

Chapter 2. The Time is Now to Decarbonize Our Economy

2.1 Scientific Evidence of Our Changing Climate

The consequences of a changing climate are here. The World Meteorological Organization found that in the 50-year period from 1970 to 2019, the number of disasters worldwide increased by a factor of five, and economic losses due to weather, climate, and water extremes have increased sevenfold.¹ New Yorkers have felt the devastation from several extreme weather events in recent years:

- Historic flooding from Hurricane Ida in 2021 not only left lasting damage to the Gulf Coast but also devastated the Northeast. The National Weather Service issued its first flash flood emergency warning for parts of northeastern New Jersey and its second ever flash flood emergency for New York City.²
- Tropical Storm Isaias left over 800,000 New Yorkers without power in 2020, with high winds causing damage to critical infrastructure.³
- In 2012, Superstorm Sandy killed dozens and left hundreds of thousands of New Yorkers without power. It brought storm surges over 13 feet high and devastated many parts of New York City.⁴ The Federal Emergency Management Agency spent over \$25 billion on recovery efforts in New York and New Jersey in the five years after Sandy.⁵
- In 2011, Tropical Storm Irene caused damage across many regions of the State, flooding main streets, washing out roads, overwhelming wastewater treatment plants, and leaving hundreds of thousands without power. Not two weeks later, Tropical Storm Lee came through New York and overwhelmed communities still dealing with the aftermath of Irene.

¹ World Meteorological Organization. 2021. *WMO Atlas of Mortality and Economic Losses from Weather, Climate and Water Extremes (1970-2019)*. Geneva. Accessed at https://library.wmo.int/index.php?lvl=notice_display&id=21930#.YaY979DMJ9N.

² Harvey, Chelsea. September 2, 2021. "Ida smashes rain records in glimpse of future warming." *E&E News*. <https://www.eenews.net/articles/ida-smashes-rain-records-in-glimpse-of-future-warming/>.

³ Zaveri, Mihir, and Ed Shanahan. August 4, 2020. "2.5 Million Lose Power and One Is Killed as Isaias Batters N.Y. Area." *The New York Times*. <https://www.nytimes.com/2020/08/04/nyregion/isaias-ny.html>.

⁴ Weissman Center for International Business, Baruch College/CUNY. 2021. "Disasters: New York City Hurricane Sandy – 2012." *NYCdata*. Accessed on November 30, 2021 at <https://www.baruch.cuny.edu/nycdata/disasters/hurricanes-sandy.html>.

⁵ Federal Emergency Management Agency. October 28, 2017. "Remembering Sandy Five Years Later." <https://www.fema.gov/press-release/20210318/remembering-sandy-five-years-later>.

New York's geographic and socioeconomic diversity will lead to a wide range of experienced climate-driven impacts. Warming trends and incidences of intense heat waves will contribute to greater localized heat stresses; heavy rainfall events that exacerbate localized flooding will continue to impact food production, natural ecosystems, and water resources; and sea-level rise will increasingly threaten sensitive coastal communities and ecosystems. Climate-driven impacts are magnified in New York's historically marginalized communities that have been disproportionately affected by and are on the front lines of climate change. Women, femmes, youth, and children in poverty commonly face higher risks and greater burdens from the impacts of climate change.

New York is feeling the impacts of a global issue. The Intergovernmental Panel on Climate Change (IPCC) is a body established by the World Meteorological Organization and the United Nations to assess scientific, technical, and socioeconomic information relevant for understanding climate change, its potential impacts, and options for adaptation and mitigation. The IPCC recently completed its Sixth Assessment cycle, releasing several reports, the entirety of which is the Sixth Assessment Report (AR6). The U.S. Global Change Research Program is currently developing its fifth National Climate Assessment, with anticipated delivery in 2023. The fourth assessment, released in 2017, states, "thousands of studies conducted by researchers around the world have documented changes in surface, atmospheric, and oceanic temperatures; melting glaciers; diminishing snow cover; shrinking sea ice; rising sea levels; ocean acidification; and increasing atmospheric water vapor." According to both the U.S. Global Change Research Program and the IPCC, substantial reductions in greenhouse gas (GHG) emissions will be required by mid-century in order to limit the global average increase in temperature to no more than 2°C (and ideally 1.5°C), thus minimizing the risk of severe impacts from climate change.

2.2 Climate Projections

New York has undertaken research to better understand what a changing climate means for the State. A report developed by the New York State Energy Research and Development Authority (NYSERDA), *The ClimAID Integrated Assessment for Effective Climate Change Adaptation in New York State* (ClimAID), discusses New York-specific climate risks and projections. The ClimAID report, released in 2011 and subsequently updated in 2014, provides projections of mean annual changes in precipitation, temperature, and sea-level rise through the year 2100. The report also projects the frequency and duration of extreme temperature and precipitation events

through the 2080s for each of the seven regions of the State. The ClimAID projections for sea-level rise served as the basis for the Department of Environmental Conservation’s (DEC) adoption of sea-level rise projection regulations pursuant to the Community Risk and Resiliency Act (CRRRA), Title 6 of the Official Compilation of Codes, Rules, and Regulations of the State of New York (NYCRR) Part 490.

When considering impacts to New York, it is critical to discuss the impact that climate change has had on historically marginalized communities.

An analysis released by the U.S. Environmental Protection Agency (EPA) in September 2021 shows that the most severe harms from climate change fall disproportionately upon underserved communities that are least able to prepare for and recover from

heat waves, poor air quality, flooding, and other impacts. EPA’s analysis indicates that racial and ethnic

Use of the Term “Disadvantaged Communities”

This Scoping Plan uses the term “Disadvantaged Communities” to be consistent with the language in the Climate Leadership and Community Protection Act (the Climate Act). The Climate Act defines Disadvantaged Communities as “communities that bear burdens of negative public health effects, environmental pollution, impacts of climate change, and possess certain socioeconomic criteria, or comprise high-concentrations of low- and moderate-income households.”

As required by the Climate Act, the Climate Justice Working Group identified Disadvantaged Communities based on geographic, public health, environmental hazard, and socioeconomic criteria.

The Climate Action Council recognizes, however, that this growing body of literature often uses other terms that more appropriately describe these populations, such as “frontline communities,” “overburdened communities,” “historically marginalized communities,” and “environmental justice communities,” among others. This Scoping Plan often uses these terms to describe communities that have been disproportionately impacted by historical environmental policy and the effects of climate change, and uses Disadvantaged Communities when referring directly to actions or requirements that are contained in the Climate Act.

For more information on Disadvantaged Communities, see *Chapter 6. Advancing Climate Justice*.

minority communities are particularly vulnerable to the greatest impacts of climate change.⁶ The Climate Leadership and Community Protection Act (the Climate Act) requires, and this Scoping Plan reflects, a particular focus on actions and investments to improve outcomes for Disadvantaged Communities.

The impacts from climate change in New York are projected to grow. NYSERDA's ClimAID report discusses these impacts in detail and articulates, by sector, the likely effects of these changes across the State. NYSERDA has also launched a climate assessment, *New York State Climate Impacts Assessment: Understanding and Preparing for Our Changing Climate*, which will provide the following:

- Updated projections and methodologies
- In-depth economic analysis
- New regions
- More diverse perspectives and stakeholder engagement
- Adaptable formats to drive wider usage
- Technical workgroups that cover eight sectors, including agriculture, buildings, ecosystems, energy, human health and safety, society and economy (including finance and insurance), transportation, and water resources
- Cross-cutting topics such as the impact on Disadvantaged Communities, municipal perspectives, and the effect on marine and Great Lakes coastal zones

Draft core projections for the updated climate assessment have been completed, including for average and extreme temperatures and precipitation. These resources will be made publicly available once the assessment is complete, which is expected in early 2023.

On a global scale, the IPCC's AR6 applies new methods that greatly reduce uncertainty and can clearly attribute ongoing climate change and its effects to continuing man-made emissions of climate pollutants. It considers five scenarios to illustrate the range of possible futures based on trends in anthropogenic drivers of climate change. In summary, the report states several factors:

- The global mean surface temperature will continue to increase until at least the mid-century under all GHG emission scenarios considered by the IPCC

⁶ U.S. Environmental Protection Agency. 2021. *Climate Change and Social Vulnerability in the United States: A Focus on Six Impacts*. U.S. Environmental Protection Agency, EPA 430-R-21-003.

- Between 1.5°C and 2°C warming will be exceeded this century unless deep reductions in carbon dioxide (CO₂) and other GHG emissions occur in the coming decades
- Changes in precipitation show:
 - Strengthened evidence since IPCC's Fifth Assessment Report (AR5) that the global water cycle will continue to intensify, leading to more variability in precipitation and surface water flows over most land regions (both seasonally and year over year)
 - The portion of global land experiencing detectable increases or decreases in seasonal mean precipitation is projected to increase
 - There will continue to be earlier onset of spring snowmelt
 - It is likely that heavy precipitation events will intensify and become more frequent in most regions with additional global warming
- Many changes due to past and future GHG emissions are irreversible for centuries to millennia, especially changes in the ocean, ice sheets, and global sea level
- Over the longer term, there is high confidence that the sea level will continue to rise for centuries to millennia due to ongoing deep ocean warming and ice sheet melt and will remain elevated for thousands of years
- It is virtually certain that the global mean sea level will continue to rise over the 21st century. Even under the very low GHG emissions scenario (Shared Socioeconomic Pathways), it is likely that the global mean sea-level rise by 2100 will be 0.28 to 0.55 meters (0.9 to 1.8 feet)

Although no single entity can solve this global problem on its own, the Climate Act established New York as a leader in the critical effort to maintain a livable planet. IPCC's AR6 makes the critical nature of this work more clear. The report notes that, while many of the changes observed in the climate are unprecedented, strong and sustained reductions in GHG emissions would limit climate change. It is imperative that New York take immediate action to aggressively reduce GHG emissions as well as invest in resiliency measures.

2.3 Benefits of Climate Action

Climate change is adversely affecting New York’s economic well-being, public health, natural resources, and environment. The severity of climate change and the threat of more severe impacts will be determined by the actions undertaken in New York and other jurisdictions to reduce GHG emissions. Such actions will have an impact on global GHG emissions, encourage other jurisdictions to implement complementary GHG emissions reduction strategies, and provide an example of how such strategies can be successfully implemented. The impacts of climate change are heightened in Disadvantaged Communities, which often bear disproportionate environmental and socioeconomic burdens as well as

What the Climate Act means for New York State

Clean Electric Grid of Tomorrow | Solar, wind, and other renewables, combined with energy storage, will deliver affordable and reliable electricity over the next decade and beyond.

Comfortable, Affordable, and Safe, Energy Efficient Homes and Businesses | Modern clean heating and cooling technologies, such as electric heat pumps and smart thermostats, combined with energy efficiency, will save New Yorkers energy and money.

Clean, Reliable Transportation | Zero-emission transportation options for families and neighborhoods will enable New York to trade gridlock and diesel fumes for fresh air and cleaner communities.

A Clean Energy Economy for Everyone | Every community, every trade, and every region will have access to clean energy solutions and the economic opportunities that the transition to a just and equitable energy system provides.

legacies of racial and ethnic discrimination. Although substantial GHG emissions reductions are necessary to avoid the most severe impacts of climate change, complementary adaptation measures will also be needed to address those risks that cannot be avoided.

New Yorkers stand to realize the extraordinary benefits of climate action across all sectors of society. The investments made today will drive value creation into the future, spurring a cleaner, more competitive economy. The Climate Act means that the electric grid will be cleaner, more affordable, and more reliable. New York homes and

businesses will be more energy-efficient, leveraging the latest clean heating and cooling and distributed energy resource technologies. Transportation will be clean, reliable, and zero-emission, and New York will be transformed into a clean energy economy that benefits everyone. These investments will support new jobs, new businesses, and new opportunities for all New Yorkers. From clean, renewable energy generation to advanced recycling and reuse programs, New York will witness a scale of change that has not been seen before.

The Climate Act recognizes communities that have historically witnessed and continue to bear the disproportionate health and socioeconomic burdens of environmental pollution and climate change. Disadvantaged Communities, by law, will benefit from the transition New York is undertaking. Foundational to the Climate Act and to this Scoping Plan is to pair climate action with equity. As sectoral progress rapidly increases, additional co-benefits and compounding benefits will be realized.⁷

Benefits of GHG Emission Mitigation

Mitigating GHG emissions will provide many direct and indirect benefits, including improved public health. Direct benefits will result from reducing the many public health impacts associated with climate change, such as heat-related morbidity and mortality; food-, water-, and vector-borne diseases; and injury and death following flooding. Indirect health benefits will occur when initiatives to mitigate GHG emissions also result in other beneficial outcomes such as reducing air pollutants produced by GHG emission sources (co-pollutants), encouraging active transport (such as walking and cycling), and reducing home health risks through building energy efficiency retrofit interventions. In addition to these public health benefits, GHG emissions and co-pollutant mitigation will result in improvements to the overall economy through economic stimulus, social community and labor, social inclusion and social justice, housing security, accessibility and quality of mobility services, avoided costs, and resources efficiency.

Benefits of Adaptation and Resilience

Adaptation and resilience planning is about protecting people and ecosystems from the changes caused by a changing climate. Individuals, communities, and regions have come to recognize the need to prepare for the risks posed to their quality of life, infrastructure, and physical safety by climate change. These risks are disproportionately high for Disadvantaged Communities. Investment in adaptation and resilience can improve quality of life, stimulate local economies, and protect the environment. The benefits of adaptation and resilience actions include improved economic opportunities, infrastructure, and equity in our rural and urban communities. New York will promote the integration of climate change adaptation and resilience planning into all relevant policies and programs using the best available science.

⁷ Bachura, Simeran, Arminel Lovell, Carly McLachlan, and Mae Angela Minas. 2020. *The Co-Benefits of Climate Action, Accelerating City-level Ambition*. London: CDP. Accessed at <https://www.cdp.net/en/reports/downloads/5329>.

2.4 Technology Advancement and Trends

Technology advancement will continue to be vital in determining the trajectory of climate change mitigation and adaptation success. Current projections rely on certain assumptions of technology adoption, prioritization, and acceptance. Technology advancements include several components:

- Better science, data collection technologies, modeling, and understanding the complex relationship of natural systems
- Advancement in mitigation, such as the continued development of renewable energy technologies, energy efficiency improvements, and new and emerging technologies (like energy storage, carbon capture and removal, hydrogen, and potential geoengineering)
- Advancement in adaptation and resilience, such as technologies that can mitigate impacts resulting from wave action and improved flood and thermal resilience in buildings, and improved understanding of nature-based solutions to address the urban heat island effect, stormwater runoff, and drought
- Accessibility, supply chains, funding, and prioritization needs to realize potential

Hydrogen

The Scoping Plan recommends following technological and research developments on the use of hydrogen as a tool to reduce greenhouse gas emissions. The Scoping Plan recommends the use of green hydrogen but acknowledges that in *Sector Strategies*, references to green hydrogen can also include pink hydrogen.

Green hydrogen | Hydrogen formed by splitting water through electrical processes supplied by renewable energy with preference given to creation when there is surplus renewable generation (e.g., from wind at night).

Pink hydrogen | Hydrogen formed by splitting water through thermal and/or electrical processes supplied by nuclear energy.

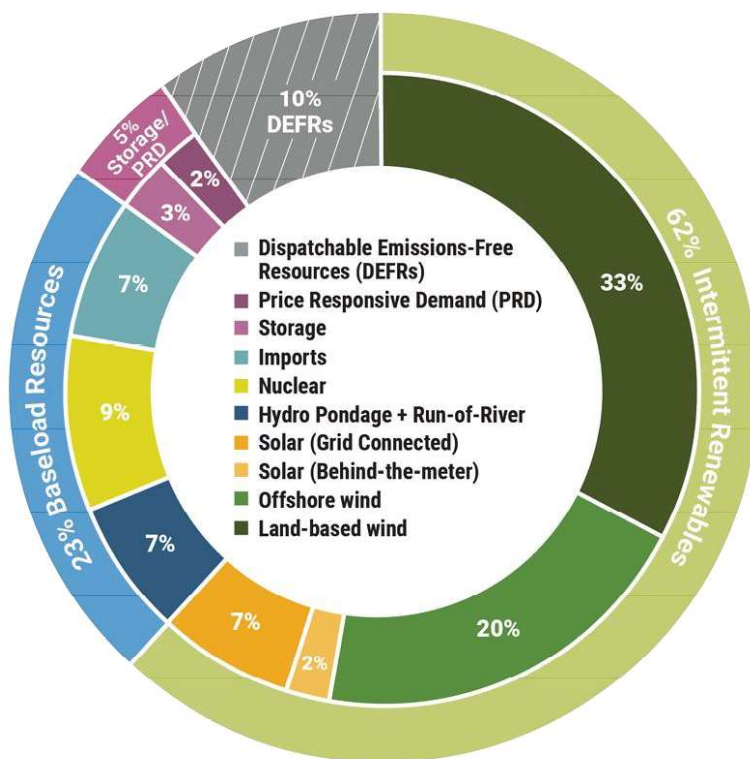
Future versions of this Scoping Plan will consider technology and market advancements when evaluating the production and use of hydrogen towards the achievement of the Climate Act emissions limits.

As science and technology continue to advance, the understanding of complex climate and environmental forces evolves, and new progress is incorporated into existing knowledge. Methodological advances and new datasets have contributed information that results in adding approximately 0.1°C to the current estimate of warming. In the Summary for Policymakers, IPCC’s AR6 states, “Since AR5, methodological advances and new datasets have provided a more complete spatial representation of changes in surface temperature, including in the Arctic. These and other improvements have additionally increased the

estimate of global surface temperature change by approximately 0.1°C, but this increase does not represent additional physical warming since the AR5.”⁸

To achieve a more resilient, efficient, and balanced grid, new technologies will be required to replace the phase-down of fossil fuel resources that are currently relied upon. The New York Independent System Operator (NYISO) has been evaluating potential impacts to system reliability and resource availability associated with climate change and extreme weather events. Through its *Climate Change Impact and Resilience Study*, which analyzes the Climate Act’s 2040 zero-emissions electricity target, NYISO has made it clear that innovation is critical to accelerating the development of new flexible and dispatchable resources to replace the existing reliability service capabilities of fossil fuel resources (see Figure 1).

Figure 1. 2040 Projected Climate Act Winter Energy Production by Resource Type



Source: NYISO Power Trends 2021.

⁸ Intergovernmental Panel on Climate Change. 2021. “Summary for Policymakers.” In *Climate Change 2021: The Physical Science Basis*. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [Masson-Delmotte, V., P. Zhai, A. Pirani, S. L. Connors, C. Péan, S. Berger, N. Caud, Y. Chen, L. Goldfarb, M. I. Gomis, M. Huang, K. Leitzell, E. Lonnoy, J.B.R. Matthews, T. K. Maycock, T. Waterfield, O. Yelekçi, R. Yu, and B. Zhou (eds.)]. Cambridge University Press. In Press. Accessed at <https://www.ipcc.ch/report/ar6/wg1/#SPM>.

2.5 The National and Global Context for Climate Action

The United Nations Framework Convention on Climate Change was founded in 1992 to serve as the international forum for multilateral climate action. The original convention was supported by the Kyoto Protocol of 1997 and the 2015 Paris Climate Agreement. Under the agreement, signatories agreed to nationally determined contributions for GHG reductions within a specified timeframe. The goal of the agreement was to keep global warming below 2°C compared with preindustrial levels, with the recognition of scientific consensus that warming at or below 1.5°C is preferable to mitigate the worst effects of climate change.⁹ The IPCC's AR6 has highlighted an even more dire need for aggressive climate action.

In the face of uncertainty on climate action and commitment at the federal level in past years, New York and other states took up the mantle. The governors of New York, California, and Washington formed the U.S. Climate Alliance in 2017 with the aim of advancing policies that would help each state meet the Paris Agreement goals. Since its creation, the Alliance has grown to a sizeable representation of bipartisan governors, and each member state commits to:

- Reducing collective net GHG emissions at least 26% to 28% by 2025 and 50% to 52% by 2030, both below 2005 levels, and collectively achieving overall net zero GHG emissions as soon as practicable, and no later than 2050
- Accelerating new and existing policies to reduce GHG pollution, building resilience to the impacts of climate change, and promoting clean energy deployment at the state and federal level.
- Centering equity, environmental justice, and a just economic transition in their efforts to achieve their climate goals and create high-quality jobs
- Tracking and reporting progress to the global community in appropriate settings, including when the world convenes to take stock of the Paris Agreement¹⁰

The United States has since reaffirmed its commitment to climate action under the Paris Agreement. The U.S. developed and committed to an economywide target of a 50% to 52% net reduction in GHG emissions by 2030 compared with 2005 levels, and the Biden Administration has committed to reaching net zero emissions economywide by no later than 2050. President Biden also ordered that the U.S.

⁹ Intergovernmental Panel on Climate Change. 2018. "Summary for Policymakers." In *Global Warming of 1.5 °C. An IPCC Special Report on the impacts of global warming of 1.5 °C above pre-industrial levels and related global GHG emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty*. Accessed at <https://www.ipcc.ch/sr15/download/>.

¹⁰ U.S. Climate Alliance. "Alliance Principles." Accessed at <http://usca.squarespace.com/alliance-principles>, Nov 29, 2022.

government would lead by example to leverage its immense scale and procurement power to drive clean, healthy, and resilient operations of federal buildings, vehicles, construction, and other activity—designed to achieve net zero emissions from overall federal operations by 2050, including a 65% emissions reduction by 2030, among other important interim milestones and sector-specific goals.¹¹

¹¹ The White House. *Executive Order 14057: Catalyzing Clean Energy Industries and Jobs Through Federal Sustainability*. December 8, 2021.