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John R. Nolon
Elisabeth Haub School of Law at Pace University

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Mitigating Climate Change by Zoning for Solar Energy Systems: Embracing Clean Energy Technology in Zoning's Centennial Year

John R. Nolon[1]

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Abstract

Adopting land use regulations that encourage solar and other clean energy systems is an essential strategy for promoting clean power and one that focuses on the essential role that local governments play in mitigating climate change. This article explores efforts at the state and local level to reform zoning and land use regulations to permit, encourage, require, and incentivize rapidly-evolving clean energy systems, particularly solar, that, in the aggregate, have the ability to significantly increase power generation and decrease carbon emissions. The article illustrates how zoning, as it approaches its 100th anniversary, is encrusted with provisions that prohibit or discourage clean and solar energy systems: barriers that are being removed by progressive communities, some more successfully than others. It describes these barriers, then provides a framework and best practice examples for revising zoning codes and other land use regulations, first to eliminate regulatory barriers to permitting clean energy systems,

[1] John R. Nolon is Distinguished Professor of Law at Pace Law School and has been an Adjunct Professor of Land Use Law and Policy at Yale in the School of Forestry and Environmental Studies since 2001. He is the founder of and Counsel to Pace's Land Use Law Center. My thanks to two excellent research assistants for their contributions to this article: Marissa Weiss and Kirsten Yerger.

focusing on solar as an example, and then to require and incentivize clean energy system deployment. Included is a review of the common law of solar access easements that helps explain the importance of the legislative powers of local government to facilitate solar power generation. The article concludes with an endorsement of state and federal actions that increase the speed of local adoption of zoning reforms by providing critical support, consistent with new scholarly findings that demonstrate how top down governmental influences can facilitate bottom-up progress, charting a strategy applicable to many other local initiatives to accommodate a wide array of emerging clean energy systems.

I. Zoning and Clean Energy Systems

Zoning turns 100 this year.[2] It is showing its age by its exclusion of modern clean energy systems[3] in most communities while illustrating its historical resilience as more and more progressive communities act to reform zoning to permit, require, and incentivize renewable energy and other clean energy systems. For clean energy systems to be constructed, they must be permitted by local zoning and not subjected to costly regulatory barriers that discourage their use and increase their costs. For the purpose of this article clean energy systems include building integrated solar systems, ground- and roof-mounted solar systems, large- and small-scale wind generation, multi-building combined heat and power facilities, microgrids, on-site electricity generation, and geothermal systems.[4] Promoting clean energy systems under local

[2] Comprehensive, city-wide zoning that defines and limits land uses and requires compliance with various dimensional requirements for land development was first adopted in 1916 in New York City.

[3] Generally, clean energy has been defined as the capture and production of energy that is generated from renewable sources that have a limited or no carbon footprint. Hilary Kao, *Beyond Solyndra: Examining the Department of Energy's Loan Guarantee Program*, 37 Wm. & Mary Envtl. L. & Pol'y Rev. 425, 437-38 (2013); Joseph P. Tomain, *Shale Gas and Clean Energy Policy*, 63 Case W. Res. L. Rev. 1187, 1194 (2013). According to another source, There are two categories of clean energy definitions: (1) energy use that produces no or low greenhouse gases ("GHGs") emissions in the production of energy and (2) renewable energy production that has a low ecological footprint, including the manufacture and production process of the fuel and the pollutants emitted in the generation of electricity. Thus, defining "clean energy" may encompass a variety of dimensions, such as impacts on air pollution, water pollution, hazardous waste, all of which has the potential to cause confusion on the regulatory scale.[3] See Joseph E. Aldy, *Promoting Clean Energy in the American Power Sector: A Proposal for a National Clean Energy Standard*, 42 E.L.R. 10131, 10134 (2012).

[4] Arguably clean energy is much broader than the sum of these discrete systems; it can be defined to include smart growth, transit oriented development, green building, and other land use strategies. "Smart Growth" strategies including compact, mixed-use development, and transit oriented development reduces GHG by lowering vehicle miles travelled and creating efficient and dependable public transportation See the 2015 New York State Energy Plan,, Volume II: Technical Appendices, Impacts and Considerations, Chapter 3, Smart Growth, http://energyplan.ny.gov/Plans/2015. Additionally green building standards, such as LEED, can reduce GHG emissions by constructing in a way that "Efficiently us[es] energy, water, and other resources; Protect[s] occupant health and improving employee productivity; and Reduc[es] waste, pollution and environmental degradation." See EPA, *Green Building,* http://archive.epa.gov/greenbuilding/web/html/about.html How to accomplish clean energy results through smart growth techniques is discussed in detail in John Nolon, *Land Use for Energy Conservation and Sustainable Development: A New Path Toward Climate Change Mitigation*, 27 J. LAND USE & ENVTL. L. 295 (2012).

land use regulations is one of the latest efforts on the part of local governments to mitigate climate change, which, in the aggregate, are most impressive.[5]

The Advent of Solar Energy Systems: The Flagship of the Clean Energy Fleet

Solar energy systems have advanced rapidly and are the flagship of the clean energy system fleet. This surge in solar energy system deployment is forcing local governments to revise zoning and, as a result, indicating how zoning can be reformed to include other clean energy systems. In finding, cataloging, and evaluating methods being crated to encourage solar energy, strategies for incorporating all types of clean energy systems are observable.

Solar energy's popularity has grown exponentially over the last few decades. While rooftop solar panels have historically "been the province of well-to-do, eco-friendly folks willing to shell out extra bucks to be green," the solar movement is rapidly expanding.[6] According to the National Renewable Energy Laboratory (NREL), the average cost of residential solar panel installation has decreased by over 70 percent in the last 15 years.[7] Many recent reports, such as those from Deutsche Bank, also assert that solar electricity has achieved "price parity" with fossil fuel-based grid power in 10 states and will continue to become as cheap, or even cheaper, than average electricity-bill prices in all but 3 states by 2016.[8]

Over the past decade, residential solar power installations have skyrocketed. In 2004, approximately 15,000 U.S. homes were equipped with PV installations. By 2014, that number grew to 600,000, and this number will likely continue to increase at an impressive rate.[9] Projections from the U.S. Energy Information Administration and the U.S. Department of Energy estimate that nearly 1 to 4 million homes could be powered by solar by 2020.[10] The primary force driving this expansion is affordability. Since the beginning of 2010, the average cost of solar panels dropped more than 60%, while government incentives like tax credits drive the cost even lower. In 2005, the average rooftop system cost $40,000. Today, that has dropped over 50%.[11] With federal, state and local incentives included, the final consumer cost could be less than $10,000. Furthermore, many homeowners have leasing and loan options, potentially paying

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[5] Among the strategies implemented at the local level to mitigate climate change are innovative environmental impact review that considers carbon impacts; constructing green infrastructure; enhancing biological sequestration; implementing innovative transit oriented development regulations, sustainable neighborhood development standards, and planning for resilient communities; creating no-build zones; and siting affordable housing near jobs, transit, and services.

[6] Richard L. Ottinger, *Rooftop Solar Cost Competitive with the Grid in Much of the U.S.: Can solar power compete with fossil fuels?* (Dec. 1, 2014) (on file with author).

[7] *Id.*

[8] *Id.*

[9] Union of Concerned Scientists, *Infographic: Affordable Rooftop Solar in the United States* (2014), http://www.ucsusa.org/our-work/clean-energy/increase-renewable-energy/affordable-rooftop-solar-united-states#.VWeaH0bwA2U (last visited June 7, 2015).

[10] *Id.*

[11] *Id.*

nothing for installation and instead paying ongoing monthly fees.[12] Thus, solar is poised to become increasingly important as a renewable energy source within the coming years.

Today, solar is also an attractive choice for many private consumers, industries, and utilities due to several factors, including falling hardware costs, innovative residential power-purchase agreements, and government incentives. 2014 saw the largest increase of installations of photovoltaic (PV) systems in history, up 30% over 2013.[13] 2014 was also a history-making year for concentrating solar power (CSP), with the three massive solar projects achieving commercial operation, with the potential of bringing 757 MW on-line.[14] In 2004, there were approximately 100 utility scale projects nationwide. This number jumped to 1,000 by 2014, and now includes mega-scale CSP projects that are coming on-line with impressive momentum. Today, over 14 GW of utility scale solar projects have power-purchase agreements in place and are expected to begin operation by 2016. The Solar Energy Institute Association predicts that over the next two years, there will be "a flurry of project completion announcements and unprecedented installation figures from the utility solar sector."[15]

Along with the growth in infrastructure, the solar market is booming. Valued just under $2 billion in 2005, it now contributes nearly $18 billion a year to the United States economy.[16] In just 4 years, jobs in this sector have grown 86%, and today, solar employs 174,000 Americans with good paying jobs that support clean energy. As the fastest source of renewable energy in the country, the solar market is becoming increasingly competitive with other energy sources, gaining an impressive 32% share of total new electric generation capacity in 2014. As solar continues to grow, it is clear that this technology has become an integral part of the American energy platform and needs to be accommodated by zoning, rather than hindered.

Zoning's Response to Solar Technology

Although both the federal and state levels of government have a strong interest in encouraging the deployment of renewable energy systems, the power to permit solar energy systems under land use law has been delegated by most states to local villages, towns, and cities. Most states are not willing to preempt local control of solar and other clean energy systems; as a result, it is state policy to defer to local discretion in these matters, allowing local policy makers to determine the types of renewable energy systems they want to permit and encourage and helping them accomplish their

[12] *Id.*
[13] Solar Energy Industries Association *U.S. Solar Market Insight Report- 2014 Year in Review- Executive Summary* at 3. http://www.seia.org/sites/default/files/HOlFT6ym3i.pdf
[14] These projects are the Ivanpah project, Genesis Solar project, and Abengoa's Mojave Solar. *Id* at 8.
[15] *Id.* at 6.
16 SEIA/GTM Research – 2009-2013 year in review reports.

goals.[17] Local governments do this by utilizing the tools and strategies made available to villages, towns, and cities under the local land use system.

Approximately 40,000 local governments have been delegated zoning power by their state legislatures. Each enjoys the discretion and power to adopt comprehensive land use plans, zoning, and land use laws and to establish a variety of local land use boards to administer land use controls, including planning boards, zoning boards of appeal, and special boards for historic preservation, environmental conservation, and architectural review.

Local officials who want to encourage solar energy systems should adjust the local land use system by first adding a solar energy component to the comprehensive plan or adopting a special solar energy policy or plan to guide the reform of land use regulations. Local governments then can amend zoning regulations to permit and encourage these systems.[18]

For each district, zoning must specify land uses allowed and set density, bulk, and area requirements, as well as other applicable standards. To further regulate land development, local governments may adopt site plan and subdivision regulations to supplement zoning law prescriptions. Site plan regulations allow administrative agencies, usually the planning board, to review and approve specific site design and features and adjust them to mitigate their impact on the neighborhood and community. Subdivision regulations require the submission of a plat or map of a proposed subdivision, showing layout and approximate dimensions for roads, sewers, water systems, and other important features, for similar approval.

When adopting a zoning ordinance, the local legislature must create a zoning board of appeals to review the zoning administrator's decisions and respond to requests for variances. Additionally, local legislatures create planning boards to review site plan, subdivision, and other land use applications. A municipality's building department approves building permit applications to ensure construction accords with State building codes, and depending on local circumstances, the local legislature may create other boards to review land development applications, ensuring proposed projects do not harm historic, architectural, or natural resources. Where states require localities to determine whether certain proposed local actions will have significant adverse environmental impacts and to consider alternatives and impose conditions to avoid or mitigate any impacts adds complexity and time to the land use system's response to modern technologies such as clean energy systems.

[17] Large-scale electrical generation systems are, of course, preempted by either federal or state law and raise questions about how to coordinate such citing with the comprehensive land use patterns created by local land use plans and regulations.

[18] Most municipalities have adopted zoning ordinances that establish various zoning districts within which certain land uses are allowed as principal, accessory, secondary, or specially permitted uses. If a land use, such as a certain type of solar energy system, is not permitted in a zoning district, it is prohibited unless the zoning board of appeals issues a use variance. Use variances are subject to strict state-established standards and are very difficult to obtain.

In most localities, that system works like this. Zoning ordinances typically require the local building inspector or a designated building department officer to serve as the Zoning Enforcement Officer (ZEO). Under this charge, the ZEO must know the zoning ordinance thoroughly, offer formal zoning interpretations as applied to proposed projects, and determine whether adopted land use regulations permit an applicant's project, as well as the process an applicant must follow to secure required approvals. When a homeowner, business entrepreneur, or developer proposes a solar energy system installation on an existing building or on its surrounding lot, the ZEO must determine whether zoning permits the system, the type of land use the system is, and the requirements it must meet. Because the ZEO must disapprove all land uses not permitted in zoning, it is important for the local legislature to determine which solar energy systems it wants to permit, define these systems, add those definitions to the zoning ordinance, ensure that each defined system is a permitted land use in zoning, and make sure that a local board is designated to approve that use.

II. Barriers to Solar Energy Systems Found in Zoning Law and Procedure

During its first century, zoning has had to adjust to many innovations, moving from rigid Euclidian formulas to smart growth, sustainable development, and now climate change mitigation and adaptation. We are witnessing and tracking its adaptation of new solar energy systems as they come on line, overcoming a variety of built-in barriers that are being identified and eliminated. By analyzing the comprehensive plans and zoning codes and ordinances of a multitude of local governments across the nation, it is evident that the regulatory barriers to solar energy system implementation are ubiquitous. These range from the simple failure to define and permit clean energy systems, to excessive height and setback restrictions, to additional permitting requirements—which greatly increase the costs of systems or discourage their use due to the unpredictability of the approval process.

Since zoning in most states must conform to the comprehensive plan, the best approach is to adopt a plan component specifying the goals and objectives of the community regarding solar and other clean energy systems. After adopting a solar energy policy and plan, local governments can amend zoning regulations to permit and encourage these systems. This requires that the community decide which zoning districts are amenable to which types of clean energy systems and permit them within those named districts. Generally land uses are allowed as principal, accessory, secondary, or specially permitted uses. Without definitions and these designations, solar energy systems become harder to build because they are not allowed in the zoning, forcing the applicant to ask the local zoning board of appeals for a use variance, which are notoriously hard to get, particularly where the use is not permitted in any district. This therefore creates an extra temporal and monetary commitment to a solar application. Local governments can combat this barrier by deciding upfront how easily they want a solar energy system to be built within their jurisdiction and adjusting their zoning code accordingly.[19]

[19] For example, in **Albany, New York**, passive and active energy equipment (i.e. solar thermal and solar PV) is permitted as of right as an accessory use within all zoning districts. Use of solar energy equipment for

The primary, and most common, barrier to solar energy system implementation occurs when solar energy systems are neither defined nor permitted in one or more zoning districts. Without explicit definitions of solar facilities, they cannot be permitted by reference in the zoning district use provisions of local zoning. In addition, the lack of clear clean energy- or solar-related definitions misses the opportunity for municipalities to send a signal to developers, property owners, and installers that they are "open for clean energy business." Municipalities can easily fix this problem by amending their zoning code to include definitions of the different solar energy systems available, based on type, size, and/or energy capacity.[20]

Since solar energy systems vary significantly by type, location of usage, size, and energy capacity, zoning definitions generally are based on these factors. Where these characteristics align with the intensity of use or impact of a solar energy system, they justify different land use regulations for each type and guide local planners as to where to allow each type of system to be constructed.

Energy system type revolves around three types of solar energy systems: (1) roof- or building-mounted, (2) ground-mounted or freestanding, and (3) building-integrated. The main difference between each of these systems is where they are located on the applicant's property, i.e. on the ground surface, on top of a building or structure, or worked into the building itself, respectively. Energy capacity similarly changes with the type, as well as physical characteristics of the solar energy system, as bigger systems unsurprisingly have larger capacities.

Most importantly, zoning may define solar energy systems according to their physical size and location using measurements similar to those found in the zoning ordinance's bulk and area requirements. Typically, bulk and area standards limit the size of a system using a maximum height, maximum footprint or disturbance zone -- measured

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electricity is a "priority and necessary component of Albany's current and long-term sustainability agenda." City of Albany, N.Y., Code § 375-93, http://ecode360.com/7688014. More specifically, **Sheridan, OR** establishes solar PV or thermal energy systems as of right as permitted uses in any zoning district, and specifies that permit approval is a ministerial decision if installation does not increase the structure's footprint and is parallel to the slope of the roof; otherwise, site development review procedures must be followed, though these provisions do not apply if the structure is in a historic, conservation, or scenic landmark district. BOROUGH OF SHERIDAN, OR., CODE § 16.203.110 (added Nov. 11, 2014), https://www.municode.com/library/or/sheridan/codes/code_of_ordinances.

[20] For example, **White Plains, NY** updated its zoning ordinance to include definitions of "solar energy system" as "devices used to capture the sun's radiation and transform it into usable heat or electricity" … and provided that they "are permitted as a part of, and may be attached to, any "building." These definitions, although basic, formally define what a solar energy system is, as well as allow roof-mounted and building-integrated systems in one simple phrase. CITY OF WHITE PLAINS, N.Y., CODE § 4.4.21, http://www.cityofwhiteplains.com/DocumentCenter/View/617 (last visited June 23, 2015). Similarly, in **Butte County, California**, § 24-157 of the local zoning code separates solar energy systems into 4 tiers (Utility-minor: roof-mount/ground up to 1/2 acre; utility-accessory: <15 percent of parcel size up to 5 acres, whichever less; utility-intermediate: <30 percent of parcel size up to 20 acres, whichever less; and utility-major: ground-mount for power generation). This directs each applicant into a tier and gives them helpful guidance regarding the permitting of their solar energy system. BUTTE CNTY., CA., CODE § 24-157 (added Sept.10, 2013), http://www.buttegeneralplan.net/products/2013-09-10_ZO_Revision2_Adopted/chapters/Part_4_101113.pdf.

in acres, square feet, percent lot coverage, or percent of the primary structure's footprint. When height restrictions are in place, many roof-mounted solar systems cannot be installed without an area variance because the solar energy equipment would make the building too tall under the zoning ordinance. An applicant must then go to the municipality's Zoning Board of Appeals to be granted a variance, which takes more time and may deter an applicant, especially since at the end a variance may be rejected. While height restrictions in zoning codes represent one of the largest barriers to solar implementation, this barrier is also one of the most easily remedied.[21]

Another barrier can be specifications as to where exactly the systems may be located on a specific parcel. Municipalities may restrict solar energy systems to the ground or roof, or may even restrict where the solar system is placed on a building (e.g. not allowing the system to be located on the front façade or on a front roof pitch). This code technique places more restrictions on applicants, who may have no other feasible (especially in terms of financial cost) option for locating their solar energy systems. Therefore, applicants may be discouraged and forfeit their solar construction plans. Municipalities can remove this barrier by eliminating as much of the system location language as possible from their zoning codes.[22]

Similar to height restrictions, setback limitations represent an easily remedied barrier to solar energy implementation, but for ground-mounted systems. Setback limitations require buildings and facilities to be set back a certain minimum number of feet from the property lines: front, rear, and both side yards. If setback limitations apply, solar systems that project out into setbacks will not be allowed without an area variance: another time consuming and indefinite step in the process. Local governments can remedy this problem by abolishing setback limitation requirements in regards to ground-mounted solar energy systems.[23]

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[21] Many municipalities chose to simply and explicitly exempt solar energy systems from height restrictions under the zoning code, which is the best practice for barrier removal. For example, **Newark, Delaware** exempts systems from height requirements entirely. CITY OF NEWARK, DE., CODE § 32-56.2 (added Apr. 27, 2015), https://www.municode.com/library/de/newark/codes/code_of_ordinances.. Other municipalities, such as **Village of Mastic Beach, New York** only exempt to a certain maximum height: accessory structures (building or roof-mounted) may exceed the maximum allowed height in any zoning district by 1 ft. VILL. OF MASTIC BEACH, N.Y., CODE § 415 (added Dec. 13, 2011), http://ecode360.com/16251214.

[22] For example, in **Asheville, North Carolina**, solar energy systems must comply with minimum setback requirements, but may be located in the front yard with a variance to allow for optimal placement if compatible with neighborhood character and within property lines. CITY OF ASHEVILLE, N.C., CODE § 7-14-1.b.2.a (added Feb. 10, 2009), https://www.municode.com/library/nc/asheville/codes/code_of_ordinances?nodeId=PTIICOOR_CH7DE_ARTXIVACTEUSST_S7-14-1ACUSST. This section of code gives an example as to how municipalities can utilize other land use approval processes, such as a variance, to allow an applicant to build in a place like a front yard if no other alternative is as optimal for energy production.

[23] **Big Flats, New York** allows passive solar devices to project a maximum of two feet into a minimum yard setback. TOWN OF BIG FLATS, N.Y., CODE § 17.16.040 https://www.municode.com/library/ny/big_flats/codes/code_of_ordinances?searchRequest=%7B%22searchText%22:%22solar%20project%22,%22pageNum%22:1,%22resultsPerPage%22:25,%22booleanSearch%22:false,%22stemming%22:true,%22fuzzy%22:false,%22synonym%22:false,%22contentTypes%22:%5B%22CODES%22%5D,%22productIds%22:%5B%5D%7D&nodeId=TIT17ZO_CH17.16BUDECORE_17.16.040PRINYA. **West Bloomfield, New York** also allows solar collectors within any required setback. TOWN OF WEST BLOOMFIELD,

Impervious land coverage is also a concern for some municipalities in regulating solar systems. It is standard to include maximum lot coverage limitations within zoning codes, which restricts the amount of land allowed to be covered by impervious surfaces on a single plot of land. This may result in an applicant not being able to install a ground-mounted solar energy system because the lot coverage maximums will be exceeded. Municipalities can remove this barrier by eliminating or enlarging lot coverage requirements for solar energy systems.[24]

Another major barrier to the installation of solar and clean energy systems is the requirement that the applicant must apply for and receive a site plan approval or a special or conditional use permit. Where such systems are not explicitly permitted as of right, the local zoning enforcement officer is likely to require site plan approval; sometimes existing special use permits are broadly enough written to include clean energy systems, but without defining them well and specifying a clear path of review and approval. Obtaining these permits can be time-consuming, as a Planning Board has little discretion to disapprove of a solar energy system installation if the site plan and special use provisions requires that the board find the use to be compatible with conditions on surrounding properties. Governmental bodies can solve this issue by exempting solar energy systems[25] from site plan approval, establishing an expedited, minor site plan approval process for them, and by abolishing special or conditional use permit requirements.[26] While local governments may hesitate to do this for each and

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N.Y., CODE § 140-118 (added), . http://www.townofwestbloomfield.org/LegalNotices/Zoning%20Ordance%20Draft.pdf. For a slightly more restrictive approach, see **Pima County, Arizona**, where an exception to the setback requirements may be made subject to approval of a Modification of Setback Requirements (MSR) request in accordance with § 18.07.070 of the zoning code. PIMA CNTY., AZ., CODE § 18.07.070 (added 2011), https://www.municode.com/library/az/pima_county/codes/code_of_ordinances?nodeId=TIT18ZO_CH18.07GEREEX_18.07.070MOSERELOCOLI.

[24] **Wall, New Jersey,** Ord. No-11-2012 was recently amended in 2010 to explicitly exclude solar panels in calculation of impervious coverage. TOWN OF WALL, N.J., CODE § 140-1.391 (added Aug. 8, 2012), http://ecode360.com/9589227. For slightly more cumbersome restrictions, see **Santa Clara County, California**: § C12-422 exempts ground-mounted systems from needing drainage permits if the installation is a minor project that results in the cumulative addition of >2000 square feet of additional impervious area/parcel that does not "have the potential to cause or exacerbate existing flood conditions, endanger adjacent property, divert or impair the flow of water in a watercourse, or cause a public nuisance." Municipalities may see this an appropriate tactic if they do not want to wholly eradicate their lot coverage requirements. SANTA CLARA CNTY., CA., CODE § C12-422 (added June 2013), ftp://law.resource.org/pub/us/code/city/ca/Santa%20Clara%20County,%20CA%20%2320.pdf.

[25] For example, numerous New York municipalities have adopted a state promulgated Unified Solar Permit that greatly expedites permit approval and makes it clear that site plan approval is not needed. Building departments like in **Somers, New York** estimate that a building permit determination on a residential application now only takes about three days average, when it could have taken several weeks prior with the site plan requirement. TOWN OF SOMERS, N.Y., CODE § (added), . **Bethlehem, NJ** also exempts ground-mounted systems smaller than 2,000 square feet from the site plan approval process. TWP. OF BETHLEHEM, N.J., CODE § 102-37.3 (added May 3, 2012), www.ecode360.com/27068141.

[26] In **Houston County, Minnesota**, rooftop and ground-mounted solar energy systems are permitted as accessory and principal uses in all zoning districts, except the floodplain district, by right. Solar energy systems are permitted as conditional uses in the floodplain district. This is an example of how municipalities concerned about flooding and other floodplain issues can still regulate development in those areas, while not inhibiting solar energy system

every solar energy system, they can create a tiered system where the least impactful are exempted or expedited.

In addition to having a zoning enforcement officer, zoning board of appeals, and a planning commission, localities can establish Architectural Review Board ("ARB") or Design Review Board ("DRB"), which generally render influential advisory opinions regarding the design of proposed construction, and Historic Preservation Commission ("HPC"), which must issue a certificate of appropriateness before applicants may commence construction. Where clean energy systems are subject to reviews by these agencies, further delays and uncertainty are built into the system. Some communities exempt solar energy systems, for example, from ARB or DRB review[27] and some HPCs create special standards for them to meet to qualify for a certificate of appropriateness.[28]

III. A Model Framework for Local Zoning and Procedures for Solar

A. Important Role of Zoning Definitions in Regulating Solar Energy Systems

As noted in Part II, a zoning codes have an article labeled "definitions" that defines all land uses permitted in any zoning district in the community. To properly permit and regulate solar energy systems, the zoning code must include definitions that delineate each type of system that the community wishes to permit. Generally, solar energy systems transform energy from sunlight into electricity or heat using specialized electrical or mechanical equipment that varies greatly in type, shape, size, and capacity from system to system. For example, solar photovoltaic systems create electricity from

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installation everywhere else. HOUSTON CNTY, MN., CODE § 110.2808 (added 2004), http://co.houston.mn.us/Documents/Ordinances/Houston_County_Ordinances.pdf.

[27] **White Plains, New York** exempts solar energy systems from review by City's Design Review Board when they are: (1) being installed on one or two family structures which do not require variance; (2) have a rated capacity of 12 kW or less; and (3) are mounted parallel to the roof surface, or tilted with no more than an 18 inch gap between the module frame and roof surface. CITY OF WHITE PLAINS, N.Y., CODE § 4.4.21.2**,** http://www.cityofwhiteplains.com/DocumentCenter/View/1228.. **Portland, Oregon** also has eliminated discretionary review of solar energy systems that adhere to community design standards. CITY OF PORTLAND, OR., CODE § 33.218 (added Jan. 1, 2015), http://www.portlandoregon.gov/bps/article/53305.

[28] In **Enfield and Farmington, Connecticut,** while a certificate of appropriateness is required, no application for such a certificate shall be denied for a solar energy system unless the commission finds that the feature cannot be installed without *substantially* impairing the historic character and appearance of the district. This allows for some flexibility for applicants who may want to build in a historic district. TOWN OF ENFIELD, CT., CODE § 46-83, *https://www.municode.com/library/ct/enfield/codes/code_of_ordinances?nodeId=PTIVCOOR_CH46HIPR_ARTIIHIDI_DIV3CEAP_S46-83CODEAPSOENSY.*.
Town of Farmington, Ct., Code § 111-26 (added August 5, 2008), http://ecode360.com/11985532?highlight=certificate%20of%20appropriateness,appropriateness%20of,appropriateness,of%20appropriate,appropriation,appropriate,certificate,solar,of. Similarly, in **Providence, RI**, in a historic district, solar energy systems and solar collectors do not require the approval of the historic district commission. CITY OF PROVIDENCE, R.I., CODE § 27-404 (amended on January 1, 2015), http://providenceri.iqm2.com/Citizens/Detail_LegiFile.aspx?MeetingID=2473&ID=4994. Finally, in **Portsmouth, VA**, the city's requirements for Certificates of Approval (for development in historic districts) exempt solar collectors from requirements if they are mounted in locations not visible from a public street. CITY OF PORTSMOUTH, VA., CODE § 40.1-2.3.4.f (added May 15, 2015), https://www.municode.com/library/va/portsmouth/codes/code_of_ordinances.

solar energy using photovoltaic cells in rooftop or ground-installed panels or incorporated into building materials. Similarly, solar thermal systems use radiant heat from the sun to warm fluids in a series of tubes or panels that are typically roof-mounted to heat water or cool and/or heat buildings, while concentrating solar power systems are generally large-scale structures with mirrors that concentrate solar energy to heat a substance, creating steam to power an electric generator through a mechanical engine.

Because solar energy systems vary greatly in size and shape, they require varying levels of review depending on magnitude of their land use impacts. The first step in reforming local zoning to accommodate is to define solar energy systems clearly; next, the municipality must determine where to permit and how to regulate each defined system in the zoning code, as each must be subject to clear standards and have an appropriate required approval process or exemption.

Since solar energy systems vary significantly by type, location of usage, size, and energy capacity, zoning definitions generally are based on these factors. Once a municipality determines the various solar energy systems it wants to permit, these systems can be categorized into several different zoning definitions using these factors. In particular, local governments should use these factors to organize solar energy systems according to their impacts on land and neighboring properties, thus enabling stricter standards and review processes for systems with higher impacts, while greatly facilitating the deployment of low-impact systems.

The number of factors used to create zoning definitions varies among municipalities. Sometimes definitions are very simple, using a single factor to differentiate between systems, such as distinguishing between system types. For example, a community might permit roof-mounted systems in all zoning districts, but choose to prohibit ground-mounted systems in some or all residential districts, because of the different impacts of each type of system.

The four factors municipalities tend to consider when creating zoning definitions include:

1. Energy system type,
2. Location where system-produced energy is used,
3. Size and shape of the system, and
4. System energy capacity.

Definition Based on System Type

A municipality may create zoning definitions for solar energy systems based on the system type. Many types of systems exist; however, most municipalities distinguish among three types of solar energy systems: (1) roof- or building-mounted, (2) ground-

mounted or freestanding, and (3) building-integrated.[29] Often, with categories 1 and 2, they distinguish and regulate differently small-scale and large-scale roof mounted and ground mounted.

- Roof- or building-mounted solar energy systems are attached to the top of a building or structure. Generally, a roof-mounted system is secured using racking systems that minimize impacts and is mounted either level with the roof or tilted toward the sun.

- Ground-mounted or freestanding solar energy systems are installed directly in the ground and not attached to any existing structure. Single or multiple panels can be mounted on individual or multiple poles when space, structural, shade, or other constraints inhibit roof-mounted systems. Much larger freestanding systems, including solar farms, can be constructed on the ground.

- Finally, building-integrated solar energy systems are incorporated into a building or structure rather than existing as separate equipment. Building-integrated systems are used as a structural component of the building, such as a roofing system or building façade. This can include roof shingles or tiles, laminates, glass, semi-transparent skylights, awnings, and fixed awnings. As a rule, zoning usually does not include definitions for building materials because the building code is responsible for their regulation, but municipalities may include zoning definitions for building-integrated solar energy systems to clarify differences in approval process requirements for the different system types.

Definitions Based on Energy Usage

Municipalities also consider where system-produced energy is utilized when defining solar energy systems in zoning.[30] Solar energy systems produce energy that is used entirely onsite, entirely offsite, or onsite and offsite. System-produced energy is used onsite when it serves the property owner, occupant, or onsite facilities. If the solar energy system is connected to the power grid, any excess electricity may be sold back to the grid via net metering to offset energy costs. Solar energy systems that generate

[29] Penn Future's Western PA Rooftop Solar Challenge Final Solar Zoning Ordinance provides an example of solar energy systems defined based on type. The ordinance defines a "building-mounted system" as one "attached to any part or type of roof on a building or structure that has an occupancy permit . . . and that is either the principal structure or an accessory structure . . . ." Additionally, the ordinance defines a "ground-mounted system" as one "mounted on a structure, pole or series of poles constructed specifically to support the photovoltaic system and not attached to any other structure" and defines a "building-integrated system," in part, as one "constructed as an integral part of a principal or accessory building or structure and where the building-integrated system features maintain a uniform profile or surface of vertical walls, window openings, and roofing." *See*, http://pennfuture.org/SunShot/SunSHOT_Ord_Zoning.pdf . .

[30] In Michigan, Casco Township's zoning ordinance includes solar energy provisions that define solar energy systems, in part, based on energy usage. For example, small solar energy systems "produce utility power primarily to on-site users or customers," medium systems "produce utility power to on-site uses and off-site customers," and large systems "produce utility power to off-site customers." *See*, https://www.planning.org/pas/infopackets/open/pdf/30revpart13.pdf.

electrical power for use offsite solely provide utility power to offsite customers, while solar energy systems that generate power for use onsite and offsite serve both the property owner, occupant, and/or onsite facilities, as well as offsite customers. Generally, systems that serve onsite uses are smaller and sited on residential or small commercial properties as accessory uses, and systems that serve offsite uses are utility-scale solar farms sited on industrial parcels as the principal use. Solar energy systems that serve both onsite and offsite uses are often medium-sized systems sited on commercial or agricultural parcels designed to provide additional revenues.

Definitions Based on Size (Bulk & Area)

Zoning may define solar energy systems according to their physical size using measurements similar to those found in the zoning ordinance's bulk and area requirements. Typically, bulk and area standards limit the size of a system using a minimum or maximum footprint or disturbance zone measured in acres, square feet, percent lot coverage, or percent of the primary structure's footprint.[31]

Definitions Based on Energy Capacity

Often, municipalities define solar energy systems based on energy capacity because the physical size of a solar energy system increases as kilowatts produced increases.[32] Further, communities often use energy usage metrics to define solar energy systems because many grants are available based on how much energy a system produces. When defining systems using energy capacity as factor, zoning definitions delineate the systems based on a minimum or maximum generating capacity, rated capacity, or rated storage volume, all measured in kilowatts (kW) or kilowatts per hour (kW/hour).

Examples of Zoning Definitions That Mix Factors

Below, several examples demonstrate a variety zoning definitions that use two or more of the factors described above to define solar energy systems.

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[31] The Template Solar Energy Development Ordinance for North Carolina defines solar energy systems, in part, based on their physical size measured in acres. According to the state's model ordinance, Level 1 Solar Energy Systems include those that are "ground-mounted on an area of up to 50 [percent] of the footprint of the primary structure on the parcel but no more than [one] acre," and Level 2 Solar Energy Systems are ground-mounted systems with a footprint of less than or equal to a half acre in residential districts, less than or equal to a 10 acres in general commercial business and office-institutional districts, and of any size in industrial districts. Finally, solar energy systems that do not satisfy the parameters for Level 1 or 2 systems are designated as Level 3 Solar Energy Systems. *See,* http://nccleantech.ncsu.edu/wp-content/uploads/Template-Solar-Ordinance_V1.0_12-18-13.pdf.

[32] In its alternative energy facilities regulation, Worcester County, MD, defines solar energy systems, in part, based on energy capacity. It defines large solar energy systems as those with a rated capacity of two hundred kilowatts or greater. Medium solar energy systems are ground-mounted systems with a rated capacity greater than five kilowatts but less than two hundred kilowatts or roof-mounted systems of any capacity in excess of five kilowatts. Finally, small solar energy systems have a rated capacity of five kilowatts or less. WORCESTER COUNTY, MD., CODE § ZS 1-344 (added Nov. 3, 2009), http://ecode360.com/14021665?highlight=solar%20energy%20systems,solar%20energy%20system,solar%20systems,solar%20energy,defining,defined,systems,define,energy,system,solar#14021665.

System Type and Energy Usage: The City University of New York (CUNY) prepared its model solar zoning ordinance as part of the U.S. Department of Energy's SunShot Initiative Rooftop Solar Challenge II. The model ordinance defines building-integrated photovoltaic (BIPV) as the incorporation of photovoltaic (PV) material into a building's envelope, including shingles or tiles, laminates, and glass placed on vertical façades, semi-transparent skylights, awnings, fixed awnings, and roofs. Ground-mounted systems are defined as solar energy systems anchored to the ground, attached to a pole or similar mounting system, and detached from any other structure. The model ordinance defines large-scale systems as those located on land primarily used to convert solar energy into electricity for offsite energy consumption and roof-mounted systems as those located on a roof of a permitted principal use or accessory structure.

System Type and Energy Usage: Goodhue County, MN, adopted solar energy system (SES) regulations in Article 19 of its zoning ordinance.[33] These regulations define a ground-mounted SES as a solar collector located on the ground surface that is physically affixed or attached to the ground, including pole-mounted systems. The regulations define a roof-mounted SES as a solar collector located on the roof of a building or structure that may be physically affixed or attached to the roof. For both ground-mounted and roof-mounted SESs, the regulations include sub-definitions for residential, commercial, and utility scale SESs. The regulations define a residential SES as accessory to the principal use of the land, designed to supply energy for onsite residential use with excess energy sold back to the grid through net metering. A commercial SES is defined as accessory to a permitted farm or business use of the land, designed to generate energy to offset utility costs or as an additional revenue stream. Finally, the utility Scale SES is defined as an energy system that is the principal use of the land, designed to provide energy primarily to offsite uses or for export to the wholesale market.

System Type and Bulk & Area: A local government outreach group convened by the Virginia Department of Environmental Quality developed two model zoning ordinances, one for smaller-scale solar energy projects and one for larger-scale projects.[34] These ordinances define both smaller-scale and larger-scale projects as those that (1) generate electricity from sunlight using one or more photovoltaic systems and other appurtenant structures and facilities onsite OR (2) utilize sunlight as an energy source to heat or cool buildings or water or produce electrical or mechanical power by collecting, transferring, and/or converting solar-generated energy. The definitions also delineate how these projects differ. A smaller-scale project is defined as one that (1) has a disturbance zone equal to or less than two acres, (2) is mounted on or over a building or parking lot or other previously-disturbed area, OR (3) utilizes integrated photovoltaics only. A larger-scale project is defined as any solar energy project that does not meet these criteria.

[33] GOODHUE COUNTY, M.N., ZONING ORDINANCE ART. 19 § 2 (amended Sept. 16, 2014) *See,,* http://www.co.goodhue.mn.us/DocumentCenter/View/2428.

[34] Virginia Department of Environmental Quality, *Renewable Energy Model Ordinances,* (2012) *See,* http://www.deq.virginia.gov/Programs/RenewableEnergy/ModelOrdinances.aspx.

System Type and Energy Capacity: Croton, NY, adopted the NY-Sun Unified Solar Permit (USP), a combined building and electrical permit for certain solar energy systems developed by the New York State Energy Research and Development Authority (NYSERDA), the New York Power Authority (NYPA), and the City University of New York (CUNY).[35] The USP expedites the permitting process for "small-scale solar electric systems," that have a rated capacity of 12 kW or less and that are installed on a permitted roof structure of a building, or on a legal accessory structure, among other requirements. The USP streamlines the permitting process for small-scale solar electric systems, requiring permit determinations to be issued within 14 days of complete application submission. USP-eligible systems are subject to building and electrical code review but are exempt from any zoning requirement.

System Type, Energy Usage, and Bulk & Area: Casco Township, MI, passed Ordinance #30-83 to add provisions addressing small, medium, and large solar energy systems in its zoning ordinance.[36] The ordinance defines small solar energy systems as single residential or small business-scale solar energy conversion systems consisting of roof panels, ground-mounted solar arrays, or other solar energy fixtures, and associated control or conversion electronics, occupying no more than one-half acre of land and that produce utility power primarily to onsite users or customers. Medium solar energy systems are defined as private onsite or utility-scale solar energy conversion systems with many ground-mounted solar arrays in rows or roof panels, and associated control or conversion electronics, occupying more than one-half acre but no more than ten acres of land and that produce utility power to onsite and offsite customers. Finally, the ordinance defines large solar energy systems as utility-scale solar energy conversion systems with many ground-mounted solar arrays in rows, and associated control or conversion electronics, occupying more than ten acres of land and that produce utility power to offsite customers.

System Type, Energy Usage, and Energy Capacity: The Town of New Hartford's solar energy system regulation defines freestanding or ground-mounted solar energy systems as those directly installed in the ground and not attached or affixed to an existing structure.[37] Rooftop mounted or building mounted systems are defined as those with solar panels mounted on top of a roof structure either as a flush-mounted system or modules fixed to frames that can be tilted toward the south at an optimal angle. The regulation defines small-scale solar as solar photovoltaic systems rated up to 10 kW per hour of energy or solar thermal systems that serve the building to which they are attached.

System Type, Energy Usage, and Energy Capacity

[35]NY-Sun, *New York State Unified Solar Permit, Croton-on-Hudson See*, http://www.crotononhudson-ny.gov/Public_Documents/CrotonHudsonNY_Engr/Application-UnifiedSolarPermitfinal.pdf.
[36] *See*,https://www.planning.org/pas/infopackets/open/pdf/30revpart13.pdf. *See* also, *supra* note 30. ___
[37] TOWN OF NEW HARTFORD, N.Y., CODE § 118-74, http://ecode360.com/6188550?highlight=defined,solar#6188550.

In Maryland, Worcester County's alternative energy facilities regulation defines large, medium, and small solar energy systems.[38] Large solar energy systems are ground-mounted with a rated capacity of 200 kW or greater and with a principal purpose to provide electrical power for sale to the general power grid. Medium solar energy systems are ground-mounted systems with a rated capacity greater than 5 kW but less than 200 kW or a roof-mounted system of any capacity in excess of 5 kW and serving, or designed to serve, any agricultural, residential, commercial, institutional, or industrial use on a single lot or parcel or group of adjacent lots or parcels. Lastly, small solar energy systems have a rated capacity of 5 kW or less and serve, or are designed to serve, any agricultural, residential, commercial, institutional, or industrial use on a single parcel or lot. The small solar energy system definition further states that individual or small groups of photovoltaic cells that are attached to and used to directly power or charge a battery for an individual device such as a light fixture, fence charger, radio, or water pump are not considered a small energy power generation facility and may be used in any zoning district without regard to lot or setback requirements.

System Type, Energy Usage and Energy Capacity: Columbia Law School's Center for Climate Change Law developed the Model Small-Scale Solar Siting Ordinance, which includes several helpful solar energy system definitions.[39] The model ordinance defines building-integrated photovoltaic (BIPV) systems as those that integrate photovoltaic modules into the building structure, such as the roof or façade, but which do not alter roof relief. The model defines freestanding or ground-mounted solar energy systems as those directly installed in the ground and not attached or affixed to an existing structure and defines rooftop or building mounted solar energy systems as those mounted on top of a structure or roof as a flush-mounted system or as modules fixed to frames that can be tilted toward the south at an optimal angle. Finally, the model ordinance defines small-scale solar as solar photovoltaic systems that produce up to ten kW per hour of energy or solar-thermal systems that serve the building to which they are attached and that do not provide energy for any other buildings.

B. Amending Zoning Codes to Permit Defined Solar Uses

After creating solar energy system definitions for the zoning code, a municipality must determine in which zoning districts to permit each defined system, as well as how to permit each system and appropriate amendments for bulk & area requirements to accommodate these systems. In most zoning codes, the local government must modify the Article that creates zoning districts by adding defined solar energy systems to the list of permitted uses for each district and by amending dimensional requirements in the bulk and area schedule for each permitted system. In some zoning codes there is an Article on Supplemental Regulations where these can be added.

[38] WORCESTER COUNTY, MD., CODE § ZS 1-344

[39] Danielle Sugarman, *Model Small-Scale Solar Siting Ordinance* (Center for Climate Change Law at Columbia Law School, 2012) http://web.law.columbia.edu/sites/default/files/microsites/climate-change/files/Resources/Model-Ordinances/Model-Small-Scale/Model%20ordinance%20Solar%20v%207.pdf.

Adding Defined Solar Energy Systems to Appropriate Zoning Districts

First, the municipality must decide in which zoning districts to permit each defined solar energy system. Generally, municipalities allow various types of systems in residential, agricultural, commercial, industrial, and mixed-use districts based on their impacts on surrounding properties.

When amending an existing zoning district to allow solar energy systems, defined systems are added as new land uses listed in the district's use regulations. Use regulations in zoning categorize allowed land uses as principal, accessory, secondary, or special. A principal use is allowed as-of-right on a parcel, while accessory uses are allowed on the parcel if they serve the principal use while being subordinate, incidental to, and customarily found in connection with that principal use. In contrast to an accessory use, a secondary use is another use on a parcel that is not a subordinate use; instead, it rises to the level of a second principal use and is also allowed as-of-right. Finally, a special use is a principal use of the land that is not as-of-right. Special uses must meet certain conditions and undergo a special use approval process before they are permitted. When updating use regulations in zoning to include solar energy, a municipality should add each defined solar energy system as one of these use types in appropriate zoning districts. Below, the four use types are described further as they relate to solar energy systems.

Principal Use

For each district, zoning lists certain uses as principal uses of land that are permitted as-of-right. In most municipalities, one principal use is permitted on each building site. Typically, a solar energy system is considered a principal use when most or all of the energy it produces is consumed offsite. Often, such a system consists of a large-scale, ground-mounted solar field, raising concerns regarding land disturbance, increased impervious surface, and aesthetic consequences. Large solar farms with greater impacts usually are permitted only in industrial, agricultural, or similar districts.

Accessory Use

A solar energy system is an accessory use when it generates power solely for onsite use to benefit the principal use of the land. Accessory uses exist on the same lot as the principal use and are subordinate, incidental to, and customarily found in connection with the principal use. Often, a solar energy system that is an accessory use is small-scale, roof- or ground-mounted system designed to supply energy for a principal use on a residential, commercial, or mixed-use parcel. A municipality may expressly list solar energy systems as accessory uses in particular districts or choose to allow these systems in all zones because they meet the qualifications of the municipality's general definition for accessory uses, which states that accessory uses are customary, incidental, and subordinate to the principal use.

Secondary Use

A solar energy system is a secondary use if it provides energy mostly for onsite uses but ships some offsite. Usually, a system is deemed a secondary use requiring more oversight when it is installed separately as a second use on the same lot as the principal use and exports over a certain threshold amount of power to offsite uses. For example, a medium-scale system sited on a commercial or agricultural parcel might be a secondary use if it provides solar energy for the onsite, principal use while shipping a significant amount of energy offsite to generate additional revenues.

Special Use

Where appropriate, zoning can designate a solar energy system as a special use requiring a special use permit issued by a local board. In these cases, the special use is a principal use allowed but conditioned upon compliance with specific requirements imposed to limit any negative effects on adjacent properties and the community. For example, a municipality may require special use permits to ensure screening or noise attenuation of certain solar energy systems in sensitive locations. If an applicant can demonstrate conclusively that the project complies with all conditions and no negative impact will result, the special use permit usually is granted.

C. Land Use Review Options for Solar Energy Systems

Zoning codes contain provisions that subject various land use proposals to a review and approval process involving local administrative officials and land use boards. The local legislature is responsible for zoning code amendments to permit various types of solar energy systems. In most cases, the planning board or commission is responsible for review and approval of special use permits and site plan and subdivision applications involving solar energy systems; in some cases the zoning board of appeals may be the approval body. Zoning code provisions that express project review and approval requirements generally intensify as impacts associated with permitted solar energy systems increase. For example, smaller systems with few or no land use impacts may be exempt from review or enjoy a streamlined administrative review process with fewer standards, while larger systems require a more rigorous, time-consuming, and intense review process before one or more local boards.

Because they have few or no land use impacts, municipalities often “exempt” building-integrated solar energy systems from board review, requiring only a building permit since they are built-in components of buildings themselves. For this solar system, an application is approved administratively through the building permit process, in which the building inspector ensures compliance with the building, electrical, and other codes. The review process is similarly uncomplicated for small-scale systems that are accessory uses, such as a roof-mounted system on a house in a residential district. Small-scale systems allowed as accessory uses generally require review by the zoning enforcement officer to ensure that the system complies with relevant use, bulk and area, and other relevant zoning requirements. If compliant, such systems are approved administratively through the building permit process. To streamline the review process for small-scale, roof-mounted solar energy systems, municipalities in New York can

adopt the NY-Sun Unified Solar Permit, which expedites the process to obtain a building permit. If a system qualifies for the Unified Solar Permit, the building department runs it through an accelerated, 14-day approval process.[40]

Larger solar energy systems with greater potential land use impacts may require more extensive land use review. In these cases, a municipality can subject systems to site plan approval if they exceed certain thresholds for size, total lot coverage, height, energy capacity, or energy usage. For example, many communities require site plan approval for secondary-use solar energy systems installed on nonresidential buildings or lots because the project size is larger and some energy will be used offsite. Major site plan review is required frequently for ground-mounted, principal use systems with large impacts such as land disturbance, increased impervious surface, and aesthetic consequences. Generally, major site plan review involves heightened review with more standards. Minor site plan review has fewer requirements and is appropriate for medium-sized systems with reduced impacts and can result in more streamlined processing.

Alternatively, local governments can allow solar energy systems with greater potential land use impacts as special uses or subject them only to administrative review, rather than require planning commission approval.[41] The planning or zoning board must

[40] The New York State Energy Research and Development Authority (NYSERDA), New York Power Authority (NYPA) and City University of New York (CUNY) developed the Unified Solar Permit (USP) to reduce costs for solar projects by streamlining municipal permitting processes. Municipalities can adopt the USP, part of Governor Cuomo's NY-Sun initiative, to expedite the time it takes qualifying solar energy systems to obtain a combined building and electrical permit for a grid-tied system. To be eligible, systems must have a rated capacity of 12 kW or less, cannot be subject to an architectural or historical review board, must not need a zoning variance or special/conditional use permit, and must be roof-mounted, compliant with building and related codes, and meet mounting and weight distribution requirements, among others. Along with the application, USP applicants must submit an eligibility checklist, a set of plans that include a site plan, a one- or three-line electrical diagram, specification sheets for manufactured components, and a permit fee. Permit determinations are issued within 14 days of complete application submission. For more information about the USP, visit http://ny-sun.ny.gov/-/media/Files/About/Statewide-Initiatives/CGC-Plans/Guidance/NYS-unified-solar-permit.pdf.

[41] In Minnesota, Goodhue County's solar energy system regulations require all solar energy systems that have greater than a 2 kW capacity to obtain a building permit and a zoning approval in the form of an administrative review; a zoning permit; or a conditional or interim use permit, depending on the zoning district in which the system is located. Where allowed, utility-scale photovoltaic rooftop and ground-mounted solar energy systems always require a conditional or interim use permit. Commercial-scale rooftop and ground-mounted solar energy systems require a conditional or interim use permit in certain environmentally sensitive zoning districts and a zoning permit in all other districts where allowed. All small-scale residential rooftop and ground-mounted solar energy systems may be approved administratively. GOODHUE COUNTY, M.N., ZONING ORDINANCE ART. 19, http://www.co.goodhue.mn.us/DocumentCenter/View/2428. Land use regulations in Yolo County, CA, allow approval of small solar energy systems for onsite uses through the issuance of a building permit and a zoning clearance, provided the application meets setback and other standards set forth in the solar energy regulation. If the County's chief building official believes a small solar energy system could have a specific, adverse impact upon the public health and safety, the official may require the applicant to apply for a use permit. Medium-sized solar energy systems for onsite and/or offsite uses may be approved through site plan approval, provided the application meets specific standards set forth in the solar regulation for medium-sized systems. The site plan review approval is ministerial (not discretionary) and does not require a public hearing. If an application for a medium-sized system fails to meet any of the standards, the zoning administrator must review it as an application for a minor use permit. The board of supervisors approves large and very large utility-scale solar energy systems through the issuance of a

review proposed special uses to determine whether they meet required standards in the special use permit regulations designed to minimize negative impacts.

D. Reviewing Bulk & Area Requirements

After adding solar energy systems to zoning districts and choosing a review process for each defined system, municipalities should review the bulk and area charts in those zoning districts to determine whether any requirements will create barriers to these systems. In cases where existing bulk and area requirements, such as height or lot coverage standards, impede the construction of a solar energy system, the municipality should consider amending setback and building height requirements to accommodate these systems or exempting solar energy systems from some or all of these requirements.[42]

E. Adjusting Site Plan Requirements to Expedite Approval of Solar Systems

Local site plan regulations can apply to solar energy systems added to an existing building or developed lot, as well as to new developments that include these systems. Site plan regulations require applicants to submit a drawing or site plan prepared according to required specifications showing the arrangement, layout, and design of the proposed land use for review and approval by a local board. Typically, the site plan must show certain elements, such as access, parking, landscaping and buffering, drainage, utilities, roads, curbs, lighting, and the location and dimensions of the principal and accessory buildings and any other intended improvements. Some communities require site plans, particularly those of larger projects, to show adjacent land uses and to provide a narrative statement of how the site's development will avoid or mitigate adverse impacts on them.

Depending on the type, location, and size of impacts associated with a solar energy system, a municipality may amend its regulations to require major or minor site plan review and approval or to exempt the system from site plan review.[43] Generally, major site plan review is reserved for larger projects and requires site plan applications to include more information, while minor site plan review is required for smaller projects and entails a simpler application process.

Major Site Plan Review

Because they involve larger projects with bigger impacts, major site plan applicants must submit additional information with the site plan, such as a transportation or stormwater management plan. Additionally, major site plan regulations typically require

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major use permit, following the planning commission's recommendation, provided the application is consistent with conditions and standards set forth in the County's solar regulations for large and very large systems. YOLO COUNTY, C.A., CODE § 8-2.1104, .1105, http://www.yolocounty.org/home/showdocument?id=26308.

[42] Bedford, New York allows solar energy collectors as as-of-right accessory structures in all zoning districts subject to maximum area, height, and setback requirements. However, the Town's zoning also exempts solar energy collectors from maximum building height limitations, provided they do not extend more than 15 feet above the roof and they do not cover more than ten percent of the roof area. TOWN OF BEDFORD, N.Y., CODE §§ 125-20, -27.

[43] *See supra*, note 40 (for an example of how this is handled in Yolo, CA).

two review phases, preliminary and final, and involve required public notice and hearings on site plan applications prior to taking final action.

Marion, Massachusettes, adopted a solar bylaw that requires major site plan review, by expedited special use permit provisions, for ground-mounted solar farms in residential districts. Full site plan review is optional. In addition to submission requirements in the Town's site plan regulations, the planning board may require major site plan applicants for solar projects to provide electrical diagrams detailing solar PV systems; associated components; electrical interconnection methods; all National Electrical Code compliant disconnects and overcurrent devices; documentation of major system components, including PV panels, the mounting system, and inverter(s); the designed annual electrical output of the system; and evidence of annual onsite consumption in watt-hours. Additionally, the planning board may require contact information for the proposed system installer and any agents representing the project proponent, as well as evidence of site control and utility notification, an operation and maintenance plan, an emergency response plan, and a description of financial surety.[44]

Minor Site Plan Review

In contrast to major site plans, some municipalities adopt minor site plan requirements to streamline the permitting process for smaller projects by requiring less information and providing faster review. Generally with minor site plan review, the legislative board can waive certain requirements for approval, no public hearing is required, and, in some cases, administrative staff can complete the review in lieu of planning board review.

A solar bylaw in Marion, Massachusetts, requires minor site plan review for ground-mounted systems that provide onsite electrical use in residential districts and that are greater than 600 square feet or 1.5 percent of the lot size, whichever is larger. The bylaw also subjects non-residential, ground-mounted systems that are not classified as solar farms to minor site plan review if the solar panel array is greater than 900 square feet or 1.5 percent of lot size, whichever is greater, but has a maximum system size of 1500 square feet.[45]

F. Coordinating and Controlling the Review by Other Local Boards

Solar energy projects may require review by other local boards in some localities. These include the zoning board of appeals, design or architectural review boards, and

[44] TOWN OF MARION, MA., BYLAW § 16.5.3, -.8, -.11, http://www.marionma.gov/Pages/MarionMA_Clerk/Bylaws%205.12.14.pdf.

[45] In addition to the Town's standard site plan submission requirements, the planning board may require minor site plan applicants for solar projects to provide electrical diagrams detailing solar PV systems; associated components; electrical interconnection methods; all National Electrical Code compliant disconnects and overcurrent devices; and documentation of major system components, including PV panels, the mounting system, and inverter(s). TOWN OF MARION, M.A., BYLAW § 16.5.2, -.6.2, -.7, http://www.marionma.gov/Pages/MarionMA_Clerk/Bylaws%205.12.14.pdf.

historic preservation commissions. Where such requirements exist, action should be taken to coordinate carefully the review of the involved boards and to expedite the approval process as much as possible.

Zoning Board of Appeals

The zoning board of appeals is authorized to issue variances from certain zoning requirements. If a developer applies to the local building department for permission to build a solar energy system and the application does not comply with the setback, height, or area requirements of the zoning ordinance, the proposal must be denied. The applicant then may apply to the zoning board of appeals for an area variance, prolonging the approval process. Local governments can eliminate this extra step in the process by amending appropriate bulk and area requirements to accommodate allowed solar energy systems or including setback or height exemptions for solar energy systems in zoning. Where solar energy systems are not defined and permitted in the zoning ordinance, some zoning boards of appeals might approve them through a use variance, which can be time-consuming and subject to legal challenge.

Design or Architectural Review Board

Design review laws authorize a design or architectural review board (ARB) to advise on or review and approve proposed new construction and building improvements in zoning districts or areas of special scenic, architectural, or aesthetic importance, as defined by the law. During its review, the ARB verifies that a proposed project's exterior design and treatment conforms to the regulation's design review standards. Often, design review laws require the board to determine whether proposed construction is "excessively dissimilar" to an established design pattern, authorize the board to eliminate "visual offensiveness," and/or empower the board to conform design in discrete areas to the character of specific landmarks or architecture of distinction. Under these standards, an ARB may determine that solar energy systems do not conform to required design review standards. Additionally, the design review process can add weeks to the approval process for solar energy systems. Local governments can prevent this conflict and streamline the process by amending design review laws to exempt or accommodate solar energy systems. Regulations can eliminate design review for systems with negligible impacts, like building-integrated systems and small-scale roof-mounted panels, and include requirements to minimize the visual impact of larger systems.

Regulations in the Village of Mastic Beach, NY., exempt solar energy systems from architectural review board approval if they meet standards set forth in the regulation. For example, roof-mounted solar systems may not extend beyond the exterior perimeter of the building on which the system is mounted or built, and ground-mounted solar energy systems may not extend into the required rear yard accessory setback when oriented at minimum design tilt. Additionally, system design must make best efforts to blend into the architecture of the building or be screened from routine view

from public rights-of-way, and the system's color must be consistent with roofing materials.[46]

Historic Preservation Commission

A local historic preservation commission (HPC) is authorized to review and approve any demolition, relocation, new construction, or exterior alteration affecting designated historic properties within its jurisdiction. Solar installations on or adjacent to designated historic properties require HPC approval, usually in the form of a certificate of appropriateness. HPC review lengthens the approval process for a solar energy system considerably and may result in its disapproval. Generally, an HPC meets only a few times per month, often creating a weeks-long waiting period for applicants. Also, historic district regulations and landmark preservation laws and guidelines may conflict with local solar energy initiatives because solar panels and related equipment frequently clash with historic building aesthetics and architecture. To avoid conflicts and process delays, a local government can amend historic district and landmark preservation laws and guidelines to include exemptions for solar energy systems, or to make historic preservation standards more compatible with local solar energy regulations. For example, these regulations can allow solar energy systems on historic properties if their design and location do not impair the historic district's character and appearance.[47] Historic district regulation is a complex area of law, so municipalities authorized by the State to control development in designated historic districts may need state agency permission to create such standards and to streamline approvals.[48]

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[46] The Village's solar regulation also allows building-integrated photovoltaic solar systems regardless of visibility, provided that the building component in which the system is integrated meets all required setback and regulations for the district in which the building is located. VILLAGE OF MASTIC BEACH, N.Y., CODE CH. 415. *See also*, Babylon, New York's solar power incentive regulation, which expedites all building permit applications for "standard installations," exempting them from architectural review or historic preservation commission review if they meet several requirements. Standard installations must be mounted on a residential structure with a single layer of roof covering; be flush-mounted parallel to the roof surface and no more than six inches above the surface; have an eighteen-inch clearing at the roof ridge and an eighteen-inch clearing path to the ridge; create a gravity roof load of no more than five pounds per square foot for photovoltaic (PV) and six pounds per square foot for residential solar hot water (RSHW); be installed by prescreened contractors as shown on a list maintained by LIPA; use certified PV panels and RSHW equipment; use other equipment such as modules, combiner boxes, and a mounting system that are approved for public use; and comply with all current National Electrical Code (NEC) requirements. TOWN OF BABYLON, N.Y., CODE §§ 89-91 to -95.

[47] The Planning and Zoning Department for the City of Alexandria, Virginia, integrated guidelines for the implementation of solar collectors in its Historic District in the Design Guidelines for the Old and Historic Alexandria District and the Parker Gray District. The city of Boulder, Colorado has created a specific guide entitled "Historic Building Energy Efficiency Guide." The Planning & Development Services/ Long Range Planning for the City of Boulder also integrated solar implementation requirements in the Design Guidelines for Historic Districts and Landmarks. The Montgomery County Historic Preservation Office has included in its historic preservation guidelines design standards for installing solar panels. The guideline states solar panels are permissible, but must be located "in unobtrusive places," and includes other preferential recommendations.

[48] Farmington, Connecticut's historic district regulation states that its historic district and properties commission will not deny a certificate of appropriateness for an exterior architectural feature, such as a solar energy system, unless the commission finds that the feature cannot be installed without substantially impairing the historic character and appearance of the district. The certificate of appropriateness for a solar energy system may require design modifications and location limitations that do not significantly impair the system's effectiveness. CITY OF FARMINGTON, CT., CODE § 111-26.

The National Park Service has set standards for the rehabilitation of historic buildings in *The Secretary of The Interior's Standards for Rehabilitation & Illustrated Guidelines on Sustainability for Rehabilitating Historic Buildings*. The Guide sets specific standards for retrofitting solar power to historic buildings. The standards set in the Guide are applied to those buildings and/or districts that are in the National Register.[49]

IV. The Problem of Solar Access: Easements and Regulations

One of the barriers to the deployment of solar energy systems that are roof- or ground-mounted is the absence of sufficient legal protection of the system's access to sunlight. A few state courts have declared that solar access is an enforceable property right, but most have not, leaving it to state and local legislatures to create solar access laws, if they are so disposed.[50] Access can be crucial to a property owner's decision to invest in and construct a solar energy system.

After some encouraging early judicial holdings,[51] state courts generally refused to recognize the doctrine. As early as 1838, the New York Supreme Court outright rejected the Doctrine of Ancient Lights in *Parker v. Foote*, holding that "such a rule was not adapted to the circumstances or existing state of things in this country."[52] It elaborated, "[It] might do well in England .... but it cannot be applied to the growing cities and villages of this country without working the most mischievous consequences."[53] In *Sher v. Leiderman,* a California court specified that "nuisance law does not provide a remedy for blockage of sunlight."[54] Nearly a decade later, in *O'Neill v. Brown,* an Illinois court held that that the definition of a "solar skyspace easement" in the Illinois Comprehensive Solar Energy Act did not create an actual, legally recognizable easement.[55] In 2012, in *Fox Creek Community Association v. Carson*, the court even upheld a restrictive covenant prohibiting the installation of solar devices in Arizona.[56]

Wisconsin is an example of a state where the judiciary takes a different view. In a 1952 case, *Prah v. Maretti*, the state court outlined the prevailing policy decisions behind limitations on solar access and ultimately rejected them, citing numerous recemt developments that now necessitated solar access.[57] The court noted, "Society has increasingly regulated the use of land by the landowner for the general welfare,"[58] and

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[49] Anne E. Grimmer with Jo Ellen Hensley Liz Petrella, and Audrey T. Tepper *The Secretary of The Interior's Standards for Rehabilitation & Illustrated Guidelines on Sustainability for Rehabilitating Historic Buildings*, Nat'l Park Serv., (2011) http://www.nps.gov/tps/standards/rehabilitation/sustainability-guidelines.pdf.

[50] *See*, Sara C. Bronin, Solar Rights, 89 B.U. L. REV. 1217, 1217 (2009). State courts in the U.S. have generally failed to adopt the British common law doctrine of Ancient Lights.

[51] *Id* at 1259.

[52] *Id* at 309.

[53] *Id* at 318.

[54] Sher v. Leiderman, 181 Cal. App. 3d 867 (Ct. App. 1986).

[55] O'Neill v. Brown, 609 N.E.2d 835 (Ill. App. 3d 1993).

[56] Fox Creek Cmty. Ass'n v. Carson, No. 1 CA-CV 11-0676, 2012 WL 2793206, at *1 (Ariz. Ct. App. July 10, 2012).

[57] Prah v. Mahretti, 321 N.W.2d 182 (Wis. 1982).

[58] *Id.*

that the need for solar access had grown more substantial. The court pointed out that plaintiff, who brought a nuisance action against her neighbor for blocking sunlight, did not need access for "aesthetic reasons or as a source of illumination but as a source of energy." This would promote the general welfare, as "Access to sunlight as an energy source is of significance to both the landowner who invests in solar collectors and to a society which has an interest in developing alternative sources of energy."[11] Finally, the court concluded that the "the policy of favoring unhindered private development in an expanding economy is no longer in harmony with the realities of our society."[59] Ultimately, although the court recognize a cause of action for sunlight interruption in nuisance law.[60]

In the wake of increasing energy demands and the conflicts that they can engender, as well as the limitations that common law provides, states and municipalities have passed statutes that support easements for solar energy. In states such as California, these statutes have enabled the judicial system to solidify solar energy as a crucial part of the energy infrastructure.

Solar Access Protections

Solar easements, protecting access to sunlight, can be created by voluntary agreements between neighbors, or by government regulation. A voluntary solar easement is a legal agreement between adjacent property owners to protect solar access for a solar energy system on one of the properties. Typically, these regulations require written and recorded solar easements that define easement dimensions, how the easement will terminate, and compensation for easement maintenance or interference, among other provisions.

When local governments grant property owners solar access permits for solar energy systems, the result is the same: by enforcing the permit, the protected property owner essentially gains a solar easement. Local laws that allow solar access permits, generally require the applicant to submit extensive information showing system installation and its relationship to adjacent properties. The permit is to protect the applicant from sunlight blockage by building construction or shading of the solar installation through vegetative growth on adjacent properties. Some localities protect solar access by mandating "solar fences" in new developments through their subdivision regulations. Solar fences are defined areas within a lot in which access to sunshine is protected regardless of whether a solar energy system exists. Finally, local regulations may require building orientation, design, or setbacks to prevent shading and preserve access to sunlight for neighboring properties.

Some state laws protect solar access in limited circumstances. In its 2013-14 session, New York's legislature considered a bill that would prohibit homeowners associations from banning both the installation of solar arrays and rooftop solar panels. This bill would amend New York Real Property Law § 339(j) to add that "no board of managers

[59] *Id.*
[60] *Id.*

shall ban in the by-laws any solar panel arrays, the installation of rooftop solar panels, or the clearing and trimming of vegetation on unit owners' properties that obscure such solar panel arrays or rooftop solar panels, provided however that the board of managers shall be consulted regarding the aesthetics of such solar panel arrays."[61] This addition would prevent one of the biggest impediments to individualized, residential solar energy system installation: homeowner association agreements that stress aesthetics of a neighborhood over promotion of renewable energy. In 2015, the New York legislature also considered a bill that would amend New York Town Law § 263 and Village Law § 7-704 to require local zoning to consider the accommodation of certain renewable energy sources, such as solar.[62]

California adopted a Solar Rights Act in 1978 to protect the rights of property owners in Home Owners Associations (HOAs) to install solar energy systems. The act provides that any covenants, conditions, or restrictions (CC&Rs) that prohibit or restrict the installation or use of a solar energy system are void.[63] Although the Act notes that it is the policy of the state to promote and encourage the use of solar energy systems, the Act allows for the imposition of reasonable restrictions on these solar energy systems. Reasonable restrictions include restrictions that do not significantly increase the cost of the system or significantly decrease its efficiency, or that allow for an alternative system of comparable cost, efficient, and energy conservation benefits. A HOA can thus impose reasonable provisions that either: restrict the installation of solar energy systems in common areas; require the owner of a separate interest to obtain a HOA's approval for the installation of a solar energy system; provide maintenance, repair, or replacement of the roofs; and require installers to indemnify or reimburse the association (or its members) for loss and damages.[64]

In T*esoro del Valle Master HOA v. Griffin*,[65] the court interpreted restrictions on solar systems as reasonable under the Act. The HOA Tesoro) imposed CC&Rs to protect homeowners' safety and to maintain architectural consistency throughout the community. The homeowners were required to obtain the Architectural Control Committee's (ACC) approval before making improvements to their property. The court, in affirming the jury's verdict in favor of Tesoro, noted that under California law, HOA's have the right to impose reasonable CC&Rs on improvements to property.[66] The court found that nothing in the language of the Act prohibits the consideration of aesthetic impacts in the ACC's determinations, reasoning that the provision that "the application

[61] Bill No. A08296.
[62] Bill No. A00065.
[63] "Any covenant, restriction, or condition contained in any deed, contract, security instrument, or other instrument affecting the transfer or sale of, or any interest in, real property that effectively prohibits or restricts the installation or use of a solar energy system is void and unenforceable." Civil Code § 714(a).
[64] Civil Code §714.1(a)-(d).
[65] 200 Cal. App.4th 619 2011
[66] *See* Civ. Code § 1354(a): "The covenants and restrictions in the declaration shall be enforceable equitable servitudes, unless unreasonable, and shall inure to the benefit of all and bind all owners of separate interest in the development."). Generally, use restrictions are deferred to as valid and are enforced "unless they are wholly arbitrary, violate a fundamental public policy, or impose a burden on the use of affected land that far outweighs any benefit. *See Nahrstedt v. Lakeside Village Condominium Assn*. 8 Cal. 4th 362, 382 (1994).)

for approval shall be processed and approved by the appropriate approving entity in the same manner as an application or approval of an architectural modification to the property" indicates that the legislature specifically anticipated that a modification to the property" would involve consideration of aesthetics.

An example of local regulation of solar access can be found in Ashland, Oregon.[67] Its solar access regulations require structures on all lots to comply with solar setbacks that define the minimum distance between a structure and the property boundary. The regulations classify each city lot according to the magnitude of its north-south lot dimension. Based on these measurements, the regulation requires solar setbacks from the northern lot line designed to minimize shadows at the north property line of each lot. In addition, Ashland's solar access regulations allow applications for a solar access permit to protect new solar energy systems from shading by vegetation on neighboring properties. Solar permit applicants must submit a fee, contact information, a solar energy system installation statement, system site and location information, a sun chart, tax lot information for adjacent properties, a parcel map showing existing buildings and vegetation, and solar access permit height limitations for adjacent properties as defined by the regulation. When a solar access permit is granted, city staff file the permit with the county clerk, including notices on each affected tax lot, and send a certified letter to the applicant and property owners of affected tax lots stating that the permit was granted.

V. Requiring Solar Energy Systems

In addition to permitting solar energy systems through zoning innovations, localities can amend land use regulations to require or incentivize solar energy systems, particularly in new development projects. These include amendments to subdivision requirements, building ready standards in building and related codes, solar mandates, solar access protections, and zoning incentives in certain districts. To further encourage solar energy systems, local governments can implement other incentives, such as streamlining the approval process and fee reductions.

Subdivision Requirements

Subdivision regulations can require solar-ready lot and building orientation. Building orientation affects a building's ability to utilize solar energy systems, as well as natural lighting and passive heating. Subdivision regulations can require a street and lot orientation buildings and lots along long blocks facing true north or true south, ensuring maximum solar access for the buildings' south sides. To further facilitate solar energy generation, subdivision requirements can mandate builders to equip homes so they are solar panel ready, where roof top panels are not provided in the first instance but the mechanical and electric systems are in place for homeowners to install them more cheaply in the future and, if done correctly, without need for further land use approvals. Finally, subdivision regulations may require a community solar system to serve the

[67] ASHLAND, O.R., MUNICIPAL CODE § 18.70

energy needs of a new subdivision's homes, compelling the homeowners' association to manage the community system and to charge members for operating costs.

The subdivision regulations of Boulder, Colorado, require the developer to maximize solar energy usage by requiring solar siting criteria for new subdivisions. The developer must orient lots and buildings and site structures to maximize the solar potential of each principal building, avoid shading by other nearby structures, allow owner control of shading, and minimize off-site shading of adjacent properties. Additionally, the developer must design the details of the building to maximize utilization of solar energy and must locate open space areas to protect buildings from shading by other buildings.[68]

Building Ready Standards

Where authorized by state law, municipalities can require solar-ready construction standards in local building codes. These standards may include electrical and plumbing accommodations for future solar energy systems, as well as requirements for building orientation and roof design that maximizes solar access and supports these systems.

In Chula Vista, California, the electrical code includes photovoltaic (PV) pre-wiring requirements that mandate all new residential units to include an electrical conduit specifically designed to allow the later installation of a PV system that utilizes solar energy as a means to provide electricity.[69] Similarly, Chula Vista's plumbing code requires all new residential units to include plumbing specifically designed to allow the later installation of a solar water heater that utilizes solar energy as the primary means of heating domestic potable water. To obtain a building permit, the applicant's building plans must include both PV pre-wiring and solar water heater pre-plumbing. The building official may modify or waive these provisions if the applicant demonstrates that the requirements are impractical due to shading, building orientation, construction constraints, or parcel configuration.

Additional Solar Mandates

Some local governments may require certain new developments to include solar energy systems or contribute to another solar energy project elsewhere in the community. In Lancaster, Pennsylvania, for example, the local solar energy system implementation regulation requires all new single-family homes to have a solar energy system to be eligible for a building permit. The mandate includes subdivisions,

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[68] CITY OF BOULDER, C.O., CODE § 9-12-12(O). Boulder's subdivision regulations also require compliance with the City's solar access requirements in Code § 9-9-17, which divide the City into three Solar Access Areas (SAA). Solar siting requirements for new subdivisions require residential units in all SAAs to have a roof surface oriented within thirty degrees of a true east-west direction and to be flat or not sloped towards true north. Each residential unit in an SAA I district must have an exterior wall surface that is oriented within thirty degrees of a true east-west direction and located on the southernmost side of the unit, and each nonresidential building with an anticipated hot water demand of one thousand or more gallons a day must have a roof surface that is flat or oriented within thirty degrees of a true east-west direction

[69] CITY OF CHULA VISTA, C.A., MUNICIPAL CODE §§ 15.24.065; 15.28.015.

requiring the developer to meet the aggregate energy generation requirement within the subdivision (as calculated by the per-unit energy generation requirement multiplied by the number of homes in the subdivision). Alternatively, a homebuilder may choose to meet the solar energy generation requirement by purchasing solar energy credits from another solar-generating development located within Lancaster.

VI. Incentivizing Solar Energy Systems

Zoning Incentives

Developers may hesitate to voluntarily provide solar energy systems because of the costs involved and market limitations on prices. By allowing developers to build beyond maximum development densities in local zoning, they can earn additional profits and use these to install solar energy systems. New York municipalities are authorized to adopt incentive zoning systems and may amend zoning to include bonus zoning or density incentives that allow developers to build at greater densities than otherwise permitted or to adjust certain bulk requirements like height or required parking spaces in exchange for installing a solar energy system. When creating a zoning incentive, municipalities must research local market conditions and engineer the incentive to provide an appropriate bonus in exchange for the amenity.

Gorham, Maine, provides a maximum density bonus of 25 percent over the allowable base density for residential and nonresidential uses in planned unit developments (PUD) in exchange for public amenities, including solar access and energy efficient design, layout, and construction.[70] To qualify for a bonus of 5 percent above the allowable base density, a PUD may provide solar access to 40 percent of the dwelling units and ensure through appropriate deed restrictions that dwelling units will utilize solar energy systems for water and space heating purposes.

Other Incentives

In addition to zoning incentives, local governments can provide other incentives to encourage solar energy system installation. Possible financial incentives include property tax abatements, reduced or discounted application fees, or fee waivers associated with solar energy systems. A municipality can create an educational incentive for these systems by establishing an information clearinghouse that directs residents to resources providing technical assistance and financial assistance for solar energy system installations. Additionally, local governments can seek funding from federal and state agencies and leverage state and federal grants to assist residents with system installations. Finally, a municipality can streamline the project review and approval process for solar energy systems to reduce process duration and increase certainty.

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[70] TOWN OF GORHAM, M.E., LAND USE AND DEVELOPMENT CODE, Ch. IA, Section IV, http://www.gorham-me.org/public_documents/gorhamme_codes/land_ord/landuse.

The Chicago Solar Express initiative establishes a streamlined permit approval system for solar installations on residential and commercial properties.[71] Part of the City's Easy Permit Process, the solar permit approval process for small installations (with an energy capacity of less than 13.44 Kw) reduced the process time from 30 days to one day and decreased the fee schedule by $100, from $375 to $275. The streamlined process applies to existing structures, not new developments or major building remodeling or new additions.

VI. Conclusion: The Importance of State and Federal Assistance

Many localities have adopted the techniques discussed in this article, acting independently based on local needs and directed by local leadership. Many more have taken the initiative because of encouragement, information, or funding provided by the state or federal government. This observation aligns with research results published in Urban Affairs Review, where the authors demonstrate that "more policy making occurs in states with a multilevel governance framework supportive of local sustainability action."[72] Localities respond to support, if it is offered in the right way, without a heavy top-down emphasis or requirements that seem like additional mandates. Correcting the deficiencies in the hundred-year old zoning system is not about taking away local power, but working with localities to build a better system. This suggests that we need to discover and implement methods of using federal and state policies and resources to support, guide, and sustain local initiatives to bring local zoning codes up to date.

State assistance should start with ensuring that the zoning enabling act gives local governments power and guidance with respect to adopting zoning innovations that promote solar and other clean energy facilities. New Jersey's Municipal Land Use Law, for example, defines an *inherently beneficial land* use as "a use which is universally considered of value to the community because it fundamentally serves the public good and promotes the general welfare," which includes "a solar or photovoltaic energy facility or structure."[73] This definition sets up solar for success within the state, defining this renewable source as a smart energy choice for the public. The inherently beneficial use designation of solar energy for example, changes the approval process for granting use variances by the Zoning Board of Adjustments. Pursuant to New Jersey law, "No variance or other relief may be granted under the terms of this section, including a variance or other relief involving an inherently beneficial use, without a showing that such variance or other relief can be granted without substantial detriment to the public good and will not substantially impair the intent and the purpose of the

[71] For more information about the Chicago Solar Express, visit http://www.cityofchicago.org/city/en/progs/env/solar_in_chicago.html.

[72] Cities and Sustainability: Polycentric Action and Multilevel Governance, Urban Affairs Review, 2015, Vol. 51(1) 46–73, Polycentric theory, as applied to sustainability policy adoption, contends that municipalities will act independently to provide public services that protect the environment. Our multilevel regression analysis of survey responses from 1,497 municipalities across the United States challenges that notion. We find that internal drivers of municipal action are insufficient. Lower policy adoption is explained by capacity constraints. More policy making occurs in states with a multilevel governance framework supportive of local sustainability action.

[73] N.J. STAT. ANN. § 40:55D-4 (West 2013).

zone plan and zoning ordinance."[74] Thus, the positive criteria for granting a use variance are presumed, and the applicant must only show that there is no detriment to the community by installing a solar energy system.[75]

In researching state and federal law and programs for this article, we found signs of intelligent life in the federal system: countless initiatives made available specifically to help local governments reform zoning and local land use procedures to incorporate solar energy in their local legal regimes. They are too numerous to list here but represent a fruitful research opportunity for a separate article on this subject. .We conclude with a representative federal and state initiative to demonstrate the effectiveness of this emerging federal, state, local partnership.

An example of how the federal government is helping is found in the Department of Energy's (DOE) SunShot initiative. Its mission is to make clean renewable energy resources more affordable and accessible to Americans by making solar energy fully cost-competitive with other energy sources.[76] In 2007 and 2008, the DOE selected 25 US cities as Solar America Cities, an effort that evolved into the Solar America Communities Program. The program aims to accelerate the adoption of solar energy technologies. SunShot's resource center includes resources developed by the 25 cities. The database includes model plans and ordinances, guides and checklists for streamlining permit applications, educational and outreach resources, market analyses, installer certification, codes and standards and much more.

A similarly effective program was created by the State of New York. The NYSolar Smart plan is led by the City University of New York (CUNY) and works in partnership with the New York Power Authority, the New York State Energy Research and Development Authority, municipalities, over thirty organizations representing utility companies, government agencies, and installers.[77] Since 2006, CUNY has led the implementation of state and federal solar grants to implement solutions to lower the soft costs -- inherent in the local land use system -- of installing solar across New York State. The plan includes conducting surveys of existing solar polices, developing a NYS Unified Solar Permit, and workshops. NYS Solar Ombudsmen are appointed and work with NYC/NYS Working Groups in collaboration with municipalities on permitting, interconnection, planning and zoning and other financing options.

[74] N.J. STAT. ANN. § 40:55d-70(d) (West 2007),
[75] Christopher DeGrezia, *Understanding Inherently Beneficial Use*, New Jersey Zoning and Land Use Blog, (Jun. 17, 2009) http://www.njlandlaw.com/archives/280.
[76] *See*, http://energy.gov/eere/sunshot/mission *and*,
https://www4.eere.energy.gov/solar/sunshot/resource_center/
[77] *See*, http://www.cuny.edu/about/resources/sustainability/nyssolar.html