

The New Hampshire Climate Change Policy Task Force

New Hampshire Climate Action Plan

*A Plan for New Hampshire's Energy, Environmental
and Economic Development Future*

**Appendix 4.9:
Plan for How to Address Existing and Potential
Climate Change Impacts**

**Prepared by the
NH Department of Environmental Services
March 2009**

Table of Contents

Recommended Actions

1. Develop a Climate Change Adaptation Plan for the State of New Hampshire (ADP 8)	3
2. Develop and Distribute Critical Information on Climate Change (ADP 1)	4
3. Promote Policies and Actions to Help Populations Most at Risk (ADP 2)	7
4. Charge and Empower Public Health Officials to Prepare for Climate Change (ADP 3)	10
5. Strengthen Protection of New Hampshire’s Natural Systems (ADP 4)	12
6. Increase Resilience to Extreme Weather Events (ADP 5)	15
7. Strengthen the Adaptability of New Hampshire’s Economy to Climate (ADP 6)	19

ADP Action 8 – Develop a Climate Change Adaptation Plan for the State of New Hampshire

Summary

The State should develop a Climate Change Adaptation Plan to support public and private partners and state agencies in the planning and preparation for the episodic and chronic events in New Hampshire that are projected to result from climate change. This Plan should identify actions that proactively prepare for these incidents and minimize their impacts on human health, the natural environment and the built environment (e.g., homes, businesses, roads, bridges, dams). The Plan should include the methodologies for making sure all necessary data are available to decision makers. There is a general lack of urgency for planning for adaptation to climate change. This Plan can provide the necessary education and information to keep New Hampshire moving in a proactive manner as we continue to face developing climate change impacts. The Plan will help our state and our decision makers identify and implement additional critical adaptation strategies.

Overall Implementation:

- Executive Order to establish the necessary body and define the scope of their responsibilities.
- Assemble the necessary bodies to develop the Adaptation Plan including members from various interests including, but not limited to, environmental, natural resources, public health, municipal and regional governance, built infrastructure (e.g., roads, dams, buildings), academia (UNH) as well as groups gathering data necessary for decision makers (e.g., coastal and flood plain LIDAR data).
- Identify data gaps and explore ways to fill those gaps
- Ensure that the plan is a living document that can change as needed.

Responsible Parties:

- The Governor's Office
- Department of Environmental Services

Timeframe:

- Development of the Adaptation Action Plan can begin immediately.
- Allow 6 months for the Plan's development.
- Once completed implementation can occur in a phased-in approach.

ADP Action 1 – Develop and Distribute Critical Information on Climate Change

Summary

There should be an investment in the analysis and dissemination of accurate and understandable information about the economic, environmental, and social impacts of climate change to policy makers and decision makers in the public and private sectors. Desired outcomes are policies and decisions that are fact-based, easy to achieve, and effective. This action is critical because of the complexity and volume of the information involved and the need to synthesize and graphically illustrate key concepts and facts to make them understandable and relevant.

Program Description

1. Mechanism (*i.e., how the policy or program achieves the desired result*)

A partnership should be formed between leading research and policy institutes such as UNH and the Center for Public Policy Studies, state and municipal elected and appointed officials, businesses, and non-profit organizations. Their charge would be to assess existing sources of information to identify gaps and develop a strategic plan to address those gaps, with a focus on getting the information into the hands of decision-makers responsible for protecting public safety and environmental integrity.

Specific actions could include updated flood plain maps; Light Detection and Ranging (LIDAR) mapping of flood plains and coastal and estuarine systems; assessments of built environment, infrastructure, and land uses at risk due to flooding, increased storm events, and sea level rise; as well as the development of a strategic plan to address those needs. Included would be the development of comprehensive modeling tools, mapping, data sets, and observations to track potential and actual impacts from climate change scenarios.

Work products would include fact sheets, maps, data sets, and other communication tools designed to help guide decision making at the state and local levels. These would include integrated and updated Geographic Information System maps showing high-risk flood areas; assessments of vulnerable housing and other infrastructure; and assessments of at-risk populations, including the elderly and low-income residents, who have limited ability to withstand sudden or long-term changes in weather. This is an information gathering-review-synthesis-consolidation process as well as an information dissemination process. Included would be the development of comprehensive modeling tools, mapping, data sets, and observations to track potential and actual impacts from climate change scenarios on public health and safety, environmental integrity, and highly vulnerable economic activity such as tourism, agriculture, and forestry.

2. Implementation Plan (*i.e., how to implement the specific policy or program*)

- a. *Method of Establishment:* Memorandum of agreement among interested parties, including those listed above. Process should be co-chaired by a leader from state government and a leader from the private sector. The governor could use an executive order to engage state officials and the bully pulpit to encourage broader participation, but all responsibility should not be put on state government.
- b. *Resources Required:* Initial funding from a combination of public and private sources to scale the scope of work. Commitment of in-kind support of staff and other experts from the institutions and sectors named above. Ongoing funding from both private and public sources.
- c. *Barriers to Address (especially for medium to low feasibility actions):* Very few beyond the need for time commitments from key experts and players. Much of this information exists – the challenge is to consolidate, condense, and redistribute it in more understandable and useful forms.

3. Parties Affected by Implementation (*i.e., residents, businesses, municipalities, etc.*)
 - a. *Parties Responsible for Implementation:* This work should be coordinated by a public-private partnership convened and administered by senior state officials from the New Hampshire Department of Environmental Services (NHDES) or related agencies. The members of this partnership should include leading research and policy institutes such as UNH and the Center for Public Policy Studies, state and municipal elected and appointed officials, business interests; and non-profit organizations.
 - b. *Parties Paying for Implementation:* Minimal initial funding from state and private sources.
 - c. *Parties Benefiting from Implementation:* Decision and policy makers in the public and private sectors.
4. Related Existing Policies and Programs (*i.e., those that address similar issues without interacting*): There are literally dozens of institutions compiling and producing good information on these subjects. This effort would complement those existing programs and make them more effective, not replace them.
5. Complementary Policies (*i.e., those that achieve greater reductions through parallel implementation*):
 - a. *Existing:*
 - b. *Proposed:*
6. Timeframe for Implementation: 1-2 years
7. Anticipated Timeframe of Outcome: 3-5 years

Program Evaluation

1. Estimated CO₂ Emission Reductions
2. Economic Effects
 - a. Costs
 - i. Short-term (2012)
 - ii. Mid-term (2025)
 - iii. Long-term (2050)
 - b. Savings
 - i. Short-term (2012)
 - ii. Mid-term (2025)
 - iii. Long-term (2050)
3. Other Benefits/Impacts
 - a. *Environmental:* More accurate data will help to make informed decisions about the potential impacts of climate change on the environment and how future development can be planned to avoid exacerbating those impacts.
 - b. *Health:* Better data will help protect human health by enabling development to be guided away from at-risk areas. Improved communication with updated information will also assist in appropriate public information dissemination.
 - c. *Social:* Better data will help to reduce social impacts, and improved communication with updated information will assist in the dissemination of appropriate public information.

- d. *Other*: Through updated mapping as well as assessments of the risks to the built environment, infrastructure and land uses, the loss of human life may be more easily avoided by enabling better disaster planning. By assessing the resilience of those environments in which human communities have settled, better plans can be developed that will identify how to move at-risk populations out of harm's way during weather-related incidents.

4. Potential for Implementation

- a. *Technical*: There is an immediate potential for implementing this action as the technology is available and some of the analysis is currently being done.
- b. *Economic*: Costs associated with the assessments related to equipment needs, personnel requirements, or time constraints could hinder additional data gathering.
- c. *Statutory/Regulatory*: Data gathering and synthesis should not be impaired by the statutory or regulatory process.
- d. *Social*: The potential large because it is expected that many people would support efforts to enable more informed and thorough decision making.

5. Other Factors of Note:

6. Level of Group Interest: Very high

7. References:

ADP Action 2 – Promote Policies and Actions to Help Populations Most at Risk

Summary

An effort will be made to focus policies and actions to help the most at-risk populations (e.g., elderly, low-income, chronically ill, and children) prepare for the impacts of climate change and related social impacts. Such impacts may pertain to the costs and availability of commuting/transportation, energy for heating and cooling homes, “cool shelters,” food and potable water, health care, and potential need for relocation. Public Health agencies need to continue to identify individuals at risk and work with NHDES in the areas of health-related impacts from climate change (i.e., changes in air quality) and public health outreach. Public Health and the Office of Emergency Management need to coordinate and participate in climate change discussions. What is currently hard for at-risk populations will likely get worse under climate change conditions. These populations will be affected by transportation costs and availability of infrastructure, and they are more likely to experience displacement because many live in vulnerable areas.

Program Description

1. Mechanism (*i.e., how the policy or program achieves the desired result*): Create and foster partnerships between organizations representing at-risk populations within each level of New Hampshire government and the private sector in order to develop, collect, and share relevant data/information. This effort will assist in determining the short- and long-term needs of these populations as they prepare for the social impacts of climate change, related extreme weather events, and population dislocation. These partnerships will be useful in educating, supporting, and empowering these same populations. Climate change will have a significant impact on the poor, and the poor have the most difficulty recovering from disaster. Educational information will need to be translated for non-English-speaking populations.

Additional measures should be taken to:

- Assess the mental health consequences and the public/private mental health system’s capacity to respond as well as the potential for civil conflict associated with climate change, extreme weather events, and population dislocation.
- Assess the need for strengthening state and local emergency response and recovery plans as well as the State Hazard Mitigation plan with special consideration given to vulnerable areas or zones of the state and to the increased demand for emergency services related to climate change, extreme weather events, and population dislocation.
- Assess and update the public health system and public/private education system’s capacity to respond to existing and potential increases in children with asthma and other chronic respiratory conditions and to consider the effects of rising daytime temperatures on the school day.

There should also be a clarification created within the state constitution to allow the gas tax to be used for transportation adaptation. This funding could be used to expand public transportation modes and the costs associated with necessary infrastructure changes to ensure that workers all across New Hampshire can get to work. There should be particularly consideration of at-risk populations and all residents who live in vulnerable area/zones of the state.

2. Implementation Plan (*i.e., how to implement the specific policy or program*)
 - a. *Method of Establishment (e.g., legislation, executive order)*: Partnership agreements between state and local public health officials, environmental officials, emergency planning officials and organizations that work with at risk populations. Constitutional amendment for a change in gas tax usage.

- b. *Resources Required:* Staff time. Legislative act to amend the constitution.
 - c. *Barriers to Address (especially for medium to low feasibility actions):* Lack of staff availability. Lack of support for constitutional amendment.
3. Parties Affected by Implementation (*i.e., residents, businesses, municipalities, etc.*)
- a. *Parties Responsible for Implementation:* State and local public health officials, NH Minority Health Coalition, and organizations that work with at-risk populations. State legislature.
 - b. *Parties Paying for Implementation:* NH Department of Health and Human Services (costs mostly involves investment of staff time).
 - c. *Parties Benefiting from Implementation:* At-risk populations, primarily, immigrant and refugee populations, essential services personnel (outdoor workers, emergency responders), rural communities, employers, and wage earners.
4. Related Existing Policies and Programs (*i.e., those that address similar issues without interacting*): Potentially state and local welfare programs, special medical services, and the NH Bureau of Elderly and Adult Services.
5. Complementary Policies (*i.e., those that achieve greater reductions through parallel implementation*): None known.
- a. *Existing:*
 - b. *Proposed:*
6. Timeframe for Implementation: 1-2 years
7. Anticipated Timeframe of Outcome: On-going

Program Evaluation

1. Estimated CO₂ Emission Reductions
2. Economic Effects
- a. Costs
 - i. Short-term (2012)
 - ii. Mid-term (2025)
 - iii. Long-term (2050)
 - b. Savings
 - i. Short-term (2012)
 - ii. Mid-term (2025)
 - iii. Long-term (2050)
3. Other Benefits/Impacts:
- a. *Environmental:* There would be limited direct environmental impact.
 - b. *Health:* This measure would greatly benefit the physical and mental health of New Hampshire residents, especially over the long term; the advanced planning would lead to reduced impacts as climate change advances.

- c. *Social*: The education and empowerment of these populations would increase their social stability by reducing their exposure to climate change impacts through education and direct assistance.
- d. *Other*: The economic costs of implementation would cost less than non-action.

4. Potential for Implementation:

- a. *Technical*: There is an immediate potential for implementing this action as the technology is available.
- b. *Economic*: The economic impact would directly benefit at-risk populations and ultimately would cost less than non-action
- c. *Statutory/Regulatory*: Planners could experience barriers in this area.
- d. *Social*: There should be significant support for this action as it directly contributes to the welfare of those who may be most affected by climate change. In addition, the direct economic costs of implementation are outweighed by the avoided costs of inaction.

5. Other Factors of Note:

6. Level of Group Interest: High

7. References:

ADP Action 3 – Charge and Empower Public Health Officials to Prepare for Climate Change

Summary

Public health officials should be charged and empowered to prepare for the increased incidence and impacts of existing and emerging infectious diseases and other acute and chronic conditions as climate change progresses. Public health action areas would include 1) vector borne infectious diseases, 2) heat related injuries, and 3) respiratory illnesses. Public health officials need better data/analysis for vector-borne infectious disease forecasting and an understanding of what indicators to track (e.g., weather patterns, mosquito pools, tick populations).

Program Description

1. Mechanism (*i.e., how the policy or program achieves the desired result*):
The Department of Health and Human Services should create a coalition to develop, update, consolidate, and/or integrate, where possible or necessary, data collection systems for health and disease surveillance, health facts and indicators, demographics, resilience, and vulnerability. The coalition’s work should take into consideration who is currently doing work on the relationship of public health to climate change and current “best practices” in responding to climate change. The coalition’s work would include strengthening local emergency responders in preparing for heat waves, temperature extremes, and air quality action days. Under climate change conditions, there will be an increase in demand on emergency services. Greater outreach and education via mass media will be needed, directed toward preparing the public for climate-related incidences and providing options for response.
2. Implementation Plan (*i.e., how to implement the specific policy or program*):
 - a. *Method of Establishment (e.g., legislation, executive order)*: Partnership led by the Department of Health and Human Services; the Department of Environmental Services; the Bureau of Emergency Management and the Bureau Emergency Medical Services within the Department of Safety; the Board of Nursing; the Board of Medicine; local public health officials; other profit and non-profit organizations working on public health issues; and other organizations that can provide outreach, education, and needed data.
 - b. *Resources Required*: Staff time.
 - c. *Barriers to Address (especially for medium to low feasibility actions)*: Lack of data and staff availability. Shortages in nursing and other medical staff.
3. Parties Affected by Implementation (*i.e., residents, businesses, municipalities, etc.*):
 - a. *Parties Responsible for Implementation*: Department of Health and Human Services and the Department of Environmental Services.
 - b. *Parties Paying for Implementation*: Department of Health and Human Services (mostly staff time is needed).
 - c. *Parties Benefiting from Implementation*: The general public and at-risk populations.
4. Related Existing Policies and Programs (*i.e., those that address similar issues without interacting*):
Environmental Public Health Tracking Program
5. Complementary Policies (*i.e., those that achieve greater reductions through parallel implementation*):
None known.
 - a. *Existing*:

b. *Proposed:*

6. Timeframe for Implementation: 1-2 years
7. Anticipated Timeframe of Outcome: 1-2 years and ongoing

Program Evaluation

1. Estimated CO₂ Emission Reductions

2. Economic Effects

a. Costs

- i. Short-term (2012)
- ii. Mid-term (2025)
- iii. Long-term (2050)

b. Savings

- i. Short-term (2012)
- ii. Mid-term (2025)
- iii. Long-term (2050)

3. Other Benefits/Impacts

- a. *Environmental:* There would be limited direct environmental impact.
- b. *Health:* The health of NH residents would be better maintained as a result of better information dissemination on the need for health precautions at specific times.
- c. *Social:* Residents would feel better prepared and more empowered by the dissemination of accurate and timely information. The empowerment of affected populations through education and direct assistance would increase their social stability and reduce their exposure to the adverse effects of climate change.
- d. *Other:* The economic costs of implementation would be less than the costs of inaction.

4. Potential for Implementation

- a. *Technical:*
- b. *Economic:* The potential for this action is high because the costs of implementing it would be relatively low and much of the required information is already available.
- c. *Statutory/Regulatory:* This measure should not require any statutory or regulatory changes.
- d. *Social:* There should be a high degree of social acceptance as the proposed action would have a direct positive effect on the well-being of New Hampshire residents

5. Other Factors of Note:

6. Level of Group Interest: High

7. References:

ADP Action 4 – Strengthen Protection of New Hampshire’s Natural Systems

Summary

There should be an effort to strengthen state and local protection of New Hampshire’s natural resources, which include agricultural soils, drinking water, hydrology, and wildlife habitat connectivity. To facilitate this action, growth should be encouraged in or near already-developed areas, at possibly higher densities, so as to place less stress on undisturbed natural areas. Implementation of this action would necessitate a greater emphasis on regional development strategies than currently exists.

Program Description

1. Mechanism (*i.e., how the policy or program achieves the desired result*):
 - a. Prioritize places to protect. For example, preserve 75 percent of all federally designated farm land to ensure land for local agriculture; preserve floodplains and wetlands to ensure the integrity of their ecological functions, especially as they relate to flood control; maintain and restore coastal and inland wetlands where most beneficial in light of shifting habitats inland, northward, and upwards.
 - b. Adapt statewide monitoring programs or create new monitoring programs to detect biological, physical, and chemical responses to direct and indirect effects of climate change. Initiate region-wide examination of the fragmentation of aquatic systems in the state to restore good river/stream habitat and natural flow.
 - c. Protect potable drinking water sources. Improve the management of groundwater as population and demand grow.
 - d. Promote resilience of forest, freshwater, and coastal ecosystems through minimizing environmental stresses such as prevalence of invasive species, occurrence of wildfires, and habitat fragmentation.
 - e. Possibly establish a Green Infrastructure Assessment to identify ecological hubs and corridor networks across the state and prioritize them for ecological values, and use that information as the foundation for focusing conservation and restoration work.
2. Implementation Plan (*i.e., how to implement the specific policy or program*):
 - a. *Method of Establishment (e.g., legislation, executive order)*: Legislation would be needed to create changes in current environmental and zoning regulations. Require climate change impacts to be considered in all state and local planning, zoning, and siting.
 - b. *Resources Required*: Seek congressional appropriation, federal grants/funding, state appropriation, or use Regional Greenhouse Gas Initiative funds (may require amendment to RGGI for authorization). Continue to utilize LCHIP and other land protection funding sources. Apply science-based technical expertise and cooperation from local and regional planning officials.
 - c. *Barriers to Address (especially for medium to low feasibility actions)*: Funding availability, geographical scope, resistance to changes in environmental and zoning regulations.
3. Parties Affected by Implementation (*i.e., residents, businesses, municipalities, etc.*):
 - a. *Parties Responsible for Implementation*: Municipalities, regional planning commissions, Department of Environmental Services, Office of Emergency Management, Office of Energy and Planning, Department of Resources and Economic Development, NH Geologic Survey, U.S. Army Corps of Engineers, National Oceanic and Atmospheric Administration, U.S. Geological Survey, universities, and public and private organizations (*i.e.* environmental, charitable).

- b. *Parties Paying for Implementation:* Same as above.
 - c. *Parties Benefiting from Implementation:* Local communities, land trusts, businesses, wildlife, timber industry, residents living in flood plains/coastal areas, and the general public.
4. *Related Existing Policies and Programs (i.e., those that address similar issues without interacting):* The state has completed the Wildlife Action Plan (WAP), which identifies areas in need of protection based on threatened/endangered species status and habitat vulnerability. Another data layer could be added to the WAP relative to the implementation of adaptation measures based on urgency and need. The state has some LIDAR data of the coastal area; however, it lacks the scale and geographical scope to be effective in determining appropriate adaptation measures. The state recently completed a flood assessment report which may provide information relative to areas throughout the state that need updated flood plain information. For coastal areas, state and local partners have created a Land Conservation Plan. GRANIT data layers could help identify forest conservation areas for carbon sequestration. NH Geologic Survey has been updating geologic and hydrologic maps and continues to partner with other organizations for funding additional updating of maps.
5. *Complementary Policies (i.e., those that achieve greater reductions through parallel implementation):*
- a. *Existing:* Aquatic connectivity studies have been completed or are underway for the town of Effingham, Nash Stream, and Winnicut River.
 - b. *Proposed:*
6. Timeframe for Implementation: 1 - 4 years
7. Anticipated Timeframe of Outcome: 1 - 4 years

Program Evaluation

1. Estimated CO₂ Emission Reductions
2. Economic Effects
 - a. Costs
 - i. Short-term (2012)
 - ii. Mid-term (2025)
 - iii. Long-term (2050)
 - b. Savings: The state and local communities will realize savings by utilizing better information for making decisions relative to habitat management, infrastructure management, and vulnerability.
 - i. Short-term (2012)
 - ii. Mid-term (2025)
 - iii. Long-term (2050)
3. Other Benefits/Impacts
 - a. *Environmental:* Urban and rural watershed planning that considers broad floodplain management criteria and applies best-use practices to minimize storm and flood hazards will increase natural infiltration, protect and restore riparian buffers, wetlands, and forests; and allow wetland mitigation corridors.

- b. *Health*: The natural ecosystems in which New Hampshire's communities are located provide numerous services upon which its citizens rely for both physical safety (e.g. flood protection) and health (e.g., water purification). The protection of these resources will contribute to the long-term health of our communities.
- c. *Social*: The preservation of New Hampshire's natural landscape will maintain the aesthetic appeal that contributes to the quality of life enjoyed by residents and visitors alike. In addition, these natural ecosystems provide many services "free of charge" and cost less than compensatory technology (e.g., water purification) to replace damaged resources.
- d. *Other*:

4. Potential for Implementation

- a. *Technical*: There is an immediate potential for implementing this action as the means and methods are available and many are currently in use.
- b. *Economic*: Funding would be necessary for additional data analysis.
- c. *Statutory/Regulatory*: Additional obstacles exist in that there could be resistance to changes in environmental and zoning regulations, and many people still think adaptation to climate change is premature.
- d. *Social*: Landowners and developers could be resistant to additional restrictions on land use.

5. Other Factors of Note:

6. Level of Group Interest: High

7. References:

ADP Action 5 – Increase Resilience to Extreme Weather Events

Summary

The state should undertake measures to increase its resilience to extreme weather events. Given that climate change forecasts include more frequent drought punctuated by more intense precipitation events and rising sea level, our built environment may be at increased risk of inland and coastal flooding. Future development could put more people and infrastructure at risk and could exacerbate the problem if sited in the wrong locations. The desired outcomes of adaptation policies in this area are:

- Guide future development away from the most vulnerable flood-prone areas.
- Render the existing built environment more resilient to weather-related impacts.
- Explore ways to move existing development out of harm's way.

Mechanisms to accomplish these outcomes focus on municipal ordinances, building codes, land use practices, infrastructure planning, and incentives. Costs of inaction are potential loss of life, property, and economic activity, especially in flood-prone inland areas and the seacoast. In short, the weather-related problems of today will be exacerbated by the climate of the future.

Program Description

1. Mechanism (*i.e., how the policy or program achieves the desired result*): Methods and resources to accomplish these outcomes focus on municipal ordinances, building codes, land use practices, infrastructure planning, and incentives. Specific actions to accomplish stated outcomes include the following:
 - a. Guide future development away from most vulnerable flood prone areas by:
 - i. Updating mapping and modeling to determine future flood prone areas.
 - ii. Acquiring LIDAR (Light Detection and Ranging) images statewide for floodplains and coastal areas.
 - iii. Prohibiting new development on and/or filling in of existing floodplains.
 - iv. Providing resources to communities to implement ordinances for development in floodplains and coastal areas.
 - v. Providing incentives for development outside of vulnerable areas.
 - b. Render the existing built environment more resilient to weather related impacts by:
 - i. Requiring consideration of climate change guidelines in building codes for regional, municipal, and urban planning.
 - ii. Changing development methods to reduce runoff (*i.e.* use of pervious pavement).
 - iii. Retrofitting existing impervious surfaces to reduce runoff.
 - iv. Re-evaluating storm frequency and intensity tables for engineers, designers, and planners.
 - v. Allocating resources to upgrade existing infrastructure to attenuate and convey increased stormwater flows.
 - vi. Providing funding for low-income homeowners in vulnerable areas to become more resilient.
 - vii. Restoring floodplains that are impacted.
 - viii. Exploring ways to protect and replenish water supplies and waste water treatment facilities in conjunction with flood protection.

- ix. Evaluating dam controls and flood storage options.
 - x. Obtaining information from the insurance industry as to the kinds of loss mitigation techniques and options that property owners are required to follow in order for insurance companies to insure properties located in high-risk areas. In the case of coastal properties, for example, such requirements could include use of hurricane shutters and certain types of roof and door designs to make the structure more resistant/resilient against storm surges and high winds.
- c. Explore ways to move existing development out of harm's way by:
- i. Creating a "retreat policy" for floodplain and coastal properties that includes large infrastructure such as water and wastewater treatment plants and energy generating facilities.
 - ii. Exploring methods and incentives for hazard mitigation (e.g., zoning, engineering, building standards, and insurance requirements) to relocate development.
 - iii. Identifying funding mechanisms to support such measures.
2. Implementation Plan (*i.e., how to implement the specific policy or program*)
- a. Guide future development away from most vulnerable flood prone areas.
- i. *Method of Establishment (e.g., legislation, executive order)*: Legislation to fund additional state match to federal mapping efforts; state and federal funding; legislation, including changes to RSA 481-A and other statutes; legislation to provide funding to Regional Planning Commissions (RPCs) and towns to write ordinances; legislation to create incentives and/or a legislative commission to assess options.
 - ii. *Resources Required*: \$100,000/year for 4 years for mapping; \$3 million for LIDAR; undefined funding level to cover legal costs and the costs of land takings to prohibit development; \$30,000 to each RPC to cover the costs of writing ordinances.
 - iii. *Barriers to Address (especially for medium to low feasibility actions)*: Funding sources; resistance from private property owners; and need for appropriately trained personnel.
- b. Render the existing built environment more resilient to weather related impacts.
- i. *Method of Establishment (e.g., legislation, executive order)*: Legislation to prohibit development in vulnerable areas as part of state law. Assistance to communities to comply (building codes). Legislation to further tighten Alteration of Terrain and other regulations with regard to floodplains. Local zoning and site review (development methods). Local regulations (retrofit impervious surfaces). Legislation (storm frequency, infrastructure upgrades, funding for residents, flood plain restoration, etc).
 - ii. *Resources Required*: Unknown.
 - iii. *Barriers to Address (especially for medium to low feasibility actions)*: Local capacity to change and enforce codes; acceptance of low-impact development and other approaches by the building industry and local boards; funding sources; state-wide data needs; qualified personnel.
- c. Explore ways to move existing development out of harm's way.
- i. *Method of Establishment (e.g., legislation, executive order)*: Legislation to create a commission to study the issue and make recommendations.

- ii. *Resources Required*: Agency staff to assist commission.
 - iii. *Barriers to Address (especially for medium to low feasibility actions)*: Public controversy.
- 3. Parties Affected by Implementation (*i.e., residents, businesses, municipalities, etc.*)
 - a. *Parties Responsible for Implementation*: Legislature; National Flood Insurance Program; local governing bodies; Department of Environmental Services, in coordination with federal agencies and the development community.
 - b. *Parties Paying for Implementation*: Taxpayers and state funding.
 - c. *Parties Benefiting from Implementation*: The entire state.
- 4. Related Existing Policies and Programs (*i.e., those that address similar issues without interacting*): National Floodplain Insurance Program, FEMA mapping, National Geodetic Mapping, NH Geologic Survey mapping, local floodplain ordinances, hazard mitigation program, NHDES' Alteration of Terrain Program and Wetlands Program.
- 5. Complementary Policies (*i.e., those that achieve greater reductions through parallel implementation*): None known.
 - a. *Existing*:
 - b. *Proposed*:
- 6. Timeframe for Implementation: 1-2 years
- 7. Anticipated Timeframe of Outcome: 1-2 years and on-going

Program Evaluation

- 1. Estimated CO₂ Emission Reductions
- 2. Economic Effects
 - a. Costs: Uncertain at present. Some economic impacts will be dictated by weather-related disasters. The extent and frequency of weather related disasters is not known. Other economic impacts will be related to the need for relocating residents and businesses after storms, flooding and erosion have affected their properties. And additional economic impact will be realized as our current infrastructure needs to be repaired after storm events and upgraded as a planned preventative action.
 - i. Short-term (2012)
 - ii. Mid-term (2025)
 - iii. Long-term (2050)
 - b. Savings: Uncertain at present. It is highly likely that pro-active costs would be less than reactive costs. Pro-active actions will also prevent damage and potential loss of life in many situations which is a cost savings.
 - i. Short-term (2012)
 - ii. Mid-term (2025)
 - iii. Long-term (2050)
- 3. Other Benefits/Impacts

- a. *Environmental*: Moving existing development and guiding future development from flood prone areas will benefit the environment by allowing wetlands, floodplains, and tidal zones to function naturally. These actions will provide attenuation of flood waters, infiltration of rain water, and the ability to recover from disturbances because intact ecosystems are more resilient.
- b. *Health*: Morbidity and mortality will be reduced within environments that are kept intact because critical storm protection will be preserved and water and air quality will be better maintained by the natural systems. Public health improvements will also result in an increased sense of security and wellbeing among affected populations.
- c. *Social*: There is the potential for civil conflict resulting from the need to relocate citizens or entire communities. As local and state government make changes to existing zoning and development policies, education will be imperative to ensure that New Hampshire residents have a thorough understanding of the importance of these initiatives.
- d. *Other*:

4. Potential for Implementation

- a. *Technical*: There is an immediate potential for implementing this action as the technology is available and some of it is in use.
- b. *Economic*: There are some barriers as funding would be necessary to upgrade the current infrastructure. Initial investments will pay off in the future by avoiding costs resulting from failed infrastructure.
- c. *Statutory/Regulatory*: Additional obstacles exist in that there could be resistance to changes in environmental and zoning regulations and many people still think adaptation to climate change is premature.
- d. *Social*: Landowners and developers could be resistant to relocation or being prohibited from developing in flood prone areas.

5. Other Factors of Note: Resilience is important to sustainability. Measures to increase our resilience to climate change are a critical element of the adaptation process.

6. Level of Group Interest: Very high

7. References:

ADP Action 6 – Strengthen the Adaptability of New Hampshire’s Economy to Climate Change

Summary

Policies should be created to support economic development that reduces or mitigates greenhouse gas emissions, introduces climate considerations into the economic growth model, and attracts environmentally responsible employers. Examples include anticipating the effects of climate change on key current industries (e.g., skiing, tourism, agricultural); developing “green collar” training and education programs; and attracting alternative energy and other “clean-tech” industries. New Hampshire should embrace this task proactively by taking advantage of any new economic opportunities where New Hampshire might create a niche for itself in sustainable economic development. To achieve these objectives, provision of supporting infrastructure and creation of appropriate tax incentives would be required.

Program Description

1. Mechanism (*i.e., how the policy or program achieves the desired result*): The proposed policies and programs would help businesses and agricultural interests prepare for and adapt to the impacts of climate change and the potential impacts of its solutions. Mechanisms would include assisting with a reduction in energy costs, developing new technologies for adapting to climate change, and fostering new opportunities in adaptive technologies and services. Implementation may require the development of infrastructure to support businesses adapting to climate change. Additionally, New Hampshire may need to develop disaster recovery plans in advance of anticipated climate-related events to ensure that assistance will be available throughout the recovery phases of increasingly frequent events.
 - a. Incentives
 - i. Tax incentives for installation of energy reducing features.
 - ii. Tax incentives to attract “green” businesses involved in the production of environmentally friendly products and climate-change-related goods and services.
 - b. Investments: Possible financial assistance to support green businesses in becoming established or developing new product lines.
 - c. Technical Assistance
 - i. Support in implementing proven technologies that reduce energy use and greenhouse gas emissions (free energy audits, educational outreach, etc.).
 - ii. Assistance to existing businesses in adapting to climate change (e.g., modifying ski areas for non-snow related activities like mountain biking, etc.).
2. Implementation Plan (*i.e., how to implement the specific policy or program*)
 - a. *Method of Establishment*: Tax reforms, state and local legislation, higher education curricula, research and development, business incubators, communication of energy-related best practices.
 - b. *Resources Required*: Incentives, investments, and technical assistance.
 - c. *Barriers to Address (especially for medium to low feasibility actions)*: Funding sources, capacity and diversity of affected businesses, lack of urgency, financing and training for education.
3. Parties Affected by Implementation (*i.e., residents, businesses, municipalities, etc.*)
 - a. *Parties Responsible for Implementation*: Federal, state and local governments; higher education; businesses; trade and affinity groups.

- b. *Parties Paying for Implementation:* Federal, state and local governments; businesses; investors; and consumers/clients.
 - c. *Parties Benefiting from Implementation:* Federal, state and local governments; businesses; investors; and employees/citizens.
4. Related Existing Policies and Programs (*i.e., those that address similar issues without interacting*): MicroCredit NH, Entrepreneurial Institute, Carsey Institute, NH Community Development Finance Authority, U.S. Small Business Administration and the Office of Small Business Development Centers.
 5. Complementary Policies (*i.e., those that achieve greater reductions through parallel implementation*):
 - a. *Existing:* Local economic initiatives
 - b. *Proposed:*
 6. Timeframe for Implementation: 2-4 years
 7. Anticipated Timeframe of Outcome: Ongoing

Program Evaluation

1. Estimated CO₂ Emission Reductions
2. Economic Effects
 - a. Costs
 - i. Short-term (2012)
 - ii. Mid-term (2025)
 - iii. Long-term (2050)
 - b. Savings
 - i. Short-term (2012)
 - ii. Mid-term (2025)
 - iii. Long-term (2050)
3. Other Benefits/Impacts
 - a. *Environmental:* Sustainable economies can greatly benefit the environment by reducing emissions of carbon dioxide, greenhouse gases, and other primary air pollutants in order to mitigate the effects of climate change and pollution of our ecosystems. This would lead to improved air and water quality directly as well as have more indirect effects on the fish and wildlife and the ecosystems upon which they depend.
 - b. *Health:* The health of NH residents would be affected over the long terms as the development and implementation of adaptation strategies create a more stable social and economic environment in which New Hampshire residents can live directly affecting mental and physical health.
 - c. *Social:* There may be increased social stability provided by safer communities and resilient economies. Even as climate change increases the frequency and intensity of extreme events, communities would be able to maintain the critical infrastructure and social networks that support communities. NH residents would benefit from a sustainable economy through increased social stability created by stable economic environments. By reducing energy costs and allowing for

adaptation in advance, communities will be able to maintain the jobs and revenue required to maintain infrastructure and education that provide for a long-term quality of life.

- d. *Other:* Preparing for climate change will lead to economic benefits as the costs of adaptation are expected to be offset by the avoided costs of climate change's direct impact. By preparing for and preventing climate change impacts the worst effects may not be realized, reducing the impact born by the entire economy.

4. Potential for Implementation

- a. *Technical:* There is an immediate potential for implementing this action as the technology is available and continually developing.
- b. *Economic:* There is a mid range potential for implementation as there would need to be economic incentives and start up funding.
- c. *Statutory/Regulatory:* There may be some resistance if statutory changes are necessary. There are some perceptions that reflect a lack of urgency in this area.
- d. *Social:* There could be strong support at NH residents would embrace development of sustainable economic growth.

5. Other Factors of Note:

6. Level of Group Interest: High

7. References: