

Coal Bed Methane in Indonesia: Issues and Local Impacts from Stakeholders' Perspective

by

Theresia B Sumarno, PhD Candidate in Petroleum Economics¹
Centre for Energy, Petroleum, and Mineral Law and Policy, University of Dundee
Nethergate, Dundee, United Kingdom, DD1 4HN
Phone: (+44) 07424650195/ Email: t.b.sumarno@dundee.ac.uk

Dr Ariel E Bergmann²

Stephen Dow³

Raphael J Heffron⁴

Abstract

The Government of Indonesia (GoI) initiated a study on Coal Bed Methane (CBM) resources in 2002 through its oil and gas research institution, Lemigas. As a result, the first CBM project was started in 2008 by PT Medco CBM Sekayu, in South Sumatra Basin, followed by 6 other CBM projects until the end of 2008. However, the growth of the industry has been very slow and uncertain. This paper discusses the issues that have hampered the development of these CBM projects in Indonesia. We applied the triangulation method both for the data collection and analysis, which include interviews, Focus Group Discussion (FGD), and surveys on local impacts and expectations in which CBM developments located to obtain primary data; literature review for its secondary data; and qualitative and quantitative methods to analyse the data obtained. The data being collected in this research is very much diverse according to the current position of the CBM investors in the industry in Indonesia. As a result, this research defines five main categories of issues that hamper the growth of the CBM industry in Indonesia, they are issues related to (1) GoI, (2) fiscal regime and regulation being implemented for the industry, (3) local communities, (4) investors, and (5) CBM technical. These issues are all connected to each another and these issues shall be addressed to improve and support the growth of the CBM industry in Indonesia.

1. CBM development in Indonesia

In 1998, Indonesia enacted the Ministerial Decree on the Implementation of Coal Bed Methane Development, the Ministerial Decree No.1669.K/30/MEP/1998. Under this decree, Lemigas, the Oil and Gas Research Institution of Republic of Indonesia initially conducted research on CBM in 2002. This research was conducted under the Research and Development Department in Lemigas. According to Mrs. Legowo, the chairman of the institution at that time, CBM in Indonesia was considered as one of the energy resources that had never been explored before. In 2006, the Minister of the Energy and Mineral Resources commanded to stop the laboratory research and start the field work for CBM. The project's budget was approved in 2005, yet Indonesia did not have the field to start the work. Medco, a national oil and gas company, agreed to do the project together with the Lemigas by signing an MOU in 2005 (Legowo, 2018; Rosyadi, 2010). The budget was from the Government and the field was Medco's. The field work was

¹ Awardee LPDP, Indonesian Endowment Fund for Education, Ministry of Finance, Republic of Indonesia

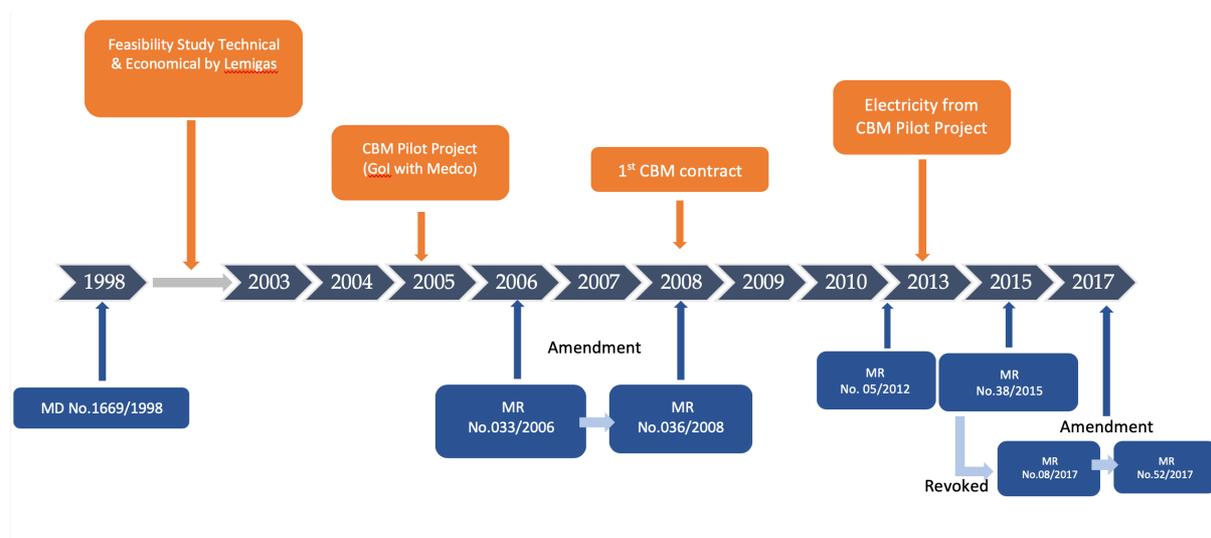
² Lecturer and Energy Economist, Centre for Energy, Petroleum, and Mineral Law and Policy, University of Dundee

³ Senior Lecturer in Energy Law, Centre for Energy, Petroleum, and Mineral Law and Policy, University of Dundee

⁴ Professor in Global Energy Law and Sustainability, Centre for Energy, Petroleum, and Mineral Law and Policy, University of Dundee

finished by the end of 2005, and in 2006, there was already CBM rig in Rambutan field, in South Sumatra basin. At that time, the result was considered good enough to kick off the CBM project. The draft of the regulation had been prepared since 2004 and in 2006 and Mrs. Legowo was appointed as the Special Staff of the Minister until 2008. The Minister of Energy and Mineral Resources enacted Ministerial Regulation No.33/2006 to regulate the CBM development activities which then was amended in 2008 by MR No. 36/2008. This MR became the basis to award the first CBM contract in 2008 (Legowo, 2018) – the Road Map of CBM development in Indonesia is shown below in Figure 1.

Figure 1: Road Map of CBM development in Indonesia (Updated by Sumarno, 2018)



The Government of Indonesia (GoI), consultancies as well as industry associations have contributed their thoughts on how they see the current CBM industry in Indonesia. They have different ways of seeing the industry at this moment. The government agreed that the current investors whose blocks are being terminated focus more on avoiding the penalty. However, they have also seen that Indonesia still have opportunity to develop the CBM industry, even though the current situation shows that the industry is slowing down according to the consultancies. There have been many issues that hamper the growth of CBM industry in Indonesia.

According to the investors' interviews, the preliminary result of field CBM study in 2002 to 2004 has been found inadequate to start the CBM exploration in Indonesia. It has been admitted by investors, that they were being impulsive and overexcited to initiate the CBM development in Indonesia. There were seven CBM blocks awarded in 2008 and this increased into 54 CBM blocks by 2015.

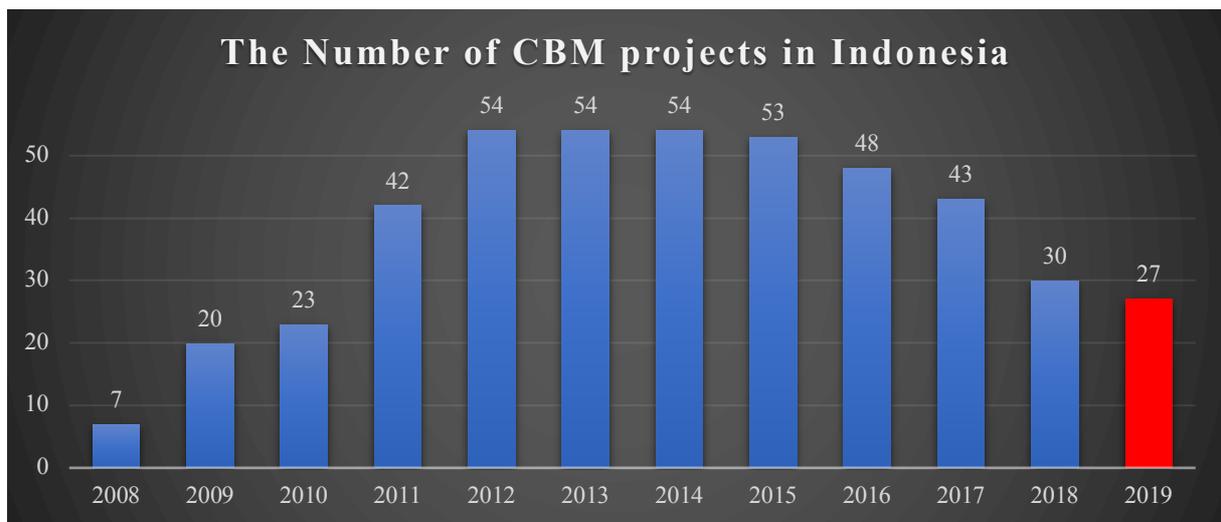
According to the SKKMigas (2018), there have been 24 CBM blocks that were terminated since 2015. NuEnergy Ltd is the only CBM operator in Indonesia that currently is being reviewed by the SKKMigas for its Plan of Development proposal, under the Net PSC. The challenges faced by the company are very different with the challenges faced by the rest of the CBM investors. Another company is now striving to avoid the penalty as their blocks are being terminated by the Government due to their failure to fulfil their firm commitments. They proposed to transfer their commitments from the unfavourable block into a block that has been known for its prospect. A not very different situation is faced by another domestic CBM investor. They are

currently facing financial difficulty as they have massive expenditures from their initial project, and this has hampered the development of their project.

Up to 2017, six CBM blocks have been terminated by the Government, and another five have been proposed by the investor to be terminated upon the fulfilment of their firm commitments. One of the CBM companies proposed for transferring the commitments of their nine CBM blocks to the Government and were awaiting for approvals. None of these nine CBM blocks were getting the approval in regards to transfer their commitments, but eight of them were in fact being terminated in 2018, and the last one is under termination process. Forced termination is mainly due to the failure of the investor in fulfilling their firm commitment in a given period, the first 3 years in their exploration period, according to the PSC contract (Government Law No. 34/2005, Article 8). This firm commitment is crucial for investor to have in their participating document when they bid the block. This is regulated under the Ministerial Regulation (MoEMR) No.5/2012, on The Procedures for Determining and Tendering Unconventional Working Contract Areas.

Today, many more projects have stalled. The number of CBM block that are still active has decreased to forty-three at the beginning of 2018 (see attachment 1), and by the end of 2018 it went down to thirty. The data shows that there are three more blocks that are under potential termination in 2018 (SKKMigas, 2018).

Figure 2: The Number of CBM Projects in Indonesia (2008-2018)



(SKKMigas, 2018)

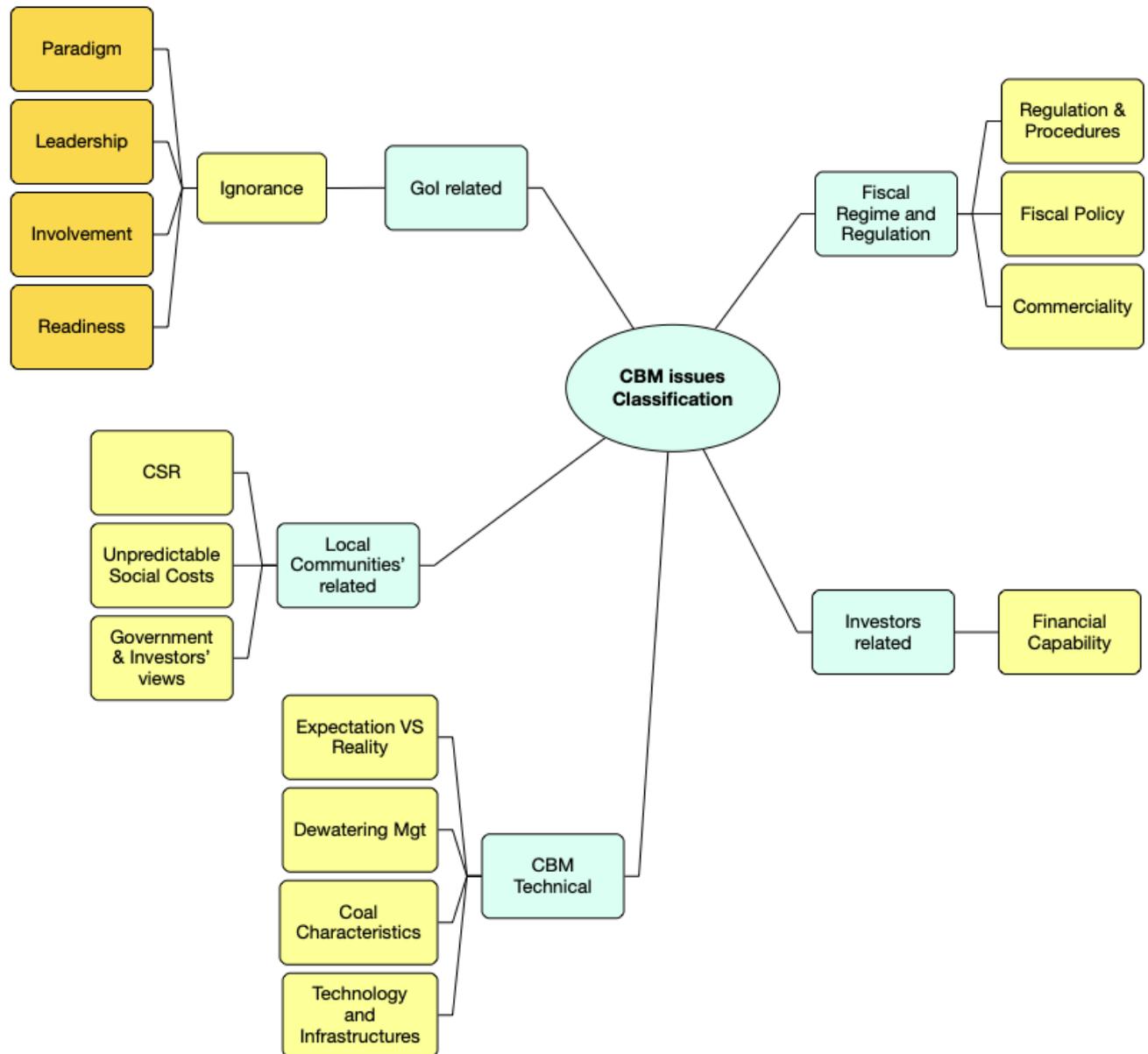
In summary, there was one block was terminated in 2015, five blocks were terminated in 2016, and another five blocks in 2017, and 13 blocks were terminated in 2018. However, there are still three CBM blocks in Indonesia that are currently under the termination process by the Government as they missed to fulfil their commitments (see Attachment 2).

These projects have been stalled due to many reasons. The next section will discuss these reasons comprehensively and provide better view on the CBM issues and challenges from the point of view of the government, investors, consultant, as well as the local community.

2. Issues in the CBM industry in Indonesia

This research identifies issues which potentially have hampered the growth of the CBM in Indonesia and classifies them into five main issues, issues related to (1) GoI, (2) regulation and fiscal regime, (3) CBM technical, (4) investors, and (5) local communities. Figure 3 shows the issues identified by the researcher. This section will cover each one of these in turn.

Figure 3: Issues hampering CBM development in Indonesia



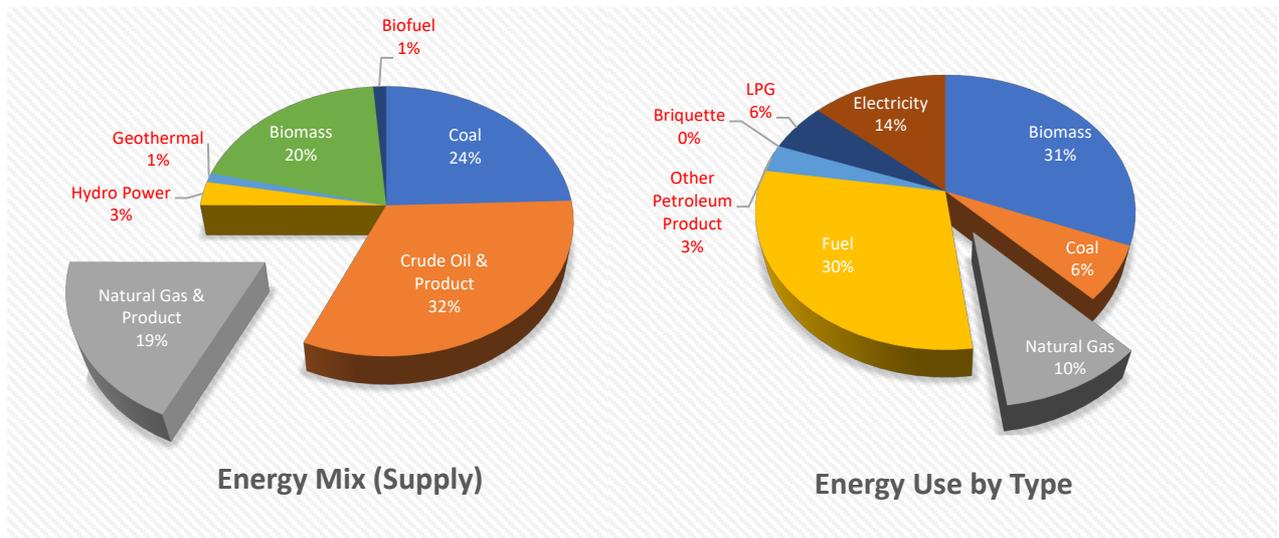
Sources: Developed by the researcher, according to data being collected in 2018

2.1. Government Related Issues

The biggest picture of the issues related to the GoI is the lack of policy formulation for CBM. It was mentioned during the FGD that the GoI has not put their focus on the energy industry, but the national infrastructure. This has led into a worse energy situation in general, and even worse for the CBM industry. According to Mr. Bachtiar, the GoI has been being ignorant with the CBM industry in Indonesia. The energy mix target had been discussed since 2007/2008 and was finalised in 2014 by enacting the Government Regulation No.79/2014. The CBM is not

targeted in the energy mix, and Mr. Bachtiar has seen this as Government ignorance towards the industry. The ignorance towards the CBM industry is real and the Government has no clear expectation on the industry.

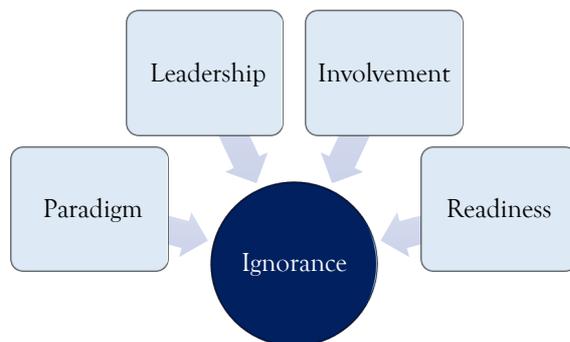
Figure 4: Indonesia's Energy Mix 2016



Sources: Ministry of Energy and Mineral Resources Republic of Indonesia (2017)

Mrs. Legowo (2018), the former of the Director of General Oil and Gas in 2008-2012, said that the Government should care more about the CBM industry in Indonesia. She believes, that when the Government starts to see the CBM as one of the energy resources that can bring great benefits for the society, the industry will be growing. All issues related to the Government always lead to ignorance by the Government (see Figure 4).

Figure 5: Government Related Issues



Sources: developed by the researcher, according to data being collected in 2018

2.1.1. The Paradigm

A new paradigm on energy resources has been framed by the National Energy Council (NEC) of the Republic of Indonesia in 2014. The NEC has four missions, (1) to design and frame the National Energy Policy (NEP) of the country, (2) to define the countermeasures of crisis and emergency energy conditions, (3) to oversee the implementation of the cross sectoral energy policy, (4) to make the NEC as an effective and trusted independent institution.

The Government enacted a government regulation (GR) No. 79/2014 to realise the National Energy Policy framed by the NEC.

“The energy resources is no longer as export commodity only, but as the engine of national growth”. (Article 6, GR79/2014)

The energy resources is to prosper the society as much as possible by optimising its benefits for the national economic development (Article 7, GR 79/2014).

As part of its mission, the NEC reviewed the implementation of the energy policy and this review is attached in President Regulation No. 22/2017, which explains about the General Energy National Plan (RUEN). This RUEN is the mandate of the Energy Law No. 30/2007, which has been established according to the NEP.

The RUEN underlined one of the main issues in the energy industry, which is the change of the paradigm. The Government has not treated the energy resources as the engine of growth, rather, as the source of revenue. There is no alignment on the derivative rules, procedures and regulation with the main energy law.

This is also mentioned many times during the FGD as well as during the individual interviews. Mr Bachtiar, as the member of the National Energy Council at that time, mentioned that the Government never actually implement the paradigm, and only put it formally in the regulation. This has been admitted by one of the CBM investors too.

According to Lubiantara (2017) there are four national paradigm to establish the energy security in Indonesia, as follows:

- Pancasila as country’s ideology

The oil and gas sector must be based on the Pancasila, meaning that the industry shall give benefit for the welfare of the society. The CBM should be used for the greatest benefits of the society, therefore this research looks at the local community in which CBM development incurs.

- 1945 constitution

This constitution is the background of the born of PSC in Indonesia. The resources underneath the country’s land is to be used for the greatest benefits of the society. As previously mentioned, the CBM gas is to be used for the local society, to provide more supply for their electricity.

- National archipelago insights

This paradigm is much related on how the people see on their country and their environment. The GoI should pay more attention on how the industry, including the CBM industry can support the economy growth.

- National security

The CBM should become one of the commodity reserves for the purpose of national security. As mentioned by the former Direktor of General Oil and Gas, Mrs. Legowo, the CBM should be one of Indonesia energy resources for the benefits of the society.

Indonesia is one of the natural resources rich country, and according to Gylfason (2006), country with abundance of natural resources tend to slow down their economic growth. Indonesia has fallen into these theories. In this case, Indonesia has fallen into rent-seeking behaviour for example imposing tariff protection for domestic producers. The society has thought that Indonesia is resource rich and this has led people to have false sense of security and the GoI neglect the needs of having good and growth-friendly economic management, such as

bureaucratic efficiency and institutional quality. It seems that the GoI failed to infuse their paradigm into their policy and actions.

2.1.2. Leadership

Indonesia has been very much improved for its infrastructures, yet the energy industry has been very slow. As a leader, a government should have been able to bring the attention and focus to the CBM development to improve the energy sector (Bachtiar, 2018).

2.1.3. The Involvement

One of the most important factors of the success CBM development is the Government's involvement. The CBM prospect in Indonesia is quite promising, but there must be a direct involvement by the Government into the project. The government shall support the investors to prove the CBM potential in Indonesia, especially those in the medium to high prospective areas. Once the CBM commerciality is proven, it will attract more investors.

One of the involvements being discussed is the involvement of the GoI in setting up the Key Performance Indicator (KPI) across government institution and ministries. There has been no comprehensive KPI target set by the Government. The GoI has been difficult to the investors by being very slow in responding the issues raised by the investors, therefore the GoI can be more involved by giving quicker response. The GoI should also be involved in the process of accessing the land for the investor at the initial stages. Furthermore, the GoI set 10% percentage participating interest to the company by enacted the Government Law No. 35/2004 to ease the process of starting the project.

However, there has been no clear guidance in the implementation in which the GoI should be paying more attention to this implementation in related to the economic issue. Concerning for the project economy and feasibility, the GoI should be getting more involved in making gas price decision for CBM gas. Gas price is one of the economic parameter which strongly determines the project economy of a field. Therefore, the Government shall have concern on the regulated price, in a way to support the industry to grow but also for the economic growth. The GoI should also consider about affordability at all costs, which should be included in the fiscal regime scenario. The affordability is not only about the affordability for the customers, but also in the process. The costs to produce gas from CBM must be cheaper, so that it can give cheap price for the last customer. The last issue classified as an involvement issues being identified in this research is the internal management issue, which is very much related to the human expertise (Moektianto, 2018). SKKMigas is the only institution that has direct contact with the investors in terms of their activities, yet they do not have CBM expertise.

2.1.4. Readiness

The Government is considered not ready to develop the CBM industry. This has been shown by the way the Government responding the CBM investors criticisms and inputs. The Government tends to be in a rush implementing the new fiscal regime and new regulation. This has added uncertainties to the CBM investors.

2.2. Fiscal Issues

This section discuss the issues related to the CBM fiscal and regulations attached to the CBM activities. However, the commerciality is also being discussed in this section as a result of the failure of the fiscal policy and procedures.

2.2.1. Regulation, Procedures, and Fiscal Policy

The Government conducted feasibility study for CBM technical and economic aspects for 5 years, from 1998 - 2004 (See Figure 1), until the first pilot project is placed. There have been 54 CBM blocks in Indonesia until 2017 since it was first awarded in 2008. The Government has classified the CBM industry as part of the upstream oil and gas industry, therefore, the CBM industry must also follow the general rules and regulation applied to upstream oil and gas industry. However there had been specific regulation assisting the new born of CBM industry since 1998 which some of them were revoked or amended (see Figure 6).

2.2.1.1. Fiscal Policy

Indonesia offered the first CBM contract in 2008 under the Net PSC arrangement, as applied to the conventional oil and gas. Mr. Gunawan, the former Head of the Unconventional Hydrocarbon Department at SKKMigas, stated the net PSC was quite attractive because of the idea of the risk sharing between the government and the contractor.

Mr. Moektianto, the former Chairman of Unconventional Hydrocarbon Committee at IPA stated different opinion about the PSC applied to CBM. In his opinion, the PSC was designed only for conventional hydrocarbon. The net PSC nor the regulation and procedures applied to CBM does not accommodate the CBM technical, which was supposed to be accommodated in the fiscal system, and the fiscal terms do not support the CBM project to be economically viable (Moektianto; Golubchenko, 2018).

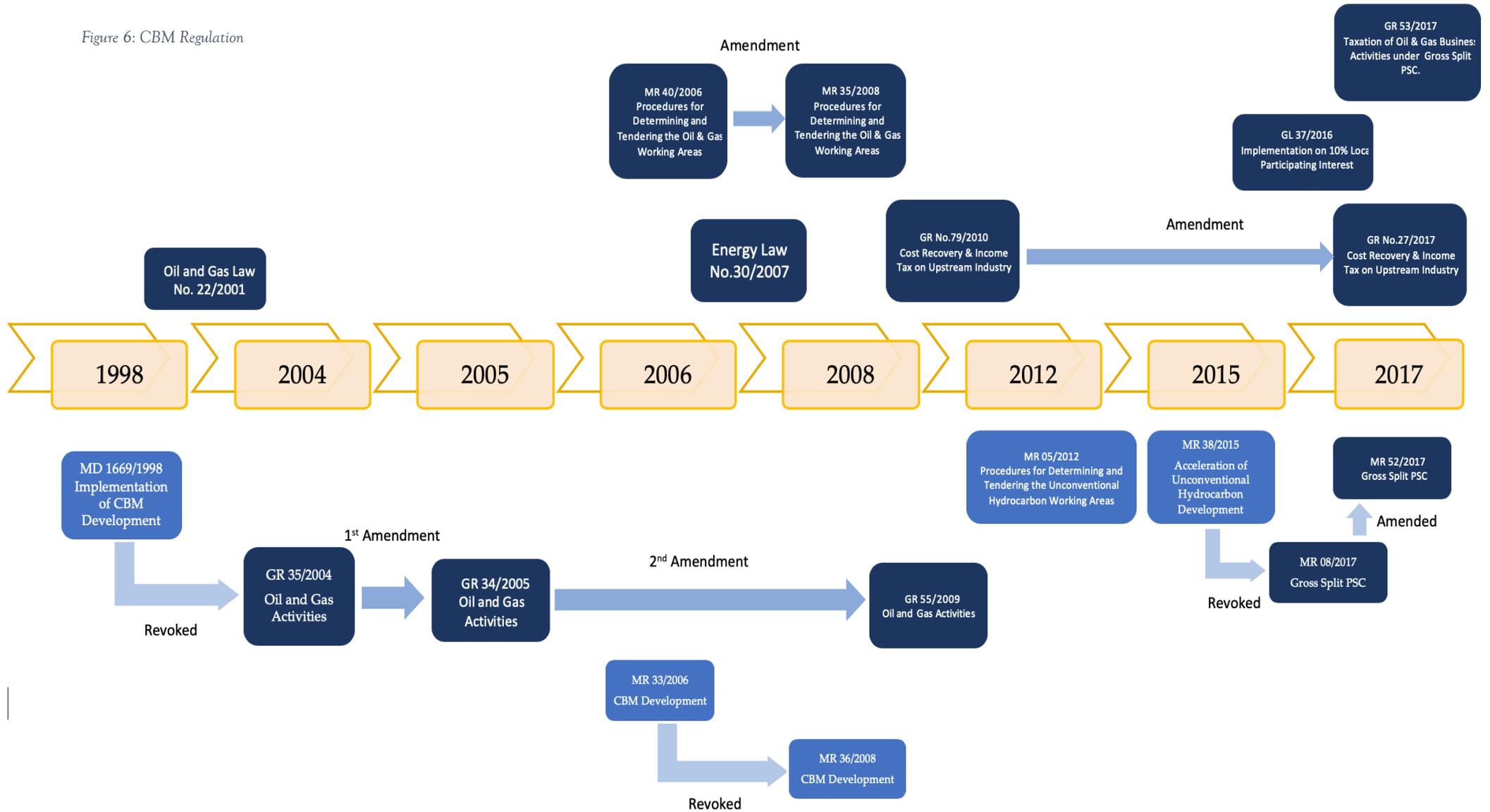
Mr. Moektianto (2018) also mentioned issue on PSC's contract period. The net PSC was designed for 30 years contract and CBM project requires time more than 30 years to reach the economy of the project meaning it fails to fit the CBM full life cycle. It is obvious, that with only 30 years contract, the PSC is not attractive for CBM investors, and the Government should amend the law to amend the contract period.

Mrs. Wajong also mentioned a problem that is much related to the new fiscal regime applied in the early 2017, the Gross Split PSC. The Gross Split PSC is regulated under the Ministerial Regulation No.8/2017 and this MR replaced the MR No.38/2015. This is one of the issues related to the regulation and fiscal regime implemented for the CBM. The Government has not finalised the regulation and procedures for those who want to change their contract from the net PSC to gross split PSC. There has been no clear instruction or procedures from the current CBM players to move into Gross Split PSC. The Government is yet to be focused on this, particularly for its documentation. This MR No.8/2017 then being revised and replaced by the MR 52/2017.

The government shall make the regulation to support the industry, a regulation that gives the investor flexibility to do their activities (Wajong; Rahmadhi, 2018). Gross split PSC is considered to be a better fiscal system for CBM as it gives more flexibility to the investor to perform the CBM activities.

Moektianto (2018) revealed that both Net PSC and Gross Split PSC do not fit to CBM industry at all. He thought that the main problem is more to the fiscal system. There is a need to redesign the fiscal regime applied to CBM, and this new fiscal regime should be adjusted to the CBM technical requirements (Moektianto; Mair, 2018).

Figure 6: CBM Regulation



2.2.1.2. Regulation and Procedures

Even though the net PSC was first considered attractive for its risk sharing concept (Gunawan, 2018), the implementation of net PSC for CBM is not the best for the project to grow. The technical standard and procedures lies in the net PSC are very complex and they are not required for CBM activities to run. In addition, Mrs. Wajong sees a problem in the implementation of the regulation which is considered impeding the CBM activities. The net PSC has procedures, rules and regulation attached to its implementation. The implementation of the regulation matches to the characteristic of the conventional oil and gas, but the CBM. Given the circumstances, the CBM players must comply with the conventional oil and gas standard lies in the regulation for its tools, equipment and services. Therefor the implementation of these regulation have caused into cost inefficiency for the CBM players. Mrs. Wajong emphasised that same mechanism cannot be implemented into two different hydrocarbon which have completely different characteristics. The cost of the initial CBM project was very high due to the standard and qualification of tools and equipment that it has to comply with.

Under the net PSC arrangement, the CBM investors must deal with approval process before conducting their CBM activities both in exploration and development stage. This is much related to the cost recovery mechanism in placed when the net PSC is applied. Without having these approvals prior to CBM activities, the sunk cost cannot be recovered. The CBM investors are required to obtain both technical approval and budget approval. Plan of Development (POD) approval must be obtained before they can start their production. This POD approval is required in each well that is going to be developed. This has become one of the main issue in the CBM industry due to its low production rate of each CBM well which then requires the project to drill many wells to reach the commercial value. In the case of CBM this cannot be applied as it is, since the project requires hundred wells to be commercialised (Moektianto, 2018; Mair, 2018).

They revoked the Ministry Regulation 38/2015, the first regulation established specifically for CBM, and over written it with the MR No. 8/2017. The MR No.38/2015 was revoked since the MR No. 8/2017 has been enacted (see Figure 6). This is one of the issues related to the regulation and fiscal regime implemented for the CBM. As previously mentioned that the Government has not finalised the regulation and all procedures to move from the net PSC into gross split PSC, and then Ministry Regulation 52/2017; and it has become worse that no one was actually appointed to deal with CBM.

Another significant issue in related to regulation is the overlapping regulation, such as the forestry regulation, the law on land and agrarian, environmental law and regulation which are overlapping with local government regulation & procedures. These are directly related to the initiation of any oil and gas project in Indonesia. This has become even worse when the CBM resources are underneath the coal mines block which belongs to other investor; or the CBM block is located in a palm plantation owned by palm company.

This create more complex situation for the CBM investor since they have to also deal with other companies and comply to any regulation to get the right to extract the CBM gas. The CBM investors have to comply with all these regulation to obtain permits to get the project started.

2.2.2. Commerciality

Selling gas is more difficult than selling oil. To be able to sell gas, the producer is required to initially find the buyer and build infrastructure which costs four times than oil (Stickley, 2014). According to Stickley (2014), there are four elements for gas industry to be success; (1) it requires a large amount of gas to be commercially viable; (2) it requires infrastructure such as pipeline

systems; (3) the gas market has a price constraint which is happening in Indonesia, the gas price is regulated by the government; and (4) is how the government can provide the incentives for the activities.

A project commerciality is determined by revenue and cost of a project. Revenue is very much attached with volume and price of the commodity. In Indonesia, the gas price is regulated by the MoEMR, including the CBM gas. The CBM cost was initially very high due to the PSC and its attached procedures and regulations, and lately, the CBM investors have managed to reduce the costs as they are now able to use a proper technology for CBM operations (Husin, 2018).

NuEnergy has a concern regarding to the gas market and the competitiveness of CBM gas in the market. Increasing the price for CBM gas will boost the project economy, but it will become an issue for the investors as it will make the CBM gas less competitive compared to conventional gas. At this moment the CBM gas is not very competitive comparing to the conventional gas, as it is difficult to create a competitive gas price for CBM gas. According to Setyatmoko, since the gas price is regulated and unless the Government is aware and take action on this, the market will never be competitive for CBM gas.

Another challenge is that the CBM gas market is not yet stable and is under developed, unlike the conventional gas market (Setyatmoko, 2018). Regardless all the challenges faced by them, the NuEnergy Ltd is the only CBM investor that is moving forward. It is believed that when they prove that their CBM is commercially viable, there will be opportunity to revive the industry in Indonesia.

2.3. Local Related Issues

This section will provide views on the relationship of the social cost attached to corporate social responsibility activities towards the project continuity as well as the current views of the GoI and investors on the socio-economic local impacts. As a further analysis, this section also discusses the result on the local impacts and expectation survey completed by the researcher.

2.3.1. Corporate Social Responsibility and Unpredictable Social Cost

The oil and gas production and exploration activities always affect directly to the environment, and some of them are negative impacts. Hence, this industry is always tied with the local issues since its existence bring direct impact to the indigenous people and the environment. There is always a need for the local people to have a compensation over the impact of the activities. This can be financial compensations and/or improvement on public facilities, such health care facilities, road and other infrastructures to improve the local's quality of life (Freilich and Popowitz, 2012). This activities are often called Corporate Social Responsibility (CSR) (Frynas, 2009).

Unlike in Australia and the U.S., CBM areas in Indonesia are mostly in dense populated areas, therefore the CBM players should take social cost into consideration. Some CBM blocks are overlapping with the palm plantation or coal mining blocks. It is crucial for the CBM players to be aware of the hidden cost caused by the social and environment where their blocks are located. These cost are unpredictable, and therefore they should have contingency fund or allowance for social costs.

Soetrisno (2009) emphasised that social cost can impact directly on the investment decision of the prospective investors. The CBM investor can calculate the estimated reserves and evaluate the project economy by using the existing data, but there is social cost that is unpredictable and can bring the economy down and eventually create an uneconomical project. This shows that it

is crucial for the CBM investors to have Corporate Social Responsibility (CSR) fund and financial allowance to cover these unpredictable social costs.

The European Commission defines a CSR as a concept whereby companies integrate the social and environmental concern into their business activities, as well as their interaction with their stakeholders. CSR is to be done on voluntary basis (European Commissions, 2001). The study by Frynas has found that it is important for the local government to be involved in the CSR program and encouraging the investors. According to Freilich and Popowitz (2012) the local government has a role to guarantee the health, safety and environment in their area. CSR will bring long-term benefits for the investors as it will also develop their public image (Streimikiene, 2009).

A new concept was developed in 1970 which was the Corporate Social Performance (SAGE, 2018). It is suggested by the SAGE publication (2018) that corporate social performance is an extension concept of CSR that emphasizes on the achieved results rather than just a responsibility towards societies. A study by Orlitzky *et al.* (2003) has proven that the corporate social performance (CSP) has a positive relationship with the corporate financial performance of the institution. A second-order meta-analysis on this relationship has been done by Busch and Friede (2018) and they claimed confidently that there is highly significant, positive, and bidirectional relationship between the corporate social performance and the corporate financial performance.

It is clear that this cost component is very important for the company's sustainability, therefore this research will focus on this cost as one of the main terms in the fiscal model being constructed.

2.3.2. The Government and Investors views on local issues

CBM operations always involve fracturing, and it is believed that this activity damages the environment in which it has been done. Therefore it is important for the CBM players to implement CSR policy and to have financial allowance to cover the negative impacts from their activities as mentioned previously.

A CBM project in Indonesia is very much related to the indigenous people and it can be assured that there will be constant interaction amongst them. Hence, it is important for them to invest in the development of the local communities to support their CBM operations with less issues (Frynas, 2009). As it has been suggested by Sage Publication (2018), a study by Patari *et al.*, (2012) on the relationship of social costs and financial performance in the energy industry, reveals that having CSR activities can actually be potentially cost savings as it will reduce the unnecessary social costs by having a better understanding on the local communities and therefore will reduce the risks of conflicts with them.

Local communities usually have already had high expectation on any industry activities that are being carried out in their area. For example, Moektianto (2018) mentioned about all the possible expectations by the local people such as the increase of employment rate, economy growth, a better electricity supply and better quality of life in general, as also said by Utama (2018).

The CBM investor, NuEnergy Ltd has overcome the challenges in relations to local people. They managed to communicate well with the local, and prepared them to accept this project as part of their project to benefit them. Prior to production, communication between the investor and the local communities is the earliest and easiest way of getting support from the locals.

The local involvement is very important to help the industry move forward (Wajong, 2018). The investors should consider and think about dealing with the local communities as these people are getting direct impacts from their activities. However, it is important that the local is the one who defines what they need from the industry, what they expect from the industry and define what the industry can do for them as well. For example, the local would encourage the government, that their area should get supply from the investor locally, since the activities of the industry will also accelerate the economy growth in their area. So it is more about the collaboration between the local area and the industry.

The Association for Oil and Gas Producer Areas (ADPM) should help the local regarding this matter. The changes of paradigm cannot only happen in the central government but also in the local government. The local should be the one defining that they want to use the gas from CBM for their area and be given a view on what is happening and how they will react to it (Bachtiar, 2018)

Rahmadhi (2018) stated that in one of their coal mining project area, Kota Baru, brought positive impact to the local community, bringing up economy activities in the community. He was convinced by looking at their past experience on coal mining project, that the CBM project will bring more positive impacts on this area. This is also agreed by Lubiantara (2018) local consultant and a government all at once, that this will bring more economy activities in the local areas. He also stated about multiplier effect on having industries activities in the local areas.

According to Husin (2018) it is possible to hire the local people, but then they have to be aware that working in the industry requires skills and knowledge about the industry. Therefore there is not much employment opportunities for the local people. He also stated that hiring local people for technical matters will cost them extra money, and yet it takes years to get them into certain level to be able working in the technical operations. One of many possibilities is to hire them doing unskilled work such as security/field guard or drilling site preparations activities (DSP). By hiring local people, it is expected that the communities will ease the process and will not disturb the activities being done in their areas.

Similar to Husin, Purba (2018) thinks that it will be difficult for investors to accommodate the local's expectation. This is most likely due to the time required for CBM project to get into commercialisation stage. The CBM project takes much longer time for it to get into commercialisation stage compared to other coal mining projects.

Purba (2018) emphasised that the GoI has a standardised approach, together with investors they do a socialisation or a campaign about the project that is being conducted in the local area and how it will develop the local community (community development). This is conducted by cooperating with the local government and the local community's leader.

2.3.3. The local community impacts and expectation towards CBM Development

The survey consent form is obtained from the Ministry of Domestic Affairs, Republic of Indonesia. A survey research proposal was submitted prior to conduct the survey. It is obliged for a researcher to submit a research proposal and request an approval to do survey in any areas in Indonesia. This is regulated by Domestic Affairs Ministry Regulation No. 64/2011, on Guidelines for Publishing Research Recommendation (Attachment XX). The survey being conducted is valid and legal as this recommendation letter was intended for provincial coverage and was shown to each of the head villages prior to conduct the survey.

A survey was done on local impacts in four main CBM basins in which CBM operation occurred. This survey result shows that the locals are impacted both positively and negatively. The local

impacts survey consists of nine different impacts that incurred in local communities. The impacts being looked at in this research are the impact on employment, education, health care service, forestry, infrastructure, water quality, air, land and farms, as well as the noise., in Barito basin are 21 questionnaires, in South Sumatra basin are 40 questionnaires, and in Central Sumatra basin are 27 basinsquestionnaire.

Figure 7: Detail of valid sample being taken

Basin	Village	#Sample	Basin	Village	#Sample
Kutai	Sanga-sanga	3	South Sumatra	Midangan Asri	14
	Poros Kabo	10		Trans Sosial	12
	Palaran	29		Sungai Tebu	14
Barito	Walangkir	21	Central Sumatra	Bukit Jaya	27

- **Kutai Basin**

The survey in Kutai Basin was done in five different areas in Kutai Kartanegara District. However only three areas being analysed which were located in which the main CBM activities incurred, which were in, Sanga-Sanga, owned by VICO CBM; Poros Kabo and Palaran which are owned by Ephindo Energy. Besides the CBM activities, there are conventional oil and gas activities as well as coal mining activities in this basin, especially in Sanga-Sanga. Most of local people in this area are not aware of CBM activities, since they are unsure about which activities actually have brought impact to their area. Considering this situation, the questionnaire being taken into account is only questionnaire which was filled by local people who really know about CBM activities in this area. Therefore from 10 questionnaires, only 3 questionnaires are being analysed.

- **Barito Basin**

The survey in Barito basin was done in one village named Walangkir, which was located in Tabalong district. The CBM block located in Walangkir belongs to PT Pertamina Hulu Energi (PT PHE), Metan Tanjung II. The local people are aware of this project being carried out in their area and able to give reliable response to the questionnaires. The issue in the data collection process was language barrier, as the elder people barely speak Bahasa Indonesia, but only their local dialect. The security guard, a local, assisted the data collection process by translating the questionnaire for them to give a better understanding on what are being asked in the questionnaire.

- **South Sumatra Basin**

The areas being visited were area in which the CBM development has incurred and is undergoing a review on its POD/FDP proposal by the NuEnergy, Ltd. and CBM well belongs to PT. PHE TJ 001. Currently, it is only the CBM project owned by the NuEnergy that is entering the POD approval process. Local people are aware of the CBM development being carried out in their areas. The survey in South Sumatra Basin was done in three villages, Midangan Asri, in which the NuEnergy's pilot CBM production wells are located, Trans Sosial (NuEnergy), and Sungai Tebu, a village close to the pilot CBM well belongs to PT PHE TJ 001.

- **Central Sumatra Basin**

The area being visited is Bukit Jaya, Riau, Pekanbaru, in which the CBM well belong to NuEnergy, Ltd. is located. This well was being plugged and abandoned when we visited the

vilage, since it was not very prospective technically. The well was located in the middle of the palm forest near the local housings.

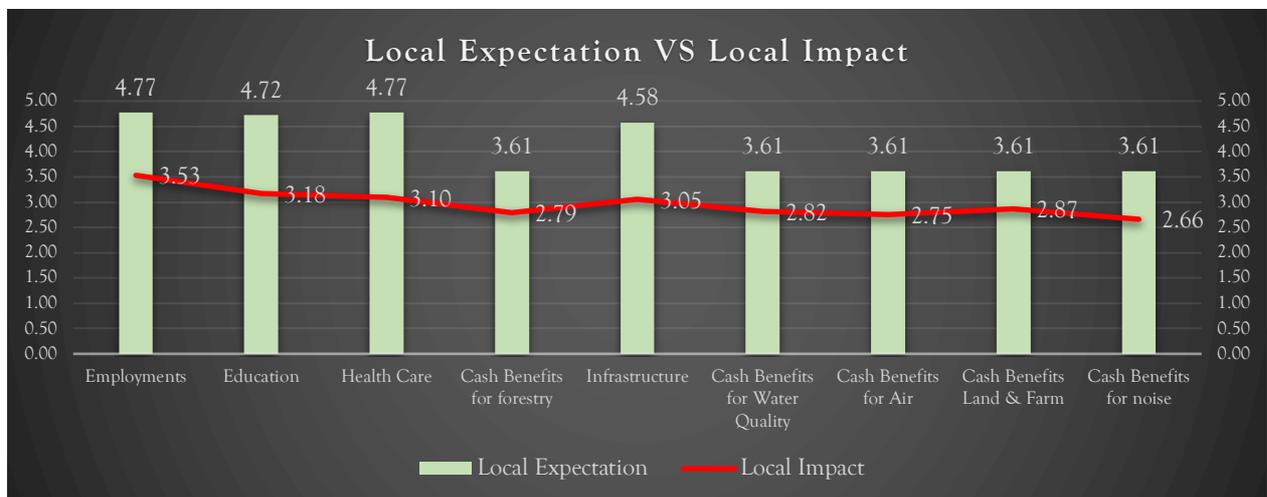
The main issue according to Mr. Soesmono is the technical issues, when it actually has to deal with the local community and the other party who own the areas such as coal miners or palm company. The most important thing to be concerned about is the intangible cost of dealing with this.

The government should look at the big picture of the industry. They might not get much money from the project, but by having CBM activities in some areas, it will boost the economy in which the CBM activities are occurring.

Mr. Brahmantyo thinks that in the next 10 years, the CBM can be the local energy sources for the local industry. According to Mr. Purba (2018), the GoI is doing a standardised approach such as campaign socialisation, community development and cooperate with the related branch of Local government and community leaders.

The following graph (see Figure 8) shows the impacts of current CBM activities in the local community in four main CBM basins. Score 5.00 shows that the expectation and impact is very high and good respectively, and the lesser the score the less expectation and worse impacts on the local communities. Date for the graph was compiled with data from 6th December 2017 to 20th December 2017. According to the graph, the CBM activities have brought above average (fairly good) impacts on employment, education, health care, and infrastructure sectors, but not environmental sector. It seems that the CBM companies should be paying more attention to the environment. The local expectation on all sectors are very high, and they expect financial compensation for the bad impacts on their environment.

Figure 8: Local Expectation VS Local Impact in Four Main CBM Basins in Indonesia



The GoI has considered this local community since 2004 and this can be seen from the law on the local participating interest, Government Law 35/2004. However this was implemented after 12 years this law enacted, yet there was no clear implementation regarding to the law, particularly for the local participating interest. Currently, the enforcement of the MR 17/2016 has caused an issue for the investors as it has direct influence to their project economy, as this is very much related to the implementation of the local participating interest.

Having these facts, it is important for both parties, GoI and investor to be more aware and concerned on the local community's development, rather only think of what they actually achieve

financially. Therefore, there is a need to assess these points and develop fiscal regime that accommodate the community development to ensure the project continuity.

2.4. Investor Related Issues

Financial Capability

There is no CBM project being developed up to day, and as long as there is no proven project, it is impossible to have new investors coming.

One of the CBM investor mentioned that investors are facing financial issues after spending all their money at the initial stage yet it was proven and they have run out of their cash to be injected to the current project (Husin; Hamzah, 2018).

The current issues faced by the CBM investors are the forced termination and its penalty. According to Mr. Gunawan (2018), this is mostly due to the lack of financial capability by the investors. In the end it becomes worse for the investors, as they must pay the penalty otherwise it will be brought to the court.

2.5. Technical Issues

2.5.1. Expectation VS Reality

There has been missed appraisal on the data, and the result technically does not match the appraisal from the joint study (Setyatmoko, 2018). The gas content in the coal is not as high as it was expected (Rahmadhi; Pujobroto, 2018). As it was previously mentioned, the investors were rushing to get the CBM blocks offered by the Government, yet there was no adequate research on the CBM property.

Wajong (2018) suspected that the false belief on CBM characteristic has triggered the initiation of the CBM project in Indonesia. There has been no progress on CBM projects carried out in Indonesia, except for one CBM investor that currently is waiting for POD approval.

2.5.2. Dewatering Management

Dewatering management has been a concern in the CBM industry. Apart from the wet coal, the problem that may exist is about where the investor get the water from to be injected for CBM fracking purposes. The only possible water source that can be used is the formation water, as it is not possible to use the ground water (Soetrisno, 2018). Soetrisno (2018) stated that this situation has created another social problem. The Government and the social community have no knowledge on this that they sometimes charged the investor a social cost towards the use of the ground water or contaminating the ground water. There is also possibility that they do not want to know or do not have the willingness to understand how the activities actually be done.

However, the water injection also lead to another technical problem since Indonesia coal is very wet and contains a lot of water already. This condition has been one of the challenges to produce gas from CBM.

2.5.3. Coal Characteristics

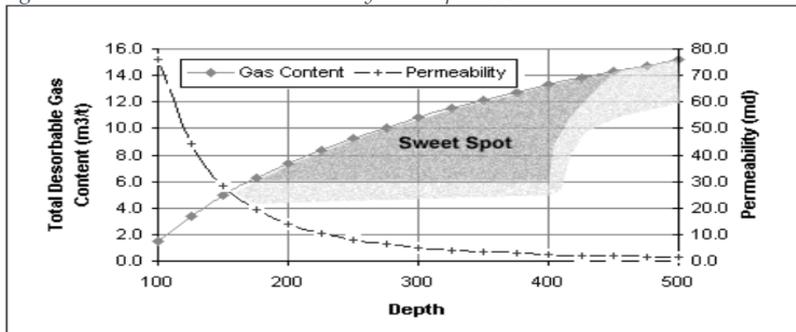
Pujobroto (2018), a former CBM exploration Manager at one of the biggest owners of CBM blocks in Indonesia confirmed that the CBM in Indonesia is not proven yet, and Indonesian coal is not thick enough for CBM. He mentioned that there are many technical issues that contribute to the failures of CBM industry in Indonesia.

There are three main issues being described, as follows:

- a. The coal is distributed widely and the structures are different one to another even they are located in the same area.
- b. The rank of the coal is too low to have a good gas content.
- c. It has low permeability. This is much related to the gas content itself. The depth has strong connection with how high the gas content and the permeability are. The deeper is the coal, the higher the gas content is. On the contrary, the deeper is the coal, the lower is the permeability.

Thomson et al., (2008) wrote on the conceptual between permeability and gas content with depth, by using coal mining data from Sydney.

Figure 9: Gas Content VS Permeability VS Depth (m)



(Thomson & MacDonald, 2003; modified from William et al. 2001)

Gunawan (2018), the former head of unconventional hydrocarbon division at the SKKMigas said that CBM is less risky compare to conventional hydrocarbon. The CBM resources tend to spread all over the place and it is not technically structural as in conventional hydrocarbon. Investors should be more encouraged and brave to invest in the CBM industry.

In addition to that, Gunawan (2018) stated that the coal permeability in South Sumatra Basin is higher than the one in Kalimantan, Kutai and Barito Basins. Another concern about the CBM gas is fast decline rates on CBM gas in each well. Therefore, it is required hundred wells to keep up the production profile rate. Surprisingly, he is convinced that Indonesia has an adequate coal thickness and gas content in the CBM basins, even though he mentioned that the permeability may not be good enough for CBM gas to be extracted.

2.5.4. Technology, Infrastructures and Geography

The fact that Indonesia is geographically an archipelago country has created another problem on mobilisation and the connectivity between the islands is one of the challenges. This has become more complex since there is inadequate infrastructures in place to ease the mobilisation. However, since CBM is planned to be locally used, this will not create a problem on distribution the production. This is much more related to the material, tools and equipment mobilisation. It increases the risks and the cost of mobilisation (Lubiantara, 2018).

There was inadequate CBM technology and the equipment standard set in the net PSC applied to conventional oil and gas is applied to CBM, regardless its characteristic difference between the conventional and unconventional hydrocarbon. According to Gunawan (2018), the Government has changed its requirement for procuring the CBM tools and equipment. The Government has learnt from the past experiences about the CBM and has willingness to adjust the requirement to support the industry.

3. Conclusion

The CBM era in Indonesia was officially started in 2008 although the research and study had been conducted since 2002 by Lemigas, Indonesia. The growth of CBM industry in Indonesia has been very slow since 2012. There were significant number of CBM blocks being awarded in 2011 and 2012, which were 19 blocks and 12 blocks respectively. The number of CBM blocks started to decrease in 2015 due to termination as the CBM investors failed to fulfil their commitments. Up to 2018, there has been no CBM project that entered into development or production stage, yet the number of the block decreased to 30 blocks in 2018 from 54 in 2014.

This research identified the key issues in terms of developing CDM in Indonesia. Five were identified and discussed and these include: government related issues, fiscal issues, local's related issues, investor related issues, and technical issues.

The government seems to ignore the industry and fail to implement the paradigm (new policy) they set in the regulation. There seems also a leadership issue within the government and less involvement of the government in the industry and they seem not to be ready to have CBM industry.

The issues under the fiscal issues are very much related to the regulation, procedures and government policy, commerciality terms, and the cost of CSR. There is regulation complexity in the implementation due to the fiscal regime applied to CBM. The commerciality issues is very much related to gas market competitiveness and the cost of CSR involved during the exploration stage.

There are issues directly related to the local community, such as permits, land access, as well as other investors from different industry that have already conducted activities. Currently, there has been no significant impact from the CBM activities since it was only a pilot project and there has been no massive drilling activities. However, they have high expectation to get a better quality of life brought by the CBM investors.

Both the GoI and industry aware that investors are currentl facing financial issues due to high initial project costs at the beginning of their project which caused by the complexity of the regulation attached to the PSC.

The final issue being determined in this research is the technical issue which mainly related to the CBM geology and its technical related to the geology. There is no match on the resource expectation and the reality. There is a huge gap between the CBM gas content being identified during the study and the CBM gas content found in the pilot project. Technically, there is also issues on dewatering management since the coal in Indonesia is very wet and contains a lot of water. The next issue is the low permeability and low gas content of the coal. However, this situation is still being assessed by the GoI as they believe that Indonesia still has potential to grow the CBM industry. Indonesia has inadequate infrastructure to support the mobility of the tool, equipment or even later to distribute the production and the fact that Indonesia is an archipelago country has made it even more difficult.

These findings will contribute into fiscal model being constructed in further research. This model is expected to balance the interest between parties, the Government, local communities and investor. Overall, this paper contributes new original data analysis on local impacts and CBM research and to Indonesian energy policy literature.

References

1. Bachtiar, A. (2018). *A Focus Group Discussion on CBM Industry in Indonesia*. Focus Group Discussion. Central Jakarta. 1 February, 2018.
2. Busch, T. and Friede, G. (2018). The Robustness of the Corporate Social and Financial Performance Relation: A Second-Order Meta-Analysis. *Corporate Social Responsibility and Environmental Management*, 25(4), pp.583-608.
3. Corporate Social Responsibility and Corporate Social Performance. (2012). In: *Sage Brief Guide to Business Ethics*. [online] Thousand Oaks: Sage Publisher Inc., pp.231-248. Available at: <http://dx.doi.org/10.4135/9781452243979.n26> [Accessed 16 Sep. 2018].
4. European Commissions: Communication on Promoting a European Framework for Corporate Social Responsibility. (2001). In: *European Commissions*. Brussels: European Commissions.
5. Freilich, R. and Popowitz, N. (2012). Oil and Gas Fracking: State and Federal Regulation Does Not Preempt Needed Local Government Regulation. *The Urban Law*, 44(3), pp.534-575.
6. Frynas, J. (2009). Corporate social responsibility in the oil and gas sector. *The Journal of World Energy Law & Business*, 2(3), pp.178-195.
7. Gunawan, B. (2018). *Views on CBM Industry in Indonesia (Government's Perspective)*. In person interview. Bandung. 22 January 2018.
8. Gylfason, T. and Zoega, G. (2006). Natural Resources and Economic Growth: The Role of Investment. *The World Economy*, 29(8), pp.1091-1115.
9. Hamzah, S. (2018). *A Focus Group Discussion on CBM Industry in Indonesia*. Focus Group Discussion. Central Jakarta. 1 February, 2018.
10. Husin, M. (2018). *Views on CBM Industry in Indonesia (Investor's Perspective)*. In person interview. South Jakarta. 29 January 2018.
11. Identification of Islands and Standardization of Their Names. (2017). In: *11th United Nations Conference on the Standardization of Geographical Names*. [online] New York: The United Nations. Available at: https://unstats.un.org/unsd/geoinfo/ungegn/docs/11th-uncsgn-docs/E_Conf.105_115_CRP.115_Agenda%20a%20Identification%20of%20Islands%20and%20Standardization%20of%20Their%20Names_BIG_Indonesia.pdf [Accessed 6 Nov. 2018].
12. Key Performance Indicator Establishment in the Ministry of Energy and Mineral Resources. Ministerial Regulation No. 13/2013.
13. Legowo, E. (2018). *Views on CBM Industry in Indonesia (Government's Perspective)*. In person interview. Tangerang. 5 February 2018.
14. Lubiantara, B. (2017). *Paradigma Baru: Pengelolaan Sektor Hulu Migas dan Ketahanan Energi - New Paradigm: Managing the Upstream Industry and Energy Security*. Jakarta: Grasindo.
15. Lubiantara, B. (2018). *Views on CBM Industry in Indonesia (Local Consultancy's & Government's Perspective)*. In person interview. South Jakarta. 3 February, 2018.

16. Mair, D. (2018). *Views on CBM Industry in Indonesia (Global Consultancy's Perspective)*. In person interview. South Jakarta. 13 February, 2018.
17. Moektianto, S. (2018). *Views on CBM Industry in Indonesia (Investor's and Industry Association's Perspective)*. In person interview. South Jakarta. 18 January, 2018.
18. Orlitzky, M., Schmidt, F. and Rynes, S. (2003). Corporate Social and Financial Performance: A Meta-Analysis. *Organization Studies*, 24(3), pp.403-441.
19. Pujobroto, A. (2018). *Views on CBM Industry in Indonesia (Investor's Perspective)*. In person interview. Bandung. 22 January, 2018.
20. Purba, S. (2018). *Views on CBM Industry in Indonesia (Government Perspective , Written Interview)*.
21. Rahmadhi, H. (2018). *A Focus Group Discussion on CBM Industry in Indonesia*. Focus Group Discussion. Central Jakarta. 1 February, 2018.
22. Rahmadhi, H. (2018). *Views on CBM Industry in Indonesia (Investor's Perspective)*. In person interview. Central Jakarta. 19 January, 2018.
23. Rosyadi, H. (2010). *Potensi Coalbed Methane untuk Mensukseskan Program Diversifikasi Energi Nasional*. [ebook] Available at: https://www.researchgate.net/publication/282183107_Potensi_Coalbed_Methane_untuk_Mensukseskan_Program_Diversifikasi_Energi_Nasional [Accessed 22 Aug. 2018].
24. Setyatmoko, U. (2018). *A Focus Group Discussion on CBM Industry in Indonesia*. Focus Group Discussion. Central Jakarta. 1 February, 2018.
25. Setyatmoko, U. (2018). *Views on CBM Industry in Indonesia (Investor's Perspective)*. In person interview. West Jakarta. 10 January, 2018.
26. Sirait, D. (2013). *Indonesia Current Policy and Regulation*.
27. Soetrisno, S. (2018). *Views on CBM Industry in Indonesia (Industry Observer's Perspective)*. In person interview. South Jakarta. 19 January, 2018.
28. Stickley, D. (2014). *A Framework for Negotiating and Managing Gas Industry Contracts*. 2nd ed. Dundee.
29. Streimikiene, D., Simanaiciene, Z. and Kovaliov, R. (2009). Corporate Social Responsibility for Implementation of Sustainable Energy Development in Baltic States. *Renewable and Sustainable Energy Reviews*, 13, pp.813-824.
30. Thomson, S. and MacDonald, D. (2003). The application of medium radius directional drilling for coal bed methane extraction. Researchgate.
31. Thomson, S., Hatherly, P., Hennings, S. and Sandford, J. (2008). A model for gas distribution in coals of the Lower Hunter, Sydney Basin. In: *Eastern Australasian Basins Symposium III*. Sydney: Researchgate.
32. Utama, J. and Golubchenko, N. (2018). *Views on CBM Industry in Indonesia (Global Consultancy's Perspective)*.
33. Wajong, M. (2018). *A Focus Group Discussion on CBM Industry in Indonesia*. Focus Group Discussion. Central Jakarta. 1 February, 2018.

34. Wajong, M. (2018). *Views on CBM Industry in Indonesia (Industry Association's Perspective)*. In person interview. South Jakarta. 8 January, 2018.
35. Williams, R., Yurakov, E. and Ashelford, D. (2001). Gas Emissions Modelling of Gate Road Development. In: *Coal Operators' Geo-technology Colloquium*.