



Utility Scale Wind and Solar Project Development – Developer's Perspective

September 23, 2019

New York Bar Association

Environmental & Energy Law Section



Background Overview of Current Status of Wind and Solar Installed Capacity

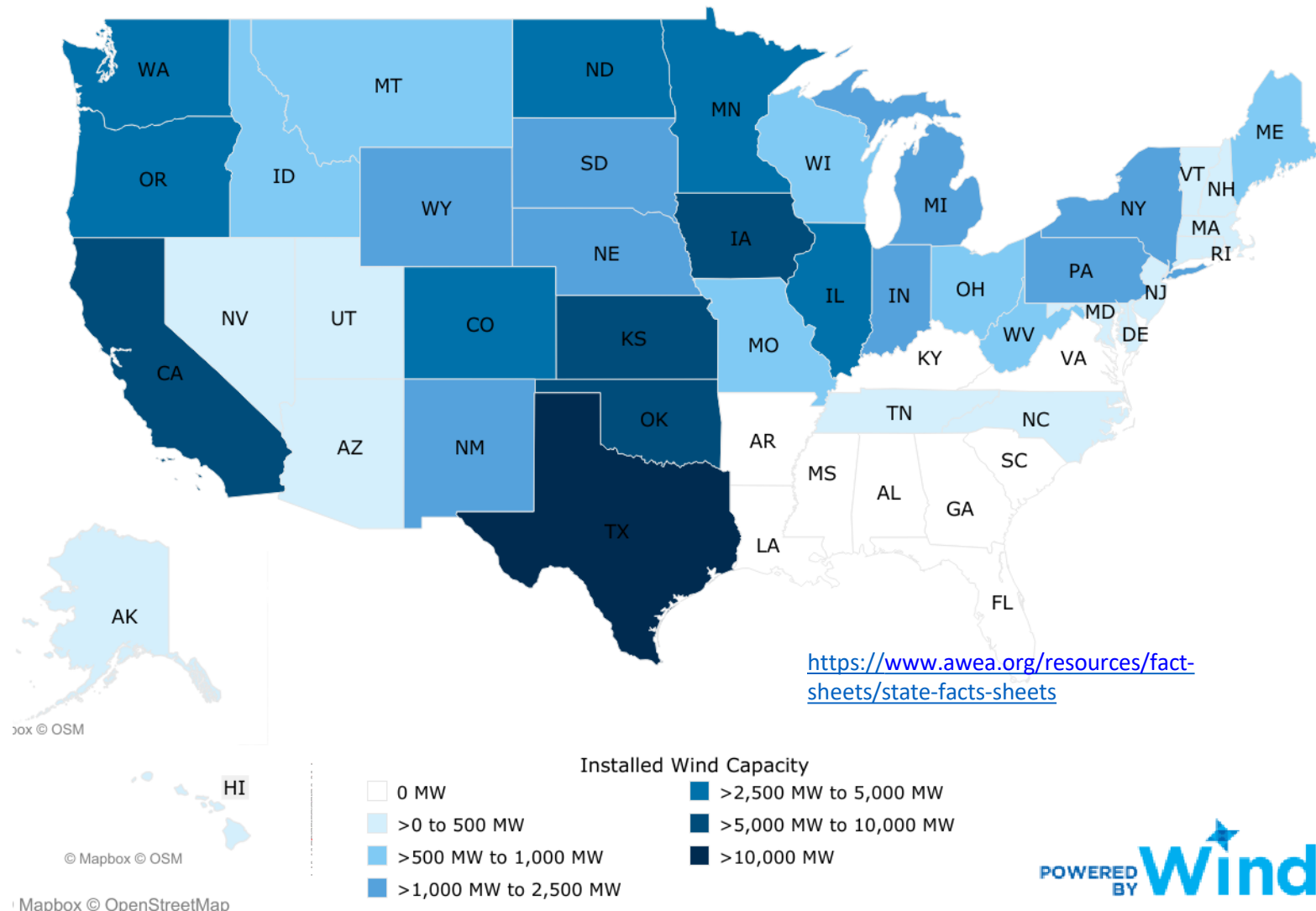
U.S. Installed Wind Capacity

- The U.S. wind industry added 7,588 MW of new wind capacity in 2018, with another 1,577 MW added in the first half of 2019.
- There are now over 57,000 wind turbines with a combined capacity of 97,960 MW operating in 41 states, Guam, and Puerto Rico
- U.S. wind power has more than tripled over the past decade, and today is the largest source of renewable generating capacity in the country

<https://www.awea.org/wind-101/basics-of-wind-energy/wind-facts-at-a-glance>

AWEA State Wind Energy Facts

Hover to view wind stats and click link to download a fact sheet



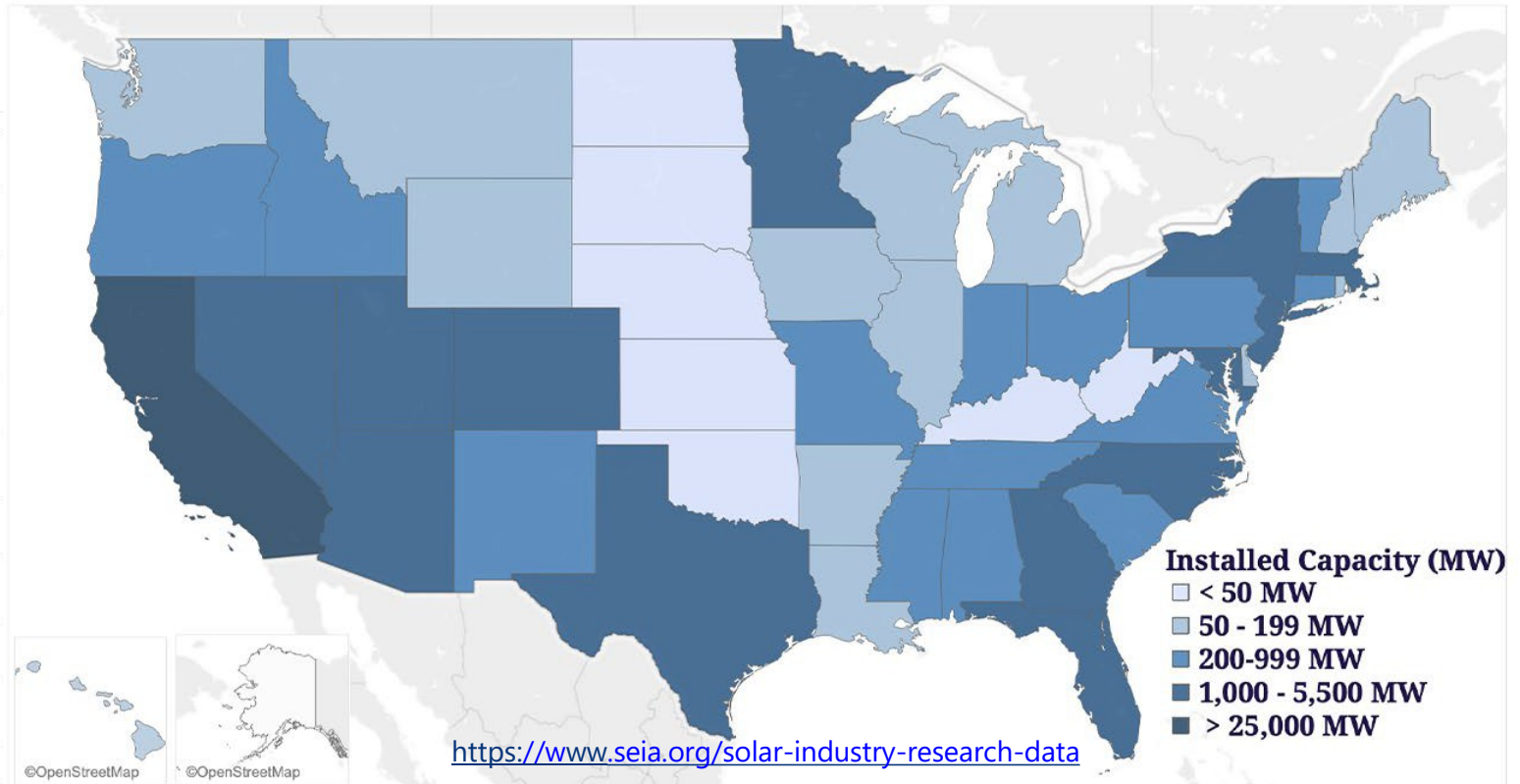
POWERED BY **Wind**

Note: Wind project data current to 2Q 2019. Economic and environmental benefits current as of year end 2018. Annual water savings based on national average water consumption factors for coal and gas plants.

U.S. Solar Installed Capacity

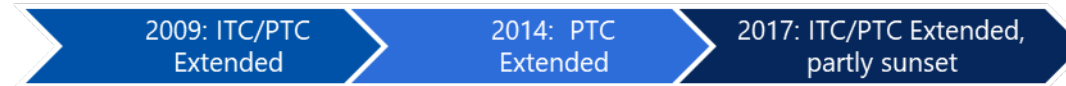
Top 10 States

California	25,016 MW
North Carolina	5,467 MW
Arizona	3,788 MW
Nevada	3,452 MW
Florida	3,156 MW
Texas	2,957 MW
New Jersey	2,829 MW
Massachusetts	2,535 MW
New York	1,718 MW
Utah	1,661 MW
Georgia	1,572 MW



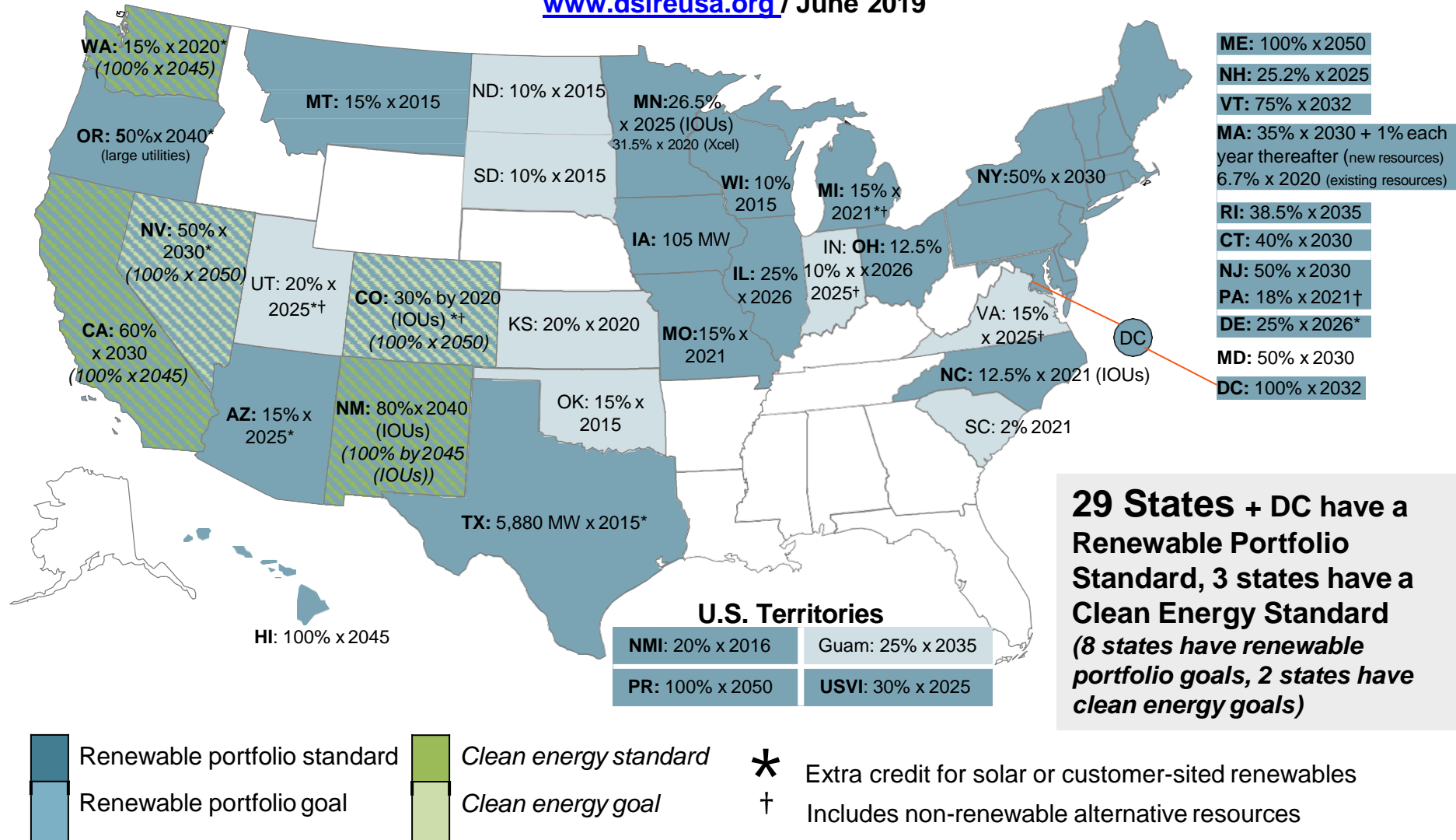
How did we get here: What are the key market drivers that been fueling development of utility scale wind and solar?

- Historical renewable energy drivers:
 - RPS/State Policies (see slides 9-10) provide some insight regarding current status of state policies, including battery storage incentives)
 - Federal Tax Credits
 - Production Tax Credits ("PTCs")
 - Investment Tax Credits ("ITCs")
 - PURPA
 - Voluntary Procurement
 - 2013; first green tariff deal
 - 2018: large corporations contracted for 6.5 GW of wind & solar; 2019 on pace for record number of corporate PPAs (approximately 6 GW contracted as of July 2019)



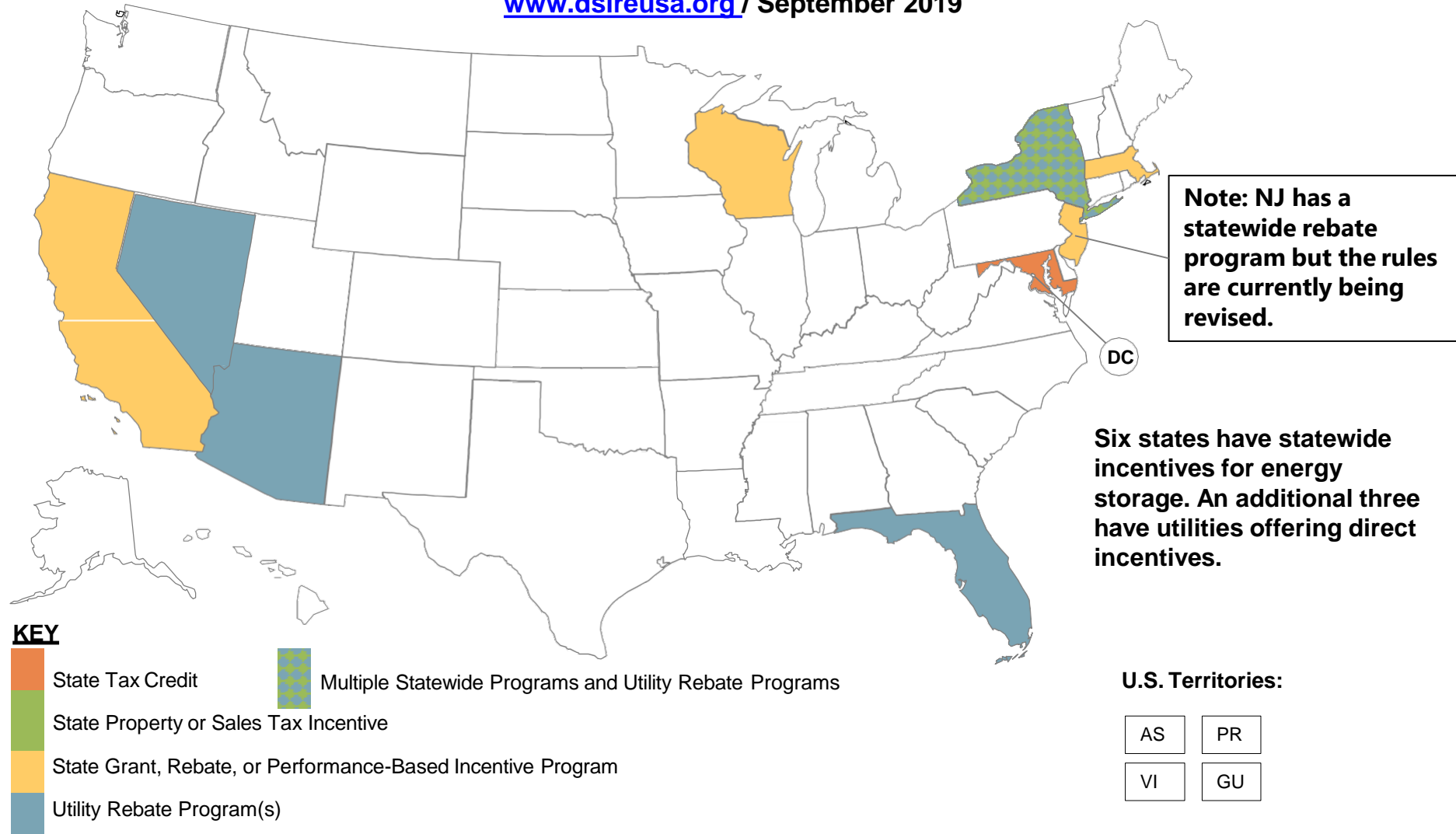
Renewable & Clean Energy Standards

www.dsireusa.org / June 2019



Energy Storage Financial Incentives

www.dsireusa.org / September 2019



What will be the key market drivers going forward?

- Climate change concerns leading to new RPS/State Policies and increases in renewable energy procurement and creation of financial incentives
- Federal Tax Credits – still available, but beginning to sunset; continuing efforts to further extend through proposed legislation, but uncertainty around ability to pass
- Retirement of coal plants and/or nuclear facilities; cost of building new or retrofitting existing facilities
- Renewable energy technology advancements (including battery storage)/reduced costs – beginning to achieve grid parity
- Procurement/Offtake opportunities continuing to increase, though highly competitive

Where does New York fit into this picture?

New York - A Huge Opportunity for Renewables

New York to Approve One of the World's Most Ambitious Climate Plans

The state would pledge to eliminate net greenhouse gas emissions by 2050, with all its electricity coming from carbon-free sources.

The bill requires New York to get 70 percent of its electricity from renewable sources like wind, solar and hydropower by 2030 and shift entirely to carbon-free power a decade later.

Supporters said the mandates handed down would likely require a vast work force to weatherize homes, swap out furnaces and install solar panels, and build wind farms and other clean energy infrastructure.

“This new law will spur the growth of green jobs across the state for decades,” said Julie Tighe, the president of the New York League of Conservation Voters.

New York Times, June 18, 2019

New York Has a Climate Plan—Now It Has to Follow Through

Major changes to electricity systems, transportation and other sectors are needed to meet ambitious greenhouse gas targets

“New York has considerable work to do to achieve the targets of the legislation. It cut emissions 8% between 1990 and 2015, according to the most recent state greenhouse gas inventory. The new law calls for reducing emissions by 40% of 1990 levels by 2030 and 85% by 2050 ([Climatewire](#), June 18). The remaining 15% of emissions would be offset to make the state carbon neutral.”

“We acknowledge these goals are extremely ambitious. They need to be in order to meet the level of greenhouse gas reduction scientists tell us is necessary to avert the worst impacts of climate change. And we acknowledge there is not a playbook we can pull off the shelf for how to decarbonize the world’s 13th-largest economy,” said Alicia Barton, who leads the New York State Energy Research and Development Authority.”

“The law calls for generating 70% of the state’s power from renewable sources by 2030. That includes a 9-gigawatt mandate for offshore wind and 6 GW of distributed solar.”

“The state announced two offshore wind contracts for 1.7 GW of offshore wind last week. It now boasts 1.5 GW of nonutility solar capacity, according to data collected by the Solar Energy Industries Association, a trade group.”

“Significant upgrades to New York’s electric grid are also needed for the state to realize its carbon-cutting ambitions. New transmission capacity will be necessary not only to accept large injections of offshore wind, but to connect large wind and solar projects in upstate New York to population centers in the south. Just as importantly, the state will need to overcome local opposition to renewable developments. Environmentalists and industry representatives alike say it is now too easy for local opposition to gum up a project.”

Scientific American, July 29, 2019

Solar Will Likely Be A Big Player in New York

New York state is going to need 23 GW more solar power

pV magazine USA did the math on the new wind and solar capacity that will be needed to supply power to 20 million people under New York's new 70% by 2030 mandate. In addition to 6 GW of distributed solar and the 2 GW that has already been awarded in large scale bids, the state is going to need around 15 GW more utility scale solar.

Meaning we'll have to cover 70% of 167 TWh – about 117 TWh – with, "solar thermal, photovoltaics, on land and offshore wind, hydroelectric, geothermal electric, geothermal ground source heat, tidal energy, wave energy, ocean thermal, (or) fuel cells which do not utilize a fossil fuel resource in the process of generating electricity"

As an editorial decision, we project that of the future electricity, 80% of it will come from solar, and 20% from wind mirroring the large

onshore wind it turns out that we'll need about 15 GW of utility scale solar and 2.6 GW of wind – in addition to what the state has already solicited through large-scale auctions, and the 6 GW of distributed solar required under the new law, which puts us over 23 GW of future solar power capacity.

Solar Spotlight – New York



At A Glance

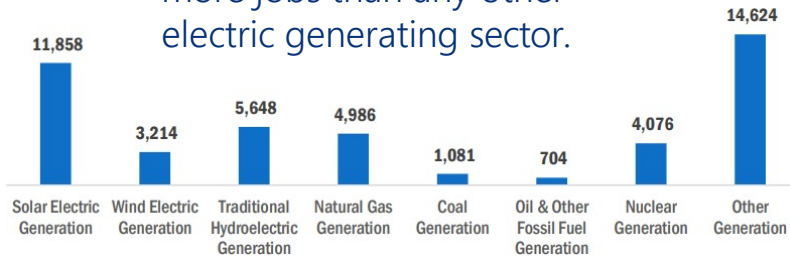
- **Solar Installed:** 1,717.8 MW (375.9 MW installed in 2018)ⁱ
 - **National Ranking:** 9th (6th in 2018)
 - **Enough Solar Installed to Power:** 296,000 homes
 - **Percentage of State's Electricity from Solar:** 1.40%ⁱⁱ
 - **Solar Jobs and Ranking:** 9,729 (4th in 2018)ⁱⁱⁱ
 - **Solar Companies in State:** 859 companies total; 100 Manufacturers, 301 Installers, 458 Others^{iv}
 - **Total Solar Investment in State:** \$4.86 billion (\$773.54 million in 2018)
 - **Price Declines:** 34% in the last 5 years
 - **Growth Projections and Ranking:** 3,385 MW over the next 5 years (ranks 5th)
-

The Role of Solar in Achieving New York's **70% Renewable Energy** by 2030

Economic Development

11,858

number of jobs in the solar electric generation sector in New-York in 2017. By far, more jobs than any other electric generating sector.

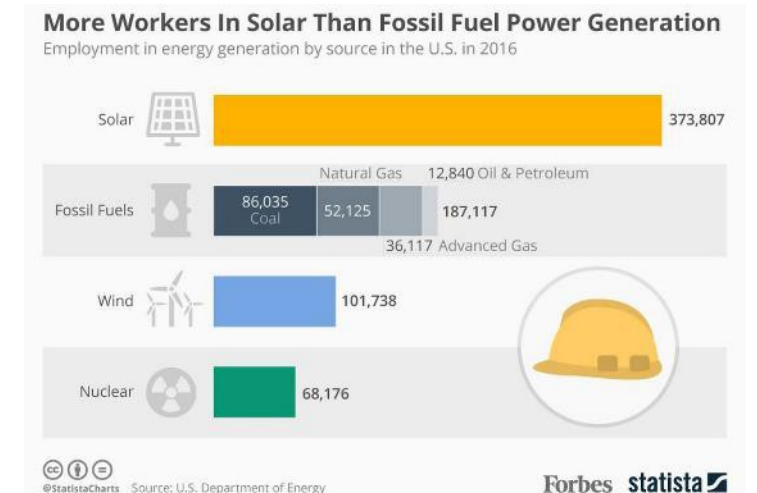


Source: US Energy and Employment Report, United States Department of Energy, May 2018

- Integration of solar projects provides many economic benefits:
 - Towns, countries and School Boards through PILOT or other tax revenues
 - Long term stable source of revenues for landowners
 - Creation of jobs during construction and operation
 - Material and service procurement
 - Hospitality sector during construction

Job Creation

- In the United States, "Proportionally, solar employment accounts for the largest share of workers in the Electric Power Generation sector... employing almost 374,000 workers, or 43% of the Electric Power Generation workforce."



New York has been successful in attracting investment for wind energy manufacturing and large wind energy projects.

Jobs & Economic Benefits

The U.S. wind industry is a major economic development driver. In addition to job creation and billions of dollars in project investment, the wind industry invests heavily in local communities, providing significant revenue in the form of property, state, and local taxes.

- Direct wind industry jobs in 2018: 3,001 to 4,000
- Capital investment in wind projects through 2018*: \$4.1 billion
- Annual state and local tax payments by wind projects: \$47 million
- Annual land lease payments*: \$5 - \$10 million

*Source: Based on state and national averages from LBNL, NREL

STATE WIND FACTS

Wind Projects as of 2Q 2019

- Installed wind capacity: **1,987 MW**
 - » State rank for installed wind capacity: **14th**
- Number of wind turbines: **1,128**
 - » State rank for number of wind turbines: **13th**
- Wind projects online: **29** (Projects larger than 10 MW: 22)
- Wind capacity under construction: **0 MW**
- Wind capacity in advanced development: **1,704 MW**

Wind Generation

In 2018, wind energy provided **3.2%** of all in-state electricity production.

- State rank for share of electricity: **24th**
- Equivalent number of homes powered by wind in 2018: **421,400**

Wind Energy Potential

- Land-based technical wind potential at 80 m hub height: **91,648 MW**
(Source: AWS Truepower, NREL)
- Offshore net technical wind potential at 100 m hub height: **73,454 MW** (Source: NREL)

Environmental Benefits

Generating wind power creates no emissions and uses virtually no water.

- 2018 annual state water consumption savings*: **737 million gallons**
- 2018 equivalent number of water bottles saved: **5.6 billion**
- 2018 annual state carbon dioxide (CO₂) emissions avoided: **1.8 million metric tons**
- 2018 equivalent cars' worth of emissions avoided: **387,000**

*Based on national average water consumption factors for coal and gas plants.

Developer's Perspective On What It Takes to Develop, Permit and Construct a Successful Utility Scale Wind or Solar Project

Key Areas of Focus for Utility Scale Wind and Solar Project Development

Development Phase

Site Control and Community Support

- Usually accomplished with long-term lease agreements and easements; direct ownership in fee sometimes used
- Community Support is critical to success – variety of mechanisms to bring value to the local communities/schools

Interconnection and Transmission

- Goal is to identify points of interconnection that are easy to get to and that do not include expensive network or system upgrade costs that can kill a project
- Also focus on curtailment risk, which can be a significant issue in offtake agreements

Resource Assessment

- GIS studies
- For wind projects, anemometers installed to collect wind data
- For solar projects, met data and solar insolation studies performed

Permitting/Environmental

- Engage with environmental/permitting consultant and legal advisor to prepare a permitting matrix and timeline for achieving all necessary federal, state, local approvals needed to build the project
- Conduct initial studies to identify any critical species (“birds, bats & bees” or cultural issues that may create permitting or community support issues
- Typically longest lead item

Implementation/Construction Phase

Technology Selection

- Determine best type of technology to be used at the site given the resource and topographical/Geotech conditions
- Establish frame agreements with key suppliers to manage cost, supply and to protect against tariff issues

Offtake Agreement

- Finding an offtaker for the energy and other environmental attributes is one of the key drivers for a successful project
- Typical options include: Bus bar PPA with utility, virtual PPA with corporate offtaker, OREC or SREC awards through state procurement process, hedge agreements

Construction

- Once the project has progressed through the development phase and has received permits and offtake (i.e., is “shovel ready”), the next phase is identifying viable contractor, determining scope and type of contract and issuing NTP
- During the construction phase, permit compliance and schedule is critical
- Once the project has reached substantial completion and is in commercial operation, hand off to the O&M team

Financing/Tax Equity

- Construction Phase – 2 options: (1) balance sheet finance or (2) debt finance
- At or just prior to COD, tax equity finance

Current Challenges and Opportunities for Wind/Solar in New York

- Permitting challenges and delays under Article 10
- Community Support
- Transmission Constraints and Costs Associated with Network/System Upgrades

Impetus for Article 10: Intent was good

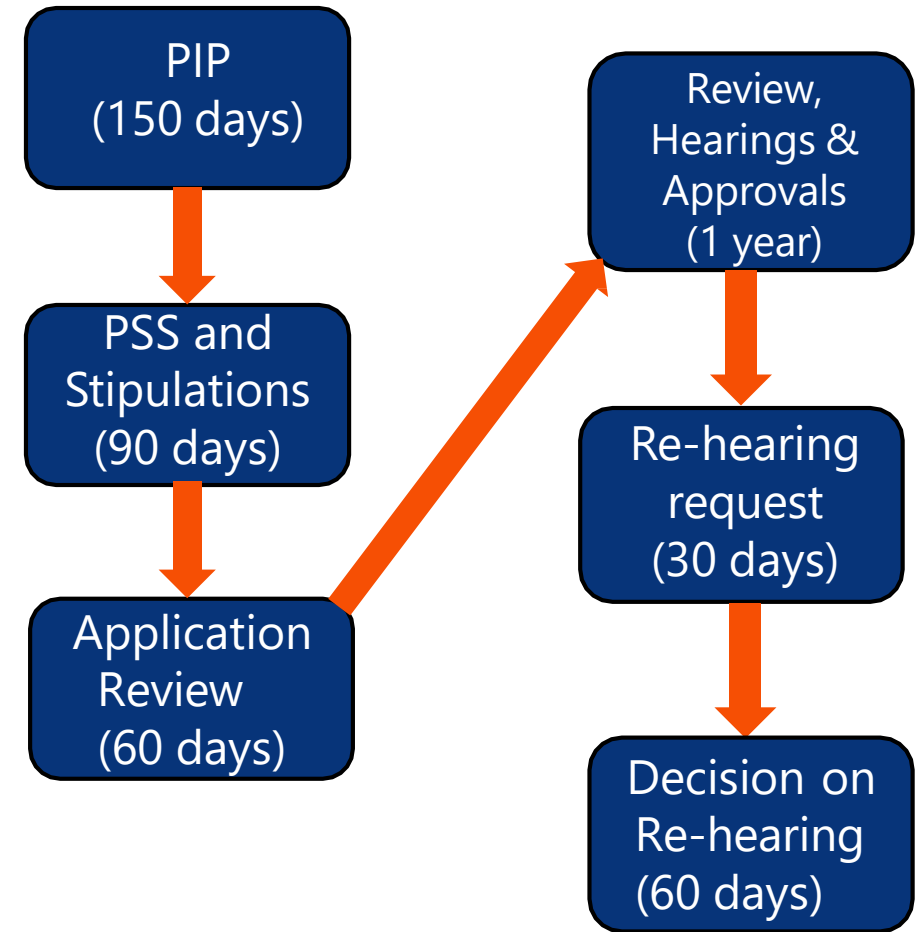
- Different policy considerations/goals and acceleration of clean energy development.
- Increase thoroughness of review & community engagement
 - Particularly the review aspect with regards to fossil generators
- Limitations on local governments time and expertise
- Susceptibility to better organized and connected NIMBY groups and local political changes
- Create “1 stop” streamlined permitting process rather than differing standards of review across different jurisdictions.
- Relief from “unreasonably burdensome” local laws.

So What Is Article 10 Anyway?

- Centralized state permitting process for power generators > 25MW
 - Renewables and traditional power generation
- Rather than being led by environmental regulators (ex: CT Siting Council), it's a judicial process, run by the NY Department of Public Service and their administrative law judges
 - All other state agencies involved in review
- Exhaustive level of required environmental studies & engineering
- Proscribed high level of community involvement & opportunities for public comment
- 2 local appointments to the "siting board" who ultimately makes the decision (out of 5 total members)
- Siting board ability to override "unreasonably burdensome" local laws
 - Though this is still relatively untested

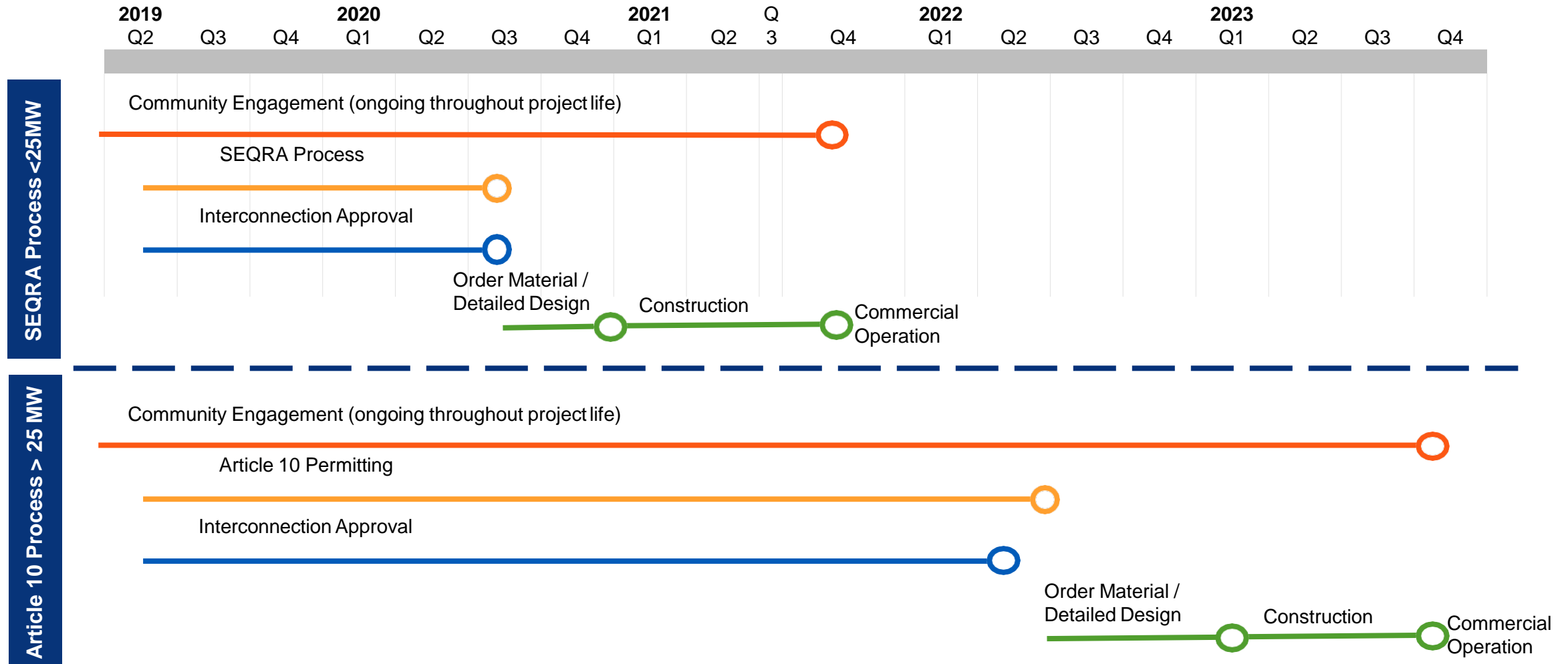
Process and Timeline Overview

- Pre-Application Phase
 - Public Involvement Program Plan (150 days)
 - Preliminary Scoping Statement (90 days)
 - Stipulations (not defined)
- Application Phase (60 days)
 - Deficiency notices
 - Completeness Determination
- Hearing Phase (1 year)
 - Issues Conference, Discovery, Testimony, Hearings, Briefing
 - Recommended Decision, Certificate, Re-hearing
- Compliance Phase (not defined)
 - Certificate Conditions
 - Construction



**2.5 Years is solar's best case scenario.
Wind projects have gone 3+ years.**

Sample Project Timelines



Challenges & Risks

- The implementation of Article 10 imposes significant **time delays** and **costs** on projects
 - Article 10 engineering, consulting, & legal roughly \$1M budget
- Each party, agency staff person, and group has their own individual concerns which can add up to **costly and complicated conditions** on the construction and operation of the projects. Death by 1,000 “papercuts”...
- Unprecedented level of agency involvement in the financial decision-making and investment decisions for projects operating in competitive marketplace and procuring contracts from New York State.
- Unimpacted intervenors with loose or no affiliation to the project have been empowered to increase litigation costs for developers, and damaging the credibility of genuine public participation in the process.
- Bandwidth for DPS and other state agencies is already maxed out resulting in delays...and the state needs to add ~10,000MW of large scale renewables by 2030 to meet their 70% renewable mandate.
- Anti-wind sentiment (and to a lesser extent anti-solar) is only growing and Article 10 gives those groups a voice, and can even give them funding to hire “experts”

Making Article 10 Work Better

Process Issue	Industry Solution
Significant delays in providing information to Applicants hinders resolution and necessitates costly and time consuming litigation.	Request early meetings, finalize project design as early in process as is practicable, propose Certificate Conditions and Settlement immediately following Application being deemed complete.
Agency demands via proposed conditions are incrementally expensive and cumulatively project killers.	Rely on the precedent set in previous projects or state policy.

Making Article 10 Work Better

Process Issue	Industry Solution
Agency involvement in internal investment and financial decision-making as a means for substantiating agency positions threatens the competitive marketplace in New York and the private sector's ability to meet the state's clean energy requirements.	Provide analysis of lost energy production (and therefore REC production) to show economic impacts of mitigation strategies such as increased curtailment.
Unimpacted intervenors with loose or no nexus to the project have been empowered to increase litigation costs for developers, and damaging the credibility of genuine public participation in the process.	Limit intervention to parties actually impacted by wind development.

Community Support: Addressing Challenges and Opportunities

- **Challenges:**

- Growing opposition to large scale wind and solar projects based on some of the following concerns:
 - Loss of agricultural lands
 - Visual (wind in particular) and other impacts (i.e., environmental, noise, etc.)
 - Perceived risk of reduction in property values (largely based on impacts described above)

- **Opportunities:**

- Strategies for preserving agricultural uses of the land used for wind and solar projects; decommissioning plans
- Economic Development
 - Long-term income stream for landowners
 - New Revenues for Towns, Counties and School Districts (i.e., PILOT Agreements and other funding mechanisms)
 - Job creation
 - Local investment in local host communities during development, construction and operation

Maximizing Land Use

Solar Energy provides stable revenues for 20+ years

Host landowners enter into lease agreements offering annual payments for use of the land.

Land will be returned to pre-existing condition

At the end of the useful life of the solar facility or the expiration of the lease (whichever comes first), the infrastructure is decommissioned and the land is returned to its pre-existing condition.

Solar facilitates complementary uses

Planting clover or other ground cover can stimulate foraging of bees and butterflies.
Some sites in Europe, the United States and Canada have successfully integrated sheep grazing amongst the solar panels.



Solar helping to re-invigorate pollinators

Beehives were installed at the Arnprior Solar Project (23.4 MWp) to enhance the biodiversity of the project by producing honey. In 2017, more than 350 "Sunny & Honey" jars were collected!



Solar and sheep

Sheep at our Arnprior Solar facility graze the vegetation beneath the panels. A win-win for both farmer (food supply for sheep) and solar project operator (vegetation maintenance)



Arnprior Sheep Grazing

- 100 pregnant ewes brought to site in mid-May
- About 10 lamb born every day
- By end of June, expect ~300 sheep on-site
- For the first time, farmer will be able to sell grass fed, free range lamb
- Partnership with Arnprior Solar offers opportunity to grow farmer's business while reducing site mechanical mowing – a true win-win!

Local Community Benefits – Economic Development



New Revenues For Towns, Counties And School Districts

- Can be in the form of a Payment in Lieu of Taxes (PILOT) agreement
- Fit for purpose from project to project
- Intent is to provide significant additional revenues to benefit host communities

Construction Jobs

Permanent job creation within the local community to support and service facilities

Long-term Operation Positions

Many jobs are created for several months during construction.

Local Investment

Significant investments into the local economy during the development (i.e. permitting work), construction (i.e. material sourcing, labor and hospitality) and operation (i.e. site monitoring and maintenance).



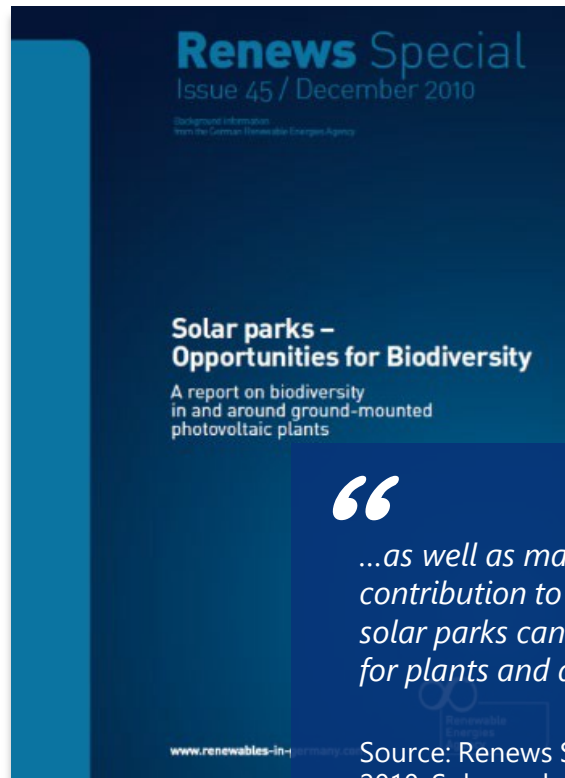
Being a Good Neighbor

EDF Renewables recognizes the importance of seeking feedback from the community at all stages of development for integration into project design.

- Most of the land beneath and around solar panels remains unused and can accommodate vegetation in the form of grasses, clover or cultural meadows.
- Solar panels maintain a low profile, not to exceed 12 ft above grade.
- Visual buffering can be integrated to reduce the project view from neighboring homes and roads. Trees normally ~2-4 ft high at planting and grow to extent shown in 5-10 years.



Solar Parks Can Enhance Biodiversity



“

...as well as making an important contribution to future energy supplies, solar parks can also provide a refuge for plants and animals.”

Source: Renews Special Issue 45 / December 2010. Solar parks – Opportunities for Biodiversity. Renewable Energies Agency



“

With appropriate land management, solar farms have the potential to support wildlife and contribute to national biodiversity targets.”

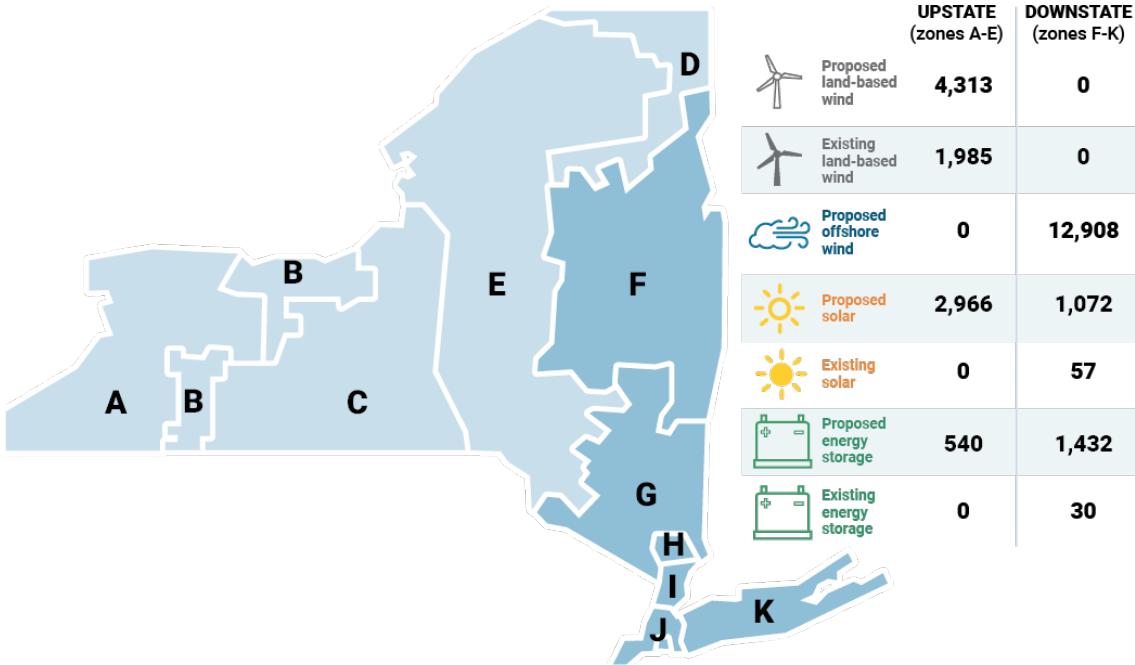
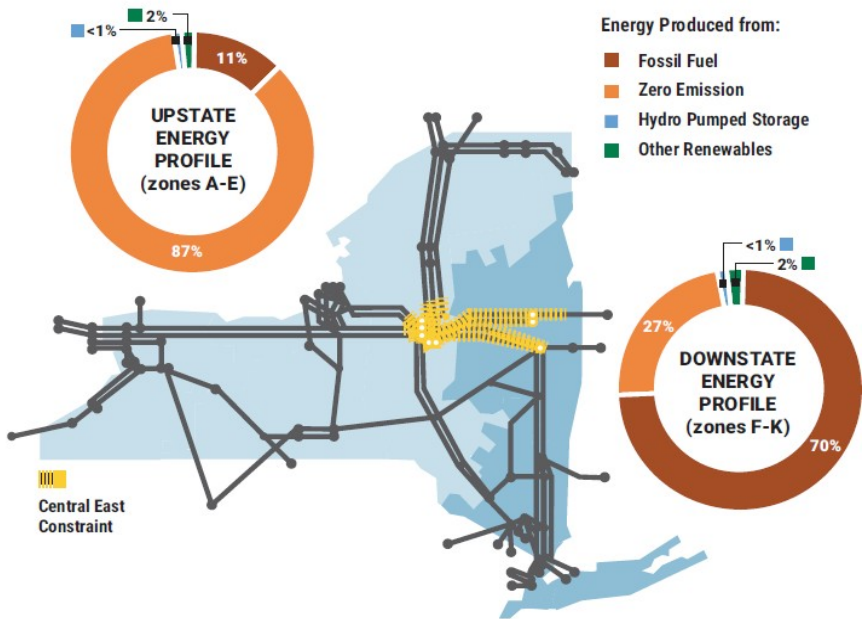
Source: BRE (2014) Biodiversity Guidance for Solar Developments. Eds G E Parker and L Greene.

Transmission: Key Factors To Be Addressed to Ensure New York's Success in Meeting Goals

- New York has a diverse mix of generation resources - Expansion of existing transmission capacity and network upgrades will be needed to integrate large injections of offshore wind and connect upstate resources to load centers in the south (see "Tale of Two Grids" image on next slide)
- Grid reliability is key and New York will need shorter-duration energy resources like energy storage to balance lower capacity factor renewables and intermittent resources
- Wholesale electricity markets will also play a significant role – NYISO's carbon pricing proposal one example of efforts to shift more investment downstate and advance the state's goals more efficiently (<https://www.nyiso.com/carbon>)

Transmission: Key Factor To Be Addressed to Ensure New York's Success in Meeting Goals

► Tale of Two Grids



For a good overview of the NYISO's work on this topic, the *Power Trends 2019 Report* recommended read:
<https://www.nyiso.com/power-trends>

Offshore Wind Transmission Considerations

- Where will offshore generation connect to onshore grid?
- What will be needed (i.e., onshore upgrades) to properly integrate offshore grid with onshore grid in order to improve reliability and resiliency, reduce congestion and add capacity?
- Who will be responsible for transmission development?
- Who will manage the design, construction and interconnection process (i.e., key stakeholders include: FERC, DOE, ISOs, RTOs and others)?
- Given the size of the offshore lease areas and the related projects, how will states and regional organizations coordinate together?
- How will offshore transmission be regulated?
- How will transmission projects be financed?

Source: <https://energyoutlook.naseo.org/data/energymeetings/presentations/Herzog--Offshore-Wind.pdf>