Regulating methane emissions from oil and gas operations

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Methane leakage reduction from the oil and gas sector should be part of a portfolio strategy to reduce U.S. greenhouse gas emissions

- Reducing methane leakage represents an important and necessary piece in a portfolio strategy to reduce greenhouse gas emissions. This includes:
  - EPA's Clean Power Plan, standards for existing power plants: about 650 MMT of CO_2 reduction in 2020 (below 2005 level)
  - Improved fuel efficiency from new motor vehicles: more than 200 MMT of CO_2 reduction in 2020 (below 2020 BAU level)
  - Now need to address methane from oil and gas sector… about 130 MMT of CO_2e reduction in 2020 (based on 2012 level)

- Methane leakage reduction from oil and gas would help the Administration meet its target of reducing U.S. emissions by 17% by 2020 (from 2005 levels)

Enhanced standards for oil and gas sector could reduce up to half its emissions

- Natural gas is primarily methane
  - 36 times more potent than CO_2 over 100-year timeframe
  - 87 times more potent than CO_2 over 20-year timeframe

- Oil and gas sector emitted 7.7 million metric tons of methane in 2012, according to EPA estimates, equivalent to more than 260 MMT of CO_2e
  - Recent, independent studies suggest actual emissions may be much higher

- Enhanced standards to **cost-effectively address methane leakage** could **reduce up to half of methane leakage – about 130 MMT of CO_2e annually** (100-year GWP of 36), in about 5 years
  - This is based on EPA estimates, but due to uncertainty in these estimates actual reductions may be much higher
  - This would build on and significantly strengthen standards established by EPA in 2012, which are expected to only reduce about 10-15% of total oil and gas sector methane emissions when fully implemented

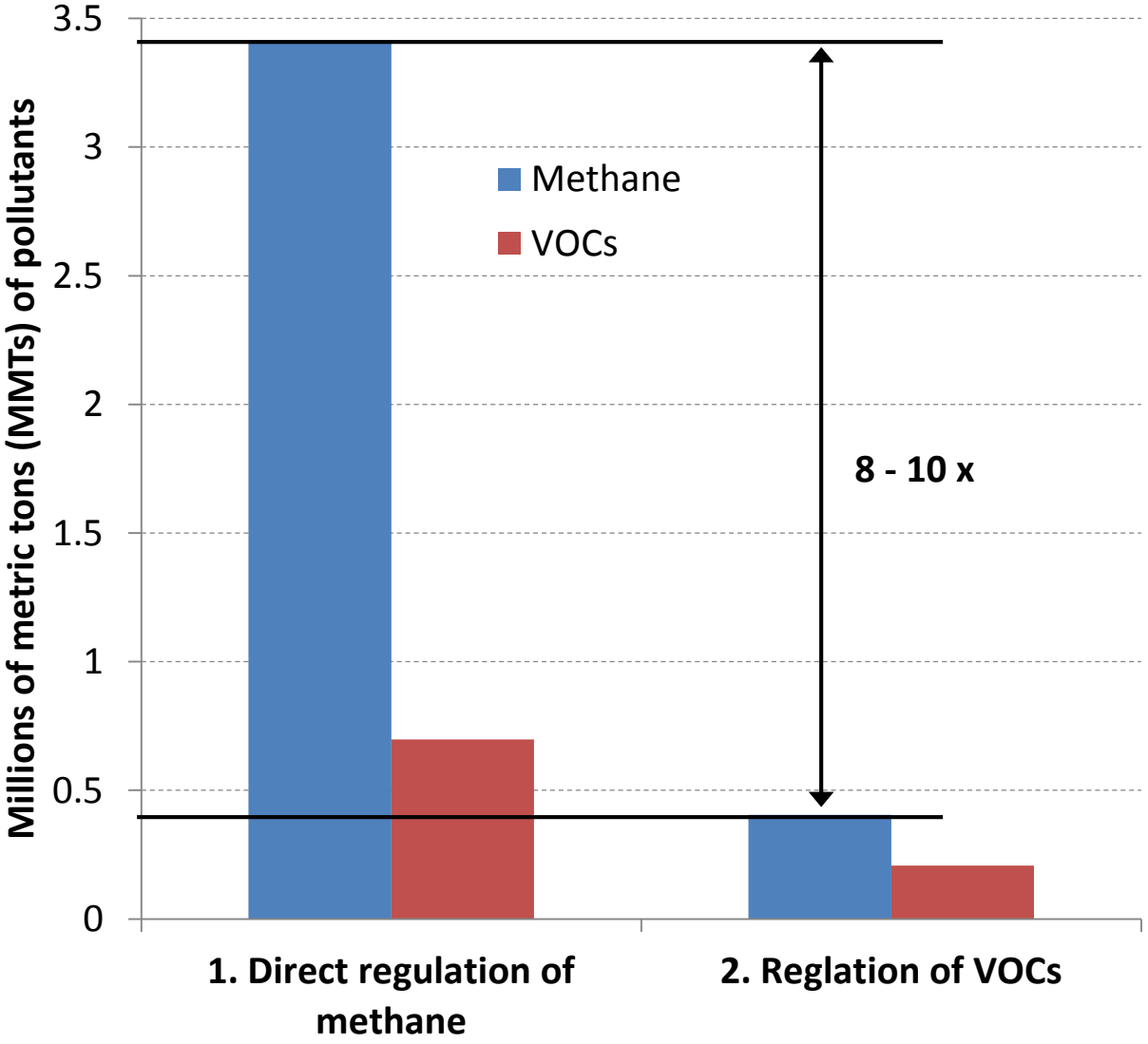
Directly addressing methane leakage via five cost-effective approaches would enable reductions of up to 50 percent

	Source of emissions	Relevant standards for leakage reduction
1	**Equipment leaks**	Leak detection and repair for well-pads, processing plants, compressor stations, large distribution facilities
2	**Pneumatic equipment**	Non-emitting, or low-emitting when non-emitting infeasible, new and existing pneumatic valve controllers and pumps
3	**Compressors**	Reducing emissions from new and existing reciprocal and centrifugal compressors, with better maintenance and operations
4	**Oil well venting**	Use of green completions to capture gas from oil wells, and if infeasible, flaring of gas rather than venting
5	**Liquids unloading**	High-emitting gas wells to use plunger lifts or other technologies, rather than crudely blowing down wells

- **Up to 50% methane leakage reduction**
- **Equivalent to about 130 MMT CO_2e** (at GWP = 36)

Regulating methane indirectly via volatile organics would lead to substantially fewer emissions reductions all around (even of VOCs)

Pollution reduction from two possible regulatory strategies



Strategies 1 and 2:

- Based on authority under the Clean Air Act
- Involve similar regulatory steps and can produce results on similar timetables (5 years)
- Would apply to new and existing sources but to very different extents

Conclusions

- Direct regulation of methane is clearly the more effective approach to reduce methane
- These approaches are built on previous EPA standards, and some states (e.g., Colorado) have implemented some of these measures; these standards' scope is limited, but they demonstrate feasibility and cost-effectiveness
- Clean Air Act provides authority for national standards
- Direct regulation can reduce about 90 MMT (at GWP=25) or 130 MMT (at GWP=36) CO_2e, which will help meet U.S. 2020 emissions reduction targets
- The measures are highly cost-effective and can be implemented in 5 years
- Compliance and implementation by states is relatively straightforward
- Reductions are much higher than with voluntary actions, even with expanded NG Star