Governance Challenges for Greening the Urban Economy: Understanding and Assessing the Links between Governance and Green Economy in Cities

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Foreword

Two decades have passed since nations of the world assembled in Rio de Janeiro and agreed to adopt a sustainable development (SD) agenda, promising to chart a development path that is equitable, environmentally just and economically rewarding. We now stand at a crossroads looking for the right path towards the world we want. The prognosis is not encouraging. According to many studies conducted by research or policy bodies, we seem to have made some progress, but still fall far short of what is required to sustain current levels of well-being. Negative environmental trends continue to be exacerbated by human interventions—primarily led by a model of unsustainable and conspicuous consumption. As most of the world's population live in urban areas today, cities concentrate a large part of the economy and contribute to unsustainable practices. But cities can also be part of the solution, as discussed in this policy report.

The unsustainable conversion of natural capital for supporting this emerging consumer culture while ignoring the ecological consequences to economies and other aspects of well-being has become quite entrenched. The extraordinary emphasis on developing produced capital appears to have overwhelmed all other aspects of natural capital required for our well-being.

On the positive side, there is expanding awareness and a growing acknowledgement of this gap in our planning and implementation processes. There is a recognized need for development metrics that extend beyond GDP, the current indicator. Increasing resolve to align production activities with environmental and equity considerations, and efforts aimed at reforming global institutional structures to create more synergies and effective implementation of relevant policies are welcome signs of change.

Research and capacity building activities at the United Nations University Institute of Advanced Studies (UNU-IAS) have examined various aspects related to the rubric of governance challenges in achieving SD—from a focus on broad-based development and well-being at the community level, equity issues related to urbanization and its implications for environmental resources, to innovations that could aid in achieving global goals for policy-making for SD.

Our research indicates that despite the exalted nature of global goals, they become relevant only when defined and shaped into pragmatic objectives and actions. This would require cooperative action by all stakeholder groups, implying that future policy processes need to ensure their relevance at various levels to guarantee successful implementation. This is no easy task, but by no means an impossible one. Current accepted standards of practice and business norms must be re-oriented to include a more consultative policy setting with all major actor representatives. It would require designing regulations that acknowledge the need for balance among all forms of capital, and incentives that provide equitable access to resources and services to all.

There are a number of expectations from processes linked to Rio+20 and beyond, particularly on how the decisions will be transformed into action and results. UNU-IAS stands ready to work with its existing and future collaborators to transform our aspirations into reality as we move forward in translating the sustainability agenda into action.

Govindan Parayil,
Director, UNU-IAS and Vice-Rector, UNU
June 2012

Executive Summary

The challenges for creating a greener economy and the institutional framework for sustainable development pass necessarily, or mostly, to cities, as they concentrate a large and growing part of the world's economy and population, as well as decision-making power. Moreover, cities are centres of knowledge and innovation both technological and institutional that can make viable a greener economy and better governance within and beyond the cities. They are also hubs for social and political movements that catalyse societal transformations. With the processes of urbanization and rural-urban transformation, the economy in cities, especially in cities of developing countries, has been shifting from traditional artisanal crafts and markets to more modern industry and service sectors. The concentration of people, resources, knowledge, political power and economic activities in urban areas, if properly managed, can provide economies of scale and efficiency gains that lower the use of resources and energy, and thereby promote doing more with less, while offering fair outcomes to the most vulnerable people and the environment. In this sense, transitioning from the traditional "brown" economy to a greener economy could be achieved by reducing resource and energy consumption in cities through improving the key components of the urban economic process: transformation of space, production and consumption, circulation (trade and transportation), social and ecosystem services and knowledge generation.

Greening of the urban process will only be achieved with better urban governance. As governance is embedded in institutions, which are humanly devised rules, we need to build the legitimate political and social mechanisms to green socio-ecological and economic systems. However, how can we assess whether or not current governance systems in these processes are steering cities towards a greener economy? If they are, how is the greening of the economy affecting people and ecosystems?

Cities need to define a way to assess whether or not their governance system is moving them towards a greener economy that leads to sustainable development and poverty eradication, in the context of the city and beyond. Governance is not only about decision-making processes, but also about how those decisions are implemented and create positive changes for people and the environment. Thus, we propose a set of governance criteria to assess the greening of urban processes that go beyond the decision-making procedures, and includes the capacity to implement change, the results in greening the economy, and final outcomes on the ground. We also look at the obstacles, achievements and lessons in the greening of the direct and indirect economic processes in cities.

The green economy and the institutional framework for a more sustainable development is intrinsically linked to the way cities operate, govern and "think". The large concentration of decisions with a massive scale and far reaching impacts puts cities in the centre of the discussions about sustainable development. Understanding how the city economy and politics function and how they are connected to a larger world (regional, national, global) is fundamental to understand to create governance mechanisms and the institutions necessary to move the world towards a green economy.

1. Introduction

Most of the world's population lives in urban areas today. Besides population, cities concentrate disproportionate amounts of the world's economy and the decision-making power in most countries. Thus, the challenges and opportunities for creating a greener economy and the institutional framework for sustainable development rest necessarily, or mostly, on how cities are developed and managed. Moreover, cities are centres of knowledge and innovation (both technological and institutional) that can make viable a greener economy and better governance within and beyond the cities.

The advent of the "new economy" based on the spread of information, technologies and efficient logistics was initially thought to disperse economic activities and reduce the need for a physical presence for certain activities (for example, work). However, the globalization of economic, political and social activities led to the need for a greater concentration of activities to generate economies of scale, and also concentrated decisions in large organizations to manage activities at the global scale (Sassen, 2000). These organizations required the concentration of physical structures and personnel, but also created a demand for services. Thus, cities grew in political and economic importance with globalization, instead of losing their relevance.

The world today is much more connected and decisions are concentrated in large public and private organizations, generally based in cities. The scale of some organizations and the reach of their operations, including supply chain tiers, can influence the economy and politics regionally and even globally, even though some cities concentrate more of those organizations than others. Thus, a city's influence on economic, social and political systems, as well as its environmental consequences, generally goes beyond the city's boundaries. Besides the city economy, cities have huge influences on the regional and global environment and on regional and global economic, social and political systems. The scale of those influences can range from local (city level) to regional (areas beyond the immediate boundaries of the city), national and global.

Urban growth not only increases the number of people living in cities but also intensifies the opportunities and challenges in cities. Perhaps the most important opportunity linked to urban growth is the increase in the importance of the urban economy. With the processes of urbanization and rural-urban transformation, the economy in many cities has been shifting from traditional artisanal crafts and markets to modern industry and service sectors. At present, a significant part of the world's economic activities and resources is concentrated in cities. Driven by the concentrated resources (for example, energy, human and finance) and huge markets, urban economies have developed very quickly since the nineteenth century. For instance, economic activities located in cities account for 55 per cent of gross national product in the least developed countries, 73 per cent in middle income countries, and can reach 85 per cent in the most developed countries (UN-Habitat, 2006). In addition, 75 per cent of global economic production takes place in cities (Work Bank, 2009). The main objective of urban economies is to enlarge productive outcomes by concentrating markets for labour, goods and capital. This kind of economic development in cities can significantly promote the whole nation's economy and increase people's incomes, living standards and job opportunities. That is to say, rapidly growing cities bring economic prosperity not just to their inhabitants but to other areas owing to spillover effects.

On the other hand, rapid urban growth habitually has entailed serious social and environmental challenges, such as urban poverty, various forms of pollution, vulnerabilities to natural events and impacts on the climate. The negative and unsustainable outcomes of current urban economies, which are based on high production and consumption patterns, have become more visible and attracted more attention since the 1990s. Cities today are responsible for 67 per cent of total global energy consumption and more than 70 per cent of greenhouse gas (GHG) emissions (UN-Habitat, 2008), and these trends significantly intensify the severity of two of the great challenges of our time: climate change and energy security. In order to keep up with rapid urban expansion and urban population growth, more resources as well as more consumption and production are required. The ever-increasing production and consumption in cities result in serious environmental problems in terms of air, water and land pollution and the degradation of ecosystems and climatic change. On the other hand, a large part of urban populations that do not have access to efficient resources and facilities, particularly in developing countries, suffer from localized environmental problems and unhealthy living conditions. This constitutes another dark side of urban development "social inequity", which can be regarded as just the result of the unbalanced and uneven structure of urbanization, especially in many developing countries.

A green economy is defined by the United Nations Environment Programme (UNEP) as one that "focuses on improving human well-being and reducing social inequity over the long-term, while not exposing future generations to significant environmental risks and ecological scarcities" (UNEP, 2011). The role of cities in promoting a green economy involves particularly the idea of greening the city-based economic processes, which also include city decisions that go beyond the administrative boundaries of cities. The institutional framework for more sustainable development is intrinsically linked to the way cities operate and "think". The large concentration of decisions with a massive scale and far-reaching impacts puts cities in the centre of the discussions about sustainable development. Understanding how the economy and politics of the city function and how the city is connected to a larger world (regional, national, global) is fundamental to understanding how to create institutional mechanisms to move the world towards a green economy.

2. Cities and Sustainable Development

2.1 The urbanization process

Urbanization is one of the key defining features of humanity as a whole. The progressive shift of people from rural areas and activities into towns and cities is a complex process inextricably tied to economic development and technological change. Cities have existed for millennia but only relatively recently (the past 200 years) have large proportions of the human population moved into cities. It can be argued that cities are fundamentally the result of surplus. Settled agriculture after the Neolithic Revolution permitted human settlement in higher densities (Bairoch, 1988). In areas where conditions were favourable, there was the creation of a surplus. Without a surplus of food production, all people would be occupied in the basic activity of subsistence. Crucially, a surplus of food creates a tradable commodity, which distinguishes a settlement from a city (Childe, 1951). The surplus frees people from the land allowing them to engage in other activities, some of which produce goods and services, many of which are also traded.

From this origin, cities have gradually evolved to incorporate larger numbers of people and wider ranges of activities. Although improving transport and trade enabled products to be brought from further afield, the volumes were such that a city was essentially reliant on the resources in its hinterland. It was not until the industrial revolution that a series of inter-related processes were set in motion to produce the urbanization we see today. The combination of a superabundance of energy in the form of fossil energy with innovations designed to exploit its potential to do mechanical work spurred the largest socio-spatial transformation the planet has ever witnessed. Increases in food production and the mechanization of that process freed yet more people to work in industry and services in new cities. New forms of transportation based on fossil fuels allowed large volumes of goods and inputs, and people, to be transported more efficiently from one point to the other at a lower cost. Although this process was essentially no different from processes over the centuries, the scale and speed of this process were remarkable in the last 200 years. In some places, the transformation was so rapid that it often occurred more quickly than it could be managed and it is this feature, the sheer speed of development, that poses a critical problem for sustainable development in the coming decades. Moreover, some of the negative impacts were not perceived in the cities themselves.

2.2 Scale: Impacts at different scales (local, regional, global)

Urbanization, although a global process, has gained more traction in some places than others. Being inextricably linked with economic development, it is no surprise to discover that the richest countries in the world are also among the most urbanized. However the global disparity in wealth across the world is also matched by levels of urbanization. As such, it becomes rapidly apparent that not all cities are alike. They do not confront the same challenges, nor do they pose the same threat to the environment. It has been shown that, generally, as cities develop they first become centres of energy consumption relative to the national average and then become entities of efficiency, displaying lower levels of per capita energy use than the national average (IEA, 2008). All depend, however, on different factors, such as form, density, location and main activities of the city. For example, cities in China may be set on high- or low-carbon pathways of intensive development as a function of their geographical location and their main economic activities (Dhakal, 2009). Yet even cities in developed countries display different levels of per capita emissions depending on their function (Onishi and Kobayashi, 2011). Cities may be concentrated on certain industries providing goods to other cities or internationally, or be specialized in the service sector. In this sense cities cannot be considered as stand-alone entities; they are dynamic and interconnected to their regions and countries but also to other cities and countries.

This broad relationship of the city to its surrounding areas can be generally explained in the following way. Early on, in the development stage, cities are more polluting because there is a lack of pollution in the hinterlands and rural areas. As they get richer, cities can better afford and become more adept at both cleaning their environment and exporting pollution outside their boundaries, and often outside their own country. Combining this with economic development brings about greater efficiencies in city life and can begin to provide services that are cleaner at the per capita level, more so than in rural areas that have the same needs. Therefore cities can be seen as transforming from areas with relative pollution to relative efficiency.

Yet with greater connectivity and speed of capital flows, innovations in one place can find themselves adopted or adapted in another location very quickly. Cities may be said to simultaneously embody and balance efficiencies and externalities (see Box 1). It is the nature of this balance, not just over levels of development but over city size, density and economic function that makes cities such a complex area of study. They produce impacts within and outside the city boundaries. The green economy in cities would seek to mitigate these impacts through the development process and throughout the many scales of impact from local to global.

Box 1: City scaling laws and the efficiency of agglomeration

While it is intuitive that larger settlements provide more services than smaller ones, the precise nature of how settlements develop and their arrangement has been of interest to economists and geographers alike through the development of location theory in spatial economics and Central Place Theory, which describes settlement hierarchies. As urbanization has continued apace, cities have grown larger than previously envisaged and complexity theory is also contributing to analysing urban processes.

A key finding is that cities do not scale proportionally in all aspects of their development. Bettencourt et al. (2007) show that power laws exist for a wide range of social, economic and physical aspects of the city. By examining the gradient of slope in logarithmic space, they identified three states, where growth is either exponential ($\beta > 1$), proportional ($\beta = 1$) or exhibits economies of scale ($\beta < 1$). Economic and social issues such as patents, serious crimes and HIV cases give proportionally higher returns than smaller cities. Conversely, infrastructural elements such as petrol stations and road length exhibit economies of scale. It is for this reason that cities are often feted as mankind's greatest achievement (Glaeser, 2011), given that they can simultaneously embody economic and environmental efficiencies. These analyses tend to neglect the effects of what happens outside the city boundaries, which provide cities with vital resources and support the consumption that cities rely upon. There is a further note of caution to these relationships; in order for exponential growth to be maintained, innovation must happen at ever quicker rates to prevent collapse. The green economy can therefore play a central role in guiding cities through this process to harness the super-linear benefits of network connectivity to internalize much of the environmental damage that is unaccounted for in these analyses.

Variable	Scaling exponent β (95% C.I)	Behaviour
New Patents	1.27 (1.25–1.29)	Increasing returns to scale
New AIDS cases	1.23 (1.18–1.29)	Increasing returns to scale
Serious Crime	1.16 (1.11–1.18)	Increasing returns to scale
Total Housing	1.01 (0.99–1.01)	Constant returns to scale
Road Surface	0.83 (0.74–0.92)	Economies of scale
Petrol Stations	0.77 (0.74–0.81)	Economies of scale

Selected data from Bettencourt et al. (2007)

References

Bettencourt et al., 2007; Glaeser, 2011.

2.3 Is the city a good place to foster a green economy?

The growing size and importance of cities across the globe make the city arguably the single most important entity for fostering the green economy, as they can provide economies of scale and concentrate a large part of the economy and decision-making power. Cities are also hubs of political movements that can press for radical changes. Cities are often a better spatial unit to undertake such activities given their diverse nature. This is because their management can be more responsive to urgent problems and free from competing national interests. Across the range of development, we see that cities play an increasingly important role in the implementation of policies regarding global environmental issues such as climate change and biodiversity loss. The green economy provides another platform for ambitious cities to promote their green credentials.

The green economy will take on a different character in different cities depending on their level of development and spatial organization. It is important to recognize that cities face different challenges. Although urbanization is increasing at a global scale, when this is differentiated by region, the picture that emerges is unique to each city. Cities in developed countries seek to grow by generating new jobs in new industries with more value-added as many of the traditional industries, such as manufacturing, are moving to lower cost developing countries. Some cities in those countries are declining as they lose the battle for investment and talent. On the other hand, many African and Asian cities are growing rapidly and their path of development will be crucial to the form that urbanization takes in this century. Thus, to be green, some of the more "developed" cities will have to retrofit themselves to reduce their overall impacts and others will have to avoid the unsustainable urbanization path. Every city has a role to play whether adopting reforming measures for its economy, greening its sectors or seeking an entirely different path.

For those cities that are embarking on their development, it is crucial to understand that infrastructure lasts at least 30 years but often much longer. Once in place, many management options become channelled into seeking technical solutions of propulsion and retrofitting rather than basic design. Therefore, it is crucial to understand the relative importance of the different tools available to cities if the green economy is to become a precursor to sustainable development.

3. Institutional Framework for Governance towards a Green Economy in Cities

3.1 Governance in cities

Cities are ideally suited to experiment with and implement green initiatives because of the concentration of people and resources. The study of cities as a favourable setting for development of green economies is even more pertinent when considering the scale and innovation capacity of urban centres (UNEP, 2011). In fact, the concentration of people, business activities, and academic institutions favours the creation and circulation of knowledge, resources and thus the emergence of new ideas or technological products enabling the greening of economic activities at large scale.

Within this context, city governments have a major role to play. They hold important powers, in terms of legal competency and resources, in sectors that are relevant for the development of a green economy such as transportation, waste management, urban planning, buildings, water management and welfare. Thus, through planning and cross-sectoral actions, local authorities in partnership with other local actors can elaborate policies aiming to create sustainable cities that provide access to jobs, housing and urban services, but also have limited carbon emissions, pollution and resource consumption. However, local governments are also limited in their legal powers and they are not the only actors that can foster the development of a green economy at the city level.

Other administrations at the regional or national level, including international agencies and investors, private companies and businesses, non-governmental organizations (NGOs), citizens and influential individuals, are the other key stakeholders in economic and social life of a city (Bulkeley and Betsill, 2005; Corfee-Morlot et al., 2009). These urban actors aspire to influence the definition of local policies in order to promote their own individual and collective interests and values. As such, the governance of cities occurs at multiple levels and contains vertical and horizontal dimensions (Corfee-Morlot et al., 2009). The vertical dimensions correspond to the traditional approach where local governments are at the bottom of the state administrative organization and where the central government possesses the supreme authority. Relations between different authorities are usually strictly defined by laws as well as by their powers. The horizontal dimensions focus on actors intervening at the city scale. These can be local governments, civil society groups, companies or individuals, among others. Relations between them are not necessarily formalized; they are constantly evolving (for example, local government networks, lobbies and local assemblies) and their influence over one another very much depends on the local environment.

Urban governance aims at connecting these dimensions and ensuring good territorial cohesion from a political, economic and social perspective. Promoting a green economy in cities involves technological, institutional and behavioural changes, which require the participation of all stakeholders. Moreover, many of the more vulnerable groups, such as the poor or minorities, have little voice and power in defining the shape and division of the resources in a city. A key challenge is therefore to establish a governance scheme in which all of the different local interests and voices are expressed and taken into account as well as represented, including even external agents, such as international agencies and other public authorities. This scheme varies from one urban context to another and is largely path-dependent.

Physical, historical, political, social and economic factors are relevant when searching for an appropriate governance system. The physical organization of a city is linked to its economic, social and political dimension. From a physical perspective, some cities are compact, concentrating people and activities within a limited area, whereas other cities face urban sprawl. The diverse city forms are connected to the way decisions are made in cities and beyond, linked to their political and legal systems. From one country to another, local governments have different competencies and resources. This affects their level of autonomy in defining local policies. Moreover, in a strong administrative state, cities often have close relations with central authorities and will base their action on national policies or seek support from the higher level authorities. Finally cities or parts of cities have different socio-economic structures. Some are instrumental economic centres that attract investment and talented populations whereas others are marked by economic backlash or social crises because they are unable to cope with the rapidity of the urbanization process. This is particularly true for cities in developing countries that are emerging as important actors in the global market economy, but also have to deal with other priorities such as poverty eradication.

There is therefore no "one-size-fits-all" model of good governance. International agencies, such as the World Bank, the United Nations Human Settlement Programme (UN-Habitat) and the United Nations Economic and Social Commission for Asia and the Pacific (UN ESCAP), have worked to develop indicators to assess current structures of urban governance and their efficiencies. Four major principles are commonly put forward to assess good governance: effectiveness and efficiency, equity, participation, and transparency and accountability (UN-Habitat, 2002). Efficiency and effectiveness refer to the delivery of public services and the promotion of local economic development, and in the context of the green economy, the protection of the environment and the promotion of social welfare. Equity means to ensure equal access to essential services. Participation refers to the freedom of association and inclusion in the decision-making process. Transparency and accountability give citizens the ability to monitor the activity of decision-makers and actors who are contributing to policy-making. The ability to monitor may be either direct or through legitimate intermediate institutions or representatives.

The difficulty in assessing urban governance is considering these principles in light of the local environment's current situation and evolution. Good governance varies therefore as much as the urban context. In addition, any kind of assessment is difficult precisely because governance is a dynamic process that regularly witnesses the emergence of new actors and policies. An efficient governance structure must therefore be flexible enough to allow for new interests and solutions to emerge, and to adapt to the different political situation faced by cities.

In many countries, informal economies represent an important share of cities' financial flows and have major impacts on job creation and environmental degradation. Examples include numerous local waste management companies that are owned by criminal organizations in southern regions of Italy. In the first instance they appear to create job opportunities locally and are economically advantageous for contracting with the local government. In the long run, however, practice shows that the environmental requirements included in the public procurements are ignored within informal economies and the final outcome is often a higher rate of degradation than before.

Multilevel governance is therefore a challenging framework for greening city policies. This applies particularly to tackling the new and old challenges of sustainability, such as air pollution and climate change, at the same time. The governance structures that were successful in the past may not be appropriate for the new challenges (Puppim de Oliveira, 2009; 2011). It is essential to involve different levels of actors in the decision-making process and to coordinate their actions in order to achieve positive implementation of policies (Bulkeley and Betsill, 2005).

Looking at the vertical dimension, many city projects need to be endorsed by a national policy in order to be fully effective in some countries. For instance, the devolution of powers and the greater autonomy of local governments from the central state, allows city governments to adopt tax incentives for use of clean energies or to levy taxes on polluting activities. Therefore, subsidiary power needs to be promoted in all sectors.

The relationship between cities and international stakeholders are also important. Projects defined by international agencies or foreign private investors should be aligned to national and local urban policies. The rules defined for regulation of these projects may also be limited in their scope and ignore other sectors' policies (Osmont et al., 2008). It is therefore necessary to connect the local and global initiatives within the broader national context. This can be achieved through local governments, which have gained increased political weight with the growing economic value of a city's activities.

As for the horizontal dimension, it is necessary to create partnerships between different actors within and beyond the local governments. To that end, green economy should be mainstreamed in the local political agendas and every department in municipal councils should be cooperating towards this objective. Thus, the benefits of a green economy for every area at the city level must be clearly identified and disseminated. This involves developing the capacity of different actors through local structures of information and debates. For example, the relation between the locally elected staff and communities can be strengthened through participatory democracy tools, such as local citizen assemblies. As for the relationship with private actors, legal frameworks such as public-private partnerships are useful instruments to bring local authorities and companies together to negotiate (Osmont et al., 2008). They encourage companies to participate in the creation of a common good while at the same time undertaking its business activities. Lastly, it is important to consider the networks of local authorities (Bulkeley, 2010). These networks allow for information-sharing and can provide resources for joint initiatives and the enhancement of local capabilities. Regulatory frameworks that allow for cooperation between neighbouring communities are useful to overcome the barrier of municipal boundaries (when an issue does not fit administrative divisions) and to find the most efficient method of action in each sector.

One of the most challenging points for governing cities is to manage their impacts on the environmental boundaries. Cities occupy a relatively small part of the globe but the impacts of their activities go much beyond the urban area or administrative boundary of the authority in charge, such as in the case of biodiversity (Puppim de Oliveira et al., 2011). How to control those impacts has no straightforward answers as the flows and life-cycle of goods, services and information are extremely complex. Indeed, the economy may be one of the best ways to start tackling this problem, as economic systems have less geographical boundaries than political or administrative systems, i.e. improving or greening economic decisions or the institutions in one point can lead to the greening of the economic decisions

in another point. The link between the political governance and the economic systems is key to assess the greening of the economy, as well as whether this greening is leading to sustainable development.

3.2 Assessing good governance towards a greener economy that leads to sustainable development

Greening urban processes are fundamental to achieve a greener economy as a whole and there are many technical ways to make this happen, but this will only become a reality if institutions that steer the city economies towards greener paths can be created. The greening of urban processes will only be achieved with better urban governance. As governance is embedded in institutions, which are humanly devised rules, it is necessary to build legitimate political and social mechanisms to green socio-ecological and economic systems. However, how can we assess whether or not current governance systems in these processes are steering cities towards a greener economy? If they are, how is the greening of the economy affecting people and ecosystems?

Good governance structures would have to be developed to link decisions to results. Thus, cities need to define a way to assess whether its governance system is moving them towards a greener economy that leads to sustainable development and poverty eradication, in the context of the city and beyond. For this purpose, based on the different frameworks in the literature discussed above, we propose to go beyond the decision processes also looking at the capacity to change, the greening of the economy and its final outcomes on the ground.

Governance (or good governance) can be assessed by four different dimensions. Two dimensions related to processes of decision-making and implementation capacity, where we can make a difference in steering the directions. The other two dimensions are related to the outcomes, or whether we are changing the economic system towards a greener economy, and whether this economy is making changes on the ground to people and the environment.

Firstly, the process dimension, which is the focus of most of the governance frameworks, encompasses the way decisions are made. Decision-making processes should be transparent and allow participation with quality. Thus, they also need to be fair and incentivize the inclusion of voices that are not generally heard in the decision-making processes, such as the most vulnerable groups, like the poor, or different voices such as ecologists. The poor should be one of the most important voices, as they should be the main beneficiaries of any green economy initiatives. Decision-makers, particularly elected or appointed officials, should also have clear responsibilities and be accountable for their decisions, as well as for having a fair process. The processes per se should be effective. The decisions should have power to create actions that are enforceable and implementable.

The second dimension brings the institutional outcome to move the decisions forward. Organizations, both governmental and non-governmental, should have the capacity to implement decisions under their jurisdiction. They need to have the political will, human and financial resources to mobilize changes, as well as the support of the local actors (Puppim de Oliveira, 2002; 2008), thus making changes towards a greener economy. The governance structure should also be able to create and/or change a set of formal and informal rules that will create incentives on the ground for greening the economy. Finally, the mechanisms of implementation must influence behavioural changes in organizations and individuals. Many of the actions for a greener economy require behavioural changes.

The third dimension is the green economy dimension to assess the changes in the economic system itself. This will give information about the directions of the economy vis-à-vis its "greening" patterns. The first criteria would be the resource efficiency of the economy, or how much resources are needed for a certain output of service or product. The second would be related to assessing whether the city as a whole is reducing its consumption (total and/or per capita) to avoid the Jevon's paradox when it gains resource efficiency. For instance, the city increases consumption of a certain resource when the resource efficiency is increased, which could lead to more final consumption (Alcott, 2005). Finally, there is a measure whether the incentives to internalize all the externalities, both within and outside the city, are in place, such as payments for ecosystem services or incentives for biodiversity conservation.

The fourth dimension to assess governance is the changes in socio-ecological aspects, reflecting the results on the ground (or whether and how the three first dimensions have led to good results). This is important to evaluate whether the "greening of the economy" is leading to sustainable development and poverty eradication. Good governance systems for green economy should bring resource conservation, increase resilience of the socio-ecological system and improve human well-being, including increase in jobs and income for the poor.

Finding indicators for each dimension would help define good governance and support the decision-making processes. However, the institutions and actors involved in the greening process of cities are numerous and varied. The challenge is to coordinate their actions and find the most appropriate system of governance in the particular context of each city. This report will provide some insights on how to build a good governance structure for greening urban economic processes, detecting opportunities and challenges in the process and the capacity dimension, but initially it is necessary to understand how urban processes can be greened.

Table 1 – Dimensions to Assess Governance

Dimension	Criteria to define the indicators for governance
DECISION AND IMPLEMENTATION CAPACITY	
1. Decision-Making Process (Process Dimension)	-Participation and Inclusiveness -Responsibility and Accountability -Decision-Making Effectiveness
2. Implementation Capacity (Capacity Dimension)	-Organizational Capacity -Formal/Informal Rule Building -Behaviour Change
GREEN ECONOMY AND SOCIO-ECOLOGICAL DIMENSIONS (OUTCOMES)	
3. Economic System (Green Economy Dimension)	-Resource Use Efficiency -Responsible Consumption -Internalization of Externalities
4. Socio-Ecological System (Socio-Ecological Dimension)	-Resource Conservation -System Resilience -Human Well-being

4. Linking the Green Economy to Urban Processes: Economic Processes in Cities

The way out of urban development vs. environmental degradation is not to stop urban growth, which would not be realistic in most cases, but to reconcile and harmonize the opportunities and challenges resulting from urban growth. Indeed, urbanization can lead to a greener economy, because cities have many advantages in being more economically efficient and environmentally friendly under certain conditions. History has proven that urbanization can be managed in a way that promotes both the economy and human well-being, as urban dwellers are generally more well-off financially and have more access to public services than their rural counterparts. The recent global debate on transitioning towards a greener economy may be a great opportunity to reconcile the opportunities and challenges of urban development and to pursue long-term sustainable development in cities. Therefore the concept of a green economy, if achievable, could help to solve many of the environmental and social problems pertaining to urban development as well.

Cities may indeed offer significant opportunities for achieving a greener economy and achieving other social and environmental goals. The concentration of people, resources, knowledge and economic activities in urban areas, if properly managed, can provide economies of scale and efficiency gains that reduce the use of resources and energy and thereby promote "doing more with less" (ICLEI 2011, p.2). In this sense, the transition from the traditional economy to a green economy could be achieved by reducing resources and energy consumption in cities, thereby improving the key components of urban development and other services generally offered in cities.

We will analyse the opportunities for and the obstacles to a greener economy in cities by looking at the specific economic processes that take place in cities: transformation of space (urban development); production and consumption; circulation (trade and transportation); and the production of ecosystem services, social services and knowledge-based activities. Understanding how to green those processes can have huge social, economic and environmental impacts on cities and beyond. We have to align the governance structures to steer those processes towards a more sustainable path.

Based on the criteria to define indicators to assess governance developed in section 3 (Table 1), we will identify indicators in each of the economic processes discussed below.

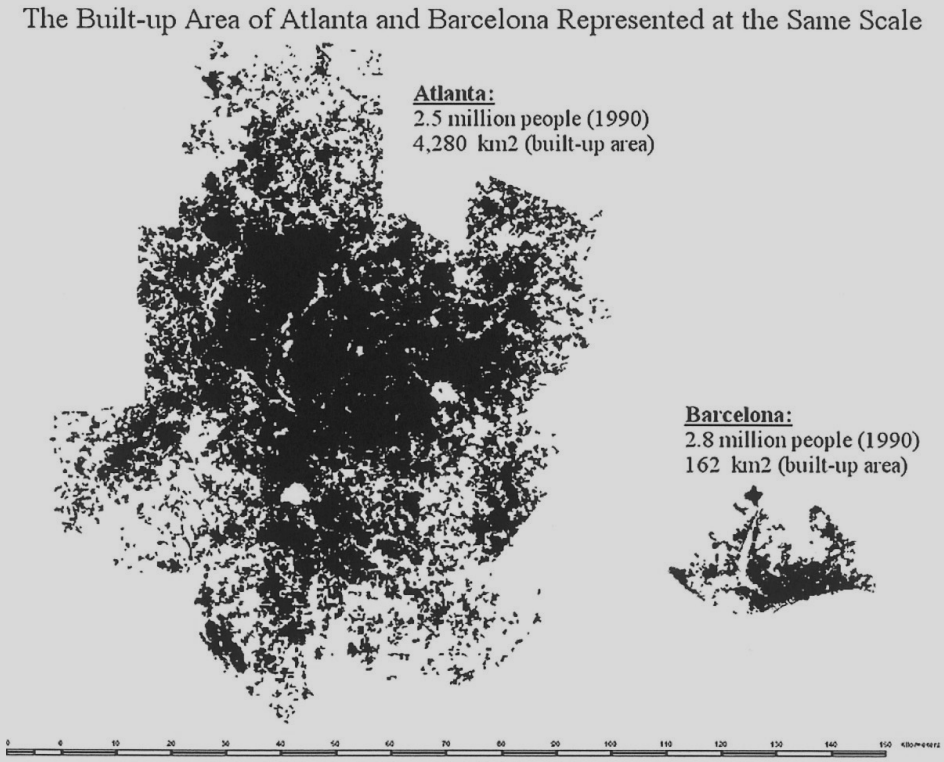
4.1 Transformation of space: Urban development

Among the most significant key components of an urban economy is the physical and spatial development of cities. Urban development transforms the natural environment and resources into built superstructures and infrastructure, and this transformation places significant stress on the remaining natural environment. The way we build our cities also determines, or at least affects, how we spend and distribute or redistribute our economic resources. Urban forms and the spatial distribution of urban functions in cities play a critical role in this respect. Sprawled cities, where low density is the norm and different urban functions are distantly located, increase the consumption of energy and natural resources, both terrestrial and aquatic. Besides, the cost of urban development is high in dispersed cities, because relatively large land areas are provided with urban infrastructure and utilities.

For instance, 70 per cent of cost of water supply systems goes towards pipes, and 30 per cent of urban energy consumption goes towards the pumping of water and the collection of waste-water in some cases (Suzuki et al., 2010). Therefore a smaller land use area can result in lower operating costs for a city's utilities. Similar conclusions can also apply to the transportation infrastructure. Compact cities with high density and mixed-use urban quarters result in energy-savings; low levels of land use change and the preservation of surrounding agricultural and forest lands result in reduced infrastructure costs and the protection of water resources.

The density and the land use of an urban area are key factors in the amount of energy that a city will consume. This is particularly true for transport-related energy consumption. It has been verified that urban density is in inverse ratio to its energy consumption, which means that energy consumption will be higher in a less dense city that is sprawled over a larger area of land (Kirby, 2008). Compact urban forms help to increase the density, and thereby reduce transport-related energy consumption. It has been argued that, with more compact development, a 20–40 per cent reduction in the miles driven by private cars can be achieved (Ewing et al., 2008). For instance, in Portland in the United States, per capita vehicle trips have been reduced by 17 per cent simply by promoting compact urban growth since 1990, and emissions of greenhouse gases (GHG) were kept at 1990 levels, despite a 16 per cent growth in population (Condon et al., 2009). Urban form also influences the amount of natural environment and resources that is converted into urban environments. A good example to illustrate the difference between sprawled and compact urban developments in the sense that the latter one is more efficient in resource and energy consumption is the comparison of the built-up areas of Atlanta in the United States and Barcelona in Spain (see Box 2). Both cities had approximately the same population in 1990, 2.5 million and 2.8 million, respectively. When looking at the built-up areas of the two cities, however, the amount of land used for urban development was 26 times greater in the dispersed city of Atlanta, which occupied 4,280 square kilometres in 1990 (Bertaud and Poole, 2007; Suzuki et al., 2010).

Box 2: Comparison of sprawled and compact urban developments



The figure above represents the built-up area of Atlanta (USA) and Barcelona (Spain) at the same scale. The figure dates back to 1990 when Atlanta and Barcelona had almost the same population, despite the huge difference between the land areas that they occupied. The average density of the Barcelona metropolitan area was 28 times larger than that of Atlanta, which implies that the transport network in Atlanta would have to cover an area 28 times larger than in Barcelona in order to carry almost the same number of passengers. This comparison also demonstrates that in order to provide the same transit accessibility in Atlanta that existed in Barcelona, the City of Atlanta would have to build an additional 2,100 miles of rail tracks and about 2,800 new rail stations.

Reference
Bertaud and Poole, 2007.

Another advantage of compact mixed-use cities for the purpose of achieving a green economy is that in cities where travel distances and travel times are shorter, public and non-motorized transportation systems could be provided easily and cost effectively. The effective and extensive provision of public and non-motorized transport options could help increase access by the urban poor and low-income citizens to various urban facilities and especially to job markets. It has been shown that, in cities where affordable and convenient public transportation systems and safe cycling and pedestrian routes do not exist, it is mostly urban poor and low-income families who suffer from exclusion from urban life, spending long hours on city roads and in high-traffic areas. Tiwari (2002) argues that the urban poor in Delhi are also the "transport poor", and that their well-being is dependent on short trip lengths, non-motorized modes of transportation and public transportation.

A key component of urban development that can promote the transition to a green economy is the superstructure, more specifically the buildings. The construction and building sector deeply affects every single person's daily life. The building sector is one of the main contributors to carbon emissions, utilizing around 40 per cent of global energy consumption; it consumes 12 per cent of all fresh water and generates 40 per cent of the total volume of waste (Rode et al., 2011). One of the key goals of the green urban economy is to promote energy and resource efficiency in the building sector and to provide high quality, healthy and affordable buildings for urban residents. Providing adequate housing for approximately 80 million or more new urban residents every year is a great emerging opportunity for the economy. Investments in the green economy in the areas of construction and the building sector could expand many industries in cities, given the strong linkages of the building sector with other sectors. For example, the adoption of new materials, technologies and appliances for saving energy could promote the development of the manufacturing, transportation and construction industries; the adoption of more solar, wind and biomass energy could encourage the utilization of renewable energy; and recycling waste could develop waste management (see Box 3). Greening the construction and building sector could also provide more sustainable production and consumption for the whole urban community and significantly increase people's welfare. In developing countries, more job opportunities may be produced with this kind of green sustainable development and, just as importantly, healthier, safe and affordable housing will be available, which could substantially eradicate poverty and inequity in cities.

Box 3: A green building example: The ZICER Building in the UK

The ZICER Building at the University of East Anglia (UK) has been awarded the "Low Energy Building of the Year" in the "Sustainability Competition – 2005" of Building Magazine. The building was also short-listed for the Times Higher Education Supplement's "Outstanding Contribution to Sustainable Development" award in the Higher 2006 awards.

The ZICER Building was built in 2003 and adopts some novel technologies such as solar PV panels for generating electricity, hollow core ceiling slabs that store heat or coolness in different seasons to provide comfortable and stable indoor temperatures, and several other measures to reduce energy demand for ventilation, heating and cooling. ZICER Building is estimated to reduce energy consumption and carbon emissions by an average of 50 per cent compared to similar buildings in the UK (Tovey and Turner, 2006).

More importantly, the building was designed and built by local companies, which means most of the construction materials, technologies and appliances were supplied locally. The biomass fuelled gasification Combined Heat and Power (CHP) plant at the university provides one third of the energy and the heating for the building and the whole campus. It cuts more than 8,000 tonnes of CO_2 every year and promotes the local green economy at the same time.

Reference

Tovey and Turner, 2006.

4.2 Consumption and production in cities

One of the most noticeable aspects of urban functioning is consumption. Whereas cities occupy only approximately 2 per cent of the Earth's surface, they consume 75 per cent of its resources (UNDESA, 2009). Urban production and consumption processes are among the

main causes of appropriation of environmental goods and services from ecosystems (MA, 2005). It has been acknowledged that more affluent cities tend to appropriate higher shares of natural resources outside their boundaries (Folke et al., 1997). Although urban consumption is linked to unprecedented economic and social opportunities for city dwellers, the gap between urban and rural living standards and consumption levels increases as countries become more urban (World Bank, 2008). Furthermore, many urban residents live in poverty, vulnerable to environmental impacts and are unable to benefit socially and economically from the opportunities of urban life. A truly green urban economy should promote the conservation and sustainable use of resources and ecosystems, and the biodiversity they contain, inside and outside the city boundaries. This also includes the solid and liquid wastes that cities generate, which have adverse impacts on the natural environment and necessitate energy and resource consumption so as to be properly managed and disposed. Avoiding over-consumption and using fewer resources in the production process could lead to less waste generation and more efficient waste management.

Urbanization has brought deep changes to human lifestyles, including consumerism (Davis, 2000). Increasing disposable incomes translate into greater demand for environmental goods and services, which is often met by unsustainable production processes. Food consumption in urban areas illustrates clearly how cities can contribute to unsustainable production–consumption patterns. For example, rising living standards, particularly in the urban centres of the developed and rapidly developing world, have been associated with shifts in diets. Increasing meat consumption (see, for example, FAO, 2006) is connected to the expansion of livestock-rearing and the environmental impacts of deforestation, GHGs and biodiversity loss. Wild species are also victims of unsustainable urban consumption patterns. Pets, foods and ornamental or medicinal species of plants and animals are being put at risk to satisfy urban demand (TRAFFIC, 2008; Wilkie and Carpenter, 1999).

The concept of sustainable consumption and production (SCP) has long been proposed as a pathway for reducing environmental impacts and creating human well-being. Yet there are several — sometimes contradictory — definitions of what constitutes SCP, which in turn leads to different implications for a green economy and in particular for the role of urban areas. Many cities have become centres to import most of its consumption and export most of its production. Having a better balance between production and consumption within cities would reduce its footprints and some of its negative externalities.

In 1994, the Oslo Symposium on Sustainable Consumption emphasized resource use efficiency and pollution reduction in the provision of basic human well-being as fundamental aspects for achieving SCP (Robins and Roberts, 1998). Although this approach points to important issues for tackling urban ecological footprints in the provision of basic goods and services for inclusive urban development, further linkages are needed to economic mechanisms for achieving a green economy in cities through SCP.

In 2003, the Marrakech Process emerged as a response to renewed interest in SCP issues worldwide, and it materialized in the Johannesburg Plan of Action of the World Summit on Sustainable Development. Its goals are to support countries in their efforts to green their economies, assist corporations develop greener business models, and promote greener lifestyles for consumers (UNDESA). The Marrakech Process represents an advance over previous approaches because it links SCP to economic drivers, and touches upon issues of lifestyle change, which are both crucial aspects for SCP in cities.

More recently, the European Environment Agency has developed an approach to SCP based on increased resource use efficiency, enhanced ecosystem resilience and greater human well-being (EEA, 2010). The incorporation of the concept of "resilience", understood as preventing overexploitation of natural resources so as to allow nature to replenish itself by not exceeding its carrying capacity, is particularly relevant for urban areas because cities consume enormous quantities of ecosystem goods and services located in areas outside their boundaries. The approach also considers the equitable distribution of the environmental and economic benefits and costs of economic activities for achieving SCP, which is in turn relevant for developing green economy approaches for cities because economic and ecological inequality remains pervasive in urban areas across the world.

Overall, SCP initiatives have been successful in highlighting the need for deep changes in current consumption and production patterns worldwide, as a precondition for sustainable development and thus for a green economy. Although not focusing exclusively on cities, most of the aspects highlighted by SCP approaches are relevant for fostering a green economy in urban areas, especially those related to reducing ecological footprints, and increasing socio-economic and environmental equity.

In order to build up more sustainable production–consumption networks, cities should not just see themselves as consumers of distant natural resources. Appropriate urban ecosystem management can build sustainable local production–consumption networks that yield multiple-scale benefits, from local well-being to sustainability—through the reduction of urban footprints. By enhancing their own local ecosystem services, urban areas can provide well-being for their residents while reducing their consumption footprints, and thus creating opportunities for greening both their economies and their landscapes. From heat island control to flood mitigation, local food provisioning to water purification, managing local ecosystems properly so as to increase their functionality will create innovative economic opportunities for clean development and ultimately render cities and local economies visibly greener.

Urban forestry and agriculture are two sectors that can contribute to urban biodiversity and ecosystem services, while providing a fertile ground for innovation, leading to a boost in the local economy that provides well-being for urban residents and contributes to reducing the urban footprint. It is acknowledged that urban agriculture can provide multiple benefits for city residents, from access to fresh food production to community-building or innovative employment opportunities (Pearson et al., 2010). In Japan, for example, recent data from the Ministry of Agriculture, Forestry and Fisheries (MAFF, 2009; 2010) shows that over 25 per cent of the national agricultural output comes from urban-like areas. Even in Tokyo, the biggest urban cluster in the world, agricultural production of vegetables corresponds to the average annual consumption of almost 700,000 people. Besides reducing food miles, urban agriculture can also be a source of local well-being. According to a recent survey by MAFF, over 85 per cent of urban residents in Japan prefer to have farmland in the city in order to secure access to fresh foods and green space. In aquatic urban ecosystems, sustainable aquaculture and good fisheries management can contribute positively to a green economy by providing local foods, creating employment and fostering technological innovation while reducing ecological footprints (Costa-Pierce et al., 2005).

Rethinking cities as providers of goods and ecosystem services through sustainable management of their local resources for fulfilling urban lifestyles and reducing footprints

has resulted in some interesting concepts. The concept of "continuous productive urban landscapes" (CPULs) is emerging as a powerful planning framework that can in turn be linked to fostering green urban economy opportunities in local food production–consumption networks. From the CPULs perspective, the city adopts a compact form so that its environs can be used for urban agriculture (Viljoen, 2005). According to the CPULs approach, growing food in and around cities can significantly decrease the need for industrialized production, extensive packaging and long distribution chains from productive spaces (rural areas) to consuming ones (cities).

Likewise, the concepts of *satoyama* and *satoumi* emerging from recent studies in the Japanese context can provide inspiration for the integration of urban ecological production and consumption when rethinking the modern, sustainable city. Both concepts refer to "a dynamic mosaic of managed socio-ecological systems producing a bundle of ecosystem services for human wellbeing" (JSSA 2010, p.13). Although they were created for rural landscapes, there are lessons that modern cities can learn regarding how to enhance sustainable production–consumption networks by increasing the local circulation of goods and services in a way that is ecologically sustainable and economically restorative. For instance, it has been noted that *satoyama* landscapes in peri-urban areas can become important hotspots for ecological restoration and increased ecological production in order to meet urban demands for food, energy and cultural services while revitalizing areas with declining populations (JILA, 2010). The *satoumi* concept can provide valuable insights for the planning of modern, sustainable coastal cities (Yanagi, 2005).

Overall, urban ecosystems can be linked to processes leading to the development of a greener economy for cities by decreasing urban footprints and increasing local circulation of material and economic resources. Yet more work needs to be done in order to fully integrate local ecosystems into a sustainable economy, including aspects related to the provision of ecosystem services (and biodiversity) fundamental for human well-being, such as climate regulation, or water provision. Initiatives based on payment schemes for ecosystem services in cities are one response to these challenges.

4.3 Circulation: Trade and transportation

Transportation is fundamental to a city's economy, as it involves the movement of two things: goods and people. It is particularly vital in contributing to urban economic productivity through better accessibility and the efficient circulation of people (rich and poor, high- and low-skilled), resources and goods within the city area as a countermeasure to the spatial mismatch of labour and workplace, housing and services and producer, retailer and consumer. The availability of transport infrastructure also influences the location of industrial, commercial and residential areas. An improved transportation infrastructure system is expected to save travel time and to increase cost-effectiveness of the overall urban mobility including freight movements. Besides the benefits accrued from the transportation of people and goods, the sector itself is a source of investment and urban employment induced by infrastructure development, operation and management, now extending to include green transport as a business field (Dalkmann and Sakamoto, 2011).

In the context of developing countries, the economic role of informal transport modes is also a significant source of mobility and employment particularly for the urban poor. In fact, these modes, including rickshaws, bicycle wagons, three-wheelers, motorcycle taxis,

and small vans, provide flexible, door-to-door transportation and fill a gap by providing relatively lower cost transportation (Cervero and Golub, 2007). Due to their size, these vehicles are able to enter narrow streets or passageways and reach neighbourhoods that cannot be entered by conventional buses or trucks. Policies that restrict the use of informal transportation, which provides niche services in circulating people and goods as well as generating employment for urban poor, may unintentionally disrupt the economic activity of a city (CDIA, 2011).

Being a means to improve the socio-economic goals of a city as well as an industry by itself, urban transport in developing countries is facing difficulties in becoming green and equitable while pursuing productivity. Transportation has a series of conflicting goals that need to be aligned to generate a green economy:

- The greenness of the transport sector essentially comes down to two things: i) the extent to which transport trips degrade the environment (land, water and air resources); and ii) the extent to which trips can be reduced through sensible planning. The goals include an improvement in energy efficiency, a reduction in air pollution and GHG emissions, increased use of renewable resources, reduced use of non-renewable resources, and, overall, improved public health.

- The equity of transport is represented by a high degree of spatial accessibility, affordability and barrier-free facilities, which allow all types of urban dwellers to perform their daily activities effectively, efficiently and safely.

- The goals of an economical transport system are, first to maximize the city's economic productivity, indicated by, among other things, minimizing transport costs and duration, revitalizing the city economy, and generating jobs and income to the population in the city and beyond; second, to encourage more investments, urban employment and other sources of local revenues from the development of the transport sector itself.

To align these goals, the measure should be one or a mix of the three pillars of transport policy options: avoid, shift, and improve (Dalkmann and Brannigan, 2007). The rest of the section describes each option based on priority.

The first priority is to promote a shift to efficient modes. The use of public transport and non-motorized modes can be promoted by improving the design of the city-wide public transport network, providing priority systems for public transport to increase its speed, improving multimodal connectivity and ensuring the safety, security, convenience (barrier-free) and affordability of public transport (see Box 4). The problem is that most public transport systems are not financially sustainable and are heavily subsidized. Increasing ridership to achieve cost recovery requires "soft" measures to change people's preferences for private modes, which are relatively indifferent. One way is to push private mode users out of their vehicles and shift them to public transport by implementing stringent measures such as road pricing, a vehicle ownership quota system, and other travel demand management policy instruments. Besides being useful to curb motorization, these economic instruments can potentially be earmarked for financing the public transit system. Such an innovative financing mechanism could keep public transport services affordable, particularly for urban poor who need the services the most, so that they are not excluded from full participation in urban socio-economic activities. It should be highlighted here that a healthy regulator-operator business model is essential in delivering affordable and reliable public transport services.

Box 4: Hong Kong's green transport system

Hong Kong represents an all-in-one model for green transport. First, people's movement relies less on motorized vehicles as it has one of the most efficient and extensive public transport systems serving 90 per cent of total passenger trips in the city coupled with high-density transit-oriented development (TOD) along rail-based transit networks (Leung, 2010; Cullinane, 2003). The transport policies consist of railways as its transit backbone, routing and licensing of transit services, and the first registration tax and fuel tax for private cars. In terms of public land administration, it adopts a land lease scheme. It should be noted that all land in Hong Kong is practically owned by the government which enables TOD implementation. Within a 500 metre radius of each station, diversity principle of land use zoning is applied: 47.5 per cent residential areas; 25.9 per cent commercial areas; 11.9 per cent office buildings; 11.5 per cent government, institution, or community buildings; 2.2 per cent hotels; and 0.8 per cent car parking spaces. The TOD covers 53 per cent of the city's population and 75 per cent of commercial and office floor areas (Leung, 2010).

Second, as a city of commerce and a gateway to China since the late nineteenth century, Hong Kong has adopted highly integrative multimodal transport and logistics services. The air cargo terminal operators at the Hong Kong International Airport (HKIA) have facilitated the introduction and development of complex air-land or air-land-air multimodal transportation services. In 2006, a new cross-boundary trans-shipment model called "Green Lane" was introduced for Hong Kong and Mainland container transportation to strengthen the connectivity between ocean container transport and cross-boundary trucks. Institutionally, Hong Kong established an advisory body which provides a forum for the public and private sectors to discuss and coordinate logistics development, called LOGSCOUNCIL, among some other initiatives to foster the competitiveness and productivity of Hong Kong's trade (Wang and Cheng, 2010).

References
Cullinane, 2003; Leung, 2010; Wang and Cheng, 2010.

For the circulation of goods, there is an increasing trend of shifting from land transport, particularly from lorries, towards multimodal transport (land, rail, air and water) for freight shipment. Transportation and logistics are continuing to integrate in response to economic globalization, speed-to-market product delivery, agile manufacturing and business practices, and integrated supply chain management (Rondinelli and Berry, 2000). In particular, cheap maritime transport costs have amplified the effect of comparative advantage and variable labour costs at a global scale. Whilst, the efficiency of maritime transport has increased massively over time, in developing countries the greatest cost is often incurred in getting goods to and from the ports. This is particularly acute where cities are far from the coast and the massive transaction costs in moving goods over land exceed that of a much longer sea trip. Furthermore, reorganization of informal modes of land transport should be carried out. Their functions as gap-fillers would remain beneficial for the city's economy.

Because overall demand for transport activity is growing rapidly and increasingly motorized (cars and motorcycles for passenger transport and lorries for freight transport), the second priority is to improve the efficiency of road vehicles through technological improvements such as fuel-efficient vehicles, alternative power sources (Dalkmann and Sakamoto, 2011) and efficient driving methods (for example, reducing idling). Although technology can do a lot, again it brings about the equity issue of cost. On the one hand, a green urban economy can be stimulated through investment in and promotion of green technologies but, on the other hand, these have to be considered as only part of the solution, recognizing that

not everyone can afford them. A green and equitable transport sector should without doubt incorporate elements of low-emission transportation modes accessible to the entire community in the city and at a cost that all can afford.

Third, because travel is a derived demand of urban activities, urban transport systems should be integrated with land use development to allow the efficient circulation of people and goods. City-planning can have a major impact but, if it is ill considered, sustainable options become harder and more costly to implement. Thus, it is increasingly necessary to make city-planning moves ahead of market forces. For passenger transport, the concept of transit-oriented development (TOD)—mixed-use compact land use development around transit nodes—has the potential to reduce motorized trip rates and to promote the use of the greenest mode of transports: walking and cycling (see Box 5).

Box 5: Good examples of land use and transport integration

Curitiba's BRT System
Curitiba's (Brazil) bus-based public transport system (the BRT system) is known to be a good example of a public transport system that is well-integrated with land-use strategies and urban development. The idea of integrating the land use and transport policies dates back to the mid-1960s, when the Curitiba Master Plan, the major planning framework of the city to steer urban development, was developed and implemented (Santos et al., 2010). The approach in the master plan regarded the transport system as the link between different urban functions, such as residential and commercial developments, recreational areas, etc., and concluded the application of the "trunk and branch system" to increase the coverage of the system (Santos et al., 2010; Suzuki et al., 2010). High density residential and commercial developments and major economic activities were concentrated along "development corridors" that corresponded to the trunk routes of the bus rapid transit system (Suzuki et al., 2010).

Curitiba city has managed to increase significantly the coverage of the bus system as well as its ridership over time. Currently, the bus service reaches almost 90 per cent of the city area and all users can access public transportation services by walking less than 500 metres (Suzuki et al., 2010). Besides, 45 per cent of all commuting trips in Curitiba are made by buses, noted as the highest rate of public transportation ridership in Brazil (Suzuki et al., 2010).

Toyama's LRT System
Toyama city in Japan, like many other mid-size Japanese cities, has been suffering from the problems that urban sprawl has caused, such as a decline in city centres, suburbanization and high reliance on private cars (Takami and Hatoyama, 2008). However, what makes the case of Toyama different from other mid-size cities in Japan is the city's initiatives to develop a public transport system, which is well-integrated with land-use strategies. Toyama city has managed to build the first light rail transit (LRT) system in Japan by converting some old railway lines, as part of its compact city strategies, and has been the focus of national attention (Onishi and Takahashi, 2011). The city has been selected as an environmental model city along with 12 other cities in 2008, mainly due to its attempts to promote compact urban development through an active public transport system.

Given the difficulty of adopting a monocentric compact city structure in Toyama, the city has decided to pursue a TOD type of an urban structure, named as "urban structure with sticks and dumplings" (Takami and Hatoyama, 2008). In this type of urban structure, "sticks" refer to public transport routes with a capacity above certain level, and the "dumplings" refer to residential and commercial developments concentrated within walking distance of public transport stations (Onishi and Takahashi, 2011). From its launch in April 2006 to March 2011, average daily ridership on the LRT system (compared to old railway lines converted) has increased from 1,917 passengers to 4,532 passengers*, of which 10 per cent were former car users (Onishi and Takahashi, 2011).

* The ridership data is taken from a presentation on the Toyama City's Environmental Model City Action Plan made by the officials of Toyama city.

References
Onishi and Takahashi, 2011; Santos et al., 2010; Suzuki et. al, 2010; Takami and Hatoyama, 2008.

Specifically for freight movements, multimodal freight transport facilities in a city need to be expanded. This would also support trade activities beyond a city's boundary. However, this will attract new activities into the surrounding areas, change land uses, increase density and generate more intensive local and cross-town traffic. Such activities are likely to be much greater in a global city logistics region, where a more complex producer environment exists along with the large market and higher income economy (O'Connor, 2010). The conflicting need for efficient distribution; availability of supporting urban facilities; coincidence with intra-city traffic peak hours; cost-effectiveness; as well as increasing pressure of environmental protection and resource conservation constitute the sources of logistic operational inefficiencies. One way to ease the frictions between people and freight activities on urban traffic is by consolidating the locations of logistics infrastructures (parking spaces, loading/unloading facilities, multimodal transfer points) with buildings (industries, retails, offices and housings) coupled with regulations to reduce friction with other road users through spatial and time restrictions (Muñuzuri et al., 2004; Zanni and Bristow, 2010).

The resources that cities in both developed and developing countries appropriate from around the world are also increasing the prominence of air transport, and its role in city development has led to the prediction that some cities may become planned around airport hubs. The aerotropolis model of urban development places the airport at the centre of the city, arguing that airports will be the next great determinant of an urban form as highways and the automobile were in the twentieth century, at least in the USA (Karsada and Lindsay, 2011). When viewed from this perspective, it is increasingly clear that cities are planned not just with their internal function in mind but also with respect to their connections to the wider world. With the exception of port cities, much of this infrastructure is outside of the control of the city government. The aerotropolis model provides a compelling means of internalizing control of the cities' links, and at one level may provide a centripetal force to the city constraining sprawl; however this model comes at the expense of the environmental impacts of air transport and its increasing use.

It should also be noted that, from the bigger picture, one cannot solely look at the transportation of those goods but at their entire lifecycle. Serious consideration needs to be given to the extent consumption-miles can be reduced through local production of food and other goods, as discussed in the previous section.

Cities generally apply a two-pronged transport policy, which increases the penetration of cleaner vehicles use for passenger and freight, and, at the same time, promotes a shift towards more efficient modes. However, the integration of land use and transport measures can be found in a few cities worldwide, for example Curitiba in Brazil. The city has well-established links between land use and public transportation that lead to a lower level of fuel consumption, around 20 per cent less than the national average, leading to less pollution and less emissions of green house gases (see Box 5). In terms of efficient logistics operations, enterprises are in pursuit of implementing new approaches, such as environmentally-oriented supply chain cooperation, which aims to reduce the consumption of materials, water and energy through the whole supply chain by cooperating with suppliers and consumers. More recently, a circular economy has been promoted in Chinese cities (Zhu et al., 2010), for example, for e-scrap in the ICT and electronics industries (Park et al., 2010). Using such practices, economic systems could and should operate according to (re-) cycling principles in support of natural systems. However, it remains debatable whether or not such approaches can bring competitive advantages, although there are indications that

a win-win benefit can be achieved and preferential policies from the government (subsidies or other forms of incentives) can help to encourage more enterprises to adopt them (Zhu et al., 2010).

In conclusion, a major impediment of adopting green transport is the cost and implementation of green transport solutions at a scale that cuts across the whole city. This is particularly pressing in rapidly developing cities that find themselves pressed financially but also have to respond to mobility challenges, which may influence the selection of the quickest but least sustainable (environmentally and socially) options. Nonetheless, transport is a complex sector involving a wide array of activities and stakeholders, which span beyond city boundaries. Thus, it has a strategic importance that could realize benefits far beyond its sector if an appropriate regulatory framework is in place and private investments driven by green polices to finance the shift to green transport in a city.

4.4 Ecosystem, social and knowledge services

Some of the most important parts of a city economy are those not captured directly by the market economy or by prices, such as ecosystem services, social services (for example, community-based, social capital) and knowledge-based activities (human and intellectual capital). Because these are not reflected directly in the gross domestic product (GDP) of cities and countries, they are generally under-estimated or completely ignored by policymakers; at worst, they are interpreted as a negative asset or as trade-offs for pursuing other "development" goals that reflect the traditional way to measure GDP, such as building houses, factories or roads.

Thus, a greener city economy has to deal with the way we value and manage such resources. One of the biggest obstacles to attracting the attention of policymakers or to incorporating these resources into policy processes is that the services provided by these resources are not completely translated into direct monetary values. Even though the economic valuation of environmental resources has been around for several decades (Barde and Pearce, 1991) and several efforts have been made to quantify and raise awareness about the value of ecosystems and environmental resources (TEEB, 2010), many of the methodologies are not robust enough and some of the values cannot be fully captured by economic valuation techniques. Moreover, when the values are known, they generally reflect long-term benefits, which may conflict with short-term goals. Social capital too has been recognized as an important asset, for example, to make governments more effective (Putnam, 1993), as well as social services provided by public institutions, such as education and health.

The greening of the city economy includes both the city economy and the influence the city may have beyond its boundaries. Urban ecosystems provide a series of benefits to the local population such as recreation, culture-based services (e.g., traditions based on biodiversity), the provision of water and food, flood control services, and energy and climate change mitigation (carbon and heat island management). Moreover, many of these services are fundamental to the well-being of the poorest population, who has little access to human-made concrete-based infrastructure. Preserving the quantity and quality of these services is key for a green economy and for poverty eradication in the city. Jobs can also be generated as labour is necessary for creating and managing those ecosystem services, such as the case of the eThekwini Municipality (Durban) in South Africa (see Box 6).

Moreover, cities have an influence on the environment, populations and economy of regions beyond the city boundaries and even in distant places. A large proportion of the resources needed for city activities is provided by external ecosystems and many of the impacts of cities (positive and negative) affect the environment and the well-being of people living outside the cities. For example, many financial institutions that provide capital for activities located beyond city boundaries are based in cities, particularly the large cities of the developed world. If those institutions worked for greening the economy, they would produce significant impacts. Cities are also responsible for a large part of the GHGs produced worldwide. Those GHGs influence many urban, rural and forest environments in distant places, affecting the services they can provide to local populations. Thus, we have to create mechanisms to green those links to facilitate the movement of the green economy to places beyond the city boundaries (similar to the "negative" externalities of cities). There are some good examples of devices already being used, such as the ecological value-added tax in Brazil, where resources are transferred to municipalities that conserve natural spaces and water reservoirs (Puppim de Oliveira, 2003).

Box 6: The Buffelsdraai Landfill Site Community Reforestation Project of eThekwini Municipality, South Africa

The Buffelsdraai Landfill Site Community Reforestation Project was initiated by the eThekwini Municipality and is aimed at offsetting a portion of the Greenhouse Gas emissions generated by hosting the FIFA 2010 World Cup (declared as 307,208 tCO2 eq) in Durban.

The project is established within the buffer area of the municipality's Bufflesdraai Regional Landfill Site, north of Durban, to create a natural carbon sink. A large portion of this area is under sugarcane cultivation. The Municipality decided to halt farming and reclaim the land to original forested state. 520 hectares of sugarcane land is planned to be reforested with 61 indigenous tree species. From November 2008 to June 2011, approximately 182 hectares of the 757 hectare municipal-owned buffer area around the landfill had been replanted and by 2015 the entire area will be reclaimed to forested states.

The Wildlands Conservation Trust is commissioned by the Municipality to implement the reforestation project through the Indigenous Trees For Life Programme (ITFL). The ITFL programme assists unemployed people known as "tree-preneurs", to set up small-scale indigenous tree nurseries at their homes. More than 600 people from surrounding impoverished communities have already engaged in the ITFL programme and improved their living conditions in the process. The tree seedlings that they grow are designed to be paid by credit notes, which can be used to obtain food, basic goods and school fees at regular "Tree Stores" held in each of the participating communities.

Since inception, the project has created a total of 314 jobs (23 full time, 9 part time, 282 temporary) for members of the surrounding communities. At regular intervals, mass planting drives are held, during which up to 60 members from the local communities are employed to assist with planting the trees at the project site. A recent social impact assessment specified that the project has significant positive impacts of increased education and food security to participant communities:

- Improved schooling for children
- Additional disposable income to cover additional needs (i.e., transport)
- Increase by 40 per cent in level of access to adequate food supply for consumption by project participants in two of the project communities

The Buffelsdraai Landfill Site Community Reforestation Project has demonstrated that the investment into climate change mitigation via community-based ecosystem management can achieve win-win-win outcomes. The restored forest areas are able to produce a significantly greater diversity of ecosystem goods and services than simply carbon sequestration, including enhancement of biodiversity refuges and water quality, river flow regulation, flood mitigation, sediment control, improved visual amenity and fire risk reduction. Through the engagement of local communities in environmental management, local communities improve their living quality by creating green jobs. In this regard the concept of Community Ecosystem Based Adaptation (CEBA) has emerged in Durban, and is seen as an important and necessary extension of the existing "Ecosystem Based Adaptation" concept.

References

The eThekwini Municipality, 2011 and 2012; The eThekwini Municipality and The Wildlands Conservation Trust, 2011.

Box written by Wanyu Shih (UNU-IAS).

Other city resources that are difficult to assess monetarily but that are key to a greener economy are those related to human, social and intellectual capital. Cities are centres for making decisions that have large impacts. Cities generally concentrate large amounts of qualified human resources (human capital) because urban citizens tend to be better-educated. Cities have the connectedness that social movements (social capital) and organizational innovative capacity (intellectual capital) need to blossom. Universities and think-tanks are mostly located in cities. Cities also concentrate decision-makers such as politicians (all parliaments are in cities), government officials, chief executive officers of companies and the headquarters of social organizations or NGOs. Cities are hubs for new technical and institutional ideas and innovation that could change the world. Allied with the concentration of capital and decision-making power, this intellectual capital could create huge changes towards the greening of the global economy. How this innovation potential can be used to green the economy in cities and elsewhere is still not clearly understood or quantifiable. However, this is no excuse not to act and move towards a greener economy that helps to eradicate poverty and protect the environment.

4.5 Assessing good governance towards greener economy in the four urban processes

The transition towards a greener economy in cities requires the actions of both governmental and non-governmental actors in different levels. Moreover, the actions of all relevant actors need to be developed and implemented with a minimum of coordination. Otherwise, opportunities might be lost and positive progress in one area might be offset by limited or inappropriate actions in another area. Monitoring of the actions in key dimensions of a governance system could help coordinate and facilitate the transition to a green economy. In this respect, indicators are useful means not only to assess the actual progress in a policy area but also to check whether or not the overall direction of the actions in a governance system is on the right track. In this section, we develop indicators that could be used to assess the governance-related performance of cities towards greening their economies in each of the urban processes discussed above based on the framework of section 3.2 (Table 1).

Table 2 presents some suggestions of indicators by different dimensions of a good governance system as well as different aspects of urban economic processes. The indicators presented in the table operate at a general level in order to make them applicable to cities in different contexts and at different levels of development. The difficulty of transferring more detailed and precise indicators to different contexts has led us to keep the indicators at a broad level. As long as the rationale behind linking the dimensions of good governance and urban economic processes are kept, more specific and detailed indicators in line with the general ones in Table 2 can be developed to assess governance performance towards a green economy in a particular context.

Table 2 – Dimensions to Assess Governance to a Green Economy in Four Key Aspects of Urban Economic Processes with Examples of Indicators

Dimensions of a Good Governance System	Criteria for Indicator Development	Examples of Indicators in Key Aspects of Urban Economic Processes			
		Transformation of Space: Urban Development	**Consumption and Production in Cities**	**Circulation: Trade and Transportation**	**Ecosystem, Social and Knowledge Services**
1. Decision-Making Process (Process Dimension)	Participation and Inclusiveness	Inclusion of disempowered and marginal societal groups to decision-making on urban development	Inclusion of concept of sustainable consumption and production in decision-making processes	Existence of mechanisms to consider the urban poor as well as environmental and affordability issues in transportation planning	Existence of a participatory process to promote improvements in ecosystem services and ecological organizations involved in the decision-making processes
	Responsibility and Accountability	Appropriate division of responsibilities for managing urban development between local and national governments	Explicit responsibility and competence to pursue sustainable consumption and production	Existence of organizations to ensure institutional coordination and multimodal integration in transport sector	Clear responsibility about who will be accountable for implementing the decisions of the above process
	Decision-making Effectiveness	Level of actual implementation of urban regional and master plans	Existence of an organization that can influence the quality of the consumption and production patterns	Availability of a well-integrated transport infrastructure in which public and non-motorized options are prevailing	Level of power of the participatory decisions to improve ecosystems' health
2. Implementation Capacity (Capacity Dimension)	Organizational Capacity	Existence of sufficient human and financial resources at the local level to develop and implement urban plans	Existence of sufficient capacity to reduce consumption and promote local production	Existence of local autonomy to provide green alternatives and regulate passenger and freight transportation in the city	Existing capacity in government and non-governmental sectors to monitor ecosystem health
	Formal/Informal Rule Building	Changes in urban planning and land use frameworks to restrict urban sprawl	Changes in urban land use rules to ensure the development of productive landscapes	Existence of management authority on the use of cars in certain parts of the city or at certain times	Changes in land use rules to make ecosystem preservation more attractive
	Behaviour Change	Number of buildings registered by green building certification systems	Existence of sustainable local consumption and production networks	Modal share of public and non-motorized transport in the city	Number of organizations developing green practices with impacts beyond the city

Dimensions of a Good Governance System	Criteria for Indicator Development	Examples of Indicators in Key Aspects of Urban Economic Processes			
		Transformation of Space: Urban Development	**Consumption and Production in Cities**	**Circulation: Trade and Transportation**	**Ecosystem, Social and Knowledge Services**
3. City Economy (Green Economy Dimension)	Resource Use Efficiency	Urban density levels and total land area under development	Level of locally produced goods in city's total consumption	Average travel time and distance in the city	Efficiency in the use of certain scarce ecosystem services
	Responsible Consumption	Lower land use change for urban development	Lower amount of natural resources brought in from places outside city boundaries	Reduced use of road-based and private modes for passenger and freight transport	Responsible use of certain ecosystem services
	Internalization of Externalities	Incentives to promote compact cities and green buildings	Amount paid for biodiversity conservation by each citizen in average	Incentives to improve public transport infrastructure and ridership	Amount paid for ecosystem services
4. Socio-Ecological System (Socio-Ecological Dimension)	Resource Conservation	Total and per capita amounts of green spaces, trees in the city	Total land area covered by natural and productive urban landscapes in the city	Decrease in land area covered by roads and car parks and in distance travelled in cars	Decrease in the amount of raw resources coming to the city
	System Resilience	Reduction in slums, low-quality buildings and infrastructure, and increase in resource savings	Prevention of overconsumption of agricultural lands and productive landscapes in and around the city	Reduction in the vulnerability of urban transport infrastructure to extreme events and disasters	Reduction in the vulnerability of the ecosystems
	Human Well-Being	Number of people living in good-quality residential areas with access to all necessary utilities	Number of people who consume food produced in ecological agriculture at the local level	Number of people who can access public transport by walking less than a certain distance	Number of people with access to social networks of green product distribution

5. Governance towards a Green Economy: Challenges in the Process and Capacity Dimensions

Even though there are good examples of green initiatives in cities, mainstreaming the green economy in the diverse economic activities described above faces tremendous governance challenges. Using the framework developed in section 3, we identified the main challenges in each of the first two dimensions in defining good governance (Table 1), which are decision-making and organizational capacity to carry out the changes. Those challenges can be common to the city as a whole, or may only be specific to some sectors.

5.1 Decision-making related challenges

Challenges related to decision-making are numerous and very much contingent on the local context and structure of the city. Some of the most common major challenges are described below. They may hinder a decision-making process from leading to final outcomes that are fair and sustainable.

5.1.1 Lack of participation and awareness of policies to achieve a green economy

The involvement of citizens in local affairs is one of the main mechanisms to make the necessary changes in governance to move cities in a more sustainable path. Particularly in developing countries, public awareness on the importance of the local environmental conditions for achieving a good quality of life is yet to be developed. Economic and pressing social issues are on top of the agenda, and generally the link between good environmental quality and good quality of life is not perceived. This applies not only to the general public but also to the main decision-makers. Local governments could play a crucial role in the transition to a green economy because the local level is the closest to the population, and where people can voice their concerns. However, local governments in many countries suffer from lack of human and social capital in terms of knowledgeable experts and active civil society. Participation, transparency and accountability are also important points that many city governance structures lack. In many cases, citizens do not have the information or lack the mechanisms to participate in city decisions. An understanding of how a conventional economy can be transformed into a green economy that reduces the consumption of resources has to be advanced among policymakers, public officials and professionals, for example, through formal or informal initiatives in education for sustainable development as well as more transparent and participatory ways of governing the cities.

5.1.2 Responsibility and accountability: Balance of power and capacity at the local level

The degree in which a city has autonomy to take decisions influences the way it moves towards a greener economy. In fact, most of the policies and strategies to achieve a green economy need to be implemented at the local level, which is the jurisdiction of sub-national governments and local authorities. In many countries, however, the responsibilities, resources and capacity to implement actions towards a green economy still belong to national governments. This results in a major obstacle, which may be termed an "implementation deficit" (Bulkeley, 2006. See Box 7). Targets, policies and strategies defined at international and national levels cannot be implemented sufficiently at the local level owing to the deficiencies of city governments in administration, finance and

service delivery. If fiscal power remains in the hands of higher level authorities and local governments are not given fiscal autonomy, local authorities will not be able to create financial incentives, such as preferential tax treatments, discount rates or abatements to attract investors. For example, in many Japanese cities, local authorities have limited power to regulate land use in private land. In many cities, there is a tax that penalizes keeping the land vacant forcing development to happen to avoid high taxation (Shapira et al., 1994). Yokohama, however, was able to change the local tax system that can provide positive incentives for preservation of natural areas (Langdale, 2011). Thus, in order to push the environmental agenda forward by realizing a green economy, local governments have to be strengthened through institutional reforms towards more decentralization. Nevertheless, the role of central authorities is important to make decentralization work as resources and accountability mechanisms of checks and balances need to be in place for guaranteeing that local affairs are properly accountable.

Box 7: Yokohama autonomy over green space protection

The City of Yokohama, the capital of Kanagawa Prefecture in Japan, has been working on the issue of green space protection through various means. Yokohama is the second largest city in Japan, with a population of 3.7 million.

Due to the urbanization process since the 1950s onwards, the City of Yokohama has been experiencing steady population growth. The urbanization, especially in the form of increase of residential areas, led to a decrease in green spaces. The city regularly carries out surveys to assess the degree in which total green coverage changes. These surveys revealed that approximately 100 hectares of green coverage were lost each year and the green coverage rate fell from 35 per cent in 2004 to 30 per cent in 2009 (City of Yokohama, 2010).

It is generally the case that Japanese local authorities have very limited power on land use control, compared, for example, to some European counterparts. It is largely up to landowners to decide when and where they want to sell or develop their land. Landowners have their own pressure to do so, because inherent tax is generally considered to be too expensive to keep the land title (Shapira et al., 1994).

The city government is basically responsible for providing and maintaining parks, thus they are in the position to ensure basic natural elements to be demonstrated in these parks. It is, however, not sufficient to provide or maintain patchy areas (e.g., parks) to reverse the trend of green space reduction.

Against this background, the City of Yokohama has a system to provide financial tax breaks for the landowners to lease their land to be used as natural parks. Also, the city initiated the Yokohama Greenery Plan in 2009 to protect and increase green spaces. The plan has main targets to protect forest, farmland, and other green spaces through a local taxation system (the Yokohama Midori (Greenery) Tax). The revenue will be used to finance the city to purchase privately owned green areas, so that the spaces would not be converted into residential or other uses. Also, tax reductions are offered mainly to farmlands in urbanized areas on the condition that these farmlands cannot be developed or resold (Langdale, 2011).

References

Langdale, 2011; Shapira et al., 1994; City of Yokohama, 2010.

Box written by Maiko Nishi (UNU-IAS).

5.1.3 Decision-making effectiveness: Limited coordination (vertical and horizontal) between government bodies and divisions

Decisions on urban and environmental issues are generally tackled by a departmental or a sectoral approach through which different divisions of local and national governments deal with the main issues. Sectoral approaches have certain advantages, such as specialization of divisions and personnel, and a reduction in duplication of tasks. However, sectoral approaches may end up with limited coordination and cooperation between governmental bodies and divisions and thereby prevent the development and implementation of integrated policies. The creation of a coordination mechanism between environmental and development oriented agencies with the participation of different stakeholders can provide an opportunity if the right institutional incentives are present (Puppim de Oliveira, 2002). The realization of a green economy calls for the effective coordination and integration of efforts and activities of all governmental bodies and divisions. Therefore institutional reforms need to be undertaken to promote a more integrated public policy-making. One solution might be to create an organization or a committee to deal with issues pertaining to a green economy by facilitating and increasing communication between different governmental bodies and economic sectors. Such an organization or a committee could also function as a holder and transmitter of the institutional memory and facilitate budget-sharing among local governmental bodies in order to coordinate initiatives for a green economy. Moreover, a concrete set of goals to be achieved in different areas concerning sustainable development would establish a clear message to the citizens, and allow them to make the local authorities accountable to their decisions.

5.2 Challenges regarding implementation capacity

Even when decisions are right, the capacity to transform decisions into actions may not be in place for different reasons. Having the organizational capacity, the rule-making power or the appropriate change in behaviour in place is fundamental to implement decisions aimed at greening the economy.

5.2.1 Organizational capacity

Human, financial and economic challenges and barriers

A lack of adequate financial and human resources at the local level often limits the capability of a city in promoting greener growth. Giving incentives to greening the economy or putting mandatory standards in place, requires resources to move the agenda forward. Green technologies or infrastructures may require high investment upfront and might not provide any guarantee of financial returns for investors, whether they are governments, companies or individuals, within a reasonable period of time. Moreover, policymakers may not be able to provide incentives or subsidies that are attractive enough for the private sector and individual households to invest or change their behaviour. The opposite may happen. Cities depend too much on developing land to raise revenues, such as the case of China (The Economist, 2012), putting pressure on ecosystems and vacant lands.

Although private financing is a potential solution for the financial change, several potential private investors may have their interests aligning mostly within the "brown economy". "Greener" companies which could be interested in promoting the alternative green agenda

may not have the capacity, influence or resources to make major investments or changes in policy. "Brown" companies can be quite influential in the policy-making process, and may oppose to changes. Moreover, poor groups may depend on brown products in the short term and changes are difficult or expensive. In many countries, for example, fossil fuels are subsidized and removal of subsidies is not politically viable because many people depend on them to fulfil their own energy needs (Resnick et al., 2012). On the other hand, "greener" companies need greater economic justifications to expand their green practices and "green" businesses may encounter difficulties in becoming mainstream in the market, particularly in the early stages without suitable economic incentives from the public sector.

Human resources can limit the local capacity to develop actions to boost the green economy in cities. The limitations may be in terms of quality and quantity, and involve both the public and non-governmental sectors. In many instances, policies to move green initiatives may need qualified human resources. Local authorities may face challenges to hire qualified personnel or train existing ones. Moreover, many actions require qualified suppliers in the local private sector. For example, any green procurement needs a prepared private sector to provide the services or products with adequate prices, which is not always available.

Alignment with existing policies

Policies and strategies for greening the economy, like climate change mitigation and adaptation, should be mainstreamed into existing policy frameworks to use financial and human resources more efficiently and effectively as well as to guarantee the continuity in priorities instead of radical change (Biesbroek et al., 2009). Policy interventions to achieve a green economy can be more effective when they build upon local strengths and appropriate local policies (Chapple, 2008). However, this is not a straightforward issue because in some cases policies and regulations that have been in use for a long time may prevent the introduction and implementation of new and up-to-date policies and regulations. This blocks the flexibility needed to integrate new information and the development of new technologies. Besides, old policy and legal frameworks may not be compatible with the new concepts, strategies and implementation tools. In such cases, reforms need to be made to the existing institutional arrangements and policy frameworks prior to incorporating the new concepts and measures.

Challenges and barriers to new technologies

Many countries, both developed and developing, have suffered from a lack of technical capacity in the process of moving to a green economy. Generally, there are three kinds of technical barriers. The lack of access to the technology constitutes the first barrier. For example, clean technologies can be used for reducing carbon emissions and environmental pollutants, but most of these clean technologies are expensive or difficult to operate. Investors have to bear high costs and risks of utilizing, operating and maintaining the clean technologies. Furthermore, old technologies have been in use for long periods and organizational and infrastructure changes may be required before using the new technologies, which also prevents new technologies from being utilized initially.

A lack of regulations and standards is another technical barrier. Without integrated and sound regulations and standards, there will be obstacles to the process of implementing a green economy at city, national and even international levels, as the first movers may

be penalized if others do not have to move as well (for example, bearing higher costs of production in the short term). The effect of their changes may also only have marginal overall influence in the final results, such as the case of climate change.

Another barrier is the lack of effective technological systems to support the development of a green economy. A single technology cannot make a significant difference to an old economy. Only a system that integrates different technologies and allows them to work smoothly and effectively, can facilitate the transition towards a green economy. If there is not enough awareness, professional skill and experience among those who run such systems, the obstacles may remain and also become more serious. For example, a city that wants to adopt a new technology or green product may need support from the local suppliers to produce some of the parts, which they may not be used to.

5.2.2 Rule building: Autonomy and legal uncertainty

The influence of city governments is bound by higher level legislation (e.g., national), which in many countries governs most of the relevant areas for development. The regulation of property rights, land use, infrastructure and the use of natural resources may be based on norms defined at the national level. This hinders cities from negotiating freely with potential external partners. For instance, a national law in Thailand prohibits foreign stakeholders from owning land in the country. As a result, a company fully owned by foreign stakeholders is not allowed to purchase land in Thailand. The regulation is strict and any Thai party, who acquires land for a foreign stakeholder may have to bear severe penalty, if discovered. To get around this barrier, foreign investors can nevertheless create a company with Thai partners who would own the major part of it. Otherwise the law also authorizes foreign parties to lease the land for industrial and commercial purposes (Curnow and Hodes, 2009). Local governments will therefore have to consider these limits when inviting external parties to invest in their city.

Moreover, cities have to work together with civil society and the private sector, both companies and individuals, to achieve a greener economy. They need to attract both public and private investments willing to contribute to sound environmental projects with economic, social or political returns. Against this background, legal certainty is a primary challenge for governments. In fact potential project leaders and investors need to assess the risks associated with their activities in order to manage them. An uncertain legal framework blurs the development scenario of an initiative and thus affects the evaluation of potential benefits. To some extent, legal certainty depends on the authorities responsible for enhancing the rule of law. Courts are key actors in ensuring that parties to a contract have their rights protected and in constraining public authorities to obey the laws. In this context, local governments are crucial actors as regards two legal aspects. Firstly, they are critical players in the implementation of international, national and local norms as many of the enforcement mechanisms rely on local authorities. Secondly, their role is essential in the adoption of local regulations that create incentives to attract private stakeholders to work together towards the same objective. An important step at the local level is therefore to provide as much information as possible on the local regulatory context and enforcement, and to create a safe environment for individual investments.

5.2.3 Behavioural change: Socio-political challenges and barriers

Achieving a green economy in practice may be more difficult than is predicted by conceptualizations and estimations. Many green initiatives will conflict with other developmental goals or individual interests in the short and medium terms. They also may face resistance from small, but powerful, corporate or political interests, or even conflict with poverty alleviation strategies, such as the provision of subsidized fuel to poor families.

Citizens also need to understand more about the implications of green economy in terms of possible behavioural changes. A green economy will be a qualitatively better but not necessarily a quantitatively bigger economy for all. If the green economy is to achieve the accompanying aim of poverty eradication, it is necessary to ensure that all sections of society are included and contribute to the needed changes. However, the development models we have today have mirrored on developed countries, which got richer by increasing their environmental footprint. It is not immediately clear to all how the development path can be re-oriented, or, indeed, the extent to which changes are needed. A greener economy may rely on low-carbon energy supplies and cleaner production systems that may need changes in consumption habits or preferences. Societal changes may imply the rejection of the mass consumerism that most of the modern societies are based on. However, this may need major changes in social and individual behaviour. It may take generations to achieve a situation where greater environmental awareness and fairness in the distribution of resources from a young age, combined with concepts such as collaborative consumption, may lead to less material consumption overall. We also need to have the right mechanisms and instruments to transform the attitudes in behaviour. Much of this entails a wider societal transition and cities, although they are the unit of analysis for this policy report, face different challenges to implementing the green economy owing to the nature of their economic activities and the behaviour of their citizens. Thus, some cities will be able to go further than others in achieving these reforms, and those that do will serve as models for others to follow.

The huge number of cities in the world means there is a large potential for innovative solutions to emerge from their varying geographical, developmental and cultural contexts. When allied to the growth in intercity networks of learning and sharing of best practices, the ability to diffuse and test various strategies and deal with the uncertainty of climate change is greatly enhanced. Cities and their leaders, however, need to be open to sharing and to recognize that solutions can come from anywhere, even from less developed cities. Likewise adopting innovative strategies can be an effective way to promote the city, especially in developing nations.

5.3 Assessing the changes towards a green economy and socio-ecological system

Challenges should be overcome where they exist in the process and capacity dimensions. Once decisions are taken effectively (process dimension) and there is an implementation capacity to carry out the decisions to a green economy, we need to assess whether or not the economy is actually getting greener. Finally, the socio-ecological system can determine whether or not the changes in the economy are delivering better economic, social and environmental outcomes, and making society and the locality more resilient to unexpected changes. The first challenge is to define the scope of the changes that will be measured. Cities can have impacts well beyond their boundaries, and some of those impacts are not easy to measure. The second challenge is to find a set of indicators that are measurable, understandable by the larger public and can reflect directly what is happening in the other two dimensions of governance. Section 4.5 (Table 2) provides examples of indicators for these two dimensions.

6. Opportunities and Solutions for a Green Economy

Even with all the challenges described above, cities still offer several opportunities and solutions to improve governance in the process and capacity dimensions, and to achieve a greener economy towards sustainable development and poverty alleviation.

6.1 Opportunities for a better decision-making process

An efficient legal and institutional regime oriented towards the green economy is a key instrument for cities because it defines the governance context, financial tools and sanctions in the event of a breach of the rules. Depending on their power remit, city governments may use different approaches to foster a green economy within their territory.

6.1.1 Participation and inclusiveness

Giving more voice may lead to more greener budgetary solutions

The change towards a green economy starts from changing public financing. The first aim is to reform the public budget allocation process to be more inclusive and participatory. Public funding may be limited, but budgets from several development sectors can be combined to support greener economies that have the backing of many people. The role of public funding is to empower local stakeholders, including investors, citizens and taxpayers, in developing a greener city. It should act as a stimulus to accelerate the process of institutional reform towards participatory urban planning and development. For example, the participatory budgeting, which started in the Brazilian city of Porto Alegre, has given more direct voice to the citizens concerning local decisions on urban interventions. Coincidently, Porto Alegre is the city with one of the largest proportion of green areas among the main Brazilian cities with almost one tree and 17 square metres green space per inhabitant (Cigana, 2007).

National and international network of cities and local governments for information exchange

Local governments can take a leading role in achieving the transition to a green economy in cities mainly because of their proximity to the implementation level of policies and strategies. In addition, local governments are the political authorities that are closest to citizens. They can create significant change not just by effective implementation of policies but also by motivating, encouraging and leading citizens and stakeholders at the local level. In order to do this, however, they need to develop their capacities in terms of knowledge, information and experience of appealing and effective solutions that have been developed and put in place in different parts of the world. National and international networks of cities and local governments could play a crucial role in this respect. Through joining such networks, cities and local governments could increase synergies and facilitate knowledge and information exchange. Currently there are several networks, such as ICLEI – Local Governments for Sustainability, the C40 Cities Climate Leadership Group, and CITYNET, that are facilitating interaction between cities and local governments all over the world. The thematic and geographical coverage of such networks needs to be expanded so as to include green economy concepts and cities that are currently excluded. The case of Surabaya's exchange with Kitakyushu for domestic waste composting helped to reduce significantly the waste going to landfill (see Box 8).

Box 8: Community-based solid waste management (CBSWM) in Surabaya

Like Jogjakarta, Surabaya is another Indonesian municipality that promotes environmental protection through CBSWM to address its solid waste problem. As an incentive for the effort to minimize municipal solid waste (MSW), Surabaya municipality has undertaken public-private partnership with Unilever, one of the most prominent private companies in Surabaya, to organize an annual competition called "Green and Clean (G&C) Program" through composting.

In the 2010 competition of the "G&C Program", Gundih, which possesses an effective waste management system, stood out among the other 2,774 villages to win the award. Waste management activities in the village are focused on efforts to reduce waste at its source. To facilitate the transition to a green economy, solid wastes have to be recycled to create added value and sustainable jobs. By producing strategic resources from wastes, gains may be attained in decoupling waste generation from economic growth.

In partnership with the Kitakyushu International Techno-cooperative Association (KITA) in Japan, the Surabaya municipal government also initiated a composting programme called "Takakura" by constructing about 16 compost houses citywide to reduce other organic wastes from a variety of sources. Each compost house could produce at least 6 cubic metres of compost per day from processing waste from traditional markets and households. The composts are used for urban farming in different units of neighbourhood to beautify the environment as well as for maintaining greenery plants and shrubs at different parks in Surabaya. According to the data from the Unit of Cleaning Department in Surabaya, about 32 per cent of reduction of solid waste volume was achieved at the Benowo landfill from 1,641 tonnes per day in 2006 to 1,242 tonnes daily in 2010.

Due to its success, the municipality replicated the model in other communities. To date, there are more than 18,000 takakuras and around 900 composters distributed to communities, assisted by 400 city environment facilitators with more than 27,000 environment cadres. At the moment, almost 50 per cent of kitchen waste has been effectively reduced due to local community participation.

Recycling handcart at Surabaya

Reference

Pearce et al., 1989.

Box written by Tonni Agustiono Kurniawan (UNU-IAS).

Consumption-production networks: Rural-urban partnerships

Since cities obtain most of their environmental goods and services from outside their boundaries, establishing sustainable consumption-production (SCP) networks among supplying regions and consumer centres can move urban areas towards a green economy while contributing to rural sustainability and well-being. One of the challenges that remain to achieve a truly green urban economy is to make sustainable products affordable and thus mainstream while improving livelihoods in the producing regions. There have been some interesting experiences in this respect regarding food products; for example, the establishment of community-supported agriculture programmes in which local and peri-urban producers can sell directly to consumers results in higher returns for the producers and lower prices for the consumers, while, improving local producers' capacities in marketing and distribution. Moreover, public funding mobilization should explicitly reflect the city's development visions and priorities for a green economy to gain public trust in the city's commitment. From there, a city can expect greater public participation.

Bio-cultural diversity considerations: facilitating local production for local consumption

In addition to fostering rural-urban partnerships, local governments can play a key role in sustainable urban ecosystem management because of their competencies in key sectors—city planning, greenery, public works, or institutional procurement, among others. Yet designing instruments that foster local sustainable consumption-production networks can be difficult for cities, as different sectors and stakeholders usually have divergent economic interests and lack a common vision on the local green economy. Linking local economic development to biodiversity protection and cultural enrichment by considering biodiversity and culture linkages can be an innovative way for local authorities to foster inclusion and participation of communities while sustainably using the local environment (see Box 9). Biodiversity and culture linkages, or bio-cultural diversity, refer to long-term interactions between human societies and the ecosystems they inhabit, encompassing local ecological knowledge and practices which are "a vital reservoir of experience, methods and skills that help societies to manage their resources" (UNESCO, 2010). By paying greater attention to the linkages between local ecosystem management patterns and local culture and traditions, city governments can more easily identify sustainable local production-consumption models that are especially suitable for their locality, both ecologically and socio-economically (Moreno-Peñaranda, 2012).

Box 9: Biocultural diversity for local production-consumption networks: lessons from policies of Kanazawa City, Japan

Kanazawa is a city of almost half a million inhabitants in west Japan, renowned for its traditional gardens, old architecture, literature, cuisine, and traditional crafts. The city was designated a UNESCO City of Crafts and Folk Art in 2009 and hosts extensive forests (covering over 50 per cent of the municipal area) and still preserves important agricultural landscapes.

In Kanazawa, biocultural diversity considerations are central in local policy making seeking to harmonize growth and sustainability. Envisioning the city as a nurturer of local culture, the local government has over the years incentivized traditional and artisanal production, which in turn has increased the visibility of the value of local ecosystems as providers of the material goods and the creative inspiration behind local culture. Biocultural considerations are manifested in a variety of businesses—crafts, architecture, traditional sake, charcoal, and salt making, or local cuisine. Agriculture and forestry, because of their importance as providers of biodiversity, ecosystem services and raw materials for these businesses are two key sectors for the local green economy.

In agriculture, Kanazawa city has supported innovative branding schemes for traditional varieties of vegetables and provided incentives for the revitalization of the local cuisine. This has resulted in the protection of local agro-biodiversity and in the creation of a renowned local brand (Kaga-vegetables) linked to local seeds, farming, processing, retail and hospitality sectors. Approximately half of the city's vegetable production corresponds to Kaga vegetables. In 2008, this accounted for JPY 1.3 billion (over USD 16 million). In forestry, local policies provide stimuli for the local crafts and traditional architecture industries, alongside forest restoration programmes targeting autochthonous, high value tree species. Over the past decades, the decline of traditional forest management resulting from decreasing economic viability of local timbers, depopulation and aging of foresters was negatively affecting the biodiversity and functionality of the local forests. City policies are now trying to reverse these trends.

References

Moreno-Peñaranda, 2012; UNESCO, 2009.

6.1.2 Responsibility and accountability

Institutional reform towards more decentralization

As argued in section 3, cities constitute favourable settings for development of a green economy and city governments hold an important potential to manage the sectors that are relevant for promoting the green economy. However, there are certain challenges towards realizing the potential that cities and city governments hold. As mentioned in the previous section, one of the foremost among these challenges is the lack of necessary power, capacity and competence at the local level. Decentralization policies, which are already in place in some countries, could be a useful opportunity to eliminate this challenge.

Decentralization refers to a reform in the organizational structure of governments that gives more autonomy and power to city governments and provides them with sufficient capacity and resources to deliver, and creates a mechanism for local accountability. In this sense, decentralization could help to overcome the "implementation deficit" at the local level arising from the lack of resources and capacity of local governments. Several countries have successfully implemented decentralization policies and empowered the political authorities at the local level. Indonesia is an interesting example in Asia, where most of the power has been given to local governments in line with the diversity of their cultural and historical backgrounds. The decentralized system in Indonesia provides cities and localities with autonomous governance that is observed to be an advantage in promoting sustainable low-carbon development, especially through various pilot and experimental projects (LCS. RNet, 2010). Nevertheless, there are still barriers in terms of the capacity and resources of the local governments to face the mounting challenges, and central authorities still have important responsibilities, even in decentralized systems.

6.1.3 Decision-making effectiveness

Co-benefits of policies for the green economy

The green economy refers to a process through which more outcomes are achieved by using fewer inputs or by consuming less. In this sense, policies for a green economy can be effective by generating several benefits simultaneously, especially in terms of resource-savings. For instance, prevention of urban sprawl is regarded as a strategy for a green urban economy because energy consumption for transportation and infrastructure utilities and the cost of providing these utilities are lower in compact cities. Developing countries, which need to tackle many problems with limited resources, could benefit from such policies and achieve cost-effectiveness. Therefore, a co-benefits approach can be an encouraging factor and an opportunity to shift the mindset of policymakers towards a green economy by indicating a more optimal use of limited resources..

Overcoming administrative boundaries through cooperation agreements

City governments as a legal entity have the capacity to enter agreements with other local authorities and non-governmental actors to share responsibility for the provision of essential services that would be costly or not possible individually. Thus they may overcome administrative boundaries and create economies of scale that are more attractive for non-governmental partners, including private initiatives. They may also tackle environmental issues spread over several localities or districts through joint initiatives. In local governments' partnerships, a third entity is usually created. It is awarded the necessary powers to negotiate with stakeholders and its action plan is defined by representatives of different public authorities. In 1995, in the region of Dakar, Senegal, local governments decided to put together their environmental competences to face a lack of financial resources. As a result they created an "Urban Community" and pooled their waste services. They then chose to delegate the collection and disposal of waste management to private companies. The Urban Community however remained the main regulator and fixed the duties of its sub-contractors. The territory of the united communes was divided in nine zones and tenders were organized for each of them. After some months, it appeared that this new competition on the market brought improvement to the quality of the service and the amount of waste collected (Thonart and Diabate, 2005).

6.2 Opportunities and solutions to improve implementation capacity

Governance-related solutions range from institutional solutions to policy interventions. They are important to link the different stakeholders to provide solutions that may not be possible to be carried out in isolation.

6.2.1 Organizational capacity

Improving organizational capacity by community-based initiatives

Many cities do not have the human and financial resources to boost their capacity to provide public services, such as waste management, cleaning and environmental education. The involvement of communities to provide services for their own or others is an important mechanism to increase the overall organizational capacity to provide services without having to increase the bureaucracy or using public resources. One advantage of community-based services over privatization is that they can provide in-kind resources (no payments, or even increasing their incomes sometimes). Community-based initiatives also avoid the problems of monopoly in the provision of services privately (many municipal services are natural monopolies). The case of community-based solid waste management in Yogyakarta is one good example (see Box 10).

Box 10: Community-based solid waste management (CBSWM) in Yogyakarta, Indonesia

Sukunan is situated around 5 kilometres west of Yogyakarta in Indonesia. With an area of 42 hectares, the village has been inhabited by about 296 households, which consist of almost 1,000 people. Since 2003, Sukunan has established a community-based solid waste management system (CBSWM) to address environmental problems caused by an over-generation of municipal solid waste (MSW).

Before the introduction of CBSWM system in Sukunan, local people burned all types of solid waste and then disposed of the refuse into traditional dumpsites. Within neighbourhood borders, the CBSWM system started in 2003. After the implementation of CBSWM, every family has started to separate their household waste into a variety of categories: plastic, paper, glass and metal, and organic. The first type is commercially sold monthly and the money is used to support development programmes; while the rest including organic waste is recycled by the community.

So far, the CBSWM system has managed to reduce solid wastes by 92 per cent. In addition, the programme has created job opportunities, thus generating additional income for the community. This reflects the applications of the co-benefits approach in a green economy, an economy that could reduce its negative impacts on the environment such as air, water, biodiversity and climate.

In 2006, the Ministry of Environment and the Ministry of Public Work in Indonesia selected Sukunan's CBSWM system as one of the best practices for solid waste treatment nationwide. Just recently, Sukunan has been designated as an Eco-Tourism Village in Indonesia.

Reference

Pearce et al., 1989.

Box written by Tonni Agustiono Kurniawan (UNU-IAS).

Financial opportunities and solutions

Green economy can be promoted by attracting private financing for green policies. This can be done by reducing the risks or increasing the rewards for investing in green initiatives, particularly for land developers, energy companies, construction sectors, public service operators (public transport, waste management, water, etc.), freight transporters and industries. This can be achieved by adopting fiscal instruments such as financial incentives and instruments (for example, feed-in tariffs) to offset the higher cost of green technology installation and clean energy usage, and incentives or disincentives (for example, preferential tax treatment or exemption) to prevent urban conversion of agricultural land or to encourage land developers to build green open spaces.

As for "brown" businesses, internalizing the environmental costs into taxation, fees and charges is one possible instrument. In the long run, however, it will be necessary to establish local market conditions that favour "greener" and "green" businesses, so that these companies can have comparative advantages over "brown" companies. Since citizens compose part of the market, it is necessary to influence their preferences in terms of green lifestyles, for example by reforming environmentally harmful subsidies (such as fuel subsidies) and conversely adopting greener subsidies (such as subsidies on public transport operations), and by adopting progressive taxes on electricity consumption, vehicle ownership, and other environmentally harmful urban activities.

To increase the market share of green products, the public sector may need initially to be the main purchaser, starting by adopting energy efficiency measures in government buildings and daily operations. In addition to earmarking green taxes, other financial sources from national, bilateral and international funding can be utilized to support municipalities in this matter, including climate financing (Glemarec, 2011).

Technical opportunities and solutions

Technical barriers cannot be tackled purely by technical solutions. Only under a comprehensive strategy, which must include solutions from the legal, institutional, and financial systems, can the technical barriers be overcome and the green economy be developed.

The priority should be given to make sure that policies are sound and suitable for enhancing the utilization of appropriate technologies, and that strengthened institutions can supervise and encourage the implementation of technical operations. Reasonable financial measures are also needed to provide funding, tax exemptions and subsidies for utilizing green technologies. Furthermore, a good market mechanism must be set up to provide investors with the incentive to invest in new green technologies with lower financial risks.

In order to avoid difficulties in adopting and operating technologies, it is very important that regulations and standards are integrated at the city, national and international levels. Integrated regulations and standards can accelerate the utilization of technologies, allow more cities to gain access to advanced technologies, and remove existing obstacles to technology transfer between cities. More national and international collaboration is needed to promote the integration of regulations and standards.

Some simple technologies can be available with limited amount of resources and make significant improvements towards a greener economy, improving economic efficiency, reducing resource use and improving human well-being. For example the introduction of more efficient and less polluting cooking stoves in India reduced the exposure of many families to indoor pollution (see Box 11).

Box 11: Use of modern non-solid cooking fuels and their alternative in India

A national representative sample survey reveals that rural households dominantly use traditional solid cooking fuels—firewood, dung, crop residues and coal/charcoal—in India. More precisely, 79.3 per cent rural, 20.95 per cent urban and 34.37 per cent slum households used traditional solid fuels in 2005 (Desai and Vanneman, 2009). The ill effect of the traditional solid fuels are well documented, particularly, the health outcome (e.g., acute respiratory illness), on women and children. There is mounting evidence that traditional solid fuels burned inefficiently release significant amount of Particulate Matter (PM), Carbon Monoxide (CO), and volatile organic compound. Studies from developing countries show that improvement in cooking stoves is a viable strategy (at least for a decade) rather than only focusing on changing fuel sources, which largely depends on affordability, availability, awareness and to some extent acceptability to the households.

The Ministry of New and Renewable Energy (MNRE) launched a National Biomass Cook Stoves Initiative (NBCI) in 2009 with the primary aim to enhance the availability of clean and efficient energy for the energy deficient and economically poor sections in India. The initiative emphasizes the enhancement of the technical capacity by setting up testing, certification and monitoring facilities including strengthening research and development programmes. As a result of government initiation with active participation of NGOs and technical institutions, cook stoves have improved, for example, Rocket Stoves, Sarai Cooking System and Fan Stoves (for details, see ARTI, 2012). Studies show that improved cooking stoves have reduced approximately 25–65 per cent PM and 32–65 per cent CO (Smith et al., 2007). However, further challenges lie in a viable commercial distribution of efficient cook stoves and continued technology development. These could be also applied to urban areas, particularly in slums, where still one-third of the households use traditional solid fuels.

References

Desai and Vanneman, 2009; Smith et al., 2007; ARTI, 2012.

Box written by Sohail Ahmad (UNU-IAS).

6.2.2 Rule building

Green public procurements

Local governments are responsible for provision of important public services that have a huge potential to contribute to the green economy. Waste and water management, transportation and buildings are essential social and economic activities with important environmental impacts. In this context, urban authorities may include environmental objectives (for example, to construct buildings with green roofs) in their contracts with external service providers. As long as competition rules are enforced, local governments can also choose their partners in tenders based on environmental or social criteria. The development of guidelines for urban green procurements and the reform of procurement rules may be necessary in order to foster this practice. Cities in Brazil, Sao Paulo for example, have achieved some success in this area, developing programmes such as the "merenda escolar" (school meal), by means of which schools can contract local small producers (family farmers) of fresh and naturally processed organic foods to supply mandatory school food services, thus contributing to local employment in the formal economy and sustainability in the food chain (Otsuki and Arce, 2007). Through the organization of tenders, local authorities also have the power to dismantle local markets by awarding different contracts to different zones or sectors, thus facilitating the entry of new operators, and potentially more innovation.

Defining regulations or caps for emissions in buildings and industrial processes

City governments have the power to enact local regulations. They may define emissions standards (for example, for GHGs and pollutants), land use, building codes and energy efficiency standards or mandate the phasing out of certain noxious industrial processes or technologies. As a result, some local governments have undertaken initiatives that are more ambitious than the national strategies. The first city level GHG emissions cap-and-trade system in Tokyo is a good example (see Box 12). It shows how initiatives at the local level can tackle a global issue as well as stimulate the greening of markets and technologies in the building industry. However in order to be more efficient, such mechanisms must be inspected and followed by sanctions in the event of non-compliance.

Box 12: Tokyo cap-and-trade system

The Tokyo's Emissions Trading System (ETS) is the first city level cap-and-trade system applied to greenhouse gases (GHG) emissions worldwide. Its overall target is to reduce CO_2 emissions by 25 per cent below the levels of 2000 by the year 2020.

The ETS applies to the heaviest emitters of the industrial and the commercial sectors. They are industrial factories, office buildings, administrative institutions and commercial buildings. Most of Tokyo's skyscrapers fall under the scheme. Around 1,400 large-scale facilities (1,100 business facilities and 300 industrial facilities), which account for approximately 20 per cent of Tokyo's GHG emissions, have been selected on the basis of their energy consumption. The baseline is a total consumption of fuels, heating and electricity of at least 1,500 kilolitres per year (crude oil equivalent) (TMG, 2010).

These facilities are awarded a limited number of allowances ("cap") that determine the total quantity of GHG emissions that they are authorized to release, for a given time period. Facility tenants have the responsibility to control their CO_2 emissions and to adopt mitigation measures. Units that emit less than the credits they have can trade their unused allowances to other participants who exceed their cap (Lee and Colopinto, 2010).

Allowances are grandfathered (free of charge). Their number is fixed on the basis of past emissions. Thanks to the "Tokyo CO_2 Emissions Reduction program" launched in 2000, which included a voluntary emissions reduction plan with a mandatory reporting scheme for targeted facilities, a lot of data on emissions has been collected. On this basis, the ETS base year is a calculated function of the average emissions of the facilities over three years from 2002 to 2007.

Allowances are allocated at the beginning of each compliance period. Their number is calculated as follows (first period):

[Base year emissions – required reduction or "compliance factor" (6 per cent for industrial buildings or 8 per cent for rest of the buildings)] X compliance period (5 years). (Based on Lee and Colopinto, 2010)

There are two compliance periods: the first one, from 2010 to 2014, foresees a reduction of 6 per cent of GHG emissions on average for five years; the second one, from 2015 to 2019, aims at a reduction of 17 per cent of emissions on average for five years. Monitoring and reporting are due on a yearly basis.

To support the good functioning of the scheme, a system of alternative credits offsets is also established. It consists of small and medium-sized installation credits within the Tokyo area, some outside Tokyo credits and renewable energy certificates.

The ETS started functioning in April 2010 and the first performance evaluation shall be made in 2015. For participants who would not meet their targets, the system foresees financial (fines) and moral ("shaming" system where names of defaulting institutions are released) sanctions. As for now, the ETS covers only one GHG namely CO_2. However the ETS shall be extended to other gases in the future (TMG, 2010).

References

Lee and Colopinto, 2010; TMG, 2010.

Economic mechanisms: Payment for ecosystem services in urban areas

Economic compensation for stakeholders providing environmental goods and services otherwise not captured by the market mechanism has been proposed as a means of improving sustainability and economic development (TEEB, 2010). Although most such experiments have been undertaken in rural areas, cities can be promising spaces to develop innovative economic incentives for a green economy. The establishment of special urban environmental protection areas as a way of preserving threatened peri-urban ecosystems while providing economic incentives for local populations can be a powerful mechanism to slow down suburbanization encroachment. The Brazilian ecological value-added tax systems in some states, such as Parana, rewards municipalities with water catchments and reservoirs with more transfers from the state. Large cities, which sometimes rely on other municipalities for the water supply, compensate indirectly the ecosystem services by the preservation of the area around the reservoirs. There are some good examples of devices already being used, such as the ecological value-added tax in Brazil, where resources are transferred to municipalities that conserve natural spaces and water reservoirs (see Box 13).

Box 13: Brazil's ecological value-added tax

One of the main sources of revenues for states and municipalities in Brazil is the Valued-Added Taxes (called ICMS). These are taxes collected by the states, but a portion has to be returned to the municipalities, proportionally to their economic activities and other factors such as population and surface, which are defined by state legislation. In 1988, the proportion of municipalities' share in the ICMS increased from 20 per cent to 25 per cent. To distribute these extra taxes to the municipalities, the State of Parana included ecological criteria (parks and water reservoirs) in the distribution criteria for the extra 5 per cent of the ICMS going to municipalities. The idea here is that municipalities providing ecosystem services should be compensated with more transfer of taxes, as they are losing value-added taxes from traditional "development" activities such as industrial parks. Even though the value is relatively low (only 5 per cent), this makes a significant difference for municipalities with large areas of natural parks and low population. Large cities with large populations do not lose their revenues, as they generate tax revenues from other activities. After Parana, the states of São Paulo and Rio Grande do Sul adopted similar criteria in 1993 and Minas Gerais in 1995. Today, more than 10 states in Brazil have ecological criteria for distributing the ICMS.

References
May et al., 2002; Puppim de Oliveira, 2003.

6.2.3 Behavioural change

Opportunities in sustainable construction: Green building councils, standards and certification systems, and new technologies for energy-savings

There are great opportunities in the building sector to mitigate GHGs because energy consumption for heating, cooling and lighting in buildings is high. Recently, there have been attempts to apply the principles of sustainable development to the entire cycle of construction activity. This has led to the development of concepts of sustainable construction and green buildings. Green buildings are regarded as one of the most useful strategies for mitigating global warming and reducing the environmental footprints of cities. There is no doubt that sustainable construction and green buildings offer significant opportunities to achieve a green economy: they both aim to reduce resource consumption and environmental pollution originating from buildings.

In many developed countries since the 1990s, green building councils have been established in order to promote sustainable construction and green buildings through building assessment methods. These methods generally include guidelines for assessing the environmental performance of buildings and certification systems to determine or benchmark buildings' performances. The building research establishment environmental assessment method (BREEAM), which was developed by the Building Research Establishment in 1990 in the UK, is the first comprehensive building performance assessment method, and still remains the most widely used, as it had impacts on countries like Canada, Australia and Hong Kong (Ding, 2008). In a similar vein, the U.S. Green Building Council launched the leadership in energy and environmental design (LEED) guidelines in 2000, and almost 13,000 buildings have been certified by the LEED guidelines since then (Korkmaz et al., 2009). There has been a growing interest in construction and promotion of green buildings in Japan, where the comprehensive assessment system for building environmental efficiency (CASBEE) is being developed and updated since 2001 (Balaban, 2012).

Building assessment methods and their associated guidelines and certification systems for green buildings can assist in raising awareness of environmental issues and in creating economic development through diversification of construction activities. In order to encourage and scale up the implementation of sustainable construction, guidelines for green buildings could be mandatory in public sector buildings (Chapple, 2008).

Along with construction of green buildings, new technologies are also being developed and implemented to improve energy efficiency and energy-savings in urban buildings. Such technological improvements could help achieve a green economy not just by reducing the environmental footprints of urban built environment but also by bringing about new business opportunities and economic activities leading to a greener economy. The city of Shenyang in China, for instance, has been developing and implementing "ground source heat pump technologies" to heat and cool the buildings in cleaner and more efficient manners (see Box 14).

Box 14: Application of ground source heat pump technology in buildings in Shenyang, China

The ground source heat pump is an energy-saving technology, which can be used in buildings for heating and cooling purposes. In Shenyang region, groundwater at 80–160 metres deep maintains a temperature between 12°C and 14°C year round. By capturing the heat from groundwater by means of a ground source heat pump, the water that is used for indoor heating in a building can be heated up to 90°C during winters. Likewise, by using the groundwater at lower temperatures and by absorbing the indoor heat by means of a heat pump, buildings can be cooled during summers. Compared with the conventional measures of heating and cooling by consuming coal, gas, and electricity, the ground source heat pump has many advantages as it is a clean, efficient, and energy-saving technology. Shenyang was included on the list of "National Renewable Energy Demonstration Cities", which was created by the Ministry of Construction (which is now the National Housing and Urban-Rural Development Ministry). Because of its inclusion on this list, ground source heat pump technology has been promoted and implemented quickly in the Shenyang region.

From September 2006 to July 2010, the ground source heat pump has been adopted for use in multiple buildings with a total floor space of 43 million square metres. If only considering the energy saving on heating by using the technology in the 152-day heating period in Shenyang per year, 1.51 million tonnes of coal combustion can be avoided. This reduction in the amount of coal used results in a reduction of emissions in the amounts of 2.87 tonnes of CO_2, 1,900 tonnes of SO_2 and 1,510 tonnes of soot emissions. By the end of the year 2010, the local government in Shenyang had continued to increase its use of heat pump technology resulting in a total implementation of 65 million square metres of ground source heat pump technology in buildings, accounting for one third of the total heating area in Shenyang city.

More advanced ground source heat pump technologies have been developed in Shenyang recently. The city has continued to develop its heat pump technology implementing the hybrid water source heat pump technology, which is combined with the conventional coal-fired heating method and can comprehensively achieve energy savings. This technology can be used within a wider area. Another effective method of application of heat pump technology is through the use of sewage water as a heating source. The potential implementation of heat pumps in buildings could be around 10 million square metres in Shenyang.

Reference
DYRBW, 2010.

Recognition mechanisms: Competitive awards for green and innovative cities

Since many cities host significant industrial development, as well as educational and research centres (including R&D), their role in sustainable innovation change can be fundamental for achieving a green economy. Making the transition from unsustainable technologies and urbanization models that place a high burden on the environment and/or the well-being of people can be facilitated by developing policy instruments that lead to innovation in eco-design and improved product performance. Cities can favour the adoption of a green economy by assisting the establishment of green technology hubs, sponsoring academic opportunities in green innovation through the institutions located within their boundaries, and implementing innovative urbanization and urban regeneration mechanisms. Recognition of such efforts, especially at the international level and in a competitive fashion, can encourage cities to move their green economy agenda forward while inspiring other cities to follow suit. For example, in the European context, a newly created award for cities

that show outstanding improvements in their sustainability is the European Green Capital award, first launched in 2010 (see the case of Vitoria-Gasteiz, Spain in Box 15). The award is given to cities that have successfully maintained high environmental standards, proven their commitment to ongoing and ambitious goals for further environmental improvement and sustainable development, and demonstrated their capability to inspire other cities and promote best practices to other European cities (EC).

Box 15: Recognizing progress towards a greener urban economy: The City of Vitoria-Gasteiz (Spain) European Green Capital for 2012

The first city ever to win the newly launched European Green Capital award was Stockholm, a city of 800,000 inhabitants famous for its urban green spaces. In 2011, the award was given to Hamburg, with 1.8 million inhabitants and remarkable green areas. In 2012, the winner was Vitoria-Gasteiz, a medium size city in northern Spain of almost one quarter million inhabitants. Medium size cities are especially relevant, as urban settlements below 250,000 people are the ones expected to grow the most worldwide in the coming decades. In Europe, over three-quarters of its cities have less than 250,000 inhabitants.

Key features of Vitoria-Gasteiz's success in 2012 have to do with its transportation and water management systems, alongside green space management. An efficient, low-carbon tram line and redesigned bus routes and stops (bringing wait-time to 10 minutes) has increased public use, reducing air and noise pollution. The system is part of the city's "Sustainable Mobility and Public Space Plan", rated "Best" by the UN-Habitat initiative on "Best Practices to Improve the Living Environment" (which awards effective sustainable urban policies and actions to improve living conditions in cities). In water management, the city has an ambitious target for domestic water consumption reduction to below 100 litres per person per day. A newly set up public office offers citizens information on water consumption and efficiency. Significant investments in water-related management aiming at reducing losses, rationalize consumption and improve quality have been undertaken in connection with the city's Agenda 21 environmental action plan.

Green space features pre-eminently in local policies. Public green space is abundant—all local residents live within 300 metres of an open green space. The "Green Belt"—a network of parks including a wetland Ramsar site—is a semi-natural area partially reclaimed from degraded lands that surround the city centre, while the outer areas host forests and mountains. The Green Belt was conceived to tackle urban sprawl, land degradation and pollution from heavy industrialization. In addition to hosting significant biodiversity, the Green Belt enhances local ecosystem services while actively engaging local residents in organic farming at public community gardens.

References
CIVITAS Initiative; European Commission, 2012; Smith, 2011.

Cultural change: Towards more sustainable lifestyles

Urbanization is increasing rapidly worldwide, and so is the demand for all sorts of environmental goods and services associated with urban lifestyles—food, energy, fibres, fuel, water, minerals, etc. Yet, as has already been mentioned, consumerism—or extravagant consumption and wasteful resource-use patterns to satisfy ever-growing individual needs—is also an ingredient of modern city life. Lifestyle changes need to be realized in order to achieve a green economy that provides well-being for all. By making these changes affordable, attractive and desirable, cities can make their economies greener. One example of lifestyle change is the use of bicycles for transportation. Whereas for years it seemed inevitable that in the course of development, cities had to sweep away bicycles in favour of motorized vehicles, many cities worldwide are increasingly developing human-powered vehicles as a response to environmental challenges, which in turn is creating new business opportunities.

7. Conclusion

Greening the economy of cities is a necessary condition for achieving a greener world economy that leads to poverty eradication. Governance within and beyond cities needs to be steered to direct cities' significant resource of physical, financial, human, social, natural and intellectual capital towards the objective of a greener economy.

We need to create the right governance mechanisms in cities by building their institutions and their capacity to be able to achieve the huge task that is to green their economy. This involves not only the local governments, but also non-governmental actors and networks beyond the cities. We need the right flow of knowledge, information and resources from local to local and from local to global to facilitate the processes of change.

Technological change is a critical component for influencing urbanization patterns; as such there are many opportunities available to stimulate areas of the green economy. However, the impact of technology is ultimately a social process. No single technological innovation will set us on the path to a green economy without a corresponding shift in public understanding and behaviour. The urbanization process brings with it changes in consumer tastes, attitudes and perspectives. None of these are negative in themselves, but experience has shown that consumption increases with economic development. However, although the imperative to change consumption patterns is an important component of the green economy, the consumer cycle also plays a central role in how we understand the functioning of the economy in its present form. Arguments about consumption have generally focused on the morality of consumption, the right of less economically developed cities to have access to goods and services, paths of development and fundamentally what we consider to be human well-being. Indeed, change in individual and collective behaviour through a different kind of formal and informal education is essential to achieve the objective of mainstreaming green economy principles in the city economy.

The green economy has also emerged as a central theme because of a deep-seated recognition that the aspiration of sustainable development will fail, if we do not get the economy right; and cities are fundamental for the world economy today. What is important is to recognize that, if the green economy is to be a prerequisite for sustainable development, then it will have to be different from our current understanding of the economic processes. A green economy goes beyond simply greening parts of the conventional economy. It will require a broader understanding of how the economy functions, including not only the appropriate pricing of environmental externalities, but creation of the right institutions that steer the economy in this direction.

The challenge to understanding the effect of cities lies in realizing how much a city's activities rely on these externalities both within and outside its borders; a problem compounded by deficiencies in city-level statistics even for population data (Montgomery, 2008). In this respect some degree of scrutiny must be applied to city activities that claim to be green. There are many activities that superficially look and feel like they are making a difference. For example, the use of electric vehicles obviates the need for fossil fuels, but what is the environmental impact of the manufacture of batteries, or indeed, of the mode of electricity generation that powers the electric cars? In more complicated scenarios, efficiency savings could be re-invested in activities that might reduce or even eliminate the initial savings. Only when the full life cycle and larger-scale effects of such activities are considered can we start to assess the green credentials of cities and the initiatives that support them.

However, the main problem of achieving a green economy is not about getting the right numbers, like prices or values of externalities. Indeed, this is well known in many cases. It is also not due to a lack of technical solutions to green the cities, as such technologies are well known and widely used. The installation cost of such green equipment is not the issue either, as many of them have a very short payback period. The major challenge is to develop the governance mechanisms to move the economy in the right (green) directions with benefits for society as a whole, particularly the poor and the most vulnerable, within and beyond the cities. We need to create the right institutions and organizational capacity in cities to make the required changes to realize a green economy. This report tries to set some of the conceptual frameworks to make a simple assessment of cities transitioning towards a green economy.

Cities are highly complex entities. They cannot exist in isolation and are therefore underpinned by a host of internal and external linkages. Very often these linkages are invisible at the city level but are precisely those that need to be considered when we talk of cities, governance and the green economy. Most cities or groups within cities guard tightly their administrative boundaries, sometimes in a very protective and inward-looking manner. The benefits of good public transportation, sustainable and affordable ways of building construction, renewable decentralized energy sources and sustainable consumption patterns can make cities better not only for their own citizens, but also for the wider society. If we fail to recognize and govern the links between cities and the local and global environment, we will be undermining the viability of cities in the long term, with unthinkable consequences to humanity, which lives mostly in cities today.

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UNU-IAS Policy Report

Governance Challenges for Greening the Urban Economy: Understanding and Assessing the Links between Governance and Green Economy in Cities

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