

Monitoring Progress Toward Sustainable Urban Transportation

Overview

Monitoring is an essential element of Canada's pursuit of sustainable urban transportation. It provides vital support to planning, decision-making, benchmarking, and the ensuring of accountability.

In the future, as urban transportation plans continue to more fully integrate the various dimensions of sustainability, monitoring will become even more important. However, many current plans do not have an integral monitoring strategy as part of an overall approach to performance measurement.

Monitoring efforts should consider outputs (actions taken), outcomes (the results of actions) and external conditions (the circumstances of actions) using three different lenses (broad focus, medium focus, narrow focus) that respond to varying purposes and interests.

The development of an effective monitoring framework should consider the strategic goals and objectives used to develop transportation plans and manage their implementation. Ideally, the relationships among goals, objectives and indicators would be defined explicitly. However, in practice this may be extremely difficult to accomplish. Monitoring programs can include many tools and activities, some of which may be "business as usual" and some of which may require special, intensive efforts.

Major challenges to successful nation-wide monitoring of urban transportation systems include the sheer complexity of those systems, municipal staff and budget constraints, and inconsistencies of practice among urban areas.

Projects profiled in this paper include two notable monitoring programs (the *Urban Transportation Indicators Survey* of the Transportation Association of Canada, and the performance measurement strategy of the City of Ottawa's *Transportation Master Plan*), and a research effort by the Centre for Sustainable Transportation to develop relevant national monitoring indicators.

Resources

See the profiles on page 4.

Introduction: Why monitor?

The path to sustainability is likely to be lengthy, winding and full of unexpected diversions. Our plans and strategies, while necessary, are usually based on an incomplete understanding of the present and imperfect projections of the future. Despite our best efforts to set a course, we won't always be heading in the right direction — so we need to keep close track of where we are, and where we're going.

In this sense, monitoring is a necessary complement to planning and acting. Monitoring helps us understand whether yesterday's plans and today's actions are working, and why — or why not. Observing, measuring and evaluating are as critical to the success of sustainable transportation strategies as prioritizing, budgeting, designing and implementing.

Monitoring has several basic purposes:

- To support **planning**, the process of figuring out where we want to go and how we can get there
- To improve **decision-making** by giving us a clearer understanding of current conditions and trends
- To enable **benchmarking** of conditions and performances among peers
- To ensure **accountability** for actions and results

Canadian urban areas are becoming more strategic in their approaches to planning for sustainability. Transportation plans are growing more sophisticated and far-reaching as they increasingly tackle the linkages between transportation and other key quality of life issues (e.g. land use, environmental and public health, economic growth, access to opportunity). However, the success of these long-range plans will depend in part, on efforts to monitor relevant conditions, actions and their impacts. Cities that remain aware of their progress toward key objectives can modify their plans, and add or delete priorities as needed. This will foster a continuous understanding of successes, failures, new opportunities and emerging challenges.

Without monitoring, the entire “knowledge foundation” of a plan will become gradually less relevant, and responsible decisions about future changes to policies or programs will become more difficult. While urban transportation plans usually identify the need for a monitoring program, few plans identify a comprehensive and specific set of measures and required resources. In the years immediately following approval of a new transportation plan, the enthusiasm for implementation can lead to a neglect of monitoring — and when the time comes to review the plan after a few years, there could be a lack of credible information that would enable an intelligent and thorough update. Regular monitoring, and the publication of results, also helps to keep transportation plans relevant by demonstrating their effectiveness and reinforcing their important objectives.

Scope and focus of monitoring efforts

Transportation monitoring programs focus on three kinds of elements — outputs, outcomes and external conditions.

Outputs. These are actions taken or resources applied (e.g. funds, staff time). They can include an organization’s adherence to its own plans and policies, facilities it has built, services it has provided, or promotions or events it has undertaken.

Outcomes. These are impacts of actions taken, hopefully representing progress toward key objectives. They can include transportation behaviours, public attitudes, transportation activity levels, or measurements of congestion, emissions and air quality. In the complex world of urban transportation, it is difficult to find outcomes that arise solely and directly from actions by one party — there are typically many factors that might influence any given outcome.

External conditions. These represent changes in the circumstances that have informed current plans, such as economic growth, land use, sociodemographics, public attitudes, transportation costs, senior government legislation, and road, air, rail or marine transportation facilities or services provided by others.

A thorough monitoring program will put these various elements into appropriate perspective by applying three different “lenses.” As illustrated in the chart below, each lens represents a different focus (broad, medium or narrow), fulfills a different purpose, and concerns itself with different areas of interest.

Three “lenses” of monitoring programs

| | Lens #1 — Broad focus (Long term) | Lens #2 — Medium focus (Mid term) | Lens #3 — Narrow focus (Short term) |
|---|--|---|--|
| Purpose | Establishes context for sustainable transportation plans, programs & projects | Informs the development of sustainable transportation plans, programs & projects | Informs the development & evaluation of sustainable transportation programs & projects |
| Primary interest | General transportation conditions and relevant community characteristics (economy, environment, land use, sociodemographic) | State of transportation system (overall inputs, outputs, performance, impacts) | Performance measurement (actions taken, results, effectiveness, efficiency) |
| Influence of actions over indicators | Nil to low — actions and indicators are linked indirectly, if at all | Moderate — actions and indicators are linked indirectly | Moderate to high — actions and indicators are linked as directly as possible |
| Sample indicators | <ul style="list-style-type: none"> ▪ Transportation greenhouse gas emissions per capita ▪ Age profile of population ▪ Air quality trends ▪ Modal shares for walking, cycling, transit and auto use ▪ Economic impact of road congestion | <ul style="list-style-type: none"> ▪ Transit ridership per capita ▪ Degree of cycling network completion ▪ Proportion of arterial roads in adequate physical condition ▪ Annual collisions involving pedestrians ▪ Level of road congestion in key corridors | <ul style="list-style-type: none"> ▪ Number of cyclists receiving skills training ▪ On-time performance of transit service ▪ Number of employers joining commuter options program ▪ Tonnes of road salt used |

Building a monitoring framework

Effective and efficient monitoring programs must transcend a simple aggregation of readily available data. Rather, they require a carefully considered architecture.

Goals, objectives and performance measures. An ideal monitoring framework should reflect a comprehensive hierarchy of transportation goals and objectives, and should explicitly define the relationships among them. (Not coincidentally, these same things are the basis of effective strategic planning). Each level of this hierarchy should include performance measures that are integrated with the information requirements of management activities. In other words, monitoring functions should substantially overlap with the basic information needs of planning and acting — something that may seem obvious, but is accomplished only with determination and effort. Indeed, while such a performance management framework would enable a clear understanding of the transportation system and how to shape it, its development would be very time-consuming and depend on a thorough analysis of all organizational mandates and functions.

In reality, most communities have neither the time nor resources to pursue such an ideal approach — rather, they strive to do the best they can with what they have. In most cases this means using transportation goals and objectives to guide the selection of indicators that extract maximum value from current practices and databases, and the identification of opportunities to gather new information with relatively little effort. To be useful, objectives should be measurable and reflect a desired change in baseline conditions over a specific timeframe. Even then, the dynamic cause-and-effect relationships among goals, objectives and indicators may not always be explicitly understood or defined, and judgment and intuitive understanding may be needed to interpret monitoring results. For example, one can only approximate the degree to which a drop in transportation energy use is due to transit ridership growth rather than improved auto fuel efficiency, or the degree to which an increase in transit ridership growth is due to improved service levels rather than rising fuel prices.

Monitoring tools and activities. A wide variety of tools and activities can play a role within an effective monitoring program. Some of the simplest will be part of basic management processes (e.g. annual spending summaries, staff timesheets, transit fleet logs). Others require ongoing or recurring efforts that have multiple applications (e.g. annual collision summaries, intersection traffic counts, infrastructure condition surveys, public opinion polls). Still others represent special or infrequent efforts that fulfill purposes that are either broad and strategic (e.g. regional origin-destination surveys) or narrow and tactical (e.g. bicycle parking counts at major employers).

It is important to carefully match monitoring tools to their purpose. For example, measuring cycling activity by counting the cyclists passing through major intersections may well be misleading, since many cyclists choose to travel on less busy roads or pathways away from high traffic volumes.

Challenges to effective monitoring

There are three major challenges facing monitoring efforts in support of sustainable urban transportation goals.

Complexity of urban transportation systems.

Monitoring something as broad as sustainability — with its diverse social, economic and environmental dimensions — is difficult enough. But the realm of urban transportation is further complicated by a great number of influences, not least the unpredictable nature of human behaviour. Trying to say with confidence where transportation patterns are heading, what the driving factors are, and what the implications might be, is difficult to say the least.

Financial and human resource limitations of municipal governments.

Budget reductions and staff downsizing have left many communities across Canada struggling to deliver basic services — and monitoring is often one of the first staff functions to be affected when times are tight. Collecting, analyzing and reporting on monitoring data frequently require more time than overstretched municipal staff can offer. To enable effective transportation monitoring, most municipalities need to significantly increase the human and financial resources they devote to the task. Even before monitoring begins, the identification of relevant baseline conditions (an essential step) can be a resource-intensive task.

Inconsistent data collection procedures, data formats and reporting practices.

As discussed above, monitoring can help us benchmark results, question differences and draw conclusions — but this requires apple-to-apple comparisons. In the absence of any national monitoring guidelines or frameworks for municipalities to follow, such comparisons will remain difficult. There is a need for capacity-building to raise the awareness and skill of municipal employees related to sustainable transportation monitoring, and to improve the comparability of monitoring frameworks among municipalities.

See the following page for profiles of three notable projects related to the monitoring of sustainable urban transportation in Canada.

The Transportation Association of Canada's Urban Transportation Indicators Survey

Perhaps the most important urban transportation monitoring exercise in Canada is the Urban Transportation Indicators (UTI) Survey conducted by the Transportation Association of Canada (TAC). The purpose of this ongoing project is to compare the progress of Canadian urban regions in achieving TAC's *New Vision for Urban Transportation*, which showed how sustainable transportation could improve the efficiency, environmental health and quality of life of Canadian cities.

TAC has now conducted three surveys with 1991, 1996 and 2001 data. Eight major metropolitan areas were represented in the first survey, 15 in the second, and 24 in the third. The information produced by the UTI Survey is intended to inform transportation planning and policy processes in Canadian cities. The most recent survey measured progress toward TAC's vision using indicators in six key areas — land use, transportation supply, transportation demand, transportation system performance, transportation costs and finance, and transportation's environmental impacts. It examined key trends pertaining to urban structure, automobile and transit use, vehicle ownership, work commuting trips, energy use, goods movement, land use and transportation initiatives, transportation expenditures, greenhouse gas emissions, and road safety.

Detailed information about the UTI Survey is available from TAC (www.tac-atc.ca).

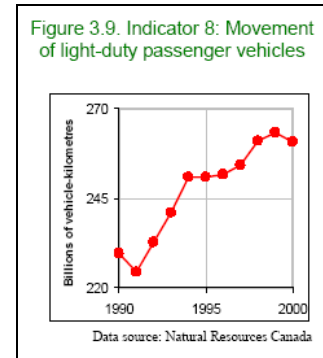
The Centre for Sustainable Transportation's Sustainable Transportation Performance Indicators project

Between 2000 and 2003, the Canadian-based Centre for Sustainable Transportation (CST) conducted research to develop a set of statistical indicators that can be used to track our national progress toward more energy-efficient urban transportation systems.

The three phases of research included an international literature review, a workshop of Canadian stakeholders to reach consensus on the recommended indicators, and the development of 14 environmental, societal and economic indicators of sustainable transportation.

The 14 indicators recommended by the CST are focused around six major topics: the environmental and health consequences of transportation; transportation activity; land use, urban form and accessibility; supply of transportation infrastructure and services; transportation expenditures and pricing; and technology adoption.

A number of reports documenting this project's technical work and recommendations are available from the CST at www.cstctd.ca.



Sample indicator chart from Phase 3 report

The City of Ottawa's Transportation Master Plan performance measurement strategy

As part of its *Transportation Master Plan* approved in 2003, the City of Ottawa developed a performance measurement strategy to track progress toward its Transportation Vision.

The strategy was built around 11 groups of performance objectives (limit motor vehicle traffic growth, increase transit use, increase cycling, increasing walking, reduce unwanted social and environmental effects, optimize use of existing system, manage transportation assets, improve transportation safety, enable efficient goods movement, meet the mobility needs of persons with disabilities, and meet public expectations) with up to four objectives per group, and up to six performance indicators per objective. Following is an excerpt from this structure:

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| Performance objective group: Limit motor vehicle traffic growth |
| Objective: Reduce motor vehicle use per capita |
| Indicator: Individual automobile use (annual vehicle-km per capita) |
| Indicator: Relative growth in traffic volumes (annual % change in volumes per % change in population) |
| Objective: Increase motor vehicle occupancy rates |
| Indicator: Auto occupancy (persons per vehicle) |

Each indicator in the monitoring framework is accompanied by a recommended frequency of monitoring (e.g. annual, biannual) as well a recommended location (e.g. city-wide, downtown) and period (e.g. weekday peak hour, entire year). An estimate is also given of the influence (e.g. low, medium or high) that the City has over the indicator. Some indicators have target values, but others do not — in some cases there is no analytical basis for a target, and in others the indicator is merely descriptive and has no ideal value. As far as possible, the proposed indicators can be monitored through regular data collection programs (e.g. origin-destination surveys, screenline counts, transit passenger counts), but in some cases they require new monitoring initiatives.

Ottawa's 2003 *Transportation Master Plan*, which includes information on the performance measurement strategy (see Chapter 14 and Annex C) is available from www.ottawa2020.com.