Evaluation of CH₄ Survey
Emissions Monitoring 2016/17
Evaluation of CH$_4$ Survey
Emissions Monitoring 2017

- **Back Ground**
  - Survey on CH$_4$ (methane) management in extractive industries was distributed in December 2016 and assembled early in 2017
    - By UNECE in Geneva
    - via web sites of
      - Committee on Sustainable Energy
      - Group of Expert on Gas
      - Group of Experts on Coal Mine Methane
      - Methane Management page
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  - .. encouraging to share survey to others
  - Therefore, no knowledge of how many have received the survey inquiry
95 responses

- from around the World
- 16 were disregarded due to being:
  - too incomplete (13 pcs with very few boxes ticked)
  - wrong type of respondent (3 pcs not from extractive industries)

79 are included in this analysis
Back Ground continued.

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79 are included in this analysis
- Responses from Midstream and downstream oil merged
- " " " " " gas merged
- Upstream oil/gas kept as is
- Coal kept as is
- 28 questions;
# 1 Type of extractive industry? Many respondents noted several categories

- **Coal; 16 (respondents); 14%**
- **Upstream oil/gas; 25; 22%**
- **Gas (midstream, downstream); 37; 32%**
- **Oil (midstream, downstream); 36; 32%**
# 2 Do you monitor/calculate CH₄ or other CH emissions?

# 3 Do you report the results?
# 4 Monitoring of CH$_4$/CH emissions mandated by law?
# 5 Primary purpose of monitoring CH₄/CH emissions?

- Safety for exploration and for coal mining
- Compliance for oil and gas

![Bar chart showing the primary purposes of monitoring CH₄/CH emissions as of 2017, categorized by financial, safety, environment, law, and other sectors, with specific focus on upstream oil/gas, oil (midstream, downstream), gas (midstream, downstream), and coal.]
# 6 Nature of CH$_4$/CH emissions?

- Fugitive leaks and controlled releases for oil and gas
- Accumulation for coal

Diagram showing emission sources and categories:
- Fugitive leaks
- Accumulation
- Controlled release
- Damage (3rd party)
- Other

Categories include:
- USt (Upstream) oil/gas
- Oil (midst., downst.)
- Gas (midst., downst.)
- Coal
# 7 Do you distinguish between CH$_4$ and other CH?

# 8 What other CH than CH$_4$?

Slightly more often in exploration. Otherwise more seldom than yes.
# 9-12 are too wide spread to present in graphic form. 
- also obvious in nature ..

- # 9 What components of your facilities do you monitor?
  - “All”, “Most”, “Where potential leaks”, “All emitting equipment” ..

- # 10 Why those particular components?
  - “Potential emitters”, “Legislation”, “Worker safety” ..

- # 11 What processes do you monitor?
  - “All”, “Most”, “Hazardous work area” ..

- # 12 Why those particular processes?
  - “Potential emissions”, “Regulation”, “Health and safety” ..
# 13 With what frequency do you monitor?

- Continuously, especially in coal
- Oil and gas: Annually
- Coal: Monthly
- Oil and gas:
  - USt (Upstream) oil/gas
  - Oil (midst., downst.)
  - Gas (midst., downst.)
  - Coal
# 14 How do you standardize CH₄ emissions in your organization?

- “scf”, “Nm3”, “t/yr”, “EPA 21”, “EN15446”, “CO2e”, “BAT”, “FID”..

# 15 Is the CH₄ emissions standardization mandated by law?
# 14 How do you standardize CH₄ emissions in your organization?

- “scf”, “Nm3”, “t/yr”, “EPA 21”, “EN15446”, “CO2e”, “BAT”, “FID”..

# 15 Is the CH₄ emissions standardization mandated by law?
# 16 What methods/technologies are used to monitor CH$_4$ emissions?

- Oil and gas tend to mix calculation with monitoring
- Coal more monitoring

![Graph showing emissions monitoring methods for oil/gas, oil (midst., downst.), gas (midst., downst.), and coal.]

- Measure actual emissions
- Calculate emissions
- Combined monitoring & calculation
# 17 Are the methods/technologies mandated by law/regulations?

Oil and gas: Methods typically a bit more NOT mandated by law
#18 Why are these methods chosen?
- “Best suited”, “no other tool”, “EPA 21”, “Low cost technology”, “used by others”, “BAT”, “Best practice” ..

#19 What % of CH₄ emissions are included in a “Maximum Allowable Emission Target” ?
- 9 respondents answered in numbers (from 0% to 100%)
- 2 respondents referred to different per facility (one said ½% to 1½%)
- 25 responded NA or that they did not understand the question
- Remaining 43 (over half) did not respond at all

# 18-19 are too wide spread to present in graphic form.
# 20 When using emission factors for calculations, what database(s) do you use?

- **Total survey**: "Company" by most
- **Upst. (Upstream) oil/gas**: "EPA" by oil industry
- **Oil (midst.,downst.)**: "UN" by coal
- **Gas (midst.,downst.)**: "Company" by most
- **Coal**: "UN" by coal

Legend:
- Blue: EPA
- Orange: UN
- Gray: Company
- Yellow: Other
# 21 How often is the monitoring equipment calibrated?

- **Oil and gas**: "As advised"


# 22 How are monitoring results recorded?

- More than half did not answer.
- Rest answered various volume, rate or flow units, mostly SI-units.
# 24 How are surveys conducted?

![Bar chart showing methods of survey conduct](chart.png)

- **Total survey**
  - By employees
  - By employees + 3rd party audit
  - By 3rd party
  - 3rd party + auditors
  - Others

- **USt(Upstream) oil/gas**
  - Method distribution:
    - By employees
    - By employees + 3rd party audit
    - By 3rd party
    - 3rd party + auditors
    - Others

- **Oil (midst., downst.)**
  - Method distribution:
    - By employees
    - By employees + 3rd party audit
    - By 3rd party
    - 3rd party + auditors
    - Others

- **Gas (midst., downst.)**
  - Method distribution:
    - By employees
    - By employees + 3rd party audit
    - By 3rd party
    - 3rd party + auditors
    - Others

- **Coal**
  - Method distribution:
    - By employees
    - By employees + 3rd party audit
    - By 3rd party
    - 3rd party + auditors
    - Others

**Legend:**
- Blue: By employees
- Orange: By employees + 3rd party audit
- Grey: By 3rd party
- Yellow: 3rd party + auditors
- Blue: Others

**Questions:**
- Same as "3rd party"?
- Coal sector uses own personnel?
# 25 How are the results aggregated?

- As company wide emissions
- Equipment type
- Not aggregated
- Others
# 26 How are your results reported?

- Publically available

Coal (vs oil&gas): Regulatory more significant
# 27 What organisations do you cooperate with on this topic?

Around half of respondents indicated a wide range of names, including:

- Governmental ministries and agencies
- Intergovernmental organisations (e.g. UN and GMI, Global Methane Initiative)
- Universities and research institutions
- 3rd party auditing companies and
- Other private companies
# 28 Contact details (full name and email address) submitted?

Approx 50/50
Most fossil extractive industries (gas, oil, coal) monitor CH$_4$ and report results

Primary purposes for monitoring are compliance and safety

The nature of emissions are fugitive leaks and controlled releases (mainly for gas and oil industries) and accumulation of gas (coal)

Oil and gas exploration distinguishes CH$_4$ from other CH-gases. Other players do not distinguish

Continuous monitoring is applied in all sectors, but especially in coal, plus monthly for coal and annually for oil and gas

CH$_4$ emission standardization mandated by law more often for coal than for oil and gas
# OVERALL SUMMARY AND CONCLUSIONS

*(Assuming that the response group is representative;)*

<table>
<thead>
<tr>
<th>Survey item</th>
<th>Oil &amp; Gas Exploration</th>
<th>Oil &amp; Gas Distribution</th>
<th>Coal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mostly monitored</td>
<td>Yes</td>
<td>- And calculated</td>
<td>Yes</td>
</tr>
<tr>
<td>Primary purposes (for monitoring)</td>
<td>Safety</td>
<td>Compliance</td>
<td>Safety</td>
</tr>
<tr>
<td>Emissions are primarily from</td>
<td>-Fugitive leaks</td>
<td></td>
<td>Accumulation</td>
</tr>
<tr>
<td></td>
<td>-- Controlled releases</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Methods/technologies for monitoring are mandated by law</td>
<td>Somewhat</td>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td>CH$_4$ emissions are typically monitored by ..</td>
<td>3rd parties</td>
<td></td>
<td>Own personnel</td>
</tr>
<tr>
<td>Recorded CH$_4$ emissions are typically reported</td>
<td>To be publicly available</td>
<td></td>
<td>For regulatory purposes</td>
</tr>
</tbody>
</table>
Reducing methane emissions would slow global temperature rises.

**BUT**

Current information is largely based on estimates, and often uneven and incomplete.
- Not all companies measure and report leaks.
- Technology for detecting and quantifying methane emissions is available.
- Standard national/regional methods for reporting them exist.
- Implementation is uneven, so hard to compare data.

**THEREFORE**

A clear need for common global approaches across each fossil energy chain and for enhanced dialogue and cooperation.
Methane management is attracting attention
Information regarding methane emissions has improved
Much effort and resources are going into remediation
A range of practices exist

BUT

The essential conclusions remain unchanged:
- Data collection is not rigorous nor comprehensive; estimates not verified
- Procedures for MRV (Monitoring, Reporting & Verification) and remediation are variable
- Enormous opportunity for knowledge enhancement and remediation
Survey identified critical gaps in information on methane emissions.

- It was recommended that work on best practice guidelines and methods to manage and reduce methane emissions be continued in the 2018–2019 work plan.

Survey highlighted the importance of and practical need for steps to be undertaken to update and refine data to reflect more accurately volumes of methane emissions from the gas sector.

Future work should be carried out in close collaboration with the International Gas Union as well as with other international mechanisms, companies, organizations and associations, and invited all interested parties to join this effort.
Thank you!

Richard Mattus
Consultant
UNECE
Date 27 I 09 I 2017, Geneva