CAN THE SOUTH AFRICAN LAND USE MANAGEMENT SYSTEM BE AN EFFECTIVE TOOL IN CREATING LOW(ER) CARBON CITIES?

Introduction

Global warming is no longer a vague threat but a fact borne out by shrinking ice caps and glaciers, intense storms and deadly bush fires (Raubenheimer 2008). There is also little doubt regarding the cause: greenhouse gas emissions have risen alarmingly over the past 250 years (IPCC 2007:5). More than half of these emissions can be attributed to fossil fuel use and much of it can be associated with cities. Although cities occupy only about 2% of the earth's surface, they are home to 50% of the world's population and demand over 75% of the world's resources (Reader 2004: 301). Reducing emissions in cities will thus make a major contribution to reducing global emissions. This can be achieved either by restricting the amount of carbon dioxide (CO_2) and other greenhouse gasses that are expelled into the environment or increasing the absorption of these gasses, predominantly by plants, and thus removing them from the atmosphere.

This paper will examine the potential of the land use management system in South Africa to make a meaningful contribution to lowering carbon emissions in cities. After a brief description of the land use management system in South Africa and the status quo regarding green house gas emissions the paper will then examine the opportunities for the land use management system to contribute to low(er) carbon cities, and the obstacles that could hamper these efforts before concluding on a way forward.

Land use management system in South Africa

The South African land use management system has seen a shift in policy from a protectionist, control-oriented approach, to a more comprehensive, facilitative approach since 1994. The previous Euro-centric model with its focus on health and amenity is giving way to a system that seeks to balance control with a broader definition of development and more sustainable settlements.

Pre-1994 legislation

South Africa was a British Colony during the first half of the twentieth century and thus its town planning system reflects British practices of those times.

Most land use until the and early twentieth century was governed by restrictive covenants in title deeds while the first town planning legislation was introduced to regulate the establishment of new settlements. This took the form of laws pertaining to township establishment, dating between 1881 (Natal), 1894 (Orange Free State), 1871 (mining towns in the Transvaal) and 1927 (Cape Province). Over time these laws were amended to provide for the process of establishing a new town or township (subdivision)[1] and the compilation and amendment of town planning or zoning schemes. The first town planning legislation was the Transvaal Townships and Town-planning Ordinance 11 of 1931 that borrowed heavily from the English Town Planning Act of 1925 (Van Wyk 1999).

Discrimination based on colour was evident from the late eighteenth century in South African planning and it is therefore not surprising that most of this town planning legislation was only applicable to 'white' areas. On the whole, legislation pertaining to land in 'Black' areas and the 'Homelands' was more concerned with tenure than land use.

Post 1994 enabling legislation

After 1994 the ANC-led government introduced a plethora of new policies and legislation, including legislation relating to strategic planning by local governments, land use management and environmental management. The first piece of legislation was the Development Facilitation Act 67 of 1995 (DFA) (South Africa 1995). Its purpose was to "introduce extraordinary measures to facilitate and speed up implementation of re-construction and development programmes and projects in relation to land; and in so doing to lay down general principles governing land development throughout the Republic" (South Africa 1995). This legislation introduced three strands of new policy: a single process to develop land, the introduction of the concept of Land Development Objectives (LDOs) as a basis for planning and budgeting by local governments, and principles for planning and development that include environmentally sustainable development.

The Green Paper of 1999 developed these ideas further, insisting on a normative, politically driven, but consultative, spatial planning process that guides technical land use management decisions. By the time the White Paper on Spatial Planning and Land Use Management (South Africa 2001) was published, the concept of strategic planning to guide local authority decisions and budgets had been consolidated in the integrated development plan (IDP) model in the White Paper on Local Government (South Africa 1998) (later entrenched in the Municipal Systems Act 32 of 2000 (MSA)(South Africa 2000)). A Land Use Management Bill (drafted concurrently with the White Paper in 2001 (South Africa 2008)) will repeal the DFA, but also provide for a single land use management system within the country[2] that is intended to be facilitative and developmentally, rather than control, oriented (South Africa 2001).

A fourth strand of environmentally sustainable development can be traced to the Environment Conservation Act 73 of 1989 that first required environmental impact assessments (EIAs) for prescribed activities including changes of land use (South Africa 1989). This continued through the DFA, the Constitution (South Africa 1996), the National Environmental Management Act 107 of 1998 (NEMA)(South Africa 1998a) and the provisions the MSA (South Africa 2000) which requires strategic environmental assessments of spatial plans.

Current system

The South African land use management system is guided by national and provincial government, but effectively operates at local government level. The main elements of this system are the strategic spatial development framework as a mandatory component of the integrated development plan, a regulatory component such as the local town planning scheme and compliance or law enforcement.

The spatial development framework (SDF) is compiled under political direction, in consultation with the community, based on the norms and principles in the DFA and White Paper (South Africa 1995, South Africa 1998). Not only does this plan provide guidance for private investors but also for public infrastructure development. Consequently, it must include a capital investment programme that is linked to the local government's budget. It must furthermore include a strategic environmental assessment of its proposals. All land development decisions should be based on this plan and it thus forms one of the bases of the 'development control' functions.

The town planning or zoning schemes regulate existing land uses and development controls. They usually comprise two parts. The first contains the maps that indicate the use and density zones of each property within the scheme boundary while the second is the scheme clauses which set out the rights and development controls related to each of the zonings. In the largest cities where much land development takes place there may be a third component

comprising the schedules or annexures containing a record of all the approved amendments to the town planning scheme that deviate from the standard conditions for that use zone. Each use zone has activities that are permitted without further application other than a building plan (primary rights), those permitted only with permission of the local government and those not permitted. If a proposed activity of a property is not permitted in terms of the use zone, a rezoning application is necessary to amend the town planning scheme use zone to permit the proposed activity or use.

The National Building Regulations (South Africa 1977) complements the town planning scheme. These regulations pertain to the construction of buildings and deal with amongst others, materials, construction methods and drainage.

The third component is the enforcement leg; ensuring that the proposals contained in the spatial plan, the town planning scheme and building regulations are adhered to. Contraventions are mostly processed through the lower (magistrates' courts) although urgent applications may be referred to the high courts.

South Africa and carbon emissions

South Africa has participated in international summits, conferences and agreements on sustainable development and is a signatory to Kyoto Protocol. This country has, however, major challenges regarding greenhouse emissions.

Greenhouse gas emissions

While emissions in South Africa are low in comparison to countries such as the USA and China, they do constitute about 1.2% of global emissions and account for nearly half of Africa's emissions with 9,50 tonnes of CO_{2e} per capita[3] (Winkler & Zipplies 2008: 112). This is significantly higher than the world average of 5.6 tonnes per capita.

By far the greatest contributor are energy supply industries (45%) followed by industrial energy (14%) and transport (11%). Non-energy sectors (that do not burn fossil fuels) comprise only 21% of the total emissions (Winkler & Zipplies 2008:116). The source of 73.8% of the energy supply emissions is derived from coal for power generation or synthetic petroleum while the greatest share of energy consumption is industry (45%), transport (20%) and residential (10%) (Winkler 2009: 40-43). These emission profiles stem from the structure of the South African economy that is based on energy intensive mining and manufacturing industries.

Based on the above, it is clear that to reduce carbon emissions in South Africa, a move from fossil fuel energy generation, energy efficiency and reduction in transport emissions will have the greatest benefits.

Energy policy

Among the objectives of the White Paper on Energy Policy (South Africa 1998b) are: improving governance in the energy sector, increasing access to affordable energy, stimulating economic development, managing energy-related environmental impacts and securing supply through diversity. The White Paper on Renewable Energy (South Africa 2003) states as its prime objective ensuring that an equitable level of national resources is invested in renewable technologies compared to investments in other energy supply options given their potential.

These policies have been translated into policy to provide subsidised electricity connections to newly constructed or upgraded state subsidised housing as well as pilot projects to

provide informal settlements that cannot be upgraded with alternative energy sources such as liquid petroleum gas (LPG) or solar power (Winkler 2009).

Mitigation

The Department of Environmental Affairs and Tourism (DEAT) has led the way in addressing the issue of climate change and greenhouse gas emissions, both internationally and locally. It has commissioned a set of long term mitigation strategies that were accepted by cabinet in July 2008 and discussed at the South African 2009 Climate Summit held in March 2009 which brought together key stakeholders to discuss climate policy (Chesterman 2009). Among the resolutions adopted require government to reduce greenhouse gas emissions from land use change and housing developments and include mitigation actions in integrated development plans (IDPs) (South Africa 2009)

Mitigation and energy efficiency were also addressed in the 2009 budget speech by Finance Minister, Trevor Manuel (Manuel 2009):

> "*We propose taking further steps to encourage energy efficiency and reduce harmful emissions, some of which have tax implications.*
>
> - *An incentive for investments by companies in energy-efficient equipment will be introduced, in the form of a supplementary depreciation allowance.*
> - *....*
> - *An increase is proposed in the international air passenger departure tax....*
> - *The existing excise duties on motor vehicles will be adjusted to take into account carbon emissions.*
>
> *It is important, furthermore that we should encourage South African companies to take advantage of the clean development mechanism established in the Kyoto Protocol. A favourable tax treatment will therefore be introduced for the recognition of income derived from the sale of emission reductions, as certified through this mechanism.*"

National government in South Africa is clearly committed to addressing carbon emissions and is actively seeking means to achieve this. The focus is on energy efficiency[4] and renewable energy sources, carbon capture and storage, and reduction of transport emissions (South Africa 2009) which will address the primary sources of carbon emissions in South Africa.

The following section will discuss the contribution the South African land use management system can make to lower carbon emissions.

Opportunities for land use management system to contribute to reduction of emissions

Each of the elements of the South African land use management system, namely the spatial development framework, the regulatory element and enforcement, can make a contribution to lower carbon emissions. As the enforcement element supports the spatial planning and regulatory components, it is crucial, for without a strong enforcement arm and stiff penalties, compliance will be voluntary and limited.

Spatial planning and development

Spatial planning, linked to land use management, can make a major contribution by creating a more efficient urban form that enables sustainable transport, through the use of more sustainable energy and through carbon sequestration (Crawford & French 2008, Swilling et al. 2008).

Most South African cities are built at such low densities that they cannot support effective public transport systems. Newer areas of higher density are often on the fringes of the urban area with a swathe of low density, detached housing between the inner city and the fringe. This pattern gives rise to a dependence on private transport, and for the poor, on micro-bus taxis.

It is essential to reduce dependence on private transport densification as well as defining and enforcing a hard urban edge beyond which no further subdivisions should be permitted. In addition, higher densities must be encouraged along (potential) public transport routes which can become 'high streets' where retail and social facilities are located. This will both reduce the need for private vehicles and encourage cycling and walking for local trips and public transport for longer trips. Simultaneously, large freestanding, car-centres shopping malls must be rejected (Swilling et al 2008).

Integrated public transport systems can be enabled through spatial planning. The metropolitan areas of South Africa have initiated bus rapid transit (BRT) systems as a first step towards more integrated public transport that will link outlying areas with the inner core and other major nodes. The primary objective of the Gautrain, currently under construction, linking Pretoria, Johannesburg and OR Tambo Airport, is to reduce the traffic on the main highways between these destinations and consequently, associated carbon emissions.

By providing safe pedestrian walkways and cycle paths, these modes of transport can be encouraged.

Spatial planning can also contribute to carbon sequestration by ensuring that natural areas, particularly along rivers and ridges remain unspoiled and that indigenous vegetation is retained. Besides absorbing carbon, these areas provide bio-diversity corridors for the movement of flora and fauna (Swilling et al. 2008). Street trees, appropriate to the climatic conditions of the city, not only improve the appearance of the city, but act as carbon sinks.

Where possible, alternative forms of energy, such as wind or solar power, should be planned for and implemented, even at the level of the individual home.

It is in emphasising these issues in the integrated development plan, the primary strategic and operational planning tool of local government, that spatial planning can make its largest contribution. Besides the actions mentioned above, other related issues can be mooted such as the reduction and recycling of waste, the extraction of energy from landfills[5], use of alternative energy sources in homes and industries and encouraging economic development that promotes efficient resource use (Zipplies & du Plooy 2008,Thabrew et al. 2009, Cape Town 2006). By stressing these concerns as part a more comprehensive debate on sustainability, their priority and associated funding, can be raised.

Regulatory environment

The regulatory environment comprising the zoning schemes and building regulations can contribute significantly to lower carbon emissions as buildings, in both construction and operation, are large contributors to greenhouse gases (Van Wyk 2009, Horn & Miller 2008).

As the Land Use Management Bill (South Africa 2008) has not yet been passed, there is an opportunity to strengthen the sustainability component. In addition, the regulations are still to be compiled, and thus the opportunity exists here to ensure than new developments are more sustainable, that cities are more compact and promote public transport.

Performance zoning can be introduced where (re)developments must meet certain minimum criteria regarding greenhouse gas emissions. These could be calculated on the basis of distance from public transport, use of renewable energy and carbon sequestration. It may be possible to include carbon taxes on new developments not adjacent to public transport routes.

The role of strategic environmental assessments and environmental impact assessments in evaluating development applications can be strengthened to ensure that ecological and carbon foot prints are evaluated and negotiations regarding alternative uses, methods and materials can commence (Thabrew et al, 2009, Stoeglehner & Narodslawsky 2008).

As part of the development process, local governments must approve the engineering services associated with new townships (subdivisions). There is an opportunity to insist on more sustainable services, from solar powered traffic lights to more efficient use of water.

Applications for land use change, whether in the form of a rezoning or a permission, also creates an opportunity to include carbon reducing conditions in approvals.

The National Building Regulations (South Africa 1977) are being reviewed and this creates an opportunity to ensure that green building methods and materials are enforced. A holistic approach such as that espoused in Horn & Miller (2008) and van Wyk (2009) could be the foundation for new construction under a revised building code. Various cities, such as Cape Town and Tshwane are engaged in developing green building by-laws. While these could not be applied retrospectively, they could be enforced for all new construction (Winkler 2009), including renovations. Some aspects such as solar water heating could, however, be made mandatory for existing housing[6].

As the main contributor to greenhouse gas emissions in South Africa is energy production and use, green building technologies that reduce energy demand must therefore play a major role in reducing energy consumption.

Constraints

While there is clearly potential to reduce carbon emissions through the land use management system, there are also a number of constraints.

Although the South African government is committed to reducing emissions and creating a lower carbon society, the rate of implementation is slow. According to an analysis by Winkler (2009) indicates that while much work has been done, a high level of sustainability is still to be reached, while Swilling is concerned that the government's renewable energy targets are "highly inadequate given the challenges ahead" (2004: 229).

Other pressing and immediate needs such as the delivery of basic services promised in election campaigns, job creation and poverty alleviation in a country with nearly one quarter of the population living on less than R174 per month (about $1 per day) (The Presidency 2008), may take priority, particularly in local governments where these needs are most acutely felt. Investments in long term solutions to climate change may be forfeited for short term political gains.

Although the Department of Minerals and Energy has played a role in the development of policies and strategies to reduce carbon emissions, the majority of CO_{2e} emissions result from activities which it controls. Traditionally a powerful department, it may not curb miming related emissions to the desired extent, possibly due to vested interests from powerful mining companies. Local government has little or no influence in mining-related decisions.

Public attitudes and ignorance is another concern. Upper income South Africans are largely conspicuous spenders with environmental issues not yet driving local political agendas. For the many South Africans living in poverty survival from day to day is paramount, while reducing carbon emissions appears to be irrelevant. Education can play a key role in creating awareness and informing on actions that South Africans can take to mitigate the effect of climate change.

Besides demands for private transport (a necessity in low density cities as well as a status symbol), South Africans of all races have traditionally preferred lower density detached

housing with a private garden. Only in the past fifteen years or so has there been a significant move to higher density forms of housing by the upper income groups, and by some low income groups moving to inner city apartments.

As there are initial capital costs to moving to alternative energy sources such as solar heating, the public will be unwilling, or unable, to invest in these technologies without government subsidies (Winkler 2009).

The market that drives consumerism will probably not change of its own accord. Government will require a carrot-and-stick approach with incentives for investment in renewable energy sources, cleaner fuels and energy efficient production and transport methods, alongside penalties for high emissions and excessive energy uses. Both surcharges and tax benefits such as those mentioned in the 2009 budget speech (Manuel 2009) will have to be employed to encourage the market to contribute its share to lower carbon cities. Consistent application of the policies and regulations, in the face of probable opposition by developers and other businesses will be necessary by both officials and politicians.

Conclusion

There is unquestionably scope for the South African land use management system to make a meaningful contribution to low(er) carbon cities. In the broad conceptualisation of land use management adopted by South Africa (South Africa 2001, Enemark 2007) both the spatial planning and the regulatory components to make contributions but must be reinforced with consistent enforcement to ensure compliance.

More compact cities, with higher densities that support energy-efficient transport systems, can reduce emissions related to transportation. This can be supplemented through retaining natural areas and planting of street trees, even in arid areas. The land use management regulatory component can support spatial planning policies and ensure low emission design and construction of new developments or refurbishments.

While compact cities have long been a goal of urban planning, revised land use management legislation with a revised building code, in conjunction with existing environmental legislation, provide an opportunity to ensure that it occurs in practice.

Control measures must be complemented with greater awareness and education as well as appropriate incentives, at least for a transition period until the new concepts, processes and technologies are firmly established.

Above all, for the land use management system to succeed as an effective tool in creating lower carbon cities there must be the political will at all levels of government to ensure that the measures described above are approved and implemented.

End notes

[1] All new large subdivisions are known as townships except in the former Cape Province. The South African land registration system recognises farm portions and *erven* within a proclaimed township as properties. Generally all erven must be serviced with basic services (water and sanitation) to the satisfaction of the local government. The process of township establishment or subdivision is controlled by provincial town planning ordinances or the Development Facilitation Act, 1967.

[2] Currently the each of the previous provinces and homelands has its own planning legislation. Although the DFA is a national act, the provinces could choose to adopt its processes or not.

[3] CO_2e refers to carbon dioxide (CO_2) equivalents that reflects the potency and contribution of other greenhouse gasses (Winker & Zipplies 2008).

[4] As a result of the lack of investment in power generation facilities coupled with sustained economic growth the South African power generation entity, ESKOM could not meet demand and large scale blackouts were experienced in the beginning of 2008. All cities had to reduce their consumption by 10% or face continued rolling blackouts which severely impacted on business and the mining industry.

[5] The extraction of methane from landfills is already in process in the City of Tshwane (Pretoria) and is supported by the Department of Minerals and Energy

[6] Raubenheimer (2008) estimates that solar water heaters could save between two and five tonnes of CO_2 per home.

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