

# Evaluation of Indonesia's Zero Routine Flaring 2030 Implementation using System Thinking Approach

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Keywords: *Public Policy, Gas Flare, Oil and Gas, System Thinking.*

Abstract: In 2017, the Government of Indonesia (GOI) became one of the countries that initiate to reduce global gas flaring by Zero Routine Flaring 2030, which declared by Minister of Energy and Mineral Resources to World Bank. However, the level of the implementation of Zero Routine Flaring 2030 still not met the expected by GOI. The results of the evaluation show that there are many factors that barriers to implementation for Oil Company are 1) nature of gas flare, 2) no facility available, 3) lack of commitment, 4) uneconomic project, then, the barriers for Government barriers are 1) regulation, 2) prices discrimination, 3) long process of bidding process, at last, the barriers for Gas Buyer barriers are 1) difficulties in getting data, 2) nature of gas flare, 3) uneconomic project and 4) high cost of technology. Overall, this policy has a useful purpose and should be continued. Therefore, it can be improved from the current is to support the effectiveness of the system. Based on the analysis using the methodology of system thinking, then the government interventions should be formulated to improve the situation are: 1) improving Company commitment, 2) improving accurate data measurement, 3) improve the bidding process, 4) improving bidding process.

## 1 INTRODUCTION

### 1.1 Background

The Government of Indonesia has committed to reducing Greenhouse Gas (GHG) emissions in the National Determined Contribution (NDC) Document presented in the UNFCCC COP-21 in Paris reflects the strong political will of the Government to take part in reducing global GHG Emissions. One of the efforts carried out in reducing emissions is gas flare reduction by limiting the gas flared. Through Presidential Regulation Number 61 of 2011, monitoring the implementation of the policy to reduce gas combustion emission volume is part of the National Action Plan to reduce Green House Gas (GHG) emission (RAN GRK). In 2017, the Government of Indonesia became one of the countries that initiated to reduce global gas flaring by Zero Routine Flaring 2030, which declared by Minister of Energy and Mineral Resources to World Bank. Then a technical regulation instrument is needed to support this commitment.

### 1.2 Problem Statement

There is some Regulation to support of Indonesia's Zero Routine Flaring 2030 that publishes by MEMR. In order to control and monitor the optimization of gas flare utility, DG Migas under MEMR has issued MEMR Regulation No. 31 of 2012 about flare management in oil and gas operations which mandates that oil and gas contractor or company must ask the government to issue permits to conduct gas flaring beyond the limit. Also, the regulation strongly recommends that companies/contractors measure and report their gas flaring activities. This regulation took effect in December 2013, one year after it was issued. Until now, this is considered good progress in the effort to minimize gas flaring. We can see from the data collected by DG Migas below.

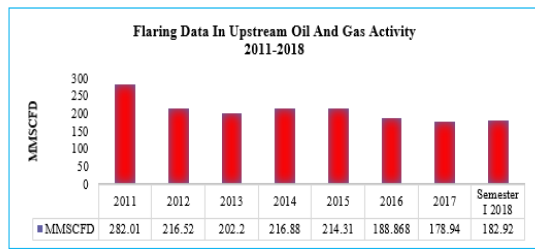


Figure 1. Flaring Data in Upstream Oil and Gas Activity

However, a command and control approach in MEMR No.31 OF 2012 alone is not enough. It needs to be combined with economic instruments such as tax and excise to give incentives/disincentives for contractors or companies to contribute to gas flaring reduction and GHG emission reduction efforts as well. So, MEMR has issued MEMR Regulation No. 32 of 2017 concerning utilization and Flare gas Pricing in Upstream Oil and Gas Activity on May 2nd, 2017.

This regulation sets the price of gas flares lower than the natural gas price, generally following the impurity level so that the company that able to get the return on investment. The gas flare price in this regulation is set at a maximum of 3.67 USD/MMBTU, while government agencies (BLU) can buy flare gas at the price of 0.35 USD/MMBTU.

However, The level achievement of Indonesia's Zero Routine Flaring 2030 still not met the expected by GOI. The result from the data that collected, only one gas sale agreement conducted, and still 178 MMSCFD flare gas to be burned in Indonesia. Most of the oil companies still burned the gas flare. As a result, the outcomes and impact of this policy are still hard to measure; notably, there are many barriers to effective implementation. This study would like to evaluate the implementation objectively for regulation, so the result of this study can be feedback for MEMR for improving the intervention in the future.

### 1.3 Research Question

From the formulation of the above problems, this study will answer the question related to the implementation of Indonesia's zero routines flaring 2030 as follows.

- How are the current implementation of Indonesia's Zero Routine Flaring 2030?
- What are the barriers to the implementation of Zero Routine Flaring 2030?
- What government intervention should be taken to improve the implementation of Indonesia's Zero Routine Flaring 2030?

- How will be the implementation plan for the solution?

### 1.4 Research Objective

The main objectives of this study are:

- Understand the real issues causing the barriers in the implementation of Indonesia's Zero Routine Flaring 2030.
- Propose a recommendation to DG Migas in order to solve Indonesia's Zero Routine Flaring 2030.

### 1.5 Research Methodology

Our methodology includes a combination of primary and secondary research for Indonesia's Zero Routine Flaring 2030. For secondary research need during the study included annual company reports of gas flare, press releases, and relevant documents. Reliable sources such as journal, paper and law, regulation, and government website or publication also referenced in PESTEL and SWOT to recognize the business issued.

Primary research was carried out to validate data and analysis. Primary data started with the interview and focus discussion group with some stakeholders who involved in flare gas management in Indonesia such as Government, Oil and Gas Company, gas buyer, and Development Institution. Then, the data from the interview and FGD will be variable data for being analyzed by the system thinking approach. Then, it will focus on some variables to improve the system.

### 1.6 Research Limitation

The scope of this study was limited to perform analysis of Indonesia's Zero Routine Flaring 2030 for oil companies, Government, and gas buyers in Indonesia.

There some potential limitations of data, including the accuracy and validity of the data in the document reported by oil companies, because there was no opportunity for MEMR to check data directly.

## 2 BUSINESS ISSUE EXPLORATION

### 2.1 Conceptual Framework

To have a better understanding of the issue, the best tools to be used are using a conceptual framework to

analyze each of the related factors and use it as a baseline to describe the purpose of the study. It contains explanations of every analysis taken on how to understand each of the activities.

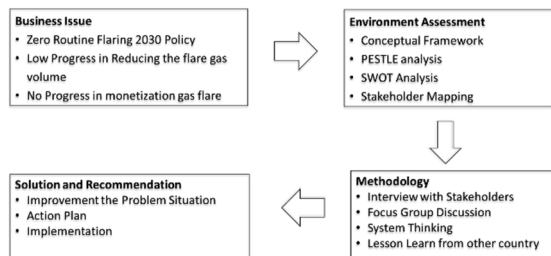


Figure 2. Conceptual framework

The framework of this study (Figure 2.) resumes limiting patterns of thought about the critical matter or keys of business properness analysis implemented to Zero Routine Flaring Policy, with government regulation as the challenge.

## 2.2 PESTEL Framework

### Political

In 2010, Government Indonesia coordinated with BAPPENAS launched Indonesia climate change sectoral roadmap 2010. Monitoring the implementation of gas flaring volume reduction policy is part of the National Action Plan on Green House Gas (GHG) Emission Reduction (RAN-GRK), stated through President Regulation No. 61/2011. With strong political will, the Government of Indonesia, play a role in reducing GHG emissions globally at UNFCCC COP-21 in Paris, to reduce Greenhouse Gas (GHG) emissions as stated in the document contributing to the national emission reduction (Intended Nationally Determined Contribution / INDC). The submission of INDC by Indonesia is essential so that the whole world knows the policies that have been are being and will be carried out by Indonesia to reduce GHG emissions. Indonesia has committed to reducing GHG emissions by 29 percent on its own (business as usual) and 41 percent with international assistance until 2030.

The Initiative Global Zero Routine Flaring 2030, introduced by the World Bank, brings together government, oil companies, and development institutions who recognize the flaring situation described above, agree to corporate to eliminate routine flaring no later than 2030. This initiative has received 77 endorsements, Indonesia is one of them through the minister of Energy and Mineral

Resources letter in 2017, the support world bank in reducing the global emission.

### Economic

Indonesia is the country with the most abundant energy consumption in Southeast Asia and fifth in the Asia Pacific in primary energy consumption, placed after China, India, Japan, and South Korea. The high GDP growth, reaching an average of 6.04% per year for the 2017-2050 period, is expected to increase Indonesia's fuel demand in the future. Indonesia's fuel demand in the future will escalate Indonesia's role both in the world energy market and to decrease global greenhouse emissions (Indonesia Energy outlook 2018, BPPT).

The National Economic growth rate with an average rate of 5.64% per year in the last five years has encouraged an increase in domestic gas demand both as fuel and industrial raw materials. This growth in demand has driven up domestic gas prices and soaring demand for infrastructure, both pipelines, and non-pipelines.

Indonesia's gross domestic product occupies the highest number compared to other Southeast Asian countries. The national gross domestic product in 2010-2015 increased by 31.6% or an average of 6.3% per year. In 2015, Java Island occupied the province with the most significant gross domestic product with a percentage of 58.1%, followed by Sumatra with 21.7%, Kalimantan with 8.8%, Sulawesi with 5.8%, Bali and Central Java with 3.04%, and Maluku and Papua by 2.5%. (Indonesian Natural Gas Balance 2016-2035, MEMR, 2018).

Based on the explanation above, the economic growth generates the growth of energy demand; then, the increasing energy demand has a positive impact on oil and gas companies as a supplier of oil and gas commodities.

### Sociocultural

Indonesia has over 250 million people, and it is the fourth most populous in the world and the world's largest Muslim majority country, with a constitution that embraces democracy and pluralism. Its people come from some 300 distinct native ethnic groups speaking over 700 languages and dialects and live on some 6000 islands amongst an archipelago of some 17,500 islands. Indonesia has many volcanoes and is plagued by many natural hazards, including earthquakes, volcanic eruptions, tsunamis, floods, and droughts. The island of Java, where 58 percent of the population lives, is the world's most densely populated island. Eleven Indonesian cities have over one million inhabitants. The largest is Jakarta, with approximately 10 million people. Except for Medan

in Sumatra, the four other cities of over 2 million people, are all located in Java.

Table 1. Population index by Work Bank

Information	Population		Average Annual Population Growth	Population Age Composition			Dependency Ratio		Crude Death Rate	Crude Birth Rate
	Million			%	%	%	% of working age population Young	% of working age population Old		
Category	2000	2018	2000-2018	Age 0-14	Age 15-64	Age 65+			Per 1,000 people	Per 1,000 female
Indonesia	211.5	267.7	1.3	27	68	5	40	8	7	19

(Source: World Bank, 2019)

Based on the table above, it can be concluded that the abundant working potential population because the productive young age is higher than the age of Old and children. This demographic bonus is a phenomenon where the population structure is very beneficial in terms of development and new project because the number of productive age is enormous (68%), while the proportion of young age (0-14 years) is 27% and the proportion of elderly (65 years and over) is 5 %.

Social aspects in Indonesia still classics problems, including local permits, delays in land acquisition, and security. These are problems that must be solved. While, the bonus of Indonesia demographics, it has a positive outcome in human resources supply.

### Technology

Technological developments allow the commercialization of gas flaring and further reduce emissions. Based on the GGRF report (2012), The following four options have been identified and considered for associated gas monetizing project or utilization:

- Own use as the power source in the oil field for transmission to the existing power grid (medium-scale)
- The power source in the oil field for electrification of nonelectrified rural area (small scale)
- Supply of piped gas to more significant consumers, such as heat and power plants and industries (medium-scale).
- Liquefied petroleum gas production (LPG), alone or in combination with other means of use (CNG or mini GTL) (Small-scale).

Determination of the right technology selection is undoubtedly needed, and it is also influenced by several factors, including the volume and composition of gas and distance between the gas location and market (intended customer). Those two factors, we can see the concept in Figure 3. as follow,

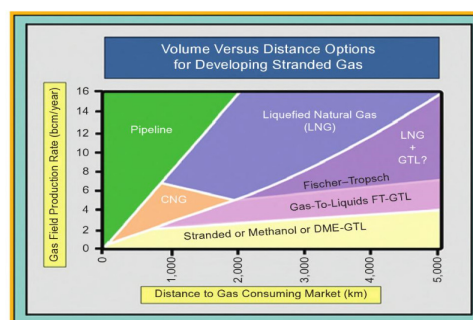


Figure 3. Production volume versus distance to the market framework for gas technologies (Wood and Mokhatab, 2008)

In conclusion, the technology aspect has the potential for wide-ranging effect on business. The technology develops a business model, so that a feasible project not only technically, but also economically.

### Legal

#### Law No. 22/2001

Oil and gas activities are controlled by Government (generally via a PSC) as the grantor of the relevant concession. Law No. 22 differentiates upstream business activities (exploration and exploitation) and downstream business activities (processing, transport, storage, and commerce) and stipulates that upstream activities are controlled through PSC between the business entity and executing agency (SKK Migas – Special Task Force Upstream Oil And Gas Activity) (Article 6).

#### Government Regulation 36/2004 on Downstream Business Activities.

Downstream business activities are carried out by business entities holding business permits issued by the minister, implemented through a reasonable, healthy, and transparent business competition mechanism. In article 12, downstream activity in oil and gas, consist of processing business activity includes a refinery, transportation activity either by land, water, and air including natural gas transportation through a pipe for commercial purposes, storage business activities which include receiving, collecting and storing for commercial purpose and commercial business activity including buying, selling, exporting, importing petroleum, gas fuel, and other product, including natural gas pipes.

**Minister of Energy and Mineral Resources Regulation (MEMR Regulation) 31/2012 on Implementation of Gas Flaring in Oil and Gas Business Activities**

This regulation mandates companies to optimize the flare gas utility. In article 3, the government set the limitation of flaring gas based on activity, such as 3% from feed gas for gas field, 5 MMSCFD for oil field (Average in six months), 0,3% intake gas plant and 0,8% from intake oil plant. Moreover, if they are flaring gas beyond the limit, they must request government permits to conduct flaring.

**MEMR Regulation 32/2017 on Utilization and Selling Price of Flare Gas in Upstream Oil and Gas Activities**

Related to supporting national energy security and reducing greenhouse gas emission and optimizing the use of gas flare produced in the upstream oil and gas business, the government has issued MEMR Regulation number 32/2017 concerning utilization and selling prices of gas flares in upstream oil and gas business activities on May 2, 2017. The price of gas flaring is set at the lowest price of 0.35 USD per MMBTU, while the maximum price is set at 3.67 USD per MMBTU.

**Law No.32 of 2009**

The government of Indonesia has also issued regulations regarding environmental protection, namely Law No.32 of 2009. Article 22 contains rules and analysis of environmental impact (AMDAL), any business and activities that have an essential impact on the environment must have an analysis of the environmental impact (AMDAL) or UKL UPL and refer to article 36, any business that has AMDAL or UKL UPL are mandated to have an environmental permit.

**Environment Aspect**

Gas flaring consists of greenhouse gas such as CO<sub>2</sub> and CH<sub>4</sub>, when released directly into the air, the traps heat in the atmosphere. The climate impact is undeniable, suggesting a significant contribution to global GHG Emissions. CO<sub>2</sub> emission comes from only the combustion of fossil fuels for about 75%. CH<sub>4</sub> is more harmful than CO<sub>2</sub>. It has 25 times more significant global warming potential than CO<sub>2</sub> on a mass basis (Johnson, M.R.; Coderre, A.R.: Canada, International Journal of Greenhouse Gas Control. 2012, 8, 121–131.)

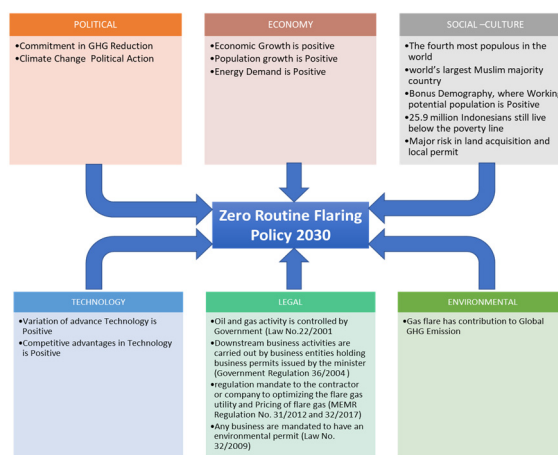


Figure 4. Summary of Pestle Analysis for Zero Routine Flaring Policy

**2.3 SWOT Analysis**

SWOT analysis is a tool to evaluate the strengths, weaknesses, opportunities, and treats in any business enterprise. A SWOT analysis can help to gain insights into the past and think of possible solutions to existing or potential problems, either for an existing business or for a new venture. This tool will help a company to make an excellent strategic plan for business growth within the industry. Figure 5. shows the SWOT analysis on the Government side to improve the implementation of zero routine flaring policy.

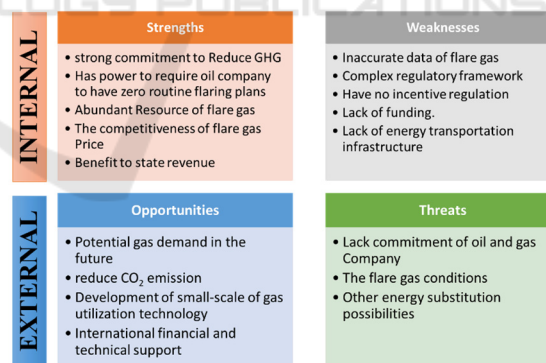


Figure 5. Summary of SWOT analysis

**2.4 Stakeholder Mapping**

Through regulation analysis (PESTEL), a better understanding of the interrelationship of these ostensibly different aspects is highlighted through stakeholders. In this related regulation analysis, various stakeholders who contribute to the flare gas management have been identified and their interconnectedness.

Table 2. Primary Stakeholder

Primary Stakeholder	Role
<b>DG of Oil and Gas (MEMR)</b>	The Director-General of Oil and Gas has the authority to issue an approval in the case of a proposal from a KKKS or gas processing business entity to flare gas.
	Issue downstream activity business permits, in this regard: a. Processing Business Permit. b. Transportation Business Permit. c. Storage Business Permit. d. Trading Business Permit.
	Select business entities as flare gas buyers. Including the authority to issue assignments to state or region-owned enterprises.
	Establish the selling price of flare gas with the recommendation of SKK Migas
	Act as a working-level unit supporting the implementation of the minister's roles.
<b>KKKS / Processing Business Entity (Who Produce Flare Gas)</b>	Conduct optimization study for the flaring of gas with volume exceeding limitations. Gas flaring must obtain the approval of the DG of Oil and Gas.
	Provide data on flare gas potential for SKK Migas.
<b>Lemigas</b>	Perform research and development, technological engineering, study and survey, and services in the oil and gas sector. Research performed can serve as the basis for the Ministry of EMR in formulating policies.
<b>SKK Migas</b>	perform tenders for the utilization of flare gas, including providing data on flare gas potential.
	SKK Migas is tasked with issuing a list of recommended flare gas prospective buyers to the Minister of EMR.
	Conduct <b>Flare Gas Potential Offer Team</b> to Perform evaluation towards (offer) documents submitted by prospective buyers.
<b>Pertamina, PGN (State-Owned Enterprises)</b>	Implement government policies (can be appointed by the government to implement certain policies in the utilization of flare gas). Can simultaneously be producer and buyer of flare gas
<b>Flare Gas Buyers</b>	Business Entity Holders of Gas Trading and/or Processing Business Permits. Government agencies, SOEs, regional SOEs.

**Interview Design**

The interview was designed to capture more in-depth and specific information on the issue from the respondent. The key informants selected from the stakeholder of gas flare. "key informants" represented

by each stakeholder, which is from Government, Government Agency, Private Gas Buyer, and Oil company as a gas producer.

**Focus Group Discussion Design**

Focus Group Discussion (FGD) seeks oil and gas company as gas producer and government perspective in the implementation of gas flaring reduction, in order to understand the real issue in implementing Zero Routine Flaring Policy, find the root causing the barriers for oil and gas company in implementing gas flare reduction and propose a recommendation to solve the issue.

FGD divided into four sections, are:

- a. Discussion with Big Five Flare Producer (Onshore and offshore) and one Gas Buyer Company that success in gas flare monetization in Indonesia.
- b. Discussion with Big Ten Flare Producers (Onshore and offshore) Company in Indonesia.
- c. Discussion with Oil Refinery Company in Indonesia.
- d. Discussion with Gas Refinery Company in Indonesia.

**The Principle of System Thinking**

System thinking is a set tool, but also a framework for looking at an issue as systemic wholes. It is language, too, that offers a way to communicate about dynamic complexities and interdependencies.

The principle of system thinking is:

- a. Thinking of the 'Big Picture'
- b. Balancing short term and Long Term Perspective
- c. Recognizing the dynamic, complex and interdependent nature of systems
- d. Taking into account both measurable and no measurable factors
- e. Remembering that we are all part of the system in which we function and that we each influence those systems even as we are being influenced by them

Through this "lens," we start seeing our circumstances in a new light, taking more responsibility for our own role in problems, and identifying more effective ways of addressing recurring difficulties.

**Causal Loop Diagrams**

The causal loop is a useful way to represent dynamic interrelationships. Provide a visual representation with which to communicate that understanding and Make explicit one's understanding of a system structure to capture the mental model.

The component of causal loop diagrams are 1) variables as an element in a situation which may act

or be acted upon, 2) Links / Arrows - show the relationship and the direction of influence between variables, 3) B as Balancing feedback loop that seeks equilibrium, 4) R as Reinforcing feedback loop that amplifies change.

### 3 BUSINESS SOLUTION

#### 3.1 Data Analysis

##### The Barrier for Oil Companies

The key informants from oil companies agreed that oil company does not commit to executing their policy and no program in the internal oil company to reduce or utilize the gas flare, no facility available, and flare gas characteristic are the barriers to the successful implementation of zero routine flarings in oil and gas sector.

##### Barrier for Government

The key informants from the government said that the first challenge expressed is about the content of regulation itself, including the bidding process, prices determined and reporting for implementation in stakeholders who want to utilize or monetize the gas flare

##### The Barrier for Gas Buyer

Based on MEMR No. 32 / 2017, the Gas buyer may come from a Private Gas Buyer and Government agency. The key informants from the gas buyer agreed that they have barriers to the nature of flare gas to manage, data as a key for investment decision, economic aspect, and technology are the barriers to monetization of flare gas to support the implementation of zero routine flarings in oil and gas sector.

The comparison between the result obtained based on interviews and FGD can be seen in table 2.

Table 3. Summary of Barriers

Interview	Focus Group Discussion
Oil Company Barrier <ul style="list-style-type: none"> <li>Nature of Gas Flare, No facility available, Lack of commitment</li> </ul> Government Barrier <ul style="list-style-type: none"> <li>Differences in prices and Bidding Process</li> </ul> Gas Buyer Barrier <ul style="list-style-type: none"> <li>Nature of Gas Flare, Data, Economic Aspect and Technology</li> </ul>	Data Management <ul style="list-style-type: none"> <li>Inaccurate data, Data accounting, Reporting</li> </ul> Internal Factor of Company <ul style="list-style-type: none"> <li>Lack of Understanding, Lack of Management support, commitment</li> </ul> Gas Buyer <ul style="list-style-type: none"> <li>Difficulties in processing/utilizing gas flare, Technologies</li> </ul>

	limitation, Gas Supply Continuity Nature of Gas Flare <ul style="list-style-type: none"> <li>Scattered source of Gas, Flow Rate relatively small, Low Gas Pressure, Uncertainty of Spec and volume of Gas, High Impurities (CO2 and H2S), Remote Area Regulation</li> <li>Need regulation for incentive or fiscal regulation, Permit simplicity, No pricing regulated, No Bidding Process</li> </ul>
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#### 3.2 Alternative Solution

Based on the interview, the key informant gave some suggestions to MEMR that they need to make further policies to improve the implementation of zero routine flarings in the oil and gas industry in Indonesia. Summary of alternative solutions complied with the interview and FGD methods can be seen in Table 3.

Table 4. Summary of alternative Solution

Interview	Focus Group Discussion
Simpler process agreement Publish accurate data Action plan learning from other countries No Pricing discrimination Other New Regulation	Improving Flare Gas Data Management System Providing Technical Assistance for gas producer and buyer, such as provide technology and business model from development institution Helping to design the financing mechanism for carbon credits to be realized through gas flaring reduction projects. Regulation Support Government strategy by Roadmap Zero Routine Flaring

#### 3.3 System Thinking by Causal Loop Diagram

The analysis of barriers to implementing the Zero Routine Flaring Policy shows the main barriers are 1) Oil Company Barrier, which are gas flare Condition, No facility available, Lack of commitment, Uneconomical Project, 2) Government Barrier, which is Regulation, Prices Discrimination, Long Process of

Bidding Process,3) Gas Buyer barriers Difficulties in getting Data, Nature of Gas Flare, Uneconomic project, High cost of Technology, these are translated into variables in the system, as follows

Table 5. Variables of Clausal Loop Diagram

Barriers	Related Variables
<b>Oil Company Barrier</b>	
Nature of Gas Flare	Associated Gas Production
	Oil Production
	O&G Well Production
	State Revenue
	Zero Routine Flaring Policy
	Energy Demand
No facility available	Available Facility
Lack of commitment	Oil Company Commitment
	Flare Gas Utilization
Uneconomic project	Alternative Funding/Financing
	Short Fall/Uneconomical Project
	Project Delay
	Investment Provide
	Investment Development
<b>Government Barrier</b>	
Regulation	Zero Routine Flaring Policy
	Energy Demand
Prices Discrimination	Price Determine
Long Process of Bidding Process	Bidding Process
<b>Gas Buyer Barrier</b>	
Difficulties in getting Data	Accurate Data
	Data Reporting
	Data Publishes
Nature of Gas Flare	Flare Gas
	GHG Emission
Uneconomic project	Commercialize Flare Gas
The high cost of Technology	Gas Buyer Investment

All of those variables are important to optimize the implementation of the Zero Routine Flaring Policy. Based on the FGD result that optimum implementation of zero routine flaring policy will result in a better commitment from the company, accurate data measurement, Alternative Funding/Financial, and gas buyer investment.

The causal loop diagram developed as follows.

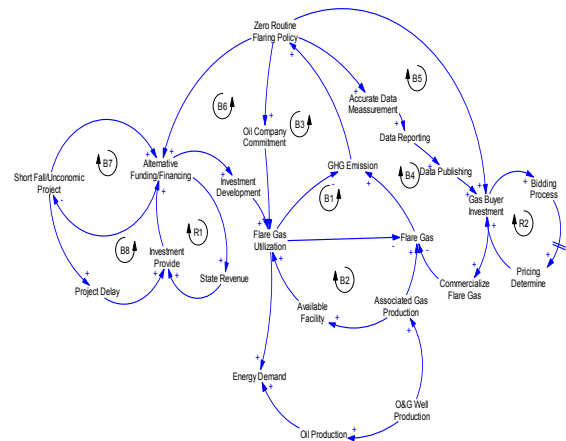


Figure 7. implementations of the Zero Routine Flaring Policy

From the causal loop diagram above, it is shown that the role of alternative funding/financing and bidding process has significant influence to determine the behavior of the system, as it has the most reinforcing loop, along with flare gas utilization and monetization to support the Zero Routine Flaring Policy. The oil company's commitment is the initial capital to establish gas flare utilization and reduces GHG Emissions at the same time.

Therefore, to improve flare gas utilization, it is necessary to optimize the investment development by alternative funding/financing so that the implementation of zero routines shall be achieved while Government needs to make more straightforward and faster proses in bidding and pricing in order to support the gas flare monetization.

**Solution**

Based on the system thinking approach, this Study suggested some solutions for improving the implementation of zero routine flarings.



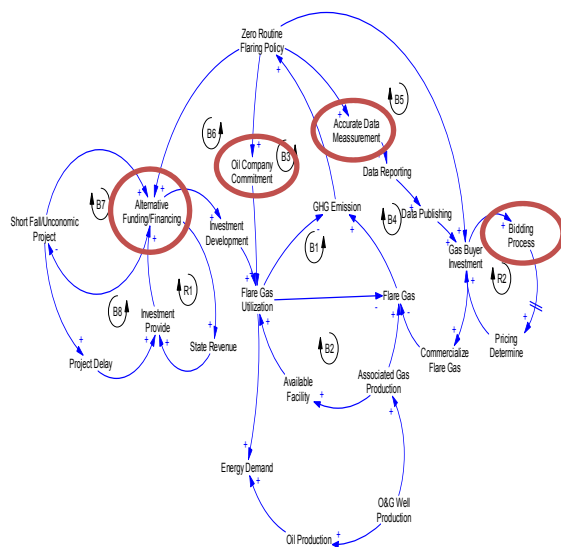


Figure 8. The importance of improving some variable in the system

**Improving Company Commitment in the System**

The activities that can be done related to this include:

- a. MEMR, through DG Migas, sends a letter to the top-level management of oil companies related to an “action plan for supporting the Zero Routine Flaring Policy.” This “enforcement” letter is setting a minimum zero routine flaring implementation level.
- b. SKK Migas conducts Technical assistant to all oil companies to a made action plan or programs internally related to reducing gas flare.
- c. Workshop for Knowledge and Experience sharing from Oil Company who already conducted gas flaring reduction to all oil companies.
- d. Small-Group Discussion, which can be done periodically, to discuss Zero Routine Flaring Policy and mutually enrich each other’s knowledge.
- e. DG Migas engages development institutions to oil companies to improve the action plan.
- f. Oil companies submit Zero Routine Flaring 2030 Action Plan to DG Migas
- g. DG Migas evaluates the action plan and categories the action plan
- h. Benchmark success plan zero routine flaring 2030
- i. Oil Companies execute the gas flare utilization project

**Alternative Funding/ Financing**

In regulation, it requires 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 economical. Only if all available options can be shown to be sufficiently uneconomic, then the gas may be flared.

Also, fiscal instruments, such as incentives and penalties, are commonly used to improve the attractiveness of flare gas reduction projects that are uneconomic and otherwise are unlikely to be implemented. Some company needs technical assistance for it to get financing from external. There are some example financing programs in Indonesia, such as Natural Resources for Development Program (NR4D) by the world bank and JCM (Joint Crediting Mechanism) by Asian Development Bank (ADB).

Therefore, some Action plan is needed to do in providing alternative funding or financing in the system, as follow:

- a. DG Migas collaborates with SKK Migas to engage Development institutions such as world bank, ADB, and other financing banks.
- b. DG Migas conducts a memorandum of understanding (MOU) with Development institutions and oil companies regarding flare gas utilization in Indonesia.
- c. DG Migas, Development institution and oil companies, execute the gas flare utilization project.

**Improving Accurate Data Measurement**

More accurate data would provide a clearer understanding of the extent and location of problem, as well as a basis for targeted action designed to both prevent the loss of potentially valuable resource and reduce harmful emission into the atmosphere" – (GAO-04-800 Natural Gas Flaring and Venting - Opportunities to improve data and reduce emissions – Page 5 – US government Accountability Office US GAO, July 2004)

Action for data improvement can be done as follow:

- a. DG Migas drafts and publishes technical guidelines for measuring data and reporting flaring among measurement standards conducted by the oil and gas company
- b. DG Migas revises the report format flare gas
- c. DG Migas conducts technical assistance to calculate measurement and reporting.
- d. Oil Companies and Gas Buyers report for monthly and annual Reports.

- e. DG Migas and SKK Migas publish gas flare data on their official websites to attract investors for gas monetization.

#### Improving the Bidding Process

As seen in the visualization of the system through the causal loop diagram, it appears that the bidding process will affect the improvement in commercialize gas and in result reducing the volume gas flaring. To accelerate the process, the bidding shall be by way of an open and competitive bid process. Therefore, Action to improve the bidding process will be conducted by SKK Migas as follow:

- a. SKK Migas prepares (brainstorming and conceptualization) of the bidding process
- b. SKK Migas Drafts Criteria of Faster Bidding Process
- c. SKK Migas Formulates procedure process bidding
- d. SKK Migas conducts Regulation Harmonization

## 4 CONCLUSIONS

In this conclusion, we provide the answers to research questions:

- a. Zero Routine Flaring Policy has been formulated by all stakeholders in such an excellent way to reduce gas to be burned and reduce greenhouse gas emissions resulting from oil and gas activities. However, the result of the policy evaluation of implementation indicates the flare gas still exist and relative in significant volume, thus having difficulty in reaching the goal. The level achievement of gas flare reduction still not met the expected by GOI. The result from the interview, only one gas sale agreement conducted and still 178 MMSCFD flare gas to be burned in Indonesia. Most of the oil companies still burned the gas flare. As a result, the outcomes and impact of this policy are still hard to measure; notably, there are many barriers to effective implementation. Overall, this policy has a useful purpose and should be continued. Therefore, it can be improved from the current state is to support the effectiveness of the system. MEMR should modify the strategy of implementation.
- b. The barriers to Zero Routine Flaring implementation for stakeholders is as follows:
  - **For Oil Company Barriers are** Nature of Gas Flare, No facility available, Lack of commitment, Uneconomic project

- **For Government Barriers are** Regulation, Prices Discrimination, Long Process of Bidding Process,
  - **Gas Buyer Barriers are** Difficulties in getting Data, Nature of Gas Flare, Uneconomic project, High cost of Technology
- c. The government interventions should be taken to improve the situation are:

**Improving Company Commitment in the system**, the activities that can be done related to this include:

1. MEMR, through DG Migas, sends a letter to the top-level management of oil companies related to "action plan for support zero routine flarings." This "enforcement" letter is setting a minimum zero routine flaring implementation level.
2. SKK Migas conduct Technical assistant to all oil company to a made an action plan or program internally related to reducing gas flare.
3. Workshop for Knowledge and Experience sharing from Oil Company who already conduct gas flaring reduction to all oil companies.
4. Small-Group Discussion, which can be done periodically, to discuss zero routine flarings and mutually enrich each other's knowledge.
5. DG Migas engage development institution to oil companies to improve the action plan.
6. Oil companies submit Zero Routine Flaring 2030 Action Plan to DG Migas.
7. DG Migas evaluate the action plan and categories the action plan.
8. Benchmark success plan zero routine flaring 2030.
9. Oil Companies execute the gas flare utilization project.

#### Improving Accurate Data Measurement

1. DG Migas draft and publish technical guidelines for measuring data and reporting flaring among measurement standards conducted by the oil and gas company.
2. DG Migas revise the report format flare gas.
3. DG Migas conduct technical assistance to calculate measurement and reporting.
4. Oil Companies and Gas Buyers report for monthly and annual Reports.
5. DG Migas and SKK Migas publish gas flare data on their official websites to attract investors for gas monetization.

**Improve the bidding process** will be conducted by SKK Migas as follow:

1. SKK Migas preparation (brainstorming and conceptualization) of the bidding process.
2. SKK Migas Drafting Criteria of Faster Bidding Process.
3. SKK Migas Formulate procedure process bidding.
4. SKK Migas conduct Regulation Harmonization.

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