

2004 CLIMATE CHANGE AND AIR ISSUES ANNUAL REPORT



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IMAGES

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TransCanada is a leading North American energy infrastructure company focused on two complementary and interrelated businesses – natural gas transmission and power generation.

TransCanada owns and operates more than 41,000 kilometres of pipeline, making it one of the largest natural gas transmission systems in North America. Our natural gas pipeline system is a vital transportation network. We link remote natural gas producing areas of the Western Canada Sedimentary Basin with markets throughout Canada and the United States.

Our pipeline network gathers natural gas from more than 1,200 locations, largely in Alberta, and transports it over long distances to some 300 delivery points across Canada. At these points, TransCanada connects with other pipeline carriers and distribution pipeline companies that deliver natural gas to consumers, businesses and industries throughout North America. In 2004, we delivered enough natural gas to heat roughly 28 million homes. A popular fuel due to its lower emissions impact, natural gas is used to heat homes, fuel businesses and drive major economic sectors.

TransCanada entered the North American power market in the early 1990s, recognizing the link between our natural gas transmission business and rising demand for electricity generation. Today, TransCanada owns and operates facilities that generate more than 2,000 megawatts of power. This includes TransCanada's wholly owned operating facilities as well as those under construction or in development. Natural gas and waste heat are used extensively to generate electricity at our wholly owned power facilities. We also have interests in non-operated facilities and projects currently in development that will generate some 4,500 megawatts of additional electricity using wind, nuclear, hydro and coal.

A detailed list and map of TransCanada's pipeline and power facilities is located on page 32 of this report.

FROM THE PRESIDENT



*Hal Kvisle
President and CEO
TransCanada*

TransCanada is in the business of transporting natural gas and generating electricity to meet the growing energy needs of businesses and consumers throughout North America. While expanding our business, TransCanada continuously identifies and takes early action to manage issues that could affect our ability to provide consumers with safe, reliable and cost-effective energy supplies. Among these issues are business risks associated with greenhouse gas emissions and air pollutants such as nitrogen oxides.

Greenhouse gases and nitrogen oxides are emitted from the combustion of fossil fuels, including natural gas. This low-emissions fuel is used extensively at TransCanada's facilities to operate the hundreds of turbine engines required to generate electricity and drive compressors that push natural gas through our pipeline network. The relationship is simple: generating more megawatts of electricity and transporting higher volumes of natural gas directly increases the amount of emissions produced by our facilities.

In the mid-1990s, TransCanada recognized the challenge of meeting the economy's rising demand for energy while responding to government and public pressure to limit greenhouse gases linked to climate change and nitrogen oxides that contribute to regional air quality issues such as

smog. To meet this challenge, TransCanada invested financial and human resources into researching, developing and applying new processes and technologies that have significantly increased the energy efficiency of our operations. At the same time, we have implemented industry-leading programs to reduce releases of methane – the chief component of natural gas – from one of the longest and most complex pipeline systems operating in the world today.

More than 10 years of emissions measurement and mitigation experience have provided TransCanada with a strategic business advantage, given growing government requirements for managing and reducing all air emissions. We continue to develop technologies that replace outdated measuring methods and statistically derived emissions estimates in order to create a more accurate and meaningful emissions inventory. At the same time, we have integrated our principles of emissions reduction throughout the TransCanada organization to ensure the potential business risks and opportunities posed by increasing environmental priorities are considered when making decisions regarding our pipeline and power businesses.

North America relies heavily on fossil fuels to supply the energy requirements of its ever-increasing population and growing industries. Higher investment in renewable and alternate energy technologies, such as TransCanada's Cartier Wind power project in Québec, will allow these energy sources to increase their market share. However, for the foreseeable future, North America will continue to need a safe and secure supply of fossil fuels. The policy, strategy and actions detailed in this report demonstrate that TransCanada is well-positioned to meet North America's energy needs in an environmentally responsible and economically effective manner.



Hal Kvisle
President and CEO

2004 OVERVIEW

TransCanada is investigating ways of capturing carbon dioxide produced by our pipeline operations and using it to improve other industrial processes. Carbon dioxide – the largest component in TransCanada's greenhouse gas (GHG) emissions inventory – is the focus of a project that is evaluating the benefits of capturing, injecting and sequestering carbon dioxide in a subsurface reservoir to increase the recovery of coalbed methane. (See page 15.)

Our fast-growing power business uses leading-edge processes and low-emissions fuels to generate electricity. Six of TransCanada's seven wholly owned, producing power generation facilities have been built within the past five years and all seven operations are fuelled by natural gas or waste heat. Natural gas produces fewer GHG emissions than power plants driven by other fossil fuels such as coal or oil, and waste heat has a negligible GHG impact. Electricity generated from waste heat also fills demand for power that would typically be met by power generated from fossil fuels. Five of our power facilities use cogeneration technology, where waste heat and electricity are both produced from one fuel source – natural gas – providing improved energy efficiencies. TransCanada will continue to expand our power business wherever sound opportunities arise, which may include the construction of new, energy-efficient facilities or the acquisition of existing conventional power generating facilities. (See page 25.)

TransCanada has developed industry-leading field procedures to reduce methane emissions from our pipelines. We minimize the need for blowdowns, when methane is vented from a pipeline to enable safe construction or repairs, by planning and combining repair projects wherever practical. We also employ a range of advanced repair procedures to eliminate the need for blowdowns. Where blowdowns are unavoidable, TransCanada employs tractor-trailer-mounted transfer compressor units to capture methane that would otherwise be vented to the atmosphere. In addition, the most advanced equipment is used to measure methane releases. (See page 20.)

TransCanada has steadily improved the accuracy of our GHG emissions inventory over the past decade through the development of new measuring tools. Our ability to measure methane emissions from small leaks on the TransCanada pipeline system was vastly improved in 2004 with the acquisition of 10 high-flow samplers – enough to equip our entire pipeline maintenance group. The new samplers include microprocessors, which store data that is fed into TransCanada's GeoFind system, a map-driven, online database. The samplers accurately measure our actual fugitive emissions and are a substantial improvement over the previous method of "bagging" leaks in plastic to determine flow rates, which were then used to develop emissions estimates. The commercial availability of the high-flow sampler is a milestone in the development of this technology, which TransCanada has supported through our participation in field tests of the first prototype. (See page 22.)



TransCanada has invested financial and human resources in new processes and technologies that have significantly reduced the volume of GHG emissions produced to deliver a unit of natural gas to market.

TransCanada is involved in research and development work aimed at preventing or mitigating methane emissions, which have a high GHG impact. We're working to improve the efficiency of a prototype portable incinerator used to burn residual methane left in pipelines after transfer compression. Another project involves developing a process to convert methane emissions to carbon dioxide using biofiltration, reducing the GHG impact of methane by more than 80 per cent. Biofilters could be installed at sites throughout our pipeline system where certain equipment emits small volumes of pressurized methane as part of normal operating practices. We are also working on a method of combining emissions of methane – the chief component of natural gas – with fuel gas and using it to drive pipeline compressors. (See page 15.)

TransCanada is working to develop the next generation of energy-efficient technology – fuel cells. We are piloting a proton exchange membrane (PEM) project in Alberta that will evaluate the fuel cell's technical, economic and environmental performance. If successful, the fuel cell could provide a more efficient and low-emissions alternative to thermal electric generators (TEGs) that now provide electrical power to TransCanada's remote pipeline facilities. TEGs operate at about two to three per cent thermal efficiency, while fuel cells offer efficiencies in the 30 to 40 per cent range and are expected to climb. (See page 14.)

TransCanada is working on new technologies – from fuel cells to capturing carbon dioxide emissions – to reduce the amount of emissions produced by our operations.

CHANGES TO THIS REPORT

This is TransCanada's second Climate Change and Air Issues Annual Report and our eleventh public report on greenhouse gas (GHG) management programs. Our report has changed as public policy on climate change and air issues has evolved and this year marks another step in that process.

TransCanada began detailed public reporting of GHG emissions in 1995 as a committed supporter of Canada's Climate Change Voluntary Challenge & Registry Inc. (VCR). Under this program, the Canadian federal government challenged industry to voluntarily reduce GHG emissions and publish annual reports detailing their progress in managing emissions. The voluntary program was launched to help Canada manage the growth in its GHG emissions. TransCanada welcomed this voluntary approach and, for a decade, submitted increasingly detailed documents that regularly won gold-level reporting awards based on the VCR reporting regime.

Our VCR report, with a dozen tables and charts of emissions history, became a key tool for our emissions management strategy and we made plans to extend its scope to cover other emissions besides GHGs. With the conclusion of the government's voluntary climate change program in 2004, TransCanada published our first Climate Change and Air Issues Annual Report, which expanded our GHG management and public reporting process to cover management plans for nitrogen oxides, or NOx. We also increased the scope of our report to cover all wholly owned facilities in the United States, as well as Canada.

But our report has also changed in other ways.

In 2005, the Canadian government moved from a voluntary reporting process to mandatory reporting of GHG emissions to Statistics Canada. The change is part of the government's plan to meet its commitment under the Kyoto Protocol, an international climate change agreement to reduce global GHG emissions. As part of this effort, the government is consulting broadly with industry to establish a new single system for GHG reporting. This new standard will replace existing and somewhat different methods used by the VCR and Statistics Canada.

During this transition period, TransCanada has decided not to publish the emissions data that has appeared in all our previous reports since the data has been developed according to VCR requirements. This will avoid the confusion inherent in publishing figures while a new system is in the process of being developed.

As required, our GHG emissions data has been submitted to Statistics Canada, while NOx numbers have been filed with the National Pollutant Release Inventory (NPRI) since 2003. While standards are being finalized for GHG emissions reporting, this report will focus on describing management plans and emissions mitigation programs that demonstrate TransCanada's ability to limit emissions from our facilities.

We list, but do not report on, several major pipeline and power facilities in which TransCanada holds significant interests but whose management and day-to-day operational control are provided by third parties. (See pages 31-35.) In 2005, TransCanada sold its interest in TransCanada Power, L.P., so facilities owned by Power LP are not included in this report.



TransCanada has annually published details of our GHG emissions actions and plans for more than 10 years.

Greenhouse gas emissions (GHGs) are linked to global climate change while nitrogen oxides (NOx) contribute to regional air quality issues that affect the environment and human health. While the nature and impacts of these emissions differ, both types of emissions can result from the same source – the combustion of fossil fuels.



OUR EMISSIONS SOURCES

GHG Emissions

Greenhouse gas emissions are different than air pollutants and have been linked with global climate change. The operation of pipeline and power facilities produces “direct” emissions of three GHGs: carbon dioxide, methane and nitrous oxide. TransCanada also accounts for indirect emissions, which are produced by companies that generate the electricity TransCanada purchases for use at our facilities. GHG impacts are global, which means reductions in any part of the world will help limit the effects of these emissions on the climate.

Carbon Dioxide

The largest component of TransCanada’s direct GHG emissions inventory is carbon dioxide, at 89 per cent. Most of our carbon dioxide emissions result from the combustion of natural gas at our pipeline facilities. Much smaller amounts are produced from our power generation plants.

Methane

Methane makes up nine per cent of TransCanada’s direct GHG emissions inventory. Methane is the chief component of natural gas. It is largely emitted from small leaks throughout our pipeline system, from components that are engineered to release methane during normal operations and during blowdowns, when natural gas is vented to the atmosphere to allow for construction and maintenance work. Negligible amounts are released from our power operations.

STRATEGY

Nitrous Oxide

Very small amounts of nitrous oxide – two per cent of total direct GHGs – are emitted as a byproduct of the combustion of natural gas at our pipeline and power facilities.

Indirect Sources

About eight per cent of our total GHG emissions inventory is classified as indirect. Since indirect emissions are associated with the electricity TransCanada purchases from third parties for use at our pipeline facilities, the amount of these emissions depends on whether the electricity is produced using coal or natural gas. Natural gas-fired power plants produce less carbon dioxide than coal-fired plants on a per-unit-energy-input basis.

GHG Basics

The three GHGs commonly produced by TransCanada are carbon dioxide, methane and nitrous oxide. Carbon dioxide is the highest volume GHG emission produced by human activities. For this reason the global warming impacts of other GHGs are commonly expressed as carbon dioxide equivalent. This is done by multiplying tonnes of emissions by their global warming potential, a factor determined by the world scientific community. This factor recognizes some GHG emissions are more potent than others in trapping heat within the atmosphere. For example, one tonne of methane has the same global warming potential over 100 years as 21 tonnes of carbon dioxide, while nitrous oxide has a global warming potential of 310.

Global Warming Potentials

CO ₂	carbon dioxide	one tonne x 1	=	tonnes carbon dioxide equivalent (CO ₂ E)
CH ₄	methane	one tonne x 21	=	tonnes carbon dioxide equivalent (CO ₂ E)
N ₂ O	nitrous oxide	one tonne x 310	=	tonnes carbon dioxide equivalent (CO ₂ E)

Nitrogen Oxides

Nitrogen oxides (NOx) are air pollutants that contribute to the formation of smog. NOx results from the combustion of fossil fuels such as the natural gas used extensively by TransCanada facilities. NOx is formed due to the high temperatures used during combustion, which oxidize the large quantities of air consumed during the process. Since NOx contributes to regional air issues, reductions must occur regionally to be effective.

Almost 90 per cent of our GHG inventory consists of carbon dioxide emissions produced by the more than 300 natural gas-fired compressor engines required to move natural gas through our pipeline system.

