Synopsis
Reducing Methane Emissions: Best Practice Guide
Engineering Design and Construction
November 2019
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This Synopsis describes actions that an organisation can take to help manage methane emissions. Any actions or recommendations are not mandatory; they are simply one effective way to help manage methane emissions. Other approaches might be as effective, or more effective in a particular situation. What readers choose to do will often depend on the circumstances, the specific risks under management and the applicable legal regime.
Checklist
Methods of reducing methane emissions from engineering design and construction

- Use electric, mechanical, or instrument air powered equipment used where possible. Including pneumatic controllers, pumps and engines.
- Centralized and consolidated facilities where possible.
- Use pipelines for liquid and gas takeaway.
- Recover natural gas for beneficial use where possible.
- Flare or combust natural gas when recovery is not possible.
- Consider the use of alternative low emission alternative equipment/process.
- Consider the use of alternative low maintenance alternative equipment/process.

Engineering design can be used to reduce methane emissions prior to the start of operations for new facilities or modifications to existing facilities. The design phase is where there is the most opportunity to identify reduction opportunities. It is also typically less expensive to implement reduction strategies in the design phase than have to modify the facility after operations have begun. The engineer should consider the following hierarchy of strategies to reduce methane emissions:

1. Eliminate sources of methane,
2. Reduce the amount of methane emitted and fuel used if the source cannot be eliminated,
3. Control remaining sources of methane.

Most engineering solutions will be specific to a company’s operations and each facility and will evolve as technology does. Any design must prioritize integrity, safety, fire protection, and regulatory requirement over methane reductions. Effective general design strategies to reduce methane emissions throughout the natural gas supply chain for both operations and maintenance activities are discussed in detail below.

1. Prioritize use of electric, mechanical and compressed air equipment
2. Centralize and consolidate facilities
3. Use pipelines for liquid and gas takeaway
4. Prioritize recovery of methane for beneficial use
5. Consider alternative low emission and low maintenance equipment
Design and Construction Strategies

Prioritize use of electric, mechanical and compressed air equipment
In some types of operations, pneumatic devices represent a significant source of emissions from the oil and industry. Using electric, mechanical or compressed devices can eliminate pneumatic device emissions completely. This also includes the use of electric compressors and pumps which reduces the amount of fuel used and for compressors can improve reliability.

Centralize and Consolidate Facilities
Centralization and consolidation of facilities allows for the use of more efficient equipment and processes. It also can make equipment more economically viable than at numerous smaller facilities. For example, an oil stabilizer can take production from surrounding facilities and eliminate venting from storage tanks but smaller stabilizers are not available or would not be economical at smaller facilities.

Use Pipelines for Oil and Natural Gas Transportation from Facilities
Use of pipelines ensures natural gas is sold and reduces or eliminates flaring or venting of natural gas. Liquid pipelines can eliminate atmospheric storage tanks, and truck loading sources.

Prioritize Recovery of Methane for Beneficial Use
Natural gas recovery should be prioritized over flaring or venting. The natural gas can be sold or used as fuel on site. Vapor recovery units can be installed to boost the pressure of low pressure gas to be sold. Gas can also be directed to a low pressure fuel system. The recovery of natural gas should be designed for where possible.

Consider Alternative Low Emission Equipment
Some processes or equipment can be eliminated or replaced with a low emission alternative system. These alternative low emission systems should be considered as long as they can meet the requirements of the project. For example methanol injection or desiccant dehydrators are some low emission alternatives to traditional glycol dehydrators.

Examples of actual design and engineering technologies and techniques that use these strategies include:
1. Locating facilities near current pipelines and power lines or brining pipeline and grid power to a facility
2. Using modular design on upstream facilities and removing equipment as production declines
3. Using welds instead of threaded connections and flanges
4. Locating fire gates and isolation valves as close to equipment as possible
5. Recovery of secondary and tertiary separator gas from condensate and crude oil
6. Elimination of storage tanks by using LACTs, pumping liquids around facility or storage in pressurized tanks
7. Proper design of storage tank control systems
8. Use of electrically driven compressors
9. Use of pig ramps and jumper lines to reduce the amount of methane released during pigging operations
10. Use of methanol for hydrate prevention instead of glycol dehydrators
11. Use of flash tanks on amine systems
12. Controlling amine acid gas streams with regenerative or recuperative thermal oxidizers
Further information

MGP Website:
www.methaneguidingprinciples.org

OGCI:
https://oilandgasclimateinitiative.com

CCAC OGMP:

IEA Methane Tracker:
https://www.iea.org/weo/methane

Natural Gas STAR Program:
https://www.epa.gov/natural-gas-star-program