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Environmental  
Conservation

# Climate-Safe Schools, Climate-Smart Kids

*Mark Lowery, Assistant Director, Office of Climate Change*

New York State School Environmental Health Conference 2024

*Climate Action in Schools: Prevention, Preparedness, Response, and Resilience*

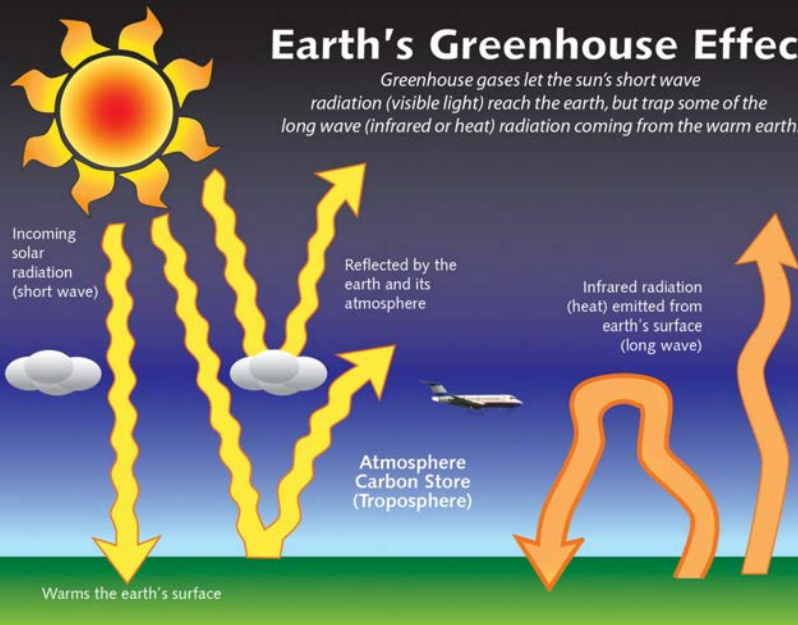
October 24, 2024



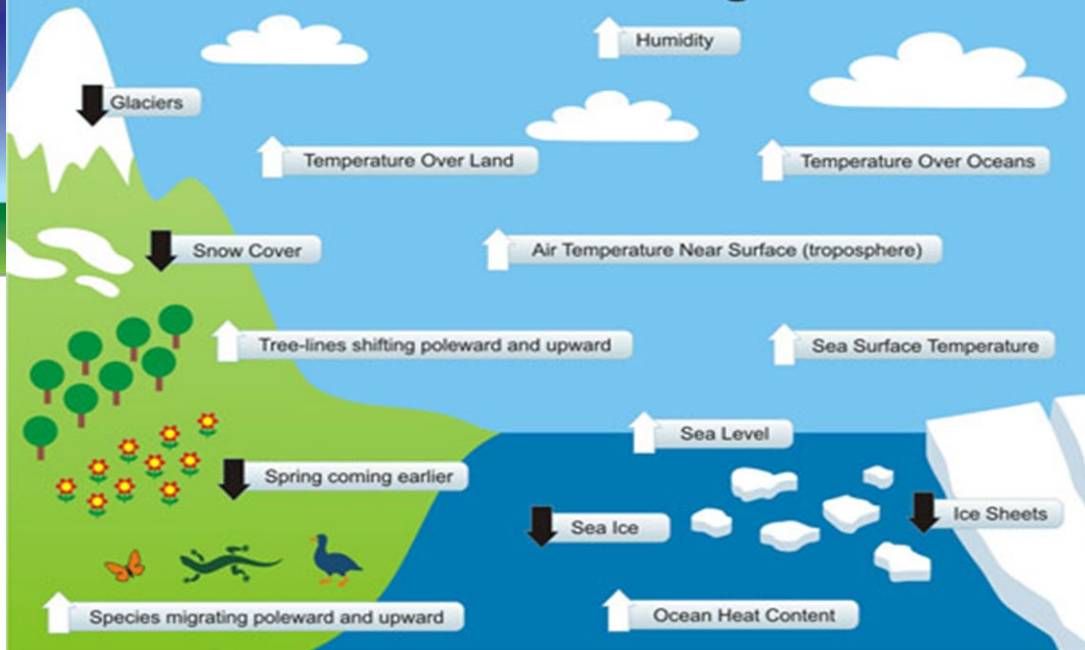
Associated Press

## Earth's Greenhouse Effect

Greenhouse gases let the sun's short wave radiation (visible light) reach the earth, but trap some of the long wave (infrared or heat) radiation coming from the warm earth.



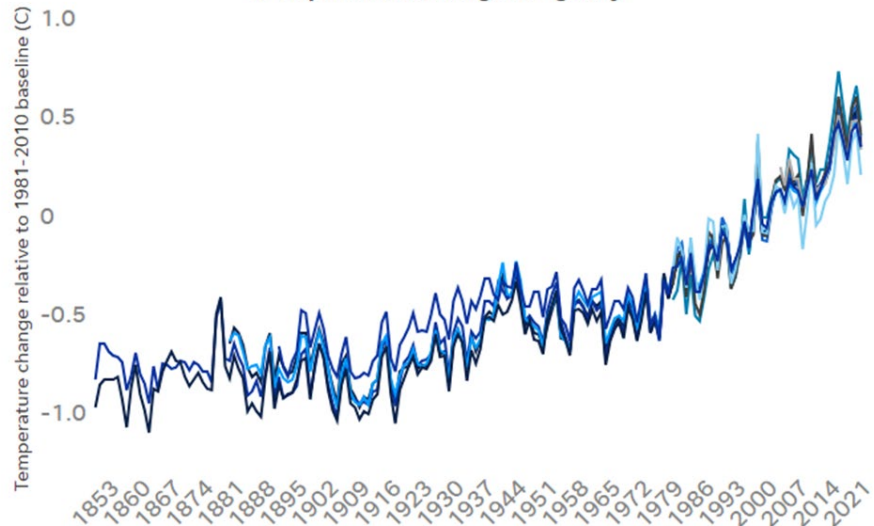
## Indicators of a Warming World



## Multiple independent climate agencies report very similar warming patterns

NASA reports overall warming of roughly one degree Celsius (nearly two degrees Fahrenheit) since the late 1800s.

● NASA   ● HadCRUT5   ● NOAA   ● Berkeley Earth   ● Copernicus ERA5  
● JRA-55   ● RSSv4 TLT   ● UAHv6 TLT   ● AIRSv7 Ts  
● Japan Meteorological Agency

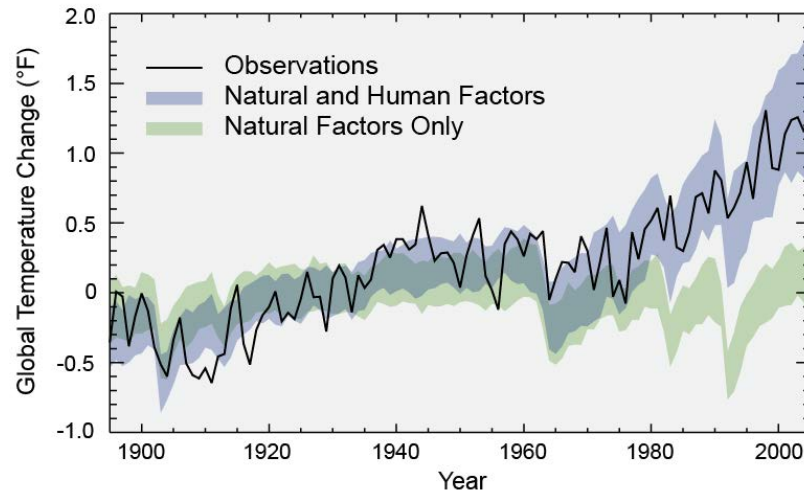


Source: Berkeley Earth  
Graphic: Kate S. Petersen, USA TODAY

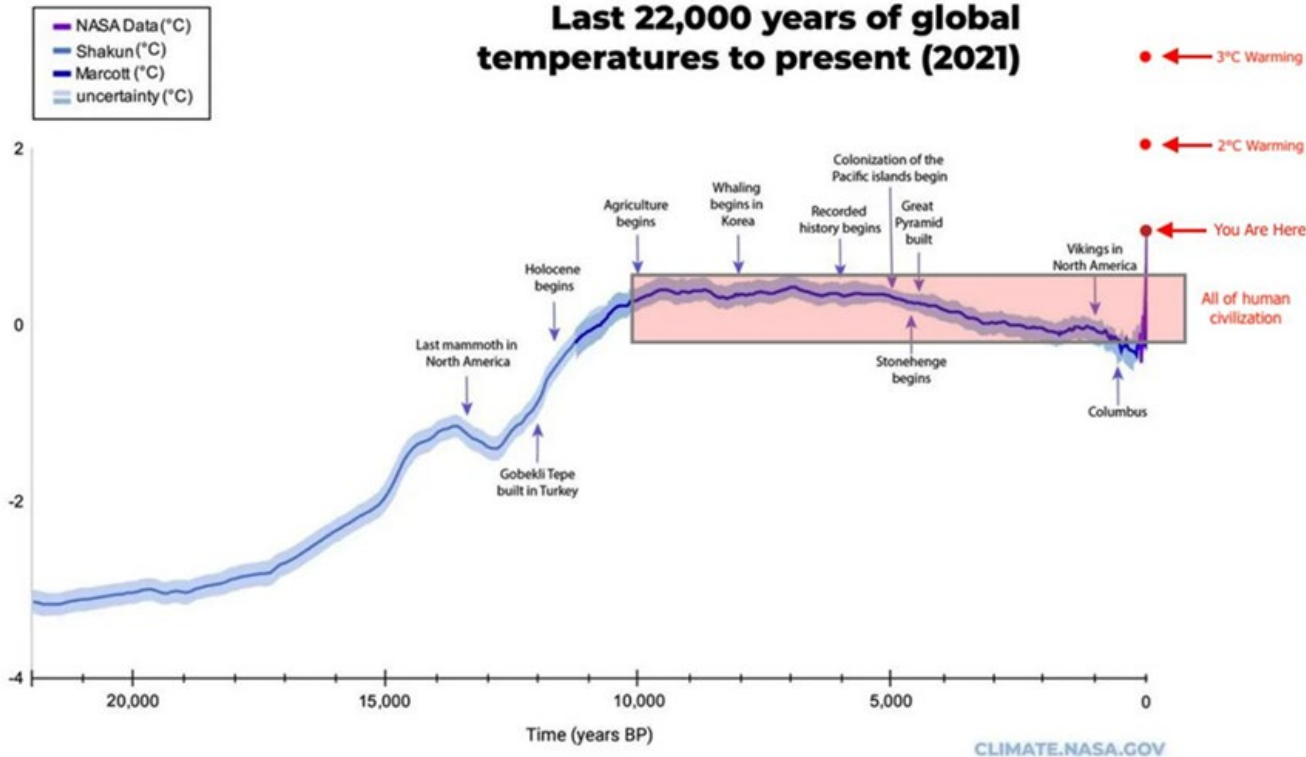
Natural climate forcings eliminated as potential cause of long-term trend:

- Changes in solar output
- Orbital cycle
- Volcanic eruptions

Separating Human and Natural Influences on Climate



## Last 22,000 years of global temperatures to present (2021)



CLIMATE.NASA.GOV

## Since Industrial Revolution:

- CO<sub>2</sub> increase: from 280 ppm to 420 ppm
- Temperature increase of 1.2°C

# National Pledges

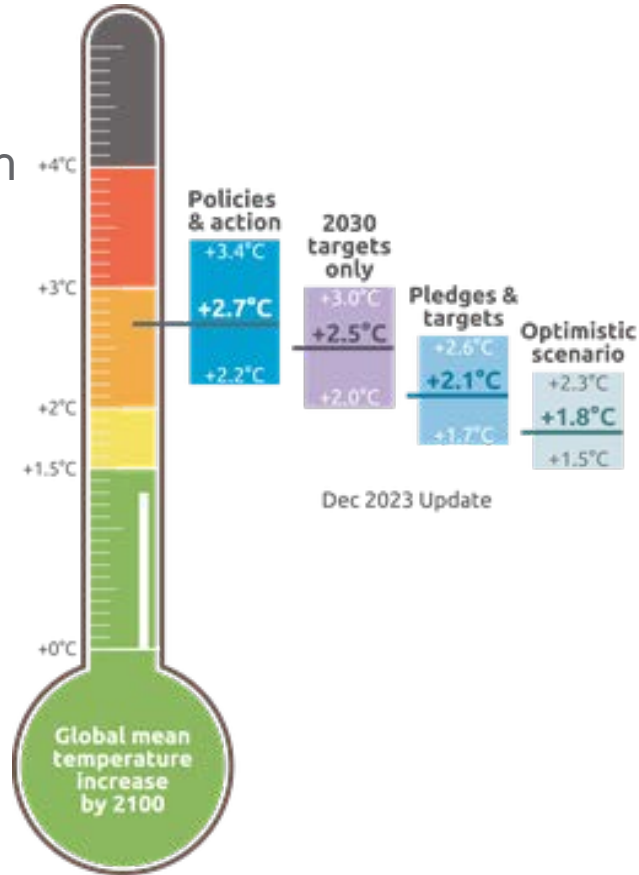
1.5°C warming: feedback loops with potential to cause runaway warming

Risks substantially higher at 2°C warming

Policies in place: 2.2- to 3.4 °C warming

Current commitments: 1.7- 2.6 °C rise by 2100

The Gap: On current track we will emit enough GHGs by 2030 to make holding warming to 1.5°C impossible.



TRACKING  
GLOBAL  
CLIMATE  
ACTION  
SINCE 2009



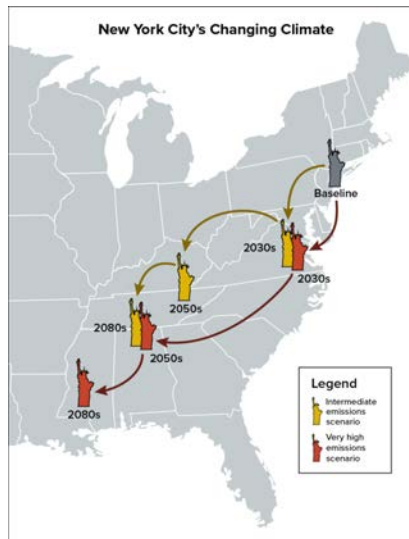
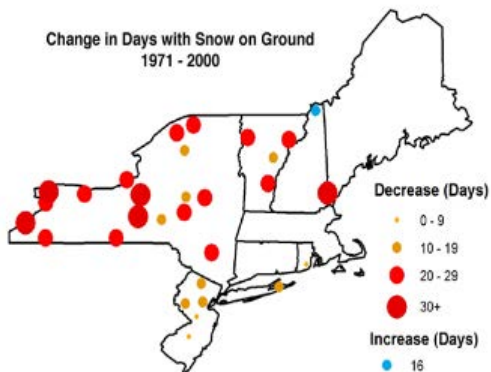
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# Increased Mean Annual Temperature (very likely)

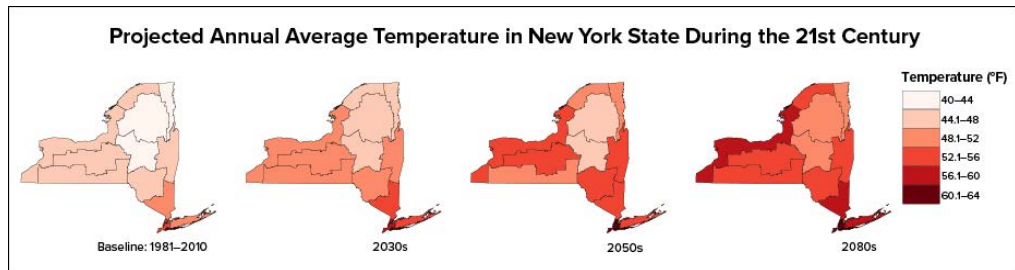
Since 1901: 2.6°F warming  
 Projected by 2100:

5°F - 11°F year-round

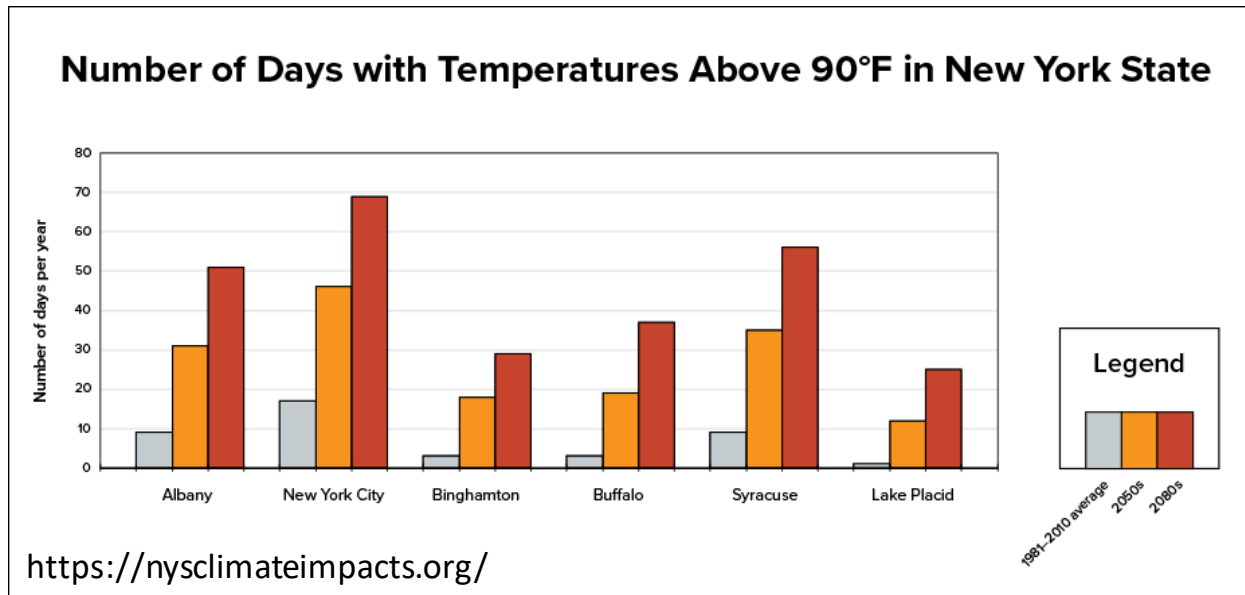
5.5°F – 12.5°F winter



<https://nysclimateimpacts.org/>



# More Extreme-heat Events (very likely)



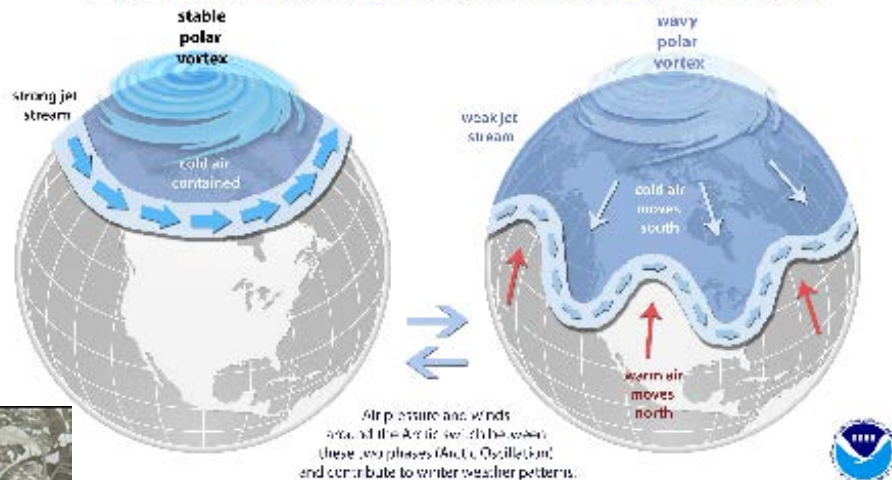


# Fewer Extreme Cold Events (likely overall, but potential for extreme cold)

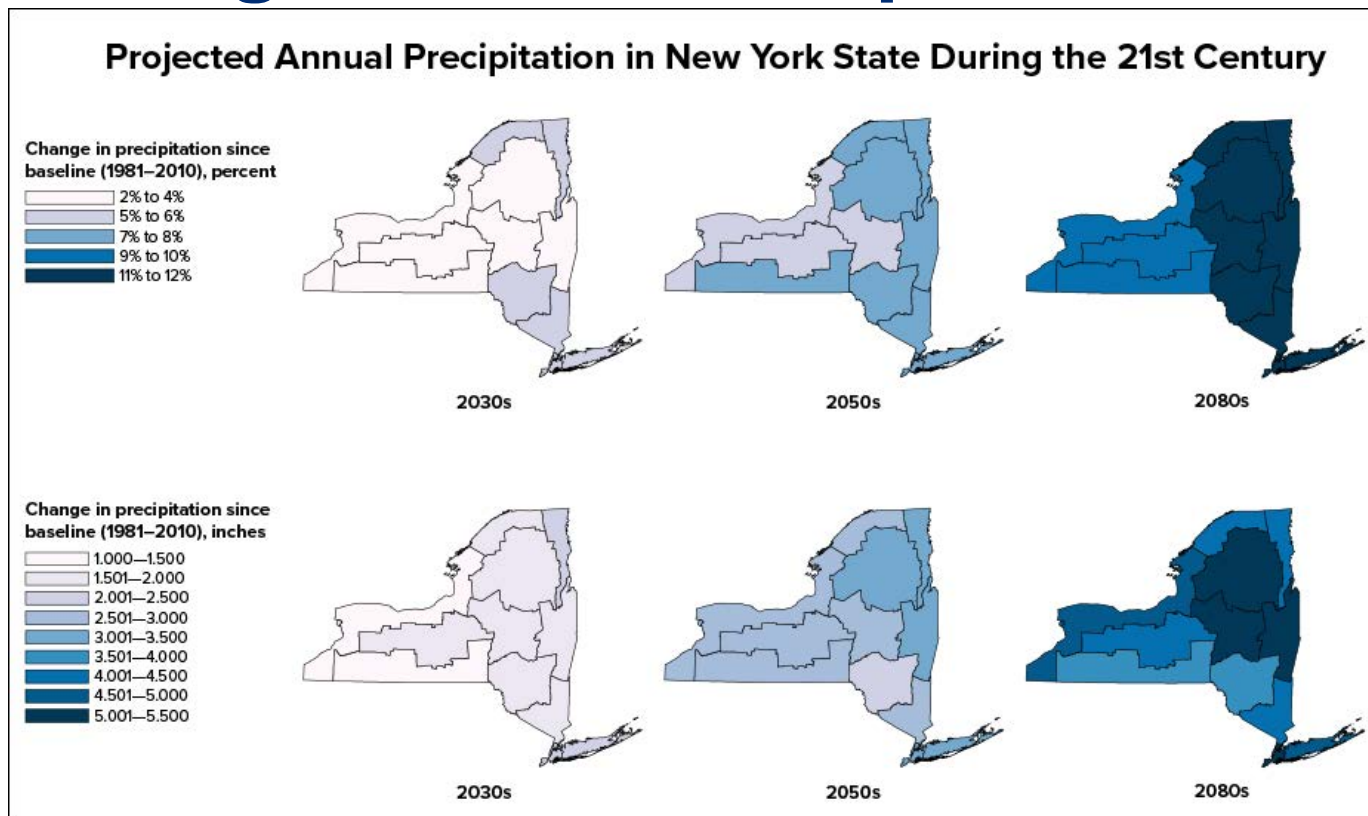
- Extreme Cold
  - Damage to property, public infrastructure
  - Crop damage
  - Demand for electricity (heating)
  - Fatalities



## The Science Behind the Polar Vortex



# Average Annual Precipitation

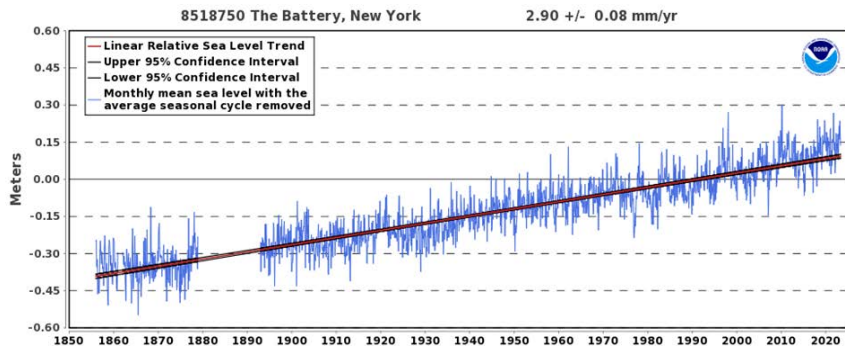


# Extreme Precipitation – NYS Southern Tier

2080s	Baseline	10 <sup>th</sup>	50 <sup>th</sup>	90 <sup>th</sup>
Days over 1 inch precipitation	8	8	10	12
Days over 2 inches precipitation	0.8	1	1	2
Days over 4 inches precipitation	0	0	0.1	0.1



# Sea Level Rise



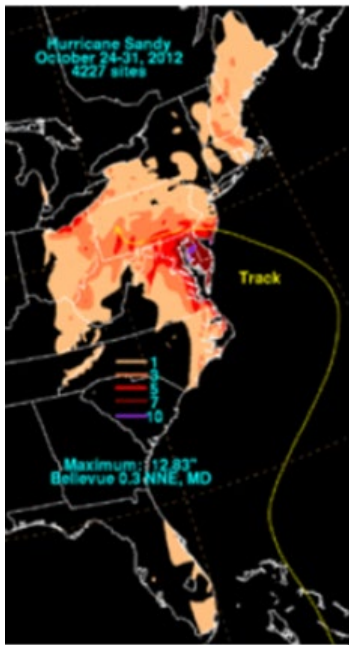
	New York City/Lower Hudson					
	Low	Low-medium	Medium	High-medium	High	Rapid Ice Melt
2030s	6	7	9	11	13	NA
2050s	12	14	16	19	23	NA
2080s	21	25	30	39	45	83
2100	25	30	36	50	65	114
2150	38	47	59	89	177	NA

6 NYCRR Part 490, Projected Sea Level Rise



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# Coastal Storms (uncertain)



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“The extreme temperatures expected under climate change may be especially harmful to children. Children are more vulnerable to heat partly because of their physiological features, but, perhaps more important, because they behave and respond differently than adults do. Children are less likely to manage their own heat risk ...”

- [Zivin and Shrader, 2016](#)







# Effects in New York

Higher temperatures  
 More precipitation  
 More frequent drought  
 Sea-level rise  
 More extreme events:

- Floods
- Heat
- Ice/snow
- Winds
- Coastal storms

Disease and pests

- Risks to people
- Stressed infrastructure
- Agricultural and ecosystem effects



Conservation Value Notes



Greenpeace International



NYSDEC



PhillipC/flickr



T.B. Ryder



NYSDEC



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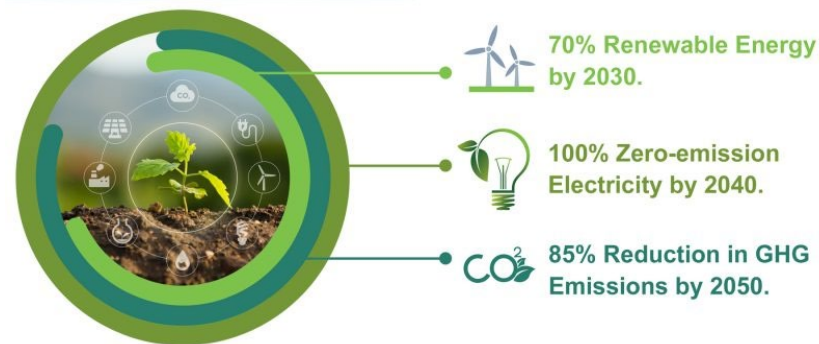
NYSDEC



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# Climate Leadership and Community Protection Act (CLCPA) – Overview

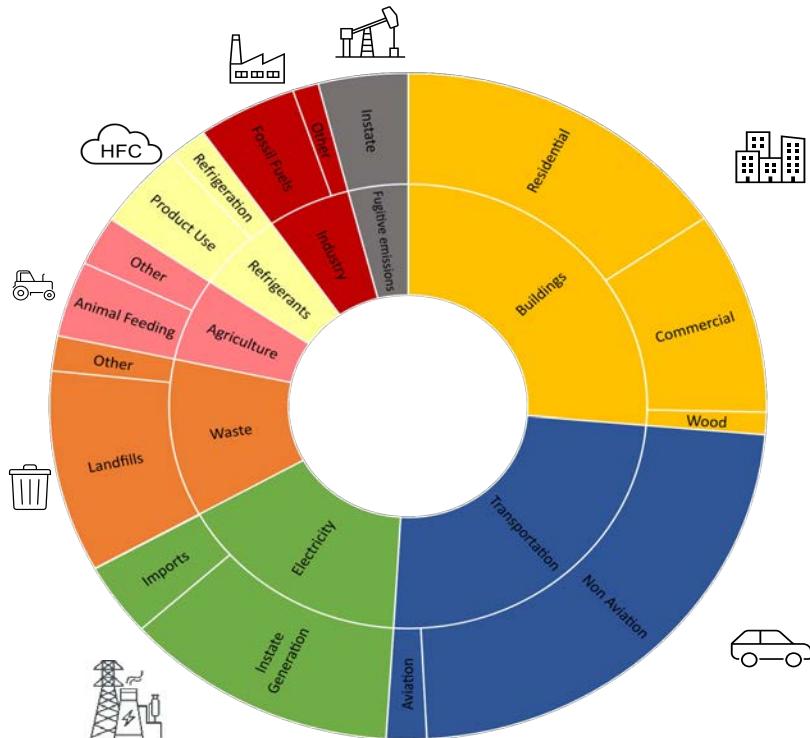
- Carbon neutral economy, mandating at least an 85% reduction in emissions below 1990 levels
- 40% reduction in emissions by 2030
- 100% zero-carbon electricity by 2040
- 70% renewable electricity by 2030
- 9,000 MW of offshore wind by 2035
- 6,000 MW of distributed solar by 2025
- 3,000 MW of energy storage by 2030
- 185 TBtu on-site energy savings by 2025
- Commitments to climate justice and just transition



Sustainable Saratoga

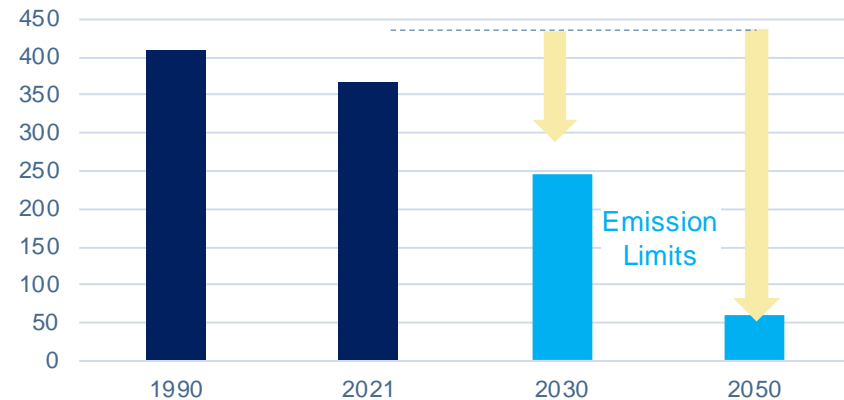
# Greenhouse Gas Emission Reduction Requirements

## Current Estimated Greenhouse Gas Emissions by Sector



2021 Calendar Year Emissions: Based on 2023 Statewide Greenhouse Gas Emissions Report.

## New York State Greenhouse Gas Emissions (MMtCO<sub>2</sub>e)



Sources: New York State Greenhouse Gas Inventory; § 496.4 Statewide Greenhouse Gas Emission Limits

# Real Benefits for New Yorkers

Stronger and More Resilient Energy Systems

Clean and Reliable Electric Power

Clean, Affordable, Reliable Transportation

Clean and Safe Energy-Efficient Homes and Businesses

Better Energy Choices

High-Quality Jobs

Better Health

An Equitable Clean Energy Economy for Everyone



## New York's Cap-and-Invest Program – How it Works

Cap-and-Invest sets an annual limit on the amount of greenhouse gas emissions emitted in New York. Every year, the cap will be set lower to reduce greenhouse gas emissions.



Large-scale greenhouse gas emissions sources and distributors of heating and transportation fuels will be required to purchase or obtain allowances for emissions associated with their activities.



The Program will prioritize frontline disadvantaged communities that have suffered from pollution as a result of environmental injustice and will ensure emissions reductions.



Proceeds will minimize potential consumer costs while supporting critical investments in focus areas such as climate mitigation, energy efficiency, and clean transportation.

### Cap-and-Invest Guiding Principles:

- Affordability
- Climate leadership
- Creating jobs and preserving competitiveness
- Investing in disadvantaged communities
- Funding a sustainable future

Advance an economywide cap-and-invest program that establishes a declining cap on greenhouse gas emissions, limits potential costs to economically vulnerable New Yorkers, invests proceeds in programs that drive emission reductions in an equitable manner, and maintains the competitiveness of New York industries.

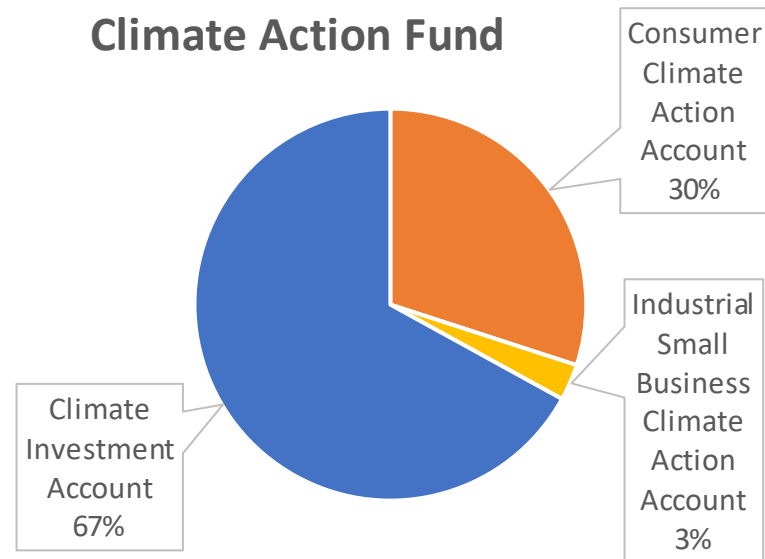


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# Investing in Emissions Reductions and Ensuring Affordability

## Climate Action Fund

- **Consumer Climate Action Account:** at least 30 percent to New Yorkers every year to mitigate consumer costs
- **Climate Investment Account:** 67% to support transition to a less carbon-intensive economy.
- **Industrial Small Business Climate Action Account:** 3 percent to help mitigate costs to small businesses.



# Smart Growth Public Infrastructure Policy Act

“... no state infrastructure agency shall approve, undertake, support or finance a public infrastructure project, including providing grants, awards, loans or assistance programs, unless, to the extent practicable, it is consistent with the relevant criteria ...”

- mobility through transportation choices including improved public transportation and reduced automobile dependency
- community based planning and collaboration
- strengthening existing and creating new communities which reduce greenhouse gas emissions
- mitigation of risk due to sea level rise, storm surge and flooding



# Community Risk and Resiliency Act (2014)

- Requires consideration of climate change by applicants for major permits
- Adds mitigation of sea-level rise, storm surge and flooding to Smart Growth Public Infrastructure Policy Act criteria
- Authorizes DEC require mitigation of significant climate risks to any natural resource, public infrastructure or services, disadvantaged communities, or private property not owned by the applicant.
- Requires guidance on implementation (DEC, DOS)
- Requires guidance on use of natural resilience measures to reduce risk (DEC, DOS)



<http://www.dec.ny.gov/energy/102559.html>



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# Extreme Heat Action Planning

## 2022 State of the State Directive:

DEC and NYSERDA to develop an **extreme heat action plan** to address impacts in

- disadvantaged communities;
- areas of employment; and
- recreational zones across the state.

<https://dec.ny.gov/environmental-protection/climate-change/effects-impacts/extreme-heat>



# Extreme Heat Action Plan

Actions agencies would take in the short (1-2 years) or mid-terms (3-5 years)

State and community capacity, governance	Emergency response and community preparedness	Buildings, built environment	Ecosystem-based adaptation
Local planning and implementation networks	Communications, outreach, education	Infrastructure and large facilities	Urban forestry, UHI solutions, conservation



# DEC UHI Mapping and Modeling Project

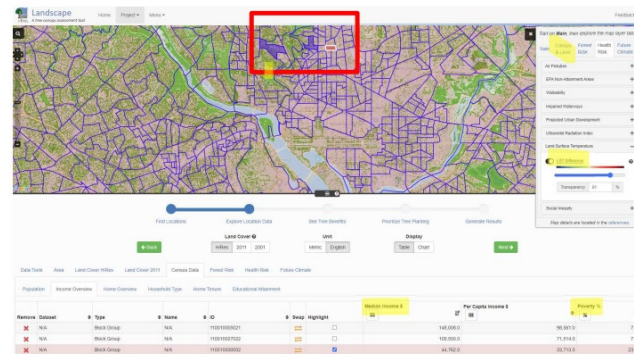
Identify urban disadvantaged communities with UHIs

Statewide mapping Hottest-hour maps

Statewide extreme-heat exposure maps (air temperature, wind chill, land-cover, solar radiation)

- Model exposure as a function of land cover, evaporation/energy balance, WBGT, components of anthropogenic heat
- Future climate change, land-use change pressures

Assessment of mitigation actions



People need to realize, as busy as we are, as challenging as it may be, it has to be a priority or we're not going to be able to survive on this planet.

*Debra Duardo, Superintendent, Los Angeles County Office of Education*



We don't need feel-good advertisements from the district. We need massive accelerated action.

*Nick Limbeck, 6th grade teacher, Chicago Public Schools*



# State Support for Local Climate Action

Assistance to communities to

- reduce greenhouse emissions
- adapt to climate change

Voluntary. No fees. Sponsored by 8 NYS state agencies.

Comprehensive. Flexible.



NYS DOT



**Climate Smart  
Communities**

[ClimateSmart.ny.gov](https://ClimateSmart.ny.gov)



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# Schools as Land Managers

“It really makes sense to think about how those spaces can serve well-being, development, learning, and social cohesion — and also environmental justice and resilience goals that can help a community thrive.”

Priya Cook, [Children & Nature Network](#)



<https://www.waldorfearlyeducation.org/>



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# Climate Change as Educational Opportunity

“The time is now to include climate education as a key climate risk mitigation strategy — along with energy transformation, land uses and water — and to make climate education a mandatory part of the national curriculum.”

*Radhika Iyengar, Columbia Climate School*



# New York State Climate Education

“New York’s lack of comprehensive, interdisciplinary and standardized K-12 climate education curricula highlights a gap in the state’s climate action plan.”

[Birkett et al., 2023](#)



Report recommendations:

- Create Office of Climate Literacy
- Develop comprehensive, interdisciplinary and justice-centered criteria
- Identify robust funding mechanisms
- Identify and develop learning resources



# New York Climate Education Hub

Teaching resource library

Climate change lesson plans

News articles for students

Teacher development materials

Administrator guidance



<https://nyclimateeducation.org/>



Captain Climate

# Climate Anxiety



86% of college students experience some climate anxiety.

39% of students (13-19 years old) ranked climate change as single largest issue facing the world.

# Schools in Climate Smart Communities



**FORCES FOR CHANGE: A YOUTH GUIDE TO  
THE NEW YORK STATE CLIMATE SMART  
COMMUNITIES PROGRAM**

**THE WILD CENTER**



# Reason for hope?



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# Reference and Resources

[All We Can Save Project](#)

['It Has to Be a Priority': Why Schools Can't Ignore the Climate Crisis \(edweek.org\)](#)

[Climate Literacy \(noaa.gov\)](#)

[National Youth Council - Project Green Schools](#)

[Roots & Shoots USA - Youth Movement of the Jane Goodall Institute \(rootsandshoots.org\)](#)

[Force of Nature Podcast](#)

[The Resilience Project](#)

[Caretakers of Wonder Toolkit](#)

[Climate Change and Children's Health | US EPA](#)



# Thank You

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## Connect with us:

- DEC: [www.dec.ny.gov](http://www.dec.ny.gov)
- Community Risk and Resiliency Act: [www.dec.ny.gov/energy/102559.html](http://www.dec.ny.gov/energy/102559.html)
- Climate Smart Communities: [www.dec.ny.gov/energy/76483.html](http://www.dec.ny.gov/energy/76483.html)
- Facebook: [www.facebook.com/NYSDEC](http://www.facebook.com/NYSDEC)
- X (formerly Twitter): <https://x.com/NYSDEC>
- Flickr: [www.flickr.com/photos/nysdec](http://www.flickr.com/photos/nysdec)

