

Showing the Value of Green Building and Community Design



Introduction

This short guide presents approaches to monitoring and assessing the mission-related impacts of green building and community design, which may be relevant for social enterprises (and programs) that seek to:

- Create awareness about the environmental, social and economical advantages of green buildings, and provide practical information on how to build green;
- Promote new urbanism approaches to reduce sprawl in suburban developments;
- Develop (pilot) projects that showcase green building practices;
- Provide incentives to retrofit existing buildings to be more energy and water efficient.

Approaches to measurement in this area include using tools to assess the impact of alternative design practices, assessing whether there is a change in practice, and assessing the impact of the change in practice on the use of materials, water and energy, and ultimately environmental systems.

Key Questions

The Demonstrating Value Framework is based on the premise that the information you gather in your organization has to be directly relevant to the decisions you make and be compelling for others to learn about your value. This leads to active engagement and thoughtful action. To work out what information is most useful, always keep the following simple question in mind:

'What do we want to know and show?'

In terms of the impact of green building, the following questions may be important for you to understand (and show):

- How 'green' are our design practices?
- Are people and organizations are changing their building practices and adopting different technologies?
- Are we influencing change that would not have happened anyway?
- Is the community as a whole advancing down a path of better material, energy, and water use?
- Are we reducing greenhouse gas emissions?
- What are the broader impacts on the environment?

Methods for Understanding Impact

Rather than present a list of indicators, we present different methodologies for assessing impact that can be applied to different types of projects (and budgets!)

Assessing Design

There are a number of tools and rating systems that have been developed to assess the sustainability of building design and community design. One of the most popular is Leadership in Energy and Environmental Design ([LEED](#)) rating system originally developed by the US Building Council. Points are distributed across major credit categories such as Sustainable Sites, Water Efficiency, Energy and Atmosphere, Materials and Resources, and Indoor Environmental Quality. Other tools for assessing the sustainability of design include Green Building Assessment Tool [GBTool](#) 1.3 (CANMET, Natural Resources Canada), [Autodesk Sustainable Design Tools](#) (Green Building Studio, Ecotect Analysis, BIM, among others).

Assessing Changes in Practices

If you are working to influence how others build, then a starting point for looking at how you are making a difference is to track whether people and organizations are changing their building practices and adopting different technologies. A useful way to do this is to set out the various options (technologies and practices) that a person or organization has available to meet specific needs ('end-use'), and then monitor the change in the numbers of people using each option. This should include a pre-intervention point to establish a baseline. Examples of end-uses include space heating, water heating, cooling, lighting, entertainment, transportation, green space).

Monitoring can be done by tracking sales of certain technologies or services, and follow-up to see how technologies are used and whether people adopt new practices. You may

also be able to use statistics that are collected by other agencies. For instance, the [Office of Energy Efficiency](#) (Natural Resources Canada) regularly surveys technologies and practices in the commercial and residential sectors.

Monitoring Changes in Materials, Energy, and Water Use

To understand the incorporation of green building and community design at a broader level, you may want to monitor changes in the amount and type of materials, energy, and water used by community. Approaches include:

Materials:

- Monitoring to track material(s) used in building, landscaping and urban development. This can apply to a specific material of interest (e.g. materials produced locally, with recycled material content, hazardous or toxic content, etc.). You may be able to use statistics that are currently collected by other agencies, or develop your own data. The later could be done in conjunction with other organizations who may also be interested in the same data.
- Extrapolation to estimate changes in material use (quantity and types) that occur from adopting green building, landscaping and urban design practices. This could be calculated based on information about changes in people's or organizational practices and technology uses. Some tools are being developed that estimate 'life cycle' material use of different products and practices, including Carnegie Mellon's [EIO-LCA model](#) and The National Institute of Standards and Technology's [BEES Online](#).

Energy Use

- Monitoring to track energy use in building, landscaping and/or urban development. This can apply to all energy use, or to a specific type of energy (e.g. energy from renewable sources). You may be able to use statistics that are currently collected by other agencies (for example Statistics Canada's [Report on Energy Supply and Demand](#), Natural Resources Canada's [National Energy Use Database](#), other levels of government, regional indicator projects, utility billing data), or develop your own data through surveying. The later could be done in conjunction with other organizations who may also be interested in the same data.
- Extrapolation to estimate changes in energy use (type and quantity) that occur from adopting green building, landscaping and urban design practices. This could be calculated based on information about changes in people's or organizational practices. Some tools are being developed that estimate 'life cycle' energy use of different products and practices.

Water Use

- Monitoring to track water use in building, landscaping and/or urban development. You may be able to use statistics that are currently collected by other agencies, or develop your own data through surveying. The later could be done in conjunction with other organizations who may also be interested in the same data.
- Extrapolation to estimate changes in water use in a community that occur from adopting green building, landscaping and urban design practices. This could be done based on data on changes in people's or organizational practices.

Monitoring Changes in Greenhouse Gas Emissions

Levels of greenhouse gas emissions (GHGs) are based on the production of GHGs from the combustion of energy, direct emissions (egs. Methane from cows, pipeline fugitive emissions, other GHGs from industrial processes) and the sequestration of GHGs in sinks (egs. forests, oceans). To understand how you may influence the level of emissions, you could assess changes in the amount and type of greenhouse gas emission produced through the following approaches:

1. Monitoring to track the production of greenhouse gas emissions. This can apply to a specific greenhouse gas of interest (e.g. carbon dioxide) or all greenhouse gases, which are commonly expressed in terms of a carbon dioxide equivalent (different gases have different global warming potentials). You may be able to use statistics that are currently collected by other agencies by region (for example Environment Canada's [National Greenhouse Gas Inventory](#)), or develop your own estimate based on applying emission factors to energy consumption data (and in some cases production data, for non-energy based emissions). It is important to use emission factors for electricity use that are specific to your region, because the fuel (and resulting emissions) for producing electricity is unique by region. A good resource for appropriate factors (including provincial electricity emission factors) is available on the Canadian Standards Association, [Climate Change Services website](#).
2. Extrapolation to estimate changes in greenhouse gas emissions that occur from adopting green building, landscaping and urban design practices. This can include reductions in emissions and changes to 'sinks' (vegetation, soils, water) that absorb emissions. Some tools are being developed that estimate 'life cycle' emissions of products.

Some tools are available on line which estimate average emissions savings from various reduction actions, particularly for households. (For instance see Pembina's [One Less Tonne tool](#)). The results may not always be transferable to your jurisdiction (particularly if your action/product relates in some way to electricity use). An environmental consultant may

also be of assistance in this type of analysis and many use detailed end-use models such as MARKAL and CIMS.

Monitoring Environmental Changes

You may want to monitor changes that relate to air quality, water quality, water system health, land and soil quality, biodiversity and habitat. Indicators relating to these factors of ecological health may be collected in your community. A good place to look is the environment department of different levels of government. Being able to estimate changes in these factors based on changes in people's and organizational practices can be quite complex and may require modeling. Many environmental consulting companies specialize in this type of analysis.

An alternate way to consider environmental impact holistically is to estimate an "ecological footprint", which relates resources use (materials, energy, water) to the bio-capacity of land. The concept has mainly been applied to compare geographical areas (municipalities, countries) and lifestyles. For more information see: [Global Footprint Network](#).