

# Sample environmental indicators and measurement approaches for sustainable transportation projects



transportation

## 1. Introduction

A sustainable transportation project should include the measurement and monitoring of environmental, social, and economic benefits. An effective measuring and monitoring methodology for a sustainable transportation project considers the relationships among goals, objectives, and indicators. Measuring programs can include many tools and activities, some of which may require rigorous efforts.

Developing a measuring and monitoring methodology for the environmental benefits of active and integrated transportation projects is a particularly difficult challenge for the sustainable transportation industry. The purpose of this document is to provide a sample of transportation-related environmental indicators along with sample methodologies for measurement and verification. Knowledge of the methodology will help applicants to track progress towards key objectives, understand what is involved with measuring the environmental benefits of their projects, factor the necessary components into their workplans, and comply with FCM's measuring and monitoring requirements.

While the processes for doing these measurements are relatively new to many

urban transportation practitioners, there is an established expertise in Canada in universities, private consulting companies, and governments. External advice and capacity building on project impact measurement may be available through the resources shown below.

## 2. Measurement Approach

The key steps to developing a measuring and monitoring approach for the environmental benefits of a sustainable transportation project are:

- Identify the **benefits** to be measured
- Define the right **indicator(s)**
- Set realistic **targets**
- Define and establish the **baseline** for impact measurement
- Define/organize a **data collection strategy** and sources of data
- **Analyze data**

The measurement approach identified above was applied to three sample sustainable transportation projects. A summary sample environmental benefits, indicators, and data collection requirements for each example project is provided below in Table 1.

**Table 1: Summary of sample environmental benefits, indicators, and data collection requirements**

<b>Example Project</b>	<b>Environmental Benefits</b>	<b>Indicators</b>	<b>Data Collection<sup>1</sup></b>	<b>Goals/Targets</b>
<p><b>Purchase of Hybrid Vehicles (Buses)</b></p> <p>[Benefits are through the use of the Hybrid Vehicles rather than purchasing the hybrid vehicles]</p>	<ul style="list-style-type: none"> <li>- Reductions in Greenhouse gas (GHG) emissions and air pollutants</li> <li>- Increase in fuel efficiencies</li> </ul>	<ul style="list-style-type: none"> <li>- Reduction in fossil fuel consumption</li> <li>- Change in transit operating costs through savings in overall fuel consumption compared to a conventional transit bus</li> </ul>	<ul style="list-style-type: none"> <li>- Vehicle fuel use</li> </ul>	<ul style="list-style-type: none"> <li>- GHG reduction target of XX kg or XX %</li> <li>- Fuel consumption reduction target of XX litres or XX %</li> <li>- Carbon Monoxide reduction target of XX kg or XX %</li> <li>- Nitrous Oxide reduction target of XX kg or XX %</li> </ul>
<p><b>Installation of Transit Priority Infrastructure</b></p> <p>[Benefits are through utilizing transit priority infrastructure rather than infrastructure installation]</p>	<ul style="list-style-type: none"> <li>- Reductions in GHG emissions and air pollutants</li> <li>- Reductions in travel times resulting in increased transit efficiency</li> </ul>	<ul style="list-style-type: none"> <li>- Reduction in fossil fuel consumption from reduced travel time</li> <li>- Change in transit operating costs through savings in overall fuel consumption compared to a conventional transit bus</li> <li>- Reduction in transit travel time</li> <li>- Reduction in vehicle kilometres traveled in single occupancy vehicles</li> <li>- Increase in transit ridership due to improved service</li> </ul>	<ul style="list-style-type: none"> <li>- Onboard timers</li> <li>- Vehicle fuel use</li> <li>- Surveys of system users to determine previous travel mode, distance traveled, etc</li> </ul>	<ul style="list-style-type: none"> <li>- Reduction in transit travel time by approximately XX minutes</li> <li>- GHG reduction target of XX kg or XX %</li> <li>- Fuel Consumption reduction target of XX litres or XX %</li> <li>- Carbon Monoxide reduction target of XX kg or XX %</li> <li>- Nitrous Oxide reduction target of XX kg or XX %</li> </ul>

<sup>1</sup> To measure the environmental benefits for active transportation projects, original, project-specific research is often necessary as the use of existing data may be difficult to interpret.

Example Project	Environmental Benefits	Indicators	Data Collection <sup>1</sup>	Goals/Targets
<p><b>Establish Bikeway/Trail Connections</b></p> <p>[Benefits are through operation of bikeway/trail connections and bike racks on the transit vehicles]</p>	<ul style="list-style-type: none"> <li>- Increase in active transportation modes</li> <li>- Reductions in GHG emissions and air pollutants resulting from reduced use of the single occupant vehicle (SOV) trip</li> <li>- Increase in bike usage</li> </ul>	<ul style="list-style-type: none"> <li>- Reduction in fossil fuel consumption resulting from use of active transportation modes</li> <li>- Increase in distance traveled in active transportation modes</li> <li>- Reduction in number of trips made by SOV's</li> </ul>	<ul style="list-style-type: none"> <li>- Surveys of system users to determine previous travel mode, distance traveled, etc.</li> <li>- Auto occupancy visually counted at screenlines</li> </ul>	<ul style="list-style-type: none"> <li>- GHG reduction target of XX kg or XX %</li> <li>- Fuel Consumption reduction target of XX litres or XX %</li> <li>- Carbon Monoxide reduction target of XX kg or XX %</li> <li>- Nitrous Oxide reduction target of XX kg or XX %</li> <li>- At least XX people will be using the bikeway/trail connections on a daily basis</li> </ul>

### 3. Additional Resources

Developing Indicators for Comprehensive and Sustainable Transport Planning, Victoria Transport Policy Institute  
[www.vtpi.org/wellmeas.pdf](http://www.vtpi.org/wellmeas.pdf)

Monitoring Progress Toward Sustainable Urban Transportation, Transport Canada  
[www.tc.gc.ca/programs/environment/utsp/monitoringsustainabletransp.htm](http://www.tc.gc.ca/programs/environment/utsp/monitoringsustainabletransp.htm)

Defining Sustainable Transportation, The Centre for Sustainable Transportation  
[http://cst.uwinnipeg.ca/documents/Defining\\_Sustainable\\_2005.pdf](http://cst.uwinnipeg.ca/documents/Defining_Sustainable_2005.pdf)

The GPI transportation accounts: sustainable transportation in Nova Scotia / prepared by Aviva Savelson ... [et al.] ; with assistance from William Martin ... [et al.] – Halifax project funded by FCM (GMF 9273)  
[www.gpiatlantic.org/pdf/transportation/hrmtransportation.pdf](http://www.gpiatlantic.org/pdf/transportation/hrmtransportation.pdf)

### 4. References and Acknowledgements

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