

Drawbacks vs the Economic benefits of Large Scale Solar

Municipal and State Energy Edge Forum
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**CORNELL
GLOBAL
DEVELOPMENT**

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NYS POLICY



RECENT NYS CLIMATE CHANGE POLICY

MAJOR *NEW* LEGISLATION (2019/2020)

- **Climate Leadership and Community Protection Act**
 - Governs overall decarbonization of the economy
- **The Accelerated Renewable Energy Growth and Community Benefit Act**
 - Establishes new rules for siting electricity generating facilities

Policy already in place 

Buildings

- New Efficiency: New York
- Carbon Neutral Buildings Roadmap

Leadership by Example

- BuildSmart (EO88)
- EO166

Transportation

- EVolveNY
- Charge Ready NY
- Drive Clean Rebate
- Municipal Clean Vehicle Rebates

Resilience

- > Community Risk and Resiliency Act
- > Resilient New York

Electricity

- > Regional Greenhouse Gas Initiative
- > Clean Energy Standard
- > NY-Sun
- > Offshore Wind
- > Energy Storage

Local Governments

- > Climate Smart Communities
- > Clean Energy Communities

Short-Lived Climate Pollutants

- > Methane Reduction Plan
- > HFC Reduction Strategy

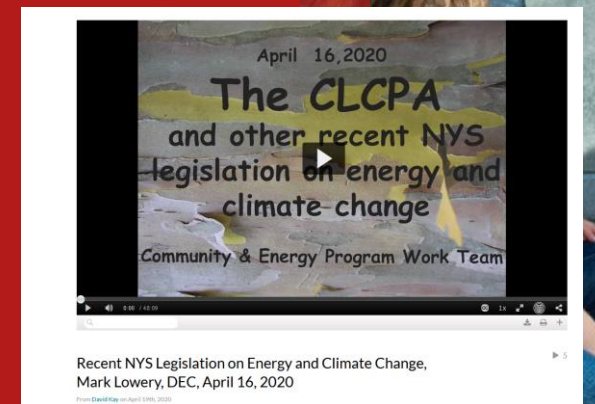
... and more!



The Climate Leadership and Community Protection Act

GHG Mandates

- 40 percent emissions reductions from 1990 levels by 2030
- 85 percent emissions reductions by 2050
- Beyond 85 percent, offsets allowed



At least

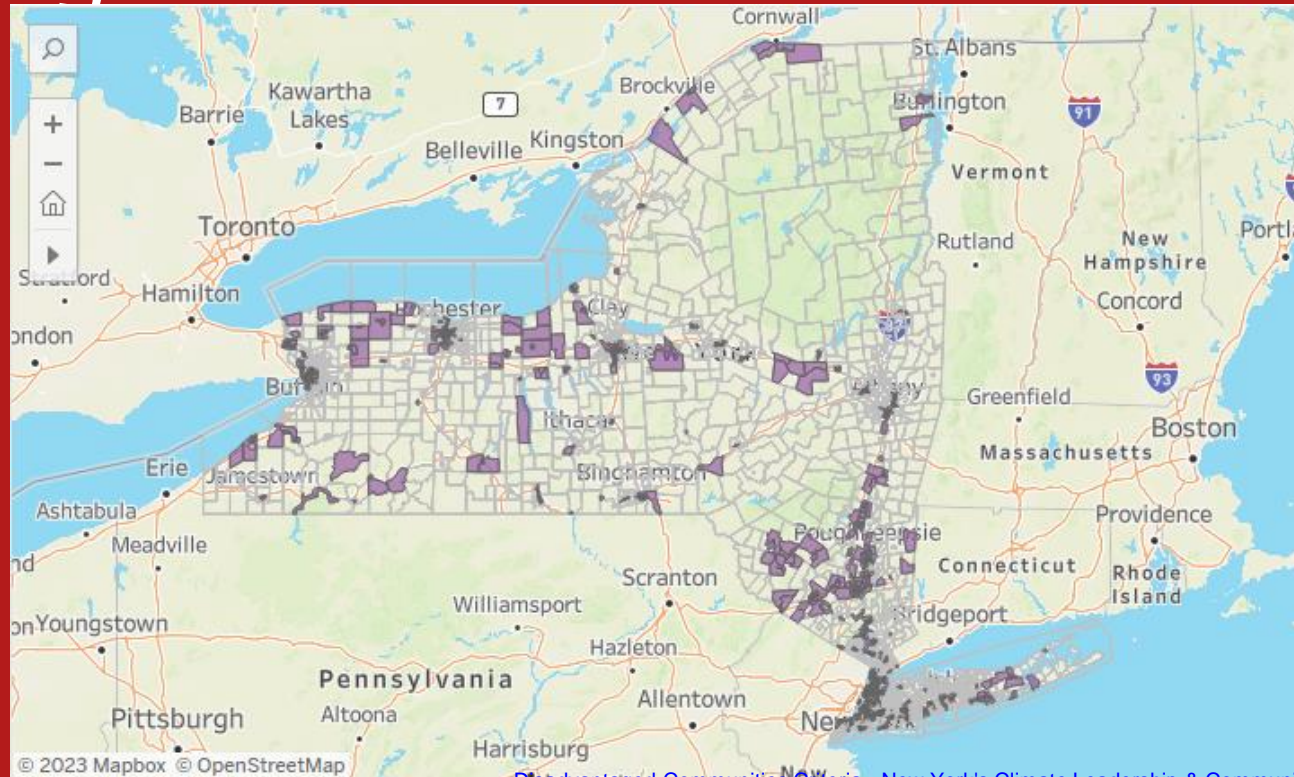
35%



of benefits directed to disadvantaged communities

The Climate Leadership and Community Protection Act

Disadvantaged communities



[Disadvantaged Communities Criteria - New York's Climate Leadership & Community Protection Act \(ny.gov\)](https://www.ny.gov/newsroom/disadvantaged-communities-criteria-new-yorks-climate-leadership-and-community-protection-act-01192023)





NY Facility Siting Policy

Accelerated Renewable Energy Growth and Community Benefit Act

- New large-scale renewable energy projects equal to or larger than 25 megawatts (MW) required to seek a permit through Office of Renewable Energy Siting
- New renewable energy projects between 20–25 MW (& existing projects under Article 10 review may opt-in to this new review process.
- If deemed complete, applications for a permit through ORES will be acted upon within one year; projects proposed on certain previously developed commercial and industrial sites will be acted upon within six months.
- If ORES does not make a determination within the required timeframe, the draft permit will be deemed approved and a permit granted.





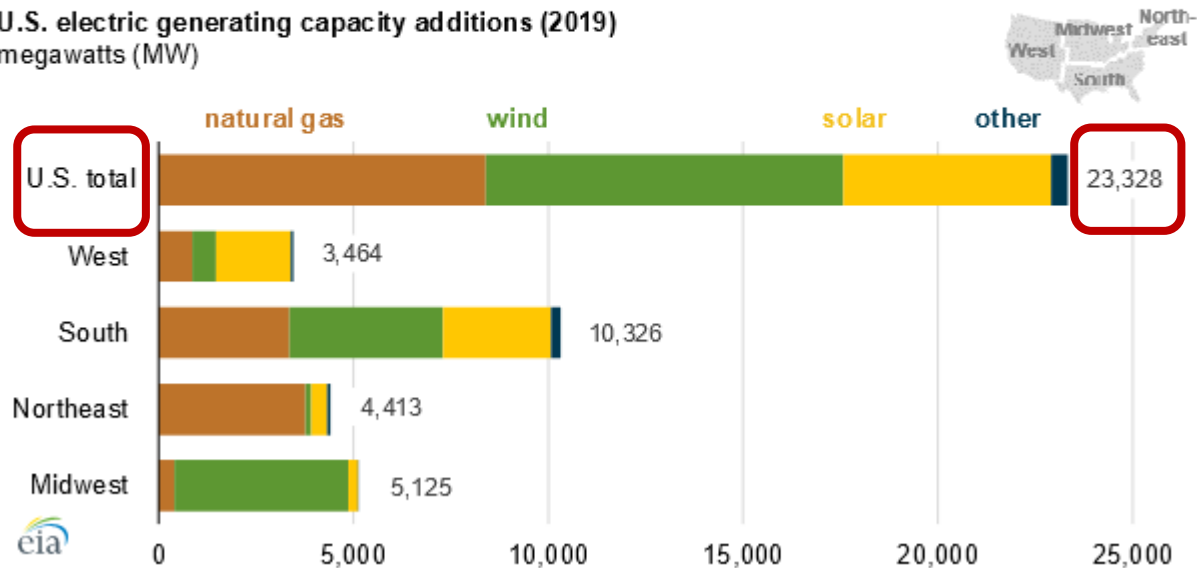
How much solar electric does the state need?

The market will decide

APRIL 21, 2020

Wind and natural gas-fired generators led U.S. power sector capacity additions in 2019

U.S. electric generating capacity additions (2019)
megawatts (MW)



Source: U.S. Energy Information Administration, *Preliminary Monthly Electric Generator Inventory*



Guesstimate in 2020:
~ 23 GW solar

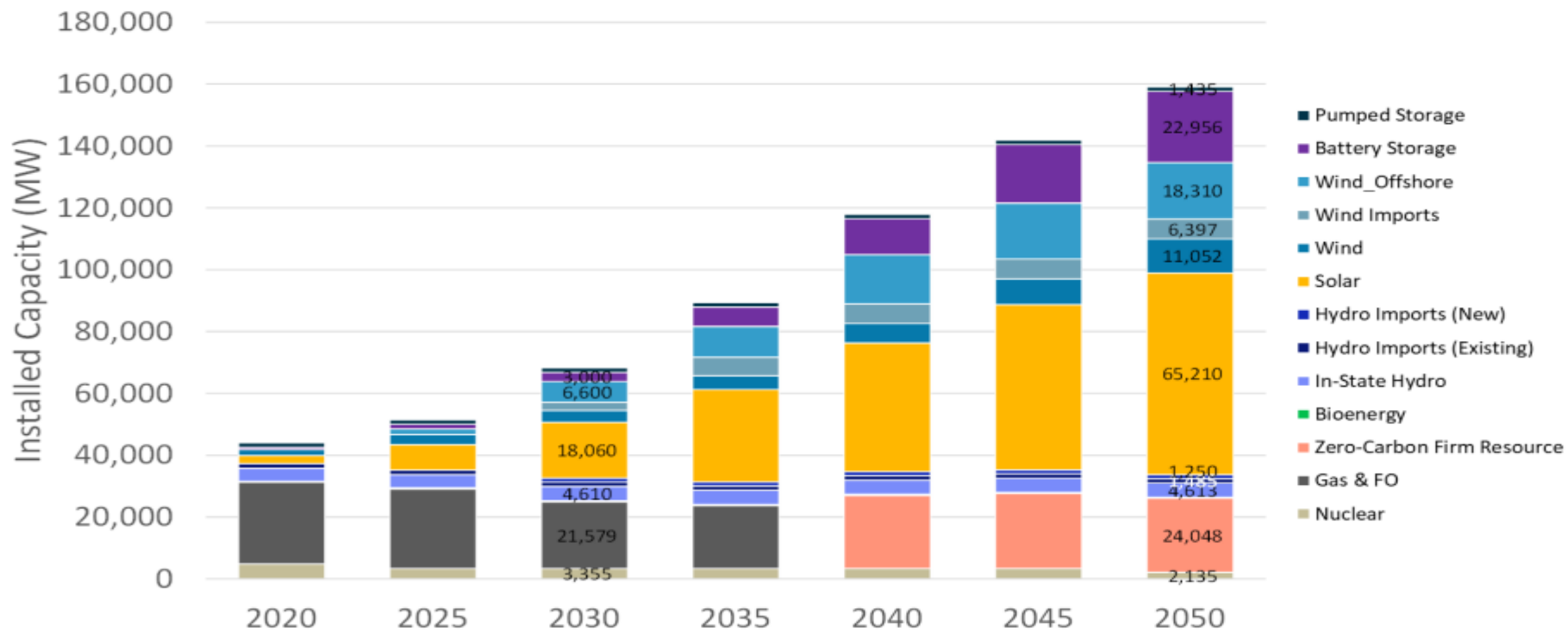
~18 GW more than
NY SUN's 5 GW

<https://pv-magazine-usa.com/2019/06/20/new-york-state-is-going-to-need-15-gw-of-solar-power/>



How much solar electric does the state need?

CAC's Draft Scoping Plan: Scenario 4



- Reference Scenario: Business as usual
- Scenario 2: Strategic Use of Low-Carbon Fuels
- Scenario 3: Accelerated Transition Away from Combustion
- Scenario 4: Beyond 85% Reduction

Solar ~ 65 GW in 2050

Source: Appendix G: Annex 2: Key Drivers and Outputs [XLSX] (Updated to include additional data on May 24, 2022) <https://climate.ny.gov/-/media/Project/Climate/Files/IA-Tech-Supplement-Annex-2-Key-Drivers-Outputs.xlsx>

Solar in New York: metrics



IEEE JOURNAL OF PHOTOVOLTAICS

1

Land Requirements for Utility-Scale PV: An Empirical Update on Power and Energy Density

Mark Bolinger^{1b} and Greta Bolinger^{1b}

**3-7 acres
per MW
(average)**



Solar in New York: metrics

Are these numbers big or small?

~20 GW needed? >>> ~100,000 acres
~30 GW needed? >>> ~150,000 acres
~40 GW needed? >>> ~200,000 acres
~50 GW needed? >>> ~250,000 acres
~60 GW needed? >>> ~300,000 acres

Possible Benchmarks???

Acres of land in NYS? **~30,160,640**

Acres of farmland in NYS? **~6,900,000**

Farm Operations - Acres Operated 2022 NASS

- Implies ~1-4% of NYS farmland could be *directly* affected by 2050

AFT analysis (2020) of NYS farmland conversion (over **15 years** - between 2001 and 2016) :

- to urban and highly developed uses (**acres**) **~56,000**
- to low density residential uses (**acres**) **~197,000**



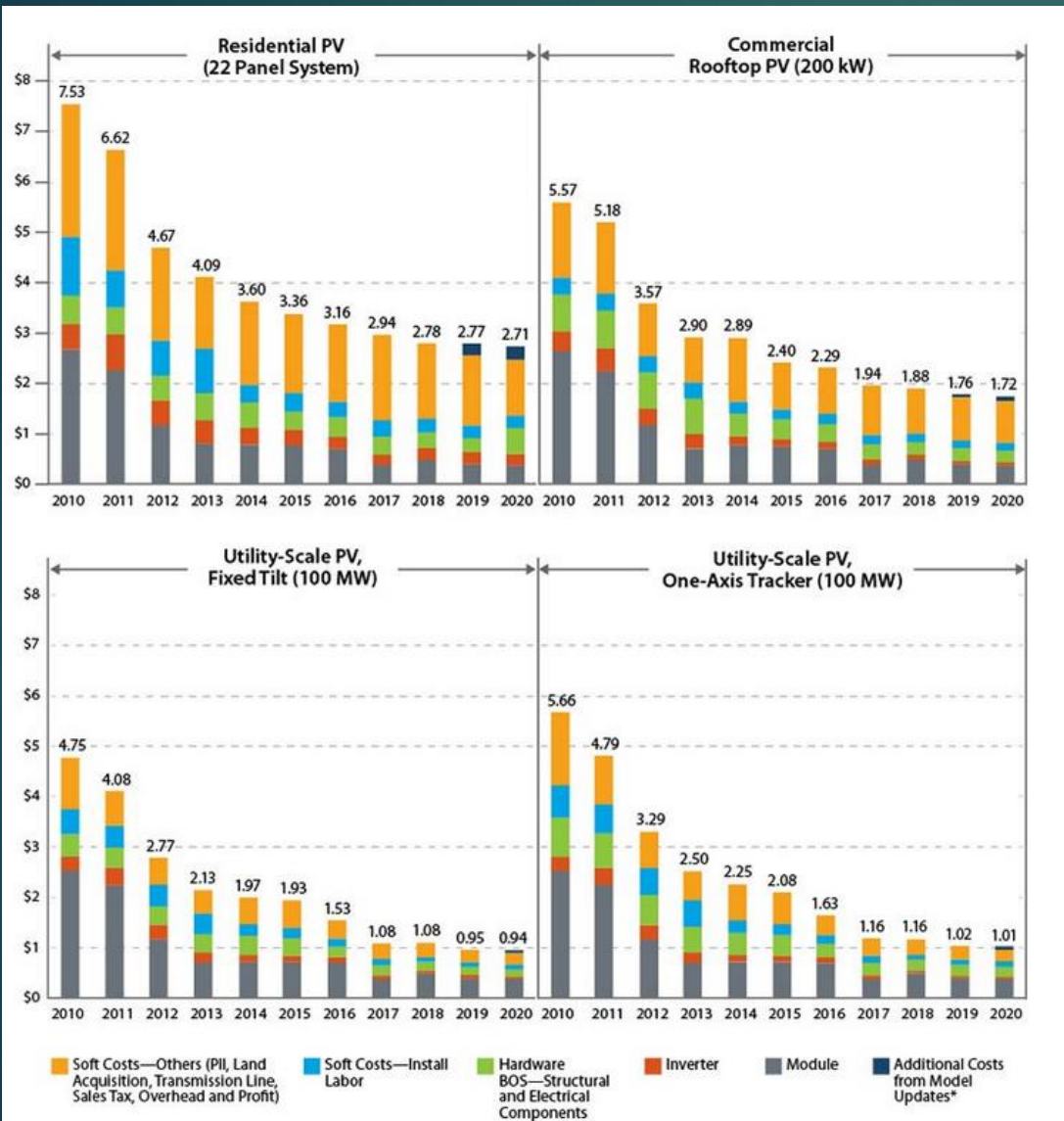
Mapping solar

(size matters)

- ❖ “Distributed” - Residential & Nonresidential ≤ 5 MW
- ❖ “Utility Scale” > 5 MW
 - ❖ Locally permitted (up to 25 MW)
 - ❖ State permitted (ORES - >25 MW)

ONE REASON SIZE MATTERS

\$/Watt DC capacity

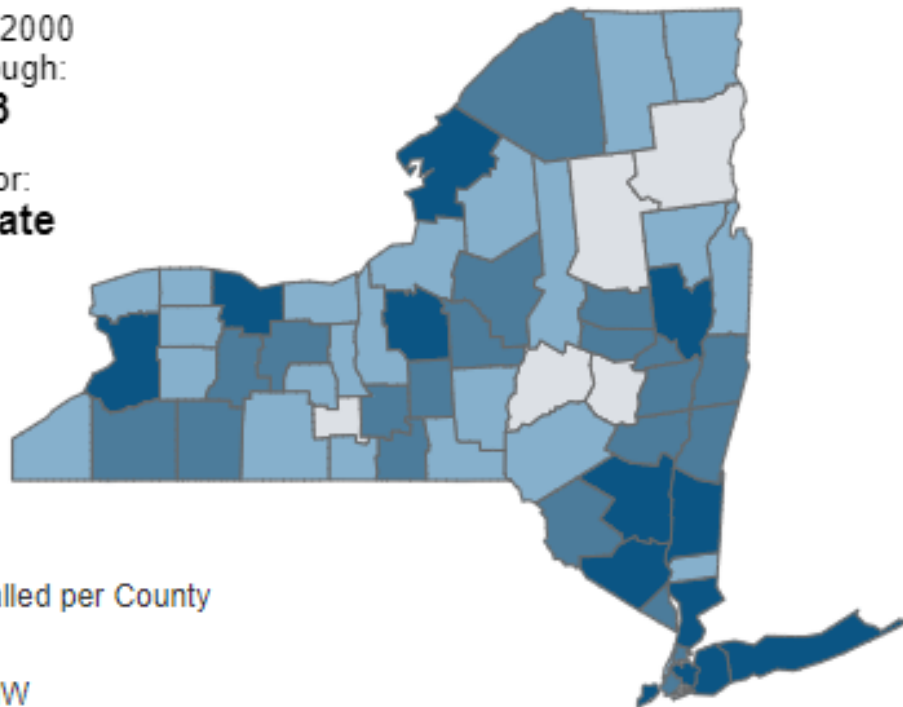


Message:
Declining costs
Economies of scale in costs of construction
Doesn't account for transmission, however.

Distributed solar projects, 2000 - 2023

Data beginning 2000
and current through:
May 31, 2023

Showing Data for:
New York State



Megawatts installed per County

- 0 to 10 MW
- >10 to 50 MW
- >50 to 100 MW
- >100 MW

Total Capacity (MW DC)

4,695 MW

Number of Projects

191,648

Data Sources: NYS DPS, NYISO. Click icon for more info

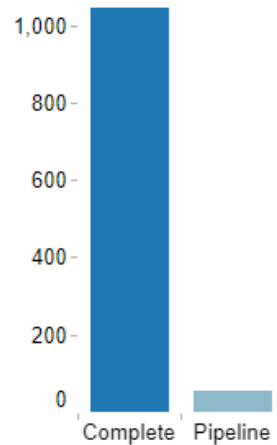


NY Sun supported Residential Projects (2000-2023)

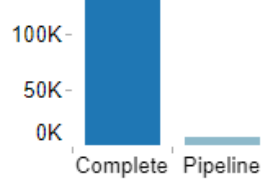
**> 1 GW
Capacity**

Dashboard Last Updated: 7/4/2023 8:06:53 AM

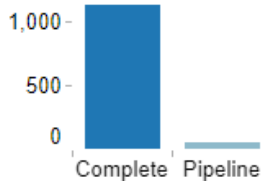
Total Capacity (MW DC)



Number of Projects

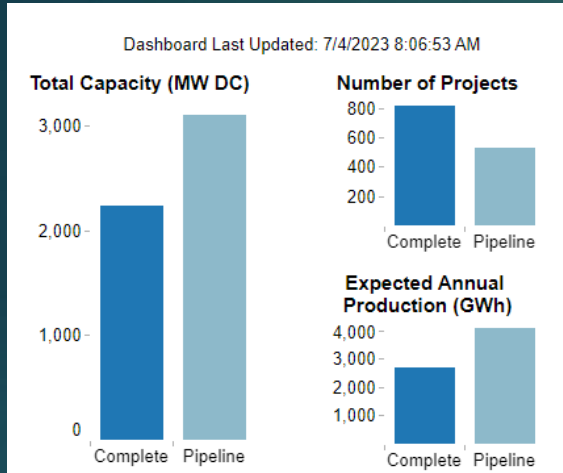
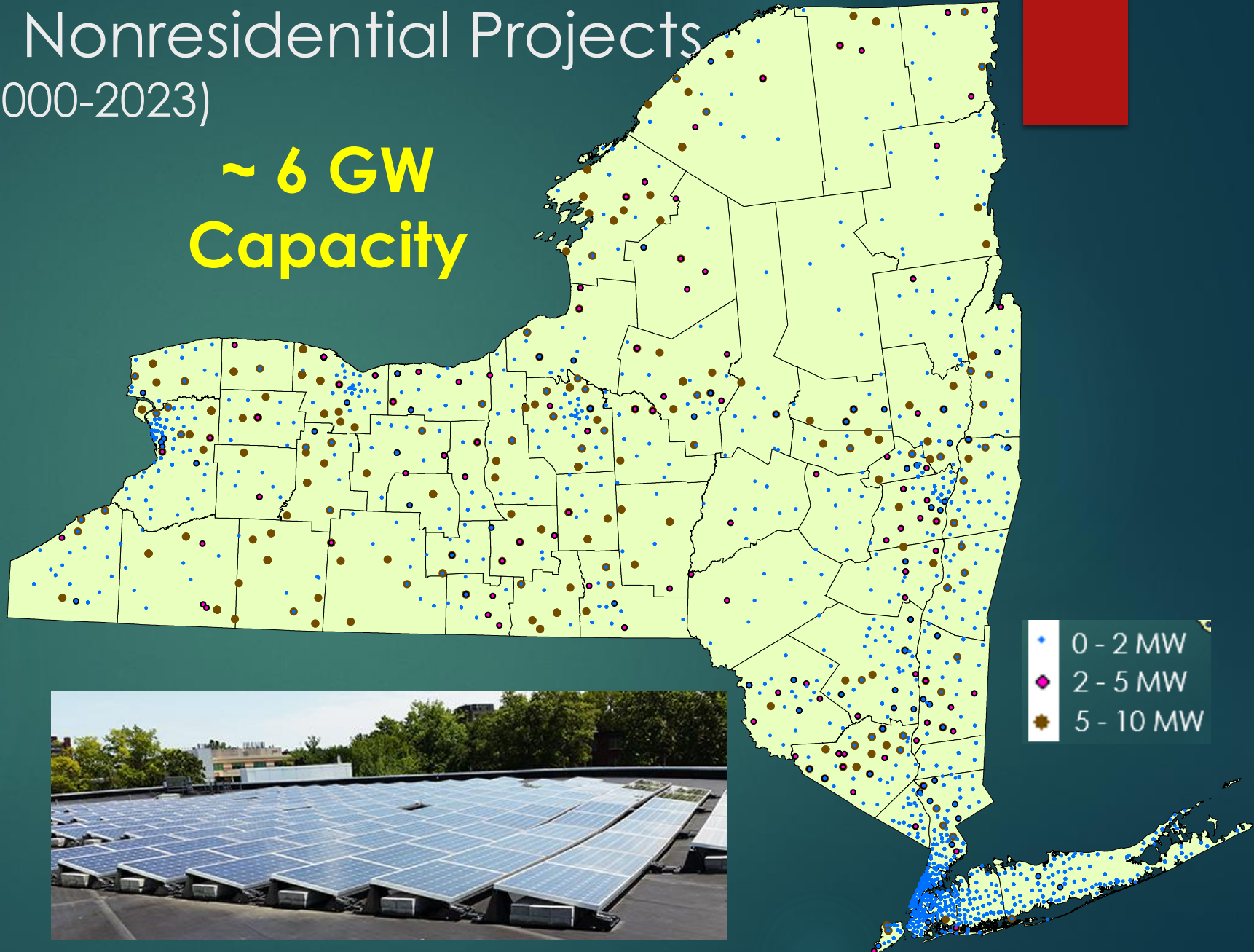


Expected Annual Production (GWh)

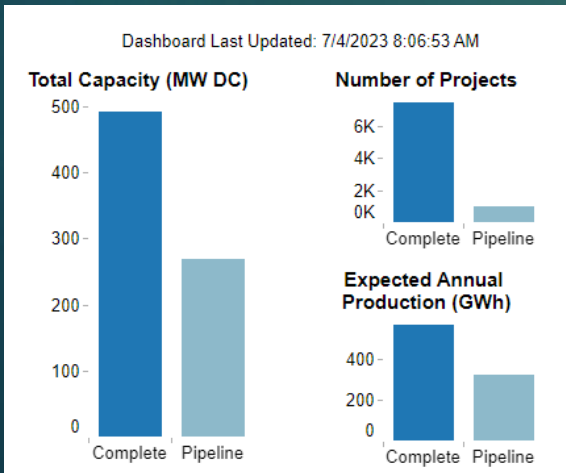


NY Sun supported Nonresidential Projects (2000-2023)

~ 6 GW Capacity



Commercial/industrial

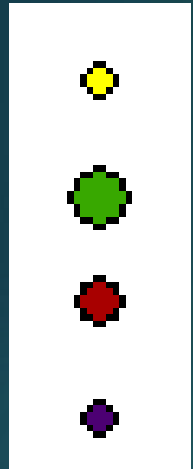


Small commercial



Solar Project Solicitations

NYSERDA (2004-2022)



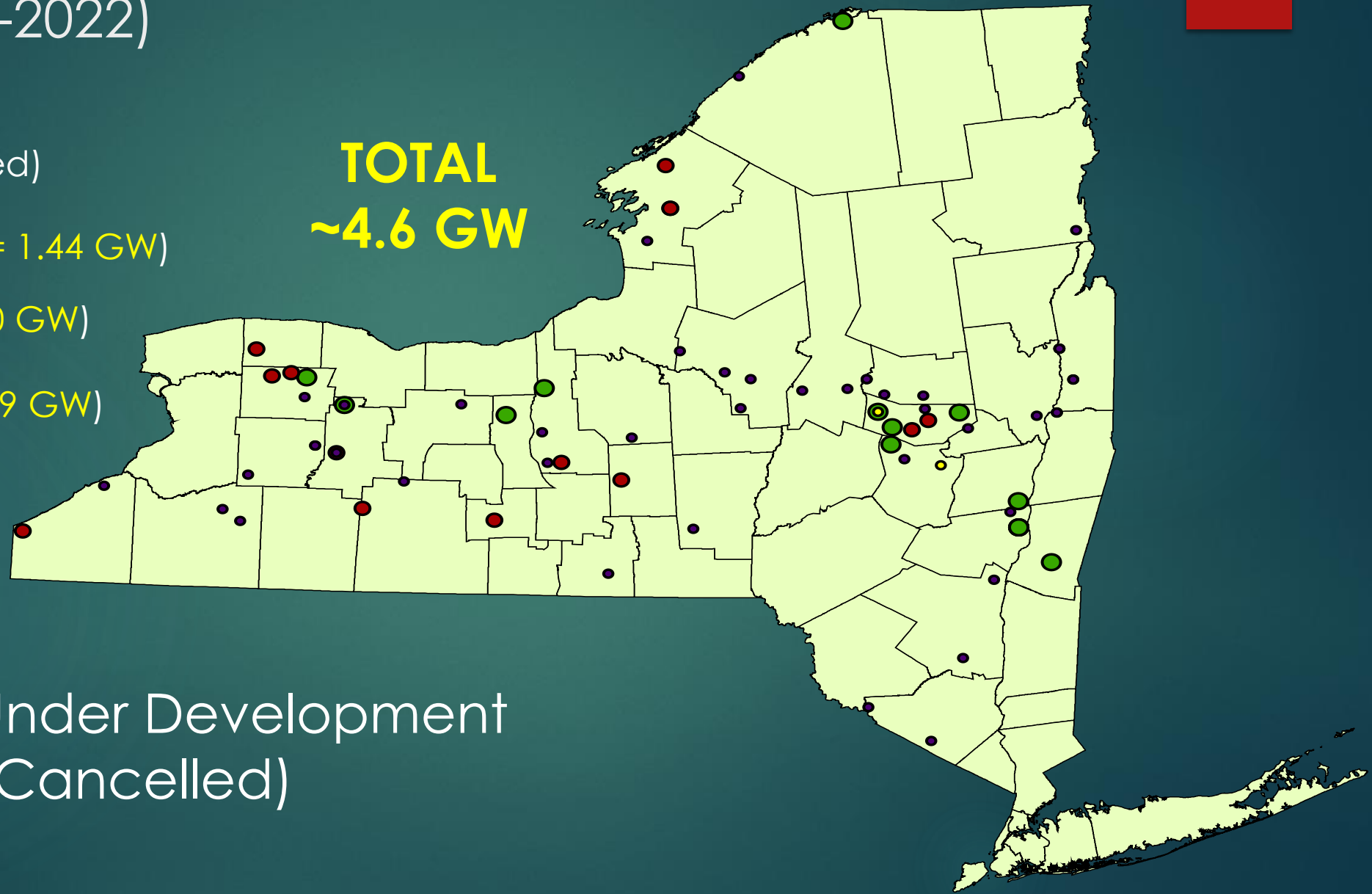
NA (cancelled)

Article 10 ($\Sigma = 1.44$ GW)

ORES ($\Sigma = 2.30$ GW)

SEQR ($\Sigma = 0.89$ GW)

TOTAL
~4.6 GW

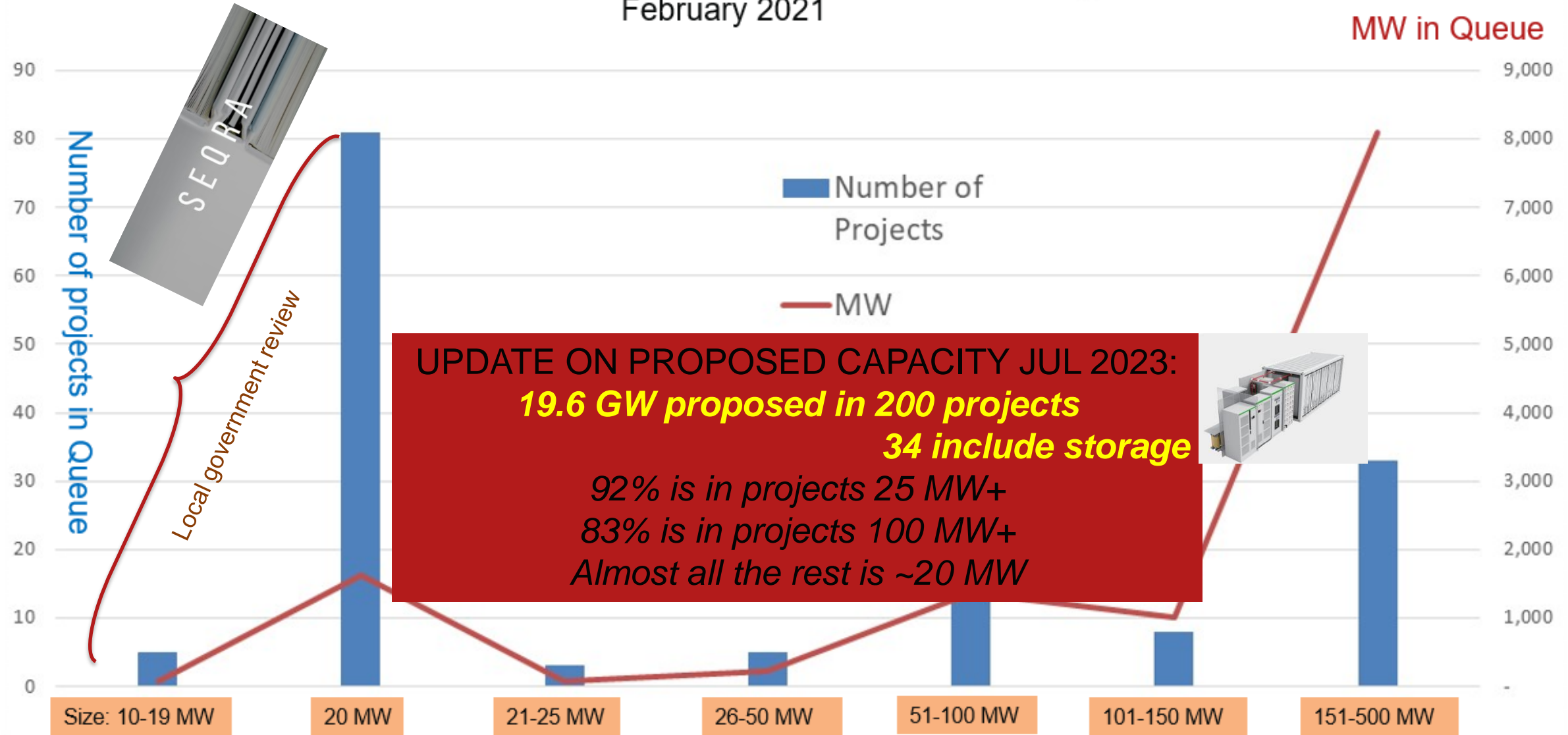


72 Under Development
(+8 Cancelled)

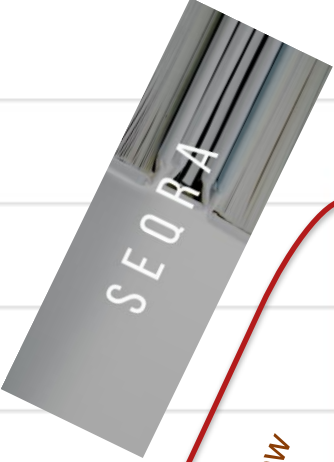
Solar Projects in NYISO Queue by Size

Number and MW of Projects

February 2021



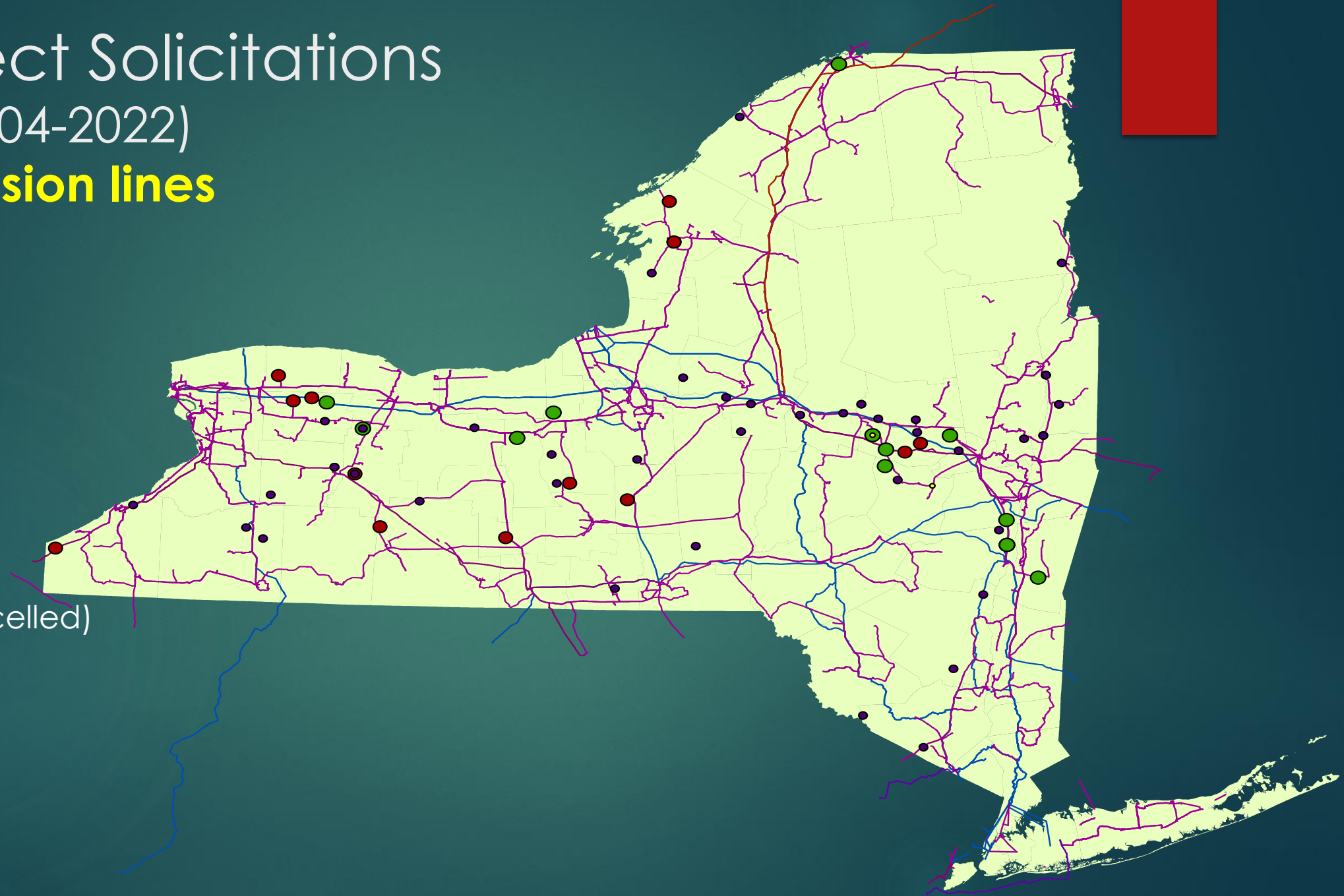
UPDATE ON PROPOSED CAPACITY JUL 2023:
19.6 GW proposed in 200 projects
34 include storage
92% is in projects 25 MW+
83% is in projects 100 MW+
Almost all the rest is ~20 MW



Local government review

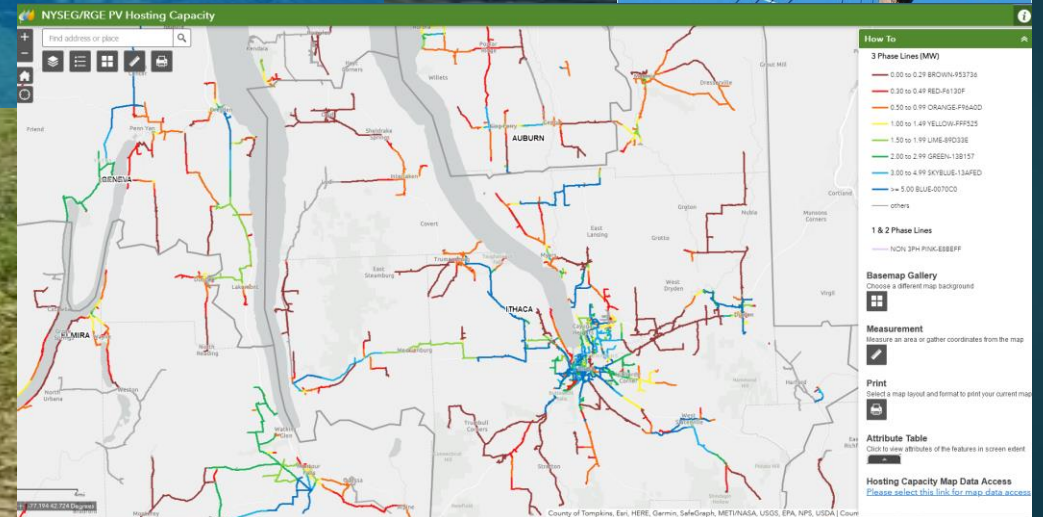
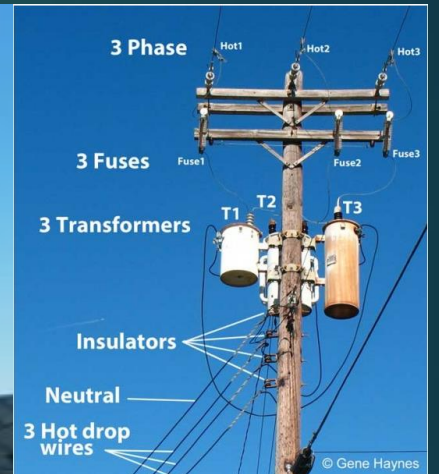


Solar Project Solicitations NYSERDA (2004-2022) and **Transmission lines**

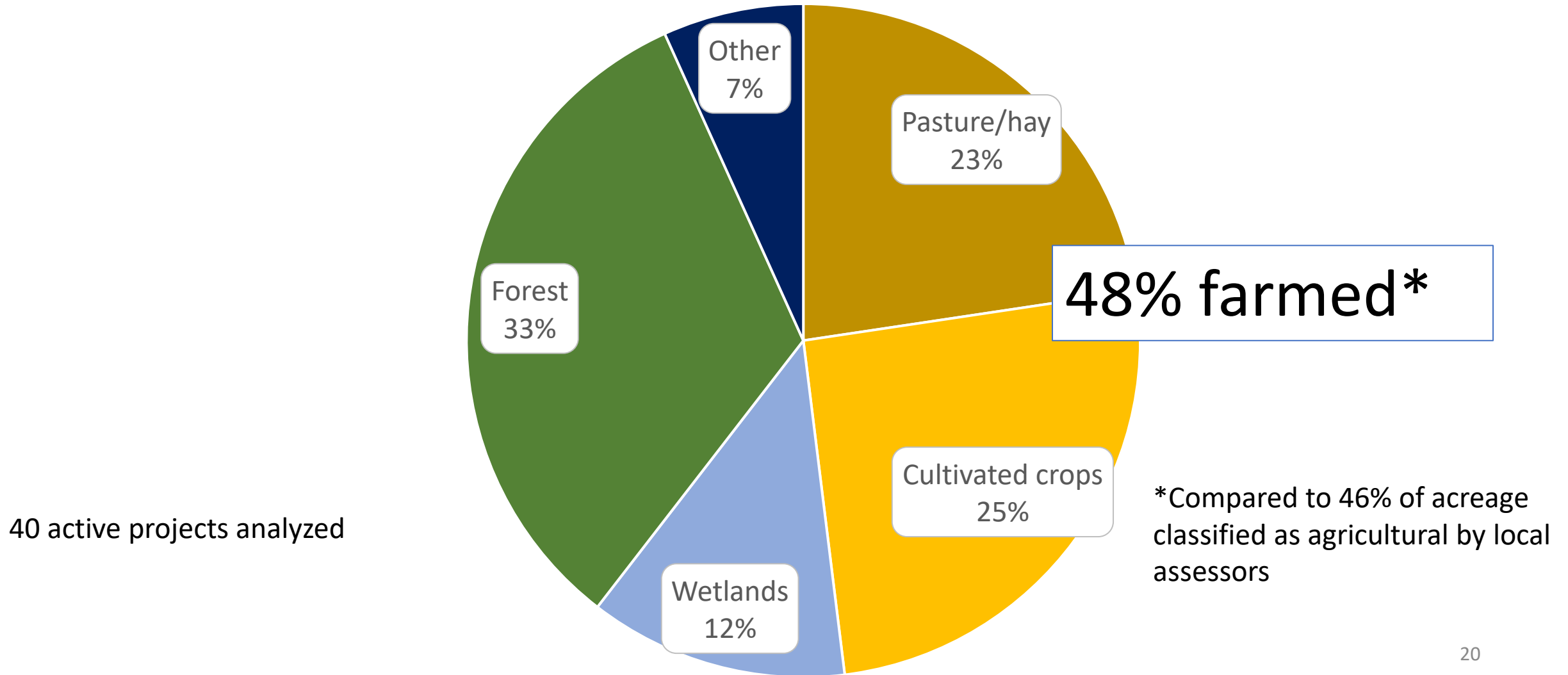


Some factors affecting developer siting of large solar projects in NYS

- Cost of grid interconnection - proximity to 3 phase power
- Ability to lease or acquire site from enough willing landowners
- Cost of leasing or purchasing land
- Relatively flat land
- Relative ease of construction
- Community acceptance
- Etc.



What categories of **land cover** are within proposed Article 10 project boundaries?





Agrivoltaics

What crops grow well under solar panels?

What crops can be grown under solar panels economically?

What kinds of farmers would do this?

What makes sense for a solar company?

Where do different crop/solar design interactions work well?



Potato?



Clover?



©Fraunhofer ISE

<https://www.laborelec.com/growing-in-the-shade-of-solar-power/>



SMART SITING SCORECARD

- **NYSERDA encourages proposers to include novel co-use, dual-use, agriphotovoltaics, agrisolar, and/or agrivoltaic activities in the development of renewable energy projects.**
- **Proposers that pledge to develop renewable energy projects in harmony with other state objectives as demonstrated through the Smart Solar Siting Scorecard (Scorecard) will be evaluated more favorably.**
- **NYSERDA is requiring all Proposers under RESRFP22-1 (RFP) to submit a complete Scorecard for each solar Bid Facility.**
- **NYSERDA will consider information contained within the completed Scorecards in the RFP scoring and evaluation process**

Key findings

Construction

- **Direct impact:** Arevon and project partners plan to invest \$128.8 million in the solar development project. Direct spending in Freeborn County is estimated to be \$15.6 million. Project organizers plan to utilize 204 employees on-site and pay \$7.9 million in wages, salaries and benefits to complete the work.
- **Total impact:** The development project will generate an estimated \$30.9 million in economic activity during construction. This includes \$13.6 million in labor income. In addition to the direct jobs, the project will support an additional 115 jobs in industries such as real estate, health care, and professional services.
- **Tax impact:** The project will generate an estimated \$461,870 in state and local taxes.



Operations and Maintenance

- **Direct impact:** Arevon anticipates spending \$2.2 million annually on operations and maintenance. Operations and maintenance costs include payments to the landowners, site maintenance, and equipment repairs and parts. The company plans on hiring four employees at the site.
- **Total impact:** Operations and maintenance of the solar project will generate an estimated \$3.3 million in economic activity in the county per year. This includes \$703,530 in labor income impacts. The project will support 14 jobs, four on-site and 10 in other industries across the county.
- **Tax impact:** The project will annually generate an estimated \$99,040 in state and local taxes.
- These impacts will be annual, as long as the project operates at projected levels. Industries experiencing the largest economic benefit include real estate, construction, and hospitals.

Economic impacts?

Example of one midwestern economic analysis

More economic impact modeling needed.
More underway.

~\$130 million construction spending
204 jobs

~\$2.2 million annual spending on O&M
14 jobs

150 MW facility



Early Days



DISCOVER CALS



Global Development

Thank you!

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