



# 20 GOOD IDEAS FOR PROMOTING CLIMATE RESILIENCE

*Opportunities for State and Local Governments*



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# Introduction

*Some states and local governments are already taking tangible actions to address their growing vulnerability to severe storms, persistent drought, worsening flooding, and devastating wildfires.* Others are developing plans and policies to lay the foundation for building resilience. Still others have yet to prepare for the climate changes that are already underway. As impacts become more frequent and intense, it will become even more pressing for communities to plan for – and implement actions to respond to – climate change.

The following 20 ideas represent a collection of planning, funding, regulatory, and investment efforts already taking place in different U.S. states and communities to prepare for and reduce the risks of climate change. These ideas offer insights and lessons for others to learn from, and build upon, in developing their own responses to a changing climate.

# Planning For Resilience

## 1. Develop enhanced state Hazard Mitigation Plans that consider climate change.

***California developed an “Enhanced” Multi-hazard Mitigation Plan that incorporates consideration of the long-term threats to the state posed by climate change.*** The state’s 2013 plan considers climate impacts to public health, agriculture, and energy including heat emergencies, prolonged drought, wildfires, flooding, extreme weather events and sea-level rise. California’s 2013 hazard mitigation plan was approved by FEMA as an “Enhanced” State Mitigation Plan, making California eligible for more federal funding following a disaster declaration. Since January 2010, having an enhanced plan has enabled California to receive approximately \$168 million in federal disaster relief funds.

## 2. Encourage localities to consider climate change in local Hazard Mitigation Plans.

***Several communities have “mainstreamed” adaptation by incorporating climate change impacts in their local hazard mitigation plans.*** In March 2013, Waveland, Mississippi, updated its local hazard mitigation plan to address sea-level rise and extreme heat.<sup>1</sup> In October 2013, Baltimore, Maryland, adopted its Disaster Preparedness and Planning Project Plan, an integrated all-hazard mitigation and climate adaptation plan that looked at the city’s vulnerabilities to extreme heat and increased flooding from climate change.<sup>2</sup> This is a good idea because it incorporates consideration of the impacts of climate change into existing planning processes.

## 3. Show sea-level rise impacts on floodplain maps.

***North Carolina has studied how sea-level rise will change the state’s flood risks.*** In 2009, FEMA granted \$5 million to North Carolina to conduct a sea-level rise risk assessment. The study evaluated the state’s risk of flooding under various scenarios of potential sea-level rise (up to 1 meter) over four “time slices” through 2100, and included consideration of how flood risks would change based upon storm intensity and frequency. The state also updated and digitized their state’s Flood Insurance Rate Maps – the maps that determine what areas are subject to flood insurance purchase requirements and floodplain regulations under the National Flood Insurance Program (NFIP). The state has allocated over \$143 million to the program since 2000 and funds this effort through a real estate recordation fee.<sup>3</sup> The state will provide digital floodplain information based upon high resolution LiDAR data to show base flood elevations, flood depths, stream networks, and topography, among other features. North Carolina has offered to share its digital floodplain mapping system with other interested states.<sup>4</sup> By taking over floodplain mapping, the state was able to improve the accuracy and functionality of the maps. With more accurate floodplain maps, North Carolina communities are empowered to make better decisions about where to direct new development and how to invest hazard mitigation funds.

#### 4. Consider climate change impacts in local comprehensive plans.

*In 2011, the Florida Legislature gave local governments the option of adding an “Adaptation Action Area” (AAA) to their comprehensive plans to designate areas vulnerable to climate impacts, including sea-level rise, extreme tides, and storm surges.*<sup>5</sup> Broward County and the City of Fort Lauderdale are testing the AAA through local planning processes. In February 2013, Broward County included a climate change element in its local land-use plans. Broward County is also working with its municipalities to designate an AAA using sea-level rise maps with the purpose of developing adaptive land-use policies and increasing funding to adapt infrastructure. As part of this initiative, Fort Lauderdale is piloting the first AAA, which involves designating vulnerable areas and identifying areas for protection, accommodation, and retreat strategies. These strategies will then be incorporated into the city’s comprehensive plan.<sup>6</sup> Policy options that may be tested include overlay zones for adaptation action areas, land acquisition programs and conservation easements, transfer and purchase of development rights, and hazard mitigation program improvements.

#### 5. Create an inter-agency state commission to assess climate change impacts to the state and make adaptation recommendations.

*The New Hampshire Legislature in 2013 created the Coastal Risk and Hazards Commission<sup>7</sup> (Commission) and charged it with recommending “legislation, rules, and other actions to prepare for projected sea-level rise and other coastal and coastal watershed hazards...”<sup>8</sup>* Commission members include members of the state House of Representatives and Senate, state agencies, academic institutions, regional planning commissions, one representative from every coastal community, and representatives from the insurance, building, and emergency planning sectors. Each year until 2016, the Commission is required to submit its findings and any recommendations for legislation. The Commission has established a Science and Technical Advisory Panel and a Steering Committee to expedite their work. The first phase of the Commission’s work is to assess the state’s vulnerabilities, identify what adaptation work is occurring throughout the state, and identify barriers to incorporating climate change science and information into planning and practice. In 2016, the Commission will provide adaptation recommendations to the Legislature and present possible legislative reforms to promote adaptation at the state and local levels.

## 6. Develop regional collaboratives to coordinate adaptation planning across localities.

*Communities on both the west and east coasts have started working together to plan for climate change and to coordinate the development of adaptation strategies across regions.* In California, regional collaboratives have been developed in San Diego, Los Angeles, Sacramento and the San Francisco Bay Area to coordinate planning across counties and municipalities in each region. In Florida, the Southeast Florida Regional Climate Change Compact represents the state's first regional collaborative to address climate change adaptation. Miami-Dade, Broward, Palm Beach, and Monroe counties agreed to work together to develop climate science and coordinate on the development and implementation of adaptation strategies. The region is home to 5.5 million people, contributes \$202 billion to the state's economy, and includes 109 communities, 48 water management agencies, and 28 transportation agencies.<sup>9</sup> This regional approach helps promote cost-effective adaptation because localities can pool resources. For example, in Florida the four counties developed consistent sea-level rise scenarios and consistent methods for mapping impacts in the region. A regional approach also helps the region avoid less effective piecemeal efforts to implementing adaptation strategies. This coordination has helped these Florida counties plan protective measures for power plants and identify nature-based strategies, such as sand dune restoration, to protect against flood impacts.

# Funding and Financing Resilience

## 7. Create a green bank to increase power grid resilience.

*Green banks, like those developed in New York and Connecticut, are publicly-capitalized investment funds designed to stimulate private capital for innovative energy investments to help create a cleaner and more resilient power grid.* The NY Green Bank was established in December 2013, initially funded with \$165.6 million in state funds and \$52.9 million from Regional Greenhouse Gas Initiative (RGGI) allowance auction proceeds.<sup>10</sup> Connecticut's green bank, the Clean Energy Finance and Investment Authority (CEFIA), was created in 2011 to attract private capital by investing resources in clean energy initiatives and projects. CEFIA leverages public funding from electric bill surcharges, the state's RGGI proceeds, and federal funds supporting private energy investments, to shift Connecticut's energy system toward sustainable, low-cost financing of clean energy development.<sup>11</sup> Green bank initiatives like these can support financing of innovative energy technologies like microgrids<sup>12</sup> and encourage investment in a cleaner and more diverse energy mix, thus reducing greenhouse gas emissions while also making the grid more resilient and reliable.

## 8. Create an infrastructure bank to leverage private financing for resilience.

*New York's Infrastructure Bank was created after Hurricane Sandy pursuant to the recommendations of the NYS 2100 Commission, to coordinate infrastructure development and investment during the recovery and beyond.* The bank will centralize New York's infrastructure planning to maximize funding efficiency, rather than making funding decisions on a project-by-project basis. This approach will allow the state to prioritize projects and initiatives that strengthen critical infrastructure to withstand future threats, such as high winds and flooding among other impacts. The bank combines federal disaster relief funds and state funds, and can leverage those funds to encourage private investments to finance resiliency improvements to the state's infrastructure.<sup>13</sup>

## 9. Institute a bag fee to fund stormwater improvements and prepare for severe urban heat.

*Since 2010, Washington, DC, has charged a 5-cent fee on all plastic and paper bags used by customers in grocery, convenience, and liquor stores to generate funds to clean up the Anacostia River and support adaptation programs.* Programs include a \$7-10 per square foot subsidy for green roofs, stream restoration, and community education and outreach. As of 2013, the fee had helped to subsidize green roofs from 200 square feet up to 25,000 square feet, and is providing enhanced subsidies in priority watersheds. Green roofs can insulate buildings and increase energy efficiency, while also reducing urban temperatures. Stream restoration projects improve water quality and habitats and can reduce flood risks.

## 10. Use stormwater fees to acquire flood-prone properties.

***Charlotte and Mecklenburg County, North Carolina, use stormwater fees to implement a buyout program that aims to reduce flood damage by purchasing high-risk properties.*** The stormwater fees are levied on all water customers as determined by the location of the property, its square footage of impervious surfaces (e.g., rooftops or driveways), and the cost of providing stormwater services. The fees are used to fund three different types of floodplain buyouts: annual buyouts are selected for acquisition based on overall flood risk to the property and other benefits that can be provided to the community through acquisition; “quick buy” properties are structures that the county purchases in the immediate aftermath of damage from destructive flooding; and “orphan” property acquisitions use stormwater fees to buy properties that did not meet the criteria for a federal grant buyout, yet are bought out because they are adjacent to other properties that have been bought out. The goal of orphan property buyouts is to encourage the last homeowners living in a high-risk neighborhood to move so that the site can be restored to its natural floodplain function.<sup>14</sup> By buying out flood-prone properties, the county is reducing its emergency response costs, creating valuable recreational space for county residents, and increasing property values.

# Integrating Climate Change Into Laws

## 11. Encourage living shorelines for flood and erosion control.

***Maryland uses a multi-layered approach for encouraging living shorelines along its estuarine shorelines.*** To limit the use of armoring, Maryland enacted the Living Shorelines Protection Act, which created a statutory preference for natural erosion control over armoring. Maryland also has coordinated permitting of living shoreline projects with the U.S. Army Corps of Engineers through a Programmatic General Permit (PGP). Under the PGP, Maryland has authority to verify federal tidal wetland permits for small-scale projects. If a project falls under a threshold level of environmental impact, the Maryland Department of the Environment can jointly issue the federal permit and state license. This permitting framework reduces regulatory hurdles for living shoreline projects because the majority of projects (85%) only require regulatory review by state agencies. The state also implements an array of supporting programs, including training of local government officials, contractors, and landowners; and provides grants and loans to fund design and construction of living shoreline projects. So far, the program has successfully encouraged living shorelines; Maryland regulators estimate that of the nearly 1,000 permits issued every year for erosion-control structures only three were to replace bulkheads or place rip rap. Living shorelines preserve valuable coastal resources, improve habitat and water quality, while also naturally controlling erosion and flooding.

## 12. Limit development and redevelopment in coastal high hazard areas.

***Maine limits development and redevelopment of properties adjacent to sandy beaches.*** The state's "Sand Dune Rules" require that structures located in coastal high hazard areas (i.e., Zone V) be moved inland if they are substantially damaged more than one time in a storm event. If the structure is damaged a second time, rebuilding is prohibited, unless the landowner can relocate the structure out of Zone V. For new development, property owners must also submit a detailed site plan demonstrating compliance with the rule's setback and density restrictions. The site plan must assess the project's vulnerability to two feet of sea-level rise over the life of the structure. The Department can condition or deny a permit where the project site will not be stable given two feet of sea-level rise over the next 100 years.<sup>15</sup> Along highly dynamic and eroding shorelines, this type of law provides a mechanism for regulators to encourage landowners to relocate development out of harm's way.

### 13. Use a development checklist to ensure that new development is “climate smart.”

*Boston instituted a requirement that new development projects consider the impacts from forecasted climate conditions over the expected life of the project.* In November 2013, the Boston Redevelopment Authority added the requirement that some large-scale development projects complete a Climate Change Preparedness and Resiliency Checklist during the initial project filing.<sup>16</sup> The checklist<sup>17</sup> requires applicants to answer questions about how the project will respond to higher temperatures and heat waves, and potential flooding from sea-level rise and increasing storm intensity. The checklist also includes sections for applicants to detail the measures the developer will take to mitigate those impacts. Mitigation measures related to increasing temperatures and heat waves include: mechanisms to reduce building energy consumption and demand on utilities and infrastructure; strategies to support building operation during periods of utility interruption; measures to reduce the urban heat island effect; and measures to accommodate more rainfall and extreme storm events. For sea-level rise and storm events, strategies include flood proofing, elevating the structure, elevating critical building systems, and installing measures to reduce wind and wave impacts. The Boston Interagency Green Building Committee reviews all checklists and ensures the project’s consistency with the steps outlined in the Climate Change Preparedness and Resiliency Guidelines.<sup>18</sup> A checklist approach requires developers to assess the vulnerability of the project to future climate impacts, but also provides developers with the flexibility to choose different types of measures to mitigate impacts to the project.

### 14. Provide water resource managers with additional authority to deal with drought.<sup>19</sup>

*In 2003, New Mexico passed legislation providing the state’s Active Water Resource Management (AWRM) program additional authority to address persistent drought in the region.* The legislation aimed to replace the lengthy water rights process and to give more authority to the state engineer (a state official that issues permits for new appropriations of surface water).<sup>20</sup> New Mexico’s water resources are already fully or overly appropriated, and projections warn of continued water scarcity in the future. AWRM provides the state engineer with a variety of powers to manage limited water resources, such as powers to allow water transfers, limit diversions, require measuring and metering of water use, create water districts and appoint water masters, and develop water master manuals. Through measuring and metering, the AWRM ensures that water availability and use are measured, and then this information is utilized to more efficiently manage water resources. The AWRM regulations also allow for the appointment of a water master with the authority to develop district-specific rules to administer and protect water rights in priority water basins.<sup>21</sup> These water masters are empowered to use flexibility within the existing system of priority administration to manage water resources during future drought cycles. The New Mexico Supreme Court upheld these powers in 2012.<sup>22</sup>

### 15. Require cool roofs on new homes.

*In December 2013, the Los Angeles City Council unanimously passed an amendment to the city’s building code that requires all new residential roofs to be “cool” roofs.* Cool roofs reflect more of the sun’s energy than traditional roofs, reducing energy use for those homes and reducing temperatures outside as well. Cool roofs in large numbers could help to lessen the city’s “urban heat island,” a phenomenon in which concrete and building density make urban areas hotter than surrounding less-developed areas. The Los Angeles water and energy utility offers a rebate for cool roofs to offset some of the costs of installation. Dallas, Texas, also instituted a cool roof requirement as part of its green building ordinance. Changes to the city’s building code require single family homes and duplexes to meet the equivalent of LEED certification or other similar standards, or meet a suite of specific requirements covering water conservation, energy efficiency, stormwater management, and other factors. Among those requirements is that new residences have “Energy Star” certified roofs that make the building more energy efficient.

# Smart Investment Decisions

## 16. Consider climate impacts in state-funded projects.

*The governors of both Maryland and Delaware have issued Executive Orders directing state agencies to consider climate change impacts in the siting and design of state-funded projects.* The Maryland orders require that new and rebuilt state structures be elevated two feet above the 100-year base flood level. Similarly, the Delaware executive order directs all state agencies to incorporate climate adaptation measures in the siting and design of state-funded projects.<sup>23</sup> These orders will not only ensure the long-term sustainability of new state projects, they will also help state agencies learn by doing. By implementing adaptive projects on the ground, state agencies can build expertise that they can share with communities and private entities.

## 17. Encourage local governments to budget for climate adaptation as part of capital improvement projects.

*In September 2013, Dane County, Wisconsin, adopted a capital budget that included \$1 million to fund adaptation measures, citing anticipated changes in temperature and precipitation from climate change.* Funding was included to purchase “blizzard busting” trucks and trimming equipment to address storm-downed trees, and to install larger culverts to reduce flood impacts from higher stream flows.<sup>24</sup>

## 18. Use coastal buybacks to reduce vulnerabilities to sea-level rise.

*A bill has been proposed in Massachusetts that would help the state prepare for the impacts of climate change through a comprehensive adaptation management plan and a coastal buyback program.*<sup>25</sup> The bill directs the secretary of energy and environmental affairs and the secretary of public safety to develop the plan under the guidance of a new interagency advisory committee. In addition to setting out detailed requirements for a vulnerability assessment and adaptation management plan, the bill also establishes a coastal buyback program, which would authorize the state to purchase vulnerable land from willing sellers. Land eligible for acquisition by the state includes land adjacent to areas affected by tides, on barrier beaches, or in velocity zones of floodplains (Zone V), or land on which structures have been substantially and repeatedly damaged by severe weather. Land purchased through the program would be used for conservation or recreation, and it could be leased to cities and towns that agree to maintain the land for those purposes. The bill further aims to support regional adaptation by establishing a grant program. The program would provide financial assistance to regional planning agencies for the development and implementation of regional adaptation plans. The bill was inspired by an announcement by Massachusetts Governor Deval Patrick of a \$50 million plan to help cities and towns increase their resilience to climate change.<sup>26</sup>

## 19. Create an emergency gas reserve.

*In October 2013, New York Governor Andrew Cuomo announced the creation of a Strategic Gasoline Reserve pilot program to prevent fuel shortages during severe weather and other emergencies.* The \$10 million pilot program is part of the state's Fuel NY initiative, launched in response to gasoline supply shortages that occurred during Hurricane Sandy that caused disruptions to emergency response and business operations. The reserve will store three million gallons of gasoline using private industry capacity on Long Island, and it will be used to supplement fuel supplies during an emergency.<sup>27</sup>

## 20. Upgrade wastewater treatment facilities to turn waste to energy.

*Both the Milwaukee Metropolitan Sewerage District and the Boston Water Resources Authority have taken advantage of wastewater byproducts to create a renewable power source for their utilities.* The wastewater treatment facilities are installed with anaerobic digesters that turn waste into methane gas that is used to power the plants. In Boston, the methane is piped to boilers that heat the buildings on site, and the steam from the boilers generates about three megawatts of electricity. In Milwaukee, the South Shore treatment plant is using its digesters' methane as part of a strategy to achieve complete energy self-sufficiency by 2035.

# Endnotes

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