

Background Paper #2

Green Building

Key Topics

This paper was prepared as an independent third party contribution to the North American Workshop on Sustainable Consumption and Production and Green Buildings (31 January – 1 February 2011, Ottawa, Canada) by the One Earth Initiative Society. The analysis and synthesis presented in this paper have been developed by One Earth and do not necessarily reflect the perspectives of the participants of the workshop.

17 January 2011

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Background Paper #2: Green Building Key Topics

The goal of the North American Workshop on Sustainable Consumption and Production and Green Building (31 January - 1 February, 2011, Ottawa, Canada) is to have a multi-stakeholder dialogue promoting bi-national collaboration on green building as an important application of international sustainable consumption and production efforts. A number of studies show that three consumption clusters -- housing, food and drink, and mobility/transportation -- drive 70 - 80% of the ecological impacts in developed economies, and promoting green building is a high-leverage option to help transform production and consumption patterns for sustainability.

The purpose of this background paper is to provide additional information to inform the dialogue during the workshop. Below, three topics of mutual interest are outlined: 1) **Financial Structures**, 2) **Building Construction Products and Life Cycle Approach**, and 3) **Building Performance**. The intent of this report is not to provide a comprehensive analysis of these green building topics, but to stimulate conversation about the current understanding of these topics and opportunities for progress through Canada-U.S. collaborative efforts in green building.

I. FINANCIAL STRUCTURES

Financial structures involve not only incentives and opportunities designed to promote green building efforts, but also extend to health and productivity benefits of buildings. In North America, the following types of **incentives** are used to encourage energy-efficient or green buildings:

Direct Financial Incentives

- Grants and other direct financial contributions.
- Low interest loans and funding assistance for additional design, energy modelling, and engineering.
- On-utility bill financing and utility rebates for energy efficiency upgrades.
- On-tax bill financing through city bonds (i.e. Property Assessed Clean Energy or PACE bonds) where encumbrance remains with the property.
- Contributions toward the incremental cost of more efficient technology in the building.
- Tax incentives such as income tax credits, property tax breaks, and sales tax exemptions on qualifying building materials.
- Credits against taxes paid and reductions or exemptions of taxes due.

Non-Financial Incentives

- Development density bonuses allow higher density or greater height.
- A waiver or reduction of development permits fees (i.e. fee-bates).
- Expedited permit review, such as fast tracking, prioritizing, and/or queue-jumping.
- Payment or reimbursement of LEED registrations, certifications, or related fees.
- Support through technical assistance, energy modelling, training, and monitoring.
- Providing access to resources.
- Training and education.
- Public recognition programs

Financial **benefits** of green building include:

- Reduced operating expenses (such as energy and water).
- Lower default risk and liability from issues such as mould and poor indoor air quality.
- Improved risk profiles for insured buildings (and owners and tenants).

- Higher value buildings that have premium occupancy rates, sale prices, occupant comfort, employee retention, and rental rates.
- Increased health benefits in comparison to traditional building and higher worker productivity

Several finance-related **barriers** to green building have been identified. First, incentives for building owners and building tenants to improve energy efficiency, make green improvements, and seek or maintain third-party certification are often misaligned, meaning those who invest do not always benefit from their investments. This suggests a need for new types of “green leases” that align incentives, clearly allocate responsibility, and set rules for various sustainable practices. Second, the lack of data and information on the value for high-performance certified green buildings hinders financial sector involvement. Third, there is a fundamental misalignment between those payback periods deemed acceptable to financial markets, and the timescale associated with the main drivers behind energy efficient buildings (i.e. climate change and diminishing global energy supplies).

II. BUILDING CONSTRUCTION PRODUCTS AND LIFE CYCLE ASSESSMENT

This discussion on **building construction products** focuses primarily on **life cycle assessment (LCA)**. The LCA is a systematic process that evaluates the environmental impacts of products, processes, and services. Its quality depends on the life cycle inventory (LCI) data it uses. An LCA tracks a product's environmental impact from resource extraction through disposal and examines the inputs (materials, water, and energy) and outputs (waste and pollution) associated with the product during its life cycle. LCAs benefit manufacturers, architects, builders, and government agencies by answering environmental impact questions and identifying areas for improvement.

In terms of the building sector, the LCA is a process that follows common building materials from cradle-to-grave and calculates the environmental impacts at each stage in the product’s life cycle. More specifically, it is an analytical tool used to comprehensively quantify and interpret the environmental flows to and from the environment over the entire life cycle of the building. This includes emissions to air, water, and land as well as the consumption of energy and other material resources. The LCA compares the entire life cycle of materials, assemblies, and whole buildings in terms of quantifiable impact indicators (such as global warming potential or natural resource use).

A **life cycle inventory (LCI)** involves the monitoring of all the material that flows into and out of the system over the course of its ‘lifetime’. For a building, this would include raw resources or materials, energy, water, and emissions. This kind of analysis can be extremely complex and may involve dozens of individual unit processes in a supply chain (i.e. the extraction of raw resources, various primary and secondary production processes, transportation, etc.) as well as hundreds of tracked substances. Life cycle databases need to be globally compatible to enhance value. Although there is value in country-specific databases, more can be done with global standards and data sets to increase the efficiency of the system and contribute to more productive and profitable trade and value chains.

III. BUILDING PERFORMANCE

The discussion on **building performance** involves a comprehensive whole-building approach to identifying energy efficiency issues as well as other areas such as water use, air quality, and waste management. Energy efficiency of buildings in North America in cities account for roughly 30-40% of primary energy consumption and over 50% of GHG emissions. Assessing building performance is complex and must consider a variety of building types, ranging from private homes and office towers to

hospitals and schools. Stakeholder groups are equally diverse, ranging from investors, builders, engineers and architects, to real estate agents, tenants, and building operators.

Key **barriers** to increased building performance include:

- Issues related to risk management, information gaps.
 - Financial costs related to being the first mover in the market.
 - Energy pricing that does not account for environmental externalities.
 - Institutional and regulatory barriers caused by existing policy frameworks.
 - Lack of alignment between first cost and operations/maintenance budgets.
 - Complexities in the building value chain.
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Speakers and participants at the workshop will cover these three topics during their presentations and discussions with the aim of overcoming identified barriers and of exploring cross-cutting and holistic solutions to green building challenges as a key sector within the consumption and production system.