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The Daily

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Study: Infrastructure capital

1960 to 2003

Public infrastructure such as roads, bridges and sewer systems gets most of the attention, but infrastructure in the private sector, such as pipelines, rail and generating facilities, is just as important to the economy, according to a new study.

The study, released today, examines the development of infrastructure in both the commercial and non-commercial (public administration) sectors in Canada since 1961, and compares Canada's long-term growth of infrastructure with that of the United States.

While the public sector accounts for the largest share of infrastructure, its share of total infrastructure assets has fallen from 33% in 1970 to 23% in 2002.

Infrastructure capital consists of engineering structures and buildings; in 2003, it comprised over 58% of total capital. Engineering structures consist of pipelines, rail, ports, telephone lines, dams, electric generating facilities, roads and sewers. Buildings are used across all industries.

Infrastructure investment in the public sector is primarily about schools, hospitals, roads and water mains. In the public administration sector, assets in infrastructure are spread about equally between engineering construction and buildings.

Outside the public sector, investment in infrastructure in terms of engineering structures has traditionally been found in a core set of commercial industries such as electric utilities, transportation and communications. More recently, the share in oil and gas exploration has increased dramatically.

In the traditional regulated commercial sector, engineering construction accounted for a large portion of assets from 1997 to 2002: some 72% in electric utilities, 33% for transportation, and 37% for telecommunications. In mining and petroleum, it accounted for 80% of all assets.

A goal of this study was to define assets that should be considered infrastructure. It defines infrastructure as a set of fixed structures that have long useful lives, whose creation involves a considerable gestation period, that have no good short- to medium-run substitutes, that underpin the production of a flow of services, and for which it is difficult to maintain inventories. These assets also have a special foundational role, supporting other factors of production.

Note to readers

This report is based on a research paper that focuses on investment in infrastructure in Canada.

This paper outlines a taxonomy to define assets that should be considered as infrastructure, and which can be used to assess the importance of different types of infrastructure investments by function and by industry. It also considers how to define the portion of infrastructure that should be considered "public."

The final two parts of the paper apply the proposed classification system to data on Canada's capital stock.

Finally, it investigates how Canada's infrastructure has evolved over the last four decades, both in the commercial and non-commercial sectors, and compares these trends with those in the United States.

Transportation's share of infrastructure has declined during past three decades

For the economy as a whole, the share of infrastructure devoted to transportation declined between 1970 and 2002, while the share in mining and petroleum activities rose.

In 1970, about 19% of infrastructure assets served a transportation function; by 2002, this had fallen to only 13%.

Share of infrastructure by function

	1970	2002	1970	2002
	Total economy		Public administration	
	%			
Transportation	19.2	12.7	34.9	34.3
Recreation, culture and education	12.4	7.4	33.8	26.2
Health and social protection	3.2	3.2	9.8	13.1
Waste, water, sewage and energy distribution	7.7	7.4	9.8	11.3
Mining and petroleum	5.1	11.1	0.0	0.0
Agriculture, manufacturing and services	12.8	11.2	0.0	0.0
Defence and public safety	0.6	0.7	1.8	2.7
Communications	2.4	2.3	0.8	0.4
Electricity	11.6	8.7	0.5	0.1
Other[1]	25.1	35.3	8.6	11.8
Total	**100.0**	**100.0**	**100.0**	**100.0**

1. Includes assets listed as "other" industrial, institutional and commercial construction; office buildings; laboratories; garage and storage facilities; and dormitories.

In contrast, the share of infrastructure assets devoted directly to mining and petroleum activities more than doubled from 5% to 11% of the total.

At the same time, the share of infrastructure assets devoted to electricity edged down from 12% to 9%. Those devoted to communications stayed steady around 2%.

In the public sector, infrastructure is primarily concentrated in schools, hospitals, roads and water mains.

In 2002, about one-third (34%) of assets were devoted to transportation in the public sector, unchanged from 1970. About 26% were devoted to recreation, culture and education, 13% to health and social protection and 11% to waste, water, sewage and energy distribution.

Evolution of infrastructure capital

The study examines the evolution of Canada's infrastructure capital since 1961. It examines how changes in infrastructure compare to changes in other inputs, that is, capital and labour.

The ratio of Canada's total infrastructure capital stock to gross domestic product (GDP), a measure of the amount of infrastructure capital available to the economy, was roughly steady until the mid-1990s, after which it declined slightly.

The drop was led by a relative decline in engineering construction, which stopped growing in the 1980s. The ratio of capital to economic output for building construction remained roughly steady, while that of machinery and equipment increased.

In combination, the relative stability of total capital along with increases in the shares of machinery and equipment and declines in engineering capital are consistent with changes in relative prices of the different types of assets over time. These changes have made machinery and equipment less expensive than infrastructure and have led to substitution of machinery and equipment for types of infrastructure assets. This substitution also occurred in the United States.

In the public sector, the ratio of infrastructure capital to total GDP has fallen dramatically, from over 35% in the 1970s, to about 20% in 2002. The decline was due in equal parts to decreases in engineering construction and building construction.

Canadian-United States differences: Spending on infrastructure grew at different times

The study also compared Canada's long-term history of the growth of infrastructure to that in the United States.

It found that Canada has gone through two long cycles since 1960. From 1960 to 1980, growth in total infrastructure capital was generally faster in Canada than in the United States. In fact, during this period, growth in all forms of capital was faster in Canada than in the United States.

However, following 1980, spending on infrastructure slowed in Canada relative to the United States, but so too did spending on other forms of capital.

One of the explanations for a slowdown in infrastructure spending is related to the economic cycle in which Canada found itself. During this period, the resource economy that had boomed in the late 1970s was less vibrant; and less infrastructure was required to support it.

But there were similarities between Canada and the United States. There was a general substitution in both countries away from infrastructure capital to another form of capital (machinery and equipment).

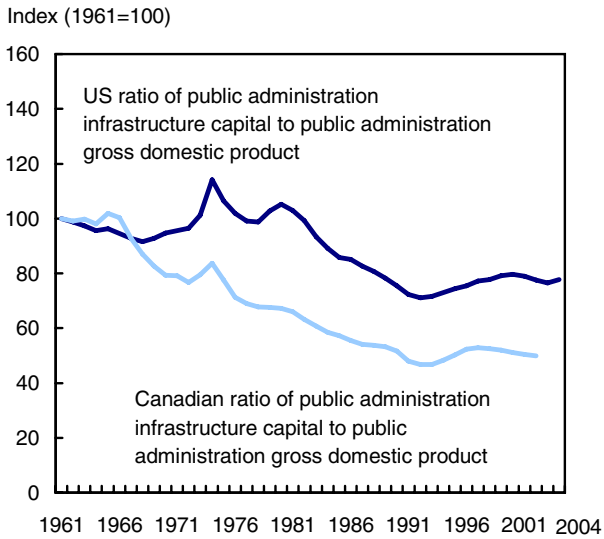
Since changes at the level of the economy can hide differences within sectors, the paper also examines the changes that occurred within public administration and the commercial infrastructure industries — communications, transportation and electricity. The decline in infrastructure capital relative to total GDP occurred in all these sectors.

The relative decline in engineering construction in the commercial sector is not, with the exception of the transportation sector, due to the relative decline in the importance of the goods and services that these sectors produce, but because almost all these sectors used less engineering construction capital to produce their output over the period.

All the commercial sectors, with the exception of rail transportation, that were major users of engineering infrastructure saw their capital to own-industry output ratios decline over this period. The downward trends in infrastructure to GDP ratios have persisted over a long period (almost 20 years) and are consistent across most of the commercial infrastructure sectors. Moreover, the Canadian trends were broadly duplicated in the United States. Firms in these sectors have become more efficient in using their capital, either because they started from a position of over capacity, or because they have increased their capital productivity.

The importance of infrastructure in the public sector (as measured by the amount of infrastructure capital relative to public administration GDP) has also been declining steadily since the early 1970s. This trend can be found in both Canada and the United States but is more pronounced in Canada.

Canadian and United States public administration sectors



The research paper "Infrastructure capital: What is it? Where is it? How much of it is there?" is now available in *The Canadian Productivity Review* (15-206-XIE2008016, free), from the *Publications* module of our website.

More studies related to productivity are available free of charge at (*www.statcan.ca/english/studies/economic.htm*).

For more information, or to enquire about the concepts, methods or data quality of this release, contact John Baldwin (613-951-8588), Microeconomic Analysis Division. ■

Domestic sales of refined petroleum products

January 2008 (preliminary)

Sales of refined petroleum products totalled 8 485 500 cubic metres in January, up 195 400 cubic metres or 2.4% from January 2007.

Sales increased in five of the seven major product groups in January. Heavy fuel oil registered the largest volumetric increase, up 105 300 cubic metres or 21.5% from the same month a year earlier. Diesel fuel oil sales were up 66 300 cubic metres or 3.1%. Motor gasoline sales increased 36 300 cubic metres or 1.1%.

By grade, sales of premium motor gasoline fell 3.2%. Regular non-leaded gasoline increased 1.4%. Mid-grade gasoline sales were up slightly from January 2007.

Preliminary domestic sales of refined petroleum products data are no longer available on CANSIM.

Definitions, data sources and methods: survey number 2150.

For more information, or to enquire about the concepts, methods or data quality of this release, contact the dissemination officer (toll-free 1-866-873-8789; 613-951-9497; *energ@statcan.ca*), Manufacturing, Construction and Energy Division.

Sales of refined petroleum products

	January 2007[r]	January 2008[p]	January 2007 to January 2008
	thousands of cubic metres		% change
Total, all products	**8 290.1**	**8 485.5**	**2.4**
Motor gasoline	3 323.5	3 359.8	1.1
Diesel fuel oil	2 163.2	2 229.5	3.1
Light fuel oil	629.7	570.6	-9.4
Heavy fuel oil	489.0	594.3	21.5
Aviation turbo fuels	491.3	536.7	9.2
Petrochemical feedstocks[1]	406.7	393.4	-3.3
All other refined products	786.8	801.3	1.8

[r] *revised*
[p] *preliminary*
1. *Materials produced by refineries that are used by the petrochemical industry to produce chemicals, synthetic rubber and a variety of plastics.*

■

Industrial Water Survey

2005

The new Industrial Water Survey gathered information on the intake and discharge of water by three groups of industries: manufacturing, mining and thermal-electric generating industries.

The survey was sent to thermal-electric power generating plants (including nuclear electric power generators), coal mines, metal mines, non-metallic mineral mines (excluding sand, gravel, clay and ceramic and refractory mines and quarries) and manufacturers.

The survey collected information on sources of water, purposes for which the water was used, whether water was re-circulated or re-used, where the water was discharged and what treatments were used. It also collected information on water acquisition costs, treatment costs and operating and maintenance expenses related to water intake and discharge.

The survey found that these three industry groups had a total water intake in 2005 of nearly 40.4 billion cubic metres. This was enough to fill more than 16 million Olympic-sized swimming pools.

Thermal-electric power producers accounted for 80% of this intake, while manufacturers withdrew 19%, and mines took 1%.

These three groups discharged 38.6 billion cubic metres in wastewater in 2005. Again, thermal-electric power producers accounted for almost 81% of the total, manufacturing industries just over 17%, and the mining industries nearly 2%.

These industries recycled about 9.6 billion cubic metres of water. The thermal-electric power producers accounted for about 44% of this total, while manufacturing industries recycled about 35% and mining industries the remaining 21%.

The three groups had total water costs amounting to just over $2.8 billion.

Note: The 2005 Industrial Water Survey was conducted under the umbrella of the Canadian Environmental Sustainability Indicators project, a joint initiative of

Statistics Canada, Environment Canada and Health Canada. It is the successor to the Water Use Survey last conducted by Statistics Canada for Environment Canada in 1996. This survey will be a biennial survey with the next version collecting data for 2007.

Definitions, data sources and methods: survey number 5120.

The report, *Industrial Water Use*, 2005 (16-401-XWE, free), is now available online. It incorporates statistical tables from the preliminary release in *The Daily* in July 2007. From the *Publications* module of our website, under *Free internet publications* choose *Environment*.

For more information, or to enquire about the concepts, methods or data quality of this release, contact the information officer (613-951-0297; *environ@statcan.ca*), Environment Accounts and Statistics Division. ■

Natural gas transport and distribution industries

2006

Financial and operational data on the natural gas transport and distribution industries are now available for 2006.

Definitions, data sources and methods: survey number 2180.

For more information, to order data, or to enquire about the concepts, methods or data quality of this release, contact the dissemination officer (toll-free 1-866-873-8789; 613-951-9497; *energ@statcan.ca*), Manufacturing, Construction and Energy Division. ■

Oil pipeline industry

2006

Financial and operational data on the oil pipeline industry are now available for 2006.

Definitions, data sources and methods: survey number 2179.

For more information, to order data, or to enquire about the concepts, methods or data quality of this release, contact the dissemination officer (toll-free 1-866-873-8789; 613-951-9497; *energ@statcan.ca*), Manufacturing, Construction and Energy Division. ■

Cement

January 2008

Data on cement are now available for January.

Available on CANSIM: tables 303-0060 and 303-0061.

Definitions, data sources and methods: survey number 2140.

For more information, or to enquire about the concepts, methods or data quality of this release, contact the dissemination officer (toll-free 1-866-873-8789; 613-951-9497; *manufact@statcan.ca*), Manufacturing, Construction and Energy Division. ■

New products

The Canadian Productivity Review: "Infrastructure capital: What is it? Where is it? How much of it is there?", no. 16
Catalogue number 15-206-XIE2008016
(free).

Industrial Water Use, 2005
Catalogue number 16-401-XWE
(free).

Exports by Country, January to December 2007, Vol. 64, no. 4
Catalogue number 65-003-XCB ($67/$221).

Exports by Country, January to December 2007, Vol. 64, no. 4
Catalogue number 65-003-XPB ($133/$441).

All prices are in Canadian dollars and exclude sales tax. Additional shipping charges apply for delivery outside Canada.

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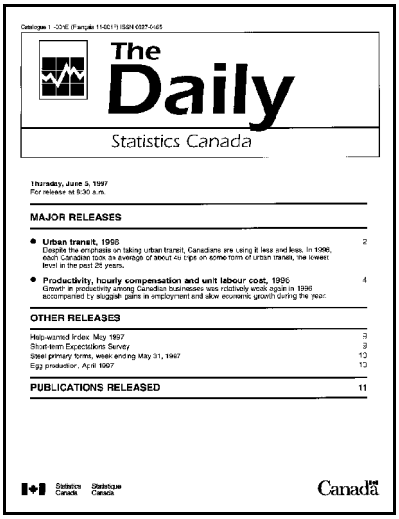

Catalogue 11-001E (Français 11-001F) ISSN 0837-0445

The Daily

Statistics Canada

Thursday, June 5, 1997
For release at 8:30 a.m.

MAJOR RELEASES

- **Urban transit, 1996** 2
  Despite the emphasis on taking urban transit, Canadians are using it less and less. In 1996, each Canadian took an average of about 40 trips on some form of urban transit, the lowest level in the past 25 years.
- **Productivity, hourly compensation and unit labour cost, 1996** 4
  Growth in productivity among Canadian businesses was relatively weak again in 1996 accompanied by sluggish gains in employment and slow economic growth during the year.

OTHER RELEASES

Help-wanted Index, May 1997 8
Short-term Expectations Survey 9
Steel primary forms, week ending May 31, 1997 10
Egg production, April 1997 10

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Statistics Canada Statistique Canada

Canada

Statistics Canada's official release bulletin

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