

Rensselaer Plateau Alliance

CLEAN ENERGY AND CLIMATE SOLUTIONS

April 15, 2021

Ethan Winter

Senior Community Engagement Manager + Project Developer, Cypress Creek Renewables

Senior New York Program Manager, Land Trust Alliance (2005-2018)

Overview

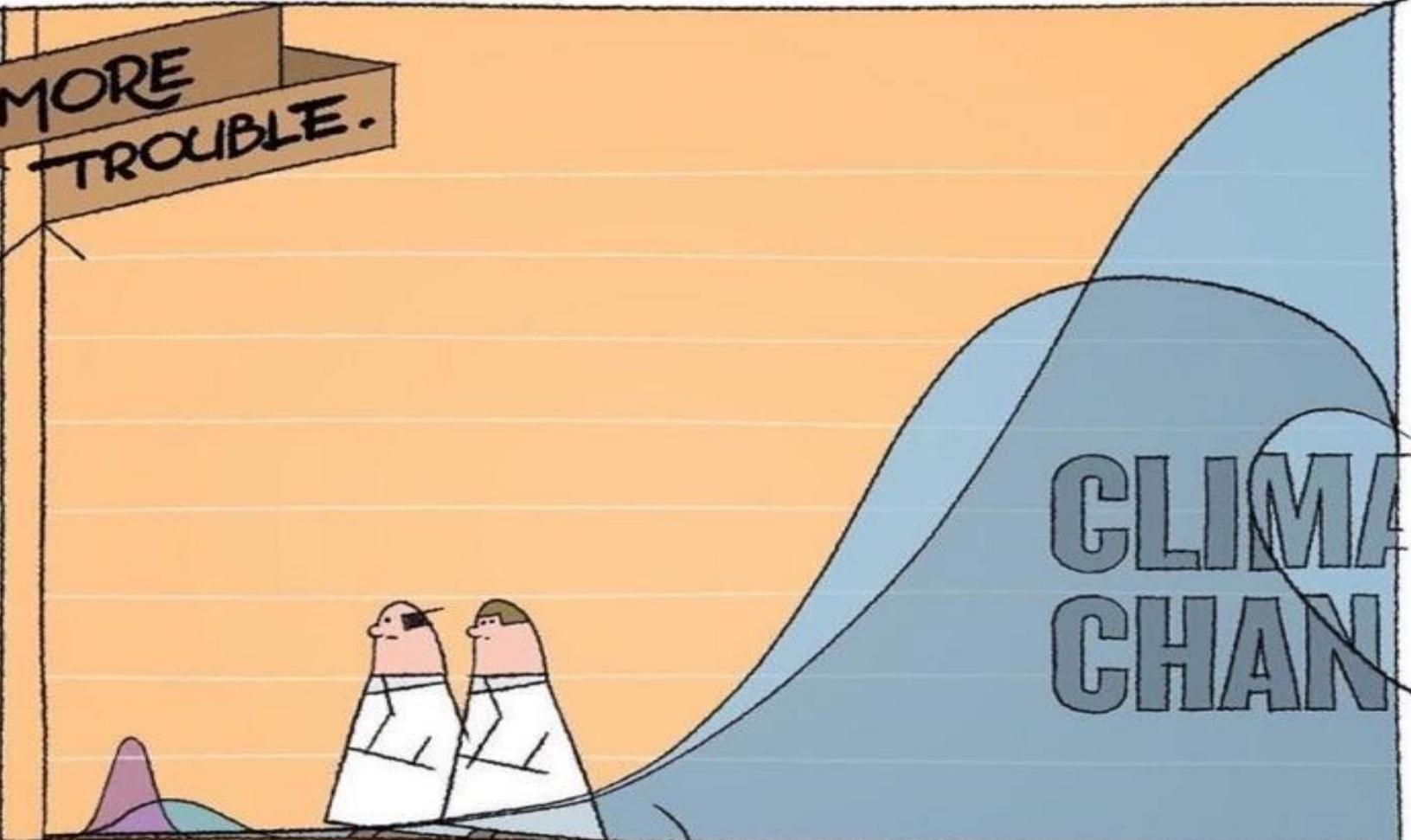
- **Climate Trends**
- **Energy & Emissions**
- **New York Climate Act (2019)**
- **Primer on Solar**
- **Community Solar in New York**
- **Discussion**
 - **Solar Siting & Development**
 - **Dual Use Solar/Agrivoltaics**
 - **Natural Climate Solutions**



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MORE TROUBLE.



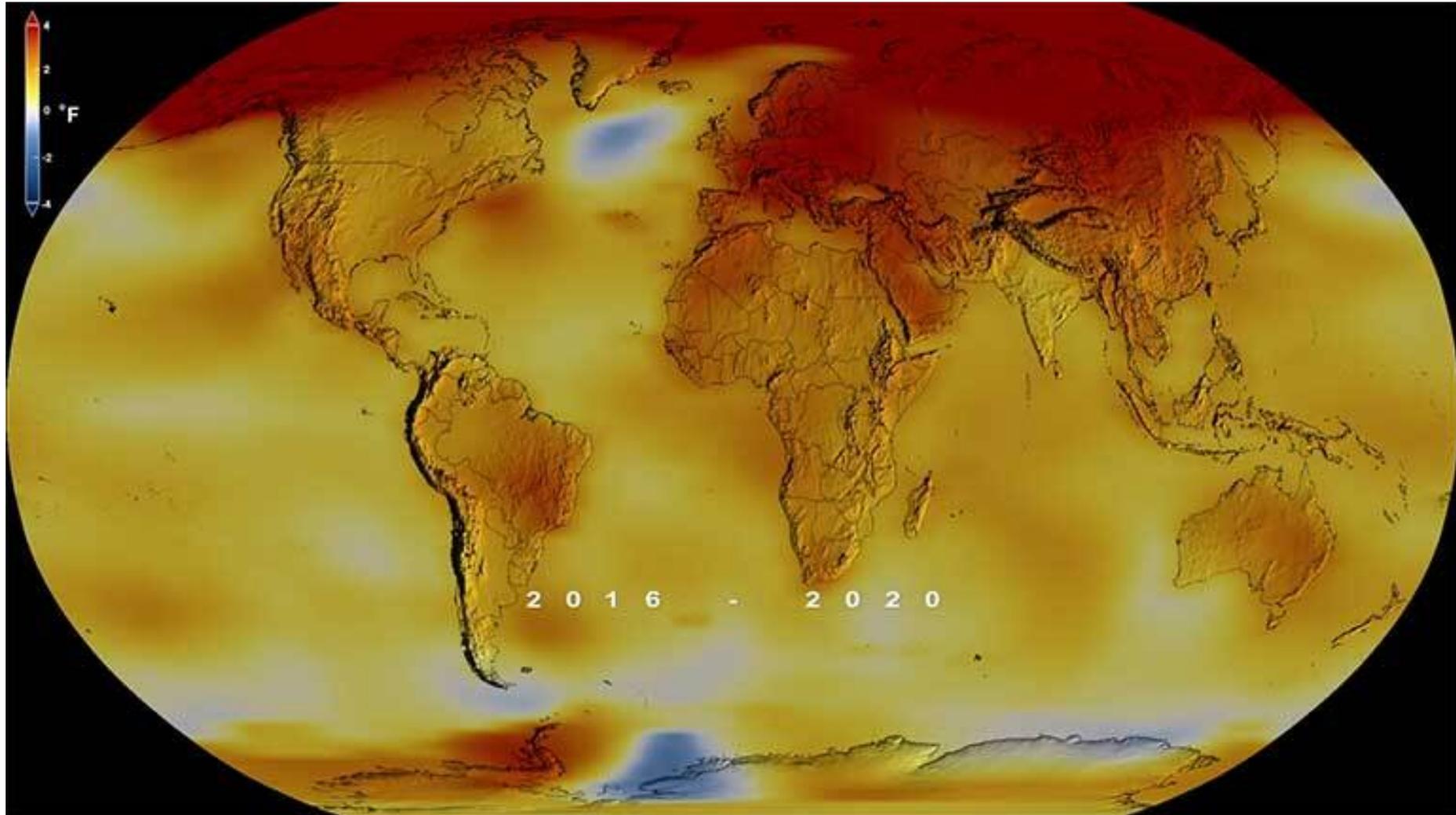
CLIMA CHAN

I'LL BE HAPPY WHEN THIS IS OVER...

#4.

2020 Tied for Warmest Year on Record

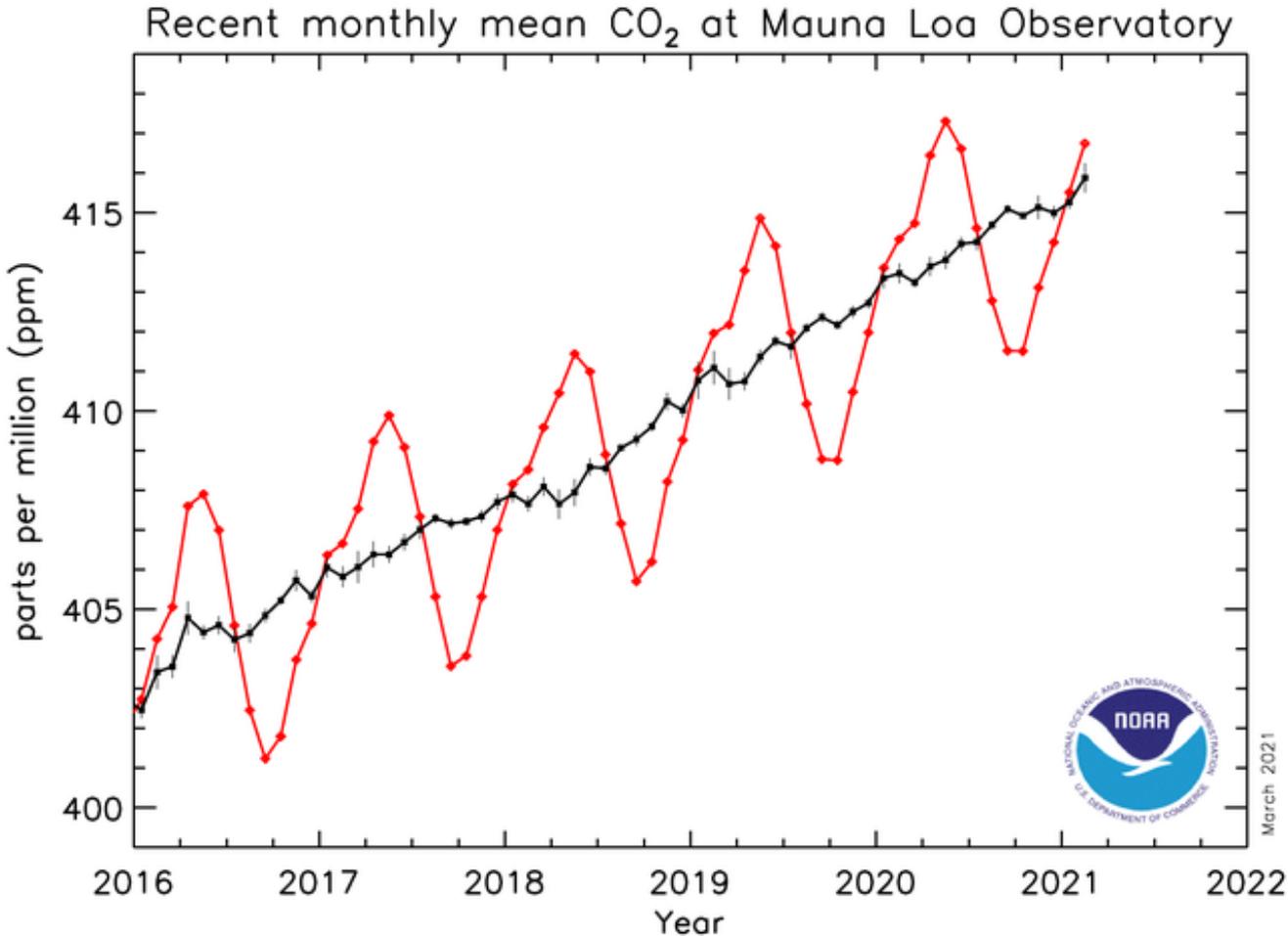
The last seven years have been the warmest seven years on record.



Source: NASA Goddard Institute for Space Studies

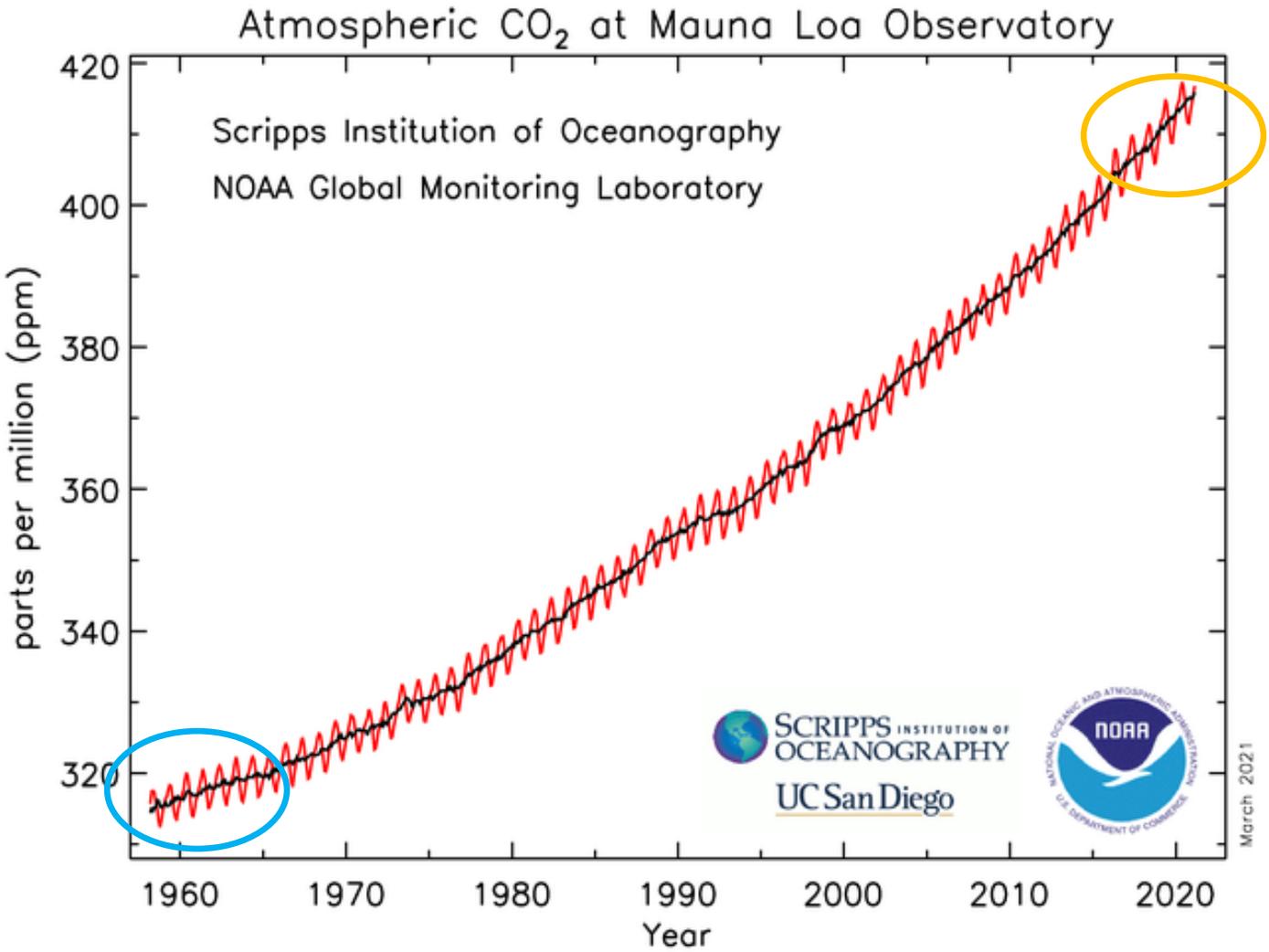
Greenhouse Gas Emissions - Increasing and Accelerating

FEBRUARY 2021 - 416.75 PPM (FEBRUARY 2020 - 414.34 PPM)

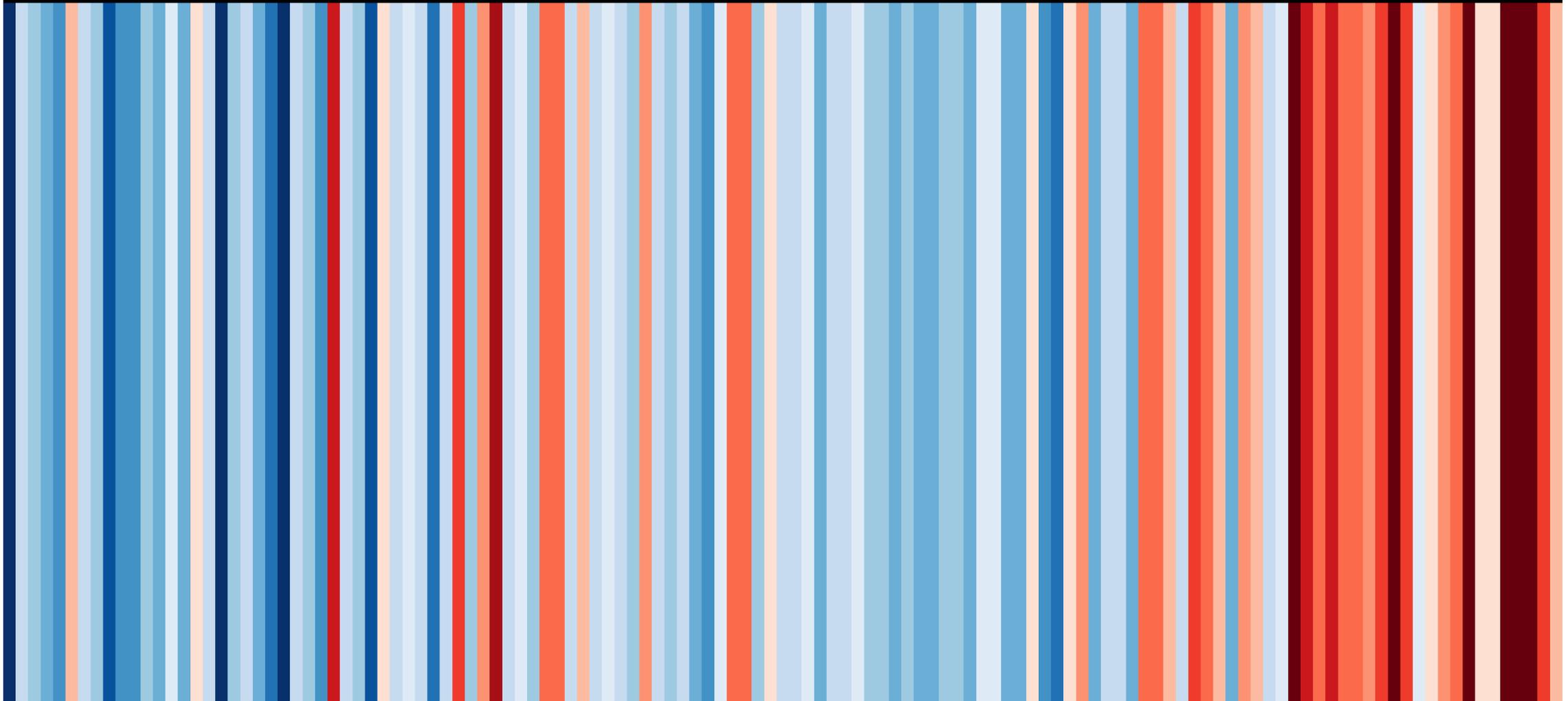


Greenhouse Gas Emissions - Increasing and Accelerating

ANNUAL GROWTH RATE - 3X INCREASE VS 1960'S



Temperature change in USA since 1895



1910

1930

1950

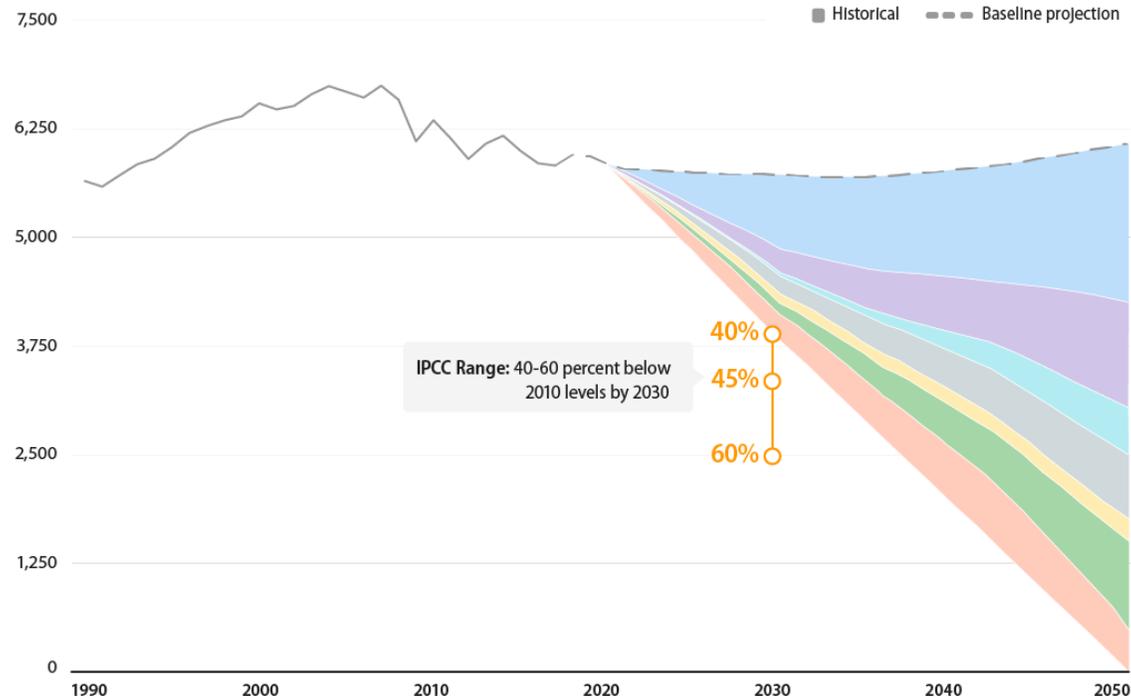
1970

1990

2010

Source: Professor Ed Hawkins (University of Reading) - <https://showyourstripes.info/>

FIGURE 1
100 percent clean future benchmarks
 Approximate emission reductions from baseline



Clean electricity. Achieve at least 65 percent clean electricity generation by 2030 and 100 percent no later than 2050. This would cut economywide emissions by an estimated 13 percent of 2005 levels in 2030 and 27 percent in 2050.

Lands and negative emission technologies. Protect 30 percent of U.S. lands and oceans and adopt climate-smart practices on an additional 100 million acres of farmland and rangeland by 2030. Deploy natural and technological solutions to sequester 1 gigaton of carbon dioxide by 2050. This would cut economywide emissions by an estimated 2 percent of 2005 levels in 2030 and 15 percent in 2050.

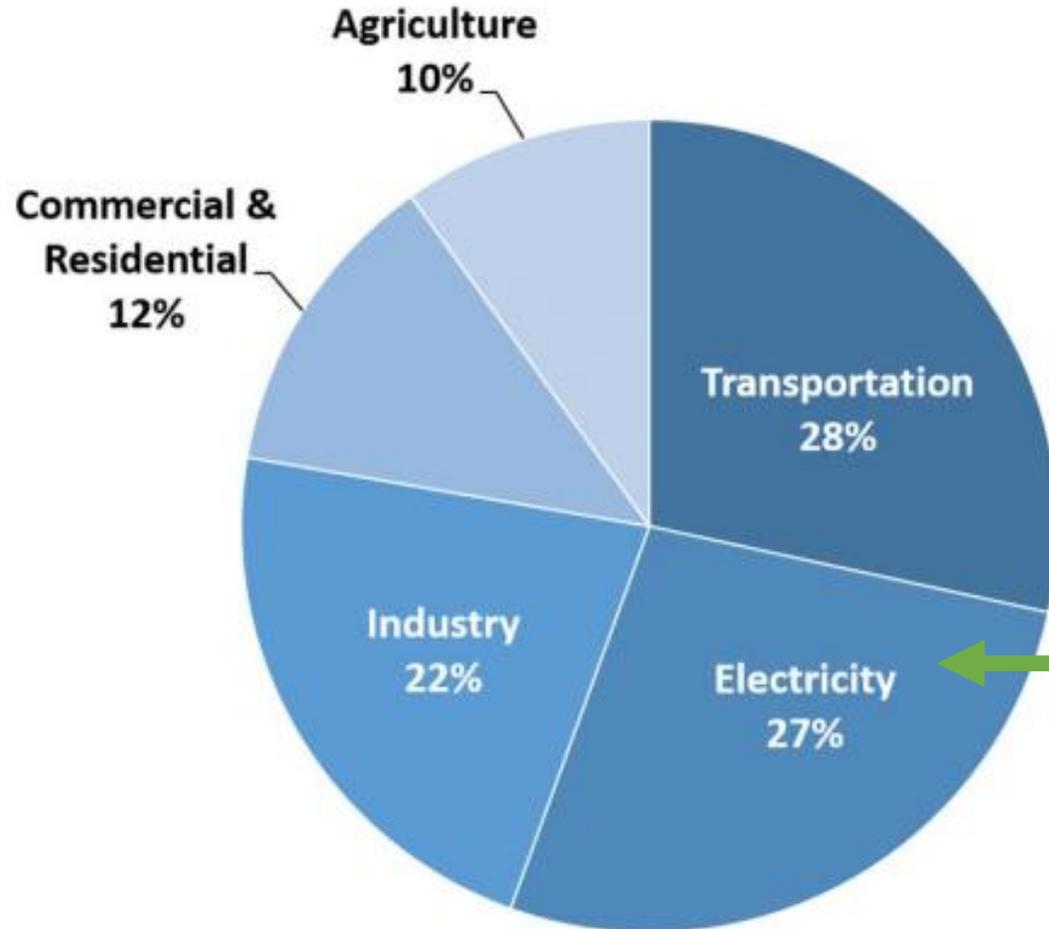
Change in greenhouse gas emissions by 100 percent clean benchmarks, as a share of 2005 emissions level

	2030	2050
Reductions achieved, 2005–2017	-13%	-13%
Projection of current trends, 2018–2050	-2%	+4%
Clean electricity	-13%	-27%
Electric vehicles and smart growth	-4%	-18%
Electric appliances	-1%	-8%
Smart manufacturing	-3%	-11%
Agriculture and waste	-2%	-4%
Lands and negative emissions technologies	-2%	-15%
Further improvements	-5%	-7%
Economywide	-43%	-100%

Source: Center for American Progress
<https://www.americanprogress.org/issues/green/reports/2019/10/10/475651/fact-sheet-100-percent-clean-future>

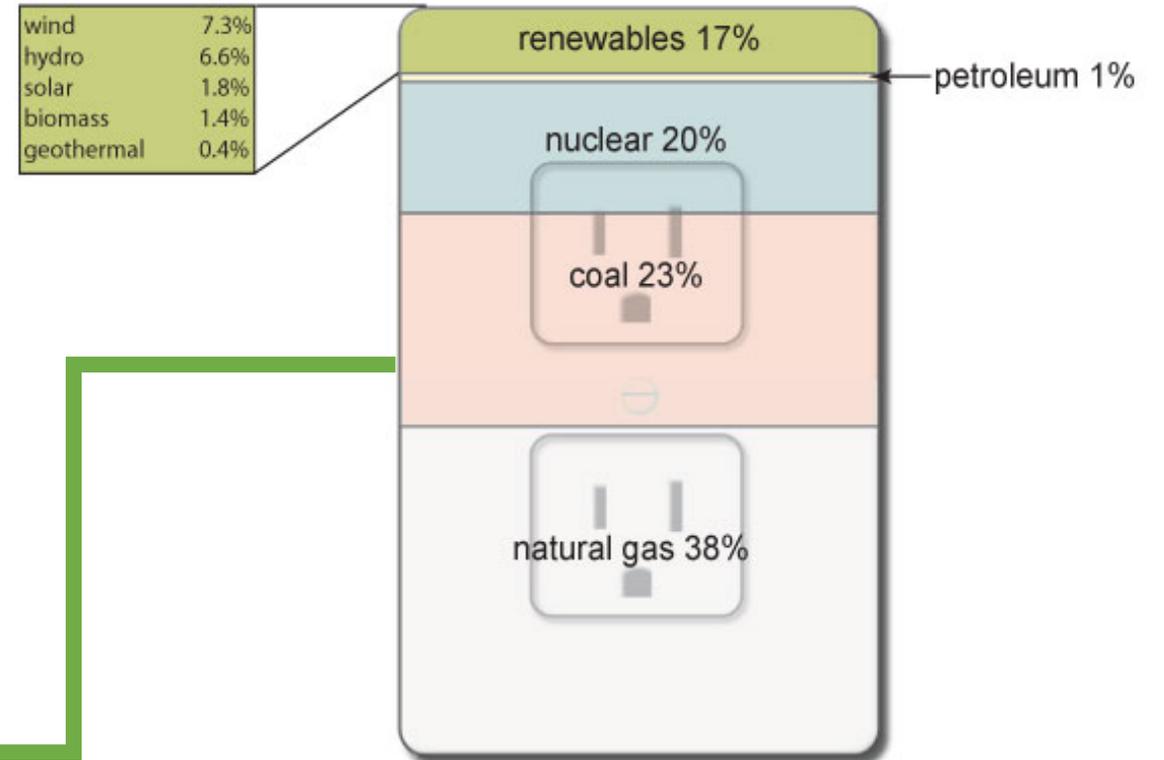
Climate Action Depends on Clean Energy (and a lot more solar)

Total U.S. Greenhouse Gas Emissions by Economic Sector in 2018



Sources of U.S. electricity generation, 2019

Total = 4.12 trillion kilowatthours



Note: Electricity generation from utility-scale facilities. Sum of percentages may not equal 100% because of independent rounding.

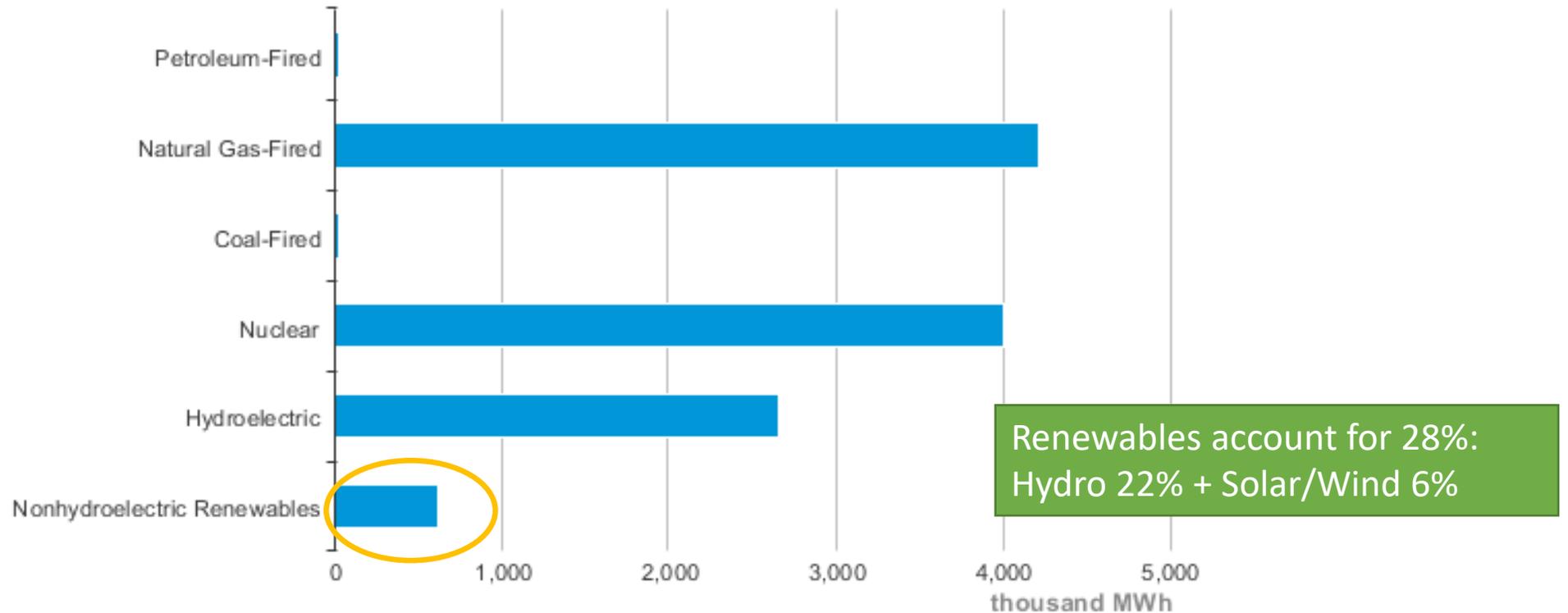
Source: U.S. Energy Information Administration, *Electric Power Monthly*, February 2020, preliminary data



Source: EPA, EIA 2020

Renewables currently represent 28% of New York's power generation. Hydroelectric power (22%) was developed decades ago. Under new state targets, significant new solar and wind capacity expected in next 10-20 years.

New York Net Electricity Generation by Source, Jan. 2020



Source: Energy Information Administration, Electric Power Monthly

2019 Climate Leadership and Community Protection Act

Very ambitious climate targets = 85% Reduction in GHG Emissions by 2050

- **70% of electricity from renewables by 2030**
- Zero-carbon emissions electricity sector by 2040
- New York investing billions in large-scale solar/wind/hydro/storage projects across the state, supporting 150,000+ jobs in clean energy sector
- CLCPA mandates specific clean energy targets:
 - > 9,000 MW (9 GW) of offshore wind by 2035
 - > 3,000 MW (3 GW) of energy storage by 2030
 - > **6,000 MW (6 GW) of Distributed PV Solar by 2025**
 - NYSERDA: 2.8 GW installed / 145,000+ projects
 - Meeting goal will require 2x increase in the pace of solar deployment across the state
 - **+640 MW of installed distributed solar per year between 2021-2025.**



Accelerated Renewable Energy Growth & Community Benefit Act

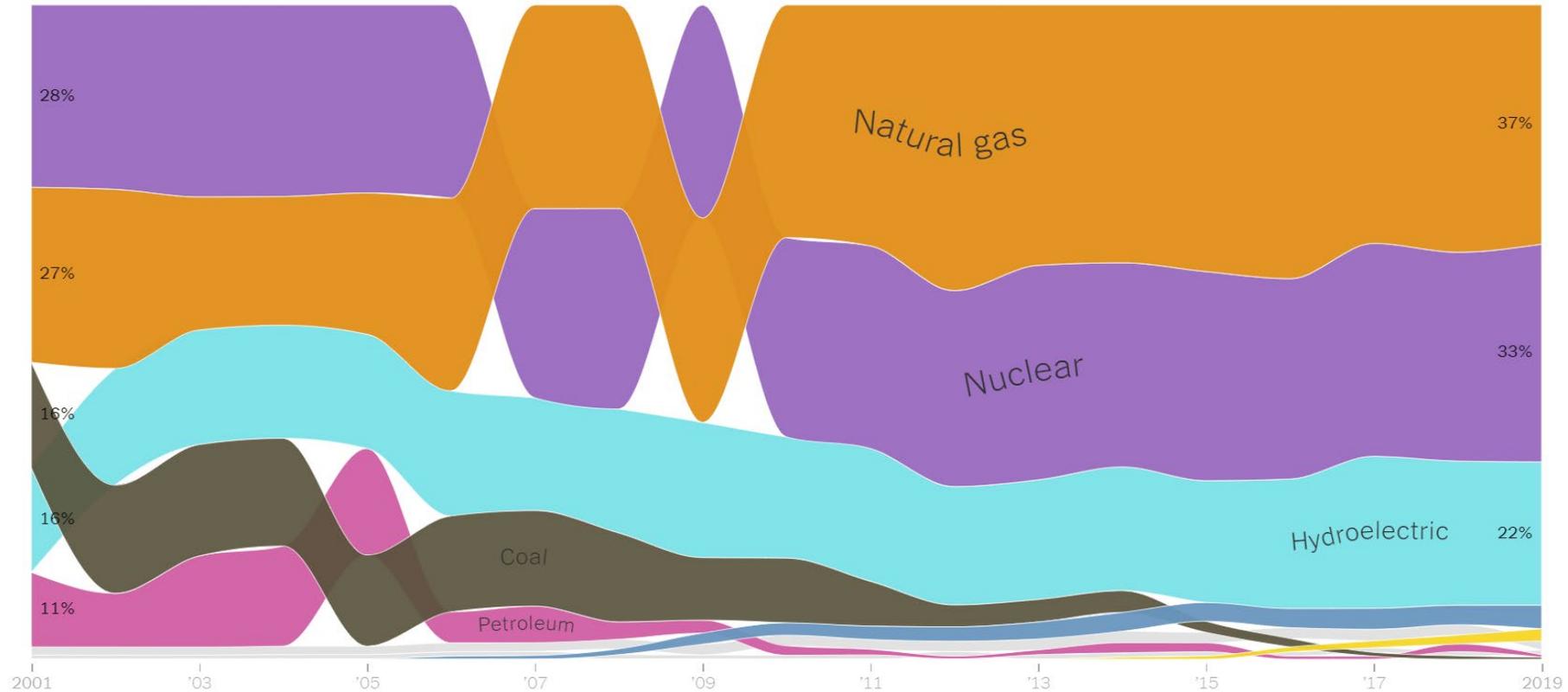
Enacted in FY2020-2021 State Budget (April 2020)

Major siting reform and initiatives aimed to achieve goals set forth in the Climate Leadership and Community Protection Act, notably a carbon-free electrical grid by 2040.

- “Section 94-c” phases out Public Service Law “Article 10” for LSR projects of 25 MW or more
- NYSERDA “Build Ready” Program to identify and expedite approvals for least-impact sites
- Establishes new Office of Renewable Energy Siting (ORES, Department of State) – still staffing up
- Streamlined permitting and approvals: after public comment hearing has closed, ORES must make final determination within one year of application being deemed complete, and within six months if project sited on “existing or abandoned commercial use” (brownfields, landfills, dormant power plants)
- Host Community Benefits Program – requirements for tax agreements/PILOTs and financial host agreements with municipalities where large-scale renewables are developed

How **New York** generated electricity from 2001 to 2019

Percentage of power produced from each energy source



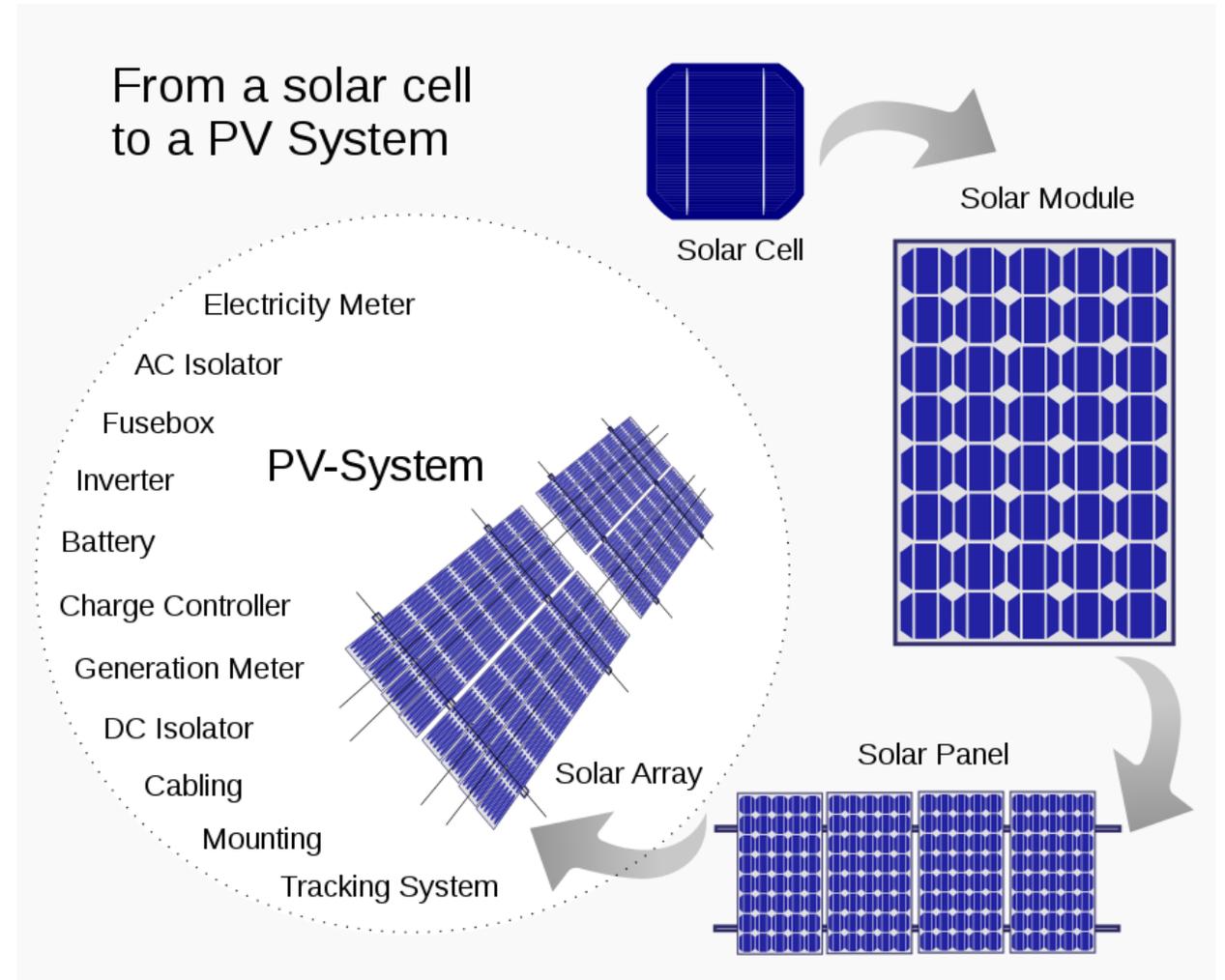
New York has committed to major changes in generation, distribution and transmission, commencing under the Reforming the Energy Vision (REV) initiative.

The mandate: economy-wide decarbonization in the next 30 years. This is an enormous undertaking involving every community.

Graphic: New York Times (October 2020)

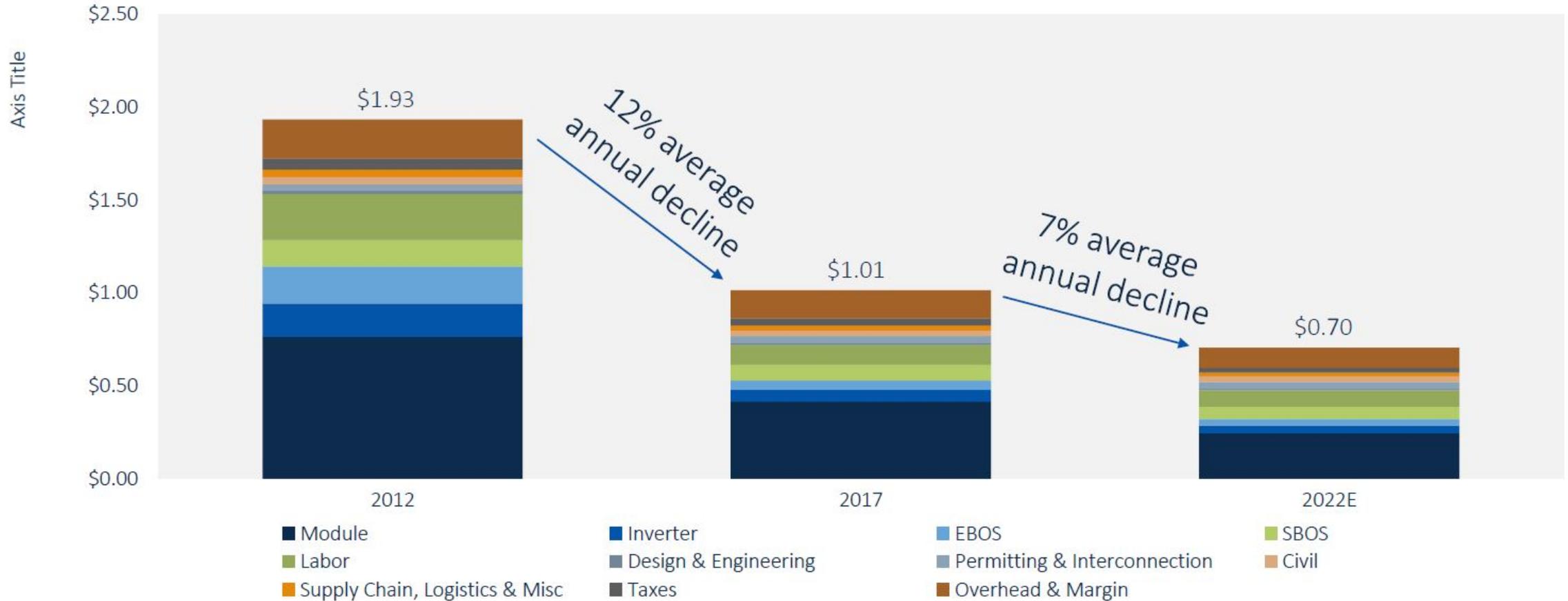
Solar PV 101

- Equipment selected to optimize output, reduce power loss during transmission, ensure efficient conversion from DC to AC.
- New materials and manufacturing techniques continue to improve price to power performance. (500+ Watt panels by 2023?)
- End of Life: recycling + repurposing are important issues. Regulations, market incentives and industry innovation needed to address. **A work in progress.**



Key Drivers of Solar: Dramatic Cost Declines (\$/W_p) and Increased Efficiency

United States Utility-Scale Fixed-Tilt System Pricing



Source: GTM Research U.S. PV Price Brief

Solar At Different Scales in New York

Rooftop (Residential & Commercial)



New York – typical residential PV

Canopy / Parking Lots



Parking canopy – Islip, NY

Solar At Different Scales in New York

Community Distributed Generation (CDG) Projects (2-5 MW)



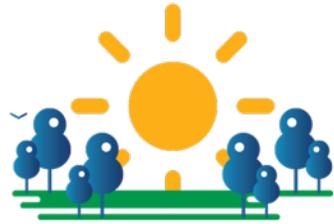
Canandaigua Community Solar, New York, 2MW, RG&E

Transmission-Scale Projects (20 - 100+ MW) – Coming Soon



Palmetto Plains, South Carolina, 106 MW, Dominion

Solar Project Development Process



1. Select site and customer



2. Design and permit



3. Buy equipment and finance



4. Construct



5. Interconnect

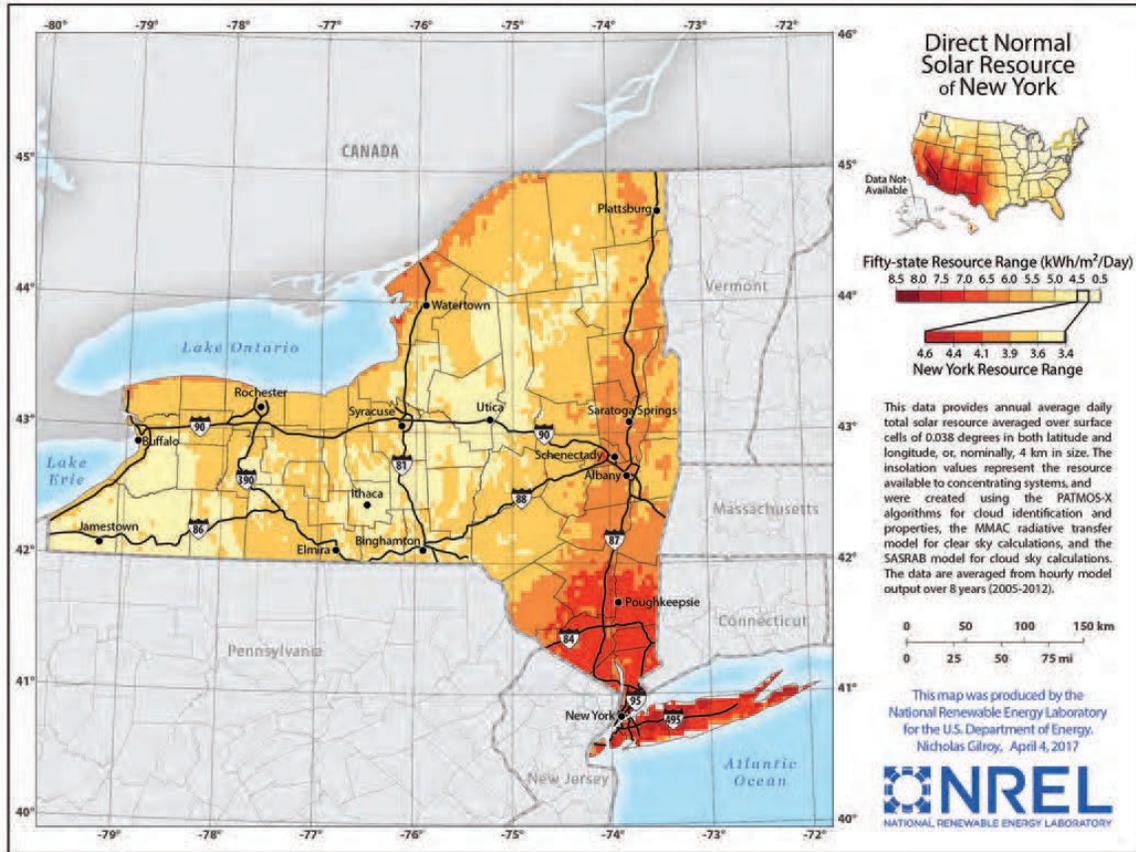


6. Operate and maintain

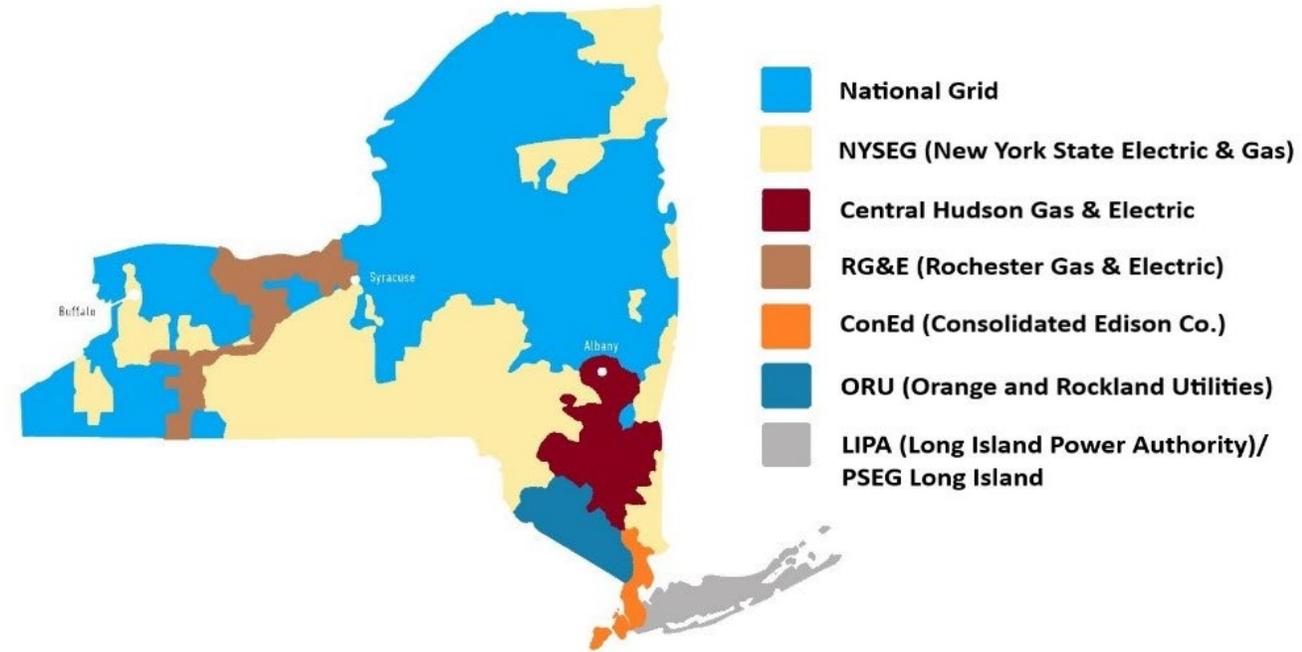
Considerations for Siting & Project Design

- Site Diligence (Current Use, Acreage, Topo/Aspect, Wetlands, Trees, Soils, Geology)
- Interconnection / POI (Access to 3-Phase with Hosting Capacity or Affordable Upgrades)
- Landowner Interest (Lease or Purchase Agreement)
- Project Design (DC/AC Size, Array Layout, Fencing & Screening)
- Equipment (Fixed Tilt vs. Trackers, Battery Storage)
- Site Plan Review / Local Zoning (Special Permit) – Local Solar Code
- SEQRA Review & Permitting - NYSDAM, DEC, SHPO, NYSERDA, USFWS, USACE, FAA
- Property Tax (RPTL-487) – Are taxing jurisdictions opted out of PILOT?
- Engineering, Procurement & Construction (EPC)
- Operation & Maintenance (O&M), including Vegetation Management Plan, Pollinator Seeding
- Decommissioning and Site Restoration

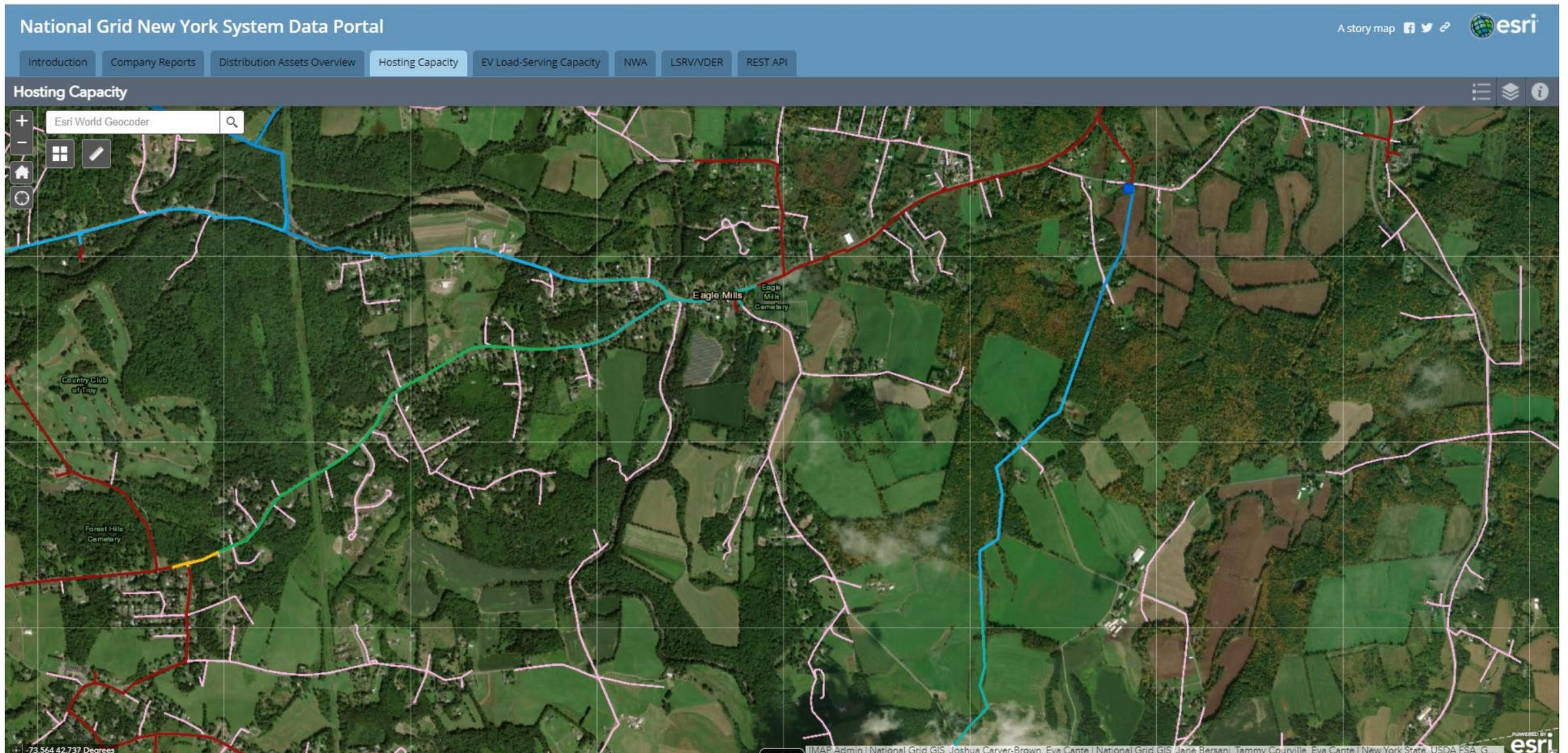
Linking Solar Resources to Utility Interconnection



New York Electric Utility Territory Map



Distribution Grid & Hosting Capacity



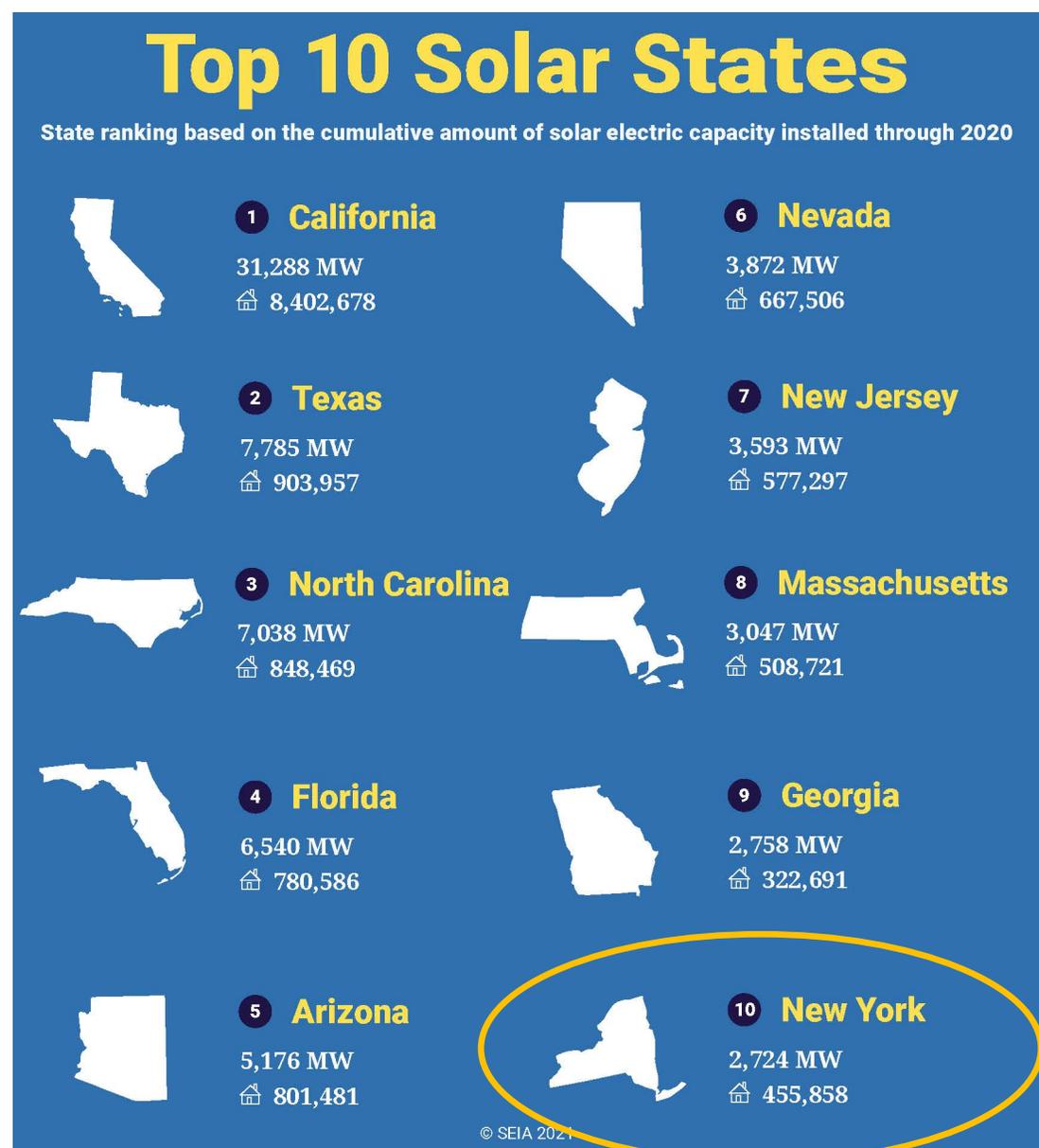
Anatomy of 5 MWac Community Solar Project

- Limit of Disturbance (LOD) / Lease Area
- Point of Interconnection (Poles & Equipment)
- Access Road
- Racking & Arrays
- Inverter Pad / Transformer
- Battery Energy Storage (if applicable)
- Fencing
- Vegetative Screening



Solar Trends in New York

- New York added approximately 550 MW of additional solar between 2019-2020.
- Texas and California each added over 3,000 MW, more than the cumulative capacity of all solar installed in New York to date.
- MA and NJ each have more than 3,000 MW of solar
- Key driver for solar in NY has been community distributed generation (aka community solar)



Equivalent of the number of homes supplied by solar energy.

All data is sourced from SEIA/Wood Mackenzie Power & Renewables Solar Market Insight® 2020 Year in Review Report. For more information, contact research@seia.org



Community Solar in New York



What is Community Solar?

Community solar allows individuals and organizations to reap the benefits of solar energy without needing to install it on their home or building.

- Members sign up for a specific allocation of the energy output of a solar project.
- The energy produced by their share of the system will be credited to lower their electric bill.
- Community solar is an alternative to rooftop PV systems for customers who:
 - Have insufficient solar and/or roof conditions (shading, size, and other factors) - Technical
 - Do not own their rooftop - Ownership
 - Are unable or unwilling to invest in an onsite solar PV system – Financial

Community solar enables access to the 80% of US households who can't feasibly install rooftop PV. One 5 MWac project is sufficient to power >1,000 NY households.

Community Solar in New York

The fastest growing segment in NY energy sector.

- 20 states, plus Washington, D.C., have policies supporting community solar. Top states: MN, NY, MA, CO.
- Statewide, 371 operating projects (496 MW) mostly in National Grid and NYSEG/RGE service areas.
- New York was largest market for community solar installations in 2020 (+ 266 MW).

89% of currently operating community solar in New York was installed in 2019 & 2020.

Robust community solar pipeline:

> 5,000 MW of community distributed generation (CDG) under development across the state based on utility interconnection applications.



Source: NYSEIA, Wood McKenzie

Forecasted Regional Need:

To reach 2030 emissions reduction targets, 8.5 GW of residential and community solar (equivalent to approx. 1.1 million residential rooftop installations) would be needed.

Commercial solar, including municipal and government solar, would contribute another 16 GW of capacity. Total distributed solar: 24.8 GW.

In addition, grid-scale solar (transmission projects) would provide the remaining 11 GW needed across New York and New England.

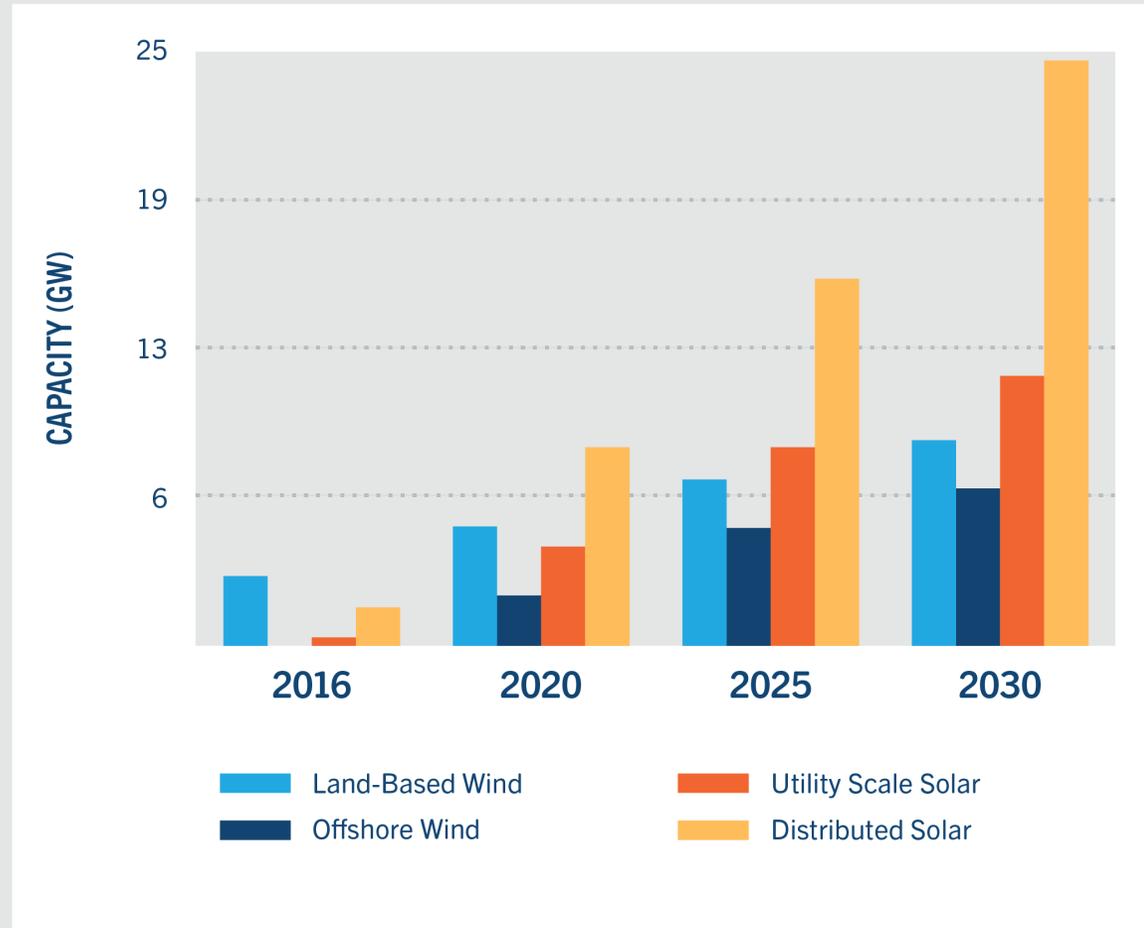
35.8 GW of solar to meet Northeast region's clean energy targets.

Source:

Energy Vision 2030: Transitioning to a Low-Emissions Energy System in the Northeast, Acadia Center (2017). (Used with permission)



Forecasted Renewable Energy Growth in New England & New York



Learn more about this report at 2030.acadiacenter.org

Integrating community solar into a working landscape



2 MW Community Solar – Rensselaer Co.



2 MW Community Solar - Dutchess Co.

Mounting Challenges for New York Farmers

6.87 million acres in production (22.8% of NYS)

- 96% of farms are family owned
- 33,438 farms (-2,100 farms vs 2012)

Dairy dominates, and many farmers are really struggling

- \$2.52 billion in revenue (47% of overall commodity sales)
- Soft commodity prices (Covid roller coaster)
- Extreme / unpredictable weather
- Trade barriers, labor costs, worker shortages, energy costs
- 20% decline in dairy farms between 2012-2017

NYSOSC Profile of New York Agriculture (2019)

- The potential harmful effects of climate change on New York farmers are wide-ranging—including significant impacts on the State's important dairy industry.

How Can Solar Help Farmers and Be compatible with Farming?

(2017 USDA Ag Census, NYSOSC)



Solar on Farmland can be a Win-Win

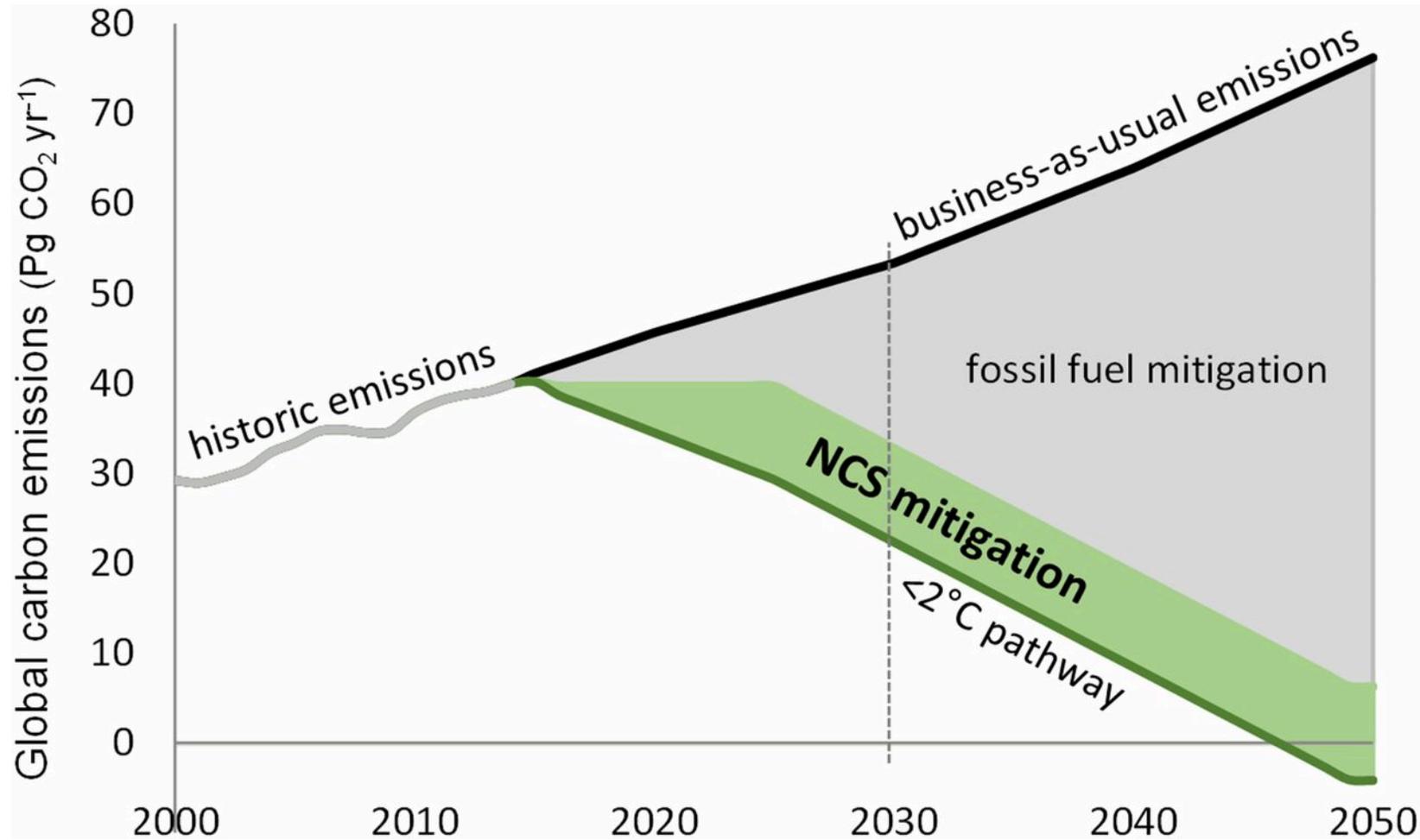
Promoting affordable clean energy, healthy soils and local agriculture

Dual-use solar facilities can play a beneficial role in providing pollinator habitat, protecting/rebuilding soils, and creating opportunities for local farm economies.

“Agrivoltaics”



Contribution of natural climate solutions (NCS) to stabilizing warming to below 2 °C.



Bronson W. Griscom et al. PNAS 2017;114:44:11645-11650

PNAS

Yale Climate Connections:

Clock running on our reliance on vegetation as a steady 'carbon sink

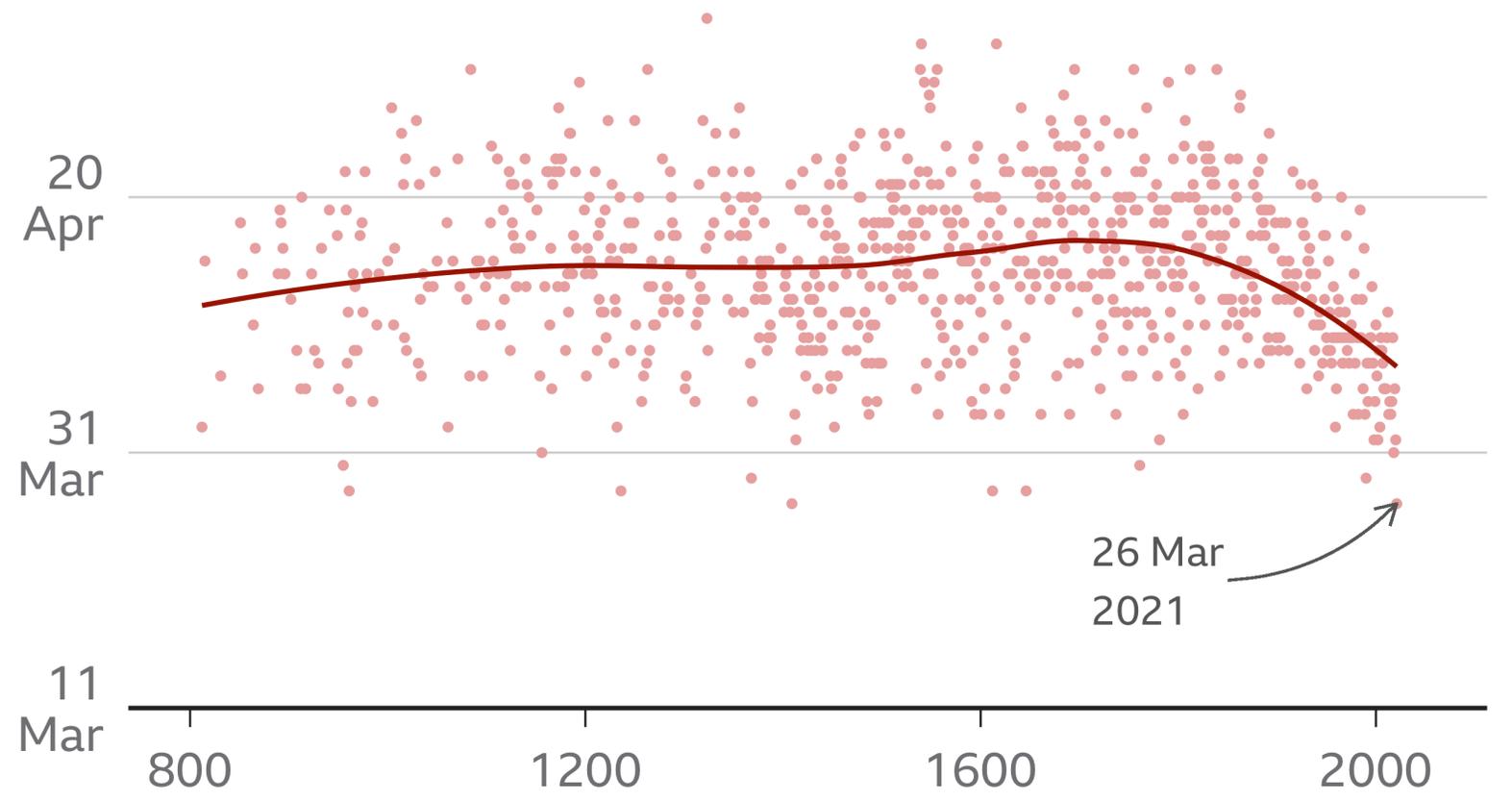
- Researchers found that the CO₂ fertilization effect rate of increase declined by nearly 50% during their study period of 1982 to 2015. This decline is likely occurring because water and nutrient availability are not increasing in the environment in the same way CO₂ is.
- As a result, the effect CO₂ has had in boosting vegetation in the past may be dissipating. This is concerning since terrestrial ecosystems have accounted for more than 50% of the global carbon sink during the last six decades and have thus substantially mitigated climate warming.
- **A decline in CO₂ fertilization effect will impact the carbon cycle, demonstrating a need to adjust our reliance on using forests and plants to sequester carbon.**

Source: *Recent global decline of CO₂ fertilization effects on vegetation photosynthesis*, Wang et al, Science, 12/2020 (<https://science.sciencemag.org/content/370/6522/1295>)



Cherry blossom: peak bloom day of the year

Kyoto, Japan, 812 to 2021



Source: Osaka Prefecture University



Questions & Discussion