

Methane Emissions Management at TransCanada

“Modern Technologies of Detection and Elimination of Methane Leakages from Natural Gas Systems”

Tomsk, Russia

September 14-16, 2005



Methane Emissions Management



Agenda

- TransCanada in business
- Climate Change Policy/Strategy
- Greenhouse Gas Emissions
- Emissions Management
- TransCanada's Experience
 - Control Methodologies
 - Research & Development
- Conclusion
- Opportunities

Leading North American energy company



- Competitively positioned in natural gas transmission & power services
- \$22.1 billion of premium pipe and power assets (\$Cdn at Dec. 31, 2004)
- Skilled, expert people with strong technical knowledge
- Strong financial position



Natural gas transmission & power assets



Transmission – 41,000 km of pipeline: 11.5 Bcf/day
Power – 5,700 MW (including LP and plants in development)

Methane emissions management



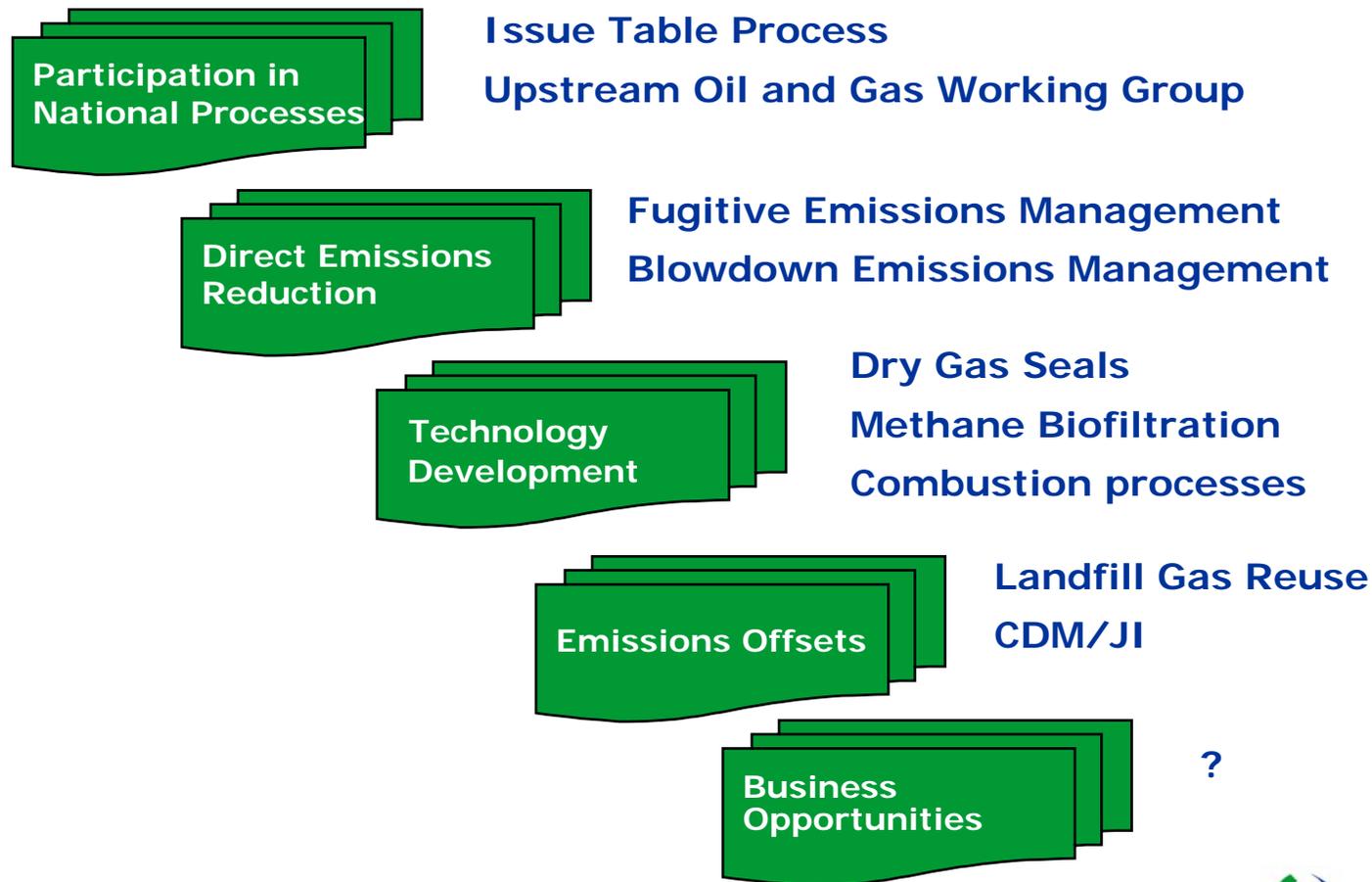
Climate Change Policy

- Climate Change issue is not going away.
- Greenhouse Gas Emissions is potential liability for TransCanada.
- We have a plan in place to manage climate change.
- TransCanada believes in promoting global solutions to this global challenge.
- TransCanada believes prudent action is required.
- TransCanada believes in a strong commitment to technological innovation.

Methane Emissions Management



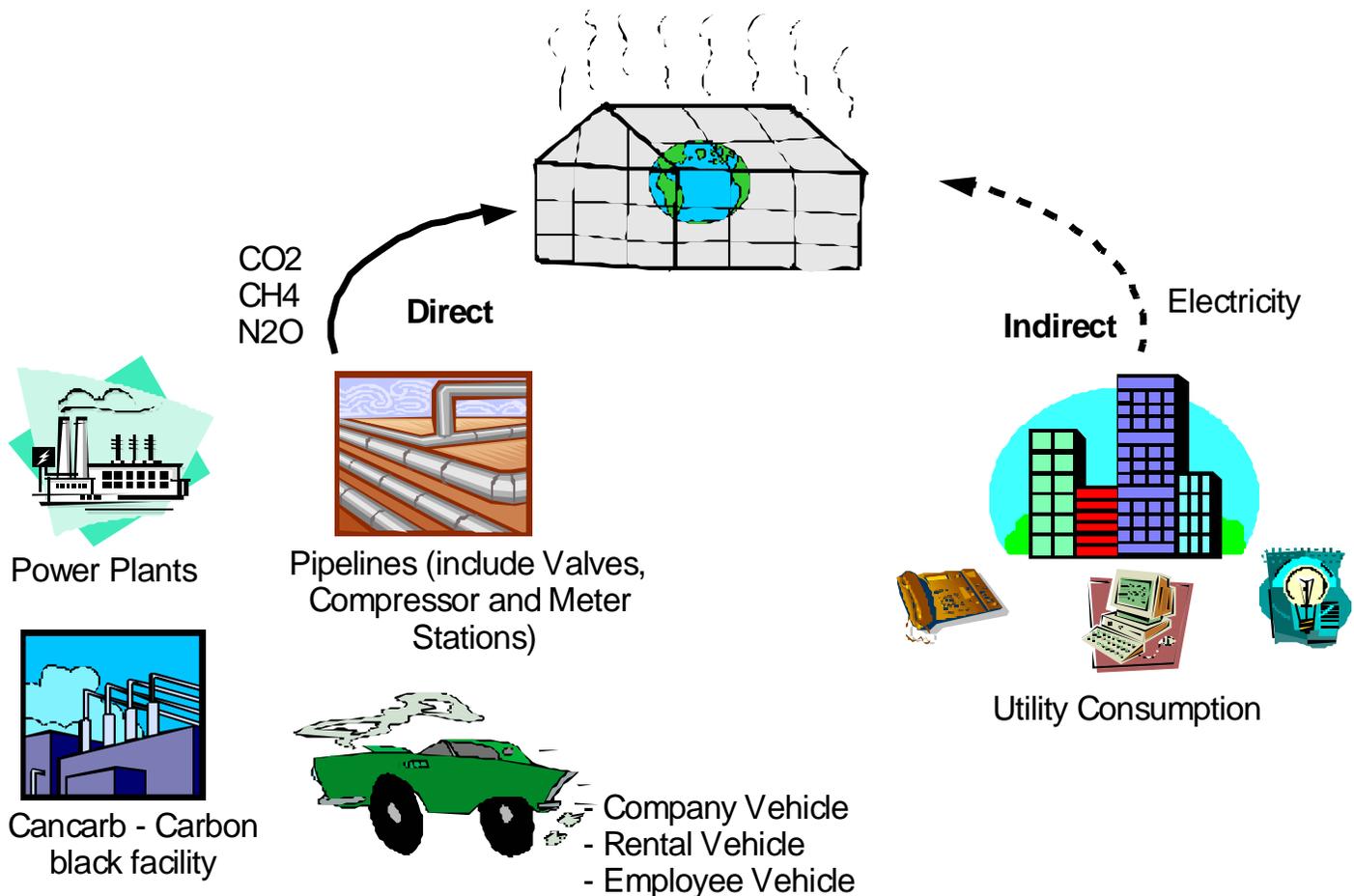
Climate Change Strategy



Sources of greenhouse gas emissions



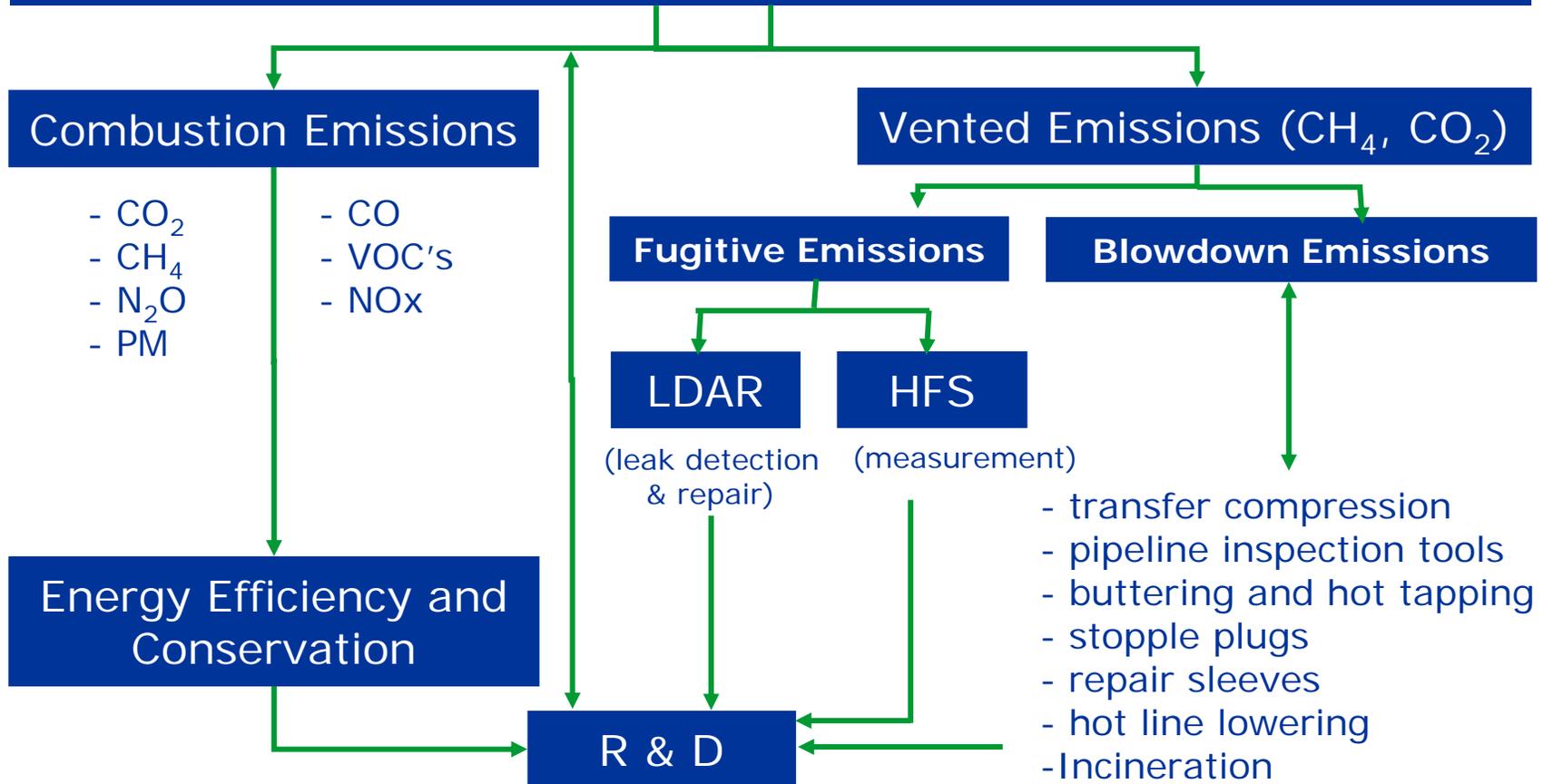
Source of Greenhouse Gas in TransCanada



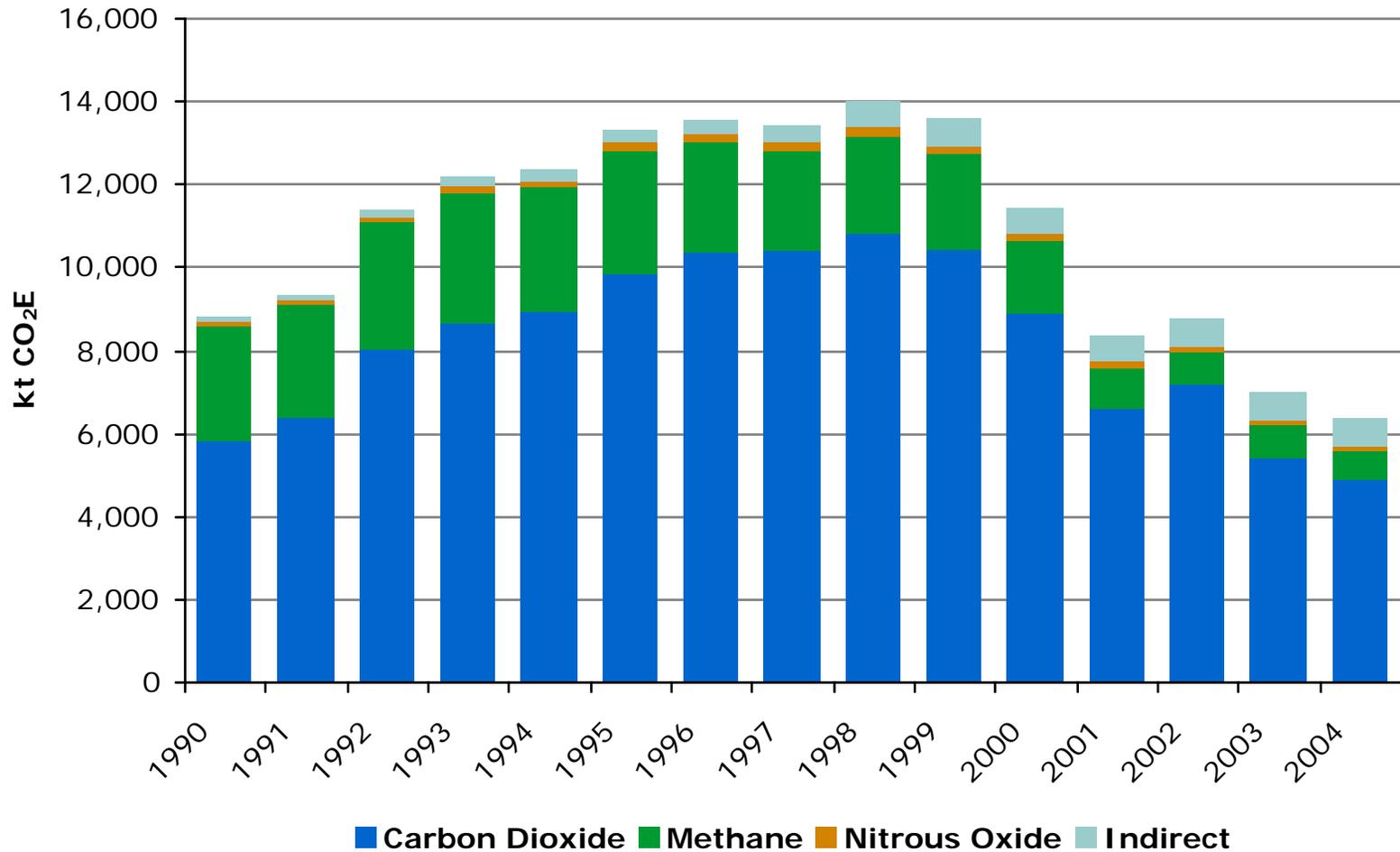
Methane emissions management



TransCanada emissions management system



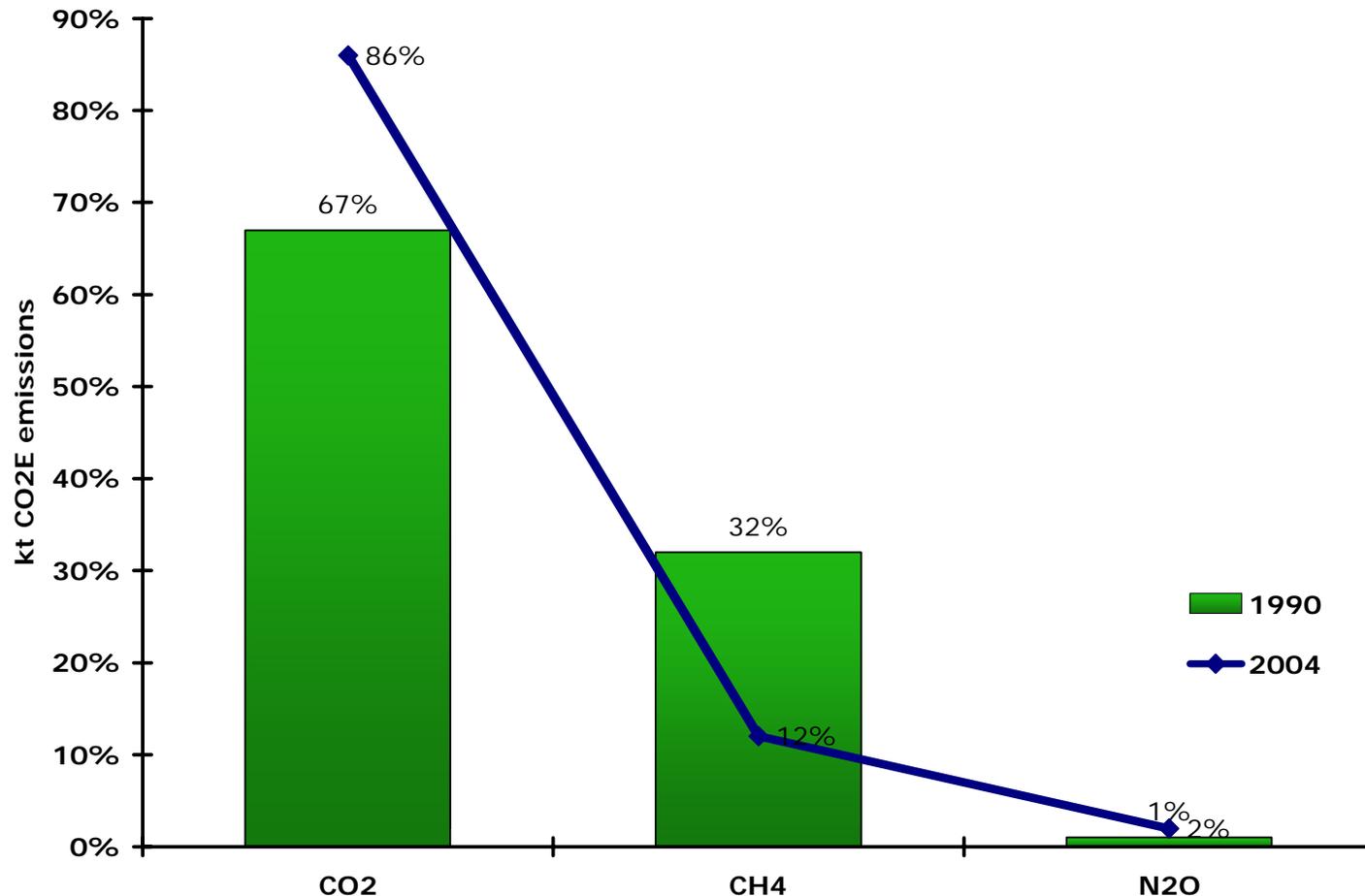
GHG emissions from pipeline operations and methane reduction



Total direct GHG emissions and methane emission decline



Percent Change of GHG Emissions by Type '1990 to 2004



Fugitive emissions management program



- **Reduce** fugitive emissions by implementing an effective leak detection and repair (LDAR) program and support Canada's national emissions reduction strategy
- **Measure** fugitive emissions from our facilities and contribute to the Canadian greenhouse gas reporting initiatives
 - use of high flow sampler (HFS)
 - annual measurement program for 10% CS, 5% MS and 5% VS per region
 - Will try to achieve a five year cycle for each facility
- **Reduce** engineered fugitive emissions through research and development programs in place

Fugitive emissions management



(LDAR vs measurement)

- High flow sampler measurement
 - Accuracy: +/- 10%
 - Identification of most “cost effective fixes”
- Bacharach HFS - new



Measurement program



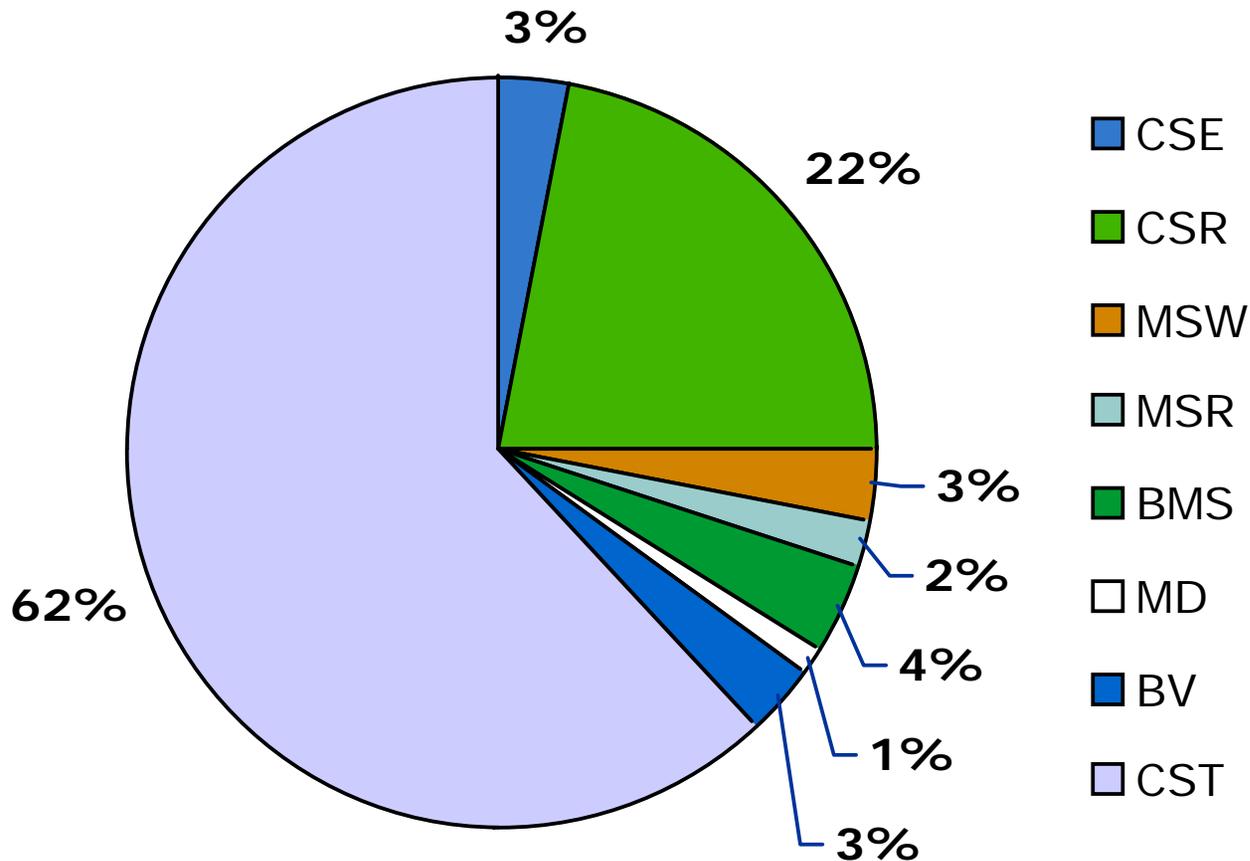
- Complete measurement 20% of system per annum
 - with High Flow Sampler
 - **conventional bagging is 10 times slower**
- Develop annual leak rates for different types of facilities to calculate system emissions
- Measurement data allow derivation of our GHG inventories.



Methane emissions management



Methane emissions from pipeline system by type of facility.

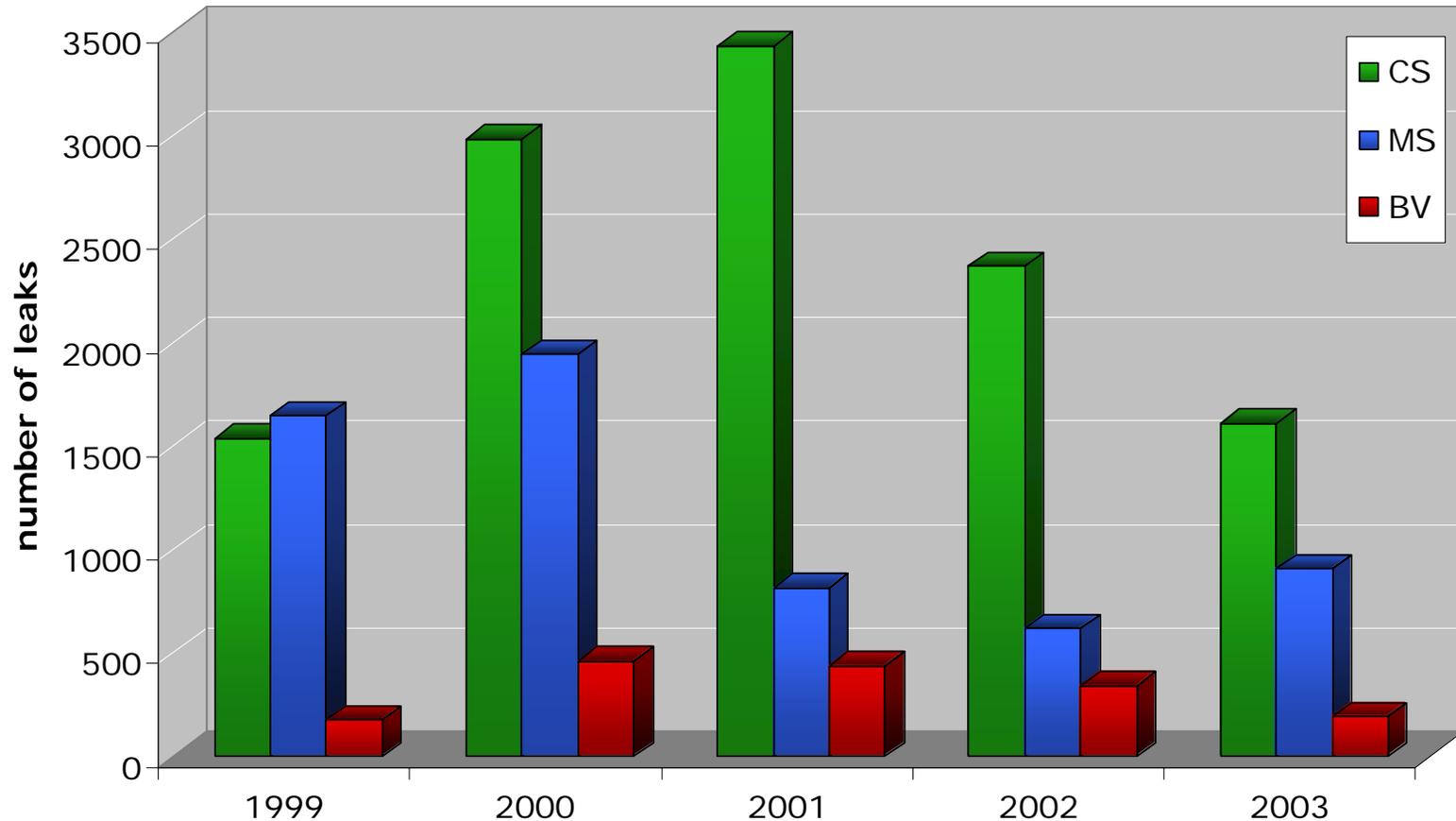


Fugitive emissions management - opportunities



High Flow Sampler Data (1999-2003)

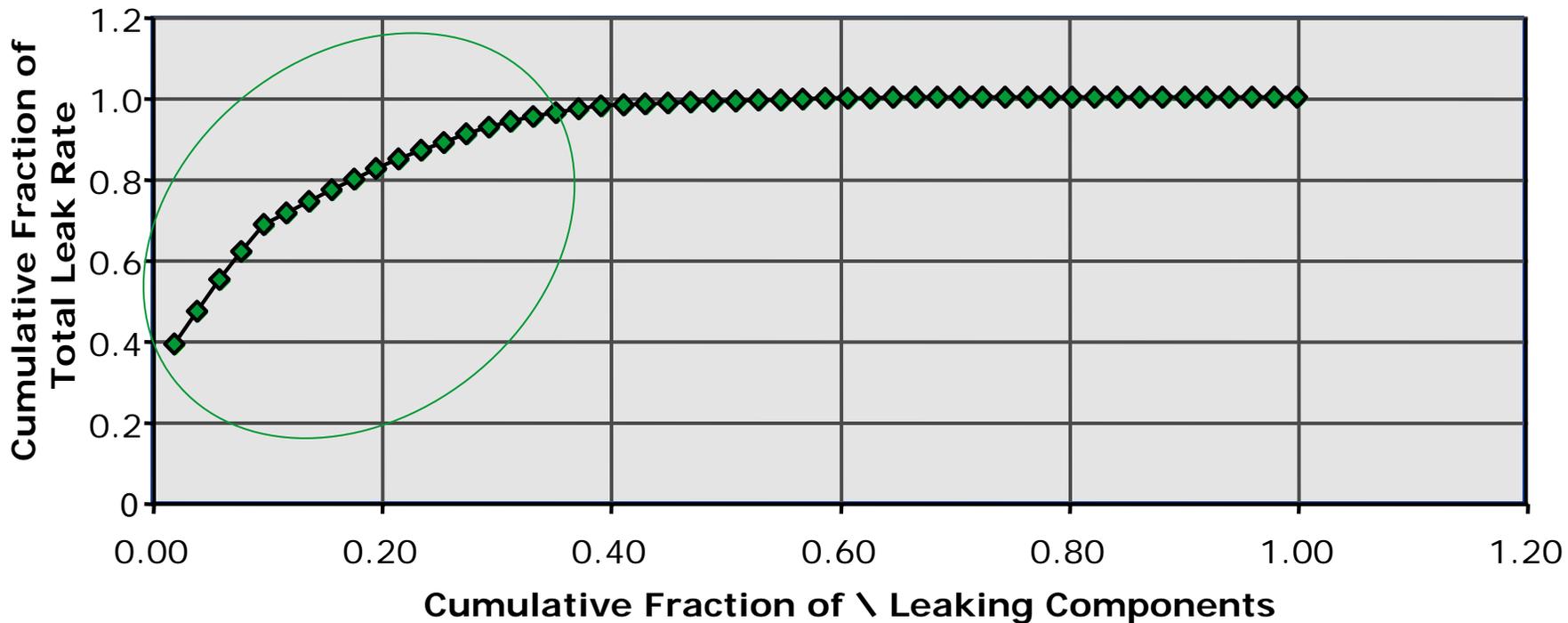
Leaking Components measured during HFS survey



Methane emissions management



Sample field measurement data analysis

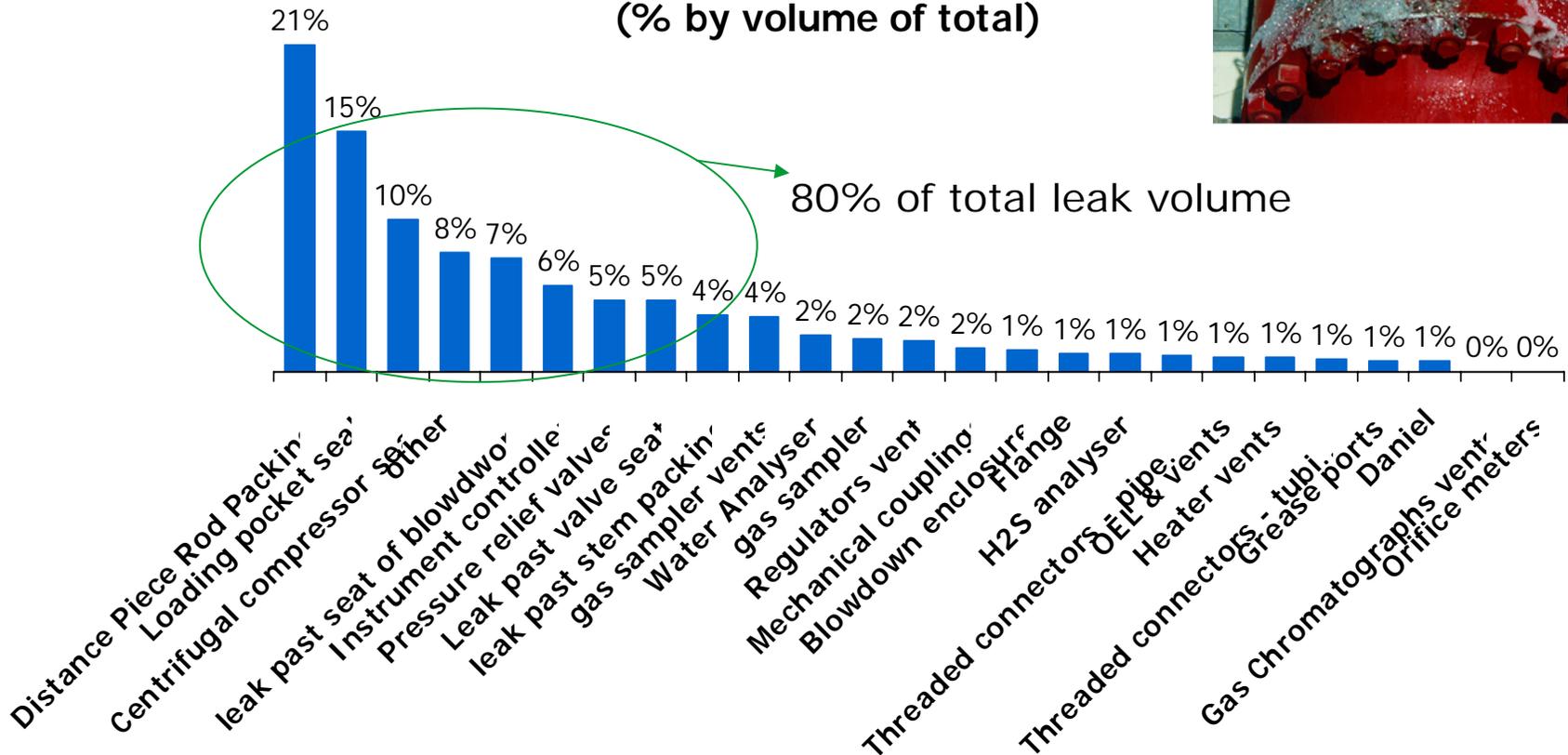


Methane emissions management - opportunities



Priority repairs...

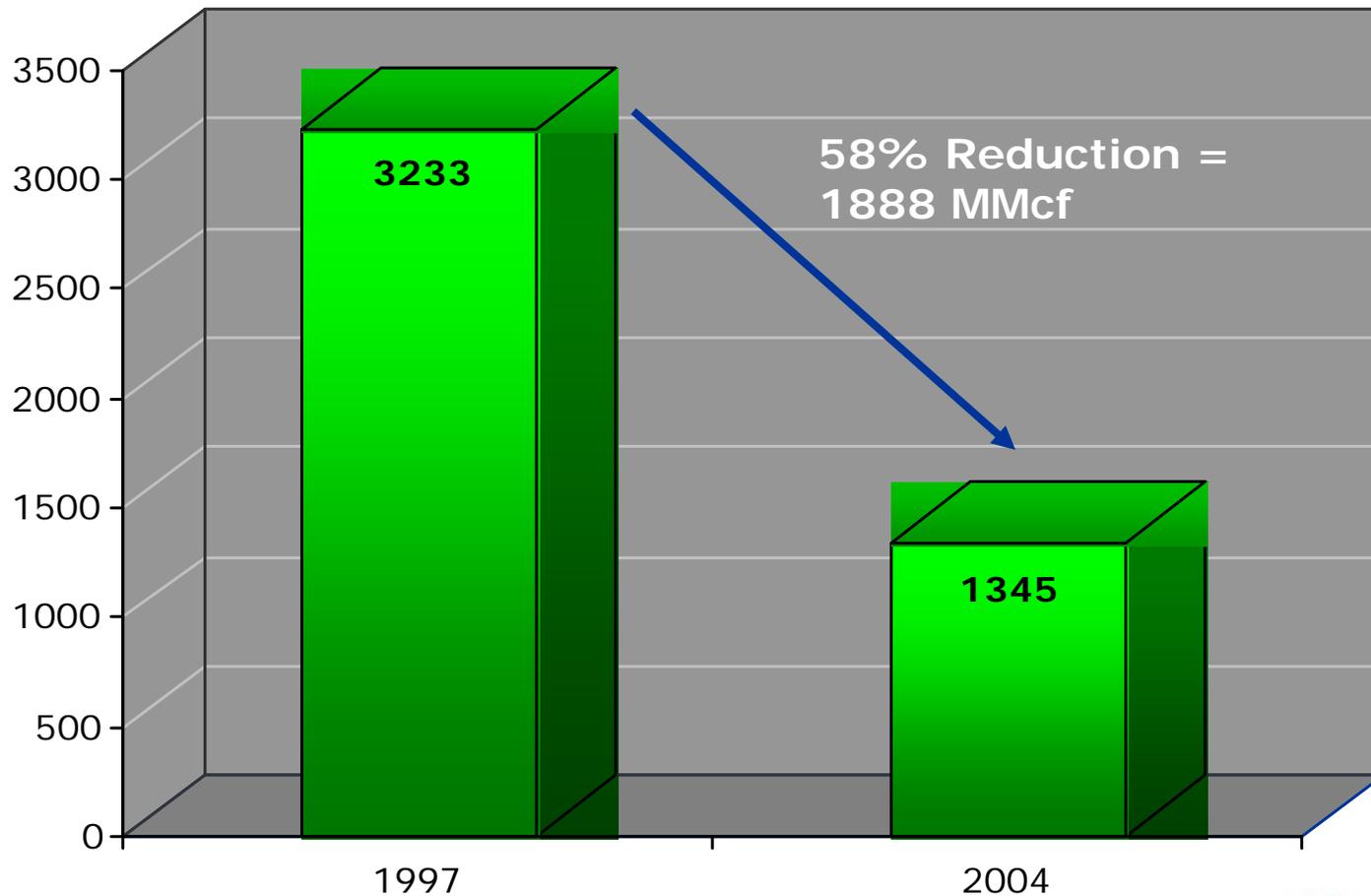
2004 HFS Leak Data by Equipment Type
(% by volume of total)



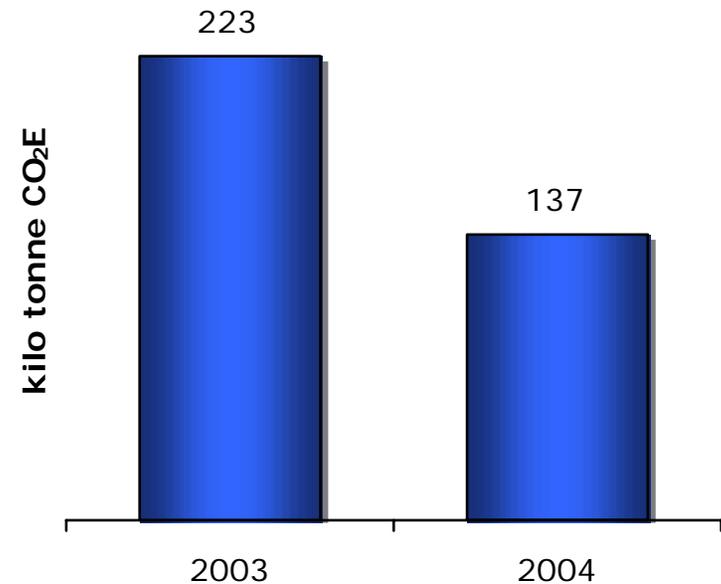
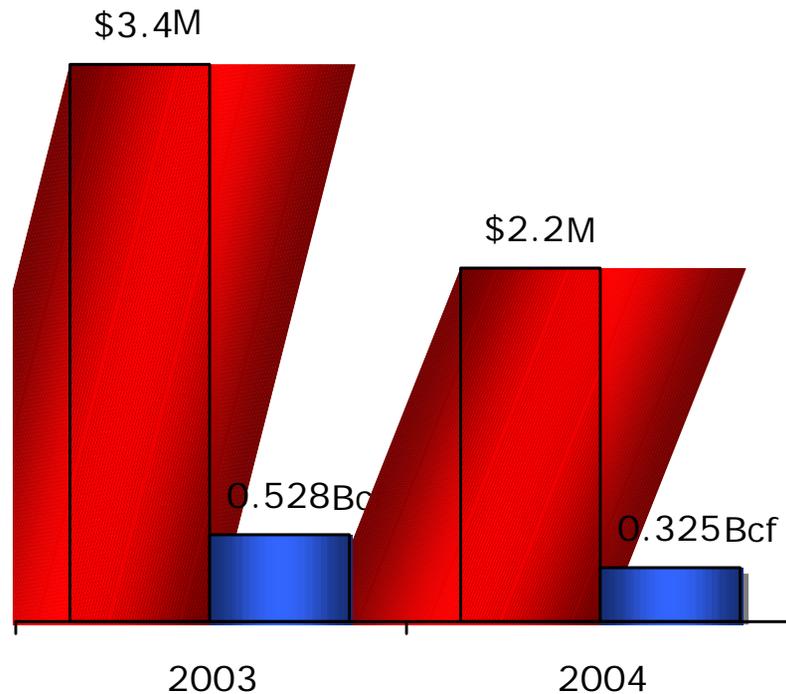
LDAR program achievement



Fugitive Emissions in million ft³ CH₄



LDAR program savings



■ \$ Value of gas saved
■ Natural gas volume save

■ Emissions saved

Blowdown emissions management



Control methods and technologies used

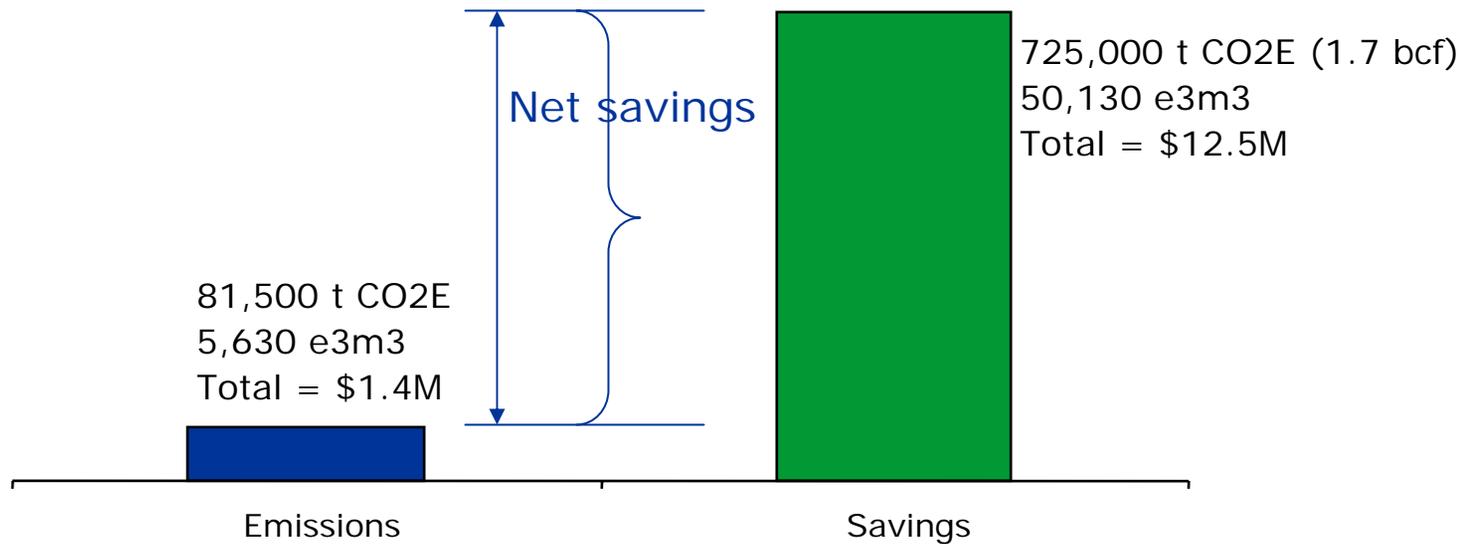
- Scheduling practices
- Operational adjustments
- Transfer (pull-down) compressors
- Buttered stubs
- Hot tapping
- Sleeves
- Stopples
- Hot line lowering



Blowdown emissions management savings



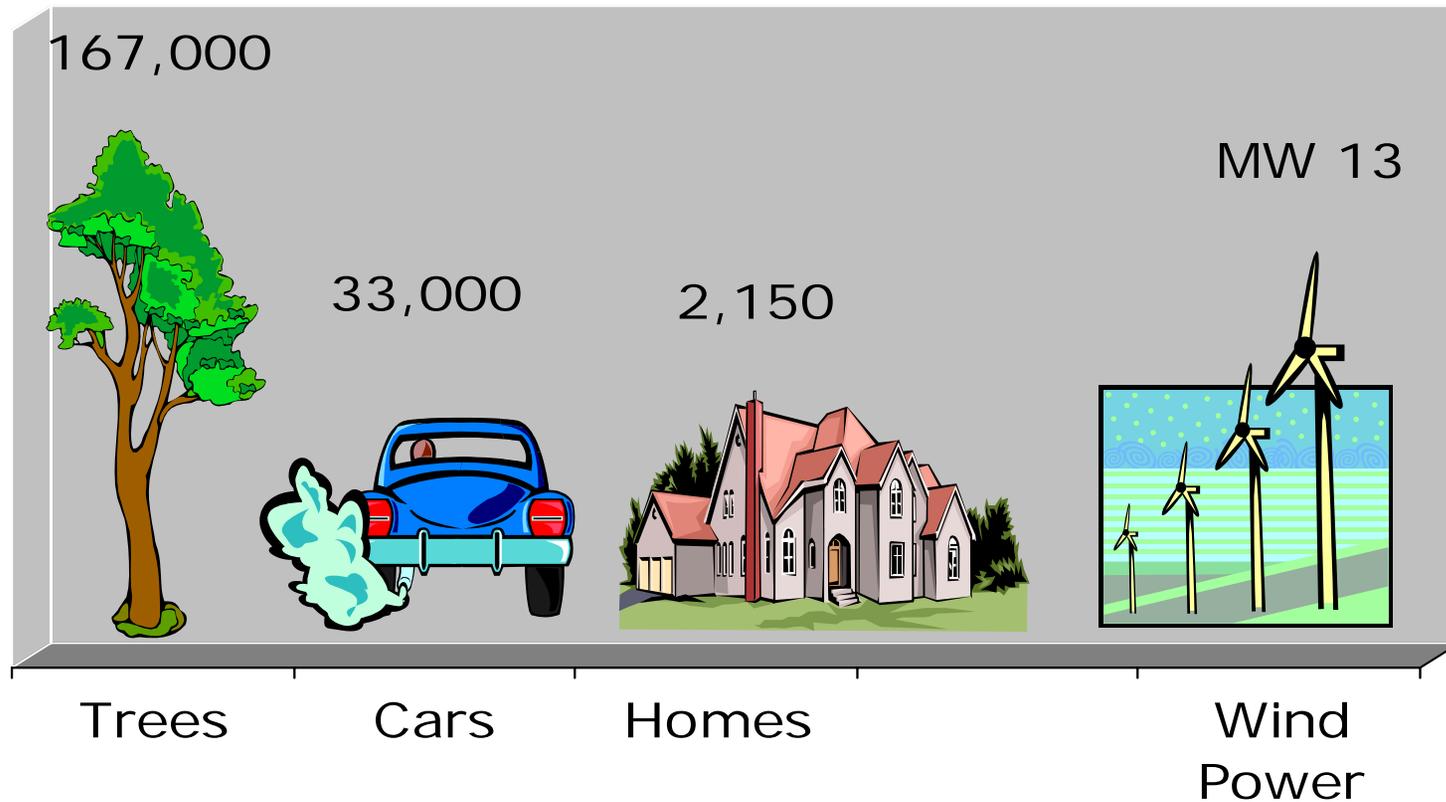
2004 Blowdown Emissions/Savings



LDAR program savings - gas saved in tree Equivalent



2004 Fugitive Emissions (LDAR) Program Contribution



Other Methane Emission Reduction Projects



Project	Status
<p>Gas-Gas Ejector (for Dry Gas seal vent gas)</p>	<p>Bench testing at Didsbury CST</p>
<p>Biofiltration (for Engineered emissions)</p>	<p>Pilot Testing at three MS sites</p>
<p>Fuel Cell (for remote power replacing TEG's)</p>	<p>Feasibility report completed</p>
<p>CH4 Incinerator (for low concentration methane leaks)</p>	<p>Start initial study with Natural Resources Canada</p>
<p>Sterling Engine (highly efficient 20-24% compared to TEG's 5%)</p>	<p>Preliminary Investigation</p>

Technology research and development (research and development project)

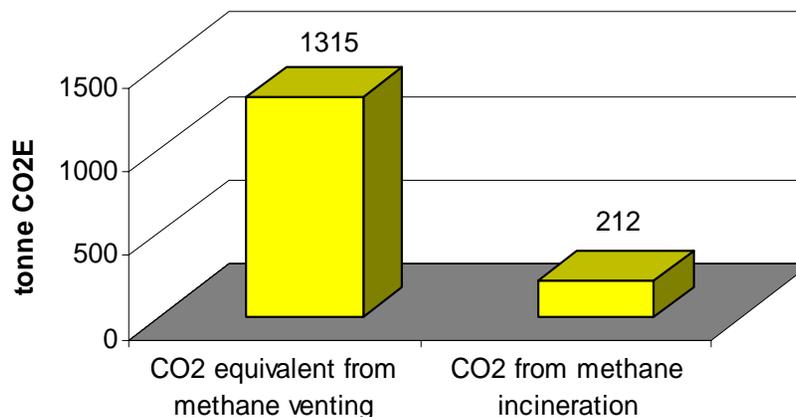


Use of incinerator for blowdowns

- Incineration of blowdown gas instead of venting (after transfer compression)
- At Caron Compressor Station, Moose Jaw, November 2002



**GHG Emission Comparison with & without
Incineration after Transfer Compression**

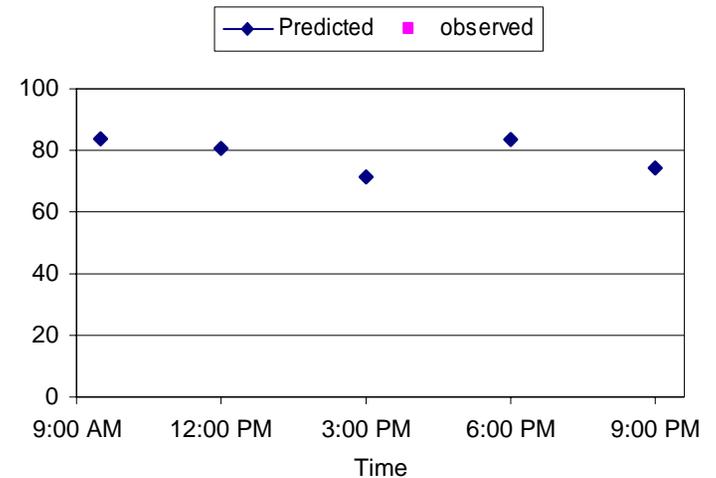
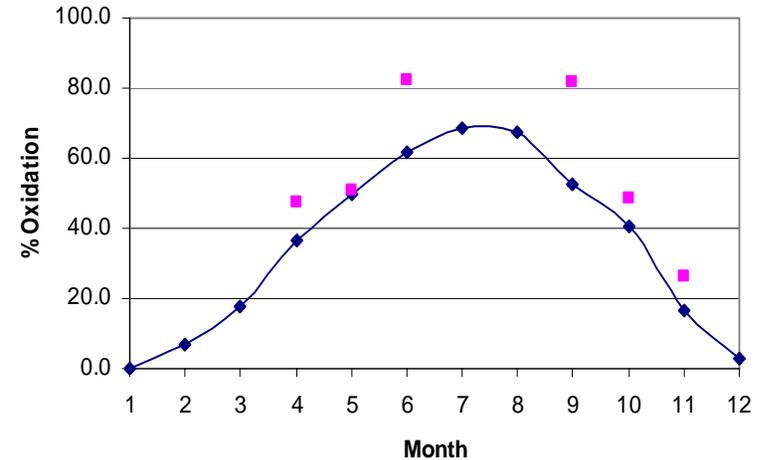


**Emission
savings of
1,100 t CO2E**

Biofiltration for engineered emission mitigation (research and development project)



Biofilter pilot plant for methane emissions reduction



Methane Emissions Management (research and development project)



Gas-Gas Ejector for low pressure gas leaks

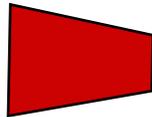
- Gas-gas ejector for dry gas seal compressors leak capture
- Use of gas-gas ejector to recompress seal gas emissions
- Designing a gas-gas ejector to capture seal gas emissions
- Re-injecting to high pressure system
- Application to TransCanada Compressors would save
 - 538 MMSCF/yr. of natural gas
 - 227,000 tCO₂E/yr. of greenhouse gas emissions
- Negligible operating cost

Gas-gas ejector for dry gas seal compressors leak capture - (research and development project)



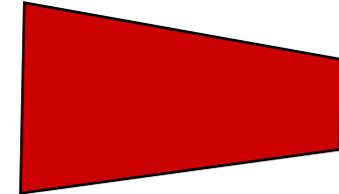
Compressor dry gas seal emissions mitigation research project

653 t CO₂ E/yr.



1 seal

227 kt CO₂ E/yr.
(538 MMCF/yr)



348 seals

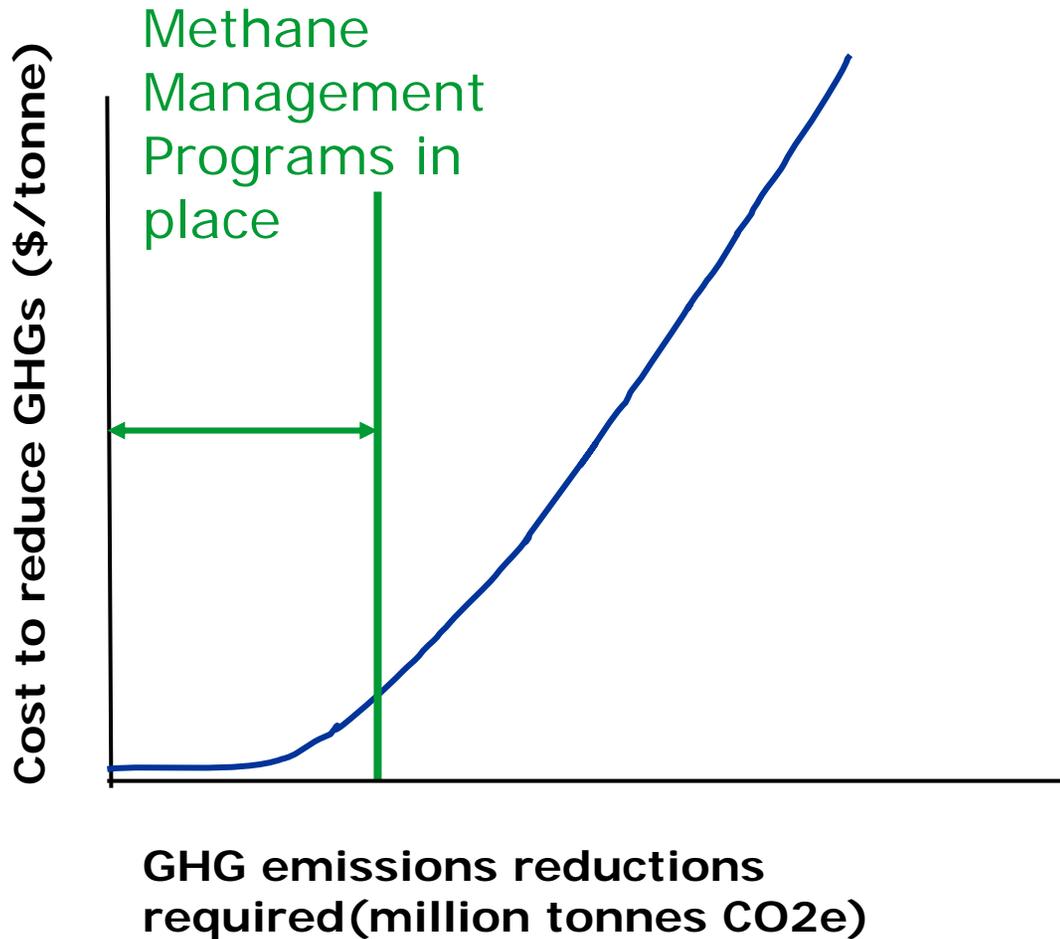
Emissions value = \$ 0.68 M

Market value of gas = \$ 3.70M
@ \$6.84/1000 ft³

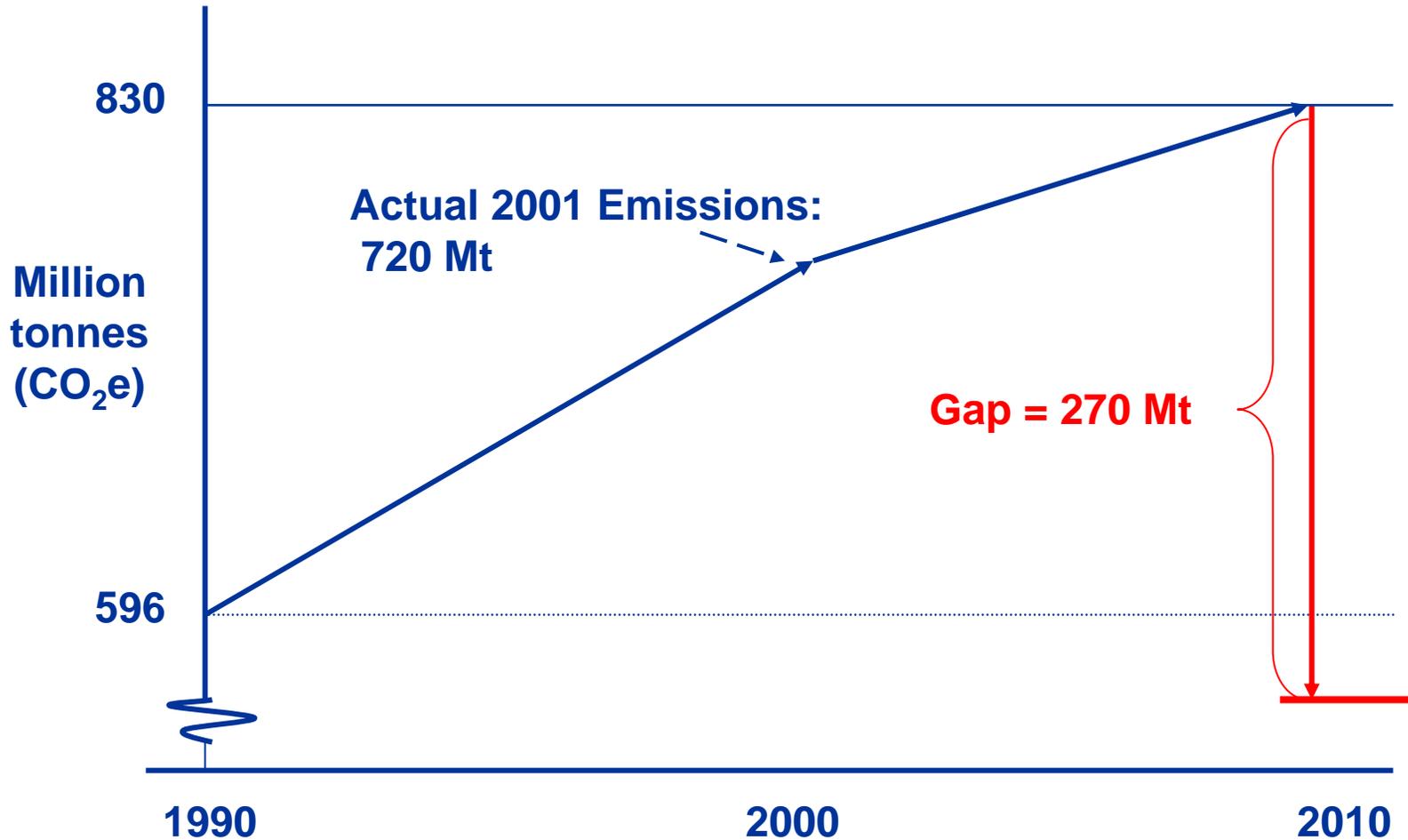
Methane emissions management



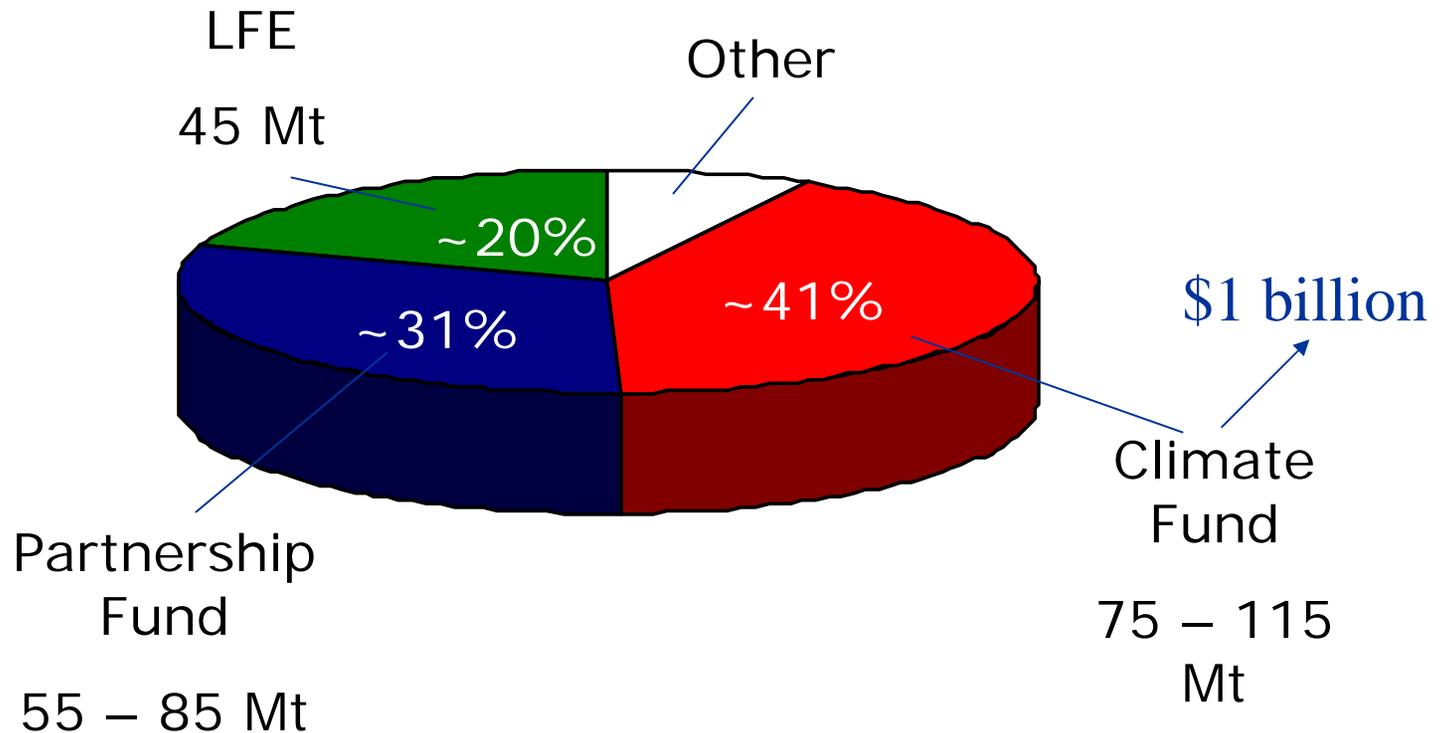
Conclusion - cost curve



Canada's Climate Change Commitment 2008-2012



How the 270MT GAP will be met



Commercial Business Opportunities



TransCanada can transfer expertise and management systems to achieve GHG reduction.

Technologies:

- LDAR (leak detection & repair) Program Management
- HFS (high flow sampler, leak measurement) Program Management

Information Systems

- Geofind Application (fugitive emissions web reporting system), emission savings, volumes, dollar value etc...

Services

- TOP's (Operating Procedures)
- Training, reporting

Methane emissions management at TransCanada



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TransCanada METHANE emissions management program



Thank you!

Any questions?



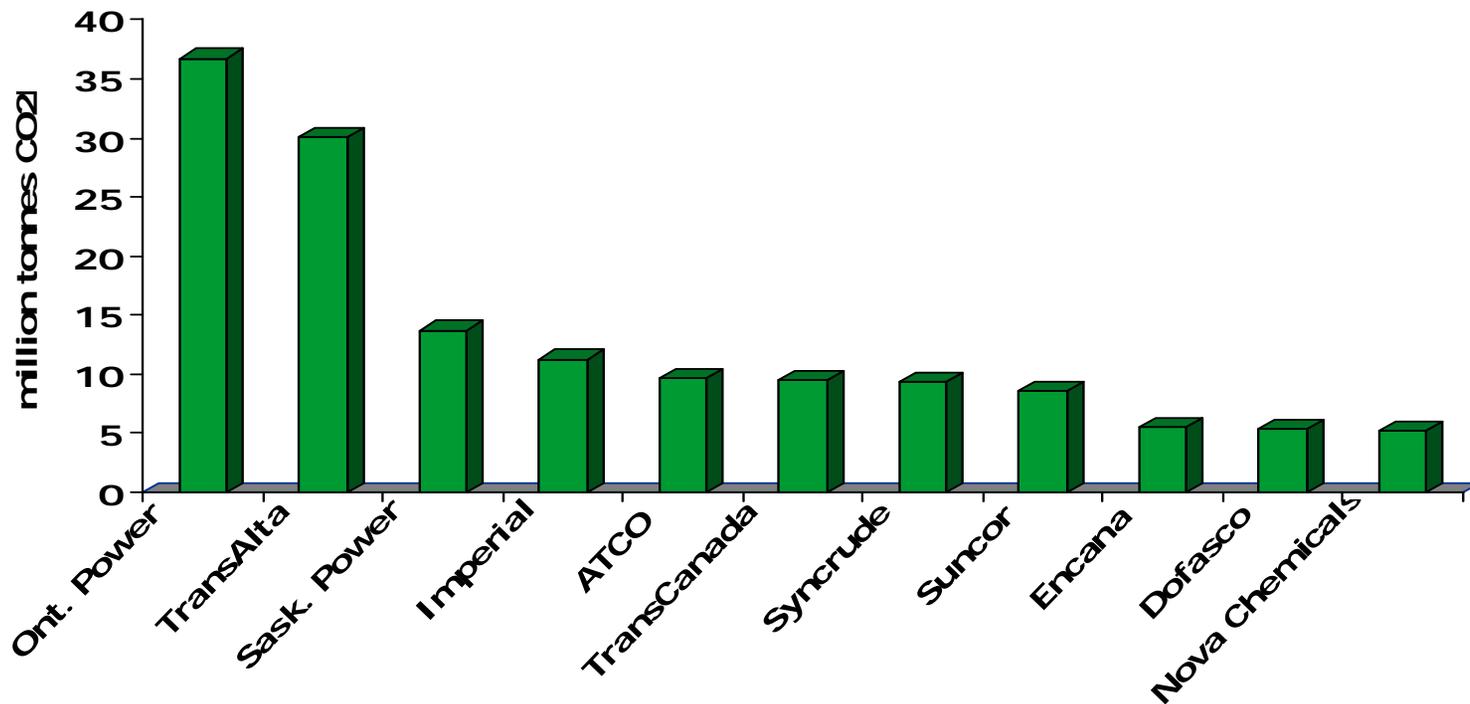
Back up slides

2004 summary of savings from methane emission reduction programs



Minimizing blowdown emissions	711,000 tonnes of CO ₂ E (49,076 e3m ³)
Transfer compression	322,000 tonnes of CO ₂ E (22,218 e3m ³)
Valve sealing	0
Buttering & hot Tapping	169,000 tonnes of CO ₂ E (11,644 e3m ³)
Repair sleeves	220,000 tonnes of CO ₂ E (15,213 e3m ³)
Reducing fugitive emissions	137,000 tonnes of CO ₂ E

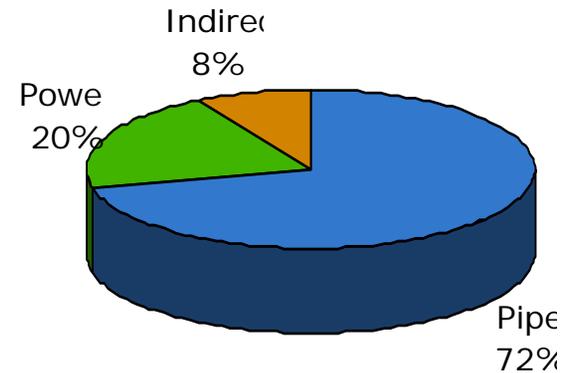
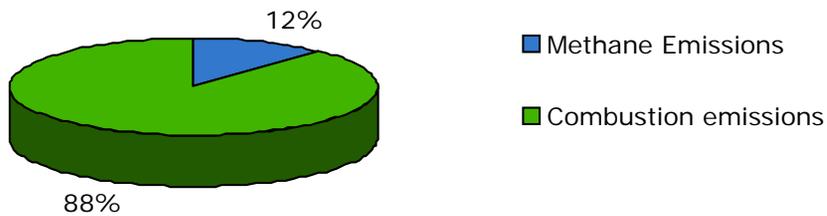
Corporate GHGs 2003



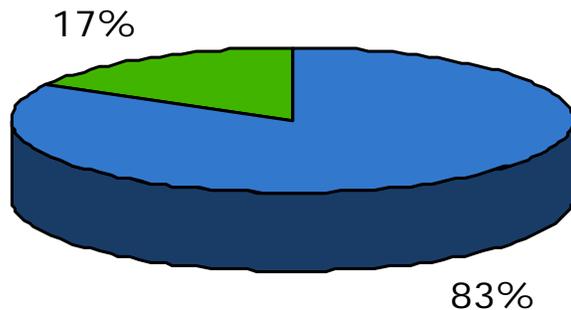
Methane emissions distribution



Greenhouse Gases



Methane Emissions



- Fugitive emissions
- Blowdown emissions