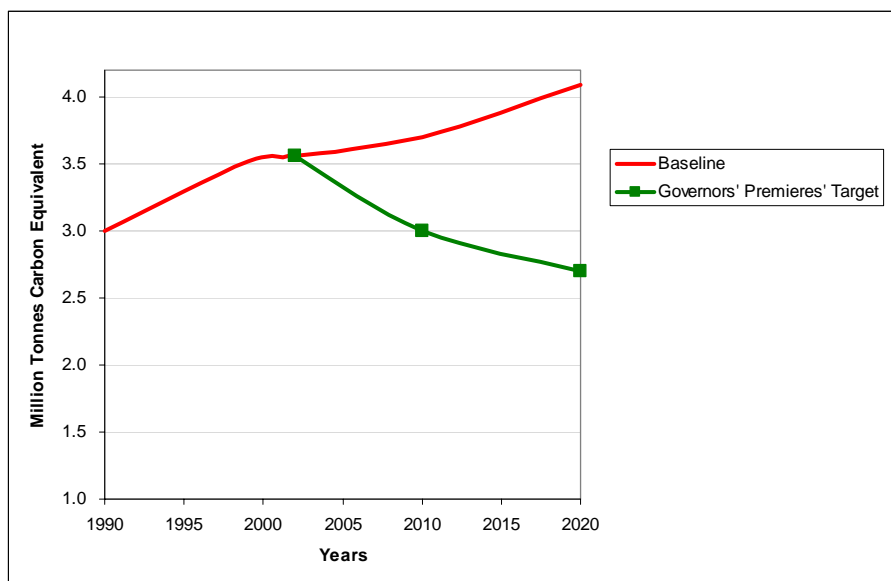


Figure ES1 above shows the Baseline path for Rhode Island's GHG emissions (expected growth of its related GHG emissions absent new initiatives) and a path for Rhode Island's proportional share of the Governors' and Premiers' regional targets, indicating the gap that needs to be filled with initiatives, programs, and policies in a comprehensive GHG Action Plan. Since the Baseline entails steady growth in GHG emissions over the next twenty years following the growth in the 1990s, the target of 10 percent below 1990 emissions in 2020 will require that emissions in 2020 be about one-third below the level of the Baseline. This presents the challenge of identifying and implementing policies and measures to close the gap.

The Stakeholders have agreed to include 52 program and policy options in this Plan to begin to fill this gap between the baseline and the greenhouse gas reduction targets.

### Higher Priority Consensus In-State Options

#	Name	Saved Carbon <sup>1</sup>
<b>Buildings and Facilities</b>		
1	Commercial/Industrial Fossil Fuel Retrofit	100
2	Compact Residential Appliances Initiative	80
3	Energy Efficiency Targeting Initiative (Industrial)	40
4	Combined Heat & Power (CHP) Initiative (Industrial)	35
5	Electric Energy Efficiency Retrofit in Non-Residential Buildings and Facilities	30
6	Efficient Residential Fossil Fuel Heating	25
7	Tax Credits For Energy Efficiency	15
8	Combined Heat & Power (CHP) Initiative (Non-Industrial)	15
9	Efficient Residential Electric Cooling	10
10	Retrofit Program For Electrically Heated Residences	9
11	Retrofit For Fossil Heated Residences	6
12	Electric Equipment Retrofit Program (Small Commercial & Industrial)	5
13	Public Facilities Efficiency Initiative	5
14	Efficient Residential Lighting / Appliances	5
15	Efficient Non-Residential Construction	5
16	Energy Star Home Construction Program	1
17	Use of Lower Carbon Fossil Fuels	TBD <sup>2</sup>
<b>Transportation</b>		
18	Local Fuel Economy Improvements (Feebate)	125
19	Transit Oriented Development and Enhancing Transit Options and Operations	19
20	Expand Bicycle/Pedestrian Infrastructures	19
21	Commuting Efficiency Program	19
22	Commuting Trip Reduction Initiative	18
23	Government Owned And Private Fleet-Vehicle Efficiency Initiative	<2.5
<b>Land Use</b>		
24	Urban/Suburban Forestry Program	<120
25	Open Space Protection Program	60
<b>Energy Supply/Solid Waste</b>		
26	Renewable Portfolio Standards	140
27	Resource Management (RM) Contracting	70
28	Pay-As-You-Throw (PAYT) Initiative	55
29	State Facilities Renewable Purchase Requirement	0.4

### Lower Priority Consensus In-State Options

#	Name	Saved Carbon
<b>Buildings and Facilities</b>		
30	Compact Floorspace Initiative	5
31	Switch from Electric to Fossil Fuel Heating	1
32	Solar Photovoltaic (PV) Buydown Program	1
33	Active Solar Hot Water Heating Initiative	1
34	Non-Residential Natural Gas Air Conditioning Initiative	<1
<b>Transportation</b>		
35	Fleet Fuel GHG Content Mandate	40
<b>Land Use</b>		
36	Conversion of Marginal Cropland to Forest Initiative	40
37	Conversion of Marginal Cropland to Wetlands Initiative	<1.5
38	Low Input Agriculture and Improved Cropping Systems Initiative	0.4
39	Forest Management Initiative	TBD <sup>2</sup>
<b>Energy Supply</b>		
40	Promote New Renewable Electricity Supply Using System Benefit Charge Funds	8
41	Promote Green Power Purchases Using System Benefit Charge Funds	13
42	Incentive Package Initiative	
	• Production tax credit	2
	• Investment tax credit	2
	• Net metering	0.2
	• Backup rates	TBD <sup>2</sup>
43	Direct Government Investments Or Expenditures in Renewable Energy	0.5
<b>Solid Waste</b>		
44	Deposit Bottle System ("Bottle Bill")	19

### Non-Consensus In-State Options

#	Name	Saved Carbon
<b>Buildings and Facilities</b>		
45	Upgrade New Residential Construction Building Code	20
46	Upgrade New Commercial Construction Building Code	40
<b>Transportation and Land Use</b>		
47	Increase the Gasoline Tax	38

<sup>1</sup> Estimates of thousands of metric tons in 2020 of greenhouse gases expressed as carbon equivalent

<sup>2</sup> TBD: To Be Determined

**Consensus Regional/National Options**

#	Name	Saved Carbon
<b>Buildings and Facilities</b>		
48	Upgrade And Extend Appliance Efficiency Standards	100
<b>Transportation</b>		
49	National Fuel Efficiency Standards For Cars And Light Trucks (CAFÉ)	250
<b>Energy Supply</b>		
50	Carbon (And Multi-Pollutant) Cap And Permit Trade System For The Power Sector	140

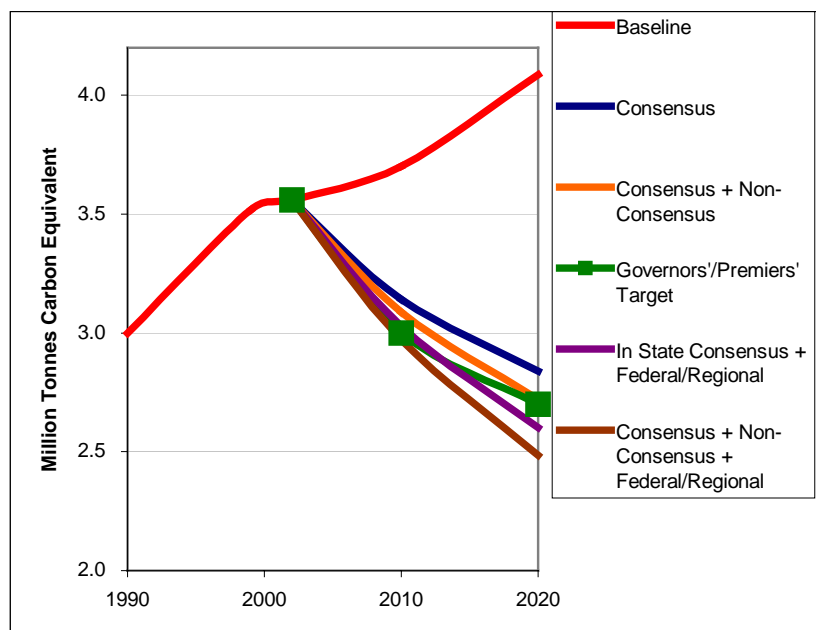
**Consensus Priority Study Options**

#	Name	Saved Carbon
51	Vehicle Miles Traveled (VMT)-Based Insurance Premium Structures	110
52	Transportation Infrastructure Planning	TBD
	<ul style="list-style-type: none"> <li>• Commuter rail/light rail and its potential electrification</li> <li>• Advanced bus rapid transit</li> <li>• Barging</li> <li>• Shifting transportation resources to preserving RI's transportation infrastructure</li> </ul>	

The Stakeholder Group's decision to include these options was based primarily on a preliminary assessment of the saved carbon and the cost of saved carbon. These factors as well as additional factors will be examined in Phase II and beyond and the prioritization of the options will be revisited at that time, and on this basis a decision will be made as to whether and if so how to proceed on each option.

Forty-nine of the options are consensus options endorsed by all the Stakeholders. Only three options are non-consensus options. Also, 49 of the options are primarily in-state options, while only three options would require regional or national implementation. Of the full set of options, 25 are targeted at buildings and facilities, 11 at transportation, 6 at land use, 6 at energy supply, and 4 at solid waste. In addition to these 52 options, the Stakeholders also identified numerous other potentially fruitful areas for Rhode Island to track and study for possible future inclusion in the Plan.

Figure ES2: RI GHG Emissions Scenarios Compared to Governors'/Premiers' Target



As can be seen in Figure ES2 above, substantial carbon savings can be attained if these options are implemented. The In-State Consensus options are projected to almost meet the 2020 target of the Governors and Premiers. The In-State options as a whole (Consensus plus Non-Consensus) could meet the 2020 target. With national and regional options added the target could be exceeded with or without the non-consensus In-State options. Moreover, the sharp downward trend approaching the year 2020 indicates that continuation of these options would have additional reductions in the following years. We assume that elements of the policy portfolios will begin to be implemented in 2003.

The modeling effort also shows that these carbon savings can be achieved while producing substantial cumulative net economic benefits to Rhode Island. For example, implementing all the in-state options could be accomplished at a cumulative net economic benefit of over \$700 million. This occurs largely because many of the options identified in this Plan also save energy and those savings exceed capital and operation and maintenance costs for the energy saving technologies and practices. There are also savings due to reductions in other air pollutants.

The Stakeholders agree that some of the in-state options identified in the Plan could and should be replaced by a combination of regional, national, and trading options when they are both timely and more cost-effective than in-state activities. To this end, Rhode Island needs to continue to monitor new technologies as well as programs and policies adopted by other jurisdictions to identify opportunities to improve Rhode Island's in-state GHG reduction programs and policies. The Rhode Island GHG Plan should be reviewed every 3-5 years to ensure that it is appropriate and achievable, and reflects the best technologies and program/policy designs, as well as the right mix of local, regional and national initiatives, and to adjust its targets and Plan accordingly. Because there will be an on-going need to coordinate among a wide range of entities including state agencies, local government, the Legislature, businesses, and citizens, Rhode Island should consider having one entity such as a state agency serve in a shepherding (i.e., coordinating and tracking) role.

## **Phase I Rhode Island Greenhouse Gas Action Plan**

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## I. Introduction and Stakeholder Process Overview

There is a growing international consensus among scientists and policymakers that carbon dioxide and other greenhouse gases are warming our planet at a rapid rate. If this trend continues it could have severe impacts on human life and the environment. Thus global warming and greenhouse gas issues have become a major concern for policymakers and citizens worldwide. Reducing greenhouse gases can help reduce global warming -- a major concern for Rhode Islanders because of its potential adverse impacts through flooding in coastal areas, saltwater contamination of drinking water, extreme weather events, damage to local crops, and other potential adverse Rhode Island impacts described by EPA in its publication *Climate Change And Rhode Island* (See Appendix C).

In response, the Rhode Island Department of Environmental Management (DEM) and the State Energy Office convened stakeholders from business, industry, citizen groups, environmental organizations, and other government agencies. The product of their work, this Action Plan, developed by a broad Stakeholder group, identifies ways Rhode Island can substantially reduce its contribution to greenhouse gas emissions.

The Rhode Island Greenhouse Gas Process began in the Fall of 2001 with funding from the U.S. Environmental Protection Agency, the U.S. Department of Energy, the Institute for Environmental Conflict Resolution, and the State of Rhode Island. The state hired Raab Associates, Ltd. to provide facilitation and project management services and Tellus Institute to provide consulting and modeling services on technical and policy issues. The process has three distinct phases:

- Phase I - Stakeholders developed a GHG Action Plan which includes its prioritized a list of greenhouse gas reduction options.
- Phase II - In the Fall of 2002, the stakeholders will further research, analyze, and (as warranted) design implementation strategies for key high priority program and policy options.
- Phase III Actual program implementation of the highest priority options, and developing implementation plans for other options.

In Phase I, Raab Associates assisted DEM and the Energy Office in structuring the process and identifying key stakeholders. During the course of Phase I the Stakeholder Steering Committee met five times and three Working Groups – 1) Buildings and Facilities; 2) Transportation and Land Use; and 3) Energy Supply and Solid Waste - met three times each, for a total of 14 meetings between October 2001 and July 2002. (For a full list of participants in each Group please refer to Section V.)

Tellus Institute used its LEAP 2000 software (See Appendix F) to model energy demand and supply, GHG and criteria air pollutant emissions, and cost scenarios for Rhode Island. The process is also supported by a dedicated website (<http://rihgh.raabassociates.org>) that houses all the relevant documents, the schedule, and contact information for the participants. The Stakeholders first reviewed the goals, mission and objectives of the process and discussed the forecasted baseline for Rhode Island GHG emissions over the planning horizon. The Stakeholders also agreed on Ground Rules that would govern the process, including:

- Decisions are to be made by consensus, meaning that everyone in the decision-making group is at least willing to live with a decision and chose not to dissent.

- Representatives are responsible for voicing their objections and concerns, and silence or absence is considered consent.
- For non-consensus issues, the Stakeholder Group members supporting each alternative approach are to be listed under each alternative.
- The Group's Report at the end of the Phase I and Final Report at the end of Phase II will include all areas of consensus, as well as a description of the alternative approaches preferred by Group members in areas where consensus is not reached, if any. (For a full copy of the Ground Rules, refer to Appendix A)

The Group reviewed a comprehensive list of options for reducing GHG emissions prepared by Tellus Institute. Some of these options built on ongoing activities in Rhode Island and some were completely new. Tellus described each option, and characterized each by its carbon reductions, cost-of-saved carbons and criteria pollutant reduction co-benefits. The Stakeholders discussed the criteria they would use to prioritize the set of options, including the carbon reductions, cost of saved carbon, and co-benefits such as the reduction of other air pollutants.

The Working Groups convened to identify, flesh-out, and prioritize options in specific areas. Most of the Stakeholders participated in at least one Working Group. The Working Groups also included other people from the Stakeholder organizations as well as other invited interested individuals. Each Working Group began by reviewing a Scoping Paper prepared by Tellus Institute describing options to reduce GHG emissions in their particular sectors. For each option, the Scoping Paper presents a summary description of the option and its potential application in Rhode Island, the impact of the option over time, the GHG reductions associated with the option's impact, and the option's overall costs, savings and co-benefits. Many of the options were iterated over several meetings between the Working Groups and the consulting team.

The Working Groups prioritized the options into four bins: high priority, medium priority, low priority, and non-consensus. They reached consensus on the priority of the vast majority of options. Each Working Group then drafted a memo for the Stakeholder Group explaining their binning decisions along with additional thoughts and concerns regarding specific options.

The full Stakeholder Group convened in June and July 2002 to review the Working Group recommendations and to weave them into a unified and comprehensive GHG Action Plan. The Stakeholder Group's deliberations were supported by GHG modeling runs showing the costs and benefits of various portfolios of options. The Phase I Action Plan represents the culmination of the Stakeholder Group's Phase I effort. It includes consensus language on targets for Rhode Island, as well as unanimous support for nearly 50 different options. Only 3 options remain as non-consensus items.

Section II includes the Stakeholders' recommendations on greenhouse gas targets for Rhode Island. Section III contains the 52 policy and program options to meet these targets, with the cost and benefit impacts of these options analyzed in Section IV. Section V lists all the members of the Stakeholder and Working Groups, and Section VI is for the signatures of the Stakeholder members. The Appendices include the process Ground Rules, the New England Governors' and Eastern Canadian Premiers' Regional GHG Reduction Targets, an EPA paper outlining the impact of climate change on Rhode Island, the baseline RI GHG scenario, scenario modeling methods, information on the LEAP 2000 model, and detailed program and policy option descriptions.

## II. Rhode Island Greenhouse Gas Reduction Targets

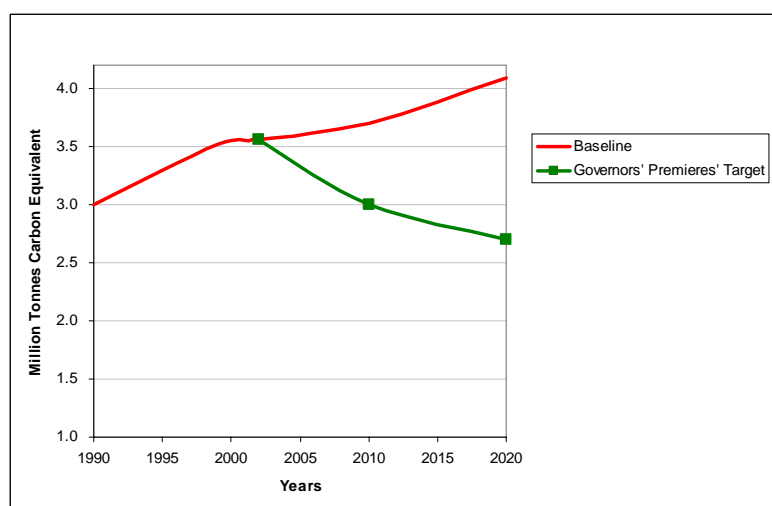
In August of 2001 all the New England Governors and Eastern Canadian Premiers signed a Climate Action Plan for New England and Eastern Canada that included the following regional GHG reduction targets:

- **Short-term Goal:** Reduce regional GHG emissions to 1990 emissions by 2010.
- **Mid-term Goal:** Reduce regional GHG emissions by at least 10% below 1990 emissions by 2020, and establish an iterative five-year process, commencing in 2005, to adjust the goals if necessary and set future emissions reduction goals.
- **Long-term Goal:** Reduce regional GHG emissions sufficiently to eliminate any dangerous threat to the climate; current science suggests this will require reductions of 75–85% below current levels

These targets are to be achieved on a regional basis with states and provinces contributing to the overall reduction in aggregate but not necessarily in equal measure by each jurisdiction. The full text regarding these targets is in Appendix B.

After careful consideration, the Rhode Island Stakeholder Group accepts the New England Governors and Eastern Canadian Premiers' regional Greenhouse Gas Reduction target of decreasing GHG emissions to the 1990 level by 2010 and 10% below 1990 levels by 2020 as a reasonable goal for now, on which to base a Rhode Island GHG Action Plan. Thus it would set its proportional share of these regional targets as its own targets, i.e., the same percentage reductions below Rhode Island's Baseline emissions path.

Fig. 2a: Baseline GHG Emissions Compared to Governors'/Premiers' Target

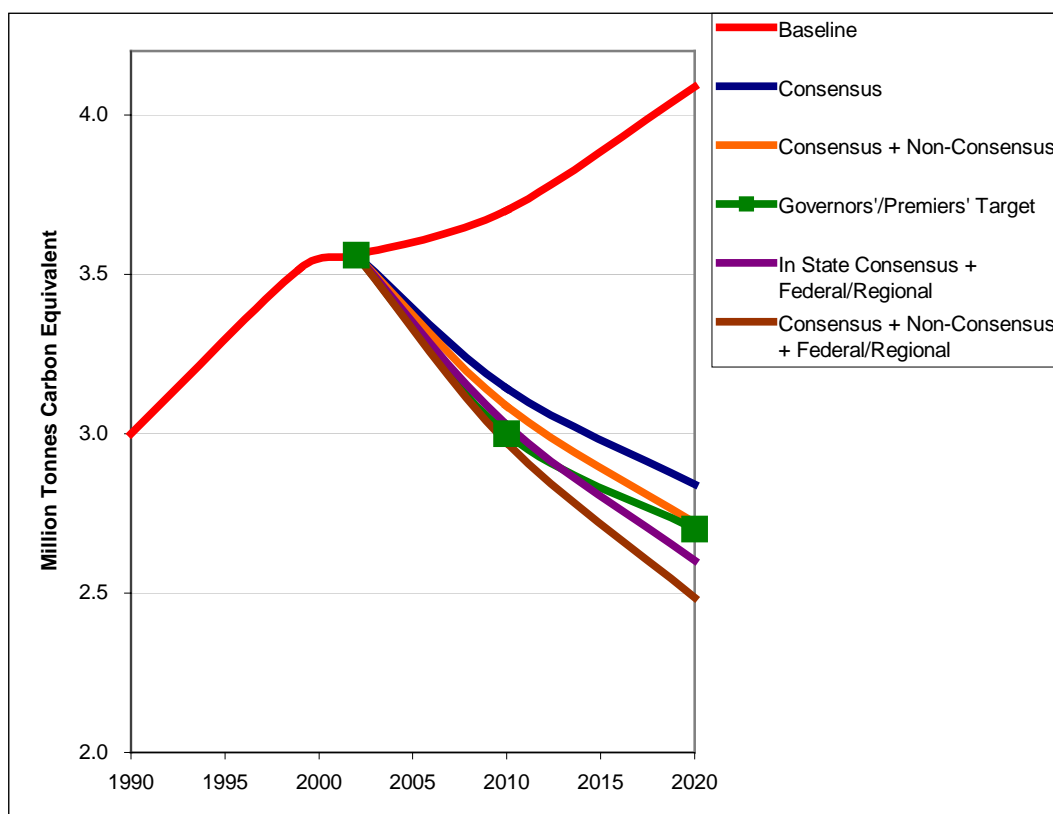


The figure above shows the Baseline path for its GHG emissions and a path for Rhode Island's proportional share of the Governors' and Premiers' regional targets, indicating the gap that needs to be filled with policies and measures in a comprehensive GHG Action Plan. Since the Baseline entails steady growth in GHG emissions over the next twenty years following the growth in the 1990s, the target of 10 percent below 1990 emissions in 2020 will require that emissions in 2020 be about one-third below the level of the Baseline. This presents the challenge of identifying and implementing policies and measures to close the gap.

The Stakeholder Group examined many GHG reduction options that could be used to meet these targets, and concluded that Rhode Island could potentially meet its proportional share of the regional targets using only in-state options if need be. This would require **launching new statewide initiatives and policies as well as expanding existing programs and policies**. (These options are delineated in the next section of this Plan.) With the Governors' and Premiers regional targets serving to guide Rhode Island's own targets in this way, the Stakeholders acknowledged that it could prove desirable in the future to depart from these targets as more is learned, either by strengthening or relaxing them, based upon perceived requirements for climate stabilization co-benefits, and the role desired by Rhode Island citizens, the performance and emergence of technologies and policies, trading across state boundaries, and enactment of national and regional programs.

The figure below shows the projected baseline for GHG emissions in Rhode Island; what the emissions for Rhode Island would need to be to meet a proportional share of the regional target, plus what the emissions could be if certain GHG reductions policies and programs options are implemented. Two of these lines show what the emissions would be from just in-state Rhode Island actions (the consensus options representing those that all the stakeholders agree should be pursued, and the consensus options plus just a few non-consensus options). The last two lines show what the emissions could be if a few key regional and national actions are added to the in-state actions.

Figure 2b: RI GHG Emissions Scenarios Compared to Governors'/Premiers' Target



It is important to point out that although the Group agrees that this Plan should show how the regional proportional share could be met by in-state activities if need be, the Group also agrees that

some of these in-state options could and should be replaced by a combination of regional, national, and trading options when they are both timely and more cost-effective than in-state activities.

Also the Group stresses the importance of Rhode Island needing to continue to monitor new technologies as well as programs and policies adopted by other jurisdictions to identify opportunities to improve Rhode Island's in-state GHG reduction programs and policies. To this end, the Stakeholders agree that the Rhode Island GHG Plan should be reviewed every 3-5 years to ensure that it is appropriate and achievable, and reflects the best technologies and program/policy designs, as well as the right mix of local, regional and national initiatives, and to adjust its targets and Plan accordingly. The Group further notes that the options delineated in the next section would need to be coordinated among a wide range of entities including state agencies, local government, the Legislature, businesses, and citizens. To this end the Group acknowledges the importance of having one entity such as state agency serve in a shepherding (i.e., coordinating and tracking) role.

The Group also notes that Tellus Institute derived the carbon reduction and other option specific numbers in this Plan using a range of data sources from in Rhode Island and elsewhere and these were refined through Stakeholder input in the Working Group process. The Group recognizes that until actual GHG reduction programs and policies can be designed and implemented in Rhode Island many of these numbers will remain as educated placeholders. The actual GHG reduction factors for a particular program or policy will depend on numerous factors including the final design and successful implementation. Therefore the Group acknowledges that carbon savings as well as other costs and benefits associated with a particular option could depart from what is shown in this document.

### III. Recommended Program and Policy Options

As shown in Figure 3a below, the Rhode Island Greenhouse Gas Plan includes 52 options. Forty-nine of the options are consensus options endorsed by all the Stakeholders. Only three options are non-consensus options indicating a split among the Stakeholders on recommendations concerning that option. Also, 49 of the options are primarily in-state options, while only three options would require regional or national implementation.

Figure 3a: Rhode Island GHG Reduction Option Categories

	<b>Buildings/ Facilities</b>	<b>Transportation</b>	<b>Land Use</b>	<b>Energy Supply</b>	<b>Solid Waste</b>	<b>Total</b>
<i>In State</i>						
Higher	17	6	2	1	3	29
Lower	5	1	4	4	1	15
Non-Consensus	2	1				3
Priority Study		2				2
<i>Sub-Total</i>	24	10	6	5	4	49
Regional/ National	1	1		1		3
<b>Total</b>	25	11	6	6	4	52

The Stakeholders identify 29 of the 49, in-state consensus options as higher priority, 15 as lower priority, and 2 for priority research. Of the full set, 25 options are targeted at buildings and facilities, 11 at transportation, 6 at land use, 6 at energy supply, and 4 at solid waste. In addition to these 52 options, the Stakeholders also identified numerous other potentially fruitful areas for Rhode Island to track and study for possible future inclusion in the Plan.

It is noteworthy that the options represent a combination of maintaining and expanding existing programs and policies, as well as putting into place many new initiatives. A number of the programs particularly in the buildings and facilities and energy supply areas, can use systems benefit charge (SBC) funds approved by the Legislature as part of electric restructuring legislation, while other programs and policies will require new funding sources. The options would also require a wide range of different lead actors from the Legislature, state agencies, local governments, businesses, and citizens.

The tables below show each of the options included in this Plan, as follows:

- Higher priority consensus in-state options
- Lower priority consensus in-state options
- Non-consensus in-state options
- Consensus regional/national options (higher priority)
- Consensus priority study

The options are grouped by sector (buildings & facilities, etc) in each table. In addition, the tables include the projected potential saved tons of carbon in 2020, the cost for each ton of saved carbon, and the co-benefits associated with each ton of saved carbon. Note that negative costs of saved carbon and negative co-benefits indicate economic savings. For example, when energy bills are reduced over the useful life of installed high efficiency equipment by more than the additional

capital and operation and maintenance costs for this improved equipment, the result is a net economic savings (negative costs of saved carbon). Similarly, the negative costs of co-benefits indicate savings from reducing key air pollutants. The Stakeholders note that all the numbers in these tables are being provided by Tellus Institute based on their professional judgment and analyses, and that these numbers need to be studied further and refined as appropriate as actual programs and policies are designed and implemented in Rhode Island.

Following the table is a short description of each of the programs, including important consensus notes from the Stakeholders regarding certain options. More detailed descriptions of each of the options as well as the modeling assumptions for each option are located in Appendix G where the options are organized by the option numbers shown in the tables below.

Following the descriptions of each of the options is another table showing the same options arranged in descending order of saved carbon for the in-state consensus and non-consensus options as well as for the few regional/national initiatives and the study options. This section of the report ends with a list of other areas and issues identified by the Stakeholders for potential future greenhouse gas reduction options.



**Table 3b: Higher Priority Consensus In-State Options**

#	Name	Saved Carbon <sup>1</sup>	CSC <sup>2</sup>	Co-Benefits <sup>3</sup>
<b>Buildings and Facilities</b>				
1	Commercial/Industrial Fossil Fuel Retrofit Initiative	100	-200	-13 to -19
2	Compact Residential Appliances Initiative	80	-550	-43 to -61
3	Energy Efficiency Targeting Initiative (Industrial)	40	-180	-32 to -46
4	Combined Heat & Power (CHP) Initiative (Industrial)	35	-70	-51 to -72
5	Electric Energy Efficiency Retrofit in Non-Residential Buildings and Facilities	30	-200	-51 to -72
6	Efficient Residential Fossil Fuel Heating Initiative	25	10	-13 to -19
7	Tax Credits For Energy Efficiency	15	-150	-32 to -46
8	Combined Heat & Power (CHP) Initiative (Non-Industrial)	15	-90	-51 to -72
9	Efficient Residential Electric Cooling Initiative	10	0	-51 to -72
10	Retrofit Program For Electrically Heated Residences	9	-7	-51 to -72
11	Retrofit Initiative For Fossil Heated Residences	6	-7	-13 to -19
12	Electric Equipment Retrofit Program (Small Commercial & Industrial)	5	-150	-36 to -51
13	Public Facilities Efficiency Initiative	5	-160	-25 to -36
14	Efficient Residential Lighting and Appliances Programs	5	-226	-51 to -72
15	Efficient Non-Residential Construction	5	-200	-36 to -51
16	Energy Star Home Construction Program	1	0	-27 to -38
17	Use of Lower Carbon Fossil Fuels	TBD <sup>4</sup>	TBD	TBD
<b>Transportation</b>				
18	Local Fuel Economy Improvements (Feebate) Initiative	125	-300	-22 to -32
19	Transit Oriented Development And Enhancing Transit Options And Operations Initiative <sup>5</sup>	19	-500	-22 to -32
20	Bicycle and Pedestrian Infrastructures Initiative	19	-500	-22 to -32
21	Commuting Efficiency Program	19	-500	-22 to -32
22	Commuting Trip Reduction Initiative	18	-500	-22 to -32
23	Government Owned And Private Fleet-Vehicle Efficiency	<2.5	-300	-22 to -32
<b>Land Use</b>				
24	Urban/Suburban Forestry Program	<120	~0	NSB <sup>6</sup>
25	Open Space Protection Program	60	~0	NSB
<b>Energy Supply</b>				
26	Renewable Portfolio Standards	140	46 & 230 <sup>7</sup>	-30 to -75
<b>Solid Waste</b>				
27	Resource Management (RM) Contracting Initiative	70	<0	TBD
28	Pay-As-You-Throw (PAYT) Initiative	55	<0	TBD
29	State Facilities Renewable Purchase Requirement	0.4	250	-30 to -75

<sup>1</sup> Estimates of thousands of metric tons in 2020<sup>2</sup> CSC is cost of saved carbon, which is net costs (costs minus savings) per metric ton carbon equivalent reduced by the option.<sup>3</sup> Net co-benefits (a savings, thus negative) per metric ton of carbon equivalent reduced by the option.<sup>4</sup> This item is TBD because this is a new option that Tellus and the Stakeholders have not analyzed.<sup>5</sup> The carbon savings and CSC are based on the TOD option in the Scoping Paper, which does not include additional savings and costs associated with transit enhancements.<sup>6</sup> NSB is Net Social Benefit, may include economic benefits or costs, but not readily quantifiable<sup>7</sup> These numbers represent upper bounds from a national and Massachusetts study respectively. See Appendix G.

**Table 3c: Lower Priority Consensus In-State Options**

#	Name	Saved Carbon	CSC	Co-Benefits
<b>Buildings and Facilities</b>				
30	Compact Floorspace Initiative	5	-400	-17 to -24
31	Switching From Electricity To Fossil Fuel Heating	1	170	-40 to -50
32	Solar Photovoltaic (PV) Buydown Program	1	1200	-13 to -19
33	Active Solar Hot Water Heating Initiative	1	1100	-20 to -30
34	Non-Residential Natural Gas Air Conditioning Initiative	<1	300	-40 to -50
<b>Transportation</b>				
35	Fleet Fuel GHG Content Mandate	40	100	-22 to -32
<b>Land Use</b>				
36	Conversion of Marginal Cropland to Forest Initiative	40	25	NSB
37	Conversion of Marginal Cropland to Wetlands Initiative	<1.5	25	NSB
38	Low Input Agriculture and Improved Cropping Systems Initiative	0.4	2-6	NSB
39	Forest Management Initiative	NRA	0-40	NEB <sup>8</sup>
<b>Energy Supply</b>				
40	Promote New Renewable Electricity Supply Using System Benefit Charge Funds	8	250	-30 to -75
41	Promote Green Power Purchases Using System Benefit Charge Funds	13	300	-30 to -75
42	Incentive Package Initiative			
	• Production tax credit	2	417	-30 to -75
	• Investment tax credit	2	417	-30 to -75
	• Net metering	0.2	294	-30 to -75
	• Backup rates	TBD	TBD	TBD
43	Direct Government Investments Or Expenditures in Renewable Energy	0.5	200	-30 to -75
<b>Solid Waste</b>				
44	Deposit Bottle System ("Bottle Bill")	19	>0	TBD

<sup>8</sup> NEB is Net Economic Benefit, but not readily quantifiable

**Table 3d: Non-Consensus In-State Options**

#	Name	Saved Carbon	CSC	Co-Benefits
<b>Buildings and Facilities</b>				
45	Upgrade New Residential Construction Building Code	20	-20	-32 to -47
46	Upgrade New Commercial Construction Building Code	40	-300	-32 to -47
<b>Transportation and Land Use</b>				
47	Increase The Gasoline Tax	38	0	-22 to -32

**Table 3e: Consensus Regional/National Options (Higher Priority)**

#	Name	Saved Carbon	CSC	Co-Benefits
<b>Buildings and Facilities</b>				
48	Upgrade And Extend Appliance Efficiency Standards	100	-50	-51 to -72
<b>Transportation</b>				
49	National Fuel Efficiency Standards For Cars And Light Trucks (CAFÉ)	250	-300	-22 to -32
<b>Energy Supply</b>				
50	Carbon (And Multi-Pollutant) Cap And Permit Trade System For The Power Sector	140	46, and 230 <sup>9</sup>	-30 to -75

**Table 3f: Consensus Priority Study Options**

#	Name	Saved Carbon	CSC	Co-Benefits
51	Vehicle Miles Traveled (VMT)-Based Insurance Premium Structures	110	<0	-22 to -32
52	Transportation Infrastructure Planning <ul style="list-style-type: none"> <li>• Commuter rail/light rail and its potential electrification</li> <li>• Advanced bus rapid transit</li> <li>• Barging</li> <li>• Carbon impacts of shifting transportation resources from new lane miles to preserving, enhancing and better integrating the State's transportation infrastructure</li> </ul>	TBD	TBD	TBD

<sup>9</sup> The saved carbon target of the Carbon Cap and Trade program is the same as the saved carbon from RPS by design, and the cost of implementation is assumed to track the RPS cost by design.

## Higher Priority Consensus In-State Options

### Buildings and Facilities

#### *1. Commercial/Industrial Fossil Fuel Retrofit Initiative*

This new program would target facilities heated with natural gas or oil in order to conserve fossil fuel. New sources of funding such as a gas/oil system benefit charge and/or Energy Office resources would be needed and could be used to support this program, which could be structured like Narragansett Electric Company's SBC-funded current "Energy Initiative" program for facilities heated with electricity. The program would provide education, program marketing and/or contractor training as well as financial incentives.

#### *2. Compact Residential Appliances Initiative*

This initiative would provide outreach and education to encourage households to select the smallest appropriate appliances for their service needs thereby reducing energy use and costs.

#### *3. Energy Efficiency Targeting Initiative (Industrial)*

This initiative would assist industries to set energy efficiency targets for production areas and processes using computerized monitoring and targeting systems.

#### *4. Combined Heat & Power (CHP) Initiative (Industrial)*

This initiative would promote the use of CHP in industry with technical studies, program marketing and financial incentives. Possible CHP technologies include combustion turbine (CT) type systems and internal combustion engines (ICEs), likely fueled by natural gas.

The Stakeholder Group unanimously agrees that this should be a higher priority option, and though some members felt that rate structure issues were not an impediment to expanded appropriate use of Combined Heat & Power, the Group noted that back-up rates will be reviewed by the Public Utility Commission in 2004 with an order to follow in 2005.

#### *5. Electric Energy Efficiency Retrofit in Non-Residential Buildings and Facilities*

Continue Narragansett Electric Company's SBC-funded program to promote installation of measures to save electricity in non-residential buildings and facilities through rebates, financing options and technical assistance for qualifying lighting, heating, air conditioning, electric motors and motor drive, and other measures.

#### *6. Efficient Residential Fossil Fuel Heating Initiative*

This new program would promote installation of the highest efficiency natural gas and oil heating equipment instead of the standard efficiency equipment that is usually installed in new and replacement applications in the State. New sources of funding such as a gas/oil system benefit charge and/or Energy Office resources would be needed and would be used to support education, program marketing and/or contractor training as well as financial incentives.

### *7. Tax Credits For Energy Efficiency*

This initiative would reinstate and expand energy efficiency tax credits to promote energy efficiency in the commercial and residential sectors. If the tax credits were extensive enough to encourage substantial energy efficiency investment, the state could slightly increase other relevant taxes to offset the revenue lost from the credits.

### *8. Combined Heat & Power (CHP) Initiative (Non-Industrial)*

This initiative would promote the use of CHP in non-industrial buildings and facilities through technical studies, program marketing and financial incentives. Potential CHP technologies include micro-turbines, fuel cells, combustion turbine (CT) type systems and internal combustion engines (ICEs) likely fueled by natural gas. Multi-building campuses are especially promising sites for CHP.

The Stakeholder Group unanimously agrees that this should be a higher priority option, and though some members felt that rate structure issues were not an impediment to expanded appropriate use of Combined Heat & Power, the Group noted that back-up rates will be reviewed by the Public Utility Commission in 2004 with an order to follow in 2005.

### *9. Efficient Residential Electric Cooling Initiative*

This new program would provide incentives for efficient home electric cooling, including promoting the purchase of high- efficiency units, improved installation and proper equipment sizing. The program would use SBC or other public benefit funds for education, program marketing and/or contractor training, as well as financial incentives. This option is currently being designed and implemented by Narragansett Electric with SBC funds.

### *10. Retrofit Program For Electrically Heated Residences*

Continue Narragansett Electric Company's "Energy Wise" program, which provides energy-use audits and surveys and financial assistance for installing weatherization measures in existing homes, thereby saving electricity.

### *11. Retrofit Initiative For Fossil Heated Residences*

This new program would be targeted to homes heated with natural gas or oil. The program would deliver such services as energy audits, information, and financial incentives for cost-effective measures that reduce fuel consumption. It could be structured like Narragansett Electric's "Energy Wise" program, which provides funding for education, program marketing and/or contractor training as well as financial incentives.

### *12. Electric Equipment Retrofit Program (Small Commercial & Industrial)*

Continue Narragansett Electric Company's SBC-funded retrofit assistance program to increase energy efficiency in small commercial & industrial buildings by providing information, interest-free financing and rebates for qualifying equipment.

### *13. Public Facilities Efficiency Initiative*

This option would expand programs to increase energy efficiency in state and local public facilities through such measures as comprehensive retrofitting, best technology in all new construction, maximum use of day lighting and lighting controls, and using lower carbon fossil fuels for space heat. It could entail legislative or regulatory changes governing leasing and financing by such facilities, new resources via expanded energy-related revolving loan funds, and mandated standards.

### *14. Efficient Residential Lighting and Appliances Programs*

Continue two programs at Narragansett Electric Company to promote (1) efficient lighting and (2) energy-efficient washing machines and other equipment in U.S. EPA's "Energy Star Appliances" programs. These systems benefits charge (SBC) funded programs offer information and rebates toward the purchase of the appliances. These programs are currently part of a regional effort spearheaded by the Northeast Energy Efficiency Project (NEEP).

### *15. Efficient Non-Residential Construction*

Continue Narragansett Electric Company's SBC-funded program to promote installation of energy-efficiency measures, primarily for electricity savings, in new non-residential buildings and those undergoing renovation, by combining information, technical assistance, and rebates for qualifying measures affecting building shells, HVAC systems, lighting and equipment.

### *16. Energy Star Home Construction Program*

Continue and intensify marketing of the US EPA's Energy Star Homes program, sponsored in Rhode Island by Narragansett Electric Company and Pascoag Fire District using SBC funds. The program promotes energy efficiency in new house construction (aiming for 30% greater efficiency than in Rhode Island's current Model Energy Code (MEC) by combining a house efficiency rating system with rebates for reaching a target rating.

### *17. Use of Lower Carbon Fossil Fuels*

This initiative replaced an option titled Switching from Oil to Natural Gas, but the Stakeholder Group was strongly divided about the advisability of this switching from oil to natural gas due to a lack of clarity regarding the relative GHG impacts of oil and gas heat. The Group agreed that we should encourage use of lower carbon fossil fuels (where fossil fuels are in use) when such fuels are available and cost effective, and that Rhode Island should continue to look for those opportunities. So this new option was created and the Group agreed that it should be a higher priority.

## ***Transportation***

### *18. Local Fuel Economy Improvements (Feebate) Initiative*

This initiative would create a fee and rebate ("feebate") incentive system (through a refinement of taxes paid in automobile purchases) for the purchase of new cars and light trucks. Rhode Island residents purchasing low efficiency vehicles would pay a higher fee and those purchasing high efficiency vehicles would get a rebate. This could be designed to be revenue neutral, thus keeping

the overall revenues the same as before. The feebate would need to be adjusted annually to ensure stability of revenues, and updated periodically to (1) monitor impacts and adjust the incentive system to meet or change the goals, (2) take account of technology changes, and (3) take account of national or regional initiatives.

#### *19. Transit Oriented Development And Enhancing Transit Options And Operations Initiative*

This initiative would combine efforts underway in Rhode Island to integrate land-use zoning and transit planning to reduce automobile trips i.e., maximize walkability, easy access to transit, smart growth, etc. It would also include improved bus routing and services, better integration with community settlement patterns and other transportation modes, and long term incentives and land use approaches to guide growth along rail transit routes. The Stakeholder Group acknowledges the relationship of transit oriented development and increased non-automobile transit opportunities, and recommended studying the creation of more aggressive implementation programs to relieve dependence on the automobile and provide greater public transit ridership.

#### *20. Bicycle and Pedestrian Infrastructures Initiative*

This initiative would build on the State's Greenspace and Greenways Element of the State Guide Plan, the existing bikeways and other efforts throughout the State to: create more bicycle lanes and paths, eliminate hazards to cyclists and pedestrians, improve street network connectivity, as well as establish pedestrian malls and walkways, through grant programs, incentive systems, zoning and regulations.

#### *21. Commuting Efficiency Program*

This program would build upon existing incentive programs in the State such as car and van pools, preferred parking, and park-and-ride lots. It would provide fare reductions (subsidies/vouchers) for transit use in commuting and Ride-Home programs for commuters who use alternative modes.

#### *22. Commuting Trip Reduction Initiative*

This initiative, one of several energy and transportation options included in the State Guide Plan, would reduce vehicle use by providing incentives for flex time, telecommuting, telecommunications and internet commerce.

#### *23. Government Owned And Private Fleet-Vehicle Efficiency Initiative*

This initiative would build on Rhode Island's current state alternative vehicle fuel program to create additional programs to optimize efficiency of vehicle use, to encourage government and industry to purchase more energy efficient vehicles and/or promote alternate fuel use. Note: the numbers in the tables and figures in this document regarding this option include only the impacts from government fleets, but the Stakeholder Group agreed that these standards should also be applied to private fleets.

***Land Use******24. Urban/Suburban Forestry Program***

This program would expand programs of the Rhode Island Department of Environmental Management, the Rhode Island Tree Council and the Statewide Planning Program to expand tree cover and thus achieve energy savings as well as other environmental and aesthetic benefits.

***25. Open Space Protection Program***

This program would expand Rhode Island's efforts to acquire and preserve open space, reduce sprawl and encourage use of existing infrastructure. The Stakeholder Group clarifies that the saved carbon estimate for this option assumes the continuation of existing open space protection programs or comparable efforts through 2020.

***Energy Supply******26. Renewable Portfolio Standards***

This initiative would establish a system requiring that a minimum percentage of retail electricity sold to Rhode Island consumers come from qualifying renewable resources. Important design features include the eligible types (e.g., wind, biomass, solar, hydroelectric, or ocean), vintages and geographic location of qualifying renewable generation, and how the percentage requirement changes over time (e.g., progressively increasing). The Stakeholder Group agrees that the RPS is an important option for consideration. The Group further agrees that the potential rate impacts of the RPS need to be looked at and modeled for Rhode Island prior to final endorsement. With this clarifying note, all the members of the Stakeholder Group felt that this should be a higher priority except for Narragansett Electric, who felt it should be a lower priority.

***Solid Waste******27. Resource Management (RM) Contracting Initiative***

This initiative would provide support for contractual arrangements between haulers and non-residential waste generators that cap compensation for garbage hauling and disposal and provide profit-sharing to contractors for waste minimization.

***28. Pay-As-You-Throw (PAYT) Initiative***

This initiative would not require state law or regulation. Instead, it would provide education and incentives to communities to adopt Pay-As-You-Throw, that would in turn require households to pay for waste disposal based on the amount they generate through a fee either for each bag or can of waste or based on the weight of their trash, thereby providing an incentive for households to generate less waste. It would expand beyond the existing PAYT programs in five Rhode Island communities, to widespread implementation by municipalities throughout the State, and would recover recycling costs as part of the fee for disposal.



### *29. State Facilities Renewable Purchase Requirement*

This option would require state agencies and facilities to buy minimum portions of their electricity from renewable resources, by setting deadlines for reaching specific target for renewables as a percentage of total electricity consumption.

## **Lower Priority Consensus In-State Options**

### *Buildings and Facilities*

#### *30. Compact Floorspace Initiative*

This voluntary initiative would encourage households and businesses to reduce floorspace per-resident or per-employee to reduce energy use and costs. The outreach and education program would explain the tradeoffs involved in reducing floorspace.

The Stakeholder Group agreed that this is a lower priority option in spite of its very low projected cost of saved carbon because many in the Group questioned the political viability of promoting smaller living units.

#### *31. Switching From Electricity To Fossil Fuel Heating*

This new initiative would promote the switching from electric space heating to natural gas and oil heating when cost-effective and would result in reduced overall carbon emissions.

#### *32. Solar Photovoltaic (PV) Buydown Program*

This involves renewal of the PV/small wind program funded by the SBC, for installation of rooftop solar Photovoltaic (PV) systems in buildings and facilities which currently subsidizes the cost by \$3 per watt of installed PV capacity.

#### *33. Active Solar Hot Water Heating Initiative*

This initiative would create a program to provide funding for education, program marketing and/or contractor training, as well as financial incentives for installation of systems that collect and store thermal energy from the sun to heat water for residential and small commercial use.

#### *34. Non-Residential Natural Gas Air Conditioning Initiative*

This natural gas air conditioning initiative would focus on commercial, industrial, and institutional applications with favorable economics such as combined replacement of electric cooling and water heating. It could be promoted through New England Gas Co.'s DSM program. The program would provide funding for education, program marketing and/or contractor training, as well as financial incentives.

***Transportation******35. Fleet Fuel GHG Content Mandate***

This initiative would study policies to establish a minimum requirement (perhaps progressively stronger over time) to reduce the life-cycle GHG content of vehicle fuels sold in the State. The requirement is not-fuel-specific or prescriptive, but could be met in a number of ways such as blends (e.g., cellulosic ethanol) and/or alternative fueled vehicles (e.g., natural gas, biodiesel), thereby reducing oil consumption and GHG emissions. Among the questions that would require resolution are supply availability, the other environmental (e.g., land and water) impacts of the alternatives versus gasoline, and the level of the requirement and availability and cost of the options to meet it.

***Land Use******36. Conversion of Marginal Cropland to Forest Initiative***

This initiative, which is a priority of the Rhode Island Land Acquisition Program, would adapt the types of approaches taken by the US Soil Bank and Conservation Reserve Program (CRP) to provide incentives to farmers to convert under-utilized or low value cropland to forested land. Incentives could include compensation, cost-sharing, and tax treatment.

***37. Conversion of Marginal Cropland to Wetlands Initiative***

This initiative, which is a priority of the Rhode Island Land Acquisition Program, would adapt the types of approaches taken by the US Soil Bank and Conservation Reserve Program (CRP) to provide incentives to farmers to convert under-utilized or low value cropland to wetlands (new or restored). Incentives could include compensation, cost-sharing, and tax treatment. While this would have important local ecological benefits, its net GHG impacts are uncertain and need further study, owing to the potential releases of methane.

***38. Low Input Agriculture and Improved Cropping Systems Initiative***

This initiative would support such practices as conservation tillage or low-tillage farming, integrated pest management, organic farming, and increased use of cover crops, which would increase carbon retention and decrease GHG releases (e.g., N<sub>2</sub>O) from reduced fertilizer use and CO<sub>2</sub> from decreased diesel use while providing soil and water benefits.

***39. Forest Management Initiative***

This initiative would build upon ongoing Rhode Island Best Management Practice programs. It would expand legislative frameworks to increase biomass in existing forests, require prompter revegetation of cut areas and restrict harvesting in streamside areas, and establish new forests and plantings.

## ***Energy Supply***

### ***40. Promote New Renewable Electricity Supply Using System Benefit Charge Funds***

This would continue the existing or emerging renewable energy programs supported by the SBC beyond the current 2012 sunset date. New renewable capacity anywhere in New England would be eligible as long as it supplies Rhode Island customers.

### ***41. Promote Green Power Purchases Using System Benefit Charge Funds***

This would also continue the programs supported by the SBC beyond the 2012 sunset date to provide subsidies to Rhode Island customers who buy green power or their suppliers. Green power is generated from renewable energy sources, such as wind and solar power, geothermal, and a limited set of hydropower and biomass resources

### ***42. Incentive Package Initiative***

- production tax credit
- investment tax credit
- net metering
- back-up rates

This initiative would build upon existing Rhode Island programs to provide a package of incentives that complement the RPS and SBC, including tax credits and net metering, to promote use of renewable technologies. A production tax credit is typically applied to the early years of operation of qualifying renewable electric generators, while the investment credit is designed to reduce the costs for the purchase, installation, or manufacture of renewable energy systems, equipment, and facilities. Tax credits can apply to income, corporate, property, and sales taxes.

Net metering allows Rhode Island retail customers to use on-site electricity generation from renewable resources and fuel cells up to 25 kW to effectively run the meter backwards, reducing the usage on which their retail electric bill is calculated. Net metering eligibility could be expanded beyond the current 25 kW limit; and the current 1 MW limit on aggregate enrollment could be raised or eliminated. Supporting electric rate provisions (e.g., tariffs for back-up electric service) could also be changed to address barriers/changes in wholesale, distribution or retail electricity market rules.

The Stakeholder Group recommended implementation of the Incentive Package to provide an important infrastructure for renewable energy and distributed generation even though the measures themselves don't provide substantial GHG savings. Any backup rate or net metering proposals should evaluate and appropriately address potential adverse rate impacts and lost revenue to the utility.

### ***43. Direct Government Investments Or Expenditures in Renewable Energy***

The State or its municipalities could pay directly to promote renewable projects ranging from investment in renewable facilities in Rhode Island (customer-sited or bulk) or using low-cost financing to the purchase of renewable energy credits or CO<sub>2</sub> emission reduction credits.

***Solid Waste******44. Deposit Bottle System ("Bottle Bill")***

A Bottle Bill would require a deposit at the time of purchase for certain bottles which is refunded upon return. The Stakeholder Group agreed to put the bottle bill in the low priority bin, assuming Pay-As-You-Throw is aggressively implemented. If not, the Group recommended restudying this option for potentially moving it up in priority.

**Non-Consensus In-State Options*****Buildings and Facilities******45. Upgrade New Residential Construction Building Code******46. Upgrade New Commercial Construction Building Code***

The residential code change would consist of promulgating and applying higher energy-efficiency standards than are reflected in current state building codes (the 1995 Model Energy Code), as the amount of energy consumed in new or substantially renovated buildings is strongly affected by building codes. This would be complemented by funding for some mix of education, training for contractors and inspectors, and possible financial incentives. The commercial code change would consist of promulgating and applying higher energy-efficiency standards than are reflected in current state building codes (the ASHRAE 90.1 Standard). This would be complemented by funding for education, training for contractors and inspectors, and possible financial incentives.

The following nine parties feel that these two options should be given higher priority: the Conservation Law Foundation, Brown University, Rhode Island DEM, the Sierra Club, RI PIRG, Sustainability, NECo, RIPTA, and TEC-RI. The following four parties feel that the two options should be given lower priority: RI DPUC, Business Roundtable, the Building Commission, and the Economic Development Corporation. The following four parties feel that it is premature to bin the two options until further study: the RI Petroleum Institute, the Oil Heat Institute, the New England Gas Company, and the Rhode Island Builders Association.

***Transportation and Land Use******47. Increase The Gasoline Tax***

A policy to increase the gasoline tax by \$0.50 per gallon would provide an incentive to purchase more fuel-efficient vehicles and to encourage more efficient travel choices. It could be explicitly tax-revenue neutral, thus not increasing overall household taxes, via complementary income-tax reductions, or it could be implicitly tax-revenue neutral by providing the funding for the rebate portion of the feebate system. The Stakeholder Group was unable to reach consensus due to significant disagreement about the wisdom and feasibility of a gasoline tax and its relative priority. The group discussed several options, including putting it in the higher priority category with clearly expressed uncertainty or the lower priority category because of the political and social barriers. The Group did agree on a need for more research, analysis and discussion to assess this option, including elasticities, neighboring state effects, the advisability of state vs. federal taxes and equity issues.

## **Regional/National Consensus Options**

### ***Buildings and Facilities***

#### ***48. Upgrade And Extend Appliance Efficiency Standards***

This initiative would support the “Northeast Equipment Standards Project” organized by the Northeast Energy Efficiency Partnership (NEEP) for states to propose or adopt energy efficiency standards for fifteen types of equipment, which would exceed existing federal efficiency standards or apply to equipment not subject to federal efficiency standards. This would be complemented by funding for training for contractors and inspectors, and possible financial incentives.

The Stakeholder Group agrees to categorize this initiative as “higher priority” but to emphasize that a focus on regional and federal standards would be a more effective strategy than RI- only implementation, which the Group believes is probably impractical.

### ***Transportation***

#### ***49. National Fuel Efficiency Standards For Cars And Light Trucks (CAFÉ)***

With this initiative, Rhode Island’s local and state governments, coordinating with other New England State governments, would encourage the US Congress to enact new national corporate average fuel efficiency (CAFÉ) standards for automobiles, raising the standards for cars and including light trucks (e.g., SUVs) in the same category. This would involve progressive increases in mpg in each year’s fleet of new sales, to double the average mpg by 2020 to about 50 mpg. If this were achieved it could reduce the level, influence the design, or obviate the need for Rhode Island-specific fuel-efficiency incentives or standards.

The Stakeholder Group agreed that the bigger the region covered by CAFÉ standards the better, and that the Group’s clear preference is to focus Rhode Island’s efforts on supporting the establishment of a more efficient national standard. If establishment of a more efficient national standard isn’t immediately forthcoming, however, the Group agreed that RI should look at the viability of a regional standard, but that a Rhode Island only standard does not really make sense.

### ***Energy Supply***

#### ***50. Carbon (And Multi-Pollutant) Cap And Permit Trade System For The Power Sector***

These options would be implemented to reduce GHG emissions either directly through a carbon cap and trade system, or indirectly through reductions in other pollutants (SO<sub>2</sub> and NO<sub>x</sub>), or both. They are best pursued at the national or regional level, but could be applied at the state level in lieu of (or as a complement to national or regional system). Currently, various multi-pollutant national approaches have been studied and proposed in Congress, and some states have taken this path.

## Consensus Priority Study Options

### *51. Vehicle Miles Traveled (VMT)-Based Insurance Premium Structures*

Explore the impacts and design of a Pay-As-You-Drive Insurance system in the State, which would base all or some portion of annual insurance premiums on vehicle miles traveled (VMT), providing incentive to make more efficient travel decisions and thus reduce VMT's, energy use and emissions of GHGs and pollutants. Some have suggested a Pay-At-The-Pump premium tied to gasoline purchases, but a more direct way to address VMT (rather than VMT and fuel efficiency together) would be odometer-based fee (e.g., at the time of annual registration).

The Stakeholder Group acknowledges that the idea of VMT-based insurance is potentially promising, but the members felt that RI should not be the first to implement such a program. The Group agreed to recommend monitoring developments in this area and keep it open as a possibility. It also agreed that this program may be more effective regionally.

### *52. Transportation Infrastructure Planning*

Study the impact of various transportation infrastructure initiatives, including:

- commuter rail/light rail and its potential electrification
- advanced bus rapid transit
- barging
- carbon impacts of shifting transportation resources from new lane miles to preserving, enhancing and better integrating the State's transportation infrastructure

**Table 3g: Consensus In-State Options (ordered by saved carbon)**

#	Name	Saved Carbon	CSC	Co-Benefits
26	Renewable Portfolio Standards	140	46, and 230	-30 to -75
18	Local Fuel Economy Improvements (Feebate) Initiative	125	-300	-22 to -32
24	Urban/Suburban Forestry Program	<120	~0	NSB
1	Commercial/Industrial Fossil Fuel Retrofit Initiative	100	-200	-13 to -19
2	Compact Residential Appliances Initiative	80	-550	-43 to -61
27	Resource Management (RM) Contracting Initiative	70	<0	TBD
25	Open Space Protection Program	60	~0	NSB
28	Pay-As-You-Throw (PAYT) Initiative	55	<0	TBD
35	Fleet Fuel GHG Content Mandate	40	100	-22 to -32
36	Conversion of Marginal Cropland to Forest Initiative	40	25	NSB
3	Energy Efficiency Targeting Initiative (Industrial)	40	-180	-32 to -46
4	Combined Heat & Power (CHP) Initiative (Industrial)	35	-70	-51 to -72
5	Electric Energy Efficiency Retrofit in Non-Residential Buildings and Facilities	30	-200	-51 to -72
6	Efficient Residential Fossil Fuel Heating Initiative	25	10	-13 to -19
19	Transit Oriented Development/Enhancing Transit Options & Operations Initiative	19	-500	-22 to -32
44	Deposit Bottle System ("Bottle Bill")	19	>0	TBD
20	Bicycle and Pedestrian Infrastructures Initiative	19	-500	-22 to -32
21	Commuting Efficiency Program	19	-500	-22 to -32
22	Commuting Trip Reduction Initiative	18	-500	-22 to -32
7	Tax Credits For Energy Efficiency	15	-150	-32 to -46
8	Combined Heat & Power (CHP) Initiative (Non-Industrial)	15	-90	-51 to -72
41	Promote Green Power Purchases Using System Benefit Charge Funds	13	300	-30 to -75
9	Efficient Residential Electric Cooling Initiative	10	0	-51 to -72
10	Retrofit Program For Electrically Heated Residences	9	-7	-51 to -72
40	Promote New Renewable Electricity Supply Using System Benefit Charge	8	250	-30 to -75
11	Retrofit Initiative For Fossil Heated Residences	6	-7	-13 to -19
30	Compact Floorspace Initiative	5	-400	-17 to -24
12	Electric Equipment Retrofit Program (Small Commercial & Industrial)	5	-150	-36 to -51
13	Public Facilities Efficiency Initiative	5	-160	-25 to -36

**Table 3g: Consensus In-State Options (continued)**

#	Name	Saved Carbon	CSC	Co-Benefits
14	Efficient Residential Lighting and Appliances Programs	5	-226	-51 to -72
15	Efficient Non-Residential Construction	5	-200	-36 to -51
23	Government Owned And Private Fleet-Vehicle Efficiency Initiative	<2.5	-300	-22 to -32
42	Incentive Package Initiative			
	• Production tax credit	2	417	-30 to -75
	• Investment tax credit	2	417	-30 to -75
	• Net metering	0.2	294	-30 to -75
	• Backup rates	TBD	TBD	TBD
37	Conversion of Marginal Cropland to Wetlands Initiative	<1.5	25	NSB
16	Energy Star Home Construction Program	1	0	-27 to -38
31	Switching From Electricity To Fossil Fuel Heating	1	170	-40 to -50
32	Solar Photovoltaic (PV) Buydown Program	1	1200	-13 to -19
33	Active Solar Hot Water Heating Initiative	1	1100	-20 to -30
34	Non-Residential Natural Gas Air Conditioning Initiative	<1	300	-40 to -50
43	Direct Government Investments Or Expenditures in Renewable Energy	0.5	200	-30 to -75
38	Low Input Agriculture and Improved Cropping Systems Initiative	0.4	2-6	NSB
29	State Facilities Renewable Purchase Requirement	0.4	250	-30 to -75
39	Forest Management Initiative	NRA	0-40	NEB
17	Use of Lower Carbon Fossil Fuels	TBD	TBD	TBD



**Table 3h: Non-Consensus State Options  
(ordered by saved carbon)**

#	Name	Saved Carbon	CSC	Co-Benefits
46	Upgrade New Commercial Construction Building Code	40	-300	-32 to -47
47	Increase The Gasoline Tax	38	0	-22 to -32
45	Upgrade New Residential Construction Building Code	20	-20	-32 to -47

**Table 3i: Consensus Regional/National Options  
(ordered by saved carbon)**

#	Name	Saved Carbon	CSC	Co-Benefits
49	Nat'l Fuel Efficiency Standards for Cars/Light Trucks (CAFÉ)	250	-300	-22 to -32
50	Carbon (and Multi-Pollutant) Cap & Permit Trade System For The Power Sector	140	46, and 230 <sup>10</sup>	-30 to -75
48	Upgrade and Extend Appliance Efficiency Standards	100	-50	-51 to -72

**Table 3j: Consensus Priority Study Options**

#	Name	Saved Carbon	CSC	Co-Benefits
51	Vehicle Miles Traveled (VMT)-Based Insurance Premium Structures	110	<0	-22 to -32
52	Transportation Infrastructure Planning <ul style="list-style-type: none"> <li>• Commuter rail/light rail and its potential electrification</li> <li>• Advanced bus rapid transit</li> <li>• Barging</li> <li>• Carbon impacts of shifting transportation resources from new lane miles to preserving, enhancing and better integrating the State's transportation infrastructure</li> </ul>	TBD	TBD	TBD

<sup>10</sup> The saved carbon target of the Carbon Cap and Trade program is the same as the saved carbon from RPS by design, and the cost of implementation is assumed to track the RPS cost by design.

## **Options to Research and Monitor For Possible Future Plan Inclusion**

The Stakeholder Group agreed the Rhode Island needs to research and monitor several options for possible future implementation:

### Energy Supply and Solid Waste

- Backyard Compost (education)
- Sludge Reduction Options (research/capital investment)
- Environmentally Preferable Procurement (EPP) Program (research)
- Performance-Based Ratemaking, including decoupling utility sales from profit to encourage energy efficiency and other public benefits
- Improving Power Factor and Reducing Line Losses

### Transportation/Land Use

- Improving the carbon efficiency of ground vehicles (air-side and land-side) at the airport
- Assess the current state of aircraft emissions and RI's role in influencing it (including best management practices)
- Taxing heavy duty vehicles
- Reducing emissions from small engines (off-road and utility engines, including lawnmowers, boats, snowmobiles, and snowblowers)
- Location efficient mortgages

### Buildings/Facilities and Transportation/Land Use

- Biodiesel fuels for both heating and transportation applications

## IV. Impact Analysis and Results

The In-State Consensus options are projected to almost meet the 2020 target of the Governors and Premiers. The In-State options as a whole (Consensus plus Non-Consensus) could meet the 2020 target. With national and regional options added the target could be exceeded. Moreover, the sharp downward trend approaching the year 2020 indicates that continuation of these options would have additional reductions in the following years.

The overall impacts of the three policy scenarios can be reflected in three broad categories – GHG reductions, economic costs and savings, and pollutant reduction co-benefits. Tables 4a through 4d show various GHG emission reduction scenarios. Tables 4e and 4f show the economic costs and benefits. And Tables 4g through 4j show the impacts of each policy on air pollutants.

For a description of the scenario modeling methods and the LEAP modeling software used to produce the graphs in this section, please see Appendices D and E respectively.

Figure 4a: Rhode Island GHG Emissions Scenarios Compared to Governors'/Premiers' Target

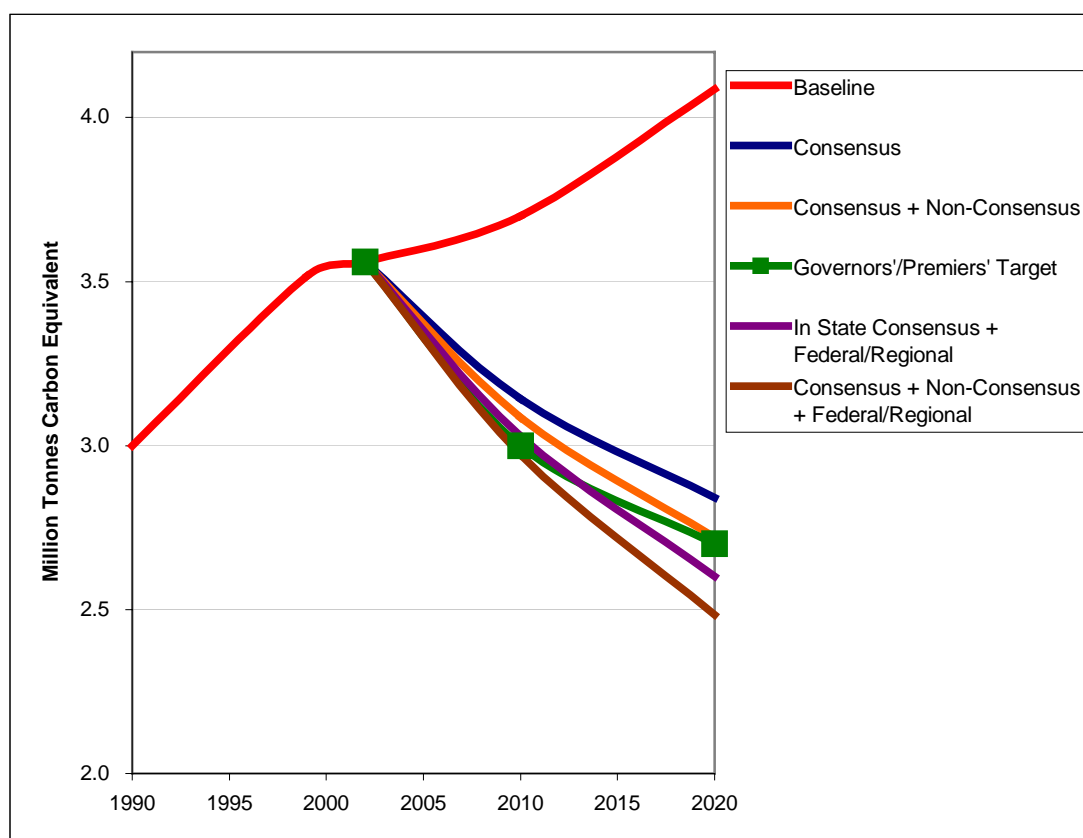


Figure 4a shows the GHG emissions trajectory of each of the four policy scenarios, along with the Baseline scenario and a path based on the targets for 2010 and 2020 adopted by the New England Governors/Canadian Premiers. These values combine emissions from all greenhouse gases from end-uses through supplies that are tracked in the LEAP system, including carbon dioxide and methane, based on the global warming potential (GWP) of each (in metric tons of carbon equivalent).

Table 4b shows the numerical values for these scenarios for two historic years, 1990 and 1999, and for three years spanning our policy scenario time-horizon, 2002, 2010 and 2020. Note that the reduction below the Baseline projection for the In-State Consensus plus Non-Consensus options reaches about 16 percent (3.1 versus 3.7 million metric tons) by 2010, and about 34 percent (2.7 versus 4.1 million metric tons) by 2020.

Table 4b.

GHG Emissions from Scenarios Million Metric Tons Carbon Equivalent					
	1990	1999	2002	2010	2020
Baseline	3.0	3.5	3.6	3.7	4.1
Consensus			3.6	3.1	2.8
Consensus + Non-Consensus			3.6	3.1	2.7
Governors'/Premieres' Target			3.6	3.0	2.7
In State Consensus + Federal/Regional			3.6	3.0	2.6
Consensus + Non-Consensus + Federal/Regional			3.6	3.0	2.5

Figure 4c shows the In-state Consensus plus Non-Consensus policy scenario broken out into the three groups of options studied in the scoping papers. It shows how that scenario is built up progressively from options in Buildings and Facilities, Transportation and Land-use and Energy and Solid Waste. Note that each group of options contributes substantially to the overall reductions.

Fig 4c. Contribution of Options to GHG Savings vs. Baseline Scenario: Consensus/Non-Consensus

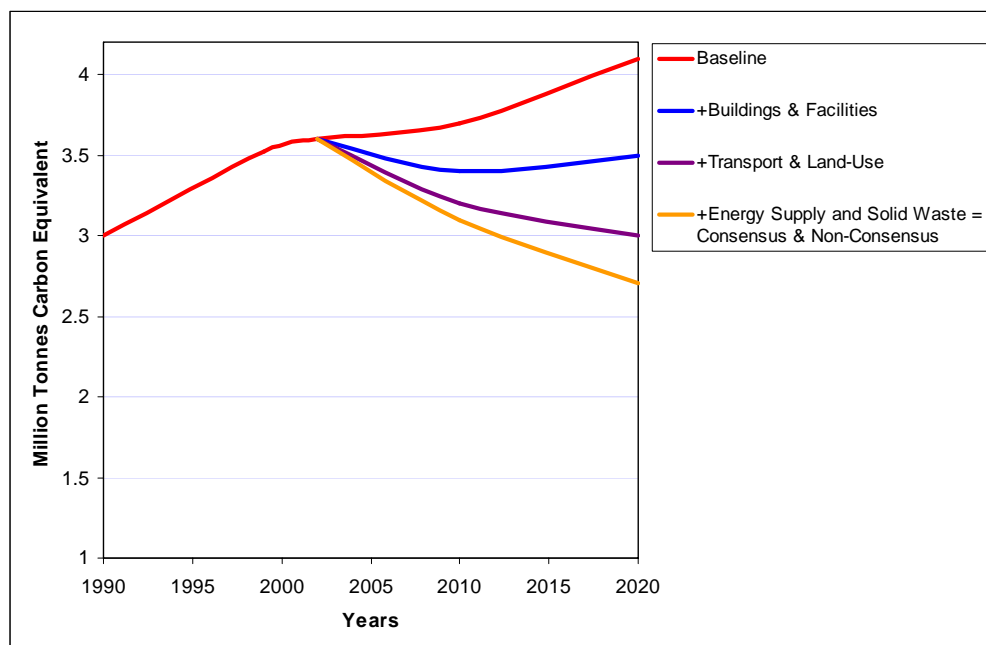


Figure 4d (see next page) shows the contribution of each individual measure to the total emission reductions in 2020 for the In-State Consensus plus Non-Consensus policy scenario. While these measure-specific impacts span a range of magnitudes, with the state RPS, vehicle efficiency, and industrial efficiency providing the largest reductions, no single measure dominates and all make important contributions.

Figure 4d: Contribution of Options to GHG Savings vs. Baseline in 2020 in Scenario: Consensus &amp; Non-Consensus

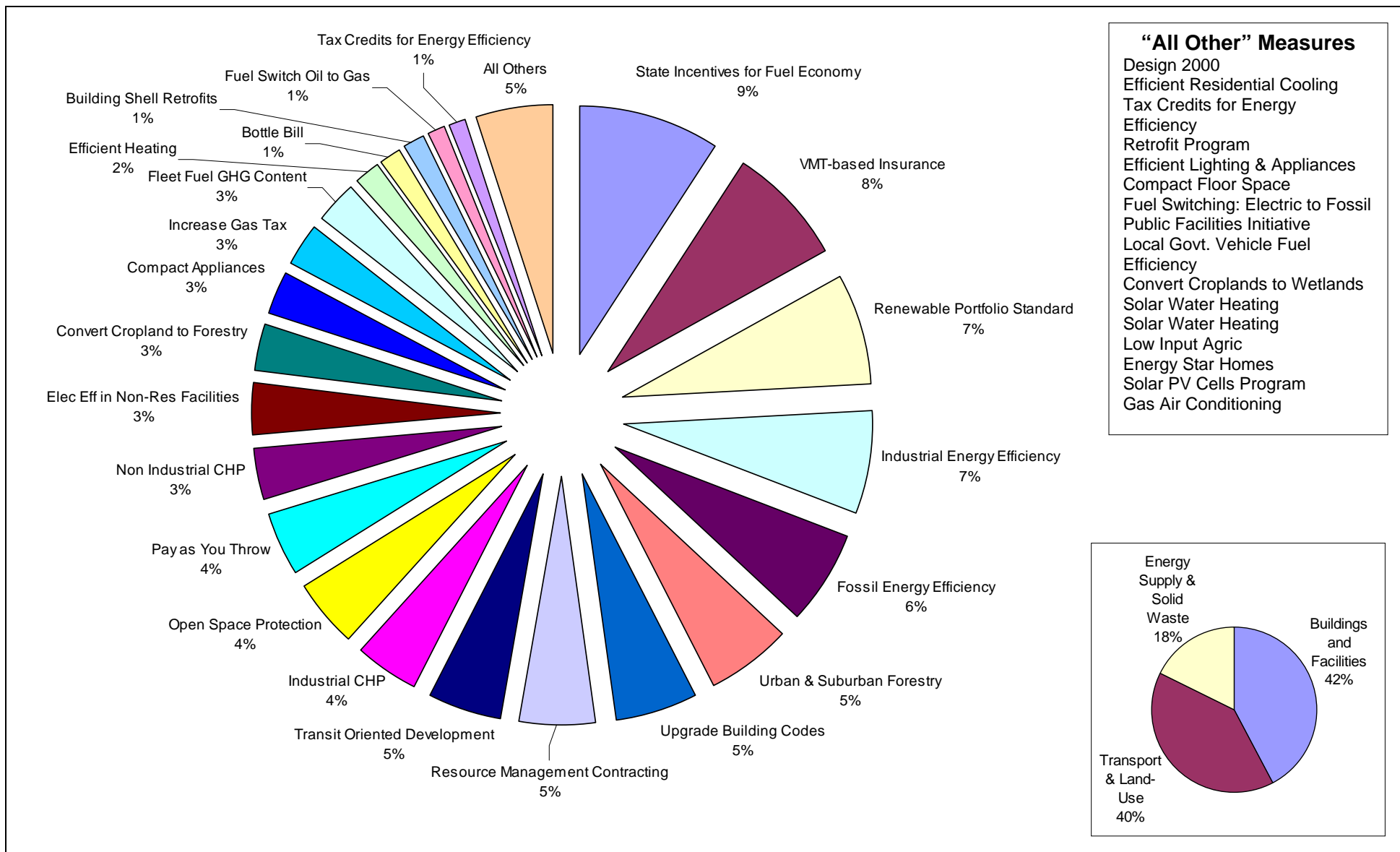


Figure 4e shows the cumulative GHG reductions and the cumulative discounted net economic benefits (i.e., savings minus costs) through 2020 of each scenario versus the Baseline. Note that costs are only assessed through 2020, not through each measure's entire lifetime. There will therefore be additional net savings (and GHG reductions) beyond 2020 for technologies installed before 2020 that are still functioning beyond 2020, which are not shown here. **Note also that the more aggressive scenarios actually yield more economic benefits;** this is because each of the scenarios have the many options with net savings along with the few (such as the RPS) with net costs, and the progression shown here adds sets of options with overall net savings.

Figure 4e: Scenario Net Economic Benefits and GHG Savings vs. Baseline

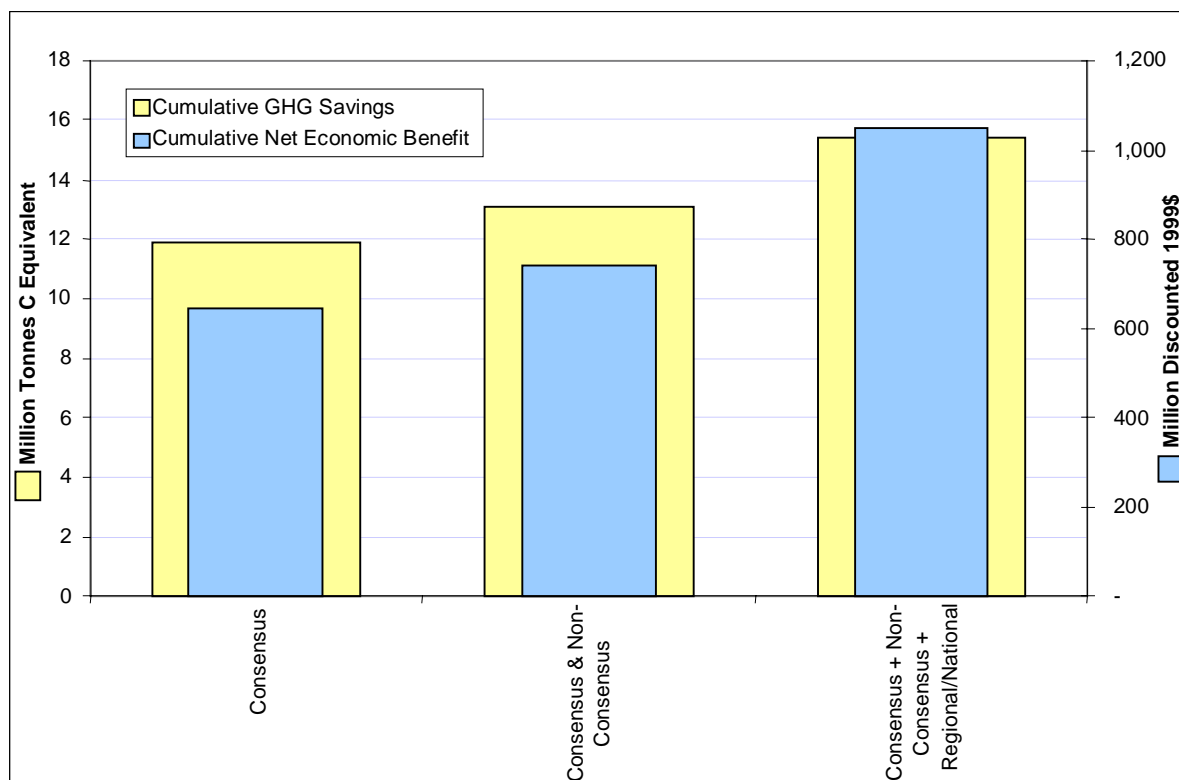


Figure 4f shows the net economic savings for each of the three policy scenarios in greater detail. **Costs** are the additional capital and O&M costs of purchasing and using more expensive energy efficient equipment. These result mainly from incremental investments in the transport sector and in buildings and facilities. Net capital and O&M costs for electric power generation are very small since the additional costs of purchasing and operating more expensive renewables are balanced by the benefits of the combined cycle natural gas power plants that are avoided because of the lower electricity demands owing to greater end-use efficiency in electricity using equipment. **Benefits** are (a) the avoided costs of fuel that no longer needs to be purchased in the scenario (compared to the fuel that would have been purchased in the Baseline scenario); (b) avoided environmental externality costs due to the lower level of non-greenhouse gas air pollutant emissions in the policy scenarios compared to the Baseline scenario. Externalities values are based on a review of externality values that have been adopted or proposed by State Public Utility Commissions in the U.S. for use in electric power planning.

Figure 4f. Costs and Benefits of Scenarios vs. Baseline

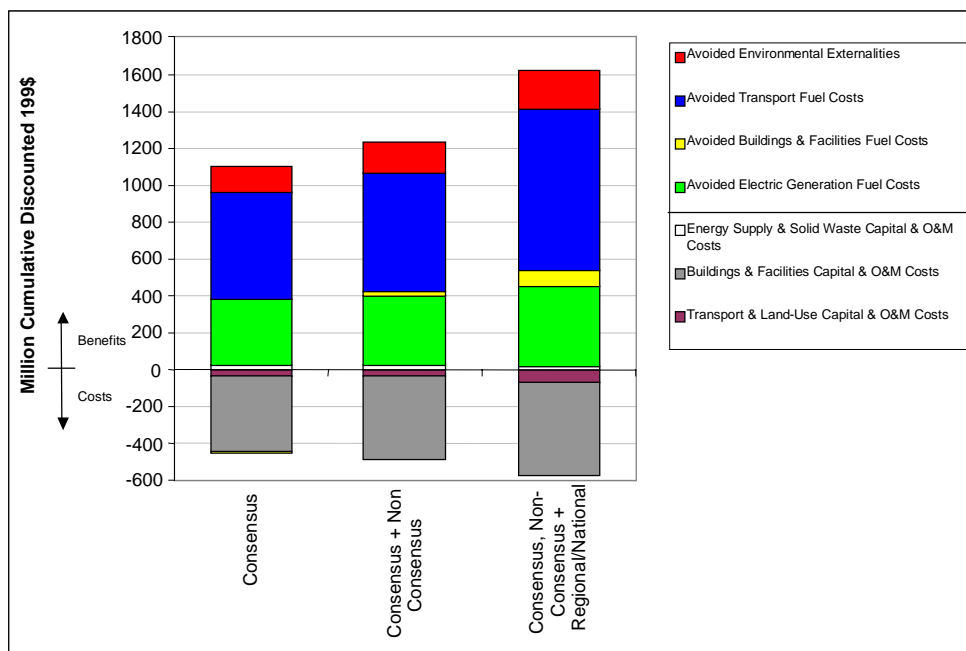


Figure 4g shows the impacts of each policy scenario on emissions of oxides of Nitrogen (NO<sub>x</sub>). Nitrogen oxides form when fuel is burned at high temperatures, as in a combustion process. NO<sub>x</sub> is involved in the formation of ground-level ozone, which can trigger serious respiratory problems. It reacts to form nitrate particles, acid aerosols, as well as NO<sub>2</sub>, which also cause respiratory problems. It also contributes to formation of acid rain and to nutrient overload that lowers water quality. NO<sub>x</sub> also contributes to atmospheric particles that cause visibility impairment most noticeable in national parks, and reacts to form toxic chemicals. It also contributes to global warming. (summarized from EPA web site:

<http://www.epa.gov/air/urbanair/nox/index.html>)

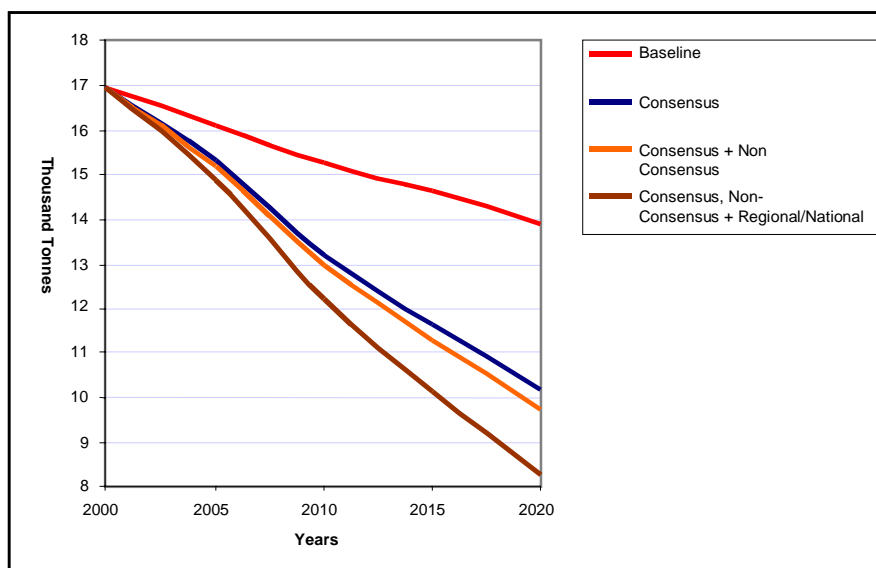
Figure 4g. Impacts of Options on Emissions of Oxides of Nitrogen NO<sub>x</sub>)

Figure 4h shows the impacts of each policy scenario on emissions of Volatile Organic Compounds (VOCs). This pollutant contributes to the production of photochemical smog and to ground level ozone, which affects the human respiratory system. High ozone levels can also damage crops, forests and wildlife (summarized from “A Guide to Environmental Analysis for Energy Planners”: <http://www.tellus.org/seib/publications/emanual.pdf>

Figure 4h: Impacts of Options on Emissions of Volatile Organic Compounds (VOCs)

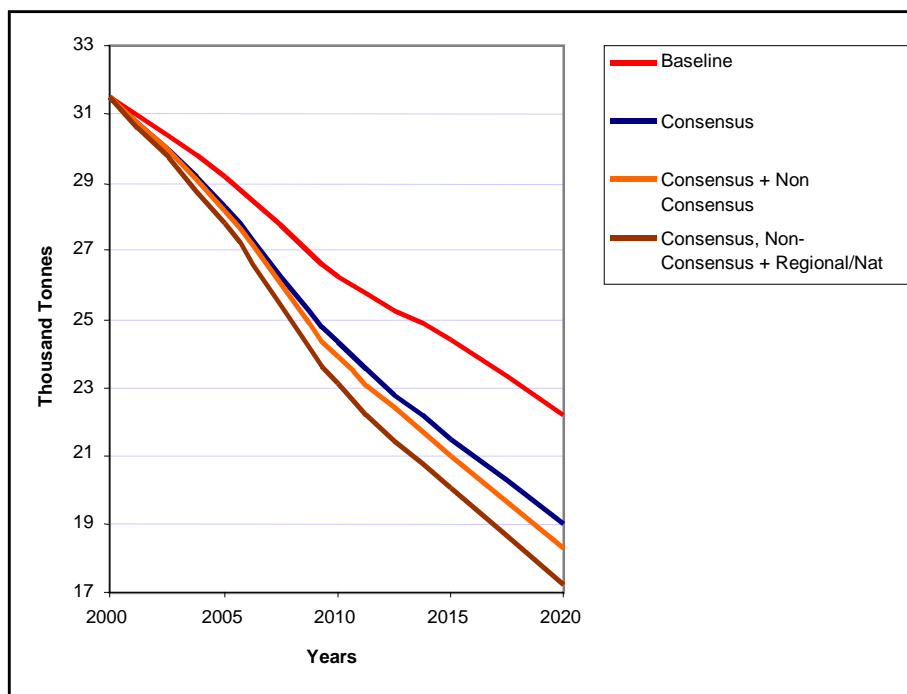


Figure 4i shows the impacts of each policy scenario on emissions of Particulate matter. The graph focuses on particulate matter of size less than 10 microns in diameter (PM10), but a similar effect is expected for particulate matter of smaller sizes (PM2.5). Particulates are associated with serious health effects including increased hospital admissions and emergency room visits for people with heart and lung disease, and work and school absences. Particulates are the major source of haze that reduces visibility in many parts of the United States, including National Parks. Particulates settle on soil and water and harm the environment by changing the nutrient and chemical balance. They also cause erosion and staining of structures. (Summarized from EPA web site: <http://www.epa.gov/eftpages/airairposulfuroxidesso2.html>)



Figure 4i: PM10 Emissions from Scenarios

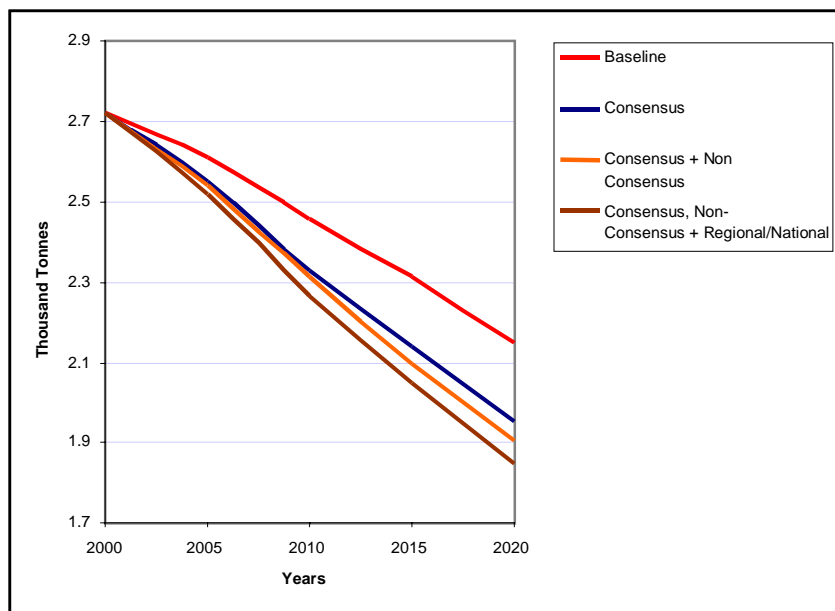
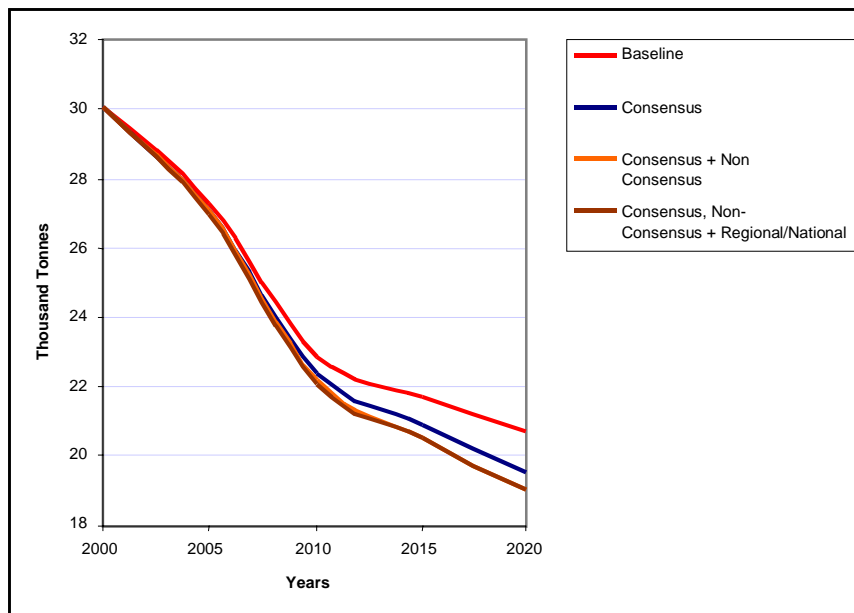


Figure 4j shows the impacts of each policy scenario on emissions of Sulfur Dioxide ( $\text{SO}_2$ ). This pollutant is formed when fuels containing sulfur, such as coal and oil are burned.  $\text{SO}_2$  contributes to respiratory illness, particularly in children and the elderly, and aggravates existing heart and lung diseases. It contributes to the formation of acid rain, which damages trees, crops, historic buildings, and monuments; and makes soils, lakes, and streams acidic. It also contributes to the formation of atmospheric particles that cause visibility impairment, most noticeably in national parks. (summarized from EPA web site: <http://www.epa.gov/ebtpages/airairposulfuroxidesso2.html>)

Figure4j: SO2 Emissions from Scenarios



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## V. List of Participants in Stakeholder and Working Groups

Table 5a: Stakeholder Members

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Department of Administration, Bill Ferguson  
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National Federation of Independent Businesses, Terrence Martiesian  
New England Gas Company, Marc Viera  
Northern Rhode Island Chamber of Commerce, Jason Martiesian  
Oil Heat Institute, Peter Lombardi  
Providence Chamber of Commerce, Janet Raymond  
RI Builder's Association, Roger Warren  
RI Department of Environmental Management, Jan Reitsma  
RI Department of Transportation, Diane Badorek  
RI Economic Development Corporation, Mike Walker  
RI League of Cities and Towns, Jennifer Perkins  
RI Petroleum Institute, Lenette Boiselle  
RI Public Interest Research Group, Kate Strouse  
RI Public Transit Authority, Mark Therrien  
RI Public Utilities Division, Doug Hartley  
RI Society of Environmental Professionals, Richard Austin  
RI State Energy Office, Janice McClanaghan  
RI Statewide Planning, John O'Brien  
Save The Bay, Topher Hamblett  
Sierra Club, Alicia Karpick  
Sustainability Coalition, Bradley Hyson  
The Energy Council of Rhode Island, Roger Buck

*Ex Officio (non-voting) Stakeholder Members*

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RI House, Policy Office, Gary Ciminero  
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 Sustainability Coalition, Bradley Hyson  
 The Energy Council of RI, Roger Buck  
 URI's Energy Center, Vin Rose  
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 RI State Energy Office, Tim Howe  
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