TOMORROW’S CITY TODAY
ECO-CITY INDICATORS, STANDARDS & FRAMEWORKS

BELLAGIO CONFERENCE REPORT

2 BELLAGIO STATEMENT
5 INTRODUCTION
6 CONCEPTUAL PERSPECTIVES
8 GLOBAL OVERVIEW
10 EMERGING INTERNATIONAL FRAMEWORKS
13 NATIONAL INDICATOR SCHEMES
15 LOCAL INDICATOR PRACTICES
20 OUTLOOK
Bellagio statement
This statement contains the conclusions and recommendations as agreed by the participants of the international conference Tomorrow’s City Today held in Bellagio, Italy, in September 2012. The event gathered together international experts to discuss the scope for developing and using indicators, standards and frameworks for urban sustainability, or eco-city, initiatives around the world. The event was hosted by the International Eco-Cities Initiative and funded by the Rockefeller Foundation (New York).

The conference participants hope that the recommendations contained in the Bellagio statement will make a valuable contribution to policy-making, planning and practice, at a time when a significant growth in diverse ‘eco-city’ initiatives across continents has been accompanied by the emergence of various indicator and accreditation schemes vying for international acceptance.

<table>
<thead>
<tr>
<th>Jutta Berns-Mumbi</th>
<th>Ecocentric cc, Johannesburg, South Africa</th>
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<tbody>
<tr>
<td>Vatsal Bhatt</td>
<td>Brookhaven National Laboratory, Upton, NY, USA</td>
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<tr>
<td>Robert Cowley</td>
<td>University of Westminster, London, UK</td>
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<td>Tu Lan Do</td>
<td>Urban Development Agency, Ministry of Construction, Hanoi, Vietnam</td>
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<td>Shufeng Dong</td>
<td>Bluepath City Consulting Co. Ltd, Beijing, China</td>
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<tr>
<td>Cate Harris</td>
<td>Lend Lease, Millers Point, NSW, Australia</td>
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<td>University of Westminster, London, UK</td>
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<td>Gerd Lintz</td>
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<td>Luis A Paredes</td>
<td>Housing and Land Use Regulatory Board, Quezon City, the Philippines</td>
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<tr>
<td>Sue Riddlestone</td>
<td>BioRegional, Surrey, UK</td>
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<tr>
<td>Mark Roseland</td>
<td>Simon Fraser University, BC, Canada</td>
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<tr>
<td>Yvonne Rydin</td>
<td>University College London, UK</td>
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<tr>
<td>Debashis Sen</td>
<td>Department of Urban Development, Government of West Bengal, Kolkata, India</td>
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<tr>
<td>Hiroaki Suzuki</td>
<td>World Bank, Washington DC, USA</td>
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<tr>
<td>Daniel Tomozeiu</td>
<td>University of Westminster, London, UK</td>
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<tr>
<td>Hongxing Xie</td>
<td>Innovation Center for Clean-air Solutions, Beijing, China</td>
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General observations

1. The concept of sustainable development has existed for at least two decades, with some agreement over the scope of its broad goals. However, in considering the design, development and use of indicators, standards and frameworks for urban sustainability, one needs to bear in mind that this has not necessarily translated into a consensus on how these goals should be structured, combined or achieved. Various actors prioritise different aspects of social, economic, and environmental sustainability.

2. Likewise, one needs to bear in mind that urban sustainability can mean quite different things conceptually and practically depending on scale: an initiative covering a large metropolitan area is likely to differ significantly from a neighbourhood-based project.

3. Also, it is important to acknowledge that the contents and design of indicators involve various knowledge sources and claims. As tools for intervening in governance, indicators (and related frameworks) carry an inherently political dimension.

4. In thinking about indicators (and related frameworks), it may be useful to consider that they involve issues of both substance (relating to urban sustainability) and processes (related to governance).

5. In considering indicators, standards and frameworks, attention should be paid to the differences in the nature of priorities, to complexity and to uncertainty at various levels (for example, city-wide level versus operational/site-specific level; and public authority perspective versus business perspective).

6. There is an ongoing need for research into the comparability of indicators, standards and frameworks, especially at an international level. Such research should also critically engage with the wider debate about the purpose of, and need for, international frameworks for urban sustainability.

Observations, lessons and recommendations pertaining to individual initiatives

1. Indicators and frameworks should be designed, implemented and engaged within the context of local policy, practice and culture. Equally, they should be informed by local environmental and economic conditions.

2. It is important to be as specific as possible about the purpose of indicator sets. Indicators may vary depending, for example, on whether they refer to short-term or long-term goals, or on the specific context (research, policy or organisational) in which they are to be used.

3. The way in which indicators are presented needs to be tailored to the intended audience(s) – for example, more technical for expert audiences and more accessible for wider audiences. Indicators should always be presented as clearly and accessibly as possible without this resulting in over-simplification.

4. Indicators should ideally integrate different dimensions of sustainability encompassing environmental, economic and social aspects of sustainable development. In addition, the definition of local indicators should take into account the interaction between the local and other levels (regional, national, international). Furthermore, in defining indicators, consideration should be given to the various stages of an initiative’s life-cycle.

5. When designing, implementing and monitoring indicators and frameworks, it is vital to engage with various stakeholders (in particular local residents in addition to business and political communities), based on existing best practices. This should include awareness-building as well as joint learning initiatives.

6. Compliance with indicators and related processes should be enhanced, where appropriate (particularly at local site level), through contracted commitment and firm action plans.

7. Given the need for indicators and frameworks to be effective in policy-making and market-led development, both political and business leadership is vital. Also important is the need for enabling incentives, building on existing political or business cases for seeking accreditation.
**Observations, lessons and recommendations pertaining to international frameworks**

1. International frameworks should aim to outline high-level principles and goals, rather than to achieve overly detailed and technical standards. These goals and principles should be ambitious as well as aspirational. They should engage with both the substance and processes of urban sustainability. They should aim to assist planners, policy makers, developers and communities in designing, applying and monitoring urban sustainability indicators.

2. Similar to local and national indicators, international frameworks should address the ‘triple bottom line’ of sustainability, balancing environmental, economic and social aspects.

3. While international indicators should specify (and reflect) clear mid- to long-term goals and targets, flexibility is required to allow the means of attaining these goals to be decided at local level. Such indicators are, therefore, likely to be performance-based.

4. Rather than reinventing the wheel, the creation of international frameworks should build upon and take advantage of the rich variety of existing practices. This will help mobilise available data, existing institutional capacity and lead to greater resource efficiency.

5. Certification thus far has focused on site-specific initiatives and developments, and has mainly been driven by private accreditation schemes. A case can be made for more open-access certification levelled at whole city initiatives. Consideration needs to be given to which bodies are best placed to act as certifiers, given the needs for transparency, international compatibility and international acceptance.

6. The effectiveness of future international frameworks will derive as much from commonalities of content and process (to facilitate cross-comparisons) as from the degree to which they allow for customisation at local level (to foster local engagement and relevance). Further research should seek to understand best practice in terms of reconciling these two complementary functions.

14 September 2012, Bellagio
This report is the result of a collaborative initiative co-ordinated by the International Eco-Cities Initiative (University of Westminster, London/ Johns Hopkins University, Baltimore/ Smithsonian Institution, Washington DC). It is based on the joint work by a group of international experts who met in autumn 2012 to discuss the development of indicators, standards and frameworks for urban sustainability initiatives. The group – made up of 18 leading researchers, policy-makers and practitioners from 14 countries from around the world – convened for a three-day conference held at the Rockefeller Bellagio Center in Bellagio, Italy, 12–14 September 2012. The report summarises the proceedings of the conference Tomorrow’s City: Developing International Standards and Policy for Eco-Cities, and includes the Bellagio statement, jointly drawn up by the participants at the end of the conference.

ACKNOWLEDGEMENTS

We are indebted to all participants for their individual as well as joint efforts in support of this conference. The report is testament to the high quality of discussion, shared learning and collaborative work enjoyed at the conference. It gives unprecedented insight into current global thinking and practice concerning the use of eco-city indicators, standards and frameworks in a variety of organisational, national and cultural contexts. As such, the findings and recommendations contained in this report should prove useful for researchers, policy-makers and practitioners alike at a time of significant growth in diverse eco-city initiatives around the world.

We are equally indebted to the Rockefeller Foundation (New York), which supported this initiative with a generous grant covering both conference and international travel costs and which assisted the organisers with invaluable professional advice. On behalf of all participants, we are most grateful for the unparalleled hospitality shown to us by the Rockefeller Bellagio Center staff, making this a unique experience.

The authors invite further dialogue on any of the issues raised in this report. Enquiries and correspondence may be directed to individual participants, or to the Editor, Simon Joss, at joss@westminster.ac.uk.

Simon Joss / Arthur Molella / Robert Kargon
International Eco-Cities Initiative

London, December 2012

“I came to this conference quite sceptical about urban sustainability indicators... but, listening to the range of initiatives that have been presented, from different countries and of different types, I can see that sustainability indicators provide a space for having a ‘conversation’ about urban sustainability.”

Yvonne Rydin, University College London (UK)

“You do need indicators to evaluate the claims that are being made because the stakes are very high for this. But standardising these evaluative criteria can be very difficult; it’s very difficult to standardise anything even within a locality – let alone in an international setting.”

Arthur Molella, Smithsonian Institute (USA)

“I think that over the next decade or so there will be a real shake-down – a coalescing, a congealing, a cohesion. But I’m not sure that will be good. That depends on what we do now.”

Mark Roseland, Simon Fraser University (Canada)
INTRODUCTION

‘Eco-city’ is an umbrella term that covers various notions of, and approaches to, sustainable urbanism, rather than a conceptually coherent and practically uniform phenomenon. It brings together multiple forms of sustainable development applied at different urban scales and locally contextualised. Sister terms include ‘climate-neutral city’, ‘low-carbon city’, ‘smart city’, ‘sustainable city’, ‘transition towns’, among others.

Recent years have seen a growing interest globally in ‘eco-city’ initiatives of various kinds. A 2011 census\(^1\) identified over 170 initiatives internationally, which represents a significant increase compared with only a decade earlier. However challenging it may be to demarcate the ‘eco-city’ conceptually and to gauge the precise extent of practical developments, there is clear evidence of increased activity across the world. The dual challenges of global climate change concerns and unprecedented urbanisation are key factors that have prompted a plethora of actors – cities, national governments, international organisations, private developers, technology firms, among others – to get engaged in conceptual, policy and practical innovation. A recent UN report\(^2\) reflected current thinking by arguing that “the key to sustainability lies in the concept of ‘green cities’ or ‘eco cities’”.

Accompanying these developments, there have been increasing calls for indicators, standards and frameworks to guide urban sustainability policy, planning and implementation. Already, there are a dozen or so schemes competing for recognition at international level; many more are deployed at national and sub-national levels. While these indicator schemes share a common goal of capturing and measuring various urban sustainability dimensions, at the same time they differ significantly in terms of conceptual definitions, methodological approaches and modes of operation. Consequently, there is a need to generate more systematic knowledge and policy analysis of how various indicator systems and endorsement schemes compare; whether there is scope for closer integration to achieve international standards; and what are the implications for policy-making. This, in turn, should help improve urban sustainability planning and performance, and inform related policy-making at local, national and international levels.

The Bellagio Conference Tomorrow’s City Today (see Table 1) was designed to make a major contribution to this debate through an intensive, three-day programme of presentations, workshops and round-table discussion among a select group of internationally leading experts. The following sections summarise the conference proceedings. The joint statement of recommendations agreed by the participants at the end of the conference is contained in the Bellagio statement reproduced on the preceding pages.

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Table 1. Bellagio conference programme

<table>
<thead>
<tr>
<th>Day 1—Mapping &amp; comparing ‘eco-city’ frameworks</th>
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<tbody>
<tr>
<td><strong>Thematic overview I:</strong> indicators &amp; frameworks as governance–issues and challenges</td>
<td>S Joss</td>
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<td><strong>Thematic overview II:</strong> the sustainable city</td>
<td>Y Rydin</td>
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<tr>
<td><strong>Thematic overview III:</strong> comparison of urban sustainability indicators &amp; frameworks</td>
<td>D Tomozeiu</td>
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<td><strong>International framework schemes: case studies</strong></td>
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<tr>
<td>Climate+ Program (Clinton Climate Initiative)</td>
<td>C Harris</td>
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<tr>
<td>Community Capital Tool (Simon Fraser University)</td>
<td>M Roseland</td>
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<tr>
<td>Eco2 Cities (World Bank)</td>
<td>H Suzuki</td>
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<tr>
<td>One Planet Communities (BioRegional)</td>
<td>S Riddlestone</td>
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<th>Day 2—Evaluating the use of urban sustainability frameworks</th>
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<tr>
<td><strong>Municipal indicator use: case studies</strong></td>
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<tr>
<td>Ho Chi Minh City (Vietnam)</td>
<td>T L Do</td>
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<td>Menlyn Main, Pretoria (South Africa)</td>
<td>J Berns-Mumbi</td>
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<tr>
<td>Tianjin Binhai Eco-City (China)</td>
<td>S Dong</td>
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<tr>
<td><strong>National &amp; municipal indicator use: case studies</strong></td>
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<tr>
<td>BREEAM Communities</td>
<td>Y Rydin</td>
</tr>
<tr>
<td>German urban sustainability frameworks</td>
<td>B Müller</td>
</tr>
<tr>
<td>Greenest City 2020, Vancouver (Canada)</td>
<td>M Roseland</td>
</tr>
<tr>
<td>Low-Carbon Cities China</td>
<td>H Xie</td>
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<tr>
<td>Surat/Gandhinagar Solar Cities (India)</td>
<td>V Bhattacharya &amp; D Sen</td>
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<tr>
<td>Victoria Harbour, Melbourne (Australia)</td>
<td>C Harris</td>
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<tr>
<th>Day 3—Identifying multi-level policy requirements and opportunities</th>
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<tr>
<td><strong>Eco-city frameworks: lessons for individual initiatives</strong></td>
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<tr>
<td><strong>Eco-city frameworks: international lessons</strong></td>
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<tr>
<td>Recommendations: towards international standards and frameworks</td>
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</table>
Eco-city indicators, standards and frameworks variously act as interventions in governing processes for urban sustainability. They do so by providing information, generating knowledge, shaping agendas, serving as tools for performance management and engaging various actors in ‘social learning’ and knowledge exchange. Thus, at one end of the spectrum, they can be understood as a technical exercise for specifying and assessing various urban sustainability dimensions; at the other end, they can be seen as an inherently socio-political process in the governance of sustainable city initiatives.

In considering the function of eco-city indicators, standards and frameworks, it is useful to take into account both generic features of indicators – as can be observed more broadly in other areas of sustainable development and other policy fields – and the particular urban contexts in which they are applied here. Concerning the former, research and practical experience over the last two decades or so have demonstrated the ‘constructed’ nature of indicators. While indicators may be defined and presented in technical and, thus, seemingly neutral terms – say, relating to the rate of urban public transport use across a specified period of time – they are essentially the product of socially constructed knowledge. As such, they reflect the particular ways in which those involved in defining indicators frame issues, make assumptions and set targets. The social construction of indicators is not problematic in itself, but it does prompt important questions about: who is involved in the process of their conceptualisation; how indicator data is captured, analysed and communicated; and how indicators are justified and warranted.

As a process of constructing knowledge, it is not surprising to see the present abundance of indicators, showing considerable variance, given the growing interest in, and evolving nature of, urban sustainability. Still, from a practitioner perspective in particular, the plethora of available urban sustainable indicators poses the conundrum of which (set of) indicators to use. It is partly for this reason that there has been growing focus on national and international eco-city frameworks as a way of guiding, standardising and ultimately accrediting urban sustainability initiatives. As conceptual and practical knowledge about urban sustainability further evolves, one may expect to see a consolidation of indicators in the form of standards and/or frameworks in the coming years and decades. This will, however, require a clear distinction between indicators defined as common principles and broad targets for use in frameworks at national and international levels, and indicators specifically defined for use in individual initiatives and settings.

**Indicators** are tools for (1) specifying urban sustainability, (2) defining related targets in measurable (quantifiable) ways, and (3) monitoring performance. They typically have a temporal dimension, with reference to past/present base values and targets for specified future periods. Individual indicators necessarily involve the reduction of complex information to singular dimensions.

**Standards** are commonly agreed norms, based on the aggregate assessment and integration of various indicator measures. Designed to be applicable across initiatives and sites, they are typically negotiated through formal consensus processes.

**Frameworks** are schemes combining sets of common targets and indicators under an overarching programme. Their purpose is: (1) defining urban sustainability coherently and comprehensively; (2) providing a more standardised approach to implementing urban sustainability across initiatives; and (3) offering integrated management packages, in the form of either open-source or certification-based step-by-step guides.

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Figure 1: Indicators in the context of urban sustainability
One of the challenges of developing and using eco-city indicators is how to take adequate account of the multiple complexity of urban sustainability, while keeping the conceptual and technical language of indicators sufficiently clear for use by various actors. Here, it is useful to consider how indicators relate to, and engage with, urban sustainability as governing process and context (Fig 1). Two key functionalities can be discerned: (1) relating to generating knowledge about urban sustainability; and (2) relating to managing urban sustainability strategies and initiatives. Concerning the former, this process involves various ‘epistemic communities’ (technical, policy, social), from environmental scientists to urban planners and from policy-makers to citizen groups. In other words, indicators – if they are to be place-specific and relevant to given organisational and policy processes as well as communities – should mobilise and integrate various knowledge sources (including local ones). Concerning the latter function, this entails guiding initiatives through project development and implementation and contributing to policy deliberation. Here, indicators serve to concretise urban sustainability policy in relation to specific projects and settings; in doing so they, in turn, facilitate wider policy formation and social learning. An important condition of indicators’ management function is the ability to provide market incentives: indicators, particularly when used in conjunction with certification processes, have the potential to integrate sustainability dimensions into market structures. This, however, depends on the perceived robustness, legitimacy and acceptance of indicators in the planning, policy and regulatory processes.

The process of generating knowledge about, and managing strategies for, urban sustainability is also intimately bound up with particular urban settings and governance modes. These relate to various urban systems (physical, environmental, socio-economic, political), scale (neighbourhood/district, city, metropolitan, city-region), and life cycles (development, implementation, policy/electoral cycle). Furthermore, they relate to context-specific political, socio-economic and cultural conditions. This underscores the multiple complexity of urban sustainability with which indicators have to engage. It further points to the importance of issues of integration and cohesion that any meaningful discussion and use of urban sustainability indicators need to address. Thus, rather than producing atomistic lists of indicators, an integrated approach requires connections to be made between various interrelated sustainability dimensions. For example, choices over land use, office:residential building ratios, and the provision of service facilities will co-determine the nature of, and potential for, sustainable transport. Similarly, urban infrastructure is intimately related to socio-metabolic resource flows. Indicators should reflect and articulate this interdependence.

Integration, cohesion and co-ordination are at the centre of governing efforts which variously seek to assemble diverse public, private and civil society actors in often new types of arrangements (e.g. public-private partnerships) with a view to working together to develop and implement urban sustainability initiatives. As such, indicators are typically part of new governance modes. Together with the future-oriented nature of urban sustainability, this then also points to the role of indicators as innovative practices. From this perspective, indicators and related frameworks have an important role in providing spaces and opportunities to learn about, discuss and practise urban sustainability.

In summary, conceptually it may be useful to approach eco-city indicators, standards and frameworks in terms of several distinct yet related governing functions that engage with various aspects of urban sustainability, rather than in terms of a narrow technical functionality (as can be found in some academic literature and policy practice). Table 2 summarises three prevailing governing functions, including definitional work (A), performance assessment (B) and social learning (C). Such an approach is also useful for discerning various indicator types; for example, ones used for carrying out technical assessments; setting overarching principles and targets; guiding particular local initiatives; managing organisational and project performance; and engaging various publics. It further clarifies the underlying modes of knowledge involved (analytical, managerial, communicative) and indicates the main audiences engaged.

<table>
<thead>
<tr>
<th>FUNCTION</th>
<th>MODE</th>
<th>AUDIENCES</th>
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| A – Definitional Work | – conceptualising urban sustainability  
– designing contents  
– structuring issues | – conceptual/analytical | – research community  
– planners  
– policy-makers |
| B – Performance Assessment | – assessing efficiency  
– monitoring performance  
– evaluating policy alternatives | – performance management  
– policy-making | – planners  
– developers  
– policy-makers |
| C – Social Learning | – integrating social values  
– social learning  
– co-producing action | – communicative deliberation | – citizens  
– stakeholders  
– planners |

It is probably the case that the majority of towns and cities across the world have sustainability goals and indicators of some form or another integrated in their strategic plans and planning policies. Attempting to catalogue them all would be impractical. Table 3 is, therefore, limited to indicator, standard and framework schemes associated with explicit eco-city policies, programmes and initiatives. The list is almost certainly not exhaustive, but it does briefly summarise the internationally most prominent schemes variously led by cities, national governments, international governmental and non-governmental organisations, and business organisations.

<table>
<thead>
<tr>
<th>Name of Initiative</th>
<th>Organisation</th>
<th>Features</th>
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<tbody>
<tr>
<td>Eco2 Cities</td>
<td>World Bank</td>
<td>Open-access framework to provide practical and scalable, analytical and operational framework for cities. Incorporates process-oriented indicators, with content-related indicator targets set locally.</td>
</tr>
<tr>
<td>Green City Index</td>
<td>Siemens</td>
<td>Technical tool for assessing urban sustainability based on global data from ≥120 large cities. Includes approx. 30 indicators in nine categories (e.g. buildings, CO2 emissions, energy, transport, waste, water).</td>
</tr>
<tr>
<td>Green Cities Programme</td>
<td>OECD</td>
<td>Assessment programme with focus on ‘green growth’ and sustainability policies for metropolitan areas. Based on multi-city analyses, the scheme aims to advise city leaders on policy ‘best practice’.</td>
</tr>
<tr>
<td>Hitachi Smart Cities</td>
<td>Hitachi</td>
<td>Development of standardised ‘smart city measurement indicators’, with special focus on urban infrastructure, and urban management systems.</td>
</tr>
<tr>
<td>ICLEI Star Community Index</td>
<td>ICLEI Local Governments for Sustainability</td>
<td>Jointly developed with US Green Building Council as a ‘national standard’ for sustainable communities. 81 goals and ten guiding principles serve as resource tool for sustainability assessments and plans.</td>
</tr>
<tr>
<td>Iefs</td>
<td>Ecocity Builders</td>
<td><em>International Ecocity Framework and Standards</em> acts as a methodology/certification platform based on the urban environment as a wider bioregional system. Designed to be used with other rating systems.</td>
</tr>
<tr>
<td>Living Building Challenge</td>
<td>International Living Future Institute</td>
<td>Urban sustainability design framework and certification programme, focused on buildings and neighbourhoods. Includes seven performance areas: beauty, energy, equity, health, materials, site, water.</td>
</tr>
<tr>
<td>One Planet Communities</td>
<td>BioRegional</td>
<td>Multi-stage certification scheme based on ecological footprint analysis and ten corresponding principles. Action plans produced through benchmarking measurement and stakeholder workshops.</td>
</tr>
<tr>
<td>RFSC</td>
<td>European Union</td>
<td>The <em>Reference Framework for Sustainable Cities</em> provides an online toolkit to assist European cities in developing and assessing urban sustainability strategies and action across planning and policy cycles.</td>
</tr>
<tr>
<td>SlimCity</td>
<td>World Economic Forum</td>
<td>Annual survey-based assessment of ‘eco-efficiency’ (energy, mobility, resources etc.) measures, with recommended use of World Bank city indicators and metrics.</td>
</tr>
<tr>
<td>Smarter Cities Challenge</td>
<td>IBM</td>
<td>‘Smarter cities assessment’ tool for customised key performance indicator (KPI) measurements and city benchmarking (against peer cities) based on global data. Offers ‘intelligent operations centre’ solutions.</td>
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### NATIONAL EXAMPLES

<table>
<thead>
<tr>
<th>Indicator Scheme</th>
<th>Body</th>
<th>Description</th>
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<tbody>
<tr>
<td>BREEAM Communities</td>
<td>BRE UK/Global</td>
<td>Multi-stage assessment and certification scheme designed for urban master planning. Covers six urban sustainability areas (energy, governance, innovation, land use, socio-economic development, transport).</td>
</tr>
<tr>
<td>CASBEE UD</td>
<td>Japan GreenBuild Council</td>
<td>Assessment system for ‘built environment efficiency’ (incl. districts/cities) regarding economic, environmental, and social criteria. In association with Japan Sustainable Building Consortium.</td>
</tr>
<tr>
<td>DGNB NSQ</td>
<td>German Sustainable Building Council</td>
<td>Certification system for new neighbourhoods, including 50 indicators across six quality dimensions (environmental, economic, process, socio-cultural, site, technical). Allows for flexibility across contexts.</td>
</tr>
<tr>
<td>Eco-city Development Index System</td>
<td>Chinese Society for Urban Studies</td>
<td>Proposed national indicator framework, organised along five categories and 28 indicators. Specific targets for majority of indicators, with eight indicators defined more flexibly in terms of ‘innovative approaches’.</td>
</tr>
<tr>
<td>Enterprise Green Communities, USA</td>
<td>Enterprise Community Partners, Inc.</td>
<td>Not-for-profit certification programme to support sustainability initiatives for affordable (low income) neighbourhoods. Free online planning/indicator tool includes mandatory and optional criteria.</td>
</tr>
<tr>
<td>Green Communities</td>
<td>US Environment Protection Agency</td>
<td>Open access ‘assistance kit’ to guide community-led sustainability action plans. Multi-stage process, including guidance on selection, use and reporting of sustainable development indicators.</td>
</tr>
<tr>
<td>Green Star Sustainable Communities</td>
<td>Green Building Council of Australia</td>
<td>Rating tool providing best practice benchmarking and certification for community-level developments. Indicator areas include: design, economic prosperity, environment, governance, innovation, liveability.</td>
</tr>
<tr>
<td>IGBC Green Townships Rating System</td>
<td>Indian Green Building Council</td>
<td>Three-stage rating/certification scheme for large-scale developments (incl. residential areas). Four indicator categories: community development, environmental and land use planning, resource management.</td>
</tr>
<tr>
<td>LEED ND</td>
<td>US Green Building Council</td>
<td>Multi-stage certification scheme operation at neighbourhood level. Focus on green buildings, smart growth and urbanism, including green infrastructure, integrated transport and liveable community.</td>
</tr>
<tr>
<td>Sustainable Communities</td>
<td>Audubon International</td>
<td>Multi-stage certification scheme based on Audubon International Principles for sustainable resource management. Specific performance indicators defined by community, with annual re-certification.</td>
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### MUNICIPAL EXAMPLES

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<thead>
<tr>
<th>Indicator Scheme</th>
<th>Body</th>
<th>Description</th>
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<tbody>
<tr>
<td>Caofeidian Eco-City</td>
<td>Tangshan Municipality</td>
<td>Purpose-built framework comprising 141 indicators (of which 109 planning and 32 management indicators) for city, neighbourhood and building levels.</td>
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<tr>
<td>Eco-Metropolis 2015</td>
<td>City of Copenhagen</td>
<td>Strategic vision statement aimed at making Copenhagen ‘the environmental capital of Europe’. Includes ten indicator categories, of which six are environmental and four social.</td>
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<tr>
<td>Greenest City 2020</td>
<td>City of Vancouver</td>
<td>The Greenest City 2020 Action Plan incorporates ten headings focusing on carbon emission, ecosystems, and waste. 15 high-level output indicators (targets) guide the step-by-step implementation plan.</td>
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<tr>
<td>SolarCity Linz</td>
<td>City of Linz</td>
<td>Piloted for Linz, but designed as a replicable indicator framework for master planning. Includes six categories (economy, environment, facilities, planning, space, transport), each with six indicators.</td>
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<tr>
<td>Tianjin Binhai Ecocity</td>
<td>Singapore and Chinese governments</td>
<td>26 tailor-made Key Performance Indicators with focus on resource efficiency, and incorporating Sino-Singaporean national standards.</td>
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<tr>
<td>Treasure Island</td>
<td>Treasure Island Development Authority</td>
<td>Sustainability master plan incorporating four indicator categories (community, energy, resilience, waste), each with specific indicator targets. Incorporates LEED ND and Climate+ Development Program.</td>
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</table>
The local, place-specific conditions of urban sustainability are always going to be a key determinant of how indicators, standards and frameworks are defined and applied. At the same time, a clear trend can be observed towards international schemes aimed at generically guiding the design, planning and implementation of various eco-city initiatives. Four such prominent international schemes are introduced here. They demonstrate some of the variety of underlying conceptual approaches, indicator types and roles, organisations involved, and the use across global regions. From a comparative perspective, questions arise as to what key similarities and differences can be identified, and how these international approaches interrelate with national and local practices.

One obvious feature of each of the four (and other) frameworks is the express purpose of common applicability in different contexts around the world, in contrast to frameworks primarily defined by, and grounded in, particular local, regional or national contingencies. The Clinton Climate Initiative’s Climate Positive Program (Climate+) is a case in point: it currently includes 18 municipal initiatives across continents, from Australia to the USA and from Brazil to Sweden. Its common framework is centred upon the output-oriented goal of achieving carbon-positive development, with a particular focus on energy, transport and waste. It supports partner projects individually through a multi-stage accreditation process and facilitates collaborative knowledge exchange among network partners. The other schemes discussed here, too, use broad common frameworks, albeit each placing different emphasis on particular substantive and procedural aspects of urban sustainability.

This, then, points to a second feature of international frameworks: they typically set out principles and goals of urban sustainability in broad terms, rather than detailing measures through specifically defined (or technologically prescriptive) indicators. For example, BioRegional’s One Planet Communities framework outlines ten ‘common international principles’, commensurate with its overall principle of striving for ‘one planet living’ based on ecological footprint analysis. In similar vein, the World Bank’s Eco2 Cities initiative promotes broad principles of urban sustainability framed in terms of a synergy between economic and ecological sustainability. In this case, characteristically, the set of broad indicators also places particular emphasis on governance processes, including social learning and performance management.

Following from this, international schemes typically take into consideration the need for their broad principles and indicators to be aligned with particular policies and processes on the ground. Since the local settings in which they are to be used are so varied, international schemes need to be flexible enough to avoid tensions with local policies and concerns over legitimacy. Different approaches are used to facilitate this global—local interaction. Eco2 Cities, for example offers a tool and resources designed to enable municipal actors to define for themselves specific, locally relevant goals and indicators for urban sustainability, based on the broad principles outlined in the framework. For the purpose of the latter, then, is not so much to impose particular targets and measures of urban sustainability, but to facilitate a collaborative process of analysis, planning and learning among relevant municipal stakeholders. In the case of the Climate+ Program, the framework’s focus on output indicators (climate-positive development at operational stage) means that there is flexibility concerning the means of implementation, thus allowing for local variation. In other words, while setting an overall development goal, it does not prescribe the specific actions or related indicators which need to be adopted locally, in order to reach that goal.

In considering the interaction between international frameworks and local initiatives, one also needs to consider the raison d’être and motivations of those promoting international schemes. These have a bearing on both how urban sustainability is conceptualised and the nature of global—local interaction. For example, several global technology firms have begun to offer their own brand of urban sustainability frameworks. These typically emphasise smart technological solutions and are offered as commercial products. Similarly, various international ‘green building/Neighbourhood’ certification schemes are commercially marketed by competing organisations.
The four examples discussed here are either by public bodies (Eco2 Cities, Community Capital Tool) or charitable organisations/foundations (One Planet Communities, Climate+ Program) whose aim is to support and enable the development and implementation of initiatives on the ground as well as to encourage shared practice learning across initiatives. To this end, the One Planet Communities scheme, for example, is available on an open-source basis. BioRegional aims to move towards full open-source accreditation, thus potentially overcoming resource problems in developing countries. Future development may see international bodies providing funding for open-source accreditation to take place.

The Community Capital Tool addresses the problem of resources in poorer localities in a different way. As a cheaper and quicker alternative to its main comprehensive ‘balance sheet’ instrument (which entails formal measurement processes), its ‘scan’ tool is based more on self-generated, qualitative assessment. In this way, lack of resources and capacity to implement a whole standardised framework or process need not mean that a locality is entirely excluded from a common process of moving towards the sustainability goals enshrined in the scheme.

Indicators in these four frameworks (and elsewhere) should not be understood as standards in the sense of agreed common norms applicable universally. (Such standards are not currently available, although international bodies, such as the International Standards Organisation, ISO, are reported to be working in the area.)

Instead, from the aforementioned governance perspective, their function can be seen as facilitating conceptualisation (definitional work), integrated planning (performance management) and collaborative action (social learning) on urban sustainability through shared, international processes. Together, as an aggregated process, the various global frameworks – complemented by national and local schemes – may over time contribute to standardisation. One can, indeed, speculate that the years to come may see a growing concentration into just a few dominant approaches.

Climate Positive Development Program

The Climate+ Program was launched in 2009 by the Clinton Climate Initiative and currently involves 18 mostly ‘in-fill’ urban projects around the world. The programme’s focus is on achieving carbon neutral/positive developments through carbon emission cuts and carbon credits (measured as outcome at operational stage; excluding construction stage). Indicators are defined in relation to three main areas: energy, transport and waste. The programme operates on the basis of a multi-stage accreditation scheme. Since 2011, the Climate+ Program has been run by the C40 Cities Climate Leadership group, in partnership with the Clinton Climate Initiative.

The global—local interaction is characterised by the application of an internationally applicable output indicator (= carbon positive development) which, however, is not in conflict with (in fact it encourages) local flexibility in the means of reaching it. The scheme explicitly requires local decision-making on strategy for meeting the output target. This may involve importing complementary sets of indicators from elsewhere (e.g. LEED ND). In terms of urban sustainability definition, the scheme deliberately espouses a narrow primary focus on carbon emissions, as a means of enabling the management and measurement of tangible outputs.

Eco2 Cities

The Eco2 Cities initiative was launched in 2010 as part of the World Bank’s Urban and Local Government Strategy, and is aimed at cities in the developing world. Its approach was shaped by an analysis of ‘best practice’ urban sustainability initiatives around the world (including Curitiba, Stockholm and Yokohama). The initiative currently supports a series of ‘catalyst’ pilot projects in Vietnam, the Philippines and Indonesia, with the intention that these can be scaled up to city-wide level. It focuses on a comprehensive integrated sustainable urban development framework – rather than prescribing specific technology or policy solutions – which seeks to encourage synergy between economic and ecological sustainability. It assists local stakeholders in defining priorities in each case, following which indicators are introduced, with cities choosing these as required.

Eco2 Cities represents a prime example of an initiative taking inspiration from existing best practice initiatives, thus illustrating the process of ongoing learning and experimentation in the field of urban sustainability. The emphasis on the process of sustainability framework definition and implementation, rather than on specific indicator content, allows for the alignment of high-level goals and local engagement, with a strong social learning element.
The benefits of greater global integration – through current international frameworks or future standards – are threefold: first, it emphasises common interests and concerns shared by cities, centred upon the idea of the physical ‘limits’ of the planet (resources, environmental vulnerability etc.). This reflects the existing commonality of themes found across otherwise disparate types of ‘eco-city’ initiatives, including reducing carbon emissions, ensuring clean water provision, improving biodiversity, as well as related themes, such as promoting sustainable socio-economic wellbeing and supporting civic participation.

The second benefit lies in the incentives for both local and national governments to improve their sustainability: successful performers stand to benefit from being branded as distinctively ‘green’ in a competitive national or international environment, while reticent cities, regions and nations will face keener social pressure to improve their performance. League tables – such as the Japanese eco-town awards and the European Union sustainable city competition – can provide useful incentives at national and regional levels to encourage cities to become engaged in urban sustainability development.

The third benefit of globally more integrated approaches is comparability and replicability. This incentivises private developers by making accreditation and certification feasible and meaningful from a business perspective. It also, more widely, benefits researchers, policymakers, planners and communities by improving comparative knowledge and encouraging policy transfer and shared practice.

Finally, the question of who should conduct any monitoring is also a key one. For international frameworks to be effective, it would seem vital for independent auditors to be involved. Here again, however, the particular implications for resource-limited settings need to be considered. There may be an important role for international bodies, such as the UN or independent research and audit organisations, to take on the responsibility of overseeing and validating independent monitoring of urban sustainability frameworks.

**One Planet Living/Communities**

<table>
<thead>
<tr>
<th>Ten principles of One Planet Living</th>
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<tr>
<td><strong>Natural Capital</strong></td>
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<tr>
<td>1. Assessing local biodiversity, making buildings more energy efficient and determining ways to adapt buildings to environmental conditions.</td>
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<tr>
<td><strong>Social Capital</strong></td>
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<td>2. Reducing waste, moving towards sustainable, clean transport, or by employing poverty alleviation, social exclusion or remediation.</td>
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<tr>
<td><strong>Human Capital</strong></td>
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<tr>
<td>3. This principle is reflected in national and international trends, recognizing the need for social, economic and environmental sustainability.</td>
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<tr>
<td><strong>Economic Capital</strong></td>
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<tr>
<td>4. Building sustainable and healthy products, such as those with low embodied energy and materials, made from renewable or waste resources.</td>
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<tr>
<td><strong>Ecological Capital</strong></td>
</tr>
<tr>
<td>5. Encouraging local participation in and linking with regional and national processes, such as those on renewable energy and reducing or reusing waste.</td>
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<tr>
<td><strong>Community Capital</strong></td>
</tr>
<tr>
<td>6. Access to social determinants of health and wellbeing. Being able to move efficiently in the urban environment is vital for health and wellbeing.</td>
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</table>

**Community Capital Tool**

The Community Capital Tool was developed in partnership between Simon Fraser University (Canada) and Tilburg University (the Netherlands). It conceptualises community capital as having six mutually reinforcing forms (see above) with specific indicators attached to each. Thus, it represents a conscious move away from the ‘three pillar’ (environment, economy and society) approach to sustainability. It takes two forms: a ‘balance sheet’ instrument (with formalised measurement process); and a more simple ‘community scan’ (more subjective, quicker, and based on local people’s perceptions). The ‘scan’ is available free online in English, Spanish, and Portuguese. In both cases, it tool designed to allow for accessible visualisation of results through simple diagrams.

The divergence from the three pillar model of sustainability is a response to the lack of agreement about how sustainability should be defined in practice. The ‘community scan’ version of the tool represents an example of an approach which actively aims to be inclusive of cities in developing countries. The ‘social learning’ governance function of indicators is clearly in evidence here, enabling communities of all types at least to deliberate on sustainability if not to implement a formalised measurement process.

NGO BioRegional’s ‘One Planet Living’ concept is derived from ‘ecological footprinting’ and conceptualised around ten principles (see above), with specific indicators for each of these. It is currently operational in initiatives at different scales – One Planet Communities and One Planet Regions – but is also being used as a framework for One Planet Companies. It functions as a formal (paid for) accreditation process, but is also investigating a fully open-source approach (with training and tools provided). The process involves benchmark measurement followed by key stakeholder workshops, leading to an action plan and ongoing measurements. It is now being applied in 51 countries (in 12 of which formal accreditation has been achieved).

The open-source model is one way in which the constraints imposed by capacity and budget problems in less wealthy cities can be overcome. The variety of contexts in which it has been adopted reflects ‘best practice’ in at least three respects: first, the deliberate simplicity of its presentation and use may have been instrumental in securing buy-in from diverse users. Second, its relative emphasis on ‘health and happiness’ may have significant appeal for the general public. Third, its adoption across different countries suggests considerable success in devising a common language through which sustainability can be defined.
Within the global–local spectrum of urban sustainability indicator frameworks, national schemes occupy an important place: in relation to the local, they provide an overarching set of generic goals, targets and standards; in relation to the global, they provide models for bilateral co-operation and adaptation in other national settings.

Historically, national schemes have often evolved from green building indicators and/or codes. As sustainability has become more broadly established in urban policy (transcending from buildings to other urban policy areas), and with growing interest in urban-scale developments by commercial operators, the original indicator schemes have been expanded to encompass the neighbourhood, district, or even the city as a whole. LEED® ND and BREEAM Communities are examples of this recent trend. In addition, national schemes often draw on broader environmental policy (e.g. relating to air pollution, water quality, biodiversity) and socio-economic policy (e.g. employment, health care, education).

Some indicator frameworks are embedded within national sustainability policies or initiatives, such as the UK government’s Eco-Town initiative for England. Most, however, should not be considered national in the sense that they are based in government agencies, or are directly linked to national policy. Instead, they can be seen as national in the sense that they are run nationwide by non-governmental professional bodies on a voluntary ‘opt-in’ basis, rather than on a mandated legislative basis. For example, LEED® ND is an initiative of the US Green Building Council, a non-profit trade organisation; BREEAM Communities is an initiative by BRE, a private UK organisation that emerged from the privatisation of the governmental agency, the Building Research Establishment. DGNB NSQ is a planning and certification scheme by the German Sustainable Building Council (Deutsche Gesellschaft für Nachhaltiges Bauen, DGNB), aimed at in-fill urban developments (Neubau Stadtquartiere, NSQ). These and similar indicator frameworks act as quasi non-governmental planning and accreditation schemes used primarily by private developers and to a lesser extent by municipal authorities. As such, they offer industry-accepted standards for urban sustainability. The success of these schemes at national level, coupled with the trend towards global marketisation of urban sustainability, has meant that such schemes are also increasingly promoted internationally.

Elsewhere, national indicator schemes are promoted by governmental agencies themselves, and developed through bilateral co-operation. The Low Carbon City in China (LCCC) initiative is such an example: it is the result of a co-operation between the Swiss and Chinese governments. It uses a set of indicators focusing primarily on low-carbon innovation linked to economic development. To date, seven Chinese municipalities have signed up to the initiative. The extended focus – from ‘green’ buildings to sustainable neighbourhoods, districts and even cities – brings with it the potential for extended functionality of ‘national’ schemes: from primarily serving as certification tools aimed at developers, to acting as policy, planning and monitoring tools involving various actor groups (planners, developers, communities). However, this should also prompt questions about the balance between new (in-fill) developments – which current schemes mainly focus on – and retro-fit initiatives; the role of voluntary versus mandated schemes (both have a role to play, though this requires careful balance); and the respective roles of national trade organisations, local government and community groups in leading on urban sustainability initiatives.

**BREEAM Communities**

BREEAM Communities is an environmental assessment method and certification scheme launched in 2012 by BRE (Building Research Establishment Ltd), a private organisation and founding member of the UK Green Building Council. While the standard BREEAM environmental rating system (launched in 1990) is tailored to individual buildings (with over 200,000 buildings certified worldwide), BREEAM Communities is specifically designed for master planning at the district/neighbourhood level concerning new, infill and regeneration projects. It acts as an independent, third party assessment and certification standard for use at project design and authorisation stage. The scheme covers six categories: governance; innovation; land use and ecology; resources and energy; social and economic wellbeing; and transport and movement. It uses a three-stage sustainability assessment process relating to: (1) the principle of development (issues and opportunities) concerning the selected site; (2) the overall layout of the proposed development; and (3) design details, such as use of technologies, landscaping issues, aesthetics, materials used etc. (Certification for individual buildings is covered by the standard BREEAM rating system.)

One way in which BREEAM Communities aims to achieve national – and international – applicability is by avoiding a prescriptive approach to design solutions. It uses a ‘balanced scorecard’ approach, with a mixture of mandatory and ‘tradeable’ assessment criteria, to allow for flexibility with regard to local conditions (commercial and other). The methodology was streamlined for the 2012 relaunch, so as to make the scheme more user-friendly for developers.

“Because we all live on the same planet, we need an international framework. But based on this frame, each country can have its own indicators, and each city and region can also develop more specific indicators.”

Do Tu Lan, Ministry of Construction (Vietnam)

“At the local level, an indicator system can make a city more quality controlled. However, an international eco-city indicators system is more about comparing – to give us a common language.”

Shanfeng Dong, Bluepath City Consulting (China)
German Urban Sustainability Frameworks

In Germany, a wide variety of national, regional, and local frameworks have been devised and/or implemented since the mid-1990s. One of the earliest examples was the Cities of the Future (Städte der Zukunft) scheme, piloted and then tested across Germany from 1996 onwards. This led to the publication in 2003 of a national framework with 12 core (easily measurable) indicators along with 12 optional, more complex ones. However, it never became more than a recommended approach, due to the regional federal structure of Germany, along with local municipal autonomy.

By way of an example of a more successful (recent) initiative, the German Sustainable Building Council (DGNB – Deutsche Gesellschaft für Nachhaltiges Bauen) has developed certification systems for new developments – at building level (DGNB) and neighbourhood level (DGNB NSQ) – with approximately 50 criteria organised into six dimensions (see above). The DGNB NSQ system differs from many other frameworks in terms of the substantial involvement of the private sector. It is designed to be flexible for different building types and different country-specific requirements, and is currently being marketed for international application. It does not, however, cover retro-fitting.

The DGNB certification system is a good example of a scheme which focuses on individual buildings and new in-fill projects; perhaps this partly explains its particular appeal to many private developers. However, this may come at the expense of a consideration of the wider urban context. Given the importance of the private sector in driving the uptake and wider acceptance of frameworks, there is some risk that more holistic accreditation schemes are at a disadvantage in this respect. DGNB NSQ highlights the importance of considering the objectives of certification: it is valued by private developers, but may serve other objectives (e.g. social learning, policy development, national monitoring) less well. This is important when such schemes have international aspirations, and considering the general trend towards consolidation at national and international levels, as it highlights the need to involve a wider group of stakeholders to achieve more rounded urban sustainability frameworks.

Sustainable City Programmes in China: LCCC / CAAC

The Low Carbon City in China (LCCC) and the Clean Air Alliance of China (CAAC) are both examples of initiatives which have come about as a result of international co-operation. The LCCC programme was launched jointly by the Swiss and Chinese governments in 2010, and is now running in seven municipalities. It supports local authorities in their efforts to define and assess sustainability through the application of the LCCC Index System, which includes 16 primary and 53 secondary indicators. CAAC was initiated by the US Energy Foundation, in collaboration with Chinese governmental departments, research organisations and other partners including NGOs, in order to support local mayors in devising and implementing their clear air strategies. Here, the overall goal of low carbon/GHG emission reduction is pegged to local issues of air pollution and clean air policy (and, therefore, indirectly also public health). It includes 16 indicators, intended to be applied annually: seven of these are categorised as ‘status’ indicators, relating to absolute air quality, emission levels, and energy mix; nine are categorised as ‘action’ indicators, focusing on city-specific efforts, such as public transport use.

In the case of both initiatives, alignment with national governmental schemes is understood to be essential to gain wider resonance. At the same time, commitment from municipal leaders is equally seen as a necessary condition for success: simply imposing national frameworks on localities does not guarantee their acceptance in the long run. As in other developing countries, issues of data quality and availability at local level have emerged (along with a lack of resources to address this), with implications for the usability of both national and international frameworks. Even where best practice and financial and operational support are shared by governments and non-governmental organisations from the developed world, this may not overcome more local issues of capacity.
It is to the specific initiative and the local level that one has to turn, in order to learn about the use of urban sustainability indicators in practice. Here, in relation to particular contexts, one gains insight into how (sets of) indicators are chosen, what particular role they play in policy-making, planning and development, and how they resonate with decision-makers, developers and the community.

Many local indicators can be seen as ‘input’ indicators (e.g. number of hospitals planned, introduction of renewable energy technology) rather than ‘output’ indicators (e.g. improvements in public health, air quality). Output indicators lend themselves more easily to cross-city comparisons, and may sit more easily in higher level frameworks, or work as ‘topline’ indicators at the local level. They are therefore more closely related to overall principles and goals; input indicators are typically tied to specific action plans.

As the featured case studies reveal, the selection of indicators and related policies at more local levels inevitably takes place, and needs to work, within local conditions (economic, social and environmental) and political and institutional processes, rather than in spite of them. This need is particularly pressing in countries with strong regional and local autonomy (for example, Germany), where bottom-up motivation to take up urban sustainability initiatives is pivotal, rather than an assumption that schemes devised by central government can simply be imposed. But even in countries with an accepted tradition of top-down planning, contextual factors should be understood as design constraints that help to define sustainability in a way which is meaningful to local realities, rather than as barriers.

These constraints should not be seen as fixed – indeed, changing them may be one of the goals of a sustainability initiative, and changes may well come about as part of the associated process of social learning. All this need not mean that sustainability can only ever be a contingent, socially constructed goal at the local level. Rather, the acknowledgment of local constraining conditions serves further to clarify the task of international and national actors as one in which the definition of core principles and aspirations must simultaneously achieve universal relevance and allow for local adaptation.

At local level, a whole range of institutional and political factors can affect the way in which urban sustainability indicators are shaped and deployed. This includes, among others: (1) the degree of integration among different governmental departments and service providers (and, conversely, the existence of institutional silos), which has an impact on how well environmental, economic and social sustainability measures are interrelated; (2) local government capacity generally, which determines the scope of implementable indicators and related policies; (3) electoral cycles, which may impede the continuous, long-term application of urban sustainability strategies and, therefore, render the use of indicators more or less useful; (4) the availability and accessibility of data, which underpin the comprehensiveness and accuracy of indicators; (5) resistance to accountability, which may undermine the transparency and openness required for indicators to yield meaningful information and encourage monitoring and learning; and (6) planning regulations and wider policy frameworks, which may incentivise, or conversely discourage, the development of indicators for urban sustainability.

“In the US, there are many cities that have started very actively to work on their plans for urban sustainability, and have targets… In India and China, there are cities which are very proactive in trying to take interesting steps… ahead of their peers”

Vatsal Bhatt, Brookhaven National Laboratory (US)

“Actually, I don’t think we could standardise sustainability, because each country has its own peculiar needs and characteristics.”

Luis A. Paredes, Housing & Land Use Regulatory Board (the Philippines)

“There has been a substantial increase in the number of frameworks and sets of indicators for eco-cities or green cities or neighbourhoods – probably due to the lack of frameworks on a larger, global scale.”

Jutta Berns-Mumbi, ecocentric cc South Africa)

“There are so many different cities in the world, with different economic and natural conditions, developmental levels, and different capacity. So it’s very difficult to standardise indicators applicable to all cities and at all levels. Instead, we emphasise the definition of sustainable urban development and the importance of working with institutions on process.”

Hiroaki Suzuki, Eco2 Cities (World Bank)
The Sino-Singapore Tianjin Eco-City and the Sino-German Qingdao Eco-park are both new-build flagship developments led by Chinese national ministries, in collaboration with Singapore and Germany, respectively. Both are expected to accommodate a large number of residents upon completion: 350,000 in Tianjin; 60,000 in Qingdao. Both share a common sustainability framework based on four dimensions (economy, society, environment, resource). Tianjin aims to provide a sustainable community in which to live and work, utilising an indicator system with 26 Key Performance Indicators, with a particular focus on resource efficiency. Qingdao is aimed more at encouraging economic growth, using 40 KPIs. In both cases, the KPIs draw on current statistical data and are linked within planning documents to very specific action points and detailed processes.

Both cases provide good examples of the often very concrete nature of indicator content at local level (when compared with the more open-ended principles and output targets included in higher level frameworks), as well as the way in which frameworks may need to build in flexibility over time. A degree of reflexivity is embedded within their implementation in each case: they are understood as representing a ‘quality control process’, with a feedback loop for continual adjustment of indicators. As a pioneering indicator system, Tianjin originally set 26 KPIs, but envisaged that these would need expanding and adapting as the development proceeded. A tension between relevance over time and comparability is therefore evident.

The developing world context serves to highlight the limitations of existing international frameworks: each one has different problems of local applicability in this case. On the other hand, the national GSSA scheme – developed to take account of local conditions, particularly at the building level – features some indicators that are less stringent than those of international rating tools. Local authorities, while supportive of developments such as Menlyn Maine, are not currently strong drivers in the process. This is partly due to prevailing resource and capacity constraints, and partly due to other pressing urban development challenges facing local government. Consequently, private developers play a pivotal role. The value of international frameworks as incentives to sustainable development taking place is therefore particularly important in developing countries: the marketing value of certification schemes is a key factor driving their adoption which, in turn, encourages more sustainable approaches to development.
Ho Chi Minh City (Vietnam)

Ho Chi Minh City is the largest conurbation in Vietnam: its population is predicted to rise from the current 7+ million to 10-12 million by 2025. While being the key regional and national economic hub, it suffers from traffic congestion, air pollution, flooding and faces significant threats from rising sea levels. In response, the authorities have developed a sustainability vision with input from the World Bank’s Eco2 Cities initiative. This has fed into a master plan which looks forward to 2050, setting intermediate goals for 2025. The main sustainability indicators to be adopted relate to transportation, green open spaces, increased water reserve areas and the sustainability of the port area. Additionally, several hundred ‘urban upgrading’ projects with focus on low-income areas are taking place around the city at present, with funding support from the World Bank. New residential developments in the city are being built with increasingly green credentials – even if many of these respond to market demands for waterfront locations (and may therefore be at risk of flooding in future).

Ho Chi Minh City provides a good example of the local interpretation of sustainability being grounded in the context of a city’s individual trajectory and geography (reflecting the philosophy of the Eco2 Cities initiative). Relatively little priority to date has been given to green energy, for example, in striking contrast to many schemes around the world, while water management is given prominence. The importance of local institutional capacity in shaping implementable plans is also exemplified here. Key challenges in defining sustainability have included a lack of relevant urban statistics with which to plan, as well as some difficulties in achieving integration across ministries.

Surat / Gandhinagar Solar Cities (India)

The cities of Surat and Gandhinagar (both in Gujarat) are included among the preliminary ‘model solar cities’ within a programme initiated by the Indian government. In 2009, the Indian Ministry of New and Renewable Energy (MNRE) announced plans to develop a (target of) 60 ‘solar cities’ within a context of ongoing economic growth and urbanisation, which is likely to lead to demand for energy outstripping supply. The programme provides support for municipal corporations in promoting the use of renewable energy, with a target of reducing conventional energy use by a minimum of ten per cent over five years in each city. Technical assistance from Brookhaven National Laboratory (US Department of Energy) is geared towards introducing indicator frameworks for planning, implementation and management of renewable energy generation and energy efficiency measures in Surat and Gandhinagar. The long-term goal in both these exemplar cities is to meet all energy needs from local renewable sources.

These cases demonstrate the way that local initiatives may be facilitated, but not predetermined in the specifics of their approach, by national government interventions. In particular, the national government facilitates international input to help overcome local capacity problems. This facilitating function does not only relate to the introduction and integration of technological systems, but also to early planning stages (including sharing knowledge about indicators). While the focus in both cities is a narrow one (on energy), this may reflect their developing world context, where a particular issue is identified as particularly pressing. In such contexts, large holistic indicator frameworks may have more relevance at a later stage.
Considering these complex contextual factors and dynamics, it becomes clear that no single ready-made framework will be sufficient in itself to address all locally identified sustainability objectives. Indeed, cities and urban developments do in fact sometimes choose to adopt multiple frameworks. Menlyn Maine, a planned new district in Pretoria (South Africa), is a case in point: it is signed up to the Climate+ Program (with focus on carbon-neutral development), but also pursuing LEED ND, in order to incorporate additional neighbourhood sustainability measures not covered by the former. Furthermore, Menlyn Maine uses the Green Star South Africa (GSSA) rating system, a voluntary set of green building rating tools developed by the South African Green Building Council. Similarly, Victoria Harbour, a mixed-use redevelopment in Melbourne (Australia), is accredited within the Climate+ Program, while at the same time using the Green Star indicators of the Green Building Council of Australia. The initiative, furthermore, has to comply with the Melbourne Docklands Ecologically Sustainable Development Guide (the state government’s sustainability framework specific to that location) which itself includes a variety of performance indicators.

The choice of multiple frameworks, then, is illustrative of the currently unresolved tensions between global and local indicator frameworks. However, their variety should not be understood as arbitrary, or as serving to encourage further fragmentation in the variety of evident approaches. Rather, it points to the reality of the complementary and, to an extent, overlapping, use of existing indicator schemes and frameworks. If some developers are choosing to sign up to voluntary schemes in addition to compulsory ones, in order to gain additional national and international recognition in the field, then they clearly judge it to be in their financial interests to do so. However, the cost implications of such an approach may deter others: on top of paying membership fees, substantial preparatory work may be required to gain accreditation.

Market demand, then, is likely to play a significant role in determining the nature and rate of development. Looking beyond commercial considerations, however, public acceptability in a broader sense is key to the introduction and ongoing success of urban sustainability initiatives and the associated use of indicators – and particularly so at the local level. Resonance among relevant civil society groups, community organisations and the wider citizenry is likely to be enhanced through sensible consultation and engagement processes. While the pitfalls of consultation in policy planning processes have been discussed in a wide body of literature, there is common agreement that some form of consultation is an important aspect of democratic accountability. There is an ongoing role for academic researchers to identify and disseminate best practice in this respect, so as to support sustainability initiatives in various urban settings. Local authorities and practitioners who manage consultation processes should, similarly, do so in a reflexive way and encourage practice learning.

Victoria Harbour, Melbourne (Australia)

Victoria Harbour is a mixed-use [office/ retail/residential] development which forms part of the wider regeneration of Melbourne Docklands. It is expected to accommodate 25,000 workers and 2,800 households on completion in 2021. It is being developed in accordance with several higher-level sustainability frameworks. It is included in the Clinton Climate Initiative’s Climate Positive Development Program; makes voluntary use of the Green Building Council of Australia’s Green Star indicators (for Office, Multi-unit Residential rating tools and the Green Start Communities Pilot Tool); and is required to comply with the statutory framework of the Melbourne Docklands ESD [Ecologically Sustainable Development Guide], which also includes performance indicators.

The multiplicity of indicator sets used in this case does not signify an arbitrary ‘pick and mix’ approach; rather, a conscious attempt to benchmark performance in a “practical and meaningful way” in the local context. The successful development of large projects of this type is therefore indicative of the centrality of the private sector as an actor in shaping sustainability on the ground. It is further indicative of the fundamental importance of involving the private sector when devising local indicator frameworks. This raises questions, on the other hand, about the extent to which local markets should be allowed to shape indicators. The case of Victoria Harbour also illustrates the fact that ‘city level’ is not the lowest one which thinking about standardisation needs to consider: in this case, separate indicators are used to assess individual buildings and for the district as a whole; in turn, these are constrained by the broader Docklands ESD guide, as part of the broader city-wide policy framework.
As noted, in designing or choosing indicator frameworks, the issue of monitoring needs to be carefully considered. While, in this respect, objectivity (for example, through independent auditing) is a key consideration in many accreditation schemes – especially those intended to be applicable across contexts – it may be the case that in-house monitoring of indicators may suffice when ‘social learning’ is a key objective of local initiatives. This may well be the case in pilot initiatives, or ones where there is little desire to compare outcomes with those elsewhere. Resource requirements are a further consideration: particularly in resource-limited settings, questions about how and at what cost schemes are administered, monitored and reported need to be addressed.

The contingent nature of local indicators means that the breadth of the stated urban sustainability goals and related measures may vary quite significantly across initiatives. In some cases, these goals and measures may focus on a very small number of particularly pressing issues. In developing countries in particular, the alleviation of very specific problems may be identified as necessary preconditions for sustainability; a more holistic approach may only have resonance after these preliminary needs have been met. In such circumstances, it seems unlikely that broad-ranging global frameworks would be applicable, except where these have a focus on process rather than substance (see, for example, the Eco2 Cities approach). The contingent nature of indicators also points to a need for flexibility over time as conditions (political and otherwise) change. Ongoing adaptation of indicator frameworks, however, may only be achievable at the expense of comparability over time.

If the current stage of indicator development around the world remains characterised more by experimentation than by consolidation then the types of tensions outlined above might be optimistically understood as creative ones. They describe the interface between the aspirational ideal of urban sustainability and the social, political, economic and environmental realities of the actual places in which this ideal is to be realised. Going beyond a pragmatic acknowledgment of the variety of the forms which indicators take at local levels, there is still a useful role for more evaluative analysis to take place. In particular, it should be possible to identify commonalities between approaches where implementation has been widely accepted locally and has yielded substantive results. Conversely, lessons can be learnt from ‘worst practice’ as identified on these same terms. The role of the research and the national/international policy community, then, is not so much to impose sustainability on local places as to facilitate open, global discussion.

“Every city’s different; every country’s different. But the human values are the same everywhere. So the question is: how do we marry these two extremely divergent principles?”

Debashis Sen, Government of West Bengal (India)

“I think there needs to be a consistency at least at a high level, to set the major parameters, goals and aspirations. Then we could be a lot more strategic, efficient and effective in terms of how we deliver against these.”

Cate Harris, Lend Lease (Australia)
Urban sustainability has undergone significant transformations in recent years: shifting from theory to practice; occupying a more central place in policy and politics; mobilising a growing mixture of public and private actors; and expanding across both the Global South and Global North. As a consequence, interest in indicators, standards and frameworks for urban sustainability has grown significantly. Yet the move to practice has not left theoretical concerns entirely behind. On the contrary, and perhaps paradoxically, growing practice has re-opened debates about some of the fundamentals: what the conceptual purpose is of indicators, standards and frameworks; the way in which these can engage in governing processes; and how the global—national—local interaction (universal standards versus local indicators) is best to be understood. It has also opened up opportunities for experimentation: certainly from research, policy and development perspectives, work on indicators, standards and frameworks can be welcomed as an ongoing learning process – involving a range of actors at local, national and international levels – about how to problematise, implement and evaluate urban sustainability. Meanwhile, experimentation has turned into business opportunities, with actors jostling for central positions in the commercialisation of urban sustainability and certification schemes.

The Bellagio conference Tomorrow’s City Today illustrated the growing, rich experience of urban sustainability initiatives around the world, along with a great appetite for shared practice learning. The discussions demonstrated the need for sophisticated, nuanced thinking around how to conceptualise indicators, standards and frameworks and how to discern discrete functions – from supporting analysis to informing policy, and from guiding practical development to engaging stakeholders. Thus, rather than universalising indicators and frameworks, it may be more productive to consider these in relation to distinct governance functions. Similarly, rather than expecting all-encompassing, explicit standards determining the contents and forms of urban sustainability, the merit of international frameworks is seen mainly in their ability to set inspiring, strategic, high-level goals and parameters corresponding to global aspirations for a sustainable world. While detailed contents necessarily have to be worked out within the context of particular local conditions and settings, this does not preclude shared practice learning across initiatives, organisations, countries and cultures. Indeed, indicators and frameworks are particularly valuable as an international language and instrument for urban sustainability practice if and when they manage to marry conceptual considerations with practical concerns and global aspirations with local goals.

### Future research

Future research, building on the Bellagio conference, will be carried out through a three-year international network funded by the Leverhulme Trust. Co-ordinated by the University of Westminster and involving ten partners across the world, the research will include a systematic, cross-comparative analysis of emerging international urban sustainability indicator and certification frameworks.

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The following is a small selection of academic and policy sources addressing aspects of urban sustainability and related indicators, standards and frameworks.

**Urban sustainability**


**[Urban] sustainability indicators / standards / ‘best practice’**


**Urban sustainability frameworks: policy and practice**

BioRegional. “One Planet Community.” bioregional.com

Bluepathcity. “Navigating the Eco-city, Sino-Singapore Tianjin Eco-city KPIs.” bluepathcity.net

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International Centre for Local Environmental Initiatives (ICLEI). “Building Sustainable Cities Programme.” icllei.org


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