



RESIDENTIAL AND
CIVIL
CONSTRUCTION
ALLIANCE OF
ONTARIO

Constructing Ontario's Future

Benchmarking Infrastructure Funding in Ontario: Towards Sustainable Policies

An Independent Study Funded by

The Residential and Civil Construction Alliance of Ontario

By

Tamer E. El-Diraby, PhD., PEng.

Associate Prof., University of Toronto

Tammy Wolters, BA, CGA, CFE

Principal & CEO, WSCS Consulting Inc.

Hesham M. Osman, PhD., PEng.

Principal, OSTAL Consulting

February 19, 2009.

The Residential and Civil Construction Alliance of Ontario (RCCAO) is an alliance composed of management and labour groups that represent all facets of the construction industry. Its stakeholders stem from residential and civil sectors of the construction industry, creating a unified voice. The RCCAO's goal is to work in cooperation with governments and related stakeholders to offer realistic solutions to a variety of challenges facing the construction industry.

RCCAO members and contributors are:

- Joint Residential Construction Council
- Heavy Construction Association of Toronto
- Greater Toronto Sewer and Waterman Contractors Association
- Residential Low-rise Forming Contractors Association of Metro Toronto & Vicinity
- LIUNA Local 183
- Residential Carpentry Contractors Association
- Carpenters' Union
- Ontario Concrete & Drain Contractors Association
- Toronto and Area Road Builders Association
- International Union of Operating Engineers, Local 793.

For more information please visit:

www.rccao.com

Executive Summary

Infrastructure is one of the most vital assets in a modern society and should be treated accordingly. This report is a call for the creation of an advanced asset management system in Ontario. While the Province can easily point to a clear breakdown of funds in areas such as health and education, it is not easy to do the same for core infrastructure—especially municipal utilities. With the public paying more and more of the costs of running such utilities (mainly water and wastewater services), the government should provide transparent, accountable and accessible information about budget levels and associated performance benchmarks. Citizens should be able to judge, clearly, who is doing what and how well with respect to our infrastructure “life lines.”

For a long time, municipal, provincial and federal governments have exchanged ideas (and, in many cases, blame) for funding the required work in infrastructure. Municipalities blame provincial and federal governments for reduced funds—which is true in many cases. On the other hand, provincial and federal governments have blamed municipalities due to the lack of clear long-term asset management practices and policies. This paper will attempt to refocus efforts away from the blame game to one in which there is a clear, long-term plan for infrastructure funding commitments

Historically, infrastructure funding has gone through cycles. Data shows that, lately, funding levels are increasing. Following many years of neglect, this is a typical response to chronic underfunding. It is also due, however, to the increased public outcry for better and secure services. For example, the funding for water and wastewater utilities has increased after the Walkerton incident. The creation and funding for transportation through Metrolinx is another case in point.

Our analysis shows that most of this funding is going to new investments to meet population growth. We still need to invest in rehabilitating older systems in order to address the growing infrastructure deficit. Moreover, research shows that the provincial and federal share of funding does not meet current replacement needs. A larger share of the funding is supplied by end users (through rates or municipal property taxes). In fact, the funding pattern for transportation has shifted to the extent that the federal government income from transportation services is higher than what it spends on the sector. In other words, between 1991/92 and 2001/02 the financial impact on the federal treasury went from an annual deficit of \$547 million in support of transport, to a surplus of \$2.4 billion taken out of the transportation sector.

Small municipalities are struggling with limited resources and capabilities (especially in the human and knowledge fronts). Most larger ones do not have long-term sustainable asset management policies. All municipalities are in dire need for clarity about the long-term contributions from provincial and federal governments. There has been a significant decline in the ownership of infrastructure capital by the federal and the provincial governments relative

to the municipal level. In Ontario, 67% of government-owned capital assets in 2005 belonged to municipalities, compared to 38% in 1961.

The government should establish clear strategies for infrastructure. After all, infrastructure systems are the life-lines of communities and the underpinnings of modern society. Appropriate funding and advanced asset management practices should be sustained and promoted. It is important to make sure that we have learned the lesson that deferring maintenance and rehabilitation will cost more in the long run compared to a well-defined program for asset management.

Moreover, we no longer have the luxury of ignoring the sustainability and quality of our infrastructure. In previous cycles, the impact of infrastructure on sustainability was not well-understood. Reduced funding will have significant impacts on sustainability. More importantly, studies show that users are now paying a growing proportion of funds, especially in relation to water utilities. The Government owes it to its citizens to manage and fund these assets (on their behalf) in the best possible manner.

Ontario needs a transparent strategy for infrastructure asset management. The strategy must include both long and short term objectives, predictable funding and performance measures. The strategy has to be drafted based on an in depth engagement of all levels of governments, in good faith, not only to develop the strategy but, more importantly, to collaborate in making it a success. This strategy has to be in the form of long-term and sustainable commitments to clear objectives. The strategy should be based on local and international best practices. For example, providing needed knowledge and logistical support to small municipalities to overcome the traditional shortage in human resources; streamlining regulations and permitting processes to save time and cost; and partnering with all stakeholders.

In addition to clear and sustained funding mechanisms for infrastructure systems, this study calls for the establishment of a formal benchmarking initiative in Ontario. Benchmarking focuses on comparing organizational performance on all fronts (cost, time, quality, productivity, etc.) to competitors in the same sector—especially those who demonstrate advanced or innovative levels of performance. Benchmarking is an integral part of the management and strategic planning of modern organizations. In fact, it is the cornerstone of judging the quality of the management team at the helm. The citizens of Ontario deserve no less.

With citizens bearing a larger portion of the costs of infrastructure funding (directly or indirectly) and with the demands for transparency (on the financial and sustainability fronts), governments all over the world are embracing the benchmarking culture. The Pew Foundation established a rigorous program to benchmark/evaluate the performance of state governments in the USA. One of the main elements of such an evaluation is the quality of infrastructure management.

Ontario needs to work with academia/NGOs and industry to propagate formal and rigorous analysis of its performance. These are the hallmarks of accountable, efficient and transparent governance. The study reviewed three international examples to solicit relevant benchmarks.

- The Australia experience: government leading and sustaining benchmarking and strategic, transparent and accountable management of assets using the best and most advanced technical and management practices.
- The Singapore experience: establishing a knowledge-enabled coordination environment to promote best practices and a spirit of collaboration between the construction industry, the public and the government.
- The Environmental Protection Agency (EPA), USA experience: integrating environmental planning and audit and project finance, where the EPA has control and provides advice on both issues in a substantive manner.

Based on an analysis of the current status in Ontario and benchmarking of some of the best practices internationally, we assert that the establishment of a coherent strategy for infrastructure asset management with clear responsibility lines is one of the most crucial actions to sustain Ontario's prosperity and lead its economy into the 21st century. Comparing Ontario to some of its international counterparts (for example, New South Wales in Australia) reveals alarming trends. The engineering and managerial capabilities of the two jurisdictions are comparable. Yet, the gap in performance (on almost all benchmarks) is dramatic. One can easily point to less rigorous policies in Ontario as the culprit in this regard—in particular the lack of depth, consistency, transparency and sustainability of such policies.

To reverse this trend, it will be important for Ontario to establish a comprehensive policy for its infrastructure systems that will exploit our existing strengths (especially in human resources); benchmark best practices worldwide; streamline our funding, and boost the impacts of infrastructure on the economy and the sustainability of our communities. This policy should consider increasing the responsibility, role and resources of the Ministry of Energy and Infrastructure (MEI) to become the Infrastructure Czar for Ontario. The Ministry should evolve into an informed, accountable leader and a custodian of Ontario infrastructure systems. Consideration should be given to creating a multi-stakeholder infrastructure council and think tanks to support the efforts of MEI in taking on this expanded role.

Within this scope, this study finds the following elements to be essential in developing Ontario's 21st century infrastructure policy:

1. Establish a clear, long-term plan for federal and provincial funding commitments. Stop the stand-alone funding announcements and provide funding that matches the needs of our communities. Governments should consider the establishment of trusts or even infrastructure banks to provide a steady and predictable flow of needed funds.

2. Create a transparent reporting system for infrastructure performance indicators (status, costs and service levels) to hold each level of government accountable. This must include an independent and clear identification of short-term objectives (based on the aforementioned strategy) and a measure of how these objectives were met. Reasons for not meeting objectives should also form part of the reporting structure.
3. Tie funding to competencies at the municipal level: Government funding should be used as an incentive to municipalities to adopt the latest best practices in engineering and management.
4. Engage all stakeholders: infrastructure management is a community issue that has far-reaching consequences. Government should engage the public, NGOs, academia, construction and finance industries and labour unions to build a consensus of needed actions and measurement benchmarks.
5. Ensure coordinated decision making: use cross-functional teams to plan and manage projects to make sure projects are provisioned in the most comprehensive manner (not just from engineering point of view but also from financial and sustainability perspectives).
6. Embed condition assessment in the regulatory structure: the current regulatory structure for performance measures and conditions assessment in Ontario pales in comparison to what is needed and what is being practiced in other countries.
7. Promote and enforce effective and knowledgeable performance measurement systems: current performance measures used by Ontario ministries are superficial at best. Most municipalities, especially small ones, lack the human resources and basic knowledge to conduct such assessments. The province, working with all stakeholders, should strive to develop a consensus on a clear set of performance benchmarks. Municipalities would be provided with an adequate level of human and knowledge resources to accurately measure and manage these benchmarks.
8. Invest in Technology, R&D and Training: Ontario lags behind its international counterparts in terms of application and generation of advanced technology and management systems in relation to sustainable asset management. Developing an agenda of R&D and technology enhancement is a fundamental requirement to sustain the asset management culture and a much needed move to enhance the quality, usability and, indeed, the return on infrastructure investments in Ontario.

Introduction

The realities of infrastructure management in the 21st century (especially the push for sustainability and full-cost pricing) require a significant change in the government's role and its funding patterns. In particular, government funding should be transparent, performance-based, sustained and long term.

Traditionally, funding infrastructure systems depended on a multitude of sources—including federal and provincial grants, bonds and other debt and equity tools. Most of the funding was dedicated to construction investments and, to a lesser degree, maintenance work. Lately, however, a bi-directional change in this policy is taking place. First, there is a push for increasing the portion of user rates in the funding equation. Second, there is a realization that the funding horizon should not be limited to the short-term needs (i.e. construction) or, even worse, dealing with infrastructure failures (i.e. rushed and unplanned repair). This second trend comes as a realization of the lack of consistent asset management culture in the administration of water and wastewater infrastructure systems. Fundamentally, there is a push for a life cycle planning and management culture that looks at these structures as assets that needs to be managed. The result of these two trends is the consistent call for full-cost pricing. This refers to the responsibility of municipalities to consider and budget for the full life of their water and wastewater infrastructure. This includes projecting and funding all the phases of asset life cycle. It also includes charging users more equitable prices.

Full cost pricing does not mean that the end user should bear all the costs. Governments (federal or provincial) should not lift its hands from infrastructure funding. It is unfair to download all the deferred maintenance costs to current users. Governments have the obligation to bring up the status of the assets to a fair condition before it transfers these costs to end users. Even when infrastructure reaches an acceptable level of quality, governments should still shoulder part of the costs.

If users are going to bear a major role in the funding of infrastructure systems, government has to be very transparent about how much funding is being provided to which municipality and based on which parameters. Governments should define a clear set of rules for provision of funds. This may be based on some of the following factors:

- Current status of infrastructure: old systems or those which have been long neglected should receive, at least initially, more funding to bring them to par.
- The composition and demographics of municipality: smaller, rural or less populated municipalities should receive special attention.

- Quality of action plans: municipal leaders have to live up to their responsibilities and lead a quantum change in the way they plan and manage their assets. Government funding should be linked to the vitality and adequacy of their action plans.

If users are going to shoulder a bigger responsibility in the new system, their municipal leaders have to be held accountable on the way they manage such assets. Clear managerial performance measures have to be established and used to report to communities on the quality of the work of their municipal leaders. The Coxwell sewer main is a case in point. This 2.7m-diameter sewer line is 50 years old. Recently, and after a general inspection, engineers discovered serious cracks that constitute a level 5 emergency situation. The city provided its engineers with emergency authorization to deal with the situation. The initial plans include building a 600m bypass with an expected cost of \$30 million. The planning process for this bypass will take at least 4 months.

It is unacceptable to deal with critical infrastructure in this manner. City leaders have to be held to a set of performance measures relating to their handling of user-funded assets. It is noteworthy that on the same day the Coxwell story emerged, the, then, President-elect Obama announced that he would be appointing a Performance Czar to evaluate the performance of public officials and hold them accountable.

The Canadian funding mechanisms have not lived up to the current challenges. First, funding is still linked to the political inclinations of federal and provincial governments. Almost every year, Canadian municipalities have to lobby governments for bigger budget portions. This short-term unpredicted model is outdated. Governments should provide long-term sustained funding mechanisms to allow municipalities to plan for a longer horizon. The State Revolving Funding Mechanism, the Highway Reserve Fund, and the recent infrastructure banks in the U.S. are good examples that merit consideration.

In short, government has to change its role and funding mechanism to meet the challenges of the current infrastructure landscape and to lead a more sustainable approach to infrastructure funding.

Objectives

In light of the above scope, this report aims to study the levels and trends of funding in Ontario for water and wastewater infrastructure. Fundamentally, the report attempts to define both the macro and micro trends of the provincial share. What is the overall budget level and what did these budgets fund?

Current Status of Infrastructure Expenditures in Ontario

Because major transportation funding is funneled through a dedicated Ministry (MTO), the funding cycle for transportation infrastructure is relatively clear. The funding mechanism for water and wastewater is not as clear. The province of Ontario (the province) generally provides infrastructure funding as part of its annual budget process which is generally released at the end of March each year. As well, the province has been known to announce one time funding at the end of its fiscal year, particularly in years where there is a significant surplus or an upcoming election.

These decisions are challenging for municipalities. Since the fiscal year for the province and the federal government is the 12 months beginning April and the fiscal year for Ontario municipalities is mandated as the calendar year, municipalities are not able to plan on any particular funding for its budgets. Many municipalities have opted to wait until late March to pass their budgets due to this disconnect. In the alternative, municipalities make assumptions of funding or the lack thereof, in municipal budget processes in order to expedite the passing of the annual budget.

This demonstrates that many municipalities continue to be highly reliant on provincial and federal funding in order to make short term decisions regarding infrastructure. This is likely due to the fact that municipalities had less responsibility prior to provincial downloading and more reliance on the income tax base to fund major projects. The downloading of various programs and services to the municipalities has resulted in an increased reliance on property taxes to repair, replace, rehabilitate and construct infrastructure assets.

The federal government has recently been more active in the funding of municipal infrastructure renewal. In particular, the Gas Tax Funding was introduced to fund various types of infrastructure, on an incremental basis. This funding was provided based upon a per capita basis with two funding transfers per year, announced well in advance of the budget year. In fact, funding levels are known until 2014. However, beyond this point, the fate of this funding is unknown. It is important to note that this funding is distributed by population. It does not take into account the population density, current infrastructure condition or the amount of infrastructure required. This has led to some concern by municipalities, particularly in rural areas where the property tax base is primarily residential.

Alternatively, the provincial and federal governments have developed special funding programs for infrastructure. The following are some examples.

COMRIF: The Canada-Ontario Municipal Rural Infrastructure Fund is a joint program between the Government of Canada and the Ontario Government to provide infrastructure funding to rural municipalities. In 2003 the Federal government committed \$1 billion to the Municipal

Rural Infrastructure Fund (MRIF) over the next 10 years to help meet the needs of smaller communities. In budget 2004, the commitment was accelerated to five years and the Ontario Government committed \$298 million to the COMRIF. The investment in Ontario will improve and renew Ontario's aging public infrastructure. In some communities, investments will help ensure ongoing compliance with drinking water standards. In others, provincial contributions will be used to support other health and safety priorities in the community, such as sewage treatment and waste diversion projects and bridge and roads improvements.

MIII: Municipal Infrastructure Investment Initiative is a \$300 million, one-time grant funding program in the 2007/2008 fiscal year that will direct new infrastructure funding to support the construction or renewal of municipally owned infrastructure assets. Almost all categories of infrastructure assets, with the exception of transit, are eligible for funding (Water, Wastewater, Roads, Bridges, Solid waste management, Long-term care facilities, Social housing, Culture, Tourism, Recreation, and Community energy). No matching funds are required from a municipality (MIII can support 100% of project costs).

Building Canada: In 2007 the federal government announced the "Building Canada Program" as a seven-year \$33B investment program that will address various sectors of the Nation's infrastructure. The program is predicated on three areas of national importance; a growing economy, a clean environment and building better communities. Within the 'clean environment' area, the program gives specific mention to wastewater projects.

Similarly in the 'building better communities' area, the program gives specific mention to drinking water projects. The Program aims to foster long term support for drinking water projects

The \$33B plan can be broadly classified into three program areas; municipal funding, provincial funding and balancing priorities. The greatest potential for direct water and waste water infrastructure funding will likely come from the first two areas.

Table 1 Building Canada Plan (2007-2014)

Municipal GST Rebate	\$5.8B
Gas Tax Fund	\$11.8B
Building Canada Fund	\$8.8B
P3 Fund	\$1.25B
Gateways and border crossings Fund	\$2.1B
Asia-Pacific Gateway and Corridor Initiative	\$1.0B
Provincial-Territorial Base Funding	\$2.275B

Municipal GST Rebate: Provides rebate of the GST paid by municipalities. The Building Canada Program has maintained the increase from 57% to 100% rebate of all amounts paid.

Gas Tax Fund: The Gas Tax Fund (GTF) will be extended from 2010 to 2014 at \$2 billion per year. As a result, over the next seven years, municipalities will receive \$11.8 billion through this mechanism. The fund supports environmentally sustainable municipal infrastructure that contributes to cleaner air, cleaner water and reduced gHg emissions. Eligible categories of investment include public transit, water and wastewater infrastructure, community energy systems, the management of solid waste, and local roads and bridges that enhance sustainability outcomes.

Building Canada Fund: The fund focuses on projects that deliver economic, environmental and social benefits to all Canadians. The priority funding categories for the fund will be Core national Highway System routes, drinking Water, Wastewater, Public transit and green energy. Funding will be used to support public infrastructure owned by provincial, territorial and municipal governments and entities, as well as private industry, in certain cases. Funding will be allocated for projects in the various provinces and territories based on their population.

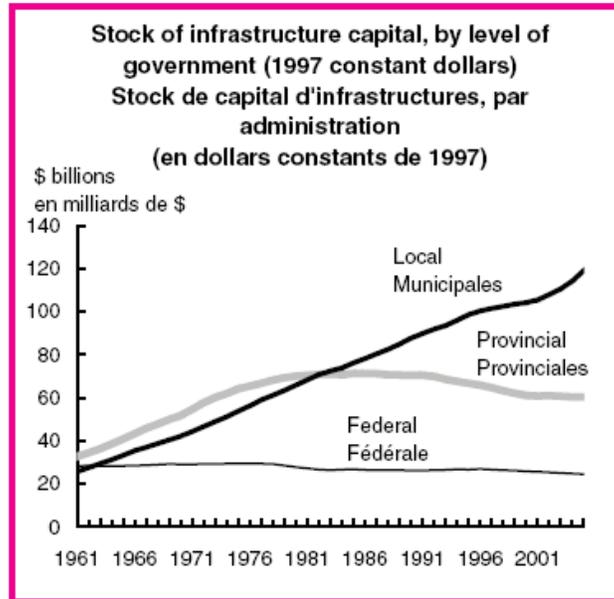
Provincial-Territorial Base Funding: Building Canada also provides \$25 million annually to each province and territory over seven years, for a total of \$175 million for each jurisdiction. This represents an expenditure of \$2.275 billion over the full period. This funding will support all of the categories noted under the *Building Canada Fund* as well as non-core national Highway System infrastructure and the safety-related rehabilitation of infrastructure in all BCF-eligible categories.

Funding Patterns

A recent study by Statistics Canada is very telling about infrastructure funding in Canada and Ontario: funding is cyclical (with no clear long-term funding mechanisms) and the burden is shifting to municipalities (which are struggling financially and knowledge-wise). After the boom in funding and investments that followed WWII, “government funding declined in the 1960’s when governments were struggling with significant budgetary deficits, as well as many of the assets built in the post-war infrastructure boom reaching the end of their life span. Every region experienced a decline in its infrastructure capital during this decade, with the exception of Ontario and British Columbia. One result has been much-publicized problems with our infrastructure. Overall, however, the growth of infrastructure by all levels of government slowed over time everywhere in Canada until the 2000s, when it began to recover (Baldwin and Dixon 2008)

While overall spending patterns enhanced in 2000, “every region showed a relative decline in the ownership of capital by the federal and the provincial governments relative to the

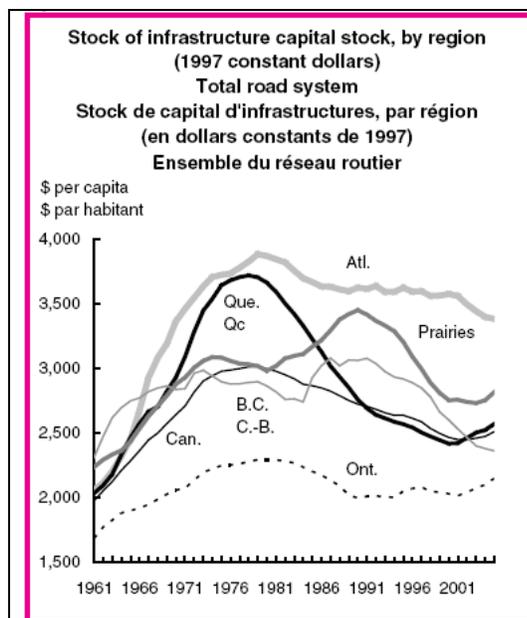
municipal level. This shift was more marked in Ontario and Quebec. In Ontario, 67% of government-owned capital in 2005 belonged to municipalities, compared to 38% in 1961. In Quebec, where the provincial government's share fell the most, the decline was twice as steep as for the country overall, from 49% to 33%. By comparison, in Prince Edward Island, it was only 17% in 2005 versus 4% in 1961 (Baldwin and Dixon 2008)”



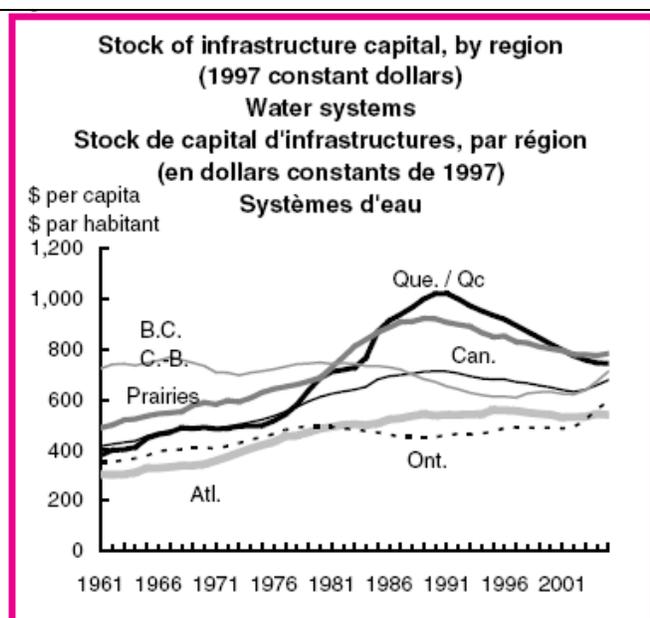
Source: Statistics Canada (Baldwin and Dixon 2008)

“The stock of road infrastructure per capita (in 1997 dollars) increased significantly between 1960 and 1980, but has been eroding since then, falling to \$2,511 in 2005 from its peak of \$3,019 in 1979. From 1995 to 2000 it fell an average of \$322 million a year. Governments have boosted the flow of investment in roads from \$4.3 billion in 1998 to \$7.3 billion in 2005, but this has barely offset the erosion of the road system. Ontario is the only part of the country where the capital stock in roads continued to rise throughout all four decades. Ontario spent less on government-owned road infrastructure than Quebec until the mid-1980s. After that, it moved ahead of Quebec. The rise in the capital stock in the road network was nearly twice as large in Ontario as in Quebec between 1961 and 2005 (Baldwin and Dixon 2008).”

“While provincial and municipal governments share ownership of the roads, environmental management and the management of water systems mainly takes place at the local government level. Municipalities account for more than 80% of capital spending in these areas by supplying a wide range of government-owned infrastructure, mainly pumping and filtration systems and water storage and distribution networks. As with roads, environmental and water system assets rose significantly between 1961 and 1981. Like roads, most regions experienced decreases thereafter (Baldwin and Dixon 2008)”.

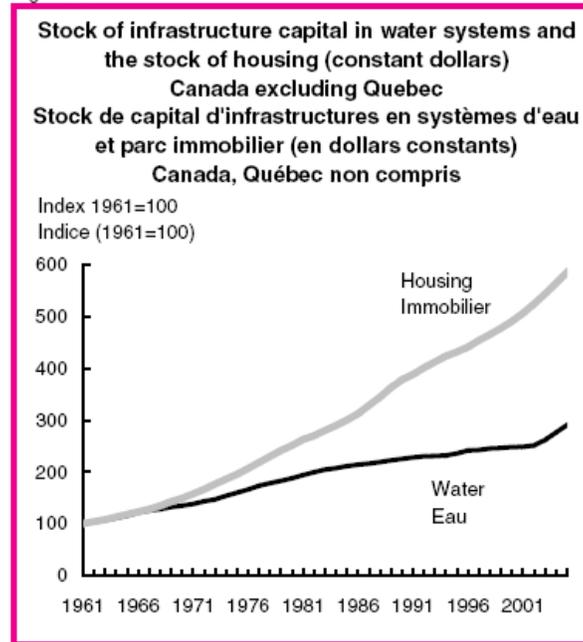


Source: Statistics Canada (Baldwin and Dixon 2008)



Source: Statistics Canada (Baldwin and Dixon 2008)

On the surface, these numbers are encouraging. However, further analysis reveals that these government investments were mainly needed to just catch up with the growth in population. Not much significant enhancement has been achieved in the quality of existing systems. “Investment in water systems has barely compensated for the ageing of existing equipment from 1993 to 2002. In fact investment in water systems outside of Quebec kept up with the increase in domestic demand (as indicated by the change in housing stock) only between 1961 and 1965. This was followed by a shortfall, which widened in most parts of Canada until recently. In Quebec, the pattern was different from the other regions. Quebec made a massive investment in this sector in the 1970s and 1980s, far more than any other part of Canada (Baldwin and Dixon 2008)”.



Source: Statistics Canada (Baldwin and Dixon 2008)

The share of infrastructure capital by government level is shown below as of 2005.

Table 2: Asset share in total government infrastructure capital, in 1997 constant dollars, Canada, 2005 (Statistics Canada, 2007)

Infrastructure	Federal	Provincial	Local	All
Road	0.8	20.4	18.6	39.9
Environment	0.8	1.7	12	14.5
Water systems	0.6	0.7	9.5	10.8
Office buildings	3.7	1.8	3.7	9.2
Recreation	0	0.7	4.8	5.5
Culture	0.1	0.3	1.6	2
Marine construction	0.7	0.8	3	4.5
Other transportation	0.4	0.1	0	0.6
Communication	0.4	0	0	0.4
Laboratories	0.6	0.2	0	0.8
Engineering	0	0	1	1.1
Institutional	1.5	0.9	1.9	4.3
Commercial	0.5	0.5	0.5	1.5
Security	1.4	1.3	0.4	3.1
Other	0.4	0.4	0.9	1.7
All	12.1	29.8	58.2	100

It is important to note, that although the provincial governments own slightly more percentage of roads infrastructure, the growth has been within the local sector as shown below.

Table 3: Average annual growth of government infrastructure capital by level of government and type of asset, in 1997 constant dollars, 1961 to 2005 (Statistics Canada, 2007)

Infrastructure	Federal	Provincial	Local	All
Road	-1.5	1.3	3.3	1.9
Environment	-1.1	0.2	3.4	2.2
Water systems	-0.8	0.6	3.2	2.4
Office buildings	1.1	3.9	5.5	2.6
Recreation		0.9	4.5	3.7
Culture	0.5	3.6	4.5	3.8
Marine construction	-1.5	1.2	2.3	0.9
Other transportation	-1	-1.2	4.3	-1
Communication	-1.5	1.5		-1.4
Laboratories	0.2	3.2	4.7	0.8
Engineering	0.5	2.3	2.8	2.7
Institutional	0.3	3.5	5.3	2.1
Commercial	-1.1	3.4	4.8	1
Security	0.2	4.5	5.5	1.7
All	-0.3	1.4	3.5	2

At the municipal level, Ontario is lagging behind most of the Country in investment in infrastructure since 1961. The chart below shows the average annual growth in local government infrastructure capital from 1961 to 2005:

Table 4: Average annual growth of total government infrastructure capital by region and period, in 1997 constant dollars (Statistics Canada, 2007)

	Atlantic	Quebec	Ontario	Prairies	British Columbia	Ontario
1961 to 1971	3.8	4.8	4.1	3.2	3.3	4
1971 to 1981	2.1	3	2.2	2.6	2.7	2.6
1981 to 1991	0.6	0.3	1	2.1	2	1.2
1991 to 2001	-0.1	-0.4	1.1	-0.5	1.1	0.3
2001 to 2005	-0.5	1	2.8	0.9	1.1	1.5
2005 to 2007	1.4	1.8	2.2	1.8	2.2	2

Although Ontario lags behind other parts of Canada, there has been some significant investment in the last decade in some areas such as water systems. The chart below shows the growth in infrastructure by category in Ontario for all levels of government.

In Ontario, infrastructure expenditures mainly consists of transfers for capital purposes to municipalities and universities, expenditures for servicing capital-related debt of schools, and expenditures for the repair and rehabilitation of schools. These expenditures are included in the Province's total expenses as shown below. It should be noted that it was very difficult to discern these numbers from exiting data. It is important that the new Ministry of Energy and

Infrastructure work with the Ministry of Finance to clarify these spending figures and clarify their trends and usage. This is the first step in making the investment transparent and accountable.

Table 5 Growth in government infrastructure capital in Ontario, by asset type and period, in 1997 constant dollars (Statistics Canada, 2007)

	1961 to 1971	1971 to 1981	1981 to 1991	1991 to 2001	2001 to 2005	2005 to 2007
Roads	4.5	2.2	0.4	1.3	3	2.2
Environment	4.8	3.1	1.3	0.3	1.4	2.3
Water Systems	3.8	3.1	1	1.9	6.6	2.8
Office Buildings	4	1.2	1.8	2.8	3.2	2.5
Recreation	6.2	4.9	1.9	2.8	4.5	4
Culture	5.5	5.3	2.9	0.8	-1.2	3.2
Marine Construction	6.6	2.8	1.5	-1	-3.1	1.9
Other transportation	0.6	0.1	-2.6	-3.5	-6.9	-1.9
Communication	-1.4	-2.2	1.7	0.6	-6.6	-0.9
Laboratories	1.2	0.7	0.9	0	-3.4	0.3
Engineering	3.6	4.1	2.8	-0.8	0.4	2.2
Institutional	3.7	1.1	1.4	0.3	9.3	2.3
Commercial	2.4	0.9	-0.3	-1.9	-5.5	-0.3
Security	0.6	-0.7	0.8	2.9	4	1.2
Other transportation	0.7	-0.7	-0.7	4.1	13.5	1.9
All	4.1	2.2	1	1.1	2.8	2.2

Table 6 Infrastructure Expenditures in Ontario (\$ Millions)

	2005-06	2006-07	2007-08	2008-09 Budget
Transportation				
Transit	1541.0	1624.0	1857.6	1250.9
Highway Construction	1237.0	1426.0	1452.2	1484.3
Other Transportation	494.0	76.0	710.3	591.3
Health				
Hospitals	296.0	375.0	638.0	1048.2
Other Health	166.0	183.0	285.9	248.1
Education				
School Boards	949.0	1000.0	950.4	1018.6
Colleges	44.0	73.0	183.3	202.0
Universities	88.0	52.0	677.6	54.8
Water / Environment	342.0	360.0	387.7	303.2
Municipal & Local Infrastructure	455.0	473.0	1794.8	308.0
Justice	84.0	102.0	215.2	475.9
Other	468.0	682.0	717.1	539.0
Total	6164.0	6426.0	9870.1	7524.3

Source: Ontario Ministry of Finance

Notes:

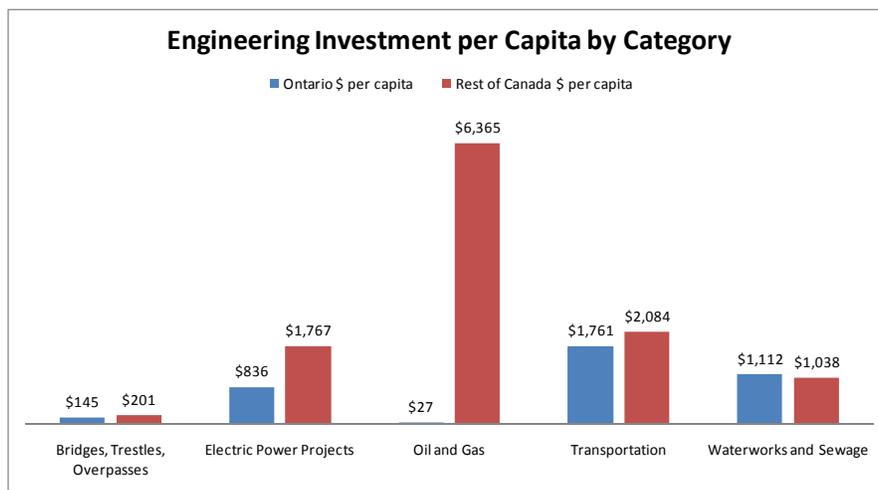
2008-09: Other Transportation includes planning activities, property acquisition, and other infrastructure programs (e.g., Municipal/Local Roads/Remote Airports). Municipal and local water and wastewater infrastructure investments are included in the Water/Environment sector.

Total expenditures in 2008–09 include \$48 million in flow-through in Investment in Capital Assets (for provincial highways) and \$225 million in flow-through in Transfers and Other Expenditures in Infrastructure (\$15 million in Transportation, \$15 million in Health, \$67 million in Water/Environment, \$128 million in Municipal and Local Infrastructure).

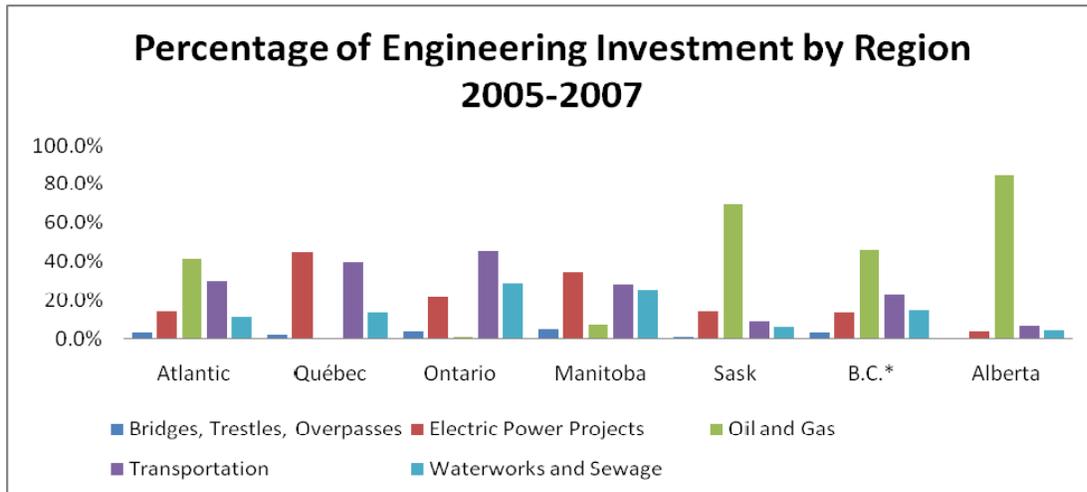
2007–08: actual expenditures include \$1,149 million under the Investing in Ontario Act, 2008. Total expenditures include \$86 million in flow through in Investment in Capital Assets (for provincial highways) and \$160 million in flow-through in Transfers and Other Expenditures in Infrastructure (\$28 million in Transportation, \$45 million in Water/Environment, \$87 million in Municipal and Local infrastructure).

2006-07: Total expenditures include \$36 million in flow-through in Investments in Capital Assets (for provincial highways) and \$208 million in flow-through in Transfers and Other Expenditures in Infrastructure (\$31 million in Transportation, \$26 million in Water/Environment, \$150 million in Municipal and Local Infrastructure and \$1 million in Other Infrastructure)

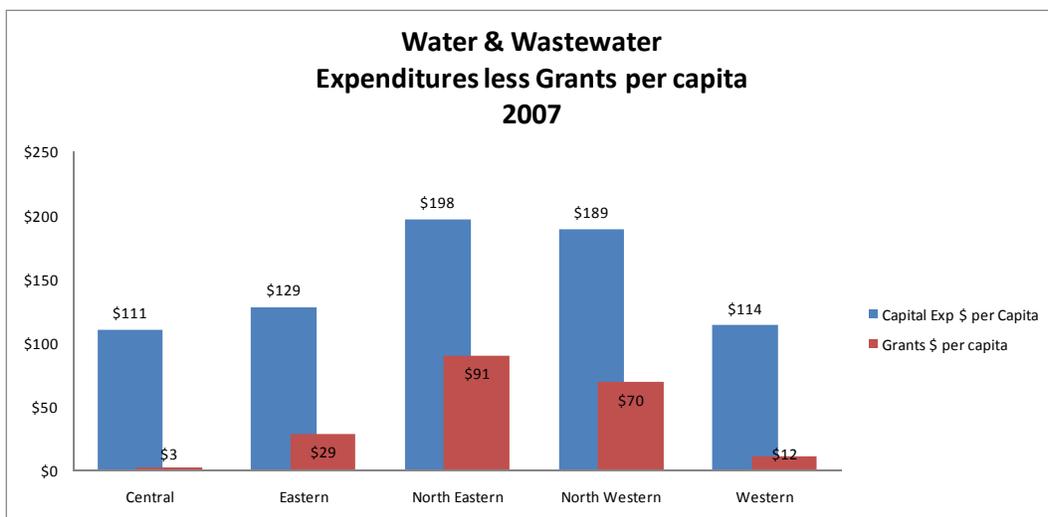
The chart below shows the engineering investment in infrastructure across Canada. Engineering includes investment in highways, roads, airfields, bridges, sewer and water treatment, marine, subways and transit, telecommunications, electric power projects as well as oil and gas projects. These investments could include private sector as well as public sector. However, the majority of the investments in transportation, water/sewer and bridges are undertaken by the public sector. According to Reed Construction Data’s Annual Construction Forecast for 2009-2011, Ontario has experienced three healthy years of infrastructure growth but engineering investment saw a slowdown in 2008 in roads, sewers and watermains. However, there appears to be confidence that steady growth will continue.



The chart below shows that Ontario's concentration is different than some parts of the country. In particular, oil and gas engineering investment is highest but not in Ontario. The chart below shows the disparity between the various regions of the country. Water and wastewater investment is the highest in Ontario at 29%, with Manitoba not far behind. The majority of this burden is shouldered by end users and municipalities.

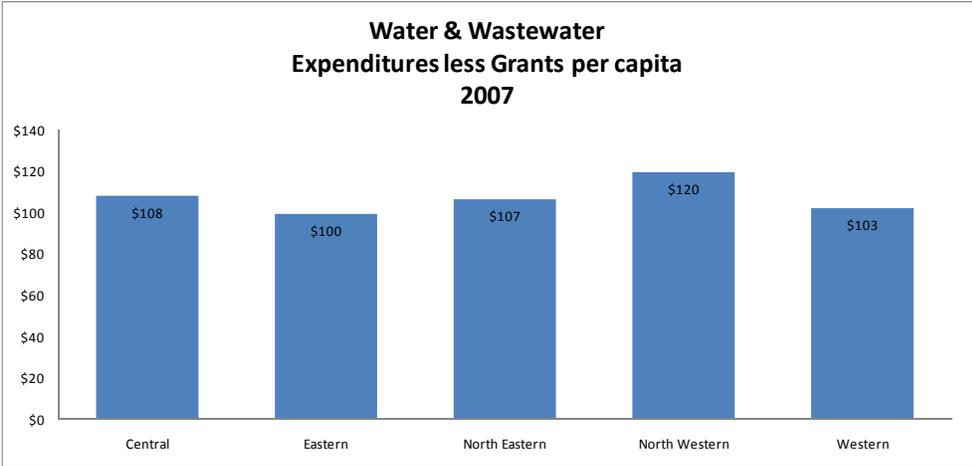


The chart below shows the distribution of expenditures and grants on a per capita basis. It is clear from this chart that the northern municipalities rely heavily on grants to fund water and wastewater projects, much more so than in the southern parts of the province. However, one must be careful in interpreting these statistics. In particular, the disparate nature of property taxation in urban centres needs to be taken into account.

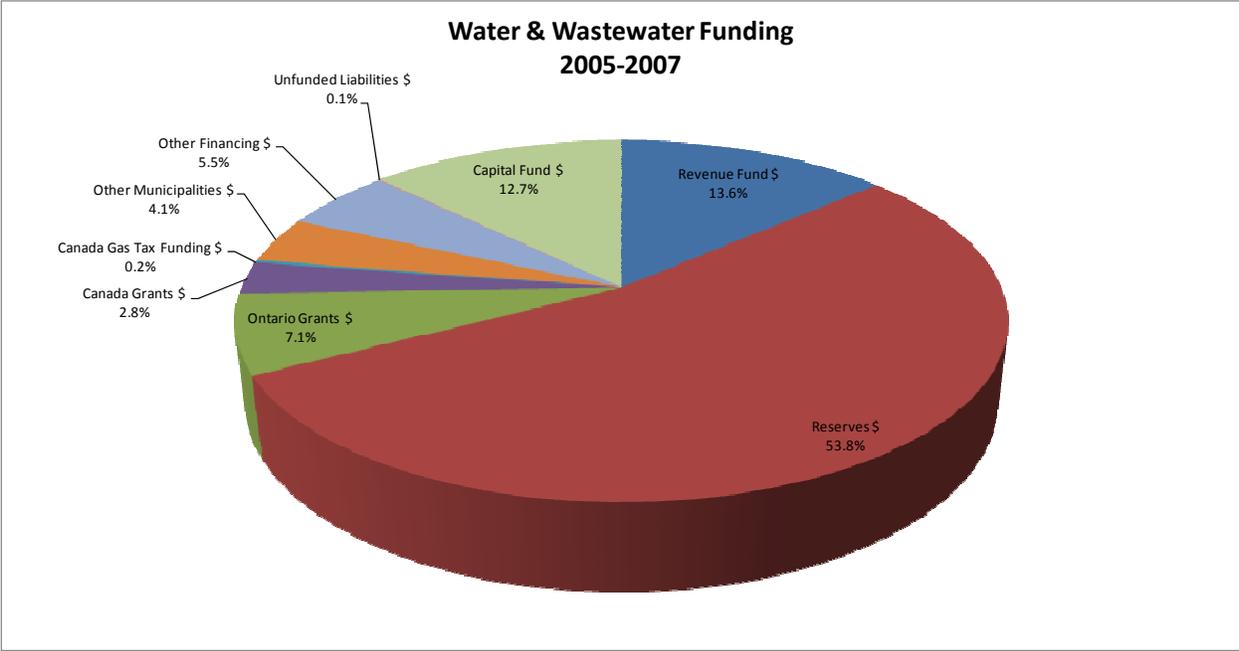


The chart below shows the net investment by municipal governments without any grants. This clearly shows that water and wastewater investment are not significantly different between

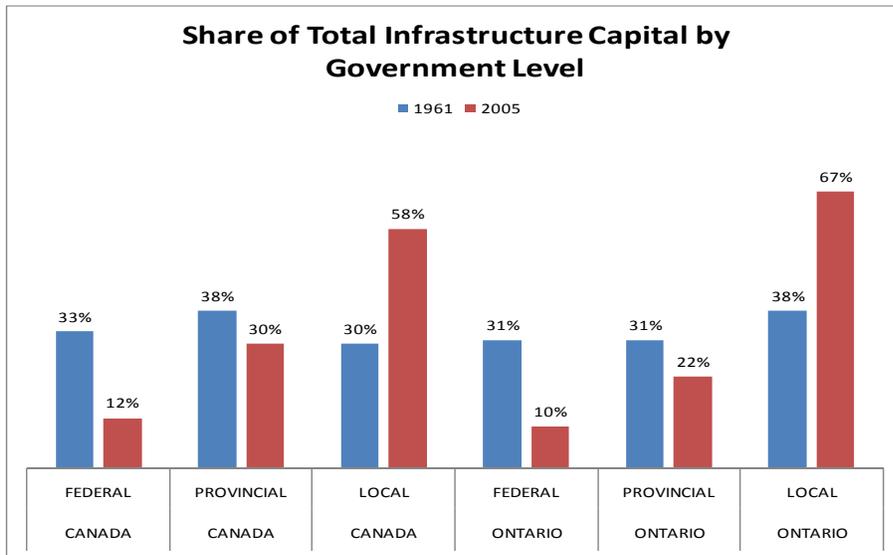
regions when grants are not present. Consequently, one can naturally conclude that grants from other levels of government have a direct impact on infrastructure decisions.



Funding of water and wastewater in Ontario is primarily from current reserves. This, of course, may cause concern as it implies that reserves are being depleted in order to fund capital expenditures. However, it is important to note that reserves may include funding from prior years. Although this would likely represent a small portion as funding from the province and the federal governments are often attached to certain projects and are flowed upon completion. The exception would be the Federal Gas Tax funding which was flowed to municipalities based upon population. In the case of Federal Gas Tax funding, funds could be put into reserves but must be used for specific purposes. However, it is important to note that this funding did not flow until 2005 and therefore, would not represent a significant part of existing reserves. The funding sources are shown in the chart below.

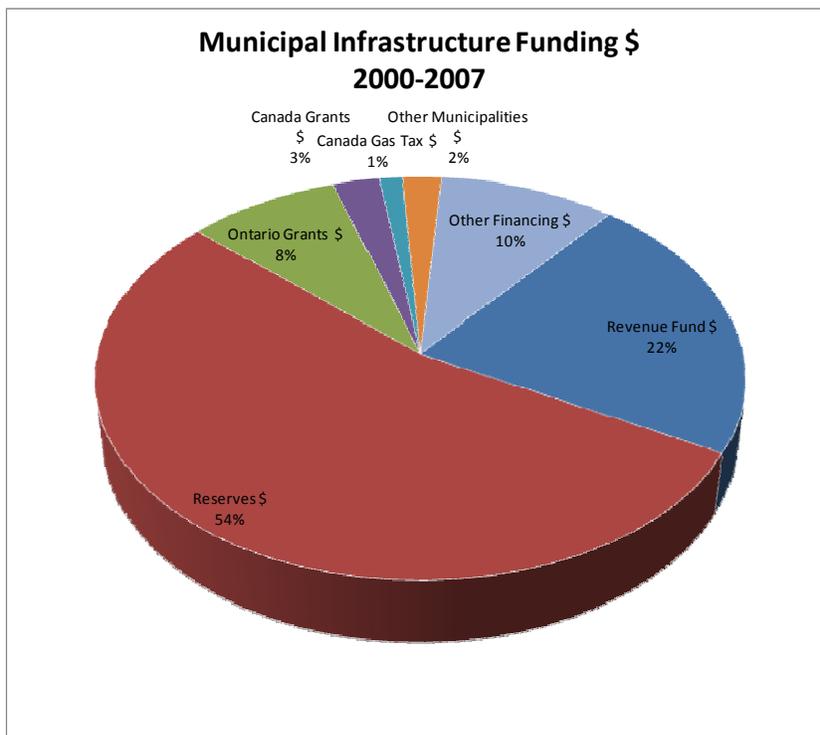


One key impact on infrastructure spending is the shift from the federal and provincial government investment in infrastructure to the municipal sector. Some of this has been due to downloading from the other levels of government of programs and services. This has been particularly true in Ontario where many provincial highways and social housing were downloaded with little funding. The reliance on infrastructure funding then shifted from income taxes to property taxes. Due to the diversity of municipal size and property assessment, the burden for making infrastructure investments is being felt like never before. To add to this is the ongoing increase in regulatory compliance required for various infrastructure systems such as water and wastewater. The growth in municipal infrastructure can also be attributed to the demands of taxpayers for recreation and culture facilities. Consequently, the percentage of infrastructure managed by the municipal sector will continue to increase over the other levels of government. The chart below shows that not only has the percentage of infrastructure grown in the municipal sector as a whole, but there also has been greater growth in Ontario.

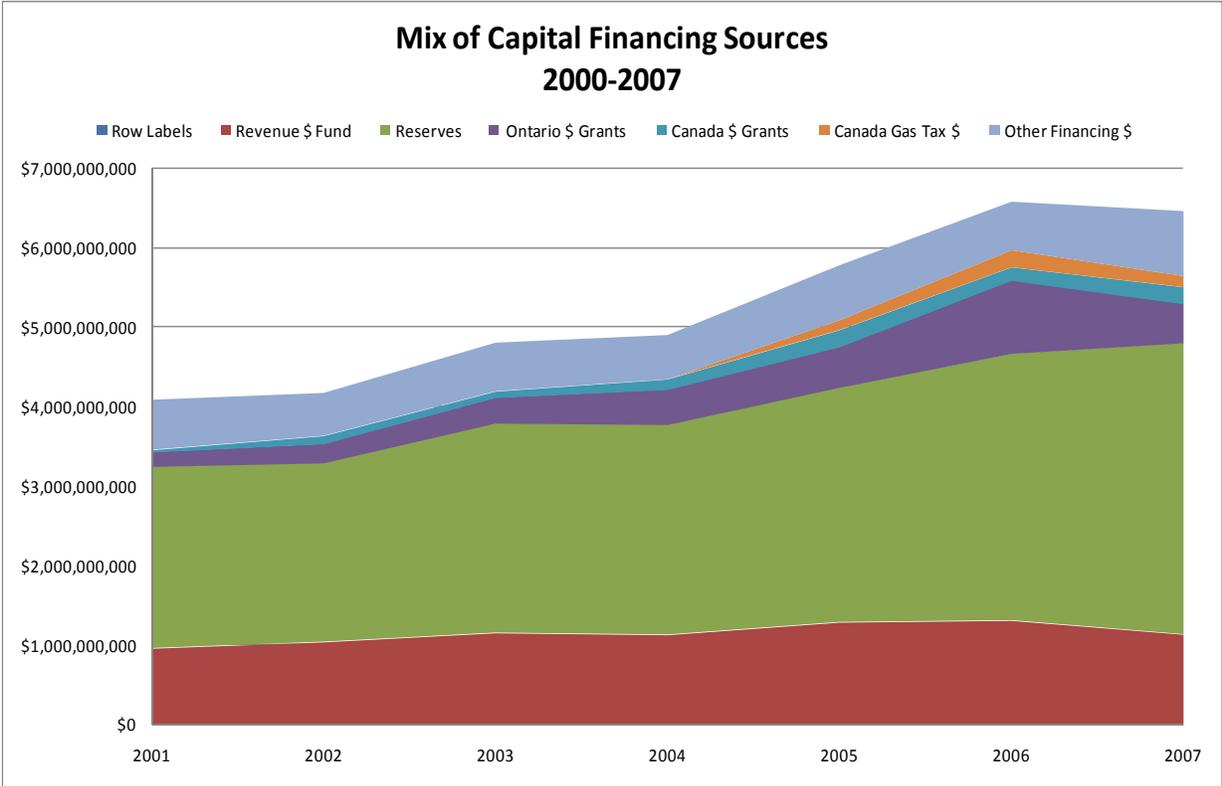


Source: Statistics Canada, Canadian Economic Observer September 2007

The chart below shows the distribution of expenditures and grants on a per capita basis. It is clear from this chart that the northern municipalities rely heavily on grants to fund water and wastewater projects, much more so than in the southern parts of the province. However, one must be careful in interpreting these statistics. In particular, the disparate nature of property taxation in urban centres needs to be taken into account.



The chart below shows the mix of capital funding sources in Ontario. Although grants from other levels of government have increased, there continues to be an over-reliance on existing reserves. Current revenues continue to be constant. This would indicate that reserves are being depleted in order to fund current infrastructure needs.



Analysis: Issues with current funding system

Funding horizons: Infrastructure spending in Ontario (especially for water and wastewater systems) often follows and stems almost annually based on the provincial budget rather than a long term asset management plan. Often municipalities will recognize the need to undertake new construction or rehabilitation of water and wastewater systems but are reluctant to increase property tax rates or utility rates to the level required to proceed. Further, the annual repayment limit set by the Ministry of Municipal Affairs and Housing as per the Municipal Act, restricts debt financing for municipalities. Consequently, grants and loans from the other levels of government are often required to proceed on many projects where municipalities are unable to raise the funds from other methods. It is also important to note, that many municipalities take a “pay-as-you-go” approach and have little reserves to fund large projects. This is likely due to the fact that municipalities like to keep property tax rates relatively low as well as a lack of full understanding of the condition of the assets that they own or that are under their control.

Benchmarking: Provincial funding mechanisms are not adequately transparent. Some progress has been achieved since the introduction of Bill 175; the establishment of municipal performance measures programs (at different ministries); and the introduction of accounting standards. However, accountability standards and benchmarks in Ontario are a far cry from the state-of-the-art practices, especially in Australia and, in the near future, the USA. To this end, a study by Statistics Canada found that “since 2001, the average age of public infrastructure in Canada has been falling almost steadily. In 2007, it reached 16.3 years, down from its peak of 17.5 seven years earlier. This rejuvenating trend was fuelled by large investments in highways and roads in Quebec and Ontario (Gagnon et al. 2008).” On the surface, this could be good news. But we have to notice that “reduction in the average age is indicative of a general trend toward younger stock of investments. It doesn’t imply necessarily that each physical asset is younger or in better condition or that a greater proportion of assets meets specific quality standards.” For example, these provinces have noticed an unprecedented increase in population. So not all the new funds went to rehabilitating or replacing existing infrastructure. The average age has gone down because many new developments have been established, not because we have fixed assets that need fixing. The lack of clear benchmarks and accountability could lead some to overestimate the repair work that is taking place.

To that end, the report found that Water supply systems, including pumping and filtration stations, “saw their average age diminish from 16.9 years in 2001 to a record low of 14.8 years in 2007. This rejuvenating trend was pushed by large investments, especially in British Columbia, Ontario and Alberta. These provinces recorded also strong growth in their urban population during the period. Unlike other public infrastructure assets, Canada’s stock of wastewater treatment plants has declined by 1.1% a year on average from 2001 to 2007. The decline spread across most provinces, except Nova Scotia and Alberta. As a result, the average age edged up from 17.4 to 17.8 years. Wastewater treatment assets have passed 63% of their useful life in 2007, the highest among the five public infrastructure assets (Gagnon et al. 2008).”

Lack of asset management culture: nowhere is the lack of accountability more clear than in the fact that only few municipalities in Ontario actually practice rigorous asset management. Although many municipalities have developed asset management strategies, many of these programs are not well-entrenched in the decision making cycle (the very essence of asset management). Municipalities have serious problems with their level of knowledge and commitment to asset management. Not enough effort is dedicated to two of the most important aspects of asset management: condition assessment and long term planning.

To that end, small municipalities are struggling given the lack of adequate human resources: One of the biggest challenges for municipalities is the fact that most are small. In fact, 97% of municipalities in Canada have a population of less than 50,000. In Ontario, 80% of the

municipalities have populations less than 50,000 as shown below. This presents significant challenges for most municipalities in funding infrastructure projects.

The situation is not better in most large municipalities. Fundamentally, this is due to the lack of coherent and sustained leadership. The City of Hamilton is a case in point. Because of their early commitment and adoption of total asset management principles, the City is now enjoying one of the most comprehensive programs in asset management in Ontario and is reaping the benefits of such a strategy.

This lack of asset management culture can be partly attributed to the fact municipalities have not accounted for its assets on their books of account and therefore, do not have an understanding of the full cost of providing services. New PSAB standards will change this in 2009 but asset management strategies will likely not surface for several years.

However, “over the last 15 years, the lion’s share of investments was for new construction while renovation and restoration work absorbed a small part of the pie. In the case of highways and roads, new construction consistently took up about 80% of investment budgets leaving 20% for renovating the road network. The rates for bridges and overpasses were similar to those of highways and roads during the 1990s, but renovation has been taking up an increased share in recent years: up to 30%. Renovations are required not only for visible assets such as roads and bridges but also for more hidden ones like sewer and wastewater systems. In 2007, gross stock of investments in sanitary and storm sewers as well as wastewater treatment amounted to \$59.9 billion or 21% of the five assets included in this study. In the 1990s, more than 90% of these investments were for new infrastructure while an increasing share was allocated to renovation and restoration in recent years (Gagnon et al. 2008)”

Unlike other infrastructure assets, the value of Canada’s wastewater treatment stock has diminished in recent years, “declining 1.1% a year on average from 2001 to 2007, when it was worth \$24.0 billion. The decline spread across all provinces except Nova Scotia and Alberta. The declines in wastewater treatment stocks were due to large investments made in the early 1980s which became older than their average useful life and were therefore subtracted from gross stocks. Recent investments were not large enough to compensate for these declines. It should be noted that a drop in the stock doesn’t imply a decline in the volume of wastewater treatment. Recent investments might have been sufficient to maintain capacity or capacity utilization might have increased (Gagnon et al. 2008)”

Accountability: the same financial accountability being asked of municipalities in reporting the value of their assets as per the Public Sector Accounting Board (PSAB) standards should be required of them in relation to engineering performance. By 2009, municipalities must transition to comply with new accounting standards requiring the move to full accrual based

accounting. PSAB has adopted these new standards requiring significant changes to the municipal financial statements with the inclusion of all assets, tangible capital assets and inventory. The impact of this transition cannot be understated. These changes will affect virtually every decision made by municipal managers. The move to full costing of programs and services becomes clearer and likely demanded by the public. Managers therefore, will need new financial management competencies in order to capture the right information, identify the cost drivers and long term impacts on the municipality of decisions. Further, business processes will need to change if the accounting changes are to provide meaningful information and ultimately determine the success of the management of assets. PSAB's Statement of Recommended Practice released in 2008 outlines best practices in reporting the Assessment of Tangible Capital Assets of governments. Although this is not a standard, governments should be encouraged to adopt these reporting practices to highlight the infrastructure plans and challenges faced by governments.

It is incumbent upon the province and municipal managers to adopt similar accountability standards that report on the engineering and sustainability status of their assets.

Upon reviewing the general practices of infrastructure funding in Ontario, we find a great deal of similarity with the findings of a report by the Public Policy Institute of California which dates back to 2000 (PPIC 2000):

1. Identified infrastructure needs outstrip available resources. The current policy debate proceeds from this consensus view.
2. Infrastructure decision making occurs in complex networks. These networks, which have developed incrementally, do not always serve the state well. Unraveling the whole that these interlocking networks form—a kind of institutional surgery—is a painstaking process. Recent and current attempts at reform have cut open parts but not the whole. This piecemeal approach has been a direct outcome of the bias of the system toward projects and the lack of a statewide strategy.
3. The definition of infrastructure is changing. Infrastructure used to be pipes, wires, and roads provided by the government. Now it includes land and buildings, information systems and satellites, and a spectrum of public and private services. Ownership and responsibility are less clear; partnerships and problems are more common.
4. Competition for infrastructure resources is the inevitable byproduct of project-based financing and budgeting. In the absence of big-picture planning, the legislature has become involved in details rather than long-term leadership and oversight.
5. A complicated formal system shapes the budget, but that system lacks a mechanism for dealing with substantive tradeoffs. The current system relies on departmental planning, department of finance oversight, and legislative control over the budget. The governor and legislature [of California] lack the information necessary to easily compare needs across departments outside of the current budget year, or address issues beyond financial feasibility, such as social, regional, or income equality.

6. There is no life-cycle framework for infrastructure. The current approach favors financing and budgeting over planning and assessing. As a result, it overvalues short-term planning and new projects and undervalues maintenance. Systematic, cradle-to-grave planning is missing.
7. The current system ignores the effects of the business cycle. As a result, the state cannot offset economic downturns or use fluctuations strategically to control construction costs.
8. Information for capital decisions is limited.
9. Information is erratic and biased in unpredictable ways. Each agency uses its own methods for planning and justifying its own budget. The quality of that information depends on the size, expertise, and resources of the agency.
10. Resources dedicated to infrastructure management vary widely among agencies. There is no centralized source for training and no centralized sources for the professional development of infrastructure managers and staff. Retaining expert staff, especially project managers, is difficult in the face of private sector competition in a strong economy.”

Benchmarking International Best Practices

Extensive work has been conducted by almost every developed country to measure, maintain and sustain its infrastructure assets. Except for the promising case of the City of Hamilton, it is hard to find coherent policies in Ontario. Funding announcements are not enough. The problem has much deeper roots and requires much more attention, collaboration and resolve.

It is hard to summarize the best practices in sustainable asset management worldwide. However, the following jurisdictions represent some highlights:

Australia

Australia is seen as the leading country in infrastructure asset management. The policy is built around the following paradigms: a fundamental commitment to long-term, forward-thinking planning and decision making; nested, collaborative approach for decision making encompassing all levels of government; emphasis on exploiting private sector contributions in all possible stages and facets of asset management within the publicly-developed plans and benchmarks (Infrastructure Canada 2004; FHWA 2003).

During the 1990s, many water utilities were incorporated as enterprises with the government as a sole stakeholder in an effort to expose Government Business Enterprises (GBEs) to competition, increased accountability, and other initiatives such as full cost recovery (Australian Public Service Commission 2007). This was implemented through the following means:

- Set the policy direction toward major changes in the industry
- Brought resources to bear in support of the reform agenda

- Provided financial incentives in the form of transfer payments to the State and local providers that proceeded with the changes
- Established financial incentives, frequently in the form of debt for equity swaps, where the State took over existing debt service payments to give the new organizations a clean balance sheet on which to build their water business
- The government arranged for Community Service Obligation payments (CSO) to address affordability issues of pensioners
- The government supported more aggressive R&D investment

Utilities in Australia take asset management seriously. They formed the very successful Water Services Association of Australia (WSAA). The association publishes a comprehensive and impressive performance benchmarking report that is the envy of other constituencies. The report outlines water consumption trends and up to 155 indicators relating to the performance of the urban water industry. It provides nationally consistent definitions and approaches which enables comparisons to be made between utilities and jurisdictions. It further informs customers about the level of service they are receiving. The report also builds community confidence and improves the water literacy of the community. The report aims to inform the decision making processes of government, regulatory agencies and water businesses, and encourages greater transparency in the way water is managed.

The infrastructure management system in New South Wales is managed through the following tools (GAO 2004, Albee 2001):

A multi-stakeholder infrastructure council: The Council is multi-stakeholder, consisting of senior government Ministers, senior executives from the construction, engineering, banking enterprises, and union officials. The Charter creating the Council mandates it to identify the strategic infrastructure issues, collect feedback on policies and development priorities, facilitate shared learning and promote best practices, provide a forum in which the government and private sector can improve their mutual understanding and address common strategic infrastructure issues.

An infrastructure coordination unit (ICU): The ICU serves as the Council's secretariat. It reports directly to the Premier. The Unit is responsible for supporting the government's strategic directions through the facilitation of infrastructure coordination across the state and for providing advice to the government on infrastructure projects and issues, especially those requiring cross-department and cross-agency coordination.

State Infrastructure Strategic Plan: The NSW government released the first State Infrastructure Strategic Plan in December 2002. The Plan sets out the government's priorities for major infrastructure (i.e. projects valued at more than \$20M, which is considered the threshold to

attract private financing) over the next ten years. The Plan is prepared by the ICU, based on input from all departments and agencies regarding their delivery strategies and capital investment plans and in close consultation with Treasury. One of the principal objectives behind the Plan is to enable the private sector to gauge the opportunities for future investment and to position itself to assist the government with the provision of services and infrastructure by providing private financing, expertise and appropriate risk-sharing. It is also intended to assist the government as a whole in communicating its infrastructure objectives to citizens and encouraging total asset management policies and processes in all sectors.

The Hunter Water Board represents a sample success story of socially responsible corporation for managing water and waste water. Over the last decade average charges per customer were reduced by about 30% in real terms. The price reductions occurred during the same period when improved service standards were adopted. Surveys conducted at that time documented improved customer satisfaction with better service levels. At the same time, 12 of 21 wastewater treatment plants achieved full compliance with all license conditions. The remaining 9 plants achieved 99.6% compliance.

Since 1990, their audited average operating costs per service have fallen by over 40% in real terms. Hunter Water went from 1,500 employees to 450 in a decade. In addition, about 100 of their employees work for a subsidiary, that provides service to Hunter Water and earns external income from other utilities by providing a range of operating or consulting type service to other smaller utilities. They formed another subsidiary company for telemetry service and then sold that company for revenue for reinvestment in the base system.

Another example is Sydney Water, which employs around 4,000 employees. Of those, 800 employees are engaged in asset management activities! All of the operating, maintenance and capital cost come from fees collected from users & developers. In addition, Sydney pays \$200 million a year to NSW as dividends, \$28 million in Load Based Fees and \$5 million in administrative fees. Their user fees are comparable to those in the USA. On the other hand, in Victoria, there is no discharge from facilities and most utilities, including some rural ones, are ISO1400 certified (GAO 2004). It is interesting to note that these success stories are reported during a time where severe drought in Australia is putting a severe strain on the country's water resources.

Singapore

The Singapore experience showcases how government policies can influence independent contractors to enhance their work. Through partnerships and a focus on accumulating and building knowledge, the government and private sector managed to

streamline construction operations and enhance overall performance levels (including better return on investments).

Buildability Development Section: a dedicated department for managing the collection, modeling, sharing and use of knowledge between all stakeholders.

Electronic National Productivity and Quality Specifications (eNPQS): is a project jointly led and managed by the Building and Construction Authority (BCA), Singapore Institute of Architects (SIA), Institution of Engineers Singapore (IES) and Association of Consulting Engineers Singapore (ACES), with extensive participation and contribution from professionals of both public and private sectors. eNPQS is an application software that enables easy access to the base NPQS and Project-Specific Data (PSD) templates for the preparation of building project specifications. All additions, amendments and omissions from the NPQS are tracked and compiled by the software. In addition, it provides an interface to electronic product catalogues.

Quality Benchmark: provides an effective platform to share data on quality trends, in term of workmanship standards. Major trends on workmanship quality are identified and industry best practices that address common defect areas are highlighted. A set of simple on-line benchmarking tools is also introduced to enable industry players to benchmark their own performance on workmanship quality against the industry standards.

Bidding system: The Quality-Fee Selection Method (QFM) is a competitive selection method that takes into consideration both the quality criteria submitted by the firms and their fee proposals. It is primarily quality-based with a higher weight given for quality. The QFM will also operate in as transparent a manner as possible. The weight of the quality criteria will be made known at tender stage. Quality scoring will be carried out before fee proposals are opened.

Application for Building Plan Approval: All building plan approvals are handled through the Corenet e-Submission System to automate and expedite the approval process. The process is initiated by obtaining written permission from the Urban Redevelopment Authority. After permission is obtained, building plans are prepared in consultation with the relevant technical departments to incorporate their requirements onto the building plans. The applicant then submits the building plans to the Building & Construction Authority with the prescribed plan fee. The BCA will approve the building plans within one week if the submission is in order. The approved plans will then be microfilmed and returned to the applicant within 2 weeks after the date of approval.

USA

Data on infrastructure funding trends in the U.S. tends to be fragmented, scarce, and issued from heterogeneous sources. One of the more reliable sources for federal infrastructure

funding are reports from the Congressional Budget Office (CBO). Within the realm of infrastructure, the CBO issued two reports; "Trends in Public Spending on Transportation and Water Infrastructure, (2007)" and "Trends in Public Infrastructure Spending (1999)".

The reports focus on spending for highways and roads, mass transit, rail, aviation, water transportation, water resources such as the construction and maintenance of dams and levees, and water supply and wastewater treatment. The 2007 report reveals interesting trends in the type, distribution and fluctuations of infrastructure spending among local, state and federal government:

- Over the last 20 years Infrastructure spending by states and localities has accounted for around three-fourths of total spending;
- The early 80's have witnessed an interesting trend in terms of the proportion of capital expenditures to operation and maintenance. From 1956 to 1978 capital expenditures were 10 to 30% more than operation and maintenance expenditures. Since then until now, the split is in favor of O&M, with 55% of total infrastructure expenditures allocated for O&M and 45% allocated for capital;
- As a share of GDP, infrastructure spending has fluctuated between 2.3 percent and 2.6 percent;
- Since the late 80s, federal spending on infrastructure has ranged between 3.5 to 4 percent of non-defense expenditures in the federal budget;
- In 2006, the federal government spent \$76.3 billion on infrastructure. Grants and loan subsidies totaled \$50.6 billion, and all other federal spending on infrastructure totaled \$25.7 billion.
- Between 1987 and 2004, spending by the federal government rose 1.7 percent annually, while yearly spending by state and local governments grew by 2.1 percent¹
- In 2004, the capital portion of federal grants and loan subsidies accounted for almost one half of total state and local capital expenditures for highways and mass transit and about one-third and one-tenth, respectively, of such expenditures for aviation and for water supply and wastewater treatment.

Although most figures outlined in the CBO report pertained to all infrastructure sectors combined, there was some interesting analysis of expenditures on water supply and waste water treatment. Priorities for infrastructure programs have changed more at the federal level than at the state and local levels. Although the largest part of federal spending for

¹ Not including spending on water resources

infrastructure has been for highways and roads, the shares devoted to water supply and wastewater treatment have significantly increased during the 1970s. In the 1970s the percentage of capital expenditures averaged 20% of total infrastructure capital expenditures. This proportion has steadily decreased over the last 20 years. In 2006, federal capital spending on water and waste water infrastructure totaled \$2.2 B USD of the \$56.3 B USD spent on capital investments (or 4%).

According to the CBO report, federal spending on operation and maintenance of water and waste water infrastructure was non-existent prior to 1997. Since then federal spending on O&M has averaged around 10% of total federal expenditures on O&M (with the lion's share of 45% going to the aviation sector).

Sources of federal funding for water and waste water in the U.S.

The primary source of stable funding for water and waste water infrastructure in the U.S. is the EPA's Clean Water State Revolving Fund (CWSRF). It should be noted that contrary to many grant programs in Canada, the CWSRF is a loan program that targets water quality protection projects for wastewater treatment, non-point source pollution control, and watershed and estuary management (CWSRF, 2007). The fund is jointly financed by the federal government (via EPA) and recipient states. For every dollar contributed by the federal government, states contribute 20 cents. The 51 state programs operate essentially as environmental infrastructure banks. The programs provide low-interest loans to a wide variety of eligible water quality projects, and loan repayments are recycled back into individual CWSRF programs. Historically, states have provided very attractive terms for CWSRF loans. Interest rates on loans have averaged approximately two percentage points below prevailing municipal market rates, with some states even providing interest-free loans for economically disadvantaged communities. Since its inception in 1987 CWSRF has provided \$63 B USD to over 20,700 loan recipients (CWSRF, 2007)

Integrating Finance and Planning: the Role of EPA

The business model of the environmental protection agency (EPA) is proving to be an efficient model. The agency is not just a regulatory body. It has evolved into a knowledge power house at the nexus of asset management and environmental protection. For example, the agency established ten Environmental Finance Centres (EFC) in collaboration with regional universities. In addition to research, these centres provide the following services to help municipalities manage their financial planning efforts through the following tools (EPA 2006):

“Direct Assistance: many of the EFCs work directly with and in communities to assist with specialized needs. For example, the EFC has received calls from municipal leaders who worked to develop much needed projects but feared they might be rejected by voters due to a lack

public understanding. The EFC worked with several specific communities to involve the public and relay an understanding of the reasoning behind local governments' decisions to consider or proceed with a particular project. In addition, the Syracuse EFC worked with communities attempting to create equitable user rates as they pursued water and wastewater system improvements.

Tool Development: Most of the EFCs have created reports, Web sites, or other tools and outreach products to disseminate financing information to communities and relevant stakeholders. For example, the ECF developed more than six outreach and educational tools, such as a video, case studies, and model amendments to states' land use control legislation. The agency, developed "PMFPTalk," a listserv of nearly 350 active members, providing local government leaders and technical assistance providers a way to submit questions or distribute information. They published a series of practice guides such as: Brownfields: Historic Preservation As a Redevelopment Option; Contaminated Properties: History, Regulations, and Resources for Community Members; and Public Involvement: How Active Participation in Environmental Issues and Decisions Makes Economic Sense and Broadens the Knowledge Base.

Partnership in project development and planning: EFCs engaged in a wide variety of other activities as well. For example, they participated in a committee whose goal was to devise an implementation plan and identify and make recommendations on a structure for developing a Chesapeake Bay Financing Authority to fund Chesapeake Bay restoration efforts. In addition, the North Carolina Division of Water Quality retained the UNC EFC to help develop the state's model stormwater ordinance. In Ohio, the regional EFC commenced a major effort to support the city of Cleveland's Economic Development Department with the development of a region-wide strategy for an industrial and commercial land bank. In addition, the GLEFC participates as a subcommittee chair in the Greater Cleveland Lead Advisory Council, a consortium of state, county, and municipal governments, and nonprofit organizations, convened to reduce the incidence of lead poisoning.

As part of its drinking water capacity assistance efforts, the EFC participated in a project to identify and analyze alternatives for small drinking water systems that are not in compliance with drinking water regulations. On a completely different front, EFC targeted television stations and studios and proposed to adopt the private sector concept of "product placement" to encourage placing environmentally beneficial products and behaviors on television shows. As a result of its efforts, EFC9 expects to develop a partnership with the Disney Environmentality Division to introduce this concept to the Disney television fall shows."

The Environmental Financial Advisory Board (EFAB) made a number of compelling recommendations to the Agency, many of which were adopted. For example, EFAB prepared various reports for the Office of Water; Office of Solid Waste and Emergency Response; Office of Policy, Economics and Innovation; and the Office of Radiation to address subjects of concern. Specifically, the board evaluated or began assessing the following issues:

- **Useful Life Financing of Water Facilities** – How environmental goals and objectives might be more affordable by using debt management practices to reduce the budgetary impact of funding capital expenditures.
- **Watershed/Non-Point Source Financing** – Options for financing non-point source pollution cleanup projects using financing entities within the watersheds of concern.
- **Application of Innovative Finance Techniques in the Transportation Infrastructure & Financial Innovation Act of 1998 to Environmental Finance Issues** – Applying a financing technique known as backloading to brown-fields cleanup/redevelopment and water/wastewater facilities.
- **Combined Operations of the State Revolving Fund Programs** – Whether to allow states to operate their Clean Water and Drinking Water Revolving Loan Funds as one.
- **Innovations in Watershed Financing: The Bay Restoration Fund Act** – Identification of the Bay Restoration Fund Act as an innovative tool.
- **Financial Assurance in RCRA Programs** – The strengths and weaknesses of the current financial test used by corporations to demonstrate they have the capacity to meet financial assurance obligations vis a vis contamination cleanup upon facility closure.
- **Affordability of U.S. Water and Sewer Rates** – Suggestions for helping governments, the private sector, and the general public pay for water and sewer services.
- **Establishing a New SRF Loan Guaranty Program** – Whether loan guarantees could be used by the Agency to help meet the funding demands for water infrastructure.
- **Application of Useful Life Financing to State Revolving Funds** – Making extended term financing of environmental facilities available through State Revolving Funds.

EFAB Projects Coordinator

◆ Timothy McProuty
Phone: (202) 564-4996
E-mail: mcprouty.timothy@epa.gov

Source: EPA annual report

Conclusions & Recommendations

Infrastructure is an asset—indeed one of the most vital assets in a modern society. It should be managed as such. Mobilizing larger volumes of funding coupled with long-term strategies for targeting the most dire infrastructure needs is a pre-requisite for achieving the sustainable infrastructure agenda. However, fundamental problems in the governance and decision making systems still needs to be addressed. Ontario requires a province-wide strategy for infrastructure. Stand-alone programs or ad hoc projects are no longer acceptable.

This report has synthesized some of the best practices in this regard. They are presented below for consideration by the Government of Ontario:

Long-term plans and sustainable funding: Adequate investments by all sources should be provided, secured and sustained to fund the strategy. The current federal budget process does not differentiate between expenditures for current consumption and long-term investment. This causes major inefficiencies in the planning, design and construction process for long-term investments. A capital budgeting system that encompasses full cost of the provision of services would increase public awareness of the problems and needs facing this country's physical infrastructure, and would help governments to focus on programs devoted to long-term growth and productivity.

1. Establish a clear long-term plan for federal and provincial infrastructure funding: Provide sustained, predictable funding. Instead of ad hoc annual (or short-term) funding “announcements”, governments should establish trusts and long-term funds (indeed infrastructure banks) that inspire steady and predictable flow of needed funds.
2. Tie funding to competencies at municipal level: Funds should be allocated based on demonstrated need and the competency of local authorities to manage these funds through long term planning. Government funding should be used as an incentive to municipalities that can showcase they are adopting adequate asset management plans that conform to the strategy and include professional and accurate benchmarks.

Wide and effective participation of all stakeholders: the strategy should be developed through input and clear understanding on behalf of all stakeholders: public, NGOs, academia, and labour unions. This strategy is not just for identifying projects or setting macro goals. Rather, it is for building a coalition for all relevant parties to pitch in, provide input, and shoulder their responsibilities.

3. Increase public awareness of infrastructure and its role: develop interactive and up-to-date web portals to educate the public about infrastructure plans and works.
4. Partner with industrial stakeholders: engage construction companies, consulting engineers, insurance and financial organizations to ease red tape and enhance collaboration.

Integrated decision making: all levels of government should collaborate in decision making that integrates land-use, development trends, regulations and funding to assure maximum return on investments:

5. Coordinated decision making: governments at all levels should communicate effectively to draft short and long term decisions to implement the proposed strategy using cross-functional teams to plan and manage projects. Given the complexity of projects, leading organizations have found that diverse teams are better equipped to manage project delivery.
6. Use project management techniques to optimize project success. The notion here is to more effectively manage capital project delivery so that projects are completed sooner and at lower costs.

Life-cycle-oriented assessment: Conducting comprehensive needs assessments to meet result-oriented goals and objectives. It is essential to identify current capabilities, including the use of an inventory of assets and their condition, and determining whether there are gaps between current and needed capabilities.

7. Embed condition assessment in the regulatory structure: the current regulatory structure for performance measures and conditions assessment in Ontario pales in comparison to what is needed and what is being practiced in other countries.

8. Promote and enforce effective and knowledgeable performance measurement systems: The current performance measures used by Ontario ministries are superficial at best. These performance measures selected are not based on sound engineering and asset management practices. The performance measures are not linked to funding and planning mechanisms. No such clear mechanisms exist to start with. However, most importantly, municipalities, especially small ones, lack the human resources and basic knowledge to conduct such knowledge—rendering their reporting worthless in many cases. It seems that performance measurement policy in Ontario is repeating the mistake of Walkerton—simplistic rules with an extremely weak implementation oversight and many loopholes or chances for abuse or neglect.

Clear and objective benchmarks: this is the core of the strategy. The province, working with all stakeholders, should develop a consensus on a clear set of objectives for core-infrastructure and an objective set of performance benchmarks that has to be achieved. This should be coupled with clear, mandatory mechanisms for measuring the engineering and sustainability performance of core infrastructure. Municipalities would be provided with an adequate level of human and knowledge resources to accurately measure and manage these benchmarks.

Accountable and transparent performance evaluation: all stakeholders, especially municipalities should be held accountable for missing or underachieving respective to these benchmarks. It is no longer acceptable that we fund (or not fund) projects in a short-term fashion that does not rely on an accurate understanding of the engineering or sustainability status or needs of our infrastructure. Decision-makers should not have to wait for a disaster to react. A proactive, rather than reactive, mindset for managing infrastructure needs to be imbedded. Governments have to evaluate results against organizational goals. Further, they have to evaluate the decision making process to ensure that goals are met.

Technology, R&D and Training: identification of R&D needs, promotion of advanced technologies, support for innovation, and collection and dissemination of best practices and related knowledge. For example; a) developing and sharing a consistent deterioration models to help municipalities clearly identify the status of their systems, b) developing and sharing models to estimate the life cycle costs including objective measures for the analysis of the socio-economic impacts of the projects, c) developing and sharing standard information models for collecting and reporting key infrastructure attributes. Developing and sharing such common models will help small municipalities overcome the limited human and financial resources they have and will expedite projects and save money.

References

- Albee, S. (2001). "The Australian Water Industry-Infrastructure A reform agenda", Presentation to the Association of Metropolitan Sewerage Agencies, Washington D.C.
- Australian Public Services Commission (2007). "The Australian experience of public sector reform", <http://www.apsc.gov.au/about/exppsreform9.htm> (accessed July 2, 2007).
- Baldwin, J. R., and Dixon, J. (2008). "Infrastructure Capital: What Is It? Where Is It? How Much of It Is There?" Micro-economic Analysis Division, Statistics Canada
- CBO (2007) Trends in Public Spending on Transportation and Water Infrastructure, (2007). United States Congress, Congressional Budget Office. August 2007.
- CWSRF (2007) Clean Water State Revolving Fund Program: Annual Report 2007.
- EPA (2006). "Environmental Finance Program—annual Report", U.S. Environmental Protection Agency
- FHWA-Federal Highway Administration. (2003). "Asset Management-a primer"
- GAO-General Accounting Office (2004). "Water infrastructure comprehensive asset management has potential to help utilities better identify needs and plan future investments"
- Gagnon, M., Gaudreault, V. and Overton, D. (2008). "Age of Public Infrastructure: A Provincial Perspective", Investment and Capital Stock Division, Statistics Canada.
- Infrastructure Canada- Research & Analysis Division. (2004). "Assessing Canada's Infrastructure Needs: A Review of Key Studies".
- PPIC—Public Policy Institute of California. (2000). "How Does California Make Its Infrastructure Decisions?"
- Roy, F. (2007). "From roads to rinks: Government Spending on Infrastructure in Canada, 1961 to 2005". Canadian Economic Observer/ September 2007. Statistics Canada