ENVISIONING GREEN BUILDING

MANUFACTURING CENTRE

BLUE WILDERNESS
MANAGEMENT GROUP INC.

Ontario

Report
Findings

Dear Colleagues,

The green building sector thrives on collaboration and shared vision. Blue Wilderness Management Group Inc. is proud of its personal, govermental and corporate friendships. We share a commitment to excellence with many leading organizations, Canadian businesses, non-profit and NGO's. Our friendship enabled the workshop in January 2008 and provided approvals for funding to develop this report. Blue Wilderness plans to continue its efforts to advance this unique venture in the Province of Ontario. We invite you to take a few moments and transport yourself into the *Green Building Manufacturing Report* and envision the opportunities. This pilot project initiative is an opportunity for individuals, corporations, organizations and governments to influence the development of important environmental, economic, and social impacts of the green building manufacturing industry.

The rapid growth of "green buildings" will position this unique initiative for success. As you will see in the enclosed report our dedication to assist the manufacturing industry makes 2008 an ideal time to launch. The project will also involve exciting growth in many related disciplines.

The Green Building Manufacturing Centre Report will provide you with a glimpse of the opportunities to express your interest in evolving technology, small business, research, and health.

If you like what you see, support this endeavor.

Julie Scarcella
Blue Wildernesss Management Group Inc.

Sources for rendering drawings and photos:
Front Cover Larry McFarland Architects Ltd. Photo: Derek Lepper, Green Roof Kortright Centre Toronto Region Conservation Authority **Page 1** GM Diermert Architect Inc. (rendering) Top left hand corner Sudbury Sustainable Energy Centre Grand Hall, Dennis Castelin + Associates, Architects. **Page 2** E-Terra Ecolodge, **Page 3** Amye Sharma, **Page 4** GM Diermert Architect Inc. **Page 8** Hazel McCallion Academic Learning Centre UOT Mississauga Campus, Photo: Ben Rahn/A-Frame Inc. **Page 10** Bakker Boniface Haden Architects, Photo: Nic Lehoux **Page 11** Top left hand corner Gauthier Gallienne Moisan Architect Inc. **Page 12 & 13** Sudbury Sustainable Energy Centre Renderings Dennis Castelin + Associates, Architects **Page 15 & 16** Forbo Flooring Systems **Page 18** HGA Architects **Page 19** Breathing Easy Instruments, Forbo Flooring Systems, and E-Terra Ecolodge **Page 21** top left Amye Sharma **Page 24** FSC Canada **Page 26** Larkin Architect Lt. Photo: Steven Evans **Page 28** Forbo Flooring Systems **Page 30** Breathing Easy Robert Stellar and Julie Scarcella **Page 32** Members of the Toronto Carpenters Union

Envisioning: **"A process used to create an idea blueprint; a roadmap to guide the planning, design, construction, and ongoing operation of a world-class sustainable Green Building Manufacturing Centre. Envisioning ensures that the centre, when complete, will be the fulfillment of the envisioning team's objectives, dreams, and aspirations for the future of our Green Building Industry."**

Julie Scarcella

The Future
Envisioning

Envisioning the Future

The first decade of the new century sees a confluence of numerous factors – climate change, a new maturity in the environmental movement, consumer consciousness of "green" (including green building), energy concerns, and governmental awareness of international responsibilities. It becomes possible to imagine technologies and facilities that were chimera ten years earlier.

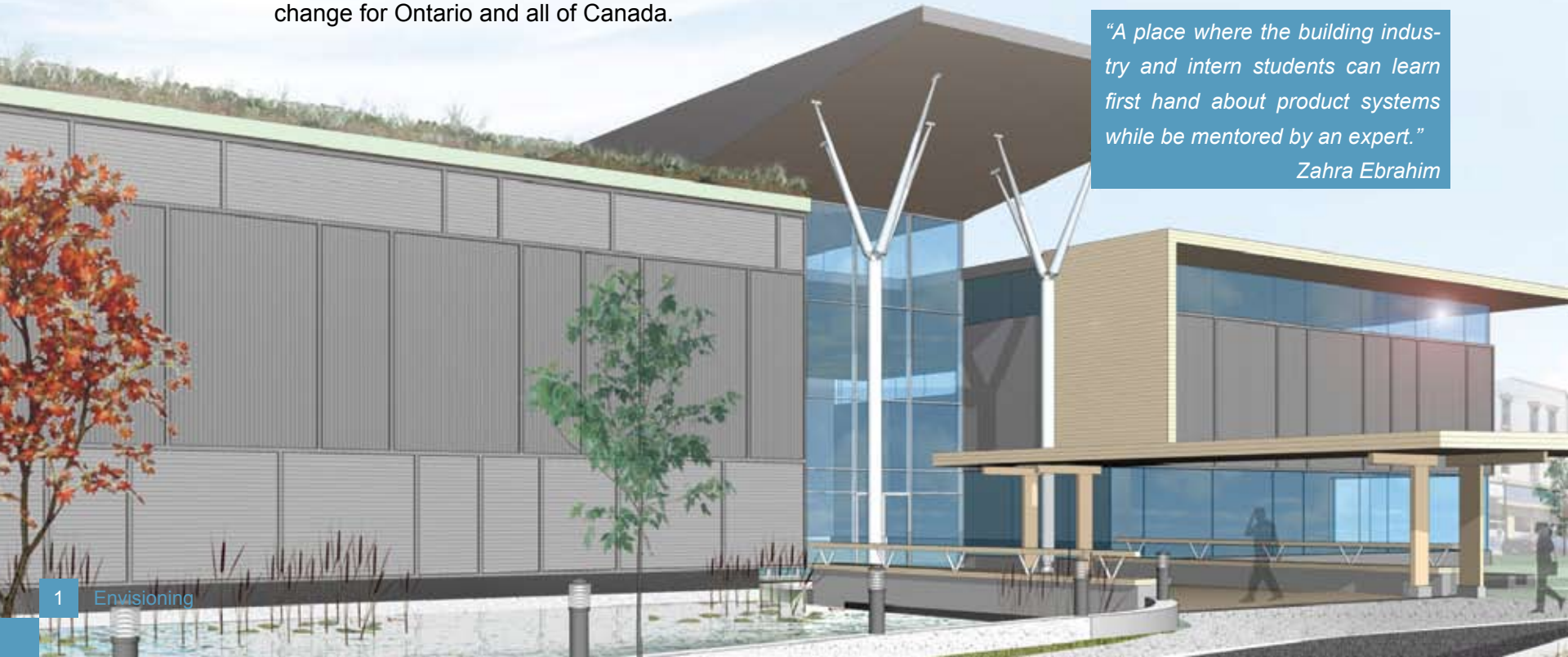
As concepts and ideas begin to take new form, new visions emerge. One such concept grows in shape and substance: a green building manufacturing center in the Greater Toronto Area. While not the first in the world, undoubtedly the most progressive, and certainly a landmark it would be the harbinger of change for Ontario and all of Canada.

This Center could:

- Provide a place where architects, LEED consultants, Interior Designers, students, manufacturers, and trades meet on common ground to learn and develop ideas and technologies that would eliminate energy, water, waste, and carbon in the manufacturing process. Professionals could work together to develop healthy building materials and sustainable infrastructure systems. Manufacturers, large and small, share, brainstorm, experiment, expand and achieve the unthinkable.

- Combine the talents of industry by working together to advance new partnerships that would benefit a huge industrial sector. Providing new jobs in a sector once lost.

"A place where the building industry and intern students can learn first hand about product systems while be mentored by an expert."
Zahra Ebrahim



"There are clear, immediate opportunities for green building products in both the U.S. and internationally. This is a huge opportunity for Canadian manufacturers and suppliers that just can't be ignored any longer."

– Bill Macheras A/Deputy Director and Trade Commissioner,
Foreign Affairs and International Trade Canada

- Establish a physical "campus" designed to foster education, sharing of ideas, demonstrations, and innovation in the green building industry. Such a project would facilitate the meeting of manufacturers, construction managers, architects, designers and tradespeople who, will define — and then redefine — "state-of-the-art" environmentally-wise and sustainable practices.

A green building center compliments the already-explosive growth in the green building industry by encouraging the interaction between businesses and organizations to verify and define fresh opportunities. As noted by participants that attended the January 17, 2008 charrette workshop in Toronto Ontario Canada;

1. New and emerging technologies (test facility for evaluating green products).

2. Facilitate economic development by assisting businesses and entrepreneurs to develop and test energy systems and green building technologies.

*Please note the different headings will be colour co-ordinated in each section to identify a new thought process.

Green Building Technologies

Envisioning continued Upon visiting the centre you will expect to find environmentally - sound material and experienced subcontractors. Consumers spend much of their time finding and educating small-scale subcontractors, some of whom shy away from new techniques. However, they will find the centre a hands-on place where learning complements their skill set.

At the center architects and drywallers discuss building envelopes that are healthy and energy efficient. Subcontracting companies would focus on education through a hands-on approac to problem solving. In this environment, plumbers could reduce their skepticism regarding rainwater cisterns and construct harvesting systems with new enthusiasm and pride!

Not all green products or assemblies are yet commercially available, which forces people to customize a variety of products with multiple manufacturers. For example, the industry could develop simplified kits for rainwater harvesting systems that include a cistern, pumps, filters and sizing calculations linked to rainwater database.

On-site classes help construction experts plan geothermal climate control systems with specialized engineers. International professionals visit to learn from Ontario and to impart lessons from their varied experiences and travels.

Case Studies In Denmark the EPA established the Life Cycle Analysis (LCA) Centre to promote product-oriented environmental strategies in private companies with a focus on the building manufacturing industry by assisting them in implementing life cycle thinking.

In Pennsylvania, the Green Building Alliance has been advancing a Green Building Manufacturing Centre to facilitate green building practices and products that have minimal impact on the natural environment and provide professionals a “go to” place to learn the latest in green building technology.

In Manitoba, the Centre for Applied Research (CARSI) in Sustainable Infrastructure was built by the Red River College of Applied Arts, Science and Technology, with the support of the Canada Foundation for Innovation, the Province of Manitoba and industry partners. CARSI’s mission is to develop advanced sustainable infrastructure technologies in Manitoba and Canada though innovation and excellence in applied research. CARSI will undertake research in construction material and building systems with a focus on asphalt and concrete pavement, advanced composite materials, large light-frame wood structures and the building envelope. A major project involving the construction within CARSI of a prototype and evaluation of the new curtain wall for Manitoba Hydro’s new corporate headquarters (which will be the most energy-efficient commercial building in

"Canadians for too long have enjoyed the luxury of almost boundless natural resources, and relatively inexpensive energy. Consequently, energy efficiency and the environmental impacts of producing construction materials have not been leading criteria in the design, construction and operation of buildings. The establishment of a Green Building Manufacturing Centre will benefit architects, engineers, and construction personnel with assistance, education and training in advanced techniques and technology."

- Gordon McAlary MSc. Eng. P.Eng., General Manager,
Canadian Shield Energy Systems, Kingston, ON

North America, if not the world) was recently successfully completed. CARSI is now the foundation for the development of a sustainable infrastructure cluster in building and construction technology within Manitoba, which will be supported by the National Research Council of Canada's Industrial Research Assistance Program.

When constructed, the Green Building Manufacturing Centre will be an innovative teaching and applied research facility that will provide entrepreneurs and businesses with an opportunity to prototype, test, and demonstrate sustainable energy systems and green building technologies. In addition, demonstrations and hands-on workshops will provide homeowners interested in resource conservation with the information required to install alternative energy systems or to make energy saving alterations to their homes.

2008 is a crucial year. As the green movement gains momentum, experts in the building and manufacturing sector along with civic and government officials must co-operate and develop the necessary partnerships. It is a time for growth. It is a time for action. It is time to envision.

In 2010, Toronto could be celebrating the grand opening of the Green Building Manufacturing Centre in one of Canada's fastest growing cities.

Partnership
Working Together

About This Report Blue Wilderness and a dedicated team of professionals from across Canada, developed a draft strategy called "*Moving the Construction of Green Building Product Agenda Forward: Working Strategy* (2007-2012)", otherwise known as the "Green Building Products Road map of Opportunities". In this strategy the project team proposed a paradigm shift, where current building practices and solutions will become a thing of the past; making way for new technologies, policies and learning centres which will be forthcoming and a necessary part of the future construction industry throughout Canada.

The strategy also includes positioning Ontario and ultimately Canada as a leader in green building design and the development of construction products and materials. The strategy evolved in the later part of 2006 and early 2007.

With the development of EcoSpex Canada *(see definition on Page 6*) technical review stemming back as early as 2005, provided a composite profile of 20 different green building product screening indicators worldwide a snapshot of the gaps, issues and opportunities within the green building product industry. Harnessed from years of research, business planning, fund raising, and industry consultation, EcoSpex will be developed by some of the leading experts in the Canadian Green Design and Product Industry. New partnerships formed in the later part of fall 2007 allowed for work plan deliverables commencing winter 2008.

"Several other countries have been our strength throughout this journey to include New Zealand, UK, Australia, and United States, with Taiwan pending" says Julie Scarcella, "now with funding in place, a business structure that works and industry support, we can finally advance this much needed tool. Truly, our research and industry collaboration provided valuable information to piece together some of the issues pertaining to policy within the green building industry. The strategy plan was developed to provide the bigger picture issues in Canada, stemming from our in-depth review with EcoSpex."

A Solution Inspired by the green building industry, Blue Wilderness approached the federal and provincial ministries, manufacturers, and associations in 2006.

On January 17, 2008, the Toronto Economic Development Corporation (TEDCO) and Blue Wilderness Management Group Inc. hosted a strategic planning session to advance opportunities in the Green Building Manufacturing Product Industry. The event was supported by The world Green Building Secretariat and Western Pennsylvania Green Building Alliance and sponsored by Caroma USA Inc., Ontario ministry of Public Infrastructure and Renewal, forbo, shaw, Gardiner Roberts LLP and Architext. During this ses-

"In order to advance innovation we need to build a culture of collaboration within industry, moving beyond our present culture where secrets are feircely guarded and where everyone holds their cards to their chest. We need to encourage people to share their cards because a mutual deck is much bigger, more powerful, and has many more synergies."

– Mark Salerno, MRAIC Canada Mortgage and Housing Corporation
Executive Board Member, CaGBC Greater Toronto Chapter

sion Blue Wilderness revealed the "draft strategy" that outlined the most urgent goals to advance the green building product industry within Canada. One case study was also presented to stakeholders that revealed a Green Building Manufacturing Centre in Pittsburgh, Pennsylvania USA, by the Green Building Alliance. Stakeholders were invited to brainstorm and provide input into this overarching "draft" strategy while considering possible outcomes to developing a Green Building Manufacturing Centre.

Objectives of the charrette:

- Bring together like-minded professional and people within the construction, design, and consulting, industries.
- Allow for networking opportunities to foster business development. In addition, the focus groups fostered collaboration among industry members, investors, researchers, academics, and potential new ideas within the industry.
- Key questions and introductions were carefully planned for the morning sessions. Each focus group was responsible for answering all eight questions in a small group atmosphere.
- A final report outlining key industry indicators, results from the workshop findings and the next steps will be developed by the Blue Wilderness team.

EcoSpex Canada will deliver to the Canadian and construction industry a comprehensive web-based database of building products which encourages and educates product specifiers to consider environmental, health, and social performance during the project selection/specification process. This format will also provide an sustainable corporate policy and ethical, health-conscious alternative to current standards in interior and exterior building design. This database is the first of its kind in Canada and hopes to be the benchmark for verifying green building materials locally and nationally in the future.

Market Transformation

Backround of this Report was funded by the Ministry of Public Renewal, Ministry of Innovation, MCW Custom Energy Solutions Ltd., Forbo, Toronto Carpenters Union, Architext, Toronto & York Region Labour Council. SA&B Magazine graciously provided the pictures, Grant Diermert Architects assisted with rendering drawings and Reed Construction Data provided the research papers. The report was written by Blue Wilderness Management Group Inc. and assisted by Gardner Roberts LLP. The aim of this report is to develop a preliminary assessment derived from the workshop and research outlining the needs, issues, market assessment and next steps required to develop a Green Building Manufacturing Centre in Canada. The report findings will also provide a snapshot of the potential economic opportunities within Ontario/Canada.

Here is why:

1. Canada's construction industry is one of the leading economic drivers. According to the Construction Sector Council (2007), the total amount of construction in the non-residential Canadian market was approximately $28 million, with BC highlighted as having the highest growth at $11 million. The council also estimates the residential market in Canada to be approximately at $60 million, with Ontario taking the lead spending approximately $22 million.

2. "McGraw-Hill Construction, one of the industry's leading trend trackers, estimates that in the US more than $59 billion will be spent annually on green building by 2010, up from $10.2 billion in 2004.

3. The building product manufacturing industry presents one of Canada's leading business sectors - According to the Statistics Canada (2007), there are around three million people employed in the manufacturing industry in Canada. Ontario houses the largest manufacturing base with **one million employed.**

4. Among Canadian cities and provinces, Ontario ranks as the number one province with the greatest amount of registered and certified LEED projects for all building types. Currently, Ontario is home to 233 registered LEED buildings, with Toronto being the major metropolitan area that supports a large growth. As noted on the chart, Ontario accounts for the largest registered LEED projects with 36% of the market compared, to BC at 24% and Alberta at 16%.

	Certified LEED projects	Registered LEED projects
Alberta	7	107
British Columbia	9	153
Manitoba	1	32
New Brunswick	2	9
New Foundland	0	0
North West Territories	1	1
Nova Scotia	1	24
Nunavut		2
Ontario	24	233
Prince Edward Island	0	2
Quebec	2	64
Saskatchewan	2	13
Yukon	0	1

5. Ontario's total square feet of registered green

It is not good enough to have great green building product if the understanding of the realities of how it must be brought to market are lacking. A green buildings manufacturing center will infuse these realities every time a manufacturer is successful in having a product applied successfully in the buildings industry.

- David Bellamy, C., P. ENG., MBA, LEED AP,
Executive Partner MCW Group of Companies

building space equates to **3,386,317.07** (as of March 2008). To validate this massive number we visited the Canada Green Building Council website and tallied up Ontario's current registered projects by adding up the square feet of each building.

6. Ontario has an international reputation for green buildings, as of 2007, the World Green Building Secretariat became home to the Toronto Region Conservation Authority. This partnership will help accelerate the organization to reach a target of 100 Green Building Councils in three years.

7. The 7th Annual World Green Building Council (WorldGBC) International Congress took place in Toronto, Ontario from July 8 to July 11, 2007. Over 100 delegates from all around the world met in Toronto over four days with one common goal, to advance green building principles worldwide.

8. With the success of the Alberta Built Green™ residential rating program with 3,339 certified homes and British Columbia ranking at 1,417 homes, demonstrates the exponential growth in the residential industry.

9. Ontario has the highest proportion of immigrants in Canada. In the Greater Toronto Area immigrants now account for nearly half of the urban population. Our ethno-cultural diversity is a source of pride and competitive advantage for the region.

Innovation Leadership

Introduction Green Building Sector & Market Demands

As rising energy prices affect international economic conditions, and global warming continues to plague the natural environment, community stakeholders now understand that actions must be taken to offset current economic, environmental, and social situations. With 40% of all energy consumption originating from commercial buildings, the adoption of green building practices and standards that lead to energy efficiency and enhanced performance presents a significant business opportunity for the building product market. “McGraw Hill Construction recently released two reports that outline current spending of $59 billion annually on green buildings by 2010.” This figure represents approximately 10% of the overall construction costs that are estimated for Canada as well as the United States. (*Green Building Alliance, 2007*)

As the concept of sustainable development becomes mainstream to business practices and political agendas, the Canadian building industry is under increasing pressure to improve energy, health and environmental performance; this is creating a demand for precise information on green building products and services targeting the commercial and residential markets.

Over the last decade, there has been a great deal of discussion and debate regarding the definition of what makes a green material green. Due in part to the growth in the building industry, where the rise of residential and commercial rating programs are adding pressure to source green product information. For the past 5 years there has been an exponential rate of growth in projects seeking LEED & BOMA certification, as well as professionals seeking accreditation. In the United States there are 1,325 certified projects and 10,309 registered projects, which totals 3.2 billion square feet of commercial building space participating in the LEED rating system. For example, in 2001 the US had 5 projects that where LEED certified.

We are currently facing a mounting problem in Canada: the green building material product sector lacks a common language, and a common foundation, which is easily communicated and clearly understood. It is crucial that we develop a green building product material sector based upon strong building blocks. If we don’t the inefficiencies and frustrations in the marketplace will continue when professionals are sourcing and specifying products.

Despite this growth of interest, consensus and clarity about what constitutes a truly green material is greatly lacking and is often clouded by exaggerated industry marketing claims for new products. For example, when an architect or designer specifies products, it becomes evident in the challenges they face when trying to source environmental attributes, and it is even tougher to distinguish between legiti-

"We need to rethink how we source, manufacture, transport and use construction materials and products to address their considerable environmental impacts. This is a complex issue that requires re-educating the industry to consider principles such as efficient use of materials, durability, reuse, recycling, local supply, and renewable sources."

– Dr Mark Gorgolewski, Department of Architectural Science, Ryerson University

mate product-specific information and self-serving marketing. To make matters worse, even reputable "sustainable design experts" may have, at best, an intuitive grasp of the relative impacts of one material over another, due to the lack of current and credible product information. Complicating the process further is the conservative culture of the building industry, where change is resisted and great inertia is in place to use materials that are familiar and accepted. (*Pharos White Paper* 2006)

Most standards are based around single categories of materials like carpet or paint and wood. Without a standard format available to professionals to research or compare green products across Canada creating "green washing". Due to a wide gap between consumer purchasing and accurate product information, most labels do not include an assessment of environmental management issues. (e.g. corperate sustainable policies, social, ethical, economic and health).

Canadians need to help the consumer and manufacturer understand what it means to produce and implement products that are socially, environmentally, and economically sound. Understanding the meaning of green, as well as identifying how to begin the transition within the manufacturing industry from traditional thinking to innovative thinking, will enable Canada to become a nation which takes pride in its products, homes, buildings, and environment.

Green Product Demonstrations

Defining the Green Building Industry "According to the Canadian Green Building Council, (2005) a green building (sometimes called a 'sustainable building') is one that has been rated 'green' by a green building rating system, or, in the absence of such a rating, a building that is recognized as green in the media or in the surrounding community. In a broader context, sustainable development is sometimes discussed in relation to the "Brundtland Definition", that "...development that meets the needs of the present without compromising the ability of future generations to meet their own needs."

During the past decade, an increasing number of architects, designers, and building owners have embraced the concept of green design; typically in the form of easy, 'win-win' strategies such as energy efficiency or using a few 'environmentally friendly' materials. But in this incremental process, increasing degrees of "green-ness" involves looking at broader time frames and issues:

Definition of a proposed Green Building Manufacturing Centre Canada Green Building Manufacturing Centre is a building designed to house the ideas within the manufacturing, trades and construction sectors. The design community and small businesses will also be provide a multidisciplinary learning environment for the construction disciplines, as well as students learning to integrate theories and practical sustainable solutions within the green product industry.

The Green Building Manufacturing Centre will advance old ideas into new – the centre would provide sustainable infrastructure strategies that demonstrate concepts from buildings to cities. Infrastructure systems and concepts offered at the centre would help link disciplines together to learn hands-on about practical installations and advice on system designs.

Integrated infrastructure – taking advantage of the linkages between different structure systems and resources – also supports the 'zero waste' concept and can help us make the most value from the least resources. This integration can work at any scale in a building material, from the building structure to a city.

For example: In Sudbury, the Sustainable Energy Centre at Cambrian College is an innovative applied research and teaching facility, with a focus on residential, commercial and institutional buildings. The Centre connects college professors and students with its partners - entrepreneurs, businesses and associations - to research, prototype, test, evaluate and to market sustainable energy systems and green building technologies. Under this symbiosis, the business partners receive the necessary assistance to prototype and develop new green building products. Stu-

As a professional involved in sustainable architecture for 15 years, I can say that a centre for the manufacture of green products is long overdue in Ontario. The decline in manufacturing jobs here can be reversed by vision and policy that recognizes the economic and environmental advantages of clean, sustainable development.

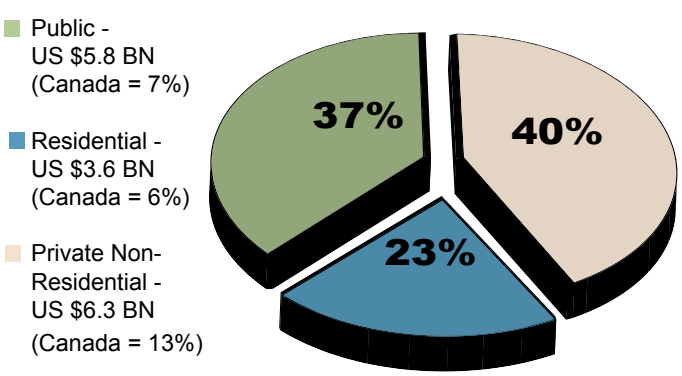
– Tom Ponessa, M Arch, Director of Programs,
Sustainable Buildings Canada

dents learn from working with the “master” and have access to the latest, state of the art equipment. (*Sustainable Energy Centre, Cambrian College, Sudbury Ontario*)

Reduce Carbon Footprint

Green Building Products The demand for green building products has increased dramatically throughout the last decade. McGraw Hill Construction, US Census Bureau and Woodbridge Associates Inc estimate that the total size of the market in 2005/2006 is US $15.7 billion. For Canada, the demand for green building products has dramatically increased. Attributed to this spending can be broken down to public, residential, and non-residential sectors. Figure one is a comparative breakdown of the actual spending and can be compared using the following percentages: 40% of the total market to private non-residential construction, 37% of the market to the public sector and 23% of the market accounts for the residential segment, including home improvements.

North Armerica: Green Building Product
Demand Estimated Market Size 2005-2006

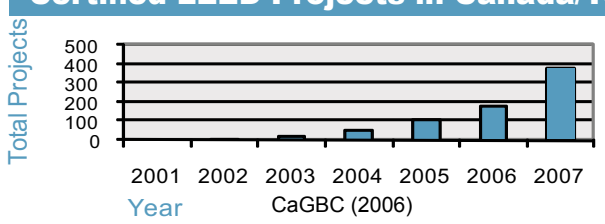


McGraw Hill Construction, US Census Bureau and Woodbridge and Associates 2006

Energy Price Factors Energy prices have also become an influential driver for demand. Since the 1900's energy prices have been on the rise, including crude oil and natural gas. Consumers, business owners and government agencies are especially noticing the dramatic increase in the operation, maintenance and up-keep of buildings and homes. It is estimated that 40% of all energy consumption originates from commercial buildings. The adoption of green building practices and standards will lead to energy efficiency and enhanced performance through environmental and economic practices.

Commercial Rating Programs Leadership in Energy Efficient Design Since the inception of rating programs such as LEED ™, Canadians have become increasingly aware of the advantages of building green. Canadian Green Building Council estimates that since the inception of LEED in 2000, there has been an increase of 80% LEED certification of buildings in Canada. This number is significant and emphasizes the need to develop efficient buildings and the development of LEED buildings.

Certified LEED Projects in Canada/Year



CaGBC (2006)

"The conventional built environment of today is causing untold damage to human and environmental health and will continue to do so until other options exist. There is an urgent need for easier acess to healthy and sustainable building materials. As the public becomes more aware of the health issues connected to unhealthy buildings it will demand, and should be entitled, to live and work in healthy environments."

- Robert Steller BBEI, BBEC EE, President, Breathing Easy

BOMA Canada Rating Program

The BOMA Go Green program is a national environmental recognition and certification program for commercial buildings in Canada, designed, developed and administered by BOMA Canada.

Go Green Plus adds a more in-depth benchmarking tool, for firms and buildings. Using a web-based assessment tool, this aspect of the Go Green program matches the 10 requirements of Go Green, and drills further into the detail of each requirement.

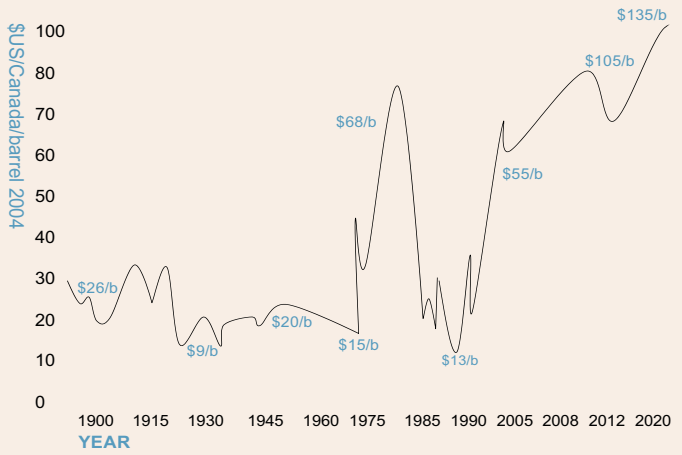
Completed Projects

There are now over 500 certified buildings in Canada.

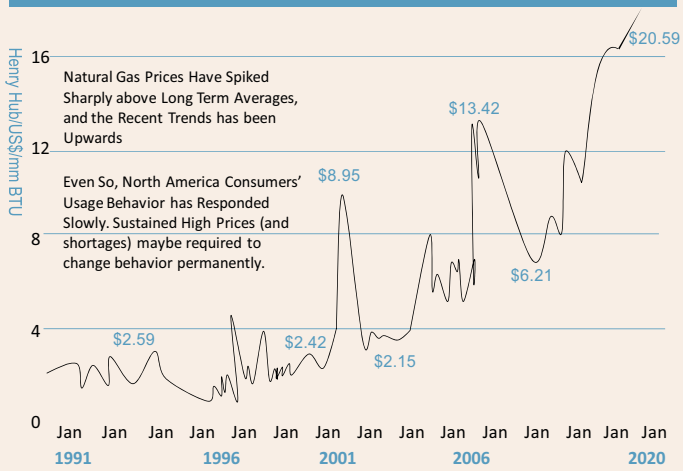
BOMA Completed Projects Since inception

Province	Go Green	Go Green Plus
British Columbia	98	4
Alberta	67	14
Saskatchewan	3	3
Manitoba	13	1
Ontario	61	81
Quebec	146	28
Atlantic Provinces	4	4

Crude Oil Prices (Inflation Adjusted)
New Era of World Oil Prices



Natural Gas Prices (Inflation Adjusted)
New Era of World Oil Prices



Green Building Products – A Roadmap Of Opportunities for Alberta Manufacturers, Woodbridge & Associates 2006

Environmental Screening

Green Product Certifications Another major driver for the demand of green building materials and products is the need to have standard verification for products placed in buildings and homes. Making compliant products is the responsibility of the manufacturer. However, assurance of compliance should be provided by independent verification of critical features of the manufactured product.

Sourcing and properly integrating credible and cost-effective green building materials, services and technologies are major barriers to the design, construction and renovation of homes as well as commercial buildings. A plethora of standards, labels, and ratings are now available addressing the environmental characteristics of building materials. The challenge is sorting out the green from the green wash, and labels. Some are good, reliable sources of information, but address only one aspect of a materials' impact, such as indoor air quality or recycled content.

While others represent the consensus of stakeholders and have a process for update and change, research has shown some are developed and managed solely by industry trade associations which are protected from change. Many are based on meeting a "good-enough" standard without differentiating between the products that are squeaking past and those which go the extra mile to become best practices. Some issues are not addressed by any standards.

Organizations such as Green Seal, the Forest Stewardship Council and others have created "green standards" for specific products that establish a minimal threshold of acceptance for a variety of environmental, human health, and product performance criteria. Green environmental standards are also time dependant, replicating only the current understanding of what is environmentally preferable, rather than what might be capable in the future. While there has been a great amount of positive work done, the sheer variety of standards, labels and competing certifications can be confusing. The quality and integrity of each of these vary widely. Germany Nordic Swan, EU Flower, Green Spec, Green Seal, GS-37, Pharos, Ecologo Program and the MTS Sustainable flooring standard, are all examples of current environmental standards.

"Our buildings are more than the simple places in which we work and live; they are expressions of our culture and of our shared ambitions. Green buildings are healthier, more environmentally, sound infrastructure. Leading builders use brain and brawn to harmonize urban living and ecology. In a happy contradiction, green buildings make a vast and lasting social impact by minimizing or eliminating their physical impact creating a more sustainable world."

- Scott McDougall, President,
TerraChoice Environmental Marketing Inc., and EcoLogo™

In order to fight "greenwashing" in Canada and streamline product searches for truly sustainable products a number of certification bodies exist in North America and World Wide. However, not all them are committed to a robust environmental screening process, here are two that are:

Terra Choice manages and maintains the Canadian Ecologo™ program and provides consumers with a level of assurance that the product bearing the EcoLogo™, EcoLogo's symbol of environmental excellence, meets stringent environmental criteria. The mark also tells the consumer that the manufacturer of the product has been audited by a credible third party.

Sustainable Materials Rating Technology (MTS) developed SMaRT using an ANSI process which incorporates a wide array of stakeholder participation. Using this process is a conscious effort that requires an all-day, every-day effort to achieve. MTS sought and obtained the participation of manufacturers, environmental NGOs, local government, national government with different areas of authority, specifiers, and academic institutions.

Perhaps even more important is that SMART is:

- **Transparent**
- **Based upon the triple bottom line**
- **Addresses bio-based elements**
- **Uses third-party verification**
- **Is LCA-based**

Sharing of Ideas

Green Building Market - Construction expenditures in Canada during 2006 for the residential and non-residential market were estimated at $193 billion. Compared to 2005 estimates, there has been an 11% increase in one year in total residential and non-residential construction expenditures.

Ontario Construction Spending

Ontario construction expenditures for the residential and non-residential market in 2006, was approximately $33 billion. This was nearly 17% of Canada's total residential and non-residential construction spending for 2006.

The residential construction industry represents one of Ontario's leading business sectors. In 2007 Ontario spent $22 billion in all residential construction endeavors including: new housing, other new housing, renovations and apartments.

Total housing Starts by Region

Province	Units	Alberta	British Columbia	Ontario (EN)	Québec
2006	Millions	8,269	11,415	23,088	12,742
2007	Millions	8,157	11,444	22,208	12,265

Sources: Construction Sector Council, Statistics Canada, Bank of Canada, CMHC, HRS

Total non-residential Construction by Region

Province	Units	Alberta	British Columbia	Ontario (EN)	Québec
2006	millions	3,687	3,769	10,490	5,008
2007	millions	4,160	4,167	10,577	4'999

Sources: Construction Sector Council, Statistics Canada, Bank of Canada, CMHC, HRSDC

The Trade sectors that represent the construction industry within Canada accounted for approximately 732,338 Canadians. In Ontario construction associated trades averaged at 293,396 of Canada's total, approximately 40% of Canada's work force.

Peak Employment (number of persons) for all Construction Trades

Province	Alberta	British Columbia	Ontario (EN)	Quebec
2006	152,825	136,627	294,781	25,501
2007	170,238	154,378	293,396	26,239

Sources: Construction Sector Council, Statistics Canada, Bank of Canada, CMHC, HRS

"To achieve significant change in society requires that we take collaboration to new levels. Peer to peer learning or the sharing of ideas and experiences in a safe and supportive environment is an important component of that collaboration."

- Bernie McIntyre, B.Sc., MSc., Manager, Community Transformation Programs
Toronto and Region Conservation (TRCA)

Alberta Construction Spending

Albert's residential and non-residential construction expenditures in 2006 was comparative to Ontario at $11 billion. This was also nearly 9% of Canada's total construction spending.

Quebec Construction Spending

Quebec's residential and non-residential construction expenditures in 2006 were $18 billion. This was also nearly 8% of Canada's total construction spending.

Today, the green building product market is in the early stages of development. It is an evolving process, not a 'revolution'. Over a period of time, green building products will win an important place among the full array of all building products.

In 2005/2006, the green building materials market in North America was worth an estimated US$15.7 Billion. Close to 40% of the green building spending took place in commercial projects in the private non-residential construction sector. A further 37% occurred in public construction markets (including municipal, state/provincial and federal government spending). Only 23% was spend in the resident housing – which includes new homes and home improvement expenditures. However, an absolute terms, this represented spending of around US$ 3.6 Billion in 2005-06. (Woodbridge Associates, August 2006)

Testing Facility

Green Building Export Market McGraw-Hill Construction 2006 *Smart Market Report* study provides current forecasts of market size and presents several insights into buyer's motivations for specifying the use of green building products. Analyses and interviews for the McGraw-Hill Construction *2006 Smart Market Report* were carried out during the spring and summer of 2005 and involved interviews with a sample of 417 architects, engineers, contractors, and building owners in the US. The report indicated that the environmentally responsible green building market will reach $10 - $20 billion over the next 5 years.

Key findings include:

- Green building comprises approximately 2% of non-residential construction starts in 2004, valued at $3.3 billion.
- By 2010, the green building market is expected to be 5% - 10% of non-residential construction starts (excluding non-building construction), valued from $10 billion - $20 billion.
- Over 70% of a representative sample of architects, engineers, contractors, and building owners anticipate sales growth from green building.
- 60% of architects, engineers, and contractors are specifying and installing green building products in their construction projects.

McGraw-Hill Construction Study Results McGraw-Hill estimates this would value the green building market at around $3.3 billion in 2004 – suggesting total non-residential spending of around $165 billion. US commerce data for 2004 show construction total spending of US $10.3 trillion. Of this, the non-residential component was US $235 billion for private non-residential construction spending and US $229 billion for public construction spending.

Market Size - Construction Spending Ontario based manufacturers of green building products may choose to focus on domestic market needs and/or exports. At the national level in Canada and the United States, these products have to compete within a C$1.5 trillion market for construction spending. Of this spending, the bulk, not surprisingly, occurs in the US. Several industry observers have noted that, for innovative new

Key Assumptions Market Shares Factors Used to Calculate Green Building Materials Market Size

	Residential	Private Non-Residential	Public	Estimate Market Size
Canada	0.25%	1.5%	2%	US$1.39 Billion
USA	0.5%	2%	3%	US$14.3 Billion

"It is time to position Ontario as the market leader. There is an extraordinary opportunity for Canada to position itself as a world-wide center for green building products. I am certain our 877 Manufacturer, Supplier and Service members will embrace the idea of a green building centre close to home where they can access relevant information on this fast growing sector of the Construction Industry."

- Kim F. McKinney Executive Vice-President Toronto Construction Association

green building products to be successful as global technologies, they could be launched with Ontario. But eventually would have to be provided commercially first within North America – and achieve early success in the US market, in order to attract private sector investment capital.

Estimated Size of Market by 2010 for the United States
Green Building Alliance

Assuming, the 2% market share assumption is a reasonable proxy, and based upon the more recent data provided earlier, this would indicate a US market (private non-residential only) for green building products valued at around US $5.5 billion in 2006. For Canada, on the same basis, the green building market would be around $1.2 billion for 2006.

Collaboration

Our Report Method As part of the development of this report material was collected through:

- Focus group and stakeholder sessions held in the Greater Toronto region;
- Interviews with other stakeholders across Canada;
- Literature and mainstream journal articles, case studies review of emerging trends and new opportunities;
- Review of initiatives in the United States and in international markets;

The purpose was to have stakeholders brainstorm and provide input into this overarching “draft” strategy and consider possible outcomes. This charrette allowed Blue Wilderness to expose key findings of past and current research within the green building industry, and expose a case study; Green Building Alliance, Green Building Manufacturing Centre.

At this event were attendees from: trade associations, Canadian federal government, Ontario governments, not-for-profit associations, architects, conservation authorities, manufacturers and small businesses.

The attendees were divided into small groups to initiate brainstorming while focusing on the visual and technical aspects of a Green Building Manufacturing Centre. Each focus group was given a series of questions to discuss amongst themselves. Participants were responsible for identifying the critical needs within the green building industry in relation to the manufacturing, trades, construction, and green building design. A facilitator for each group tape recorded each session and wrote down ideas on a series of flip charts.

Blue Wilderness staff reviewed the raw material by listening to the tapes, tallying results and addressing all question. The results were then identified and categorized into paragraphs to explain the focus group questions, answers and results.

Blue Wilderness provided draft report findings to an appointed advisory group that attended the workshop to critique and add value to the report format and finalize conclusions.

Stakeholder Input The purpose of this workshop was to bring together working profession-

"We were surprised to realize while renovating and opening EcoInhabit that there is virtually no financial support available for green building if it is commercial. We had to fund the entire project (including our geothermal) ourselves. I think it is great that there is so much support for the home owner but there needs to be alot more done to support 'green' business in Ontario (and Canada). Canada has the means (and the public support) to be a leader in this industry."

- Kati Penny co-owner- EcoInhabit: Earth Inspired Living

als in green building industry, such as, manufacturers, trade associations, LEED consultants, interior designers, government professionals, architects, engineering, and non-for-profit organizations. The purpose was multi-layered to identify a series of key questions with stakeholders, allow for opportunities to brain-storm, identify the "need" for a Green Building Manufacturing Centre in Ontario. The goal is to build awareness, present a draft strategy to move the industry forward.

Attendance A total of 62 people attended the charrette. As the charrette evolved opportunities and opjectives emerged. This is by no means an exhaustive list and only represents the top answers that were discussed. Phase 2 directions are defined as "Next Steps" later in the report.

Please note that this is not a comprehensive analysis, rather a starting point to assemble leaders and partners within Canada, to help pursue this initiative and continue to address the needs of the Green Building industry.

Standards

Our Report Findings The answers below were the most popular answers commonly expressed by the groups.

What would be the objectives of the GBMC? Please list possibilities

- Government buy in and create financial opportunities
- Interactive learning center with access to materials and information
- Center for Collaboration
- Demonstration of product manufacturing/ green products/promote common language of sustainable development
- Resource for bringing groups and different professionals together
- Direct research for different professionals in the green building industry
- Test facility for existing and new products
- Tax incentives and grant programs
- Environmental labels and standards

Recommendations/Summary

Provide a centre that would allow the business sector/academic/goverment a common place to advance research by incorporating sustainable infrastructure. This centre would conduct innovation and improved applied research that leads the development of innovative and emerging sustainable infastructure technologies in the construction materials systems.

What type of interactions between universities and industry would be most fruitful for collaboration in the development of a green building manufacturing center?

- Integration of education into more practical processes
- Institutions to incorporate sustainability and economics into curriculum
- Incorporate student knowledge into practical design processes with mentors
- Student and university research through builder incentive programs (Mars Center example)
- Implementation of a materials program
- Scholarships, grants/review other case studies
- Youth and design professionals working together
- Testing the development of products
- Coordination (development of a panel of university experts)
- Expand potential partners

Recommendations/Summary

Presently, there is a huge disconnect between industry and the people who study it. There needs to be collaborative relationships formed between universities and a non-profit organization developed for this proposed centre. Universities should spread sustainability across the entire business world.

"As Ontario's economy undergoes dramatic transformation the role of a 'Green Building Manufacturing Centre' (GBMC) is crucial in providing leadership, best practices and solid examples of what a green economy is, and what it can mean to trades workers. Quality 'Green' jobs, in design, manufacturing and in construction can have an extremely positive impact individually, socially, economically and environmentally and this can be clearly demonstrated by a vibrant, effective Green Building Manufacturing Centre."

- Mike Yorke President Carpenters and Allied Workers Local 27

What could be some of the marketing assistance tools for existing and new product manufacturers?

- Establishment into markets, incentives and awareness
- Promote environmental technologies
- Center for product standards, testing and modification • Industry network
- Absolute control – pay fee
- Some control – insurance-type tax

What are some of the market transformation barriers within the green building product manufacturing industry?

- What people need and what is being offered
- No tax structure
- Little incentive to go green
- Non-existent physical place for education
- Lack of certification in Canada (green wash)
- Lack of transparency
- LCA does not include health and triple bottom line criteria

Recommendations/Summary

There is a distinct disconnect between what people really want as opposed to what is being provided. Currently there is a high cost for green products, little incentive to go green and a huge misconception of what consumers really want.

Investment Entrepreneurs

What further research is needed to conduct a construction economic impact report; examining emerging trends and opportunities and identifying gaps within the green product industry?

- Determine impact of the construction and building industry in relation to society, environment and economics/Verify if the opportunity is needed/develop a strategy plan
- Compile data regarding building product manufacturers including firms and employment trends
- Analysis of data for provincial/federal innovation assets as evidenced by patent and federal research and development investments.
- Further analysis of how green buildings will impact the market for specific green building products.

Recommendations/Summary

Leadership from companies like Blue Wilderness Management Group Inc. and associates will be the catayst that allows Ontario to position itself to meet the demands for the creation of provincial green buildings, but also to position local building product manufacturers to take advantage of the Canadian, US and international market growth.

How can Ontario become the recognized leader in the green buildingindustry?

- Ontario needs to catch up and keep pase as a domestic and global leader
- Need leadership will from politicians
- Need updated existing environmental standards in the construction/building industry.
- Identify a geographically location for this national center
- Not enough leadership in Ontario
- Create a reward system to develop leadership in green buildings in Ontario
- Non-existent policies and green building codes

Recommendations/Summary

A long list of market drivers – from rising oil prices to improved technological alternatives – is propelling global demand for innovative clean tech products and services. Impacts of the environmental and social needs are vital. We must act now to ensure that we build a future to change our behavior, education, and attitude. Ontario must take risks, remove barriers, provide incentives, and become a leader in this industry.

"Although we are making strides on energy efficiency, water conservation, and waste diversion and reduction - green building materials are an exceedingly complex challenge. And since Canada and Alberta rely so heavily on our position of supplying raw materials to building material manufacturing, we need to be integrated in this discussion and lead rather than follow."

Alex Joseph, M.E.Des., MBA candidate, LEED AP,
Executive Director - EnerVision - Innovation Coordinator - SAIT Polytechnic

Why should Ontario become the recognized leader in the green building manufacturing industry?

- Provide research and education capacity, Ontario universities could develop a partnership with the centre positioning sustainable infrastructure opportunities.
- Growth in the residential new housing and renovating sector is the largest industry in Ontario, with 313,000 jobs in high paying direct and indirect jobs provided every year.
- $14.5 Billion in wages – the average weekly wage in Ontario's construction sector is $902.62.
- Ontario is well positioned geographically
- Show linkages to support all disciplines between industries.
- Ontario is nationally reconized for the promotion and adoption of green buildings
- Ontario is well-positioned to service major real estate markets.

Recommendations/Summary

The value of this report and future reports would clarify the gaps between demand and supply, while outlining the next steps. At this point in time there are many sectors in disarray across Ontario and Canada in the different disciplines. The green building manufacturing centre can bring a cohesive partnership in all discipline sectors.

Resource

To meet the demand for the creation of green buildings and to enable local building product manufacturers to take advantage of the Canadian and international markets, what more do we need to consider?

- Strategic plan needed
- Change government barriers/behaviour
- Climate change specific technologies
- Green government procurement
- Carbon Tax?/Economic signals
- Tax advantages to consumers
- Liability reasons, huge barrier
- Immigration – attract innovator's public policy to stimulate the market
- Mandates – tax drivers
- Paradigm Shift – away from cheap is best.
- What is the cost? LCA, cradle-to-cradle
- Cumulative impacts
- Local certification (credits, world markets)
- Technology can be licensed (not to just focus on products) • Creating standards that work

Recommendations/Summary

Corporate Acceptance the owners of standard buildings face massive obsolescence…in the United States companies as diverse as the Bank of America, Enzyme, IBM, and Toyota are constructing or have already moved into green buildings. Green is not only getting more respect, it is rapidly becoming a necessity.

Please list in chronological order the next steps that should occur

- Report on Findings
- Review other case studies
- Further analysis of data regarding building product manufacturers (e.g firms and employment trends)
- Obtain and receive buy in from the provincial governments/political-will
- Present ideas and general terms to the provincial and federal governments
- Get senior officials and policy support
- Look for high value job creation – green collar
- Develop Non-for-Profit Status
- Funding and grants available
- Simple targets
- Hire a project management firm to keep advancing to the next phase and develop task force
- Develop industry network/partners
- Do more industry workshops

Recommendations/Summary

With no dominant road map defined in Ontario in the green building product industry, there is ripe opportunity for manufacturers to gain an early competitive advantage in the marketplace.

"Along with sustainable design comes a sustainable future for Canada. There are many innovative ideas and business plans that can and should be put into practice on a world wide scale. The opportunities are endless and the desire for low impact consumer products is great. The green industry has an 'equalizing' quality in that any country- rich or poor, can step up and take the lead."

- Jeremy Gourlay co-owner- EcoInhabit: Earth Inspired Living

Which building product sectors and technologies offer the greatest opportunity?

- All renewable products
- Existing buildings e.g. rehabilitation/retrofitting
- Energy efficiency/savings solutions e. g. materials (wood products, windows, doors, glass, specialty materials), equipment, processes
- Those utilizing highly recycled content
- Air conditioning and focus on clean air
- Upfront design for green, materials, systems
- Advanced Composite Materials (ACM)
- Large light-frame wood structures
- Building envelope systems
- Environmental control chambers
- Structural test systems
- Flexible, multi-channel data acquisition systems
- Strong floor testing
- Indoor Air quality testing

Recommendations/Summary

With the launch of the green building certification system (LEED), the building industry has shifted its practices dramatically. All signs are that the building product industry has begun to transform. Timing is critical.

International knowlege

Possible Outcomes

1. Position Ontario as the national center for green building materials innovation, production, and utilization for Canada in the construction industry.

2. Get support from government, associations and private sector to advance the Construction of Green Building Products Agenda by developing a strategy plan that will validate, verify, and define the roadmap of opportunities for Canadian manufacturers by exploring the development of a Green Building Manufacturing Centre.

3. Support, develop and grow the green building products industry in Ontario/Canada with direct assistance as well as applied research grants.

4. Create a competitive advantage for green building product manufacturers in Ontario/Canada, as well as companies that want to relocate here.

5. Encourage innovation, integration and collaboration between building product manufacturers and building professionals to improve building performance.

6. Facilitate networking to assist with education, labor training, and product innovation to reduce the incubation time of marketable innovations.

7. Advance a feasibility study to address key outcomes.

8. Develop an advisory board to assist with the process.

9. Empower the next generation in the construction industry by providing solutions to assist small to medium businesses understand the necessary steps in achieving sustainable economic planning.

10. Encourage interaction among regional businesses and organizations involved in the development and manufacturing of green building products.

11. Assist manufacturers in understanding sustainability audits, tax incentives, cost analysis and further educate them on specifying products to industry needs.

12. Develop a green product Investors Council

13. Develop partnerships with other case studies in Canada that are similar to this proposed project.

14. Develop grants that are not so tedious such as the Sustainable Technology Development Canada (STDC) current process. This process has too much “red tape” with significant lag time for approvals. Also, allow small businesses to achieve product grants that are structured differently from the current Ontario Centre of Excellence so that all businesses get a chance to

"The Green Building manufacturing centre will provide a welcome opportunity to share knowledge and expertise between our countries, exchange ideas through industry experts and expand product and business development within the green building industry. "

- Inez Mitchell, Senior Advisor, Economic Department
Consulate General of the Kingdom of the Netherlands

receive funding. This should be a competitive process to award funding for projects that seek to develop and introduce new green building products to the marketplace. Innovation and identification of clear and simple paths to commercialization would be key components for winning proposals.

15. Advance a second report that would include a more comprehensive analysis of data collection on green building product manufacturers firms and employment trends. Analysis of data for regional innovation assets as evidenced by patent and federal research and development investments.

Core Findings - Charrette/Workshop January 17, 2008

- Interactive learning centre with access to materials and information
- Training for students, trades, construction and manufacturers
- Centre of Collaboration
- Environmental labels and standards
- Demonstration of green product manufacturing
- Find a green product
- Promote a common language of sustainable development
- Resource for bringing green building industry groups together
- Test facility for new technologies

Leadership

Focusing the Opportunity The stated goal of this effort is to determine if Ontario should continue to pursue the Green Building Manufacturing Initiative. This industry initiative will be designed as an economic development opportunity to spur the growth of existing firms, assist new firms entering the market, drive product innovation, and unite the various disciplines that will impact the green building product market.

The market demand for green building products is affected by the overall economy and construction activity, as well as by the willingness of builders, businesses, and individuals to use green building products.

Ontario is uniquely positioned to take advantage of the growing interest in building green. The leadership of the region, as demonstrated by the number of LEED projects, will allow the Green Building Manufacturing Centre to seize the opportunity. The Green Building Manufacturing Centre can build on the assets of an existing building product sector, a healthy innovation pipeline, transportation infrastructure, and proximity to major markets.

Once the argument is confirmed that Ontario has a unique opportunity to be a leader in the manufacturing of green building products, attention will be turned to consider the best approach in supporting the building products sectors that have the greatest potential.

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Next Steps Based on the research compiled for this report and key findings from the charrette, Blue Wilderness Management Group Inc. developed this report entitled "*Envisioning the Green Building Manufacturing*".

Next steps would include:

1. Schedule meetings to discuss the 'big picture' and potential outcomes, outline goals and objectives
2. Review work plan and budget needs
3. Apply for funding
4. Develop a not-for-profit structure
5. Review existing network of collaborative resources that could provide partners in different industries to include: associations, architects, engineers, corporations, developers, product manufacturers, and environmental organizations, including sponsors within the GTA area
6. Create links to other organizations within the GTA that are currently developing Green Building Advancement Strategies
7. Shortlist potential volunteers/board officials
8. Identify next report phases

The value of Research

Green Building Alliance - "Leadership from groups like the Green Building Alliance will be the catalyst that allows a region to position itself to meet the demand for the creation of local green buildings, as well as to position local building product manufacturers to take advantage of the U.S. and International market growth."

Centre for Applied Research in Sustainable Infrastructure (CARSI) Red River College, Winnipeg, Manitoba Canada - To develop advanced sustainable infrastructure technologies and products in Manitoba through innovation and excellence in applied research, which benefit the environment, and economy, of Canada.

Building Green - New Business Opportunities for New York Manufacturers - "Local sourcing strengthens local economies". It can also reduce the cost and energy associated with transporting goods over long distances, which is why LEED promotes sourcing products within 500 miles of a building's location. The 500-mile preference gives New York firms greater opportunity to compete for LEED projects from Ohio to parts of Canada and even North Carolina."

Environmental and Social Responsibility in Public Procurement - "We believe that, as a major customer, the public sector has a particular responsibility to minimize the environmental impact of its procurement. By being a demanding customer, the public sector can also help the business sector to become more competitive in a market where the demand for environmental technology is growing fast. By stipulating environmental requirements, the availability of environmental product information will also be increased."