

Appendix H: Adaptation and Resilience Strategy Components

Building Capacity

The “Building Capacity” theme comprises of four strategies related to statewide planning, consideration of future conditions in state decision making, enhancement of general understanding of climate change improving the public’s adaptive capacity, and identifying options for financing adaptation and reducing or shifting risk.

Commit to Creating, Implementing, and Updating a Comprehensive and Equitable State Climate Change Adaptation and Resilience Plan

New York is vulnerable to a variety of climate hazards, many of which will become more severe as the climate changes and results in substantial property loss (Table H-1). Note that the values reported in the table include only personal and public property losses and does not include long-term economic losses, medical costs, or loss of life. Despite this vulnerability, New York has not committed substantial resources to comprehensive adaptation planning and coordination. The State should couple its nation-leading goals to mitigate climate change with similarly ambitious goals to adapt to it.

Table H-1. Average Annual Property Loss from Severe Hazard Events in New York, 1996–2017

Hazard	Avg. loss	Hazard	Avg. loss	Hazard	Avg. loss
Flooding	\$67,100,000	Ice Storm	\$1,670,000	Lightning	\$176,000
Wind	\$11,300,000	Coastal Hazards	\$1,620,000	Heat Wave	\$86,000
Snowstorm	\$9,400,000	Cold Wave	\$836,000	Tsunami/Seiche	\$18,000
Hail	\$3,330,000	Hurricane	\$470,000	Wildfire	\$4,640
Tornado	\$1,810,000				

Components of the Strategy

- **Provide executive-level coordination of adaptation and resilience activities:** Appoint a chief state resilience officer and convene an adaptation and resilience sub-cabinet.

No single executive within New York government is focused entirely on coordinating the activities of the many state agencies and authorities with a role in adaptation and resilience. The governor should appoint a CSRO and charge them with convening an executive-level adaptation and resilience sub-cabinet, ensuring interagency communication and coordination on adaptation

and resilience activities, and development of a comprehensive climate change adaptation and resilience plan.

- **Develop an adaptation and resilience plan:** Prepare for development of a comprehensive state climate change adaptation and resilience plan.

The recommendations included in this document address only a small number of well-understood hazards and reflect recommendations made during prior initiatives and do not address the wide range New York’s vulnerabilities. The governor should assign the CSRO the task of overseeing development of a comprehensive statewide climate change adaptation and resilience plan.

- **Complete vulnerability assessments and adaptation plans:** Complete preliminary agency vulnerability assessments and adaptation plans. Identify and prioritize state adaptation and resilience projects.

DEC is coordinating development of assessments of climate change risks to assets and strategic missions for all agencies and authorities, with support from the OGS and consultants. DEC should prioritize completion of the remaining draft agency vulnerability assessment reports. Funding for current and planned consultant support has been allocated from the EPF Climate Change Mitigation and Adaptation Account.

- **Continue assessments and research:** Continue ongoing update to New York climate change assessment and initiate other research.

Effective assessment, planning and regulation are dependent on actionable science-based projections, down-scaled to the lowest feasible level, and other research. NYSERDA or another agency should undertake comprehensive climate assessments on a regular basis, and DEC or other agencies should undertake or fund additional research as needs are identified.

Incorporate Equitable Adaptation and Risk-Reduction Considerations into Relevant State Funding and Regulatory Programs, Projects, and Policies

Incorporating equity into adaptation considerations in state programs is important for ensuring Disadvantaged Communities are protected against the effects of climate change. Implementation of this strategy would include incorporating equity and justice considerations into these programs, consistent use of science-based projections in state decision making, and development of climate-resilient design guidelines for state-funded projects, among others.

Components of the Strategy

- **Provide guidance on use of climate change projections:** DEC should release guidance describing projected climatic changes to support relevant decision making.

CRRA, as amended by the Climate Act, requires DEC to, among other things, take action to support state agencies and other entities assess climate change risk on proposed projects.¹ DEC should release guidance on use of projections by state agencies, including coordinating activities of the Interagency Climate Adaptation and Resiliency Work Group (ICARWG)² and DEC internal work groups to identify those climate parameters of most relevance to agency decision making and develop guidance on their application. Upon completion of such guidance, the governor should direct all agencies to apply these projections where appropriate.

- **Coordinate infrastructure investments:** The CSRO should provide recommendations to the Executive Chamber to adopt a process to ensure integration of federal, state and local infrastructure investments to ensure efficient use of land and other resources, and consideration of adaptation and resilience. No mechanism currently exists to ensure that state investments, particularly in energy, transportation and housing infrastructure, and economic development are aligned to maximize efficient use of land and energy, and to reduce risks to climate hazards. The CSRO or other designated official should provide recommendations to the Executive Chamber on policies and procedures required to ensure integration and efficiency of state infrastructure and other investments.
- **Evaluate equity and justice:** The CSRO should develop a formal policy on evaluation of equity and justice impacts of state adaptation and resilience decisions and provide guidance on use of such evaluation to prioritize action in Disadvantaged Communities.

New York's evaluation of effects of state decisions, particularly infrastructure investments, on Disadvantaged Communities, communities of color, or LMI households would gain consistency and transparency through development of a formal evaluation policy and framework. The policy shall include guidance on selection of relevant metrics. Upon completion of the report on barriers and opportunities facing Disadvantaged Communities currently under development and due by January 2022, DEC and NYSERDA should proceed with development of an evaluation framework and policy for evaluation of equity and justice impacts of state decisions.

¹ Community Risk and Resiliency Act § 17-a.

² The Interagency Climate Adaptation and Resilience Work Group is a self-directed body comprising representatives from more than 20 state agencies and authorities. DEC convenes the ICARWG to facilitate information sharing and other activities related to adaptation.

- **Adopt resilient design guidelines:** OGS and DEC should convene a work group to adopt climate resilient design guidelines for state-funded projects.

Adoption of climate-resilient design guidelines for state-funded projects would secure state investments against future hazards while providing a model for privately funded projects and creating demand for skilled design professionals and tradespeople. OGS, in consultation with DEC, should convene a work group of infrastructure and economic development agencies, including staff with appropriate expertise in resilient design, for the purpose of adopting climate-resilient design guidelines for state-funded projects.

- **Amend the Smart Growth Public Infrastructure Policy Act:** The State should amend the Smart Growth Public Infrastructure Policy Act and similar statutes to require consideration of climate hazards and development of guidance by relevant agencies.

The 2010 Smart Growth Public Infrastructure Policy Act (ECL Article 6) requires public infrastructure agencies to consider several smart growth criteria, including mitigation of future risk due to sea-level rise, storm surge and flooding, before undertaking, funding, approving or supporting a public infrastructure project. The State should amend the Smart Growth Public Infrastructure Policy Act to require consideration of mitigation of all relevant climate hazards and require relevant agencies to develop implementation guidance.

- **Enhance design capacity:** OGS should convene work group to establish policies and procedures to require design professionals and contractors on State-funded projects to consider future climate conditions.

Incorporation of future conditions and natural resilience measures into state-funded projects will require the design community to be knowledgeable of forward-looking design guidelines and to understand applicability of natural resilience measures. Such policies and procedures should include consideration of changes in storm intensity and frequency and that design professionals are qualified to incorporate natural resources and nature-based features into project design.

- **Assess climate vulnerabilities during land and water planning:** DEC, DOS and other agencies that fund land or water planning activities should adopt policies to ensure all state-funded land and water use plans include assessment of climate vulnerabilities and, as appropriate, strategies to promote resilience and reduce risk.

State agencies provide funding to support a variety of regional and municipal plans related to land and water use, including, but not limited to, comprehensive plans, source water protection plans, and local waterfront revitalization plans. DEC, DOS and other agencies that fund land or water

planning activities should adopt policies to ensure that state-funded plans include assessment of climate vulnerabilities and resilience strategies. The ICARWG should serve as a forum for reporting on agency activity in this area and information sharing.

Strengthen Meaningful Community Engagement and Public Education and Build Adaptive Capacity across All Sectors

Public awareness of the need for the Climate Act and its implementing actions is critical to its ultimate success. Ensuring individual and household resilience will be crucial in reducing risks associated with climatic events. Climate adaptation provides significant opportunity for vocational training and job growth that can be targeted to vulnerable communities and those in transition from reliance on fossil-fuel based industries.

Components of the Strategy

- **Raise student and public awareness:** The State Education Department should convene a work group to establish a campaign to build student and public awareness of climate change effects and solutions.

Public education and awareness programs are necessary to ensure public understanding and acceptance of the need for the Climate Act, and enhanced public understanding of risks would allow more informed decisions to reduce risks to health and safety. DEC has appointed a strategic communications director for climate. The State Education Department should convene a work group to develop and implement a comprehensive public education and awareness campaign.

- **Provide disaster preparedness and response training for building operations staff:** NYSERDA and partner agencies should establish a program to train building operations staff in disaster preparedness and response.

Building operations staff, such as multi-family building superintendents, can enhance building resilience and assist residents in disaster preparedness and response, particularly to address risks associated with sea-level rise, stormwater runoff, flooding, extreme heat and high winds.

NYSERDA and partner agencies should launch training to enhance building operations staff capacity to prepare for and react to severe events.

- **Establish a resilience audit program:** NYSERDA, in consultation with DEC, HCR, OTDA, and the Division of Homeland Security and Emergency Services (DHSES) should establish a residential and small business resilience audit program.

The resilience audit program should provide for grants, low-cost loans or tax exemptions to encourage homeowners and small businesses to undertake risk-reduction measures prior to a dangerous event. A resilience audit program could be modeled on, and perhaps combined with, energy audit programs currently available for residential building owners, farmers and tenants. NYSERDA, in consultation with DEC, HCR, OTDA, and the Division of Homeland Security and Emergency Services (DHSES), should incorporate resilience audits into existing energy audit programs, and the state should enact legislation to establish programs to reduce individual costs of risk-reduction measures.

Identify and Evaluate Options for Supporting Equitable Adaptation and Resilience Practices and Projects, and to Enhance Insurance Protection

The costs of dealing with the effects of climate change will be significant and will continue to rise as the planet warms. These costs may include investments to reduce risk or costs to respond to, and recover from, natural events, exacerbated by climate change. Unfortunately, the benefits of these investments are often difficult to quantify as they generally consist of avoided remedial costs, and the payback is generally realized only after an event occurs, or some dangerous threshold is crossed. Although insurance can serve to spread risk, strategies to enhance insurance coverage must include consideration of renters and owners of at-risk properties who do not participate in the National Flood Insurance Program, and the potential effects of insurance premium increases on low-income households. The components of this strategy are intended to secure the funds necessary to make necessary investments in resilience and enhance insurance protection.

Components of the Strategy

- **Create a resilient infrastructure fund:** The State should create a resilient infrastructure fund through bonding.

The Environmental Bond Act to be placed on the 2022 ballot likely represents the best opportunity to secure funding for many of the actions recommended in this scoping plan. All programs funded by a bond act, if approved, should include appropriate focus on Disadvantaged Communities.

- **Establish an insurance-premium surcharge for high-value, high-risk properties:** Impose a surcharge on insurance premiums for select lines of insurance to support risk-reduction and adaptation projects.

Insurance premiums for select lines of insurance affected by climate hazards will generate revenue for risk-reduction and adaptation projects. One study estimated that a 1.5% surcharge on property-casualty insurance on high-value, at-risk properties could generate more than \$2.7 billion in revenues over ten years, which could be leveraged to address a substantial share of unmet adaptation and resilience needs. The State should enact legislation to approve a surcharge on property insurance premiums for high-value, at-risk properties to raise needed revenue to support risk-reduction projects and to disincentivize construction of such properties.

- **Authorize community preservation funds for all municipalities:** The State should enact legislation authorizing all municipalities to establish community preservation funds.

Community preservation funds may be used for adaptation and resilience projects within the communities or their drinking water watersheds, or for upstream flood mitigation. The General Municipal Law and Town Law authorize establishment of community preservation funds for individual municipalities. Creation of such funds in additional municipalities can be a slow and burdensome process. The State should enact legislation to authorize all counties and municipalities to create, with voter approval, community preservation funds without the need to seek further approval from the Legislature. The authorizing statute should specify that community preservation funds may be used for adaptation and resilience projects within the boundaries of the county or municipality, or outside the county or municipality boundaries to protect their drinking-water source or to mitigate upstream flood risk. The statute should also specify that community preservation funds may be raised via bonding, in addition to property-transfer taxes, and that the funds may be used as match for federal, state or other funding opportunities.

- **Focus anchor-institution investment on community benefit and wealth building:** DOH should encourage anchor institution (large, usually nonprofit organization tethered to their communities, like universities, medical centers, or local government entities) to focus community benefit investments on projects to equitably address climate change and build local community wealth.

Hospitals and other anchor institutions have an opportunity to enhance community resilience and public health through investment of community benefit funds. DOH should convene a work group of relevant agencies, anchor institutions and stakeholders to develop a comprehensive strategy to encourage investment by anchor institutions and community wealth building.

- **Explore hazard mitigation funding alternatives:** The Division of Budget, or other appropriate agency, should report on options to enhance hazard mitigation funding and to prefund disaster recovery, and to transfer catastrophic risk to the insurance and capital markets.

Although at least one authority (MTA) uses catastrophe bonding to reduce risk, financing and risk-transfer models related to damage to physical and economic resources due to climate-enhanced catastrophic events have not been well examined for possible broader use by New York. The Division of Budget or other appropriate agency, as designated by the governor, should provide an analysis of options and recommendations to ensure availability of funding in the event of climatic disaster and to transfer climate risks from state taxpayers.

- **Improve insurance coverage:** DEC and partners at all levels of government should implement strategies to increase take-up rates of flood insurance and other coverage related to climate hazards.

A substantial number of New York property owners do not carry flood or other hazard insurance, despite the significant risk. DEC and partners should review available information and, if necessary, survey the amount and types of coverage purchases by property owners and develop strategies to increase participation.

- **Restrict anti-concurrent causation clauses:** The State should adopt legislation to prohibit or restrict anti-concurrent causation clauses for sewer backup insurance coverage where flooding is the cause.

In a 2015 report, ordered by the Legislature, the Department of Financial Services recommended anti-concurrent causation clauses be prohibited for sewer backup insurance, but the Legislature failed to act on this recommendation. The State should adopt legislation to prohibit anti-concurrent causation clauses for sewer backup insurance coverage where flood is the cause.

Communities and Infrastructure

The Communities and Infrastructure theme includes five strategies to assist municipalities prepare for and react to increasingly severe climate hazards. These initiatives include recommendations to expand State support for regional and local planning, and to assist municipalities in their efforts to incorporate future conditions into local planning and regulatory decisions. This theme also includes specific recommendations to address risks due to flooding and extreme heat, and to ensure resilience of the energy system.

Provide State Agency Planning and Technical Support for Equitable Regional and Local Adaptation and Resilience Plans and Projects

Local officials have consistently advised that they lack resources, including not only funds, but technical expertise and access to information and decision-support tools to support effective adaptation planning. This strategy would accelerate current efforts to provide guidance, and financial and technical support for community and regional planning and implementation, for mainstreaming of climate change considerations into local planning and regulatory programs, and for consideration of local economic resilience under future climate conditions in planning decisions. This strategy would also provide planning for climate-induced migration, both into and within the State.

Components of the Strategy

- **Develop local adaptation capacity:** DEC, DOS and other agencies should support development of local resilience, continuity and adaptive capacity; and consideration of climate change in local regulatory and planning programs.

All agencies should accelerate current efforts to provide guidance, and financial and technical support for community and regional planning and implementation, and for mainstreaming of climate change considerations into local planning and regulatory programs. DEC's Climate Leadership Coordinators should focus on supporting municipal adaptation planning and implementation, and DOS should continue to support county-level adaptation planning. DEC, DOS and DHSES should actively update guidance and requirements for funded local and regional planning to ensure consideration of future conditions. The ICARWG should continue to facilitate information sharing and interagency coordination to support these program updates. As feasible and appropriate, materials should be made available in other languages, in addition to English.

- **Promote local economic resilience:** DOS, ESD, and other relevant agencies should support development of local economic resilience strategies, climate-adapted economic development, business continuity planning, and local government climate financing and budgeting.

DOS, ESD, and other relevant agencies should continue to develop and expand programs, such as the BOA program and DRI, to provide climate-adapted economic development, particularly in Disadvantaged Communities or those in transition from a fossil-fuel based economy, and to provide guidance on business continuity planning.

- **Deploy online tools:** DEC and partner agencies, including DOS, NYSERDA, DHSES, and the Office of Information Technology Services, should support deployment of online tools to facilitate vulnerability assessments, adaptation planning and implementation.

Local governments and regional entities require decision-support tools to facilitate vulnerability assessments, and to aid in adaptation planning, project management, and selection of metrics. DEC and partner agencies, including DOS, NYSERDA, DHSES, and the Office of Information Technology Services, should accelerate current efforts to develop and deploy online tools to support local and regional facilitation. High-priority projects include an online adaptation portal for municipalities, a drought warning and communication tool and updates to DEC's Climate Smart Resiliency Planning self-assessment tool. The ICARWG should continue to facilitate and coordinate these efforts.

- **Support recovery planning:** DOS and DEC should support community-led pre-event, long-term recovery planning.

Pre-event recovery planning allows communities to consider long-term plans to benefit the entire community and that consider future conditions before disaster strikes. DOS and DEC should adapt applicable Federal Emergency Management Agency (FEMA) planning guidance³ for New York. Consideration should be given to supplement current funding to provide additional planning assistance through DEC's Climate Leadership Coordinators as local interest increases. Funding for implementation of pre-event long-term recovery plans, including consideration of community-led relocation, with strategic property buy-outs, strategic reuse of industrialized waterfronts, and economic repurposing of buy-out properties and stranded coastal assets should be enhanced.

- **Consider relocation and buyouts:** NYSERDA, in consultation with DEC, HCR, and DOS, should analyze relocation and buyout of properties as potential alternatives to electrification of at-risk buildings.

Electrification or similar investments in publicly owned buildings located in at-risk areas may not warrant the investment. NYSERDA, in consultation with DEC, HCR, and DOS, should develop criteria to determine if relocation, including property buyouts, is a more protective and cost-effective alternative to publicly funded electrification of some individual buildings.

- **Establish post-disaster strike teams:** The CSRO should establish strike teams to equitably assist municipalities with resilient post-disaster recovery.

Interagency teams should be trained in anticipation of deployment to disaster areas to facilitate recovery efforts. The governor should designate a lead agency for establishment of post-disaster

³ Federal Emergency Management Agency. (2017). Pre-Disaster Recovery Planning Guide for Local Governments. FEMA Publication FD 008-03.

strike teams, and assign a work group, comprising DHSES, DOS, DEC, and the Governor's Office of Storm Recovery, to develop a work plan to prepare such teams for deployment.

- **Plan for climate migration:** DEC should convene a work group, to include NYSERDA, DOS, HCR, DHSES, Governor's Office of Storm Recovery, subject experts from SUNY or other universities, and refugee resettlement agencies, to develop a strategy to address climate migration, including consideration of differential effects of relocation strategies in disadvantaged communities.

Significant immigration to the state by those escaping disasters, such as hurricanes and droughts, and those attracted by, for example, the state's abundant water resources, can be expected.

Migration within the state as residents move to escape hazards such as rising seas or urban heat may also occur. DEC should convene a work group, to include NYSERDA, DOS, HCR, DHSES, Governor's Office of Storm Recovery, subject experts from SUNY or other universities, and refugee resettlement agencies, to develop a climate migration strategy.

Evaluate Opportunities to Ensure Equitable Consideration of Future Climate Conditions in Land-Use Planning and Environmental Reviews

Work to mainstream consideration of climate change in environmental reviews is ongoing, but much remains to be done, and local governments require more explicit authority to consider climate change and biodiversity in comprehensive plans.

Components of the Strategy

- **Provide guidance on assessment of climate risks:** DEC should accelerate ongoing efforts to develop or update guidance for mitigation of climate change risks in permit and SEQRA reviews; and amend the SEQRA Handbook and workbooks.

DEC should accelerate ongoing efforts to incorporate consideration and mitigation of climate change risks in permit and SEQRA reviews and complete revisions to all relevant permit guidance, workbooks and the SEQRA Handbook.

- **Facilitate adaptation projects:** DEC should amend the project review process to facilitate approval of climate adaptation projects.

DEC should adopt a policy to include identification of adaptive, carbon-neutral or resilient projects, and procedures to facilitate project review, without jeopardizing opportunities for meaningful public engagement in the review process. The review should also include review of a potential incentive program for carbon-neutral or resilient development.

- **Consider climate and biodiversity in comprehensive plans:** Amend relevant legislation to include consideration of climate mitigation, adaptation and resilience, and biodiversity as potential topics in comprehensive plans.

State law enumerates the topics that municipal comprehensive plans may include. The State should amend relevant statutes to explicitly empower municipalities to address climate change mitigation, adaptation and resilience, and maintenance of biodiversity in comprehensive plans.

Develop Policies, Programs, and Decision Support Tools to Reduce Risks Associated with Coastal and Inland Flooding

Flooding is New York’s primary climate hazard, and we can expect both insured and uninsured losses to increase as sea level continues to rise and more frequent extreme precipitation events result in more extensive and deeper floods, including dangerous flash flooding in urban areas not previously considered flood prone. Components of this strategy would provide improved map and other information resources, funding and regulations to reduce flood risks.

Components of the Strategy

- **Increase pace of floodplain assessments:** Increase the pace of local floodplain assessments to identify flood hazards.

DEC has funded approximately 48 local floodplain assessments, which provide a solid foundation for projects to reduce flood risk, including capacity to consider future conditions. DEC should increase the pace of completion of local floodplain assessments.

- **Right-size infrastructure:** DEC should hire a statewide technical assistance coordinator to support municipalities in right-sizing culverts and bridges to reduce flood risk and improve habitat connectivity.

Incorrectly sized stream crossings (culverts and bridges) can create significant flood risks and negatively affect habitat connectivity for aquatic and terrestrial species. Analysis and flood modeling require technical expertise, and municipalities face challenges in using available data and technical analysis to prioritize stream-crossing projects and proceed to implementation, while fully considering future risks. DEC should hire a statewide technical assistance coordinator to support municipalities in prioritizing and implementing right-sizing projects. Funding for capital projects for projects designed to address future flood risk should be expanded.

- **Support Community Rating System participation:** DEC and DHSES should provide support and incentives for municipal participation in the Federal Emergency Management Agency's Community Rating System.

The FEMA Community Rating System provides for reduced National Flood Insurance Program premiums for property owners within participating communities. However, the program has been criticized as a means by which risk taken by owners of at-risk properties are borne by all residents of the municipality. DEC and DHSES should continue to encourage and support municipal participation in the Community Rating System while seeking approaches to minimize costs to residents at large.

- **Strengthen State building code:** DOS should amend state building code to account for sea-level rise and enhanced riverine flooding, and potential use of innovative structures, such as amphibious buildings.

The lack of flood risk maps that account for future riverine flows is an impediment to including future flood risk in the code, but additional measures of safety to account for projected sea-level rise could be added to the code based on current maps. DOS should update the Uniform Code to account for projected sea-level rise and to provide for use of innovative construction techniques to reduce flood risk, including use of amphibious buildings.

- **Develop statewide mapping strategy:** DEC should develop a statewide flood-risk mapping strategy.

Current flood insurance rate maps and other mapping products do not indicate the projected wider and deeper floodplains expected as severe precipitation events become more common. DEC and other agencies should continue ongoing work to reduce risks of flooding, including through more effective mapping and development of a statewide mapping strategy to include analysis of the potential changes in riverine flood risk, an inventory of available mapping and related data, and an assessment of the potential for scaling results of novel mapping techniques that have been piloted in small areas to larger portions of the state. Development of this strategy should include exploration of the use of multi-hazard, climate-informed datasets on flood hazard to account for pluvial flood risk, combination flooding due to sea-level rise coupled with extreme precipitation, and other climate effects.

- **Digitize dam failure inundation maps:** DEC should digitize dam failure inundation maps and integrate with other geographic resources to improve emergency planning and response, and explore approaches to use these maps to enhance public information and outreach efforts.

Dam failure inundation maps are not currently digitized, and some are out of date. Digitization would allow ready integration with other geographic resources to improve emergency planning and response. DEC should 1) fund a position to advance dam failure inundation map digitization, 2) complete map updates and digitization, and 3) and implement an outreach strategy to use these maps to enhance public information and outreach efforts.

- **Support dam removals:** DEC should support dam removals that reduce flood risk and improve aquatic habitat quality.

Decisions regarding each individual dam represent a complex intersection of history, ownership, community perception, and trade-offs among flood-risk reduction, potential for hydropower, and fish and wildlife habitat. DEC has created a Dam Removal Working Group and directed it to provide recommendations to streamline DEC processes and practices regarding dam removals, outreach to dam owners and stakeholders, and potential funding opportunities. DEC should 1) commence implementation of the recommendations of its Dam Removal Working Group (due June 2022), 2) adopt a policy on dam removal, including consideration of creation of a general permit for dam removal, and 3) hire a technical coordinator to guide dam owners through the evaluation and permit process. State agencies that own dams should demonstrate leadership by example by undertaking a comprehensive review of dams on state property and initiating removals where appropriate.

Develop Policies and Programs to Reduce Human Health Risks Associated with New Patterns of Thermal Extremes

In most years, more Americans die from the effects of extreme heat, than from flooding, and frequency of extreme heat events is one of the most direct effects of global warming. At the same time, changes in atmospheric circulation patterns, perhaps precipitated by loss of sea ice, may lead to periods of extreme cold in New York. Components to this strategy include support for cooling centers, heat emergency planning, weatherization, and access to thermal resilience programs for vulnerable populations.

Components of the Strategy

- **Develop cooling centers and enhance accessibility:** DEC and DOH should continue to support development and operation of cooling centers, including assessments to increase accessibility via public transportation.

DEC should continue to provide, and to the extent feasible, expand funding for development and operation of cooling centers. Cooling center planning should include an assessment of accessibility via public transportation and prioritize placement in vulnerable communities. DOH should continue to promote cooling centers and cooling center locations and continue work to improve community access to cooling centers during heat events and when public health conditions allow.

- **Develop regional and local heat emergency plans:** DOH should support development of regional and local heat emergency plans that prioritize the health and stability of vulnerable communities.

DOH has developed county heat and health profiles that include temperature trends and projections, health effects, population vulnerability and availability of adaptation resources for every county except New York City. DEC's Climate Smart Community grants can be used for heat-emergency planning, but funding is limited, and uptake is low. DOH should build upon its county heat and health profile reports to develop regional and local heat emergency plans that prioritize the health and stability of disadvantaged communities.

- **Strengthen weatherization requirements:** DOS should amend the state building code to require more effective weatherization from thermal extremes.

The DOS should amend the Energy Conservation Construction Code to require high-performance building envelopes in new construction and, as applicable, additions and alterations, of residential and commercial buildings.

- **Enhance thermal resilience in vulnerable populations:** OTDA and NYSERDA should promote and facilitate access to programs that provide cooling, weatherization, and solar assistance to vulnerable populations.

OTDA's Home Energy Assistance Program provides air conditioners or fans to low-income households that include an individual with a medical condition that is exacerbated by heat, and the Weatherization Assistance Program provides energy efficiency measures to low-income homeowners, renters and owners of rental buildings. NYSERDA provides incentives for

residential solar installation. The State should consider the need to expand funding and eligibility for weatherization assistance and the feasibility of providing high-efficiency cooling units, including heat pumps, and addressing energy costs and insecurity, and additional barriers to their use. OTDA and NYSERDA should seek opportunities to integrate their respective weatherization and solar installation programs.

- **Conduct outreach to reduce risks of extreme heat:** DOH and others should assess adequacy of current advisories and adopt a plan to address deficiencies.

DOH should convene an interagency work group, comprising DOH, DEC, DHSES and other relevant entities to assess adequacy of current extreme heat advisories and adopt a strategic outreach plan to address identified deficiencies. The strategic plan should include strategies to provide actionable information to outside workers and their employers, vulnerable individuals, and other key stakeholders, and training and guidance on reduction of thermal risks to local public health staff, local officials and other partners.

- **Adopt a green infrastructure plan:** DEC and others should develop a strategy to promote and incentivize use of green infrastructure and natural resources, including urban forests, to reduce climate risks.

The State does not have a comprehensive, interagency plan to expand, promote and incentivize use of natural resources, nature-based features, shade structures, cool roofs, cool pavements, parks and spray pads to reduce individual risks and mitigate neighborhood climate impacts associated with extreme heat, flooding and stormwater runoff. Expanded green infrastructure programs and other programs to encourage or require resilient construction would drive demand for skilled design professionals and tradespeople. DEC should convene a work group, comprising DOH, DOS, OPRHP, DHSES, DOT, Environmental Facilities Corporation (EFC) and other relevant entities, to develop a strategy to promote and incentivize use of green infrastructure and natural resources, including urban forests, to reduce climate risks, and prioritizing investment to benefit disadvantaged communities. The strategy should include work with the Army Corps of Engineers to develop regional permits, or specific Nationwide Permit 54 regional conditions, to incentivize use of natural and nature-based features to enhance resilience and ecosystem benefits. All agencies should review existing and planned funding programs to identify opportunities to directly fund, prioritize or otherwise incentivize use of such measures, particularly in disadvantaged communities.

Ensure the Reliability, Resilience, and Safety of a Decarbonized Energy System

The increasing frequency of severe climatic events has exposed vulnerabilities in the state's energy system and the need to improve the reliability and resilience of the energy system, as well as the resilience of those who depend on that energy system in buildings and for transportation. Assessment of system vulnerabilities to increasing climate hazards and investment to ensure system resilience will be required. Energy system providers must continually reassess infrastructure vulnerabilities across the entirety of their service territories to determine appropriate resilience initiatives to mitigate potential disruptions due to the effects of climate change and make their infrastructure more adaptable to weather extremes.

Components of the Strategy

- **Establish energy system resilience standards and assess vulnerabilities:** The PSC should establish resilience standards and require public and investor-owned utilities and generators to assess vulnerabilities to climate hazards and to develop and implement agency-approved risk-reduction plans.

Near-term restructuring of the power grid provides an opportunity to ensure generation, transmission and distribution infrastructure is resilient to current and future climate hazards. The PSC should initiate a proceeding to 1) establish resilience standards, 2) require all regulated generators and utilities to conduct vulnerability assessments, and 3) require all regulated generators and utilities to complete risk-reduction plans for DPS approval. Risk assessment and planning should include assessment of the potential spread of chemical contaminants.

- **Develop strategies for grid outages and extreme weather events:** The CSRO or other designated individual should convene a work group, comprising DPS, DHSES, DOT, DEC, NYSERDA, NYPA and other relevant entities, to develop strategies to ensure availability of fuel and power for emergency vehicular fleet operations and essential public transportation during power grid outages. This work group should also establish a resilience plan for EV-charging infrastructure to ensure access to transportation, including evacuation during extreme weather events.

Electrification of the transportation sector will require strategies to ensure availability and distribution - not only of fuel, but of power, to vehicles, including vehicles required for emergency response and potential evacuation. The CSRO or other designated individual should convene a work group, comprising DPS, DHSES, DOT, DEC, NYSERDA, NYPA and other

relevant entities, to develop strategies to ensure availability of transportation fuel and power in the event of emergencies.

- **Promote capital improvements:** NYSERDA, in consultation with DPS, DOS, and other relevant entities, should promote capital improvements in buildings to endure grid failures and to facilitate buildings' ability to accept power when system re-energized.

High-performance building envelopes, batteries, and solar PV would enhance building occupant resilience to grid failures. Ability to accept power when system is re-energized without need for individual building inspection and service would enhance community recovery after grid failure. NYSERDA, in consultation with DPS, DOS, and other relevant entities, should implement a strategy to promote capital improvements to buildings to endure and recover from grid failures.

- **PV and EV-charging in building code:** DOS, in consultation with NYSERDA, should include requirements for PV and EV-charging readiness in the building code.

PV and EV-charging readiness would not only result in GHG emission reductions but enhance household resilience to grid failures. DOS, in consultation with NYSERDA, should adopt amendments to the Uniform Code to require, as appropriate, new buildings are prepared for future installation of solar energy equipment, piping and wiring, and are constructed with electrical capacity and pre-wiring to allow future installation of electric vehicle charging stations.

- **Support local renewable systems:** NYSERDA, in consultation with DPS, DHSES, and local governments should develop a comprehensive strategy to support development of islandable microgrids and district systems using renewable sources of energy to provide locally generated power, especially in critical facilities during grid emergencies.

NYSERDA, in consultation with DPS and DHSES, should complete an update of its current microgrid strategy to de-emphasize fossil generation in favor of renewable generation and storage, and to promote microgrids as the bases of resilience hubs.

Living Systems

The Living Systems theme comprises of three strategies. The first is focused on addressing risks to our ecosystems and biodiversity and emphasizes the need to ensure conservation and connectivity of critical habitats. Also included are recommendations specific to the agricultural sector, and the ability of forests to serve as carbon sinks, due to the GHG emission mitigation and economic importance of these sectors.

Develop Policies and Programs to Reduce Risks Threatening Ecosystems and Biodiversity

The components of this strategy provide for a variety of mechanisms to ensure conservation or protection of the most important pieces of our life-sustaining ecosystems. These initiatives include a focus on intentional planning to identify and protect critical ecosystems and to establish and protect connectivity at several scales, ranging from the landscape scale to enable populations to migrate northward and upward as the climate warms, to project-specific planning to ensure wildlife and aquatic organism connectivity.

Components of the Strategy

- **Improve local wildlife and aquatic connectivity:** DEC and DOT should improve local wildlife and aquatic connectivity, including through use of standardized environmentally friendly design features, during transportation infrastructure improvement projects, as practicable, and as identified by statewide critical terrestrial and aquatic habitat and conservation planning efforts.

Routine projects to replace or improve transportation infrastructure, such as culverts and bridges, provide opportunity to address factors that limit connectivity. DEC and DOT should periodically review and make necessary updates to existing guidance regarding incorporation of recommended design features and BMPs to reconnect or enhance terrestrial and aquatic habitat connectivity during projects to replace or improve transportation infrastructure.

- **Expand conservation easements to include other areas** DEC and AGM should expand development of conservation easement and incentive programs (such as the Source Water Buffer Program) to include areas of farms set aside for conservation of wetlands, stream corridors, riparian buffers, or wildlife corridors.

The Source Water Buffer Program, administered by AGM, is funded by the Clean Water Infrastructure Act of 2017 for purchase of easements on agricultural land to support or enhance public drinking water quality and provides for protection of wetlands, stream corridors and riparian buffers, but not for the explicit goals of wildlife habitat protection or enhancement. The state should amend the authorizing statute to allow AGM to expand eligibility for the Source Water Buffer Program to include wildlife habitat protection or enhancement and to recognize wildlife habitat protection or enhancement as an important co-benefit in selection of public drinking water source protection.

- **Incorporate BMPs from species management plans:** DEC, ORES, NYSERDA, DOS, and DOT should incorporate BMPs from species management plans into state and federally funded or regulated projects, including renewable energy projects, in or near occupied habitats to reduce and mitigate ecosystem impacts.

DEC, ORES, NYSERDA, DOS, DOT and other relevant agencies should incorporate BMPs for threatened and endangered species into planning, funding and regulatory programs, including permit conditions for projects in or near occupied habitats (such as grasslands and tidal wetlands), to reduce and mitigate ecosystem impacts. ORES, in consultation with DEC, should amend its permitting procedures to reduce reliance on mitigation and to consider application of BMPs as the default practice.

- **Amend Real Property Tax Law to incentivize private forest stewardship:** The State should enact legislation to amend Real Property Tax Law to incentivize private forest stewardship for a broader range of goals, including biodiversity, wildlife habitat protection, water resource protection, outdoor recreation and carbon sequestration.

Real Property Tax Law Section 480 provides a tax benefit in the form of a reduced assessment on qualifying lands maintained for forest production. The state should create a Real Property Tax Law incentive to allow private forest landowners to manage for other benefits (such as wildlife habitat) and, if desired by the landowner, to conserve their forests in natural conditions to participate in tax-incentive programs. This recommendation parallels a similar Agriculture and Forestry Advisory Panel recommendation.

- **Prioritize biodiversity and carbon sequestration:** DEC should heighten consideration of biodiversity and enhancement of carbon sequestration among the priorities in state forest land planning, and adopt guidance for development of unit management plans that includes conservation of biodiversity and increased carbon sequestration as priorities.

The Strategic Plan for State Forest Management⁴ guides management of state forests and is implemented through unit management plans that establish specific management activities on each local unit. DEC should include guidance on biodiversity conservation and carbon sequestration among management priorities in the next update to the Strategic Plan for State Forest Management.

⁴ New York State Department of Environmental Conservation. (2011). Strategic Plan for State Forest Management. New York State Department of Environmental Conservation. Albany, New York.

- **Expand implementation of ISCMP:** DEC and AGM should advance biocontrol of forest pests, and expand implementation of relevant parts of the ISCMP, including two key ISCMP priorities: advance prevention and early detection, and improve the response to invasive species.

The ISCMP⁵ guides invasive species management by DEC and AGM. The plan is framed around 8 focal initiatives: partnerships and capacity, information sharing, setting priorities, engaging and informing the public, advance prevention and early detection, response, ecosystem resilience, and evaluation. Due to the potential economic and environmental harms caused by invasive species, aggressive implementation of the ISCMP should be a priority for DEC and AGM. DEC and AGM should evaluate opportunities to improve capacity for prevention and early detection of, and rapid response to, invasive species, as detailed in the management plan.

- **Ensure protection of stream buffers:** The State should create a regulatory program to ensure protection of stream buffers to protect and enhance water and habitat quality, reduce flood risk, and prevent soil erosion.

Stream, or riparian, buffers, provide numerous environmental benefits, including streambank stabilization, erosion and sediment control, filtration, flood-risk reduction, wildlife habitat, and shade for streams, all of which will become increasingly important as temperatures rise and precipitation events become more extreme. The State should establish a regulatory program to protect stream buffers and associated environmental services.

Enhance Climate Resilience and Adaptive Capacity of Agricultural Sector, while Preparing to Take Advantage of Emerging Opportunities

Included below are recommendations to improve water and energy efficiency on farms, incorporate other climate-resilient practices into farm operations and continue research and outreach to help farmers prepare for the effects of a warming climate. However, these recommendations do not address the entire gamut of climate hazards New York growers face and should not be interpreted as a complete agricultural adaptation plan.

Components of the Strategy

- **Establish a farm water and energy efficiency program:** AGM and NYSERDA should develop and support a water and energy efficiency realization program to meet agricultural needs related

⁵ New York State Department of Environmental Conservation. (2018). New York State Invasive Species Comprehensive Management Plan. New York State Department of Environmental Conservation. Albany, New York.

to climate change, including decision-support tools, power upgrades and strategies to reduce equipment costs.

Elements of this recommendation are addressed by several current state programs. These programs include the AGM's AEM program; NYSERDA's Agriculture Energy Audit program, various guidance on best practices for dairy farms and greenhouses, financial assistance for energy efficiency measures and renewable energy, and the Clean Energy for Agriculture Task Force Strategic Plan.⁶ AGM and NYSERDA should continue to evaluate existing agricultural water and energy efficiency programs and seek opportunities to improve and expand participation in them.

- **Promote resilient crops:** The State should expand support for research and outreach on climate-resilient crop varieties; technology to provide freeze and frost protection; strategies to address invasive species, pathogens and pests; and increased use of perennial crops for food and feed.

The State should continue and expand financial support for Cornell's Integrated Pest Management and Soil Health programs and research on 1) plant breeding programs to develop and understand crop varieties' tolerance to weather variance, 2) risk of freeze damage from changing temperature patterns and use of technological developments to monitor freeze and frost protection on crops, and 3) suitable cropping systems and system analysis for perennial crops for food and feed production.

- **Promote agricultural and watershed-based BMPs:** AGM should assess, develop and promote agricultural and watershed-based BMPs for flood attenuation, drought mitigation and water quality protection.

AGM's Ecosystem Based Management program focuses on resolving complex problems at a single location by coordinating relevant programs at all levels of government. The program provides targeted funding to fill gaps between other funding programs to achieve on-the-ground results. Pilot projects implemented by SWCDs have led to integration of Ecosystem Based Management program principles into AGM's AEM program and other existing programs. AGM should seek opportunities to expand the Ecosystem Based Management program and associated outreach.

⁶ New York State Energy Research and Development Authority. (2011). Clean Energy for Agriculture Task Force Strategic Plan. NYSERDA. Albany, New York.

Preserve and Protect the Ability of Forest Ecosystems to Sequester Carbon

In recognition of the important role healthy forests play in sequestering carbon, ensuring forests retain their sequestration potential under future conditions should be considered in state acquisition programs. As with agriculture, this strategy does not constitute a complete adaptation plan for our forests. Many recommendations described in strategy 21.2.10, Develop Policies and Programs to Reduce Risks Threatening Ecosystems and Biodiversity, also address the goal of protecting the ability of our forests to continue to sequester carbon. This strategy complements the strategies described in *Chapter 15. Agriculture and Forestry*, which serve to enhance the ability of our forests to remove CO₂ from the atmosphere and sequester it in healthy trees and forest soils.

Components of the Strategy

- **Consider resilience in land acquisition:** DEC, OPRHP, AGM, and other agencies and authorities should include resilience criteria in state acquisition programs.

As originally enacted, the CRRA requires DEC, OPRHP, and AGM to consider mitigation of future physical risk due to flooding, storm surge and flooding in their respective land acquisition programs. As amended by the Climate Act, the CRRA requires DEC to help agencies assess a wide range of climate risks on projects. DEC, OPRHP, AGM, and other agencies and authorities should complete reviews of, and necessary updates to, all land acquisition programs, especially those covered by the CRRA, to ensure future conditions and applicable resiliency criteria are duly considered in acquisition decision making. Such reviews and updates should include not only sea-level rise, storm surge and flooding, as expressly required by the CRRA, but all climate hazards relevant to acquisitions.