Judith Ryser

METHODS OF MEASURING AND ASSESSING THE SUSTAINABILITY OF URBAN DEVELOPMENTS

IMPLEMENTING SUSTAINABILITY AT THE LEVEL OF THE URBAN PROJECT

Sustainability, discussed in the sister paper in the context of regeneration and gentrification, is a very broad concept and goes way beyond the rescue of the planet. In its broadest sense it implies an equitably shared environment which becomes increasingly urbanised. There are tensions, exacerbated in cities, between the diverse needs and wants of those who use them, residents (citizens, voters), the working population, visitors, transient people, etc., compounded by subjective perceptions of such needs and wants.

1a. ProjetUrbain – Urban Project, David Mangin and Philippe Panerai, Paranatheses 1999, book cover

1b. Site of Projeturbain 2nd phase Lyon 2010
Source: Google Maps

Sustainable development, management, maintenance and use of the city would require a system of government capable of upholding the principles of social and spatial justice to secure an equitable use of cities by all. It would require custodians of the collective good and the public interest, a method of holding decision makers to account, a public participation process which guarantees citizens a say, and third party vetted procedures to share out finite public assets equitably between all stakeholders while keeping the city open to all.

These processes would need to be accompanied by continuous monitoring as a basis for corrective action at the level of sustainable urban management but, most concretely, for sustainable urban projects ('le projeturbain'). Tools become necessary to measure, evaluate and accredit the current state of the urban environment and to anticipate the impact of urban regeneration projects. Criteria for such measures and evaluations tend to take the form of indicators, standards and frameworks. They will be guided by a number of policies as well as influenced by political demands which are

changing over time. At the forefront of current debates in this field are climate change, notwithstanding comprehending sustainable urbanity.

The current state of climate change

Key criteria of sustainable urban development are embedded in the political aim to reduce adverse effects of cities on climate change. They are expressed as targets for CO2 reduction at global and national levels. The implementation of these objectives takes place in the built environment, essentially at the level of cities which translate, and not seldom surpass such targets in their development strategies. The Agenda 21 movements have contributed considerably to more sustainable local solutions.

CO2 reduction targets are one thing, implementing them is quite another. It means specifying operational methods to do so, essentially in terms of mitigation or adaptation of the existing urban fabric or, somewhat less problematically, for new build. Such methods tend to be included in planning policies, plans and regulations. In Madrid for example, CO2 related initiatives are incorporated in the Plan for the Sustainable Use of Energy and Climate Change Prevention 2008-2012, and in London in the Mayor of London Plan 2011, together with subsequent amendments by the Committee on Climate Change approved by the mayor.

In reality, sustainability goals of cities go beyond climate change issues. While they may aim to ease the stress on the planet by reducing CO2 emissions, politically they often focus on more localised objectives, such as less public expenditure especially during periods of austerity, a more resilient building stock which would profit both owners and users financially, a cleaner urban environment with less pollution helping to reduce health costs and to attract foreign talent, boosting the green industry to diversify the local economy or, like in London, increasing carbon trading for the benefit of its financial sector.

Translating sustainability targets into masterplanning

CO2 emission reduction	Overall	Housing*	Transport	Commerce / public sector*	Other
Madrid *CO2 t/year* *(Municipal Plan)*	-728,419	*housing, commerce, institutional: -130,505	-111,631	* industry: -40,283	waste: -437,000 sink: -9,000
(Other initiatives)	-2,604.08	-104.7	- 2,500		
Total	-731,023.08	-130,541.12	-114,131.1	-40,283	-446,000
London Potential savings of Mayoral Group: 133,400 t CO2 (GLA own)	-60% by 2025 -33 m t CO2 pa = -600mt (2007-2025) (UK –60% by 2050). 2004: 15%by2010, 20%by2015, 25%by 2020, 30% by 2025. GLA demands targets for 2012, 2016 and 2020.	(1990 base) = -12.2 mt CO2 (-7.7 mt CO2 = realistic) -39% savings for London total by 2025 meeting level 3 by 2010, level 6 by 2016. Code for Sustainable Homes	-7.1 mt CO2 by 2025 (-4.3 = realistic) -22% saving re London total by 2025	-13.7 mt CO2 by 2025 (-7.6 mt CO2 = realistic) -39% saving re London total by 2025	More than a third has to be contributed by government action to reach the -60% target by 2025. Energy supply 13.8 mt by 2025.

2. CO2 emission reduction targets per key sector Madrid - London
Source: Madrid: Plan for the Sustainable Use of Energy and Climate Change Prevention 2008-2012. London: The Mayor of London. Climate Change Action Plan 2007. Greater London Assembly Environment Committee. Energy Action Group. London Sustainable Development Commission. 1st (and last) report 2003. Energy sub-group. London Leaders 2008, 2009. The London Plan and its Alterations. The Mayoral Group: CO2 emission reduction targets for own emissions.

When proposing masterplans and urban design solutions for specific sites, these questions are relevant and may contradict values embedded in planning regulations and urban design tools. Most importantly, they may neglect 'the right to the city' of those with different values.

One way of objectivising the evaluation of the sustainability credentials of masterplans is to resort to some of the many sustainability evaluation tools which are being developed worldwide. Considering the current slacking of mitigation and adaptation to climate change in the aftermath of the financial crisis, the efforts of the green technology community should be welcome, even if their agendas do not necessarily coincide with global or even local targets of reducing ecological footprints or curbing wasteful use of finite resources.

Masterplanners and urban designers would benefit from using such tools, even when they are not able to measure in absolute terms how sustainable their schemes actually are. Nevertheless, they may facilitate to rank order the sustainability content of masterplans and thereby assist urban designers to discover which aspects are worth improving.

Before presenting some of these tools, it is important to put them into the wider context of 'sustainable development' and establish what it actually tries to achieve, and in whose mind.

The wider context of sustainability targets

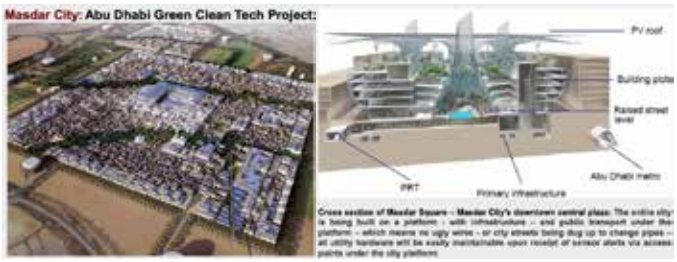
It is important to evaluate the sustainability of urban development within its wider, including spatial context. A project, such as the eco-city of Dongtan in China may be sustainable within its own 'green' logic and technological sustainability criteria. When setting it into the wider context of invading one of three relatively untouched alluvial islands in the Yangtze river by creating infrastructure links between the 20 million population of the Shanghai conurbation and the then yet unspoilt opposite bank of the river, it is clear that the 'green' credentials of Dongtan are unable to offset the unsustainability of such a macro-environmental intervention. This example is chosen deliberately because it has been advocated as an exemplar of sustainable development worldwide. Despite all the global hype, its construction has been abandoned although the infrastructure links have been built, the farmers displaced and ecological damage done to this river environment.

Similar critiques could be levied at Masdar, a high-tech eco-city in the desert of the United Arab Emirates also highly publicised or, at a much smaller scale, at eco-towns planned on greenfield sites in the UK.

All these examples constitute some form of sprawl or 'green field' developments rather than urban regeneration. Dongtan was clearly going to be a new, secluded ex-urbia for the wealthy Shanghai population. Similarly, Masdar was not meant to become a balanced environment open to a mixed population.

3a. Dongtan in its context
Source: http://www.onegreen.net/maps/html/25867.html

3b. DongtanEcocity Arup project
Source: DAC&Cities http://www.dac.dk/en/dac-cities/sustainable-cities/all-cases/energy/dongtan



4a. Masdar, aerial view of model
Source: www2daydy-bau.com

4b. Masdar section across city
Source: http://www.2daydubai.com/pages/masdar-city.php

The English eco-towns, now practically abandoned, were in effect small ex-urban neighbourhoods whose location was determined by the availability of discounted public land. The sustainability of these 'noble-savage' dreams was contested as they were marginal to existing settlements and infrastructure,

5a. UK EcotownNorth West Bicester in Oxfordshire, Masterplan
Source: http://nwbicester.co.uk/masterplan/masterplan-proposals/draft-masterplan/masterplan-overview-what-makes-nw-bicester-different/

5b. UK Ecotown Bicester in Oxfordshire, eco-boulevard
Source: http://nwbicester.co.uk/masterplan/masterplan-proposals/draft-masterplan/masterplan-overview-what-makes-nw-bicester-different/

and likely to become dormitory towns for car-dependent middle class commuters.

How do these projects and their questionable sustainability credentials compare with the speculative building craze in Spain before the bubble burst? The Spanish ex-urban speculative developments are clearly unsustainable and any attempt to retrofit them with sustainable micro-development technologies may not be able to reverse the ecological damage they have already inflicted. In their current stage of abandonment there is little danger for them to become gentrified, and without a massive turnaround they may simply remain ruins before their time. It may be more expedient to direct finite resources to urban environments in need of regeneration, such as the EUSS13 site of Delicia - Mendez Álvaro- Abroñigal on the fringe of the inner city.

These examples confirm the importance of measurement tools capable of assessing projects according to longer term sustainability criteria in a wide context when deciding on investment strategies or granting planning consent for them.

6a. Delicias site Madrid
Source: http://nwbicester.co.uk/masterplan/masterplan-proposals/draft-masterplan/masterplan-overview-what-makes-nw-bicester-different/

6b. Google map of the Delicias area in Madrid

MEASURING SUSTAINABILITY

"You can't manage what you don't measure" the City of New York affirms in its report on the state of its environment. Therefore, there is a need for the planning system to incorporate some means of measurement and evaluation, together with a process of continuous monitoring to assess the effectiveness of sustainability targets and their implementation. This is a complex matter. Achieving optima at one level, for example the building, does not necessarily mean an optimum at the level of neighbourhoods and their specific micro-climates, and even less so at the scale of the city as a whole. In the light of its practical experiences at various levels of operation in many parts of the world, BioRegional makes this case strongly in its "One Planet Living Principles".

The energy and environmental characteristics of buildings, urban transportation, workplaces, blue-green areas and the spaces in between are extremely difficult to grasp in reality, or even to model, especially when taking account of the actions of those who use them. Aside matter and space there is also a time element which changes the urban fabric as well as its uses and needs to be factored into such an equation. For BioRegional key to all this is human behaviour and how to foster change toward less profligate waste of resources. This is why it emphasises sustainable living rather than sustainable environments.

7. BioRegional One Planet Communities principles (see appendix 3) example: Zero Carbon, We-You contribution
Source: BioRegional

Reality imposes simplification when trying to measure the degree of sustainability of cities both quantitatively and qualitatively. The approach of cities tends to be one of iteration. They start by establishing broad targets and subsequently more detailed criteria of sustainability, for example what it would take to turn them into 'eco-cities'. Gradually, these criteria are translated into indicators, standards and frameworks which enable cities to compare their progress over time, as well as to measure their level of sustainability against other cities, an increasing necessity imposed by globalisation. To that end, cities need to establish empirical databases, but this is costly as it requires data collection capacity and specialist knowledge of data mining and interpretation.

Cities are protective of their political ambitions and aspirations and tend to set their own sustainability targets. Some are devising their own purpose built frameworks, standards and indicators. However many others are likely to involve recognised third parties to translate their targets into operational programmes. This includes relying on indicators, standards and frameworks established by agencies which are following their own agendas. They divide roughly into four categories: intergovernmental organisations, industry, national agencies, professional bodies.

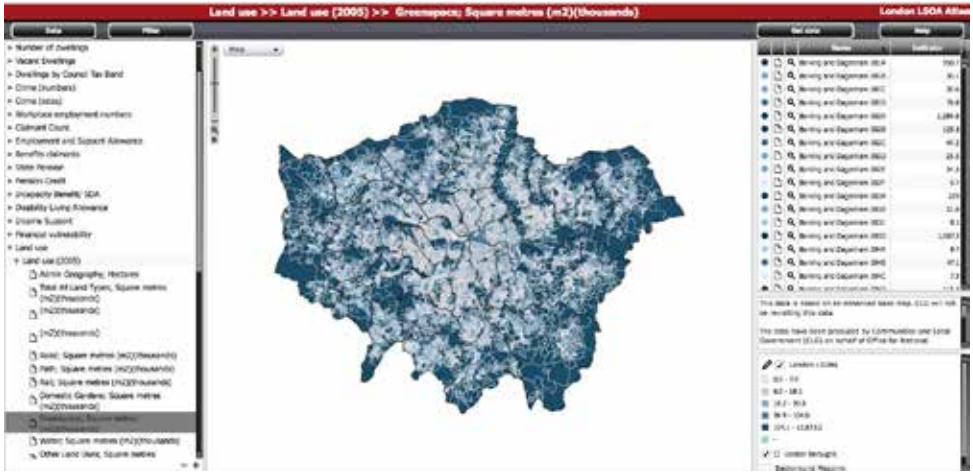
1	intergovernmental organisations	They aim to establish global acceptance of their policy frameworks and evaluations
2	industry	It wishes to get its technical tools and certification accepted globally and sell them as a service, preferably on a continuous basis
3	national agencies	such as green build councils or university consortia which devise assessment systems mainly for national but by extension for international use
4	professional bodies	those who endeavour to influence behaviour and related policies.

8. Third party agencies devising indicators, standards and frameworks

Capturing the sustainability of cities and neighbourhoods

Evaluating 'sustainability' is by no means easy. It presents many challenges and is not practised widely. For example, the fact that no sustainability audits have been undertaken of the state of the local economy and society in the areas in and around the Olympic Games of 2012 in London, means that there exists no base-line to evaluate the legacy effects from a sustainability point of view.

Although the Greater London Authority's Datastore is among the better public urban databases, reasons of commercial confidentiality were given for not making data available on the real estate transformation of the Olympic site.



9. London LSOA Atlas example: Green space distribution in Greater London, per London Borough
Source: GLA Datastore

Evaluating 'value for money' and improvement of quality of space and quality of life requires a lot of clarification as well as political openness. Does value for money relate to the tax payers, profitability of the private sector, the land owner, the developer, the investor, other interested parties? Is quality of space and life meant to improve for those living, working and playing in the area, and/or the areas

around them, or for those who move into these areas after regeneration? Or is urban regeneration supposed to benefit the city as a whole, the nation at large?

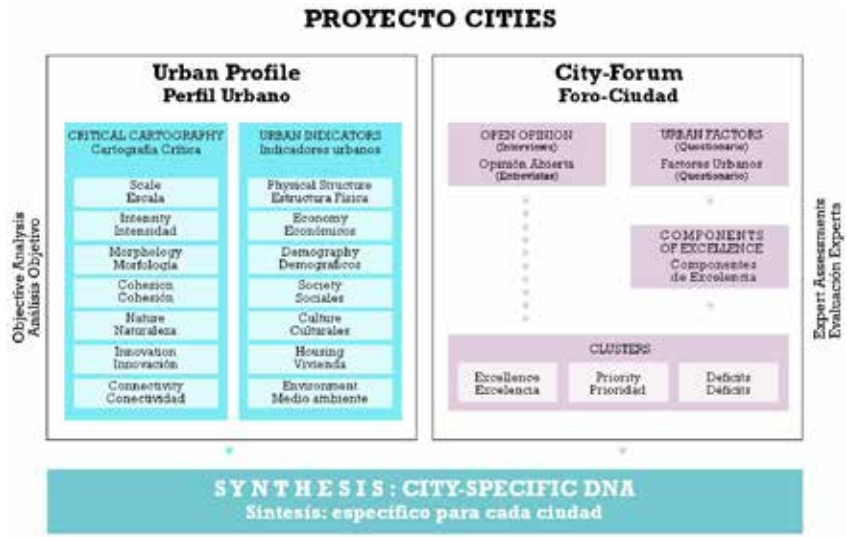
Some methods are briefly presented which may be of assistance to conceive sustainable development strategies and help evaluating them according to 'green' urban models such as eco-cities, by using indicators, standards and frameworks developed by various institutions: governmental, academic, commercial, or design teams themselves.

Evaluation methods

Those in the business of 'green technology', in the private as well as the public sector, are proposing criteria according to which the 'level of sustainability' can be assessed. This is one way of making their green technological innovations competitive. Their aim is to set international standards, preferably accepted worldwide. Increasing preoccupation with the adverse effects of the built environment on climate change has led to green technologies devised for buildings. They focus on energy efficiency, renewable energy sources, locally sourced building materials, indigenous plants, and generally passive as well as active methods of making designs more environmentally friendly. It became soon apparent that although such interventions are improving the performance of buildings they are not sufficient at the scale of neighbourhoods or cities as a whole. The configuration of buildings within a given morphology and climate is generating a micro-climate with the spaces between buildings. They warrant other methods and criteria to evaluate the integrated performance of an urban environment at a larger scale. Such tools would beuseful for urban designers and planners.

A designer approach

ProyectoCities is an example of a design team approach to incorporating sustainability criteria. The FundacionMetropoli is resorting to what it has conceived as 'landscape intelligence' to guide and evaluate its ecological design strategies. In a participatory mode it has devised over 180 indicators grouped into functional clusters to establish an urban profile as a framework for sustainable integrated design. An urban forum constituted by the key stakeholders of the areas for which the projects are being conceived is assessing and weighing the indicators. The aim is to identify the 'components of excellence' and the critical issues of these areas. Together they constitute a sort of urban DNA which acts as a basis to setting priorities and to phase sustainable development.



10. designer approach to measuring sustainability, ProyectoCitiesmethodoloty
Source: FundacionMetropoli

The emergence of evaluation techniques

The preoccupation with climate change has brought about a plethora of evaluation techniques. At present, there exist many different

assessment methods of 'green' technologies at various scales focusing on different aspects. They include the 'Climate+ Program' launched by the 'Clinton Climate Initiative' concentrating on 'in-fill' urban projects; 'Eco2Cities' devised by the World Bank's urban and local government strategy at the global intergovernmental level; NGO initiatives, such as the 'One Planet Living' concept developed by BioRegional; outcomes of academic partnerships such as the 'Community Capital Tool' devised by the Simon Fraser University, Canada in cooperation with Tilburg University, Netherlands; commercial projects, such as the 'LEED Certification System' elaborated by the US Green Building Council; or the 'Green City Index' devised by Siemens, a technical 'rank order' tool for assessing urban sustainability based on global data from over 120 large cities including over 30 indicators; as well as the 'BREEAM Communities', an environmental assessment method and certification scheme developed by the UK Building Research Establishment ltd, transposing its local 'Environmental Rating System' to masterplanning for neighbourhoods or designs at district level for new, infill and regeneration projects.

Most of these schemes and many others aspire to be recognised at the global intergovernmental level. The Bellagio Report is analysing a number of them.

11. Bellagio Report 2012 Tomorrow's City Today Eco-City Indicators, Standards & Frameworks
Source: Westminster University

Two are discussed here as possible tools towards project design for the sites proposed for the EUSS13 summer school: the BREEAM Communities and the One Planet Communities of BioRegional. The former concentrates on technical considerations regarding a sustainable built environment, the latter focuses on wider ecological considerations and conditions of sustainable living.

BREEAM Communities

BREEAM Communities is an instrument designed to assess the sustainability of urban projects. It "…is a standard that helps developers, local authorities and design teams to improve, measure and certify the sustainability of developments at the neighbourhood scape and beyond. It covers economic, social and environmental sustainability - assessing issues like housing provision, transport networks, community facilities and economic impact…"

BREEAM Communities is applied in various forms in over 50 countries. It links masterplanning to the assessment process presented in a technical Manual.

BREEAM uses a 'balanced scoreboard' approach with a mixture of mandatory and tradable assessment criteria, suitable for adaptation to local conditions of use to developers, while avoiding a prescriptive approach to design solutions.

Categories and steps for BREEAM Communities

The BREEAM Communities process comprises five impact categories, together with an innovation criterion.

These categories are assessed in three iterative steps. For details see Table 1 Annex 1

The Steps as well as the Categories are linked to statutory requirements which vary from country to country. They include, for

12. BREEAM Communities Technical Manual 2012
Source: BRE

1	governance (GO)	community participation at all stages, design, construction, operation and long term stewardship of the development	(9.3%)
2	social and economic wellbeing (SE)	health and wellbeing expressed in inclusive design in terms of social cohesion, adequate housing and access to employment	
		local economy	14.8%
		social wellbeing	17.1%
		environmental conditions	10.8%
3	resources and energy (RE)	sustainable use of natural resources and reduction of carbon emissions	(21.6%)
4	land use and ecology (LE)	sustainable land use and ecological enhancement	(12.6%)
5	transport and movement (TM)	transport and movement infrastructure design to encourage use of sustainable modes of transport	(13.8%)
	innovation (Inn)	aims at the promotion and adoption of innovative solutions with likely results in environmental, social or economic benefits over and above the scheme's content	

13. 5 Impact criteria (with their weightings percentages)

1	establishing the principles of development; the suitability of the development regarding local requirements; a strategic plan for a wider area showing housing, services and employment opportunities to improve sustainability, e.g. community scale energy generation, transport and amenity requirements
2	masterplanning process determining layout, detailed mobility plans and location of amenities
3	detailed design with landscaping, drainage, transportation facilities and the built environment (the latter includes whole building assessment methods)

14. 3 iterative steps

example, EU requirements for Environmental Impact Assessments which would be counted as evidence. Nothing prevents the users of BREEAM to go beyond standards laid down by law. It has to be kept in mind though that any such assessment is a forecast and not an empirically verified state of the art. For this reason, BREEAM and others are keen on accreditation, which means that once built, these developments are periodically measured and their degree of sustainability evaluated.

Consultation and engagement

BREEAM Communities recognise the importance of consultation and community engagement. While step 1 includes a 'Consultation Plan' engaging the community is taken up in practice only during the second step (consultation and engagement) and the third step (community management of facilities) of development. Arguably, the strategic decision making issues considered when initiating a project are just as important and should engage the local population from the outset on whom such developments are imposed. The best way of doing this depends on each project specifically. The design team is expected to devise a consultation plan itself, adapted to local conditions. Table 3 of the Manual is giving detailed relationships between BREEAM Communities and building level assessments. Table 2 provides assessment issues with a link to consultation. (Annex 2).

Relation between BREEAM Communities and building level assessments

Linking specific aspects which contribute to the sustainability of a scheme at the level of buildings and that of the scheme as a whole is important as there are significant interdependencies. The community level requirements can reinforce the statutory requirements of building regulations or codes for 'Sustainable Homes' (in the UK). Conversely, formal links with building technology requirements may hamper innovation at masterplan level. Therefore, BREEAM stresses the importance to keep the assessment procedure flexible at both building and community levels.

BREEAM Communities and long term viability of schemes

The purpose of BREEAM Communities is not to set guidelines for development economics. Nevertheless, when assessing long term viability of BREEAM Communities the focus is on

three priorities: economic viability, demographic needs and priorities, and labour and skills.

economic viability (SE01)	increasing demand on resources, services and land
demographic needs and priorities (SE02)	direct and indirect costs associated with impacts on climate change
labour and skills (SE17)	

15. Long term viability criteria
Source: BRE

A full assessment of site constraints and opportunities is considering the economic impact of other factors (ecology, resources, transport, social wellbeing) reaching beyond the development. Strategies are derived from this evaluation to guide masterplanning. They take account of increasing demand on resources, services and land in the future, together with direct and indirect costs related to impacts on climate change. The BREEAM Communities process is underpinned by a BREEAM Communities Scheme Document.

1	introduction
2	Scope of BREEAM Communities
3	Scoring and rating proposals
4	Step 1 establishing the principle of development
5	Step 2 determining the layout of the development
6	Step 3 designing the details
7	Innovation
8	Appendices

16. BREEAM Communities Scheme Document Checklist in eight parts
Source: BRE UK

Independent assessor and mandatory standards

The evaluation of the performance of a scheme is carried out by an independent assessor on the basis of which a BREEAM Certificate is issued to reflect the performance against the BREEAM standard. Criteria for the type of schemes which are suitable for BREEAM Communities assessment are specified. Overall, they have to have a significant impact on their surroundings and their existing capacity.

Besides consultation and engagement (GO 02) for Step 2, only Step 1 'establishing the principles of the development', includes mandatory BREEAM Community standards for each of its categories of assessment. These categories and their mandatory standards can be used as a checklist to ensure the sustainability of the initial project design.

17. Step 1: Criteria for establishing principles of the development
Source: BRE UK

1	consultation plan (GO 01)
2	economic impact (SE 01)
3	demographic needs and priorities (SE 02)
4	flood risk assessment (SE 03)
5	noise pollution (SE 04)
6	energy strategy (RE 01)
7	existing buildings and infrastructure (RE 02)
8	water strategy (RE 03)
9	ecology strategy (LE 01)
10	land use (LE 02)
11	transport assessment (TM 01)

1	biodiversity and habitat protection and enhancement	(SE 08 microclimate, known urban morphology, minimising adverse conditions…) (SE 10 adapting to climate change, known impacts, risks deduced by design…) (SE 13 flood risk management, allowing for climate change…) (LE 03 water pollution, drainage plan, prevention measures…) (LE 04 enhancement of ecological value, creating new habitats, protection…)
2	pedestrian, cyclist and vehicular movement	(SE 12 local parking, distances between parking and residences, use on site…) (TM 03 cycling network, safe, appealing, connected to residences…)
3	public transport	(TM 04 access to public transport, minimum distance to stops, diverse modes…)
4	street and building layout, use and orientation	(SE 05 mixed tenure, good space standards, affordable housing…)
5	housing type, provision and location	(SE 06 delivery of services, facilities, amenities at appropriate, walking distance…)
6	utilities and other infrastructure provision	(SE 09 utilities, single point of access, coordinated installation, ducting…) (SE 07 activities, multiple uses, connectivity…)
7	public realm and green infrastructure	(SE 11 green infrastructure plan, green spaces within walking distance…) (LE 05 landscape compliant with ecological strategy, native species…)

18. Step 2: Site specific categories for 'determining the layout of the development
Source: BRE UK

The lists presented for Step 1 may seem prolific. However, Step 2 and Step 3 encompass a lot more criteria and factors to be taken into account when determining the layout of the development and detailed designs, reviewing them and adjusting project solutions.

Besides stating the aims and identifying assessment criteria - some given, some left to the designers - for each category, the supplied proforma require the designers also to fill in compliance notices and schedules of evidence, besides additional project specific information.

A serious limitation of such lists is that they cannot assess the interdependencies and mutual influences of individual aspects. Following checklists very closely may also hamper innovative solutions outside these frameworks or criteria and their prescribed way of weighting them against each other.

The criteria of the design review (GO 03) may constitute a useful and simpler checklist of aspects which sustainable design has to take into account.

19. Design review criteria

1	the character and identity of the place
2	how security is considered and addressed through design
3	the design of the public realm
4	how the design addresses movement and legibility
5	the layout of the development
6	the diversity and compatibility of uses in the development
7	how the place is designed to be flexible and adaptable over time
8	the design of the landscape
9	the density, scale and appearance of the development.

The way BREEAM Communities describes itself is as being flexible while driving forward real and measurable improvements in a non-prescriptive way, while avoiding mandatory planning standards. In its view, the benefits of engaging with BREEAM Communities are to achieve integration between the BREEAM methodology, the procurement process and programme timeframes, all this without unduly hampering the design process and leaving room for potential alternative solutions.

It could be argued though, that the BREEAM Communities approach emanates from BRE's (Building Research Establishment) past as a governmental agency in charge of preparing regulations, devising controls, testing materials and issuing certificates.

In sum, a checklist of individual technical performance standards may be appropriate at the level of a (free standing) building. However, they may not be able to capture the combined effects of the many criteria on each other and the wider environment. Most crucially, checklists may hamper innovation, something that transpires in BREEAM's succinct treatment of as yet unknown technologies or sustainable design principles. No checklist will ever replace creativity and experience of designers.

One Planet Communities

BioRegional has conceived 'One Planet Communities' as a social entrepreneurial charity. It emanates from the concern of the planet's overall ecological capacity and focuses on practical solutions for sustainable developments, besides assisting the development of sustainable communities. It aims to lead the way to sustainable living through practical demonstration of sustainable consumption and production. These concerns are reflected in the 10 principles of One Planet Living.

1. health and happiness
2. equity, local economy and fair trade
3. culture, heritage and community
4. land use and wildlife
5. sustainable water

6. local and sustainable food
7. local and sustainable materials
8. sustainable transport
9. zero waste
10. zero carbon.

Combined into a framework, these principles are linked to 10 considerations when they are consolidated into an outline 'Sustainability Action Plan' as a guiding principle for each concrete project:

1. global and local context (current energy and waste situation with opportunities for change),
2. ecological footprint and other targets to achieve One Planet Living ,
3. local/international benchmarks (e.g. Fair Trade, LEED, BREEAM),
4. performance indicators and timelines to meet One Planet Living ,
5. key strategies applied throughout the whole development process,
6. communication and PR strategy related to the principle,
7. regulation and policy issues related to the principle of sustainable living,
8. mechanisms to achieve wider community and municipal engagements, e.g. Local Agenda 21,
9. key partners to enlist (e.g. renewable energy companies, governance, NGOs),
10. key cross cutting issues with other One Planet principles to achieve synergies.

Evaluating the BedZED experiment

The One Planet Living principles have been developed for, and were applied to the BedZED estate in South London and are continuously monitored. BioRegional cooperated with Bill Dunster, known for his ecological designs, Arup who are global experts on ecological building and design technology, and Ellis & Moore for green infrastructure. They also benefited from Peabody, an enlightened client who encouraged experimentation.

20. The BedZED low energy low carbon development in South London
Photo: Judith Ryser

21. BedZED technical section showing building physics
Source: Arup

Many components of these ten principles related to energy efficiency and zero carbon energy through building physics, as well as sustainable materials locally sourced when possible. The designers applied all available green technologies, such as south facing sun conservatories, heat recovery with wind cowls, super insulation, air tightness and green roofs, good day-lighting and visible energy meters. The latter helped inhabitants to optimise the effects of this low tech passive design by adapting their behaviour.

The design team found that some ecological design principles, such as only south facing and glazed sun terraces did not necessarily produce value for money while unduly constraining the use of the buildings. Nevertheless, living on this experimental estate generated a strong sense of community, a better understanding of ecological living and thereby a reduced ecological footprint.

On the communal level, BedZED had provided a woodchip fired combined heat and power plant; the UKs first membrane bioreactor to recycle grey and black water effluents; sustainable transport in the form of a car club and few parking bays encouraging cycling and walking and use of public transport. Lessons

learnt from continuous monitoring were that pragmatic and more conventional solutions were more sustainable in some cases in value for money terms. For example, poor public transportation infrastructure hampered BedZED's sustainable transportation strategy. Although the communal ecological installations brought useful research results, it became clear that complete self-reliance was less appropriate than using the existing networks of sewage, curb side waste collection of recycled waste and space heating instead of complete on-site disposal and energy generation. Locally sourced food supplies remain popular while green terraces and roofs are contributing to bio-diversity.

Perhaps BedZED's most significant effect was its wider repercussions. It contributed to new green legislation in the UK, benchmarking London's emissions, other sustainable living communities based on improved 'Sustainable Action Plans'. Its ten principles are being applied throughout the world thanks to the One Planet Living initiative with WWF which promotes sustainable development and ecological footprinting based on sustainable buildings, infrastructure and lifestyles.

Sustainability Action Plan

The New England Quarter (NEQ) in Brighton, UK is used to illustrate how a Sustainability Action Plan (SAP) is devised. This mixed use development was designed in 2006 by BioRegionalQuintain for Crest Nicholson, a developer known for his community focused approach. The design was for a difficult 8 ha brown field site near the railway station. The project shows what targets have been adopted for the 10 One Planet Living Principles, and how they have been translated into an operational programme by means of a SAP (Sustainable Action Plan) which is based on 9 key sustainability objectives. These objectives are also measured against the Eco Homes assessment for housing and the BREEAM assessment credits for the non domestic part:

1. natural environment
2. pollution
3. community safety
4. economy and work
5. energy generation and use
6. land use
7. transport
8. waste
9. housing.

BREEAM credit sections to assess the non domestic development of NEQ:

1. management
2. health and wellbeing
3. energy
4. transport
5. water
6. materials
7. land use and ecology
8. pollution.

EcoHomes assessment criteria used for sustainability rating of NEQ housing:

1. energy
2. transport
3. pollution
4. materials
5. water
6. land use and ecology
7. health and wellbeing

NEQ SAP Components and Sectoral Plans:

1. Zero Carbon Plan, reducing energy use and optimising renewable energy supply
2. Sustainable Water Plan
3. Local Sustainable Food Plan, with on-and off-site growing and fresh food support
4. Culture and Heritage Plan, with community centre, consultation, extranet,
5. Equity and Fair Trade, through community trust association
6. Health and Happiness, through building

design and infrastructure, community trust, on-going management performance.

All these various principles, assessment criteria and targets are consolidated in the Sustainability Action Plan and its component sectoral plan, and the project is vetted according to One Planet Living Common International Targets. The summary targets, commitments and mechanisms show in which form these objectives have been produced.

The One Planet Living list of sustainability criteria differs from many other sets of sustainability indicators inasmuch as it comprises a wider range of quality of life aspects: health and happiness, access to basic elements of life, culture and recreation, tourism and leisure education and training, as well as fair trade and locally produced food, besides all the usual material ecological components. Great emphasis is laid on management, continuous monitoring and feedback processes.

During BioRegional's involvement in concrete projects, its influence was unexpectedly wide. The UK had introduced new legislation for greener new build housing, among them the EcoHomes standards for which BRE has devised a credit system. In response to BedZED, the local municipality adopted a Sustainability Strategy, corresponding Action Plans and a Sustainability Checklist. These tools were also used explicitly to set sustainability targets for the New England Quarter site in Brighton and BioRegional has used the BRE credit system to assess its 12 key objectives for the sustainable community planned for this site.

SUSTAINABILITY INDICATORS, STANDARDS AND FRAMEWORKS: THEIR LIMITATIONS AND APPLICABILITY IN PRACTICE

The question remains open of who should select sustainability standards: the client, the planning authority, the designer or the users of the development, or a combination of them all. By proposing a sustainable solution for the 'Delicias Axis' in Madrid site selected for the EUSS13 design approach to "Old Territories as New Opportunities for Urban Regeneration: Urban Acupuncture", the students could devise their own sustainability criteria, while seeking inspiration from the BREEAM Communities, the One Planet Principles or any of the other methodologies briefly discussed above.

Principle	Further information
Zero Carbon	• **Sustainability Action Plan** (Section 7.1)
Zero Waste	• **Design Statement** (Sustainable Waste section)
Sustainable Transport	• **Accessibility Statement** and **Travel Plan**
Local and Sustainable Materials	• **Design Statement** (Materials section)
Local and Sustainable Food	• **Sustainability Action Plan** (Section 7.3)
Sustainable Water	• **Sustainability Action Plan** (section 7.2)
Natural Habitats and Wildlife	• **Design Statement** (Landscape & Ecology section)
Culture and Heritage	• **Sustainability Action Plan** (Section 7.4)
Equity and Fair Trade	• **Sustainability Action Plan** (Section 7.5)
Health and Happiness	• **Sustainability Action Plan** (Section 7.6)

23. NEQ Brighton scheme Sustainability Action Plan with its components
Source: BioRegional

Any indicators, standards and frameworks to assess and evaluate sustainability can be useful for designers in pursuit of sustainable development. Nevertheless, they are mere tools and many other criteria are influencing design decisions.

Designers have to go beyond such measurement tools when conceiving solutions for sustainable urban change. They need to encompass the question of how sustainability, regeneration and gentrification processes are hanging together. Their relationship cannot be explained by simply measuring and assessing them or their component parts. These urban change processes depend on different value systems which may not be shared between the state, the private sector, designers and communities using the city. Designers may well find themselves in a position of needing to develop their own tools for positively influencing these processes.

Although designers on the whole carry out designs for clients, it does not mean that they should endorse only the clients' criteria for

their developments, especially of those who do not attribute much importance to sustainability. Private, development-led, profit seeking urban regeneration tends to create 'sameness' and, at worst, poor quality of space and low sustainability. Conversely, from a design point of view, it could be argued that spatial diversity, reflected in mixed development, for example, with different uses alongside each other makes a better contribution to sustainable 'quality of space'. However this is often resisted by the development industry, not least because it implies complex property management. Nor is it necessarily in the interest of developers to secure a long lifespan for their developments, as demolition and replacement may be more lucrative for them with increasing land prices. Conversely, development negotiated between a variety of stakeholders tends to generate a feeling of ownership which tends to contribute to the longevity of such schemes, thus to their sustainability. Finally, the state may have different objectives from both the development industry and the design profession, embedded in the regulatory process with which all the other protagonists are expected to comply.

These contradictions between the state, the development industry and the design profession may contribute to making the physical fabric transient without lasting identity. This may exacerbate uncertainty and alienation of the urban dwellers, besides reducing their public realm, an important part of a sustainable environment. The design professionals are implicated in this process, as they are increasingly working for the private sector and prone to subjecting themselves to its value systems, often in contradiction with the meaning, if not the letter of public planning principles. Tools to assess and evaluate sustainable development may therefore constitute a useful means to reaching a modus vivendi for the cooperation between diverse protagonists with conflicting interests in producing a more sustainable urban environment.

Step 1	Step 2	Step 3
Governance		
GO01 – Consultation plan	GO02 – Consultation and engagement GO03 – Design review	GO04 – Community management of facilities
Social and economic wellbeing		
SE01 – Economic impact SE02 – Demographic needs and priorities SE03 – Flood Risk Assessment SE04 – Noise pollution	SE05 – Housing provision SE06 – Delivery of services, facilities and amenities SE07 – Public realm SE08 – Microclimate SE09 – Utilities SE10 – Adapting to climate change SE11 – Green infrastructure SE12 – Local parking SE13 – Flood risk management	SE14 – Local vernacular SE15 – Inclusive Design SE16 – Light pollution SE17 – Labour and skills
Resources and energy		
RE01 – Energy strategy RE02 – Existing buildings and infrastructure RE03 – Water strategy		RE04 – Sustainable buildings RE05 – Low-impact materials RE06 – Resource efficiency RE07 – Transport carbon emissions
Land use and ecology		
LE01 – Ecology strategy LE02 – Land use	LE03 – Water pollution LE04 – Enhancement of ecological value LE05 – Landscape	LE06 – Rainwater harvesting
Transport and movement		
TM01 – Transport assessment	TM02 – Safe and appealing streets TM03 – Cycling network TM04 – Access to public transport	TM05 – Cycling facilities TM06 – Public transport facilities

Annex 1. Table 1: BREEAM Communities 2012 steps, categories and assessment issues for the three steps.

Step	Issue
Step 1	GO01 - Consultation plan SE02 - Demographic needs and priorities SE03 - Flood risk assessment RE02 - Existing buildings and infrastructure LE01 - Ecology strategy
Step 2	GO02 - Consultation and engagement GO03 - Design review SE06 - Delivery of services, facilities and amenities SE07 - Public realm SE11 - Green infrastructure SE12 - Local parking LE05 - Landscape
Step 3	GO04 - Community management of facilities SE14 - Local vernacular TM05 - Cycling facilities TM06 - Public transport facilities

Annex 2. BREEAM Technical Manual Table 2: assessment and consultation

Annex 3. Regional 10 One Planet Community Principles

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1. Judith Ryser. 2013. Strategies for the post-speculative city, redressing the balance in favour of sustainable development, presented at EUSS 2013 and included in this publication.
2. For a discussion of 'sustainability, see companion paper: Judith Ryser. 2013. Strategies for the Post Speculative City, Redressing the Balance in Favour of Sustainable Development. EUSS13
3. French planners and academics invented the term 'le projeturbain' to describe sustainable urban regeneration.
4. David Mangin& Philippe Panerai. 1999. ProjetUrbain. Parantheses.
5. Simon Joss (ed). 2012. International Eco-Cities Initiative. Tomorrow's city today, eco-city indicators, standards & Frameworks. Bellagio Conference Report. University of Westminster.
6. See numerous UN agreements: e.g. Kyoto Protocol 11/12/1997 and Doha Amendment 08/12/2012; Rio Earth Summit 1992; Copenhagen Accord 18/12/2009 Rio+20 Convention 21/06/2012
7. For Spain and the UK see paper given at the Isocarp Congress on Low Carbon Cities in Porto Portugal. Teresa Franchini& Judith Ryser. 2009. Toward Low Carbon Cities: Madrid and London. table p 6 for CO2 reduction targets. For a detailed account of levels of responsibility of CO2 reduction targets and implementation in the UK, see Comparative Study of National Responses to the Challenge Posed by Climate Change and Energy Resource Constraints, UK Response by Judith Ryser. Isocarp
8. For Madrid and London see paper by Teresa Franchini& Judith Ryser, 2009, op.cit. Tables pp 4, 7, 12.
9. For Madrid and London they are discussed in Teresa Franchini& Judith Ryser, 2009. op cit.
10. http://www.london.gov.uk/priorities/planning/london-plan
11. Table by Teresa Franchini and Judith Ryser. Toward Low Carbon Cities: Madrid and London. Paper for Isocarp congress 2009 in Porto, Portugal.
12. This point is being made by BioRegional, evidence based by their 'sustainable living' projects, e.g. in Brighton
13. http://www.oneplanetcommunities.org/about-2/process/endorsement/annual-review/
14. http://masdarcity.ae/en/
15. Department of Communities and Local Government. Eco-Towns, living a greener future. 2008. DCLG. For a critique, see
16. http://www.dalenstrategies.com/2012/whatever-happened-to-eco-towns/
17. See Teresa Franchini, Workshop Proposal, old territories as new opportunities for urban regeneration: urban acupuncture at the Delicias Axis in Madrid.
18. "Greener, Greater New York, The Mayor of New York, 2011. For a discussion, see: Leo Hollis. 2012. Cities are Good for You. Bloomsbury, pp 317-320.
19. Pooran Desai. 2010. One Planet Community, a rel-life guide to sustainable living. Wiley; and annual reviews http://www.oneplanetcommunities.org/about-2/process/endorsement/annual-review/
20. For details, see intereactive table in OneBrighton.co.uk. for details:
21. http://www.onebrighton.co.uk/carbon_footprint.aspx
22. What makes an Eco-Town? A report from BioRegional and CABE inspired by the eco-towns challenge panel. 2008. CABE
23. Simon Joss. 2010. "Eco-cities: a global survey 2009." WIT Transactions on Ecology and the Environment, vol 129: 239-250. Joss, S., Cowley, R. &Tomozeiu, D. 2013. "'Towards the 'ubiquitous eco-city': an analysis of the internationalisation of eco-city policy and practice." Journal of Urban Research & Practice, DOI:10.1080/17535069.2012.762216.
24. e.g. The City of Copenhagen has adopted Eco-Metropolis 2015, ten indicator categories, six environmental and four social; the City of Linz has designed SolarCity Linz, a replicable indicator framework for 'eco' masterplanning comprising six categories with six indicators each; the Tanshan municipality has adopted CaofeidianEciCity, a framework comprising 141 indicators for planning and management of cities, neighbourhoods and buildings.
25. e.g. Eco2Cities from 2010 as part of the World Bank's Urban and Local Government Strategy aimed at the developing world; SlimCity, an annual assessment of 'eco-efficiency' measures by the World Economic Forum using World Bank eco-city indicators and metrics; the Climate+ Program from 2009 by the Clinton Climate Initiative for carbon neutral developments; the Green Cities Programme by the OECD collecting and disseminating 'green growth' best practices; the Reference Framework for Sustainable Cities (RFSC) with its on-line toolkit by the European Union.
26. E.g. the Green City Index by Siemens, a technical tool to assess urban sustainability based on global data from 20 large cities; standardized 'smart city measurement indicators' by Hitachi for urban management and infrastructure; 'Smarter City Assessment by IBM, a tool for customised 'key performance indicator measurements and city benchmarking; the International Ecocity Framework and Standards (IEFS) as a certification platform by Ecocity Builders.
27. e.g. the ICLEI Star Community Index, US national standards for sustainable communities developed by ICLEI with the US Green Building Council; BREEAM Communities, a multi-stage assessment and certification scheme designed by the British Research Establishment for urban masterplanning, from which 'Leadership in Energy and Environmental Design (LEED) was derived in the USA, a multi-stage rating and certification scheme operating at neighbourhood as well as building levels; Eco-city Development Index System by the Chinese Society for Urban Studies, including indicators for innovation.
28. e.g. One Planet Communities has been developed by BioRegional which focuses on ecological footprint analysis based in ten principles including health and happiness; Global City Indicators Facility is a membership based standardised method for comparing city performance, including 'quality of life' categories besides city services designed by the government of Ontario with the University of Toronto; the Community Capital Tool devised by the universities of Simon Fraser in Canada and Tilburg university in the Netherlands consisting of a scan of six mutually reinforcing community capitals as a social learning tool.
29. http://data.london.gov.uk/ interactive maps see for example http://data.london.gov.uk/visualisations/atlas/lsoa-atlas-2012/atlas.html
30. Londonhttp://data.london.gov.uk/datastore/applications/interactive-map-indices-deprivation
31. ProyectoCities methodology to establish the 'DNA' of an urban area evolved by the FundacionMetropoli, Madrid. In: Judith Ryser (ed). 2010. Landscape Intelligence, visions and projects of the FundacionMetropoli. FundacionMetropoli
32. For a review of such indicators, standards and frameworks, see:
33. 'International Eco-Cities Initiative, Tomorrow's city today, eco-city indicators, standards and frameworks, Bellago Conference Report, December 2012. Simon Joss (ed), University of Westminster, and
34. Joss, S, Tomozeiu, D. &Cowley, R. 2011. Eco-Cities. A Global Survey 2011. (Eco-City Profiles). London. University of Westminster.
35. BREEAM: Building Research Establishment Environmental Assessment Method.
36. BREEAM Communities, An Introduction for Local Authorities. www.bream.org . BREEAM Communities as been adopted by the City of Bristol making use of nationally recognised standards in line with the National Planning Policy Framework, for its major developments. BREEAM aims to ensure that its standards provide social and economic benefits whilst mitigating the impacts of the built environment. In doing so… it stimulates demand for sustainable developments.
37. BREEAM Communities Manual 2012. Code for a Sustainable Built Environment. Technical Manual SD202 – 01.2012. bre. Available on www.bream.org
38. BREEAM Communities Manual op.cit. Table 6 p 20. For detailed criteria see Tables 7 – 11, pp 21-24.
39. BREEAM Communities Manual, op.cit, pp 7-9.
40. www.bream.org
41. BREEAM Communities Manual, op.cit, Step 1, establishing the principle of the development, schedules with for each category its aim, assessment criteria, compliance notes, schedule of evidence and additional information pp 26-68.
42. BREEAM Communities Manual op.cit. Step 2 categories and criteria, pp 70-123
43. Pooran Desai. 2010. One Planet Communities, a real-life guide to sustainable living, p 143.
44. http://www.bioregional.com/files/publications/BedZEDBrochure2010.pdf
45. It is possible to download the companies toolkit to apply SAP at
46. http://www.oneplanetliving.net/take-action/companies-toolkit/download-companies-toolkit/
47. brighton_sap.pdf
48. www.breeam.org/.../EcoHomes_2006_Guidance_v1.2_-_April_2006.pdf
49. brighton_sap.pdf. Annex pp70-81.
50. see companion paper: Judith Ryser. 2013. Strategies for the Post Speculative City, Redressing the Balance in Favour of Sustainable Development. EUSS13
51. see for example, Anna Minton, 2012, Ground Control - Fear and happiness in the 21st century city, Penguin Books.