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SITING RENEWABLE GENERATION: THE NORTHEAST PERSPECTIVE

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The Northeastern U.S. is simultaneously home to the most ambitious regional renewable energy goals and the most constrained lands in the U.S. This paper builds upon past work on siting policy to examine siting solutions tailored to meeting renewable energy demand in a land-constrained region. Along with creative new approaches to renewables siting, the paper examines four approaches to reduce the need for land-intensive utility-scale renewables.

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INTRODUCTION

The analysis and recommendations in Carl Zichella and Johnathan Hladik's whitepaper, *Siting: Finding a Home for Renewable Energy and Transmission*,[1] lay the foundation for further discussion of the challenges and opportunities for siting both renewable generation and transmission, particularly in the West. Those authors noted, however, ". . . [I]n the Eastern Interconnection, transmission projects are built almost exclusively on private land. How landowners are treated throughout this process can determine whether projects are more

[1] Carl Zichella and Johnathan Hladik. *Siting: Finding a Home for Renewable Energy and Transmission*, America's Power Plan, 2013. http://americaspowerplan.com/wp-content/uploads/2013/09/APP-SITING-PAPER.pdf.

rapidly approved and developed or delayed and even halted."[2] To address these particular concerns, this paper builds on the policy recommendations from Hladik and Zichella, this time focusing on siting large-scale renewable generation in the Northeast.

To meet the region's renewable energy and climate change goals, the land-constrained Northeast must cultivate public acceptance of renewable generation siting (and in some cases, siting of associated transmission projects as well) on private land or even adjacent public lands. Although many communities are eager to host renewable energy projects, many are also acting to block construction of this infrastructure. In the absence of significant public land resources or deserts, public imperatives for large-scale renewable generation require new, comprehensive, innovative siting policies.

The need for sites seems daunting, but proven strategies can relieve pressure on local siting. These include proliferation of rooftop solar photovoltaic or other customer-sited solutions, optimizing demand response and energy efficiency measures to reduce the need for new generation, offshore wind growth, and increasing imports of renewables. Community-based renewables projects also offer the potential for rapid proliferation.

At the same time, the need for more large-scale renewables in the Northeast is undeniable. This paper recommends strategies to resolve particular difficulties of siting generation in land-constrained areas. Northeastern policymakers, local stakeholders, and developers should work together to develop creative approaches to utility-scale renewable generation siting—for example, on brownfields, prison lands, and land trust properties.

THE NEED FOR RENEWABLE GENERATION AND SITING SOLUTIONS

Through the Regional Greenhouse Gas Initiative (RGGI), seven northeastern states—Massachusetts, Vermont, Rhode Island, Maine, New Hampshire, Connecticut, and New York—have binding carbon reduction goals, complemented by renewable energy standards. Assuming the current policies and relative consumption levels stay static, the region will have approximately 42 percent of its energy come from renewable sources by 2030,[3] up from 20 percent in 2015. Roughly doubling annual renewable generation thus requires a tremendous build-out of renewable plants in a relatively short time in a region with little land to spare.

[2] Id., page 6.

[3] Some states include existing hydroelectric resources in this calculation, while others do not.

STATE	RE TARGET
New York	50% by 2030
Connecticut	27% by 2020
Maine	40% by 2017
Massachusetts	~30% by 2030
New Hampshire	24.8% by 2025
Rhode Island	38.5% by 2035
Vermont	75% by 2032
Total Region	**~42% by 2030**

Source: Database for State Incentives for Renewables & Efficiency (DSIRE)

For example, meeting New York's 50 percent renewable generation by 2030 (50 x 30) standard necessitates open space to house a projected 6,800 megawatts (MW) of utility-scale solar photovoltaics (PV) and 3,500 MW of onshore wind.[4] This would require 136 km^2 and 700 km^2, respectively, according to land-use estimates in the National Renewable Energy Laboratory's *Renewable Electricity Futures Study*.[5] As such, attaining 50 x 30 depends not only upon projects getting timely regulatory approvals and permits, but also early identification of private land and partners willing to open their property to renewable development. But the history of delays and defeats due to local opposition to siting of renewable installations is already haunting investors.

Effective local advocacy groups prevent the siting of wind farms, large-scale solar PV, and even rooftop solar, which conflict with other perceived land use priorities. According to Alliance for Clean Energy-New York's Executive Director Anne Reynolds, in the current siting, permitting, and interconnection framework, developers estimate a four-year process is the best-case scenario—but obtaining all the government permissions, overcoming opposition, and siting a wind farm project can take as long as eight years. Where to develop new projects thus emerges as a critical barrier to meeting the state goals.

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[4] New York State Department of Public Service, CASE 15-E-0302 - *Proceeding on Motion of the Commission to Implement a Large-Scale Renewable Program and a Clean Energy Standard*, Final Supplemental Environmental Impact Statement, 14-2 (2016). (hereinafter CES FSEIS)

[5] National Renewable Energy Laboratory (2012). "Renewable Electricity Futures Study." Hand, M.M.; Baldwin, S.; DeMeo, E.; Reilly, J.M.; Mai, T.; Arent, D.; Porro, G.; Meshek M.; Sandor, D. eds. 4 vols. NREL/TP-6A20-52409. Golden, CO: National Renewable Energy Laboratory. http://www.nrel.gove/analysis/re_futures/.

LAND-USE COMPATIBILITY

Developers have had mixed success winning community support for wind farms. While farming communities are often supportive—appreciating substantial lease fees and tax benefits—second-home owners and others have proven intractable and savvy opponents able to mount political opposition, adding significantly to project costs, causing delays, and ultimately stymying many permit approvals.[6]

Wind power is compatible with farming: Turbines may be located 1,000 feet apart, leaving room for all but the largest farm equipment. However, wind farms can dramatically transform viewsheds, especially on wind-rich ridgelines, and can pose some risk to birds and bats (especially if sited in migration corridors), impacting larger groups of stakeholders.

Unlike wind, large-scale solar PV is incompatible with most active agricultural uses, wildlife habitat, or wilderness.[7] More than half of New York State is occupied by forest and woodland, and farmland accounts for nearly one-quarter of the total land area, with almost 60 percent of that land dedicated to crops.[8] Large solar farms require significant land—estimates are between five and ten acres per MW.[9] Some mid-sized solar projects may also be suitable on pivot corners or abutting rights of way on field edges so they are out of the way and off the most productive land.

LOCAL CONTROL CONFLICTS WITH STATEWIDE GOALS

Renewable development advocates identify the growing use of local zoning regulations to circumvent state certification processes and at least delay, if not ultimately prevent, the licensing of wind farms. In these communities, the opposition to wind or solar farms centers on the viewshed impacts on relatively pastoral landscapes, feared decrease in land value, and some fears of other negative effects of renewable development.

Several town councils in New York State have adopted six-month moratoriums not only on the siting of wind farms, but on siting meteorological (met) towers needed to assess the viability of wind resources. Met tower moratoriums essentially preclude wind development, in spite of state law preemptive authority, by preventing developers from collecting the necessary wind measurement data required by New York state law. Indirectly, the towns are nullifying the state's authority to site utility-scale generation necessary to meet clean energy goals. Even as

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[6] For example, in Western New York's Orleans and Niagara counties, some towns have opposed wind development, recently hiring a former New York State Attorney General to represent them in efforts to block the installation of 70 turbines near Lake Ontario. The project is opposed by Save Ontario Shores, a local residents' group. At a recent rally they illustrated their point: The height of the turbines could exceed that of the tallest building in Western New York.

[7] There are some new developments, however. Electric cooperatives in Minnesota, for example, have successfully experimented with bee, bird, and butterfly habitat in solar gardens. See http://fresh-energy.org/tag/bees/.

[8] CES FSEIS 3-4.

[9] NYSERDA estimates the amount of land desirable for a lease "generally ranges from 10 to 30 acres, depending upon the size of the solar array." *Landowner considerations for solar land leases*. NYSERDA, 2016.

developers challenge town decisions in court as contrary to state law, risks of project delay can be fatal.

Significant local opposition indicates a legitimate concern. Without addressing local opposition, state or federal siting preemption often unnecessarily overlooks solutions that can achieve the same needed infrastructure without burdening local communities. These communities often lack ordinances for renewable infrastructure, so when a project is proposed there is a scramble to respond, leaving local action open to the most vocal opponents. As such, local governments should consider creating ordinances that deal with clean energy siting before a new project arises. Local environmental organizations can also play an important role in generating support for renewable siting.

POLICYMAKER	RECOMMENDATION
State agriculture agencies; state energy regulators	Coordinate state policies for prime agricultural land preservation and the need for renewable energy generation.
Governors, local permitting authorities, and state legislators	Consider state preemption of some local land use authority as a last resort to overcome indirect measures that systematically undermine energy projects such as met tower siting, while also following the *Smart from the Start*[10] siting principles at the state level.
State permitting authorities, state energy offices, local governments	Develop model ordinances for renewable energy siting to guide local permitting processes.

FINDING A HOME FOR UTILITY-SCALE RENEWABLES IN THE NORTHEAST

Unlike the West, where vast swaths of quality resources occupy public lands, the Northeast must find suitable sites for utility-scale renewable development where few obvious options exist. Where renewable energy goals require a relatively rapid build-out of utility-scale wind and solar generation, policymakers have two kinds of options: facilitate identification and development of

[10] Found on p. 10 of *Siting: Finding a New Home for Renewable Energy and Transmission,* America's Power Plan, 2013. http://americaspowerplan.com/wp-content/uploads/2013/09/APP-SITING-PAPER.pdf.

low-conflict land areas, or reduce the need for such land. Both strategies are necessary to meet clean energy goals in the land-constrained Northeast.

RELIEVING THE PRESSURE ON SITING RENEWABLE GENERATION

This paper identifies four options for reducing the demand for land suitable for utility-scale renewable generation: 1) accelerate the development of offshore wind; 2) require bulk-system and distribution system planning to reduce the need for additional generation and transmission; 3) proactively engage with communities to build local support for renewable generation, including both utility-scale and community-scale renewables; and 4) increase international imports of clean energy, particularly Canadian hydroelectric resources with minimal impact on First Nations, local communities, and the environment.

Realize the potential for offshore wind

Offshore wind turbines minimize siting objections and provide generation in close proximity to load. The successful deployment of offshore wind in Germany, Denmark, the United Kingdom, and the Netherlands suggest safety, cost, and viewshed concerns can be mitigated in the U.S. Although the many-year opposition against Massachusetts's Cape Wind project in Nantucket Sound, first proposed in 2001, stands as a warning that offshore wind is not immune from siting objections, new offshore projects are faring better thanks to new supportive state and federal siting policies.

For example, Massachusetts's Act Relative to Energy Diversity supports offshore wind development by reducing the risk for developers in two complementary ways.[11] First, it carves out special areas for offshore wind development, reducing the potential for costly delays and conflicts. These areas include only those for which an initial federal lease was issued, where fishing, navigation, cultural, and environmental conflicts are minimized, where development rights were secured through competitive bidding, and—perhaps most significant—sites that are more than ten miles from any inhabited area. Second, it requires utilities to contract for the development of 1,600 MW of new offshore wind projects, reducing the financial risk for developers.

In September 2016 New York's Governor Cuomo released a New York State Offshore Wind Blueprint. The Blueprint lays the foundation for the state's first comprehensive Offshore Wind Master Plan[12] with environmental studies of specific offshore areas, soliciting responses from energy consumers, utilities, environmental groups, coastal communities, commercial fishing, and maritime industries.

Creating transmission plans that minimize siting conflicts for offshore wind can also have a huge impact. Atlantic Wind Connection[13] was a visionary attempt to rationalize the rapid

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[11] Mass. Gen. Laws Chapter 23M, § 83C (2016); Formerly House bill 4568.

[12] *Blueprint for the New York State Offshore Wind Master Plan*, NYSERDA, 2016. https://www.nyserda.ny.gov/-/media/Files/Publications/Research/Biomass-Solar-Wind/New-York-State-Offshore-Wind-Blueprint.pdf.

[13] See http://atlanticwindconnection.com/awc-projects/atlantic-wind-connection for more information.

development of offshore wind resources by building an offshore, undersea transmission line supporting 7,700 MW of offshore wind capacity spanning states in the Mid-Atlantic region. Organizing these interconnections can lead to a faster, more environmentally benign, and less costly approach to linking these resources to the onshore load centers, though there will be limited places at which to do this.

POLICYMAKER	RECOMMENDATION
State environmental agencies; state energy regulators	Pre-screen offshore wind development areas for least-conflict sites
State environmental agencies; state energy regulators	Create a roadmap for offshore wind that includes a process to solicit stakeholder feedback and create a clear development path for offshore wind.

Making the most of existing infrastructure

As the Northeast transitions away from fossil fuel-based generation, conventional generators will retire, leaving transmission capacity free for new plants. To the extent practicable, new wind and solar resources must take advantage of this transmission capacity to avoid the need for new wires. For example, large retiring coastal nuclear, coal, or gas plants will leave unused substations and transmission infrastructure, creating low-conflict terminals for new offshore wind electricity to reach the grid.

Resource planning must also prioritize locations for renewable generation with production profiles that complement other renewable resources on the system. Taking advantage of uncorrelated variability of renewables to optimize grid performance can improve overall efficiency, deferring or avoiding new transmission, and reducing the need for additional flexibility to balance variations in wind and solar generation. New technology that can route power flow from congested to uncongested lines can also help as part of an integrated transmission plan.

Distributed renewable alternatives

In many cases, utility-scale generation is not the lowest risk or least-cost-best-fit option to meet clean energy goals. Distributed alternatives have great potential to reduce the need for utility-scale projects: In Germany 40 percent of renewable energy comes from single-owner providers. Although siting rules generally require that the applicant present, and the regulator assess, the no-action alternative when proposing a utility-scale development, by the time an application is filed with the permitting authority, it is often too late to seriously consider distributed alternatives.

In the land-constrained Northeast, system planners should engage communities early in considering alternatives through distributed energy resources like demand response (DR),

energy efficiency, distributed generation (DG), and storage. That starts with integrated distribution planning, or considering demand-side resources together with supply-side resources in meeting future system needs at least cost. Public utility commissions can—and some do—require distribution utilities to identify areas ripe for adding renewable generation, and develop the value proposition to support strategically located DER.

Community renewable DG is a particularly promising approach due to community benefits, economies of scale, and the appeal for many communities of local self-determination. Community DG opens up renewable energy participation to utility customers who lack direct access to clean generation, such as renters or low-income customers without roof access for solar panels. These customers nonetheless contribute to the financing of renewable generation elsewhere through their electric bills; community DG provides them equitable access.[14] Community net metering allows multiple customers to net meter from one common DG installation; the resulting credit is offset against the bills of participating customers.

In addition, many communities are eager for more control over the energy decisions that affect their lives; community DG programs offer this potential. A growing movement toward energy democracy channels this sentiment and builds the political base of support for renewable energy. These communities can also take advantage of considerable cost and reliability advantages by pooling resources when compared with residential rooftop solar systems. For example, the median cost for non-residential solar DG systems is 13-38 percent less than the average residential system.[15]

POLICYMAKER	RECOMMENDATION
State energy regulators; state executive and legislature; publicly-owned utilities	Community solar or wind can provide local benefits, an important factor in overcoming local opposition to siting and to channel public sentiment in favor of siting large-scale renewable development.

The following recommendations from one of America's Power Plan's foundational white papers, *Policy Implications of Decentralization,*[16] also remain relevant here:

[14] NY PSC Case 15-E-0082, Implementing a Community Net Metering Program, *Order Establishing a Community Distributed Generation Program* (issued July 17, 2015).

[15] Barbose, G., & Naim Darghouth. *Tracking the Sun IX*. Lawrence Berkeley National Laboratory, 2016. https://emp.lbl.gov/sites/all/files/tracking_the_sun_ix_report_0.pdf.

[16] James Newcomb, Virginia Lacy, Lena Hansen, and Mathias Bell, *Distributed Energy Resources: Policy Implications of Decentralizatio*n, with Rocky Mountain Institute. America's Power Plan, 2013. Available at http://americaspowerplan.com/wp-content/uploads/2013/09/APP-DER-PAPER.pdf.

POLICYMAKER	RECOMMENDATION
Public utility commissions	Require utilities to implement integrated distribution planning to provide transparency into the value of distributed energy resources and allow competition to provide grid services.
Public utility commissions	Require utilities to regularly issue public reports on planned transmission and distribution upgrades, and solicit non-wires alternatives before need is imminent. Plans should include cost per kW, the characterization of reductions for deferral, and date.
PUCs, FERC, RTOs/ISOs	Facilitate cost recovery for non-wires alternatives on a coordinated utility, state, and regional basis.

Community engagement

Real land-use conflicts must be explored and resolved, and the best way to do this involves long-term planning, coordination among state agencies, between state and local governments, and between community leaders including land trusts, environmental justice organizers, and environmental activists. Collaborative work on these issues has yielded success in several states, whether convened by state government, energy agencies, or non-governmental organizations. For example, a statewide roundtable convened by The Nature Conservancy is tackling these issues in New York.[17]

As mapping for solar siting has been developed on a generic basis for the West,[18] similar projects would be useful in the East as well. The Energy Zone Mapping Tool, a collaboration of the U.S. Department of Energy's national labs, identifies areas suitable for renewable power generation in a searchable GIS format including topography, proximity to water, and nearest population centers.[19] Originally developed for the West, recent updates have added substantial information about the Eastern Interconnect. In addition to the basic information concerning renewable

[17] See http://www.cbuilding.org/project/rogr for more information about the roundtable.

[18] See resources at Western Governors Association, *Western Renewable Energy Zones*, 2009. http://www.westgov.org/rtep/219-western-renewable-energy-zones.

[19] The Energy Zone Mapping Tool is can be found at http://ezmt.anl.gov/ .

generation potential, these updates include environmental databases, such as marine protected areas and national conservation easements, and regulatory restrictions for some states.

But although generic mapping can eliminate inappropriate sites and identify viable ones, siting is ultimately a detailed site-specific process, necessitating in-depth studies, site visits, and local community involvement.

POLICYMAKER	RECOMMENDATION
State environment and energy regulators	Mapping appropriate sites on a generic basis can identify go and no-go areas. That said, once sites are identified that are viable for wind or solar, site visits must identify and avoid particularly sensitive environmental reserves and population centers.
Developers, state permitting authorities, state energy and environmental regulators	Factor competing uses into the planning and mapping exercise. Categories include identification of especially vulnerable environmental resources, including wetlands, greenfields, potential carbon sinks, and critical active farmland. In addition, cultural resources should be studied and protected: historic landmarks designated historic sites and communities, sacred ground of Native American or other cultures.
Developers, state permitting authorities, state energy and environmental regulators	Identifying communities already overburdened by energy or other environmental infrastructure is critical. The needs of those communities must be respected and the views of residents solicited and addressed. These tend to be environmental justice communities, populated by people of color and low-income residents.
State environment and energy regulators	Take the long view: long-range planning, with full disclosure and community participation can both identify appropriate sites and allay community concerns. Transparency builds trust.
State permitting authorities, regional development councils	Assist localities by providing them the information and resources to make good decisions on siting. For example, in New York State, regional economic development councils and cooperative extension educators are promoting and educating about renewable energy development.

Planning and mapping will not eliminate the need for community engagement: Residents may support clean energy, but oppose siting particular renewable resources in their own communities. This makes targeted mitigation a valuable siting tool, helping win support for renewables in communities with strong opposition. For instance, if the renewable resource can provide power to the host community, or replace a local polluting facility, these accommodations may tip the balance in public opinion. In addition, including an environmental justice component to siting criteria and consulting affected neighborhoods will enhance justice toward low-income communities.

The *Smart from the Start* principles remain an important resource in this regard:

Smart from the Start Siting Policies and Criteria

- Consult stakeholders early and involve them in planning, zoning and siting.
- Collect and use geospatial information to categorize the risk of resource conflicts.
- Avoid land and wildlife conservation conflicts (including national parks and other protected areas) and prioritize development in previously disturbed areas.
- Avoid cultural resource conflicts (historic sites, tribal resources, etc.).
- Identify excellent renewable energy resource values.
- Establish, when possible, pre-screened resource zones for development .
- Incentivize resource zone development with priority approvals and access to transmission.
- Consider renewable energy zones or development sites that optimize the use of the grid.
- Maximize the use of existing infrastructure, including transmission and roads.
- "Mitigation that matters" (durable and planned conservation improvements at larger scales).
- Where zoning is not feasible (as in much of the Eastern Interconnection), use siting criteria based on the above principles.

Source: Zichella & Hladik, Finding a Home for Renewable Energy & Transmission, America's Power Plan, 2013.

POLICYMAKER	RECOMMENDATION
State energy offices; utilities	Lead and fund local education about the economic and social benefits of renewable energy to local communities. Assist localities by providing them the information and resources to make good decisions on siting.

Increasing import potential and international trade

Land-constrained Northeastern states looking for creative solutions to decarbonize their electricity system and maintain affordable, reliable electricity service have renewed interest in a mature resource – imported Canadian hydroelectricity. Massachusetts's Comprehensive Energy Diversity Law requires public utilities to procure 9,450 gigawatt-hours (GWh) of new renewable generation, giving preference to proposals combining new in-state wind and solar with Canadian hydro.[20] New York City pledged to reduce carbon emissions 80 percent from 2005 levels by 2050,[21] and power 100 percent of the City's operations with renewable energy, just as Governor Cuomo announced a statewide emissions reduction target of 40 percent by 2030 and a 50 x 30 Clean Energy Standard that includes new hydro power.[22]

New international transmission requires Canadian National Energy Review Board and U.S. DOE approval. Luckily, a recent summit between the U.S., Canada, and Mexico produced encouraging pledges to increase transnational energy cooperation, including transmission interconnection, and achieve 50 percent clean electricity by 2025.[23] But even with national permits and long-term contracts in hand, Northeastern transmission developers accessing Canadian hydro must navigate siting in some of the most constrained corridors in the country.

The Minnesota-Manitoba Great Northern Transmission Line (GNTL)[24] shows how proactive stakeholder engagement and international collaboration using Smart from the Start principles secured cost-effective, streamlined access to Canadian hydro. GNTL will bring 883 MW of Canadian hydro into Minnesota, diversifying and decarbonizing the electricity system via a new 500kV (~1,200MW) transmission line at costs comparable to a new combined-cycle gas plant.

At least three reasons stand out for the line's success. First, goals for renewable energy (25 percent by 2025) and decarbonization (30 percent below 2005 levels by 2025) created clear policy support for renewable energy projects. Second, Minnesota Power (MP) and Manitoba Hydro (MH) coordinated from the beginning, creating a mutually beneficial relationship. Besides getting size and economics right, their PPA's novel "wind storage" provision financial mechanism lets Canadian hydro complement Minnesota's vast wind resource, by allowing MP to sell excess wind power to MH and buy hydro back later for the same price.

Third, MP engaged early with public agencies, landowners, and local First Nations on siting and permitting before filing any PUC application. The utility used public land when possible, avoided conflicts with landowners, and consulted local governments despite state preemption of county

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[20] Mass. Gen. Laws Chapter 23M, § 83C (2016); Formerly House bill 4568.

[21] See OneNYC.gov for more information, http://www1.nyc.gov/html/onenyc/index.html.

[22] See announcement on NY.gov website, https://www.governor.ny.gov/news/governor-cuomo-joined-vice-president-gore-announces-new-actions-reduce-greenhouse-gas-emissions.

[23] Dlouhy, Jennifer A. and Angela Greiling Keane, *U.S., Mexico, Canada Pledge 50 Percent Clean Power by 2025,* Bloomberg, 6/27/2016. https://www.bloomberg.com/news/articles/2016-06-27/u-s-mexico-said-to-pledge-50-percent-clean-power-by-2025

[24] http://www.greatnortherntransmissionline.com/index.html.

siting authority. When MP submitted a route for state and federal approval, the proposal and border crossing point had been modified several times to accommodate stakeholders and received near universal support, including resolutions of support from border counties and the Red Lake Band of Chippewa Indians.

Northeastern renewable and transmission developers can learn from Minnesota and apply Smart from the Start principles to suit their unique needs, but important differences remain between Minnesota and the Northeast. Land and resource constraints making Canadian hydro so attractive for the Northeast also make in-state transmission siting particularly difficult. But clear policy signals, burying or submerging lines, and using imported hydro to complement domestic renewables facilitate support for new transmission. Wind resources from upstate New York, Maine, Vermont, and New Hampshire further improve the economics of regional north-south transmission. In light of the history of opposition of Canadian First Nations to some hydro development, state policy makers have a responsibility to ensure Canadian hydro imports are not at the expense of these communities.

POLICYMAKER	RECOMMENDATION
FERC, Public Utility Commissions, Transmission Developers	Examine Smart from the Start criteria and require utilities, developers, and state permitting authorities to follow the principles when determining where to site needed transmission.
Utilities, public utility commissioners, state legislators, state energy offices	Consider how Canadian hydro can best complement local renewable resources to improve resource diversity and local support for transmission development where it's needed.
State permitting authorities, transmission developers, utilities	In land constrained areas, use existing rights of way for transmission pathways. Consider waterways and burying lines where overhead lines are undesirable or politically impossible.
Public Utility Commissioners	Encourage domestic renewable energy and transmission developers to coordinate early with Canadian partners eager to find markets for exportable renewable hydroelectricity.
Transmission developers, utilities	Seek presidential permits early and seek support from other national agencies. Leverage momentum for international transmission created by recent pledges from U.S., Canada, and Mexico.

NEW POSSIBILITIES FOR RENEWABLE GENERATION SITING

Brownfields

The EPA RE-powering (for Renewable Energy) program facilitates contaminated site cleanup and reduces greenhouse gas emissions by creating incentives for siting renewable energy resources on "Brightfields" – capped landfills or former brownfields sites. In EPA's view, sites still undergoing remediation can save on the electricity needed to power the cleanup by developing and buying clean energy onsite.

Brightfields projects provide significant benefits in addition to cleanup. They can be structured to require little if any upfront investment, and developers can take advantage of common clean-up incentives and streamlined permitting. Brightfields also provide direct and indirect local employment opportunities in addition to energy savings for residents and cleanup work. Concomitant community partnerships can revive neighborhoods.

RE-powering identifies 80,000 potential Brightfield sites nationally. If proceeding hand in hand with communities developing their own revitalization strategies, this program could result in significant generation where power is consumed.

POLICYMAKER	RECOMMENDATION
Municipal and Local Authorities	Reuse brownfields for renewable energy siting, in consultation and with guidance from affected communities. Consult the EPA RE-Powering (Renewable Energy Powering) mechanism for renewable energy development on brownfields (polluted sites) as an economical alternative to siting on greenfields or undeveloped land.

Prison lands

Large-scale solar developments are already proceeding on mall parking lot roofs and along highway berms, but other ubiquitous, underutilized state land resources exist at correctional institutions.

Recently, eastern state governments have begun making open land surrounding correctional facilities available for solar PV installations. For example, Maryland regulators and towns have approved solar facilities on state prison lands since 2011. Last year the New York State Department of Corrections and Community Supervision (DOCCS) issued a Request for Proposal to install customer- and developer-sited solar PV projects on leased state-owned lands surrounding certain upstate prisons. The developer would sell power to DOCCS under a 20-year power purchase agreement, preventing DOCCS from paying more than what the state currently pays at wholesale.

Land trust or other conserved properties

Land conservation organizations are examining their mission to preserve land in a pristine state in light of climate change impacts. The Nature Conservancy, for example, has gathered renewable energy, environmental, and local government stakeholders to collaboratively develop principles for siting renewable development in New York. The Land Trust Alliance and Open Space Institute are similarly examining their responsibility and capacity to play a role in carbon mitigation. One approach under consideration is to encourage local land trusts to aid in identifying suitable sites for solar and wind farms, and reviewing land trust inventory for possible community DG projects, while designing new conservation easements to include renewable generation.

Mobilizing local land trusts to support siting renewable generation may include the use of some appropriate land trust properties. Such use would entail reviewing existing land inventory to identify suitable sites; supporting community solar projects; and designing new conservation easements to include use for renewable generation.

Some land trusts are considering shared renewables projects based on recent state regulatory decisions allowing community net metering for local power. For trust lands to be available for siting renewables, the definition of their mission would have to expand from pristine conservation stewardship to "integrated conservation projects." Land conservancies could enter into community partnerships for shared renewable generation benefiting the land trusts, their members, and their communities, while decarbonizing the state's electric sector and ensuring the long-term protection of forests and wildlife.

POLICYMAKER	RECOMMENDATION
State energy and environment regulators; localities and developers	Engage with local environmental and land trust groups, which have a central role to play in educating communities and mobilizing support for renewable growth.

CONCLUSION

Achieving the Northeast's aggressive goals for renewable penetration will require a combination of substantial land areas in rural regions for large wind and solar farms, meaningful offshore wind development, expanded transmission, and broad deployment of behind-the-meter installations like rooftop solar. Large-scale projects will impact significant tracts of land in a region where most land is privately owned and where energy uses compete with farming, residential housing, recreational use, wilderness set-asides, or environmentally sensitive areas.

In this context, the success of large-scale siting depends on long-term planning and active participation of local communities. The need for large-scale generation resources can be partially mitigated by a combination of distributed and community renewable generation,

rooftop solar, small-scale wind, offshore wind, increased energy efficiency and demand response, and optimizing renewable imports. But in the end, we need all options for renewable infrastructure in order to decarbonize the generation of electricity.