

NEW JERSEY MAYORS' CLIMATE SUMMIT



hosted by

**MAYOR PHIL KRAMER OF FRANKLIN TOWNSHIP &
MAYOR BRUCE A. HARRIS OF CHATHAM BOROUGH**



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What We Must Achieve



Understanding Paris, Kyoto, and
New Jersey's Global Warming
Response Act

New Jersey in a warming world: What's at stake

Robert Kopp

Institute of Earth, Ocean and Atmospheric Sciences
Rutgers University–New Brunswick



EOAS

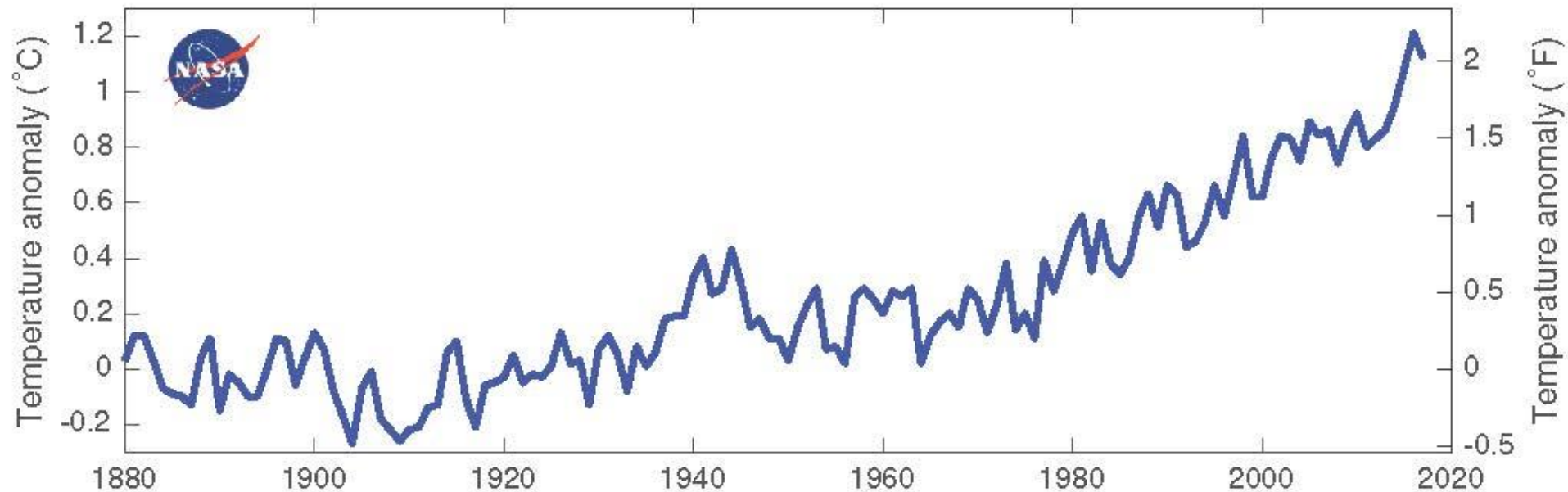
Mayors' Climate Summit
February 3, 2018

Climate
Impact Lab



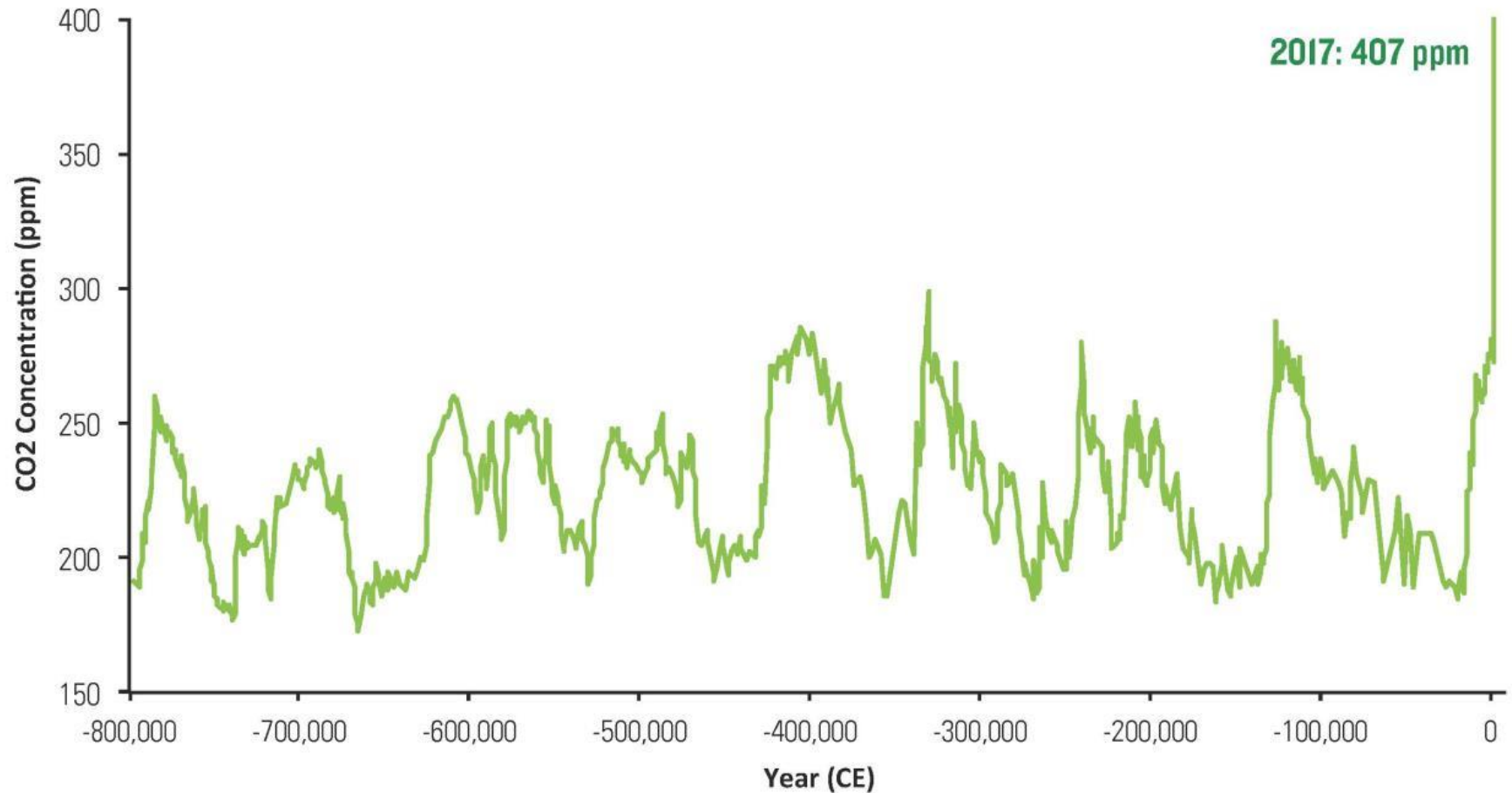
Temperatures are rising.

Annual average global mean temperatures

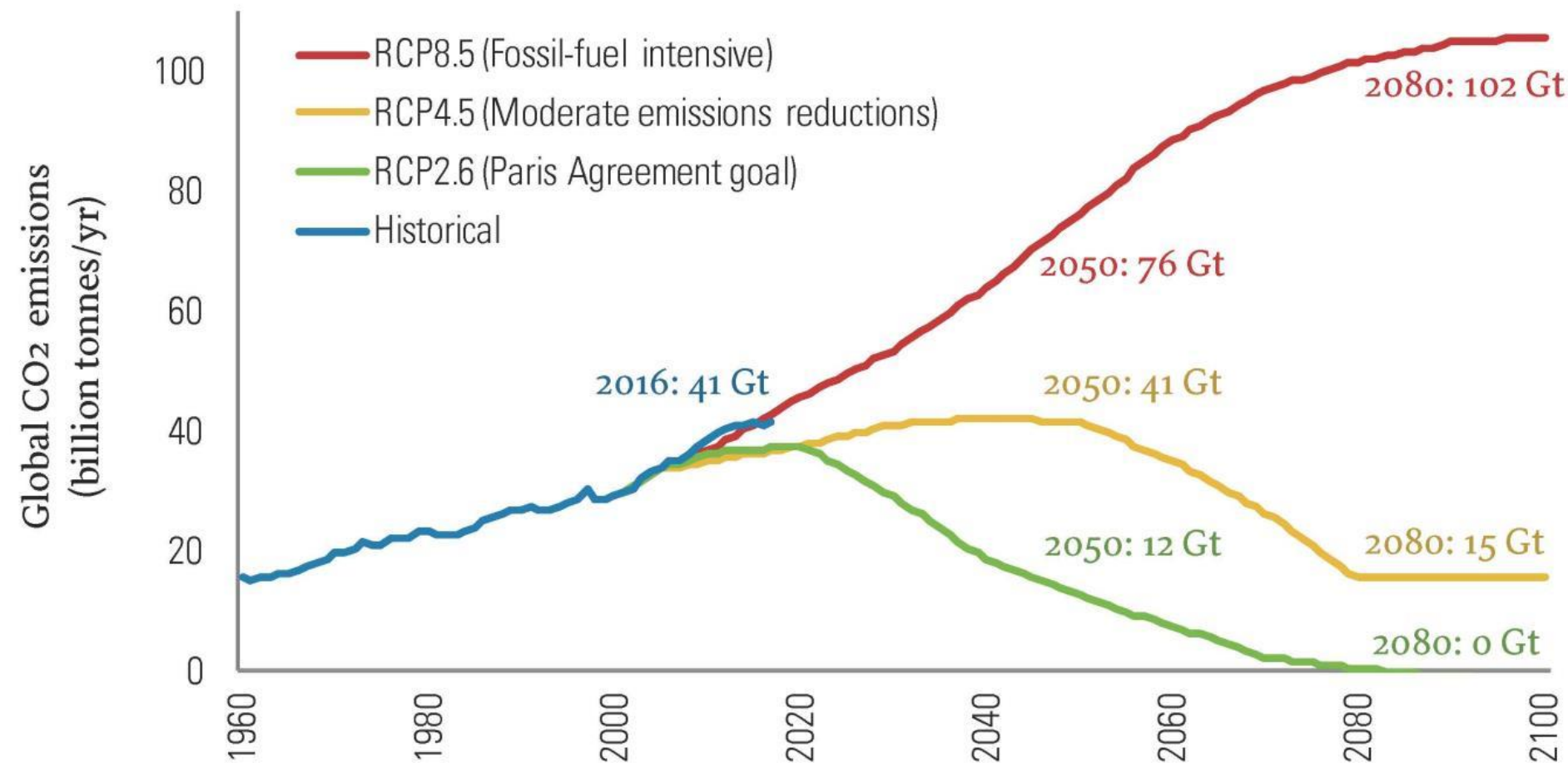


Between 1980 and 2017, temperatures rose at an average rate of about 0.17°C (0.31°F) per decade. The 2017 average global temperature was about 0.9°C (2.0°F) above the late nineteenth century average. It was most likely the second warmest year on record, after the El Niño year of 2016.

In spring 2014, carbon dioxide concentration surpassed 400 ppm for the first time in well over 800 thousand years.



Society's choice: Global carbon dioxide emissions under three different "Representative Concentration Pathways"



2080-2099, likely global mean temperature increases relative to 19th century of

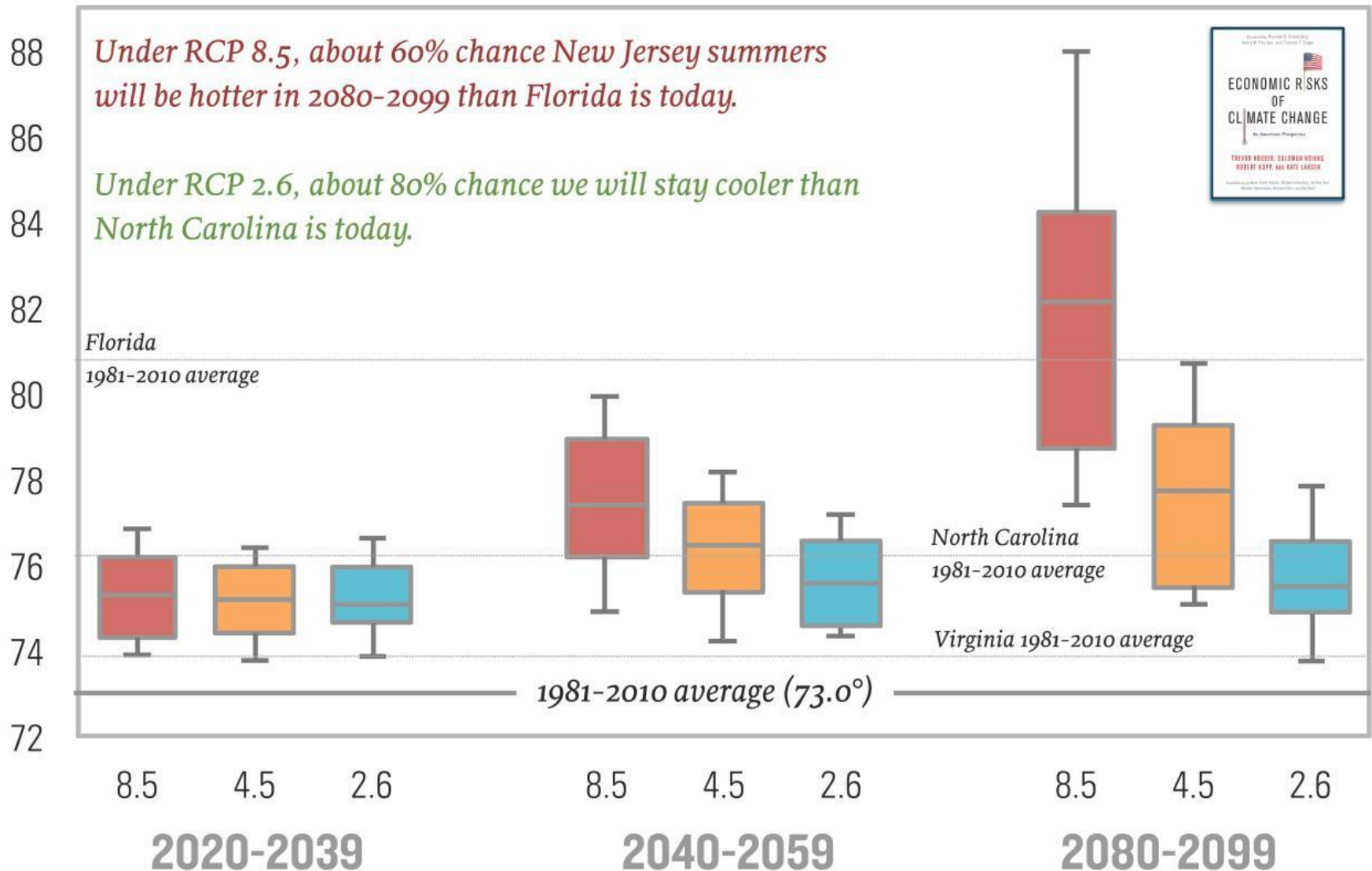
RCP 8.5: 6-10°F (3.5-5.7°C)

RCP 4.5: 3.5-6.0°F (2.0-3.3°C)

RCP 2.6: 2.4-4.0°F (1.3-2.2°C) [consistent with nominal international target of 2°C]

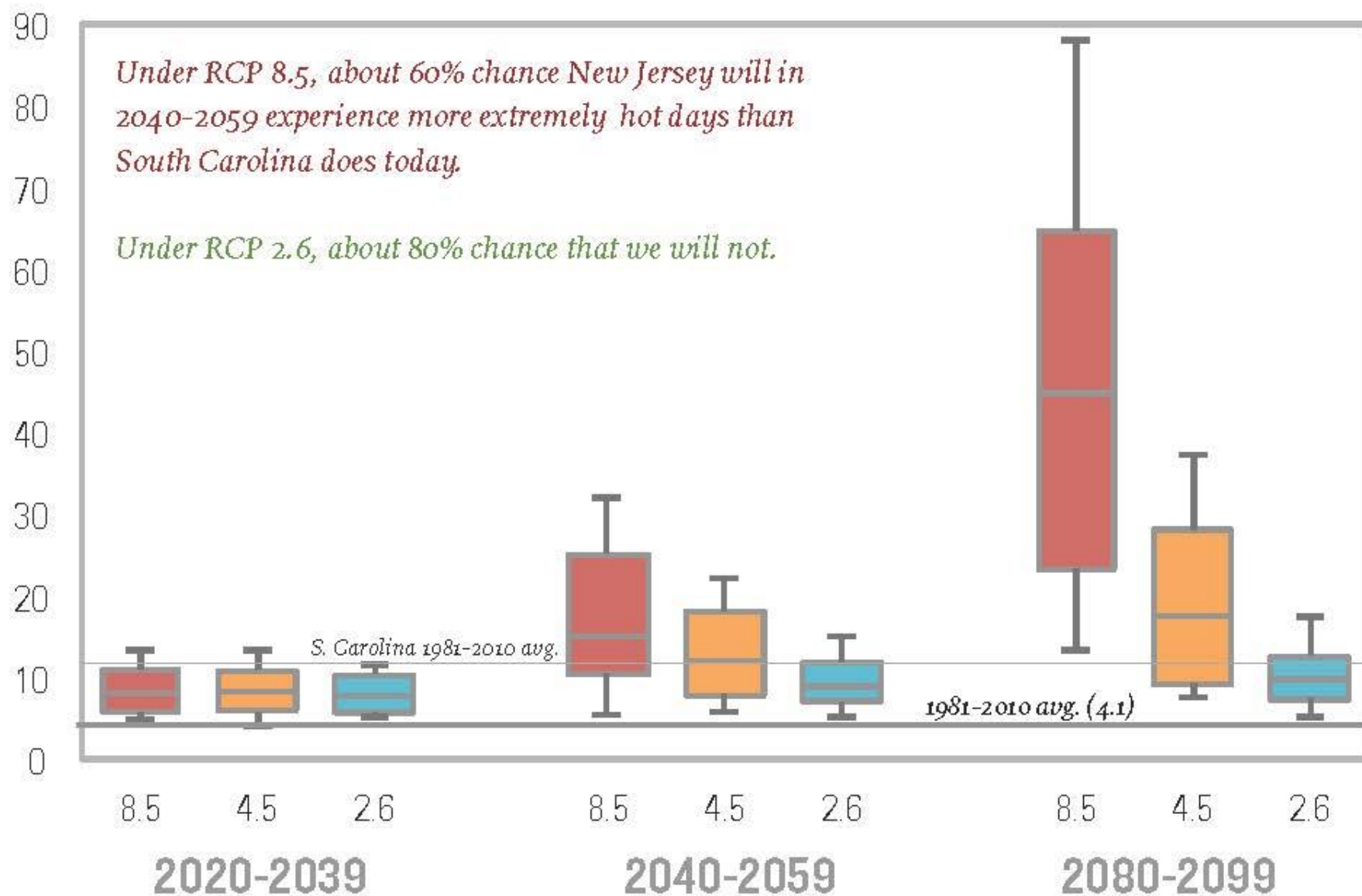
Our choice affects how hot it will be

Average summer temperatures in New Jersey, degrees Fahrenheit

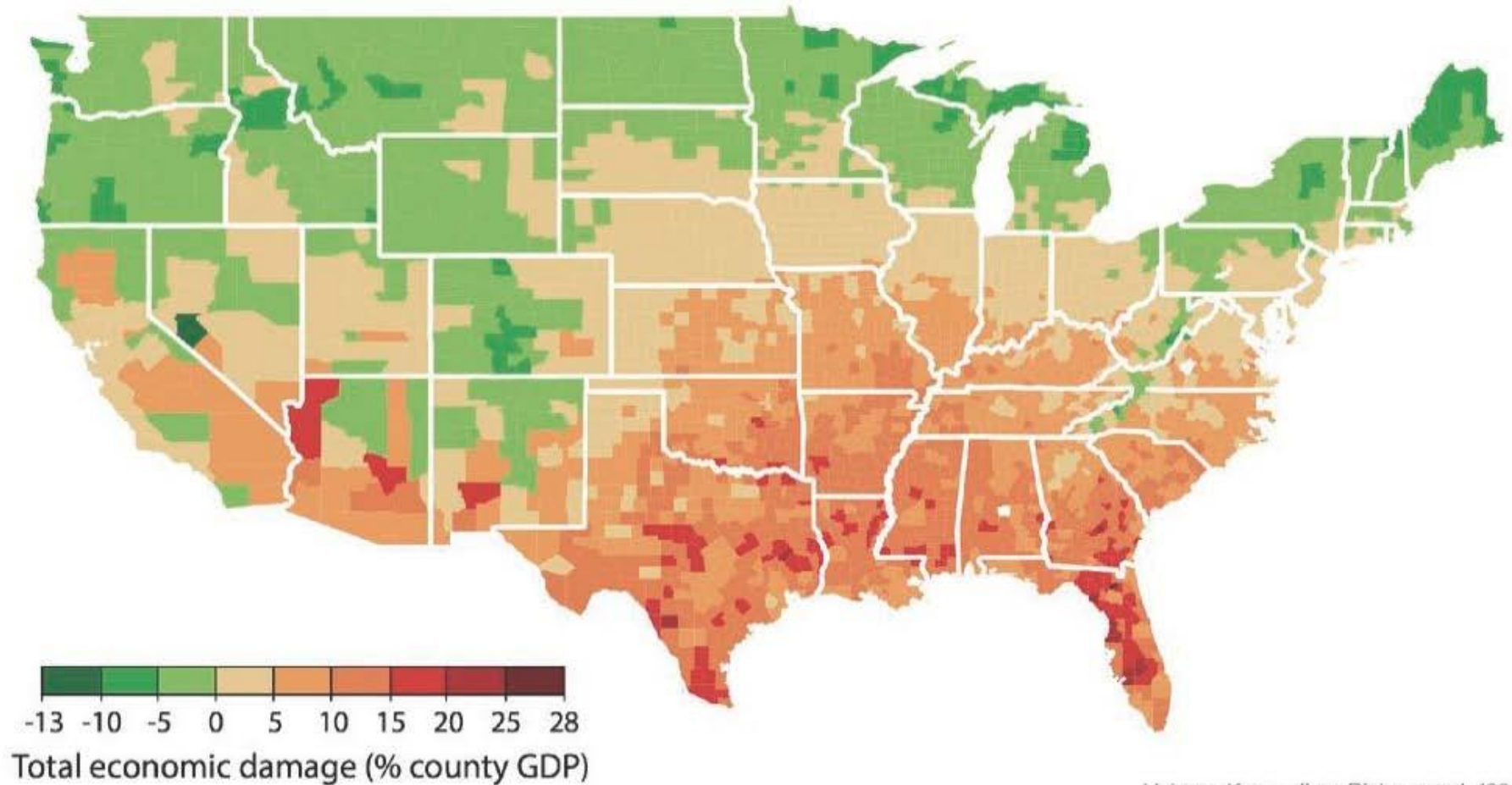


Number of days above 95°F in New Jersey

Average days/year, population-weighted

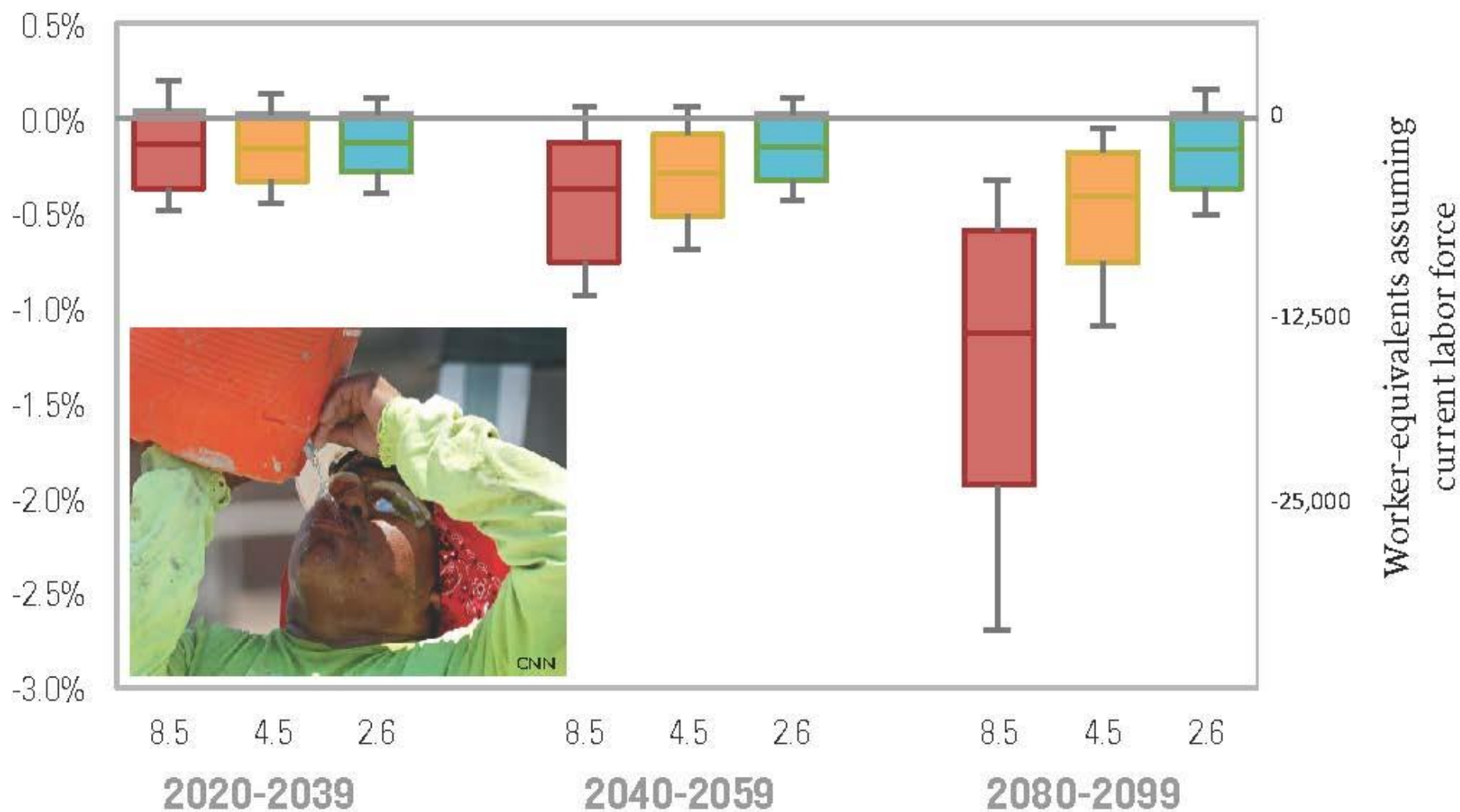


And our choice comes with economic risks, which we are increasingly learning how to measure.



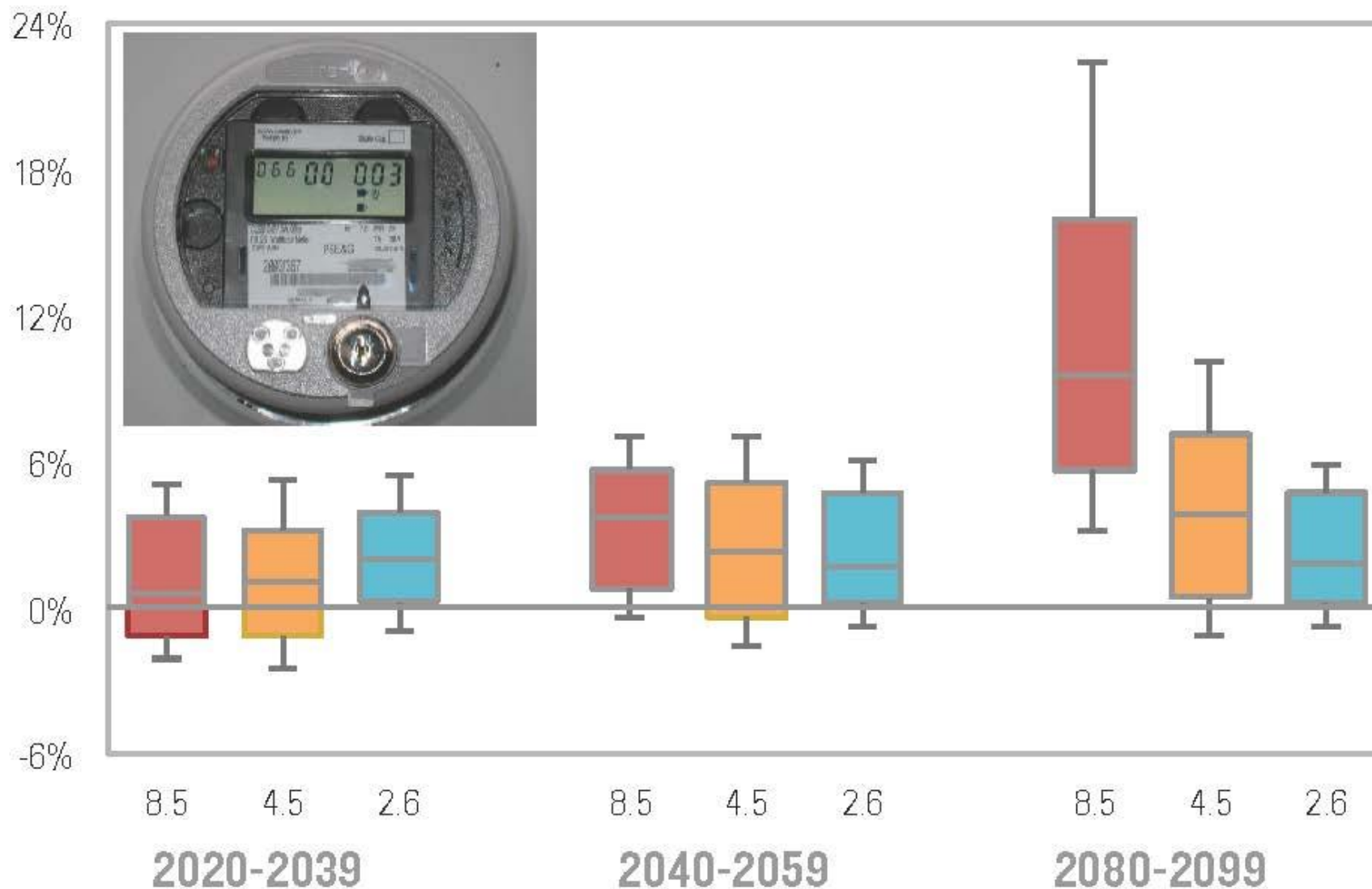
Hsiang, Kopp, Jina, Rising, et al. (2017)

Higher temperatures lead to lower labor productivity in outdoors and manufacturing sectors (~28% of workers) in New Jersey.



Higher temperatures increase energy expenditures in New Jersey

% above year 2012 base (\$14.3 billion)

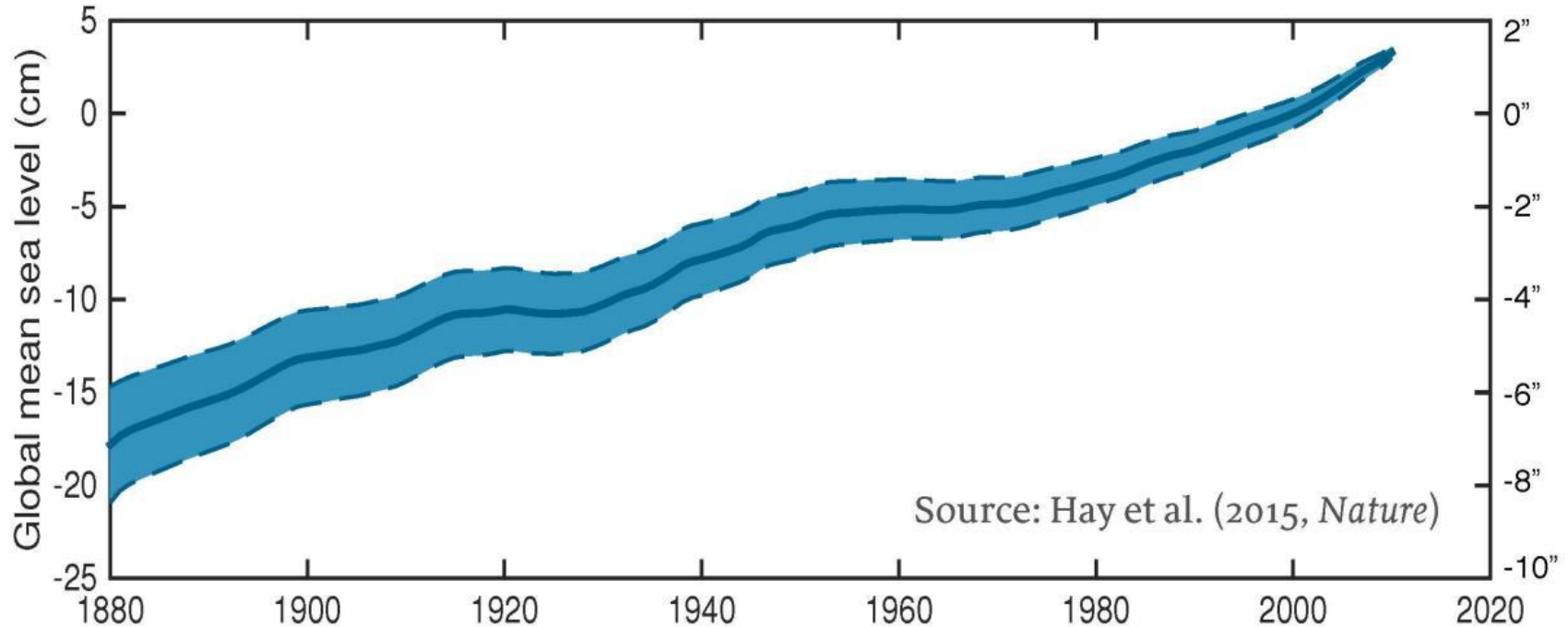




But the biggest risk in New Jersey that we know how to quantify comes (perhaps unsurprisingly) from rising seas...

The ocean is rising.

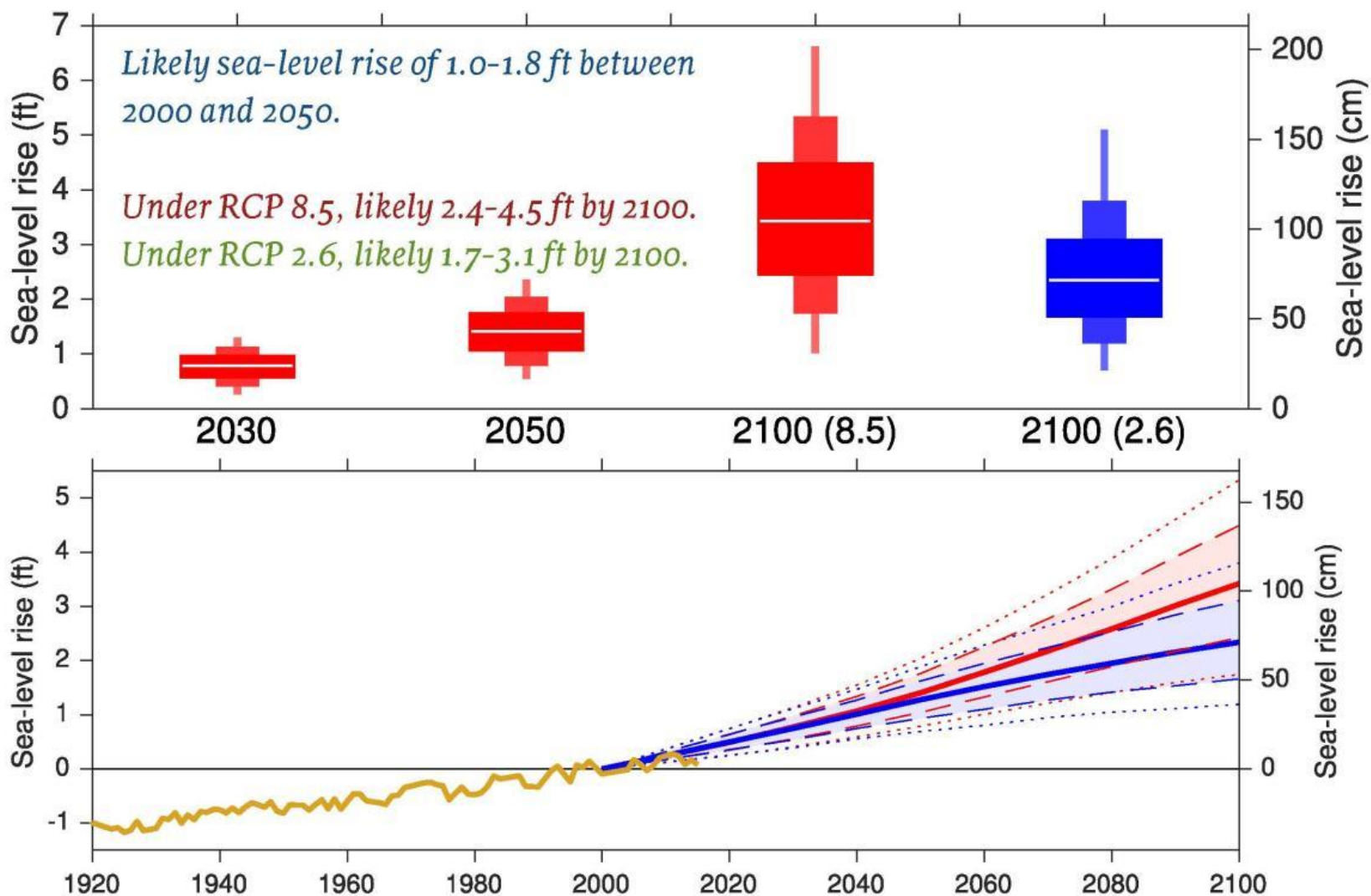
Global mean sea-level rise (cm above year 2000 level)



The rate of global-mean sea-level rise in the 20th century (1.4 ± 0.2 mm/yr, about 5.5"/century) was the fastest in at least 2600 years. The rate of rise over the last 20 years was 3.0 ± 0.7 mm/yr (12"/century), about twice as fast.

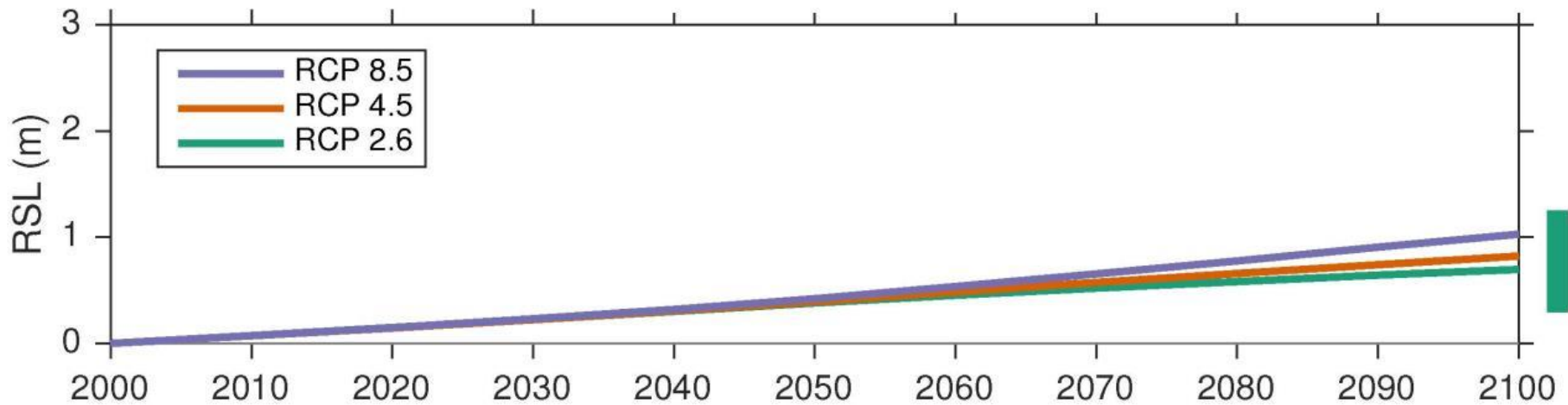
Our choice affects how high sea level will be

Sea-level rise along the NJ shore, above year 2000 levels



...and some emerging science suggests higher numbers are more likely than previously thought under high-emissions scenarios.

Sea-level rise along the NJ shore, above year 2000 levels



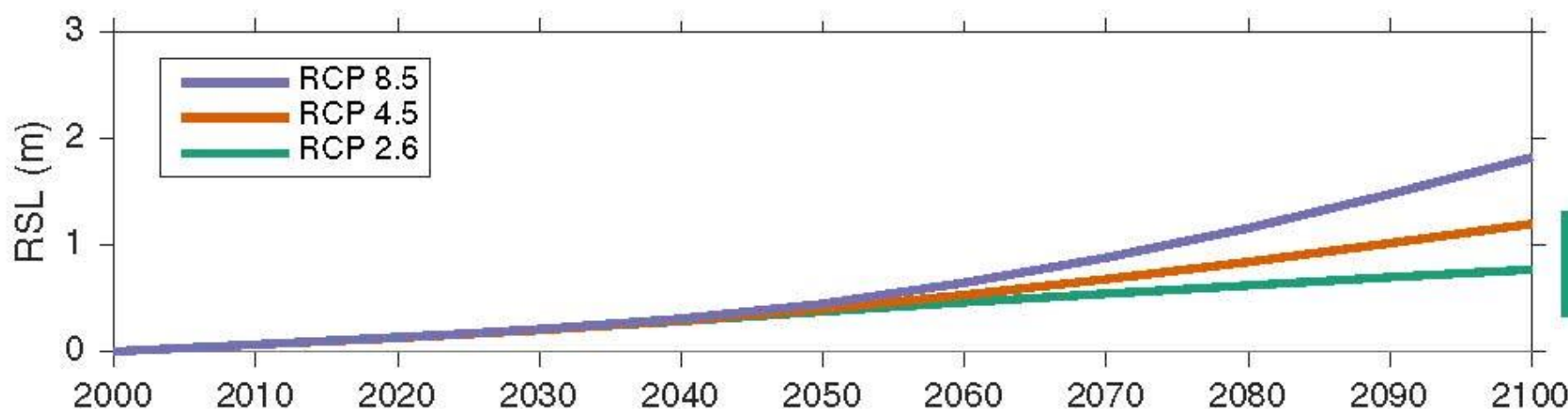
Likely sea-level rise of 1.0-1.8 ft between 2000 and 2050.

Under RCP 8.5, likely 2.4-4.5 ft by 2100.

Under RCP 2.6, likely 1.7-3.1 ft by 2100.

...and some emerging science suggests higher numbers are more likely than previously thought under high-emissions scenarios.

Sea-level rise along the NJ shore, above year 2000 levels



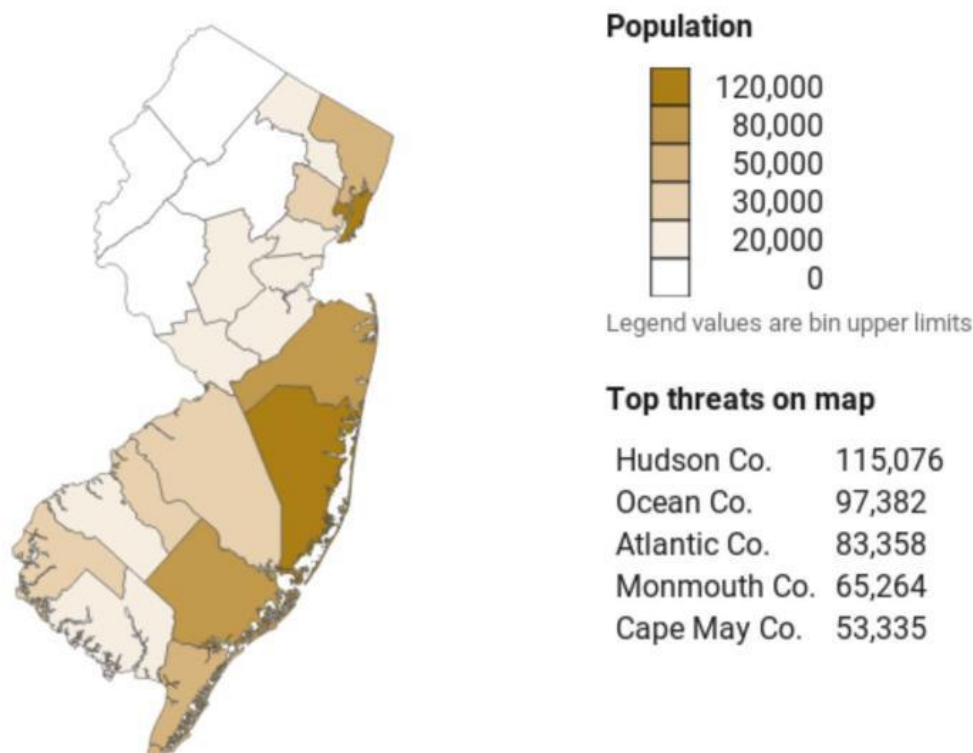
Likely sea-level rise of 0.9-1.9 ft between 2000 and 2050.

Under RCP 8.5, likely 4.4-8.3 ft by 2100.

Under RCP 2.6, likely 1.6-3.5 ft by 2100.



Total population below 10ft in New Jersey by county



Values exclude sub-10ft areas potentially protected by levees or other features. Elevation is defined relative to local high tide lines. Source: Climate Central Risk Finder, 2017. <http://www.riskfinder.org/>

CLIMATE  CENTRAL

About 600 thousands New Jerseyans (about 7% of the total state population) live within 10 feet (3 m) of the high tide line – areas potentially vulnerable to sea-level rise over the next century. About \$190 billion of property is located there.

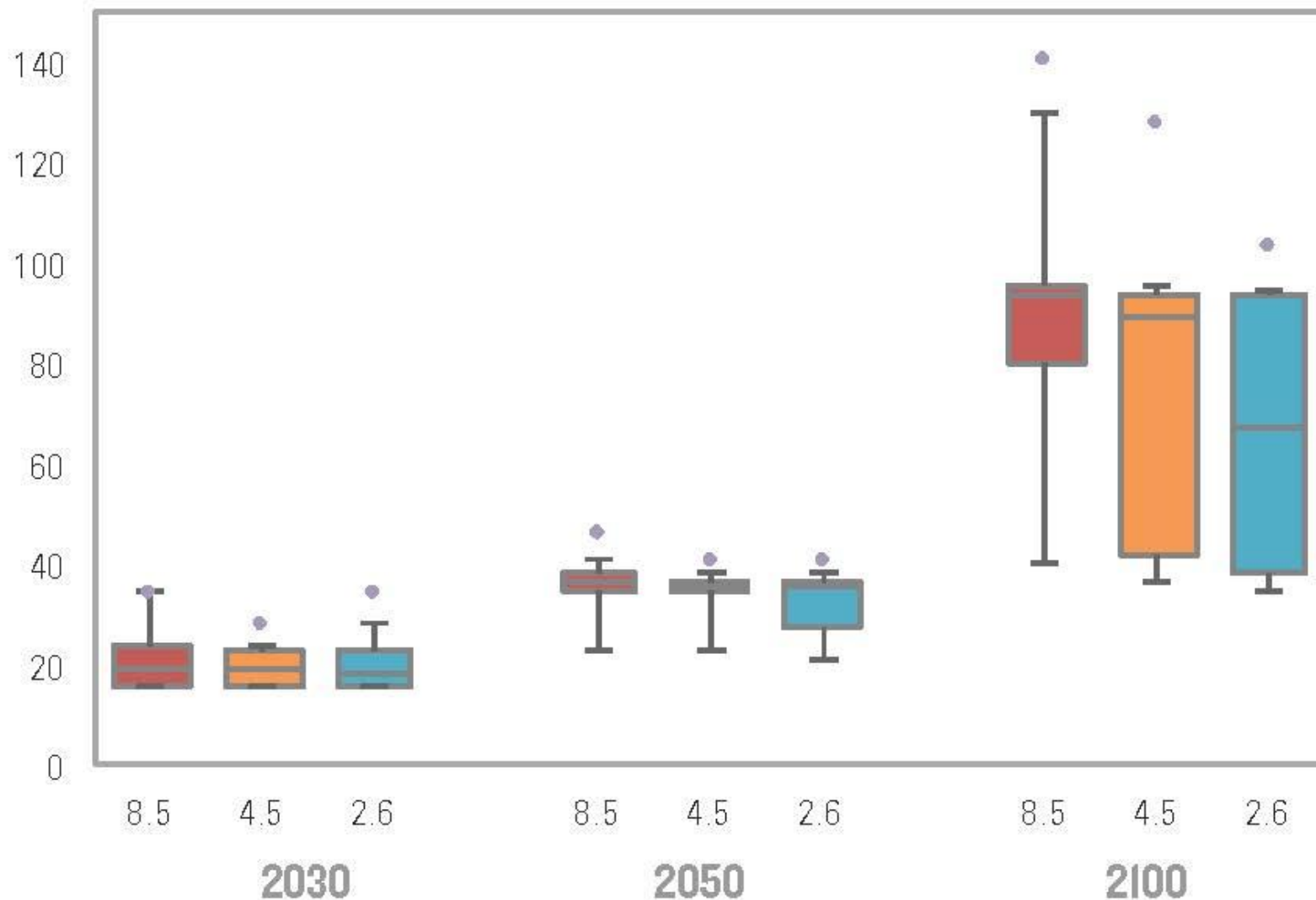
Permanent flooding of land due to sea-level rise

Lefort Cemetery, Leeville, Louisiana



Value of current NJ property falling below the mean high tide line

Billion dollars per year (assuming current property distribution)



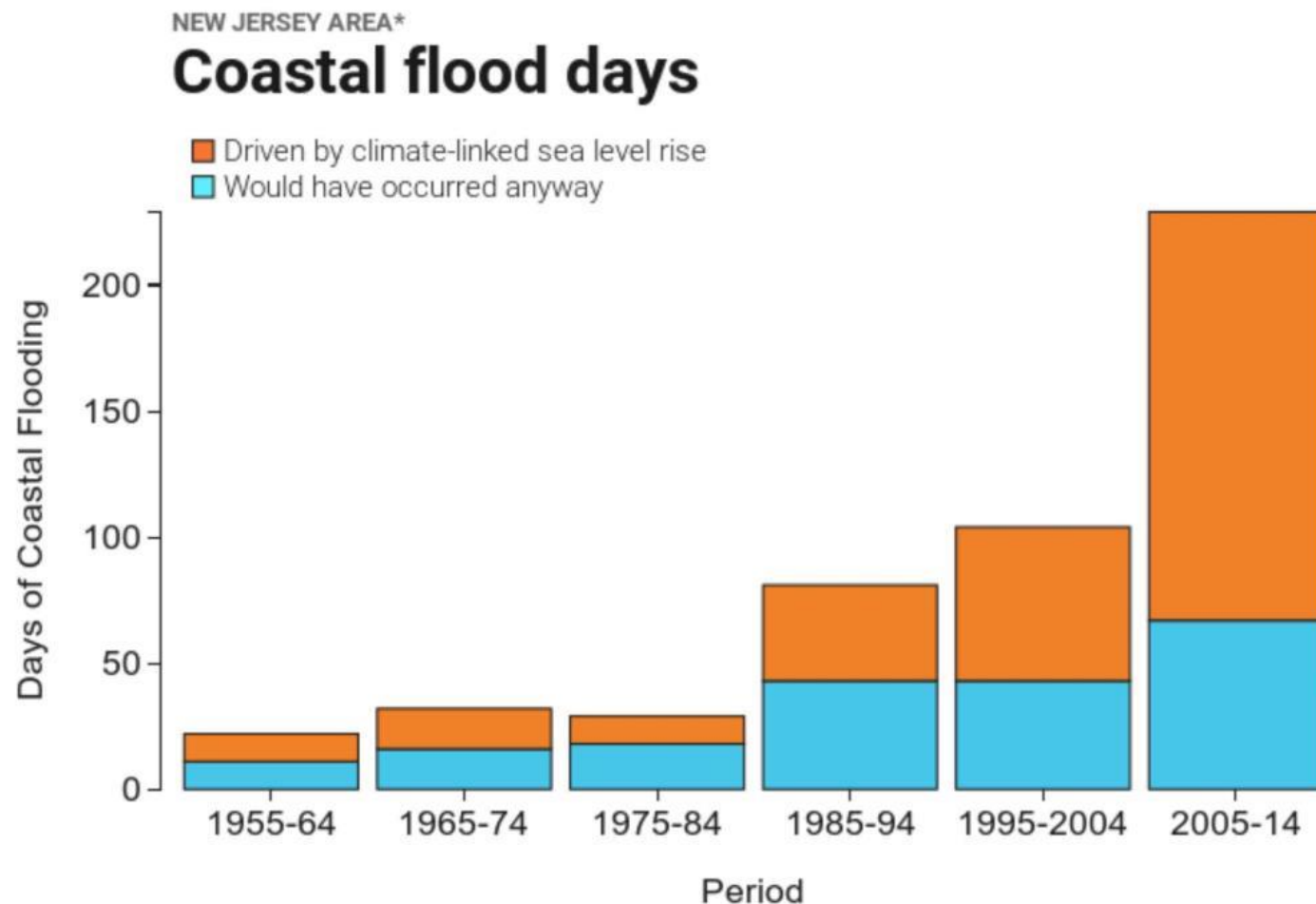
Bars/whiskers indicate 66%/90% probability.
Diamonds indicate 99th percentile (1-in-100) projection.

Before permanent high-tide flooding comes sunny-day 'nuisance' flooding, enhanced by sea-level rise

Broad Channel, Jamaica Bay, Queens, New York City



Sea-level rise is *already* greatly increasing 'nuisance' flooding.



Storm flooding

Ship Bottom, NJ

Global sea-level rise from 1880–2012 exposed about 80 thousand additional people in New York City and New Jersey to Sandy's storm surge (Miller et al., 2013).



2008

(Courtesy Prof. Ken Miller)

THE REGION'S MOST EXTENSIVE STORM COVERAGE 10 PAGES INSIDE

The Philadelphia Inquirer

philly.com

D 1000 East 10th Street Philadelphia, PA 19107

Wednesday, Oct. 31, 2012 ★ 2012 Pulitzer Prize Winner ★ \$1

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Death Toll
Hurricane
claims 50 on
East Coast.



New York City
Devastating
blow cripples
Big Apple.



Powerless
Fallen trees
leave millions
in dark.

Swath of Destruction

Deluged Shore towns face daunting cleanup

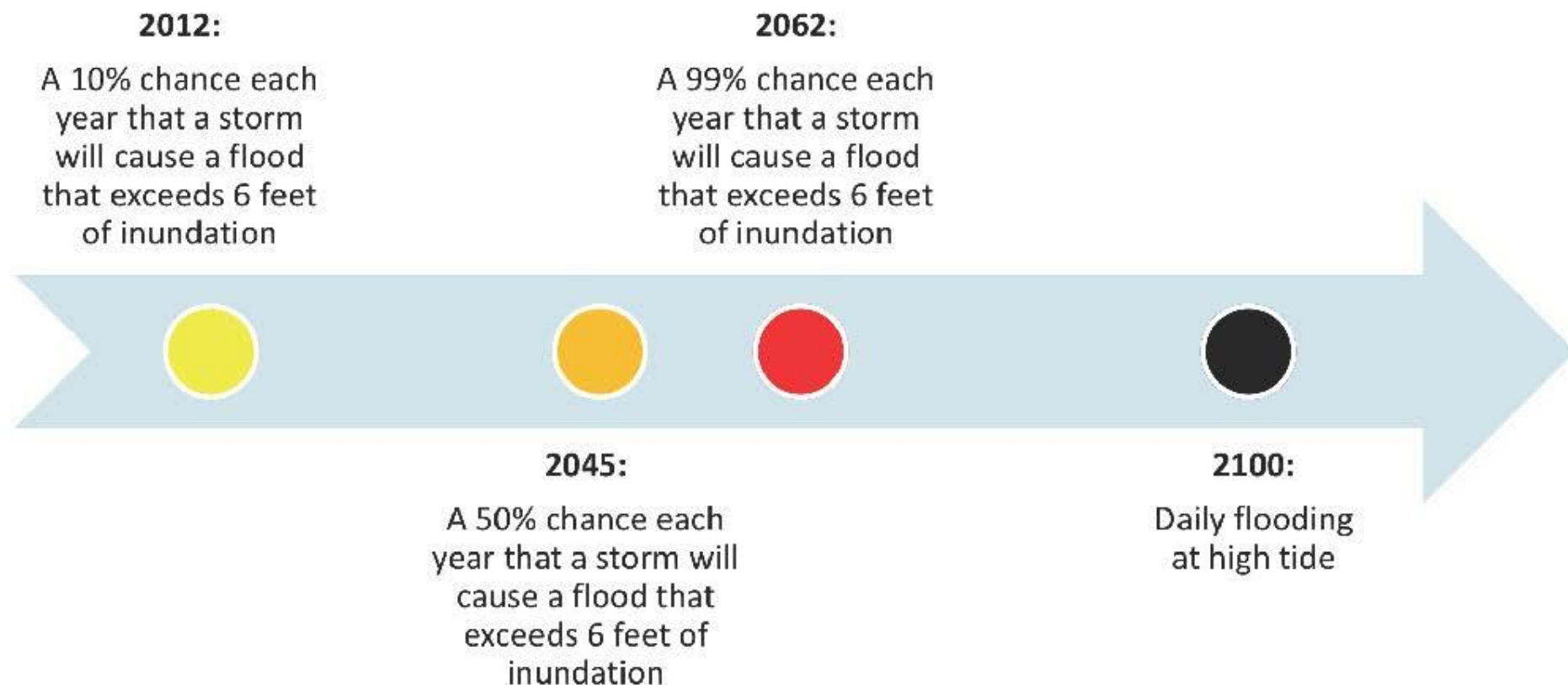


October 31, 2012

Expected number of flood events changes significantly with SLR

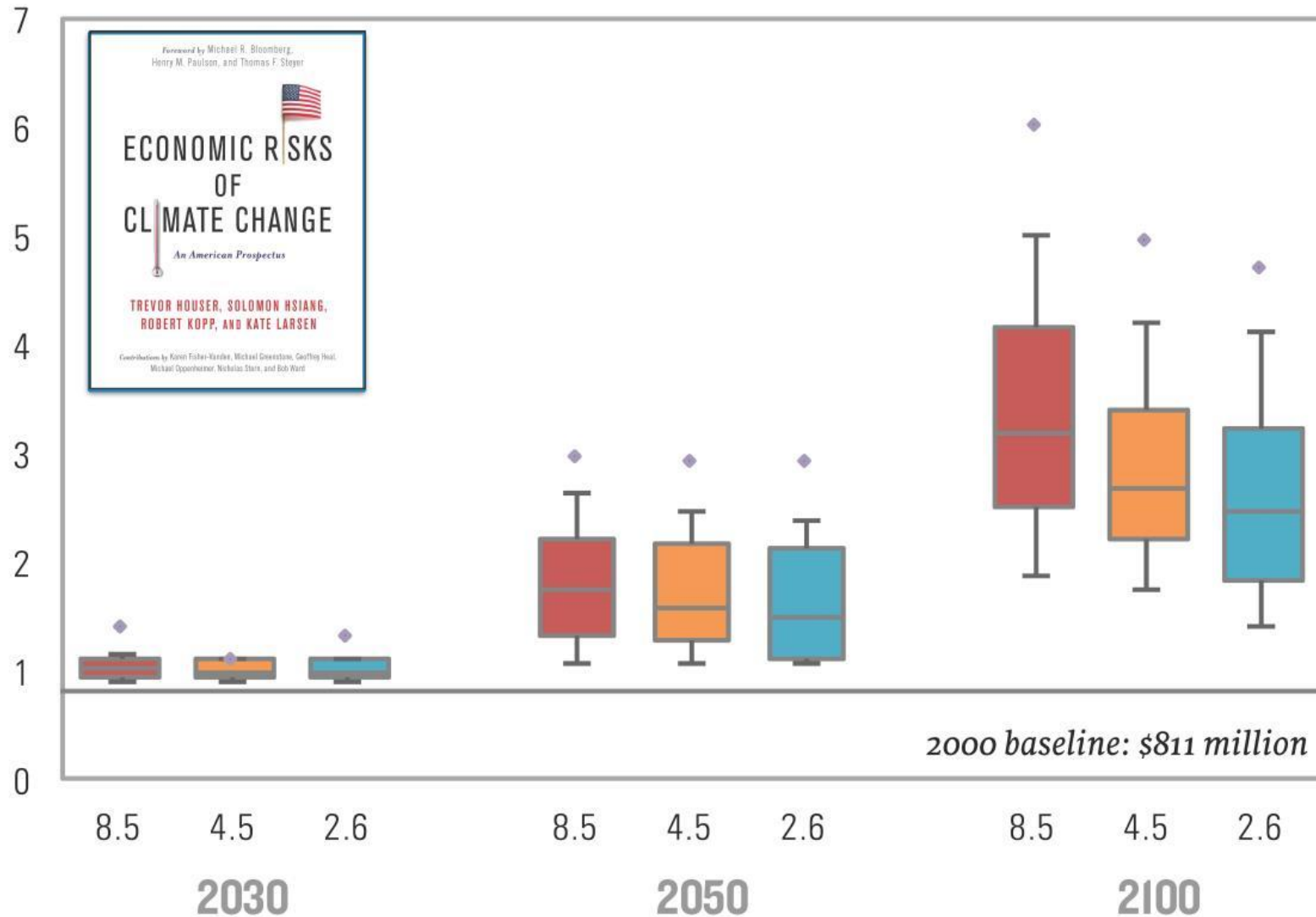
Expected number of floods events at Atlantic City under

NJCAA central estimate, high emissions (1.4' by 2050, 3.4' by 2100)



Increased average coastal storm damage in New Jersey

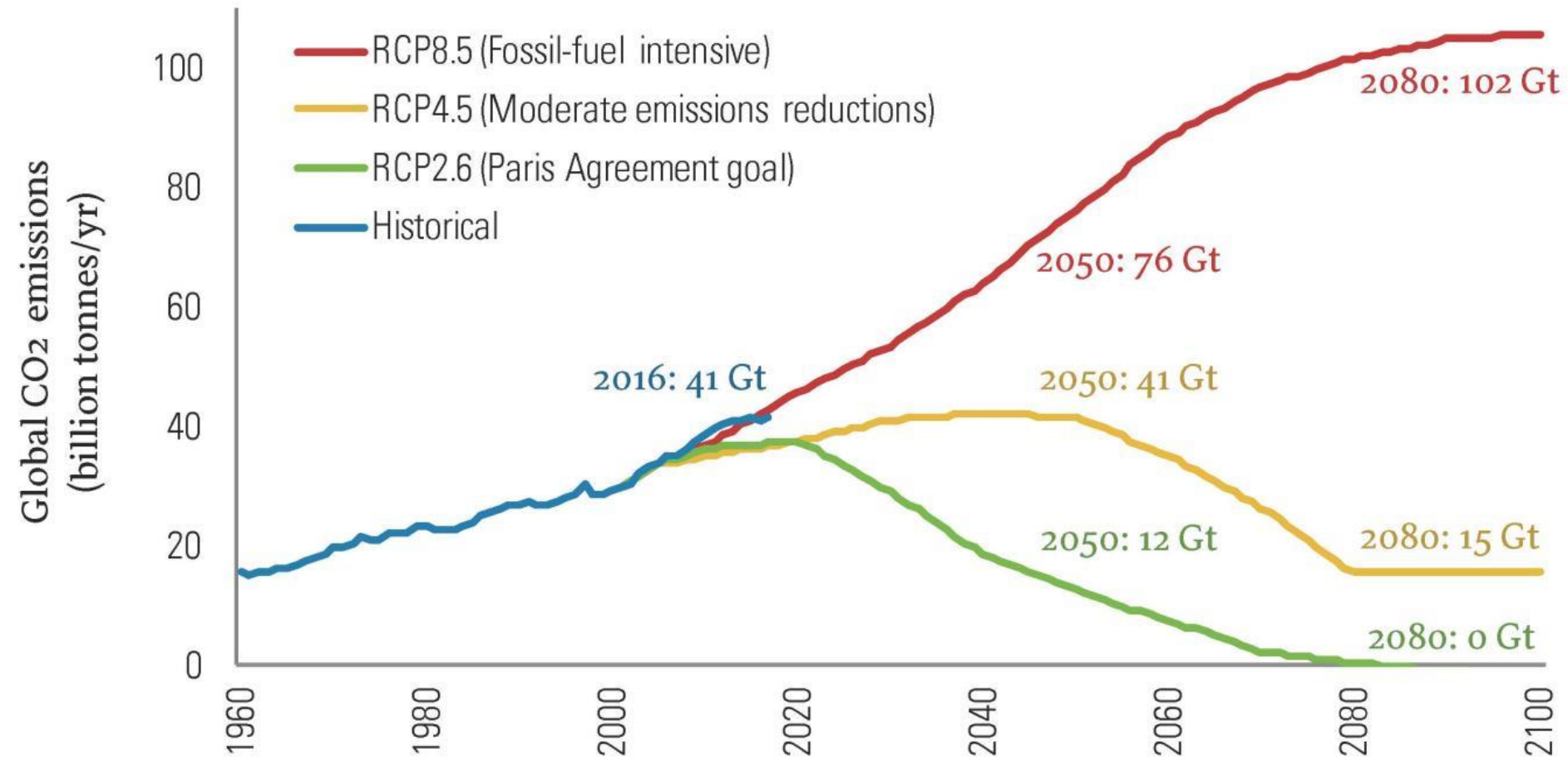
Billion dollars per year (assuming current property distribution, abandoning property that falls below mean sea level)



Bars/whiskers indicate 66%/90% probability.
Diamonds indicate 99th percentile (1-in-100) projection.

So what do we do?

Our mitigation policy choices affect the sea-level to which we will have to adapt



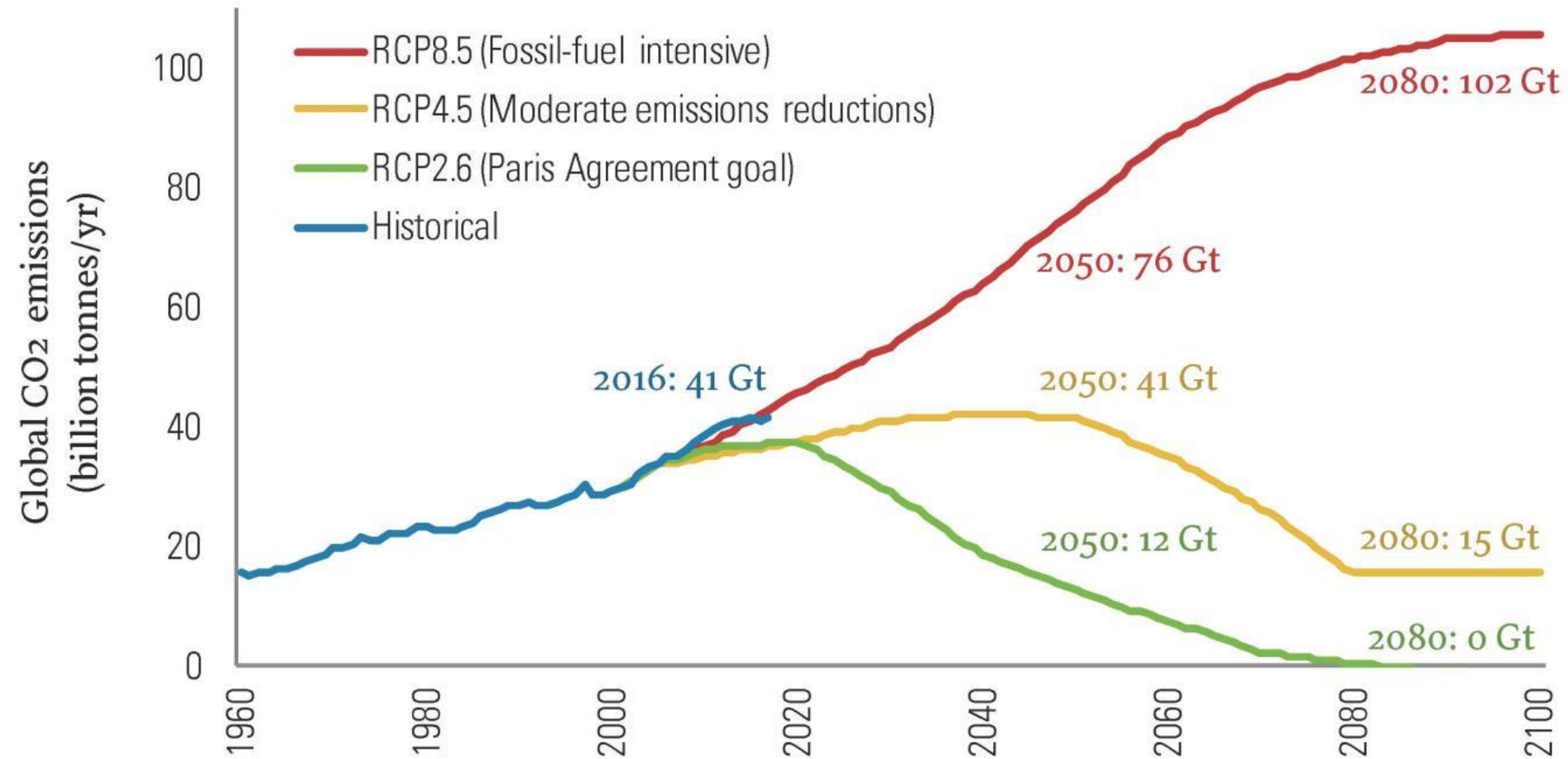
Likely NJ sea-level rise relative to 2000 CE:

RCP 8.5: 2.2-4.5 ft or 4.4-8.3 ft

RCP 4.5: 1.8-3.7 ft or 2.8-5.3 ft

RCP 2.6: 1.7-3.1 ft or 1.6-3.5 ft

Our mitigation policy choices affect the sea-level to which we will have to adapt but we will have to adapt to some sea-level rise even under strong mitigation.



Likely NJ sea-level rise relative to 2000 CE:

RCP 8.5: 2.2-4.5 ft or 4.4-8.3 ft

RCP 4.5: 1.8-3.7 ft or 2.8-5.3 ft

RCP 2.6: 1.7-3.1 ft or 1.6-3.5 ft

Do we rebuild essentially unchanged (maybe a little gentrified), and assume the rest of the country will continue to subsidize indefinitely?



Do we raise (and otherwise modify) our communities to accommodate occasional flooding?



Do we raise (and otherwise modify) our communities to accommodate occasional flooding?



Remember: elevating houses is of limited value if you don't also protect critical infrastructure!

Do we harden?

Proposed East Side Coastal Resiliency Project



Do we harden?

Proposed East Side Coastal Resiliency Project



But remember: you also need to plan for those occasions when hard protection fails.

Do we expand protective natural infrastructure?



New oyster beds in Jamaica Bay

Do we relocate to higher ground?



Oakwood Beach, Staten Island

Coastal Climate Risk & Resilience Initiative



AMERICAN LITTORAL SOCIETY



State of New Jersey
DEPARTMENT OF ENVIRONMENTAL PROTECTION



The Nature Conservancy



New Jersey in a warming world: What's at stake

Robert Kopp

Institute of Earth, Ocean and Atmospheric Sciences
Rutgers University–New Brunswick
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EOAS

Mayors' Climate Summit
February 3, 2018

Climate
Impact Lab





THE STATE UNIVERSITY
OF NEW JERSEY

NJ Climate Adaptation Alliance

Climate Change Policy in New Jersey: *What We Must Achieve*

Jeanne Herb

Sustainable Jersey Mayor's Climate Institute

February 3, 2018

Adaptation: Adjustment in natural or human systems that are designed to reduce vulnerability to actual or expected changes in the climate. Includes measures that increase our ability to absorb, accommodate, recover from and respond to a changing climate.



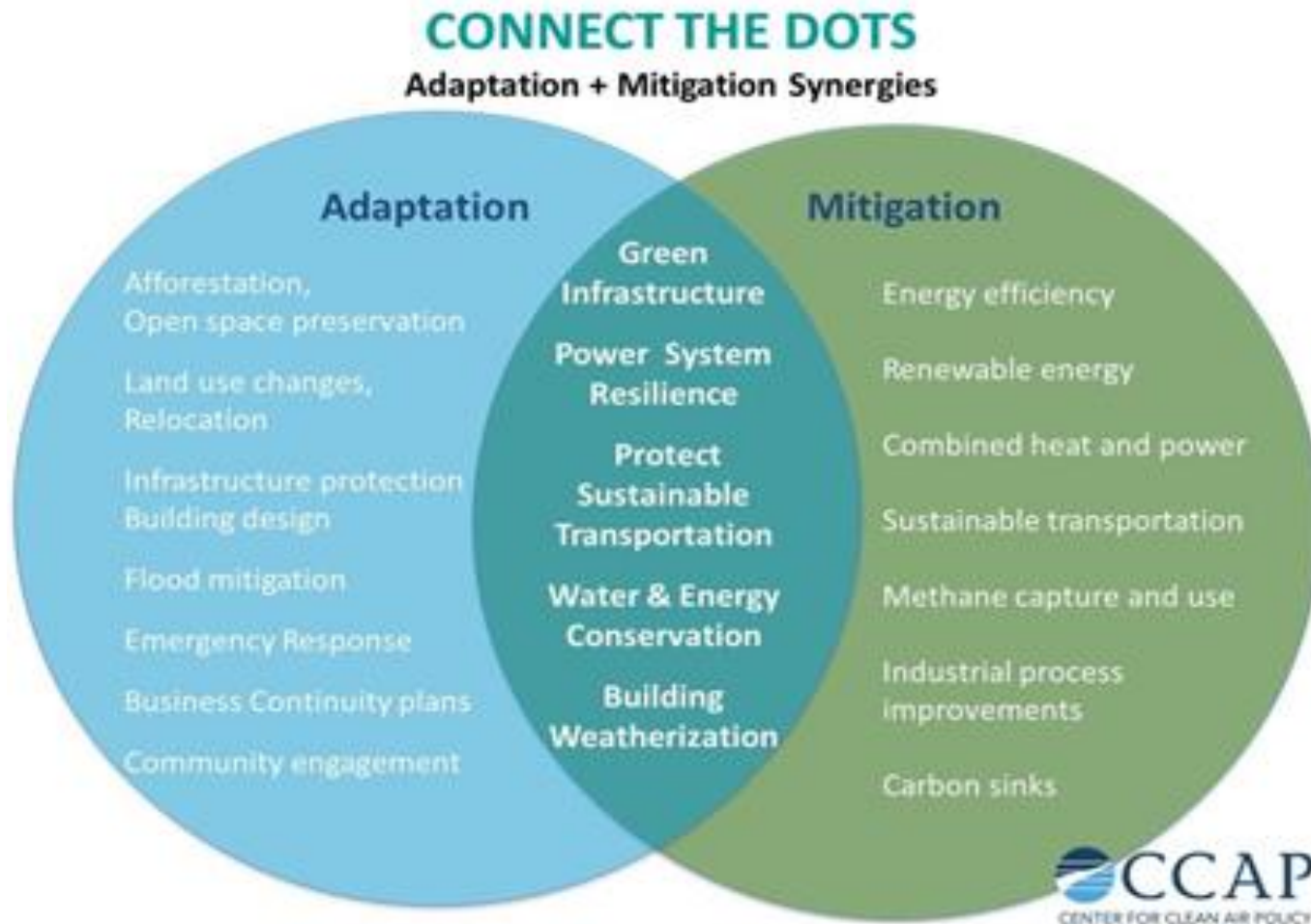
Image from grist.org



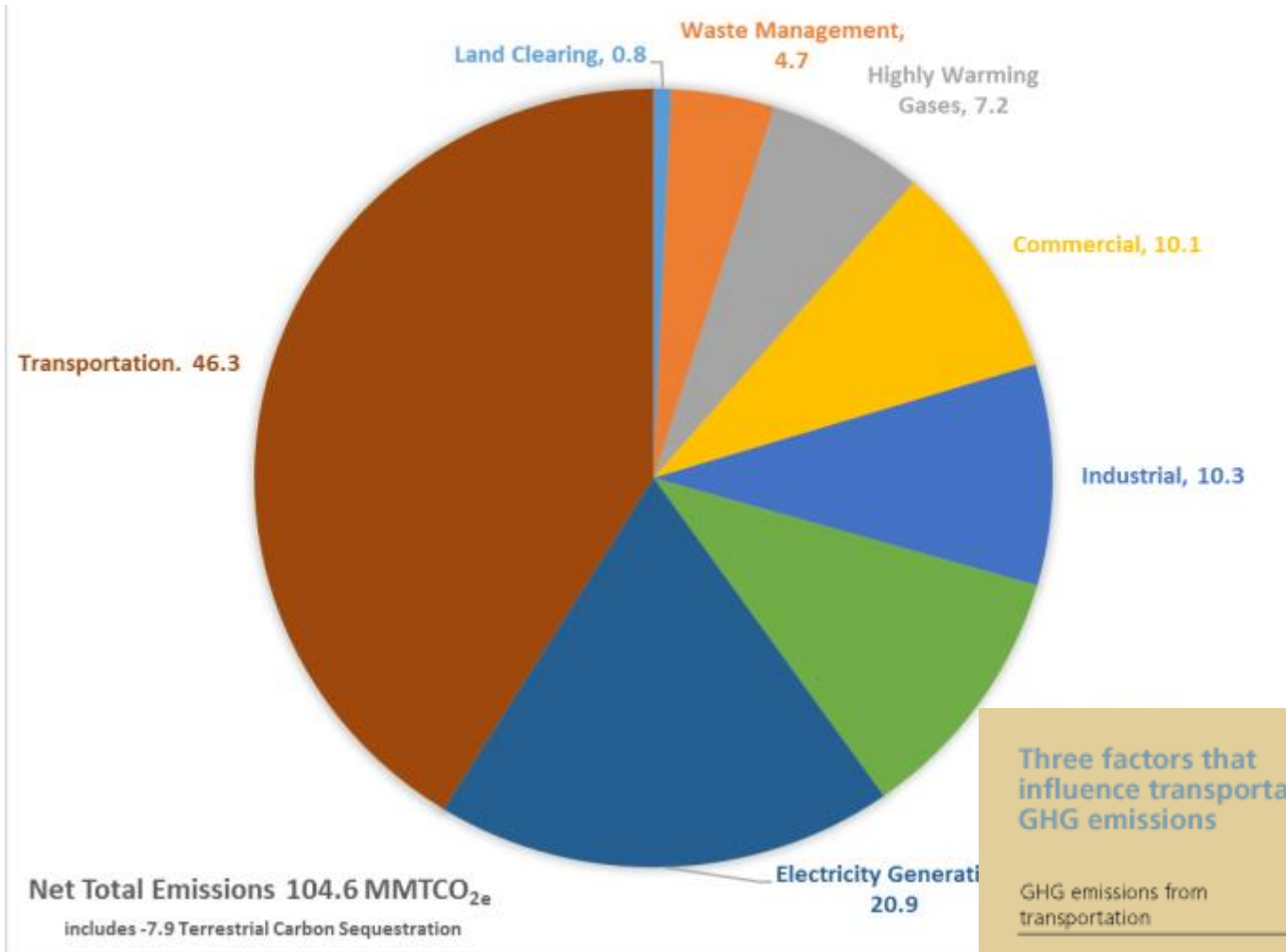
Image from Sunrun

Mitigation: Human intervention that reduces the sources of greenhouse gas emissions or that enhances sinks that absorb emissions.

The Nexus of Mitigation and Adaptation



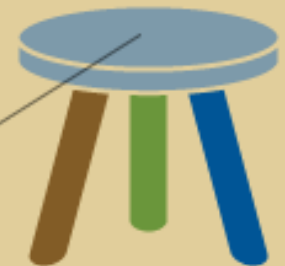
Estimated NJ Statewide GHG Emissions, 2012 data



Three factors that influence transportation GHG emissions

GHG emissions from transportation

- Fuel properties
- Vehicle efficiency
- Total demand for transport



New Jersey Authority

- New Jersey Air Pollution Control Act (NJSA 26:2C)
 - Clean cars
 - Classifies CO₂ as a pollutant
- NJ Global Warming Response Act (NJSA 26:2C-37)
 - Sets statewide limits: Reduce emissions to 1990 levels by 2020; and 80 percent below 2006 levels by 2050
 - Requires creation of a statewide inventory
 - Requires development of a statewide, economy-wide plan to achieve statewide limits
 - Requires establishment of a mandatory reporting program
- NJ Global Warming Solutions Fund Act (NJSA 26:2C-45)
 - RGGI participation
 - Formula for investment of RGGI auction proceeds
- Electric Discount and Energy Competition Act
- Energy Master Plan

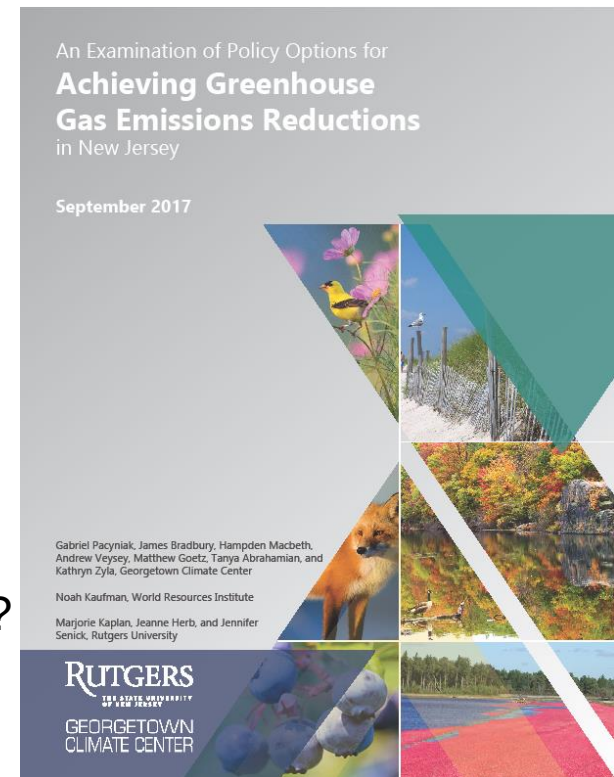
Administrative Procedures Act, Renewable Portfolio Standard, Offshore Wind Economic Development Act, NJ Diesel Retrofit Law, State Development and Redevelopment Plan, and other long-range planning authorities.

Policy Options to Reduce GHG Emissions in NJ

A GHG emissions reduction policy roadmap for New Jersey

Examines critical issues to attain statewide limits:

- Do the goals still reflect scientific consensus?
- What is NJ's current emissions trend?
- What NJ authorities are available to address GHG emissions?
- What mitigation policies in other states can NJ consider?
- How can policies address the needs of populations and communities most impacted by climate change?

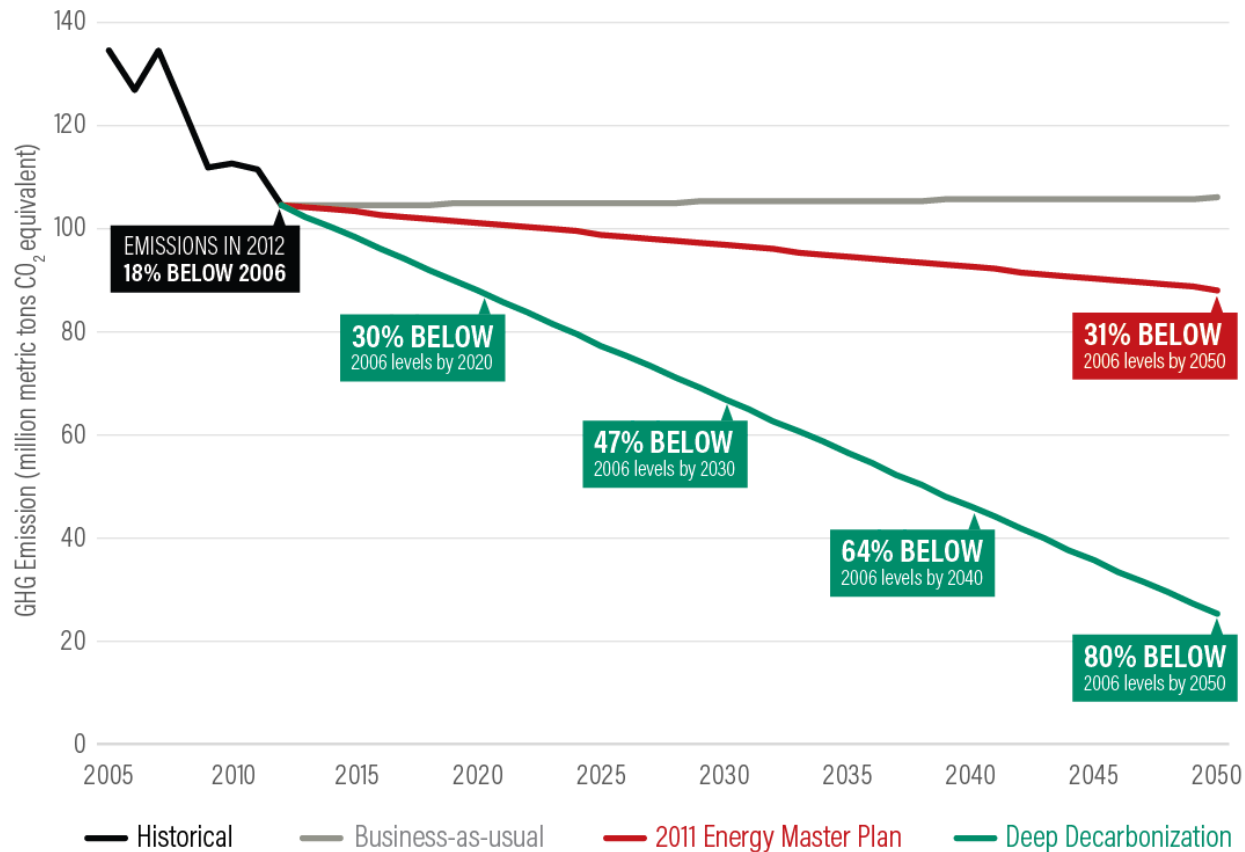


Findings

- ✓ Yes! NJ's statutory limit of 80% reduction of GHG emissions from 2006 levels by 2050 is still appropriate and reflects scientific consensus (and the Paris accord).
- ✓ Yes! There are innovative policies in other states that NJ can learn from and many of those policies deliver additional benefits.
- ✓ Yes! NJ has several existing laws and authorities that can be used to advance innovative policies to address GHG emissions and promote clean energy and energy efficiency.
- ✓ Yes! There is a need to consider contribution of greenhouse gas emissions to overall community burden and many states are actively considering policy in this area.
- ✓ Yes! Addressing climate emissions is an economy-wide challenge and we need to think beyond power plants (buildings, carbon sinks, transportation, highly warming gases)

New Jersey Emissions Pathways

NJ met its 2020 limit in 2008 but does not have a long term vision to reduce emissions 75% to meet its 2050 limit.



Decarbonization Pathways



United States Mid-Century Strategy FOR DEEP DECARBONIZATION

Transition to a low carbon energy system – economy-wide;

Sequester carbon through forests, soils, and nature-based CO₂ removal;

Reduce non-CO₂ greenhouse gas emissions

Categories of Policy Options

1. Mid-term and long-term economy wide planning
 - Example: Interim GHG emissions limit (2030) [CA, CO, DE, DC, MD, MN, NH, NY, RI, VT, WA], establishment of sub-limits (MPO land use planning)
2. Standard setting with opportunities for innovation and development
 - Example: Energy Efficiency Portfolio Standard, building codes, smart growth land use, nature based and low impact design, stewardship and trees, municipal fleets.
3. Multi-state approaches
 - Example: ZEV MOU [CA, CT, MA, MD, NY, OR, RI, VT]
4. Climate Change Considerations in Rulemaking and Planning
 - Example: Social Cost of Carbon incorporation into regulatory and planning functions [CA, CO, IL, MN NY], reduce waste.
5. Strategies to address equity for populations especially vulnerable to climate change and communities that are disproportionately burdened by environmental pollution
 - Example: Establish a more formal EJ policy, create programs that target benefits to local EJ communities [CA, NY, MN], ensure emissions are reduced in EJ communities.

New Authorities

New initiatives through statutory authority

- Example: Economy-wide carbon pricing such as legislation under consideration in MA to return revenues to households and some reinvestment into GHG emissions reduction and community resiliency



WHAT **WE** KNOW

WHAT
WE KNOW

HEAR FROM
SCIENTISTS

ABOUT
THE INITIATIVE



- *By making informed choices now, we can reduce risks for future generations and ourselves, and help communities adapt to climate change.*
- *People have responded successfully to other major environmental challenges such as acid rain and the ozone hole with benefits greater than costs, and*
- *scientists working with economists believe there are ways to manage the risks of climate change while balancing current and future economic prosperity.*

Why Does It Matter? Why Might it Matter?



NJSPOTLIGHT
NEWS, ISSUES AND INSIGHT FOR NEW JERSEY

BUDGET EDUCATION ENERGY & ENVIRONMENT HEALTHCARE
VIDEOS WEBINARS ROUNDTABLES ELECTIONS 2016 WATER IMMIGRATION

OPINION

ARTICLE COMMENTS (4)

OP-ED: LEADERSHIP NOW CAN PROTECT NJ'S WATER SUPPLY FROM FUTURE CLIMATE CHANGE

TOM KEAN SR. AND JIM FLORIO | SEPTEMBER 29, 2016

New report is catalyst to begin identifying risks to water supply posed by climate change and implementing measures to reduce vulnerability



Tom Kean Sr. and Jim Florio

Clean, plentiful drinking water is critical for New Jersey's families, businesses, and the future health and wellbeing of our state. In addition to the challenges that water-supply regulators and utilities have faced in the past, a new two-volume report released by the New Jersey Climate Adaptation Alliance brings attention to the challenges a changing climate poses to our drinking-water supplies. The reports also offer insights on

Health
Business
Energy Security
End to Subsidies
Technological Innovation
Food, Clothing, Shelter
Infrastructure Integrity
Livable communities
National Security
Moral Responsibility
Equity
Legacy for Our Children
Good For the Economy
Energy Choice

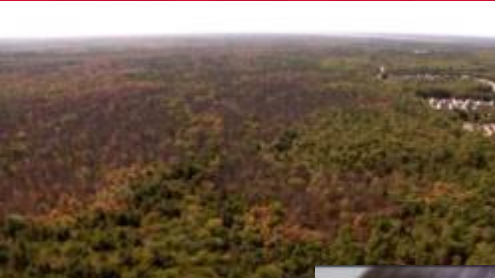


Addressing Climate Change is a Monumental Opportunity

<https://www.youtube.com/watch?v=ibWYcA0p3Mc&feature=youtu.be>



Mindy Lubber, CERES



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New Jersey Climate Adaptation Alliance

The **New Jersey Climate Adaptation Alliance** was formed in response to a diverse group of stakeholders who came together on November 29, 2011 at Rutgers University to participate in the conference "Preparing NJ for Climate Change: A Workshop for Decision-Makers."

Changing climate and rising sea levels will have a devastating impact on New Jersey's economy, the health of our residents, the State's natural resources, and the extensive infrastructure system that delivers transportation services, energy and clean water to millions of New Jerseyans. The Alliance will focus on climate change preparedness in key impacted sectors (public health; watersheds, rivers and coastal communities; built infrastructure; agriculture; and natural resources) through:

- Conducting outreach and education of the general public and targeted sectoral leaders;
- Developing recommendations for state and local actions through collaboration with policymakers at the state, federal and local levels;
- Undertaking demonstration and pilot projects in partnership with the private sector, local

FOLLOW US ON TWITTER

 Follow us on Twitter

WHAT'S NEW?

Conference Announcement
Creating the Healthiest Nation: Climate Changes Health annual meeting and expo hosted by the American Public Health Association will be held from November 4-8, 2017 in Atlanta, Georgia. Abstract deadline is February 20, 2017. More information [here](#).

Job Opportunity
Associate Director position available at the Urban Coast Institute at Monmouth University. Application deadline **January 31, 2017**. More information [here](#).

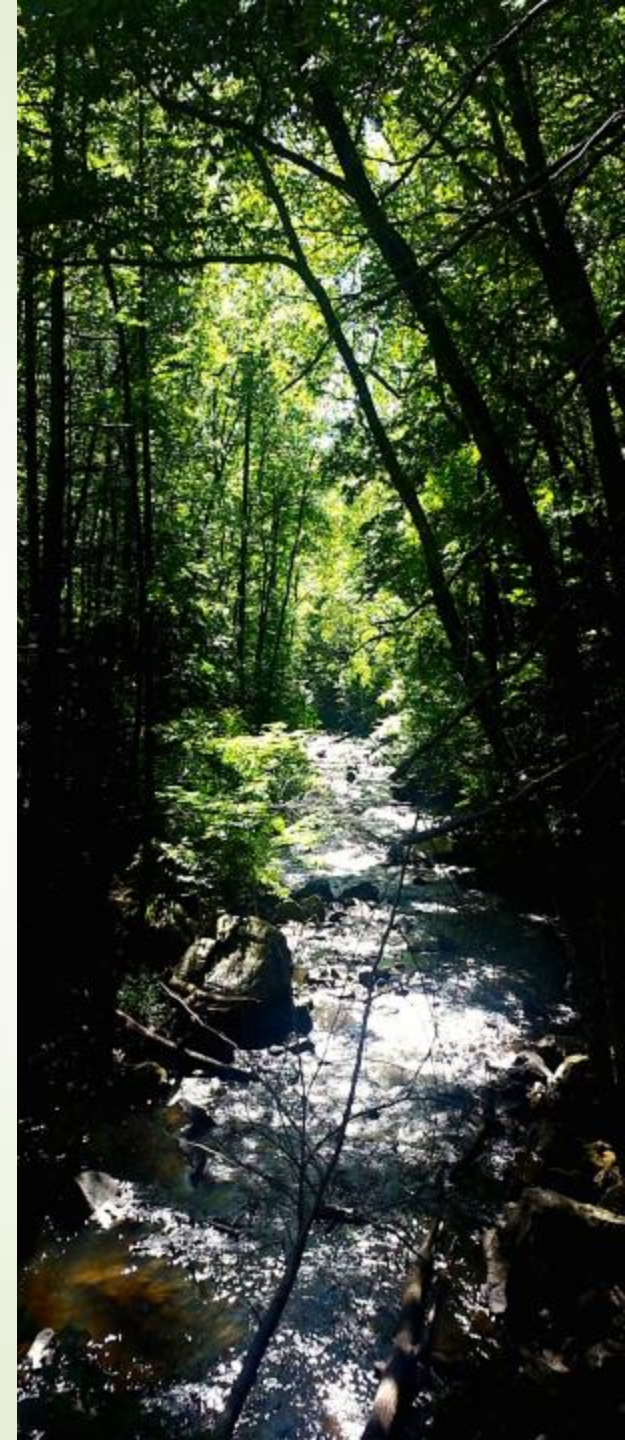
Regional Plan Association's New Study
The Regional Plan Association recently released a study, citing the work of the New Jersey Climate Adaptation Alliance [Under Water: How Sea Level Rise Threatens the Tri-State Region](#), which details the severe threats posed to parts of New York, New Jersey, and Connecticut metropolitan areas as a result of permanent sea level rise.

NJ Sea-Level Rise Reports
Read the October 2016 reports related to the New Jersey Climate Adaptation Alliance Science and Technical Advisory Panel on Sea-Level Rise and Coastal Storms. [Access the New Jersey's Future](#)



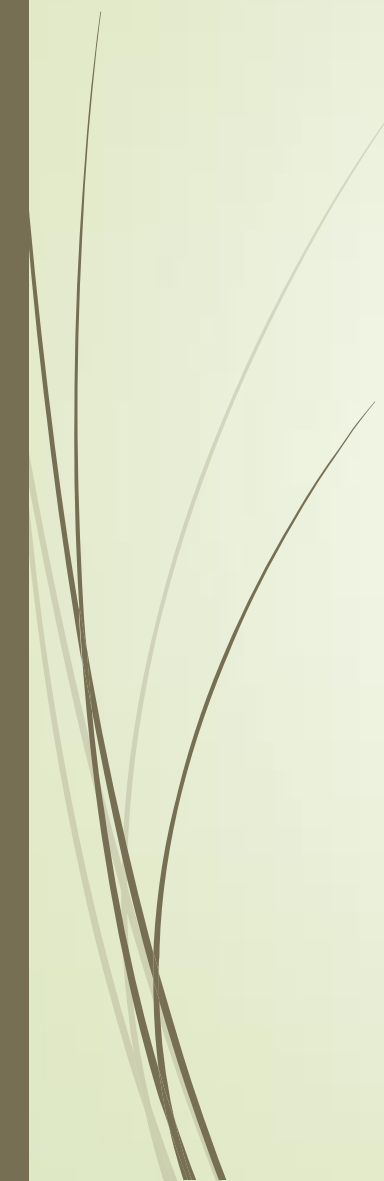
Ed Potosnak, Executive Director

New Jersey League of
Conservation Voters
& New Jersey LCV
Education Fund





New Jersey League of Conservation Voters Education Fund

- Educates, empowers and mobilizes residents to engage in the democratic process to advance strong environmental solutions.
 - Provide policymakers and opinion leaders with sound, objective, non-partisan information that encourages actions that safeguard the environment now and for future generations.
- 

GREEN IN '17

NEW JERSEY LEAGUE OF
CONSERVATION VOTERS EDUCATION FUND

ACHIEVE 100%
CLEAN ENERGY



MODERNIZE
PUBLIC
TRANSIT



DEMAND
ENVIRONMENTAL
JUSTICE



PRESERVE
LANDS &
PARKS



PROTECT
DRINKING
WATER

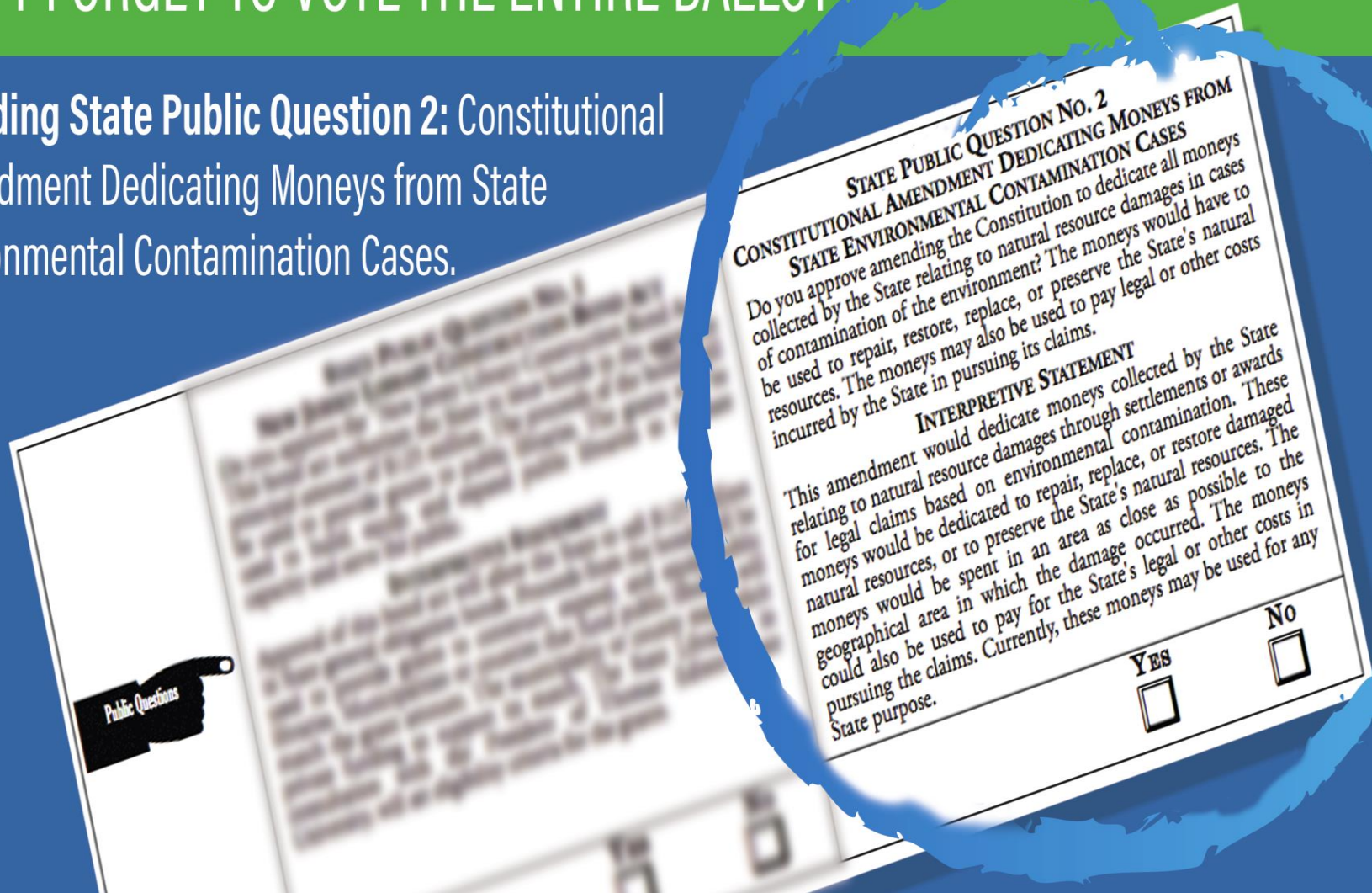


GREEN
IN '17
NEW JERSEY
League of Conservation Voters
Education Fund GREEN IN '17

ON TUESDAY, NOVEMBER 7TH

DON'T FORGET TO VOTE THE ENTIRE BALLOT

Including State Public Question 2: Constitutional Amendment Dedicating Moneys from State Environmental Contamination Cases.



Municipality-based pledges

NJ League of Conservation Voters

- 80% clean energy by 2050, increased to 100% clean energy by 2050

NJ Sierra Club

- 100% clean energy by 2050
- Offshore wind
- Increased energy storage

Climate Mayors

- Meet the 1.5 degree Celsius target of Paris Climate Agreement
- Invest in renewable energy

Food and Water Watch

- 100% clean renewable energy by 2035
- Reform renewable portfolio
- Improve net metering
- Increase energy efficiency



Municipality-based pledges

Rethink Energy NJ

- 80% by 2050
- Transition to locally-made clean energy sources
- Stopping unnecessary pipelines

Work Environment Council

- 30% renewable by 2025
- 50% renewable by 2035
- 80% renewable by 2050

Clean Water Action

- 100% green economy by 2050
 - Implement Newark Climate Resiliency Action Plan (RAP) to address flooding, heat island effect, air pollution, health harms
-

Municipalities & counties that have taken pledges

- Cape May Point
- Cherry Hill
- East Brunswick
- Fanwood
- Glen Rock
- Highland Park
- Hoboken
- Jersey City
- Long Branch
- Marlboro Township
- Morristown
- Newark
- Plainsboro
- Princeton
- Secaucus
- South Orange Village
- Swedesboro
- Trenton
- Union City
- Verona
- West New York
- North Brunswick
- Ewing
- Union City
- Franklin Lakes
- Highland Park
- Elizabeth
- Westwood
- Franklin Twp
- Tenafly
- Belmar
- Jersey City
- Essex County
- Ocean County
- Montclair
- Flemington
- And many more!

Thank You To Our Co-Sponsors



NJ Climate Adaptation Alliance

