

**Water and
Wastewater
Services in
Canada**



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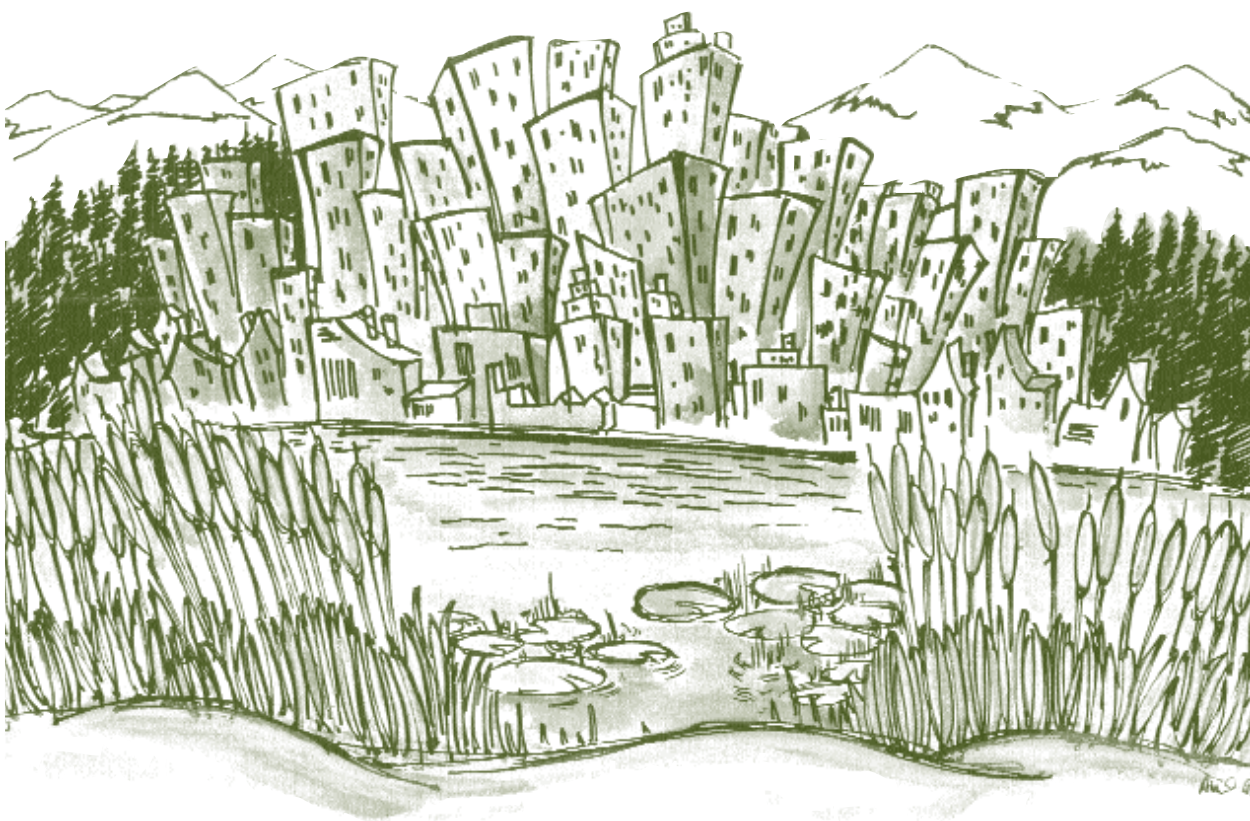
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***State of the Debate on the
Environment and the Economy:
Water and Wastewater Services in Canada***

National Round Table
on the Environment
and the Economy



Table ronde nationale
sur l'environnement
et l'économie

Mandate



The National Round Table on the Environment and the Economy (NRTEE) was created to “play the role of catalyst in identifying, explaining and promoting, in all sectors of Canadian society and in all regions of Canada, principles and practices of sustainable development.” Specifically, the agency identifies issues that have both environmental and economic implications, explores these implications, and attempts to identify actions that will balance economic prosperity with environmental preservation.

At the heart of the NRTEE's work is a commitment to improve the quality of economic and environmental policy development by providing decision makers with the information they need to make reasoned choices on a sustainable future for Canada. The agency seeks to carry out its mandate by:

- advising decision makers and opinion leaders on the best way to integrate environmental and economic considerations into decision making;
- actively seeking input from stakeholders with a vested interest in any particular issue and providing a neutral meeting ground where they can work to resolve issues and overcome barriers to sustainable development;
- analysing environmental and economic facts to identify changes that will enhance sustainability in Canada; and
- using the products of research, analysis, and national consultation to come to a conclusion on the state of the debate on the environment and the economy.

The NRTEE's state of the debate reports synthesize the results of stakeholder consultations on potential opportunities for sustainable development. They summarize the extent of consensus and reasons for disagreement, review the consequences of action or inaction, and recommend steps specific stakeholders can take to promote sustainability.

Membership



The NRTEE is composed of a Chair and up to 24 distinguished Canadians. These individuals are appointed by the Prime Minister as opinion leaders representing a variety of regions and sectors of Canadian society including business, labour, academia, environmental organizations, and First Nations. Members of the NRTEE meet as a round table four times a year to review and discuss the ongoing work of the agency, set priorities, and initiate new activities.

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Preface



With this state of the debate report, *Water and Wastewater Services in Canada*, the National Round Table on the Environment and the Economy (NRTEE) introduces a new series of flagship publications. Based on commissioned research and national consultation, the report aims to provide up-to-date and highly reliable information on ways to optimize environmental and economic goals in the delivery of water and wastewater services in Canada. As such, it represents a unique reference tool for policy and decision making for this sector.

The majority of the recommendations in this report are grounded in consensus among key stakeholder groups. However, the national consultations conducted by the NRTEE revealed continuing disagreement over appropriate action in some areas. In these instances, the NRTEE offers advice to help advance the debate on outstanding issues.

The NRTEE extends its appreciation to all those who played a part in bringing this project to fruition. In particular, it wishes to thank members of the NRTEE Task Force on Environmental Technologies for guiding the project and staff at The Delphi Group for research and development of a first draft of this report. Credit is also due to the staff of the NRTEE secretariat for their efforts in coordinating the multistakeholder consultations and in producing the final report.

Since the Chair of the NRTEE, Dr. Stuart Smith, is engaged in the business of water and wastewater services, he has declared a conflict of interest and has not participated in the consultations, planning, or reporting of the work described in this publication. Furthermore, he has had no part in forming the conclusions or recommendations.

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Executive Summary



Canada's water and wastewater system is under pressure: the infrastructure – water and wastewater treatment facilities, sewers, supply lines – is severely deteriorating, primarily due to shortages of public funding. If the decline continues, the health of the country's water resources will suffer. At the same time, due to subsidized and below-cost pricing for water and wastewater services, innovative environmental technologies that conserve water resources are failing to find a market.

The National Round Table on the Environment and the Economy (NRTEE) recently completed a program of national consultation on the sustainable development of the water and wastewater system. While the type and seriousness of issues varied across the country, the consultation revealed broad areas of consensus. For example:

- the lack of user pay systems in many regions and municipalities across the country discourages conservation of water resources;
- given public fiscal realities, a major infusion of private capital is required to maintain existing systems and build new facilities;
- Canada's water and wastewater system will likely have to move toward full cost, user pay principles over the next decade simply to meet basic infrastructure requirements; and
- a full cost, user pay system would significantly increase demand for eco-efficient environmental technologies and promote economic development through infrastructure renewal and development. It would also improve the capacity of Canadian environmental firms to compete in export markets, thus driving growth and job creation.

Stakeholders also agreed that small, rural, and remote communities would need some ongoing public support for their water services and that measures would be needed to cushion the impact of higher water prices on low income groups.

Consensus could not be reached in some areas. Contentious issues included whether external costs (costs not directly related to providing water and wastewater services) should be factored into water prices; whether the private or public sector would be most efficient at raising capital and operating facilities; and whether private ownership and management of water and wastewater facilities would compromise environmental standards.

Using the results of the national consultation, the NRTEE has developed recommendations for achieving a more rational, sustainable water

and wastewater system. Targeted at specific stakeholder groups (see parentheses), this advice addresses pricing, financing, regulatory, employment, business development, and other issues.

Recommendations include:

- increasing public awareness of the costs of water and wastewater services (federal, provincial, municipal governments);
- phasing out capital and operational support for water and wastewater services to large and mid-sized municipalities (provincial governments);
- setting up a uniform accounting and reporting system for water and wastewater agencies (municipal governments, water management professionals);
- developing models of public-private partnerships for delivery of water and wastewater services (infrastructure and environmental technology companies);
- strengthening the provinces' role in regulating water quality and setting environmental standards (provincial governments, environmental organizations);
- helping Canadian environmental technology firms expand into global markets by fostering the development of a domestic market for their services (federal government); and
- placing a priority on support for R&D and commercialization for front-of-pipe technologies (technologies used during a process to minimize or eliminate the production of an emission or waste) submitted to the Technology Partnership Program (federal government).

The successful transition to a more sustainable water and wastewater system will depend to a large degree on effective public education and involvement. The NRTEE's recommendations, based on national consensus, illustrate the interconnectedness of stakeholders and range of win-win solutions possible.

I. Introduction



Water and wastewater services in Canada are in a state of radical transformation, as communities across the country grapple with the challenges of preserving the environment while maintaining or expanding water infrastructure. At the root of the problem is the fact that Canada has the lowest consumer prices for water and wastewater services in the industrialized world, but next to the highest rate of per capita use – a situation that is clearly contrary to sustainable development of the sector.

While Canadians have enjoyed a high level of water services, the current water and wastewater infrastructure is severely deteriorating, due to shortages of public funding. If the decline continues, the health of the country's water resources – its ground water, lakes, and rivers – will suffer. At the same time, due to subsidized and below-cost pricing for water and wastewater services, innovative environmental technologies that conserve water resources are failing to find a market.

In 1995, the National Round Table on the Environment and the Economy (NRTEE) launched a program of analysis and nationwide, multistakeholder consultation on the future of water and wastewater services in Canada. The goal was to determine whether a more sustainable water system was technologically and economically feasible and, if so, whether national consensus existed on how to achieve such a system.

To identify areas of national consensus on water and wastewater infrastructure issues, the NRTEE convened four round tables, two in Toronto and one each in Montreal and Vancouver, between the fall of 1995 and the spring of 1996. Participants included representatives from municipalities, the environmental industry,

labour, environmental groups, financiers, infrastructure companies, and expert commentators (see Appendix). Discussions were informed by an issues paper commissioned by the NRTEE.

This state of the debate report presents the results of the NRTEE's analysis and consultation. It shows how more rational management of the water and wastewater system could engender both environmental and economic gains for Canada, helping to conserve water resources and opening up new jobs and export markets for Canadians. Aimed at an audience of decision makers and stakeholders in the area of water and wastewater services, the report:

- analyses Canada's water and wastewater system;
- argues for the need to move toward a more rational water and wastewater system;
- outlines the benefits of such a system;
- details areas of national consensus and divergence on the issues; and
- recommends actions that stakeholders can take to build a system that provides both environmental and economic gains.

II. Analysis of Canada's Water and Wastewater System



Service and Capital Realities

Canada's water and wastewater infrastructure services are among the best in the world. While there is room for improvement, public health planning coupled with the growth of municipal services has resulted in a high quality water and wastewater infrastructure system in most parts of the country.

But such an infrastructure does not come cheap: estimates for 1994 put the operational costs of water and wastewater services in Canada at \$5.9 billion and capital expenditures at \$4.7 billion.¹ The major portion of the cost of water infrastructure relates to water distribution systems and sewers. Costs include land access and rights of way, excavation, soil moving, and laying foundations for supply lines and sewers. Added to these are the actual costs of sewer pipes, pumping systems, and screens. Installing a kilometre of major collection sewer in a dense urban area can cost tens of millions of dollars.

Market Distortions

In most Canadian regions and municipalities, water and wastewater services are characterized by two significant market distortions: first, consumer prices do not reflect the true cost (i.e., all operational and capital costs) of treating water and cleaning effluent. Artificially low consumer prices, subsidized by taxes, encourage overuse of scarce resources and discourage efficient use of those resources. Second, water and wastewater infrastructure services are not provided on a user pay basis.

These market distortions reduce demand for front-of-pipe environmental technologies (technologies used during a process to minimize or avoid producing an emission or waste). Consumers are not motivated to adopt conservation oriented lifestyles, invest in eco-efficient end-use technologies, press for more comprehensive conservation planning, or demand more efficient treatment of water and wastewater.

Full Cost Pricing and Subsidies

If consumers are not picking up the full tab for water services through their water bills, who is? Historically, capital costs (i.e., the costs of building water and wastewater treatment plants and sewers) have been supported by tax revenue, both provincial and federal. In addition, certain jurisdictions receive some operational subsidies. The magnitude and mix of subsidies vary significantly by province.

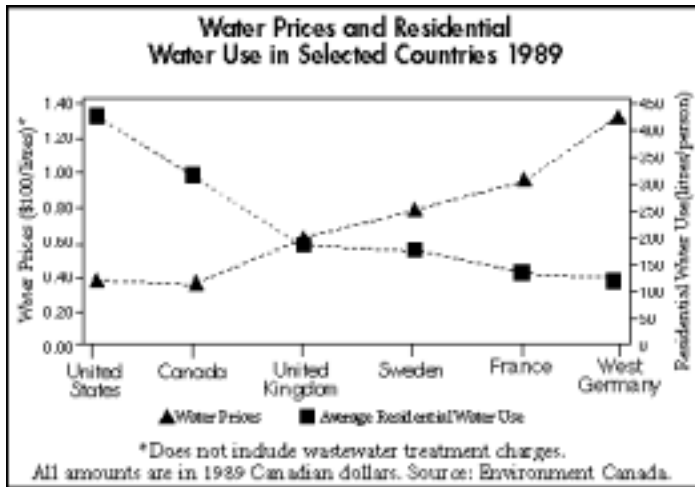
Based on the differential between user charges and actual cost, it is estimated that in 1994 operational subsidies amounted to \$2.2 billion and capital subsidies to \$3.1 billion.² Simply put, Canada's environmental infrastructure services receive a massive direct subsidy – and this is just for direct operational and capital charges or “out of pocket” costs. External costs – costs related to the environmental and social impact of the resource use such as water table depletion, water pollution, and conservation and replenishment measures – are not factored in.

User Pay Pricing

Operational costs are largely paid by consumers. However, in many cases users do not pay directly but indirectly through general tax revenue. For example, 10 million households in Canada, including some in urban areas, received unmetered water services in 1991.³ Further, some communities that have user fees charge a flat rate for all users rather than a volume rate. This has a major impact on consumption: residential water use under flat rate systems averages 450 litres/person/day compared with 270 litres/person/day under volume rates.⁴ This difference in water consumption is reflected in the amount of wastewater generated.

Figure 1 highlights the impact of the lack of a full cost, user pay regime for water services in Canada. The relationship between price and consumption is quite evident. The higher the price, the lower the level of water consumption and, consequently, wastewater treatment. A country such as West Germany, which has a full cost, user pay system, consumes substantially less water per person.

FIGURE 1⁵



Impact on Sustainability

The lack of full cost, user pay principles in the provision of water and wastewater services in Canada affects sustainability in the following way: Canadians use excessive amounts of water due to subsidized prices. This diminishes the country's water resources, putting undue stress on aquatic ecosystems. It also means that as a society Canadians spend more in total (i.e., both consumer and public expenditures) on water than perhaps they should.

Infrastructure and Fiscal Trends

Much of Canada's water and wastewater infrastructure – its water and wastewater treatment facilities, sewers, and supply lines – needs major upgrading or wholesale replacement. Some sewers in older urban areas pre-date confederation. Existing funds are being used primarily to address critical water and wastewater infrastructure needs. Anything beyond the urgent is a luxury for many Canadian municipalities. As a result, water infrastructure is deteriorating, maintenance is being deferred, service delivery is less efficient, and ecosystems are stressed in various ways (see Box).

It also appears that the amount of public capital available for water and wastewater infrastruc-

ture is declining. The long-term viability of Canada's water and wastewater infrastructure is consequently under threat, and opportunities for economic development are being missed.

Environmental infrastructure requirements in Canada are the sum of two accounts: existing unmet needs and new demands that will arise in the medium to long term.

Unmet Maintenance Needs for Water Infrastructure

The capital costs of sewers and water and wastewater treatment systems have largely been covered by public subsidies. The current infrastructure shortfall is mainly due to gradual cut-backs by the federal and provincial governments since the early 1970s, when revenue streams started to show signs of stress. Between 1971 and 1990, all public infrastructure financing fell from 3.5 per cent to slightly over 2 per cent of gross domestic product (GDP). The downward trend has continued through the 1990s, with the exception of a small rise attributable to the Federal Infrastructure Program.

How Poor Water and Wastewater Infrastructure Stresses the Environment

Inadequate and poorly maintained water and wastewater infrastructure has major implications for Canada's environment:

- Poorly treated water effluent can significantly reduce water quality in natural water bodies. Many cities across Canada release effluent into waterways with only primary treatment, resulting in high faecal coliform counts, reduced oxygen content, and other factors that affect human and ecosystem health.
- Improper management of storm water can change the natural absorption of precipitation in ecosystems.
- Poor water and wastewater infrastructure (old and faulty supply lines and sewers) results in high losses of water and wastewater, with negative effects on the quality of ground water.

As a result, in 1996 there is a large unmet need to maintain and refurbish existing water and wastewater infrastructure, particularly sewage capital stock. By ignoring this need for the last 15 to 20 years, governments have exacerbated the situation since repair bills rise exponentially over time. Estimates of unmet water and wastewater infrastructure needs range from \$38–49 billion⁶. This is the capital needed to ensure that existing capital stock and services are maintained.

New Infrastructure Demands on the Horizon

The challenge of maintaining existing water and wastewater infrastructure is compounded by new demands stemming from:

- urban growth in areas such as Halton Region, Ontario, and Surrey, British Columbia, and the need to improve services to remote and rural areas;
- more stringent regulations governing activities such as storm water separation and tertiary level effluent treatment; and
- separation of waste streams containing hazardous and toxic wastes.

Conservative projections estimate that, under current pricing regimes, new capital demands for water and wastewater infrastructure will exceed \$41 billion by the year 2015.⁷

In total, Canadian capital requirements for environmental infrastructure will be \$79–90 billion over the next 20 years. These projections assume a static market and do not reflect a move toward more conservation-oriented practices and to full cost, user pay pricing systems that promote sustainability.

Fiscal Trends

All levels of government are looking for ways to reduce deficits. As the federal government cuts transfer payments to the provinces, many of which have stagnant tax bases, there is great pressure to reduce grants to municipalities. This trend is readily apparent today and will accelerate as the full impact of federal and provincial deficit reduction is felt through the 1990s. The impact of deficit reduction on water and wastewater infrastructure services will be dramatic.

Impact on Sustainability

Infrastructure and fiscal trends suggest a future crisis for Canada's water and wastewater infrastructure services. The predicted infrastructure bill and the reality of public deficit reduction may have a major impact on sustainability.

If a solution to the pressing capital shortfall for water and wastewater services is not found, Canada's water-based infrastructure will degrade rapidly over the next two decades. Should this occur, the quality of Canada's water resources will be threatened. Moreover, opportunities for economic activity to meet the country's water and wastewater needs will be lost.

III. Toward a More Rational Water and Wastewater System



Full Cost, User Pay Principles

The challenges outlined in the previous chapter could be addressed by moving toward full cost, user pay, direct consumer charges for water and wastewater services. Such a pricing system would help attract the capital needed to maintain and augment Canada's water infrastructure. Moreover, by paying directly for water services, consumers would create the revenue flow to retire the debt incurred in retrofitting existing infrastructure and building new infrastructure. New environmental and economic opportunities would follow.

Environmental Opportunities

The evidence from other countries and jurisdictions is clear. When prices for water and wastewater treatment rise, residential, institutional, and industrial consumers do three things:

- they start using less water (does the lawn really have to be watered twice a week, if at all?);
- they respond to existing, or press for new, systems that reduce consumption (such as re-use practices) or take advantage of municipal programs for water use efficiency; and
- they change operating practices and introduce new systems/technologies to reduce water consumption and wastewater generation.

As well as changing consumer behaviour, price increases associated with full cost systems give water and wastewater service providers the revenue stream to maintain systems to meet environmental standards. Indeed, higher water prices provide an incentive to meet environmental standards with front-of-pipe rather than end-of-pipe technologies (technologies used to clean up or reduce the environmental impact of an emission or waste).

Economic Opportunities

Positive effects are also felt on the economic side of the sustainability ledger. When prices rise, residential, institutional, and industrial water consumers and wastewater generators make:

- small investments in low-tech water efficiency (e.g., low-flow shower heads, faucet aerators); and
- major capital investments in operating systems ranging from improved piping systems to more water-efficient appliances.

Water infrastructure operators also respond to price increases by:

- upgrading or building new infrastructure with more efficient technologies – this often requires a level of investment that is only viable at higher prices; and
- making operations more efficient to cope with lower subsidy support.

Impact on Sustainability

The actions consumers and service providers take as prices rise would be desirable in both economic and environmental terms. What is needed is a water and wastewater market that promotes the sustainable use of water through conservation; establishes mechanisms to attain and enforce higher environmental standards; and creates incentives for consumers and providers to invest in technologies and practices that reduce water consumption and wastewater generation. The challenge is to send the market signals needed to capitalize on environmental and economic opportunities for sustainability.

Public-Private Partnerships

Capital shortfalls are leading municipalities to consider alternative modes of financing and delivering water and wastewater services. Increasingly, they are looking at the use of public-private partnerships to operate water and wastewater infrastructure.

Public-private partnerships have been defined as “any situation in which the costs, risks and rewards of creating, refurbishing, expanding or operating a municipal infrastructure are shared by government and the private sector.”⁸ A common way of combining private financing, design, construction, and operation of large-scale infrastructure projects is through some form of a build, own, operate, transfer (BOOT) arrangement. For example:

- A franchisee, frequently a consortium, contracts to build a facility and operate it for a fixed period.

- Typically, the franchisee provides a portion of the equity financing and obtains loans for the rest. These are secured against a guaranteed stream of income from the project or service.
- At the end of the contract period, ownership is transferred to the public authority.
- A new contract (either with the same franchisee or a different successful bidder) is concluded for refurbishment, replacement, and/or continued operation.

The BOOT arrangement includes situations in which existing infrastructure is refurbished and/or operated on a lease from a public authority.

The trend toward public-private partnerships has generated much debate as to whether public or private owners/managers are more efficient. Some observers argue that public owners/managers would be just as efficient as private operators if they operated under similar conditions (i.e., they were free of political influence or direct public accountability but had to generate a return to shareholders). Others maintain that private ownership/management involves economies of scale, better access to capital, and is driven by profit-oriented incentives that promote efficiency.

Regardless of the arguments, there is a clear movement toward public-private partnerships for providing water and wastewater services throughout the country. Reasons include:

- **Raising capital:** as governments withdraw from indirect, subsidy-type financing of water infrastructure, private financiers are becoming partners with water and wastewater agencies and municipalities. For example, when a municipality must fund a significant percentage of water infrastructure from private sources, a financial intermediary (an underwriter or broker) acts as financial adviser/partner to help raise capital.

- **Investment/lending risk:** risk increases as water and wastewater prices rise to pay back the principal and interest costs of infrastructure capital. This means that investors and lenders seek greater assurances that loans and equity capital can be repaid and are more actively involved in the investment (i.e., they may require regular reports from and meetings with senior municipal officials). In some instances, especially for very large projects, financiers recommend the introduction of private managers who are familiar with cash flow and debt repayment to operate facilities.

- **Competing infrastructure demands:** faced with enormous infrastructure requirements (e.g., for roads and bridges), some Canadian municipalities are looking for ways to divest themselves of direct fiscal and operational accountability for water and wastewater services. This is especially the case when a user charge system already exists, or could be introduced, to cover all capital and operational costs.

- **Economies of scale:** some municipalities, especially small- to medium-sized ones, have relatively modest water and wastewater infrastructure. In these instances, a private operator with several existing facilities may be able to offer services for less and be better placed to raise capital.

- **Reducing overhead:** municipalities are seeking ways to reduce operating costs. Entering into a public-private partnership for water and wastewater infrastructure gives them a mechanism for charging all planning, administrative, and technical personnel to users.

Several Canadian municipalities have already entered into public-private partnerships for providing water and wastewater services. These partnerships entail a range of ownership, financing, construction, retrofit, management, and control relationships between the municipalities and the private companies.

Principles for Public-Private Partnerships

When do public-private partnerships benefit the environment and the economy, and what type of relationship does this entail? Public-private partnerships that promote sustainability tend to be based on these principles:

- Ownership of water infrastructure and facilities by public bodies or agencies.
- Strong public control at the federal and provincial level of water quality and environmental standards.
- Strong public consultation and information mechanisms.
- A competitive test of whether public or private manager/financiers provide the best mix of efficiency and service in the view of larger public interest.
- Full cost, user pay pricing systems implemented on a gradual basis.

- Capital and operational decisions made on a rational market basis, including strong customer service practices.
- Raising capital through either public bodies (e.g., municipalities) or private companies depending on which route is least costly for the project.
- Transparent financial reporting and accounting.

Impact on Sustainability

Public-private partnerships can benefit sustainability if they reflect the principles proposed above. However, similar results can be achieved by structuring publicly run facilities on private sector principles (e.g., an independent, publicly accountable water/wastewater utility). *The key point is to ensure that efficiency and the ability to raise capital are balanced with the public interest in service and environmental quality.* This requires an open, competitive environment that includes public interest guidelines or regulations.

IV. Benefits of a More Rational Water and Wastewater System



Preserving Canada's Water Resources

More rational provision of water and wastewater services has several benefits for water resources and the environment:

- **Reduced stress on aquatic systems and water supplies:** There is an assumption that Canada has water to spare. This assumption is wrong. While water throughout the country is plentiful, clean water may be in short supply at specific locations at certain times of the year and day, for example, in urban areas during summer, drought periods, and peak demand. These shortages stress aquatic ecosystems and water supplies. A more rational system for water provision would reduce the amount of water consumed, consequently reducing stress on the environment.
- **Reduced improper discharges:** Poorly maintained piping systems and sewers may lose more than 25 per cent of the water they carry. This means, for example, that effluent discharges into land mass and ground water rather than being treated in wastewater plants. Adequate pricing systems for water and wastewater would provide the capital needed to maintain infrastructure adequately.
- **Maintained and enhanced environmental standards:** When public subsidies for water and wastewater services are reduced or eliminated (with the exception of support for small, rural, and remote communities), provincial governments put more emphasis on maintaining, enforcing, and enhancing environmental standards. This benefits aquatic ecosystems and promotes technological innovation, since performance standards (which can be achieved through new and cheaper technologies) rather than process standards (which often restrict the type of technology used) become more common.

Promoting Economic Development and Environmental Technology

The economic benefits of attracting private capital into water and wastewater infrastructure under full cost, user pay regimes are significant. They include:

Technology development and application:

A range of water-efficient, front-of-pipe technologies exists, many of which have limited markets in Canada because they are not competitive at current water prices. The same is true for some process technologies that use water more efficiently in industrial and institutional applications.

Full cost pricing changes this equation, making many technologies commercially viable.

Examples include:

- water-efficient technologies, either generation or end-use-focused (e.g., low-flow shower heads, toilet dams, double piping systems for homes and office buildings; solar, aquatic, or ecological forms of effluent treatment);
- process technologies that use less water and generate less waste in production (e.g., more efficient compressors and pumps in industry); and
- water recovery and wastewater re-use technologies (e.g., water barrels for homes; membrane technologies in industry).

In the long term, home owners and builders respond to higher water prices by changing building designs to include, for example, xeriscaping and plumbing systems that re-use grey water.

Higher prices for water and wastewater services would help stimulate Canada's environmental technology market, encouraging development of new technology and services and attracting risk capital to the sector.

Reduced infrastructure requirements: Since fair, user pay pricing systems discourage consumption of resources, less infrastructure is needed. Precise figures are difficult to calculate. However, if water prices rise by 100 per cent over time, water usage and a related percentage of wastewater generated decline by approximately 30 per cent. Thus, the actual amount of infrastructure financing required (i.e., \$79–90 billion) is an overestimate, and could likely be reduced by between 10 and 16 per cent.⁹

This means that infrastructure should not be built to accommodate straight-line demand projections based on historical experience. Rather, the amount of new infrastructure should reflect lower demand brought about by higher prices. Further, higher, full cost prices for environmental infrastructure services open the door to more sustainable service delivery approaches, and attention should be given to considering such innovative options.

Job creation: A more sustainable Canadian water and wastewater system has vast potential for job creation. Private capital (likely in the tens of billions of dollars) attracted to address infrastructure needs would create jobs in construction, project management, environmental engineering, environmental technology, finance, insurance, and legal firms. The number of jobs directly and indirectly created would be substantial, though further work is needed to provide precise figures.

Opening Up a Major Export Market

Global demand for water and wastewater infrastructure is growing rapidly (in Southeast Asia, for example, the projected growth rate for environmental technologies as a whole is 16 per cent a year).¹⁰ The growth of cities, especially in the newly industrializing economies of Latin America and Asia, is at last being accompanied by infrastructure development. The World Bank projects that the water infrastructure market in newly industrializing economies will grow by \$400 billion between now and the year 2005.

Canadian infrastructure companies (e.g., in construction and project management) and environmental technology firms (e.g., in water purification and wastewater treatment) could compete effectively in these markets in quality and price. However, they appear to be missing many opportunities.

The main reason is that the French, British, and American firms that win the infrastructure development and management contracts can supply turnkey solutions including engineering, construction, environmental technology, project management, project financing, insurance and legal services, and goods. Canadian firms have not developed the networks needed to offer that package of services, largely because there is no domestic demand – individual municipalities have managed and contracted out services and governments have provided subsidies to cover financing.

This situation is changing as local authorities such as Hamilton and the York and Halton regions tender management contracts and multimillion dollar projects (in excess of \$300 million for both Halton and York)¹¹ to private companies. These initiatives are based on full cost, user pay systems and public-private partnerships. By fostering the development of a domestic market requiring turnkey water and wastewater infrastructure solutions, these communities are helping to build the capacity of Canadian companies to compete in international markets.

V. Results of the NRTEE's National Multistakeholder Consultation



Areas of Major National Consensus

The multistakeholder round tables convened by the NRTEE revealed broad agreement with the analysis presented in the previous chapters. The round tables also identified concerns over the impact of a more rational water and wastewater system and highlighted ways to ease the transition to such a system. The major areas of consensus were as follows:

Infrastructure Needs

1. Canada's water and wastewater infrastructure is in major need of upgrading. Capital shortfalls over the past two decades have led to a rapid deterioration of infrastructure, and this process will accelerate in the years ahead.
2. There is a critical need for more capital to meet existing and new infrastructure demands. Given public fiscal realities, a major infusion of private capital for water and wastewater infrastructure is required to maintain existing systems and build new facilities.
3. The time to act is now: any delay in dealing with Canada's water and wastewater infrastructure challenges will only make problems more daunting in the future.

Current Market Distortions

4. Current pricing regimes do not encourage conservation. The lack of user pay systems in many regions and municipalities across the country encourages overuse of water resources.
5. The full capital and operational costs of treating water and effluent are not charged directly to the consumer. A substantial proportion of costs are covered through tax or other public subsidies. This is creating a capital "gap" in water services and promotes inefficient production and consumption of water resources.

Achieving a More Rational System

6. Canada's water and wastewater system will likely have to move toward full cost, user pay principles over the next decade simply to meet basic infrastructure capital requirements. This will mean major increases in the price of water services.
7. The introduction of various types of public-private partnerships has much merit since private financing will be required to maintain and build new water and wastewater infrastructure.
8. Both public and private means for delivering services are valid provided (a) the overall public interest in service quality is served, and (b) public and private agencies/companies have an equal opportunity to compete for water infrastructure projects and management contracts in an open, competitive environment. In addition, an independent means of reviewing/approving rate increases should be established.
9. The key issue in service delivery under either public or private models is the application of full cost, user pay systems and rational, sustainable decision making.
10. The transition to more sustainable development of water and wastewater services will likely involve a reduced provincial role in the regulation or provision of such services, coupled with an increased role in regulation and monitoring of water quality and the environment. A regulatory review to eliminate regulations that inhibit efficiency and innovation is long overdue.

Easing the Transition

11. Small, rural, and remote municipalities will require transitional and ongoing support as a more open system with less public capital financing evolves.
12. There may be a need for short-term fiscal incentives to bridge the higher costs of municipal versus provincial/federal borrowing during the transition period.

13. The impact of water price increases on lower income groups should be moderated through direct or indirect fiscal supports; however, the specific means for doing this are not clear.
14. The role of labour should be respected through adherence to negotiated collective bargaining agreements.
2. Some participants, particularly environmental NGOs and some public officials, believed the cost of externalities should be factored into the price of water services in the long term.
3. Some private sector participants felt the private sector should be allowed to own assets and that this would provide some asset security for financiers. Most participants, however, believed that continued public ownership of assets provides better protection of broader societal interests.

Consultation and Collaboration

15. Maintaining water quality and service while moving toward a full cost, user pay system will require extensive collaboration between all levels of government, labour, environmental organizations, and the private sector. A planned and incremental process of change is highly desirable.
16. All stakeholder groups must play a role in the transition toward a more sustainable water and wastewater infrastructure system.
17. The transition process should include significant public participation and communication both at the macro level and within individual municipalities or jurisdictions.
4. Public operators and private sector infrastructure company/finance participants had differing views on the private sector's capacity to raise capital and operate facilities more efficiently than the public sector. Many private sector participants thought the private sector had the incentive and ability to manage the development and operation of water and wastewater infrastructure more efficiently than public agencies. Many public water service managers believed they were as efficient as private sector counterparts and had the advantage of not having to generate a return to shareholders. Other participants took the position that the public-private issue is moot as long as systems are operated in an open and competitive manner.

Spin-off Benefits

18. A full cost, user pay system would significantly increase demand for eco-efficient environmental technologies, and promote economic development through infrastructure renewal and development. It would also improve the capacity of the Canadian environmental industry to compete in export markets, thus driving growth and job creation.
5. Some environmental NGOs had concerns over whether private ownership and management of water and wastewater facilities would compromise environmental standards – standards that are generally comparable across the country.

Issues of Divergence

Opinions were divided on the following issues:

1. Most participants from environmental non-governmental organizations (NGOs) and community organizations felt that comprehensive land use and watershed management are required to ensure a sustainable future for Canada's water and wastewater services.

Regional Variations

Regional variations in the type and seriousness of issues were also apparent. These variations reflected the state of urban development, community size, urgency of infrastructure problems, provincial fiscal situation, and local legislation.

1. **State of urban development:** Ontario and Quebec have a very different infrastructure capital problem from that of British Columbia and Alberta. In older urban areas in Ontario and Quebec, capital has not been adequately provided to maintain infrastructure over the past several decades. Their problem is how best to recover from this capital shortfall and also meet new demands. In contrast, in British Columbia and Alberta, where major urban growth took place more recently, the issue is how to capitalize new infrastructure requirements most effectively.
2. **Community size:** Small, rural, and remote communities are more concerned than major centres about a government retreat from providing capital for water infrastructure. This concern is particularly pronounced in Ontario, Manitoba, and Saskatchewan. In addition, there appears to be more concern in Quebec and Atlantic Canada about how smaller communities and lower income groups could pay higher prices for water services.
3. **Urgency of infrastructure problems:** In Halifax-Dartmouth, the Greater Toronto Area (GTA) and Montreal, infrastructure problems are promoting rapid progress in the search for solutions. In this respect, some communities in Atlantic Canada are further ahead than the GTA, which in turn is moving faster than communities in the Prairie provinces or British Columbia.
4. **Fiscal situation:** The weaker fiscal situation of Ontario, Quebec, and some Atlantic provinces is prompting them to look closely at liberalizing water and wastewater infrastructure regulations in the near future. The problem appears less pressing in provinces that have begun to reduce their provincial debt.
5. **Local legislation:** Legislation affecting water and wastewater services can vary significantly between provinces, and in some cases between municipalities in a particular province. Quebec has a more direct regulatory role in service delivery than does Alberta. Manitoba and Saskatchewan have a legislative environment that responds to the geographic spread of small- and medium-sized municipalities.

These differences in emphasis and focus across the country should be considered in developing transition strategies toward a more sustainable water and wastewater system.

VI. Advice to Stakeholders



Members of the NRTEE recognize that the transition to a more sustainable water and wastewater system in Canada will not be easy. Various regulatory, local authority, infrastructure industry, and financial hurdles must be overcome to build a system that benefits Canada's environment and economy.

The following advice flows from the national stakeholder consultations organized by the NRTEE. It targets specific stakeholder groups, suggesting actions that will help achieve both environmental and economic goals in the delivery of water and wastewater services. As much as possible, the recommendations are based on stakeholder consensus. Where stakeholders could not agree on courses of action, the NRTEE makes recommendations to help advance the debate on contentious issues.

The success of the actions proposed below will depend to a large degree on effective public education and participation in the transition process and ongoing delivery of services. Public engagement is important for three reasons. First, few Canadians realize that the true cost of water and wastewater services (including long-term capital and operating costs) is up to double what they pay now through water bills or taxes. Second, if price increases are imposed without public education and consultation, consumer resistance will be profound. Third, sustainability implies public participation in the process of change.

Government of Canada

- Provide education about water and wastewater services in Canada to increase knowledge among consumers and decision makers.
- Provide information sessions/workshops to Canadian municipalities about sustainable water and wastewater services and the role of public-private partnerships.
- Ensure that the goods and services tax (GST) will either not be applied to water and wastewater services or, at least, be revenue neutral (i.e., generate no net tax revenue for the federal government).
- Place a priority on support for R&D and commercialization for front-of-pipe technologies submitted to the Technology Partnership Program.

- Investigate the merits of short- or medium-term incentives – such as capital gains relief on investment – to attract private capital for financing water infrastructure.
- Conduct a study into the impact of providing more sustainable water and wastewater services on employment in various sectors of the economy.
- Help Canadian water infrastructure and environmental technology companies expand into global markets by fostering the development of the domestic market.

Provincial Governments

- Reform regulations governing water and wastewater services, emphasizing environmental performance rather than the technological/technical process.
- Strengthen the provincial role in regulating water quality and setting environmental standards.
- Support the principle of full cost, user pay pricing in the medium and long term, and phase out capital and operational support for water and wastewater infrastructure/ services to large- and medium-sized municipalities (the cut-off point would likely vary by province). Once funding support ends, a province could announce that it is no longer the lender of last recourse for water infrastructure debt incurred by large- and medium-sized municipalities. This would improve the provincial debt rating.
- Develop specific water and wastewater funding and support programs for small, rural, and remote communities. These could include direct funding and interest-free loans. They could also include technical services to promote “bundling” of projects among several small, rural, or remote communities and watershed-based planning.
- Factor in water and wastewater costs when calculating transfer payments under welfare and other social assistance programs.

- Ensure that labour agreements are respected in the event of a transfer of ownership/management from public agencies to private operators.
- Be open to working with environmental groups on regulatory and conservation issues.

Municipal Governments

- Provide easy-to-understand information to consumers on the costs of water and wastewater services and how these are financed.
- Establish a uniform accounting and reporting system for water and wastewater agencies/facilities throughout the country. Organizations such as the Canadian Water and Wastewater Association are an excellent resource to this end.
- Educate municipal politicians and senior staff about the sustainability of water and wastewater services, and the role of public-private partnerships.

Labour

- Study the impact of full cost, user pay pricing regimes on collective bargaining agreements.
- Study how unionized jobs could be created in various sectors of the economy as full cost, user pay pricing, and additional infrastructure capital flows into water and wastewater services.
- Explore how job classification and mobility could be dealt with in collective agreements to promote efficiency in the sector.

Environmental Groups

- Work with provincial governments to strengthen their role in setting and enforcing water quality and environmental standards and regulations.
- Urge various levels of government to explore how the external costs of delivering water and wastewater services can be valued and introduced in practice, preferably using

market-based mechanisms (these could be similar to air emission permits, for example).

- Advocate watershed-based planning and service delivery. This advocacy may be particularly timely in provinces considering municipal amalgamations and regional government systems.

Water Management Professionals and their Associations

- Work with municipalities to establish a uniform accounting and reporting system for water and wastewater agencies/facilities throughout the country.
- Develop greater awareness of more holistic ways of delivering water and wastewater services (e.g., watershed-based planning).
- Develop an understanding of public-private partnerships in preparation for service delivery based on market principles.

Infrastructure and Environmental Technology Companies

- Show municipalities and other levels of government how environmental and economic goals can be integrated into water and wastewater service delivery.
- Determine how a more rational water and wastewater system based on full cost, user pay pricing will affect jobs.
- Identify technology development opportunities that are commercially viable under higher price regimes.
- Develop models for public-private partnerships that reflect principles of sustainability.

Financiers

- Determine the true cost of federally/provincially supported borrowing to fund water and wastewater infrastructure.
- Assess the impact on provincial bond ratings of provincial funding support and lender-of-last-recourse position on municipal debt for water and wastewater services.
- Develop mechanisms to manage risk and reduce the overall cost of municipal borrowing for water infrastructure.

VII. Conclusion



Achieving a sustainable water and wastewater infrastructure in Canada will be an enormous challenge; but it is not insurmountable. The NRTEE believes (1) that it is technologically and commercially feasible to provide Canadian water and wastewater services in a more sustainable fashion; and (2) that national consensus exists for action by governments (including local governments), labour, environmental groups, water management professionals and their associations, infrastructure and environmental technology companies, and financiers.

To launch Canada on a path to more sustainable development of its water and wastewater system, the NRTEE proposes the following framework for action:

- The price of water and wastewater services charged directly to residential, institutional and industrial consumers should reflect the full costs (capital and operational) of these services.
- Indirect public financing (subsidies) for water and wastewater services should be largely eliminated. However, governments, especially provincial governments, should continue to provide financial and other support for these services in small, rural, and remote communities.
- The principal role of the federal and provincial governments should be to preserve water quality and maintain environmental standards.

- Water and wastewater services could be delivered either by public agencies or public-private partnerships, depending on which route offers the best benefits for the environment and the economy.
- Research should be conducted to determine how various external costs can be valued and introduced in practice through market mechanisms.
- Innovative front-of-pipe technologies that conserve resources should be developed.

This first state of the debate report from the NRTEE fleshes out this framework with advice targeted at specific stakeholder groups. The proposed actions, based on national consensus, illustrate the interconnectedness of stakeholders and the range of win-win solutions possible with commitment, ingenuity, and partnership.

Appendix



Participants in the Round Tables on Environmental Infrastructures

Attendees

The following individuals attended the Round Table sessions on the subject of environmental infrastructure services.

Toronto, October 17-18, 1995

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Public Committee for Safe Sewage Treatment
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Regional Municipality of Hamilton-Wentworth
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The Delphi Group
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Carol Phillips
Director, Education and International Affairs
Canadian Automobile Workers

Angus Ross
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SOREMA Management Inc. and
Chief Agent
SOREMA Canadian Branch

Lori Williams
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Endnotes

1. Delta Partners, *Canadian Approaches to Environmental Infrastructure Projects, Report to Industry Canada and Public Technology Canada*, p. 8.

2. Federation of Canadian Municipalities and McGill University, *Report on the State of Municipal Infrastructure in Canada*, p. 23.

Powell, George P. "Financing Municipal Water and Wastewater Services - What Needs to be Done," *Environmental Science and Engineering*, pp. 28-29.

Note: Operational Cost Estimates: No exhaustive source data survey of water and wastewater operational expenditures has been conducted. Most sources cite operational revenue (i.e. user fees 1995) \$3.5-\$3.7 bn. This, however, does not represent the actual cost of operation since tax, grant and debt-based revenue for operations (particularly for wastewater treatment) are not netted in. The estimate of operational expenditures totaling \$5.9 bn. is, therefore, based on: an estimate of \$6 bn. from the Delta partners; and the fact that the Federation of Canadian Municipalities/McGill survey estimated that user fees cover only 63% of water distribution and supply costs.

Capital Cost Estimates: Capital costs include replacement costs for existing systems and building of infrastructure for new development. The calculation used for replacement costs took 1992 expenditures (G. Powell, 1995) for Ontario, updated to 1994 (@ 5% per year) and extrapolated for the country (using Ontario as 40% of national activity). The specific calculation was: \$912 mn. X 1.10/.4 = \$2.3 bn. New building activity was estimated by The Delphi Group to total \$2.4 bn. reflecting infrastructure expenditures primarily in the Greater Toronto, North and South Shore Montreal and Greater Vancouver areas. Total capital costs were, therefore, estimated to be \$4.7 bn.

3. Federation of Canadian Municipalities, pp. 23-24.

Note: The Federation of Canadian Municipalities/McGill survey estimated that user fees only covered 63 and 33% of water and wastewater operational and capital costs, respectively. This translates into subsidies from other sources of \$2.2 bn. of operational expenditures, and \$3.1 bn. of capital expenditures.

4. D.M. Tate and D.M. Lacelle, "Municipal Water Rates in Canada: Current Practices and Prices," pp. 3, 12.

5. Canada. Environment Canada, "Urban Water: Environmental Indicator Bulletin," SOE Bulletin No. 94-1, (Ottawa, February 1994), p. 4.

6. Canada. Environment Canada, p. 4.

7. "Introduction to Public-Private Partnerships," *Proceedings of the The 23rd Annual Technical Symposium and Exhibition of the Water Environment Association of Ontario*, Peat Marwick, (April 1994), p. 465.

8. Federation of Canadian Municipalities, p. 5.

J.W. MacLaren, "Clean Water for Ontario: New Directions, New Challenges," *Insight Information Inc.*, Moderator's comments. (April 1995), p. 2.

Note: Unmet infrastructure requirements (defined as immediate capital expenditures that reflect the need for improved drinking water supply and treatment, toxic chemical removal from wastewater including pollution prevention at the source, and combined sewage and storm water management) are, at the high end, projected to be over \$50 mn. New infrastructure requirements (defined as systems expansion to reflect new urban development and new wastewater treatment systems) are, at the high end, projected at \$100 bn. The figures used in the report are conservative and less than the high end projections.

9. Steve Bonk, "Municipal Water System Leakage Reduction" *In Encouraging Municipal Water-Use Efficiency*, edited by Michael Hyduk, pp. 24-25.

Note: Water losses due to poor infrastructure are high. Examples include: St-Hubert (losses of 40%), Sillery (losses of 35%), Calgary (losses of 30%), and Scarborough (losses of 353.3 gallons per minute). These cities are representative and support a conservative estimate of losses exceeding 25%.

10. R.M. Loudon, "The Influence of Water/Wastewater Rates on Water Use," *Every Drop Counts*, Edited by Dan Shrubsole and Don Tate, pp. 2, 51.

Note: The elasticity of residential demand relative to price increases of water (and therefore also wastewater) is 20-30%. Industrial/commercial elasticity is 5-15%. This means that a doubling of water prices will lead to a decline in water consumed by 20-30% for residences and 5-10% for industrial/commercial users. Since the amount of infrastructure capital demand is based upon existing water consumption levels, estimates of future infrastructure needs should reflect a projected decline in consumption that increased prices will cause. It is estimated, therefore, that as households consume 20-30% less water, and businesses 5-10% less, this should reduce infrastructure requirements by 12-17%. This factor is important, since municipalities should build infrastructure to meet projected future rather than current consumption patterns.

11. John Wiebe, GLOBE Foundation of Canada, "Opportunities for Strategic Alliances."

12. Terrence Corcoran, "Perils of Water Privatization," *Globe and Mail*, 27 April 1996.

Note: This State of the Debate Report of the National Round Table on the Environment and the Economy is a product of a process of national consultation which included distribution and discussion of an Issues Paper on the subject of Water and Wastewater. The national consultation verified the analysis of water and wastewater reflected in the Issues Paper, including many of the facts and figures that are cited in the State of the Debate Report.

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