



Development of a Best Management Practice in Canada for Controlling Fugitive Emissions at Upstream Oil and Gas Facilities

Modern Technologies of Detection and Elimination
of Methane Leakages from Natural Gas Systems
September 14-16, 2005 Tomsk (Akademgorodok, Russia)

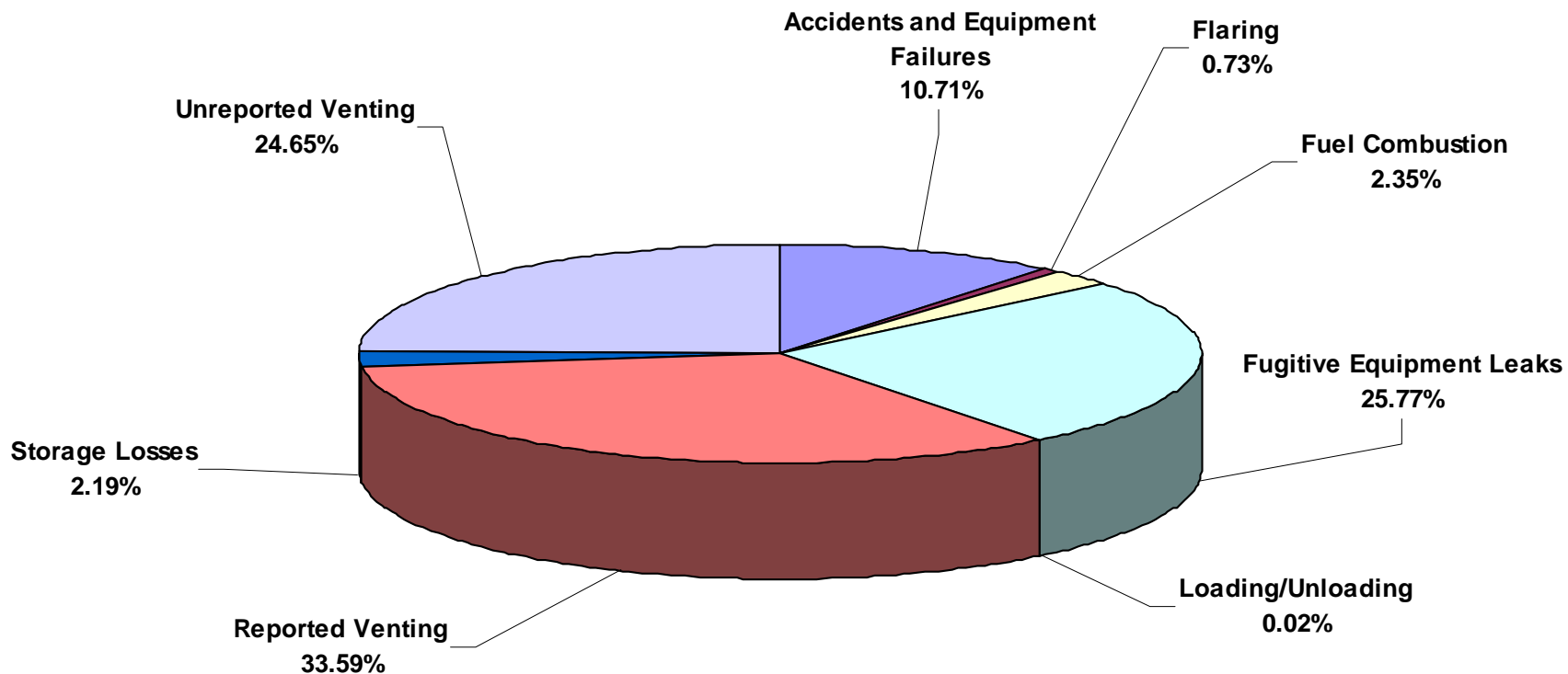
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Canadian UOG Industry

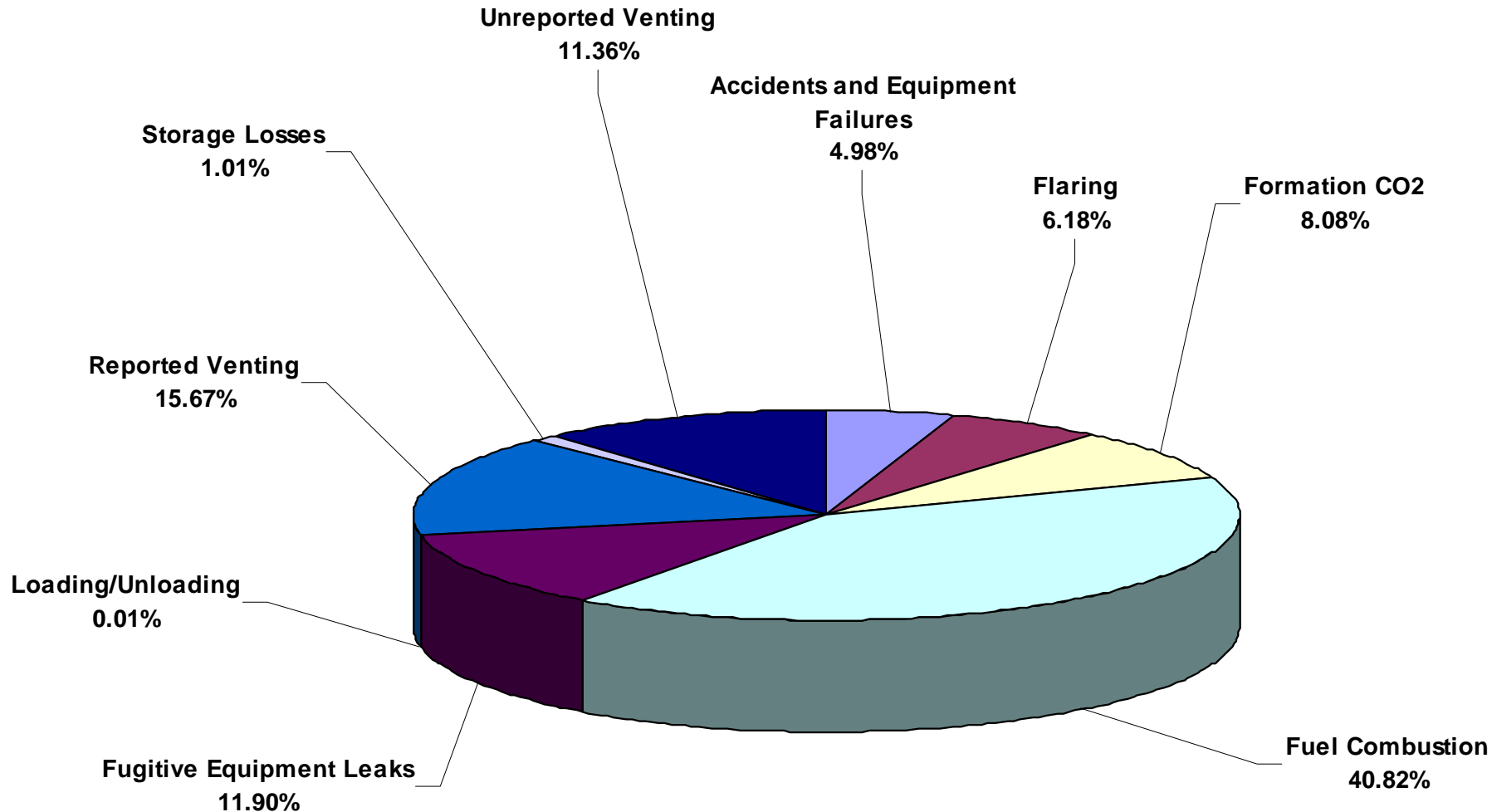
Methane Emissions Presented by Source Category
Total Emissions = 1 849 kt/y





Canadian UOG Industry

Carbon Dioxide Equivalent Emissions Presented by Source Category
Total Emissions = 84 355 kt/y





Background

- **CAPP began discussions with EC on development of a Fugitive Emissions BMP (early 2004)**
- **Subsequently, Clean Air Strategic Alliance (CASA) came out with related recommendations:**
 - **UOG industry to develop a Fugitive Emissions BMP by December 31, 2005.**
 - **EUB should require licensees to develop and implement LDAR programs to minimize fugitive emissions from UOG facilities.**
 - **CASA to review BMP in 2007.**



Objectives

- **Phase 1 (2005): Fugitives BMP Development.**
 - Develop an initial BMP for managing fugitive emissions & targeting larger volume emissions that are cost effective to address.
- **Phase 2 (2006): Field Validation Program.**
 - Evaluate/demonstrate selected key control technologies.
 - Develop a more complete understanding of the life expectancy of specific types of repairs.
 - Update the BMP based on the results.



Special Considerations

- **UOG industry is characterized more by many smaller widely dispersed facilities.**
 - Application of conventional LDAR programs to UOG not practicable.
- **Leak control is of limited value at oil production facilities not connected to a gas gathering system.**



Technology & Standards

- **Design Standards:**
 - ASME: Pressure vessel and piping design.
 - NACE: Corrosion control.
 - OH&S: Workplace safety.
 - NFPA: Explosion and fire hazards.
- **Industry recommended operating and design practices (e.g., API).**
- **Compliance with the manufacturer's guidelines.**
 - Area and fence line monitoring systems.



Management System

- **Objective leak definition.**
- **Guidance on key leak contributors to target.**
- **Key performance targets.**
 - Effectiveness of screening program.
 - Maximum leak frequencies.
- **Monitoring Program.**
 - Monitoring frequency (according to type of component and application).
 - Permanent leak sensors for chronic or frequent leakers.
 - Monitoring ports on vent and flare systems.
- **Leak repairs.**
 - Scheduling.
 - Economic analysis.
- **QA/QC requirements.**
 - Personnel training.
 - Primary calibrations.
 - Field checks.



Management System

- **Corporate commitment.**
 - Fugitive emissions management is an ongoing commitment not a one-time initiative.
 - Potential for fugitive equipment leaks will tend to increase as facilities age.
 - Allocation of adequate resources.
 - Employee awareness and incentive programs.
 - Performance tracking.
 - Senior management involvement.



Management System

- **Record keeping.**
 - Calibration and maintenance records.
 - Economic evaluations.
 - Completed survey forms.
 - Annual reporting (KPIs, target components).
- **Component-specific control options.**
 - For frequent or chronic leakers.
- **Odor control.**
 - Root cause analysis.
 - Complaint tracking.



Basic DI&M Strategy

- **Identify high priority components & facilities.**
- **Monitor at appropriate frequencies.**
- **Repair leakers if:**
 - Economical to fix.
 - Pose a safety, health, environmental or operability concern.
- **Implement repairs within a reasonable time.**
- **Quantify emissions and document justification for any leakers not be repaired.**
- **Increase inspection/monitoring frequency for un-repaired leakers.**



Control of Problem Sources

- **Increased monitoring and repair frequency.**
- **Replacement with better performing components and/or sealing systems.**
- **Continuous or/semi-continuous leak monitoring systems coupled with predictive maintenance.**
 - Potential monitoring parameters include temperature, pressure, flow, concentration.
- **Add-on or retrofit controls (e.g., vapour capture and treatment or recovery systems).**



Component Control Options

- **Compressor seals.**
- **Valves.**
- **Process sewers and drains.**
- **Pumps.**
- **Threaded and flanged connections.**
- **Pressure relief devices.**
- **Open-ended valves and lines.**
- **Sampling points.**



Conclusions

- **Management of fugitive emissions is becoming a routine requirement at UOG facilities.**
- **A targeted approach is warranted.**
 - Focus monitoring & control efforts where need and benefit are greatest.
 - Fix all leaks, where practicable to do so, regardless of where they occur.
- **A rational approach to fugitive emission management makes good environmental sense and offers an attractive payback.**
- **CAPP guidelines will be available by end of 2005.**



List of Acronyms

- ASME** – American Society of Mechanical Engineers
- API** – American Petroleum Institute
- BMP** – Best Management Practice
- CAPP** – Canadian Association of Petroleum Producers
- CASA** – Clean Air Strategic Alliance
- DI&M** – Directed Inspection and Maintenance
- EC** – Environment Canada
- EUB** – Alberta Energy and Utilities Board
- KPI** – Key Performance Indicator
- LDAR** – Leak Detection and Repair
- NACE** – National Association of Corrosion Engineers
- NFPA** – National Fire Protection Association
- OH&S** – Occupational Health & Safety
- QA/QC** – Quality Assurance/Quality Control
- UOG** – Upstream Oil and Gas