

From the Royal Architectural Institute of Canada



RAIC > Green Architecture > Sustainability and the Built-Environment

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Green Architecture

> Sustainability and the Built-Environment

Sustainability and the Built-Environment

Green Building Rating Systems

That the environment of our planet is under stress is no longer a matter of debate. Human activities affect the patterns and processes of the natural world. Buildings, in particular, are interventions into nature. They use land, erode biodiversity, consume resources, generate waste, affect traffic volumes, and contribute to atmospheric pollution.

Model National Energy Code

Life Cycle Costs

Housing and Residential Construction

Canada is falling behind other nations in Europe and the United States with respect to "green" building design. All governments must establish sustainable development goals and provide the necessary financial rewards and economic incentives to reach these goals. Canada must start to measure progress based on the **triple bottom line: environmental, social and economic progress**, or as some have put it, the **three P's: planet, people and prosperity**.

Net Zero Energy Homes

Municipalities (and others) to facilitate increased density

The **role of Architects** in achieving environmental sustainability is a vital one. As designers of buildings and communities, Architects negotiate between human participants—users, developers, decision-makers—and the environment. In this sense, Architects stand-in for the natural world, ensuring that it is not something distinct and outside of architectural and urban design processes, but "heard" and thoughtfully considered in every aspect from planning and design to construction and maintenance.

Transportation

Alternative and Renewable Sources of Energy

Green Labeling Systems for Building Products

Health Issues to be included in LEED™ Canada

Construction Waste Management

The RAIC actively advocates for "greener" buildings and more sustainable architecture. This section outlines the **RAIC position** regarding public policies that affect building design and acts as a tool to assist Architects in promoting more sustainable building practices.

> Ed Mazria's Presentation on Climate Change

Use Green Building Rating Systems

Architects should encourage all levels of government, all building owners, and all clients to require a minimum level of a green building rating system for all building projects (such as LEEDTM Canada gold).

Improve the National Model Energy Code for Buildings

Architects should lobby the provincial governments to support and maintain the Model National Energy Code (MNECB) for Buildings and the Model National Energy Code of Canada for Houses (MNECH) and to adopt these codes and their revisions. Furthermore, the Federal Government should incorporate energy requirements into the National Building Code. Revised codes should require buildings and houses to be constructed to be at least 25% more energy efficient than those constructed under the current MNEC.

Life Cycle Costs and Life Cycle Management

All procurement agencies, including all levels of government, their agencies and crown corporations, as well as private sector developers should be encouraged to develop building programs and to select designs and procure building projects based on *life cycle costs* and not solely on initial capital construction costs.

Housing and Residential Construction

- The federal and provincial governments should establish strong incentive

programs and tax breaks for upgrading housing stock built prior to 1980 to make homes more energy efficient.

- The Canada Green Building Council should accelerate the development of LEED™ Canada standards for low-rise residential buildings and include R-2000 in the rating system.
- Architects should assist the Canadian Home Builders Association in helping to improve R-2000 standards and Architects should advocate to all municipalities, to all housing developers, and to all homebuyers, that all new housing should be constructed to the R-2000 standard as a minimum.

#### **Net Zero Energy Homes**

Architects should lobby the Federal Government, mortgage lenders, and the CMHC to develop programs that require all homes be net zero energy by the year 2030.

#### **Municipalities to facilitate increased density**

In order to reduce sprawl, all municipalities must be encouraged to change their land use and zoning policies to permit denser, mixed-use developments. Architects are encouraged to demonstrate to municipal officials creative methods of city-building that allow for intensification and more livable cities.

#### **Transportation**

Governments at all levels must significantly increase funding and develop policies that support mass transit and other modes of transportation (such as bicycle paths, etc.) for both goods and people. The government currently is sending mixed messages in its policies and funding priorities for transportation. Architects should lobby the Federal Government to stop encouraging highway expansion and developing incentive programs that support increased automobile use and instead concentrate on mass transit and alternative modes of transportation.

#### **Alternative and Renewable Sources of Energy**

Architects are encouraged to incorporate technologies using alternative sources of energy into their building designs. Architect should lobby the Federal Government to expand incentive programs that encourage renewable energies (such as the Renewable Energy Deployment Initiative or REDI program). Furthermore, Architects should advocate for the expansion of research and development into new energy sources (such as hydrogen, wind, and solar power).

#### **Green Labeling Systems for Building Products**

The architectural profession should lobby the Federal Government to develop, support and maintain a holistic database and system for life-cycle assessments and inventories of all building materials, products and processes. In addition, Architects and clients should be encouraged to specify and use ENERGY STAR® products and labeling systems must be expanded to all types of building equipment.

#### **Construction Waste**

In order to reduce construction waste, all levels of government should provide incentives for construction recycling (such as tax credits for recycled material and components) and penalties for construction waste (increased tipping fees or other charges). Architects are encouraged adjust their designs and specifications to require recycling and reductions in construction waste.

#### **Health Issues to be included in LEED™ Canada**

The Canada Green Building Council should be encouraged to incorporate public health issues into the next iteration of LEED™ Canada. Obesity and asthma are two diseases facing young people; in fact, adolescents today now have shorter life spans than their parents according to the US Center for Disease Control. Well-marked, inviting stairwells in buildings encourage walking. Compact, walkable communities encourage exercise and reduce car trips and pollution. These and similar issues should be addressed within LEED™ Canada.



### Green Building Rating Systems

Green building rating systems could be compared to a score card or report card. These systems are tools that help to evaluate how environmentally-friendly, or "green" is a building's design, construction and operation. Some of these systems include LEED™ Canada, Green Globes and BREAAAM.

LEED™ Canada uses a point system to assign values to five key areas:

- Sustainable Site Planning
- Safeguarding Water and Water Efficiency
- Energy Efficiency and Renewable Energy
- Conservation of Materials and Resources
- Indoor Environmental Quality

According to the total points a building receives, it will be categorized as certified, silver, gold or platinum standard.

LEED has already been adopted by many United States agencies and municipalities and in Canada, the following now require that all buildings funded by their organization to meet a minimum LEED standard:

- The City of Vancouver is seeking approval of a policy that would require LEED Silver for all of its own projects;
- The City of Victoria, on its own Docks Lands redevelopment, is requiring private sector developers to build to LEED Silver;
- The City of Calgary has LEED embedded it in Sustainability Policy for its own buildings;
- Toronto Waterfront Revitalization Corporation requires all new developments in that project to be LEED Gold;
- The Resort Municipality of Whistler requires LEED for their new owned projects;
- British Columbia Buildings Corporation (BCBC) requires LEED for any new projects;
- Public Works and Government Services Canada requires some rating system to be used on all new projects over \$1 million and requires it to be LEED over \$10 million. The Minister announced at the GLOBE Conference that the target is now LEED Gold for the latter category;
- Greater Vancouver Regional District (GVRD) Board of Directors has also adopted LEED for its own facilities and recommended that its 21 member municipalities do the same;
- LEED has been incorporated in the 2010 Olympic bid for all venue construction;
- Société Immobilière du Québec is requiring LEED for new projects;
- Manitoba Hydro is building a new \$150 million office building and has stated that the target is LEED Platinum;
- Alberta Infrastructure has a Schools Pilot that requires LEED.

Because adopting an existing green building rating system is a readily available method for raising the bar with respect to more sustainable design and construction, the RAIC encourages all levels of government, all building owners, and all clients to require a minimum level of a green building rating system for all building projects (such as LEED™ Canada gold).

### What Architects can do:

- Learn about green building rating systems and become an LEED™ Accredited Professional or an expert in other rating systems;

- Convince all clients to adopt a minimum level of a rating system in all building designs and operations;
- Write to governments and other agencies and encourage them to adopt a green building rating system for all building projects.



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### Model National Energy Code

The National Research Council of Canada's Institute for Research in Construction (NRC-IRC) produces model codes for adoption by provinces and other jurisdictions in Canada. Two of these codes are to assist in the design of more energy efficient buildings:

- The *Model National Energy Code of Canada for Houses* (MNECH)
- The *Model National Energy Code of Canada for Buildings* (MNECB)

Unfortunately most provinces have not adopted these codes.

The MNECB sets out minimum requirements for features of buildings that determine their energy efficiency, taking into account regional construction costs, regional heating fuel types and their costs, and regional climatic differences. The MNECB has, in addition to sections on the building envelope and water heating, detailed information on lighting, HVAC systems and electrical power, which can offer major energy savings.

It has been argued by the RAIC and others that the requirements in existing Model National Energy Codes are not stringent enough and could easily be updated to current technology and standards. The Canadian Commission on Building and Fire Codes (CCBFC) recognizes that both the MNECH and MNECB are out-of date and have communicated with their provincial counterparts regarding updating and maintaining these documents. The BC Environmental Technology Working Group recommends that "energy and resource efficiency" should become part of the National Building Code rather than in its own distinct and separate code.

### What Architects can do:

- Promote the use of existing Model National Energy Codes;
- Write to your provincial Minister of Energy (or provincial equivalent) and encourage the province to support the maintenance and adoption of the Model National Energy Codes;
- Provide feedback to NRC-IRC on how best to strengthen the energy requirements in the two codes and to consider including energy in the National Building Code.



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### Life Cycle Costs

Over the last few years the Royal Architectural Institute of Canada (RAIC) and the Association of Consulting Engineers of Canada (ACEC) have advocated to the Federal Government and others to make procurement decisions based, in part, on life cycle costs. The following is an excerpt from a joint position paper from the Architects and engineers to the Federal Government:

*Professional services involve not only the preparation of designs and drawings, but also, creative, independent, and often innovative*

*advice and solutions. These solutions may include:*

- a) lower capital costs,*
- b) **reduced operating and maintenance costs,***
- c) superior income-producing capabilities, or*
- d) more efficient space utilization.*

*Furthermore, **the life of a building or facility will be extended based on good architectural and/or engineering services.** ... It is frequently the Owners decisions during design and construction of a project which can increase or decrease costs. For example, an Owner may decide to substitute an expensive wall-cladding system with a cheaper system. Although there is a net savings in capital costs, the maintenance costs for the exterior of the building are significantly increased, compounded with a shorter cycle for building replacement (recapitalization).*

Subsequently the RAIC developed a course entitled, *SDCB 201 Green Building Tools and Techniques: Marketing, Building Economics and Environmental Assessment* which in part trained Architects on the importance of life cycle costing and how to educate clients about life cycle costs and how it must be a critical part of all management and design decisions.

All procurement agencies, including all levels of government, their agencies and crown corporations, as well as private sector developers should be encouraged to develop functional programs and building projects based on sound principles of life cycle management and to select designs and award building projects based on life cycle costs and not solely on initial capital construction costs.

#### **What Architects can do:**

- Become experts at Life Cycle Costing or identify appropriate cost consultants;
- Obtain a copy of the CD-ROM, *SDCB 201 Green Building Tools and Techniques: Marketing, Building Economics and Environmental Assessment* ;
- Educate clients about the importance of Life Cycle Costing and Life Cycle Management;
- Encourage government agencies and other clients in the MUSH sector (Municipalities, Universities, Schools and Hospitals) to develop building programs based on Life Cycle Management principles and to include Life Cycle Costing services in their ratings for consultant selection.




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#### **Housing and Residential Construction**

The Canadian Home Builders Association (CHBA) was a leader in developing the popular R-2000 program several years ago for use in new home construction; however, many recognize that it is indeed the stock of *existing* homes, built prior to 1980, that consume the bulk of all residential energy. Therefore, it is critical to make these existing houses more energy efficient and governments must encourage incentives for homeowners to undertake the necessary retrofits. On the other hand, the average new home now consumes about 25% less energy than before 1980. However, these new homes are also about 16 to 18% larger with a fewer number of people living in them – the result: we have made little gain.

In addition, there is has not yet been a widely accepted green building rating system for designers of housing (at least for "Part Nine" housing) and the Canada Green Building Council should be encouraged to accelerate the development of

LEED™ Home. In addition, LEED™ Home should recognize and incorporate the R-2000 system.

Finally, Architects should work with homebuilders, the Canadian Home Builders Association (CHBA), and the Natural Resources Canada (NRCan) to expand and upgrade the standards of the R-2000 program. Also clients of all multiple-unit housing must require that such housing be built to R-2000 standards. Because clients are not likely going to demand this, there is a challenge for developers to be able to demonstrate to their clients the cost effectiveness of homes and multi-units residences that are constructed to R-2000 standards.

### **R-2000**

*The R-2000 Program was created in 1981 as a partnership between the Canadian Home Builders' Association and Natural Resources Canada to begin moving this [standard] into the marketplace. The R-2000 Standard was formalized, homebuilders were trained in the new design and construction techniques, and consumers began to learn about these "better-built" homes.*

*The R-2000 Standard is a voluntary national standard that is in addition to and beyond building code requirements. The R-2000 Standard is a performance-based standard. It sets criteria for how a house must perform rather than specify exactly how it must be constructed. The builder is free to choose the best and most-cost effective approach for each home—construction techniques, building products, mechanical equipment, lighting and appliances. One of the most important aspects of the Standard is the energy target for space and water heating. The target is calculated for each house, taking into consideration size, fuel type, lot orientation and location (to account for climate variations across Canada). Typically R-2000 homes will use approximately 30% less energy than a comparable non-R-2000 home. ...*

*...The R-2000 Standard recognizes the importance of resource conservation both during the construction of the home and later during the ongoing operation of the home. R-2000 homes use only water-saving toilets, showers and faucets. Builders are also required to use materials with recycled content.*

*The R-2000 Standard is updated periodically to reflect the ongoing evolution of the construction technology and development of new materials, products and systems. This ensures that R-2000 continues to represent the leading edge of housing technology, and that homebuyers will continue to benefit from the latest advances in new home construction.*

One way to ensure greener and more energy efficient houses is to encourage more municipalities, developers and homebuilders to comply with or exceed the R-2000 standard.

### **What Architects can do:**

- Ensure all single family houses and multi-unit residential houses designed by Architects meet or exceed R-2000 standards;
- Lobby the Federal Government to expand existing programs and develop new financial incentives to encourage retrofitting existing housing stock to become more energy efficient;
- Encourage and assist the Canada Green Building Council in developing LEED™ Home and encourage the use of R-2000 as the minimum energy performance for a LEED™ Home house in Canada
- Lobby municipalities and developers to require that all new house construction meets or exceeds R-2000 or equivalent standards;
- As a minimum ensure that all multiple unit housing be built to R-2000 standards and funding authorities require these standards;
- Encourage homebuilders to take the necessary training and licensing to become R-2000 builders;

- Promote the development of financing, mortgaging and marketing schemes to facilitate an increase in the market share of all energy efficient homes.



### Net Zero Energy Homes

**Definition:** *A net-zero energy home supplies to the grid an annual output of electricity that is equal to the amount of power purchased from the grid.* In many cases, the entire energy consumption (i.e. heating, cooling and electrical energy consumption of a net-zero energy home) can be provided by renewable energy sources.

A group of homebuilders and developers and other stakeholders has been formed to deal with new decentralized energy systems for future Canadian homes. The group is called the *Net-Zero Energy Home Coalition* and they are responding both to climate change as well as the reliability and supply of electricity (partly driven by the blackout last summer in Ontario and other parts of North America and by recent security concerns). This group recognizes the potential to go beyond R-2000 with more advanced energy conservation and more importantly, through a decentralized residential scale energy production primarily by means of photovoltaics, wind and other forms of energy production.

The coalition is proposing an incremental deployment of renewable energy systems in home construction so that by the year 2030 all new homes will be net-zero energy. In addition, they are proposing that the cost of goods and services for all renewable energy systems be exempt from GST and PST.

#### What Architects can do:

- Encourage all Authorities Having Jurisdiction including provinces and utility companies to permit net metering and smart metering;
- Support the concept of net-zero energy;
- Lobby the Federal Government, mortgage lenders, and the CMHC to develop programs to ensure that all homes be net-zero energy by the year 2030;
- Support tax exemption for renewable energy systems and products;
- Become experts in photovoltaic systems and other renewable energy technologies;
- Incorporate renewable energy technologies into all new designs for residential construction.



### Municipalities (and others) to facilitate increased density

In his RAIC Gold Medal address in 2001, Jack Diamond, FRAIC noted the need to increase density in Canadian cities:

*"...infrastructure capital and operating costs must be supported by the tax base. The greater cost of operating a **spread** city versus a **compact** city is huge. It is interesting that the costs of operating health and education systems are scrutinized to make them sustainable. No one at present analyzes the cost effectiveness of urban form. And yet, the costs are at least as great as health and education combined. Full cost pricing for new development would reverse present low density tendencies."*

Architects continue to expound on the importance of intensification, mass transit and other similar solutions for our cities; however, no real progress has been made since this speech. In order to reduce sprawl (and the construction of more streets and highways), all municipalities must be encouraged to change their land use and zoning policies to permit denser, mixed-use developments.

Furthermore, it is critical that planning encompass entire regions to ensure an integrated approach to sustainable planning. Currently there is a lack of inter-governmental cooperation and inter-jurisdictional cooperation with respect to land use planning.

#### What Architects can do:

- Lobby for additional research regarding the real costs of sprawl (environmental costs, social costs and economic costs);
- Convince clients to develop on brownfield sites only;
- Encourage only limited and very efficient land use on greenfield sites, and better account for costs to expand infrastructure and services into greenfield areas;
- Ask governments to provide incentives for land-efficient, sustainable, private investment;
- Demonstrate to municipal officials creative methods of city-building that allow for intensification and more livable cities, such as mixed-use smart buildings and live-work developments;
- Encourage municipalities to zone areas by building design or building type rather than by use;
- Lobby for additional funding for mass transit;
- Support creative zoning and other efforts to increase density and to allow for mixed use developments and public buildings adjacent to residential zones, such as density bonuses to encourage developers to increase floor-to-area ratios;
- Lobby for incentives that encourage multiple-use facilities that increase, educational, civic, social and cultural integration of communities;
- Encourage the Federal Government to share revenues with metropolitan regions with incentives or conditions that the funds be used for sustainable planning and infrastructure;
- Lobby for a tax structure that values transit-dependent, high density housing.




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#### Transportation

Canadian politics has been influenced by roads for too long - roads (and highways), that is their construction and improvement, have been the traditional political carrot for votes. This can no longer continue if we are to develop sustainable transportation systems for both goods and people. We need new solutions which are integrated, clean, and can move people and goods through mass transit using inter-modal connections. Cities must develop a wide range of opportunities to reduce our dependence on fossil-fueled vehicles such as: ride sharing and car sharing; more and better mass transit systems; bicycle paths; new fuels; and better goods movement and supply chain management systems and even telecommuting.

A Toronto group, called *Moving the Economy* has already undertaken research, demonstration projects and held a forum on how to engage governments and decision-makers in the "new mobility or the next generation transportation products services and technologies"

Governments at all levels must significantly increase funding for mass transit and



support alternatives modes of transportation (such as bicycle paths, etc.). The government currently is sending mixed messages in its policies and funding priorities for transportation. Architects should lobby the Federal Government to stop encouraging highway expansion and incentive programs that support increased automobile use (such as funding the ethanol gasoline program) and concentrate on mass transit and alternative modes of transportation. This is the only way to reduce congestion and achieve our Kyoto commitment.

#### What Architects can do:

- Lobby the federal and provincial government for additional funding for mass transit;
- Encourage all clients to consider transit-oriented developments and allow for alternative modes of transportation to access all buildings;
- Encourage municipalities to improve roadway level-of-services standards only in areas served by mass transit;
- Provide bicycle parking and similar amenities in all designs, as well as pedestrian paths to and throughout all developments;
- Support streamlined, integrated transportation systems such as, smart cards, intermodal connections, goods movement and logistic services, etc.;
- Encourage the Federal Government to provide fiscal policies and financial incentives for the development and use of automobiles and other transportation systems which *do not* use fossil fuels.




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#### Alternative and Renewable Sources of Energy

Over the last several years, the RAIC has received considerable assistance from Natural Resources Canada (NRCan), including

- supporting and funding the development of certain SDCB (Sustainable Design for Canadian Buildings) courses,
- providing speakers and materials for various courses,
- providing venues and expertise for courses and meetings,
- entering into contribution agreements with the RAIC for the administration of the Commercial Building Incentive Program (CBIP) and the Renewable Energy Deployment Initiative (REDI) grants for designs incorporating renewable energy

In addition, Natural Resources Canada awarded an Energy Efficiency Recognition Award in 2003 to the RAIC for its efforts in professional development and encouraging green building design.

The various programs within NRCan are, however, subject to funding limitations from the federal budget and subject to political decisions. In order to ensure that these programs are maintained and funding for them is increased, it is necessary to lobby the government and to remind both the senior bureaucrats and politicians of their importance and success.

#### What Architects can do:

- Write to the federal Minister of Natural Resources asking that these programs be maintained and expanded;
- Write to your local Member of Parliament to ensure continued support from NRCan;
- Lobby the Federal Government to ensure that it lives up to its Kyoto

- commitments;
- Encourage all Architects and clients to take advantage of existing incentive and grant programs offered by NRCan.



### Green Labeling Systems for Building Products<sup>1</sup>

A wide variety of programs exist to certify, verify or report on the environmental attributes of products. The tremendous and rapid proliferation of programs certifying everything from salmon safety to appliances, building materials and cleaning products has led to confusion in the marketplace.

The US Environmental Protection Agency (EPA) recognizes three basic types of labels — positive, neutral, and negative — in document 742-R-98-009, *Environmental Labeling, Issues, Policies and Practices Worldwide*. Positive labels provide certification or reporting on one or more environmentally positive attributes of a product. Neutral labels provide a summary of environmental information for the customer to use in purchasing decisions, whereas negative labels warn of a product's toxicity or harmful ingredients.

EPA further classifies labeling programs as either mandatory or voluntary. Negative labels are largely mandatory as required by law to make poisons and hazardous materials known to the purchaser. Positive labels are not usually mandatory, but their presence can increase sales among mandatory purchasing programs. For example, a single attribute label of recycled content in paper may not be legally required to market the paper product. However, the fact that Federal Government guidelines require a percentage of recycled content in paper purchases means the presence of that label will allow for purchases by federal agencies.

The International Organization for Standardization (ISO) voluntary standards classify labels as Type I, Type II and Type III, as described in the next section. These classifications could be characterized as "positive" and "neutral" types of labels within the EPA context.

#### ISO Standards

ISO has established standards or draft standards for three types of labels: Type I, Type II and Type III. ISO developed this series of standards based on "an urgent need for guidance on how standards in this field should be used to meet an identified need" (ISO 14025).

**Type I** labels are the most common type of label in today's market. Type I labels require third party certification of a pre-set list of criteria. The criteria, which might include a variety of environmental issues such as recycled content, the absence of VOC's, and bio-degradability, are the basis for issuing a 'green' label. The label does not usually include the criteria details, or even the list of criteria considered.

**Type II** labels provide self-declarations by a materials extraction organization (logger, for example), manufacturer or supplier. There is no third party review in Type II labels.

**Type III** labels require the rigorous use of life cycle environmental information, an open consultation process, and ease of comparison among products. Type III labels are similar to consumer nutrition labeling on food products.

<sup>1</sup> *Information supplied by the Wayne Trusty of the Athena Institute*

The following table shows existing labeling programs by ISO Type.

Country	Date Program Began	Program Name	ISO Type I	ISO Type II	ISO Type III
Canada	2000	Canadian Standards Association (CSA) Sustainable Forestry Certification	X		
Canada	1988	Environmental Choice/ TerraChoice	X		
Canada		Power Smart Program	X		
U. S.	1941	American Tree Farm System		X	
U. S.	1994	Chlorine Free Products Association	X		
U. S.	1999	Consumer Labeling Initiative	X		
U. S.	1987	Rainforest Alliance ECO-O.K. (Smart wood)			
U. S.	1979	Energy Guide	X		
U. S.	1992	Energy Star	X		
U. S.	1993	Forestry Stewardship Council (FSC)	X		
U. S.	1989	Green Seal	X		
U. S.	1989	Scientific Certification Systems (SCS)	X		X
U. S.		Sustainable Forestry Initiative		X	



Environmental Choice, Canada  
 Symbol:



#### ISO Type: Type I

The Environmental Choice program is the most widely accepted eco-labeling program in Canada. Environmental Choice was begun in 1988 by Environment Canada, the Canadian government's environmental department, as a voluntary certification program. In 1995, control and administration of the program was given to TerraChoice Environmental Services, Inc., a private Canadian company. The Canadian government retains ownership of the program, but TerraChoice is responsible for its financial health and operations.

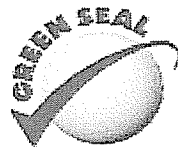
Criteria for a product category are developed through a Technical Briefing Note (TBN). Data for the TBN is provided in a study performed by TerraChoice based on the established criteria for a product category. An unusual aspect of this program allows for companies to seek certification of a product even if the program has not yet established that product category. In other words, the program functions to certify and label from both the demand and supply sides of the market.

Companies pay for services related to studies necessary for certification and supply all relevant data. TerraChoice also receives payment for services to run the program for the Canadian government. A review committee accepts and responds to public comments and, with TerraChoice, determines the draft guidelines to be sent to the government. Once the government approves the guidelines they are released.

The weakness of the program is the same as that of all Type I programs. The criteria established for each product category vary widely and do not lend themselves to a list of pre-set parameters that would facilitate quantitative life cycle assessment.

#### Green Seal

Symbol:



#### ISO Type: Type I

Green Seal was the first widely accepted environmental labeling program in the US. The Green Seal Board establishes criteria on a category-by-category basis. The program has established product standards and product criteria. Product standards are considered more in-depth and are meant to include life cycle considerations, whereas product criteria are a relatively shallow review of product information.

Green Seal receives fees for services provided to companies or products wishing to be certified. It also provides services to government purchasing organizations and receives foundation support. Any company or group can suggest a product category. A report is written by Green Seal after collecting data relevant to the criteria, and the report is then sent out for review. All final decisions are made by Green Seal's CEO.

The strength of the Green Seal program is its well-established name and

recognition within the purchasing community. Green Seal standards have been recognized and cited by the US Green Building Council and others as ways to achieve certain credits in the LEED 2.0 Green Building Rating System.

Green Seal's reputation has suffered with the questioning of the rigour of its criteria. In addition to the basic problems related to Type I programs, reports submitted by Green Seal that are not based on life cycle data are of questionable value. Green Seal's distinction between types of certification was perhaps made to increase market penetration, but has instead weakened the entire program.

#### Scientific Certification Systems (SCS)

Symbol:



#### ISO Type: Type I, Type III

SCS is a private scientific organization with a solid reputation for high quality work. A number of programs exist within the company, including the following.

1. Environmental Claims Certification Program
2. Eco-Profile Labeling System
3. Forestry Certification Program
4. Power Certification Program
5. Sustainable Fisheries Management
6. Organic Growers Certification

The Environmental Claims and Eco-Profile Labeling Systems have been combined to perform a variety of services. Certification services range from validating the claims of a product based on established criteria for claims verification, to cradle-to-grave assessment to achieve a certified Eco-Profile. The Eco-Profile model grew out of the SCS "Environmental Report Card" in order to assess products on established standards for life cycle assessment and analysis. To accomplish this work, SCS uses Life-Cycle Stressor-Effects Assessment (LCSEA) to characterize the inventory data.

Involvement in this program is expensive, largely due to the cost of collecting data (certification can range up to \$50,000) but this system is the first real Type III labeling program in North America. SCS is involved in developing ISO Type III standards and, in an attempt to harmonize with other programs, has established relationships with organizations in Chile, Finland, Sweden, Japan and Korea. The organization collaborated with some of these international organizations to produce a version of an LCSEA practitioner's manual for Type III labeling.

SCS is probably the strongest scientific organization in North America involved with certification and environmental labeling. Also significant are its involvement in ISO and its attempts to seek program harmonization according to ISO 14025. With a strong reputation for high-quality and thorough work, SCS is also experienced at effectively collating and communicating data.

Perhaps the main weakness of the SCS program is the cost involved with collection of data.

#### Energy Star

Symbol:



### ISO Type: Type 1

In 1992 the US Environmental Protection Agency (EPA) introduced ENERGY STAR as a voluntary labeling program designed to identify and promote energy-efficient products to reduce greenhouse gas emissions. Computers and monitors were the first labeled products. Through 1995, EPA expanded the label to additional office equipment products and residential heating and cooling equipment. In 1996, EPA partnered with the US Department of Energy for particular product categories. The ENERGY STAR label is now on major appliances, office equipment, lighting, home electronics, and more. EPA has also extended the label to cover new homes and commercial and industrial buildings.

ENERGY STAR is more "product-based" than "system-based" as is LEED or other green building rating systems.

### What Architects can do:

- Lobby the Federal Government to develop and maintain a holistic database system for inventories of all building materials, products and processes and their full life-cycle assessments;
- Become familiar with the different green labeling systems and understand their various strengths and weaknesses;
- Specify only products including appliances, furnishings, and building equipment with a recognized green label.




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### Construction Waste Management

It has been argued that the construction industry produces approximately 20-30% of the total waste stream. Although construction waste management is dealt with as part of most green building rating systems including LEED™, Architects can readily reduce construction waste through better design, better specifications and better on-site construction practices.

Sound waste management strategies and practices can result in a number of financial benefits:

1. Reduced haulage and tipping fees, as a result of less waste and more efficient use of materials.
2. A more accurate calculation of materials needed and, thereby, a possible reduction in new material costs.
3. Increase in productivity as the project that has been designed to use materials more efficiently.
4. The potential to create revenue from the sale of used equipment and materials.

There are also many environmental benefits, including:

1. Extending the life of existing landfills.
2. Reducing the need for virgin resources.
3. Reducing the impact of producing new materials.

For instance, the AIA "Environmental Resource Guide" points out that every pound of steel produced from recycled steel, rather than raw materials, saves 5.7 MJ of energy. Similarly, the reuse of scrap steel results in a 47% reduction in oil use, an 86% reduction in air emissions, a 76% reduction in water contaminants, a 40% reduction in water use, and a 97% reduction in mine wastes.

The RAIC has recently developed Practice Builder on Construction and Demolition Waste Management.

**What Architects can do:**

- Optimize all designs to use materials efficiently and to reduce waste;
- Incorporate recycled materials in all building projects;
- Include in all specifications, best practices to reduce construction waste



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**Health Issues to be included in LEED™ Canada**

The American Institute of Architects (AIA) has recently commissioned research into the affects of design on public health. New chronic diseases that are greatly affecting American society (and also Canadian society) include type 2 diabetes, osteoporosis and obesity. One very effective treatment is *walking*; unfortunately however, we have created environments where walking is very difficult and not encouraged – whether it be within a building which is only accessible by elevators, or, within a community where people must drive to visit neighbours or to buy milk. The US program, "Active Living by Design" has formed partnerships with various cities in the US to help encourage physical activity to by supporting developments and land uses *"that allow people to mingle in public spaces, create walkable neighborhoods, and promote safe walking to shops and schools"*.

One other suggestion proposed in the recent AIA Journal of Architecture is to incorporate health issues into LEED™ – this would go beyond the existing "Indoor Environmental Quality" points – and include design features that encourage walking such as inviting and visible staircases and providing accessible pedestrian circulation within sites and around communities.

**What Architects can do:**

- Ensure designs at all scales encourage walking and exercise;
- Encourage and assist the Canada Green Building Council to incorporate health issues into the next version of LEED™

