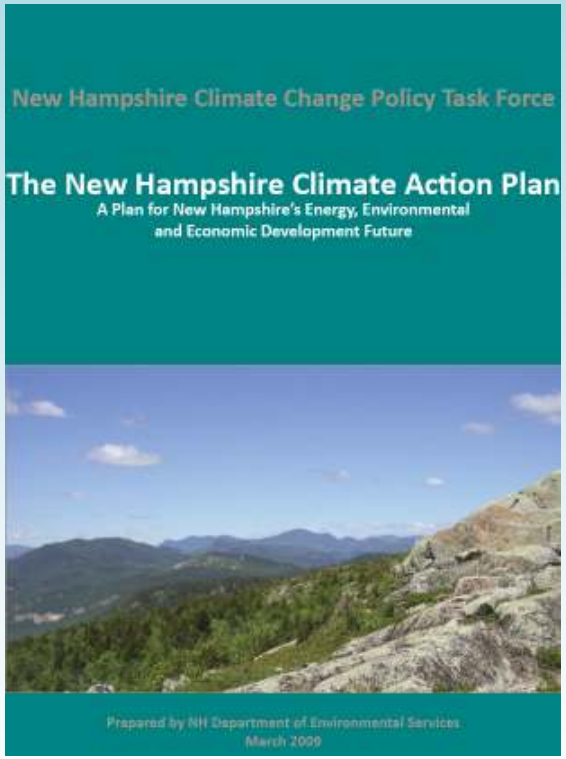
The NH Climate Action Plan

NH Energy and Climate Collaborative
Jan 14, 2010



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Climate Change Policy Task Force

- Established through Executive Order 2007-3 December 6, 2007
  - Establish quantified greenhouse reduction goals
  - Recommend specific actions to achieve its greenhouse gas reduction goals

Action Plan Development Process

- Climate Change Policy Task Force
  - Twenty-nine (29) members
- Working Groups (6)
  - 125+ Participants
- Six (6) Official Public Listening Sessions
  - 15 Locations
  - 275 Participants
  - 100 Commenters
- 300 Pages of Public Comments
  - e.g., mail, email, phone calls

NH Climate Action Plan

- The plan encompasses the thinking and recommendations of one of the largest, most diverse collections of leading New Hampshire citizens in many years
- Promotes growth of new jobs in the building trades and renewable energy development, and reduces the cost of energy to our citizens and businesses
- Identifies actions that everyone – in and out of government – can take to not only curb climate change, but also reduce their own energy costs.

Climate Change Policy Task Force Recommended Goals

- Reduce greenhouse gas emissions
  20% below 1990 levels by 2025
  [44% below 2005 levels by 2025]

- Reduce greenhouse gas emissions
  80% below 1990 levels by 2050

STATE ACTION COMPLEMENTS GLOBAL EFFORTS

Overarching Strategies to Achieve Goals

1. Maximize energy efficiency in buildings and transportation;
2. Increase renewable and low-emitting heat and electric power sources;
3. Protect our natural resources to maintain the amount of carbon sequestered;
4. Develop an integrated education, outreach and workforce training program; and
5. Adapt to existing and potential climate change impacts.

Maximize Efficiency in Buildings

- New residential construction that is 100% more efficient
- Retrofit 30,000/yr existing residential buildings to be 60% more efficient
- Retrofit existing Commercial, Industrial, and Municipal Buildings to be 50% more efficient
- Increase the Use of Combined Heat & Power

Increase Renewable/Low-CO_2 Emitting Resources

- Implement Regional Greenhouse Gas Initiative (RGGI)
- Promote Renewable Energy through the Electric Portfolio Standard (RPS)
- Increase Renewable Energy and Low-CO_2e Thermal Energy Systems
- Encourage the Use of Biogenic Waste Sources for Energy Generation

Encourage Land Use Patterns that Reduce VMT

- Streamline Approvals for Low- Greenhouse Gas Development Projects
- Develop Model Zoning to Support Bus/Rail Transit
- Develop Model Zoning for Higher-Density, Mixed-Use Development
- Continue/Expand Funding, Education, and Technical Assistance to Municipalities

Reduce VMT through an Integrated Multi-Modal Transportation System

- Implement a Stable Funding Stream to Support Public Transportation
- Improve and Expand Bus Service
  - Local
  - Intercity
- Maintain and Expand Freight Rail Service
  - Critical to maintaining roads
  - The precursor to passenger rail

Protect Our Natural Resources to Maintain the Carbon Sequestered

- Maximize Availability of Biomass for Electricity and Heating within Sustainable Limits
- Invest in Forests to Maximize Carbon Storage and to Avoid Net Forest Land Conversion
- Promote Durable Wood Products
- Maximize Source Reduction and Recycling

Lead by Example in Government Operations

- Establish an Energy Management Unit
- Establish a Self-Sustaining Fund for Energy Efficiency Projects in State Government
- Increase Funding for High Performance Public Schools
- Provide for the Establishment of Local Energy Commissions

Develop Integrated Education, Outreach and Workforce Training

- Energy Efficiency and Conservation in School Curricula
- Develop Residential Energy Efficiency and Conservation Programs
- Create an Energy Efficiency and Sustainable Energy Systems Web Portal
- Increase Energy Efficiency through Building Management Education Programs

Plan for Existing and Potential Climate Change Impacts

- Develop a Climate Change Adaptation Plan for the State of New Hampshire
- Develop and Distribute Critical Information
- Focus Policies and Actions to Most at Risk Populations
- Charge and Empower Public Health Officials
- Increase Resilience of Natural and Built Environments

Emission Reductions & Economic Analysis

5 Overarching Strategies

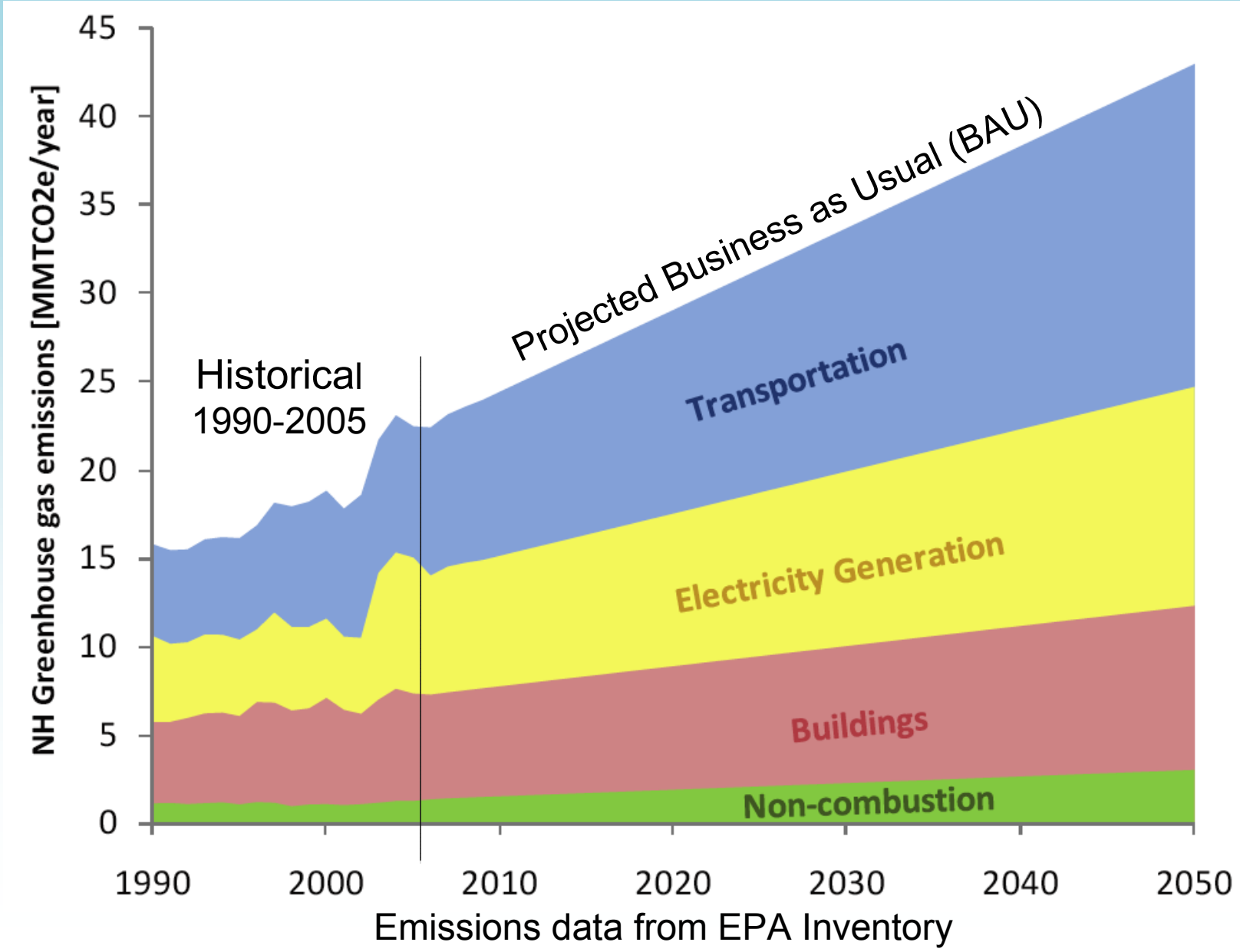
1. Energy efficiency in buildings & transportation
2. Renewable/low-emitting power sources
3. Protect natural resources
4. Develop education, outreach, & workforce training program
5. Adapt to climate change impacts

CSNE Analysis Integrated with Working Groups

1. Buildings (RCI)
2. Energy Generation & Use (EGU)
3. Transportation & Land Use (TLU)
4. Agriculture, Forestry, & Waste (AFW)

1. Government Leadership & Action (GLA)
2. Adaptation (ADP)

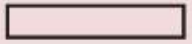
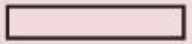
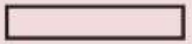
Historical & Projected (BAU) Emissions by Sector



Emission Reduction Analysis

- Performed analysis for actions proposed by 4 Working Groups (RCI, EGU, TLU, AFW)
- Team (CSNE & DES) and iterative approach
  - checked key assumptions with working groups
- **Transparent** analysis
  - Approach and Assumptions (Appendix 7)
  - one for each working group
- Emission reductions NOT be quantified for ALL actions
- Goals to generate decision relevant information
- Results summarized in Analysis Results Tables (Appendix 6)

NH CAP – Appendix 6

	CO_2 Emissions Reduction [MMTCO2e/year]			Economic Impact (2008 dollars)		Timing of Economic Impact		Parties Economically Impacted by:	
	2012	2025	2050	Costs	Benefits	Costs	Benefits	Costs	Benefits
NOTE: **Bolded and underlined** actions indicates action was used to quantify emissions reduction "wedge" for sector.									
Buildings									
RCI 1.1 Maximize Energy Efficiency in New Construction *100% more efficient*	0.46	2.85	6.93	$$$$$$	$$$$$$			E	E
RCI 1.2 Maximize Energy Efficiency in Existing Residential Buildings *30,000 homes/year; 60% more efficient*	0.78	3.29	3.29	$$$$$	$$$$$$			C	C
RCI 1.3 Maximize Energy Efficiency in Existing Commercial, Industrial, and Municipal Buildings *50% more efficient*	0.54	2.29	2.80	$$$$	$$$$$$			B	B
RCI 1.4A Upgrade Building Energy Codes *50% more efficient thermal*	0.21	0.87	2.13	$$$$	$$$$$			E	E
RCI 1.4B Improve Building Energy Code Compliance *80% compliance (6.6% more efficient thermal)*	0.03	0.12	0.28	$	$$$			GI	-
RCI 1.5 Establish an Energy Properties Section in MLS Listings	-	-	-	$$	-		-	C	C
RCI 1.8 Conserve Embodied Energy in Existing Building Stock	-	-	-	$$$$	$$$$$			-	-

$$ 2.5-25 mil, $$$ 25-125 mil, $$$$ 125-500 mil, $$$$$ 500-1000 mil, $$$$$$ > 1 bil

E: evenly distributed, C: consumers, B: business, G: government (state, local)

Example: RCI Emissions Reduction Analysis

RCI 1.2 Maximize Energy Efficiency in Existing Residential Buildings

CSNE Residential model includes:

1.NH population (1,247,342) and number of occupied housing units (474,517) in 2000; numbers then extrapolated to 2008 based on population estimates (from OEP)

2.New England marginal emissions factor for electricity

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011-2050
NE Marginal emissions factor [lbs CO2/ MWh]	1,488	1,394	1,338	1,179	1,102	1,107	*1,063*	*1,028*	*994*	*961*	*930*	*899*

3. Residential energy consumption, fuel profile, and EF

Annual thermal consumption [million BTU / person] = 40.1
Annual non-thermal electric consumption [million BTU / person] = 8.7

Thermal fuel profile:	Distillate fuel	52.3%	Fuel emissions factor	Distillate fuel	161.386
	Natural gas	15.0%	[lbCO2e/million BTU]	Natural gas	117.080
	LPG	14.2%		LPG	139.039
	Electric	7.5%		Kerosene	159.535
	Kerosene	6.0%		Wood	0.000
	Wood	5.1%			

Example: RCI Emissions Reduction Analysis

RCI 1.2 Maximize Energy Efficiency in Existing Residential Buildings

Action: Renovate 30,000 units per year use 60% less energy
48.8 mil btu * 0.6 = 29.3 mil btu
(30,000 homes/year)*29.3 mil btu*years* FP*EF = MMTCO2e

Action	CO2 Emissions reduction [MMTCO2e/year]		
	2012	2025	2050
RCI 1.2	0.78	3.29	3.29

505,000 units (2008) / 30,000 homes per year = 16.8 years

Example: RCI Emissions Reduction Analysis

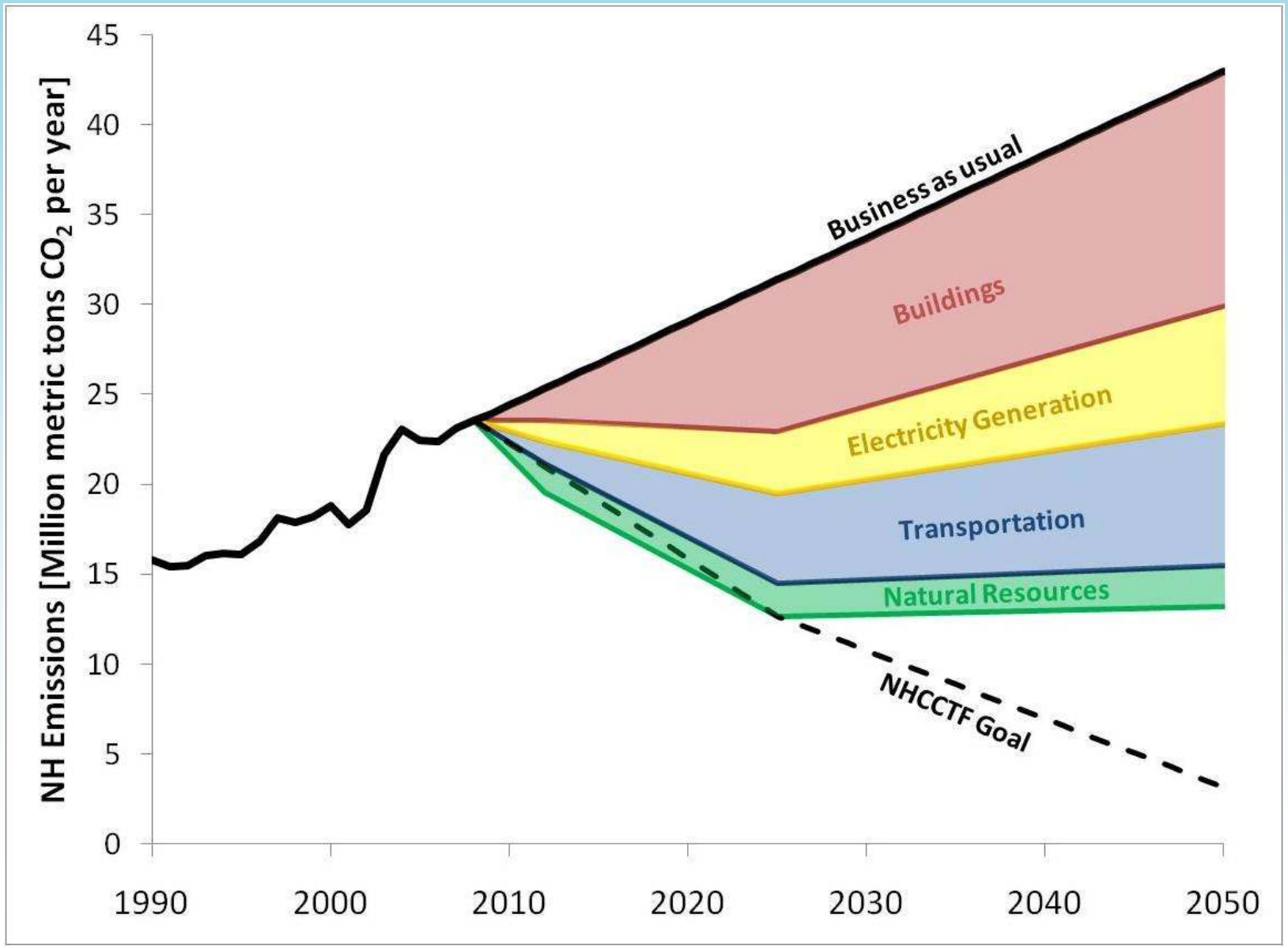
Recommended Actions

RCI 1.1 Maximize Energy Efficiency in New Construction
RCI 1.2 Maximize Energy Efficiency in Existing Residential Buildings
RCI 1.3 Maximize Energy Efficiency in Existing Commercial, Industrial, and Municipal Buildings
RCI 1.4 Upgrade Building Energy Codes/Improve Compliance
RCI 1.5 Establish an Energy Properties Section in Property Listings
RCI 1.8 Conserve embodied energy in existing building stock
RCI 2.1 Install higher-efficiency equipment, processes, & systems
RCI 3.1 Promote renewable energy and low-CO2 energy systems

Example: RCI Emissions Reduction Analysis

Action	CO2 Emissions reduction [MMTCO2e/year]		
	2012	2025	2050
RCI 1.1 New Construction zero net energy use	0.46	2.85	6.93
RCI 1.2 Existing Residential 60% less energy use	0.78	3.29	3.29
RCI 1.3 Existing Com,Ind,Muni 50% less energy	0.54	2.29	2.80
Combo all 3 **(not just a sum!)**	1.77	7.96	11.55

Projected CAP Emission Reductions (Wedges)



Economic Analysis

- Given large number of actions
  - took an “efficient analysis” approach
  - objective to provide “order of magnitude” economic impact
  - not as detailed as previous UNH economic studies (RPS, RGGI)
- Limited to New Hampshire costs/benefits
- Where appropriate, used a 1:1 multiplier benefit of “recycling” saved dollars in NH economy – considered conservative
- No discounting of costs and benefits to reflect timing or uncertainty
- Does not consider all the potential benefits
  e.g. reduced health costs due to reduced air pollution emissions

- Reporting of estimated economic costs & benefits
  - magnitude, timing, parties impacted

Economic Analysis

Fuel Forecast
Based on EIA Annual Energy Outlook 2008, constant $2008

Fuel	Units	2012	2025	2050
LPG	Gallon	$1.87	$1.89	$1.97
Residual Oil	Gallon	$1.48	$1.44	$1.57
Distillate Oil	Gallon	$2.59	$2.61	$2.78
Natural Gas	Therm	$0.87	$0.90	$0.99
Gasoline	Gallon	$2.76	$2.71	$2.80
Diesel	Gallon	$2.75	$2.75	$2.91
Electricity (NH)	kWh	$0.15	$0.15	$0.15

Example: RCI Economic Analysis

RCI 1.2 Maximize Energy Efficiency in Existing Residential Buildings

Cost to renovate housing unit so it uses 60% less energy: $36,000

Cost: $36,000 * 30,000/year = $1,080 million per year for 16.8 years

Savings: Reduced fuel use (from emissions analysis) * fuel cost * 2

Action	Cost ($2008 millions)			Savings ($2008 Millions)		
	2012	2025	2050	2012	2025	2050
RCI 1.2	$1,080	$222	$0	$425	$1,735	$1,793

NH CAP – Appendix 6

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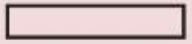
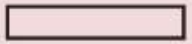
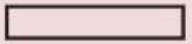
RCI 1.5 Establish an Energy Properties Section in MLS Listings	-	-	-	$$	-		-	C	C
RCI 1.8 Conserve Embodied Energy in Existing Building Stock	-	-	-	$$$$	$$$$$			-	-

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Economic and Greenhouse Gas Impacts of New 2009 Fuel Economy Standards – New Hampshire

Year	MMTCDe			Net Economic Benefit
	BAU	CAFE 2007	CAFE 2009	
2011	5.6	5.6	5.6	($20 million)
2025	6.7	5.7	5.2	$1,092 million

CAFE 2009 results in cumulative savings (2011 – 2025) of:

1 billions gallons of fuel

(= removing 2 million cars from the road for one year)

$9 billion (in 2009 dollars)

10 MMTCDe

BAU (Business as usual): 25.4 mpg

CAFE 2007: 35mpg by 2020

CAFE 2009: 35.5 mpg by 2016

CarbonSolutionsNE.org

NH Economic Benefits & Avoided Emissions - 2025