

Methane Emissions Management at TransCanada PipeLines



AGENDA

- TransCanada PipeLines Ltd.
 - **Introduction & Background**
- TransCanada Climate Change Strategy
- Greenhouse Gas Emissions
- Emissions Management Strategy
- TransCanada's Experience
 - **Control Methodologies**
 - **Research & Development**
- Conclusion

Methane Emissions Management at TransCanada PipeLines



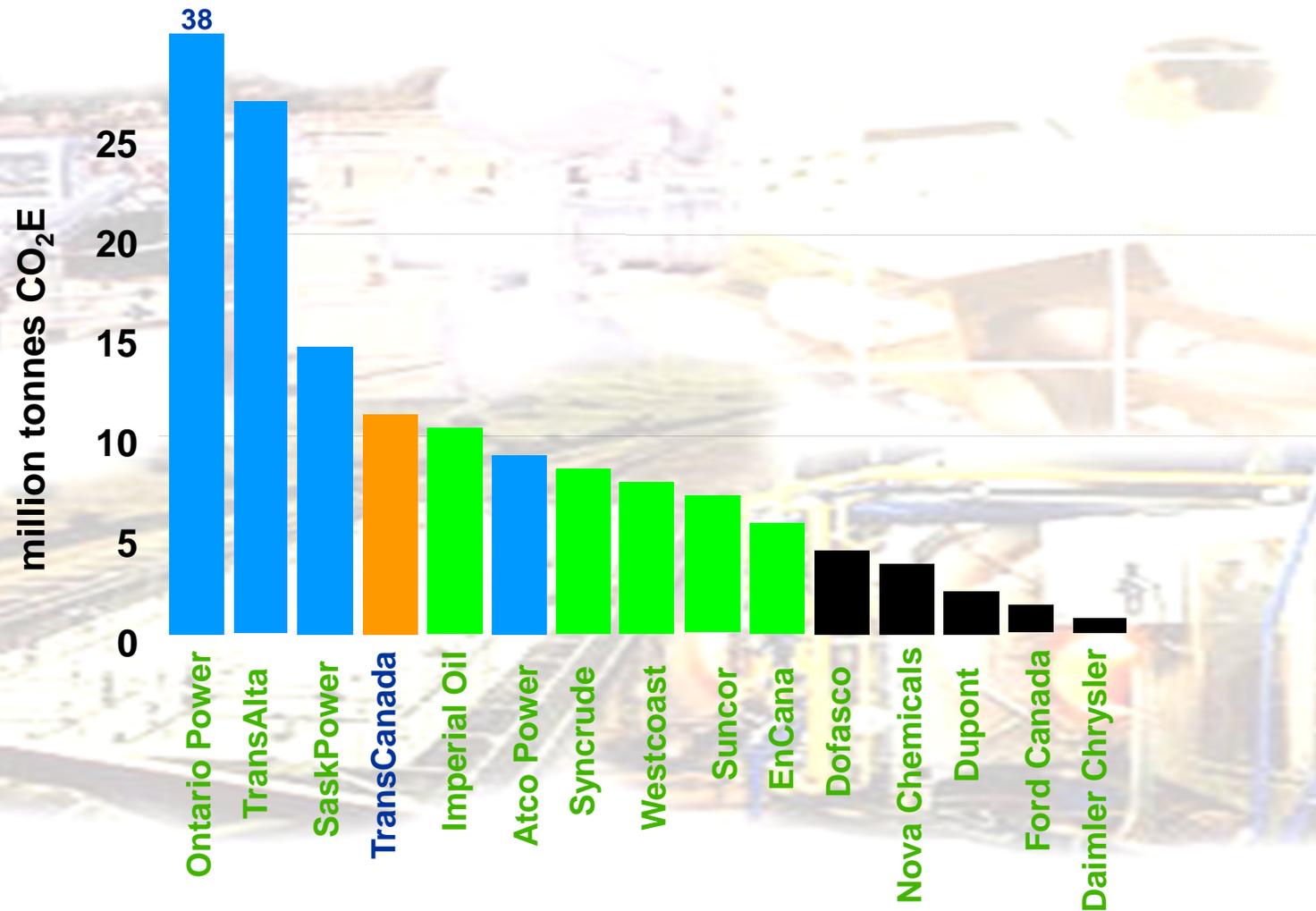
TransCanada PipeLines at a Glance



Methane Emissions Management at TransCanada PipeLines



Corporate GHG Emitters



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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.**

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Climate Change Strategy

Participation in
National Processes

Issue Table Process
Upstream Oil and Gas Working Group

Direct Emissions
Reduction

Fugitive Emissions Management
Blowdown Emissions Management

Technology
Development

Dry Gas Seals
Methane Biofiltration
Combustion processes

Emissions Offsets

Landfill Gas Reuse
CDM/JI

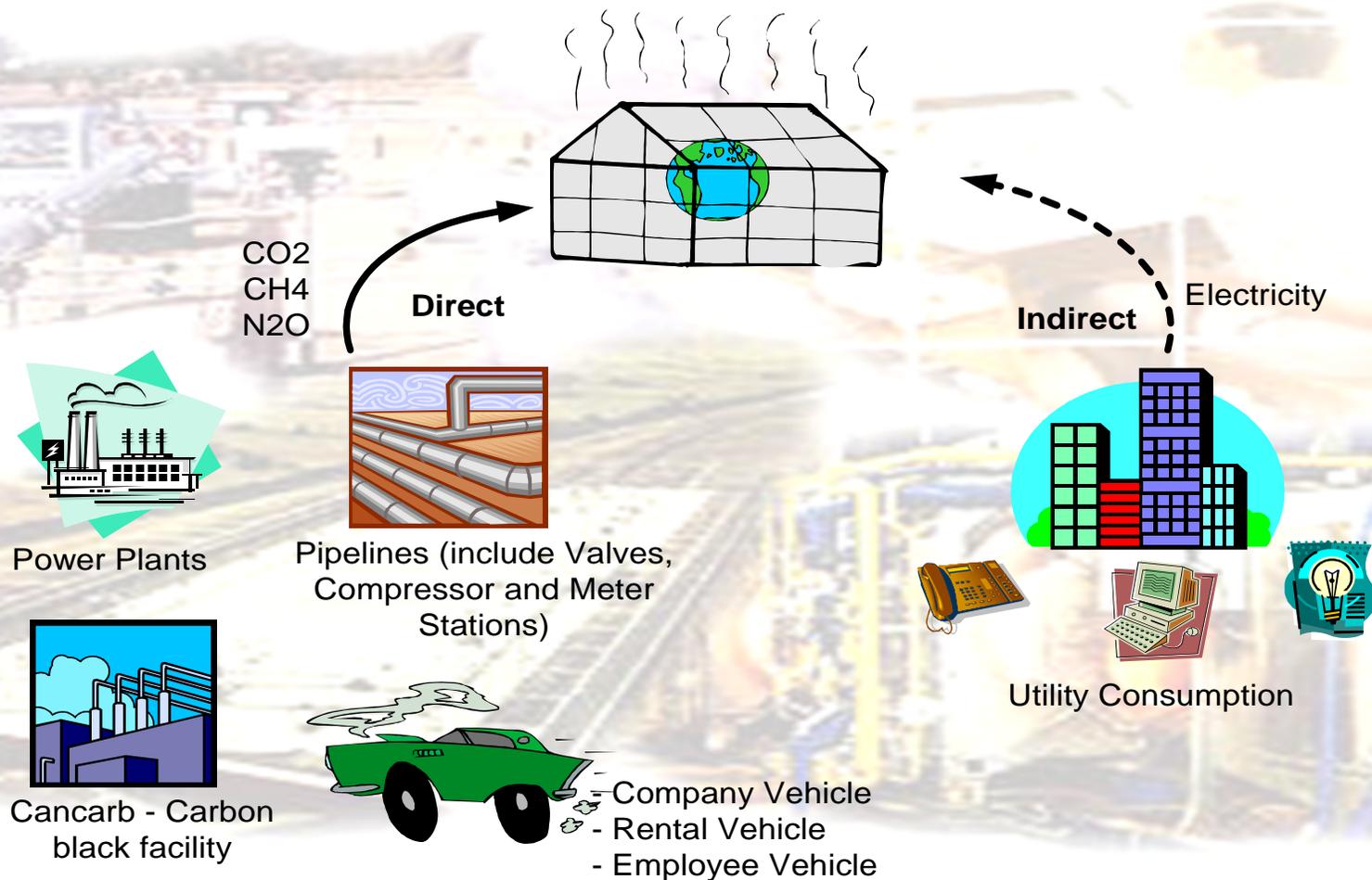
Business
Opportunities

CO2
service ?

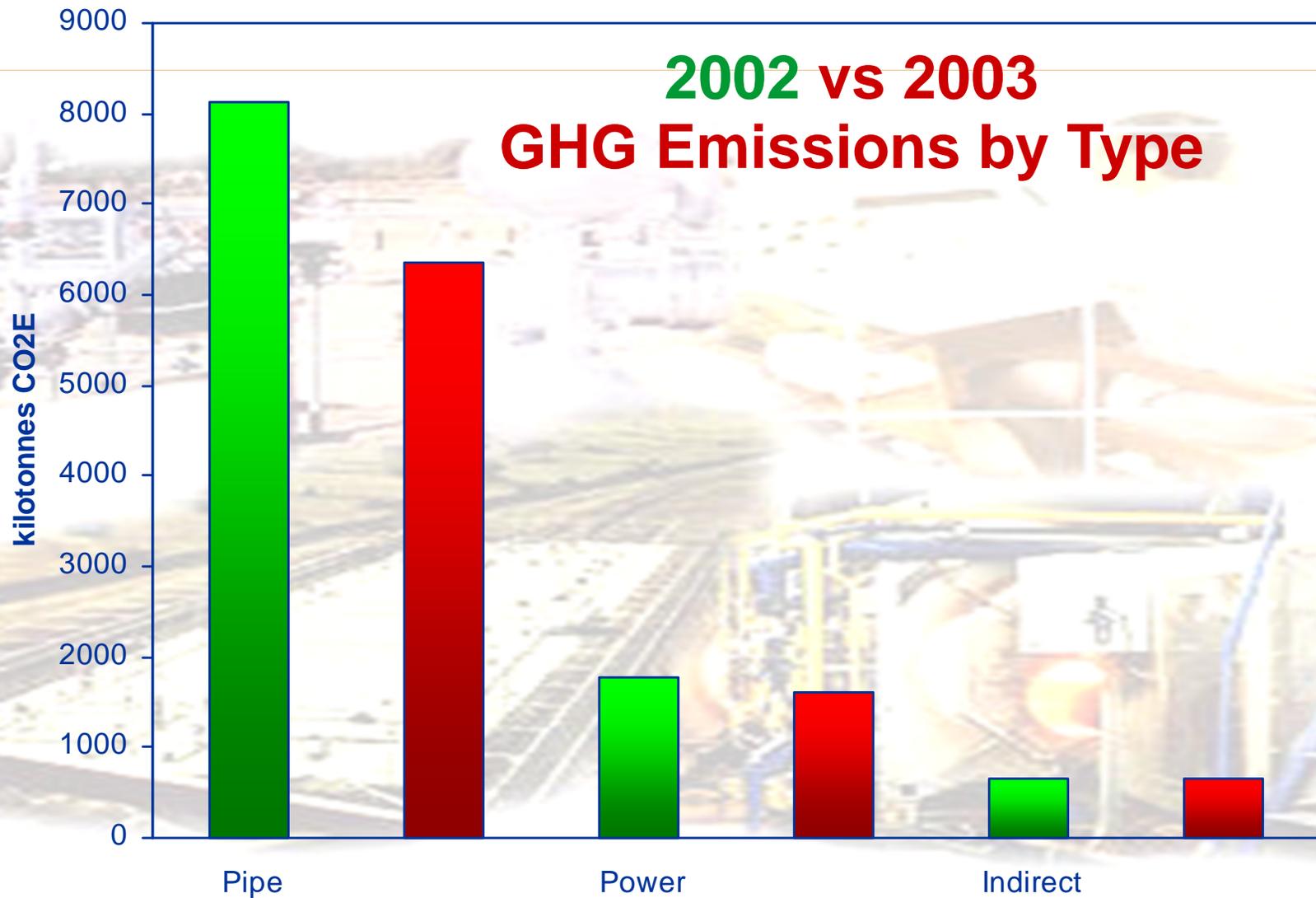
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Source of Greenhouse Gas in TransCanada



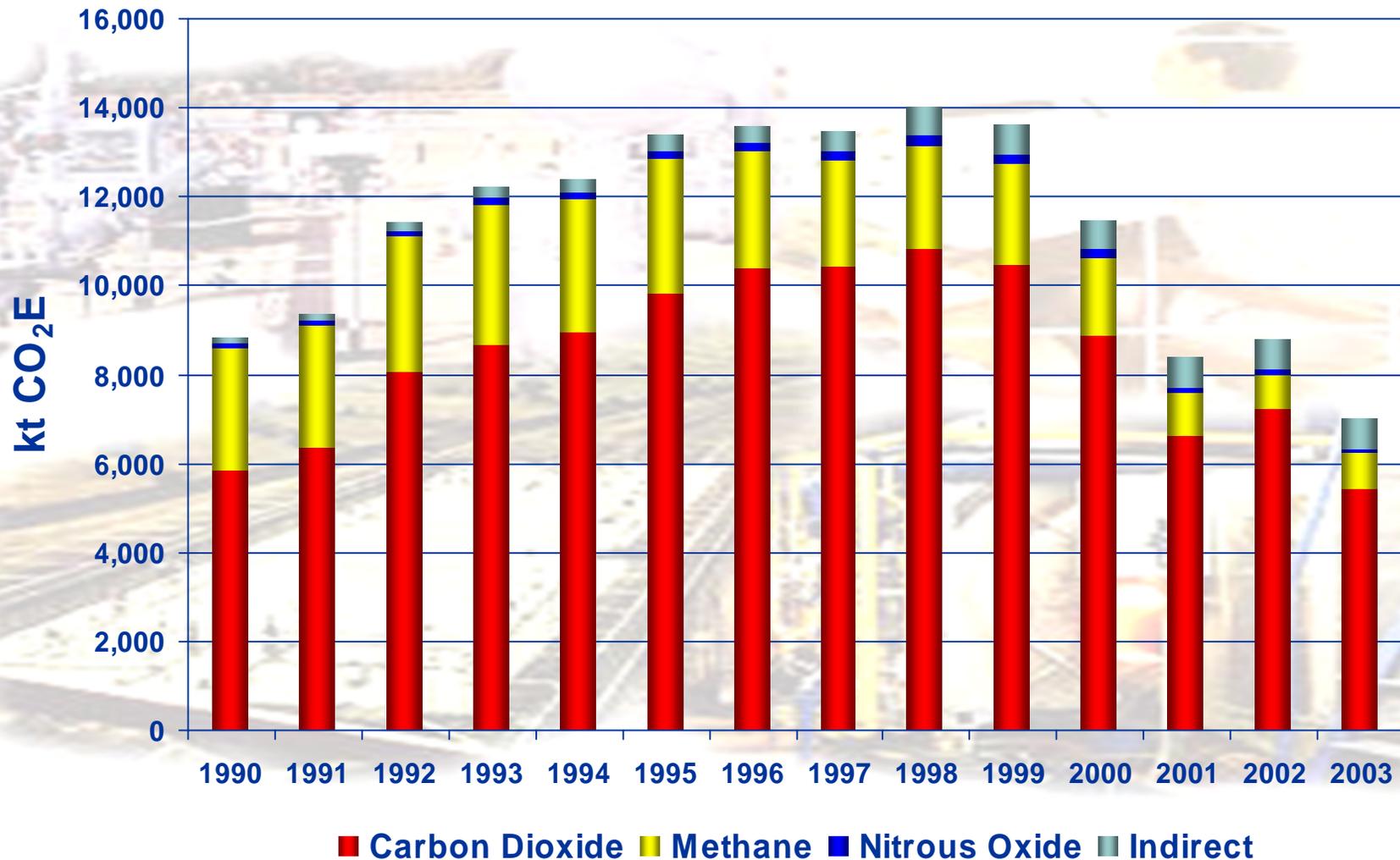
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Greenhouse Gas Emissions from Pipeline Operations

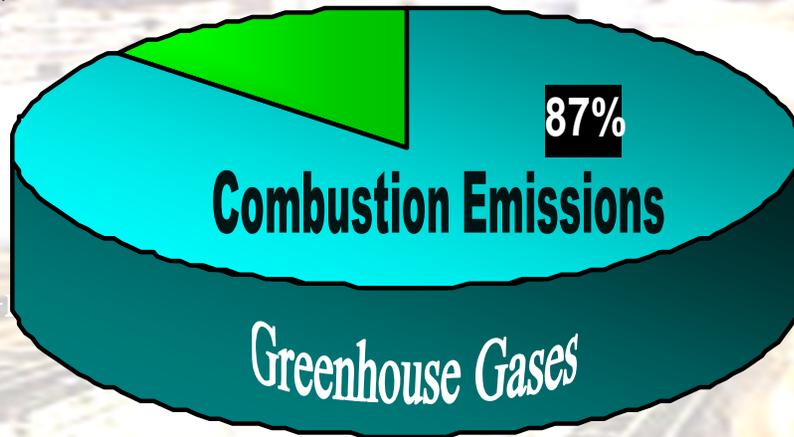


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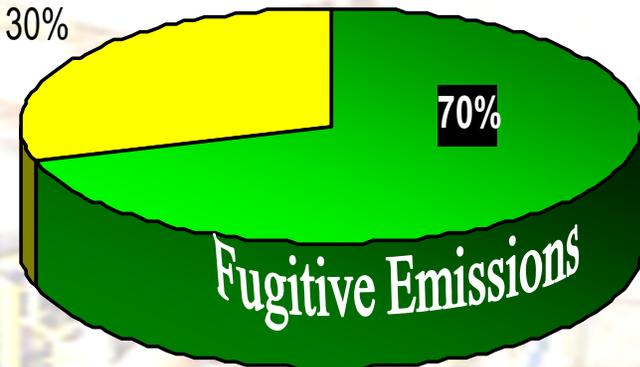
Methane Emissions Distribution

Methane Emissions
13%



Greenhouse Gas Emissions

Blowdown Emissions
30%

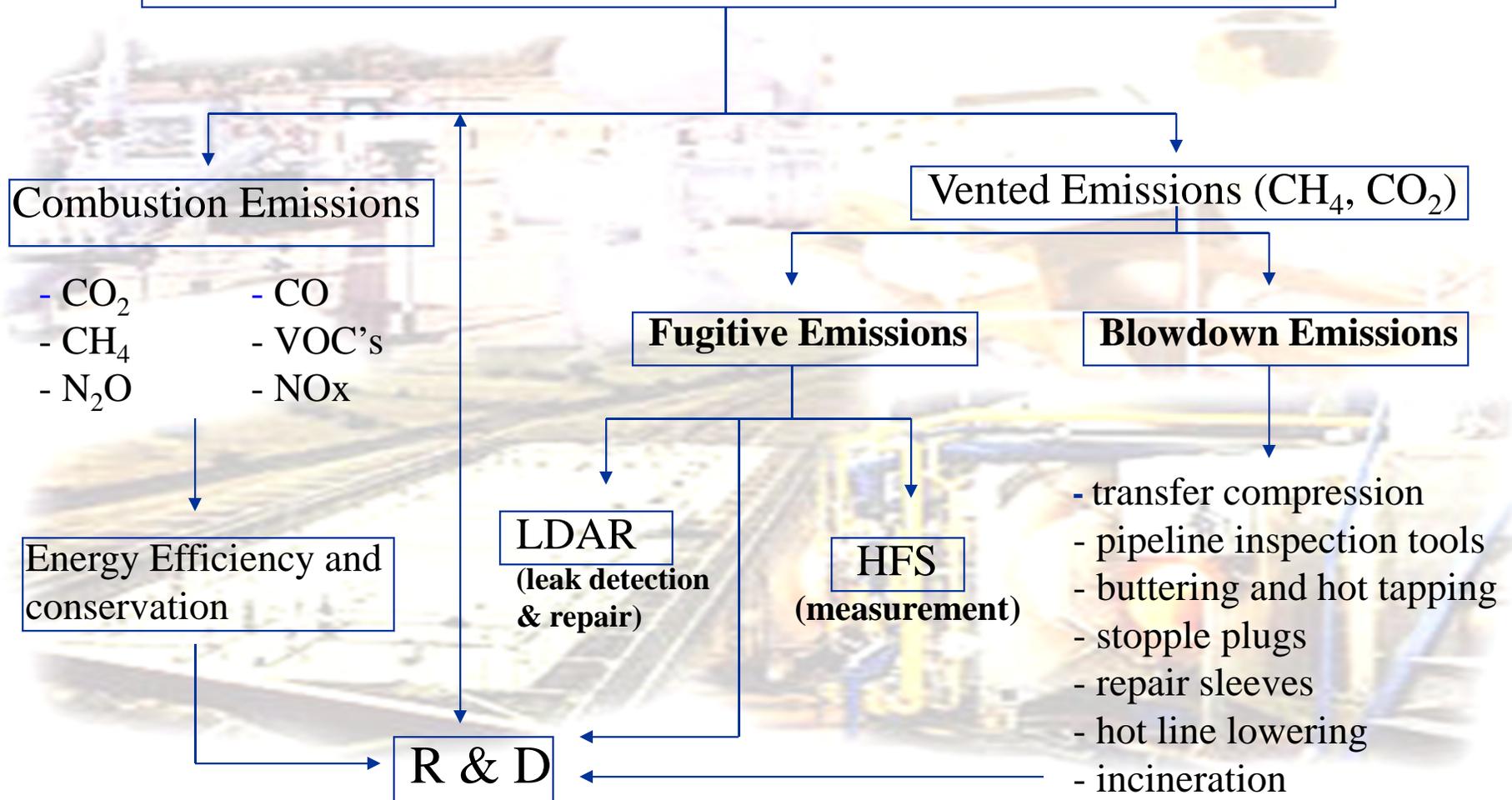


Methane Emissions

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TCPL Emissions Management System



Methane Emissions Management at TransCanada PipeLines

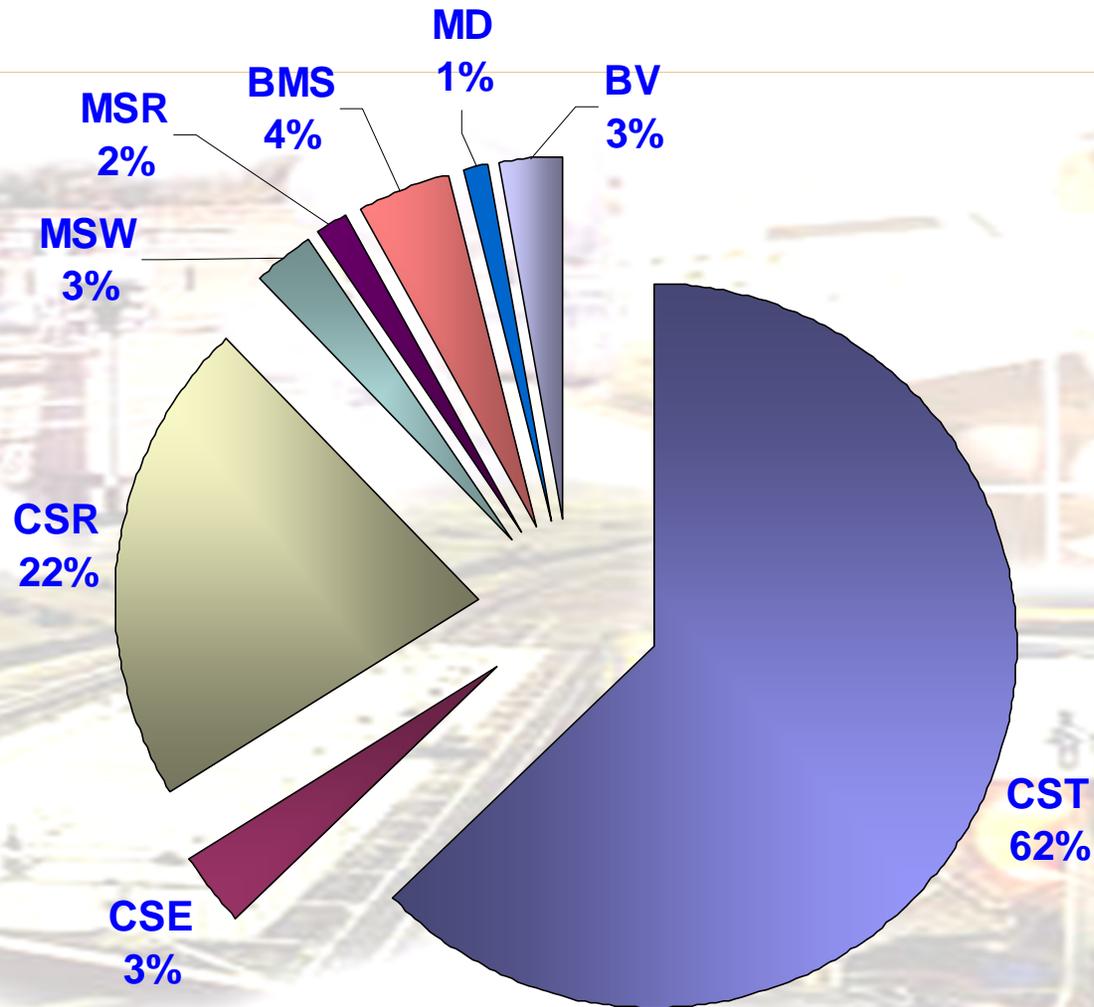


Fugitive Emissions Management ***(LDAR vs Measurement)***

- **High Flow Sampler Measurement**
 - **Accuracy; $\pm 25\%$**
 - identification of most "cost effective fixes"
- **Bacharach HFS - NEW**



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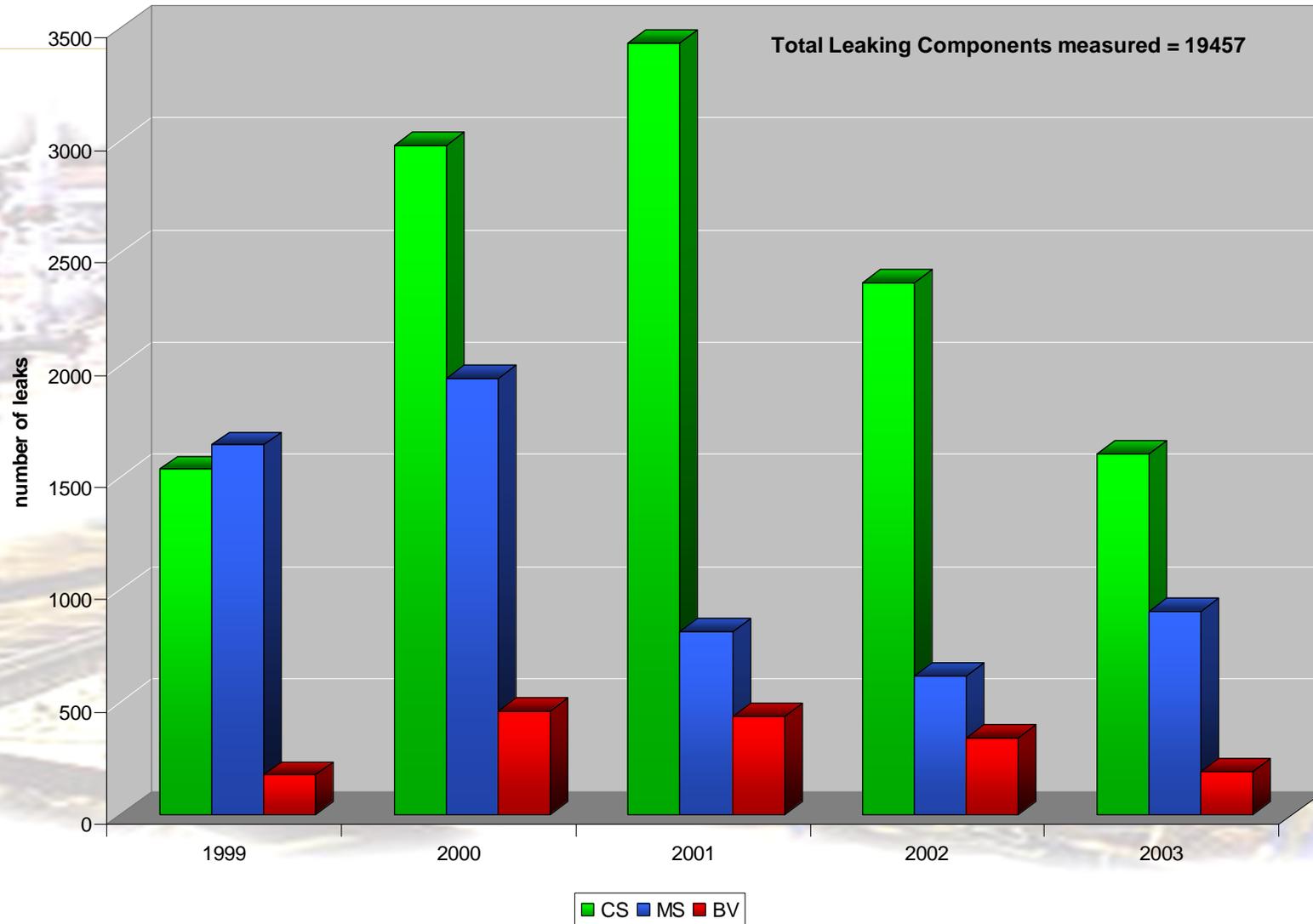


2003 Methane Emissions from system by Facility Type

Methane Emissions Management at TransCanada PipeLines



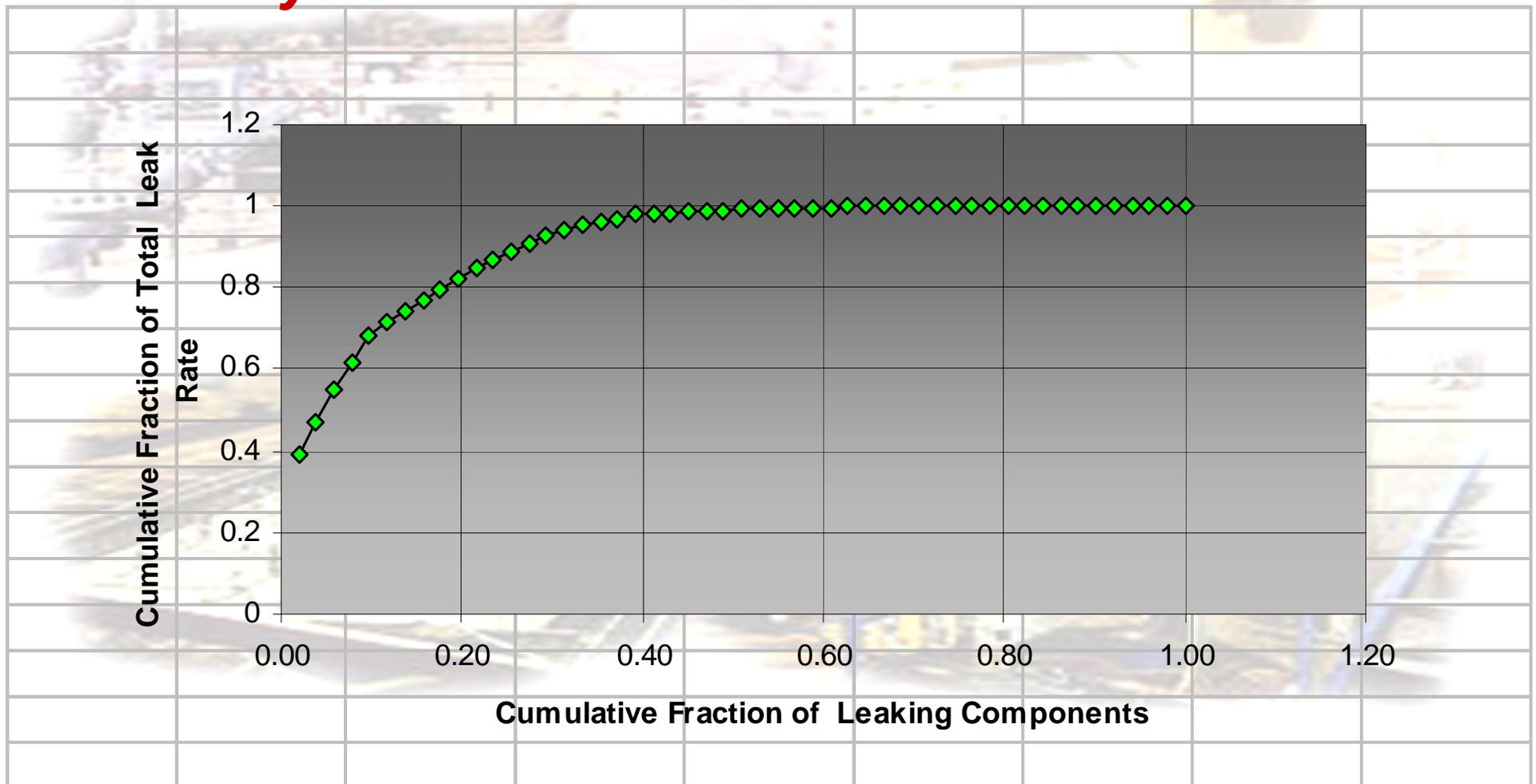
High Flow Sampler Data (1999-2003)



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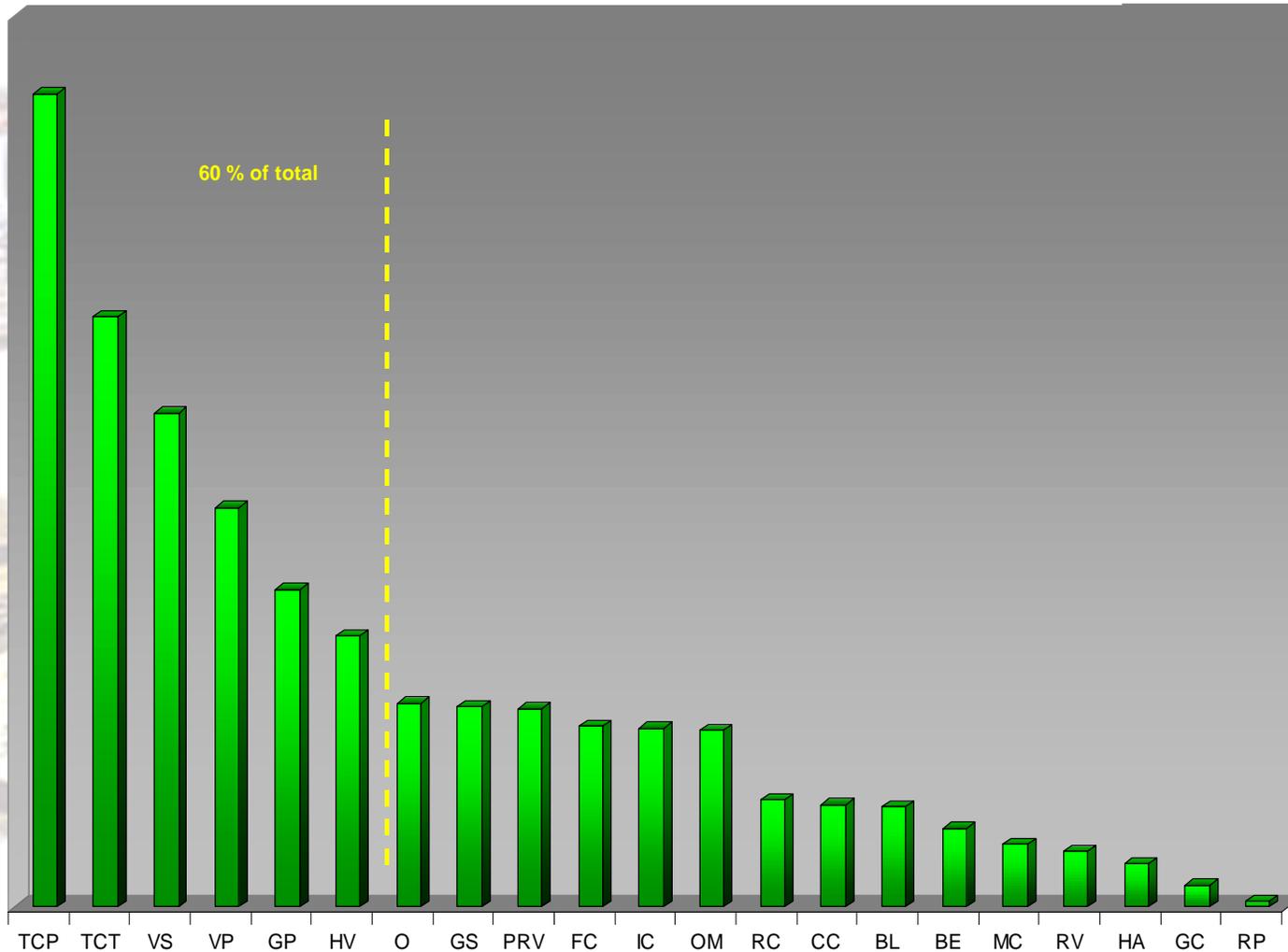
Sample Field Measurement Data Analysis



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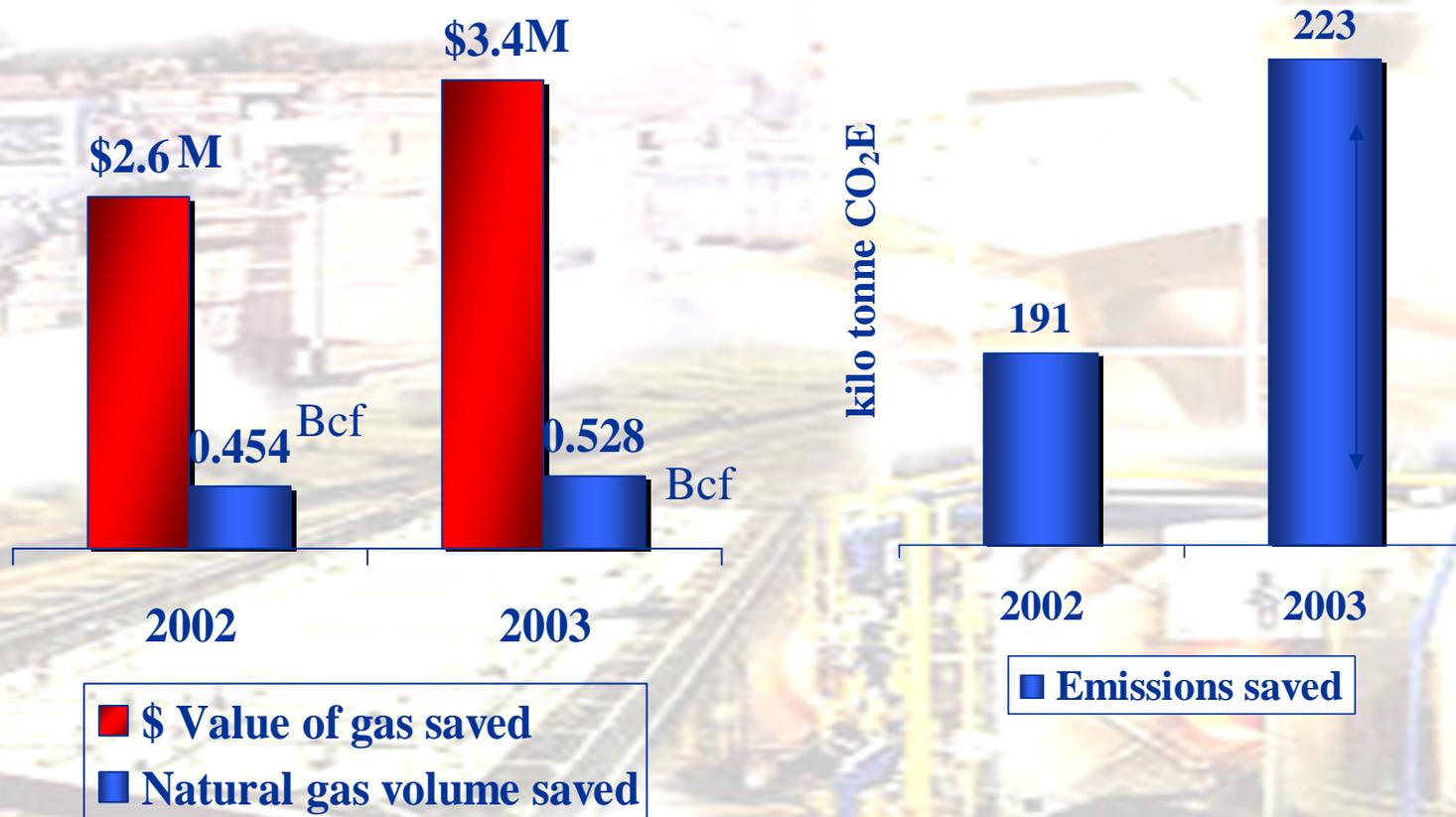
Benefit - Cost Effective Repairs



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LDAR Program Achievements

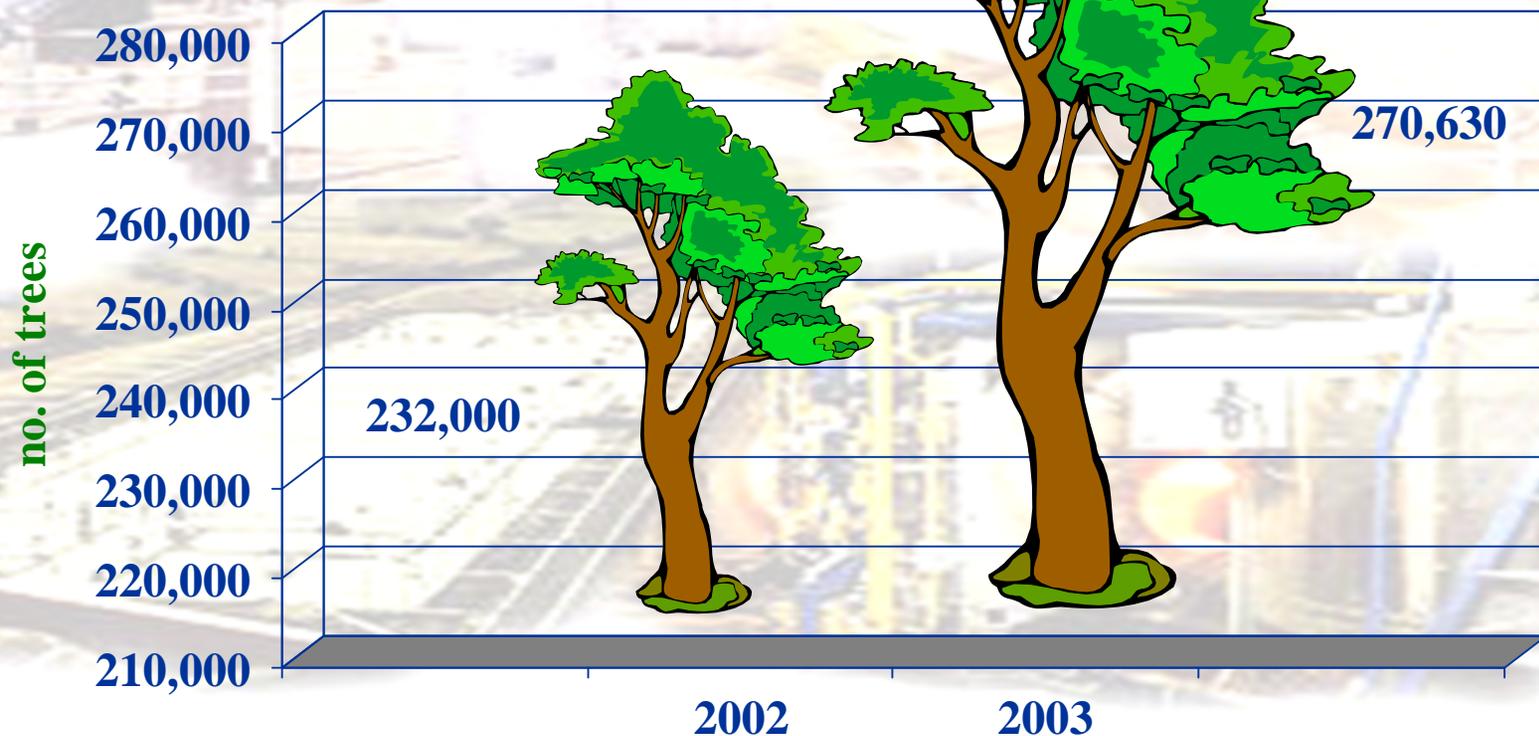


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TransCanada's Contribution to Environment Emissions saved in no. of Tree Equivalents

- Total Equivalent Cars taken off the road = 42,330
- Total Equivalent Homes which can be heated for one year = 3,427



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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



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Reducing Emissions by using Transfer Compressor



Outcome from Reduction Programs



2003 Summary of Savings from Methane Emission Reduction Programs

Minimizing Blowdown Emissions	1,132 tonnes of CO ₂ E
Transfer Compression	626,966
Valve Sealing	61,678
Buttering & Hot Tapping	154,632
Repair Sleeves	164,949
Reducing Fugitive Emissions	223,270

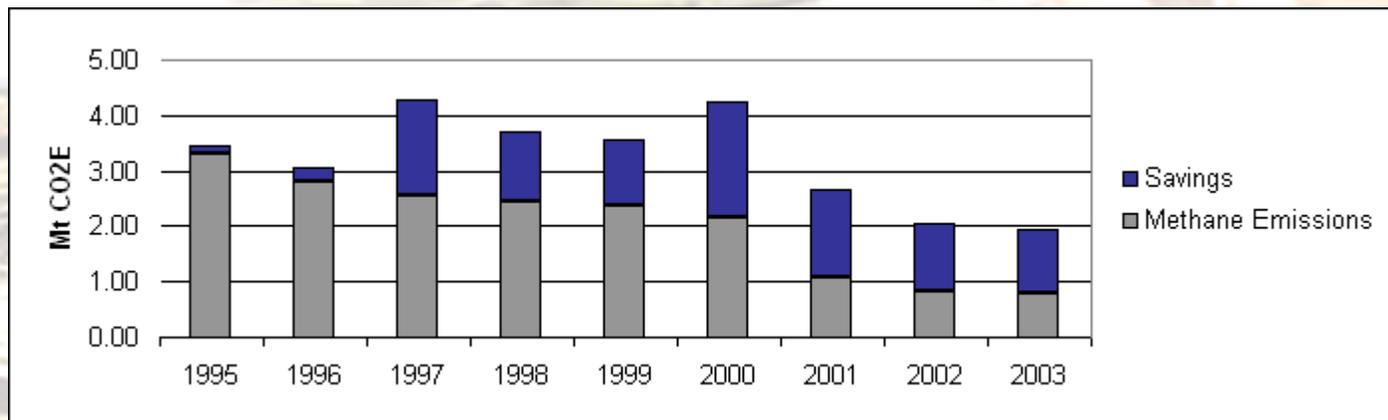
Savings Outcome



Methane Emissions and Savings

(million tonnes of carbon dioxide equivalent - Mt CO₂E)

	1995	1996	1997	1998	1999	2000	2001	2002	2003
Methane Emissions	3.29	2.82	2.55	2.45	2.37	2.15	1.06	0.82	0.81
Savings	0.15	0.23	1.74	1.26	1.20	2.10	1.59	1.24	1.13



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Research & Development

- **Incineration of Blowdown Gas using new Technology**
- **Biofilter for Meter station methane emissions oxidation**
- **Dry Gas Seal Emissions capture technology**
- **Incineration Methane emissions by the use of CH₄Reactor**
- **Fuel Cells**

R & D

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Technology R&D at TCPL

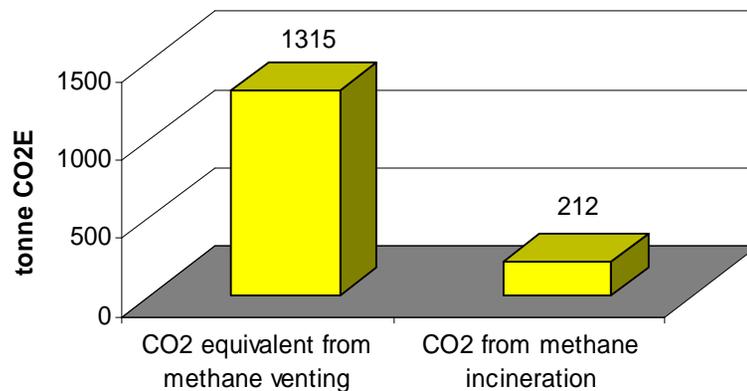
(use of incinerator for blowdowns)

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

R & D



GHG Emission Comparison with & without Incineration after Transfer Compression



Emission savings of 1,100 t CO2E

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Biofilter Pilot Plant for Methane Emissions Reduction

R & D

Research at University of Calgary



Meter Station, Alberta



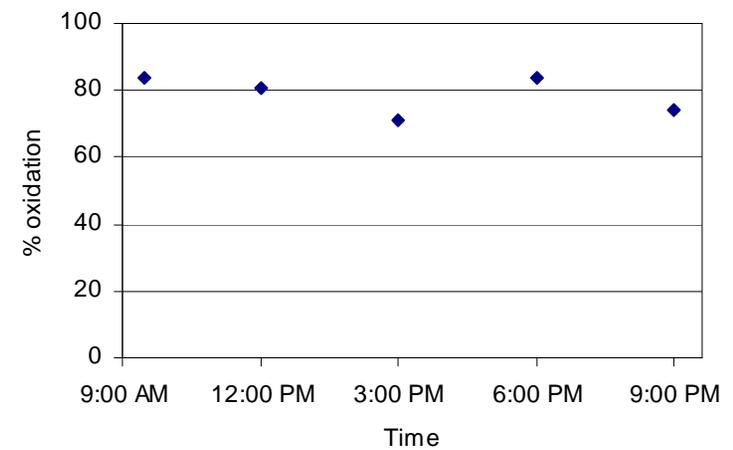
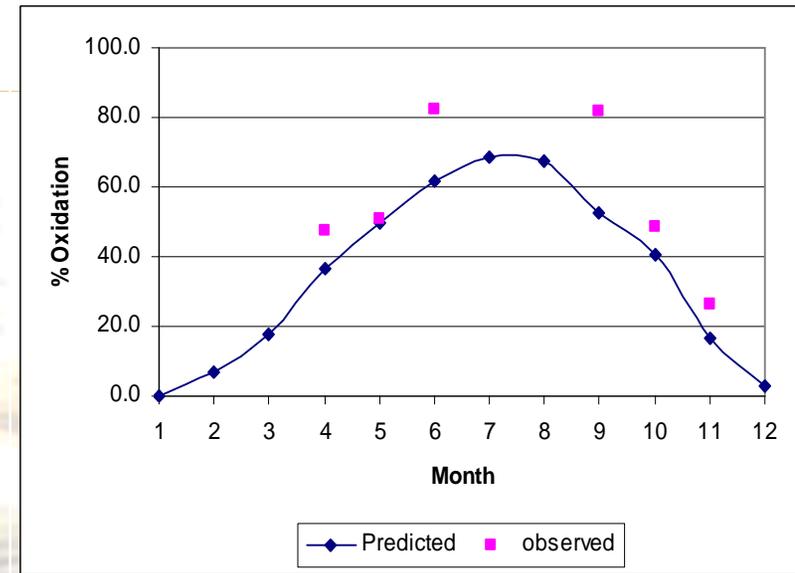
Biofilter

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Biofilter Pilot Plant for Methane Emissions Reduction

R & D



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Compressor Dry Gas Seal Emissions Mitigation Research Project

R & D

- Use of gas-gas ejector to recompress 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

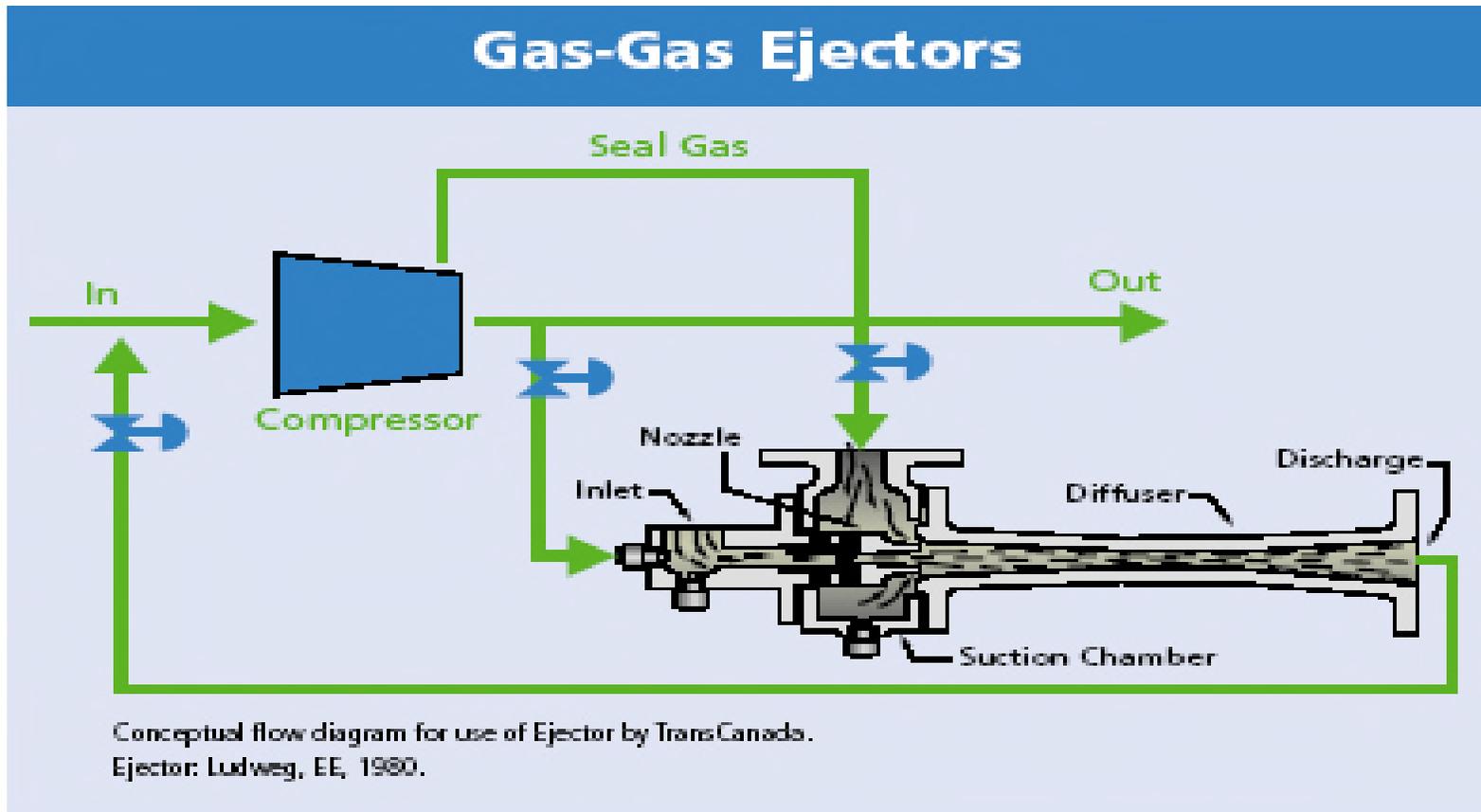


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Compressor Dry Gas Seal Emissions Mitigation Research Project

R & D



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Compressor Dry Gas Seal Emissions Mitigation Research Project

R & D

653 t CO₂ E/yr.



1 seal

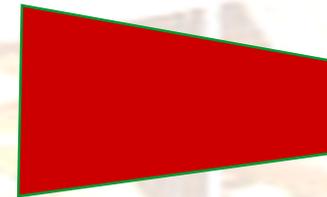
Emissions Value = \$ 0.68 M

Market value of gas = \$ 3.70M

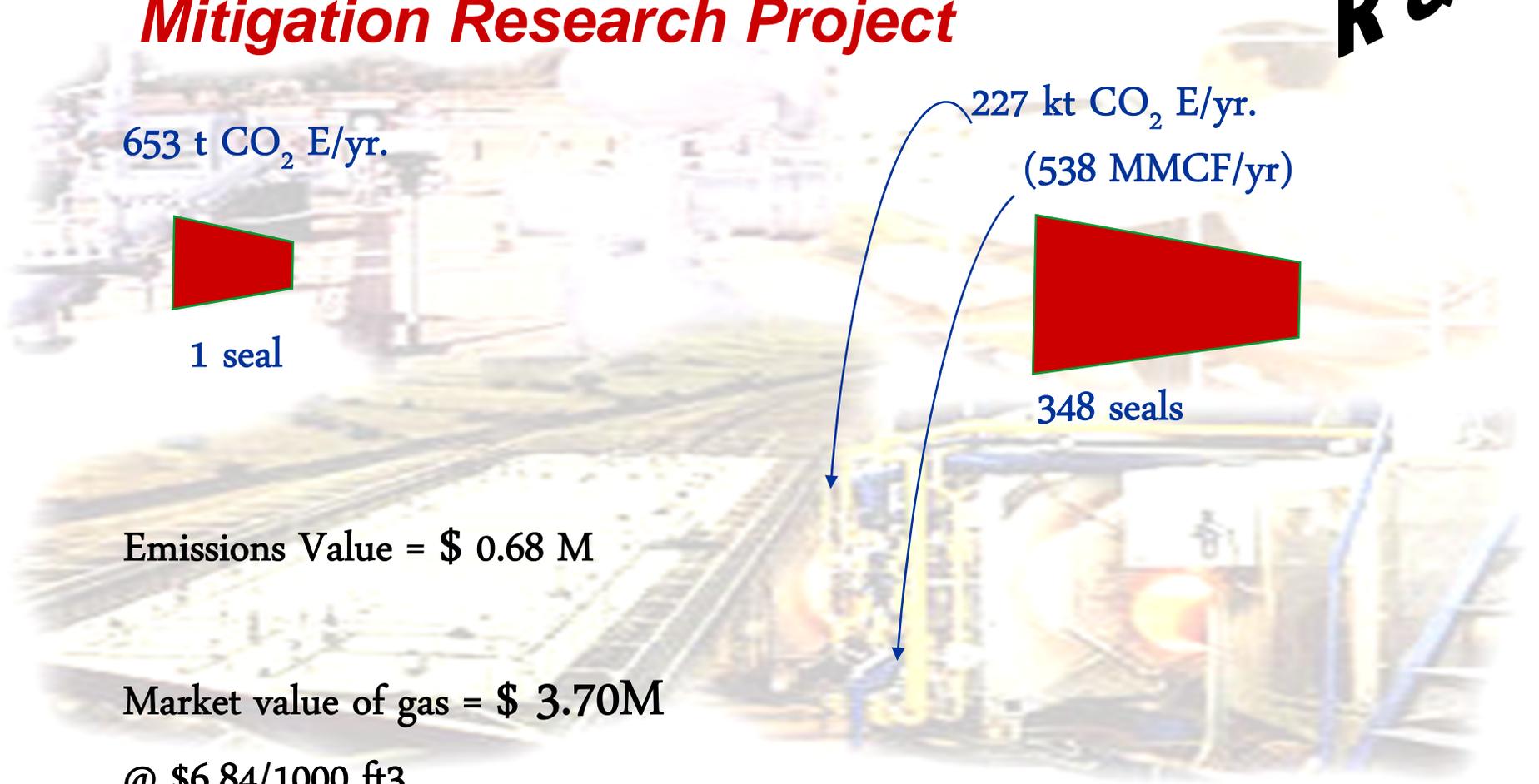
@ \$6.84/1000 ft³

227 kt CO₂ E/yr.

(538 MMCF/yr)



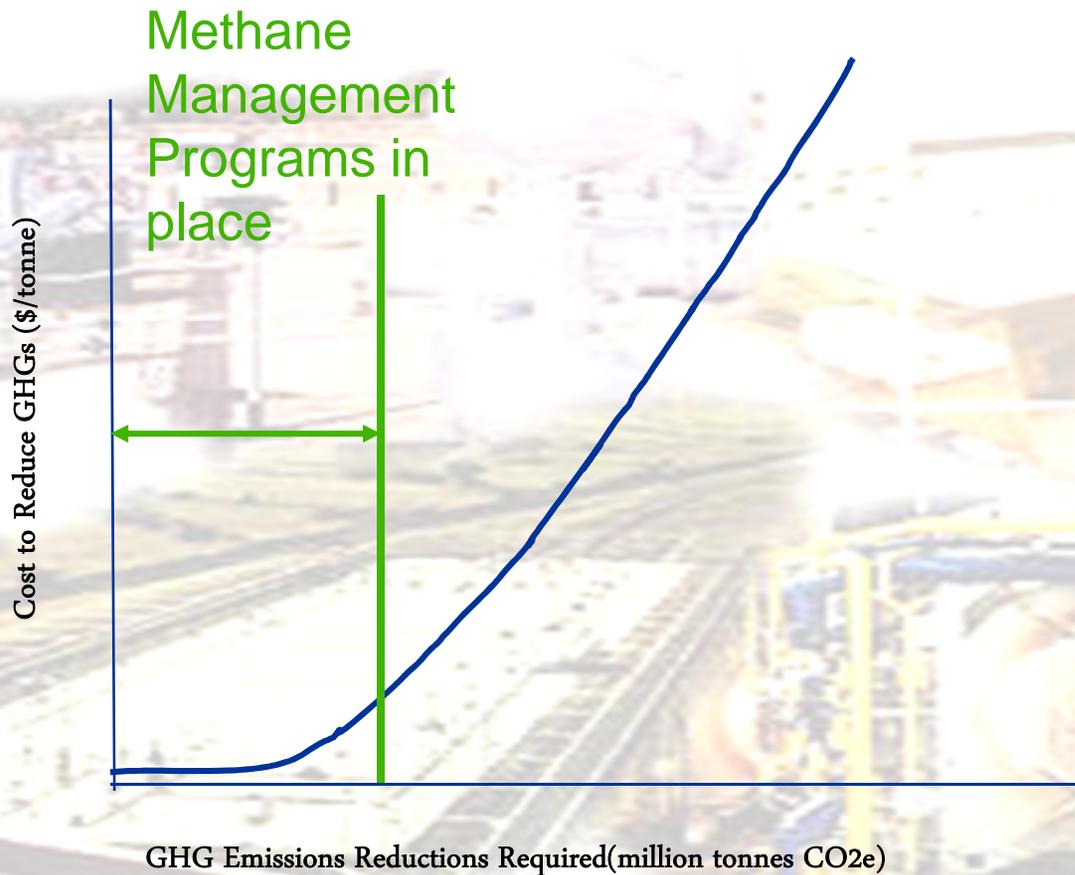
348 seals



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CONCLUSION - Cost Curve



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Thank you!

