



Flaring and Incineration

There are a number of methods for handling waste gases at upstream oil and gas facilities, the most common being combustion. Flaring and incineration are two methods of combustion considered acceptable by the Alberta Energy Regulator (AER). Historically, the most common type of combustion has been flaring. In recent years, incineration technology has emerged as another method of combusting waste gases. This EnerFAQs explains why flaring and incineration are sometimes necessary and how the AER ensures that flaring and incineration are carried out in a manner protective of public safety and the environment.

» What are flaring and incineration?

Flaring and incineration are two technologies used to combust waste gases that are unable to be processed or sold.

- **Flaring** is the igniting of natural gas at the end of a flare stack—a long metal tube up which the gas is sent. This causes the characteristic flame associated with flaring.
- **Incineration** is the mixing and combusting of waste gas streams, air, and fuel in an enclosed chamber. Air and gas are mixed at a controlled rate and ignited. No flame is visible from an incinerator that is operating properly.

» What emissions does the combustion of waste gases produce?

The type of emissions depend on the composition of gas and the combustion efficiency. For example, high efficiency combustion ensures that nearly all methane is converted to carbon dioxide (CO₂) and water vapour. If hydrogen sulphide (H₂S) is included in the waste gas stream, nearly all of the hydrogen sulphide is converted to sulphur dioxide (SO₂).



If the waste gas stream contains both methane and H_2S , a lower combustion efficiency flare or incinerator may emit some H_2S and methane as unburned products. Lower combustion efficiency can also result in other emissions, including black smoke and particulates. The minimum combustion temperature, liquid separation and minimum heating value of the waste gas stream in AER regulations ensure that components in the waste gas, including methane and H_2S , are adequately combusted.

» **Does using an incinerator result in less of an impact on the environment?**

Flaring and incineration are two different technologies used to combust natural gas waste. Emissions depend on factors such as combustion efficiency and heating value of the gas being combusted. Generally, the higher the combustion efficiency and heating value, the lower the impact on the environment.

Many factors can affect combustion efficiency. For example, a flare stack exposed to windy conditions may perform at a lower efficiency than a stack that operates in calm conditions. However, due to their height, flare stacks often better disperse emissions into the atmosphere in hilly or mountainous terrain than do incinerators. Meanwhile, incinerators are not affected by windy conditions. A correctly operated incinerator can yield higher efficiencies through proper mixing, gas composition, retention time, and combustion temperature.

Properly designed incinerators can result in higher combustion efficiency than flares. However, incinerators can be affected by a narrow range of flow rates compared to flares and therefore have difficulty adequately dispersing emissions with higher H_2S concentrations in the waste gas. It is important to select the combustion technology suitable for the particular application.

» **What is combustion efficiency?**

Combustion efficiency, generally expressed as a percentage, is essentially the amount of methane converted to CO_2 , or H_2S converted to SO_2 . The more converted, the better the efficiency. Combustion efficiency can be affected by many factors, including meteorological conditions, operator competency, and waste gas composition.

For flares, the AER requires the minimum energy content of the gas mixture (20 megajoules per cubic metre), which has been shown to result in higher combustion efficiencies. If a waste gas stream contains low amounts of hydrocarbons, fuel gas must be added to allow the mixture to combust efficiently.

To ensure combustion efficiency for incinerators, the AER requires that the stack top temperature is maintained at least 600 degrees Celsius or higher and have a minimum residence time (the time the gas remains within the incinerator before being released into the atmosphere) of 0.5 seconds. Conventional incinerators are equipped with refractory lining—which help contain most of the combustion heat and control the combustion airflow into the incinerator—can increase combustion efficiency. Some incinerators have innovative hybrid designs that do not contain refractory lining. Properly designed incinerators can achieve very high combustion efficiency.

The AER requires that all waste gas combustion technologies, including those for SO₂, be designed to comply with Alberta Environment and Sustainable Resource Development's *Alberta Ambient Air Quality Objectives and Guidelines*.

» **What are the Alberta Ambient Air Quality Objectives and Guidelines?**

The Government of Alberta has set out acceptable minimal levels of safety and environmental protection related to air quality. These are called the *Alberta Ambient Air Quality Objectives and Guidelines* and are among the most stringent in Canada.

» **What are the AER's regulations regarding flaring and incineration?**

The AER regulates flaring and incineration through performance and reporting requirements, permits, and data collection, as detailed in *Directive 060: Upstream Petroleum Industry Flaring, Incinerating, and Venting*.

A permit is required for well test flaring or incineration when the waste gas contains more than 5 per cent H₂S or the total well test volume exceeds 200, 400, or 600 thousand cubic metres, depending on the type of the well.

The AER requires that companies evaluate flaring and incineration at existing facilities and determine if the gas should be conserved. The licensee or operator is expected to consider the following:

- Are there residents in the area?
- Are there directly affected local residents with environmental or health concerns?
- Are there economic alternatives to burning the gas?
- Would clustering of flares be economically viable?
- Are the environmental impacts of eliminating or reducing flaring greater than the environmental benefits?

» **Are companies required to notify the AER and residents before flaring or incinerating?**

Before planned flaring or incineration (unlike flaring or incineration during an emergency), the licensee or operator is required to provide 24-hour advance notice to the appropriate AER field centre, all residents within a 3 kilometre (km) radius for well tests with an H₂S content greater than 1 per cent, and all residents within a 1.5 km radius for well tests with an H₂S content of less than 1 per cent.

Additional “good neighbour” notification, including notice for short-duration events, should be conducted if members of the public have identified themselves as sensitive to emissions from the facility or if they are interested in receiving notice of planned flaring or incineration for other reasons.

The AER expects the licensee or operator to provide an information package to the public before planned flaring or incineration. The information package must include

- names and contact information, including telephone numbers, of the licensee or operator and the AER field centre;
- the location of the test flaring or incineration;
- duration (start date and latest expected completion date);
- expected flaring or incineration volumes and rates; and
- information on the type of well (oil or gas) and, if applicable, information on the H₂S content of the gas to be burned.

» **How are flaring and incineration complaints handled?**

The AER expects the licensee or operator to address any concerns raised by the public before flaring or incinerating. If, after reasonable attempts, outstanding concerns remain unresolved, the operator or the public may request the assistance of the appropriate AER field centre.

In situations where a flaring or incineration permit is required or where an application has been made for such a permit but your concerns have not been addressed by the licensee or operator, you may submit a statement of concern to the AER. The AER will consider the statement of concern. See *EnerFAQs Expressing Your Concerns - How to File a Statement of Concern About an Energy Resource Project*.

In situations where a flaring or incineration permit is not required and your concerns have not been addressed by the licensee or operator, you may contact the appropriate AER field centre. AER staff will then respond to the inquiry according to established procedures. If the licensee or operator is in compliance with the requirements in *Directive O60* and has appropriately considered any unique circumstances related to the flaring or incineration and if field centre staff have determined that all procedures for the planned event are acceptable, it will be allowed to proceed.

» Additional Information

For more information on the AER and its processes or if you wish to speak with your local field centre or have general questions about oil and gas in the province of Alberta, contact the AER's Customer Contact Centre: Monday to Friday (8:00 a.m. to 4:30 p.m.) at 1-855-297-8311 (toll free).

This document is part of the EnerFAQs series, which explains the AER's regulations and processes as they relate to specific energy issues. Please visit www.aer.ca to read more of the EnerFAQs series.

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