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Regulatory reform in the Indonesian Natural Gas Market

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Abstract

This paper analyses the problems and dilemmas Indonesia is facing in the upstream and downstream segments of the gas market and the remedies suggested and practiced in Indonesia to mitigate the problems. Indonesia is a country gifted with natural resources, including natural gas and oil. The exploitation of both of these energy resources has given rise to a large oil and gas industry and resulting in Indonesia becoming a leading world LNG producer. However, prospects for Indonesian gas are changing due to the country's natural gas policy in 2001. Implications of this policy change have become more visible and demonstrate the difficulties Indonesia is facing with respect to the national management of this natural resource. Indonesia is in a way trapped: the country possesses a tremendous natural resource without being able to get the full benefit out of it for the benefit of the country's economic prosperity.

Keywords:
Natural Gas, gas market reform, gas market regulation, natural, institutional and economical barriers in regulatory reform, Indonesian gas market

1. Introduction

Indonesia is a country with abundant natural resources, including natural gas and oil. Exploitation of these energy resources has given rise to a huge oil and gas industry which has brought Indonesia to a world leading position as a Liquid Natural Gas (LNG) producer. Due to the geography of the country – Indonesia is large archipelago – and the distributed location of the gas fields, Indonesia focused on LNG production and shipping from the beginning of natural gas exploitation. LNG shipping has been the main option for processing natural gas, for both domestic consumption and export. Since the early 1980s Indonesia exported natural gas to other countries, in particular within the region. Japan, South Korea, and Taiwan were served by LNG tankers whereas Singapore and Malaysia could be connected to the Indonesian gas fields by pipelines. However, prospects for Indonesian gas have changed following a refocusing of natural gas policy in 2001. In recent years, the implications of this policy change have become apparent and demonstrate the difficulties Indonesia is facing with respect to the national natural resource management. Briefly stated, Indonesia wants to further develop its domestic downstream gas market for the benefit of the country's economic prosperity, but is facing serious natural, institutional and economic barriers (Hyden et al, 2003; OECD, 2011). At the same time, the country is facing similar upstream barriers to the exploration and exploitation of new gas fields; with the ultimate consequence that the country is unable to simultaneously meet increasing future gas demand in the domestic and export market. Therefore, in some respects, Indonesia is trapped: the country possesses a tremendous natural resource without being able to get the full benefit for the country's economic prosperity.
This paper briefly reviews the short-term problems and dilemmas Indonesia is facing in upstream and downstream segments of the gas market; and outlines the remedies suggested and practiced in Indonesia to mitigate the problems. More specifically the paper aims to answer the following two questions:

1. What are the natural, institutional and economic barriers to development of upstream and downstream segments of the Indonesian gas market?
2. What regulatory remedies have been suggested and practiced to mitigate the barriers?

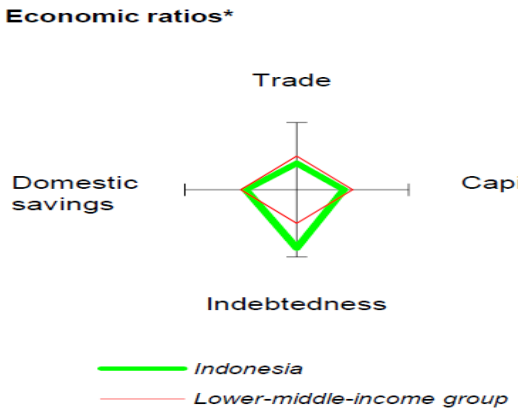
The paper is structured as follows. The next section briefly introduces Indonesia's natural gas market and gas industry. Then Section 3 discusses the upstream problems and regulatory remedies in more detail. Similarly Section 4 discusses the problems and regulatory remedies in the downstream segment of the market. Section 5, the concluding section, summarizes the major findings.

2. Natural gas in the Indonesian archipelago

Indonesia is an archipelago consisting of 17.000 islands inhabited by about 240 million people in 2011. The population and the economy concentrate on the island of Java, with about 130 million inhabitants. Much of the country's surface is covered by tropical rain forests, and Indonesia is second only to Brazil in terms of tropical forest cover Natural resource production makes up a major share of gross domestic product (GDP). In addition to oil and gas, the country has massive

coal, bauxite and nickel reserves. Large parts of the country are not easy to access and mineral exploration is incomplete. Next to production and export of mineral resources, agriculture has a substantive share in Indonesia's GDP. Large areas of rainforest are converted to agricultural cultiuvation every year in order to keep up with the growing population. Lately however, Indonesia has started diversifying economic activities by developing industry, and so balancing the country's economic portfolio, national income and wealth position.

Figure 1: Economic Ratio



Source: Worldbank key economic data

According to the Worldbank classification, Indonesia belongs to the lower-middle income group of countries with an economic profile showing above average indebtedness (Figure 1). Industry, including the natural resource industry and services are the country's two largest economic sectors (Table 1).

Table 1

STRUCTURE of the ECONOMY

	1989	1999	2008	2009
(% of GDP)				
Agriculture	21.7	19.6	14.5	15.3
Industry	38.3	43.4	48.1	47.6
Manufacturing	19.7	26.0	27.9	26.4
Services	40.0	37.0	36.0	34.1
Household final consumption expenditure	55.8	73.9	62.7	56.6
General gov't final consumption expenditure	8.7	6.6	8.4	9.6
Imports of goods and services	21.4	27.4	28.7	21.3

Source Worldbank key economic data

Oil and gas production have been part of Indonesia's economic activity for more than a century, starting in 1883 with the discovery of a gas field in North Sumatra. Within a few years more oil and gas fields were discovered, among others in South Sumatra and Kalimantan. Initially the

natural gas was only used as field fuel, facilitating production of the rather thick Indonesian crude oil. Substantive new gas discoveries where made in the 1970s in Sumatra and Kalimantan; and later in other parts of Indonesia such as the islands of Natuna, Papua and Maluka. Indonesian gas reserves and gas fields are distributed throughout the country (Figure 2); and the archipelago geography creates natural barriers to easy transport. This has been mitigated by distributed LNG production and shipping combined with localized gas pipeline infrastructures. Indonesia is considered to be the tenth largest holder of natural gas reserves in the world and the second largest in the Asian Pacific region (IEA, 2007). Indonesian gas fields are also relatively small in size, which makes production costly (Figure 2).

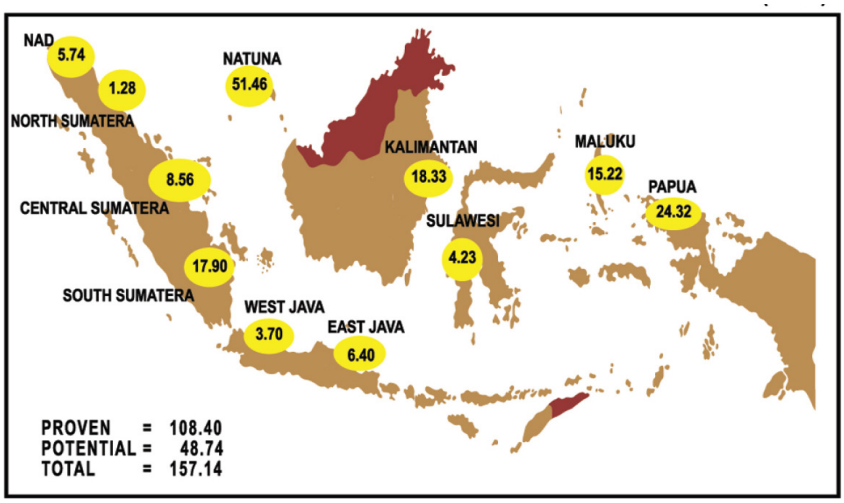
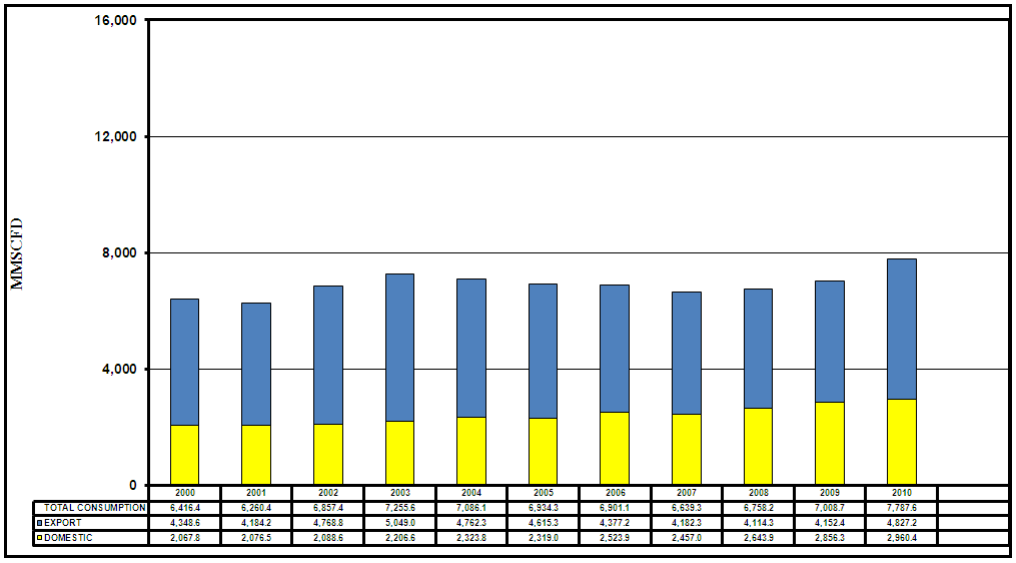


Figure 2 Indonesian gas fields and gas reserves in Trillion Standard Cubic Feet (TSCF) in 2010 proven and estimated
(Source: leaflet of the Ministry of Energy and Mineral Resources of the Republic of Indonesia)

Thus far Indonesia has strongly focused on gas export but plans to redirect focus to the domestic market. However, during 2000-2010 gas export continued to exceed domestic gas consumption (Figure 3).



	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
TOTAL CONSUMPTION	6,416.4	6,260.4	6,857.4	7,255.6	7,086.1	6,934.3	6,901.1	6,639.3	6,758.2	7,008.7	7,787.6
EXPORT	4,348.6	4,184.2	4,768.8	5,049.0	4,762.3	4,615.3	4,377.2	4,182.3	4,114.3	4,152.4	4,827.2
DOMESTIC	2,067.8	2,076.5	2,088.6	2,206.6	2,323.8	2,319.0	2,523.9	2,457.0	2,643.9	2,856.3	2,960.4

Figure 3 Export vs Import Consumption 2000-2010
Source: Indonesian Natural Gas Roadmap, 2011

Most exported gas is supplied to countries in the region, in particular Japan. The Indonesian domestic market is basically an industrial and electricity production market, apart from significant usage of the natural gas for gas and oil production itself (Figure 4).

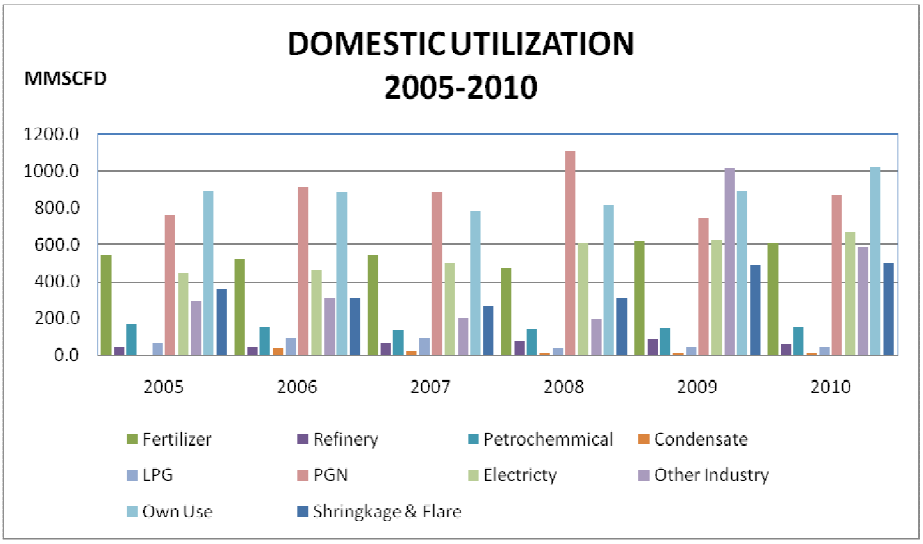


Figure 4 Domestic natural gas consumption 2005-2010
Source: Ditjen Migas (2005-2010) compiled by the authors

Domestic gas demand shows a consistent increase since 2005. The fertilizer industry and power generation take significant shares in domestic demand. The oil industry also used substantive volumes of natural gas for oil production (Figure 3). Indonesian crude oil can only be produced by steam injected into the well. Natural gas is used for the onsite steam production. Another significant category is flare gas. This gas has to be burned to reduce pressure in the system of

petroleum operation. To avoid wasting the gas this flare is sold to interested consumers because the total volume is quite significant, between 300-400 MMSCFD per years, which is large enough to supply more than one fertilizer plant. However it should be noted that since it is intermittent, it is unlikely that a business entity would invest in a new project and base the gas supply solely from gas flare.

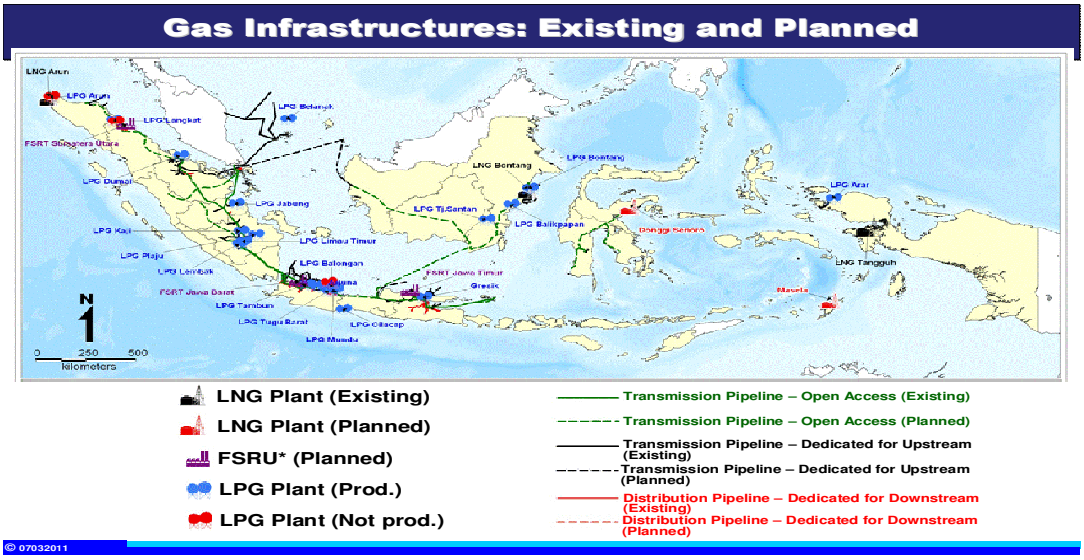


Figure 5 Indonesian gas transmission infrastructures
Source : Ditjen Migas, 2011

The size and island structure of the country is a natural barrier to developing a gas pipeline based transmission and transportation infrastructure in Indonesia (Figure 5). To overcome these problems the two operational LNG plants have been located to facilitate efficient export of the natural gas. However in the new focus on the domestic gas market they are not well located as the distance to the domestic market is quite large. Five more LNG trains are planned at different gas fields distributed over the country, but it will take time before they can be brought into operation. Indonesia is facing a number of problems in the further development of the gas market. The next two sections review these problems in more detail.

3 Barriers in the upstream segment of the gas market

1.1 Natural barriers

Indonesia has huge gas reserves and some basins with high potential have not yet been explored. The current proven reserve is assumed to permit gas production for about 48 years, but this might be longer if new finds are made.
Not all proven gas fields are yet in production. There are several natural reasons for this. First, the remote and distributed location of the proven Indonesian gas fields is not attractive for

investment. Moreover, as Figure 2 indicates, there are many gas fields, but most of them are restricted in volume which is a challenge to the economic feasibility of exploitation.
Second, there are mixed gas qualities in the fields. In particular the huge Natuna field (with 51 TCF Recoverable Reserves) presents a problem. Exploitation of this huge gas field became problematic when it was discovered that the CO_2 content of the gas is about 80 percent. Commercial application of the Natuna gas therefore would require substantial additional investments in cleaning technology to remove and process the huge amounts of CO_2. The costs of developing and operating the field are estimated to be US$ 8145 billion and US$ 9941 billion respectively (Ditjen Migas, 2008). Although the Natuna field is currently the largest Indonesian gas field, the low gas quality presents commercial substantial risks to its exploitation.
Third, gas production in remote gas fields sometimes requires expensive on site stand alone technology, which also challenges the commercial attractiveness of the gas. An example is the Masela block (15 TCF), which can only be exploited by floating LNG technology. So the production, treatment, liquefaction and shipping need to be concentrated in a remote area far out to sea. Apart from the huge extra investments, there is also a technological risk, because floating LNG train technology is a less proven than onshore LNG train technology.
Fourth, the remote and distributed location of the many relatively small Indonesian gas fields in the archipelago geography of the country, in combination with the concentration of the economic center of the country on the island of Java, makes it difficult to develop commercial applications of the natural gas via a pipeline infrastructure. The sea, the large distances and the remoteness to export markets, forces Indonesia to continue the LNG route for natural gas exploitation. There are government ambitions to increase the gas pipeline infrastructure in some parts of the archipelago, but serious investments are lacking. Part of the problem here is uncertainty about a sustained development of the domestic consumer market (see next section).
It shows that the natural circumstances of Indonesia act as a barrier because they require substantive additional investments, which in their turn challenge the commercial attractiveness of Indonesian gas on the international market. Supplying the “more expensive” Indonesian gas to the domestic market is no alternative, because the domestic purchasing power is currently too low for selling the gas domestically (see also next section).

3.2 Institutional barriers

Indonesia made a significant change in natural gas policy with the introduction of a new gas law in 2001. The law changed many things, but in the context of this paper only a few changes are relevant. In general the new law was meant to give the Indonesian gas sector a strong push by introducing liberalization in the downstream market and by rebalancing the export/domestic market focus in gas policy. Indonesia wanted to have a stronger domestic gas market, instead of continuing exporting the larger part of Indonesian gas as LNG.
With respect to the upstream segment of the market, the law meant to improve the quality of the institutional environment for potential investors in exploration, development and production of gas fields. The Indonesian government dominates the natural gas sector, but has always worked together with private investors to exploit the natural resource. To facilitate the upstream public-private cooperation, Indonesia, almost from the beginning, applied the so-called production sharing contract (PSC) allowing the private party full cost recovery in exploitation of the gas field, but at the same time guaranteeing the state revenue. The 2001 law meant to improve the

transparency and quality of the procedures for obtaining PSCs by private companies. One of the problems to be solved was the double role of the organization Pertamina in the bidding process. Before the new law Pertamina acted both as gas company and as the organization responsible for the PSCs. This double role lead to corruption and inefficiency (Schulte Nordholdt, 1994). The new law transformed Pertamina into a profit oriented limited liability company and transmitted the contractual responsibilities to two new public organizations called Ditjen Migas and BP Migas, which now share the responsibility for managing the gas and the oil sector in Indonesia. However, the new law did little to improve the institutional environment for investors. In some respects it even worsened the conditions since investors were confronted with new barriers. The new law turned out not to be a *Lex Specialis* like the previous gas law, which presented investors with many diffuse and badly defined competencies and contradictory requests and obligations of public organizations. The new gas law extended the number of public organizations investors had to deal with, in particular in other sectors and jurisdictions than the gas sector. The organizations all have their own, often quite contradictory, requirements which are not coordinated at the governmental level. This has complicated the procedure for a PSC and the procedure takes more time under the 2001 law than before.

Another related institutional problem is the quality of geological data available for potential investors in Indonesia. These data are produced by governmental organizations and are the core information for potential investors in the bidding process of a PSC. In general the quality of these data is rather poor and most of the time only available as hard copy. Under certain conditions investors are allowed to collect the seismic data in cooperation with the governmental agency (Ditjen Migas), which gives the investor the privilege to have the right to match the "winning" bid in the bidding process. This option is called direct offer bidding. However, the Indonesian government lacking the money for state of the art seismographic research and has yet to invest in improvement of data quality because of extra costs involved. One of the consequences of poor data quality was demonstrated in 2010 when only 3 of the 14 offered working acreages were successfully tendered. In total 36 companies bought the tender package with the unreliable data, but only three companies continued the bidding for a contract.

A third institutional problem that emerged after introduction of the 2001 gas law is caused by the so-called Domestic Market Obligation (DMO). DMO requires producers to offer 25% of their gas production to the domestic market, since Indonesia wants to develop the domestic gas market in conjunction with export of the gas. However, DMO is basically a paper based legal obligation with hardly any workable procedures for producers. A related problem is that clear tariffs for the domestic market are missing. Producers are faced with an obligation which is complicated due to lack of clear transparent rules. The law requires the producers to offer the gas to domestic consumers for a minimum price reflecting cost recovery and a margin. However, if the location of the gas field gives the producer the alternative of export, they tend to offer the gas to domestic consumers for a price close to the export price instead of the price reflecting cost recovery and margin. Since almost all gas fields have the option of export, the DMO turns out to be yet another bureaucratic obstacle for production companies.

3.3 Economic barriers

The natural and institutional barriers discussed previously have severe implications for new investments in the gas sector (Figure 6). A major concern is that investments in exploration are

on the same low level for many years now. A result of the investments not increasingly sufficiently is that finding and proving of new gas reserves does not grow either. A cause of the lagging investments in exploration are the investment risks, with investment costs not being recovered when no gas is found.
The natural and geographical conditions of Indonesia are considered as a serious drawback in this regard, because they make investors hesitant, as stated in a study by Price Waterhouse Coopers (PWC) from 2005:

"*From a geological prospective, investors expect to discover smaller "finds" in more remote locations which dramatically changes the risk profile of these exploration activities. As previously mentioned this scenario will increase the finding and operating costs thereby lowering profitability without some sort of additional fiscal incentive. To induce investment for exploration operations with such geological risk profile, the GOI must establish regulatory and fiscal measures which are conducive and attractive to potential/existing investors.*"
(Price Waterhouse Cooper, 2005)

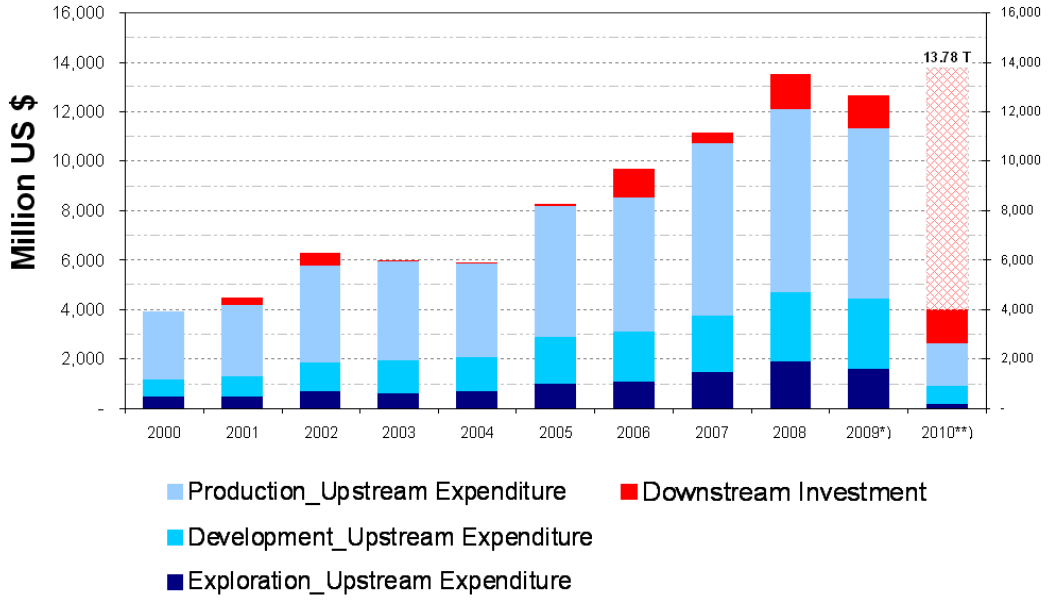


Figure 6: Upstream and Downstream Oil and Gas investment 2000-2010
Source: Ditjen Migas (2011)

Investments need some form of compensation or risk alleviation for the relatively expensive geographical conditions of the Indonesian gas fields. Currently this financial compensation is not available, simply because the Indonesia does not have the capital, even though the country's unproven gas reserves are assumed to be quite voluminous, according to a PWC study from (Investor Survey of the Indonesian Oil and Gas Industry,2010) The Indonesian investment climate is however considered as too risky for many potential investors.
Indonesia is facing a real challenge here, since about 20% of the country's budget depends on revenues from the gas (and oil) sector (Figure 7). If gas production stagnates or decreases in the coming decades the country will lose substantial income thereby limiting the country's potential for economic development. Stagnating gas production will also hinder further development of the domestic gas market and this too will affect the country's development potential. The

primary idea behind further domestic market development is economic growth and with natural gas as catalyst (see also below).

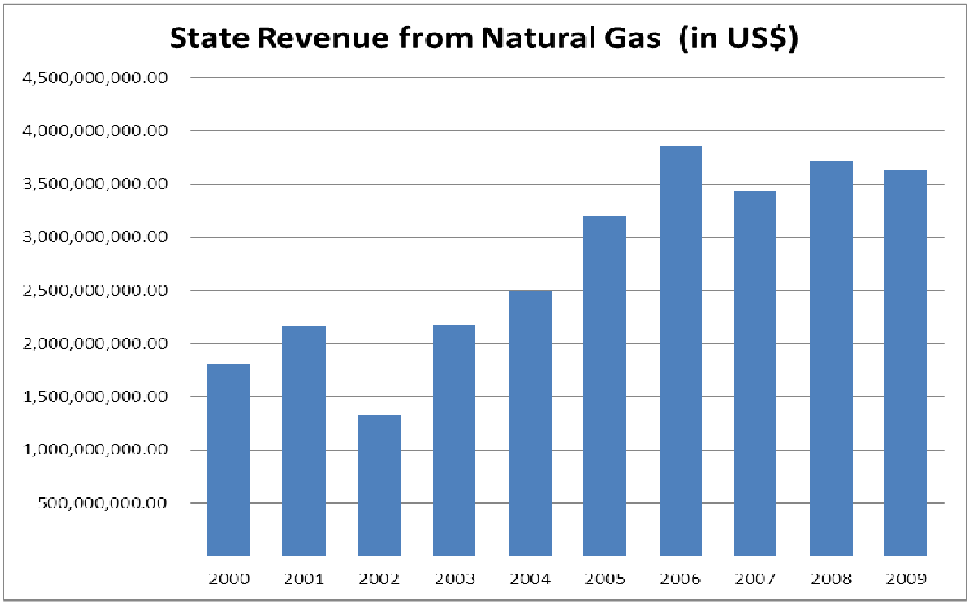


Figure 7: State Revenue from Natural Gas 2000-2009
Source: Ditjen Migas, 2009

3.4 Regulatory remedies in the upstream segment of the market

In this section we will analyze the regulatory remedies suggested/applied to the three types of barriers in the upstream segment of the market.

3.4.1 Regulatory remedy to mitigate the natural barriers

Above we have shown that Indonesia's natural gas reserve is not easily accessible. The many fields are relatively small and remotely located, with mixed gas quality. Almost all fields are offshore. Finding and exploiting the fields requires large investments and attracting these makes the presence of an excellent investment environment a prerequisite. However, we have shown that such an investment environment is far from reality in Indonesia. The PSC contracts do allow private investors full cost recovery, but as we also have seen, getting such a contract is not easy and clearly no guarantee that the contracted field contains natural gas.
Development of a good infrastructure is the most important way of dealing with the natural circumstances in the Indonesian upstream segment. Due to the distributed offshore production sites, shipping of LNG is almost the only transport option, but this transport technology is relatively expensive compared to pipeline transport, and in combination with the relatively small scale of the gas fields it is even more expensive. This is a very serious problem for the further exploitation of Indonesian gas fields. It needs creative technological and financial solutions, which are currently lacking. Clustering of transportation infrastructure offshore could be a

workable option to handle the infrastructure needs in an economically feasible way. Figure 5 above gives some examples of the options. Although there are new infrastructure projects planned (localized pipelines, new LNG trains and terminals), investors are lacking. According to a PWC report of 2008 (Investor Survey of the Indonesian Oil and Gas Industry, 2008), Indonesia should develop an incentive system for infrastructure development both in the upstream and the downstream segment of the market. In the upstream market the full cost recovery scheme is not sufficient to attract investors. But developing an effective and efficient incentive structure is perhaps still a bridge too far for the current governmental bureaucracy, given the institutional problems Indonesia is currently facing. One of the options Indonesia is considering is a so-called depletion premium to finance future exploration of new gas fields. The money should come from a form of taxation of the profits of the gas companies. Currently it is unclear if this premium will become reality.

3.4.2 Regulatory remedies to mitigate the institutional barriers

On the institutional side the regulatory challenge is to reduce or prevent institutional risks for potential investors. As we have seen, overlapping jurisdictions, contesting competencies and low quality information are the current institutional risks for investors. With respect to the jurisdiction of laws there are some signs of improvement. Indonesia has mitigated import restrictions on all products and technology for upstream activities, which has clearly improved investment conditions. But far more needs to be done. For example, producers are still exposed to unclear definitions of the concept of Cost Recovery. This is causing a lot of uncertainty with respect to workable business cases. The same holds for licensing procedures which require involvement of too many governmental organizations contesting each other on account of efficient procedures. In general, the Indonesian gas sector institutional environment needs a high level of professionalism since all companies active in the upstream segment are large global oil and gas companies.

3.4.3 Regulatory remedies to mitigate the economic barriers

As shown above, on the economic side Indonesia is facing two serious problems: a lack of investment in exploration of new gas fields and a risk of decreasing revenues due to delayed investments in gas field production. Mitigation of both problems requires a system of incentives to stimulate investment. For instance the government has allowed potential investors to participate in the seismic and geophysics research of gas fields. The research effort of investors is compensated by providing them privilege in the bidding process. In the bidding rounds in 2005 till 2008 50-80 % of the biddings were privileged, based on joint research of the government and the companies. But despite joint cooperation in research, only 30-50 % of the open biddings for gas fields was contracted between 2005 and 2008 (Ditjen Migas, 2009).
Production could also be stimulated by reconsidering the balance between cost recovery and state revenue in the PSC contracts. One of the options currently considered is a dynamic split between the share of the investor and the state, decided by the cumulative earnings of the producer instead of a fixed ratio independent of earnings. Another option considered is the introduction of a so-called Gross Production Contract as an alternative to the PSC contract. In the

Gross Production Contract the state and the producer agree upfront about their share in the profit. This leaves the investor freedom to increase profit whereas the state is certain about the state revenue. A third option currently under investigation is a delay in remittance of the state revenue until the field is in full production.
All remedies will need some institutional courage and creativity, in particular on the part of Indonesian governmental bureaucracy. The most difficult task is to encourage all parties to overcome their sectorial tunnel vision for the benefit of a better Indonesian investment climate for the gas market. However, this is easily said but quite difficult to realize. Meanwhile gas market problems in Indonesia are accumulating and one of the more serious domestic problems the country is facing is increasing domestic demand in combination with decreasing production. After having analyzed the production side of the problem, we now turn to the market side of the problem.

4 Barriers and regulatory remedies in the downstream segment of the gas market

4.1 Downstream barriers

As indicated above, Indonesia made a significant change in gas policy focus in 2001, when it was decided that the natural gas should not only bring in state revenues, but that it also should contribute more significantly to the country's economic development and prosperity. For that reason, further development of the domestic market became a dominant focal point in Indonesian gas policy. In 2006 oil, natural gas and coal were dominating the primary energy mix of the country, with oil accounting for about half and natural gas for about 25%. The share of natural gas in the country's primary energy mix is expected to grow to 30% in 2025. This seems to be a manageable increase, but in reality it is proving challenging given the overall growth of primary energy demand. Further development of the domestic market is facing serious barriers, which we will discuss in this section.
Figure 8 below gives an overview of projected gas supply and demand until the year 2025. It shows that large parts of the gas produced already have been contracted. It also predicts that production and supply of natural gas is decreasing over the years (lower trend line). But most importantly the figure shows the increasing gap between demand and supply of natural gas in the near future. This seriously affects the Indonesian ambition to further develop the domestic gas market. As domestic need of gas is growing, the availability of the gas is decreasing. This shows how the problems in the upstream segment of the market severely affect the gas policy ambition downstream. The domestic need for gas has been growing since 2005 when the government stopped the diesel subsidy for industry. Industry en mass moved to natural gas since the price of natural gas is still strictly top down regulated. However, the problems are accumulating since there is a lack of domestic gas supply. These problems are not only caused by the upstream problems, but also by some problems downstream.

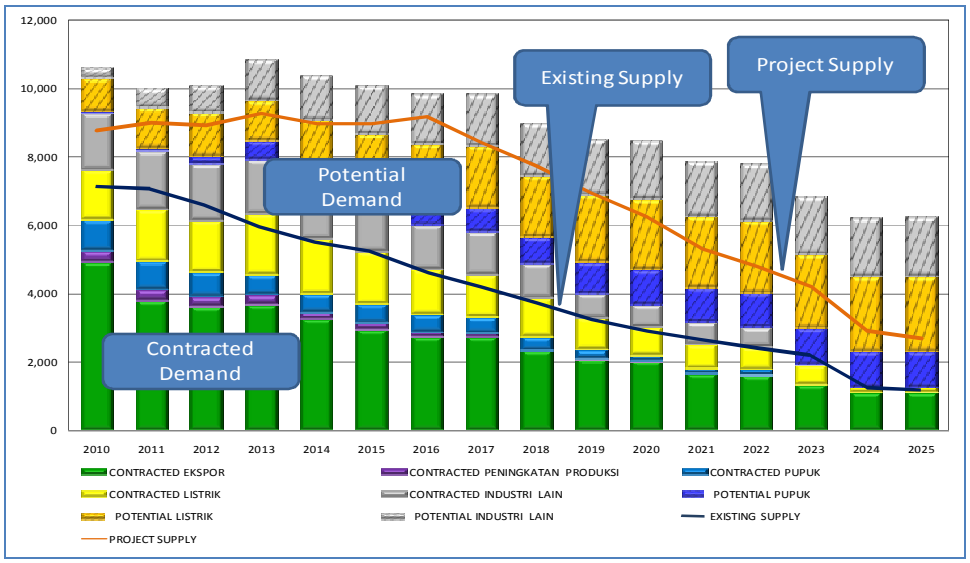


Figure 8: Supply and demand of natural gas 2011-2025 (in MMSCFD unit)
Source: Indonesia Natural Gas Balance 2011

One of the downstream barriers to balance domestic demand and supply is the low purchasing power of the domestic market. The domestic gas price is regulated top down by government and is almost three times lower than the export price, so producers lack a strong incentive to supply the domestic market. A serious related problem is the lack of market infrastructure, which in turn makes the prospects for the further development of the domestic market highly uncertain and this uncertainty keeps investors and producers away from the domestic market. It is difficult to get out of this vicious circle. Indonesia has tried two points of entry to get out: extending the gas infrastructure and the introduction of liberalization in the downstream market.

On infrastructure Indonesia is facing geographic barriers as discussed above. This means that the LNG route is actually the only way to transport the gas to the domestic market. The domestic market is primarily on the island of Java where the Indonesian population and economic activity is concentrated. As shown in Figure 5 above, Java has three LNG terminals but the pipeline infrastructure on the island itself is not well developed. Figure 5 also shows the planning of new infrastructure projects, but to date all these projects exist only on paper and investment funds are currently lacking.

Institutional reform was the second entry point used by Indonesia to push development of the domestic market. Deregulation and liberalization were introduced in 2001 by the new gas law. The idea was to make a sharper distinction between the role and position of some of the incumbent parties such as Pertamina, the organization that had a double role in the bidding for PSC contracts upstream (see above). Pertamina became a gas company and the regulation of the open downstream market was taken care of by BPH Migas. The 2001 law also opened the downstream market for third parties implying that they should have access to the pipeline system on the island of Java.

Now, several years after the opening of the market, it appears that the reform has not worked effectively. The state owned company PGN, controlling more than 80 % of transmission grid presents a serious barrier in the third party access model. In practice the company provides little

access to third parties[1]. There is a clear abuse of the position of PGN being the system operator of most of the pipelines as a commercial gas company. The implication is that companies who want to sell natural gas develop their own point to point pipeline system as soon as this is feasible. This contradicts the official governmental ambition to develop a more integrated and freely accessible pipeline infrastructure in the country. The point to point pipeline is not accessible for third parties. So institutional reform and infrastructure developments jointly act as serious barriers for the further development of the domestic gas market.

4.2 Downstream regulatory remedies

Currently Indonesia is not putting a lot of effort into mitigating the problems in the downstream market. In recent years there has been a lack of coordination at the governmental level. Stopping the subsidy on diesel for environmental reasons in 2005, led to a run for natural gas (as the environmentally benign alternative) but a workable program to increase gas supply to the domestic market was not put in place. There is a lack of strategy in Indonesia to mitigate the barriers in the development of the domestic market and no incentive scheme for inland infrastructure investments. The pipeline system does increase, but only on a monopolized point to point basis, which is not very helpful for developing the domestic market.
The 2001 regulatory reform needs to be brought further, but here too, ambition and plans are lacking. Market abuse of the dominant incumbent continues without any regulatory intervention. The domestic gas price is fixed by the government on a level far below the export price. From a perspective of social policy this is understandable, but it doesn't bring the natural gas to the domestic market since the producer can get a better price in the export market. The domestic market is highly uncertain due to a risky institutional, financial and infrastructure environment: not an attractive prospect for investors, producers and suppliers of natural gas. A further development and maturing of the domestic gas market needs a lot of change in Indonesia on almost all relevant aspects. Most needed is a less risky investment environment and more effective public support.

5 Summary and conclusion

This paper has reviewed the short term problems and dilemmas Indonesia is facing in the upstream and downstream segments of the gas market and the remedies suggested and practiced to mitigate the problems. More specifically the paper raised and answered the following two questions:

1. What are the natural, institutional and economic barriers in the development of the upstream and downstream segments of the Indonesian gas market?
2. What regulatory remedies are suggested and practiced to mitigate the barriers?

[1] See for example the cases listed in the Ditjen Migas 2008 and 2009 reports on East Java and Sumatra

The analysis shows that Indonesia possesses substantial natural gas resources at distributed locations in the country's large archipelago. Indonesia's gas reserves are ranked tenth globally, and the larger part of the annual natural gas production is exported as LNG to countries in the region. A bit less than half is consumed domestically, mainly by industrial sectors and for the production of electricity. The household segment of the market is negligible.

The review shows the problems Indonesia has to face both in the upstream and in the downstream segment of the gas market. Both segments are exposed to natural, institutional and economic barriers, making it difficult for Indonesia to get the full benefits of the natural gas. The geography of the country is a given but acts as a strong barrier both upstream and downstream. The remote and distributed location of the many relatively small gas fields makes it more difficult to exploit the natural resource for a competitive price, in particular in the prospect of increased global competition in the gas market. The remoteness also requires advanced island based (stand-alone) LNG technology which is not yet fully proven and more expensive than the proven LNG technology. This makes the exploitation of these remote fields more risky, whereas at the same time the size of the fields and the gas quality is very modest. In the downstream segment the geography is a barrier too, due to the large distances between the gas fields and the load centers. Gas consumption is concentrated on the island of Java, but the gas infrastructure needed to respond to increasing domestic gas demand is lagging far behind current needs and is LNG based due to lack of an integrated pipeline infrastructure on the island. Incentives to initiate new infrastructure investments are absent or functioning the other way around as we have seen in the several peer-to-peer pipeline projects currently under construction in Java. These pipelines are not under the jurisdiction of the third party access regime and for that reason do not add to an improvement of the island gas infrastructure.

Our analysis also shows that a significant part of the gas market problems Indonesia is facing an institutional origin or cause. Here it seems that Indonesia really needs to make a significant step in reducing the institutional risks and uncertainties for potential investors. At the core of the problem is a lack of transparency in concession policy and revenue policies, a massive hindering bureaucracy and very poor bureaucratic performance, with the poor quality of seismic data with which the government tries to attract potential investors as a manifestation of the institutional problems. Improvement of the institutional investment conditions is badly needed to attract the interest of private companies who are willing to tackle and mitigate the many challenges of getting Indonesian gas out of the field. This will require not only a reform of the gas market on paper as the country did in 2001, but a transformation of the investment, production and supply conditions in reality. For us it is unclear if Indonesia has the capacity to initiate such a real-life transformation at the present time.

References

Ditjen Migas (2008) *Kronologi Natuna D-Alpha,* internal report

Ditjen Migas (2008) *Pembahasan Kegiatan Usaha Niaga Gas Bumi Di Jawa Timur,* internal report

Ditjen Migas (2009) *Pembahasan Permohonan Izin Usaha Niaga Gas Bumi Melalui Pipapt Pertiwi Nusantara Resources Di Medan*, internal report

Ditjen Migas (2009) *Penerimaan Negara Migas*, internal report

Ditjen Migas (2000) *Regular and Direct Proposal Areas Opened For Tender 2001-2009*, internal report

Ditjen Migas (2011) *Investasi Hulu dan Hilir*, internal report

Ditjen Migas (2011) *Produksi dan Pemanfaatan Gas Bumi* 2005-2011, internal report

Ditjen Migas (2011) *Roadmap Gas Bumi Nasional*, Pp 20

Ditjen Migas (2011) *Update of Gas Development and Study of Implementation Small Scale LNG in Indonesia*, Presentation in Gastech Amsterdam Conference and Exhibition 2011

Hayden G, Court J and Mease K (2003) The Bureaucracy and Governance in 16 Developing Countries, World Governance Survey Discussion Paper 7

Indonesian Petroleum Association (2008), *Mencari Solusi Menghadapi Tantangan Energi Migas di Indonesia*, TEMPO, 139

Ministry of Energy and Mineral Resources (2010) *Handbook of Energy Statistic and Economics of Indonesia* Centre for Data Information on Energy and Mineral Resources

PriceWaterhouseCooper (2005) Oil and Gas Invesment in Indonesia: *An Industry Survey on Invesment and Opportunities to Enhance Upstream Invesment*

PriceWaterhouseCooper (2008) Investor Survey of the Indonesian Oil and Gas Industry

PriceWaterhouseCooper (2010) Investor Survey of the Indonesian Oil and Gas Industry

PriceWaterhouseCooper (2010) Oil and Gas in Indonesia: *Investment and Taxation Guide*

OECD (2011) Government at a Glance Pp 95

Schulte Nordholt, N.G (1994). *Corruption and Legitimacy in Indonesia* : an Exploration. Pp 65-93 in Heleen E. Bekker and Nico G. Schulte Nordholt (eds), *Corruption and Legitimacy*. Amsterdam : SISWO Publication

Worldbank, 2011, *Indonesia at a Glance*, devdata.worldbank.org/AAG/idn_aag.pdf