Ecocity and Education Workshop Outcomes Friday, February 10, 2012

SCHOOL OF CONSTRUCTION AND THE ENVIRONMENT

Lunch & Learn: Education's Role in Building Ecocities

On Friday, February 10th, 2012, Richard Register and Kirstin Miller from Ecocity Builders (www.ecocitybuilders.org) presented at BCIT's Burnaby Campus in a School of Construction and the Environment sponsored Lunch and Learn on Ecocities and Education. Following the Lunch and Learn, SOCE faculty and staff participated in a workshop to explore a focus on ecocity education and applied research to advance the state of practice concerned with the natural environment, the built environment and the relationship between them.

Workshop

The goal of this workshop was to review progress to date by SOCE to become a leader in sustainability education and explore linkages between the School's mandate and dimensions of ecocity education.

Key components are:

- Introducing the concept of ecocities as well as what is needed for ecocity education
- Examining whether we can advance the state of practice through ecocity education at SOCE
- Exploring the campus as living lab through becoming an ecocity fractal, a model that could be followed by others

Introduction to the Ecocity School concept

Presented by Richard Register, President, Ecocity Builders

Richard reviewed the concepts that are integral to ecocities including slide images from around the world of relevant examples that demonstrate: climate appropriate built environments, preservation of natural landscapes, agricultural production close to and within the built environment, pedestrian oriented land-use and transportation solutions. Emphasis is given to: high-density, high-performance, mixed-use buildings that contain all the services needed for daily life with rapid transit linkages to other service centres and jobs. For more information visit: www.ecocitybuilders.org

He noted that while many places exhibit aspects of the ecocity, he has yet to find everything concentrated in one place. He believes that in order to advance the state of practice toward ecocity development, it would be important for the school to also be an ecocity, or ecocity fractal. A fractal would contain all of the essential elements of an ecocity within approximately two city blocks. Complementing the demonstration of ecocity concepts in the campus' built environment, the curriculum to support ecocity education would also need to address all of the elements of city building including: land-use planning, architecture and landscape architecture, law, social studies and history, construction and trades, etc. (see Addendum). Richard believes that SOCE is well positioned to become the world's first ecocity school given the commitment to sustainability in education and the opportunity to redevelop the Burnaby campus.

Introduction to the International Ecocity Framework and Standards

Presented by: Kirstin Miller, Executive Director Ecocity Builders

Kirstin introduced the International Ecocity Framework and Standards (IEFS) that is being developed by Ecocity Builders in collaboration with international experts. BCIT's SOCE is the lead sponsor of this initiative. The purpose is to establish clear performance metrics for an ecocity. The framework helps position a city with regard to whether it is approaching or has achieved the performance of an ecocity. There are eight levels in the framework as follows:

Unhealthy	Green 1	Green 2	Green 3	Ecocity 1	Ecocity 2	Ecocity 3	Gaia

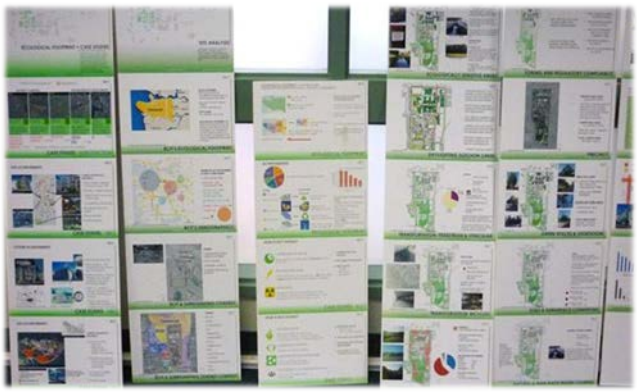
Work is underway now to develop the baseline performance criteria for the Ecocity 1 standard. There are fifteen ecocity conditions that together comprise the standard. They are grouped into the following categories: urban design, bio-geo-physical conditions, ecological imperatives, socio-cultural features. For more information visit: www.ecocitystandards.org

SOCE and Sustainability

Presented by: Jennie Moore, Director of Sustainable Development and Environmental Stewardship

In 2006, SOCE adopted a Sustainability Framework (www.bcit.ca/construction/sustainability) that is premised on the global challenge to live within the earth's carrying capacity, to provide equal opportunity to the world's population, and to account for all costs and benefits of decisions. Six themes were developed in collaboration with the heads of each of the School's programs. These themes help guide the School's efforts to become a leader in education that advances sustainability in the built and natural environment:

1. *Protect and strengthen assets*
2. *Balance use and renewal of resources*
3. *Account for all costs and benefits*
4. *Reduce waste and eliminate toxics*
5. *Ensure safety and access to services*
6. *Support opportunities for improvement and enjoyment*



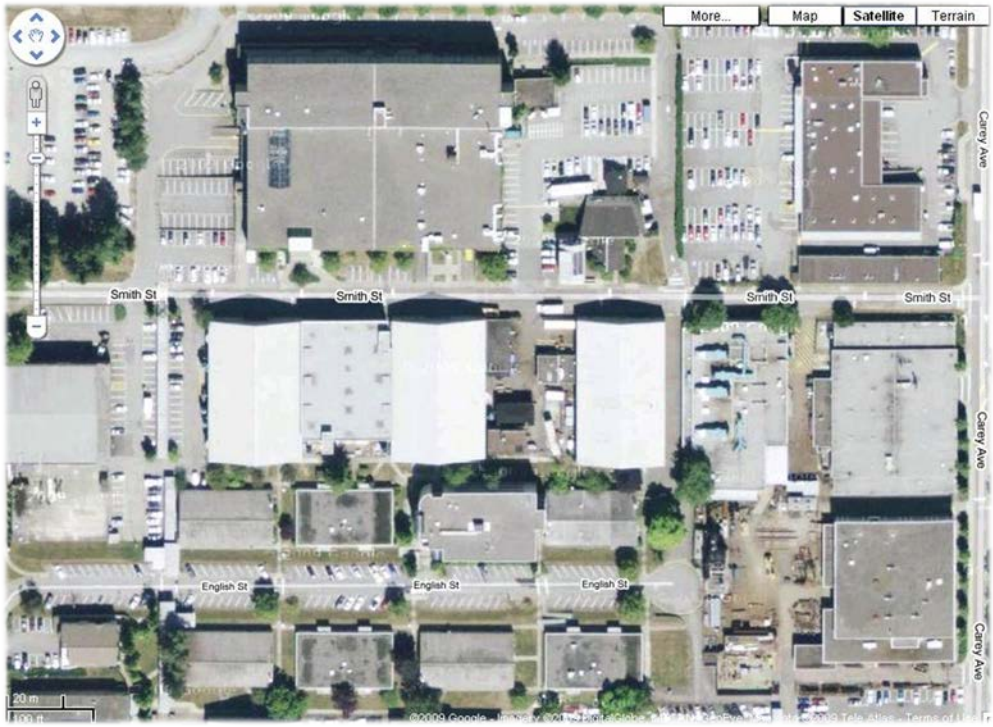
Also in 2006, BCIT developed the notion of developing its campuses as living laboratories of sustainability (Reference 1 Moore and Wong 2008). For the SOCE, this approach is represented in the School's strategic vision to embody sustainability principles within curricula and the campus environment where we deliver our educational programs.

In 2009, the School sponsored a workshop where Architectural Science students worked with Richard Register and Kirstin Miller of Ecocity Builders (www.ecocitybuilders.org) and a host of professionals from the BCIT community, as well as representatives from industry, to develop a vision for the campus following ecocity principles (Reference 2 Ecocity Builders Newsletter). An overarching goal was to reduce energy and materials throughput on campus by a factor of four (75%) to ten (90%).

In the interest of achieving ecological sustainability, meaning use of ecological goods and services within nature's carrying capacity, the scientific community is calling for a four to ten-fold reduction in global levels of energy and materials consumption. Growing concerns about energy security coupled with evidence of anthropocentrically induced climate change, habitat degradation and species loss, global fisheries decline, desertification and water shortages point towards the relevance of the scientific community's challenge despite perceptions that such targets are "unrealistic."

Inspired by the outcomes of this initiative, SOCE faculty, staff and students have set about implementing their ideas. As a first step, the School is applying leading edge technology to the challenge of achieving a four to ten-fold reduction in energy and materials consumption of a portion of the BCIT Burnaby Campus comprising buildings NE1-8. This is known as the "Factor IV Initiative".

Aerial photo of the Factor IV Initiative that covers buildings NE1 to NE8

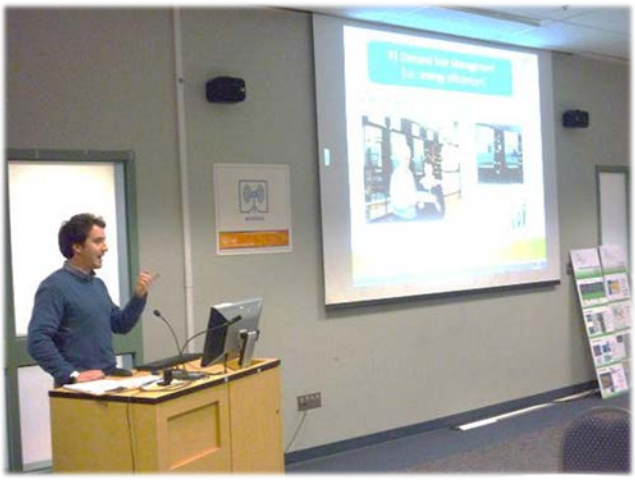


Key initiatives include:

- 75% energy reduction
- 75% material reduction
- Street repair
- Guichon creek – day lighting the north end of the creek
- Rethink NE1 (a large building within the Factor IV area)

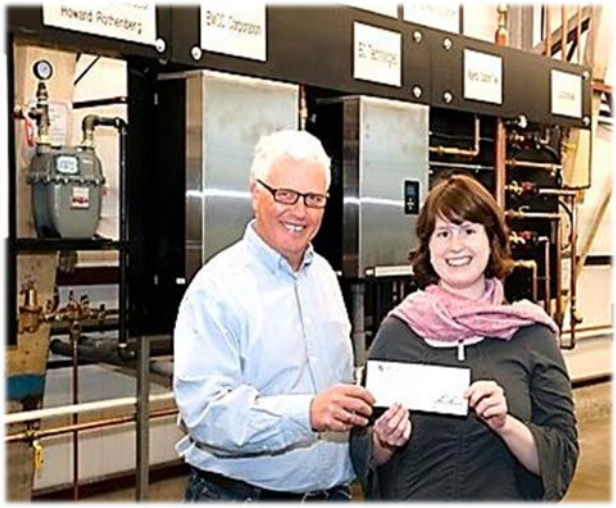
Update on the Factor IV Initiative (formerly known as Sustainability Precinct)

Presented by Alexandre Hebert, Energy and Sustainability Manager and Andrea Linsky, Energy Specialist



The Factor IV Initiative aims to reduce energy and materials throughput in the northeast area of the Burnaby campus without compromising service levels. Specifically, the focus is where SOCE teaches most of its programs, in buildings NE1-8. The 2009 baseline for energy use in these buildings is 44,000 gigajoules (GJ) of energy annually. Since the initiative's start in 2009, SOCE has already saved more than 9.5% of all electricity used annually, the equivalent of powering 440 houses for a year. These savings were achieved by installing auto-timers, high efficiency boilers, compressed air systems, efficient lights, and adopting "lights out" procedures.

SOCE is on-track to reducing energy demand in buildings NE2-8 by 75%. The commitment to sustainability encompasses not only green building design on campus, but employee stewardship programs, a greening curriculum and instructional practice, and community building programs in alignment with the goals of reducing BCIT's overall ecological footprint.



Students, faculty and staff have worked together during the last few months to establish a baseline, a reduction target and a list of projects needed to meet the Factor IV energy reduction target (table 1). Phase 1 excludes NE1, which is a very large and complex building that is connected to the campus district energy system. The 2009 baseline for buildings NE2-8 is 12,000 GJ/yr.

Table 1: List of Projects to Reduce Energy Consumption in NE2-8

	DESCRIPTION	**STATUS**	**STUDENTS**
1	Smart Meters	Installation in-progress.	Real time data will be made available to students.
2	Wood dust Extraction	Completed.	Students did original energy audit; one case study written.
3	NE6 High Efficiency condensing boilers	Completed.	Designed and installed by Faculty; used by students in piping programs.
4	Heat doctors	Completed.	n/a
5	Biomass system	Engineering study and business case in progress; principle investigator or team of investigator now needed; Some capital secured.	One case study written; Boiler house will be designed for students; Faculty involved in project development.
6	Welding ventilation in NE8	Engineering study and business case completed; need capital.	Students did original energy audit; one case study written.
7	NE6 Outdoor welding	Project team created.	To be confirmed.
8	Lighting Redesign	Engineering study in progress.	n/a

Workshop Break-Out Groups

Following the presentations, participants broke into two small groups. One was led by Richard Register and focused on curricula to advance ecocity education. The second group was led by Kirstin Miller and explored how to advance the concept of the campus as living laboratory of sustainability, particularly with regard to building an ecocity fractal at the northeast end of campus where SOCE delivers its programs.

Group 1: Ecocity Education

A new model of faculty and student interfacing was discussed as well as undergrad programs modeled after C.H.O and programs leading to a diploma.

The idea to bridge departments and schools with in BCIT was brought forward especially concerning project based work; barriers would need to be removed so that the campus can fully work together as one. There is the option of putting on different events to inform faculty, staff and students about the role of education in building ecocities and to enhance the ecological thinking approach.

- Ecocity day – interdisciplinary learning day
- Faculty forum / centre
- Ecocity orientation / foundation
- Student led conference

Group 2: Campus as a living lab of sustainability – Ecocity fractal

This group focused on 3 of the 5 key initiatives put forward by the SOCE.

1. Daylight Guichon Creek

Tom Saare discussed the restoration of the south end of the Creek and the collaboration between BCIT and the Habitat Foundation. With the support of the Foundation, gabions which have previously failed have now been replaced and stability has been restored. The focus was on the link of day lighting the south section of Guichon creek to the entire restoration efforts. The pools and creek need to be brought up to grade and there is the potential to reconnect the lower portion. We are currently waiting to receive a grant for the day lighting phase. With a $60,000 fund from the Habitat Trust Fund the creek was reconnected to the culvert and resident cutthroat trout have been established. The campus facilities have been capping and redirecting current storm and

drain systems from discharging into the creek. However the awareness of how to keep the creek free of chemicals and toxins has to be increased. The creek now flows into a pond, which flows into the culvert to Canada Way, Still Creek and on to Burnaby Lake.

Several other ideas were brought forward:

- Could we do some sort of take on the Yellow Fish marking that were added to neighbourhood drains? We could create a marking either outside, or inside by sinks etc., to raise awareness for the habitat the creek represents. Is there a way to identify the route it is flowing underground and mark it above ground?
- Danny Catt suggested a video that would inform students of the ecological impact of the drains and how to dispose of waste in an ecologically responsible form.
- Create a campaign like "Heatsavers" that focuses on drain awareness i.e. "Down the Drain".
- Utilize QR markings that link to videos or other information.
- Find ways to increase the visibility of the underground creek (such as glass panels or bridges throughout campus).
- Can we report fish and raise awareness of the ecology in the minds of the students?
- Bring the fish signs into the building too – to bring awareness of the need to address water systems health

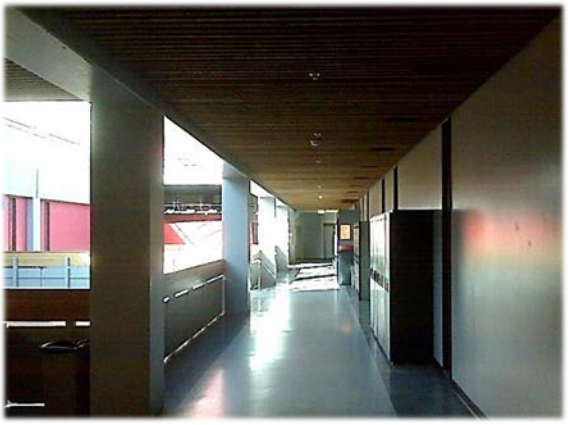
2. Street Repair

The option was raised to connect with the City of Burnaby when it comes to street repair and to see if there is an identifiable link. Low cost changes, like planters, could be implemented rather quickly. The idea of landscape furniture was brought forward and to incorporate trash bins in a more "enjoyable" way. A pilot project supported by NE2 regarding pedestrianization could be brought forward, Smith Street from NE1 to NE3 could be closed off and used as the pilot project's space. There is the option of closing Smith Street to traffic, however this would eliminate the access to the lower parking lot and the cut-off point would have to be chosen

carefully as Emergency Vehicle access still needs to be available. Traffic patterns would have to be considered and the reduction in available parking spaces would be a hard sell. There is a need to address the car culture itself and rethink other possibilities, including bus access to BCIT. A reduction of road access to make the area more pedestrian friendly and to make them similar to the Olympic Village roads was discussed. The chain link fence should be removed to make the area more attractive, new arty fences with iron works could be created (Granville Island Example) as well as murals.

3. Re-Think NE1

The question was raised to keep the building or not; is it possible to redesign it in light of the concerns raised by a recent seismic report? Major modifications would be needed and current faculty and students would have to be relocated. The HVAC system has issues and these would need to be dealt with in the near future. Another option would be to construct a net zero Ecocity building which would become a new flagship facility. The campus is at the "end of life" and the redevelopment of some building is an option, looking at the buildings to last for the next 60 years. There is a life cycle analysis study underway for NE1. It is termed valuable real estate and the thoughts are to find something that could go there and bring in more revenue to the campus. Commercial opportunities need to



studied and more community uses need to be applied to the school. Two examples were brought forward from SFU and UBC. UBC has developed campus with market housing and has successfully attracted students and faculty and created a striving community. SFU has created a Univercity with great retail options. BCIT needs to utilize the roof tops of buildings for study and recreation, claiming a great view to the North Shore Mountains. The campus Master Plan needs to integrate these ideas and be revised.

References

1. Moore, J. and J. Wong. 2008. British Columbia Institute of Technology Campus Master Plan: A Living Laboratory of Sustainability, in Sinclair, Brian, ed. *Campus Design and Planning: Culture, Context and the Pursuit of Sustainability*. Ottawa: Canada Green Building Council.

2. Ecocities Emerging Newsletter – follow the link below for Ecocity Principles http://www.ecocitybuilders.org/ecocity-newsletter/

ADDENDUM 1

World's first Ecocity University

Ecocity University in an Ecocity or Ecocity Fractal – At BCIT?

A discussion paper by Richard Register

Idea

I've had an idea for several years and suggested it in a number of places including China, Korea, Singapore, Brail, Israel, Germany, India and the US, that the world needs an Ecocity University (or college if less ambitiously formulated). The suggestion has often elicited the comment, "Yes, let's have a school of ecology and environmental sciences in our new development." No, that's not the idea. There are plenty of excellent such schools.

What is missing is the focus on ecological design and planning from the land uses and lay out literally on up. We need a clear focus on our built environments of all scales, from village to metropolis, complete with study of supportive and related technologies and lifestyles. Associated architecture, landscape architecture, energy and transport technologies, restoration strategies for agriculture and natural habitat and the supportive legal and political landscape – all would be exemplified in a built scholastic community focusing on the discipline with a clear set of curricula. As far as I can tell, that is not happening anywhere. First in the field would be historic.

Its core courses would look at city design and layout, architecture and all associated and connected systems through the lens of ecology, geography and evolution, finding the systems within and the sense of place and time. Practically everything relates to cities so big and powerful are they in the Earth's environment; the set of core courses would branch out into the more intimately connected studies and disciplines. There is a randomness that confounds better understanding of whole systems and makes it more difficult to get a sense of proportion and summons tools for prioritization; Ecocity studies provides a way of seeing what we build in its most basic whole systems sense and how to build it better with insights from life and Earth sciences, logic, common sense and world wide experience in pursuit of healthy cities.

At a particular school…

It could start with a district of a campus, maybe at BCIT, for example. In as little as two or three conventional city blocks there is enough potential diversity of structures and functions that could be designed according to Ecocity principles to illustrate and

embody the kind of city the future needs. Classrooms, housing, offices, labs, social gathering places, places to eat and drink, useful commerce would all have to be there. So would architecture respecting proper sun angles and weather related ecologically informed features. Having a creek running under campus (actually it appears two though one may be very small) provides an opportunity for waterway, fish and riparian restoration coordinated with social open spaces. We in the field call this kind of full-featured community development an Ecocity "fractal," a fraction of the whole with all essential parts present and well arranged for mutual synergistic benefit. Such fractals could be what we've variously called an integral neighborhood, and integral downtown or in the case being considered here, an integral campus district or whole campus.

An Ecocity school, college or university would have to be part of a new Ecocity or a conventional existing city resolutely determined to become an Ecocity in its near-term and long-term future growth. But it might be hard to find such a city. Failing some supportive community that is comprehensively committed, an existing school campus could be reshaped and "re-missioned" to create such an Ecocity school and provide a context of a whole campus that becomes a full bodied community in its own right and sets in place changes in that direction, both in physical plant, as it is often called, and in related curriculum.

I'd like to help inspire and establish that by way of the educational corporation of which I'm president, Ecocity Builders. It should be in Ecocity whole-town architecture, not just a few "green buildings," that is, interrelated structures that express the best of our thinking on Ecocities to date, essential parts and associated functions integrated as best we can imagine, linked by foot, bicycle, elevator, bridges between buildings for thorough pedestrian access and pleasure and include covered walkways in rainy or snowy locations and, of course, with easy transit availability. At this late date in solving global problems I believe it would have to be "complete" like a living organism is complete if whole and healthy. The world needs that kind of model. Sometimes I think of this as the "anatomy analogy" or alternatively as a full spectrum Ecocity or Ecocity fractal. The Ecocity University would amount to education embodied in the structure itself. The school would teach by its own physical example as well as through its curricula.

The Ecocity school and its facilities could perhaps start out as a vigorously growing branch of and administrated by a department or school of BCIT committed to such a sustainability plan and provided with the land, and possibly malleable existing buildings, that is, buildings that could remodeled or integrated whole into a the larger Ecocity fractal context.

Defining project and Ecocity University design at the same time

The presently existing school, schools or departments involved would cover the disciplines one sees at our International Ecocity Conferences. The commitment to innovation around basic principles, also at the heart of the conference series, has to be present if we want to help solve world problems rapidly in reshaping cities. To start, core areas an initial founding team could discuss in some detail leading to early stages in organizing would be:

- Layout and city design
- Engineering
- Architecture
- Transportation
- Energy
- Restoration of natural and agricultural lands
- Development
- Supporting policy
- Economic and political strategies for Ecocity-building incentives, and for Ecocity U itself

Need

When I see the plans for Tianjin Ecocity, Dongtan, Wangzhuang and other projects presently dubbed "Ecocity" I immediately think of amendments that would fit beautifully in an Ecocity University campus as an "urban fractal," to use Australian architect Paul Downton's term. The earliest "urban fractal" idea I can trace is my own "integral neighborhood" for Berkeley, California from back in 1975. Hints at the physical design are, of course, all over my book, "Ecocities – Rebuilding Cities in Balance with Nature." I think we need this school immediately. The triple crisis of climate change, approaching end of cheap energy and species diversity collapse world-wide (extinctions and rapidly degrading biological evolution) requires this to happen as soon as we can possibly organize it.

My thoughts for basic subjects/disciplines that would be taught:

Latest Ecocity thinking, based on basic principles – the core courses

Historic Ecocity design precedents expressed in past and present patterns

Ecological architecture

Public transportation, from in-city to international – that fits the Ecocity world

Private transportation facilitated by urban design – foot, bike and elevator largely

Engineering for enduring cities, towns and villages (amortization, conservation, big numbers CO2 sequestration in reforestation)

Appropriate renewable energy technologies with basic macro chemistry and physics (for truer proportionality)

Materials resources inventories and projections into the future, such as of the rare metals that are subject to the Rust Factor of diminution

Low energy (probably organic, more locally focused skills intensive) agriculture, permaculture

Indigenous people traditional built community arrangements, early cities

Land use law and development law

Ecological economics and full employment "green collar jobs"

Green business development based on building and maintaining Ecocities

Political strategy for instituting supportive Ecocity policy

Restoration of natural systems studies and related biodiversity and evolutionary studies

Geography (related to the item directly above)

Sociology and psychology related to the whole range of subjects

History of the subject and efforts to build the Ecocity itself

Taken together, the above informs society "what to build." The current ideas for solving today's big problems – climate change, collapse of cheap energy reserves and biodiversity – revolve rather randomly around bailouts for whatever is already going on, with the "shovel ready" approach funding continuing to build precisely what got us into the problems in the first place. We need to not rebuild the problem but rather the solution. You can only learn how to do that if there is a concerted effort at the level of advanced education to directly confront the problem of building "the right thing." The internal principles, such as those evident studying the "anatomy analogy" and respecting the physics and chemistry implied by designing for "access by proximity" rather than access by building energy hungry machines, need to be at the

core of building “the right thing.” At the same time each potential Ecocity or Ecocity fractal must relate sensitively to, as said earlier, the local conditions of sun angles, weather, geography, natural support for food sources in soil and waters, local cultural traditions and so on. The mix is a wonderfully rich panorama for any school to explore, and in my opinion, indispensable if we are to leave anything for our grandchildren but a lonely planet in chaos.

Opportunity of being first

An objective in launching an Ecocity college or university initiative could be to gain “priority” as the scientists say in questing first discovery or application of laws or technologies in establishing “the world’s first.” If such an initiative were successful the particular school would enjoy a very influential position among educational institutions around the world. We need to do it right as fast as possible as society is likely to breakdown quickly if we don’t learn and teach how to build extreme low energy, land conserving, biodiversity regenerating cities. A university can be a very powerful economic, creative and important intellectual key element in a city’s economy and help an early Ecocity to thrive and influence other similar city-building efforts. That is its “proximate” contribution. Beyond that, the world needs it right now.