



ECOCITY FOCUS LAB

Final Report

British Columbia Institute of Technology, School of Construction and the Environment
in collaboration with Ecocity Builders

ECOCITY
BUILDERS



November 7-10, 2016, BCIT Downtown Campus

ECOCITY FOCUS LAB

FINAL REPORT

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1. INTRODUCTION

The **International Ecocity Standards (IES)** seek to provide an innovative vision for an ecologically restorative human civilization, as well as a practical methodology for assessing and guiding progress towards the goal. As far as we know, there are no true ecocities yet, although some are moving in that direction. And because each city is unique, there is no one-size-fits-all ecocity development model or just one way to get there from where we are now. However, ecocities share basic characteristics analogous to healthy ecosystems and living organisms. They are the physical containers for human evolution and creativity.

An ecocity is a human settlement modeled on the self-sustaining resilient structure and function of natural ecosystems:

- It seeks to provide healthy abundance to its inhabitants without consuming more renewable resources than it replaces.
- It seeks to function without producing more waste than it can assimilate or recycle for new uses, or than nature can dilute and absorb harmlessly, and without being toxic to itself or neighbouring ecosystems.
- Its inhabitants' ecological impacts reflect planetary supportive lifestyles; its social order reflects fundamental principles of fairness, justice, reasonable equity and consensus at ample levels of happiness.

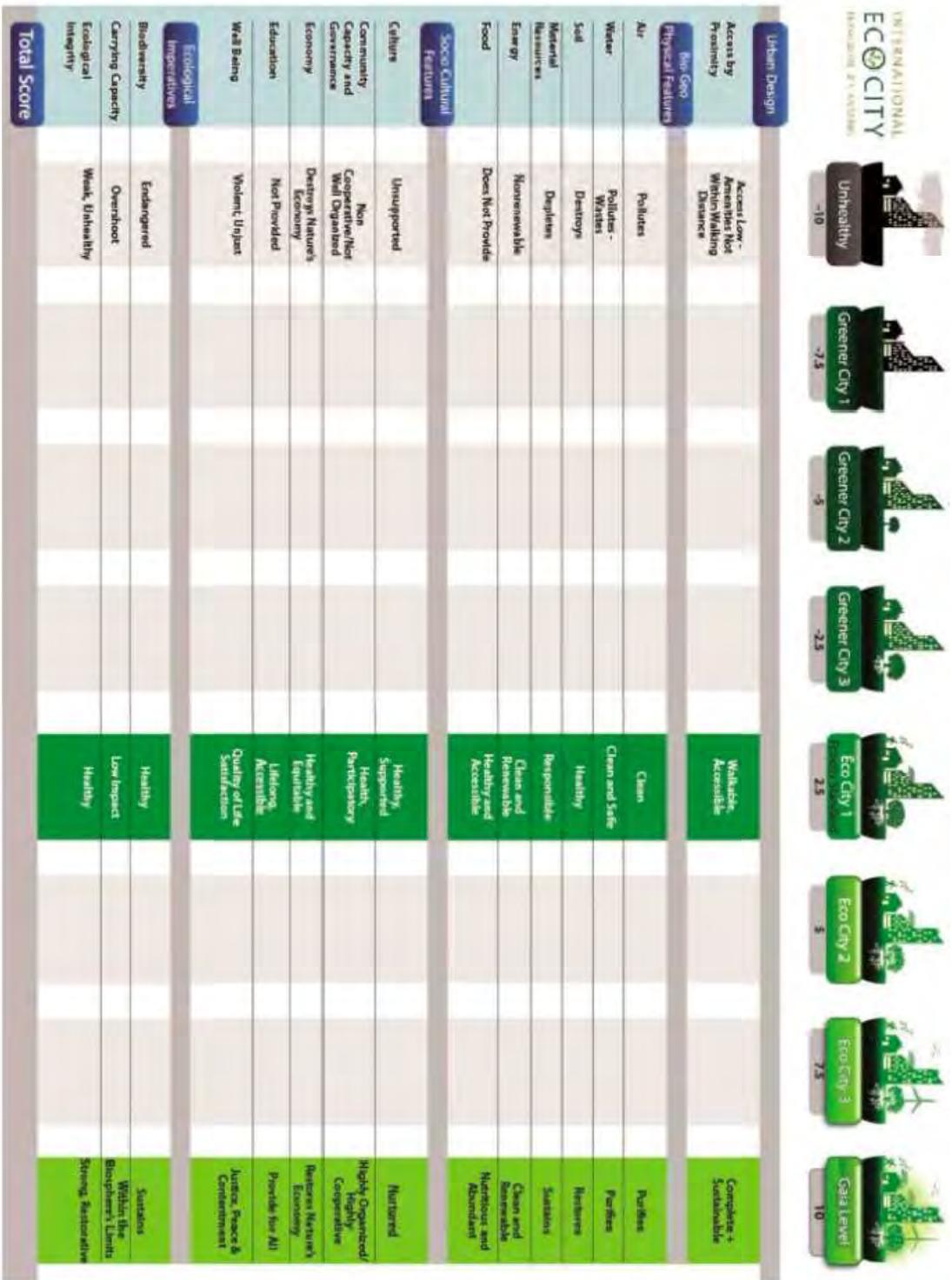
The Ecocity Framework comprises 15 standards in four categories – urban design, bio-geophysical conditions, socio-cultural features and ecological imperatives.¹ It is a diagnostic tool for cities and citizens to measure progress towards ecocity conditions. Designed for a wide range of users, including both novices and experts, the Framework charts a city's steps forward — from existing conditions to "threshold" ecocity standards and beyond. A city reaches Ecocity Level 1 when it achieves a positive score in all categories. This level in the Standards encompasses metrics tied to social justice and one-planet living, including food security, well-being, and carrying capacity. Measurement tools include the walk score, happiness index, ecological footprint and consumption-based greenhouse gas (GHG) emissions. There are two more levels – Ecocity Level 2 and Ecocity Level 3 – that are steps towards becoming a GAIA city. The concept of GAIA derives from earth's holistic system of systems that is capable of maintaining a homeostatic (i.e., stable) state in which all life thrives.

At the inaugural Ecocity Standards workshop held in Vancouver in 2010, local government, community leaders, and industry experts helped develop initial content for the standards as well as the framework that organizes them. This was shared with an international audience at the 2011 Ecocity World Summit in Montreal. In 2012 workshop participants reconvened in Vancouver to share progress, engage feedback, and further refine the International Ecocity Standards prior to their debut at the United Nations Earth Summit in Rio de Janeiro (Rio+20). Staff from the City of Vancouver helped assess the measurability of each standard, and academic as well as industry experts and local government staff from across the lower mainland probed the content and suggested improvements.

¹ As a result of the Ecocity Focus Lab it was agreed to add three additional standards under the urban design category bringing the total number of standards to 18.



International Ecocity Framework



2. OVERVIEW AND OBJECTIVES

The Ecocity Focus Lab was convened to continue the exploration and refinement of the *International Ecocity Standards* (www.ecocitystandards.org) as well as one of the cornerstone tools that supports the Standards – the *ecoCity Footprint Tool*. Outcomes from the focus lab will be shared at the upcoming Ecocity World Summit in Melbourne, July 12-14, 2017.

The Focus Lab was held at the British Columbia Institute of Technology (BCIT) Downtown Campus and co-hosted by BCIT School of Construction and the Environment and its partner Ecocity Builders.

The Ecocity Focus Lab had two foci : (1) an introduction to ecocity tools, particularly the ecoCity Footprint Tool (November 7th), and (2) confirmation of headline indicators for the International Ecocity Standards (November 8th, 9th, 10th)

Objectives for November 7th were to:

- Orient participants to a spectrum of sustainability standards and frameworks, and locate where the International Ecocity Standards fit within this spectrum.
- Provide an overview and update on ecocity tools currently employed by Ecocity Builders.
- Review the application of the ecoCity Footprint Tool in three international cities.
- Refine a proposed project that will pilot the ecoCity Footprint Tool with four BC communities.

Objectives for November 8th – 10th were to:

- Choose ONE headline indicator and associated benchmark for each of the 15 standards to gauge whether a city exists in balance with nature.

3. ACKNOWLEDGEMENTS

BCIT School of Construction and the Environment and Ecocity Builders gratefully acknowledge the numerous participants, facilitators and note-takers who contributed to the success of the Ecocity Focus Lab. A special thanks to the Ecocity Builders Interns who contributed to the background research in preparation for the Focus Lab: Edward Kim, Isabela Mesquita, Eva Phillips, and Anarosa Robledo. This report was prepared by the Ecocity Focus Lab Facilitation Team: Cora Hallsworth, Rosemary Cooper and Cheeying Ho and edited by Dr. Jennie Moore. It summarizes the presentations, discussions, and outcomes of the Focus Lab.

November 7th Participants:

Jennie Moore, Associate Dean, BCIT SOCE (HOST)
 Wayne Hand, Dean, BCIT SOCE (HOST)
 Kirstin Miller, Executive Director, Ecocity Builders (CO-HOST)
 Cora Hallsworth, Project Manager, BCIT (FACILITATOR)
 George Benson, Masters Student, UBC, (NOTE-TAKER)
 Allison Ashcroft, Canada Network Coordinator, USDN
 Steve Bercu, Board Chair, Ecocity Builders
 Pilar Bonilla, Faculty, BCIT SOCE
 Sarah Campbell, Manger, Sustainability Programs, BCIT
 Robyn Chan, Evergreen Foundation
 Simon Joss, Board Member, Ecocity Builders, University of Westminster
 John McDonald, Retired Faculty, BCIT SOCE
 Jeanie Morton, City Studio
 Sydney Moss, Ecocity Builders
 Freda Pagani, Retired, UBC Sustainability Office
 Olga Petrov, Faculty, BCIT
 Rick Pruetz, Board Member, Ecocity Builders
 Dave Rutherford, Associate Dean, BCIT SOCE
 Rick Smith, Ecocity Builders/ Wayne State University
 Vanessa Timmer, Executive Director, One Earth
 Julian Zelazny, Acting Manager, Sustainability Programs, BCIT

BC Pilot Representatives:

Caroline Jackson, City of North Vancouver
 Pam Hartling, District of Saanich
 Brad Badelt, City of Vancouver
 Steve Young, City of Victoria

International Pilot Communities:

Aparajithan Narasimhan, Chennai, India
 Diana Marcela Rincon, Medellin Colombia, (by Skype)
 Santos Mera, Cusco, Peru, (by Skype)

November 8th (Urban Design and Ecological Imperatives) Participants

	Participants
Access by Proximity	Rick Pruetz, Ecocity Builders [Table Convener] Jim Bailey, District of West Vancouver Chalys Joseph, City of Vancouver Jan Timmer, Green Architect & Industrial Ecologist Freda Pagani, retired staff, UBC Rick Smith, Ecocity Builders Aparajithan Narasimhan, Chennai, India
Healthy Biodiversity	Kirstin Miller, Ecocity Builders [Table Convener] Melissa Woehler [Note-taker] Robyn Chan, Evergreen Foundation Angela Danyluk, City of Vancouver Julian Zelazny, staff BCIT James Boothroyd, Green Bloc Initiative
Carrying Capacity	Jennie Moore, BCIT [Table Convener] Gordon Frenke [Note-taker] Wayne De Angelis, BCIT
Ecological Integrity	Sydney Moss, Ecocity Builders [Table Convener] Cheeying Ho [Note-taker] Bill Rees, retired faculty, UBC Amy Greenwood, Fraser Basin Council Mona Lemoine, McLennan Design Cora Hallsworth, Cora Hallsworth Consulting

November 9th (Bio-geophysical Features) Participants

	Participants
Clean and Safe Water	Rosemary Cooper, BCIT [Table Convener] Gordon Frenke [Note-taker] Ray Fung, District of West Vancouver John Madden, UBC
Clean Air	Jennie Moore, BCIT [Table Convener] Lida Sadri [Note-taker] Rodrigo Mora, BCIT Menn Biagtan, Lung Association of BC Julie Saxton, Metro Vancouver Glen Okrainetz, BC Ministry of Environment Laurie Stott, BCIT Olga Petrov, BCIT Bruce Ainslie, Environment Canada Roger Quan, Metro Vancouver
Healthy Soils	Julian Zelazny, BCIT [Table Convener] Sonya Oetterich [Note-taker] Jace Standish, BCIT Jonn Braman, University Endowment Lands
Clean and Renewable Energy	Sydney Moss, Ecocity Builders [Table Convener] Shelagh Paton [Note-taker] Alexandre Hebert, BCIT Vladimir Kostka, Terasen
Responsible Resources/ Materials	Rick Pruetz, Ecocity Builders [Table Convener and Note Taker] Tracy Casavant, Lighthouse Sustainable Building Centre Wayne De Angelis, BCIT Charlotte McLaughlin, resident, District of West Vancouver Jane McRae, Metro Vancouver Cora Hallsworth, Cora Hallsworth Consulting
Healthy and Accessible Food	Kirsten Miller, Ecocity Builders [Table Convener] Kent Mullinix, Kwantlen Poly Technic Peter LeBlanc, BC Association of Farmers Markets

November 10th Participants

	Participants
Healthy Culture	Rick Pruetz [Table Convener] Julian Zelazny [Note Taker] Claire Mochrie, Global Frameworks Ltd. Lorraine Copas, SPARC Vancouver Freda Pagani, retired staff, UBC
Community Capacity/ Governance	Jennie Moore [Table Convener] Qara Clemente [Note-taker] Mark Roseland, SFU Mark Giltrow, BCIT Aftab Erfan, UBC Daniel Sturgeon, SFU
Healthy and Equitable Economy	Rosemary Cooper, BCIT [Table Convener] Janet Morris-Reade, Association of Service Providers for Employability and Career Michelle Molnar, David Suzuki Foundation Susanna Lui Gurr, BC Centre for Employment Excellence
Lifelong Education	Sydney Moss, Ecocity Builders [Table Convener] Sonya Oetterich [Note-taker] Kevin Millsip, Next Up John McDonald, retired, BCIT Miriam Esquitin, City Studio Rob van Wynsberghe, UBC
Well Being/Quality of Life	Kirsten Miller, Ecocity Builders [Table Convener] Daniel Ross [Note-taker] Janet Rerecich, BC Parks and Recreation Association Pilar Bonilla, BCIT Maureen Connelly, BCIT Frances Kirson, BCIT

4. NOVEMBER 7th SUMMARY OF PROCEEDINGS

The following summarizes the proceedings for November 7th. This first day of the Focus Lab provided an orientation on the ecocity standards and an introduction to ecocity tools, particularly the ecoCity Footprint Tool. It also included a workshop with BC communities interested in piloting the ecoCity Footprint Tool.

November 7th Agenda

Welcome & Introduction	9:00 am – 9:20 am
International EcoCity Framework and Standards Overview , <i>Simon Joss, University of Westminster, Kirsten Miller, EcoCity Builders, Jennie Moore, BCIT</i>	9:20 am - 10:30 am
BREAK	10:30 am - 10:40 am
Overview of International Application of ecoCity Footprint Tool , <i>Sydney Moss, Ecocity Builders and representatives of international pilot cities</i>	10:40 am - 11:55 am
Local Government Efforts on Sustainable Consumption , <i>Babe O’Sullivan, USDN</i>	11:55 am – 12:15pm
LUNCH	12:15 pm – 1:00 pm
BC PILOT WORKSHOP	
Purpose and Objectives	1:00 pm - 1:10 pm
ecoCity Footprint Tool Overview , <i>Jennie Moore</i>	1:10 pm - 1:25 pm
Participant (Pilot) Objectives	1:35 pm - 2:00 pm
Pilot Project Overview , <i>Cora Hallsworth and Allison Ashcroft</i>	2:00 pm - 2:15 pm
BREAK	2:15 pm – 2:30 pm
Group Discussion - Project Scoping	2:30 pm - 3:25 pm
Wrap Up and Next Steps	3:25 pm - 3:30 pm



(above) Wayne Hand provides Welcoming Remarks

Welcoming Remarks

- Wayne Hand, Dean, BCIT School of Construction and the Environment (SOCE): BCIT's School, of Construction and Environment, is concerned with the natural environment and the built environment and the relationship between them. The School is pleased to be partnering with Ecocity Builders who shares an interest in building cities in balance with nature.
- Dr. Jennie Moore, Associate Dean, BCIT SOCE: The School has been working with Ecocity Builders since 2008; BCIT provides technical leadership and academic rigour to the partnership and Ecocity Builders provides an extensive international network and expertise working at the community level.
- Kirstin Miller, Executive Director, Ecocity Builders (EB): An Ecocity network emerged in San Francisco in the 1970s and in Vancouver in the 1990s. Through a conference series and other initiatives, the BCIT-Ecocity Builders relationship is deepening in a powerful way and there is an emergent network of practitioners and institutions. This work is not just about the indicators and the metrics, but the deeper question of how they are used.



Orientation to International Standards and Frameworks

Dr. Simon Joss, University of Westminster (above)

- Over the next few days, we'll delve into many technical aspects of what it means to be a sustainable city. It is important to start at the beginning with a big-picture view and to remind ourselves how far we've come over the past thirty years or so.
- One fundamental question we can ask: will our work on the Standards make empirical contributions towards sustainability? There are many frameworks and ideas out there, but we have to always be critical in asking how far we've actually moved toward sustainability.
- A second question to ask: when designing and implementing these frameworks is whether we are taking communities along with us? It is easy to get lost in technocratic discourses, but to truly achieve sustainability, we need to bring along all members of society.
- Simon's presentation summarized different ecocity frameworks informed by research done at Westminster with other international collaborators on practitioner-driven indicators::
 - Indicators, as technical descriptors are quite reductive. They simplify what is otherwise a much more complex process. For example: if you think about sustainable water management, you might define an indicator in terms of the amount of water consumed per person per day. Water use, a very complex issue, is reduced to a relatively simple indicator. Indicators, of course, are also often presented as scientific, objective measurements, but are value-laden and contain very normative assumptions. They often involve significant

- guesswork. One of the main critiques of indicators is that they create a very atomistic understanding of an issue but no theoretical understanding.
- Frameworks add value as they attempt to inform understanding of several indicators and use them to describe more complex systems and norms. Frameworks also clarify how indicators can be used. A framework can be used to support the design process, supervise implementation, and monitor long-term progress.
 - Standards are a more recent phenomenon and are driven by various, often international, systems, where norms are being prescribed. The big question asked of standardization is whether we are trying to standardize outcomes or processes. Also asked is whether we are trying to reach some lowest common denominator, or reach for something highly ambitious.
 - It is useful to think about all of this dynamically, as part of an iterative planning process that draws on a variety of factors, including policy context, urban setting, governance processes, technical and social dimensions.
 - It is important to refer to several emergent environmental frameworks, the Paris declaration, which includes several frameworks, the Sustainable Development Goals that is part of the Habitat New Urban Agenda (NUA) that was just signed in 2016, and the ISO 3710 standards on urban sustainability. The “mushrooming” of frameworks in the past five years has been immense, and it remains to be seen whether these will converge.
 - The Paris Accord prompts us to think about what might be the key focus of an ecocity framework; is the central focus to be mitigation of climate change through reduction of GHGs? This Accord guides us in focusing on the limiting of warming to 2C compared to pre-Industrial temperatures. The agreement has three frameworks built into it: financing, technology, and capacity building.
 - SDG 11: Sustainable Cities and Communities (2016) is outlined in HABITAT III New Urban Agenda. The central emphasis of this framework is poverty reduction. It has ten aspirational targets: 4 social, 4 environmental, 1 economic, and 1 cultural. It’s not a legally binding agreement, but signatories are expected to take ownership over the process of implementing the agreement.
 - ISO 37101: Sustainable Communities (2016), is a very process-oriented document and framework, which offers only a limited definition of what sustainability looks like, but rather gives a clear indication of *how* it could be assessed, e.g., “plan, do, check, act.”
 - It can be useful to analyze frameworks against two axes: (axis 1) extent to which a framework focuses on global vs. local practice, and (axis 2) extent to which it promotes innovation or standardization.
 - The uniqueness of the International Ecocity Standards is that they are challenging because they are robust, represent deep knowledge, and encourage an integrated assessment.
 - Looking ahead, there are four questions we can keep in mind during these discussions:
 - How can we reconcile globally developed frameworks at the local level?
 - How do we mobilize stakeholders? (Particularly amongst vulnerable or marginalized communities.)
 - How can we effect partnerships between promoters and local implementers? How can we engage partnerships between framework developers and those who will be working with it?
 - How can we ensure robustness in the application of the framework?

Questions and Comments for Dr. Simon Joss

What competing standards are the closest to the International Ecocity Standards?

Joss: If I had to pick one, I would choose the One Planet framework, because both frameworks have as their core standard the ecological footprint analysis. For this reason, they appear to be the most robust and credible. Brighton, UK committed to this challenge and has established an action plan.

To what degree have the Ecocity Standards been influencing these international agreements?

Joss: I think they have been influencing agreements not in practical, implementation-oriented ways, but rather in helping create a rhetorical and ideological space for the ideas that are contained within the ecocities framework.

I think there is a danger of standards that become fossilized over time. What thought has been given to these standards being dynamic over time?

Joss: Absolutely right. One of the diagrams I presented talked about the encoding of information into a single framework or standard and then proliferating out into various different practices. This should also be through a dynamic process. We should be careful not to get too bogged down in technical details and spending long periods refining these tools; rather, we should make sure the big-picture is considered and the direction correct.

Ecocity Standards and Indicators in Action – Overview of Ecocity Tools

Kirstin Miller, Executive Director, Ecocity Builders

- The Ecocity Standards emerged because people kept asking about the authenticity of self-identified ecocity projects.
- The goal of ecocities is to reshape cities for the long-term health of human and natural systems.
- Ecocity Builders (EB) is not a city-builder but a non-profit educator that works with those who build cities. We provide a number of tools and resources to help cities and non-profits do their work.
- Most of the resources we have developed have been put together through the international conference series, where practitioners have been working together to share ideas, e.g., iteratively develop standards.
- The premise of our work is that cities are part of an urban ecosystem. Like organisms that are part of natural ecosystems, cities bring in energy and materials from surrounding areas and process them through the city's "metabolic" systems. Urban ecosystems, therefore, include concentrations of people and the built environment (i.e, the city) as well as the productive ecosystems generating the energy and matter required to sustain the whole of the city and assimilate its wastes.
- Ecocity definition: A human settlement modelled on the self-sustaining, resilient structure and function of healthy natural ecosystems and living organisms.
 - An ecocity seeks to provide healthy abundance to its inhabitants without consuming more renewable resources than it replaces.
 - It seeks to function without producing more waste than it can assimilate or recycle for new uses or than nature can dilute and absorb harmlessly, without being toxic to itself or neighbouring ecosystems.

- Its inhabitants' ecological impacts reflect planetary supportive lifestyles; its social order reflects fundamental principles of fairness, justice, reasonable equity and consensus at ample levels of happiness.
- EB works directly with communities. Many communities are not interested in the technical aspects of sustainability, but rather they want to achieve the outcomes: i.e., clean water and air and so on. As they ask questions about how this can be done, they come to realise the complexity of these multifaceted objectives. EB partners as closely as possible with communities on these issues to help them understand the standards and their own goals.
- EB is working with community partners to access more and more data, and to create community maps and inventories. EB is developing a growing number of tools, e.g., UrbInsight which helps to visualize sustainability data and metrics for cities and related flows of resources within a community. The goal is to move past schematic diagrams to true visualizations of the actual system of a given community, creating a high level of granularity that can be useful to communities and policymakers. EB applies the EcoCompass method, based in participatory action research.
- Collecting data for assessing Ecocity conditions has been the major challenge since the information currently sits in so many different silos. Using open source tools like Geonode, that conforms to open source standards, we are able to tag and share this data across platforms. It is the key to unlocking a lot of these insights.
- The work has been both “barefoot” – locally derived, culturally appropriate, affordable, and largely self-directed – and “bottom up” – case-based, beginning with real-world observations and so on. This work has been largely in the developing world, and it has really taken on a life of its own because communities have directed it themselves.
- Much of the work has focused on striking a balance between aggregation and local needs: EB has been primarily focused on highly granular projects. There are possible synergies between work of groups like ISO, with their global initiatives and processes, and our locally oriented - work.
- Our goal is to integrate insights into planning and decision-making. The Paris Accord, the SDGs, New Urban Agenda, and ISO, are all being considered as possible areas of implementation for the frameworks and tools.

Questions and Comments for Kirstin Miller

The focus on working with local communities is an interesting approach and at the same time there is also a clear reason to focus on a metabolic flow at a bioregional perspective. It would be interesting to map these material flows onto jurisdictional boundaries in order to locate the best areas for implementation.

Miller: Yes, agreed. Mapping jurisdictional boundaries is something we try to do to help make sure that there is a clear understanding of municipal landscapes which can become quite complex, even overlapping.

When looking at these indicators, there appears to be an omission in the form of animal welfare. The focus on resource flows can make those animal lives appear merely as resource inputs or outputs from a city.

Miller: We cover this somewhat in the access to healthy and nutritious food and the biodiversity metrics.



Overview of the ecoCity Footprint Tool

Dr. Jennie Moore, Associate Dean, BCIT (above, with Kirstin Miller)

- The ecoCity Footprint Tool was developed as part of Dr. Jennie Moore’s PhD thesis, and a beta version of it was tested with the City of Vancouver in association with the development of their *Greenest City 2020 Action Plan*. It is also being tested with a number of international cities, representatives of three of these communities will be sharing their experiences using the tool this morning.
- The Tool looks at the demand on nature that a city’s operation, coupled with the lifestyle activities of a city’s residents create. It uses bottom-up data collected and used by the city for planning and policy development. Data are supplemented by additional regional and statistical information as well as life cycle analysis.
- The City of Vancouver has focused policy efforts on clean and renewable energy, and the Tool helped by creating a more complete understanding of the impacts of energy use. Footprint results have led the City to focus on better understanding the impacts of food, including collecting more granular data on local food consumption.
- The Tool has been useful in exploring the full impacts of consumption; it links policy to outcomes on demand for nature’s biologically productive land and sea area, as well as providing an opportunity to engage citizens with meaningful information about steps that they can take to reduce that demand.
- The Tool is aimed at identifying a pathway to one-planet living (currently we have 1.64 hectares of biocapacity per person available). Urban ecological footprints assessments of early participant cities:
 - Vancouver is about 53% above one-planet living.

- Medellin is 17% above the one-planet living.
- Cusco is 9% below one-planet living.

Questions and Comments for Dr. Jennie Moore

One of the many elephants in the room is that this implicitly says our standard of living is so high that we may have to stop growing.

Moore: Yes, that is the clear message and probably why this analysis has not taken off. We clearly have a long-standing economic problem that is driving consumption locally yet producing negative impacts on health and wellness elsewhere.

Do these tools let you prioritize where the low-hanging fruit are in terms of reductions?

Moore: Yes, absolutely. These are policy analysis tools and, with correct questions and available data, you can start to focus on things like: what kind of dietary changes might drive the biggest footprint reductions.

What other cities are below the one-planet threshold?

Moore: Generally, cities in Latin America as well as Africa. There are also a few in South Asia. It corresponds very closely with wealth so the key is to find those cities that achieve high Human Development Indicators (HDI) with low ecological footprints. Some examples can be found in Latin America.

One question is how do we include culture in these different standards and systems? One of the rationales for this might be that culture can replace consumption.

Moore: During my PhD research, I found that cities that have really high HDI scores and low consumption rates also had robust social policies and cultural systems. For example, there's a huge correlation between the high-consumption cultures found in Canada and the United States, but Canada achieves a slightly lower ecological footprint and has a slightly better social safety net. In countries like Germany and Japan, where they achieve equal or greater HDI the eco-footprint is significantly lower than in North America. Coincidentally these are examples of countries with robust social policy and cultural frameworks that can drive lower consumption and emissions and yet still achieve high HDI scores. Other examples can be found in Latin America, e.g. Ecuador, Cuba, and Costa Rica, but here low incomes also play a role as in other developing countries.

Application of ecoCity Footprint Tool with International Pilot Cities Facilitated by Sydney Moss, Ecocity Builders

Introduction

- Ecocity Builders is looking for the sweet spot between government- and community-sourced data. When arriving in a city, EB first goes to the government offices to establish a partnership and a point of contact for access to data. We then work with a local academic institution and community-based organizations to generate several community data collection workshops. These data sets can be integrated to provide bottom-up and top-down perspectives of our partner cities. In 2016, we worked with Medellin, Colombia and Cusco, Peru. We offered our UrbInsight course in both cities through local accredited academic institutions. Upon the completion of the course, several students were interested in continuing their research and understanding of their city through the UrbInsight model. EB provided an internship opportunity in partnership with Jennie Moore and BCIT to further visit data partners to acquire necessary data to complete a bottom-up, ecoCity Footprint analysis of their city (comprising an urban metabolism, consumption-based GHG emissions inventory, and ecological footprint analysis). As we offered this internship to our partner cities, a past collaborator asked to be included in the tool trainings and workshops to complete an ecoCity Footprint analysis for a small eco-village in Chennai, India.
 - Sydney provided a contextual overview for each of the pilot cities and then research leads from each city provided an overview of their experience in implementing the ecoCity Footprint Tool.
- Medellin, Colombia
 - A major innovator, particularly in transportation as bus rapid transit (BRT) has been experimented with.
 - In Medellin, EB was able to work directly with the planning department and a private utility.
- Cusco, Peru
 - A UNESCO World Heritage site.
 - EB partnered with the local Bureau of Land Management and the national Ministry of the Environment.
 - Work began with them at the same time as they initiated a major new land use planning process.
- Chennai, India
 - A much smaller scale community project, for a community that is currently being designed and developed for a projected 10,000 residents. This case demonstrates the scalability of the tool.

Medellin: Presented by Diana Marcela Rincon, Medellin Planning Department

- Territorial context of Medellin: second largest city in Colombia after Bogota, located on one of the branches of the Andes. It is built in a small valley, over 60km long, and is only 6km wide at its widest. Also one of the highest cities in the world, at 1,600M above sea level. These geographical factors make the environmental conditions of the city and its challenges very complex.
- The most critical environmental challenge faced is air quality.
- In terms of challenges and opportunities related to working with the ecoCity Footprint Tool:

- For food, there was very little data available initially. Data was collected from two key studies, but neither revealed much about consumption by the city as a whole. Rather they were surveys of people from all socio-economic levels about their consumption levels.
- For housing, Medellin has a high propensity of informal settlements, so there is little granularity of the data regarding density or uses beyond residential or non-residential. For construction and materials usage, partnerships would have to be sought to access more data from private construction companies.
- For consumables and wastes, the only data that could be derived was the total aggregate amount of waste headed to landfill. Recycling data is held by private companies who were reluctant to release it.
- Accessing transportation data was challenging because only the most basic numbers pertaining to total cars in the city was available, with many cars registered in different cities and not directly in Medellin.
- Lack of collaboration from the City in taking on this kind of analysis was also a major challenge.
 - Diana hopes that there is a greater emphasis on this work in the future, and in particular that it be carried out in partnership with metropolitan actors throughout the region.

Cusco, Peru: Presented by Santos Mero, University of Cusco

- The first task was to work on translation of the Tool (from English to Spanish), to enable full use by the staff in Cusco.
- Next they established teams of people to visit the holders/sources of data, such as utility companies for water, energy, and others. They visited suppliers of food, Ministries, and different sources of municipal statistics, and generally cast as far and wide a net as possible in their research.
- The way that the information was sought was challenging to adapt into the Peruvian context, with many logistical problems like photocopying occurring.
- Another challenge is that each city, and each department collects data in different formats, and the aggregate information was sometimes different between municipalities and cities. Municipal statistics (2014 and 2015 data) were used to generate estimates for construction and waste
- Transportation information was accessed from a number of organizations; again, standardization was a problem, with so many different standards for data collection adopted by each of the sources.
- Overall, there was little information about food for the city.
- In terms of the challenges for the project: the recording of data was different in cities in the Peruvian context and that made adaptation to the excel sheets in the ecoCity Footprint Tool challenging.

Chennai, India: Presented by Apar Narasimhan, AN Projects Design P Ltd

- The study focus is a planned community in Chennai that is in development, with scheduled delivery in 2017. It's a microcosm of Indian middle class developments.
- Social strata was a key determinant of energy and material usage – in India, caste is a major factor.
- For building materials, all of the information was available, since Apar is the primary designer.
- Energy: heat gain of the buildings was a key concern given the hot climate. They want to reduce the load from air conditioners because of heat-gain potential.
- Transportation data was harder to pin down: the ecoCity Footprint Tool was designed for existing cities, but with this project vehicle types and usage cannot be known until residents move in.

Conclusions, presented by Sydney Moss and Jennie Moore

- An overarching theme was the difficulty of aligning data needs with the available sources, which varied significantly.
- Another common challenge was difficulty finding local food data. This was also a challenge for the Vancouver ecological footprint analysis.
- Further adaptation, including translation, would be helpful to make it simpler for other jurisdictions to collect data for the Tool.
- Participants found engaging in the research very interesting because it informs an understanding of how the city works.
- Taking a regional approach where data is collected for an entire metropolitan area, not just a specific city or district within it, could also inform a more holistic understanding.

Questions for the Presenters

Are these tools viewed with suspicion because they are foreign, or do people in the departments see them as useful?

Santos: it was a surprise that the data collection was so difficult, and so further adaptation will be necessary.

Diana: different actors have mixed feelings about it. On the one hand, it's something very positive because it would help prioritize interventions in specific areas, but the lack of availability of data is readily apparent and this can be embarrassing for the city.

Vancouver had challenges with food data; are there other cities that have done better?

We are not aware of any city that has a good handle on food consumption. London has done some good work, and Oregon State University is now engaging in a state-wide study, but overall the nexus of food and energy have mostly been off local government policy-makers' radar. It is important to also recognize that local food does not always mean lower GHG emissions or environmental impacts, e.g., fossil-fuel use in greenhouse operations. Therefore, it is important to support environmentally sustainable food production, e.g. organic in-field and in-season food, that is also locally produced.



Sustainable Consumption in Cities

Babe O'Sullivan, Urban Sustainability Directors Network (USDN) (above)

- The consumption economy is arguably tied to the post-war, economic era and to the political imaginings of 'the good life.'
- For the US and Canada, we've seen a steady increase in the contribution of 'consumption' to the economy. US economy is now 70%~ consumption-based, while Canada is 55-60%.
- Consumption and climate change are inexorably linked: the US EPA did a study in 2009 showing that about 43% of GHG emissions were associated with the provision of goods and food.
- The study and practice of sustainability in this decade has come to focus on consumption. We can no longer ignore consumption impacts. It is a "more honest approach"; and it is a high-impact potential area of work.
- Sustainable consumption requires an absolute reduction in the material goods that we consume. It constitutes a shift in values away from a consumer culture and towards a de-materialized world-view, recognizing that consumption will need to rise in certain sectors and population strata whilst adhering to global ecological limits.
- Sustainability directors have tended to consider waste-reduction as the primary lens through which to view dematerialization. Sustainable consumption applies a holistic view of waste *production*, not just making sure it is processed correctly once produced.

- The work that USDN has been doing focuses on creating a narrative for *Advancing Sustainable Consumption in Cities* that shows best practices in different areas: housing, climate action, food, economy, etc.
- An important step for cities hoping to address sustainable consumption is to measure impacts as a means of directing action. Much of this work has been focused on climate action. Approaches like consumption-based emissions inventories (CBEI) are advancing, but are primarily GHG-focused.
- Portland has been a real leader on sustainable consumption; it and other cities that have done CBEI-inventories have found their emissions were twice as high as what would be reported in a traditional community-based inventory.
- CBEI's in North America typically show that over half of our emissions are from households' consumption of food, goods, and services. Lifecycle emissions analyses show that the production and use-phases have dramatically different profiles: the major portion of emissions is actually upstream, in production, not in use.
- USDN has been working on sustainable consumption for three years and it is now coming into focus as an area where real impacts can be felt in policy. New measurement tools are growing the application of this thinking and are iteratively being worked into community goals; there is growing experimentation in policy and projects.
- How we talk about consumption is one of the greatest challenges. Most people do not want to talk about it. In the urban governance framework, most people get very nervous when consumption is raised. Therefore, a positive message is needed for its framing.

Questions for Babe O'Sullivan

Are there any indications of the best ways (early on) to speak about consumption?

The basic messages have centred around environmental stewardship.

Is it that we need to reduce consumption in the economy overall, or do we need to de-couple growth?

Andrew Jackson in the UK has done lots of thinking on this.

How do we access the toolkit and how does the USDN work?

You can access the toolkit by going to <http://sustainableconsumption.usdn.org>. USDN is a peer learning network that provides a platform for bringing cities together to build and share knowledge relating to sustainability of cities. Work includes grants for research and other collaborative initiatives.

Thinking about the production side and how there's clearly a lack of focus on this, it is also clear that there is less focus on use as well. The prime concern is point of purchase. Could focusing on both be useful?

Absolutely. The policy innovation levers are numerous and there is a need to combine all areas. We are slowly coming to a point where there is an appetite for sustainable consumption activity amongst policy leaders.

Workshop with BC Pilot Cities

Introduction

Cora Hallsworth

The focus for the afternoon is to conduct a workshop with our four potential BC-based pilots, who will help to test refinements to the ecoCity Footprint Tool.

Objective: refine the scope of work for a BC pilot of the ecoCity Footprint Tool to inform the development of a USDN funding proposal that is due Dec 1st. This portion of the Focus Lab was funded by a USDN mini-grant to meet this objective.

Background

Dr. Jennie Moore

- Initially created the ecoCity Footprint Tool to support policy related decision making aimed at reversing global ecological overshoot. The tool does this by evaluating a community's ecological footprint, using community based data.
- There is now growing interest in this tool because of its capacity to provide a consumption based emission inventory as well as a territorial emission inventory.
- We feel this tool can support leading cities who are seeking to tackle the root causes of global ecological overshoot and climate change... specifically, our individual and collective consumption choices and habits.
- A unique feature is that while many consumption based emission inventories are built using econometric input-output data, the ecoCity Footprint Tool prioritizes the use of bottom-up data, which is collected at the community level. In cases where this community data is not accessible, national statistics may be substituted. The emphasis on bottom-up data allows for more detailed policy analysis. The Tool also aligns with traditional spheres of planning at the local government level.

Pilot Project Overview

Cora Hallsworth

Pilot Participants and representatives: City of Victoria (Steve Young), City of Vancouver (Brad Badelt), City of North Vancouver (Caroline Jackson, District of Saanich (Pam Hartling).

A set of about a dozen observing cities will also be engaged in the project.

The pilot is focusing on BC-based communities because the Tool already contains substantial BC-based data and methodology, furthermore the four pilots are all USDN members which is required for the USDN funding proposal.

Proposed Pilot Project (Phase 1 & 2):

Outcomes for Phase 1:

- Modifications for compliance with new international standard (GPC / Covenant of Mayors).
- Scoping for on-line tool.
- Enhance 'user-friendliness'.
- Pre-populate Tool with data sources to minimize the reporting burden of communities.

Outcome for Phase 2: Creation and testing of on-line Prototype

Anticipated benefits for pilots:

- Alleviate resource demands associated with increased GHG reporting burdens.
 - Meet Global Covenant of Mayors for Climate & Energy (formerly Compact of Mayors) reporting requirements.
- Inform and advance sustainable consumption and climate action strategies.
- Access to BCIT and student intern support.

Key tasks:

- Introductory webinar for all cities.
- Populating data base for each pilot (with support of students).
- Workshop to review populated database and undertake preliminary scenario building exercises.
- Preparation of feedback report to pilots.

Conclusions and Wrap up

- Pilot representatives expressed support for proposal as summarized to date and for the proposed work plan and deliverables.
- Cora will draft a proposal for circulation to the pilots for their review, and a final proposal will be submitted to USDN by Dec 1st.

5. NOVEMBER 8TH – 10TH SUMMARY OF PROCEEDINGS

On November 8th to 10th a broad spectrum of community sustainability experts were convened, including early participants in developing the International Ecocity Standards (IES), City of Vancouver staff, as well as staff from other Metro Vancouver cities and provincial government agencies, community leaders, and scholars from a variety of post-secondary institutions in the Lower Mainland. Together, participants explored proposed indicators and benchmarks for the standards aimed at assessing whether a city exists in balance with nature. **The specific objective of the EcoCity Focus Lab for November 8th – 10th was to choose ONE headline indicator and associated benchmark for each of the 15 standards to gauge whether a city exists in balance with nature at Ecocity Level 1.**

The intention in selecting one headline indicator for each standard is to acknowledge that cities may have limited capacity to evaluate and monitor a full spectrum of indicators. The **headline indicator** is that one indicator seen to be critical for that particular standard, which can serve as a starting point.

At the Focus Lab, participants were provided a proposed set of headline and supporting indicators, and associated benchmarks. Participants were asked to either confirm these selections or seek recommendations for alternatives. For **benchmarks**, participants were asked to identify a performance level that if achieved across the city would result in a socially just city that exists in balance with nature (defined as Ecocity Level1).

November 8 – 10th Agenda

On November 8th the focus was on the Urban Design and Ecological Imperatives for eco-cities, including:

- *Access by Proximity*
- *Carrying Capacity*
- *Healthy Biodiversity*
- *Ecological Integrity*

On November 9th the focus was on Bio-Geophysical conditions of ecocities, including:

- *Clean Air*
- *Clean and Safe Water*
- *Healthy Soil*
- *Responsible Resources/Materials*
- *Clean and Renewable Energy*
- *Healthy and Accessible Food*

On November 10th the focus was on Socio-Cultural features of ecocities, including:

- *Healthy Culture*
- *Community Capacity/Governance*
- *Healthy and Equitable Economy*
- *Lifelong Education*
- *Well Being/Quality of Life*

A detailed agenda for November 8th – 10th is presented below.

Detailed Agenda

Welcome & Introduction	9:00 am – 9:10 am
Purpose and Objectives	9:10 am- 9:15 am
Introductory Presentations <ul style="list-style-type: none"> • <i>Simon Joss, University of Westminster</i>, will provide a high level overview of international best practices regarding sustainability assessment of cities. • <i>Kirstin Miller, EcoCity Builders</i> will introduce the Ecocity Standards. • <i>Jennie Moore, BCIT</i> will introduce the headline indicators for the Standards. 	9:15 am - 10:15 am
Roundtable Discussions on Headline Indicators and Benchmarks	10:15 am –2:30 pm
Roll out and Implementation of the EcoCity Framework (time permitting) <ol style="list-style-type: none"> 1. <i>Group discussion</i> 	2:30 p.m. - 3:15 p.m.
Wrap Up and Thank you	3:15 p.m. - 3:30 p.m.

Roundtable Discussion on Headline Indicators and Benchmarks:

The preliminary findings of the Ecocity Focus Lab confirmed that there should be 18 standards and related headline indicators. However, only 15 were reviewed during the workshop. The three additional standards fall under the category of Urban Design, and are included in Table 1. Some indicators achieved quick consensus, others required further consideration. Following the Focus Lab in November, the IES core team worked with the Focus Lab outputs and further refined the headline indicators. The results are presented in Table 1 below. In some cases, a headline indicator has not been confirmed and this remains an opportunity for ongoing research and refinement, to be continued in the discussions at the upcoming Melbourne Ecocity Summit 2017 and beyond. A summary of the discussions at the Focus Lab, including the rationale for the selection of headline indicators, as well as potential performance benchmarks are included in Appendix A.

A companion document to this Report– “Ecocity Focus Lab Participants Guide” presents the proposed set of indicators and benchmarks which participants used as a starting point for discussion. This document can be accessed at [INSERT LINK](#).

Table 1: International Ecocity Standards and Headline Indicators

CATEGORY	STANDARD	HEADLINE INDICATOR
URBAN DESIGN	1. Access by Proximity	Median distance between housing, work and daily services
	2. Safe and Affordable Housing	Percentage population living in safe and affordable housing
	3. Green Building	Performance of building stock, both residential and commercial
	4. Environmentally Friendly Transport	Percentage mode split for walking, cycling and transit
BIO-GEOPHYSICAL CONDITIONS	5. Clean Air	Quality of indoor and outdoor air and quantity of greenhouse gas emissions
	6. Clean and Safe Water	Quantity and quality of available water supplies
	7. Healthy Soil	Not confirmed: elements include soil physical and chemical properties
	8. Responsible Resources/Materials	Quantity of waste produced
	9. Clean and Renewable Energy	Percentage of total energy that is renewable
	10. Healthy and Accessible Food	Percentage of diet that is plant-based
SOCIO-CULTURAL FEATURES	11. Healthy Culture	Not confirmed: elements include trust, sense of place, eco-literacy, inclusion, and identity
	12. Community Capacity/Governance	Percentage of population that participates in decisions that affect them
	13. Healthy and Equitable Economy	Income disparity as measured by the GINI coefficient
	14. Lifelong Education	Percentage of literacy for men and women
	15. Well Being/Quality of Life	Percentage of population with access to means of self-sufficient living
ECOLOGICAL IMPERATIVES	16. Healthy Biodiversity	Number of representative keystone species in bioregion where city is located and from where the city draws sustenance
	17. Earth's Carrying Capacity	Ecological footprint that measures demand on nature's services relative to global (and regional) available biocapacity
	18. Ecological Integrity	Not confirmed: elements include capability to regenerate

Implementation Considerations:

Participants were asked to provide input on implementation considerations. Specifically, participants were asked to consider the following questions:

- What needs to happen for the IES standards to be adopted for use by communities and local governments?
- The IES is focused on ensuring that cities exist within nature’s limits, which makes it unique from other existing standards. How can the IES standards highlight this distinction while complementing other existing standards?

Highlights of responses

- **Apply science:** be clear on what we know and where there are gaps (i.e., uncertainties that still need to be investigated)
- **Be strategic in communication:** link to issues that have traction (e.g., climate action); use natural disasters as an opportunity to capture attention; hire a PR firm to guide communications; use knowledge collected through the IES to help reduce externalization of negative impacts.
- **Address political realities:** some communities will not want to communicate poor performance, or take on issues where they have limited control.
- **Engage implementation partners:** engaging city staff should be a priority; youth should also be engaged; creation of roundtables could also be considered.
- **Align with other standards** (e.g., LEED).
- **Transportation should be emphasized as a focus area for action.**

APPENDIX A: RESULTS OF TABLE DISCUSSIONS FOR EACH STANDARD'S HEADLINE INDICATOR

This appendix presents a summary of the discussion of the headline indicators and benchmarks that took place at the Focus Lab. This summary includes participants proposed headline indicator and benchmark(s) and their rationale for their selection of these indicators and benchmarks.

November 8th Summary: Urban Design and Ecological Imperatives

<i>Standard: Access by Proximity</i>	
Standard Condition for an Ecocity	The city provides residents with walkable access between safe and affordable housing, basic urban services, and open/green space. It demonstrates environmentally friendly transport options and provides walking and transit access to close-by employment.
Standard Justification	The ability for residents to access daily destinations (such as retail, services and employment) on foot, by bicycle, or by public transit reduces personal vehicle use, improves energy efficiency and land conservation, improves street vitality and safety, and creates opportunities for physical activity. The higher the percentage of trips taken by these sustainable modes, the fewer trips taken by car and thus the more sustainable transportation is within a city.
Headline Indicator and Definition	Percentage mode split for walking, cycling, transit and freight deliveries. Definition: Excludes private motorized transit. Motorized transit (both public and for freight) must be powered from clean, renewables sources. A large city or region may have multiple centres, each one is self-sufficient for the most part, and some may wish to be designated as an "ecocity fractal."
Ecocity Level 1 Benchmark	86% of trips taken by walking, cycling, transit and freight deliveries.
Rationale	A high "eco-mobility" mode split that favours walking, cycling and transit over the use of private automobiles is likely to reflect the goal of putting everyday needs close to one another. Although the Walk Score methodology more closely approximates the goal of access by proximity, it has at least two drawbacks: 1) Walk Score measures proximity by straight line measurement, ignoring the possibility of actual barriers to access (such as highways) or the pedestrian-friendliness of the route. Consequently, mode split may be a more accurate estimate of the extent to which walkers, bicyclists and public transportation users experience proximity. 2) Walk Score is primarily available in the US, Canada and Australia. Even though data to estimate mode split is not universally available, it is more ubiquitous than Walk Score. The proposed eco-mobility mode split of 86 percent is based on survey research undertaken by Newman and Kenworthy (1999), Kenworthy 2006), Moore (2013) of cities that achieve among the lowest per capita vehicle kilometers travelled per capita. See Moore (2013) page 174, regarding eco-mobility mode split of 86% for downtown Vancouver BC, which compares favorably with mode splits in high density cities like Tokyo (88%) and Hong Kong (89%). Moore estimates transportation CO ₂ emissions of 1.6 tCO ₂ e per capita if all of Vancouver achieved 86% eco-mobility mode split. Ecocity 1: 86% is used because it is benchmarked against Hong Kong, Downtown Vancouver. Hong Kong is 89% walk, bike, transit. Gaia: 100% ecomobility was proposed as the Gaia benchmark. Some participants disagreed



	<p>saying 100% of anything is not a statistic found in nature. What about truck deliveries, for example? Others argued that 100% was possible if freight and local goods deliveries occur in vehicles that have comparable impact/benefit ratios as mass transportation and/or if all vehicles use clean renewable fuel.</p>
<p>Supporting Indicators</p>	<ul style="list-style-type: none"> ● <i>Walking access</i> – the percentage of residents who have access to basic services (education, health care, green spaces, recreation, shopping, food, entertainment, transit connections to other urban centers located within the city’s ecological metropolis, or ecopolis) within walking distance (approximately 500-1500 meters) from their homes. ● <i>Jobs-Housing Balance</i>: the percentage of the population that is employed within City limits. ● <i>Public transit access</i>: the percentage of the population that works in an area less than 30 minutes away by public transit, unless the employee is telecommuting.

Discussion Highlights for Access by Proximity:

- The proposed headline indicator presented to the group was “**Percentage mode split for walking, cycling and transit.**”
- When this headline indicator/benchmark was discussed in plenary, some participants mentioned the drawbacks of using ecomobility mode split as a surrogate for access by proximity. For example, is mode split a measurement of how close everything is or really a measurement of how well ecomobility can overcome poor access by proximity? Likewise, is mode split measuring a lack of viable transportation options (such as a population that cannot afford cars) rather than easy access to everyday needs?
- In the plenary discussion, one participant noted that in an earlier version of the International Ecocity Framework and Standards (IEFS 5-19), the relevant standard was Urban Design and Transport and there were four indicators: Access by Proximity, Safe Housing/Green Building, Affordable Housing and Environmentally-Friendly Transport. IEFS 5-19 also had seven “measures” under the four indicators, which we would now simply treat as seven indicators. This was not resolved at the plenary session. But one possible approach is to return to calling the standard Urban Design and Transport and selecting one indicator to be the headline indicator. For the reason mentioned above, ecomobility may be an inferior indicator to access by proximity, with perhaps a benchmark of a to-be-determined percent of the population within 300 meters of basic needs/services, public transportation and green space. Because Walk Score is used in few countries, a survey instrument may have to be used to estimate this percentage.



<i>Standard: Healthy Biodiversity</i>	
Standard Condition for an Ecocity	Biodiversity of local, bioregional and global ecosystems is sustained, including species diversity, ecosystem diversity and genetic diversity; natural habitat and biodiversity is restored.
Standard Justification	Biodiversity measures the number of species that coexist in a specific habitat. It is a measure of ecosystem health. Greater biodiversity implies greater health. Cities are part of, and dependent on, larger ecosystems and bioregions and must work to sustain biodiversity, including species diversity, ecosystem diversity and genetic diversity.
Headline Indicator and Definition	Healthy urban metabolism Definition: Urban metabolism supports healthy biodiversity and functioning ecosystems regionally or globally.
Ecocity Level 1 Benchmark	Benchmark Critical ecological processes are intact and functioning. EC 1: ecological processes are not drawing down on natural capital Gaia: ecological processes are being restored
Rationale	Intact and functioning ecological processes of a bioregion is a holistic way of measuring healthy biodiversity. As it may be difficult to measure ecological processes, measuring keystone species (e.g. orcas, salmon in Vancouver’s bioregion) may be a useful indicator.

Discussion Highlights for Healthy Biodiversity:

All three proposed headline indicators were reviewed and discussed (**Composition of Species (native and alien), Change in Biomass Productivity, and Percentage of Natural Areas**), and a new one (urban metabolism) was selected as it was considered a more holistic way of looking at healthy biodiversity, including the interconnections within a bioregion, than any of the individual indicators proposed.

It was also noted that:

- It is important to understand cycles of an ecosystem, as ecosystems change over time and can still remain viable.
- Using keystone species in a region would be helpful in determining the viability of ecological processes.

Suggestions for measuring included:

- composition of species (native & invasive)
- change in biomass productivity
- percentage of natural areas

<i>Standard: Carrying Capacity</i>	
Standard Condition for an Ecocity	Demands on ecosystems are within the limits of Earth’s bio-capacity, resources are converted restoratively and support regional ecological integrity.
Standard Justification	The carrying capacity of a biological species is the maximum population size of the species that the environment can sustain indefinitely, given the food, habitat, water and other necessities available in the environment. In population biology, carrying capacity is defined as the environment's maximal load. Cities constitute the dominant habitat of the human species and most cities extract resources from the environment through a combination of local production and trade. Therefore, it is important to identify not only the maximum human population that the bioregion can support within which a city is located, but also the total global environment capacity to support humanity at its current levels of affluence and technology.
Option 1: Headline Indicator and Definition	Per Capita Ecological Footprint The urban person’s demand on the ecological services given by the natural areas of a bioregion. Definition: Human demand on biocapacity.
EcoCity Level 1 Benchmark	1.15 gh/capita
Rationale	In one year, humans are consuming renewable resources that take over 1.5 years to regenerate. The ecological footprint is divided into food, buildings, consumables and waste, transportation, and water. Setting a limit for the use of renewable ecological services can be directly related to energy efficiency and waste management in cities. A healthy environment is one in which the human demand for ecological services has a low impact in the supply of those services by nature.
References	Moore, Jennie. 2013. Getting Serious About Sustainability: Exploring the Potential for One-Planet Living in Vancouver. Vancouver BC: University of British Columbia (https://circle.ubc.ca/handle/2429/44943).

Discussion Highlights for Carrying Capacity:

- The group agreed with the choice of headline indicator presented to the group (**Per Capita Ecological Footprint**).
- Biocapacity is dynamic; the new benchmark should be lower: 1.15 gh/capita. Human demand is the ecological footprint; supply is biocapacity.
- Ecological carrying capacity currently measures the amount of ecological land and sea area that is in *direct service* to humans, and also how much ecologically productive land is reserved for natural processes. It is measured globally.
- Protected land and direct service to human land doesn’t need to be mutually exclusive. We can use land that is already servicing human needs more effectively/responsibly to meet some of the goals of reserving land for nature.

- There are many environmental issues that may threaten to reduce total ecological area, such as sea level rise, ocean acidification etc.
- The usefulness of the end result (i.e. the political response) is what matters most. For that reason, it was suggested that a bioregional ecological carrying capacity indicator may be best to use instead of a global one.
- There was agreement that global carrying capacity is still very useful for cities to consider as they have a reach or impact well outside of their borders, and also the capacity to change or minimize those impacts.
- Using this headline indicator may be difficult if we are trying to use it for just one city within a region, as there is so much connection that it is difficult to allocate, i.e., which ecological costs are directly linked to certain economic/human activities.
- It matters *where* we protect land, not just the total global amount. It has to be distributed somewhat evenly for ecosystems and habitats to thrive.
- It is important to consider which ecosystems are being preserved. And to always ask who has influence over what is valued and preserved, and what is not?
- One thing we are not capturing in this benchmark is the QUALITY of preserved ecologically productive land, which is not represented by just the amount.
- What is the quality of life that would realistically result from reducing our gh/capita being drawn down to 1.15?

<i>Standard: Ecological Integrity</i>	
Standard Condition for an Ecocity	Essential linkages within and between ecosystems are maintained and provide contiguous habitat area and ecological corridors.
Standard Justification	Ecological integrity refers to the capacity of life, be it an organism or ecosystem, to organize, regenerate, reproduce, and evolve itself (Pimental et al. 2000). Cities ultimately depend on ecosystems for provision of sustenance and essential life support services such as clean air, clean and abundant water, pollination of crops, and assimilation of wastes. Therefore, it is important that the integrity of the local and global ecosystems upon which cities depend retain their integral features to support life.
Headline Indicator and Definition	Capability to regenerate to pre-industrial state of diversity and ecosystem function at the bioregional scale. Natural processes are in place to enable regenerative capacity commensurate with the preindustrial condition of the biome. This is measured by nutrient recycling, carbon emissions/sequestration, air, water, biodiversity, area of habitat.
EcoCity Level 1 Benchmark	A rating of "B" equivalent to 75%, which means the indicator lies within but is near to its range of natural variability. Ecosystem components are maintained or restored across the bioregion.
Rationale	An ecosystem that is within its natural range of variability has adapted over millennia and can be expected to continue to do so.
References	Source: NatureServe (http://www.natureserve.org/conservation-tools/ecological-integrity-assessment)
Supporting Indicators	Linkages and ecosystem connectivity Contiguous terrestrial, aquatic, oceanic and aerial pathways are preserved to allow safe passage by annually migrating animals and those that migrate slowly through adaptive responses to disturbance, e.g. urbanization, climate change. Connectivity of ecosystem service flows is maintained.

Discussion Highlights for Ecological Integrity:

1. The proposed headline indicator presented to the group "**Capability to regenerate**" was refined as noted above.
2. Scale is important (need for local and global) – temporal and spatial
3. Assume that regenerative/restorative doesn't include humans
4. Regenerate to original state (pre-industrial conditions (pre early 19th century)); should we talk about regenerative/restorative, or just focus on getting city in balance?
5. Species abundance and ecosystems services are maintained (clean water, fresh air, biological integrity), recognizing that species change (succession)
6. Scale and density of cities / built environment important for ecological integrity
7. Need to use bioregional scale and corridors, and a longer period of time/seasons to account for species migration
8. How do we account for seasonal variability and change? E.g. migration of birds, salmon

November 9th Summary: Bio-Geophysical Conditions

<i>Standard: Clean Air</i>	
Standard Condition for an Ecocity	The city maintains a level of air quality that is conducive to good health within buildings, the city's air shed, and the atmosphere.
Standard Justification	Humans and other living things living in and nearby cities need clean, healthy air to breathe, both inside and outside. Overall conditions for healthy biodiversity and healthy life on this planet are conditional upon the maintenance of a healthy atmosphere.
Headline Indicator 1 and Definition	Indoor Air Quality Particulate (pm 2.5) measured against ambient natural background condition of the bioregion
Ecocity Level 1 Benchmarks for Headline Indicator 1	e.g. in Pacific Northwest = 2.5 micrograms/m ³
Rationale	Ecocity Level 1 = GAIA (because is there is no safe exposure level)
Headline Indicator 2 and Definition	Outdoor Air Quality / Quality of the Airshed AQHI (Canada)
Ecocity Level 1 Benchmark for Indicator 2	90% achievement of AQHI averaged over the year
Rationale	AQHI (Canada) links 3 key attainments to health, which includes exposure over one year (365 days/yr); measured over a 3 hr interval to: <ul style="list-style-type: none"> • pm 2.5 & flexibility to customize based on local containment concerns • NO₂ • O₃
Headline Indicator 3 and Definition	Consumption-based greenhouse gas emissions Measures the greenhouse gases that are emitted as a result of all production and consumption activities associated with the residents of a city, regardless of its territorial boundary. This approach accounts for imports of goods that are produced elsewhere for the benefit of residents in a city. Greenhouse gases can be measured as an index based on the relative climate forcing capacity of carbon dioxide, the most common greenhouse gas in the atmosphere (comprising 80% of emissions). The unit of measure is tonnes of carbon dioxide equivalent (tCO ₂ e).
Ecocity Level 1 Benchmark	Total per capita greenhouse gas emissions at or below 1.5 tCO₂e/ca/yr
Rationale	Climate stabilization studies indicate that at a global population of 7.3 billion, per capita emissions of no more than 2 tonnes per year meet the global sequestration threshold. A target of not more than 1.5 tCO ₂ e per capita has been identified as the per capita target for a one-planet city (Moore 2015; 2013). However, it should be noted that even a lower target of 1 tonne per person per year may be inadequate to achieve climate stability, let alone reverse climate changes already underway. It is possible to reach 1 tonne per

	<p>person per year even in a high consuming society, e.g. North America, for someone fully committed to solar, car-free living. A consumption-based approach to emissions inventorying (vs a territorial approach) provides a more comprehensive, and therefore, more accurate reflection of the emissions associated with an urban resident’s lifestyle.</p>
<p>Supporting indicators</p>	<p>Supporting indicators for indoor air quality:</p> <ul style="list-style-type: none"> • CO₂ = rate of air exchange <p>For Ecocity Level 1 & CO₂ Air Exchange = Look at population building standards with decreased respiratory illness incidence e.g. ASHRAE</p> <ul style="list-style-type: none"> • Particulate (pm 10) = WHO
<p>References</p>	<ul style="list-style-type: none"> • Moore (2015) <i>Ecological Footprints and Lifestyle Archetypes: Exploring Dimensions of Consumption and the Transformation Needed to Achieve Urban Sustainability</i>, Sustainability (7) 4747-4763. Available online: http://www.mdpi.com/2071-1050/7/4/4747/htm • Moore, Jennie. 2013. <i>Getting Serious About Sustainability: Exploring the Potential for One-Planet Living in Vancouver</i>. Vancouver BC: University of British Columbia (https://circle.ubc.ca/handle/2429/44943). • World Health Organization • US Protocol for Community-Scale and Local Government Greenhouse Gas Emissions - ICLEI USA

Discussion Highlights for Clean Air:

- The group did not change the proposed headline indicator categories (indoor air quality, outdoor air quality and GHG emissions).
- It was discussed that there is no indicator/index for indoor air quality that is universal across residential commercial and industrial spaces. The AQHI (Air Quality Health Index) from Environment Canada is recommended instead. Further, since residential indoor air quality reflects the highest standard it was agreed that this would be the proxy for all.
- It was noted that industrial air quality is managed to a certain extent by limiting exposure duration times.
- There is a strong connection between indoor and outdoor air quality – indoor air provides additional exposure due to furnishings etc.
- chose residential for indoor because long-term exposure
- chose AQHI of Canada because direct link to health
- % tree canopy indicator would help clean outdoor air
- CO₂e is ok because accounts for important trace gases with ozone depleting impacts e.g. HCFC
- Per capita metric overlooks intra-urban inequalities (putting pressure on the low emissions majority)
 - particularly relevant in unequal developing economies where an elite minority could account for super high per capita emissions
- Cross Connections:
 - Safe and affordable housing

- Ventilation: Air exchange rates (m^3/hr)
- Materials in buildings & toxic off gasing
 - Responsible resources and materials



<i>Standard: Clean and Safe Water</i>	
Standard Condition for an Ecocity	Residents have sufficient and continuous access to convenient and affordable clean drinking water and domestic use water; city water source, waterways and water bodies are healthy and function without negative impact to ecosystems.
Standard Justification	People need sufficient and continuous access to convenient and affordable clean drinking water to maintain health. They also need access to domestic use water for sanitation. The amount of water available for human use is determined by watershed flows, including rates of aquifer recharge. The quality of water sources, waterways and water bodies are conducive to human and ecosystem health when they function without negative impacts.
Headline Indicator and Definition	<ul style="list-style-type: none"> • The group did not agree that any of the initial proposed indicators were appropriate for the topic of clean and safe water since they are not ecologically focused and only prioritize human standards. • The group felt it was necessary to address the entire hydrological cycle to manage the total water that is drawn from a system for human uses (and water that is put back in), while reserving enough for natural systems reliant on the water system as well. • Primarily, the goal is to not exceed the hydrological carrying capacity (city size and population); a “regionally responsive” approach is also essential; as is acknowledging annual fluctuations.
Ecocity Level 1 Benchmark	<p>The three highest priorities areas of focus when it comes to water are:</p> <ul style="list-style-type: none"> • Watershed Health • City (what happens within) • Receiving Body (may be a source for another city)
Rationale	<ul style="list-style-type: none"> • It is crucial to develop a methodology to determine locally specific and appropriate targets vs setting hard targets from up above and imposing them downwards. • Some example benchmarks may relate to the following: <ul style="list-style-type: none"> ○ Governance structures and jurisdiction covered ○ Water rates and pricing ○ Use of the source, mechanisms that protect the source ○ How stormwater is used as a resource ○ Resilience level of infrastructure ○ Health of ecological systems (many indicators for this) ○ Quality – probably enough literature on allowable limits for good health. But context and measurement can pose an issue. <ol style="list-style-type: none"> 1. Context matters – the 200 L/p/d certainly does not apply to all cities or nations 2. Health of Citizens and Nature are BOTH key.

Discussion Highlights for Clean and Safe Water:

- The proposed headline indicators presented to the group were **“Sufficient water (quantity),”** **“Percentage of time during which drinking water and other domestic use water is available,”** and **“Percentage of the population that has reasonable access to an improved drinking-water supply.”**
- Water that exists outside of direct human use needs to be considered, i.e., not altering water bodies, aquifer in a way that negatively impact ecosystems.
- A philosophical question was asked: what level of ‘nature’ do we want to preserve and protect?
- How globally applicable are the headline indicators? The goal seems to apply most clearly to developed and more prosperous nations/cities.
- The indicators are very anthropocentric as they are written - they only focus on drinking water and not on water resources in general.
- Stormwater and sewage are part of the water equation too. One region’s receiving body of effluent is another region’s intake body. All water systems are integrated one way or another.
- Consider India water balance method.



<i>Standard: Healthy Soil</i>	
Standard Condition for an Ecocity	Soils functions and operations meet their ranges of healthy ecosystem functions as appropriate to their types and environments; fertility is maintained or improved.
Standard Justification	Humans depend on healthy soils for provisioning of food and fibers. Soils provide a range of ecosystem functions according to their type and environment and are crucial to an ecosystem's health.
Headline Indicator and Definition	Sufficient extent, proximity and connectedness of soil meeting quality for growing medium, recreation/natural areas, and building.
Ecocity Level 1 Benchmarks	Benchmark for the volume of the soil and its proximity to the city and its connectedness/continuity
Rationale	<p>A variety of factors are important:</p> <ol style="list-style-type: none"> 2. need to consider total quantity, quality and distribution across city 3. need to consider availability of different soils for different applications (buildings, parks, agriculture) 4. definition of soil health depends on soil type/location <p>May be useful to divide indices based on classifications of soil use: agriculture soils per capita, recreational use, building soil</p>
Supporting Indicators	<p>... for Growing Medium:</p> <ul style="list-style-type: none"> • "The quality of the soil as measured by a variety of indicators is good or high for the agricultural use considering factors such as fertility, tilth, depth, drainage." <p>... for Building Use:</p> <ul style="list-style-type: none"> • "The quality of the soil as measured by a variety of indicators is good or high for the building use considering suitable physical characteristics for supporting structures, and considers highest/best use; for example, not agricultural soils." • Structure, texture, layering • Suitable physical characteristics for supporting building structures <p>... for Recreation/Natural Areas:</p> <ul style="list-style-type: none"> • "The quality of the soil as measured by a variety of indicators is good or high for recreation/natural areas use considering suitable... ." <p>[Note: the group was unable to agree on a way to express this indicator.]</p>

Discussion Highlights for Healthy Soil:

- The headline indicators presented to the group were "Soil Fertility Index (SFI), Soil Drainage Index (DI), and Soil Productivity Index (PI)".

<i>Standard: Responsible Resources/Materials</i>	
Standard Condition for an Ecocity	Non-food and non-energy renewable and non-renewable resources are sourced, allocated, managed and recycled responsibly and equitably and without adversely affecting human health or the resilience of ecosystems.
Standard Justification	Humans depend on a constant supply of resources and materials to construct and maintain tools, machinery, buildings and infrastructure that comprise the artifacts of daily life. The goal is for non-food and non-energy renewable and non-renewable resources to be sourced, allocated, managed and recycled responsibly and equitably, without adversely affecting human health or the resilience of ecosystems.
Headline Indicator and Definition	Percent of material inputs that are recaptured for equal or greater use within region described in benchmark. (The reference to “equal or greater use” means the recycling process cannot result in a degrading of the original material, such as plastic bottles becoming plastic bags before being thrown out.)
Ecocity Level 1 Benchmark	<p>Benchmark for Headline Indicator Ecocity 1</p> <p>100 percent of material inputs are recaptured for equal or greater use within a 2000 km radius of city. Or 80 percent of material inputs are recaptured for equal or greater use within the bioregion of the city.</p> <p>(The rationale is that it would be unrealistic to assume that some materials, steel for example, could be reused in the city but that it seemed reasonable to assume that everything can be reused within 2000 km of a city. The lower bar for the ecoregion assumes that it would be preferable but more difficult to reuse all materials within a bioregion.)</p> <p>Gaia Benchmark for Headline Indicator</p> <p>120 percent of material inputs are recaptured for equal or greater use within a 2000 km radius of city. [The table did not say the following but they probably would have if I had asked them.] Or 100 percent of material inputs are recaptured for equal or greater use within the bioregion of the city. (Cities would exceed 100 percent by mining their landfills.)</p>
Rationale	The ultimate goal is to eliminate the concept of waste, whereby all by-products that result through the production and use of a given material are repurposed, reused and recycled, as is the product itself at the end of its useful life.
Supporting Indicator 1	[As in handout] Embodied carbon impact of non-food consumable goods (tCO ₂ e). (Evaluation of the lifecycle carbon impacts associated with production, consumption and disposal of non-food consumable goods.)
Supporting Indicator 1 Ecocity 1 Benchmark	Net zero carbon emission associated with production, consumption and disposal of non-food consumable goods.
Rationale	The lifecycle carbon impacts of consumable products must be accounted for in order to limit global temperature rise to below a 1.5°C warming.
Supporting Indicator 2	<p>Level of compliance with “Red List Free” requirements under the Living Building Challenge</p> <p>Under the Living Building Challenge, a building project may not contain any of the Red</p>

	List chemicals or chemical groups. These include toxic chemicals such as asbestos, bisphenol A, cadmium, etc.
Ecocity Level 1 Benchmark for Supporting Indicator 2	TBD. The use of the redlist indicator presumes adoption of the LBC, or other comparable certification systems.
Rationale	To ensure human health and ecosystem health it is necessary to eliminate the use of materials and chemicals that are known to be toxic.
Supporting Indicator	Percent of imports come from regions meeting Greener City 1,2, 3 or Ecocity 1 benchmarks or better. (Rationale is that materials/goods imported from these regions would automatically meet objectives of the Responsible Resources/Materials standard: meaning sourced, allocated, managed and recycled responsibly and equitably and without adversely affecting human health or the resilience of ecosystems.)
Ecocity Level 1 Benchmark for Supporting Indicator 3:	50 percent of imports come from regions meeting Ecocity 1 benchmarks or better or 100 percent come from regions meeting Greener City 1, 2 or 3 benchmarks. (This split benchmark is needed to give cities a path to becoming level Ecocity 1. Otherwise a catch would result in which no city could reach Ecocity 1 because there already had to be an Ecocity 1 region from which to import.) [Gaia Benchmark for Supporting Indicator 3: 50 percent of imports come from regions meeting Gaia benchmarks or better or 100 percent from regions meeting Ecocity 1 benchmarks]
Rationale	
References	Living Building Challenge: http://living-future.org/lbc Living Community Challenge: http://living-future.org/lcc Circular Economy, Ellen MacArthur Foundation: https://www.ellenmacarthurfoundation.org/circular-economy Environmental Product Declarations: http://environdec.com/ GREENGUARD and ECOLOGO: http://industries.ul.com/environment

Discussion Highlights for Responsible Materials/Resources:

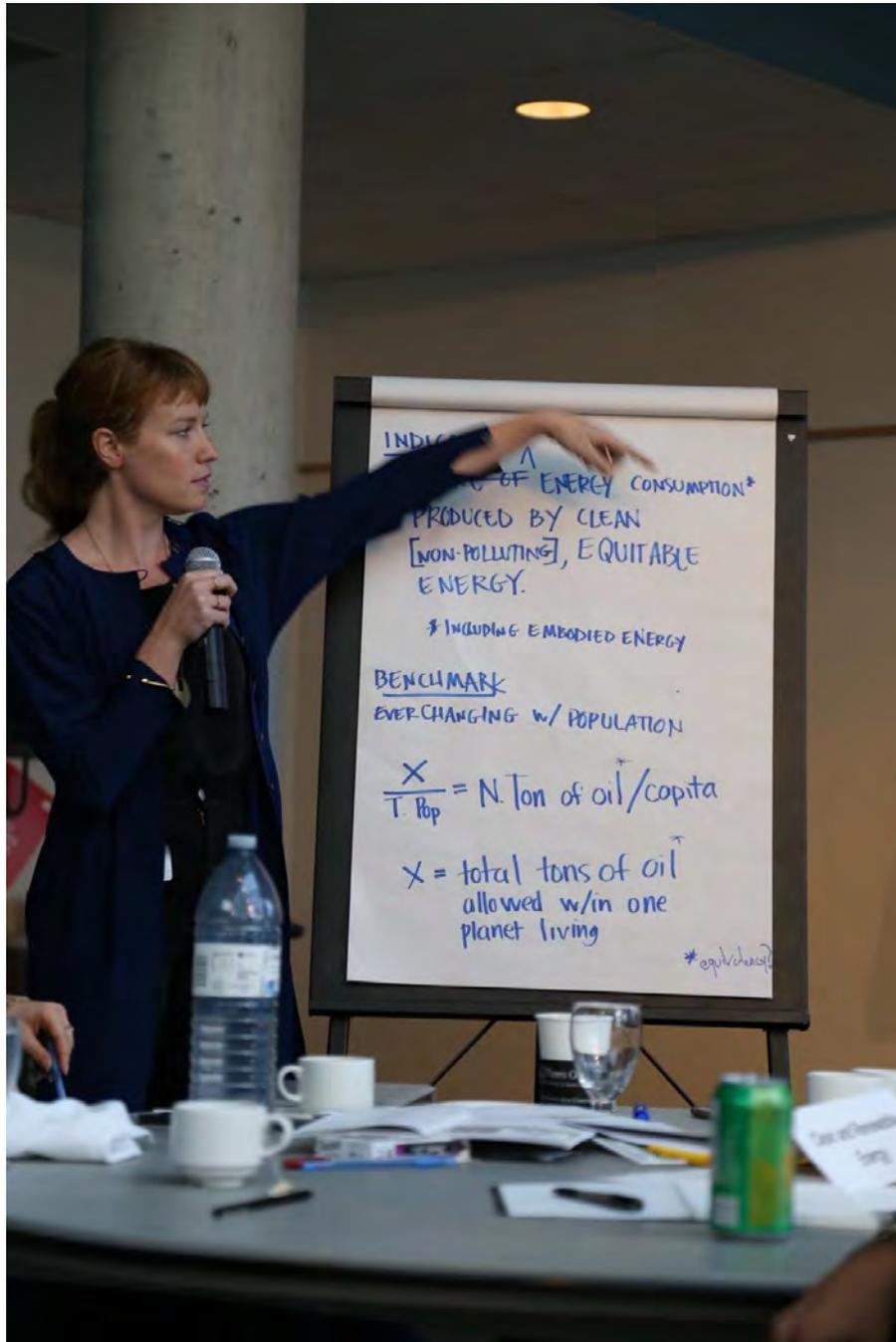
- The headline indicator presented to the group was “**Production of waste per capita (not including food waste) (tonnes/capita/year)**”. The table participants thought the proposed indicator (tonnes disposed/capita) was too narrow, and that the focus on outputs rather than inputs was the wrong approach. They said it is silent about sourcing, managing, recycling and health considerations. The participants briefly considered an indicator that includes recycling and an indicator that would measure the materials that come from within the bioregion and stay within the bioregion. This concept morphed into evaluating what inputs are produced from materials that are nontoxic, recyclable and renewable (including produced with renewable energy rather than fossil fuels) before the table agreed on the indicators/benchmarks listed above. The group also discussed the importance of scale - i.e., it may be difficult to achieve certain targets within a smaller region - a target might be lower for a community but higher for a region.

<i>Standard: Clean and Renewable Energy</i>	
Standard Condition for an Ecocity	Energy is provided for, and extracted, generated and consumed without significant negative impact to ecosystems or to short or long-term human health and does not exacerbate climate change.
Standard Justification:	Energy is required for living. Urban lifestyles are becoming increasingly energy intensive, and most of that energy is derived from fossil fuels. The extraction, transportation, and ultimate combustion of fossil fuels produces negative ecosystem impacts that require careful consideration and management. Energy management of supply (including renewable energy) and management of energy demand (through efficiency and behaviour change) are both important.
Option 1: Headline Indicator and Definition	Share of energy consumption* produced by clean, non-polluting, renewable, and equitable sources equals 2 T with any excess coming from 90% of total energy consumption. (*including embodied energy from production)
Ecocity Level 1 Benchmark	<p>Changing with population</p> <p>$X \text{ tons/Population} = N. \text{ tons of oil/capita}$</p> <p>Measuring: GJ/ Fossil fuels/capita/yr</p> <ul style="list-style-type: none"> • Equitable • Renewable energy • Non-polluting • Embodied
Rationale	<ul style="list-style-type: none"> • Could be achieved by reducing consumption or by increasing clean energy • 2 tons of fossil fuels per year consumption per person for 1 Earth usage • 90% of energy produced by renewable sources isn't a good measure because it isn't equal usage across different cities and countries • 2 T is within current (2016) carrying capacity • Can't apply 90% to the city level, percentage doesn't work • Population affects the amount allowed, benchmark would have to be recalculated each year • Equation → <ul style="list-style-type: none"> ○ $x/\text{Population of the world} = \text{max/capita}$ ○ $2T/\text{capita} = \text{max}$

Discussion Highlights for Renewable Energy:

- The proposed headline indicators presented to the group were “Quantity of fossils consumed/capita/year and Share of energy consumption produced by renewable sources”.
- Not all communities have the capability to produce clean energy (e.g., Madras: cloudy days 160 d/yr, sun not reliable throughout the year; no other resources; 10 million people to serve
 - Scale, partnering with others as part of the solution
 - Pursue technological advances
- Standard must have relation to global capacity limits

- Reduce demand for energy without reducing quality of life
- Need to consider global and local impacts: What are local energy resources; determine local carrying capacity
- "Cleanness" of energy could be captured in other indicators for other standards.



<i>Standard: Healthy and Accessible Food</i>	
Standard Condition for an Ecocity	Sufficient amounts of healthy and nutritious food are accessible to all and are grown, manufactured, distributed and recycled by processes which maintain the healthy function of ecosystems and do not exacerbate climate change.
Standard justification:	An ecocity will have sufficient amounts of healthy and nutritious food accessible to all that is grown, manufactured, distributed and recycled by processes that maintain the healthy function of ecosystems and do not exacerbate climate change.
Option 1: Headline Indicator and Definition	Percentage of weight of nutritionally complete diet for the population that is plant based
Ecocity Level 1 Benchmark	Ecocity Level 1 = 90%
Rationale	Based on Moore’s research (Moore 2015, p 8) no more than 21 kg of a 548kg one-planet diet would be meat, or roughly 4%. Consequently, a one planet diet would be 96% or higher plant based, (keeping in mind that this does not guarantee proper caloric or nutrient intake for human health.)
<i>Measures</i>	
Supporting Indicators	<ul style="list-style-type: none"> • Optimize regenerative terrestrial and aquatic bioregional food systems to maximize bioregional food self-reliance • Nutritionally complete plant based diet is accessible • Nutritionally complete plant based diet is affordable • Food production, method and scale is in alignment with healthy function of ecosystems and within the environmental capacity of the bioregion <ul style="list-style-type: none"> • Healthy soil • BiodiversityAir quality (ghg & carbon sequestration) • Energy return on energy invested for food production • Extent food waste is part of healthy urban metabolism <ul style="list-style-type: none"> • Ecocity 1 = all food waste cycled back • Ecocity 2/3 = includes all human waste/biosolids • GAIA = no food waste to cycle <p>Note cultural differences/access</p>
Ecocity Level 1 Benchmark	96% or higher for Ecocity Level 1
Rationale	
Reference	Moore, Jennie. "Ecological footprints and lifestyle archetypes: Exploring dimensions of consumption and the transformation needed to achieve urban sustainability." Sustainability 7.4 (2015): 4747-4763.

NOTE: A measure for the environmental impact of food systems is under development as part of the Integrated Urban Metabolism and Ecological Footprint Assessment for Food Systems.

Discussion Highlights for Healthy and Accessible Food:

- The proposed headline indicator presented to the group was “Access to nutritious and reliable food as defined through food market score.”
- Make sure food from oceans captured
- Could eat more red meat if sustainable re: energy, water etc.; requires new technology at scale
- Need to address cultural differences (e.g., Inuit are in balance with nature with meat-based diet)
- All food-waste cycle back
- Should have a hierarchy
- Metabolism tool shows feedbacks
- Linkages with air, soil and energy
- “regenerative” = key word - implies certain methods of farming/fishing
- calories don’t measure nutrient quality – need to use weight



November 10th Summary: Socio-Cultural Features

<i>Standard: Healthy Culture</i>	
Standard Condition for an Ecocity	Cultural activities that strengthen eco-literacy, patterns of human knowledge and creative expression are facilitated, symbolic thought and social learning is developed.
Standard justification	Cultural activities include stories of place and engage in placemaking that observes the natural cycles of ecosystems and people’s socio-ecological engagement with them. Through these activities, people gain an understanding of that which sustains them and in turn nurture ecosystem relationships that foster continuous sustenance evolving in an ethic of care for self, and for others both human and non-human. Opportunities for play and innovation are encouraged in ways that further development of the individual and the community of which they are part.
Headline Indicator and Definition	Social-Environmental Inclusivity Index A new survey instrument that measures social and environmental inclusivity, including: the ability of residents to access and engage creative experiences and cultural heritage, as well as a community with memorable sense of place and a vital public life.
Ecocity Level 1 Benchmark:	X% people satisfied with their social-environmental inclusivity via the opportunity to: <ul style="list-style-type: none"> ➤ experience, appreciate and understand nature, (particularly local nature); ➤ recognize and reduce the impact of their lifestyles on the earth; ➤ engage in and/or experience preferred opportunities for creative expression; ➤ access and/or experience aspects of cultural heritage; ➤ experience and enjoy a memorable sense of place; and ➤ enjoy and/or participate in a vital public life.
Rationale	Healthy culture for an ecocity needs to incorporate nature as well as people, which the proposed new social-environment inclusivity index addresses. Our cities need to provide opportunity for positive interaction regardless of race, gender, sexual orientation, education, ability, age, class and so on. They also need to nurture knowledge of, and obligation to share, local nature and the broader Earth. Vital public life is something to be considered in all community places including trains, sidewalks, streets.

Discussion Highlights for Healthy Culture:

The proposed benchmark is a newly proposed index comprised of four sub-components.

The group discussion brought forward two key questions for the Healthy Culture group. One was about the definition of environmental inclusivity. The response given is that environmental inclusivity occurs when people include nature in their knowledge base, which involves local environmental knowledge, as well as understanding and respect for eco-footprints.

A second question was about how the Arts are included in the headline indicator. The response given was the arts were one of many forms of creative expression featured in the third sub-indicator of the new social-environmental inclusivity index.

<i>Standard: Community Capacity/Governance</i>	
Standard Condition for an Ecocity	Full and equitable community participation is supported in decision-making processes along with legal, physical and organizational support for neighbourhoods, community organizations, institutions and agencies to enhance their capacities.
Standard Justification:	Meaningful community participation in decision-making processes when outcomes affect community members is essential to self-determination and is part of a transparent approach to governance. Meaningful participation for ecocities emphasizes shared decision-making, and permeable and horizontal relationships. Community capacity to engage in decision-making requires support by governing bodies working in collaboration with local representatives that share a stake in community outcomes.
Headline Indicator and Definition	Support for capacity development Capacity is the actual or potential ability to act. Capacity, defined by the Aspen Institute (1996), is the combined influence of a community’s commitment, resources and skills that can be deployed to build on community strengths and address community problems and opportunities (p1). Eco-cities uniquely require high levels of social capital and eco-literacy for effective action.
Ecocity Level 1 Benchmark:	Composite benchmark with levels TBD comprised of two sub-indicators: <ul style="list-style-type: none"> ● reflexive engagement – back-and-forth sharing of information ● adaptability – evidence that decision processes and outcomes have improved through reflexive engagement.
Rationale	<ul style="list-style-type: none"> ● Community capacity is a critical foundation for making good decisions and taking effective action. Ecocities purposefully seek to build commitment from organizations, businesses and individuals; expand, extend and leverage resources; and invest in increasing the quantity and quality of skill of the region’s citizens. ● Improvement in the second sub-indicator, adaptability, will include evidence of social learning and a greater capability to act in response to the new social understanding developed and/or other issues that arise.
References	<p>Roseland, Mark, ed. 2012. <i>Toward Sustainable Communities: Resources for Citizens and their Governments</i>. Gabriola Island BC: New Society Publishers.</p> <p>STAR Communities, March 2015. STAR Community Rating System Version 1.2 Washington D.C.</p> <p>The Aspen Institute, 1996. <i>Measuring Community Capacity Building</i> Version 3-96. http://www.qog.pol.gu.se/digitalAssets/1418/1418047_2012_16_bauhr_grimes.pdf</p>

Discussion Highlights for Community Capacity/Governance:

Social learning is connected to the Lifelong Learning standard. We know that social learning has occurred when there are commonly shared concepts and awareness about ecocity basics. This is measured in a variety of ways such as ecoliteracy concepts being taught in school curriculum and post-secondary education. More details and other metrics can be found in Appendix A.

Social learning is also connected to the Healthy Culture standard. Overlaps between the Community Capacity/Governance and both the Lifelong Learning and Healthy Culture standards should be addressed in the next revision of the Ecocity Standards.

An increasing number of collaborative partnerships, including those that involve working across boundaries and outside the city's bioregion, were deemed important to governance for ecocities and the success of the Headline Indicator.



<i>Standard: Healthy and Equitable Economy</i>	
Standard Condition for An Ecocity	The city's economy consistently favours economic activities that reduce harm and positively benefit the environment and human health and support a high level of local and equitable employment options.
Standard Justification	The economy of an ecocity consistently favors economic activities that reduce harm and positively benefit the environment and human health and support a high level of local and equitable employment options, both formal and informal.
Headline Indicator 1 and Definition	Income distribution The Gini coefficient (sometimes expressed as a Gini ratio or a normalized Gini index) is a measure of statistical dispersion intended to represent the income distribution of a nation or city's residents, and is the most commonly used measure of inequality.
Ecocity Level 1 Benchmark	0.2 Gini coefficient
Rationale	<p>The Gini coefficient (0 = perfect income equality; 1 = perfect inequality) seems like a good choice for the headline indicator for a few key reasons: (1) it is a well-known measure with some statistics available for cities; (2) it encompasses a range of social justice concerns; and (3) income inequality can be addressed at the city level – most recently by local minimum wage laws and more traditionally by education, economic development, housing and zoning policies/programs. While unemployment ratios are key to a healthy economy, they are heavily influenced by national and global economic cycles.</p> <p>A Gini coefficient of 0.2 is an attainable yet aspirational benchmark. The most equitable US city (according to a 2011 study) is Ogden-Clearfield, UT, with a Gini coefficient of 0.386, which is 85.8 percent of the US Gini coefficient of 0.45. According to the US CIA, Slovenia had the greatest countrywide income equality in the world (Gini coefficient of 0.237, 2012). Assuming that an individual city should be capable of achieving a Gini coefficient that is 85 percent of the national Gini coefficient suggests a city ecocity 1 target of Gini coefficient 0.20.</p>
Headline Indicator 2 and Definition	Green and Resilient City Economy A resilient city economy has the capacity to survive, adapt, and flourish in the face of turbulent change and uncertainty. The most resilient cities are more economically diverse and greener.
Ecocity Level 1 Benchmark(s)	<ul style="list-style-type: none"> • Economically diversity city economy as measured by: <ul style="list-style-type: none"> ○ top business sector wages ≤ 25% total economic activity (total wages earned) ○ wages of top three sectors ≤ 50% total economic activity (total wages earned). ○ Ecological footprint demand of 1.7 gha/economic sector
Rationale	<ul style="list-style-type: none"> • Economic diversity is a key indicator of economic well being included within the Genuine Progress Indicator (Anielski, 2007). The more diverse a city's economy the more insulated it is from negative repercussions should any major sector of the economy experience a serious downturn. Example of sectors might include: arts, agriculture, clean energy, construction and development, hi tech, construction and development, health, (advanced) manufacturing, FIRE (finance, insurance, and real estate). The Ecocity Level 1 benchmark was

	<p>borrowed from the City of Santa Monica’s Sustainability Indicators Report developed with advice from Mark Anielski, authour of <i>The Economics of Happiness</i>. Santa Monica is known for its strong sustainability orientation and their indicators seemed a reasonable choice to the group.</p> <ul style="list-style-type: none"> • The ecological footprint is a way to measure the demand on nature’s available capital versus nature’s supply. This indicator was chosen because it complemented the measure used in the Carrying Capacity standard. When business sectors have lower ecological demands, allowing them to anticipate and buffer the unexpected shocks arising from climate change and resource depletion. While ecological footprints are determined for cities, nations, individuals and businesses, the group did not think they had been developed for business sectors which would be a worthwhile endeavor given that economic development is conducted with economic or industry sectors as its foundation.
<p>References</p>	<p>http://www.footprintnetwork.org/en/index.php/GFN/page/footprint_for_business/ Santa Monica: https://www.smgov.net/uploadedFiles/Departments/OSE/Categories/Sustainability/Sustainable_City_Report_Card_2012.pdf http://www.smgov.net/uploadedFiles/Departments/OSE/Categories/Sustainability/SCP_2006_Adopted_Plan.pdf https://data.sustainablesm.org/stat/goals/3gc7-g672/qsmw-qzUU/ghud-yt92 Anielski, 2007. <i>The Economics of Happiness: Building Genuine Wealth</i>. New Society Publishers: Gabriola Island.</p>

Discussion Highlights for Healthy and Equitable Economy:

The Gini coefficient was proposed prior to the Ecocity Focus Lab as the headline indicator for a healthy and equitable economy. While the group agreed with this choice, they felt strongly that a second, complementary headline indicator was necessary to achieve an Ecocity level 1. Theoretically, a city could have a 0.2 Gini coefficient but an economy that is strongly based on carbon or unsustainable rates of resource extraction, which would not be in balance with nature. Likewise, that same city could be strongly dominated by one economic sector making it vulnerable to fluctuations in the market or business conditions of that sector. It is for this reason the second headline indicator of a “green and resilient economy” was considered critically important for an Ecocity.

The group also reviewed the other supporting indicators proposed and determined a rationale for their potential removal, shift to another standard, or inclusion within a new supporting indicator. A summary is provided here:

- Genuine Progress Indicator - remove because it is has limited adoption due in part because it is unwieldy with many indicators that overlap other Ecocity standards. The group chose instead to use some key economic indicators from the GPI such as economic diversity.
- Percentage of the working-age population employed in the locality - removed but mixed feelings about doing so. On the one hand, the group believed that a city economy whose business sector achieved a one-planet footprint would by necessity be quite local in nature. On the other hand, an emphasis on a

local economy is mentioned quite frequently in other standards and is relatively easy to measure. For example, the STAR Community Rating System highlights “Local Economy” in the Jobs and Economy section. Evaluation measures include: community self-reliance and local financial institution deposits (page 57). Supporting local businesses are a commonly expressed action of interest to residents and so we think that some supporting indicator of a local economy should be chosen (DHM Research, 2011, referenced in http://www.oneearthweb.org/uploads/2/1/3/3/21333498/sustainable_consumption_report_cara_pike_on_e_earth_aug15.pdf).

- Share of women and minorities in local leadership - removed as believed better in another Ecocity standard.
- Female and minorities unemployment rate - incorporated into supporting indicator below.
- X% of business start-ups - removed; does not differentiate between carbon-intensive and green, or local and corporate businesses with headquarters elsewhere and poor distribution of economic value. The green and resilient headline indicator deemed a better approach to measuring business activity that contributes to an Ecocity economy that is in balance with nature and supportive of quality of life for all.
- Amount of jobs in independent business - removed; again does not differentiate the type of business; the green and resilient headline indicator measure this better.

The supporting indicator, “access to decent jobs supportive of quality of life”, was deemed necessary to complement the two headline indicators. Two benchmarks could measure this: (1) X % of total population able to access decent jobs supportive of quality of life; and (2) X ratio of unemployed women and minorities compared to the total unemployment rate. “Access” included notions such as a reasonable combined working and commuting times and access to affordable childcare. “Decent” went beyond just a living wage to include the idea of work-life balance and measures to remove discrimination for part-time or seasonal work in terms of pay, promotion, training, and job security.

<i>Standard: Lifelong Learning</i>	
Standard Condition for an Ecocity	Residents have access to lifelong education including access to information about history of place, culture, ecology, and tradition provided through formal and informal education, vocational training and other social institutions.
Standard justification	In an ecocity, residents all have access to lifelong education including access to information about history of place, culture, ecology, and tradition provided through formal and informal education, vocational training and other social institutions.
Option 1: Headline Indicator and Definition	Literacy rate for adults and youth of both sexes
Ecocity Level 1 Benchmark:	99% of population has basic literacy
Rationale	Literacy rate is a good measure because it enables lifelong learning regardless of whether or not people complete a pre-determined number of grades in school. As shown in Moore (2015) in Table 2, literacy rates are lower (72%) in one-planet countries and can be as high as 99% in three planet countries. However, high literacy is arguably essential to achieving and maintaining one-planet lifestyles as well as critical to human wellbeing. Consequently, the 99% rate is suggested as the target. Beyond eco-city level 1, enhanced literacy emphasizing a regenerative model of place-based learning becomes the emphasis.
References	Moore, Jennie. "Ecological footprints and lifestyle archetypes: Exploring dimensions of consumption and the transformation needed to achieve urban sustainability." <i>Sustainability</i> 7.4 (2015): 4747-4763. http://www.uis.unesco.org/Education/Pages/default.aspx Source: UNESCO Institute for Statistics, Catalog Sources World Development Indicators http://www.uis.unesco.org

Discussion Highlights for Lifelong Learning:

A spectrum of literacy was highlighted. Four levels of basic literacy were presented: 40% at Greenest City Level 1; 70% at Greenest City Level 2; 80% at Greenest City Level 3 and 99% at Ecocity Level 1. Beyond this, the focus shifts to higher levels of “enhanced literacy” culminating in the GAIA level emphasizing a regenerative model of indigenous or place-based education. Enhanced literacy would be measured through a survey that would determine the % of population that has competencies in a variety of areas including:

- Human rights, peace, equality
- Agriculture (sustainable)
- Sustainability
- Biodiversity, ecology
- Diversity and acceptance
- Curiosity
- Healthy
- Indigenized/history & neighborhood traditions
- Spirituality

- Politics
- Economy
- Skills
- Holistic Thinking
- Storytelling narrative (indigenous)



<i>Standard: Well Being/Quality of Life</i>	
Standard Condition for an Ecocity	Residents report satisfaction with their quality of life including employment, the built, natural and landscaped environment, physical and mental health, education, safety, recreation and leisure, and social belonging.
Standard Justification	Residents report strong satisfaction with quality of life including employment, the built, natural and landscaped environment, physical and mental health, education, safety; recreation and leisure time, and social belonging.
Headline Indicator and Definition	<p>“The Jane Jacobs Indicator”</p> <p>An indicator that determines how happy people are living in their city or place. Happiness is measured in three main categories each with sub-questions. (1) <i>Access to resources</i> - questions about employment, self-sufficiency, food security; (2) <i>Choices</i> – mobility, freedom of movement, housing, congregation/religion, connections, learning, work/life balance; and (3) <i>Health</i> – built environment, wellness, soundscape, landscapes, physical activity, safety and resilience.</p>
Ecocity Level 1 Benchmark (s)	<p>X% of people happy with their Quality of Life measured in one of three ways:</p> <ul style="list-style-type: none"> • a qualitative survey • using an existing quantitative assessments such as Happy Planet Index • as a ratio of Quality of Life to the average score for all other Ecocity standards. <p>Satisfaction or peace and contentment are the benchmark for Ecocity Level 1. Thriving and flourishing occur at higher levels for Ecocity Levels 2 and 3. Self-actualization is the measure for the GAIA level.</p>
Rationale	Happiness with quality of life and wellbeing is a concept of fundamental importance to an ecocity.

Discussion Highlights for Well-being/ Quality of Life:

The choice how to measure % of people happy with their quality of life remains to be addressed. Three options were suggested. While potentially challenging to measure, the third benchmark option provides an opportunity to measure wellbeing and quality of life in the context of the other standards collectively. The idea of measure wellbeing in relation to specific standard(s) was also suggested and viewed favorably.

APPENDIX B: IMPLEMENTATION RECOMMENDATIONS

On November 8th and 10th participants convened as a large group to discuss overarching implementation issues. This discussion did not occur on November 9th due to time limitations. Results of these discussions are summarized below.

- **What needs to happen? How can these IES standards help us plan for + create more ecologically balanced and socially just?**

Apply science:

- Getting it right (scientific evidence)
- Point to what we know and where there are gaps (uncertainties that still need to be investigated)

Strategic communications:

- Engage students and scholars via PANDO to explore and test revised standards. **ACTION ITEM: Jennie Moore and Mark Roseland will develop relevant new PANDO network.**
- Link to issues that have traction e.g. carbon emissions
- Use natural disasters as an opportunity for change. Bordering cities may fight over managing rain water. But a disaster might make incentives for them to work together. Informal settlements persist even on no build zones.
- Hire PR firm to help frame issues and market (marshal political will)
- Stakeholders, civil society, religious organizations, etc.
- PR could include celebrity spokesperson
- Deliver message strategically
- Balance hard-hitting facts with messages of hope
- Question false assumptions, e.g. is consumer society really making us happy
- Now in Canada is a good time to gain political engagement on these issues
- Use a design competition. Awards ceremony for cities.
- Explore new ways to share data e.g. new app
- Distribute presentations and focus lab report

Address political realities:

- Mayors / Council do not want to be embarrassed with an indicator system that they can't meet or can't control.
- How do you get to the next level? Put in the General Plan / Official Community Plan. Put them in the goals for these.
- How do you get a land owner to do something the owner doesn't want to do or can't afford to do.
- Getting control of land for preservation or development. Easier to get from private owners than from other public entities.
- How can cities control the hinterlands? Is that responsibility of States / Provinces?
- Engage staff rather than elected/changing politicians
- Public education and support for political action

- Youth
- Roundtable
- Interested individuals

Align with and complement other standards:

- Have ecocity standards plug into LEED neighbourhoods; mandate by central government to do LEED neighbourhood.
- National and provincial environmental standards.
- India has a 100 Smart Cities competition.
- Indicators must always be looked at in conjunction with other indicators

Additional tactical comments:

- Hyperlink linkages between standards; create a diagram to show interconnections.
- Rather than utilizing benchmarks, which are really challenging to establish at the universal scale and are always changing along with population growth and innovation (i.e. renewable energy), why not start with current state of each standard and measure/report progress, improvement and/or decline related to status.
 - **How can Ecocity Standards (carrying capacity) help achieve Eco-Socio cities?**
 - Knowing carrying capacity of region/planet helps inform efforts to reduce externalization of negative impacts (externalities/misery)
 - Greater local control over water, air, land resources
 - Mainstream changes into society
 - Change cultural narrative away from growth toward development
 - Integrate livable standard with ecological integrity and framework/standards
 - Synergies of groups/push innovation
 - Greater local taxation power
 - **Specific actions needed to achieve the goal to create more ecologically balanced and socially just society**

Emphasis on transportation:

- Chennai had mode split 80% walking + cycling + transit. Based on deprivation, not choice. Downtown used to be job hub, but now dispersed in complex web. Suburban rail lines. Ownership of land is a challenge. Modify land use or transportation?
- Oslo and Hamburg had goal for bicycle pedestrian trips. Amsterdam has taken back canals from cars. Disallowed permits or made expensive.
- Proximity: some climates very hot and difficult to walk. How to make that walkable? Singapore has projected buildings to provide shelter from rain and heat.
- Pedestrian infrastructure. Boundary walls define ownership of property, but this cuts off porosity of city. Distinguishing perimeter streets and pedestrian / bike streets.

- Upscale residential towers connected to roads that go to shopping / work, but disconnected from public. Delhi has great transit, but not used.
- In Chennai central vegetable market. Neighbourhood store takes truck to central market and takes to vegetables. Efficiency? should we have multiple small markets?
- Do deliveries by hand carts. Gondolas. Bikes.
- Big box stores. Long term agreements. Promised parking. Vehicle industry. Can't convince them to change mode share.
- Major income from government is sale of petroleum and vehicles. Public transit is heavily subsidized vs. a drain in resources. 4% of India pays income tax. Cash strapped system. '
- First aid by ambulance using two wheelers. Any private vehicle.

The UMIS method is proposed to help assess the biodiversity indicator. A 5 step process was proposed by the table participants:

(1) Define the bioregions critical ecosystems



(2) Assess urban metabolism to discover local, bioregional and global ecosystem sources and sinks

(3) Determine all negative impacts

(4) Determine intervention points



(5) Apply interventions

- policy
- education
- projects/planning
- investments

(6) Repeat 2 – 5