



G L O B A L F O R U M

On Flaring and Venting Reduction
and Natural Gas Utilisation

Successful Application of Gas Utilisation Technologies

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Flaring and Methane Emissions Connection

- Flaring directly results in methane emissions
 - Flares have < 100% combustion efficiency resulting in un-combusted methane emissions
 - Flame can be extinguished by weather, intermittent flow, or low heat-content gas resulting methane venting
 - Flaring undermines incentives to reduce fugitive and venting emissions of methane
- Flaring keeps saleable methane from reaching markets worldwide
 - At least 150 billion cubic meters¹ (Bcm) of gas is flared and an additional 81 Bcm² is vented/leaked annually
 - This is equivalent to \$16.2 billion of lost sales revenues at \$70 per thousand m³ gas price

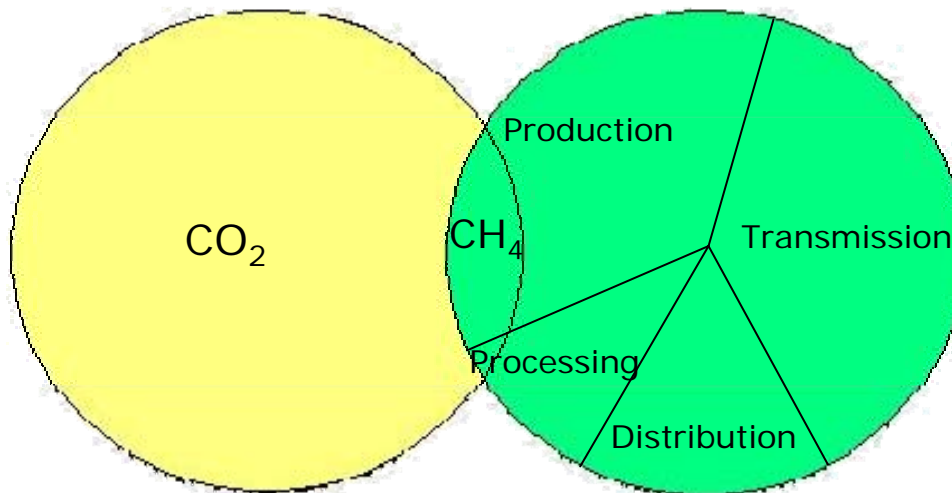
¹GGFR website.

²EPA. "Global Anthropogenic Non-CO₂ Greenhouse Gas Emissions: 1990-2020." June, 2006

Methane to Markets Role



**150 Bcm of
gas wasted
in flares**



**81 Bcm of gas
wasted in vents
and leaks**

- Fugitive and Vented methane has 21 x global warming potential as combusted
 - 150 Bcm methane flared = 281 million tonnes of CO₂e (tCO₂e)
 - 81 Bcm methane vented/leaked = 1,165 million tCO₂e
- Methane to Markets has common goal with GGFR
 - Recover vented gas for beneficial purposes in addition to flared gas
- Participants have found cost-effective technologies to capture and utilize gas vented onsite

Background: Methane to Markets

- The **Methane to Markets Partnership (M2M)** is an international initiative that advances cost-effective, near-term methane recovery and use as a clean energy source in four sectors:



Oil and Gas Systems



Coal Mines



Landfills



Agricultural Waste

- The goals of the Partnership are to reduce global methane emissions to:
 - Enhance economic growth
 - Improve air quality and industrial safety
 - Reduce emissions of greenhouse gases
 - Strengthen energy security

Natural Gas STAR International

- Under the Methane to Markets Partnership, U.S. EPA expanded Natural Gas STAR internationally



Methane to Markets

- Oil and Gas Subcommittee



110 US Partner Companies

9 International Partner Companies

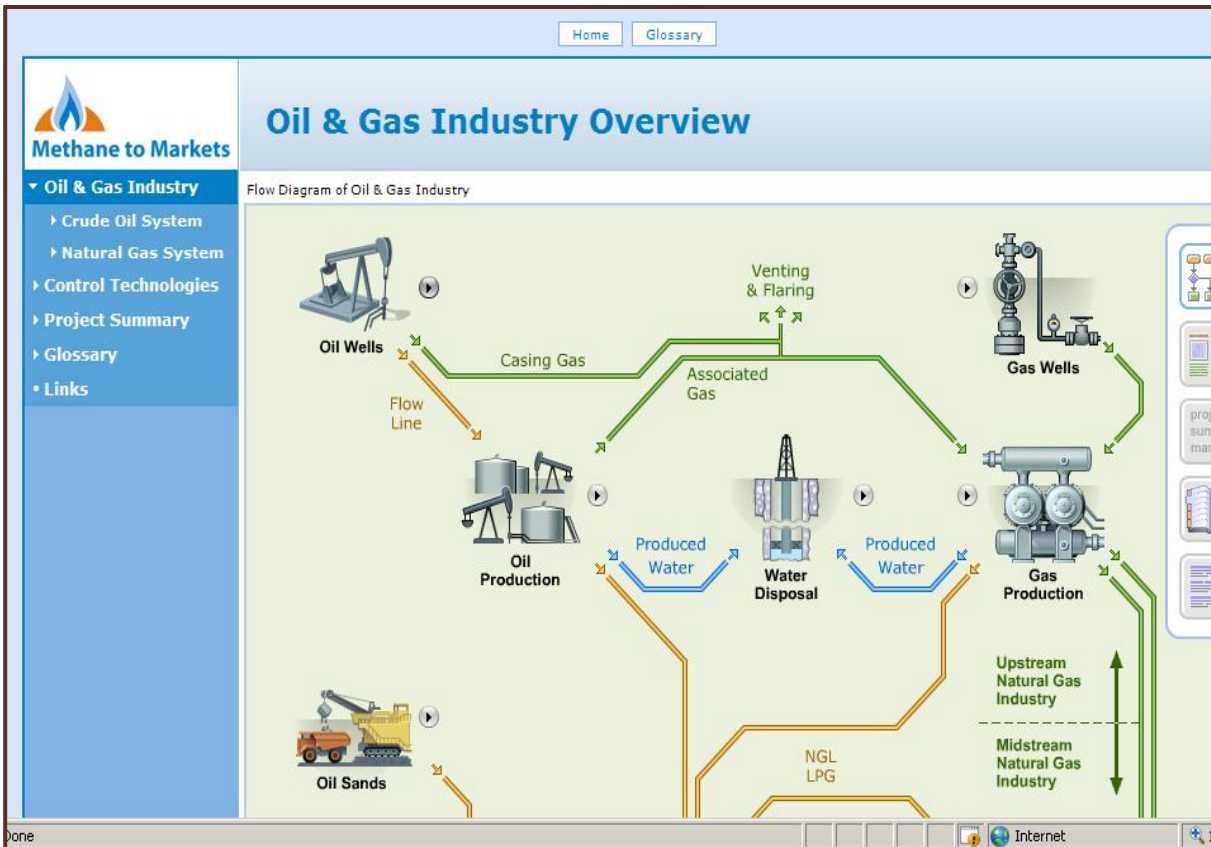
Natural Gas STAR International

- Natural Gas STAR is a *flexible, voluntary partnership* between EPA and the oil and natural gas industry designed to *cost-effectively* reduce methane emissions from natural gas operations.
- Companies world-wide are welcome to join Natural Gas STAR International



Tools Available for Project Identification

- Methanetomarkets.org/resources/oil-gas/index.htm




Install Electronic Flare Ignition Devices
PRO Fact Sheet No. 303

Applicable sectors:
 Production Processing Transmission and Distribution
 Compressors/Engines Drilling/Refrigeration
 Pumps/Blowers Pneumatics/Control
 Tanks Valves Wells Other

Partners reporting this PRO: Chevron U.S.A. Production Company (now Chevron/Texaco Corporation)
Other related PROs: Install Flares, Install BASOP Valves

Technology/Practice Overview
Description: Flares are used to safely dispose of combustible gas and avoid releasing it to the atmosphere. Some flares have one or more continuously burning pilot flames, while others use gas by only lighting pilot flames in preparation for use. Pilots can be blown out by wind and gas leakage and/or waste gas is occasionally released to an unlit flare. Both of these situations result in methane, volatile organic compounds (VOC) and noxious air pollutant (NAP) emissions to the atmosphere.
 This technology replaces the intermittent or continuously burning flare pilots with electrical sparking pilots similar to a modern gas stove. These sparking pilots require low electrical power that can be supplied from a battery with solar recharging in remote sites. In addition to using electronic flare ignition devices for pilots, facilities may also install sensors to detect the pilot flame and shut off fuel gas if the pilot is extinguished.
Operating Requirements: A low ampere electrical power supply is required, such as solar recharged batteries.
Applicability: This technology can be applied to all pilot flame ignition systems, including flares and heaters.
Methane Emissions Reductions: Methane emissions occur from leaking or venting un-combusted natural gas through an unlit flare. Leakage may occur through emergency shut valves and blowdown valves connected to a flare. Venting occurs when flare pilot flames are occasionally blown out by high winds, causing release of methane at 70 scf per hour per pilot unit they are not shut out.

Methane Savings: 1.58 Mcf per year
Costs: Capital Costs (including installation) <\$1,000 \$1,000 - \$10,000 >\$10,000
Operating and Maintenance Costs (annual): <\$100 \$100-\$1,000 >\$1,000
Payback (Years): 1-1 1-3 3-11 >10
Benefits: Reducing methane emissions was an associated benefit of the project.

Technical Documents

Flared and Vented Gas Utilisation Opportunities

- Technologies already exist to capture vented and flared gas
 - The key is to find a beneficial use for captured gas
- Oil and gas companies have implemented and found such technologies to be practical
- Projects are typically localized, focused on individual sites
- Localized projects typically do not need external financing
 - Capital investments are moderate
 - Payback periods vary, often <1 to 3 years

Flared and Vented Gas Utilisation Projects

- Oil and gas companies have cost-effectively initiated or implemented the following projects to reduce gas flaring and methane venting
 - Gas Utilisation Technology Overview
 - Flare Emissions and Efficiency – Past and Current Research
 - Operational Experience with Gas-Diesel Engine Running on Flare Gas
 - Case Studies
 - Angola: Elimination of Routine Flaring in Angola – The Onshore Solution
 - Brazil: Improving Natural Gas Utilisation in the Campos' Basin
 - Colombia: Capture flared gas and vented tank vapors
 - Ecuador: Small-scale Power Generation from High-CO₂ Flared Gas

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