

BRIDGING THE GREEN AND BROWN AGENDAS

The concept of sustainable cities includes a number of fundamental objectives, that is: minimization of the use of non-renewable resources; achievement of the sustainable use of renewable resources; and staying within the absorptive capacity of local and global waste absorption limits. Action to attain these objectives provides the link between the natural and the built environment, or between the green and brown agendas. How these objectives have been and are being addressed in urban planning is the focus of this chapter.

SUSTAINABLE URBAN DEVELOPMENT: THE GREEN AND BROWN AGENDAS

Urban planning is one of the few professions with a specific remit that encompasses the three pillars of sustainable urbanization – economic, environmental and social – and should therefore be at the centre of attempts to define new approaches that integrate solutions seamlessly. It is also very specifically oriented to long term issues, as city building is a continuous process. Thus urban planners should embrace the sustainable development approach if they are to leave a positive legacy for future generations.

A significant practical dilemma that faces planners – as well as other urban professionals and politicians – when they try to implement sustainable urban development is how to integrate the two different sets of concerns of the ‘green

agenda’ and the ‘brown agenda’, i.e. the natural environment and the human environment (see Table 7).

The brown agenda is essential for making a city work, for a healthy and liveable environment and for creating the human and economic opportunities which have driven cities throughout their history. All cities consume land and resources such as energy, water and materials, which they use for buildings and transport. In the process of making a city functional, these resources are turned into wastes. It is now possible to quantify this impact in one parameter called ecological footprint.

The brown functions of a city generally consume and degrade its green resources and processes, respectively, unless the city intervenes through processes such as urban planning and environmental management. The green, natural systems of a city have real limits and capacity issues associated with their use. The challenge for urban planning is to find ways that cities can integrate these two agendas – to respect the natural environment and to improve the human environment, at the same time.

INNOVATIONS IN ACHIEVING GREEN AND BROWN SYNERGIES: GLOBAL TRENDS

A number of key, but overlapping, innovations are occurring globally in order to synergize the green and brown agendas. These are described below.

The green agenda Natural systems, global, regional and local, used as services by cities	The brown agenda Human systems required to make cities healthy and liveable and which are part of the metabolism of the city
Ecosystems that provide green open space used by the city for biodiversity protection and recreation.	Waste systems to recycle and remove wastes from cities, including solid, liquid and air waste.
Water systems that cities use to tap the natural flow for water supply and waste disposal.	Energy systems to provide power, heating, cooling and lighting for all city functions.
Climate and air systems that provide cities with the requirements for healthy life.	Transport systems to enable mobility in the city, including the fuel.
Other ecological services, including agricultural and forestry systems providing food and fibre for cities.	Building and materials systems that provide the physical basis of life in cities.

Table 7

Characteristics of the green and brown agendas in the urban environment

Development of renewable energy

Renewable power enables cities to create healthy and liveable environments while minimizing the use and impact of fossil fuels. A number of urban areas are now partly powered by renewable energy techniques and technologies, from the region to the building level.

There are significant opportunities to harness solar, wind, hydro and geothermal power for urban use. Hydropower has been used in cities such as Vancouver (Canada) and Christchurch (New Zealand) for decades. However, while some solar city projects such as Freiburg (Germany) exist, there are presently no major cities in the world that are powered entirely by renewable energy. Movement towards a renewable-energy future will require much greater commitment from cities at all levels, including at the local and the metropolitan levels. Urban planning is also necessary to create the infrastructure needed to support renewable sources of power at the scale necessary to help power a city.

Transport can also be a major part of the move towards renewable energy development. For example, electric vehicles can play a critical role in enabling renewables to build up as a much higher proportion of the urban energy grid. However, this breakthrough in technology will need to be carefully examined to ensure that cities use it to be fully sustainable and not justify further urban sprawl.

Striving for carbon-neutral cities

The key objective of the trend towards ‘carbon neutral’ cities is to ensure that every home, neighbourhood and business is carbon neutral. Carbon neutral cities are able to reduce their ecological footprint through energy efficiency and by

replacing fossil fuels, thus providing a basis for ecological regeneration by creating offsets in the bioregion.

Incentives or requirements for buildings to meet green-building standards have been used in some cities as part of a move towards carbon neutrality. Zero-energy buildings and homes have been built in The Netherlands, Denmark and Germany for at least ten years now. Preserving and planting trees is also being used to help to sequester carbon emissions and naturally cool buildings and homes, thereby reducing the use of energy for artificial cooling. In Australian cities, for instance, the carbon emissions of many municipal motor pools are being offset through tree-planting initiatives.

Although there is evidence of a growing commitment to minimizing carbon footprint in cities, this needs to become a feature of whole neighbourhoods and even complete cities if the world is to move to ‘post-carbon cities’. Indeed, carbon neutrality can become the goal for all urban development but will require a three step process: reducing energy use wherever possible; adding as much renewable energy as possible and offsetting any CO₂ emitted through purchasing carbon credits.

Distributed power and water systems

The development of distributed power and water systems aims to achieve a shift from large centralized power and water systems to small-scale and neighbourhood-based systems within cities. The distributed use of power and water can enable a city to reduce its ecological footprint, as power and water can be more efficiently provided using the benefits of electronic control systems, and, particularly through water sensitive urban design, a city can improve its green character.

In large cities, the traditional engineering approach to providing energy has been through large centralized production facilities and extensive distribution systems that transport power relatively long distances. This is wasteful because of line losses, but also because large base load power systems cannot be turned on and off easily, so there is considerable power shedding when the load does not meet the need.

Distributed infrastructure is beginning to be demonstrated in cities across the globe such as Malmö (Sweden) and Toronto (Canada). Utilities will need to work with city planners to develop models for local energy and water planning through community-based approaches and local management.

Increasing photosynthetic spaces as part of green infrastructure

Growing energy and providing food and materials locally is becoming part of urban infrastructure development. The use of photosynthetic processes in cities reduces their ecological impact by replacing fossil fuels and can bring substantial ecological benefits through emphasis on natural systems.

There has been a positive trend in planning in the direction of an expanded notion of urban infrastructure that includes the idea of 'green infrastructure' based on photosynthetic processes. Green infrastructure refers to the many green and ecological features and systems, from wetlands to urban forests that provide a host of benefits to cities and urban residents. This understanding of green infrastructure as part of the working landscape of cities and metropolitan areas has been extended to include the photosynthetic sources of renewable energy, local food and fibre. Cities are embarking on efforts to promote sustainable local food production in view of the vast amounts of energy required to grow, process and deliver food (see Box 6).

Progress in moving away from fossil fuels also requires serious localizing and local sourcing of building materials. This, in turn, provides new opportunities to build more photosynthetic-economies. Dramatic reductions in the energy consumed as part of making these materials is, of course, the primary benefit.

Improving eco-efficiency

In an effort to improve eco-efficiency, cities and regions are moving from linear to circular or closed-loop systems, where substantial amounts of their energy and material needs are provided from waste streams. Eco-efficient cities reduce their

Box 6 Energy costs of food production in the US

The high energy costs of food production are vividly illustrated in the case of the US. It takes around 10 fossil fuel calories to produce each food calorie in the average American diet. So if an individual's daily food intake is 2,000 calories, it takes around 20,000 calories to grow the food and get it to the person. This means that growing, processing and delivering food consumed by a family of four each year requires the equivalent of almost 34,000 kilowatt-hours of energy, or more than 930 gallons of gasoline. For comparison, the average U.S. household annually consumes about 10,800 kilowatt-hours of electricity, or about 1,070 gallons of gasoline. Thus, as much energy is used in the US to grow food as to power homes or fuel cars.

Source: Starrs, 2005

ecological footprint by reducing wastes and resource requirements, and can also incorporate green agenda issues in the process.

A more integrated notion of energy and water entails seeing cities as complex metabolic systems with flows and cycles and where, ideally, outputs traditionally viewed as negative (e.g. solid waste, wastewater) are re-envisioned as productive inputs to satisfy other urban needs, including energy. This shift away from the current view of cities as linear resource-extracting machines is often described as the eco-efficiency agenda.

Eco-efficiency does not have to involve just new technology but can also be introduced into cities through intensive use of human resources such as the Cairo's waste recycling communities, the Zabaleen. For instance, there are many examples of how cities across the third world have integrated waste management into local industries, buildings and food production.

Increasing sense of place

A growing number of cities and regions understand sustainability more generally as a way of building their local economies, building onto a unique sense of place, and as a way of nurturing a high quality of life and a strong commitment to community. The more place-oriented and locally self sufficient a city's economy is, the more it will reduce its ecological footprint and ensure that its valuable ecological features are enhanced.

When people have a sense of belonging and an identity in their town or city, they are keen to create local enterprises.

When communities relate strongly to the local environment, the city's heritage and its unique culture, they develop a strong social capital of networks and trust that forms the basis of a robust urban economy. This approach to local economic development, which emphasizes place-based social capital, can be related to the sustainability agenda in cities. Energy efficiency, for instance through producing power from solar, wind or biomass in the locality or region, can also be part of local economic development strategies.

Sustainable transport

Cities, neighbourhoods and regions are increasingly being designed to use energy sparingly by offering walkable, transit-oriented options, often supplemented by vehicles powered by renewable energy. Cities with more sustainable transport systems have been able to reduce their ecological footprints from their reduced use of fossil fuels, as well as through reduced urban sprawl and reduced dependence on car-based infrastructure.

The agenda for large cities now is to have more sustainable transport options so as to reduce traffic whilst reducing greenhouse gases. To reduce a city's ecological footprint and enhance its liveability, it is necessary to manage the growth of cars and trucks and their associated fossil fuel consumption. Unfortunately, for many cities, the reduction of car use is not yet on the agenda and traffic growth has been continuous.

A number of studies have shown that physical planning decisions determine how cities use cars and petroleum fuels. Within the urban planning profession also there is increasing awareness that sustainable transport will only happen if much greater attention is paid to: urban form and density; infrastructure priorities, especially relative commitment to public transport compared to cars; and street planning, especially provision for pedestrians and cyclists as part of sustainable mobility management.

■ Urban form and density planning

The feasibility of different types of transport systems and services is influenced by the density of a city. For example, high density city centres can have highly effective public transport opportunities whilst low density cities and suburbs are likely to depend on the car. Density is therefore a major tool available to planners in cities. It is best used where a city has good transit or wants to build transit, as the resulting Transit Oriented Developments reduce ecological footprint in cities and undermine the kind of car-based sprawl that eats into the green agenda of cities. Thus



Motor vehicle abundance, and thus dependence on petroleum, is rising at an alarming rate in cities

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Transit Oriented Developments can enable a city to put in place a clear urban growth boundary and to build a green wall for agriculture, recreation, biodiversity and the other natural systems of the green agenda. In the US, for instance, shifting 60 per cent of new growth to compact patterns would reduce CO₂ emissions by 85 million metric tonnes annually by 2030.

■ Infrastructure priorities and transit planning

Investing in viable, accessible transit systems is the most important component for cities to become resilient to waning oil sources and to minimize their contribution to climate change. Transit not just saves oil, but it helps restructure a city so that it can begin the exponential reduction in oil and car use so necessary for a sustainable future.

Modern rail is now seen as a major strategy for reversing the proliferation of the private car. Although busways can be quicker than traffic in car saturated cities, it is important to use the extra speed of rail to establish an advantage over cars in traffic—as demonstrated through 'transit to traffic' ratio empirical calculations, which are used to determine how effective public transport is in competing with the car in terms of speed. Rail is also important because it has a density-inducing effect around stations, which can help to provide the focussed centres so critical to overcoming car dependence, and they are also electric, which reduces vulnerability to oil.

Across the world, cities are building modern electric rail systems at vastly increasing rates, as they simultaneously

address the challenges of fuel security, decarbonizing the economy in the context of addressing climate change, reducing traffic congestion sustainably, and creating productive city centres. China for example is committed to building 120,000km of new rail by 2020. In India, Delhi is building a modern electric metro rail system and a 172km electric rail has been built in Perth, Australia in the past 20 years.

■ Street planning and mobility management

If cities build freeways, car dependence quickly follows. This is because the extra speed of freeways means that the city can quickly spread outwards into lower density land uses as the freeway rapidly becomes the preferred option. Building freeways does not help either the brown agenda or the green agenda. It will not help a city save fuel and studies have shown that there is little benefit for cities in terms of congestion and as this is the main reason for building them, it does seem to be a waste.

If, on the other hand, a city does not build freeways but prefers to emphasise transit, it can enable its streets to become an important part of the sustainable transport system. Sustainable mobility management is about 'streets not roads' – the streets are used for a multiplicity of purposes, not just maximizing vehicle flow. The emphasis is on achieving efficiency by maximizing people movement, not car movement, and on achieving a high level of amenity and safety for all street users. This policy also picks up on the concept of integration of transport facilities as public space. Freeways thus, from this perspective, become very unfriendly solutions, as they are not good public spaces.

Cities that have confronted the provision of a freeway such as Copenhagen, Zurich, Portland, Vancouver and Toronto have been global leaders in the move towards more sustainable transportation. Enough demonstrations now exist to show that alternative approaches such as pedestrian and bicycle strategies work dramatically to improve city economies and to integrate the green and brown agendas.

Developing cities without slums

'Cities without slums' is presently one of the most important goals of urban planning in developing countries. Attaining the goal of cities without slums will require innovative approaches that can enable slums to be upgraded, if not as models of sustainability, certainly in ways that address the most pressing brown and green agenda challenges of poor access to safe drinking water and sanitation as well as degrading environmental conditions.

Slums pose a significant threat to the green agenda as most are built on physically unsafe land that is vulnerable to natural hazards. They often deprive the city of foreshore land for flood control and natural bio-filtration from fringing wetland vegetation, severe erosion can result from steep slopes when they are settled upon, and, as the major source of domestic energy for slum dwellers is firewood, nearby land on the periphery of the city is often deforested.

At the same time, the brown agenda for those living in slums is seriously compromised as well. Most slum housing is built of makeshift materials that can only provide rudimentary protection against natural hazards. Invariably, levels of access to clean drinking water and safe sanitation are extremely low, resulting in basic health problems. Electricity is frequently stolen from grids and presents many risks in its use.

The current trend is to address the phenomenon of slums through two strategies: firstly, upscaling the upgrading of existing slums; and, secondly, adoption of urban and housing policies that prevent the emergence of new slums. Slum upgrading is mostly concerned with the brown agenda and consists of improving security of tenure and installing new or improving existing infrastructure and services, up to a satisfactory standard. The results of upgrading are highly visible, immediate and make a significant difference in the quality of life of the urban poor, especially in the area of environmental safety and human health.

Working with the community to enable them to participate in the development process and in the management of infrastructure can enable a slum community to thrive and develop pride in their green and brown achievements. They



Both the brown agenda and green agendas are seriously compromised in slums



Innovative strategies to reduce vehicle emissions are being introduced in some countries

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can become models of sustainability, as they create reduced levels of resource consumption whilst creating healthy and attractive living environments for the residents.

ADDRESSING THE GREEN AND BROWN AGENDAS THROUGH URBAN PLANNING AND GOVERNANCE

Sustainable urban development planning, like all long term planning, requires governance that goes beyond market forces and can help to create widely accessible infrastructure and

community services. In Table 8 below, the six core functions of urban governance which would be needed for sustainable urban development are set out. Examples of the types of structures, or mechanisms that are needed for this are also listed in the table.

The challenges outlined in this chapter cannot be effectively addressed without a regional plan which incorporates the whole city and its region. Cities have grown everywhere to engulf local authorities in surrounding rural areas and, in many countries, there is now a need for a metropolitan-wide perspective on most of the issues raised in this chapter.

There is also need for an effective statutory process to enable key land use decisions and regulations to be made legally enforceable. Urban planning has become enmeshed in regulations from the past and needs to revise these at the same time as it faces the new challenges of sustainable development. Bigger projects and decisions on infrastructure should be part of a development assessment process which can bring in wider economic benefits and reduce costs whilst setting common good conditions.

To balance this kind of regulatory approach, urban governance should also include a development facilitation function to ensure innovations and demonstrations are set up in partnership with government, industry and the community. The glue that will make this all work will be a development financing function that can tap old money sources, such as rates and taxes, and new money sources, such as public-private partnerships, development bonuses and capture of increased land value.

Finally, there is need for a participatory process that can help develop and deliver sustainability visions. The social

Urban governance function	Example structure/mechanism
Regional strategic planning that can cross local boundaries on transport, biodiversity, climate change, water, waste, housing...and cover the whole metropolitan region.	Regional planning authority
Statutory development control function that can regulate for common good outcomes and implement the regional plan in each local community.	Town planning schemes and by-laws for building and development approvals
Project assessment function that can enable infrastructure and land development to be controlled for common good outcomes	Planning and environment authority
Development facilitation function that can help set up demonstrations of sustainability innovations, especially in redevelopment projects	Development authority
Development financing function that can link sustainability programmes to innovative ways of financing change	Local authority and regional planning authority
Community engagement function that can enable decisions to be made which ensure sustainability outcomes	All planning bodies

Table 8

Urban planning and governance for sustainable urban development



Solar energy can significantly reduce dependence on non-renewable energy sources in cities

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capital of the city needs to be strengthened as these new challenges are faced. That cannot happen without deliberative processes engaging communities in their future. Many cities' sustainability strategies now include goals of equity and social justice, with gender included under this umbrella. Urban planning has experimented with emerging engagement processes and must now seek to make them part of day-to-day governance systems.

CONCLUDING REMARKS

Linking the green and brown agendas is a relatively new challenge for cities and none are able yet to fully demonstrate how to improve human health and liveability whilst simultaneously reducing their ecological footprints and improving the natural environment. This will not be possible without a revived and regenerated approach to urban planning. Urban planners now need to find ways of creatively integrating these innovations into mainstream urban planning and governance systems.

The biggest challenge facing cities in the near future will be how to manage the transition to a post fossil fuel world. This will be compounded by the recent global financial down turn, which may slow down some of the major green and brown agenda integration programmes, such as slum upgrading. However, government-funded green infrastructure and energy programmes currently being initiated in some developed countries in order to stimulate economic activity and generate jobs may offer significant opportunities for cities to implement some of the innovations described in this chapter.