NATIONAL ROUND TABLE ON THE ENVIRONMENT AND THE ECONOMY
TABLE RONDE NATIONALE SUR L'ENVIRONNEMENT ET L'ÉCONOMIE

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National Round Table on the Environment and the Economy

Table ronde nationale sur l'environnement et l'économie

NRT-1995002
Delphi Group
Water and Wastewater Services

National Issues Paper

Water on the Economy

An Environmental and Economic Market Analysis of Water, Wastewater and Waste Disposal Systems in Canada: Moving Towards a More Sustainable Future

October 1995

Prepared for the NRTEE

NRT-1995002
Delphi Group
34pp

The National Round Table on the Environment and the Economy is pleased to present this report as a further contribution to the greater understanding of the concept of sustainable development and its practical applications.

The views expressed herein are those of the authors and do not necessarily represent those of the National Round Table or its members.

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I. Outline

This market analysis of Canada's water, wastewater and solid waste disposal systems points to a need for drastic transformation in the management and provision of these services owing to shifting economic and market forces.

Unmet infrastructure capital requirements; population and urban growth; environment-oriented regulation; and federal and provincial fiscal restraints are among the factors strongly affecting today's market dynamics. Together, they call for major changes in the delivery of water and wastewater services in Canada.

Because our current course is unsustainable and demands new solutions that are economically and environmentally viable, the National Round Table on the Environment and the Economy (NRTEE) commissioned this study. The NRTEE also hosted Round Tables to discuss and assess the market analysis and to gain an understanding of the national state of debate on this subject.

This study examines the current state of Canada's water, wastewater and solid waste disposal infrastructure, pricing schemes for services, and emerging trends in the development of this industry. It highlights obstacles to sustainability and explores ways of turning these challenges to new opportunities that benefit both the environment and the economy.

Leading environmental and economic precepts, based on secondary research, are used as parameters for this analysis. At the same time, the study recognizes that solutions to Canada's water and wastewater challenge will be more holistic, involving a combination of economic, environmental, social and political factors.

Throughout this study, certain market distortions are underscored as key factors contributing to an unsustainable water, wastewater and waste disposal system. One is that consumer prices for these services often do not reflect the true cost (i.e. operational, capital and depreciation) of these goods. Artificially low consumer prices, subsidized mainly by taxes, encourage overuse of scarce resources and discourage conservation of resources, waste control and other more efficient use of these resources.

Another market distortion is that few Canadian communities provide water and wastewater services on a user pay basis. This further limits demand for, and the development of, viable front-of-the-pipe environmental technologies (technologies used during a process to minimize or eliminate the production of an emission or waste). Consumers are not motivated to invest in more environmentally efficient technologies and demand more efficient treatment of water, wastewater and solid waste disposal.

Based on this assessment, the analysis identifies public-private partnerships as the most effective means of addressing current environmental infrastructure market requirements. It further proposes new user pay pricing schemes that reflect the full cost of water, wastewater and solid waste disposal services. The study demonstrates how higher prices for these services will boost demand for cost-competitive and more efficient environmental technologies. It also explains how this will encourage conservation-oriented behaviour. Ultimately, this new strategy would lead to a more sustainable water and wastewater system and benefit the economy — especially in the development of front-of-the-pipe pollution prevention and resource conservation technologies.

The subsequent review of this analysis at four multistakeholder Round Table sessions stimulated further debate and scrutiny. Round Table participants naturally had different views on the subject. Based on their comments, a summary is provided at the end of each section of this report, reflecting areas of consensus and divergence of opinions. This analysis further identifies issues for which

there is broad-based support for action and others that require further discussion.

The market analysis was prepared by The Delphi Group, a Canadian environmental consulting and financial advisory firm that specializes in developing transition strategies to make markets more sustainable. The Delphi Group also facilitated the four Round Table sessions.

II. A Survey of Water, Wastewater and Solid Waste Disposal Systems

1. Market Overview

Water, wastewater and solid waste disposal services are a major component of the environmental infrastructure, which also includes gas and electric utilities. This study focuses on the infrastructure for water, wastewater and solid waste disposal services. This involves water and wastewater treatment facilities, sewers, supply lines, materials recycling and waste diversion. Generally the infrastructure is categorized under the following operations:

- Water Treatment
  - Primary
  - Secondary
  - Water Metering
- Wastewater Treatment
  - Primary
  - Secondary
  - Tertiary
- Solid Waste Management
  - Multi-Materials Recycling
  - Resource Recovery
  - Waste Diversion
  - Yard Waste Composting

Water, wastewater and sold waste disposal infrastructure and services in Canada are largely managed and provided by local, municipal governments along with some larger service providers such as the Ontario Clean Water Agency.

Over the past two decades, communities in North America, Western Europe and Japan have moved towards secondary water treatment, secondary and tertiary wastewater treatment, and solid waste diversion including reuse and recycling.

Market Size and Growth

The Delphi Group estimates 1993 annual expenditures for public environmental services in Canada to be as follows:

Operational Expenditures	$8.4 billion
Capital Expenditures	$5.6 billion

This estimation is based on data drawn from municipalities, Industry Canada, and the U.S. Environmental Protection Agency.

Operational expenditures are estimated to grow at an annual rate of 3-5% annually under current pricing regimes. This growth reflects the following four factors:

- Modest population growth;
- More expensive services, including secondary/tertiary wastewater treatment and hazardous waste disposal, driven by regulation and environmental concerns;
- Growing urban concentration in certain parts of the country such as the Montreal North and South Shores and the B.C. Lower Mainland; and
- Slight increases in per capita use of water over time.

Cost Coverage

The direct operational and capital costs of infrastructure are covered from a number of revenue sources. These include:

1. User fees to customers in both residential and institutional, commercial and industrial (ICⅈ) sectors;

2. Operating subsidies from the municipal tax base;
3. Capital budgets funded through locally-generated income and/or debt;
4. Ongoing operating and capital grants from provincial governments; and
5. Special federal or provincial grant programs, such as the 1994/95 Federal Infrastructure Program.

In addition to these direct sources of revenue, there are indirect forms of financial support for water and wastewater services, such as established overhead in municipalities. For example, a city engineer's salary might not be allocated specifically to water and wastewater services.

Except for user fees, each of these direct and indirect sources of revenue represents a subsidy for infrastructure and services. The size and mix of these subsidies varies significantly by province and municipality. Subsidies for water and wastewater services are usually much greater than those for solid waste disposal. This is mainly because of the large amount of capital required for the infrastructure. There is also clear evidence that the residential sector is more highly subsidized than the IC&I sector, particularly for solid waste disposal.

What does this signify? End users of water and wastewater services in Canada receive a massive direct subsidy for the operating and capital costs of providing these services. It is worth noting that these costs represent 'internal, out-of-pocket' costs. External costs related to resource conservation and replenishment (e.g. water table depletion) and capital depreciation are not factored into the cost of service.

Based on the differential between user charges and actual costs, annual subsidies for Canada's water, wastewater and waste disposal system are estimated as follows:

Operational Subsidies	$1.6 billion
Capital Subsidies	$3.7 billion

Price and Usage

Following is a breakdown of major water users and pricing systems in Canada for water, wastewater and waste disposal. The information is based on Ontario data.

Major Water Users

Domestic (residential)	35%
Industrial	26%
Commercial/Institutional	23%
Unaccounted (e.g. meter error, firefighting)	16%

Pricing Systems

Included in the following types of water charges, there is often a "sewer surcharge" for wastewater treatment:

Flat rate (i.e. same rate for all users)	33.2%
Declining block (rate decreases as consumption increases)	34.1%
Constant unit	32.5%
Increasing block (rate increases as consumption increases)	.3%

Relationship between Price and Usage

Using 1991 data from Environment Canada, a number of observations can be made on the relationship between pricing systems and water consumption; and on various charges for waste disposal services. Particularly noteworthy is the following:

- Residential water usage under flat rates averages 450 litres per person per day. Usage under volume rates averages 250 litres per person per day. Volume pricing requires meters at the point of delivery to each user. The introduction of household meters in areas previously under flat rates has resulted in a rapid decrease in consumption per person. Within three to four years consumption stabilizes at the average volume usage.
- Ten million households in Canada, including some in urban areas, received unmetered water services in 1991.
- Waste disposal services for residential users are mainly provided under a flat rate and paid through local taxes. Certain user fees apply to services in some areas, such as dumping charges in rural areas and a growing move toward per-bag charges in urban areas.
- In larger municipalities, the IC&I sector often pays for private waste collection on top of general public taxes for waste services. In effect, this sector is subsidizing residential waste disposal services.

To reflect the full cost of water and wastewater services, it is estimated that consumer prices should increase between 30-160%, depending on the level of subsidy in a given municipality. Recent developments in Dartmouth, Nova Scotia and Moncton, New Brunswick, confirm this "gap" between full cost and consumer rates. To meet infrastructure needs, both cities are considering plans to increase water rates for consumers over several years. The increase in rates for waste disposal is estimated to be more modest, ranging between 10% and 40%.

2. Capital requirements in Canada

Infrastructure is capital intensive. Water and wastewater services require water distribution systems, sewers and water and wastewater treatment systems. Waste disposal requires collection systems, landfill sites and multi-materials recycling facilities. Capital investment takes in the following cost-related factors:

- Long lead times for planning, design and approvals;
- Major land use and right of way;
- Greater emphasis on construction than technology;
- High operating and maintenance costs; and
- Gradual depletion of infrastructure. Landfills deteriorate rapidly after 35 to 40 years, and sewers after 40 to 50 years.

Much of Canada's current water, wastewater and waste disposal infrastructure is in dire need of major upgrading, if not complete replacement. Some sewers in older urban areas pre-date confederation. Landfill for metropolitan Toronto is at peak capacity with no solution in sight.

Existing financing has been used to address critical environmental infrastructure needs. However, any investment beyond the urgent is a luxury for many Canadian municipalities. Caught in this situation, Canada's water, wastewater and waste disposal infrastructure is deteriorating, maintenance is being deferred, and service delivery is insufficient. Less and less attention is given to investing in waste diversion systems and landfill replacements.

3. Global Comparisons

United States

The United States has both public and private utilities for water, wastewater and waste disposal services. Approximately 25% of the U.S. population depends on privately-owned water-based services. The remainder relies on public utilities. While investor-owned water utilities generally serve smaller centres, a few operate in cities. St. Louis, Indianapolis and New Jersey offer private services. Private ownership is more common for waste disposal services.

Investor-owned water utilities are regulated by the state and have the latitude to operate independently in accordance with existing environmental and quality standards. Private utilities can raise capital for infrastructure development and maintenance. They receive no federal or state financial support.

As might be expected, prices are higher for water and waste disposal services provided by privately-owned utilities. Private environmental infrastructure systems also tend to be in better condition than public systems.

The U.S. situation is quite similar to that of Canada. The U.S. Environmental Protection Agency (EPA) estimates a backlog of U.S. $90 billion in capital required for water and wastewater infrastructure, based on 1991 data. This does not take into account future needs. It is a major reason why the U.S. is moving toward investor-owned systems — either through privatization or public-private partnerships — to address its needs.

Britain

In the latter years of the Margaret Thatcher government, Britain's legislature approved a simultaneous flotation of 29 public water utilities. The general public was invited to purchase equity in the newly privatized companies that provided them with water services. While this radical move to privatization was clearly ideologically motivated, there was an economic rationale: Massive investment in infrastructure in excess of $50 billion (U.S.) was needed over 15 years. Legislators also believed that it was beneficial to separate the institutions that provide water services from those that enforce quality standards.

Looking back after five years of privatization, investors and managers are in favour of Britain's private water sys-

tem while customers' response has been somewhat less enthusiastic, or negative.

On one hand, services are generally more efficient and of higher quality. British water companies have also been very successful in entering into new environmental infrastructure markets, particularly in emerging economies.

On the other hand, prices have risen substantially. There is also concern that salaries and bonuses for senior utility managers have risen exorbitantly and are out of line with market conditions.

Waste disposal services in Britain are provided by local authorities and involve a large amount of subcontracting to private service providers. Per capita waste generation is much lower in Britain than in North America, which helps to explain why infrastructure demands are somewhat less pressing. However, there is pressure to enhance waste diversion efforts owing to limited landfill.

France

France is a strong example of how services are successfully provided through public-private partnerships. Throughout most of the 1990s, water and waste services in France have been run, by private companies. Among the variety of contractual arrangements between the public and private sector, the most common are leases and concessions. Leasing lets a private company operate and maintain a utility under contract with a local authority. Concession arrangements go one step further: the private company takes responsibility for financing new assets. In both cases, the municipality retains ownership of infrastructure assets either during the contractual period or when the contract expires.

By maintaining local control of services and providing incentives for private sector efficiency, France has struck a balance between full cost pricing and the public interest. The French model has also enabled the domestic environmental industry to become more competitive and successfully penetrate global markets, most notably in water and wastewater services.

Emerging Economies

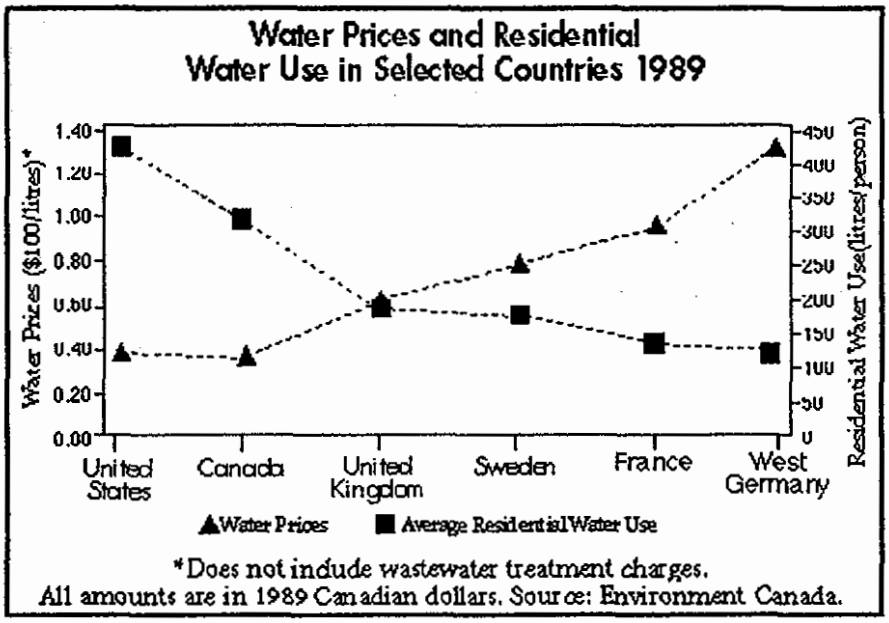
As their economies grow and per capita incomes rise, the newly industrialized countries of Asia and Latin America are moving towards full cost, user pay for water, wastewater and waste disposal services. These services are largely provided through public-private partnerships or full privatization. The trend is also towards private financing of the environmental infrastructure.

For example, in Malaysia, the Indah Water Konsortium has set up private financing to upgrade and construct a national sewage system. The service will be funded through user fees. In Mexico, the Grupo Gutsa construction company is increasing the supply of potable water to city residents and installing water meters to cover costs. Taiwan and India are taking a similar approach to the management of solid waste.

Price and Usage in Industrialized Countries

There is a clear correlation between prices for water services and usage per person, especially in the residential sector. The higher the price of water the lower the average residential use. This is indicated in the accompanying Graph A, which compares residential water prices with usage in Canada and five other industrialized countries. The figures are based on 1989 data from Environment Canada. Higher prices normally indicate a move toward full cost pricing. U.S. figures vary somewhat from the trend. However, when figures for investor-owned water services are taken separately from publicly-owned utilities, then we see a similar correlation between higher prices and lower usage. Publicly-owned utilities generally have lower prices and higher residential per capita consumption rates while the reverse occurs with investor-owned water companies.

GRAPH A:



A similar, though less profound correlation exists between price and industrial and institutional consumption.

Waste generation per capita varies in industrialized countries owing to a combination of factors, so it is more difficult to compare the relationship between price and waste generation globally.

Looking at the unit cost of waste disposal, Europe has the highest rates, Japan's are lower and North America's rates are the lowest. Disposal methods also vary. For example, incineration is much more common in Europe and Japan than in North America.

Other factors that have an impact on waste generation include waste disposal prices, regulations, recycling and re-use incentives, and cultural norms. Owing to these other factors, price has less of an impact on waste generation than it does on water usage.

4. Impact on Sustainability

Consumer Behaviour

The clear and strong inverse relationship between the price of water and per capita residential consumption, and, to a lesser degree, the influence of price on industrial and institutional consumption, and on the reduction of waste generation, is worth exploring further in terms of consumer attitude and conservation behaviour. How do consumers reduce their water usage and hence wastewater, and also solid waste in places where prices are higher and where full cost, user pay systems have been introduced? Here is what occurs among residential, industrial and institutional sectors:

1. There is a conscious effort to use less water. For example, a homeowner might decide it is not necessary to water the lawn twice a week, or even at all.
2. Consumers take greater advantage of existing municipal water programs and effective water systems that help reduce consumption and maximize the 3Rs (reduce, recycle, re-use), or they might push for newer, more efficient systems.
3. There is a significant move toward 'greener' practices: this includes adopting green procurement measures that help reduce waste generation, and choosing products with less packaging.
4. Small investments are made in low-tech water efficiency devices such as low-flow shower heads and faucet aerators, and in waste diversion technologies such as home and industrial composters.

5. Major capital expenditures to improve operating systems are made over time as opportunities arise. These range from expenditures on improved piping systems, more water-efficient appliances, to the introduction of manufacturing technologies that use less water and generate less waste.

Clearly, no one likes to see prices rise for products and services. Communities that have shifted towards full cost, user pay pricing schemes are more likely to accept the transition if they are fully informed about the reasons for the price increases and have a direct say in the introduction and management of the new pricing system. Public participation and communication is vital for understanding and accepting change.

Incentives for Service Providers

Higher prices and revenue increases associated with full cost pricing are also incentives for service providers to improve water, wastewater and solid waste disposal systems. Here are some underlying reasons:

- The high level of investment needed to upgrade and replace existing infrastructure, or to build new systems using more efficient technologies, becomes more viable with higher prices.
- Higher prices would also encourage service providers to make their operations more efficient, since there is no subsidy support.
- Owners and investors of private utilities would get better returns on their investment by maximizing the net operating value of a utility.

Problems of price structures and conservation behaviour are less insurmountable in the area of waste disposal than those in the water and wastewater infrastructure. This is because solid waste disposal systems are already substantially less subsidized, so prices more closely reflect costs. Furthermore, markets that deal with waste disposal are also more competitive than those in the area of water and wastewater. This has already encouraged greater private participation in waste disposal. Finally, waste disposal requires far less capital investment than water and wastewater services. This notwithstanding, further changes that reflect full costs and fair price increases would still have a positive environmental and economic influence. The main challenge with waste disposal is the absence of a user pay system.

Overall, as prices rise for water, wastewater and waste disposal services, consumers and service providers change behaviour and take actions that are both environmentally and economically desirable.

Conclusions

- Taking into account the global experience of full cost, user pay for water and wastewater services, there is a strong interest in retaining some form of public control over service delivery and water quality.
- A move toward public-private partnerships and full privatization has been driven by the need for more capital.
- There is a significant correlation between higher water prices and lower per capita residential consumption; the correlation also applies, though less acutely, to industry and institutions.
- Price is one of several factors that influence per capita waste generation.
- The importance of public participation and communication cannot be underestimated when introducing a shift in pricing schemes and an increase in prices for an essential service.
- The existing environmental infrastructure market in Canada is flawed. Our current pricing scheme and highly subsidized modus operandi does not encourage conservation and eco-efficient behaviour. In fact, it appears to do the opposite: Canada's current water and wastewater system promotes inefficient use of scarce resources and fosters behaviour that needlessly damages the environment.

5. Views from the Round Tables

A) Consensus

- Round Table participants agreed with most of the findings in this section : Survey of Water, Wastewater and Waste Disposal Systems.
- Participants agreed that Canada's environmental infrastructure is in major need of upgrading.
- There was also consensus that current pricing schemes do not encourage sustainability.

B) Divergence of opinion

- Round Table participants had different views on the issue of subsidies: they did not reach consensus on the extent to which the environmental infrastructure is subsidized.
- There were diverging views among Round Table participants about whether the solid waste sector should be given a different kind of analysis, given the difference in magnitude and type of challenge.

C) Suggestions

- Round Table participants suggested that more empirical data is needed to measure the extent of subsidization in Canada and in specific communities.
- Participants noted the value of information available on Canada's environmental infrastructure and suggested the need to distribute it more widely to decision makers and the general public.

III. Infrastructure and Fiscal Trends

1. The Infrastructure Situation

Current needs and new demands

To assess the full financial requirements for environmental infrastructure in Canada, it is necessary to take into account existing unmet needs and new demands over the medium to long term.

First it is useful to review how financial requirements for infrastructure have been met in Canada. Some capital costs of sewers, water and wastewater treatment systems and landfill sites have largely been covered by various kinds of public subsidies. For almost four decades, Canada's environmental infrastructure was financed through continuous increases in public funding. After this uninterrupted flow of funds, fiscal supply could not keep pace with capital demand. During the recession in the early 1970s governments began to reduce their financial support.

The current capital shortfall is mainly due to gradual cutbacks by the federal and provincial government since the early 1970s, when revenue streams started to show signs of stress. Between 1971 and 1990, public financing for infrastructure dropped from 3.5 per cent to just over two 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.

As a result, in 1995 there is a large unmet need to maintain and refurbish existing environmental infrastructure, particularly for sewage systems. By ignoring this need for the last 15 to 20 years, governments have exacerbated the situation because repair bills rise exponentially over time. Estimates for unmet capital requirements for infrastructure range from $44 to $58 billion. This is the amount needed to ensure that existing infrastructure and services are maintained and restored.

New infrastructure and service demands compound the need for further financing. These new demands stem from several changes and circumstances, including the following:

- Urban growth in areas such Halton Region, Ontario, and Surrey, British Columbia;
- More stringent regulations for certain activities, including storm water and sludge treatment;
- Gradual growth in per capita water consumption;
- Separation of waste streams containing hazardous and toxic wastes;
- A desire for better drinking water coupled with public health and environmental concerns about the quality of water and waterways; and
- Enhanced recycling and re-use systems.

Based on projections by governments, municipalities and industrial associations, The Delphi Group estimates conservatively that capital demands for water, wastewater and waste disposal infrastructure will exceed $53 billion by the year 2015. Capital requirements for environmental infrastructure will range between $97 to $111 billion over the next 20 years. These projections assume a static market and do not reflect a move towards more conservation-oriented practices and full cost, user pay schemes that promote sustainability.

2. The Fiscal Situation

The New Reality

All levels of government are looking for drastic measures 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 and local organizations. Municipalities are already experiencing the effects of deficit reduction. This trend is not only readily apparent today but will accelerate as the full impact of federal and provincial cutbacks is felt over the next decade. The impact of deficit reduction on environmental services will be dramatic.

Environmental infrastructure is a particularly vulnerable target for federal cost reductions and transfer cuts because of the subsidized nature of this sector — it would be logical to propose that real costs must be passed on to the user owing to the lack of public funds. Yet Canadians might be better off if this were to occur.

The continuing rapid decline of publicly available funds will further reduce subsidies to the environmental infrastructure. This might cause prices for these services to increase slightly, but it would be insufficient to meet existing infrastructure needs and new demands.

Impact on the Environmental Industry

Although Canada's environmental industry is growing slowly, at 4% to 7%, this sector has yet to experience its full, predicted potential for growth. The industry comprises a number of small companies that operate in local markets. The limited incentive to introduce more efficient technologies owing to current pricing systems and subsidization, is one reason why this market is not very cost-competitive — especially in the following areas:

- Generation or end use improvements to water efficiency technologies;
- Recycling technologies and systems;
- Process technologies that require less water and generate less waste; and
- Waste recovery technologies.

Industry is also cautious about developing new technologies and services owing to the lack of success and growth of businesses in this area. Furthermore, there is limited availability of risk capital to venture into new opportunities.

This has a broader economic impact: It curbs innovative development in other industries closely linked with environmental technology. These include construction, project and facility management, and engineering. This translates into lost economic opportunities in an emerging market with strong potential both nationally and internationally.

Conclusions

Infrastructure and fiscal trends point to a future crisis for Canada's water and wastewater infrastructure and services. Capital shortages to meet infrastructure needs will continue as fiscal pressures mount. Without additional financing, Canada's water, wastewater and waste disposal infrastructure will seriously decline and have a devastating impact on the environment.

To address this economic and environmental challenge, a major shift is needed in the management and delivery of Canada's environmental infrastructure and related services. The change begins with conservation-oriented land-use policies, and watershed management and regulations. It also begins with a more rational approach that considers water, wastewater and waste disposal services as scarce commodities rather than a 'free' unlimited public right. New mechanisms are needed to measure and quantify the full cost of these services. At the outset they could incorporate external costs associated with these services, such as the cost of arable land use.

A full cost, user pay system for water and wastewater services can have a dramatic environmental and economic impact. As well as encouraging consumers to use less water and become more conservation-oriented in related areas, higher prices can provide revenues to maintain systems and meet environmental standards. It can open doors to private financing and management, and bring new investments and needed capital. With rising prices, and a better return on investment, private interests will be motivated to enter a field previously dominated by public service providers. Private-public partnerships could offer a combined advantage of expertise and access to capital.

This new market-based approach to managing and financing water and wastewater infrastructure and services can be an incentive for consumers and providers to invest in more efficient technologies and practices that reduce water consumption and wastewater.

Although infrastructure conditions and fiscal realities demand such a market shift, the change can ultimately lead to a more efficient, comprehensive management of

our water, wastewater and waste disposal systems. It would open new economic opportunities and widen incentives for sustainability.

It is worth repeating that public participation is essential for the success of any market transition. It is also vital to balance private interests and market needs with the public interest.

A key challenge will be to plan a market transition that will help to protect ecosystems, minimize economic losses and service disruptions, and prevent any further environmental degradation.

3. Views from the Round Tables

A) Consensus

Round Table participants agreed on the following:

- There is a major need for substantial financing for environmental infrastructure.
- Public capital financing required for environmental infrastructure will be drastically reduced owing to public deficit reduction.
- A full cost, user pay system would significantly increase demand for eco-efficient environmental technologies.
- Lower-income households should be protected from the impact of higher prices for water and wastewater services through direct or indirect public funding.
- Public participation and communication is important in the successful transition to a more sustainable water, wastewater and waste disposal system.

B) Divergence of Opinion

- Round Table participants had different views about whether land use and watershed management is a necessary aspect of market change.
- Opinions diverged about whether it is viable to factor external costs into prices for water and wastewater services.

C) Suggestions

- Round Table participants pointed to the need for more quantifiable information on existing facilities and other infrastructure in individual communities and the entire country.
- Participants suggested that, if external costs were to be factored into the price for water, wastewater and waste disposal services, then this should be considered a long-term goal.

IV. Public-Private Partnerships

1. Meeting Different Interests

Purpose of Public-Private Partnerships

Public-private partnerships give government and the private sector an opportunity to share costs, risks and rewards in an area for which there is widespread public demand. Public-private partnerships are driven by three main factors: a need to raise capital; a desire to improve operating efficiency; and a need to mitigate and diversify risk away from the public purse. As such these arrangements are being considered by municipalities as an alternative means of financing and operating current water and wastewater systems.

Public-private partnerships can take various forms. These are outlined in detail in the 'Public-Private Partnership Models' section later in this chapter. It is worth noting that public-private partnerships normally involve a full cost, user charge system. This creates the incentive and generates the revenue needed by the private sector to cover capital and operational costs; it enables the public sector, backed by private support, to continue to offer a vital public service while divesting itself of direct fiscal and operational accountability. Therefore, in the case of water and wastewater systems, such arrangements would normally include full costs in the pricing structure, including external costs such as system depreciation, and would implement user charges through meters. Revenues would be dedicated exclusively to operating, maintaining, and upgrading systems as well as meeting growing needs. A universal accounting system would also be adopted.

Considering these factors, public-private partnerships are an effective means of introducing full cost, user pay schemes for water and wastewater services. They are less effective for introducing such pricing arrangements to solid waste disposal services. It is difficult to introduce higher prices for disposing waste because this service cannot be accurately quantified. Waste is more mobile and entails various volumes and weights that are difficult to incorporate into standard measurements. Furthermore, the private sector is already significantly involved in waste disposal.

Benefits

While not a panacea or a solution by themselves to Canada's enormous infrastructure requirements, public-private partnerships can offer a number of benefits to consumers, governments and private interests. These include the following:

- Greater Efficiency: There is substantial that public-private partnerships are more efficient and reduce the cost of managing water, wastewater and solid waste disposal services over time. The incentive of a financial return on the investment is a motivator and driving force towards raising new capital and introducing technologies and operating practices that increase efficiency.
- Improved Quality of Service: The quality of service can improve through a public-private partnership arrangement because parties have better access to capital and expertise to make the improvement, and also because of the very high standards of private sector service.
- Protection of Assets: Future earnings depend on preserving assets. This becomes an incentive for public-private partnerships to ensure that capital stock is maintained and upgraded. Restoration and improvements are generally covered through depreciation and similar charges. Such a major investment also strengthens commitments to a long-term association.

- **Cost Control:** Cost ceilings and growth limits in many public-private partnership contracts allow public agencies and regulators to plan for the future with more confidence and control unexpected increases in budget requirements.
- **Access to Capital:** Privately-managed infrastructure projects instill confidence among investors and financiers. Financiers take the view that service and financial targets can be reached more effectively. Private companies offer greater financial expertise in acquiring and retiring capital investments.
- **Capital Availability:** Financing capital infrastructure requirements by means of public-private partnerships frees up public capital for other pressing needs.
- **Improved Debt Rating:** Private financiers would consider full cost, user charges, coupled with private financing of infrastructure assets, as being more fiscally responsible. The result is improved ratings that help to increase the borrowing capacity of governments and reduce public capital costs.
- **Trade Competitiveness:** Globally, public-private partnerships are increasingly being used to meet environmental infrastructure requirements. Expertise drawn from the domestic market has helped private companies to become more competitive internationally. The domestic experience gives the private sector the competitive advantage of building strategic alliances and consortia. These ties bring additional, combined expertise in important competitive areas, including project management, environmental engineering and technology, legal and financial matters.

Risks

There are also many risks associated with public-private partnerships as well as challenges in their initial formation. These are often due to poorly structured arrangements and social concerns. Following are key hazards and roadblocks:

- **Loss of Public Control:** Government has a responsibility for the public interest. If the scale is tipped too heavily in favour of private-sector interests, the arrangement might not meet the government's demands and standards for service and other public needs.
- **Weak Competition:** Limiting competition for a public-private partnership could lead to a poor choice of partners, and hinder the arrangement right from the beginning. A weak competitive process could be a costly public price to pay.
- **Labour Opposition:** Labour unions often have concerns about the effect of public-private relationships on collective bargaining agreements and job security. Labour opposition can cause a public-private partnership to be abandoned during the drawing stage and could make the transition to a new market-driven infrastructure process more difficult.
- **Middle Management Intransigence:** Middle managers are often concerned about job security in a public-private relationship. While experience has shown that most private owners and service providers offer training to help ensure strong job performance and competitiveness, the concern is widespread enough to hinder acceptance of a public-private arrangement.
- **Solvency:** Companies can go bankrupt, withdraw from certain markets, or dissolve in the normal course of business.
- **Poor Performance:** There can be situations in which private companies prove to be less efficient than their public counterparts. If private partners do not perform according to contract and expectations during the construction or operating stage, then the public alternative might be more secure.

Public-private partnerships that have formed in Canada to manage water and wastewater services have generally addressed key market shortcomings with success. The best way to mitigate risk is to identify and apply the most appropriate public-private partnership model and to ensure that contractual and legal arrangement are clear and comprehensive.

2. Public-Private Partnership Models

A Matter of Approach

A wide spectrum of public-private partnership models are being applied to managing water, wastewater and waste disposal services. Models vary in the degree of decision making and functional responsibility shared by each partner. They offer different ways of balancing responsi-

bility for ownership; financing; construction; refurbishing and replacement; operations management, including maintenance, and administration; and overall decision making, including dispute resolution.

The Graph B shown below provides an overview of the approaches that have been used in managing environmental infrastructure and providing services. It is presented as a continuum, which starts with the *Fully Public* system and moves through various combinations of public-private partnerships leading ultimately to full *Privatization*. The fully public system is one in which the government owns, manages and operates all aspects of infrastructure and services. Government finances the facility, hires personnel, and issues tenders whenever additional outside expertise is needed. Most of Canada's water, wastewater and waste disposal systems are fully public. At the other end of the continuum, privatization involves complete private ownership, management, operation and financing of infrastructure projects. Government's role is limited to the establishment and enforcement of public health and safety, and environmental regulations.

Contracting Out: The private sector obtains a contract, generally through an open competition, to operate and maintain services for the public body. Private financing is not included in this agreement. This type of partnership is currently used by Ontario's Halton Region, which has contracted out its biosolids recycling program to Terratec Environmental Limited. The Regional Municipality of Hamilton-Wentworth is also currently setting up this type of arrangement with Philips Utilities Management Corporation.

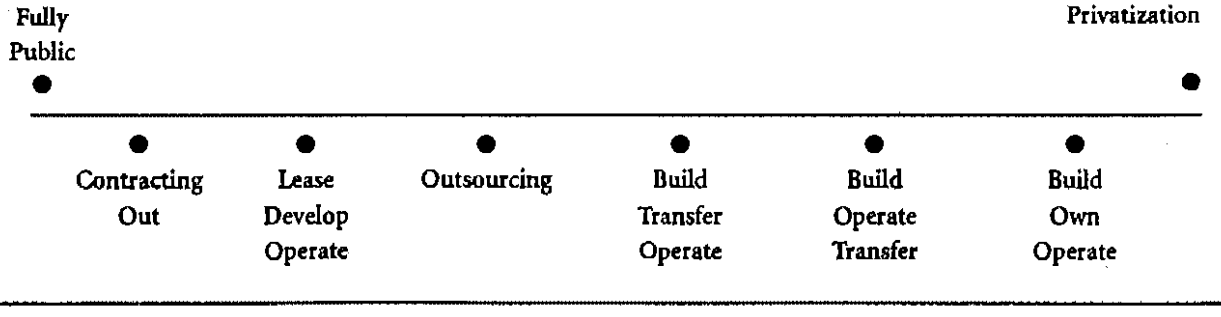
Lease, Develop, Operate: This is a long-term lease to operate and expand an existing facility. The private developer agrees to refurbish and/or replace the environmental infrastructure with the understanding that investments will be recovered over the term of the lease through a reasonable rate of return. The Regional Municipality of Ottawa-Carleton entered into this kind of arrangement with a French water company to help rebuild one of Canada's most modern wastewater treatment centres.

Outsourcing: In this partnership, capital assets are sold to the private sector. Responsibility for raising capital, operations and staffing is transferred to the new private owner. A long-term contract negotiated between the government and the private owner establishes the services that must be provided. The Ontario Clean Water Agency was created in 1994 through such an arrangement.

Build, Transfer, Operate: This model combines private capital and operations with public ownership. Government determines the capital need, which is usually a new facility for water and wastewater treatment or solid waste disposal. Tenders are issued, and a final contract is signed with the private company to design, build and operate the facility over a fixed period of time. Often the capital assets are leased back to the private operator. York Region is looking into this form of arrangement in a recent request for proposal.

Build, Operate, Transfer: This partnership approach involves higher risk to the private partner. A franchisee, frequently a consortium of private operators, contracts to build, finance and operate a facility for a fixed period. User fees help to cover financing and operating costs. At

Graph B: Continuum of Public-Private Partnerships



the end of the contractual period, assets are transferred back to the public authority. A new contract, either with the same franchisee or a different successful bidder, is concluded for upgrading, replacement of infrastructure, and/or continued operation. This model is less popular among environmental infrastructure groups, although the City of Montreal is considering using this approach to manage future water and wastewater infrastructure requirements. The model is being used for the Fixed Link project in Prince Edward Island.

Build, Own, Operate: In this arrangement, the private partner builds, owns and operates the facility through an ongoing contract. It is a form of de facto privatization. The private company gains full ownership but must adhere to government regulations and certain stipulations that could include price controls. This approach is most commonly used by U.S. water and wastewater utilities. The City of Calgary has announced plans to sell the city's water and wastewater system.

Principles for Public-Private Partnerships in Canada

There is no ideal public-private partnership model. Geography, community size and financial strength are some reasons why certain arrangements work better or are preferred over others. However, if they reflect certain key principles, then various forms of public-private partnerships can help to address the combined challenges of sustainability; insufficient financing for infrastructure; and the move toward full cost, user pay (Editor's note: PLUS fair price increase; user pay does not mean a price increase in the sense of generating revenue; it refers to user fees based on meeting costs; a price increase goes beyond just meeting full costs; it refers to revenue generation) systems to benefit the environment and the economy. These principles are as follows:

1. Exclusive public control over water quality and land use to ensure a comprehensive approach that is conservation-oriented.
2. Exclusive public control of environmental preservation.
3. A fair degree of public control over infrastructure preservation, particularly for assets with a long life span like sewers.
4. Shared public-private responsibility and decisions for service quality.
5. Strong private-sector direction and responsibility for customer services.
6. Private control of facility design and construction.
7. Private management and operation of facilities and services.
8. Largely private financing.
9. Transparent financial reporting and accounting, according to a standard system for environmental infrastructure and services.
10. Primarily public ownership of assets; private ownership in unique situations.
11. A full cost, user pay pricing scheme that is understood by the consumer to be conservation-oriented.

Conclusions

Public-private partnerships that reflect the principles cited in this section would benefit both partners, contribute to sustainability, and also benefit the economy by preserving and upgrading Canada's environmental infrastructure. It would further stimulate the growth of the environmental industry.

Public-private partnership models that best reflect these principles include *Lease, Build Operate; Outsourcing; Build, Transfer, Operate;* and *Build, Own, Transfer* models.

Partnership arrangements also work best when they contain an element of competition. For example, it is viable for a public-private partnership to seek private financing for a wastewater system and choose to manage the system through open competition, which would enable existing public managers to be among the bidders. Keeping a degree of competition in the relationship during the full contractual period or term of agreement is also desirable.

Some Canadian communities are clearly moving towards public-private partnerships to provide water and wastewater services. However, certain market obstacles are impeding this more sustainable approach to the management of Canada's environmental infrastructure. This is stalling wider response to the public-private partnerships option. The next chapter looks more closely at these market obstacles.

3. Views from the Round Tables

A) Consensus

Round Table participants agreed on the following:

- Various types of public-private partnerships are an effective approach to addressing current infrastructure challenges in Canada.
- Any new partnership or other activity used to preserve and operate environmental infrastructure must ensure that the public interest is served.
- Decisions on utility operations should be based on cost effectiveness, environmental and public health.
- An independent entity, rather than the private operator, should set or approve rates.

B) Divergence of Opinion

- Round Table participants had different views about ownership of environmental infrastructure. Some felt there was no reason to prevent the private sector from owing public assets, noting that this would provide a form of security to financiers. Others believed that continued public ownership of assets would ensure better protection of broader social interests.
- There was a divergence of opinion on public and private sector performance. Some participants felt that the private sector has the incentive and expertise to raise capital and operate facilities more efficiently. Others were of the view that public sector operators and the private sector could perform equally well as long as systems are run in an open and competitive manner.

C) Suggestions

- Round Table participants noted that public-private partnerships should be tailored to meet the needs of individual communities.

V. A Transition Strategy Towards a Level Playing Field

1. Key Market Obstacles

It has been shown that Canada's water, wastewater and waste disposal infrastructure market is environmentally and economically unsustainable. The costly infrastructure is rapidly declining and putting stress on the environment. Critically needed public funding to refurbish and upgrade the system is not available.

This section turns to solutions and a strategy to ease the transition. A key solution is a more level playing field: A new market-based approach giving both the public and private sectors the tools and incentives to build a more efficient full cost, user pay system could effectively address Canada's water and waste challenges. It could also generate technological innovations and conservation-oriented behaviour that would further benefit the environment.

First, the following market obstacles must be addressed.

Challenges and Alternatives

Regulation

Municipal activity, which includes running most of Canada's environmental infrastructure and services, is largely regulated by the provincial government. Provinces have strict regulations on financing and incurring debt. Provinces also have a number of regulations that apply to capital, design, and service standards. However, the regulations vary significantly in each province. In some provinces, for example, revenue from water and sewage cannot be separated from general revenue.

While many regulations reflect current public health and environmental concerns, many others reflect past provincial involvement in the delivery of water and waste services and have lost their relevancy.

A major obstacle is the large number of regulations of a technical nature that specify the technological process to be used for water/wastewater and waste disposal services. These types of rules inhibit innovation and efficiency. A more effective alternative would be to base regulations on performance rather than process.

Although provincial governments are moving away from financing infrastructure under mounting fiscal pressure, the many cumbersome and at times irrelevant regulations remain. Often they become roadblocks to the creation of public-private partnerships and other innovative activities that could help to promote this market sector.

Public Capital Financing

Major upgrading and new infrastructure needs cannot be met under current levels of public financing. In fact, municipalities must first address pressing maintenance problems before they can even consider upgrades and new demands. Capital shortfall and lack of public funds is contributing to the decline of Canada's water, wastewater and waste disposal infrastructure and related environmental problems. The alternative is to seek new sources of funding through new market directions.

Municipal Obstacles

Municipalities have come to rely upon public financing to manage and operate infrastructure and services. While some communities have introduced new or higher water and waste charges, such as extra 'per bag' garbage fees or individual water bills, most municipalities are cautious about taking new measures to address their urgent infrastructure maintenance and refurbishing needs. Many elected officials and senior managers are not aware of the opportunities offered through public-private partnerships or how to implement these options. Others, including

labour groups and middle managers, are concerned about job security if the private sector takes over service delivery and other operations. It is worth noting that Canadian and foreign experience in public-private relationships shows that private operators are inclined to absorb staff into the new working environment, provide training and respect collective bargaining agreements.

Generally, the main municipal obstacle to new infrastructure market development is caution and hence inaction. This caution, however, reflects a need for better understanding about the positive impact of new approaches such as public-private partnerships and the fiscal incentives needed to launch them.

A special challenge facing smaller municipalities and rural communities is the limited capacity to raise capital due to smaller economies of scale. Strategies could be developed to promote partnerships or collaborations between municipalities to raise required funds. It would be useful to determine which system would be most effective from an economic and sustainable perspective before seeking the necessary financing.

Industry Obstacles

Traditionally, businesses have relied upon tenders and contracts to build infrastructure and improve service instruments. Construction and engineering firms have especially benefitted from these bidding and contractual opportunities. Public-private partnerships require a different market approach. This could involve more risk and the capacity to raise capital.

The challenge facing the environmental industry is the need to become more entrepreneurial and to seize opportunities in the emerging infrastructure market. This can best be done through the competitive advantage of strategic alliances and partnerships. Engineering firms can strengthen their position by building alliances with project managers, construction companies, legal firms, enterprises in environmental technology, financiers and insurers. This offers a highly efficient and competitive network — one that can provide comprehensive, "packaged" services to municipalities requiring turnkey water and wastewater infrastructure solutions.

Industry is starting to respond as local authorities such York Region tender management contracts with partnerships of multiple firms. Of the bidders who qualified to compete for York Region's major contract to supply water, six were consortia of multiple firms offering a range of skills, technology and expertise.

Financial Obstacles

Certain taxes, regulations and guarantees in their current form could become obstacles to ensuring a level playing field in public-private partnerships and other new infrastructure arrangements. For example, regulations governing capital gains tax on assets; and different income tax treatment for public agencies, Crown corporations and private businesses would need to be re-examined in light of a new infrastructure market. Provincial positions on guarantees and final recourse will be very important. For example, in certain conditions provincial sovereign guarantees could help small and rural communities reduce financing costs. Finally, the GST cost factor must also be addressed. Currently, for example, municipalities are exempt from charging GST for water services. However, in a public-private partnership where assets could be transferred or sold to private operators, GST must be charged. This could represent a potential windfall in revenue for the federal government. The situation can be addressed through a third-party or independent accounting entity.

2. Strategic Tools: Participation Stakeholder Roles

Public and private stakeholders in all sectors, including decision makers and consumers, play an important role in change and must be involved from the beginning. A successful transition to a market-based, full-cost user fee system with fair price increases will therefore greatly depend upon public education and participation. Consumers must be kept informed through clear, up-to-date information.

To ease the transition to a sustainable water and waste system, stakeholders must work together to change the means of financing the country's infrastructure and alter the market. Through their collaboration and concerted efforts, public and private groups and individuals can ensure a 'managed change process' where all players are active participants.

Following are some areas where stakeholders, including all levels of government, will play an important role:

Regulatory Framework

Various provincial regulatory frameworks governing private financing of infrastructure and capital projects could be liberalized in the short term. Provinces could also develop policies for a transition to full cost, user pay systems and for the final, full implementation. This would be an important signal to municipalities that full cost, user pay systems will eventually be put in place and that provincial regulations will reflect this change.

Public Capital

Initially the federal and provincial governments could place a short-term condition on public financing of infrastructure that would require leveraging public capital with additional investment from the private sector. This could be effective over a period of two to three years. Public-private partnerships could be encouraged through fiscal incentives or other supportive measures such as "fast-track" approvals.

Over the medium and long term, ranging between three to five years, public financing could be tied more specifically to public health, environmental and economic concerns. There is a strong argument for using public funding to make non-marketable projects marketable by preparing them for public-private partnership or reducing the cost of financing the project.

Sovereign guarantees are another way of encouraging public-private partnerships to develop in the infrastructure market. Provincial governments can play an important role in setting conditions under which sovereign guarantees should be offered. Bond rating agencies could help provinces determine whether reduced capital funding coupled with public-private sector sovereign guarantees might have a positive or neutral impact over the medium and long term.

Municipal Support

Leading municipal associations can play an important role in helping municipalities to understand and adjust to new public-private partnerships and new pricing schemes for water and waste systems. Key organizations at the national level include the Federation of Canadian Municipalities (FCM), the Canadian Association of Municipal Administrators (CAMA) and the Canadian Water and Wastewater Association (CWWA). Municipal organizations in provinces that bring together elected officials and senior staff can also offer shared experiences and information to individual communities.

Municipalities could benefit further from better access to new information on contractual arrangements and how they work successfully. Independent advice from a neutral party on the best way of setting up a public-private partnership could also assist decision makers. A standard accounting system is yet another tool that could give municipalities the ability to more effectively compare costs and choose partners.

Industrial Development

New business alliances that combine special areas of industrial and professional expertise can give industry a financial and competitive edge. Industrial associations could become effective brokers in fostering linkages between companies and organizations specializing in environmental technology, construction, environmental engineering, finance, project management, insurance and law. New opportunities to enter into environmental infrastructure markets would encourage companies to boost their technological capacity. As the market opens to more competition, industry with this technological strength will be motivated to develop new, competing technologies that promote eco-efficiency and conservation.

Small and medium-sized companies could also develop and thrive in an infrastructure market that promotes various types of public-private partnerships and user pay systems. These companies will see their customer base diversify as large, private firms or consortia replace some traditional public sector customers.

Financial and Tax Measures

The introduction of a tax-exempt municipal bond market in Canada is worth being considered by all levels of government and private capital markets. Such a measure could reduce the capital costs associated with financing utilities. This has worked in the United States where capital gains from municipal bonds are tax exempt.

There appears to be support for the concept that growth should pay for itself, and this has already been demon-

strated in some places that have successfully used tiered or variable pricing schemes. In growing young suburban areas users of new facilities might be required to "pay their own freight" and be assessed higher charges than inner cities with established infrastructure.

The federal government could also consider a GST neutral policy for environmental services provided by the private sector.

Capital gains incentives for new facility development over the short to medium term could also encourage investments in this area.

3. Conclusions

- While there are some instances where government or private groups can take unilateral action to promote change in the environmental infrastructure market, in most cases collaboration is necessary and more effective to ease the transition to a full cost, user fee system.
- Providing services under this new market-based system would work best under a utility-style of operation. Delivering services through public or private utilities has several of the following advantages:
  - The focus would be on cost efficiency and service quality, since a single utility would not operate as a division of a larger municipal organization that might have competing priorities;
  - As a clearly defined market entity, a utility could raise capital more easily and repayment would be also be simpler to track and secure;
  - Performance incentives and penalties are easier to introduce;
  - A utility offers incentives to invest in long-term conservation options.
- These factors notwithstanding, a utility would still be subject to provincial regulation and rates would be set or approved by an independent body. In effect, a utility would operate as a regulated monopoly. Municipalities would retain authority over urban planning with significant input from local utilities.
- Reducing consumption lies at the heart of environmental preservation. A full cost, user fee water and wastewater and waste disposal system has a direct impact on reducing consumption, and hence on sustainability.
  - First, higher levels of capital expenditures become feasible and investors and owners would be motivated to upgrade and enhance their systems to increase water efficiency. Higher levels of capital expenditure therefore would help reduce water losses.
  - Second, through increased capital, it will also be more feasible over time to introduce secondary and tertiary treatments that could be more costly and require more efficient, innovative technologies, since higher prices preside, the cash flow to introduce these efficiencies. An important environmental benefit is the improved quality of waterways.
  - Third, as has been explained in more detail earlier, consumers would be motivated through higher prices to find more efficient ways of using water and reducing consumption.
  - Fourth, higher costs for waste disposal promotes more competitive waste recovery and efficiency technologies.
  - Finally, more efficient public-private partnerships would require fewer input resources to treat water and wastewater and to dispose solid waste.
- These environmental benefits also translate into a major economic gain for the Canadian economy. Since fair, user pay pricing schemes promote resource conservation, less infrastructure will be needed. It is difficult to make a precise calculation; however, it is reasonable to expect that if water prices rise by 100% over time, water usage will decline by approximately 30%. On this basis, earlier estimates of $97 to $111 required for current and future infrastructure financing that were suggested in this report could likely be reduced by 20% to 30%.This means that infrastructure should not be built to accommodate straight-line demand projections drawn from historical experience. Rather, the amount of new infrastructure should reflect lower demand brought about by higher prices.

Acknowledgements

This market analysis is a product of secondary research that includes consultations with leading experts in the field of environmental infrastructure and reference to literature listed below. Much of the data and information presented, and the views advanced, can be credited to the individuals and organizations mentioned below. For easier reading, the text does not include specific attributions. These can be provided upon request. Generally, however, statistical data and information on market experience has been drawn from secondary research. The Delphi Group has used this research to arrive at its market projections and analytical conclusions.

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