GHG Sources

The operation of our pipeline systems produces three types of GHG emissions: carbon dioxide, methane and nitrous oxide. Nitrous oxide is a very small portion of total carbon dioxide equivalent emissions and comes from essentially the same sources as carbon dioxide.

Carbon Dioxide Sources

- Natural gas-fired turbines and reciprocating engines that drive compressors used to move natural gas through TransCanada's pipelines at speeds of 30 kilometres per hour.
- Natural gas or diesel fuel consumed by boilers required for space heating and auxiliary or backup generators in case of power interruptions at compressor stations.
- Line heaters that burn natural gas to raise the temperature of sales gas at storage and production facilities.

Methane Sources

- Fugitive emissions from small leaks that occur throughout all pipeline systems.
- Fugitive emissions from components that are engineered to emit methane as part of normal operations.
- Fugitive emissions from pipeline blowdowns, when natural gas is vented to the atmosphere to allow for safe maintenance and construction activities.
- Unburned hydrocarbons (methane) in exhaust gases.

Our pipeline system has a complex pickup and delivery role, quite different from most other North American pipeline systems.

Measuring GHG Emissions

Consumer demand for natural gas is entirely outside TransCanada's control; however, changes in demand have a dramatic impact on our total GHG emissions profile.

That's why we measure and report pipeline GHG emissions in two ways: total GHG emissions and GHG intensity. GHG intensity compares total pipeline emissions against gas volumes delivered and average distance of haul for each pipeline system. GHG intensity is the most accurate way of measuring TransCanada's ability to manage emissions while delivering major gas volumes over long distances.

TransCanada will continue to measure and report total tonnes of GHG emissions as required, but we will also calculate pipeline GHG intensity as an indicator of progress in our emissions management.

Reducing Pipeline GHG Intensity

TransCanada has established the following performance indicators to track and measure success in three specific areas that affect the GHG emissions intensity of our pipeline network. These performance measures are:

- carbon dioxide emissions
- fugitive methane emissions from blowdowns, when gas is vented from lines to enable safe maintenance or repairs
- fugitive methane emissions from leaks and engineered sources.

Reducing Carbon Dioxide Emissions

Two-thirds of TransCanada's total GHG emissions inventory consists of carbon dioxide (CO_2) emissions from the compressor engines required to move natural gas through our pipelines. Installing high-efficiency turbine engines when replacing older units or adding capacity has helped reduce pipeline CO_2 emissions since 1990. But our ability to achieve further reductions in this area will depend on the development of new compressor technologies and significant improvements in CO_2 removal, transportation and storage or sequestration.

Today, roughly 85 per cent of TransCanada's compression power is derived from natural gas-fired turbine engines. Some of these are aeroderivative turbine engines, which are similar to airplane engines and can have energy efficiencies as high as 39 per cent. About seven per cent of our compression power is provided by less efficient natural gas-fired reciprocating engines and another seven per cent from electric drives. The average energy efficiency of TransCanada's pipeline compressor engines is 35 per cent. That means 35 per cent of the total fuel consumed actually produces the mechanical power that drives compressor engines. The rest of the consumed fuel is lost to mechanical friction, or waste heat, which is emitted from exhaust stacks. TransCanada has implemented maintenance procedures to ensure efficiencies are maintained at peak levels.

The new turbine engines are an improvement over older models that had thermal efficiencies as low as 25 per cent. However, replacement decisions have to meet strict cost/benefit criteria because a 30-megawatt (MW) turbine engine costs roughly $30 million to purchase and install and has a lifespan of 25 to 30 years.

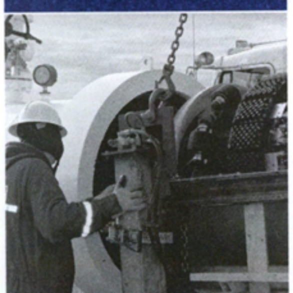
Reducing Fugitive Methane Emissions from Blowdowns

Realistically, TransCanada's largest opportunity for reductions in GHG emissions lies with controlling fugitive and blowdown emissions of methane, the chief component of natural gas. In 2004, methane made up 8.3 per cent of TransCanada's total GHG emissions and 10 per cent of pipeline GHGs, with virtually all methane emissions attributed to our pipeline network.

Having eliminated nearly three-quarters of total methane emissions since 1990, there are now fewer ways in which we can achieve further methane reductions. But we continue to identify opportunities and implement innovative procedures for decreasing fugitive methane emissions.

TransCanada's largest opportunity for GHG reductions lies in controlling emissions of methane.

TransCanada is evaluating new technology that would detect stress corrosion cracking in pipelines without the need for venting natural gas to the atmosphere.



In 2004, nearly 30 per cent of methane emissions from pipelines resulted from blowdowns, when pipe sections are sealed off and natural gas is vented to allow for safe construction and maintenance work.

TransCanada's first strategy is to avoid or prevent blowdowns. Where that isn't achievable, we capture as much methane as possible and transfer it to parallel pipelines. We are also piloting an incineration project, where residual blowdown methane is burned to produce carbon dioxide, which has a far lower GHG impact than methane.

Preventing Blowdown Emissions

Outage Decision Model (ODM) is used to assess and minimize the frequency and duration of all pipeline outages (service interruptions), usually by combining several repair and maintenance jobs into a single outage. TransCanada policy states that ODM must be used before any outage is performed on our pipeline network.

Hot tapping technologies, pioneered by TransCanada, allow a new branch pipeline to be connected to an operating pipeline. New branch lines up to 30 inches in diameter can be welded to operating pipelines up to 48 inches in diameter during full-pressure, full-flow operations. This allows work to proceed safely, without the need to vent large gas volumes in a blowdown.

Repair sleeves of composite fibre or steel are used to repair corrosion in pipeline sections without shutting down service or venting methane to the atmosphere. During these repairs, pipeline compression is typically reduced to 80 per cent of normal pressure.

Valve sealing can stop leaks in very large valves on transmission pipelines, substantially reducing the amount of natural gas that must be vented to the atmosphere in a blowdown. Valves are closed on either end of a pipeline section slated for repair. But if one of the valves is found to leak, another valve further along the line must be closed, which substantially increases the amount of natural gas that must be vented. Traditionally, such blowdown extensions could only be avoided if the valve seat was faulty and sealant could be applied. But the development of new sealants that can be applied to entire valve bodies has significantly reduced the number of cases in which blowdowns are extended due to valve leaks.

In-line inspection tools are being evaluated by TransCanada and GE Energy to determine if new technology can provide dependable remote detection of stress corrosion cracking (SCC) in operating pipelines. Pipeline inspection tools, called "pigs," are fitted with electromagnetic acoustic transducers (EMATs) – ultrasound systems that do not rely on a liquid medium. If successful, EMAT technology could replace conventional SCC detection methods, involving line excavations and blowdowns of natural gas to allow for hydrostatic pipeline tests using water pressure.

Capturing Blowdown Emissions

Portable transfer compressors push gas out of pipeline sections scheduled for repair or maintenance into parallel pipeline sections to ensure safe working conditions. Our fleet of eight truck-mounted compressors captures most of the methane that would otherwise be vented to the atmosphere during a blowdown.

Air-powered expellers remove small amounts of residual methane that remain following transfer compression. Traditionally, these expellers were powered by a stream of compressed gas from the parallel, operating pipeline system, but this involved releasing some methane to the atmosphere. Since 2000, TransCanada has used air compressors to power the expellers, avoiding another source of methane emissions.

Incineration of methane has the potential to reduce the GHG impacts of residual methane following blowdowns. Incineration converts methane to carbon dioxide, which has a much lower GHG impact. We are now working with vendors on incinerator design modifications that would reduce the elapsed time for incineration. This would limit the length of time that parallel lines must carry additional gas volumes – increasing compression requirements and associated emissions that tend to offset incineration benefits.

Innovative measures for the prevention and capture of methane emissions have reduced this source of GHGs by 75 per cent since 1990.

Reducing Fugitive Methane Emissions from Leaks

Reductions in methane emissions from leaks and engineered sources are achieved through our extensive fugitive emissions management program.

Fugitive emissions from leaks result from pipeline equipment, such as flanges and valves, as well as components that are engineered to release methane as part of normal operations. Emissions of this type are continuous (24 hours/day) and account for about 70 per cent of TransCanada's total methane emissions, or seven per cent of the company's total pipeline GHG emissions. Locating and reducing emissions from these sources can potentially consume significant resources.

As fugitive emissions sources are eliminated each year, opportunities for savings in succeeding years are reduced accordingly.

Detection and Measurement

Leak Detection and Repair (LDAR) involves identifying leaks from susceptible components, setting priorities, conducting repairs for those components that do not require pipeline outages and documenting results. This process is carried out on a rotating basis covering all TransCanada's pipeline facilities. The Fugitive Emissions Management Team is responsible for implementing LDAR work and tallying the emissions savings on a monthly basis. A central database captures all the LDAR data recorded for each facility on an annual basis. The number of facilities that undergo the LDAR process is the key business performance indicator for field operations teams and management, and is a factor in their compensation.

From accumulated experience, it has become evident that not all facilities require an annual leak detection and repair schedule. Reductions in fugitive emissions can be maintained even when some facilities are moved to leak detection and repair every two years. The LDAR program is administered through the planned maintenance program, called Avantis, and has become part of TransCanada's overall standard operating procedures.

High-flow samplers became the standard method of measuring fugitive emission leaks throughout TransCanada's entire pipeline network in 2004. Expanding our use of high-flow samplers was made possible due to the introduction of commercially manufactured units, which allowed TransCanada to acquire 10 high-flow samplers – enough to equip our entire pipeline maintenance group.

Standard use of high-flow samplers has important implications for TransCanada's fugitive emissions measurement program because of their speed and precision in measuring methane emissions from small leaks. To date, these units are giving us far more accurate – and lower – measurements of total fugitive emissions. They replace older methods that involved using soapy water to find small leaks, which were then "bagged" in plastic to determine flow rates.

New high-flow samplers include microprocessors for storage and downloading of data, greatly improving accuracy and efficiency of record keeping. Data from all high-flow samplers is fed into TransCanada's GeoFind database system, providing a highly accurate, system-wide picture of our fugitive emissions profile in real time.

TransCanada's experience with high-flow samplers dates back to 1996 when we helped field-test the first prototype. Since that time, we have owned the only high-flow sampler in Canada. During almost a decade of use, the high-flow prototype – about the size of a briefcase – has proven significantly faster and more accurate than bagging methods of leak measurement.

Aerial leak inspection and gas detectors are used to find leaks in buried facilities and open-ended lines such as blowdown vents, where high-flow sampling and soap-and-water detection are not practical.

High-flow samplers are the latest and best technology for accurate measurement and elimination of fugitive methane emissions.

POWER

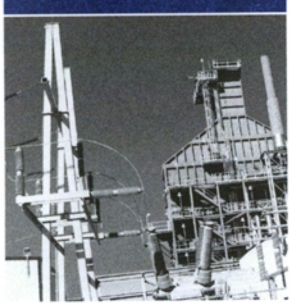
TransCanada's Role in North American Power

TransCanada is among North America's fastest growing independent electricity producers. We own and operate more than 1,042 megawatts (MW) of installed generation capacity, with another 1,000 MW acquired or under construction in 2005.

Since entering the electricity market in the early 1990s, TransCanada has invested in high-efficiency power facilities that generate electricity using leading-edge processes and low-emissions fuels. 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 in development that generate some 4,500 MW of electricity using wind, nuclear, hydro and coal.

In 2005, TransCanada sold its interests in TransCanada Power, L.P., which included nine power plants. The move allows TransCanada to focus on larger projects that have long-term sales contracts for their power output. The new projects include high-efficiency, gas-fired cogeneration, wind power and hydroelectric power.

The natural gas-fired Grandview cogeneration facility was completed in December 2004 and operated throughout 2005. Power and waste heat from this 90-MW facility, located in Saint John, New Brunswick, is sold to Irving Oil Limited under a 20-year power purchase agreement (PPA).



TransCanada added 567 MW of zero-emissions hydro to its generating capacity in April 2005 with the purchase of the Connecticut River and Deerfield River hydroelectric systems from USGen New England Inc.

The assets include generating facilities on two river systems in New England, now known as TransCanada's U.S. Northeast Hydro Systems.

In Québec, TransCanada continued to focus on cogeneration power facilities with the construction of the 550-MW Bécancour cogeneration power plant near Trois-Rivières. It is scheduled to begin operating fall 2006, and will supply power to Hydro-Québec Distribution and steam to major businesses.

About 740 MW of wind power will come on stream between 2006 and 2012 with the commissioning of six power projects in Québec. The projects represent an investment of $1.1 billion by Cartier Wind Energy Inc., which is indirectly co-owned by TransCanada at 62 per cent, and Innergex II Income Fund at 38 per cent. The projects have long-term electricity supply contracts with Hydro-Québec Distribution. When completed, the projects' total annual production will provide the energy required to meet the electricity needs of about 150,000 households in Québec. Typically, wind power can generate electricity about one-third of the time since winds are not steady enough to produce power consistently.

Wind power is a growing segment of our power portfolio.

Power Quickfacts

Wholly Owned Power Facilities

Capacity *– megawatts (MW)*

Plant	Capacity	Startup	Type
Bear Creek	80	March/03	Combined Cycle Cogeneration
*Bécancour**	*550*	Fall/06	Cogeneration
Cancarb Power	27	Feb/01	Waste Heat Recovery
Carseland	80	Jan/02	Cogeneration
Grandview	90	Dec/04	Cogeneration
MacKay River	165	Fall/04	Cogeneration
Ocean State	560	Dec/90	Combined Cycle
Redwater	40	Jan/02	Cogeneration
*U.S. Northeast Hydro***	*567*	April/05	Hydroelectric
Total	1,042/*2,159*		

* *Bécancour is currently under construction.*

** *U.S. Northeast Hydro was purchased April 1, 2005. Assets include the Connecticut River and Deerfield River hydroelectric systems in New England.*

Five of our power facilities are cogeneration operations that have the highest possible energy efficiency rating with current technology.

GHG Sources

- Natural gas-fired turbines that drive generators used to create electricity.
- Boilers at power plants.

Energy Efficiency

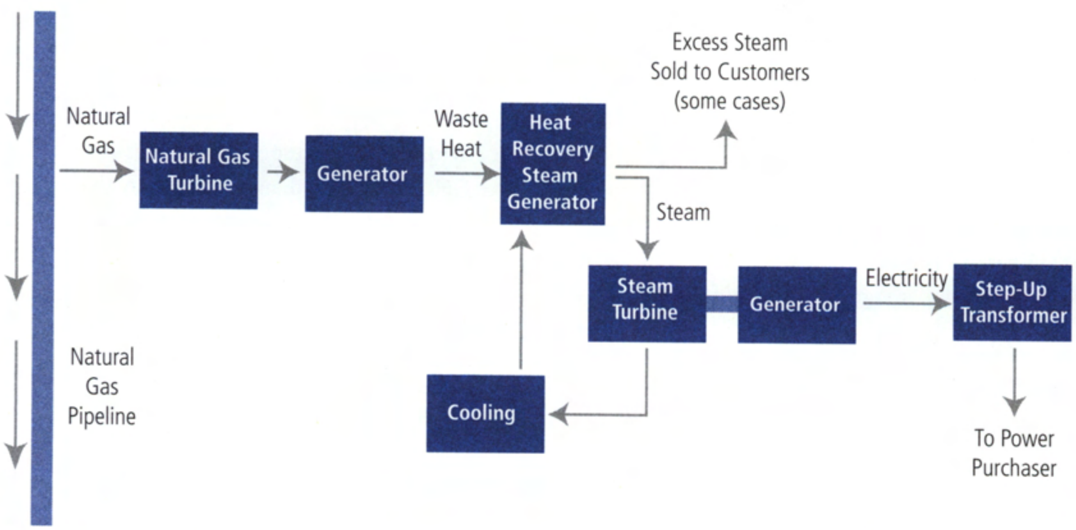
Six of TransCanada's seven wholly owned, producing power generation facilities have been built within the past five years and all seven operations use some of the most environmentally responsible processes and fuels available today. Six are fuelled by natural gas, producing fewer GHG emissions than power plants that consume other fossil fuels such as coal or oil. A conventional coal-fired power plant creates about 1,000 kilograms of carbon dioxide for each megawatt-hour of electricity generated, compared with approximately 400 kilograms of carbon dioxide produced by conventional natural gas-fired power plants.

Our seventh wholly owned power facility, Cancarb, takes advantage of a unique opportunity and generates electricity almost entirely from waste heat provided by an adjoining industrial operation. Electricity generated from waste heat has a negligible GHG impact. It also fills demand for power that would typically be met by fossil fuel generators.

Five of our seven power operations are cogeneration facilities. Cogeneration facilities use natural gas-fired turbine engines to produce two commodities – electricity and waste heat – from one fuel source. Natural gas-fired turbine engines drive generators that produce electricity while waste heat from the turbine engines is captured or turned into steam. Both products can be sold to nearby industries to heat buildings or for use in various processes. Waste heat and steam can displace fossil fuels and their associated emissions.

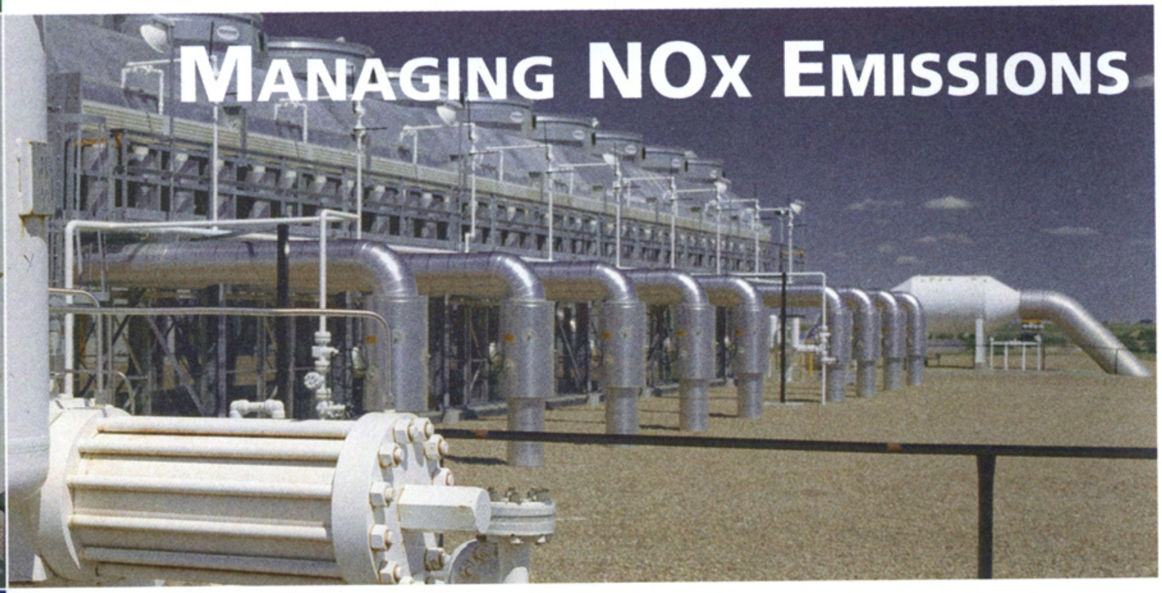
Since waste heat and steam cannot be transported long distances, cogeneration plants must be located close to industrial clients. For example, our MacKay River power facility sells steam to a nearby oilsands operator to extract oil from the Alberta tar sands while our Redwater power facility sells waste heat to a natural gas liquids fractionation plant to extract propane and butane from natural gas.

DIAGRAM 2 – TYPICAL WASTE HEAT PROCESS USED IN TRANSCANADA POWER FACILITIES



Waste heat cannot be transported long distances, so cogeneration plants must be located close to industrial clients.

Nitrogen oxides (NOx) are air pollutants that contribute to regional air quality issues such as smog. TransCanada annually reports NOx emissions to Canada's National Pollutant Release Inventory (NPRI).



Managing NOx Emissions

PIPELINES

The combustion of natural gas consumed by our pipeline operations produces NOx.

NOx Sources

- Natural gas-fired turbines and reciprocating engines that drive compressors used to move natural gas through TransCanada's pipelines.
- Natural gas or diesel fuel consumed by boilers required for space heating and auxiliary or backup generators in case of power interruptions at compressor stations.
- Line heaters that burn natural gas to raise the temperature of sales gas at storage and production facilities.

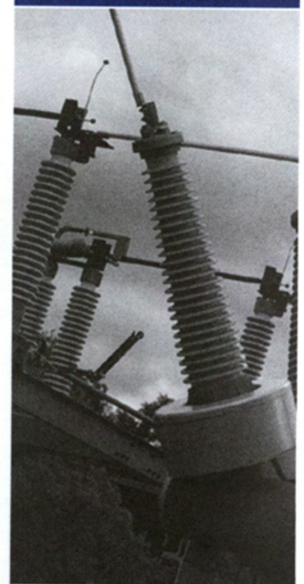
Measuring NOx

On TransCanada's pipeline system, Emissions Factor Estimate (EFE) is the method used to calculate NOx emissions from natural gas-fired turbines and reciprocating engines. Emissions are estimated according to the engine type. This method results in a high estimate, since it uses the engine's highest operating temperature and related emissions. EFE is also used to determine NOx levels from stationary combustion equipment at pipeline installations.

Managing NOx

There are more than 300 compressor units along our 41,000-kilometre, wholly owned pipeline network. In recent years, older style reciprocating engines have been retired as necessary and only a small number remain in service. New compressors are driven by natural gas-fired turbine engines, which reduce the production of all emissions.

A number of technologies are used to prevent the formation of NOx during the operation of the turbine or reciprocating engines on our pipelines. Dry Low Emissions (DLE), Dry Low NOx (DLN) and SoLo NOx all refer to the same basic technology, which is the preferred method of NOx prevention at most TransCanada facilities. These technologies tightly control the air/fuel ratios used in the combustion process in order to reduce the flame temperature and resulting NOx formation. Water is used to reduce flame temperature and NOx formation at three compressor stations on our BC System.



POWER

NOx Sources

- Natural gas-fired turbines that drive generators at the majority of TransCanada's power facilities.

Measuring NOx

NOx emissions are measured at TransCanada facilities using Continuous Emissions Monitoring (CEM), where an analyzer in the flue stack gives a direct measurement.

Managing NOx

TransCanada's main objective is to prevent the formation of NOx at its power facilities through the use of low-NOx technologies. Where prevention isn't economically feasible or required by law, TransCanada manages these emissions through established cap-and-trade systems. To manage NOx, TransCanada:

- prevents NOx formation through our choice of processes for generating electricity
- uses front-end technologies designed to prevent the formation of NOx, such as DLN or DLE technology
- trades or purchases NOx emissions allowances in regions that have implemented cap-and-trade systems.

Processes

Of our seven wholly owned, producing power plants, six have been built since 2001 and use some of the most environmentally responsible technologies available to generate electricity. Cancarb is powered almost entirely by waste heat from an adjacent industrial site, and produces near zero-emissions electricity. Five of our power