

## Life cycle guarantors of sustainability

R. Paluoja & S. Moore

*Seneca Sustainability Partnership, Seneca College, Canada*

### Abstract

Sustainable cities rely on architects, engineers and urban planners, professions in the first tier of professional practitioners in the built environment. Few if any urban and building systems designed by them however are “fit-and-forget”. They rely on a “fit-and-manage” strategy. Potentially more significant for the long-term performance of these urban systems and individual buildings is the second tier of professions including technologists, technicians, and trades people. This latter group contributes ideas to the design professions, is employed in the construction or retrofit of these designs, and then operates and manages them over many generations. These second tier practitioners are often neglected or given little significance in the broader urban conversation about the future of our cities. They are an essential grouping however not only because of their crucial role in assuring the life cycle success of sustainable designs but as an important, homegrown employment resource for any community or country.

The Seneca Sustainability Partnership, at one of Canada’s premier post-secondary institutions, is an advocate for this second tier of professions in ensuring that they are educated in the principles of applied urban sustainability. New training materials, consulting opportunities for technologists, research outreach and public participation are attuned to the role of this second tier.

*Keywords:* green building, technologist, technician, trades, Brownfield, built environment, life cycle, urban sustainability, demand management, restoration.

### 1 Introduction

The design of sustainable buildings and communities has entered the mainstream of discussions about the future of living places. Whether borrowing from past models, responding to opportunities for appropriate and cost effective technologies, or competing with alternative, market transformation, strategies for attaining a healthier world, sustainability can no longer be ignored.



Too often however this discussion has failed to drill deeper than the first tier of urban practitioners - the architects, engineers, scientists and urban planners, responsible for their promotion and design. Below this group however is what this paper describes as the second tier of practitioners. This level includes workers like the operators of newly designed green buildings, construction contractors charged with building or retrofitting urban environments, and even emergency service providers, or road crews, who must navigate or maintain narrower streets. Reference to the medical profession is appropriate. The role of doctors as a first tier of decision-makers is well understood but no health system could operate without nurses, therapists, and first response paramedics, among others.

This paper examines a Canadian strategy for recognizing this second tier of practitioners in their workplace function and its alliance with the primary post-secondary institutions responsible for their education.

## **2 The college/second tier practitioner in the sustainable built environment**

The education of principal designers of the built environment, including architects, professional engineers and associated sciences, and urban planners, occurs in the university sector. As noted above, however there exists a robust second tier of practitioners described as technologists, technicians, and trades persons whose education is usually associated with the technical college sector.

The notion of tiers of practitioners may be troubling, suggesting a pejorative hierarchy. It is an acknowledgement however of prevailing codes, practices, and jurisdictional authority for approving projects, assigning responsibility, and assuming historic roles which change over time and may do so eventually for emerging fields like the Brownfield industry. Educational content, legal entitlement and professional adjudication also play a role in determining these occasionally contested definitions.

### **2.1 Technologist, technician, and trades person descriptions**

The description of this second tier differs from one country to another but not their essential role. Technologists and technicians in Canada perform a variety of complex tasks. The Canadian Technology Human Resources Board notes that in Canada the terms 'Technician' and 'Technologist' describe many occupations, but that Applied Science or Engineering Technicians and Technologists are distinct individuals. Through a high degree of specialized training they may use, test, repair, design, analyze and problem solve in a broad range of applied science and engineering areas. They work in a vast range of sectors, from textiles to telecommunications, and of course the built environment (CTHRB [1]).

They may practice under the direction of first tier professionals who have legal entitlement for safe design, but more often they are primary agents for effective analysis, technical planning and eventual construction. Smaller municipalities for instance often employ a technologist as their lead engineering



administrator relying on professional engineers only for specialized consultation and sign offs as legally required.

The trades have a more common understanding of their role in different jurisdictions, but this often leads to a stereotyping of them as skilled functionaries under the meaningful and intellectual direction of other decision-making professionals. They often appear “invisible” in the range of issues associated with sustainable development.

Attempts have been made to correct this impression. Skills Canada along with the Cement Association of Canada and other partners support the Ontario Masonry Training Centre. Using an applied training approach, masons are taught to use methods that implement the sustainable vision of first tier professionals. New masons as second tier practitioners develop respect for their work and pride in creating a lasting life cycle legacy.

The International Trades Education Initiative (ITEC [2]) commented, 35 years after the Whitehill Report was submitted to the National Trust for Historic Preservation in the United States in 1968, on the role of the trades in preserving the built environment. They noted that not only had the traditional trades not disappeared as predicted, but that they had grown in numbers, diversity, and vitality. Unfortunately their characterization, by James Marston Fitch as the disenfranchised “headless hand”, had persisted.

## 2.2 Role of the life cycle guarantor

While sustainable cities have a particular reliance on the first tier of professional practitioners in the urban environment, few if any urban and building systems designed by them are “fit-and-forget”. They rely on a “fit-and-manage” strategy (Barnard [3]).

An examination of the persistence of benefits from new building commissioning, prepared for the California Energy Commission as part of the Public Interest Energy Research Program, described the failure of items intended to achieve more sustainable solutions within examined buildings. These included dimmable ballasts, desiccant cooling, and a natural ventilation cycle. (Friedman et al [4]). These items performed poorly or were not maintained because of a failure to gain operator support during the design process and then afterwards because of a lack of adequate training. Poor operator morale and constant staff turnover exacerbated the problem.

The long-term sustainable performance of these urban systems and individual buildings depends on a second tier of professions as described. They contribute ideas to the principal design professions, are then employed in the construction or retrofit of these designs, and finally operate and manage them over many generations. These second tier practitioners are often neglected or given little significance in the broader urban conversation about the future of our cities. They are essential however not only because of their crucial role in assuring the life cycle success of sustainable designs but as an important, homegrown employment resource for communities.

Practitioners in this second tier are the essential life cycle guarantors of sustainable urban systems and individual buildings. They interact with these



systems on an almost daily basis and with the right skills and appropriate commitment they can ensure that these systems and buildings perform to the level of expectation designed into them. These practitioners can be enabled to adjust systems for better performance than in the original design. Negatively however, if imbued only with a basic appreciation of design intention, a modicum of poorly adaptable skills, and a limited interest in sustainable performance, these practitioners will unwittingly ensure that such systems and buildings soon descend in performance to the level of knowledge and interest of this maintainer.

### **2.3 Canadian Environmental Certification Approvals Board**

The Canadian Environmental Certification Approvals Board (CECAB [5]) has provided tools for sustainable development management by technicians and technologists. Recipients of their “Canadian Certified Environmental Practitioner” designation must demonstrate that their skills meet or exceed the National Occupational Standards for environmental employment in their field of specialization. These national standards are an emerging guide to the skills and knowledge required by competent practitioners. Developed with industry consultation they provide a comprehensive list of descriptions of the day-to-day work within 19 fields of environmental specialization. These standards are updated every five years reflecting changes within the environment industry.

The task for institutions educating these practitioners is to incorporate such emerging ideas, measures, and skills in their students, so that they might engage in a more serious dialogue with universities and first tier professionals on the collaborative role of each in building sustainable cities.

## **3 Role of the Canadian community college system**

In Canada the education and training of this second tier is largely performed, though not exclusively, by the community college system. Community colleges are recent additions to the post-secondary system in Canada. Most date back fewer than 40 years. They have evolved in some cases out of older technical colleges as well as associated specialty institutions such as agricultural training schools. These in turn had their roots in 19th century organizations like the Mechanics Institutes, predecessors in some cases of the public library system. They all recognized an essential need for training and education of a different type than that found in universities.

Occasionally European models such as apprenticeship were adopted but in most cases training evolved as a market driven response to industry needs and requests for skilled workers to meet the challenges of new technologies. This strategy has grown to encompass the demands for workers in soft service areas (such as tourism and business retail) and human service areas (such as early childhood education and firefighting).

The university system for its part realized the attractiveness of such training for many of its potential students and therefore sought to clearly differentiate its



role in the post-secondary education market. Almost a hundred years ago in 1907, and long before the current college system appeared, Robert Falconer, at his installation as President of the University of Toronto [6], responded to those arguing for a more practical education by reminding his listeners that his institution was “not a technical school”. Research and graduate work were to be its hallmark.

### 3.1 Utilitarian versus intellectual identities

The challenge for colleges in educating this second tier is to confront the nature of their intellectual identity, build on its specific academic focus, and so provide for the engagement of its faculty, students, and graduates in the challenge of building a sustainable world. The evolving character of post-secondary education in Canada however has emphasized the largely utilitarian focus of the community college system alongside the more overt intellectual identity of the university system. Colleges, technical institutions, trades facilities, and even union-initiated training ventures have accordingly been very successful in recruitment, registration, hands-on learning, co-op and work placement opportunities, and the eventual employment of their graduates. This success has at least partially argued forcefully against any significant movement towards a more intentional intellectual profile.

The utilitarian success of colleges serves them well by allowing them to match their delivery to the standards and expectations of the outside world. They might unconsciously reject an explicit acknowledgement of the intellectual because of its association with the effete, the pretentious, elitism, and academic overreach. As a result universities often look upon them as less than full academic partners.

In the absence of a more explicit engagement in the world of ideas and social intervention, colleges necessarily receive less attention from a multitude of initiatives familiar to universities, namely improved public funding, research dollars, major alumni donations, participation in public forums, access to graduate studies, etc. Nor is this unique to Canada. As a general rule, forums concerned with major public issues such as sustainability invariably are the sole academic preserve of universities regardless of the country.

In some ways this is extraordinarily ironic. Broader issues of meaning, civic engagement, and questioning the nature of external change and the status quo are essential pre-requisites for living in a rapidly changing world. Even at its most utilitarian level therefore such questioning should be part of a college student's education.

The way forward for colleges in Canada is to recognize their evolved role as not only providers of practical education but also one in which an intellectual dimension is attuned to their distinct nature and the kinds of roles their graduates will assume.

### 3.2 The college system's intellectual engagement

An intellectual identity is founded on colleges questioning their role related to the given and emerging world in which they operate, and from understanding



and advocating for those graduates entering the second tier, enabling them to engage in the discussion and practice of sustainability. In doing so its graduates and programs obtain legitimacy for participating in actions related to this emerging world. This intellectual examination, including research, practical application, and policy development is ultimately defined however by the program identity of colleges. Colleges can pursue a more explicit engagement with sustainable cities by tackling three program related issues.

### **3.2.1 Paradigms**

The operating paradigms in college academic programs often run counter to sustainability. Civil Technology's models are often post-war suburban development such as single use, low-density subdivisions, on cul-de-sac, wide streets. Within this context students learn about road design, centralized servicing, and the surface sealing of the landscape. They learn technique but less clear is their ability to question or imagine other infrastructure opportunities such as hybrid, on-site servicing, narrow streets, and alternatives to pavement. Every academic area could list taken-for-granted assumptions, shaping its curriculum, but eliminating other options.

### **3.2.2 Culture**

The belief systems and practices that shape the professions college students enter often fail to incorporate ideas of sustainability. Building Systems Technicians interact daily with technologies that have a direct impact on energy use, air quality, building performance, water conservation, and greenhouse gas reduction. Too often however these workers are depicted as little more than overpaid floor sweepers in tattered t-shirts. Education, training and accreditation are powerful tools for building a culture of workplace legitimacy.

### **3.2.3 Engagement**

Issues-oriented panels usually focus on the top of a profession's hierarchy rather than involving a range of practitioners. Sustainable development initiatives are generally focused around architecture and professional engineering professions, thus ignoring technicians and technologists. Such bias infiltrates every field from medicine and law to the built environment. It is hardly noticed because of its ubiquity. Public and private agencies turn to the universities when they need research often forgetting that the colleges could be a more relevant source of enquiry.

## **4 About Seneca College and its commitment**

The Seneca Sustainability Partnership (SSP) is the outreach expression of Seneca College's internal designation of its Centre for the Built Environment (established 1996) as a centre of excellence. It is located within the Faculty of Applied Science and Engineering Technology. The Partnership's role is to develop a public and policy profile, training strategy, programs, and educational delivery for the second tier of practitioners in creating a sustainable built



environment. The Centre developed significant capacity in applied urban sustainability and the Seneca Sustainability Partnership has built on this by playing a more explicit role in legitimizing the role of the second tier of practitioners as engaged participants in external public forums discussing, practicing and building sustainable cities.

Seneca College is Canada's largest community college and one of the country's premier post-secondary institutions. It is located in the fastest growing and largest urban region in Canada, that of Toronto, an area described as the Greater Golden Horseshoe. Toronto's effective, though not jurisdictional extension, stretches a hundred miles or more in every land direction, within a region defined by the logistics management of products and services distribution, personal workplace commuting, watersheds, and leisure opportunities.

Seneca has upwards of 18,000 full-time students and nearly 100,000 in part-time learning. Its size obliges it not only to find means of accommodating and serving such a large population, but also to envision a wider public role. Its President, Dr. Rick Miner, has committed the college to a national role, a significant undertaking in a country 5,514 kilometres from the Atlantic to Pacific Ocean, and 4,600 kilometres from the country's northernmost to its southernmost point. Canada has a relatively sparse population of 32 million, two official languages, and over 600 First Nations or recognized bands.

In assuming an advocacy role, the Seneca Sustainability Partnership, by undertaking multiple initiatives, is building a role for the intellectual engagement of second tier practitioners in creating sustainable cities.

#### **4.1 Seneca Sustainability Partnership (SSP) supported full-time academic programs of the Centre for the Built Environment (CBE) at Seneca College**

- Integrated Environmental Site Remediation, a four-year applied degree, in Brownfield reclamation and healthy, sustainable redevelopment
- Civil Engineering Technology, a three-year diploma program for engineering technologists
- Building Systems Engineering Technology, a three-year diploma program for engineering technologists
- Environmental Technology, a three-year diploma program for technologists.

#### **4.2 SSP supported CBE part-time academic programs**

- Building Environmental Systems, a program for building operators
- Photovoltaic Technology, a three level program
- Wind Power, a one subject introduction to the field
- Biomass, a two-subject program
- Geothermal Energy, a two-subject program.



### **4.3 SSP supported education and training intervention programs**

Three accredited training intervention programs are provided with major public sector government departments in support of public policy initiatives in the pursuit of sustainable development. These include:

- The development of the Energy Training Ontario (ETO) office with the province's Ministry of Environment and Energy in 1993 to deliver energy demand side management training
- Building operator needs assessment and training delivery for clients of the federal government's Department of Natural Resources in support of demand side energy management
- Environmental management and regulations training for the dry cleaning sector in the province of Ontario in association with the Ontario Ministry of the Environment.

### **4.4 SSP supported external partnerships**

In expanding its program base, but more explicitly enhancing and profiling the role of education for the second tier of built environment practitioners, the SSP pursued an aggressive policy of intentional outreach, positioning its programs and graduates for a more dynamic role in public discussions on sustainable development outcomes. Some of its partner organizations include:

- The Cement Association of Canada (CAC), a private sector lobby group advocating and implementing strategies for effective sustainable development within its sector
- Canada Mortgage and Housing Corporation (CMHC)
- The Toronto and Region Conservation Authority (TRCA).

### **4.5 SSP supported intellectual partnerships**

The SSP established formal partnerships with leading thinkers and advocates in issues related to the built environment. They include:

- Storm Cunningham, author of *The Restoration Economy*
- Jean Bilodeau, former Director-General in Environment Canada
- Leeroy Murray, European based representative for the Centre.

### **4.6 SSP supported Cross-Canada network – Avativut**

In the interest of working with and advocating on behalf of the college system the SSP established a Canada-wide organization for applied urban sustainability with institutions from every geographic area of the country.

Avativut is the Inuktitut word for the English expression, "balanced use" (French - usage équilibré). It guides a national network of colleges consisting of:

Nova Scotia Community College (Atlantic Canada)

Collège de Rosemont (Montreal and Province of Quebec)

Seneca College (Toronto and Province of Ontario)

Nunavut Arctic College (Nunavut and northern territories)



Southern Alberta Institute of Technology (Calgary and Prairies)  
 Douglas College (New Westminster and British Columbia)  
 British Columbia Institute of Technology (Vancouver, British Columbia)

#### 4.7 SSP supported public awareness

The SSP pursues aggressive profile awareness through a variety of means. One of these was its participation in media and filmed advocacy in 2004 through the Sustainable Development television production of CLARE Media in association with the Cement Association of Canada, Canadian Learning Television, and ACCESS – the Education Station. There are plans for participation and curriculum development in a six part series on sustainable development, scheduled for release by CLARE Media in 2008.

### 5 Conclusion

The Seneca Sustainability Partnership aims to develop the life cycle guarantor role for sustainability within a sector of professions historically marginalized in the urban conversation but now seen as an essential component for successful sustainable performance. The above is intended to be a description and a recipe for an ongoing process and discussion.

### References

- [1] CTHRB, Canadian Technology Human Resources Board, <http://www.cthrb.ca>
- [2] ITEC, The International Trades Education Initiative, <http://www.itei-ites.org/ITEI.htm> Copyright © 2004 Preservation Trades Network, last modified: 01/05/05.
- [3] Barnard, N., Dynamic energy storage in the building fabric, BSRIA TR 9/94, 1994, referenced in Roderic Bunn, Sustainable building services in developing countries: the challenge to find “best fit” technologies, *UNEP Industry and Environment*, April – September 2003.
- [4] Friedman, H., Potter, A., & Haasl, T., (Portland Energy Conservation, Inc.), and David Claridge (Texas A&M University) Persistence of Benefits from New Building Commissioning, HPCBS#ESP2.2T5b2, California Energy Commission, Public Interest Energy Research program, *published in the proceedings of the 2002 ACEEE Summer Study on Energy Efficiency in Buildings*, August 2002.
- [5] CECAB, [http://www.cecab.org/documents/NOSprofiles/Appendix%20B%20-%20TT%20NOS%20Profiles/Master%20TT%20Profiles%20Statements%20Updated/nos\\_MasterProfileByType\\_TT19.pdf](http://www.cecab.org/documents/NOSprofiles/Appendix%20B%20-%20TT%20NOS%20Profiles/Master%20TT%20Profiles%20Statements%20Updated/nos_MasterProfileByType_TT19.pdf).
- [6] University of Toronto <http://www.newsandevents.utoronto.ca/bios/02/history19.htm>.

