Regional Governance, Urban Form and Energy Use: Opportunities and Limitations in US Practices

Abstract
In this article, we review a large yet scattered set of literature on the connections among urban form, energy and regional governance, from three angles: 1) residential and travel energy savings from compact development; 2) land use planning and their influence on compact development; and 3) regional approaches in coordinating fragmented local land use planning. We also review a variety of costs and other barriers associated with their implementation. While these connections have been long discussed in the literature, recently heightened concerns regarding greenhouse gas emissions, energy prices and economic growth have created a renewed interest in identifying a regional scale role for planners in the debate. We identify the key linkages between urban form and energy use as mediated through transportation demand, travel behavior and household uses. We synthesize the land use and governance literature to identify those that take the most advantage of these linkages. Using their potential in exploiting these linkages as a basis, we discuss the opportunities and limitations of regional governance approaches in the US.

Keywords: land use, energy use, regionalism, urban form, governance

Introduction
The energy consumption trends of urban areas threaten the resiliency of our cities. In the US, urban areas account for approximately 75 percent of the total energy consumption with residents directly consuming at least 40 percent of that for transportation and household purposes (EIA 2007, TRB 2009). Energy expenditures in the US constitute a significant and rising share of regular household spending (BLS 2010, Brown and Southworth 2006). Consumption in other parts of the world, though lower, shows similar upward trajectories (IPCC 2007). Despite the technological innovations and efficiency
gains, studies suggest that energy consumption will continue to increase due to lifestyle and demographic changes, increased wealth and latent demand (IEA 2008, Weber and Perrels 2000, Wright 2008). This has led researchers to conclude that realizing a reduction in urban energy use will require changes in social and spatial characteristics of human settlements (Ewing et al. 2008, TRB 2009). These characteristics include regional urban form, housing unit characteristics and individual behavior.

Multiple studies have documented the ways in which land use policies can influence urban form and human behavior (Cervero and Arrington 2008, Bednar-Friedl 2011, Ewing and Cervero 2001, Ewing et al. 2002, Liu and Shen 2011, Newman and Kenworthy 1999, TRB 2009). Sorting through these can help identify the key linkages to energy use and the policy frameworks and scales of implementation that are more effective at exploiting them. For example, studies have shown growing evidence that regional coordination can better account for the negative externalities of fragmented local land use policy and improve some their ability to impact region-wide development outcomes (Ewing and Rong 2008, TRB 2009). However, there remains a gap in our understanding about whether local efforts at energy savings are likely to be ineffective without taking a coordinated or complementary metropolitan approach, and what sort of regional efforts are likely to be more successful. Also important are assessing the arguments against various forms of regional coordination, a common theoretical and political barrier to coordinating local policy.

In this article, we attempt to address this gap through a review of research-based literature and a review of trends in planning governance and identifying areas where more research is needed. We cover a large yet scattered set of literature on the connections among urban form, energy and regional governance, from three angles: 1) residential and travel energy savings from compact development; 2) land use planning and their influence on compact development; and 3) regional approaches in coordinating land use planning. We identify the key linkages between urban form and energy use as mediated through transportation demand, travel behavior and household uses. We synthesize the land use and governance literature to identify those that take the most
advantage of these linkages and they likeliest barriers to their success. Using the potential in exploiting these linkages as a basis, we discuss the opportunities and limitations of ongoing regional governance approaches in the US. We conclude with a discussion setting a research agenda on how the knowledge gap can be further closed and what practices and policies researchers and practitioners ought to test in the future.

Background: urban form and energy use

Numerous empirical studies have confirmed the connections between characteristics of urban form and energy use. In this section, we organize this literature into two parts: the connections between urban form and (1) transportation energy consumption and (2) residential energy consumption.

From a transportation perspective, energy use is an outcome of factors such as, the number of trips, distance travelled, transportation mode used, etc. Although their relationship with land use is complex, a number of characteristics have been associated with travel demand and behavior. Multiple studies (see, for example, Crane 2000, Gordon and Richardson 1998) including a recent and comprehensive review by the Transportation Research Board (2009) found that compact urban areas have lower travel demand particularly when both residential and employment densities are high and close to each other. Such arrangements make multiple transportation modes more viable, allow multi-purpose trips and reduce travel distances (Crane 2000), each contributing to the reduction in net energy consumption.

More direct studies (such as Newman and Kenworthy 1999) found that transportation energy consumption declines as density increases. Others have added that the location and type of density (Mindali et al. 2004) and mix of land uses (Owens 1986) are also important determinants of transportation energy consumption. For example, smaller lot sizes and parking availability are associated with patterns of consumption that include ownership of smaller cars and less energy consuming multi-family housing units (Dale 1997, Ewing and Kostyack 2005). In a recent study on the effects urban form on
transportation energy consumption in Baltimore, Maryland, Liu and Shen (2011) found that characteristics of the built form are related both directly and indirectly to household energy use outcomes. Variations in the built environment were found to have a significant effect on VMT, especially when the built environment was represented by an accessibility measurement. The authors also noted modest indirect effects as household choose vehicle size and type based the neighborhood context. The TRB (2009) study argues that these effects can be made even stronger when complemented with energy pricing policies and improved vehicle efficiencies.

The above findings have often been used to suggest: a) the need for higher densities and mixed-use developments to reduce travel demand, and b) greater mode choices to reduce automobile trips (Cervero and Arrington 2008, Cervero and Klockerman 1997, TRB 2009). Transit-oriented developments (TOD) have promoted these principles as a way to both increase the density of housing and employment centers near transit and provide job accessibility to suburban residents. Cervero and Arrington’s (2008) study of 17 TODs across five U.S. metropolitan areas showed that car trips generated – and by extension, energy consumed – per household in TODs were significantly lower than standard rates estimated by the Institute of Transportation Engineer’s manual. TODs and other travel related energy-reducing practices are, however, currently only a small portion of the development landscape and their effect is blunted by a lack of coordination across municipal boundaries in a metropolitan area.

Studies have also looked at the link between characteristics of urban form and residential energy use. In an average household, physical characteristics: the size of the structure (Kaza 2010; Wilson and Boehland 2005, Kahn 2000), space heating and cooling, water heating, and lighting (Randolph and Masters 2008, Rong 2006, El-Khawas 1997, Brown and Southworth 2008); household demographics (Weber and Perrels 2000, Schipper et al. 1989), appliances in use (Rong 2006), and climatic variability (Kaza 2010) have been shown to be critical determinants of household energy use patterns. According to Brown and Southworth (2008), approximately 63 percent of houses in the U.S. are single-family detached units, accounting for 73 percent of residential energy consumption. Schipper et
al. (1989) estimate that housing characteristics account for approximately 50 percent of a home’s energy use, while household characteristics and their lifestyle activities account for the remaining amount. The characteristics of residential structures themselves often vary with urban form and land use policy. Controlling for other influences, Ewing and Rong (2008) found that residents of low-density developments were more likely to live in larger single-family detached houses than comparable residents in a more compact development and that larger, detached houses use more energy because there is both more space to heat and cool as well as more exposed surface area subject to thermal loss. Further, they note that the median square footage of new housing has been steadily increasing, facilitated by less constrained land supplies and larger lots in the suburbs.

A related challenge is the inequitable burden of costs that the existing urban form places on low-income residents. With regard to household energy consumption, empirical research focused on characteristics of low income households is limited and they are generally assumed to be similar to average households. However, a case-control study of energy use among low-income households (Parker et al. 1996) has found that significant variation in the “maintained interior temperature between households” could only be attributed to behavioral differences among the occupants. This suggests higher vulnerability of low income households to both energy prices as well as policy interventions that disregard different risks and behavioral characteristics. Hackett and Lutzenhiser (1991) have called it the balancing of an ‘engineering approach’ to residential energy consumption with a more ‘behavioral approach.’ Higher housing prices and lack of transportation options forces low-income households to choose locations and structures where they spend a higher share of their incomes on energy and increases their vulnerability to fluctuations in the price of energy (Owens 1986, Pastor et al 2009). A study by Sharpe (1982) found that decentralized patterns of development have left the residents of auto-centric suburbs especially vulnerable to increases in the cost of fuel. These fluctuations are particularly troublesome for low-income households who lack the flexibility to absorb an increase in transportation costs without limiting their accessibility.
Modifying these energy use outcomes will require a number of changes to current urban policy practices. In addition to direct approaches such as targeted pricing schemes that reduce usage (Hirst 1978) other measures are needed. They may include expanding the adoption of more energy efficient green building codes, upgrading older structures for better energy efficiency and planning for an urban form that provides choices in housing types beyond the ubiquitous single-family detached housing (Brown and Southworth 2006, Kahn 2000).

In summary, a number of urban form characteristics can be implicated in the energy use outcomes or urban areas, most commonly, density, mix of building types, spatial arrangement of uses, urban design and accessibility of transportation networks. Most of these show a strong connection between compactness of urban form and reduction in energy use. For example, the TRB (2009) study concludes that increasing residential density across a metropolitan area by a factor of two could lower VMT by about 5 to 12 percent and perhaps by as much as 25 percent if efforts to restrict low density development are coupled with other demand-side policies and infrastructure investments.

The specific urban form characteristics however, are outcomes of numerous interlinked phenomena occurring at multiple scales. They range from neighborhood scale energy efficiency requirements, to municipal zoning requirements and larger scale issues of constructing regional transit systems. Although individual units of governments can – and do – adopt policies to address these linkages, the effect is often blunted by externalities not contained within their jurisdictional boundaries. For example, an attempt to increase density or limit fringe growth in one city may simply shift growth to another city within the region (Bento et al. 2009). Similar effects can be expected of isolated policies to increase energy efficiency of buildings or pricing of externalities. Fragmented general purpose governments in an linked region and a growing collection of single purpose special districts has created an obvious disjuncture between governance structures and the actual daily lives (and commutes) of metropolitan residents. This suggests that urban form interventions to affect energy use should be coordinated at the regional scale for better policy efficacy and collective regional outcomes (Basolo 2003, Dierwechter 2008,
Swanstrom 2001, Wheeler 2002). However, implementing such policies requires multi-jurisdictional coordination in an economic and socially networked metropolitan region, which is often limited by institutional and cultural barriers and competition among municipalities for growth and resources.

**Governance and urban form**

Studies have characterized regional coordination of growth management strategies from numerous perspectives. They range from presence of strong regional agencies, to complementary activities of numerous boundary spanning organizations (BSOs) that lead to regionally coherent policies, to a sense of regional identity among seemingly disparate areas (Young 2010). Other factors can include the extent of state involvement and oversight in regional planning, participatory engagement among agencies at new scales and regionally oriented policies by local agencies (Boyle and Mohamed 2007). Examining these frameworks and their various components can help identify their relationship with characteristics of urban form and their efficacy in, or barriers to reducing energy use.

Regional plans by multi-purpose agencies like councils of governments (COGs) and metropolitan planning organization (MPOs) to promote compact growth generally consider local jurisdiction as a given and attempt to identify approaches that work within this framework. While such attempts are less contested, studies show that their impact is often limited and overrun by larger scale trends in regional growth, transportation investments, and shifts in demographics and consumption (Womersley 2006). A recent review of regional land use planning processes in the U.S. found that while they were able to successfully forge a consensus about the shape of future growth, policies to enact this vision were inhibited by a lack of regional decision making authority (Knaap and Lewis 2011). These limits have led to calls for alternative approaches that range from more incentive based cooperation, coordination and collaboration, to empowered centralized regional agencies with a stronger state mandate (Campbell 1996, Konishi 2000, Cervero 1996, Downs 1994). In a study of leaders pursuing a regional smart
growth agenda in metropolitan Chicago, Young (2010) found that the effectiveness of boundary spanning organizations (BSOs) were limited by the lack of a decisive, empowered regional authority. Nonetheless, regional proponents like Wheeler (2009), suggest that the challenges resulting from unsustainable development are providing the inertia needed for greater regional coordination and a willingness of local governments to act collectively, if only voluntarily. Wallis (1994) called this emergent interest a third wave of regionalism, differing from previous calls in that it does not rely on formal institutions of regional government, but rather a framework of voluntary stakeholder governance by participating agencies. Such arguments rely on the belief that regional coordination is needed, and possible, even in places without regulatory regional institutions.

Coordination of land use goals and actions among multiple agencies is however, a complex undertaking, one that involves interactions among a number of underlying factors. Each of them may affect the potential for regional coordination differently. The rest of this section attempts to identify the main lessons from literature on what these factors are, how their traditional practices affect urban form and energy use, their modes of interaction and the barriers to change.

**Government structure:** Several studies have confirmed the role fragmented government structures play in urban sprawl by comparing the level fragmentation with measurable outcomes of urban development such as density, urbanized land area, property values and public expenditures on infrastructure (Carruthers and Ulfarsson 2002, Razin and Rosentraub 2000). In their study of growth in the Barcelona Metropolitan Region of Spain over the last 25 years, Paül and Tonts (2005) found that fragmented planning at the municipal has largely failed to halt the sprawling consumption of productive agricultural lands. Resulting competition between local government is also blamed for creating inefficiencies by limiting gains from scale economies in service provision (Downs 1994, Rusk 1993, 1999) and underinvestment on public goods that would benefit the entire region (Basolo 2003, Carruthers and Ulfarsson 2002, Razin and Rosentraub 2000). In their study of city spending on affordable housing, Basolo and Hastings (2003) found that
local governments compete against one another in economic self-interest to the detriment of the collective regional well being.

**Spatial Rationalities:** The few regional success stories in the U.S. supports the theories of Norris (2001) and others that the political structure of state and local government in the U.S. context is a substantial barrier to the implementation of regional governance strategies. In addition to fragmented local institutions, Huxley (2006) and Dierwechter (2008) have suggested that the lack of political support for regional solutions relates to the conflicting spatial rationalities present in the smart growth paradigm, representing the tensions of a diverse urban society. The rhetoric of growth management has been widely adopted by planners and policy makers. However, as Briassoulis (1999) reports, while the language of sustainable development is a common reference point, there is little consensus about what exactly this means and how it can be implemented. State sponsored growth management has varied in its objectives and achievements throughout planning history. Moving from growth control to smart growth planning paradigms, the spatial rationalities and legitimizing discourses attached to various policies interventions have changed over time. Far from representing unanimity among a homogenous public about the role and direction of planning policy, these rationalities are more likely oppositional, setting up an arena of spatial conflict.

**Spatial practices:** Zoning impacts household location and type. Restrictive zoning and subdivision ordinances in many suburban jurisdictions have been criticized for promoting larger houses, protecting local privilege, discouraging multi-family developments and mixed use developments, (Downs 1994, Levine 2006, Nelson 1992, Quigley and Rosenthal 2005, Shlay and Rossi 1981). These have led to pushing residents further away from jobs and auto-dependence for most non-home based activity. Uncoordinated controls in one city also tend to export unwanted growth and its attendant ills to neighboring communities (Downs 1994). The result is a political climate in which local governments use land use policy to maintain property values and avoid increased tax burdens to the detriment of larger regional concerns like energy use. Savitch and Vogel
(2000a) find that the incentive to overcome fragmentation is outweighed by perceived political and economic concerns for the locality.

**Infrastructure financing and land use**: A number of government activities already require regional coordination. For example, federal legislations such as, the Intermodal Surface Transportation Efficiency Act (ISTEA) and the Transportation Equity Act for the 21st Century (TEA-21) required coordinated regional planning for transportation infrastructure investment. However, land use policy has been largely left under the control of local municipalities and often uncoordinated with regional transportation decisions. Studies of infrastructure investments advanced with the goal of relieving congestion and reducing emissions show that such measures often induced more traffic and facilitated more sprawl before reaching a new congested equilibrium (Cervero 2003, Giuliano 2004). Past experience has shown that short-term gains in efficiency are offset by growth in population and per capita driving.

**Regional processes**: Regional efforts such as visioning exercises and scenario planning provide a framework for engaging disparate stakeholders. It is a process of social learning and building capacity that can help forge a regional identity and coordinate policy decisions (Bartholomew 2007, Chakraborty 2010). However, a change in development outcomes still relies on the production of consensus, common goals and the stakeholders returning to their constituents and convincing them that implementing the agreed upon regional plan is in their best interest (Helling 1998, Norris 2001). Previous studies have questioned the efficacy of collaborative visioning, finding in many cases that they do not produce implementable plans and have little impact on development outcomes (Helling 1998). Further, many existing approaches for coordination such as metropolitan visions developed by regional planning agencies, can be merely reflective of local interests (Barbour and Teitz 2006).

The above findings summarize the ways in which land use governance affects urban form and its many dimensions. It illustrates how certain practices lead to land use patterns that consume higher levels of energy. For example, local plans that limit the supply of high
density development options, segment land uses and prevent the integration of local policy initiatives with regional infrastructure planning can be said to ignore the energy implications of spatial structure. By extension, such policies demonstrate the promise of land use policy to achieve more compact urban forms.

Arguments for regional coordination are however, not without its critics. They suggest that developers are better able to satisfy market demand for low density suburbs in a fragmented governance structure emphasizing public choice (Ahluwalia 1999). However, research has shown that demand for alternative housing types in mixed use, walkable neighborhoods exists (Song and Knaap 2003, Storper and Manville 2006 and Myers and Gearin 2001). In Myers and Gearin’s (2001) study of demand for denser residential environments, survey data was used to capture a more nuanced picture of housing demand, showing a growing interest in more traditional neighborhood developments as a result of demographic change. Likewise, an emerging process of urban resurgence is recorded in Storper and Manville’s (2006) study of residential preferences and household location behavior as a result of an evolving process of regional economic restructuring. Finally, Song and Knaap (2003) use hedonic price analysis to show that households are in fact willing to pay a premium for the design features of the new urbanism, challenging the notion that no market exists for housing based on smart growth principles.

Regional planning frameworks, governance and energy use

Efforts to address energy use through land use policy are occurring at multiple scales. At the federal level, the U.S. Department of Housing and Urban Development (HUD) recently created the Office of Sustainable Housing and Communities to foster the development of Regional Plan(s) for Sustainable Development across the nations (HUD 2010). Part of its mission is to better coordinate land use policy with housing and transportation investments to effect a reduction in residential energy costs (HUD 2010). Participations in this program is however, voluntary and no clear guidelines are provided as to what should be included in the Regional Plan (Chakraborty et al. 2011). Several
states have also attempted to promote smart growth policies linking land use policy to energy use outcomes. These efforts underscore the fact that, to date, state-level mandates and incentives have been the main drivers of successful regional coordination in the U.S.

More recently, metropolitan areas facing bleak choices with regard to accommodating projected growth and infrastructure needs, have turned to a voluntary form of regional cooperation utilizing existing institutional structures such as, Metropolitan Planning Organizations (MPOs) and Councils of Government (COGs). Aside from a few notable examples (see: Envision Utah, Oregon Shines, Chicago Metropolis 2020, and California’s Blueprint) however, little is known about how this emerging form of regionalism is affecting both patterns of metropolitan development and its resultant energy consumption.

However, some studies, primarily focused on efforts in Europe, have documented the impact of regional planning and policy on development outcomes (Albrechts et al. 2003, Newman 2000). In that context, the authors suggest that regional governance first emerged in the interest of exploiting economic opportunities but has more recently become concerned with the environmental and social impacts of economic restructuring and spatial development. In their review of recent European regional planning efforts, Albrechts et al. (2003) find a renewed interest in strategic spatial planning combining economic, environmental and social objectives to address quality of life concerns in response to emerging sub-national place identities. Examples include elected, centralized administrative arrangements of city-regions in Germany, a spatial structure plan for multiple urban regions in Belgium altering the legal framework of local land use planning, and a spatial development strategy for Northern Ireland. Results of these efforts suggest strategic concepts of regional spatial planning have been translated into land use plans used to guide a more sustainable public and private development in a politically acceptable way (Albrechts et al. 2003, Newman 2000). Studies on the organizational structures and success of regional institutions have presented opportunities to compare their impacts on local plans, planning culture, land use policies and development outcomes.
Land use related regional efforts in the US that discuss energy consumption as an explicit driver, however, are very limited. Among state-level initiatives, the state of California recently passed legislation, Senate Bill 375 (SB 375), aimed at redesigning the built environment of communities through regional coordination to reduce energy consumption. In this framework, municipalities are expected to work together on regional land use plans that provide a wider range of transportation and housing choice to residents (Ewing et al. 2008, CA SB 375). As an example of a state-level mandate, this legislation attempts to use regional MPOs more proactively, matching transportation investments to a normative vision of future land use in contrast to what has in the past been a reactive process (Barbour and Teitz 2006). California SB 375 directs the state Air Resources Board (ARB) to set greenhouse gas (GHG) reduction targets and to work with MPOs to “align their transportation, housing, and regional land-use plans with greenhouse gas reductions in mind” (California Air Resources Board). Other states have tried to promote regional coordination in a suite of growth management policies. Although not explicitly aimed at reducing energy consumption, these policies have sought to address externalities of urban development. Florida’s Growth Management Act of 1985 requires consistency and concurrency between land use and transportation plans, and development permits (Florida Department of Community Affairs). Maryland’s Priority Funding Act of 1997 provides fiscal incentives to local governments to influence the location of new infrastructure consistent with smart-growth principles (Maryland Department of Planning). Studies by Chapin (2007), Dierwetcher (2008) and Lewis et al. (2009), among others, show varying degrees of coordination employed in a smart growth planning paradigm, although outcomes have generally been less than expected in terms of affecting more compact patterns of metropolitan growth.

The above discussion and the factors presented in the earlier section present a way to understand how institutional contexts are important determinants of local government behavior. Below we draw upon these ideas to present a synthesis of available literature on three cases representing varying degrees of regional coordination (Table 1). This framing, we argue, presents a way to demonstrate how different regional approaches affect land use, and by extension, their potential to affect energy use (both by influencing
urban form and by directly coordinating energy policy). We apply a typology based on state level planning mandates and requirements. On that scale, we identify three regions in the US that are adequately separated and, which provide some evidence relevant to this study. These regions include the metropolitan areas around Portland, OR which has a state mandated regional government, Sacramento, CA where exists a state supported regional “process” and Dallas, TX where bare minimum regional coordination is required to meet federal MPO transportation planning requirements (Barbour and Teitz 2006, Burby and May 1997, Goetz et al. 2002, Seltzer 2004).

The Dallas-Ft. Worth metropolitan region represents regional planning without a state mandate. As a conservative state with a system of home rule empowering local governments, Texas has been reluctant to interfere with the autonomy of localities, favoring instead the free market system, individual property rights and limited state government intervention (Burby and May, 1997 and Meck, 2002). In their study of sprawl and its impacts, Ewing et al. (2003) ranked the Dallas-Fortworth metropolitan area the tenth most sprawling region in the U.S. Frumpkin et al. (2004), looking at the health impacts of sprawl, note that Dallas-Ft. Worth has developed under a policy of plentiful roads and low densities such that its has approximately 50 percent more VMT per capital than comparably sized regions. Regional planning is limited to transportation planning by the COG/MPO. Although no studies have specifically evaluated regional coordination in the Dallas area, our review of the region’s plans illustrate an emphasis on local control of land use policy. For example, the state statute establishing the North Central Texas Council of Governments (NCTCOG) says its purpose is “to make studies and plans to guide the unified, far-reaching development of the region, eliminate duplication, and promote economy and efficiency in the coordinated development of the region.” However, the MPO has no control over land use policy that would determine where future development should occur (NCTCOG 2011). Instead, the region’s Mobility 2030 plan specifically says, “the key to maintaining a sustainable pattern of development is to allow cities the option to present a variety of land use, zoning, mobility, and service
packages to the development market and residents” (NCTCOG 2011). While this approach is not uncommon and fits with the theory of public choice, the resulting patterns of development suggest this fragmentation leads to inefficient spatial outcomes.

At the other extreme, state level requirements in Oregon set the framework for an elected regional government in the Portland area and mandate coordinated comprehensive land use planning between local governments, special districts and the Metro region (Dierwetcher 2008, ORS 197 2009). The plans of individual cities place a heavy emphasis on metropolitan coordination and the support of regional growth management efforts (Dierwetcher 2008). As a result, the city of Portland’s zoning map is consistent with the region-wide planning goals of accommodating growth inside the urban growth boundary (UGB) while preserving neighborhoods, open space and the environment (Seltzer 2004). Development outcomes reflect this with more dense development concentrated in the downtown area, while the residential neighborhoods outside the city center have maintained their single-family character serviced by commercial nodes (Mayer and Provo 2004, Seltzer 2004). The combination of the UGB and public investment priorities limited the region’s expansion of urbanized land to only 3 percent to accommodate a population increase of 31 percent during the 1990s (Dierwetcher 2008). This stands in stark contrast to Chicago’s 46 percent increase in urbanized land from 1970 to 1990 to accommodate a mere 4 percent increase in population (Houck 2006).

Finally, regional planning in the Sacramento region differs from both Portland and Dallas-Ft. Worth in that it relies on a collaborative framework of governance to implement a regional land use policy supported by transportation investment. In advance of creating their MTP2035 plan for transportation in the region, SACOG used a region-wide land use planning process that involved multi-scalar stakeholder participation to create a collective preferred development scenario promoting compact, mixed-use development with transit choices (Barbour and Teitz 2006). Compliance with the Blueprint vision is voluntary, but the organizers claim that by involving a diverse array of stakeholders in the planning process, political will is created across the region to affect a change in local land use policy. An outcome of the planning process was the adoption of
the *Blueprint Preferred Scenario Map* and a list of growth principles in 2004 by SACOG in addition to local government commitment to change land use plans to be consistent with the preferred regional scenario (Barbour and Teitz (2006). These are intended to “promotes compact, mixed-use development and more transit choices as an alternative to low density development” (Blueprint, 2011). The principles include: (1) transportation choices, (2) mixed-use developments, (3) compact development, (4) housing choice and diversity, (5) use of existing assets, (6) quality design, and (7) natural resources conservation (Blueprint 2011). These principles and their visualization in the preferred scenario map for the region represent significantly different futures from most participant cities comprehensive land use plans, putting at risk approval of federal transportation funding (Barbour and Teitz 2006).

The Sacramento process represents the potential of planning in a regional governance framework in contrast to the increasingly unlikely formation of new regional governments in the U.S. As collaborative governance, it relies on buy in from stakeholder participants can create the political will to force local politicians into regional collaboration on issues of land use regulation. Although the implementation of outcomes by localities can be uncertain, the process itself has been credited with forging a shared regional identity and creating a dialogue about the future impacts of development on regional sustainability (Morrison 2006). Walker (1987) developed a typology of intergovernmental coordination in which metropolitan-wide government structures were classified as politically very difficult to form. Alternatively, regional councils of government (COGs) were classified as relatively easy political formations. The examples of Sacramento and Dallas capture this political reality. A key difference between the experience of the Sacramento and Dallas regions is how a regional visioning and scenario planning process was able capture the public imagination and generate the political will needed to convince local governments to adhere to the regional land use plan associated with the preferred growth scenario. Added to this was the fact that this process was essentially grassroots led. The result was a building up of interest and pressure from the bottom around neighborhood scale participatory processes that were able to frame
contentious growth issues as a problem of regional quality of life (Barbour and Teitz 2006).

The examples of Dallas-Ft. Worth, Portland and Sacramento show the range of institutional frameworks being employed at the regional scale to coordinate local government decisions. The success of regional planning in these areas has varied, with the Portland region having had the most researched and reported effect on urban development through a combination of growth management policies and incentives that shape the type and location of new development (Nelson 1999). The strength of the regional frameworks is also an indicator of the compactness of urban form and other criteria responsible reducing energy use. The success or failure of non-regulatory approaches is however, depends on the voluntary collaboration of diverse interests absent a strong state mandate for regional coordination. As a result, their impact may take longer to percolate through the local planning process to affect measurable outcomes. Nonetheless, these collaborative frameworks offer a politically viable alternative to the ideal of Portland’s Metro, itself increasingly under attack by those wishing to limit its power to shape local policy.

**Discussion**

Current sub-regional land use planning structures exacerbate the energy needs of our cities. The uncertainty of future energy prices and their inequitable impact on vulnerable populations add to the urgency of addressing this problem. Studies have shown that local efforts at energy savings are likely to be ineffective without taking a coordinated or complementary regional approach. However, municipal governments lack the incentives to cede land use authority to regional agencies. In a perceived economy of globalized competition, land use control is seen as yet another way municipalities can vie with each other for increases in growth, tax revenue and resources. Variations by regions and their complexity have led to a wide variety of alternative and complementary paths to regional actions. However, many of them lack clear goals, making it difficult to design empirical and quasi-experimental studies regarding their efficacy. This review shows that 1) these
challenges inhibit the role of urban form in affecting energy use reductions and 2) in the absence of established frameworks (or to supplement weak ones), other approaches can emerge to take advantage of regional benefits.

Regional transportation planning in the US is now supported by federal mandates and fiscal incentives, successfully overcoming local resistance. Land use planning at the regional scale, despite its advantages has received no such mandate and must rely on the sense of a shared future amongst regionally connected stakeholders. The scenario planning and visioning processes increasingly employed by regional entities like COGs or even MPOs reflect this dynamic. These processes acknowledge local control of zoning and land use policy while attempting to affect a change in subjectivity and an awareness of interconnectivity among stakeholders. Issues such as regional quality of life or environmental preservation are invoked as spatial rationalities for intervention with the intention of encouraging local changes to land use policy that affect regional outcomes. However, it remains to be seen what effect regional governance, absent a strong state of federal mandate and the support of fiscal incentives, can have on spatial patterns of development. More research is needed to better understand the pathways and processes along which this change in environmental subjectivity occurs and under what conditions it results in more sustainable outcomes over the long term. Can the diverse positions and needs of different cities really be reconciled in a regional vision? In addition, how do higher level mandates add to or hinder these processes? For example, California’s recently passed SB 375 effectively mandates the process that the Sacramento region undertook for all regions in the state. However, it still relies on a framework of voluntary governance and the fiscal incentives it provides may not by substantial enough to affect a change in the way land use policy is set at the local level.

Although California’s SB 375 explicitly identifies changes to land use policy as a way to reduce GHG emission, a governance framework doesn’t guarantee success in resolving complex problems such as reducing energy consumption through location decisions and the production of the built environment. Power imbalances exist in the governance framework in the same way that they are present in other forms of representative or
participatory democracy. The goals and values of regional stakeholders and the publics they represent are far from homogenous. The potential exists for the process to be corrupted by powerful interests or coalitions, threatening not only the likelihood of sustainable policy outcomes but also the legitimacy and political support of the process itself (Lockwood et al. 2010). This is remedied to some extent by both creating incentives for action, as in the California example and ensuring downward accountability for the stakeholders participating in the process.

In the end, regionalism remains a topic more of debate than agreement among scholars and practitioners. It is clear, however, that there are connections between land use and energy use, and there are benefits to thinking about them together at a regional scale. Factors in the relationship between urban form and energy use discussed above lend them to policy interventions. These interventions include using land use policy to promote more compact development through a smart growth planning paradigm that includes policies like density minimums, smaller lot sizes, TOD, inclusionary zoning, growth boundaries and infrastructure investment (Dierwetcher 2008, TRB 2009). Those who wish to take advantage of these connections will find growing evidence of its strength, specific linkages and models of implementation for a wide variety of contexts. It is clear though that some frameworks are more efficient at generating better outcomes. In synthesizing the existing literature, it becomes clear that there is a gap between studies of how these policies can be scaled-up to the regional level. Regional scale studies often limit their focus to institutional structures and planning processes, whereas local scale changes to land use policy and urban form have been evaluated for their effect on energy use outcomes. However, absent in both cases is a clear understanding of how these policy changes come to be implemented, especially at the regional scale. Most regional scale studies assume the presence of a regional authority for decision-making and often overextend their influence on development outcomes. Such conditions are largely non-existent in most regions, limiting the potential applicability of these studies. Researchers need to think of regionalism as interaction among complex roles played by organizations, governmental and non-governmental, at multiple levels even in places where established regulatory frameworks do not exist.
End Notes:
1. It should be noted that mandates such as these have come under heavy scrutiny due to the recent recession and condition of state and federal budgets. At the time of writing the federal and California governments were considering removing funding for these potentially landmark programs.
2. References to actual cases are used primarily to illustrate our theoretical argument, not to provide empirical evidence based on a case study methodology.
3. Governance implies that “existing institutions can be harnessed in new ways, that cooperation can be carried out on a fluid and voluntary basis among localities and that people can best regulate themselves through horizontally linked institutions” (Savitch and Vogel, 2000 p. 161).

References:


Transportation Research Board (TRB), 2009. Driving and the built environment: the
effects of compact development on motorized travel, energy use, and CO₂
emissions – Special Report 298. Committee for the Study on the Relationships
Among Development Patterns, Vehicle Miles Travelled, and Energy
Consumption, National Research Council.

U.S. Department of Housing and Urban Development. Office of Sustainable Housing and
Communities, [online] Available from

on Travel Patterns in Europe and North America. Transport Policy, 13 (3), 229-239.


Wassmer, R. W., 2006. The influence of local urban containment policies and statewide
growth management on the size of United States urban areas. Journal of Regional

Weber, C. and Perrels, A., 2000. Modelling lifestyle effects on energy demand and

Weitz, J. and Seltzer, E., 1998. Regional planning and regional governance in the United

Wheeler, S., 2009. Regions, megaregions, and sustainability. Regional Studies, 43 (6),
868-876.

Wheeler, S. M., 2002. The new regionalism: Key characteristics of an emerging

Wilson, A. and Navaro, R., 2007. Driving to green buildings: the transportation energy
intensity of buildings. Environmental Building News, 16(9).

Wilson, A. and Boehland, J., 2005. Small is beautiful: U.S. house size, resource use and


Table 1 Typologies of regional land use planning

<table>
<thead>
<tr>
<th></th>
<th>Dallas-Ft. Worth, TX</th>
<th>Sacramento, CA</th>
<th>Portland, OR</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>State</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>State planning mandate</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Local land use plan review</td>
<td>*</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Consistency requirement</td>
<td>*</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td><strong>Region</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Regional government</td>
<td>X</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Regional visioning process</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Regional land use planning</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Regional growth management policies</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Regional transportation link to land use</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td><strong>Local</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Local adoption of regional vision</td>
<td>X</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Local implementation of regional land use plan</td>
<td>X</td>
<td></td>
<td>X</td>
</tr>
</tbody>
</table>

* Only required for Housing Element