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Global Gas Flaring Reduction Partnership
(GGFR)

Guidance on Upstream Flaring and Venting

Policy and Regulation

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Contents

1. Introduction

The oil and gas industry has historically employed two options, gas re-injection and monetization, to utilize associated gas. These options are only extensively utilized in a few economically developed, oil-producing countries. As a result, global levels of flaring and venting exceed 150 billion cubic meters a year.

It is the host government's responsibility to develop and implement policy enabling flare and vent reduction investments. Typically, the bulk of investments in gas utilization are funded by oil companies who are unlikely to commit their resources to associated gas utilization projects unless the host government creates an environment that supports their economic viability, and where the rights and obligations of the oil companies to utilize the gas are clear. Specifically, the host government is responsible for establishing this environment through legislation, regulation and market/economic measures.

Specific policy measures will depend on the each country's circumstances and are likely to include both upstream and downstream sectors. However, some generic lessons can be drawn from successes in associated gas utilization achieved by a number of oil producing countries, such as Algeria, Canada, Norway, the United Kingdom, and the United States:

1) Oil & gas legislation, and oil & gas concessions/licenses, should be clear, comprehensive and unambiguous on the treatment of associated gas.

2) Fiscal terms should encourage associated gas utilization investments:
   Special fiscal treatment of associated gas investments may be needed to overcome the high up-front capital cost and (relatively) poor economics of associated gas utilization projects.

3) The gas market should encourage and enable associated gas utilization with:
   a) The oil & gas companies given the right to monetize gas, generally including gas export;
   b) Open and non-discriminatory access to infrastructure, including gas processing and transmission facilities, and to electricity grids (to sell electricity produced on-site from associated gas); and
   c) Market-based energy pricing.

4) Flare and venting regulation should be clear, with effective monitoring and enforcement:
   The right market conditions and investment incentive schemes should be complemented by flare and vent regulation in order to challenge operators to consider every gas utilization option.

5) Reduction in legacy flaring requires a comprehensive and methodical approach:
   A generally accepted approach to address legacy flares and vents is to (i) create an environment enabling gas utilization investments (ii) establish a realistic flare/vent-out deadline (iii) coordinate operators' investment programs, and (iv) closely monitor them to ensure that they are implemented on time. Developing these flare reduction

programs should be a cooperative approach in consultation with key stakeholders, particularly the operators. Although stakeholder consultations will take time and effort, they typically add value by:

a) Establishing a challenging, but realistic flare-out deadline;
b) Identifying key issues and risks in implementation of operators' associated gas utilization programs, which in turn allow these to be addressed in timely fashion;
c) Developing a fiscal framework consistent with the country's flare and vent reduction policy;
d) Transforming the potential of the policy into results on the ground through greater trust, ownership, and commitment by stakeholders.

6) New oil developments should include provision for associated gas utilization:
In new oil developments, associated gas utilization should be an integral part of the field development planning process. Addressing flaring and venting retroactively is more costly and often more technically challenging.

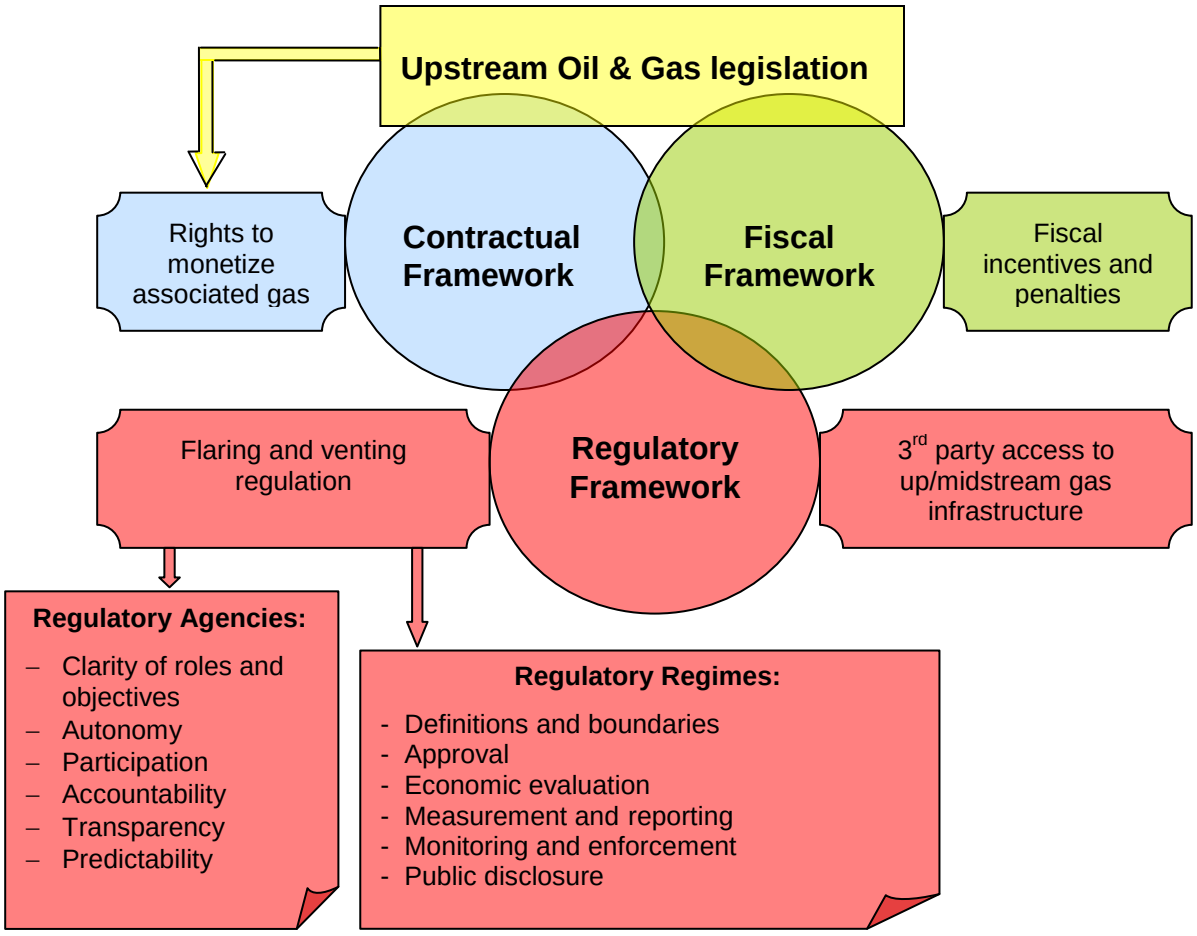
7) An integrated plan should be developed for both associated and non-associated gas:
Flaring and venting reduction and non-associated gas development should be integrated into a country gas master plan and/or energy sector strategy

8) Finally, a combination of the above measures is essential to achieve significant reduction in flaring and venting.

This note builds on both lessons learned from flare and vent reduction by "champion" countries and on experience in regulation of other industries. It provides guidance on flaring and venting policy in the upstream hydrocarbon sector in the following four areas:

- Upstream Oil and Gas Legislation
- Contractual framework
- Fiscal framework
- Regulatory framework

The following figure illustrates the interdependence of these four elements.



Wherever possible, examples of best practices are provided for illustration, and templates and spreadsheet models for practical application.

2. Upstream Oil & Gas Legislation

The oil & gas industry in each country is governed by the relevant oil & gas legislation. The legislation should determine how all aspects of the industry are regulated, treated fiscally and treated contractually through production contracts and/or licenses. The treatment of associated gas must be explicitly addressed in the legislation. Often, to enable changes in specific regulations to be made more easily, the law(s) governing oil & gas extraction will only lay out the fundamental framework, and will provide for detailed provisions to be specified by the oil & gas regulator.

Unlike oil, legislation may also be necessary to cover the treatment of gas in the mid- and down-stream.

2.1. Contractual Framework

Petroleum contracts and agreements are often unclear regarding the treatment of associated gas. The rights and obligations of the venture partners to utilize associated gas must be clearly specified.

2.2. Fiscal Framework

There are two types of fiscal stimuli typically used by host governments to promote investment in flare and vent reduction projects, namely incentives and penalties. Incentives, or preferential fiscal regimes, can be effective when applied to associated gas investments in either, or both, upstream and downstream operations; penalties are imposed uniquely on upstream activities, namely flaring and venting of associated gas.

Fiscal stimuli are intended to create a situation where the economically preferred method of handling associated gas production is through its utilization. Penalties raise the cost of flaring or venting, while incentives lower the net after-tax cost of investment in gas gathering projects.

In general, use of a combination of incentives and penalties has proved to be more effective than penalties alone. This is because, to be an effective deterrent to flaring/venting, penalties may need to be set at such a high level that neither flaring/venting nor installing gas gathering facilities is economically viable, and the preferred option for the operator becomes not to produce the oil. Incentives reduce the effective cost to the operator of investing in gas gathering, thereby reducing this risk.

Incentives or penalties can be introduced into production licenses or production sharing agreements as well as in the fiscal system. In some ways this can be even more effective as they can often be tailored more specifically to individual circumstances, discriminating for example between fields that are remote from existing infrastructure from those in close proximity to potential markets.

2.3. Incentives

Although no incentives are needed to produce associated gas, they may be required to stimulate investment in its utilization. This is particularly so when the domestic gas market is underdeveloped and/or there are no gas export opportunities, as significant investment will then be required to bring the gas to a market

A range of fiscal measures can be used for this purpose, including reduced royalty, accelerated depreciation, investment credits and uplifts, tax holidays. Incentives should preferably be provided in combination with regulatory requirements to eliminate or reduce flaring and venting, including specific flare-out dates. Otherwise, operators may still not be sufficiently incentivized to dedicate resources to associated gas utilization projects.

Care should be taken when introducing incentives for gas utilization projects to avoid unexpected consequences. For example, allowing gas utilization project costs to be deducted from tax payments on oil revenues would benefit oil & gas producers, but will not assist 3rd parties who may undertake the gas utilization projects.

Incentives should not substitute for policy measures to address market impediments to gas utilization, such as access to processing and transmission capacities, or no rights to export gas or artificially depressed domestic energy prices. The choice and size of incentives should therefore be preceded by consultation with operators and other energy sector stakeholders in order to identify the impediments to associated gas utilization.

2.4. Penalties

The other fiscal tool to promote gas utilization is to penalize flaring and venting of gas. This usually takes the form of a fine imposed on a unit of gas flared or vented. For instance, a so called CO_2 tax of about US$120/1000m^3 has been in place in Norway since 1991. It has contributed to reductions in flare and vent volumes, in particular by encouraging the development of new technologies and operational procedures to minimize non-routine flaring and venting.[1]

Another penalty option, employed for instance in the U.S. Outer Continental Shelf, is to impose royalty payments on the flared or vented associated gas that the regulator considers could have been utilized, and on gas flared/vented without the regulator's prior approval.[2]

In summary, if a penalty approach is to address flaring and venting effectively, the following three conditions should be met:

- Penalties should be established at a sufficiently high level to make the alternative of investing in flare and vent reduction more attractive than paying the penalty. Otherwise, it will likely just increase the operator's costs and the government's revenues - while flaring and venting continue. It should not however be so high that it closing in oil production becomes the preferred option for the operator.
- A 'flaring penalty' based approach will provide sub-optimal results unless it builds upon a well-established and effective flaring regulatory framework. In particular, it requires the presence of a strong, independent regulatory body that establishes flare measurement and reporting requirements for operators, has the resources and authority to monitor flare and vent volumes and their measurement, and is fully empowered to enforce the regulations and pursue infringements.
- A penalty approach is likely to work better if accompanied by fiscal incentives for associated gas utilization investments.

3. Regulatory Framework

3.1. Flaring and venting regulation

There are two essential elements of flaring and venting regulation: The Regulatory Agency and the Regulatory Regime.

3.1.1. Regulatory agency

3.1.1.1. Criteria for flare and vent regulatory agencies

[1] However, the key driving force behind the reduction of routine flaring in Norway has been the country's flaring regulatory regime that makes it virtually impossible for the operator to proceed with a field development until a solution to associated gas utilization is found.

[2] The operator in the US OCS does not pay royalty on flared or vented associated gas if flaring or venting is approved by the regulator, or is within the limits that do not require the regulator's approval.

There are a number of requirements of an agency with responsibility for flare and vent regulation.

- Clarity of roles and objectives
- Autonomy
- Participation
- Accountability
- Transparency
- Predictability

These are similar to those applicable to regulators of other industries, and lessons learned from these can be useful. The World Bank Policy Research Working Paper on regulatory effectiveness (WPS 3536, 2005) developed for the electricity industry provides a useful checklist of regulatory criteria (see Attachment).

Flaring and venting regulation is normally performed by a dedicated and empowered institution either in the form of a standalone regulatory body (such as the Energy Resource Conservation Board - the ERCB - in Alberta, Canada), or a department in a relevant ministry (such as, the Licensing and Consents Unit of the Department of Trade and Industry in the United Kingdom, the Norwegian Petroleum Directorate, and the Interior Department's Minerals Management Service in the United States). It is important that, whatever the form of the regulatory agency, it should be independent of influence by the oil & gas operators and by politicians.

3.1.1.2. Coordination of flare and environmental regulators

In many regimes, environmental concerns associated with flaring and venting have led to e.g. air quality and greenhouse gas emissions being regulated by an agency responsible for environmental protection . It is important that regulations issued by this agency and the agency responsible for flaring and venting are properly coordinated. This requires clear definition of the respective roles and responsibilities of the two regulators, and effective cooperation between them. Otherwise, overlapping responsibilities, contradictions or gaps may complicate regulatory enforcement.

3.1.2. Regulatory regimes

A regulatory regime establishes what is regulated and how it is regulated. Key features of a good flaring and venting regulatory regime are:

- Definitions and boundaries
- Regulatory approval
- Measurement
- Economic evaluation
- Monitoring
- Reporting

- Enforcement
- Public dissemination

In order to facilitate the changes in specific regulations that may be necessary over time, regulatory rules and procedures should preferably be set forth in secondary rather than primary legislation. Or alternatively as a stand alone document. Directive 60 "Upstream Petroleum Industry Flaring, Incineration, and Venting" (see Attachment), developed in Alberta (Canada), is an excellent example of a dedicated piece of stand-alone regulatory legislation that covers most of the elements of the province's flare and vent regulatory regime.

To facilitate communication between the regulator and the oil and gas operators, each operator should be required to have a single focal point responsible for compliance with flaring and venting regulation and for all interactions with the regulator on any flaring and venting issues.

3.1.2.1. Definitions and boundaries

Oil and gas production is a multi-stage process, including a number of activities that can be accompanied by flaring and venting. The regulator's role is to define which of these activities is subject to which specific flare and vent regulation.

Generally, flares and vents can be split into two categories – continuous and intermittent, and the latter could be further divided into upsets (unplanned, emergency situations) and maintenance and tests (planned activities). In the upstream oil and gas sector, the overall goal with respect to continuous events should to eliminate flares and vents through gas utilization projects, while intermittent events need to be addressed through improved operational practices to minimize the number and duration of events and the resultant flare and vent volumes. Further downstream (gas processing, LNG) flaring and venting can similarly be reduced most effectively by improved operational practices.

3.1.2.2. Regulatory approval

Prior approval of flares and vents is a widely used regulatory approach that is applied for both new and existing installations.

3.1.2.2.1. New installations

Flaring and venting are addressed more effectively, and at lower cost, if it is done during field development planning. This is true both onshore and offshore, but in particular for the latter due to the typical lack of space on an offshore platform to retro-fit additional (gas utilization) equipment. In view of this, it is a good practice for the regulator to require all operators develop associated gas utilization options during the design phase, and incorporate appropriate gas utilization facilities during construction.

This integrated approach to hydrocarbon field development has been applied in a number of jurisdictions including the Norwegian Petroleum Directorate (the regulator) and the US Interior Department's Minerals Management Service, which do not allow an operator to develop a field until a solution that avoids continuous flaring or venting of the associated gas is defined.

3.1.2.2.2. Existing installations

The regulatory approach to flaring and venting from existing installations has to take into account the nature of the industry. An approach that requires the regulators prior approval to flare or vent for each installation may be practical where the number of installations is in the low hundreds, but is totally impractical when the number gets much larger. The different approaches adopted in Alberta (Canada) and the United Kingdom illustrate this well. The regulatory base in Alberta includes more than 45,000 oil wells. In view of this, the operator is not required to obtain a permit to flare or vent (except for a few well defined situations, for example, where the concentration of H2S in the gas exceeds 5 percent). Each operator is however required to invest in a gas utilization project if its Net Present Value (NPV) is above the industry-wide threshold established by the regulator. In contrast, with only several hundred flaring or venting installation, each must obtain a flare and vent consent from the regulator in the United Kingdom.

To reduce intermittent flares and vents, the regulator may request the operator to seek an approval if the duration of an event exceeds a certain threshold. For instance, the flare and vent regulatory regime governing oil production in the U.S. Outer Continental Shelf calls for the operator to seek an approval if the duration of intermittent flaring or venting will exceed 48 hours per event, or 144 cumulative hours per month. Another option is to set up a volume-based threshold. For example, operators in Alaska must seek approval for flaring/venting volumes that will exceed 1 million standard cubic feet per day.

3.1.2.3. Measurement

Until recently, associated gas has been often been considered a byproduct to be disposed of for safety considerations. As a result, neither industry nor regulatory bodies considered the issue of accurate flare/vent volume measurement important.

When developing flare and vent measurement requirements, the regulator should be aware that the measurement of associated gas is technically challenging. The key issues include potentially very large changes over short time period in the volumes to be measured, low gas pressure, and the presence in gas of liquids and sometime solids. Although metering equipment exists that addresses many of these challenges (for instance ultrasonic meters), its use should be properly justified because of the high cost[3]. In Alberta (Canada), for low volumes of flaring and venting, the operator may estimate the volumes using technically sound procedures rather than meter the flows.

The Guidelines on flare and vent measurement (see Attachment) gives an overview of various flare and vent measurement systems. The full guidelines summarize the issues that need to be considered for selection and use of a particular measurement option.

3.1.2.4. Economic evaluation

[3] The cost of an installed ultrasonic meter runs into tens of thousands of dollars. Installation of meters can also be expensive as production may need to be interrupted.

Many regulatory regimes (e.g. Alberta (Canada) and the United Kingdom) require each operator to make an economic evaluation of all the available associated gas utilization options, and to utilize the gas whenever gas utilization is shown to be economic. Only if all available options can be shown to be sufficiently uneconomic then the gas may be flared or, if unavoidable, vented. In Alberta (Canada), uneconomic means projects with Net Present Values less than minus 50,000 Canadian dollars.

In many cases (e.g. Alberta, Canada) to maximize utilization of associated gas from new projects, it is essential that the regulatory agency has the power to ensure that available gas infrastructure (gas processing facilities, pipelines etc) with spare capacity can be used by an operator even when these facilities are owned by a 3rd party. It is also good practice to request an operator to evaluate opportunities of joint gas utilization projects with neighboring operators, and/or provide gas free of charge at the license boundary to any interested party. As circumstances can change over time, it is advisable to require that the utilization economics for ongoing flares and vents are regularly reviewed and updated, say every 12 months.

In addition, fiscal instruments, such as incentives and penalties (see the section on fiscal framework) are commonly used to improve the attractiveness of flare and vent reduction projects that are uneconomic and otherwise are unlikely to be implemented.

Economic evaluation criteria and parameters

Typically, the economic criterion to be assessed is either the utilization project rate of return or net present value.

To ensure that all economic evaluations of gas utilization investments are conducted on an equivalent basis, the regulator should specify key parameters such as:

- Rules for NPV calculation (pre-tax or after-tax cash flows)
- Discount rate to be used
- How operating costs should be estimated (e.g. as a percentage of capital expenditures)
- Standard rates to be used for CAPEX items, such as steel prices
- Price forecasts to use for gas, electricity, and other commodities that can be produced from associated gas
- Assumptions to be used for inflation forecast
- Gas processing and pipeline tariffs to be used

These parameters may be specified directly by the regulator (e.g. the discount rate) or operators should be directed to use to specific published data (e.g. for tariffs).

One of the best practice examples of flare and vent regulation in this regard is Directive 60 of the Alberta ERCB (see Attachment). Section 2.8 of the Directive provides a very detailed list of evaluation requirements and parameters.

3.1.2.5. Monitoring

Flaring and venting volumes

Monitoring of flaring and venting volumes is a necessary condition for enforcement or regulations.

The regulator has two complementary options for monitoring flare and vent volumes:

- Operators' reports and logs
- Ad-hoc site inspections

Normally operators are required to maintain a written record of all flare and vent events regardless of size and duration, and to report these to the regulator on a regular basis. Depending on how flare and vent volumes are measured (metered or estimated), the record may be generated electronically or manually.

Ad-hoc site inspections are used to ensure record keeping is being done as required by regulation, to inspect facilities to ensure that appropriate gas measuring equipment is installed where required, and to check on methodologies being used to estimate flare/vent volumes where this is acceptable practice.

On-site monitoring of venting is generally more challenging than flaring, as vented gas is not visible to the naked eye. A number of regulators (U.S. Mineral Management Service (MMS) and Alberta Energy Resources Conservation Board (ERCB)) employ infra-red video cameras that allow otherwise invisible vent streams be "seen".

3.1.2.6. Reporting

Reporting of flare and vent volumes are an integral part of a regulatory regime. It allows the regulator to:

- Monitor the operators' compliance with approved flaring and venting levels.
- Identify under-performing assets by e.g. comparing the performance of similar types of asset so that measures can be taken to improve the performance of poorly performing assets.
- Identify assets warranting a site inspection.
- Monitor progress in flare and vent reduction within the jurisdiction.

In many regimes, reporting is now done electronically ensuring comprehensive and up-to-date data is readily available to the regulator.

3.1.2.6.1. Reporting assets

Before setting up specific reporting requirements, a decision should be made with respect to the level of detail required for flare and vent data. Reporting detail may range from per flare stack to per production block or concessionary area. Fairly detailed reporting is recommended to allow the regulator identify non-compliance. Ultimately, the choice of flaring/venting reporting detail will depend on the number of flare and vent sites and the capacity of the regulator to effectively monitor their performance and ensure compliance with

regulations. It is advisable to define the flaring and venting assets to be reported through consultations with operators.

3.1.2.6.2. Reporting content

After defining the reporting assets, the content of reporting should be specified. It is recommended to include all flare and vent events regardless whether they require approval or not. It is also advisable to request operators to report separately on continuous and intermittent events.

For benchmarking purposes, it is useful it include data on oil production, associated gas production and associated gas utilization. This information will allow the regulator to monitor historic data of the operator, as well as compare flare and vent performance between operators by using indicators such as volume of flaring as a percentage of associated gas production.

The template could be used as a starting point for developing a reporting format. Clearly specific aspects of a flare and vent regulatory regime may require additional data be reported e.g. flared sour gas volumes.

3.1.2.6.3. Reporting frequency

A distinction should be made between records kept on-site and reports to be submitted to the regulator. In line with best practice in flare and vent reporting, the operator should maintain daily logs, while routinely sending reports to the regulator on say a monthly basis. Logs should be available to the regulator upon request and should be kept by the operator, preferably on-site and preferably for a few years.

3.1.2.6.4. Reporting system

It is recommended to integrate flare and vent reporting into an existing reporting system used by the regulatory authorities to oversee the upstream hydrocarbon sector. Electronic reporting systems ensure the regulator has up-to-date and comprehensive data.

3.1.2.6.5. Carbon Dioxide Equivalent (CO2e) emissions

Besides flare and vent volumes, the regulatory authorities may also need/wish to monitor the level of CO2e emissions stemming from flaring and venting. The special spreadsheet (see Attachment) could be used for that purpose. It calculates the mass of CO2e emitted into the atmosphere as a result of flaring or venting. The required input data are:

- Flaring/venting volume
- Gas composition or the average flared/vented gas density
- Flare combustion efficiency

The level of combustion efficiency assumed by operators may need to be adjusted downward as the combustion efficiency specified by the manufacturer of the burner tip (e.g. 98 percent), often assumed by operators as being applicable to their flares, does not take into account a number of site-specific factors that reduce combustion efficiency such as gas velocity, liquid content in the gas, heat content of the gas, and wind conditions.

3.1.2.7. Enforcement

Enforcement is a key element of a flaring regulatory framework since, regardless the design of the framework, it is unlikely to bring expected results unless regulatory infringements are identified and effectively pursued by the regulator.

It is a good practice to describe the consequences of noncompliance in detail in regulatory documents, so that operators are aware of the regulator's expectations and enforcement policy. An option is to list typical noncompliance events under broader categories (such as, approval, economic evaluation, measurement, reporting) and establish an enforcement level for each event. The level could range from a notification to license suspension or even revocation.

A notification requesting corrective actions within a fixed period could be applied to minor non-compliances Enforcement actions should escalate, for instance to penalties and license suspension/revocation if the operator fails to take timely remedial actions in response to prior notifications, or for a major infraction. Alberta ERCB Directive 019 (see Attachment) is a good example of a regulatory document describing in detail the enforcement actions for different levels of noncompliance.

The operator should be allowed to challenge the regulator's decisions in court if they are believed to be in conflict with regulations in place. Otherwise, the regulator should be fully empowered to execute the actions specified in regulatory documents.

3.1.2.8. Public disclosure of flare and vent data

In many cases, reported flaring and venting volumes are made public on a regular basis. As well as demonstrating the transparency of the regulatory process, it also puts 'peers pressure' on poorly performing operators to improve their performance.

Normally total flare and vent volumes are reported annually, with a breakdown of flaring and venting volumes by operator. Annual reporting of flare and vent volumes provides a clear measure of progress in flaring and venting reduction in the jurisdiction and creates positive pressure for continuous improvement, while the operators' statistics identify the 'champions' and the 'laggards'.

The report on flaring and venting issued annually by the Alberta ERCB is a good example of such practice.

4. Third-party access (TPA) to gas infrastructure

Open and fair TPA to gas gathering, processing and transmission facilities is essential for promoting associated gas utilization, and hence flare and vent reduction. The Oil & Gas legislation and regulatory regime should assure non-discriminatory and transparent TPA to the gas handling infrastructure such as gas processing facilities and gas pipelines and trunk lines.

Upstream gas infrastructure is usually built and owned by the oil & gas operators. Access to this infrastructure is often not regulated and therefore entails commercial negotiations

between the parties. It is good practice, however, for the regulator to have the right to impose TPA if this cannot be secured through commercial negotiations. The ERCB in Alberta, Canada and the DTI in the UK have such powers. In Alberta, for example, if the associated gas producer and the infrastructure owner cannot agree access terms, the ERCB can issue an order establishing a tariff rate, the share of the capacity of the pipeline or facility that the infrastructure owner must make available, and any other conditions that the ERCB might consider necessary to ensure equitable and fair treatment. In most cases, the owner of an unregulated pipeline or facility will reach a negotiated settlement to avoid imposition of such an order.

Downstream gas infrastructure is often owned by utility companies which, in many cases, are regulated to ensure tariffs etc are set fairly, and that access is free and open to all potential users provided gas quality specifications are met. Tariffs etc are normally published on a regular basis.

List of useful documents

1. Regulatory Effectiveness: the Impact of Regulation and Regulatory Governance Arrangements on Electricity Industry Outcomes (WPS 3536)
2. Alberta ERCB Directive 17 "Measurement requirements for Upstream Oil and Gas Operations"
3. Alberta ERCB Directive 19 " EUB Compliance Assurance - Enforcement"
4. Alberta ERCB Directive 60 "Upstream Petroleum Industry Flaring, Incineration, and Venting"
5. Monthly Flaring & Venting Volume Report
6. Daily Flaring & Venting Volume Report
7. Comparison of Associated Gas flaring regulations: Alberta & Norway
8. United Kingdom: Flaring Policy
9. USA: Natural Gas Flaring and Venting. Opportunities to Improve Data and Reduce Emissions
10. API: Compendium of Greenhouse Gas Emissions Methodologies for the Oil and Gas Industry
11. Flaring: Questions and Answers
12. Alberta ERCB. Upstream Petroleum Industry Flaring and Venting Report 2007
13. Flaring, Incinerating and Venting Reduction Guideline for British Columbia
14. Solution Gas Flaring and Venting in Alberta: Volume Trends and Conservation Costs
15. World Bank: Environmental, Health, and Safety Guidelines for Offshore Oil and Gas Development
16. World Bank: Environmental, Health, and Safety Guidelines for Onshore Oil and Gas Development
17. GGFR: Regulation of Associated Gas Flaring and Venting: A Global Overview and Lessons
18. GGFR: Guidelines on Flare and Vent Measurement