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Climate Change, Zoning and
Transportation Planning: Urbanization
as a Response to Carbon Loading

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Zoning and Land Use Planning

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Climate Change, Zoning and Transportation Planning

Urbanization as a Response to Carbon Loading

On February 2, 2006, the Intergovernmental Panel on Climate Change (IPCC) expressed the consensus of the scientific community that global warming is unequivocal and that its main driver is human activity. On April 7, 2007, the IPCC issued a second report detailing the likely consequences of climate change: widening droughts, more severe storm events, increased inland flooding, sea level rise, and consequent inundation of low lying

lands. The Center for Climate Systems Research at Columbia University estimates that sea levels around New York City's boroughs will increase by five inches by 2030, with some estimates predicting up to 12 inches more between 2030 and 2080. The biggest threat to the safety of millions of city dwellers and its trillions of dollars of real property is the prospect of increasingly vicious storms that may propel encroaching waters onto the shore and threaten the stability of vulnerable buildings.

The latest IPCC report followed on the heels of the United States Supreme Court's April 2nd ruling, in *Massachusetts v. EPA*,¹ that the Clean Air Act gives the agency the authority to regulate tailpipe emissions of greenhouse gases and that the rationale used by the EPA for not regulating these emissions was inadequate. Other than the majority's unremarkable finding that greenhouse gases are an air pollutant, the case disposed of very little substantively, sending EPA back to the laboratory to find a better rationale for its

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regulatory forbearance or to move forward with effective prescriptions.

On April 10th, the Bloomberg administration in New York City issued a study that reported that city residents produce nearly 70% less greenhouse gas per capita than the national average (the average New York City resident is responsible for 7.1 metric tons of gas emissions, while the national average is 24.5).² The study explained that this is because less energy is needed to heat, cool, light, and fuel buildings in the city because they are more densely packed and because residences are smaller than the national average. In addition, the density of the population and the mix of residential and commercial uses make public transit possible and decrease the use of automobiles by city residents.

While the heated battle between the states and the EPA garners major headlines, the zoning laws of New York City have been credited with an astonishing reduction in the gases that are producing climate change and its worrisome consequences. It is, after all, zoning that creates the blueprint for land development and dictates the densities and land uses

that give New York City international bragging rights in the struggle to reduce carbon emissions and slow climate change. It has produced relatively smaller residential units, a large proportion of multi-family, high-rise, and mixed-use buildings, and located retail goods, personal services, and mass transit stations within walking distance for many of the city's residents. Meanwhile, land use patterns across the American countryside produce average daily commutes to work of 23 miles roundtrip. Eliminating that trip by putting the commuter on a bus, train, or bike will reduce that person's contribution to carbon dioxide emissions by 6,520 pounds per year.

Demographic experts project that the American population will increase by 100 million over the next 40 years.³ These additional residents will create a tremendous demand for housing and nonresidential development. It is predicted that over 70 million new homes and 100 billion square feet of nonresidential space will be necessary to accommodate this growth in population.⁴ Since many of the new households will comprise young singles and couples, aging empty nest-

ers, and immigrants, a large percentage of these 100 million Americans will be oriented to urban living. This is in stark contrast to the demand created over the last decade of growth in the U.S. which resulted in two-thirds of the new housing being single-family detached units.

This new and changing demand for urban settlement, combined with the nation's increased concern for climate change, provides an opportunity to rethink urban and suburban development. If future land use can be more like New York City's mixed-use, higher density development, climate change can be mitigated in a variety of ways and a host of other benefits can be secured.

A July, 2007 report of the Northeast Climate Impacts Assessment Synthesis Team confirms that municipal actions, and zoning particularly, rank high among the options available to decision-makers to mitigate and adapt to climate change. Among the three options the report highlights in its Executive Summary is: "Using state and municipal zoning laws, building codes, and incentives to encourage energy-efficient buildings, discourage urban sprawl, provide low-

emission transportation alternatives, and avoid development in vulnerable coastal areas and floodplains."⁵ The Executive Summary concludes with these words: "The Northeast states and their municipal governments have a rich array of proven strategies and policies available to meet the climate challenge in partnership with businesses, institutions, and an increasingly supportive public. The time to act is now."⁶

This article explores the relationship among zoning, transportation planning, and climate change. It discusses the relationship between land use densities and transportation choices, reviews the trend toward transit oriented development in higher density communities and transportation efficient development in lower density areas, presents several case studies where land use and transportation planning are beginning to intersect, and ends with a strategic approach for communities to consider.

Densities and Transportation Choices

Throughout the country, how we travel from home to work, shop, and recreate is dictated by land use laws that establish population densities and

that either separate or mix retail, office, light industries, and residential development. When density is increased for both residential and commercial uses, the distance between origin and destination is shorter and walking, bicycling, and mass transit services are more feasible. In order for increased densities to be tolerated, attractive building, landscape, and streetscape design must be employed. Studies have shown that increased population density decreases automobile ownership and the number of vehicle miles traveled. “[D]oubling the population density of a community could reduce per-family driving by as much as 20 to 30 percent.”⁷ “[O]ne study found that at high density, levels of 10,000 to 50,000 people per square mile, half of all trips were not by automobile, and walking and bicycling increased significantly.”⁸

Transit systems require riders. Transit oriented communities must have enough population to support passenger rail service, bus rapid transit, or other commercial, multi-person conveyances. The Institute of Traffic Engineers estimates that four to eight housing units per acre are necessary to support a transit system at a

minimum level and more than 15 units per acre to support frequent service. Increased commercial density also increases transit ridership. Transit Oriented Development (TOD) refers to mixed-use (residential, retail, and office), walkable communities that attract sufficient riders to make rail or bus service economically feasible. There are many benefits to TOD, not the least of which is the reduction of carbon emissions from automobile tail pipes which is a leading cause of air pollution and a major contributor to climate change.

Not all communities can or wish to support densities at this level. They can still achieve some of the benefits of TOD-type developments. Transportation Efficient Developments (TED) can be created at lower densities that emphasize mixed uses, a range of housing types, and walkability. Studies indicate that the average suburban household in some locations takes up to 15 vehicle trips a day, each one increasing carbon emissions and causing traffic congestion. In these areas, medium density mixed-use communities, clustered around hamlets or crossroads, can reduce vehicle trips, vehicle

miles traveled, traffic congestion, air pollution, and hours spent in the car. TED can bestow some of the energy savings and pollution reducing advantages of TOD in communities that cannot become transit oriented.

There has been much written about transportation choices and land use, most of it under the rubric of “transit oriented development.”⁹ But the terminology is varied, revealing a certain amount of ambiguity about the subject matter. Some authors write about “transit supportive” development, others use the term “transit ready,” and some discuss “transportation efficient” land use patterns. Others appearing in the literature include “transit friendly,”¹⁰ “station area planning,”¹¹ “transportation demand management” (TDM), “traditional neighborhood development” (TND),¹² “planned unit development,”¹³ “transit-related development,”¹⁴ “development-oriented transit,”¹⁵ “transit supportive urban design,”¹⁶ “transit station communities,”¹⁷ “transit focused development,”¹⁸ and “transit villages.”¹⁹

This is a highly interdisciplinary field involving many dif-

ferent geographical contexts, populations, densities, and transportation modalities. Much of what is written about the subject is imprecise about how land use planning and regulation can serve the cause of cost-effective transit oriented or transportation efficient development.²⁰ Any attempt to describe a single approach is subject to a host of exceptions in particular places, but some template for discussing the legal underpinnings of this important subject is needed.²¹

The Urban Redevelopment Context

Since city dwellers, on average, own fewer cars, take fewer automobile trips, and use less fossil fuel to heat and cool their homes, urban redevelopment projects and programs provide a promising context for mitigating carbon emissions by linking land use and transportation planning. The goal of urban revitalization projects, until very recently, was not to mitigate climate change or, necessarily, to link urban neighborhood development with transit services. Their objectives have been to increase urban tax bases, provide needed employment, reduce poverty, and attract more

middle-income residents. Zoning to place more development projects in urban areas, even those served by transit stations, risks being Transit Adjacent Development (TAD); simply being located adjacent to transit services does not necessarily reduce car ownership, parking costs, traffic congestion, or promote transit ridership. Here, we examine some urban redevelopment projects that demonstrate a range of land use regulations, public investments, and partnerships with the private sector that move from “transportation adjacent” to transit oriented development.

Yonkers, New York

The City of Yonkers struggled for years to jumpstart its downtown and adjacent industrial waterfront on the Hudson River, an area that is served by three commuter train stations, less than a half hour trip from New York City’s Grand Central Station. During the past two decades, the city amended its waterfront urban renewal plan over a dozen times before the private market began to respond in the early part of this decade. Governmental commitments to provide urban recreational and de-

sign amenities, build an impressive central library, renovate historic buildings, clear deteriorated buildings, remediate brownfields—all within walking distance of the central rail station on the river—began a process that has led to considerable success.

The zoning and land use techniques that the City of Yonkers used were numerous. It adopted a highly detailed master plan for the waterfront area that contained certain specifications regarding the types of development the city wanted on available vacant land in the area. An innovative zoning technique—called the Master Plan Zone—was adopted that provided as-of-right status for developments that conform to the design standards contained in the master plan. Compliance with New York State’s onerous environmental review requirements was waived for such projects, since the impacts of development contemplated by the master plan had already been studied and mitigation provided.

Early in this process, a developer was selected through a request for proposals process to plan the redevelopment of two centrally-located sites, immediately adjacent to the train sta-

tion. As the city developed its plan and conducted its environmental impact review, the private redeveloper began site planning and provided economic and market input. Information provided by citizens, environmental consultants, other professionals, and the developer were integrated as the process progressed and the master plan and designs for the two sites were adjusted.

The result is the development of Hudson Park, a project that contains nearly 500 middle-income rental residential units, public pedestrian access to a renovated waterfront, restaurants, office and retail space, and immediate access to the train station through carefully designed walkways and entrances that provide security to riders. Hudson Park is a dramatic transit oriented development where parking provided is approximately 50% less than the amount required by traditional urban zoning. This is possible because the buildings and area attract commuters who travel to work by train. The developer saved \$25,000 in development costs for each parking space not constructed, and residents save \$6,000 annually for owning one car instead of two. Three high qual-

ity restaurants and a number of retail stores catering to the middle income population of these buildings have appeared since the first 250 residents moved into phase one of the Hudson Park development. This project and the public amenities provided by the government are credited with sparking considerable private sector interest in the area.

The master plan for the nearby downtown provides for the redevelopment of the central business district and connections to the Hudson River waterfront and central train station. The area, although run-down for decades, contains interesting irregular streets, appropriately scaled buildings, and a variety of public amenities in a pedestrian-oriented environment. Plans for new downtown redevelopment call for mid-rise, mixed-use buildings and the opening up of the Saw Mill River which was buried under concrete decades ago. The city council recently designated a team of three redevelopment companies to plan and implement a multi-phase \$3.1 billion development program in the downtown, extending to the waterfront adjacent to Hudson Park. The proposed centerpiece of this development is a

mixed use building topped by a 6,500 seat AAA minor league baseball stadium, built over parking, 800 residences, and more than 600,000 square feet of office and hotel space. The developers' plan includes more residential development on the waterfront itself, a pedestrian link to the river from the downtown, and integration with the nearly completed Hudson Park project.

Seattle, Washington²²

Seattle's Strategic Planning Office and Sound Transit launched a three-year station area planning program in 1998 to create a development plan for eight areas, each within a quarter of a mile of a light-rail station. In 2001, the city adopted a station area overlay district ordinance, rezoning the land to accommodate higher-density development.²³ Developers are assured that conforming building proposals will receive approval as they do in Yonkers. There are six zoning designations in the station area district, allowing commercial and residential uses of varying density, as well as some light industry.²⁴ Seattle hopes to connect all of its major neighborhoods with bus rapid transit (BRT) and light-rail service

within the next 20 years. Construction started in 2004 on a light rail station and line that will connect one district—Beacon Hill—with the rest of Seattle by 2009.

Austin, Texas²⁵

Austin uses a two-phase implementation approach for introducing TOD. In the first phase, TOD district boundaries are established, and TOD district zoning classification is identified. Gateway, Midway, and Transition Zones are designated, and regulations that control land use are adopted for each zone, thus setting the stage for phase two: the implementation of a Station Area Plan. The Station Area Plan includes specific design standards and development goals for each TOD district. The plan includes strategies to achieve affordable housing around the transit stations.

The intensity and scale of development differs in the various zones extending from the transit station. The Gateway Zone is the area that immediately surrounds the station platform, extending 300–500 feet from it. It has the highest level of transit integration, with streetscapes that connect the station platform with the sur-

rounding buildings, which are oriented toward the station. The ground floors of these adjacent structures contain pedestrian-oriented retail stores, with residential uses on the upper floors. This area has the highest density of the three TOD zones. Midway Zones, which are the next closest to the station, are predominately residential, but include some retail and office space, and are not as dense as gateway zones. Finally, Transition Zones are the areas on the periphery of the TOD district, which are also predominantly residential, and have the lowest density of the three districts.

Austin Station Area plans have additional specifications for the buildings to be developed in each zone. For example, gateway zone mixed-use buildings must have a certain percentage of their exterior walls constructed of see-through glass. Parking is prohibited in front of certain buildings.

Denver, Colorado²⁶

Denver has plans to redevelop neighborhoods around a number of transit stations in the metropolitan area.²⁷ Central Platte Valley will contain 1,800 housing units within three to four blocks of Denver Union

Station. A mixed-use project at Littleton Station will have 20,000 square feet of office space, and 35 condo and townhouse residential units. Englewood City Center Station features 438 residential units and nearly 700,000 square feet of retail space, municipal offices, and outdoor community space. The Village at Arapahoe Station plan calls for a dense mix of uses within a 110-acre area surrounding the train station, including 3.37 million square feet of residential, 660,000 square feet of retail, 1.57 million square feet of office, 220,000 square feet of hotel space, and 254,000 square feet reserved for cultural uses. Land around the Belleview Station was re-zoned so that high-density residential buildings can be built on an existing golf course.

A great deal of new development in Denver is to be located around light-rail and bus rapid transit stations. TOD plans are becoming the norm in many parts of the city. The Regional Transportation District will use sales tax revenues to fund the expansion plan of six new transit lines in the next decade. This represents a \$4.7 billion regional infrastructure investment devoted to transportation and TOD areas.

The Suburban Context

Outlying areas within commuting distance of cities vary widely in circumstance ranging from older, deteriorating suburbs to slowly developing rural areas. The metropolitan center and these adjacent areas constitute the relevant region for transportation planning purposes. Here state transportation departments or regional metropolitan planning organizations (MPOs) prepare capital plans for all types of transportation infrastructure, including transit services. Developing mechanisms to coordinate state and MPO transportation planning with local land use planning is key to the success of transit and transportation oriented development and is arguably required under federal law.²⁸

Whether legally mandated or not, land use planning among localities in a transportation region must be coordinated with transportation infrastructure planning and development for practical reasons. Local land use plans and zoning determine how much population can increase over time which, in turn, determines demand for various types of transportation services. Transit lines for rail and BRT services cannot be planned in isolation, station-

by-station. The economics of transit station development and rail and bus lines are dependent upon land use densities; there must be a sufficient number of commuters in a relevant group of adjacent communities to provide a minimal level of ridership throughout the area served by the transit system. Where transit service is not feasible, other modes of transportation must be planned.

In this section, we turn to examples of municipal land use planning in suburban areas that is cognizant of transportation needs and requirements, if not fully integrated into the regional transportation planning process. While there is no single model for such planning, these case studies provide examples for suburban municipalities to consider as they coordinate local land use planning with neighboring communities and transportation planning agencies. These examples exhibit a variety of land use and transportation techniques. Land use plans and zoning contain a variety of mixed uses, floor area ratios, maximum building heights, lot area coverage requirements, and standards such as setbacks, parking, and sidewalk design. These are coordinated with

planned capital improvements such as interconnected sidewalks and trails, bike paths, and jitney service from moderate density hamlets to area transit stations. Together these initiatives are intended to reduce congestion, car dependency, and air pollution and its related health and climate hazards.

New York Suburbs

On both sides of the Hudson River north of New York City steps are being taken to use land use solutions to reduce traffic congestion and carbon emissions. Land use patterns in suburban New York Metropolitan communities have generated automobile commutes to work that greatly exceed the national average of 23 miles, home sizes significantly in excess of the 2,400 square foot national average, and households whose members routinely make from seven to 15 separate trips a day to destinations they can reach only by car.

In an effort to link land use, community design, and transportation planning, the New York Metropolitan Transportation Council (NYMTC) is coordinating pilot sustainable development studies in this region. Two of the studies, Rt.

303 Corridor and the Rt. 6/35/202/Bear Mountain Parkway Sustainable Development Project, resulted in land use actions taken by developed suburban municipalities that link land use densities and modal choices.

Rt. 303 Corridor, Orangetown

The Town of Orangetown is located in Rockland County, which is subject to severe growth pressures. Route 303 is the main roadway through the town. The town joined forces with the county and NYMTC to conduct a sustainable development study of the corridor. Input was gathered from residents and business owners. Computer simulation was used to show various future scenarios for land use and transportation and a final sustainable development plan was selected.

The ultimate goal of the plan is to have three hamlet-like centers on Route 303. These centers will contain increased densities and mixed uses, promote pedestrian safety, and provide a variety of activities and services. By decreasing the distance between points of origin and destinations, transit, bicycle and pedestrian travel will become more feasible. The mixed-use centers support

home and locally based employment and promote a variety of housing options. Implementation began with short term safety improvements such as left hand turn signals, synchronized traffic lights, and improved crosswalks, sidewalks, and pedestrian and bicycle circulation. The town updated its comprehensive plan and adopted a Route 303 Overlay Zoning District to designate special land use considerations for the roadway.

Rt. 6/35/202/Bear Mountain Parkway Sustainable Development Project

The City of Peekskill and the towns of Cortlandt and Yorktown teamed with Westchester County and NYMTC to create an intermunicipal sustainable development plan. In 2000, residents met to identify traffic issues and potential solutions. Various land use and transportation improvements were developed and presented to the public. In August of 2002, the communities selected a preferred land use scenario and decided on transportation improvement projects. As a result of the study, the three municipalities entered into an intermunicipal agreement to coordinate land use and

transportation planning across municipal boundaries.

In 2005, Yorktown revised its comprehensive plan and adopted the bicycle and pedestrian recommendations for its road projects. The vision section in the comprehensive plan calls for five designated business districts to become more pedestrian friendly and a town-wide network of bike paths that link business centers, residential areas, regional trails, and parks. The town plans to use traffic calming measures in hamlet centers and to provide continuous sidewalk connections. The comprehensive plan also contains numerous provisions aimed at increasing the use of transit, such as jitney service to nearby train stations.

Cortlandt also updated its comprehensive plan to include recommendations from the study. These enhancements are intended to improve traffic flow, promote safety, and provide bicycle and pedestrian connections and bus transit facilities.

LaGrange Town Center

Farther north, the Town of LaGrange used an innovative land use technique that can be employed by communities to manage and define future

growth in a way that creates more livable places that are environmentally, socially, and fiscally sound. It adopted a mixed-use Priority Growth District, or PGD, that directs development to a specific location and contains design and amenity standards that provide an alternative to the large lot single family zoning prevalent in suburban areas that are distant from the metropolitan center. The PGD concept is particularly well-suited for outlying suburban communities, where the rate of growth is significant but where there is still a rural character and significant natural resources to be preserved. The pressure to provide new homes in these suburban growth areas can be addressed through the identification of Priority Growth Districts where roadways and other infrastructure either exist or can be accommodated in ways that reduce the length and number of automobile trips and create the possibility for some type of transit service in the future.

The Town of LaGrange worked with Dutchess County to create a PGD zone where there was an existing suburban transportation corridor and intersection. The zone in effect

creates a new hamlet, serving new and existing residential development and providing some retail services. It introduces the concepts of mixed-use development, a variety of housing types, dedicated affordable, and trails and sidewalks. The zone encompasses 616 acres, and provides for up to 220,000 square feet of commercial space, including up to 160,000 square feet of retail, a supermarket and restaurants, a 50,000 square foot government center with a library, and between 560 to 680 housing units of several types: senior housing and assisted living units, apartments, townhouses, and single-family residences. It will be served by central water and sewer with potential to serve additional adjacent growth, and is located along a state highway.

Arlington, Virginia

Arlington County is an older developed suburban community located close to Washington, D.C. that has been redeveloped over the last three decades.²⁹ It has used a number of land use and transportation techniques to provide for redevelopment in a more transportation friendly fashion. By 1979, the Washington Metro-

politan Area Transit Agency (WMATA) had extended its heavy-rail system from Washington, D.C. to the Rosslyn-Ballston Corridor, the main commercial area of the county. In anticipation of the train service, the county put forth initial plans for mixed-use, high-density development within a quarter mile radius of transit stations. Residential buildings around Metro stations are typically 18–20 stories, and office buildings are 10–12 stories. The transit connection and mixed-use redevelopment around the transit stations mitigated the economic loss and suburban sprawl that Arlington County suffered when it was served only by roadways.

Because of the access and redevelopment that new transit provided, Arlington became a more attractive location for residents and workers. Density and mixed use around transit stations decreased vehicle trips taken by residents. There are five transit stations in the Rosslyn-Ballston corridor that are less than a mile apart. Most residences and offices in the corridor are within a 15 minute walk to a rail station. A bus system also links Arlington County with Washington, D.C.

Driving is further discouraged by parking regulations.

Arlington requires that most parking for high-density uses be in below-grade parking structures. Furthermore, parking requirements are lower in Arlington than in other Virginia counties (e.g., multi-family apartments in Arlington require 1-1.125 off-street spaces per unit, whereas Fairfax requires 1.6 spaces per unit).

Developers are required to include residential development in conjunction with any office development around transit stations. Such a mix allows residents to use the transit system to commute out of the corridor while workers commute into the corridor, thus creating a more balanced use of the transportation system. In the last 20 years, the county has matched commercial construction on a roughly one-for-one basis with residential.

Hayward, California

Over the last decade, the City of Hayward has changed from an area with struggling businesses and large parking lots around its transit station to an example of how pedestrian friendly TOD can improve a suburb.³⁰ The city took proactive steps to ensure that mixed-use development surrounded

the transit station that links the city to San Francisco and the rest of the Bay Area via Bay Area Rapid Transit (BART). The city adopted the Hayward Downtown Redevelopment Plan-BART Station Access Plan and corresponding zoning to implement the plan.³¹ A pedestrian promenade links the station to a new retail center and over 1,000 units of housing are being developed which include higher density multi-family units. In the High Density Residential District, there is a minimum lot size of 7,500 square feet and a maximum building height of 40 feet.

Hillsboro, Oregon

The City of Hillsboro is 11 miles west of the City of Portland and is connected to the city via the Westside MAX light-rail line. Near the Orenco Station is a 190-acre development that features a mixed-use town center, Crossroads at Orenco Station, and mixed-use residential properties.³² The town center includes 70,000 square feet of retail, 30,000 square feet of office, 40,000 square feet of loft residence, and 28 live/work town homes. The Crossroads at Orenco Station is a 49-acre retail development with 150,000 square feet

of retail. The station is a half mile from the major residential developments which include 1,834 residences, and is connected to the town center by village greens and pedestrian pathways.

Planning for this mixed-use scheme at the Orenco Station began in 1994. Construction began in 1997. Under the *Portland Metro Area 2040 Plan*, the Orenco area was rezoned as a “station community residential village,” with a distinct, mixed-use town center. The new zoning allows for narrow streets (20 feet wide), setbacks from the streets of only 19 feet, side yard easements, live/work homes, and garages that face alleys.³³ The town center buildings must line the streets, with parking behind the building, on-street, or underground. Mixed-uses are allowed throughout the area, and are required in some places.

The planning framework for the project was a joint undertaking among Hillsboro, Washington County, Metro (the regional planning agency), TriMet (the regional transit agency), and developers PacTrust and Costa Pacific Homes. By including all of these groups, Hillsboro was better able to implement its objec-

tives of promoting walkability and pedestrian access to the transit station.

Additional Local Standards for Reducing Emissions and Promoting Energy Efficiency

Suburban and urban communities can mitigate carbon emissions and promote energy efficiency by adopting building design and location standards, such as those promoted by the Leadership in Energy and Environmental Design (LEED) criteria promulgated by the U.S. Green Building Council.³⁴ This they can do in at least three ways: by committing themselves to meeting LEED standards in newly built or renovated municipal buildings, or in those funded by the municipality; by requiring new privately-built or renovated buildings to meet LEED standards; and by adopting standards similar to those contained in the Council's evolving Neighborhood Development Rating System.

There are four levels of LEED certification for individual buildings which can be attained by accumulating points for implementing design standards in the categories of sustainable site development, wa-

ter savings, energy efficiency, materials selected, and indoor environmental quality. The LEED standards can serve as a model for incorporating energy efficient design standards into local building codes and requirements. LEED standards also contain design features normally associated with land use planning and zoning. For example in a LEED for Homes Certification, a new home receives 10 points, one third of the required number of points for certification, just for being smaller than the national average.³⁵ A project can also earn points towards certification by developing at higher densities, by being located near public transportation, or by using energy efficient appliances.

In 2006, the Town of Babylon, New York adopted a law requiring all newly constructed commercial buildings, office buildings, industrial buildings, multiple residences, and some senior citizen residences to comply with LEED standards.³⁶ The City Council of Scottsdale, Arizona adopted a formal Green Building Policy for municipal buildings in March 2005. The city initiated its Green Building Program in 1998, by offering development incentives to developers to con-

struct environmentally sensitive building. The mandatory policy for municipal buildings requires that “all new, occupied . . . city buildings of any size will be designed, contracted and built to LEED Gold Certification levels or higher.”³⁷

The U.S. Green Building Council is providing additional guidance to municipalities interested in promoting energy efficiency at the neighborhood development level. Under its LEED for Neighborhood Development Rating System, it integrates smart growth, new urbanism, and green building standards into a system for designing and rating neighborhood development.³⁸ Under this system, both the location and the design of buildings can be certified as meeting the Council’s standards for environmentally responsible and sustainable development. A pilot program testing these neighborhood standards is being conducted by the Council, the Council for New Urbanism, and the Natural Resources Defense Council. After the pilot program concludes in 2008, a revised rating system will be instituted. Among the standards contained at the pilot stage are reduced automobile

dependence, creation of a bicycle network, compact development, diversity of uses and housing types, affordability of housing, the proximity of housing and job sites, reduction of parking footprint, proximity to transit facilities, and transportation demand management. These are matters that go to the heart of traditional local land use regulation and are at the forefront of integrating transportation and land use planning. Communities should carefully follow this LEED process and consider incorporating its results in their land use plans, regulatory standards, and development approval processes.

Toward a Comprehensive Approach

Despite impressive progress in recent years, we have much to learn about how government can reduce carbon emissions by connecting transportation infrastructure with the built environment. To provide truly transit oriented development, it is not enough to rezone land near transit stations for higher density mixed uses, although this certainly helps. How they can go further is a critical issue. This article demonstrates that municipalities are on the brink

of learning how to rezone and use other land use and development techniques that significantly reduce carbon emissions by integrating land use and transportation planning. This is, nonetheless, a work in progress.³⁹

In this section, we describe a comprehensive approach for planners and regulators to consider to formulate workable strategies for transit oriented and transportation efficient development. The questions that burden attempts to create best land use regulatory practices include the following: how to identify a large enough area for rezoning around transit stops, how many riders are needed for efficient rail or bus rapid transit service, how can land use planning create a pattern of population to support transit development, how to encourage landowners and developers to cooperate with transit oriented development plans, how to finance needed infrastructure improvements, how to create affordable housing for workers in the transit area, and how to create a strong and compelling sense of place.

In such a rapidly evolving field, this exercise may be somewhat premature, but should provide some guidance, if not a target

for provocative criticism and commentary.

We present first a comprehensive approach for TOD planning and implementation in urban and nearby suburban areas, then add notes regarding TED: transportation efficient development in lower density communities.

There are 10 steps in our comprehensive land use regime to integrate land use and transportation planning to accomplish transit oriented development:

1. Conduct a feasibility study and designate one or more transit areas.
2. Develop and adopt a transit area land use plan.
3. Conduct an environmental impact review.
4. Adopt a transit area overlay zone.
5. Develop strategies with landowners and for selecting developers.
6. Amend land use regulations to add energy efficient design and location standards.
7. Streamline approval of proposed transit area development projects.
8. Provide bonus densities to developers and require cash in exchange for bonuses.

9. Use cash to create energy efficient workforce housing and livable neighborhoods.

10. Leverage cash with grants and incentives from state and federal agencies.

1. Feasibility Study and Transit Area Designation

Adequate densities of development and a variety of land uses are needed in a sufficiently large transit area to generate enough riders for transit service to be economically feasible.⁴⁰ The feasibility of a local transit oriented development plan is dependent on a regional transit system that serves sufficient riders at each transit station; this requires close coordination between regional transportation planning and local land use planning.⁴¹ The two go hand-in-hand; localities must be willing to create transit ready plans while regional transportation agencies must create plans that can serve a number of transit ready locations.

2. Develop and Adopt a Transit Area Land Use Plan

Local governments are authorized to adopt comprehensive land use plans under state law.⁴² As a corollary, they are

authorized to adopt area specific plans for discrete neighborhoods to serve various purposes such as local waterfront development, urban renewal, and transit oriented development. For communities with two or more transit stations, such area specific plans can be adopted for each facility. These area plans can be specific; they can include design elements that define the scale, intensity, and density of buildings and the particular features that will discourage the use of cars and encourage pedestrian access to amenities including the transit station. Such plans can be designed and drawn in sufficient detail so that developers know what to propose and so that proposals can be judged for compliance with the plans. They can also include performance objectives that provide developers alternative means of designing projects to respond to market opportunities while accomplishing the plan's specific objectives.

3. Conduct Environmental Impact Review

Under federal and some state laws, governmental agencies must consider the environmental impact of projects they un-

dertake, fund, or approve.⁴³ Increasingly, the impact of governmental actions on climate change is being addressed under these requirements.⁴⁴ In New York, California, and several other states, environmental impact statutes require local land use approval boards to impose conditions on developments that they approve to mitigate their adverse environmental impacts to the maximum extent feasible. Cases are being brought involving challenges to approvals that fail to consider and mitigate the impact of projects on climate change.⁴⁵ Local governments in other states have the authority to require environmental impact studies of projects under their charters, home rule authority, authority to conduct land use planning, or authority to adopt local police power laws. Doing such studies, whether required or not, is critical to ensure that TOD projects enhance rather than adversely affect local environmental conditions.

In New York, under the State Environmental Quality Review Act, the local legislative body can prepare a Generic Environmental Impact Statement (GEIS) on the environmental impact of the proposed transit

area land use plan.⁴⁶ If this study is done in sufficient detail, then development projects that conform to the plan can be expedited since no further environmental impact studies will be required. Loans from state and federal agencies can be solicited to pay for environmental studies. These loans can be repaid through the collection of fees from developers who propose projects that comply with the plan.⁴⁷

4. Adopt a Transit Area Overlay Zone

The current zoning in the transit area can be left in place. An overlay zone can be adopted by the local legislative body that is coterminous with the boundaries of the designated transit area. The zoning can provide that any development that complies in full with the carefully designed transit area land use plan and the Generic Environmental Impact Statement is automatically an as-of-right land use in the overlay zone.

This zoning district and the increased development that it allows over the current zoning can be designated by the local legislature as a density bonus to developers whose projects conform to its standards. Under

the law of many states, this allows the legislative body to accept cash contributions in exchange for the additional density and zoning benefits allowed in the transit area. Alternatively, developers can be asked to provide needed amenities in exchange for the rezoning.

5. Develop Strategy with Landowners and for Selecting Developers

In most localities, much of the land within a transit area will be privately owned. Some of it is developed, some vacant, and some underdeveloped. For a transit area plan to be feasible, private landowners must be willing to cooperate. One approach is to provide in the zoning provisions that adjacent landowners can petition for the rezoning of their land under the transit area overlay zone, subject to the submission of a development proposal that conforms to the transit area land use plan. Another approach is to form a local development corporation that can negotiate options to purchase parcels from landowners and empower this quasi-public corporation to enter into agreements with developers. A third is to use a local renewal agency or a state

entity to carry out this function. Where there are title problems with land in the transit area or other problems in acquiring difficult parcels, eminent domain may be available to be used in some areas to acquire land as a last resort.

6. Amend Land Use Regulations to Add Energy Efficient Design and Location Standards

Transit area overlay zoning provisions should limit the size of residential units and require all buildings in the overlay zone to comply with energy standards that reduce energy consumption. Such compliance will reduce fossil fuel consumption and provide for green development that helps reduce and mitigate greenhouse gas emissions. Although the U.S. Green Building Council's Leadership in Energy and Environmental Design (LEED)⁴⁸ energy standards are voluntary, they can be made regulatory by incorporation into local regulations in a transit area overlay district.⁴⁹

7. Streamline Approval of Proposed Transit Area Developments

Developers who propose projects that comply with the

Generic Environmental Impact Statement and the transit area overlay zone provisions can enjoy significant streamlining of the local approval process of their proposals. Such developments can be excepted from certain project review requirements, and the politically charged process of rezoning. This works where proposed projects raise no unexamined environmental impacts, and comply with the design and performance standards of the transit area plan.

8. Provide Bonus Densities to Developers, Requiring Cash in Exchange

The law in many states allows municipalities to provide a variety of zoning bonuses, waivers, and incentives to developers in exchange for the provision of public benefits, broadly defined.⁵⁰ The statutes make it clear that developers can provide these benefits directly, or, in lieu thereof, be required to pay cash in exchange for zoning incentives. In a transit area overlay zone, the underlying zoning remains in place and the higher densities allowed under the overlay provisions can be designated bonus densities under these statutes.

9. Use Cash to Create Workforce Housing and Livable Spaces

The additional density allowed in TOD areas calls for communities to provide environmental, recreational, and design enhancement to improve the quality of life in the neighborhood. To fill jobs in the community, especially in the retail and office buildings provided for by TOD zoning, the locality should provide for affordable housing for needed workers, who can walk or take short bus trips to the workplace.⁵¹ Cash provided by developers can be kept in trust funds for transit area enhancements and for developing workforce housing.

10. Leverage Cash with Grants and Incentives from State and Federal Agencies

Climate change has altered the federal and state agenda and will reshape funding programs and priorities for programs and projects that promise to reduce fossil fuel consumption, dependency on foreign oil, and greenhouse gas emissions. Since there are too few competent local initiatives in the nation that utilize a com-

prehensive land use regime of the type described here, local initiatives that do should enjoy considerable success in soliciting state and federal funding for land use and transportation planning, environmental studies, workforce housing, transportation and urban amenity capital projects, and other support needed to create successful transportation and land use demonstration projects.⁵²

In fact, the need for localities to develop such programs could lead to state legislation that expands existing urban redevelopment incentives to transit oriented initiatives. State legislatures can create an Energy Conservation Zone Program under which developers are allowed relief from sales, mortgage recording, and real estate transfer taxes, and that authorizes local governments to enter into Payment in Lieu of Taxes agreements with transit area developers.

Transportation Efficient Development

In some communities, development at densities and in locations that support transit facilities is not feasible. These communities may not be located along an existing or planned transit line or may lack

the infrastructure or market conditions that support higher density development. Still, these communities can adopt a transportation area overlay zone that achieves some of the public benefits of transit oriented development. Zoning controls in these areas can limit the size of housing units, combine retail, service, office, and residential land uses, and require new buildings to meet energy standards and mitigate greenhouse gas emissions.

Each of the 10 steps outlined above for transit area development can be followed by such communities, setting the stage for a transformation in land development patterns in developing communities. The comprehensive plan of a developing community, outside the service area of foreseeable transit lines, can be amended to concentrate future development in transportation overlay zones and to limit development outside such zones. Mixed use, higher density suburban developments can provide jobs for residents of the development and provide retail goods and personal services within walking distance of neighborhood residents.

Suburban communities that adopt higher density, mixed

use zoning will find it easier politically to adopt strong environmental protection ordinances applicable to the land outside these higher density zones. Density bonuses can be provided in the transportation efficient overlay area and the cash contributed by developers can be used to purchase the development rights of valuable open space areas that contain critical natural resources. The preservation of such resources will provide valuable environmental benefits such as carbon sequestration,⁵³ food production, wetlands and habitat preservation, stormwater management and flood prevention, watershed protection, and the prevention of erosion and sedimentation.

Conclusion

Until very recently, public opinion regarding the importance of mitigating and adapting to climate change was in flux. With recent reports of the Intergovernmental Panel on Climate Change, the scientific and policy community seem united in the understanding that governmental actions that reduce emissions and that mitigate them through sequestration are critically important. Local plans and regulations

that integrate transportation and land use planning and environmental laws that preserve vegetative covers that remove and store carbon clearly advance the public health, safety, morals, and welfare, the *sine qua non* of land use regulation.

¹127 S.Ct. 1438, 549 U.S. _____ (April 2, 2007).

²“Inventory of New York City Greenhouse Gas Emissions,” 10 April, 2007, available at www.nyc.gov/html/om/pdf/ccp_report041007.pdf (last visited 9 July, 2007).

³“The census indicates that the nation should reach 400 million by 2043” Currently the U.S. population is just over 300 million. Arthur C. Nelson and Robert E. Lang, *The Next 100 Million, Planning*, The American Planning Association, Vol. 73. No. 1, Jan. 2007, p. 4.

⁴Id. pp. 4–6.

⁵Peter C. Frumhoff, et al. *Confronting Climate Change in the U.S. Northeast: Science, Impacts, and Solutions* xii (July 2007) available at <http://www.climatechoices.org/assets/documents/climatechoices/confronting-climate-change-in-the-u-s-northeast.pdf>.

⁶Id. at xiii.

⁷ITE SMART GROWTH TASK FORCE, *SMART GROWTH: TRANSPORTATION GUIDELINES* 30 (Institute of Transportation Engineers 2003).

⁸Id.

⁹This is the most widely used term, coined by urban designer Peter Calthorpe in the 1990s.

¹⁰Used by New Jersey Transit. <http://policy.rutgers.edu/vtc/tod/>

newsletter/vol2-num1/article_village_update.html#belmar.

¹¹Used in Austin, TX, referring specifically to overlay zoning around transit stations. http://www.ci.austin.tx.us/planning/tod/station_area_planning.htm.

¹²Refers to the kind of development popular before post-WWII sprawl, and is essentially TOD before it got that name.

¹³*Creating Transit-Supportive Land-Use Regulations*, ed. Marya Morris, American Planning Association (1996).

¹⁴This term, and the following terms, are all taken from Robert T. Dunphy, et al., *Developing Around Transit: Strategies and Solutions That Work*, Washington, D.C. (ULI-the Urban Land Institute, 2004) 4.

¹⁵This term is used when transit planners are asked to accommodate existing developments, but the goal is the same.

¹⁶Used by the Minnesota legislature.

¹⁷Used by the Puget Sound Regional Council in Seattle.

¹⁸Used by the Transportation Research Board.

¹⁹Popularized by Michael Bernick and Robert Cervero in *Transit Villages for the 21st Century*, written in 1997. The term is also used by the California and New Jersey legislatures.

²⁰See ITE SMART GROWTH TASK FORCE, SMART GROWTH TRANSPORTATION GUIDELINES: AN ITE PROPOSED RECOMMENDED PRACTICE 23–27, 41–72 (Inst. of Transp. Eng'rs 2003) (many recommendations are proposed concerning how to improve road usage and encourage public

transportation, but hardly any space is given to describing how land use regulations can effect these changes).

²¹See, e.g. Greg Yager, *Taking Transit*, URB. LAND, vol. 65, No. 7, July 2006, at 103; Alden S. Raine, *Waterfront TOD*, URB. LAND, vol. 62, No. 5, May 2003, at 79.

²²http://www.seattle.gov/transportation/docs/sdotc500_seattlemoving_1_20_06.pdf.

²³ROBERT T. DUNPHY, ET AL., *DEVELOPING AROUND TRANSIT: STRATEGIES AND SOLUTIONS THAT WORK*, 109–110 Washington, D.C. (ULI- the Urban Land Institute, 2004).

²⁴<http://www.soundtransit.org/documents/pdf/working/rel/tod/BeaconFactSheet.pdf>.

²⁵*Transit Oriented Development Guidebook*, City of Austin Neighborhood and Planning Department (April, 2006).

²⁶*Transit Oriented Development Status Report*, RTD Board of Directors (March, 2006).

²⁷*Strategy Plan: Community Planning and Development*. Transit Oriented Development Strategic Plan (Denver, 2 August, 2006).

²⁸49 U.S.C.A. § 5303 requires MPOs to conduct planning processes that “provide for consideration of projects and strategies that will . . . (E) protect and enhance the environment, promote energy conservation, improve the quality of life, and promote consistency between transportation improvements and State and local planned growth and economic development patterns” (emphasis added). This same language is made applicable to statewide transportation planning and programming in 23 U.S.C.A. sec. 135 which requires each state to carry out a statewide

transportation planning process that achieves these same objectives.

²⁹Interstate 66 only permits HOV during peak commuting hours. Dennis Leach, "The Arlington County Case Study: Rosslyn-Ballston Corridor," in *THE NEW TRANSIT TOWN: BEST PRACTICES IN TRANSIT-ORIENTED DEVELOPMENT*, HANK DITTMAR AND GLORIA OHLAND, EDs., 139. Island Press (Washington, D.C., 2004).

³⁰California Transit Oriented Development Database (amended 2007), at <http://transitorienteddevelopment.dot.ca.gov/station/stateViewStationOverview.jsp?stationId=6>.

³¹City of Hayward, CA, Zoning Ordinance (amended 27 June, 2006), available at <http://www.hayward-ca.gov/municipal/zoningordinance.shtm>.

³²Robert T. DUNPHY, ET AL., *DEVELOPING AROUND TRANSIT: STRATEGIES AND SOLUTIONS THAT WORK 73* (Urban Land Institute 2004).

³³"UnSprawl Case Study: Orenco Station," at <http://www.terrain.org/unsprawl/10/>.

³⁴LEED for Neighborhood Development Rating System (June 2007), available at <http://www.usgbc.org/DisplayPage.aspx?CategoryID=19> (last checked Jan. 22, 2007).

³⁵See UNITED STATES GREEN BUILDING COUNCIL, *RATING SYSTEM FOR PILOT DEMONSTRATION OF LEED FOR HOMES PROGRAM 22* (Sept. 8 2005), available at http://www.usgbc.org/FileHandling/show_general_file.asp?DocumentID=855.

³⁶RESOLUTION NO. _____ NOVEMBER 15, 2006: ADOPTING LOCAL LAW NO. _____ OF 2006 ADDING TO THE CODE OF BABYLON, CHAPTER 89, ARTICLE VIII, BUILDING CON-

STRUCTION, available at www.usgbc.org/ShowFile.aspx?DocumentID=2164.

³⁷City of Scottsdale, AZ, Resolution No. 6644, adopted March 22, 2005. Scottsdale's Green Building Program is described at <http://www.scottsdaleaz.gov/greenbuilding/>.

³⁸LEED for Neighborhood Development Rating System (June 2007), available at <http://www.usgbc.org/ShareFile.aspx?DocumentID=2845>.

³⁹See Robert T. Dunphy, *Shaping Land Use as if Transportation Mattered* (Apr. 2005), at http://online.caup.washington.edu/udp_symposium/dunphy.doc (last visited Jun. 13, 2007).

⁴⁰"Though density and concentration of activity sufficient to support transit operations are TOD essentials, there is no absolute density standard for TOD." Ellen Greenberg, "Regulations Shape Reality: Zoning for Transit oriented Development," in *THE NEW TRANSIT TOWN: BEST PRACTICES IN TRANSIT ORIENTED DEVELOPMENT*, HANK DITTMAR & GLORIA OHLAND, EDs., 74. Island Press (Washington, D.C., 2004).

⁴¹In order to ensure that transportation systems will receive their required ridership, some cities have set forth minimum density requirements, rather than maximum ones. San Jose, CA—General Plan density minimums are given for areas within 2,000 feet of transit station (20 units per acre for suburban, 45 units per acre for urban). Also, cities can establish an average density: The City of Mountain View, Whisman Station required an average density of 12-14.5 units per acre. *Transit Oriented Development Guidebook*, City of Austin Neighborhood and Planning Department (April, 2006).

⁴²See, e.g., N.Y. VILLAGE LAW § 7-722; N.Y. TOWN LAW § 272-a; N.Y. GENERAL CITY LAW § 28-a.

⁴³42 U.S.C.A. §§ 4321-4370f (National Environmental Policy Act); see, e.g., N.Y. ENVTL. CONSERV. LAW Art. 8 (State Environmental Quality Review Act).

⁴⁴See Michael B. Gerrard, Climate Change and Impact Statements, *NYL Journal* (May 25, 2007).

⁴⁵Recently, two challenges were brought against a California county for violating the state environmental review statute by failing to address how new development under an updated comprehensive plan would affect climate change. See *Center for Biological Diversity v. San Bernardino Co.*, (San Bernardino Co. Super. Ct., filed April 11, 2007); *California v. San Bernardino Co.* (San Bernardino Co. Super. Ct., filed April 13, 2007).

⁴⁶Title 6 NYCRR Part 617.10 of the SEQRA regulations defines a GEIS and explains its potential uses and functions.

⁴⁷See e.g., Title 6 NYCRR Part 617.13(a), which allows agencies to charge a portion of the lead agency's costs of preparing a GEIS to developers in the study area.

⁴⁸The United States Green Building Council recommends that LEED buildings also be located close to mass transit stations in order to increase their overall efficiency. LEED for Neighborhood Development Rating System (<http://www.usgbc.org/ShowFile.aspx?DocumentID=1895>).

⁴⁹See RESOLUTION NO. _____ NOVEMBER 15, 2006: ADOPTING LOCAL LAW NO. _____ OF 2006 ADDING TO THE CODE OF BABYLON, CHAPTER 89, ARTICLE VIII, BUILDING CONSTRUCTION, at www.usgbc.org/ShowFile.aspx?DocumentID=2164.

⁵⁰See, e.g., New York Town Law § 261-b and Village Law § 7-703, adopted in 1991, and General City Law § 81-d, adopted in 1992, which grant parallel authority to towns, villages, and cities to adopt incentive zoning systems and set forth the specific provisions that must be followed.

⁵¹John R. Nolon & Jessica A. Bacher, *Local Inclusionary Housing Program: Meeting Housing Needs*, 36 REAL EST. LAW J. 73 (2007).

⁵²The Transit Village Act of 1995 in California encourages local jurisdictions to zone and plan for intensive, mixed-use development around rail stations, and gives state transportation funds to those who pursue TOD. Robert T. DUNPHY, ET AL., *DEVELOPING AROUND TRANSIT: STRATEGIES AND SOLUTIONS THAT WORK* 36 (Urban Land Institute 2004). The Federal Transit Administration evaluates specific aspects of a site to determine if it should receive grants for major capital projects. These aspects included the following: 1. *Existing Land Use* (What is the density of the population in the area, and how pedestrian friendly is it?); 2. *Containment of Sprawl* (What kind of growth management is in place?); 3. *Station Area Zoning* (Do the ordinances support increased development near stations?); 4. *Corridor Planning* (Is transit-supportive development encouraged in the transit corridors?); 5. *Policy and Plan Implementation Processes* (What public and private processes facilitate station area development?); and 6. *Impact of Transit Oriented Planning* (Is there a positive development impact on the area due to transit?). *Id.* at 90.

⁵³Permit conditions can be imposed to protect the environment, which can include curbing greenhouse gas emissions. In *Konicelik v. Planning Board of the Town of East Hampton*, the

court upheld a planning board's conditional approval of a subdivision plat that imposed several conditions designed to protect "the extensive area of undisturbed forest, and the pres-

ence of numerous important plant species throughout the site." 590 N.Y.S.2d 900, 901-02 (N.Y. App. Div. 1992).