Towards a green urban economy? Unravelling urban sustainability transitions from a regime perspective
Mans, U.; Meerow, S.A.

Published in:
IST 2012 - Navigating theories and challenging realities. Track F: the role of the cities and regions in transitions

Citation for published version (APA):

General rights
It is not permitted to download or to forward/distribute the text or part of it without the consent of the author(s) and/or copyright holder(s), other than for strictly personal, individual use, unless the work is under an open content license (like Creative Commons).

Disclaimer/Complaints regulations
If you believe that digital publication of certain material infringes any of your rights or (privacy) interests, please let the Library know, stating your reasons. In case of a legitimate complaint, the Library will make the material inaccessible and/or remove it from the website. Please Ask the Library: http://uba.uva.nl/en/contact, or a letter to: Library of the University of Amsterdam, Secretariat, Singel 425, 1012 WP Amsterdam, The Netherlands. You will be contacted as soon as possible.
Towards a Green Urban Economy? Unravelling Urban Sustainability Transitions from a Regime Perspective

1) Introduction:

The current debate about sustainability transitions engages with various inter-related perspectives. Scholars working on innovation systems, socio-technological change, ecological economics and regional development all have contributed to the understanding of what sustainability means in the context of post-industrial development on the one hand and the increasing urgency for climate change mitigation on the other. One of these perspectives is the multi-level perspective (MLP) as developed by leading authors from the STRN network (Rip and Kemp 1998, Geels 2004).

The MLP logic puts emphasis on the dynamics that stem from radical ‘niches’, how these interact with relatively stable ‘regimes’ and the way the ‘landscape’ level exerts pressure on niche and regime. The notion of landscape refers to the external context, in which a certain socio-technical regime is embedded (i.e. the growing international pressure to act on climate change). The regime level depicts the current way things are done regarding a certain aspect of socio-technical development (i.e. the way cars are being produced and used). The niche level relates to specific fields of initiative and innovation, where small-scale changes are being tested (i.e. carmakers investing in a new type of low emission engine).

The MLP approach has proved a valuable tool to assess societal transitions, and has become a central theme within the growing literature about resilience, sustainability and environmental innovation. However, there is a recent addition to this discussion, which highlights the need to look more in-depth at the spatial dimension of the MLP logic. Authors like Hodson, Marvin, McCauley and Stephens argue that the MLP focus on national innovation systems leaves many open questions as to the territorial scales in which transitions take place (Hodson and Marvin 2011, McCauley and Stephens 2012). According to their view, the MLP only offers a limited understanding for transition dynamics on the sub-national – be it regional or urban – scale. Geels for example argues that the role of cities is limited to either “actors” (e.g. initiators of local policies) or “location” (e.g. executors of national policies, and doubts whether it is justified to specifically study urban transitions: “[a]lthough the focus on cities and low carbon transitions is important and interesting, […] an exclusive focus on cities may be unwarranted (Geels 2012, p.26ff).

His position stands in contrast to the multi-level governance (MLG) perspective and how its proponents perceive the role of the urban level in sustainability transitions. MLG scholars generally focus on the interplay a) between different scales (vertical multi-level governance), and b) within each scale (horizontal multi-level governance). In particular when it comes to the vertical linkages between different governmental (administrative) levels of authority, the urban scale is considered an important aspect to understanding the design and implementation of public policy. As Bulkeley et al argue: “cities are reproduced through, and at the same time actively reconfigure, structural, social, economic and political processes” (Bulkeley et al 2012a, p. 4).
At the time of writing, there is no consensus about whether the MLG focus of multiple stakeholders and multiple scales of governance is compatible with the conceptual understanding of the MLP’s trinity landscape, regime and niche. If we accept however, that the urban level is important for sustainability transitions, and that both MLP and MLG are relevant approaches to understanding the dynamics that unfold on the urban scale when investigating societal change, then what is required is the identification of potential synergies between MLP and MLG perspectives. This paper aims to look for these synergies. Our contribution to the academic debate on sustainability transitions is twofold: first, we introduce the notion of an urban sustainability regime as a mid-way between the MLP and the MLG perspective; second, we provide empirical evidence regarding the regime characteristics of urban policies in support of environmental innovation.

The remainder of the paper is structured as follows. Section 2 introduces the urban view within the MLP perspective, and poses the question whether the ‘urban’ should be considered a niche or regime. Section 3 elaborates on the MLG perspective in the context of renewable energy policies, and explains how the four policy modes ‘authority, ‘provision’, ‘enabling’ and ‘self-governing’ can help to inform an assessment of urban sustainability transitions. Section 4 focuses in on the notion of green economy, and looks at the emerging economic sectors in the field of cleantech in general and renewable energy in particular. Section 5 explains the methods applied for this study and section 6 provides empirical material based on a recent research project for the international city network ICLEI on renewable energy industry cluster initiatives. The authors conclude in section 7 with an analysis of the five city examples in the light of the regime-niche dichotomy and discuss what the findings entail for MLP/MLG perspectives in urban sustainability research.

2) Sustainability and the urban scale from the MLP perspective: niche or regime?

Within the innovation system discourse, the multi-level perspective has established itself as an important research stream. Rip and Kemp first introduced the three concepts of landscape, regime and niche in an attempt to ‘order’ the multiple levels of innovation (Rip and Kemp 1998: 328), the scholarly work that evolved around this starting point has led to the consensus that it is useful to consider the wider socio-political-economic systems when looking at the dynamics of technological transitions. In the words of Smith et al, “sustainable technology transitions are better understood as changes mediated by the resources, interests and expectations of institutionally embedded networks of actors” (Smith et al 2005: 1508). Many therefore consider the MLP a valuable tool in assessing innovation systems as it offers a holistic view of the various actors and multi-scalar processes involved in societal transitions. The MLP puts emphasis on three inter-related levels: The first level, the niche, is the most dynamic part of the system, where radical innovation generally occurs: “[n]iches are crucial for transitions, because they provide the seeds for systemic change” (Geels 2010: 27). In this, visionary leadership, personal networks and learning processes (i.e. through experimentation) are crucial (Geels 2011: 28). The second refers to the more structural factors, which determine the ‘rules of the game’: the regime level. The regime reproduces itself through “semi-coherent set of rules” (Geels 2011: 27) and is resistant to change. As Praetorius explains: “incumbent actors tend to keep the prevailing technological regime alive by fostering incremental instead of radical innovation” (Praetorius 2009: 227). The third level, the landscape, is more stable
than the regime, and represents external factors that exert (usually longer-term) pressure onto the regime.

As one of the key advocates of the MLP, Geels argues that the regime is the most important part of the system when assessing transition processes: “[t]he regime level is of primary interest, because transitions are defined as shifts from one regime to another regime” (Geels 2010: 26). This is an understandable statement, as it confirms the MLP’s claim to go beyond technological developments only and to instead understand how agency and structure shape societal change in continuous interaction. In this interaction, rules, arrangements and institutions play an important role in shape gradual processes of socio-technical change within the limits of what the various stakeholders wish (not) to change. As a consequence, regimes are relatively stable and are generally marked by routine and a low appetite for fast decision-making. As Geels explain: “Because existing regimes are characterised by lock-in innovation occurs incrementally, with small adjustments accumulating into stable trajectories” (Geels 2011: 27).

However, it has thus far remained unclear within the MLP debate how the definition of regime can be applied when looking beyond the national context. “The role of places and spatial scales in these transition processes has not been an explicit issue of concern. The tendency has been to presume regimes operating at a national scale, perhaps for reasons to do with the nation-state policy audiences” (Smith et al 2010: 443). This goes against a major trend in governance literature, as it does not take account of the fact that the management of ecological resources is “increasingly becoming issues at an urban scale” (Hodson and Marvin: 478).

The recent climate change debate has brought additional arguments to this apparent over-emphasis on the national level. First, because climate change impacts large agglomerations much more than entire countries: many urban populations already face the direct consequences of increased flooding, droughts or heat waves – and this trend is expected to continue. Even if it remains debatable to what extent the risk of extreme weather conditions in urban centres will indeed rise over the next decades, there is a common understanding that adaptation and mitigation action is much cheaper if it is done now rather than later. A second factor is the increasingly visible failure of the inter-governmental negotiations regarding climate policies in Copenhagen 2009, Cancun 2010 and Durban 2011 to agree on concrete policy action against climate change, or even a minimum consensus on a way forward. It seems increasingly difficult for national decision-makers to support major changes at a country and global level in favour of a more sustainable policy agenda. Bulkeley argues that this inertia is met with a growing interest in sustainability from below: “Traditionally conceived as a global problem requiring global solutions, the urban politics of climate change has been a key factor in challenging research and policy communities to reconsider how the governance of global environmental problems takes place” (Bulkeley 2010: 230). Spaeth and Rohrbacher confirm the sub-national aspect of transitions, albeit from a regional point of view: “although a region’s potential contribution to broader transitions is certainly limited by principal constraints (e.g. the lack of control over important actors and framework conditions), human and institutional capacities in the region can make a great difference” (Spaeth and Rohracher 2010: 456).

As a consequence, a large number of city leaders from many parts of the world are warming up to the idea that climate change policies can and should be informed – if not driven – by those responsible for urban development. “Climate Change is becoming an issue of identity to many
municipal and regional developments; it is also viewed as an opportunity for many companies in industrial and emerging markets” (Schneidewind and Scheck 2012: 45, authors’ translation).

As a result of this global interest in city-led initiatives, international networks such as the C40, REN21, ICLEI and others are increasingly active and run various programmes aimed at facilitating urban transitions towards greater sustainability. The Energy Cities Initiative, for example, used the Rio+20 Conference in June 2012 as a platform to publish 30 concrete proposals to support energy transitions in cities and towns. A number of universities are tuning in to the subject, with numerous research initiatives and departments being established to investigate urban retrofitting (University of Cardiff), urban resilience (University of Amsterdam), urban governance (Durham University), city sustainability (LSE Cities) and many others.

Despite this growing field of knowledge, the urban sustainability transition is still hard to place within the MLP perspective. In her recent volume on low-carbon transitions in the context of cities, Bulkeley concludes that “the multilevel perspective fails to engage sufficiently with the urban nature of these processes, or their fundamentally political character” (Bulkeley et al 2012b: 37). While the MLP puts emphasis on a holistic approach, it risks staying abstract for the urban context, where concrete opportunities for actors and / or institutions could be highly informative. If an assessment of sustainability transitions limits the regime level to nation-wide arrangements (such as the tax system, industrial policies or environmental regulation), it gives researchers few options to look into other, sub-national scales that are closer to the ‘real’ impact these systemic changes have in daily practice. “The transition of complex socio-technical systems, and particularly the shift from a fossil fuel-based energy system to one reliant on renewable energy sources involves a significant re-shaping of regional, place-based infrastructures, economic systems, and social practices” (McCaulley and Stephens 2012: 214). This holds true particularly for the urban context. As Hodson and Marvin point out, “transition approaches have said little about what the multi-level perspective on systemic transitions can contribute to understanding urban social-technical transitions” (Hodson and Marvin 2010: 480).

Given the fact that there is a well-acknowledged need for sustainability and transition research to inform current and future processes of societal change, and that cities are becoming increasingly important as a polity, it is useful to investigate how the MLP can be reconciled with the urban scale. It is important “to understand how ‘cities’ are developing and endeavouring to enact strategic responses to a set of ‘landscape’ pressures through the managed reconfiguration of socio-technical infrastructures both within the metropolitan areas and externally through their relations with other scales” (Hodson and Marvin 2010: 478).

It seems clear that, when looking at the urban level, agency and structure cannot be assessed from a national system perspective. Municipal actors and institutions are always embedded in their specific context (i.e. the Mayor of Mexico City is a much more powerful player in national politics than the mayor of Berlin), and achieving a better understanding therefore requires an investigation into the specifically local dynamics of socio-technical change. There are many ways such an assessment of the urban scale can be done. As far as sustainability transitions are concerned, the way environmental innovation is being organized seems of particular importance, because this is where the notions of ‘regime’ and ‘niche’ come closest to one another. As Cooke explains: “eco-innovation [...] has to be understood as occurring because of what are often geographically proximate concentrations and
interactions amongst small, fast-moving systems of innovators and their networks” (Cooke 2011: 143). In this sense, we remember Geels’ earlier argument that niches are important because of their ability to bring about radical innovations due to greater dynamism. Because the urban setting – with its territorial concentration of economic, social and political networks – tends to be a more dynamic environment than the national system, it could be argued that it fulfils regime and niche functions at the same time.

Indeed, the urban sustainability transition is best understood as the local expression of environmental innovations that encapsulate the social, economic and political opportunities available because of the geographic concentration of agency in cities. As van den Bergh points out: “an important task in studying environmental innovations and adequate policy to stimulate them is obtaining a good understanding of environmental innovators and their incentives” (Van den Bergh et al 2011: 4). With this statement, van den Bergh puts the role of agency centre stage, and highlights the need to look at the conditions that make innovators innovate. The urban polity seems well-suited to play a nodal role in such a process, but questions remain as to the exact role cities have in this. If the role of local governments is important, how does the urban scale fit within the niche-regime hierarchy?

We argue that in order to investigate how municipalities can act as facilitators for environmental innovation, the ‘regime’ perspective provides the most suitable route of enquiry. The concept of ‘niche’ is too limited to cover the complexities that are inherent to an urban setting. Rather, the notion of niche underscores the ability of a small set of actors to drive innovation because of few structural constraints. In a city, particularly when looking at large agglomerations, innovations need time, and major changes are generally hard to implement across a municipality. This might be different for small communities within larger cities; however, on a city-wide scale it is difficult to talk about ‘niche’. Instead, using the regime concept for the urban context allows us to consider the city as a separate polity, which has a specific political decision-making process, a separate budget and can choose to have a local sustainability agenda. It has specific sets of rules and institutions. At the same time, there is no doubt that there are many restrictions to what cities can do to promote sustainability. This makes it even more relevant in the context of the MLP debate: landscape pressures (such as national policies, international regulations, environmental threats, business interests, etc.) impact urban sustainability policies; and urban policies can in turn impact environmental niche innovations and other levels of governance. A similar argument is put forward by Westley et al, who point to the importance of institutional entrepreneurs in shaping niche developments (Westley et al 2011: 768). The urban regime as proposed in this paper is positioned mid-way, and acts as an interlocutor between landscape, national regime and niche.

3) Urban policy options for fostering environmental innovation

In order to develop this notion of ‘urban regime’ further, it is useful to consider the work that has been done in the field of multi-level governance. While the function of local governments in supporting innovation systems has generally been overlooked in MLP’s contribution to the sustainability transitions debate, the role of cities in sustainability transitions figures prominently in the multi-level governance literature (see for example Bulkeley and Betsill 2003: 27). This is the
academic response to a growing number of city leaders who wish to enhance their city’s resilience in view of the economic and environmental challenges of the 21st century, and who are keen to position their localities as an autonomous polity. Even though the freedoms municipalities have are often limited, decentralisation trends across the globe mark a gradual shift from national to sub-national levels of authority (see for example Baud and Hordijk 2009, Brenner 2004). We therefore look to the MLG literature for a better understanding of the policy tools available to municipal governments for sustainable transitions.

In their multi-level analysis of urban climate change governance, Bulkeley and Kern identified four modes of urban governance, namely: self-governing, governing by authority, governing by provision, and governing by enabling (Bulkeley and Kern 2006: 2242). In the years since, their typology has been adopted by a number of other studies (for example Alber and Kern 2008; Corfee-Morlot et al 2009), and have been used by major international organizations and initiatives as a useful framework for understanding urban environmental governance, such as ICLEI and REN21.

It is useful to delve a bit deeper into each of these modes of urban environmental governance. The first, ‘self-governing’, refers to the ways in which the local government organizes its own operations. In this way the municipal government acts as a role model, i.e. by placing solar panels on public buildings. In the second form, ‘governing by authority’ (sometimes also referred to as ‘governing by regulation’) is defined by the local government’s use of their regulatory powers and control to achieve policy goals. For example, the local government might alter new building standards to require solar water heaters. With the third governance mode, ‘governing by provision’, local governments can provide various resources and support, i.e. giving financial aid to cleantech start-up companies. The fourth mode, ‘governing by enabling’ defines local governments as promoters, encouraging participation and aiding in networking. To illustrate, a municipality might promote the city as an international cleantech hub. These four different modes of governance are not exclusive. On the contrary, municipal strategies often encompass a combination of them (Alber and Kern 2008: 5).

We argue that this set of urban policy tools can bridge the conceptual difference between MLP on the one hand and MLG on the other. Figure 1 below illustrates this argument. Whereas the MLP point of view (left) emphasises the holistic character of the regime and regime shifts (and considers the urban scale as an integral part of the overall regime dynamics), the MLG perspective (right) pays particular attention to the urban scale as one of the vertical levels of government (in which horizontal policy dynamics in interaction with other stakeholders take shape).
Figure 1: MLP lacks conceptual clarity regarding the urban scale; the MLG focus on the urban scale might offers synergies between the two perspectives.
The proposed mid-way (down) puts centre stage the urban regime as a separate political entity, which applies the various urban policy tools in order to influence certain niche developments, for example in the field of environmental innovation.

4) Focusing in on the Renewable Energy Business

Before we turn to the empirical part of the paper, which looks at the urban regime in practice, let us first consider the possible routes of enquiry for investigating environmental innovation. When looking at environmental innovation and the governance thereof, one has to take account of the current trends in sustainability and related research streams. In the last few decades the concept of sustainability has become increasingly popular, a buzzword among academics, policymakers, and industry (Fiksel 2006: 14). In economics, this greater focus on sustainability has shifted attention from achieving unimpeded economic growth to what has been termed a ‘green economy’ or ‘green growth’. This view emphasises the “implications for economic growth and prosperity of a transition to a low carbon economy” (Foxon 2011: 2264). However, there is a lack of agreement on exact definitions.

According to the United Nations Environmental Programme, a green economy in general terms is “one whose growth in income and employment is driven by public and private investments that reduce carbon emissions and pollution, enhance energy and resource efficiency, and prevent the loss of biodiversity and ecosystem services” (UNEP 2011: 16). In turn, the World Bank defines green growth as “growth that is efficient in its use of natural resources, clean in that it minimizes pollution and environmental impacts, and resilient in that it accounts for natural hazards and the role of environmental management and natural capital in preventing physical disasters” (World Bank 2012: 2). According to the OECD, green growth requires a “growth strategy that accounts for increases in public and private investments and consumption leading to sustainable resource use, lower greenhouse gas emissions, and reduced vulnerability to climate change” (Kamal-Chaoui et al 2009: 138). It is important to note that these definitions were designed for national economies and are therefore not city-specific. For the municipal level the World Bank developed a similar concept called ‘EcoCity’ approach, which provides a toolbox for local governments to facilitate economic growth that is both durable and ecologically sound: “the EcoCities initiative expects to assist cities in developing countries gain access to financial resources needed for strategic urban infrastructure investments” (Suzuki 2010: 2).

The underlying idea of the ‘greening’ economy is an attractive, win-win scenario; it holds the promise to improve the economy through the creation of new business and jobs while also benefitting the environment (see also McCauley and Stephens 2012: 213). Thus, it is not surprising that the concept has been gaining traction with policymakers. In 2008, in the wake of the financial crisis, a number of international organizations joined forces in promoting a “Global Green New Deal” (UNEP 2009: 1). They called for stimulus spending and investment into the green economy, claiming that it would drive economic recovery, positively impact the environment, and reduce poverty. Many countries did consequently ramp up investments in green technology. The United States, for example, invested $90 million into clean energy technologies as part of the American Recovery and Reinvestment Act of 2009 (Grunwald 2010: no page). As a result of policies like these, the global clean technology market
grew an average of 31 per cent annually from 2008 to 2010 (van der Slot and van den Berg 2012: 15). The green industry encompasses a variety of industries and clean technologies, or ‘cleantech’, as they are often collectively labelled. These technologies range from mobility, efficiency to energy and waste management solutions. 

Among these different fields of innovation, there are a number of reasons to take a closer look at the renewable energy industry. A report by the International Labour Organization has identified eight key sectors that they expect to undergo major changes in the transition towards a green economy, namely; agriculture, forestry, fishing, energy, resource-intensive manufacturing, recycling, buildings and transport (ILO 2012: 3). The report further points out that there has been particularly “rapid employment growth in renewable energy”, with global job growth in the sector increasing 21 per cent per year, and an estimated five million people working in the sector already (ILO 2012: 2). Similar numbers stem from recent studies by the International Renewable Energy Agency (IRENA), where renewable energy jobs worldwide are estimated at 3.5 million in 2010 (IRENA 2011: 15), and at five million in 2011. In line with these developments, global interest in renewable energy continues to grow significantly, with new investments increasing from $US 160 billion in 2009 to $US 243 billion in 2011 (Frankfurt School of Management and Finance 2011: 202; ibid 2012: 76).

Similar to what we have seen in the context of the sustainability transitions debate, the term green economy is primarily a national concept (see for example OECD 2009, no page). However, in light of the current urbanisation and decentralisation trends there is a growing recognition of the need to consider the urban dimension of the green economy and the potential role of local governments in achieving green growth. As a recent OECD report states, “[c]entral government policy alone cannot ensure a green transition... [c]ities are essential to making growth stronger, greener and more inclusive” (OECD 2012: 24). Also, UNEP’s “Towards a Green Economy” policy guide includes a whole section on cities. In the chapter it is argued that “in most countries, cities will be important sites for the emerging green economy” (UNEP 2011: 458). One of the primary reasons for this, it is explained, is that “cities will also develop high-tech green manufacturing clusters in or close to urban cores” (Ibid: 458). A recent survey among city governments published by LSE Cities confirms this trend: 37 out of 53 cities state that green economic development is considered either an important or a very important part of their political agenda (LSE Cities and ICLEI 2012: 25).

In fact, there is already evidence of the urban dominance in green growth. A recent study on the United States found that the majority of the green economy growth and job creation between 2003 and 2010 occurred in the 100 largest metropolitan regions (Muro et al. 2011: 24). This same study found clusters to be particularly beneficial, with clean economy businesses located in clustered areas growing 1.4 per cent faster per annum between 2003 and 2010 than those that were more secluded (Ibid: 4). Similarly, a study on the clean economy found that “Top-performing cleantech countries have established large companies in the sector and have built a cleantech cluster of supportive companies, including suppliers and clients, financial institutions and research institutes” (van der Slot and van den Berg 2012: 43).

In other words, the urban scale is becoming part of the green growth debate. It is an economically and politically appealing concept, one that is supported by the continued growth of an increasingly successful sector. Within the wider green economy, cleantech in general, and more specifically the renewable energy industry, is expected to have a significant economic, environmental, and social impact on sustainability governance. Whereas municipal initiatives have a role to play in the
development of localized clusters, this aspect “has not been dealt with in sustainability transitions literature” (Berkhout et al 2012: 110).

5) Methodology

In order to assess the role local governments can play in designing and implementing environmental innovation policies, we look at five city examples with a concrete experience in setting up a municipal cluster in the renewable energy sector. For each city, we present the types of policies that the individual local governments deployed as part of their effort to establish a local renewable energy cluster initiative. These policies reflect the relationship between the municipal authorities and those organisations that are active in the local renewable sector. An effort was made for geographic diversity; the sample includes cities in North and South America, Asia, and Europe: Baoding (China), Calgary (Canada), Hamburg (Germany), San Diego (United States) and Piracicaba (Brazil).

![Map of selected case studies](image)

*Figure 1: Selected Case Studies*

It should be noted that in this paper we use a slightly different definition for the four modes of governance discussed in section 3. This is because these relate to energy generation and use and not policy options for local governments to manage the development of the renewable energy industry. Whereas Bulkeley and Kern define ‘governing by provision’ as providing electricity through for example communal energy companies, we use the term ‘provision’ in the sense of financial support, which falls under ‘enabling’ in Bulkeley and Kern’s conception. Consequently, our definition of ‘enabling’ is somewhat more narrow, referring to promotional and networking activities, and excluding financial support. With these distinctions, our classification is more similar to that of Alber and Kern, since they also include ‘financial means’ under ‘provisioning’ and include ‘persuasion’ and ‘role of local government in coordinating and facilitating partnerships with private actors and encouraging community engagement’ under the category ‘enabling’ (Alber and Kern 2008: 5).

In section 2 we concluded that the urban regime seems an adequate point of departure for understanding transition processes. In order to test this assumption, we apply the four modes of governance and use them to assess municipal action towards the renewable energy sector. Do local
governments proactively engage in local niche developments, or do they rather respond to niche developments originating from the private sector? Can urban-level politics be considered part of the niche, or do municipalities play a regime role? In order to answer these questions, it is important to consider the different characteristics of respectively niche and regime. Based on the MLP literature discussed in section 2, it is possible to identify certain characteristics that are relevant for niche and regime developments. We suggest using the following categories:

1) scope of change;
2) type of initiative;
3) level of risk taking;
4) speed of change;
5) drivers of change.

These categories reflect the assumptions underpinning the MLP interpretation of respectively niche and regime. Scope of change refers to how much change is taken place within a given time span: is this radical or incremental? The type of initiative reflects the mode in which initiatives are taken forward: are these driven by trial-and-error or more careful learning and planning processes? The level of risk-taking shows whether proponents of sustainability initiatives are driven by visionary leadership and prepared to accept potential failure. Speed of change is slightly different from the earlier category scope of change, as it refers to the inner working of such a process: how fast can decisions be taken? The last category looks at the underlying drivers of change behind these processes. Are these dependent on individual networks of stakeholders from within the system, or do the existing institutions and routines determine the way forward?

<table>
<thead>
<tr>
<th>scope of change</th>
<th>type of initiative</th>
<th>level of risk taking</th>
<th>speed of change</th>
<th>drivers of change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Niche</td>
<td>radical innovation</td>
<td>high-risk</td>
<td>dynamism</td>
<td>agency-driven</td>
</tr>
<tr>
<td>Regime</td>
<td>incremental change</td>
<td>pro-safeguards</td>
<td>risk-averse</td>
<td>institutions-driven</td>
</tr>
</tbody>
</table>

Table 1: Suggested key differentiators between niche and regime

From the MLP literature we can argue that niche developments are generally marked by the dominance of radical innovation; a pro-experimentation attitude; high-risk; dynamism; and agency-driven processes. In contrast, regime developments characteristics generally include incremental change; a pro-safeguards attitude; risk-averision; relative stability; and are institutions-driven. Table 1 above gives an overview of these differentiators between niche and regime. In the next section, we present the four local governments’ policy tools used to stimulate a renewable energy cluster initiative in order to relate them to the identified niche and regime characteristics.
6) Five City Experiences: Urban Green Economy in Practice

We looked at five cities with a functioning renewable energy cluster initiative. In other words, it was not sufficient for a city to have a relatively high number of relevant organisations in the renewable energy sector within its territory; it was necessary that they had a cluster management structure in place.” The findings are based on public documentation, policy analyses, as well as on a number of unpublished economic reports. For the original study, all relevant data per cluster initiative were compiled, and interviews with experts and key stakeholders were conducted. These were done either in person, by phone, email correspondence and/or through a short online questionnaire. The following sections present key aspects from this study, and provide a short description of each city experience.

Baoding, China

The city of Baoding has developed the Green Power Valley renewable energy cluster as part of the broader Baoding High Tech Industrial Development Zone. Baoding has a strong industrial legacy, which not only caused the major lake pollution that helped to motivate the city’s sustainability agenda, but also provided a foundation for the green energy industry. The local government, led by the mayor, aims to make Baoding the nation’s leader in renewable energy manufacturing. By encouraging the growth of the green economy, the municipality hoped to mitigate a potential local economic crisis caused by the forced shutdown of 400 local businesses in response to the pollution of Baiyangdian Lake. The municipality has also set a target for reducing CO2 emissions 35 per cent by 2015 and 48 per cent by 2020. The local government also lobbied the national government to gain their support towards these goals.

The local government of Baoding has used a variety of governance modes to support the growth of the cluster. The municipality enacted a number of local regulations under the title “Several Regulations about Encouraging Investment in the Power Valley”. These range from tax exemptions to assistance for renewable energy workers’ families in settling in the city. The city also has an active incubator policy, providing new companies with office space and eventually land for building on. Thus, the goal is not just to attract foreign direct investment, but to stimulate innovation. Beyond local policy efforts, the city’s mayor has actively worked in Beijing to promote Baoding’s renewable energy profile, consequently becoming a fairly prominent national figure. The city also invested US$ 7.6 million to become one of the nation’s solar energy cities. These efforts seem to have paid off, in the six years since it was created by the city, the Green Power Valley has grown to include 200 companies.
With a population of 1.182.000, the city of Calgary is the largest city in the province of Alberta, and the 5th largest in the country. The province contains vast fossil fuel reserves, estimated to be the world’s largest deposits of oil sands and the third largest of crude oil. The city also has solar energy potential since it is one of the sunniest cities in Canada. Calgary’s economy centres on the oil and gas sector, with one out of every thirteen jobs in the city relating to energy. Although the city is a major hub for conventional fuels, the municipality would like to expand this to include renewable energy as well.

The Sustainable and Renewable Energy (SURE) cluster is an initiative of the Calgary Economic Development (CED), which is the city’s leading economic development agency. The initiative is part of a larger aim to make the city a leading global energy centre. The CED believes that the local, existing expertise in the energy business provides an excellent foundation for renewable energy development. This is also seen as a way to diversify the local economy and thereby enhance the economic resilience of the city. Although the cluster is managed by CED and not the local government directly, the two have a close working relationship and the cluster expenses are paid from the municipal economic development budget. Calgary’s sustainability policies can be divided into four main parts: a municipal climate change policy, energy supply agreements, a strategy for energy demand management, and sustainable buildings. The municipality signed the Calgary Climate Change Accord, whereby they committed to a 20 per cent corporate greenhouse gas emission reduction by 2020, and 80 per cent by 2050. The local government also worked with a variety of stakeholders to devise a so-called Community Greenhouse Gas Reduction Plan. The city has set ambitious sustainability goals in terms of its own energy use, with 100 per cent of the city’s electricity expected to come from renewable sources by 2012. They also already have a functioning 100 per cent wind-powered light rail transit system. The local government encourages networking, serving as the host of the Global Clean Energy Congress, the Virgin Earth Challenge, and the International Sustainable Energy Congress. Furthermore, the municipality is a member of the World Energy Cities Partnership.

Hamburg, Germany
The Renewable Energy Cluster in Hamburg was established in 2008 with support from the municipal government. It was part of the local government’s effort to diversify the local economy and to counter the economic downturn in the face of the 2008 financial crisis. The cluster and the city are primarily focused on the wind energy industry, with the objective to make the city the nation’s leader in wind energy. The decision to focus on wind was based on the fact that the offshore wind industry was booming and that Hamburg was already home to the administration centres for many firms with a long track record in the wind energy business.

The local government provided initial funding for the renewable energy cluster in the form of co-financing. Although the cluster is officially an independent entity, it remains closely aligned with the municipality, with half the supervisory board members coming from the local government and its office located within that of the city’s Business Development Corporation. Hamburg’s 1st priority has been to support the local renewable energy industry by coordinating, matchmaking and promotional activities. These types of activities are cost-effective and are well-received by the business sector. The co-financing made available for the cluster initiative is another important choice, which has enabled a more structural interaction among the various players in the sector. As a result of the cluster’s establishment, the municipality’s investment promotion strategy for renewable energy businesses has now been taken over by the cluster management. Next to the city’s support of the cluster initiative, Hamburg also plans to encourage local energy generation, with the idea that local consumption would strengthen Hamburg’s reputation as an attractive location for businesses in the wind, solar and bio-energy sector. While the municipality’s goal is to stimulate economic growth across the entire spectrum of renewable energy, the most promising field of the cluster rests with the wind business. For example, the city intends to reform planning regulations to allow wind turbines to be placed in the city’s port area.

Piracicaba, Brazil

The city of Piracicaba, with a population of roughly 364,000, lies in the heart of the Brazil’s sugar cane industrial region, and the local economy is dominated by the sector. The city has long served as an export-oriented manufacturing base, with its many sugar and ethanol mills that produce around 502 million litres of ethanol annually. The municipal government has significant autonomy on political, administrative, and financial levels, a result of decentralization efforts across Brazil in the 1990s. The local government therefore has the authority to set its own industrial and environmental policies. The municipality has less control over energy provision, which is much more centralized. The city’s economic development secretariat, SEMDEC, works to strengthen the city’s industrial profile.

As the municipality’s ethanol industry grew, it began to receive considerable international interest, which led to requests for study tours and marketing events. The municipal trade department’s response to this increasing logistical challenge was the creation of the Arranjo Productivo Local de
Álcool da Região do Piracicaba (APLA) cluster in 2006. The organisation was also seen as a way to connect all the different local stakeholders in the ethanol industry, thereby increasing the value of whole productive chain and contributing to the sustainable development of the region. The city plays an important role in the cluster initiative’s daily operation. The cluster is also supported by the national government’s trade and investment promotion agency (APEX), which provides half the funding for the cluster. In general, it is the national government that provides most of the key policies to support the ethanol and renewable energy sector, as well as the São Paulo state authorities. National regulations have led ethanol production to double since 2002, and already more than 50 per cent of Brazilian cars have flex-fuel engines. Ethanol enjoys a similar priority on state level. In the case of São Paulo, where 60 per cent of Brazil’s sugarcane is grown, many supporting mechanisms exist, including lower tax rates for ethanol production and R&D programmes. Nevertheless, the Piracicaba municipality has also made its own efforts to enable sugarcane-based electricity to be fed into the local grid and to ramp up investments in the sector. The city has also been involved in APLA’s efforts to establish a technology park for bio-energy innovation.

San Diego, United States

San Diego is the 8th largest city in the United States and is blessed with a natural harbour, beaches, and a mild, very sunny climate. San Diego has a diverse economic profile, with the largest sectors being military, tourism, international trade, and manufacturing. The presence of a more than 50 research institutes and six universities, has supported the development of the nation’s largest biotechnology cluster, as well as other high-tech and innovative businesses. These include a number of telecommunication, and increasingly, cleantech companies. The city’s autonomy is governed by the Californian Constitution, leaving the municipality free to create regulations relating to environment, industry, and energy. The municipal government is actively pursuing a local environmental agenda, which includes a climate plan to return to 1990 emission levels by 2020 and to reduce them by 80 per cent by 2050. When it comes to funding these sustainability policies, both state and federal incentives play an important role.

The green economy forms an important part of San Diego’s sustainability and economic development strategy. The city wants to take advantage of the global renewable energy boom by positioning itself as a hub for the burgeoning industry, thereby fostering the creation of new businesses and the relocation of existing companies to the city. With this in mind, the city helped to create the CleanTECH San Diego cluster, and the municipality maintains a close working relationship with the independent organization. Although the cluster includes all clean technologies, much of its work relates to renewable energy. The city makes use of cluster’s expertise and the products and services offered by the cluster members when implementing sustainable solutions. Often the cluster will act as a match-maker for the city, for example helping them to procure environmentally friendly technologies. The local government attempts to act as a role model, reducing emissions from city operations through conservation and renewable energy use. They provide financial support for
residents’ renewable and energy efficiency upgrades, research, and networking activities. Through the “Smart City San Diego Initiative”, the city is partnering with the local utility, General Electric, the University of California San Diego, and the CleanTECH cluster to “drive San Diego’s clean energy evolution”. City leaders also lobby the state and national government for the continuation and expansion of cleantech support mechanisms.

7) Analysis: Modes of Urban Governance and Regime vs. Niche Characteristics

The previous section presented the various pathways local governments have followed in order to establish a renewable energy cluster initiative. We now turn to what this means in terms of regime and niche characteristics. In order to do this, we have analysed the four modes of urban governance for each city and feed these findings into a niche-regime assessment.

In Baoding, the local government has made use of all four modes of urban governance, most prominently “governing by authority” and “governing by enabling”, and to a slightly lesser extent “governing by provision”. A number of local regulations have been instituted to support the renewable energy industry. The local government has also worked as an enabler, promoting the reputation of the Green Power Valley and the city as the nation’s leading renewable energy centre. In terms of provisioning, the city has provided office space, land and financial benefits to innovative renewable energy companies.

The city of Calgary is actively promoting the local renewable energy industry primarily by enabling. Through the CED’s SURE cluster initiative, they are providing a platform for local renewable energy businesses to network and gain publicity. Similarly, the local government is promoting the city as a major energy centre through international partnerships and by conferences. The city is also acting as a role-model, choosing to procure only renewable power.

The Hamburg municipal government has played a critical role in the city’s renewable energy cluster initiative. The local government attempted to promote renewable energy business, consumption, and the city’s profile as a wind energy hub, thereby “governing by enabling”. The city has also provided support in the form of co-financing for the establishment of the cluster initiative and an office on the premises of the city’s development corporation. The city has to a lesser extent acted as a role model and shown a willingness to alter regulations to benefit the renewable energy sector.

Piracicaba has been particularly active in providing support to the cluster management, and through an active enabling policy from the early days of the cluster initiative onwards. The municipality has taken the lead to bring together the various companies working in the ethanol sector and created a knowledge network that reaches beyond provincial and national borders. The new plan to establish a technology park that would serve as an interconnector between the private sector and science is another indication of the municipality acting as enabler for the renewables business.

San Diego confirms that a coordinated knowledge exchange between city, private sector and other stakeholders can create synergies. The municipality makes active use of the cluster’s expertise and the products and services offered by the cluster members. The city also acted as enabler by promoting the image of San Diego as a clean energy leader through Smart City San Diego, and the bid
to the US Department of Energy for hosting the 2013 Solar Decathlon (San Diego came in 2nd). Also, municipal support for the cluster comes in the form of non-financial commitments (such as networking activities) and funding for research and development programs.

Having analyzed the different policies and modes of governance employed by these cities with regards to renewable energy, it is possible to relate these strategies to the five niche/regime characteristics. Tables 2 and 3 below present an overview of the various experiences for each city. Table 2 includes the niche-specific developments; table 3 shows the regime-specific developments. The presented data in the tables reveal that in the various city examples, we find niche as well as regime characteristics. This confirms the findings of a recent study of the renewable energy cluster in Worcester, Massachusetts, which concludes that cluster initiatives can have a paradox effect: they mobilize niche technologies on the one hand, while they have the potential to impede radical change because of close ties to key stakeholders of the current regime (McCauley and Stephens 2012: 222).

However, we observe less niche characteristics in comparison to regime characteristics. Local governments tend to play the role of third party facilitator, and stay in the background. They carefully consider their moves before taking decisions. While political leadership, as it proved crucial in Baoding and San Diego for example, can play a vital role in bringing about radical change, city authorities seem to be generally risk-averse, less dynamic and let existing institutions lead the way. This indicates that the regime characteristics are indeed important to understanding sustainability politics in the urban context.

<table>
<thead>
<tr>
<th></th>
<th>radical innovation</th>
<th>pro-experimentation</th>
<th>high-risk</th>
<th>dynamism</th>
<th>agency-driven</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Baoding</strong></td>
<td>Clear break with earlier industrial structure and earlier policies</td>
<td>Clear focus on renewable energy, and political leadership lobby towards national capital</td>
<td>After environmental disaster, change occurred fast, context helped to implement swift changes</td>
<td>Mayor was instrumental, being a first-mover and firm proponent</td>
<td></td>
</tr>
<tr>
<td><strong>Calgary</strong></td>
<td>As there is sufficient capital, innovation is high on the agenda</td>
<td></td>
<td>Since cluster was created, many companies have joined the organisation</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Hamburg</strong></td>
<td></td>
<td></td>
<td>Since the inception of the cluster, many have joined the initiative within its first year</td>
<td>Key actors in the city’s economic department and private sector stakeholders had prepared the ground for the cluster</td>
<td></td>
</tr>
<tr>
<td>City</td>
<td>Description</td>
<td>Current Status</td>
<td>Key City Stakeholders Felt the Need to Have More Effective Support for Increasing Outside Interest in the Sector</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-----------</td>
<td>-----------------------------------------------------------------------------</td>
<td>---------------------------------------------------------------------------------</td>
<td>---------------------------------------------------------------------------------------------------------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Piracicaba</td>
<td>Recent developments have brought the cluster to support the development of a technology park for renewables</td>
<td>In a few years, cluster has rapidly grown to include more than 800 organisations</td>
<td>Strong leadership in starting the cluster</td>
<td></td>
<td></td>
</tr>
<tr>
<td>San Diego</td>
<td>Over 50 different research institutes and leading research universities, innovation a priority</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 2: Niche characteristics for selected case studies

<table>
<thead>
<tr>
<th>City</th>
<th>Incremental Change</th>
<th>Pro-Safeguards</th>
<th>Risk-Averse</th>
<th>Relative Stability</th>
<th>Institutions-Driven</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baoding</td>
<td>With most revenue stemming from fossil fuels, a change towards renewables is a long-term process</td>
<td>The choice to support renewables is a de-facto insurance policy against a possible economic downturn in the fossil fuels sector</td>
<td>All initiatives are in addition to current mainstream policies, which are kept intact</td>
<td>Major corporate players determine the rules of the game, barriers to swift changes</td>
<td>Green Power Valley managed by High-Tech Zone, which is in charge</td>
</tr>
<tr>
<td>Calgary</td>
<td>Slow response to early initiatives from private sector</td>
<td>Renewable energy is only one of various priorities designated to stimulate economic development</td>
<td>Limited additional capacity within the city to support the establishment of cluster</td>
<td>City's status as administrative centre reinforces further growth in this segment</td>
<td>City's economic development agency in charge, and driven by medium-term (political) considerations</td>
</tr>
<tr>
<td>Piracicaba</td>
<td>Part of national and regional long-standing policies to promote ethanol</td>
<td>Cluster managed with the support of other existing organisations and current staff members</td>
<td>Focus on the local industrial strength: biofuels only. No efforts undertaken to expand the cluster beyond</td>
<td>Cluster members have similar interests, and are mainly interested in the growth of current</td>
<td>The cluster management has a clear, narrow mandate to enhance the productivity of</td>
</tr>
</tbody>
</table>
Table 3: Regime characteristics for selected case studies

Even though the niche characteristics are less visible, they can play a role in sustainability transitions on the urban scale. Particularly in Baoding, where environmental peril triggered the municipal interest in a renewable energy sector, the city policies could be considered having niche characteristics. The transition dynamic was more radical and faster than in the other examples. However, it should be noted that the cultural, political context in China and its centralised governance system is an additional element to consider in this regard. The other city examples reveal that niche characteristics are much less visible than regime characteristics, and are most visible 1) in the context of leadership (four out of five cities in the sample); and 2) when looking at the dynamic environment: in four out of five cities we observe a highly dynamic cluster process where private actors move quickly to join the initiative.

8) Conclusion and Discussion

This paper began with a debate about the possible synergies between the multi-level perspective and multi-level governance theory regarding sustainability transitions in the urban context. In general, the findings presented in the empirical section confirm that the urban level can indeed be considered as a regime in itself, and that the four urban governance modes from the MLG discourse offer an appropriate analytical tool. The ten categories identified for niche and regime characteristics support the view that urban policy tools tend to more regime-oriented than niche-oriented. The properties of urban policies reflect the policy patterns often associated with highly institutionalised processes, where incremental change, barriers to innovation and risk-averse strategies dominate the decision-making process.

What does this mean for the debate about sustainability transitions on the urban scale within the multi-level perspective? If urban developments are indeed crucial to sustainability transitions, and local government actors are increasingly active in shaping the way sustainability policies are designed and implemented, it seems that it does not suffice to address the urban context as part of a holistic regime assessment. While there is great value in integrating all relevant scales into a holistic assessment of a given transition process, the increasing relevance of the urban as a polity calls for greater emphasis on empirical data from metropolitan regions. This is in line with Geels’ call for more in-depth research about the specific processes underpinning societal change: “the core analytical puzzle is to understand how environmental innovations emerge and how these can replace,
transform or reconfigure existing systems” (Geels 2011: 25). A more specific research focus on urban sustainability regimes might offer interesting insights in this regard.

The MLP approach does not lose its significance however; rather we suggest that the MLP can be used for urban sustainability transitions. In doing so, the MLP trinity, landscape, regime and niche could remain the skeleton on which to build such an assessment; it offers an interesting starting point for assessing how urban sustainability policies evolve over time. In such an assessment, the landscape level would reflect external influences (including provincial or national policies!). The regime level would include the local authorities (municipal or even communal), and the niche would be defined as agent-networks that act as drivers of change in continuous interaction with the local government.

This paper provided a first empirical argument to interpret urban sustainability politics. There is little doubt that there is a need for more research about urban-specific pressures from landscape onto regime and niche level and their effects in the short-, medium- and long-term. The presented examples from the renewable energy sectors provide an initial assessment and call for other scholars to contribute to this emerging field of knowledge.
References:

Alber, G., Kern, K., 2008. Governing Climate Change in Cities: Modes of Urban Climate Governance in Multi-level Systems. OECD.


Hodson, M., Marvin, S., 2010. Can cities shape socio-technical transitions and how would we know if they were? Research Policy 39, 477-485.


Notes:

1 For more information please see the full report: “Role of local governments in promoting renewable energy businesses: A contribution to a green urban economy” available at: www.iclei.org
2 One authoritative definition includes six distinct categories identified by Roland Berger’s Green Tech Atlas Germany, namely: 1) environmentally friendly power generation and storage, 2) energy efficiency, 3) material efficiency, 4) waste management and recycling, 5) sustainable water management, and 6) sustainable mobility (Federal Ministry for the Environment, Nature Conservation and Nuclear Safety 2009)
3 IRENA Presentation by R. Ferroukhi, MENAREC Conference, 13 May 2012, Rabat, Morocco.
4 A cluster is defined as a geographic concentration of interconnected economic and innovative activities in a particular field. Clusters can exist with or without the knowledge of the companies in them, and they can occur without any intervention, project or organization. According to the International Cleantech Network, a cluster consists of representatives from industry, academia and government institutions (the triple helix) – often coordinated by an organizational unit.