



FACTS NEW YORK

A M E R I C A N S E C U R I T Y P R O J E C T

Pay Now, Pay Later: New York

The increased frequency of hurricanes, Nor'easters and other extreme events exposes New York's coastal areas¹ to hundreds of billions—if not trillions²—of dollars in losses.

Climate change-sensitive industries conservatively account for 290,000 jobs and \$77 billion in profits annually in New York.³

New York State is actively pursuing clean energy, which could supply over three-quarters of the state's electricity⁴ and support over 100,000 jobs.⁵

According to a new study, a failure to mitigate the effects of climate change could begin to cause serious gross domestic product and job losses within the next several decades. Between 2010 and 2050, it could cost New York \$122.9 billion in GDP and over 560,000 jobs.*

**GDP numbers are based on a 0% discount rate. Job losses are measured in labor years, or entire years of fulltime employment. Backus, George et al., "Assessing the Near-Term Risk of Climate Uncertainty: Interdependencies among the U.S. States," Sandia Report (Sandia National Laboratories, May 2010), 141. https://cfwebprod.sandia.gov/cfdocs/CCIM/docs/Climate_Risk_Assessment.pdf (accessed March 23, 2011).*

Admittedly, the effects of climate change, a complex and intricate phenomenon, are difficult to predict with precision. Informed scientific and economic projections, as we have used in our research, however, allow us to see that New York faces significant losses in industries crucial to its economy if no action is taken.

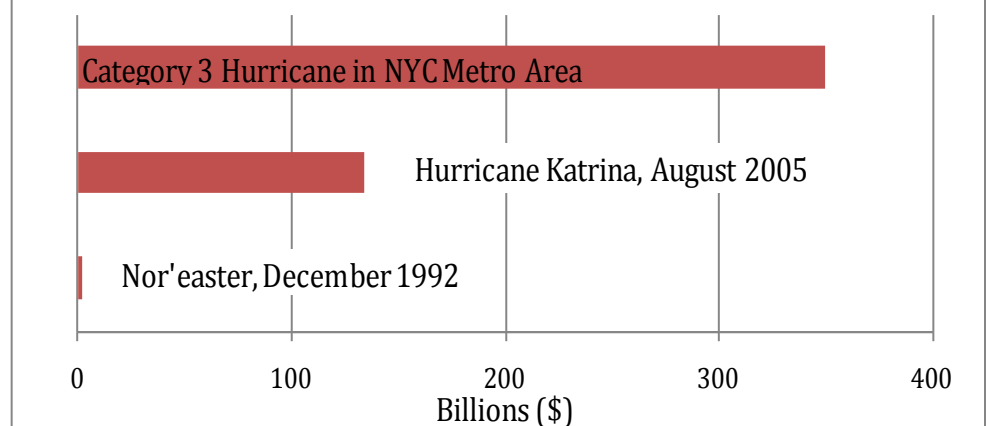
Moreover, data shows New York is poised to benefit from the research, development, and distribution of renewable energy technologies. New York has the potential to generate over 80% of its electricity from renewable sources,⁶ and a clean energy push could generate nearly 110,000 jobs statewide.⁷ With its vast clean energy potential, the energy efficiency of its leading city, and an ambitious set of policy goals, New York stands poised to make substantial progress in tackling climate change over the next two decades. Should we fail to take

action against climate change, New Yorkers have much to lose.

Pay Later: The Cost of Inaction

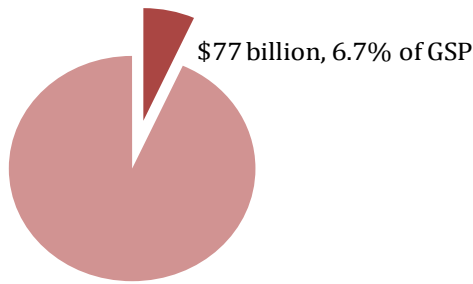
Overly reliant on inefficient coal- and oil-burning power plants,⁸ New York emits more greenhouse gases than all of Mexico and Central America combined.⁹ Even New York City, whose residents generate less than one-third of the greenhouse emissions per capita than the average American,¹⁰ still produces roughly one out of every 400 tons of greenhouse gases produced globally.¹¹ Climate change severely threatens New York's coasts, its workforce, and its quality of life.

Comparison of Estimated Damages from Category 3 Hurricane to Previous Events



Sources: Repetto and Easton; National Climactic Data Center¹⁸

New York Industries Directly Affected by Climate Change



Sources: Coakley et al; National Wildlife Foundation; Union of Concerned Scientists, New York: Confronting Climate Change; Hubschman et al; Schwartz

Coasting towards Trouble

With coasts along the Atlantic Ocean and Great Lakes—as well as major waterways including the Hudson River and St. Lawrence Seaway—New York boasts over 3,900 miles of coastline subject to the federal Coastal Zone Management Act, more than all but one state.¹² **Climate change-induced flooding poses huge risks to these coastal regions, home to 87% of New York’s residents¹³ and between \$1.9 trillion¹⁴ and \$2.5 trillion¹⁵ of insured property.** By the 2020s, a consensus of climate models project annual precipitation to increase by to 5%, and sea levels to rise by 2-5 inches—or roughly twice that under a rapid ice-melt scenario.¹⁶ “As sea levels rise,” one study notes, “coastal flooding associated with storms will very likely increase in intensity, frequency, and duration.”¹⁷

Current 10-year floods¹⁹ are predicted to occur as often as every 6.5 years by the 2020s, while what currently are once-in-a-century floods are predicted to hit the New York City metropolitan region as often as every 43 years.²⁰ Such floods would peak at about 9 feet²¹ in a region which houses the

largest U.S. public transit system and three major airports (to say nothing of residential properties) less than 10 feet above sea level.²² Assuming a current 10-year flood triggered claims on just 1% of insured coastal properties (about \$22 billion) then the increase in frequency during the period from 2020 to 2040 (three rather than two floods) could be expected to cost an extra \$550 million per year (\$22 billion over 20 years).²³

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In New York as elsewhere, “[t]he very harmful risks of damage from climate change arise from an increasing likeli-

hood of such extreme weather events, not from a gradual change in average conditions.”²⁴ Unlike annualized risk estimates, however, extreme events tend to be unpredictable—relatively unlikely to occur in any given year, but potentially catastrophic when they do occur. The major extreme events threatening the New York City metropolitan region are Nor’easters, and less frequent but potentially more damaging hurricanes.²⁵ The United States Army Corps of Engineers estimates that a Category 3 hurricane would flood nearly a third of lower Manhattan,²⁶ for example, and the total storm damages to the New York metropolitan region would likely cost \$200 billion or more²⁷—an amount equivalent to about \$1,750 for every household in the United States.²⁸ In fact, one paper argues that most models underestimate by up to 50% the probability of a hurricane causing \$100-500 billion in damage by 2030, and predicts that hurricanes will cause \$100-130 billion of damage each year in the New York City metropolitan area by 2030.²⁹ This is not to say that the city will experience hurricanes every year, but rather that when they do occur, they have the potential to cause hundreds of billions (perhaps trillions) of dollars in damage.³⁰

The higher sea levels, greater precipitation, and warmer temperatures presented by climate change will only increase the risk of extreme events—not just hurricanes, but also heat waves, droughts, and high-precipitation events.

Industries under Siege

New York City’s securities industry—concentrated around Wall Street in lower Manhattan—**employs some 160,000 people and contributes over \$62 billion to the economy**

in salaries alone.³¹ Since lower Manhattan would be among the first parts of New York City to flood, climate change puts Wall Street at risk, both literally and figuratively.³² Yet the financial industry is not the only one likely to suffer.

Shorter, warmer, and slushier winters threaten winter favorites like skiing and snowmobiling, which contribute approximately \$4 billion and 10,000 jobs to New York's economy.³³ As in the rest of the Northeast, between 1970 and 2000 the average winter temperature in New York State increased by 4°F.³⁴

Hunting, angling, and wildlife viewing opportunities will decline as wetlands disappear; Adirondack spruce, fir, and hemlock forests shrink; and coastal waters warm.³⁵ Iconic species like Long Island lobsters and Adirondack snowshoe hares will likely all but disappear by the end of the century, and the jobs of nearly 70,000 New Yorkers who work in industries vulnerable to these changes—such as hunting, fishing, wood and paper products, and wildlife-related tourism—are also at stake.³⁶ These industries contribute over \$3.2 billion annually to the state's economy.³⁷

New York's nearly 36,000 farms contributed roughly \$3.6 billion to the state's economy in 2005, but have traditionally focused on cool-weather specialties like apples and dairy.³⁸ Higher temperatures, encroaching weeds, agricultural pests, and changing precipitation patterns threaten their livelihood. Nor are these changes helpful for destinations like the Hudson Valley, whose tourism industry contributes another \$4.5 billion annually.³⁹

Together, these vulnerable industries employ over 290,000⁴⁰ people and

contribute over \$77 billion annually to New York's economy.⁴¹ In the Adirondacks region, an estimated 4-14% of the workforce is employed by climate-sensitive industries.⁴²

I Love NY (but not quite as much as before)

While the bustle of New York City has long attracted visitors, New York State has no shortage of other tourist destinations, from Long Island's sandy shores to the Adirondack High Peaks, and from the Great Lakes to the Catskills. In fact, **8% of the entire United States population lives within a one-hour drive of the Hudson River.**⁴³ Climate change jeopardizes the diverse features that make New York so inviting.

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New York's sandy coasts are retreating, despite spending over \$500 million on sand replenishment since the 1920s—a greater investment than in any other state.⁴⁴ The increasing need for these expensive replenishment efforts may well allow only the wealthiest

communities to keep their beaches as others erode away.⁴⁵ Even as rising temperatures in the Great Lakes region increase the thirst for water and contribute to more forest fires, the main sources of water—the lakes themselves—will likely drop in level.⁴⁶ Rising winter temperatures mean that many North Country attractions such as snowmobiling, skiing, and snowshoeing will likely face a much shorter, wetter season.⁴⁷

In New York City, heat-related deaths are projected to reach 850 annually by 2020.⁴⁸ Its water supply also faces significant threats. "First flush" storms—heavy precipitation events following periods of drought—could cause turbidity in the city's main water supply.⁴⁹ The New York City Department of Environmental Protection estimates that building a filtration plant to reduce the level of sediment present would cost \$5-10 billion, with an additional \$300-500 million per year for maintenance.⁵⁰ At the same time, the intrusion of salt water up the Hudson River (as the sea level rises and the river level falls) will probably reach Chelsea Pump Station—an emergency source of water during droughts—likely needed at the very time salt water reaches it.⁵¹

Pay Later: The Benefits of Taking Action

As dire as New York's future seems from climate change, the state has a tremendous capacity for initiatives that will help offset these negative effects and produce positive results. **New Yorkers already consume just half the electricity of the average American,⁵² and the state has the potential to generate 84% of its electricity from renewable sources.⁵³**

Even now, it is the largest producer of wind energy in the Northeast,⁵⁴ and generates the most hydroelectric power of any state east of the Rocky Mountains—nearly 12% of the national total.⁵⁵ Many New York farms capture methane to power on-site operations,⁵⁶ while in New York City, the New York Power Authority has installed 32 fuel cells to generate electricity from wastewater treatment-generated methane.⁵⁷

In addition to sheer physical potential, New York has demonstrated the political will to take action, setting ambitious goals over the coming decade. The New York Public Service Commission has required that renewables comprise at least 24% of the state’s energy portfolio by 2013.⁵⁸ New York has also implemented California’s tailpipe emissions standards, requiring tailpipe emissions to decrease about 30% below 2002 levels by 2016. By 2017, New York City’s government plans to reduce its carbon emissions by 30% below 2006 levels.⁵⁹ By 2019, New York plans to reduce emissions by 10% below 2009 levels in accordance with the Regional Greenhouse Gas Initiative, the county’s first compulsory cap-and-trade regime for carbon dioxide, which New York founded in 2005 with six other Northeastern states.⁶⁰

A major investment in clean energy could create an estimated 109,000 jobs in New York State.⁶¹

Conclusion

New York must consider action on climate change not just in terms of cost, but also in terms of opportunities. If we give New York’s population, businesses, and investors clear and consistent signals by properly offering initiatives and cultivating demand, investment and innovation in renewable technologies will follow.

New Yorkers will have to pay for the effects of climate change. The only remaining question is whether they will pay now, or pay later and run the risk of paying significantly more.



Major Electric Power Plants (>=100 MW)		Renewable Energy Potential
Coal Mine, Surface	Coal	Biomass (>= 50 tons/sq km/yr)
Coal Mine, Underground	Geothermal	Geothermal (>= 80 milliwatts/m2)
Natural Gas Hub	Hydroelectric	Solar (>= 6.0 kWh/m2/day)
Petroleum Refinery	Natural Gas	Wind (>= 3 Power Class)
Oil Import Site	Nuclear	
Oil Seaport	Petroleum	
Electricity Transmission Line (>= 345 kV)	Solar	
Natural Gas Flow (1 mile band width = 100 million cubic feet/day)	Wind	
Oil and Gas Active Leases	Wood	
	Other Renewable	

(Endnotes)

- 1 Radley Horton et al., “Chapter 3: Climate observations and projections,” *Annals of the New York Academy of Science*, vol. 1196, 2010, 41. <http://www3.interscience.wiley.com/cgi-bin/fulltext/123443060/PDFSTART> (accessed July 21, 2010).
- 2 Howard Kunreuther and Erwann Michel-Kerjan, “Encouraging Adaptation to Climate Change: Long-Term Flood Insurance,” *Resources for the Future*, issue brief 09-13, December 2009, 3. <http://www.rff.org/RFF/Documents/RFF-IB-09-13.pdf> (accessed July 21, 2010).
- 3 Detailed below in “Industries Under Siege.”
- 4 National Wildlife Federation, *Global Warming and New York*, January 30, 2009, 2. <http://www.nwf.org/Global-Warming/-/media/PDFs/Global%20Warming/Global%20Warming%20State%20Fact%20Sheets/NewYork.ashx> (accessed July 21, 2010).
- 5 Robert Pollin, James Heintz, and Heidi Garrett-Peltier, *The Economic Benefits of Investing in Clean Energy*, Political Economy Research Institute, University of Massachusetts, Amherst and Center for American Progress, June 2009, 60. http://www.american-progress.org/issues/2009/06/pdf/peri_report.pdf (accessed July 21, 2010).
- 6 National Wildlife Federation, 2.
- 7 Pollin et al., 60.
- 8 Union of Concerned Scientists, *New York: Confronting Climate Change in the U.S. Northeast*, 2007, 7. http://www.climatechoices.org/assets/documents/climatechoices/new-york_necia.pdf (accessed July 21, 2010); P.C. Frumhoff et al., *Confronting Climate Change in the U.S. Northeast: Science, Impacts, and Solutions: Synthesis report of the Northeast Climate Impacts Assessment*, Union of

- Concerned Scientists, 2007. <http://www.climatechoices.org/assets/documents/climatechoices/confronting-climate-change-in-the-u-s-northeast.pdf> (accessed July 14, 2010).
- 9 National Wildlife Federation, 2.
- 10 Jonathan Dickinson, ed., *Inventory of New York City Greenhouse Gas Emissions*, Mayor's Office of Operations, Office of Long-Term Planning and Sustainability, City of New York, April 2007, 6. <http://www.nyc.gov/html/planyc2030> (accessed July 14, 2010).
- 11 New York City Department of Environmental Protection et al., *Report 1: Assessment and Action Plan—A Report Based on the Ongoing Work of the DEP Climate Change Task Force*, May 2008, 15. http://www.nyc.gov/html/dep/html/dep_projects/climate_change.shtml (accessed July 21, 2010). The report notes “New York City emits nearly 0.25% of the world’s total greenhouse gases.”
- 12 Jonathan Hubschman, Ned Sullivan and Andy Bicking, *Hudson River Coast at Risk on the Eve of the 400th: Audit and Action Agenda for New York State Coastal Management Program*, Scenic Hudson, March 2008, 5. <http://www.scenichudson.org/files/u2/CMPcomplete.pdf> (accessed July 21, 2010).
- 13 Ibid.
- 14 Union of Concerned Scientists, *New York: Confronting Climate Change*, 2.
- 15 Kunreuther and Michel-Kerjan, 3.
- 16 Horton et al., 53.
- 17 Ibid., 56.
- 18 Costs are a median of high and low estimates and projections. National Climatic Data Center, *Billion Dollar U.S. Weather Disasters*, February 2010. <http://www.ncdc.noaa.gov/oa/reports/billionz.html> (accessed September 23, 2010).
- 19 Ibid., 55. “Current” is derived from baseline of 1971-2000.
- 20 Climate Change Information Resources-New York Metropolitan Region, *What changes in climate are projected for the region?*, Earth Institute, Columbia University, 2005. http://ccir.ciesin.columbia.edu/nyc/ccir-ny_q2a.html (accessed July 21, 2010).
- 21 Horton et al., 55.
- 22 Climate Change Information Resources-New York Metropolitan Region, *How will climate change affect the region’s transportation system?* Earth Institute, Columbia University, 2005. http://ccir.ciesin.columbia.edu/nyc/ccir-ny_q2d.html (accessed September 3, 2010).
- 23 Horton et al., 55.
- 24 Robert Repetto and Robert Easton, “Climate Change and Damage from Extreme Weather Events,” *Environment*, March/April 2010. <http://www.environmentmagazine.org/Archives/Back%20Issues/March-April%202010/climate-change-full.html> (accessed July 21, 2010).
- 25 Horton et al., 47.
- 26 American Meteorological Society, “Timing Is Everything: How Vulnerable To Flooding Is New York City?” *ScienceDaily*, August 3, 2008. <http://www.sciencedaily.com/releases/2008/07/080730175524.htm> (accessed July 21, 2010).
- 27 Repetto and Easton.
- 28 The estimated number of households in the United States in 2009 was 105,480,101. Adjusting this upward by 9.1% in line with estimated population growth from April 2000 to July 2009 suggests a total of 115,078,790 households. Dividing \$200 billion among this number of households equals \$1737.94. U.S. Census Bureau, *State & County QuickFacts: USA*, April 22, 2010. <http://quickfacts.census.gov/qfd/states/00000.html> (accessed July 28, 2010).
- 29 Repetto and Easton.
- 30 Ibid. Mean projected hurricane cost: \$200 billion to \$500 billion; National Climatic Data Center, *Billion Dollar U.S. Weather Disasters*, February 2010. <http://www.ncdc.noaa.gov/oa/reports/billionz.html> (accessed July 21, 2010). Costs of other disasters adjusted for inflation.

- 31 Nelson D. Schwartz, "Wall St. Hiring in Anticipation of an Economic Recovery," *New York Times*, July 10, 2010. <http://www.nytimes.com/2010/07/11/business/11rebound.html> (accessed July 21, 2010).
- 32 American Meteorological Society.
- 33 Union of Concerned Scientists, *New York: Confronting Climate Change*, 7.
- 34 Ibid., 1.
- 35 Union of Concerned Scientists, *New York: Confronting Climate Change*, 2-5; National Wildlife Federation.
- 36 National Wildlife Federation (\$3.2 billion and 59,492 jobs from hunting, fishing, and wildlife viewing), 2; Union of Concerned Scientists, *New York: Confronting Climate Change* (10,000 employed by wood- and paper-product companies in the Adirondacks), 5.
- 37 National Wildlife Federation, 2.
- 38 Union of Concerned Scientists, *New York: Confronting Climate Change*, 5-6.
- 39 Hubschman et al., 7.
- 40 Combines previously stated totals by industry and assumes 1.5 workers per farm (54,000).
- 41 Based on \$1,144,481,000 gross state product (2008). Caitlin E. Coakley, Daniel A. Reed, Shane T. Taylor, *Gross Domestic Product by State: Advance Statistics for 2008 and Revised Statistics for 2005–2007*, Bureau of Economic Analysis, June 2009. http://www.bea.gov/scb/pdf/2009/06%20June/0609_gdp_state.pdf (accessed July 21, 2010).
- 42 Union of Concerned Scientists, *New York: Confronting Climate Change*, 5.
- 43 Hubschman et al., 5.
- 44 Climate Change Information Resources-New York Metropolitan Region, 1. <http://ccir.ciesin.columbia.edu/nyc/pdf/> (accessed September 2, 2010).
- 45 Ibid.
- 46 George W. Kling et al., *Confronting Climate Change in the Great Lakes Region: Impacts on our Communities and Ecosystems*, Union of Concerned Scientists and Ecological Society of America, April 2003, 3. http://ucsusa.org/assets/documents/global_warming/greatlakes_final.pdf (accessed July 21, 2010).
- 47 Union of Concerned Scientists, *New York: Confronting Climate Change*; New York Academy of Sciences and New York State Energy Research and Development Authority, *Climate Change in New York State: Developing a Research Strategy*, May 2007. <http://www.nyserda.org/programs/environment/emep/backgroundpaper.pdf> (accessed July 21, 2010).
- 48 New York Academy of Sciences and New York State Energy Research and Development Authority, 13.
- 49 New York City Department of Environmental Protection, *Adapting NYC's Water Supply and Wastewater Treatment Systems to Climate Change*, November 2005, 16. http://www.climate-science.gov/workshop2005/presentations/WA2.5_Lloyd.pdf (accessed July 21, 2010).
- 50 Ibid.
- 51 Climate Change Information Resources-New York Metropolitan Region, *How might climate change affect the coastal environment and coastal communities?.* http://ccir.ciesin.columbia.edu/nyc/ccir-ny_q2e.html (accessed September 3, 2010).
- 52 U.S. Energy Information Administration, *State Energy Profiles: New York*, 2010. http://www.eia.doe.gov/state/state_energy_profiles.cfm?sid=NY (accessed July 21, 2010).
- 53 National Wildlife Federation, 2.
- 54 Union of Concerned Scientists, *New York: Confronting Climate Change*, 8.
- 55 U.S. Energy Information Administration.
- 56 Union of Concerned Scientists, *New York: Confronting Climate Change*, 8.
- 57 New York City Department of Environmental Protection et al., *Assessment and Action Plan*, 11.

58 U.S. Energy Information Administration.

59 Dickinson, 5.

60 Union of Concerned Scientists, *New York: Confronting Climate Change*, 2; National Wildlife Federation.

61 Pollin et al., 60.