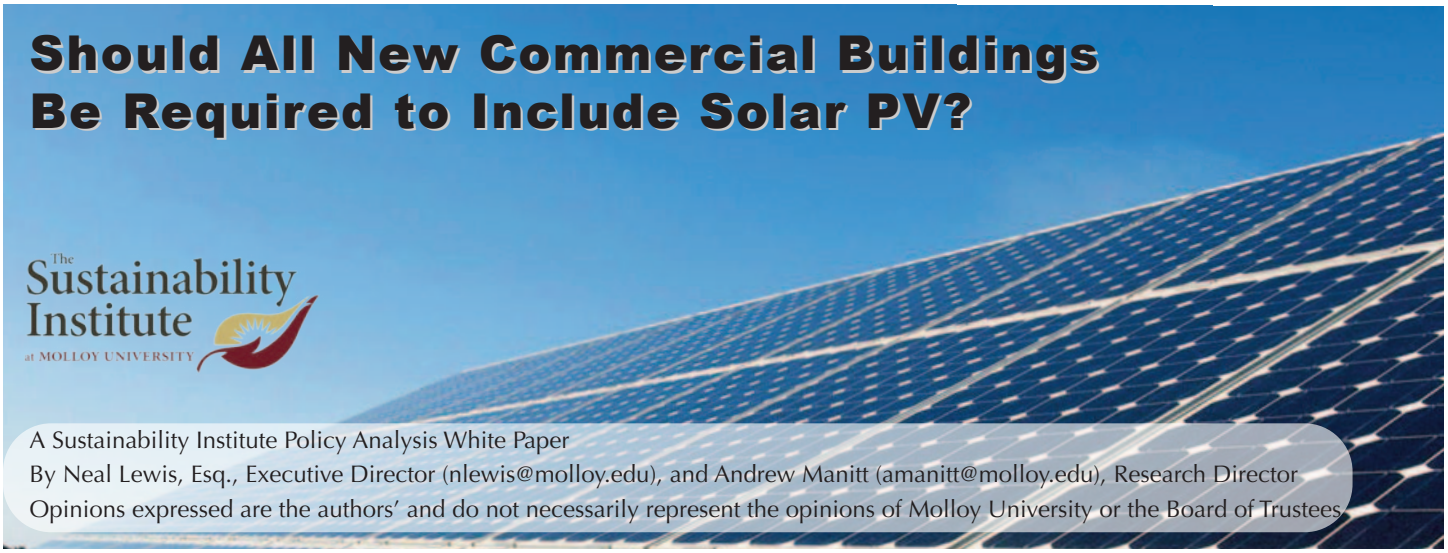
Should All New Commercial Buildings Be Required to Include Solar PV?



A Sustainability Institute Policy Analysis White Paper
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New York State has an Ambitious Goal to Mitigate Climate Change by Achieving 100% Renewable Electricity by 2040 (70% by 2030). In Light of this Goal, Should Local Building Codes Continue to Permit Construction of New Commercial Buildings (that will Exist for Decades) Without Requiring any Renewable Energy Systems, such as Solar PV?

Requiring Solar PV

This white paper looks at the proposition that building codes—which are always in a dynamic process of being reevaluated, improved and updated—should now be amended to require that all new commercial building construction include renewable energy systems, specifically, solar PV. Such a new requirement would be appropriate if it:

- ✓ is consistent with policy goals to mitigate global warming;
- ✓ is within local governments' authority to adopt;
- ✓ is easy to implement by town building departments;
- ✓ advances good planning principles for mitigating the environmental impacts from new buildings;
- ✓ advances other social and economic benefits including local job creation; and
- ✓ avoids creating an unreasonable hardship.

Local Stretch Energy Codes

Building codes are an important and sometimes overlooked tool in advancing New York State energy and climate goals. The NY State Codes Council sets statewide building codes, however only in the realm of energy codes, local governments are permitted to treat the requirements of the Energy Conservation Construction Code of New York State (ECCCNYS) as a floor, or minimum, and to adopt "stretch codes" that are more stringent than the state energy conservation construction code[2]. In fact, the New York State Energy Research and Development Authority (NYSERDA) has developed a model stretch code, and has encouraged its adoption by offering grants to municipalities that enact it[3]. Note that the NY State Codes Council has been criticized by environmentalists for its relatively slow action on clean energy standards, as the trend of efficiency requirements in the updates to the ECCNYS has not been consistent with NY State climate goals, and in the past the ECCNYS has sometimes not even kept current with advances in the International Energy Conservation Code.

70% Renewables By 2030

A solar PV requirement for new commercial buildings would advance the goals set in NY State's Climate Leadership and Community Protection Act (CLCPA) of 70% renewable energy generation by 2030 and a 100% carbon-free electric grid by 2040[1]. The feasibility of a solar requirement on new commercial buildings is supported by the fact that solar PV are revenue generating additions to a building. Additionally, the existence of Commercial PACE financing, available in both Nassau and Suffolk counties, provides a lower-cost, long-term alternative to traditional loans that cover 100% of out-of-pocket costs for new clean energy projects in commercially owned buildings.

As a home rule state, New York provides towns and villages a powerful tool to drive the adoption of energy efficiency and renewables. Long Island towns have a history of driving clean energy adoption with local energy conservation construction stretch codes. Beginning in 2006, most LI towns adopted ENERGY STAR® standards, and required independent HERS ratings for all new homes[4]. LI municipalities were the first to adopt a uniform fast-track permit for residential solar PV, developed collaboratively with industry and promoted by incentives from LIPA[5]. Now, Long Island municipalities could provide leadership and be the first in NYS to adopt innovative local laws that require renewables for new commercial construction.

Diverse Renewable Energy Portfolio

Offshore wind has tremendous potential to supply the LI region with renewable energy. New York State has set a goal of 9,000 MW of offshore wind capacity by 2035. Construction has begun on New York State's first offshore windfarm off the east end of Long Island, and planning is currently underway for investments in offshore wind farms in the New York Bight that could be significant in size, with hundreds of turbines that would each be 600+ feet tall. However, even if NY's offshore wind potential is maximized, the energy generated will likely be shared with other

parts of NY State, and as large as the goal of 9 gigawatts is, it will not by itself satisfy the goal of a zero-carbon emission electric grid by 2040.

Rooftop solar remains a vital element of energy planning, as recognized in the PSEG Integrated Resource Plan[6]. It is important to encourage solar energy and maintain a diverse, distributed electric grid. Wind and solar are complementary technologies that help compensate for each other's intermittency. Policies that promote distributed solar generation increase grid resiliency. Encouraging the installation of solar PV also promotes the local solar industry and creates green jobs. Renewable energy development should be channeled as much as possible to the built environment, because maintaining open space is vital to the Island's wildlife, drinking water protection, and quality of life. The Long Island Solar Roadmap project, organized by the Nature Conservancy and Defenders of Wildlife estimates that in Nassau and Suffolk counties, there is the potential to site 19,500 megawatts of solar PV capacity on large commercial rooftops, parking lots, and previously disturbed land, without impacting forests, wetlands and other ecologically sensitive areas.

—Reasonable Requirement —Environmental Planning

Each new building impacts the electric grid and increases the demand for electricity. In some cases, new electric infrastructure investments are required, which in turn must be maintained. These demands on our electric grid represent a cost to all ratepayers of Long Island. An instructive analogy to consider: it is commonplace for proposals for new buildings going through planning and environmental review to be required to construct—at the builder's expense—new traffic lights or road expansions to mitigate traffic impacts likely to result when the buildings go into operation. This paper proposes that it is similarly reasonable to also require new buildings to mitigate their impact on the electric grid by meeting some of their electric needs through clean, distributed, renewable energy generation.

The applicability of this analogy is more than merely theoretical. Recent revisions to the NYS State Environmental Quality Review Act (SEQRA) regulations have now established a requirement that when reviewing a proposed action, climate change mitigation must at least be included in the scope of the review. In cases where full environmental impact statements (EIS) are prepared, then the applicant must disclose "impacts of the proposed action on the use and conservation of energy" and should also demonstrate how the proposed project includes "measures to avoid, or reduce... impact on climate change."[7] So, as is the case for traffic and parking, during SEQRA review for proposed buildings, it is reasonable for the lead municipality to require measures to mitigate the amount of greenhouse gases attributable to the new building.

—Reasonable Requirement —Fiscal Impact

Although this paper does not include real estate analyses, the authors take note that the vast majority of new buildings that are approved do not include any renewable energy generation systems. This represents a tremendous missed opportunity, as the design and construction phase for new buildings is the most cost-efficient time to plan and implement the incorporation of efficiency measures and renewable generation systems. Before installing solar on older buildings, there is often a need to repair the roof, some roofs lack the strength needed for solar, and shading from mechanical equipment and other obstructions can limit the amount of roof area where solar PV would be effective. When designing a new building to include solar, stronger and more durable roofing materials can be specified in order to handle the added weight from a solar system. Locating mechanical equipment to maximize space for solar PV is a much easier option when a building is being designed and before mechanicals are fixed in place. As a high-cost region, it is important for LI to adopt policies that direct developers to choose the right building designs and materials and optimize available roof space for solar, so that buildings will control energy costs and therefore help business to be successful and keep money in the local economy for decades to come.

Commercial PACE[8] is now available in both Nassau and Suffolk counties for Solar PV financing on buildings with no out-of-pocket expense.

Investments in solar at the time of new building construction will produce long term fiscal benefits. According to the National Renewable Energy Laboratory, the benchmark cost for commercial PV from 10 kW – 2 MW was $1.72 per watt in the first quarter of 2020[9]. At that cost, a 60 kW system would increase the initial cost of a 20,000 sq. ft. building by $103,200. Based on an average sales price of $191 per square foot for office space and $273 per square foot for retail space[10], that would be about 1.9% to 2.7% of the building's sales price. Under the VDER tariff (value of distributed energy resources), the value of the electricity produced by the solar PV varies depending on how much electricity is used on-site, the location of the facility, and the time of day and year that it is produced. Since the LIPA trustees adopted VDER to parallel State policy, there is concern that the adoption of large commercial solar projects has been slowing on LI, because the VDER formula's variability makes returns more complex to calculate, and makes some installations not as financially advantageous as was the case under the prior net-metering or feed-in-tariff offerings[11]. However, when considered as a requirement for new building construction, the installation of solar PV will easily generate positive savings over the life of the building. If solar PV is required, the use of battery storage

will become more attractive to allow businesses to reduce peak demand and potentially greatly reduce demand charges on their electric bills.

Commercial PACE Financing

An important tool is now available for financing solar PV installations on new (or old) commercial buildings, it is called: Open Commercial Property Assessed Clean Energy (**Open C-PACE**) financing. Open C-PACE has been adopted by the Legislatures of both Nassau and Suffolk Counties, and several other locations throughout New York State. It is up and running and has financed projects in both LI counties (exculding the citites of Long Beach and Glen Cove). It provides a lower-cost, long-term alternative to traditional loans that cover 100% of out-of-poket costs for clean energy projects in commercially-owned buildings. The Open C-PACE program is administered by the not-for-profit Energy Improvement Corporation (EIC) in those NY counties and cities where it has been adopted by the local government. Open C-PACE financing is not a bank loan and differs from traditional financing options.

Incentives vs. Requirements

Requirements should only be used for compelling policy objectives. Utility incentives serve an important role in advancing clean energy, however they are not free, as they are paid for by all ratepayers, and they are being eliminated for solar PV as that market transforms. Using local density bonuses to incentivize solar would introduce complications and would lack a logical nexus to sustainable energy goals.

Requirements are appropriate due to a market failure in the often complex commercial real estate sector. This sector usually operates with split incentives between building developers/owners, who may not pay electric bills, and occupants/tenants who usually do. This sector also lacks a standard approach to pricing and assigning PV's benefits in transactions between building owners and tenants. Requirementss are appropriate when the policy goal is clear and the challenge is big enough to warrant industry-wide compliance. (NYS provides an opt-in for municipalities to require homes to be built solar ready[12]. For commercial buildings, this opt-in provision is not available, and would be insufficient to overcome the split-incentive-driven market failure.)

Proposed Commercial Building Solar PV Mandate

Solar Wattage Per Square Foot (SWPSF)

POLICY	10,000 sq. ft. Building [1 floor] 10,000 sq. ft. Footprint	50,000 sq. ft. Building [1 floor] 50,000 sq. ft. Footprint	150,000 sq. ft. Building [3 floors] 50,000 sq. ft. Footprint
2022 — 3 watts per. sq. ft. of Building *Footprint*	30 kW solar PV	150 kW solar PV	150 kW solar PV

Solar Codes Elsewhere

Some Long Island towns have implemented residential energy conservation stretch codes that set high standards and could be seen as models for other regions to consider adopting. For example, Southampton and East Hampton have among the most stringent energy performance codes for new home construction, which not only require diagnostic testing by qualified third parties for all new homes, but also have increased efficiency standards for larger homes[13]. Nevertheless, when it comes to the use of stretch codes for solar installation, we can learn a lot by considering what has been done elsewhere. The state of California has garnered media attention for adopting a requirement for almost all new residential construction to include sufficient renewable generation capacity to meet the full expected electric demand of the residences—beginning in 2020[14]. This paper focuses instead on requirements for renewable generation on new commercial construction that have been adopted in California cities including Culver City[15], Sebastopol[16], San Francisco[17], and Santa Monica[18], which represent a greater opportunity to treat as model ordinances and consider adopting similar requirements to balance the need to preserve open space with efforts to promote significant clean energy projects on Long Island. Such a requirement has been called the "Merton Rule" after the Borough of Merton in England, the first municipality to adopt a requirement for new commercial development to include solar PV. Closer to home, in New York City Local Laws 92 and 94 of 2019 require new buildings or replacement of roof decks to incorporate solar PV, green roof systems, or a combination of both[19]. The authors view the option for a green roof as less valuable outside the dense development of New York City.

The approach that this paper recommends, is to use a simple requirement of a set kilowatt nameplate capacity ratio to the square footage of the building's footprint (or total floor area of conditioned space). For example, Santa Monica requires 2 Watts of PV per square foot of building footprint for all commercial construction. Culver City requires 1 kW of PV per 10,000 square feet of total floor space, for buildings over 10,000 square feet. The advantage of these requirements is simplicity. New York City requires a 'sustainable roof zone' equal to 100% of the roof not used for setbacks or access required by building and fire codes, or other uses such as mechanical equipment, water towers, stormwater management, and recreational spaces that are essential to the building's principal use. Another approach is to require projected PV generation to meet a percentage of the building's expected energy or electric consumption. Sebastopol, CA has a hybrid system that allows the developer to choose either installing 2 watts per square foot of conditioned space, or sufficient PV to meet 75% of projected annual electric consumption. Rules based on projected

energy use could drive greater efficiency, since the developer will have an incentive to increase efficiency and reduce projected energy use, in order to reduce the amount of renewables required. The downside is that this approach will introduce additional complication during permitting.

Model Solar Code

Past experience of working to change local building codes teaches that any new requirement should be easy to implement. Therefore, this paper recommends that towns pass a straightforward requirement of solar PV that could by calculated by simply reviewing the proposed building's blueprints.

This paper recommends a formula of 3 watts of solar PV nameplate capacity per square foot of building footprint. This would be technically simple both to administer by town building departments, and to comply with by developers. For most buildings, this requirement can easily be met with rooftop solar. As a rule of thumb, solar PV modules are commonly available with nameplate capacities around 15 watts per square foot (wpsf), although there are both more and less efficient products available. Assuming a building has roof space roughly equal to its footprint, the proposed requirement for 3 watts per/sq ft would take up as little as approximately just 20% of the roof space.

To ease administrative adjustment, during the first year of the requirement, buildings smaller than 5,000 square feet may be exempted. Stakeholder feedback however, questioned exexmpting any size buildings with electric service. It is understood that building requirements for the proposed model code should provide for exceptions, variances and alternative compliance paths.

Alternative Compliance Paths

In order to ensure that a policy requiring solar for new commercial building construction is not unduly burdensome, the developer should have available alternative compliance paths that achieve the same goals.

• If the developer prefers not to locate solar on the building's roof, then the town code should allow construction of a solar carport over their parking lot on site.

• If the applicant can demonstrate that the roof design is not conducive to solar installation and cannot be easily altered, or that the roof design was important to a community engaged planning process where design features that are not conducive to solar PV were included as part of an adopted plan, or interconnection to the grid at the location of the new building would be technically or financially infeasible for the required amount of on-site solar PV, then some or all of the solar PV requirement can be met by new, *off-site* installations of solar PV through remote net-metered or community-shared-solar. Alternatively, the developer could document equivalent annual energy generation using a different renewable energy technology.

• Rather than comply with the full PV requirement set out in the new policy, alternatively, the developer may bring forth appropriate documentation to demonstrate they could install onsite a lesser amount of solar PV, but that it will be enough to satisfy 75% of the building's projected annual electric usage.

• If the applicant can demonstrate unavoidable hardship, such that complying with the requirements of this law would make a particular project economically unfeasible, the capacity requirement may be lowered (by variance) at the discretion of the ZBA..

Conclusion

A solar PV requirement for new commercial development will mitigate climate change in a way that puts a premium on preserving open space and directing renewables into the built environment. LI municipalities are well positioned to be regional climate action leaders by adopting a solar requirement for all new commercial buildings. As a home rule state, NY's local municipalities are empowered to adopt stretch energy codes for new construction. (Local efforts to adopt strict energy code requirements for energy rating performance tests before COs are issued for new homes on LI—as recommended by the authors' previous white papers—that started in 2006, continue to work well).

Long Island is ready for a paradigm shift in the approach to new building construction. Under this standard a message is sent that renewables must be included in new buildings. A solar requirement will be straightforward to enforce by town building departments, it will create local green jobs and boost regional economic development. It will be a reasonable requirement for builders to implement; resulting either in a revenue stream for building owners, or savings for businesses who eventually occupy the new buildings.

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