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Land Use Strategies that Mitigate Climate Change

John R. Nolon

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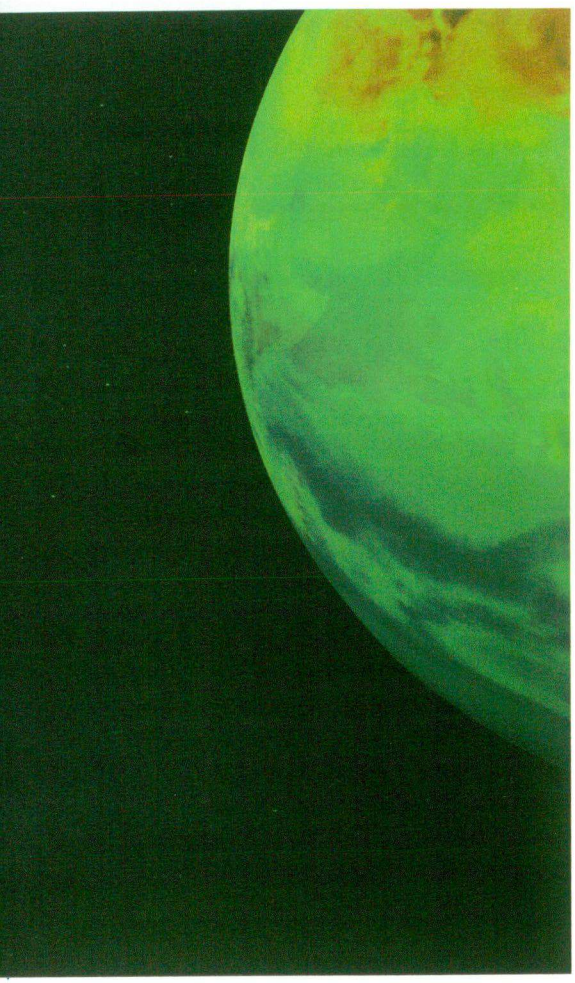

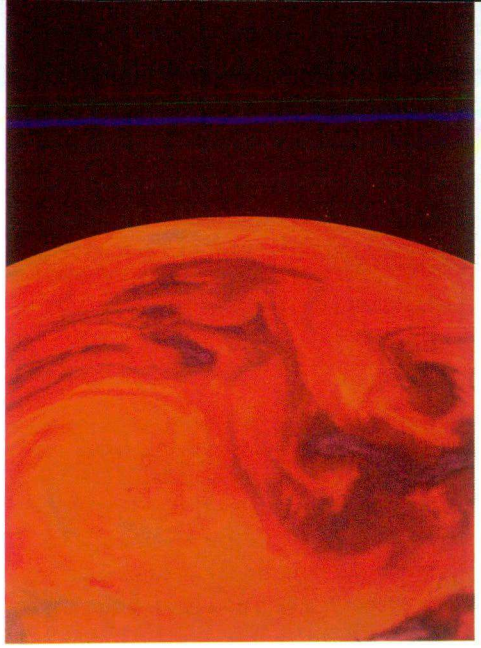

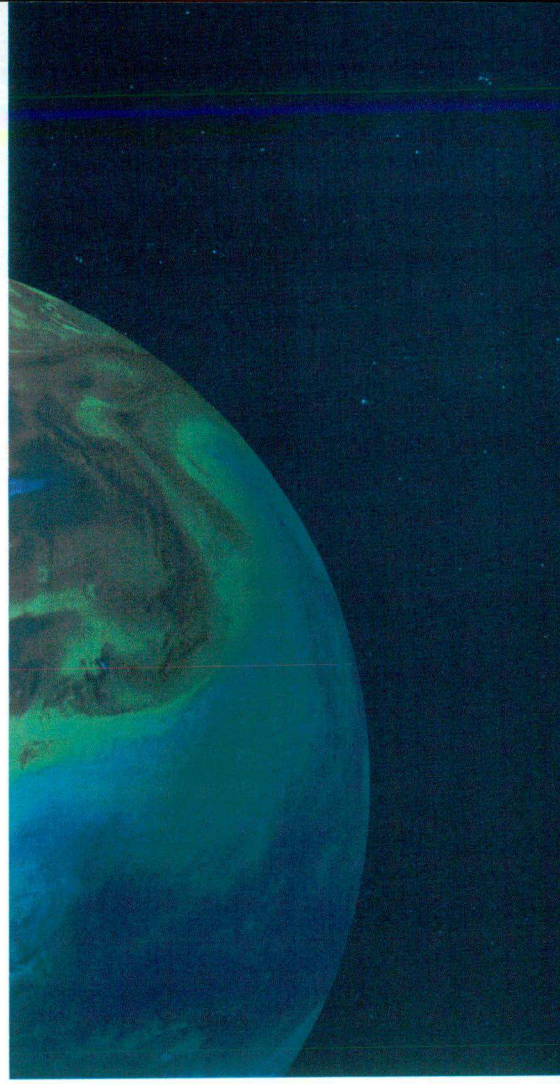

By John R. Nolon

The ABA's House of Delegates unanimously adopted a resolution in August 2019 addressing the urgent problems posed by climate change. It urged all levels of government as well as the private sector to "to recognize their obligation to address climate change and take action" to "[r]educe U.S. greenhouse gas emissions to net zero or below as soon as possible[.]" ABA Resolution, https://bit.ly/32LDW1h. The resolution also urged Congress to adopt legislation to reduce greenhouse gas emissions based on sustainable development principles and to engage in "constructive international discussions under the United Nations Framework Convention on Climate Change[.]" Id. Finally, addressing practitioners, it urged lawyers "to advise their clients of the risks and opportunities that climate change provides." Id.

At first blush this resolution seems to have little to do with the practice of law in most law firms and agencies that do not engage with the federal government or international bodies. This is not the case, however, particularly now that the Paris Accord and the Intergovernmental Panel on Climate Change (IPCC) have called on state and local governments to contribute to climate change mitigation.

In 2014, the IPCC embraced the critical

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role of municipal governments in mitigating the causes of climate change. Chapter Twelve of its Fifth Assessment Report recognized the plenary power of local governments to shape human settlements and the direct relationship between land use patterns and climate change mitigation. In 2015, the Paris Climate Agreement adopted by the Conference of the Parties followed suit. The recognition of a key role for the grassroots levels of government—both states and localities—provides boundless opportunities to lawyers practicing real estate, land use, environmental, and municipal law. Local governments are embracing this role, despite the US withdrawal from the Paris Climate Agreement, discussed below.

This article discusses techniques and strategies that municipal governments can employ to mitigate climate change, of which land use and municipal law lawyers should be aware. For more information on this topic by the author see *Low Carbon Land Use: Paris, Pittsburgh, and the IPCC,* 40 U. Ark. L.R. 551 (2018).

Land Use Law and Climate Change

In 2004, Princeton Professor Robert Socolow provided a framework for mitigating climate change through "stabilization wedges," each capable of preventing at least a billion metric tons of carbon emissions annually using existing technology. Stephan Pacala & Robert Socolow, *Stabilization Wedges: Solving the Climate Problem for the Next 50 Years with Current Technologies*, 305 Science 968, 970 (2004), https://bit.ly/1SwfUQA. This article borrows components from Professor Socolow's wedge and reconfigures them into a "land use stabilization wedge." Each component of this wedge is capable of significantly reducing or capturing carbon dioxide (CO2), which is the biggest contributor to the greenhouse gases that cause global warming.

Whether, in the aggregate, the land use techniques described below will prevent a billion or more metric tons of emissions each year depends on how many, and to what extent, local governments embrace them. This can be facilitated by lawyers who advise state and local agencies, land developers, and environmental advocates.

Energy Conservation in the Built Environment

The first component of the land use stabilization wedge is buildings. The most recent Environmental Protection Agency (EPA) Greenhouse Gas Inventory estimates that residential and commercial buildings emit 35 percent of domestic CO2 emissions. The increased demand for new residential and commercial space is related directly to the consumption of fossil fuel and CO2 emissions. As a result, the legal authority to regulate building location and construction to reduce these emissions can be a critical component of climate change mitigation policy.

According to the Census Bureau, the US population will increase by more than 90 million people during the next 40 years. Sandra L. Colby & Jennifer M. Ortman, *Projections of the Size and Composition of the U.S. Population: 2014 to 2060,* at 1 (2015), https://bit.ly/2sBhYjW. Using today's domestic household size, there will be around 35 million new households. This population increase will expand market demand for new residential and commercial buildings and the rehabilitation or replacement of millions of structures that will age-out during the next four decades.

The land use standards that dictate energy efficiency in new and substantially rehabilitated buildings are created by state and local governments. The size and shape of buildings and their interior spaces, their thermal efficiency, and whether they are served by efficient energy sources are dictated and influenced by zoning and other local land use regulations.

Regarding building construction, state legislatures propose energy conservation codes for buildings, which in many states are then adopted, enforced, and enhanced by municipal governments. Locally-enforced energy codes ensure that all new and substantially rehabilitated buildings are constructed with energy conservation in mind. The International Codes Council (ICC) gradually strengthens these energy conserving code requirements and reissues new recommended standards every several years. Most states have adopted the ICC's International Energy Conservation Code (IECC) as a baseline to conserve energy in new and substantially rehabilitated buildings. State law in some states allows local governments to adopt enhancements to the state energy code that achieve even greater conservation. In 2018, New York's Building Code Council adopted the NYStretch-Energy Code for local governments to consider. It achieves energy efficiency performance significantly above the baseline 2019 Energy Conservation Construction Code.

The novel idea of requiring large, energy-consumptive houses (so-called McMansions) to be more energy-efficient was incorporated into local law in Marin County, California. The county requires large homes with more than 4,000 square feet to exceed energy conservation code requirements by 15 percent. Marin County Ordinance § 19.04.140 (2011). If the home size is greater than 4,000 square feet, but less than 5,500 square feet, it must exceed the state code in efficiency by 17.5 percent. For homes between 5,500 and 6,500 square feet, the requirement is 30 percent. Homes over 6,500 square feet must be "net zero energy" users, a goal that green builders can actually achieve.

Energy Star is a voluntary set of standards, one of many that local governments may reference in their zoning and energy code requirements. The town of Greenburgh, New York, enhanced its local energy code by requiring all new homes to comply with the Energy Star rating system promulgated by the EPA and the US Department of Energy. See Greenburgh, N.Y., Code § 100-20 (2011). It governs appliances, heating and cooling systems, the thermal envelope, electrical, ventilation, and equipment efficiency.

Also, in New York, the town of Blooming Grove offers home builders a density bonus under its zoning code to encourage them to adopt Energy Star. See Blooming Grove, N.Y., Code § 235-14.1(A)(3) (2011). The town awards a ten percent increase in the number of homes that can be constructed under local zoning in exchange for making the homes Energy Star compliant.

Local land use boards can require developers and their design consultants to follow an integrated design process, in which they collaborate during the early stages of the project review process to

achieve the greatest possible energy conservation and cost reduction. It is at this stage that decisions can be made about building orientation, form, shading, energy efficient exterior lighting, window size and location, rooflines and extensions, reflective roofing, height-to-floor ratios, and building features that relate to passive ventilation and cooling.

Using similar powers and administrative techniques, localities can promote the construction of passive homes, both single- and multi-family. Instead of mechanized systems providing heating or cooling, passive buildings rely on the construction materials and techniques to use significantly less energy. Buildings in the United States that implement the latest domestic passive house standards use 10 to 25 percent of the energy of similarly sized, conventionally constructed residential structures. Techniques used include thick insulation, exterior air sealing, fluid-applied silicone air barriers over plywood sheathing, triple-paned windows, and high-efficiency heat-recovery ventilators.

In Milton, Vermont, a nonprofit developer created multi-family senior apartments, using passive building techniques. The heating bill for these 30 senior households is expected to be 80 percent less than the cost of energy required by similarly sized buildings and even less than that of many single-family homes in the community. See Jeffrey Spivak, *Multiple Efficiencies for Multifamily*, Am. Plan. Ass'n Mag. (Oct. 2017), https://bit.ly/2BFZ3GA. This technique holds great promise as passive houses continue to draw support from around the country with certified passive house construction doubling almost every year.

Reducing Emissions in the Transportation Sector

The second component of the land use stabilization wedge focuses on transportation, which is the largest source of CO2 emissions from fossil fuel combustion in the United States. In 2016, Americans drove more than 3.2 trillion miles, 89.8 percent of which are attributable to light-duty motor vehicles (i.e., passenger vehicles and light-duty trucks such as minivans and sports utility vehicles). See U.S. Dep't Transp., Traffic Volume Trends 2 (2016), https://bit.ly/2lJ4HB3.

Light-duty motor vehicles account for 59.4 percent of total transportation CO2 emissions, which contribute 19.1 percent of national CO2 emissions. See U.S. Envtl. Prot. Agency, *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2015*, at ES-11.

The Fifth Assessment Report of the IPCC, Chapter 12, targets the shaping of human settlements as a key to climate change mitigation. It focuses on "the patterns and spatial arrangement of land use, transportation systems, and urban design elements, including the physical urban extent, layout of streets and buildings, as well as the internal configuration of settlements." Chapter 12 also notes that "areas with a high mix of land uses encourage a mix of residential and retail activity and thus increase the area's vitality and the aesthetic interest of the neighbourhood." Land use regulations can ensure attractive buildings, personal neighborhood scales, and amenable green infrastructure.

The role of transportation in reducing greenhouse gas (GHG) emissions is discussed at length in a 2010 US Department of Transportation report. Like Chapter 12 of the IPCC Fifth Assessment, the report finds that GHG emissions can be decreased by using transportation strategies. Dep't of Transp., *Transportation's Role in Reducing U.S. Greenhouse Gas Emissions, Vol. 1: Synthesis Rep. to Congress*, ES-7 (2010), https://bit.ly/2OQ9Phs. It calculates that these strategies, including land use law reform, could decrease GHG emissions from transportation by six percent to 21 percent by 2050. Similarly, an Obama Administration report in 2016 identified a "pathway" to reduce GHG emissions involving smart growth patterns of development such as walkable, livable, compact, and mixed-use development. See The White House, *United States Mid-Century Strategy for Deep Decarbonization* 33, 56-57 (2016), https://bit.ly/2W9DsQ9.

Little can be done to reduce emissions from personal travel without this type of neighborhood development. What can be done to reduce emissions in compact, mixed-use neighborhoods is to provide a variety of mobility options, including projects that enhance walking and biking, provide for safe and attractive pedestrian experiences, and create a human-scale sense of place.

The successful development of transit stations and rail and bus lines is dependent upon land use densities and mixed-use development. There must be enough commuters in a transit station area to provide a base level of ridership. In addition, ridership must be sufficiently diverse to ensure that people are traveling to work, to shop, to seek entertainment, and to go home at various times during the day, thereby increasing the cost efficiency of the transit system.

Even where communities are not served by transit systems, local leaders can create compact, mixed-use neighborhoods that reduce car trips and miles traveled. Zoning controls can limit the size of housing units and combine retail, office, and residential land uses, putting services, shops, and jobs in closer proximity to homes. Communities not yet served by transit can designate one or more priority growth districts and create overlay zones for them that allow greater densities and more land uses than permitted in the underlying zoning districts. By clustering development strategically, these growing localities position themselves for future service by commuter rail or bus rapid transit, thereby becoming "transit ready."

Suburban areas that adopt higher-density, mixed-use zoning will find it easier politically to adopt strong environmental protection ordinances applicable to the land outside high-density zones. Where state law permits, density bonuses may be provided in denser suburban zones and cash contributions made by developers in exchange. This money can be used to purchase development rights from landowners in sensitive environmental areas outside the higher-density zone, areas that mitigate climate change through biological sequestration. This balance between development and conservation can be accomplished within transit-served urban areas as well—highlighting again zoning's ability to create sustainable settlement patterns and to mitigate climate change.

Capturing Emissions through Biological Sequestration

The green edge of the land use

stabilization wedge is the biological sequestration of CO2. It occurs within the vegetated environment: resources such as forests, pastures, meadows, croplands, urban trees, and green infrastructure. These landscapes naturally absorb and store approximately 18.2 percent of domestic CO2 emissions. See U.S. Envtl. Prot. Agency, *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2012*, at ES-20 (2013). Perpetuating and expanding the sequestering environment is fundamentally a land use issue, one that can be addressed by land use law.

The above discussion on transportation described how shaping human settlements to promote walkable, livable communities directly mitigates climate change by reducing vehicle miles traveled and energy consumed in buildings. Compact, mixed-use, and sustainable neighborhood developments promoted by land use regulations are, therefore, essential strategies for lowering emissions. Fortunately, they also promote biological sequestration. Such developments attract population growth to urban places by creating healthy neighborhoods for living, working, and recreating, which preserves existing open space in outlying areas. One estimate calculates that doubling urban density would accommodate the entire projected population increase by mid-century, thereby saving an area the size of Connecticut and all of its sequestered resources from development. John R. Nolon, *The Land Use Stabilization Wedge Strategy: Shifting Ground to Mitigate Climate Change,* 34 Wm. & Mary Envtl. L. & Pol'y Rev. 1, 14 (2009).

Strategies that create green infrastructure in developing and developed places, while adding marginally to sequestration, are necessary if urban communities are to attract additional residents and workers. They are essential adaptive technique, too. In developed cities, for example, tree canopies can be increased, green infrastructure added, urban gardens promoted, and buildings oriented to cool living environments, lessen the heat island effect, make cities attractive places to live, and soften the effects of higher densities.

If urban places do not accommodate population growth, outlying lands become targets for residential and commercial development. In these places, land use law can be particularly effective in designating and protecting lands that sequester carbon. As suburban subdivisions are developed, they can be better situated in the existing vegetated landscape through thoughtful land use regulations. Local governments can shape suburban and exurban land development to reduce land coverage and impervious surfaces, limit flooding, retain and add vegetation, protect community character, and prevent ground and surface water pollution. Together, such strategies limit development densities and tend to push population growth back toward developed centers and corridors.

Municipal governments in suburban and exurban areas have a long history of concern for the loss of open space and ecosystem services to encroaching development. Decades-old local open space preservation laws and programs yield a number of strategies that can now be employed as sequestration techniques. These include standards regarding environmentally sensitive area designation, erosion and sedimentation control, grading, filling, drainage, soil disturbance, removal of vegetation, floodplains control, natural resource management, watershed, groundwater, watercourse, and wetland protection, landscaping requirements, ridgeline, steep slope, scenic resources, shoreline regulation, stormwater management, timber harvesting regulations, tree protection and canopy expansion, and the transfer of development rights from lands to be preserved to developable areas.

Most local environmental laws and natural resource protections of this type are enacted because of perturbations at the community level: the loss of a treasured viewshed, the gradual decline of visible open space, surface water or groundwater contamination, increased flooding, or the disappearance of treasured wildlife, among others. These disturbing influences motivate local stakeholders and their elected officials to act to address their causes. As a result, local governments are becoming increasingly reliable partners in the global effort to manage climate change.

Distributed Energy—Lost in Transmission

As noted above, residential and commercial buildings are responsible for 35 percent of domestic CO2 emissions. Shockingly, two-thirds of the fuel used to generate electrical power in the United States is lost as escaped heat at the point of generation and in transmission. Many of our electrical generation plants are located at sites far removed from where the power is needed: where people live and work and where industry operates. Much of the energy lost to generate electricity for the conventional power grid can be saved by on-site or distributed energy generation.

Pittsburgh has long been a leader in mitigating climate change, using its local land use power and democratic processes to reduce energy consumption and fossil fuel emissions. The city's zoning code, in fact, aggressively facilitates one of the most promising mitigation measures, that of promoting distributed, or on-site, power generation. Pittsburgh is also a model smart city. In response to the US Department of Transportation's Smart City challenge in 2015, the city developed a plan to create innovative, interconnected infrastructure that responds efficiently and affordably to the transportation and energy needs of local residents. The city called it SmartPGH: a plan to integrate multiple interconnected systems, including a network of microgrids that generate electricity on-site, greatly reducing the energy lost in remote generation and transmission.

The Department of Energy's Research and Development Program defines a microgrid as "a group of interconnected loads and distributed energy resources within clearly defined electrical boundaries that acts as a single controllable entity with respect to the grid. . . . [that] can connect and disconnect from the grid to enable it to operate in both grid-connected or island-mode." U.S. Dep't of Energy, *Summary Report: 2012 DOE Microgrid Workshop 1* (June 30, 2012), https://bit.ly/2PhxbR8. Microgrids can capture the heat used to generate power by converting it to the energy needed to cool and heat connected buildings. This is called Combined Heat and Power.

Microgrids usually operate in multiple buildings, a city block, or a larger neighborhood and are therefore ideally subject to local planning and regulation. They can be prevented or furthered by land use standards. At the local level, on-site generation and CHP facilities cannot be developed if not permitted by local zoning. Pittsburgh used its delegated power to adopt zoning and land use regulations to enable microgrids to develop. The city council amended its municipal code to add a Performance Point System that incentivizes sustainable development. It awards developers density bonuses for points that they accumulate by developing sustainably, including the development of distributed energy systems such as microgrids.

For zoning to permit or promote a land use, it must define that use and specify where it may be located and how it is to be regulated or facilitated. In one of the first such definitions of its kind, the Pittsburgh Zoning Code says: "Distributed Energy Systems shall mean a range of smaller-scale technologies designed to provide electricity and thermal energy closer to consumers. These approaches include fossil and renewable energy technologies, micro-grids, on-site energy storage, and combined heat and power systems." City of Pittsburgh Zoning Code, § 915.07.C(7), https://bit.ly/2oYwlOp.

As demonstrated here, many energy technologies and facilities cannot be built if they are not permitted at the local zoning level. Localities like Pittsburgh have the ability to incentivize energy conserving development through density bonuses and partnerships using funds from local capital budgets. Innovations in energy technology can be furthered and assimilated by an informed public that understands the seriousness of current problems and the feasibility of new solutions. Because zoning is required to be in conformance with a comprehensive land use plan developed with robust citizen participation, land use planning provides a valuable opportunity to engage and inform the public.

Renewable Energy—Community Power

Community power is an emerging tool for implementing renewable energy technology. It is also a metaphor for the power of local governments to further or frustrate that resource. Historically, land use regulations were more of a hindrance than a help to the adoption of renewable energy facilities. In some communities, the soft costs of renewable energy facilities, including the expense of securing local approval for wind and solar energy systems, remained high while the cost of the systems declined. In others, these facilities were simply zoned out. This is changing, and the pace of change is rapid.

As indicated above, the Pittsburgh Zoning Code defines distributed energy systems to include "a range of smaller-scale technologies designed to provide electricity and thermal energy closer to consumers," including renewable energy facilities. The source of power for microgrids, which is incentivized by this zoning law, can be small-scale renewable energy systems, such as community solar systems and small- to mid-sized individual or clustered wind turbines or on-site solar panels.

Communities like Pittsburgh, using their land use power, are mitigating climate change by defining the types of emerging sources of renewable power and permitting those sources in zoning districts, and some are requiring property owners to accommodate these sources or creatively incentivizing them in a variety of ways. The facilities supported by local land use laws can be called community power systems. These systems are studied as part of land use planning, being called for in comprehensive plans, defined by zoning codes, and permitted in certain districts, either as-of-right, as accessory or secondary uses, or as special permitted uses. Larger, higher-intensity systems can be permitted by zoning but are subject to protective standards.

A few state legislatures have preempted local authority to regulate renewable energy systems, particularly large-scale projects that are subject to state agency regulation and licensing. But most mid-sized and smaller systems remain subject to local regulation under the plenary authority delegated to local governments to control private development. This is understandable; the risks and impacts of energy systems are experienced first-hand locally by the residents of these communities.

When, for example, wind power companies first approach a community with a proposal to develop towers over 200 feet high, with blades nearly as long as a football field, neighbors naturally oppose them until their risks are understood and mitigated by regulation. Less dramatically, a proposal to cluster a few smaller towers to serve on-site needs or even a single wind turbine on a residential roof will initially meet opposition. Residents, particularly adjacent neighbors, are concerned about the noise, visual interruption, ice throws, the strobe effect, change of neighborhood character, and the consequent diminution of their property values. Since land use laws are based on intense democratic participation by the public, these risks must be examined and, where they are well founded, reduced or eliminated.

Local governments typically begin the process of regulating wind power by doing studies of wind generation systems, exploring both the risks and benefits, and memorializing their findings in a comprehensive land use plan amendment or adopting a land use policy. They then define various types and sizes of wind energy systems and prohibit them in inappropriate locations and permit them in others, with needed safeguards. These laws create spacing and setback requirements, limit or buffer noises, require aesthetic controls, and impose regulations on noise levels, viewshed interruptions, heights, location, size, lighting, color, or design. Some laws require local licenses and even provide for decommissioning.

Zoning for solar energy facilities proceeds in the same way. When the Land Use Law Center, to which the author is counsel, was retained to help draft a model solar energy law for communities in New York, it started by working with industry representatives to understand the various types, shapes, intensities, and other characteristics of these facilities. It realized that building-integrated solar systems are part of the structure itself and should be exempted from land use regulation. Small-scale roof-top and

ground-mounted systems should be permitted as-of-right or as accessory uses, and larger scale systems should be subject to special permits and site plan regulations. These were the foundational components of the Model Law, which has been adopted by many local governments in the state.

New York law encourages local governments to expedite small-scale solar systems through its Unified Solar Permit. It applies to solar systems with a capacity of 12 kilowatts or fewer that are not subject to architectural or historical review board approval, do not require a zoning variance or a special use permit, and that are roof-mounted, compliant with building and related codes, and meet mounting and weight distribution requirements.

Without assured access to the rays of the sun, property owners may be discouraged from installing solar panels because the cost of the systems may not be recouped over time if sunlight is diminished by development on adjacent parcels. In most states, solar easements or nuisance actions for blocking the sun's energy are not recognized by common law. However, they can be created by local government regulation. 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. This is an especially viable technique when applied through subdivision regulations to new developments.

Some localities are requiring developers to install solar energy systems or, short of that, to make buildings solar-ready. Other communities incentivize, rather than require, these solar facilities, typically by providing density bonuses for solar panels, solar readiness, and solar access easements.

Conclusion

Although local governments in most states have broad and flexible power to adopt land use regulations of the type discussed above, many of them need counsel from attorneys to educate them about that power and, specifically, the types of strategies they can implement legally. Attorneys can, in compliance with the House of Delegates's resolution, either as pro bono counsel or as retained counsel, provide this knowledge through research and advocacy. Developer clients benefit from the advantages their developments bring to the local community. Now they can add climate change mitigation to that balance sheet and strengthen the case for project approval. Environmental clients are often effective in lobbying local governments to lessen the impact on the environment of their policies and development projects. Their lawyers can inform land use officials that this now includes mitigating the worsening threat of climate change. Lawyers who are retained or work as municipal attorneys can do the same. The advent of local climate change mitigation law is upon us and offers the tool kit that attorneys can use to capture the power of law to confront climate change at every level of society and government. ■