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POLICY SUGGESTIONS FOR THE INITIAL DEVELOPMENT OF VIETNAM'S GAS INDUSTRY

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Abbreviations

BCM	Billion cubic meters
BTU	British thermal unit
Government	Government of Vietnam
LNG	Liquefied natural gas
LPG	Liquefied petroleum gas
MOIT	Ministry of Industry and Trade
Mtoe	Million tons oil equivalent
MW	Mega watt
MBBTU	Thousand billion BTUs
MMBTU	Million BTUs
MMCM	Million cubic meters
PVN	PetroVietnam, formally the Vietnam Oil and Gas Group
PVEP	PetroVietnam Exploration and Production Corporation
PVGas	PetroVietnam Gas Corporation
SCM	Standard cubic meters
USD / US$	United States dollar
TCM	Trillion cubic meters
VND	Vietnam Dong (Vietnamese currency)

I. Introduction

Economic development is the first priority of national policy in Vietnam, and the availability of sufficient energy resources is one of the keys to achieving this objective.

Thanks to the transition from a planned to a market-oriented economic system, Vietnam's economy has achieved significant development over the last several years with an average GDP growth of 8 percent per year from 2005 to 2007. The recent slowdown due to the global recession contributed to GDP growth of only 4.5 percent for 2009. Although the country will face difficulties due to inflation, GDP growth is still expected to hit 6.8 percent, 7.7 percent, and 8 percent in the next three years, according to a forecast by Business Monitor International.[1] Economic development has resulted in dramatically increasing energy consumption in Vietnam. In order to meet this rising demand, on which continued economic development is contingent, Vietnamese policy makers envision that the nation's energy sectors will be developed according to a market mechanism. This includes market solutions based on competition rather than monopolies, subsidized prices, and encouragement of private sector investment.

However, translation of these objectives into actual policy measures is often more difficult than simply announcing goals. Although the gas industry has played a prominent role in the economic development of Vietnam, there has been the lack of a policy for the development of the gas industry in Vietnam. In the absence of such a policy, the industry is going to face a number of challenges in the near future. To make things more difficult, there is no development model or path that Vietnam can follow; it must find its own solutions.

This paper aims to discuss policy choices for the development of Vietnam's gas industry. These policies must meet a number of criteria to be suitable for Vietnam, an emerging market which seeks to attract investment:

1. *Transparency.* Participants in the gas chain need to know the rules and how they are being applied.
2. *Stability.* Policies should be consistent and stable for an extended period of time.
3. *Predictability.* Outcomes should be predictable for investors.
4. *Flexibility.* The benefits for participants in the gas chain should be adjusted according to the risks they bear.[2]

The paper begins with an introduction to Vietnam's gas industry, and then presents each of the issues that a country must address concerning its gas industry when formulating an energy policy: industry structure, market development, gas prices, and others. International trends and principles for formulating gas policy will be introduced into the discussion. This section will also identify some different options for developing Vietnam's gas policies. The following section identifies the range of problems that

[1] "Vietnam Oil and Gas Report Q1 2010," *Business Monitor International Ltd,* page 51.
[2] These principles are borrowed from "An Introduction to the Gas Sector," The World Bank, Vietnam Gas Sector Mission, January 7-8, 2009, page 84.

Vietnam's gas policy should address and looks at a number of possible solutions. Finally, the paper concludes with some overall comments regarding gas policy in Vietnam.

II. Overview of Vietnam's gas industry

Natural gas is a critical source of energy for Vietnam, and it plays an important role in the nation's energy economy. BMI reports that natural gas is the second biggest primary energy provider, accounting for 18 percent of the nation's energy, followed by coal and hydroelectric power. It is expected that the use of gas will increase to account for 31 percent of Vietnam's primary energy demand, and oil demand will be down to 38 percent.[3]

Vietnam's natural gas industry has developed a long way from its initial small onshore field located in Thai Binh province, south of Haiphong, in the 1970s. Today there are three major reserve basins located in southern Vietnam – Cuu Long, Nam Con Son, and Malay-Tho Chu – which supply the power generation and fertilizer projects currently under operation.

The modern natural gas industry was born in 1995, with the production of associated gas from the Bach Ho oil field to the Ba Ria Power Plant, which had an output of under 3 million cubic meters (MMCM) per day. Three years later, with the introduction of the Dinh Co Gas Processing Plant and Thi Vai Storage facilities, gas output from this pipeline system was raised to over 1 billion cubic meters (BCM) per year. By comparison, a typical gas-fired power plant consumes approximately 700 million cubic meters per year.

The designed capacity of the Bach Ho – Dinh Co pipeline was 1.5 BCM per year and was upgraded to 2.0 – 2.2 BCM per year in 2001 in order to transport the additional associated gas from the Rang Dong field, via the pipeline linking this with the Bach Ho central platform. This pipeline is owned by the Vietnam Oil and Gas Group (PetroVietnam, or PVN, Vietnam's state-owned energy consortium) and operated by the subsidiary PVGas.

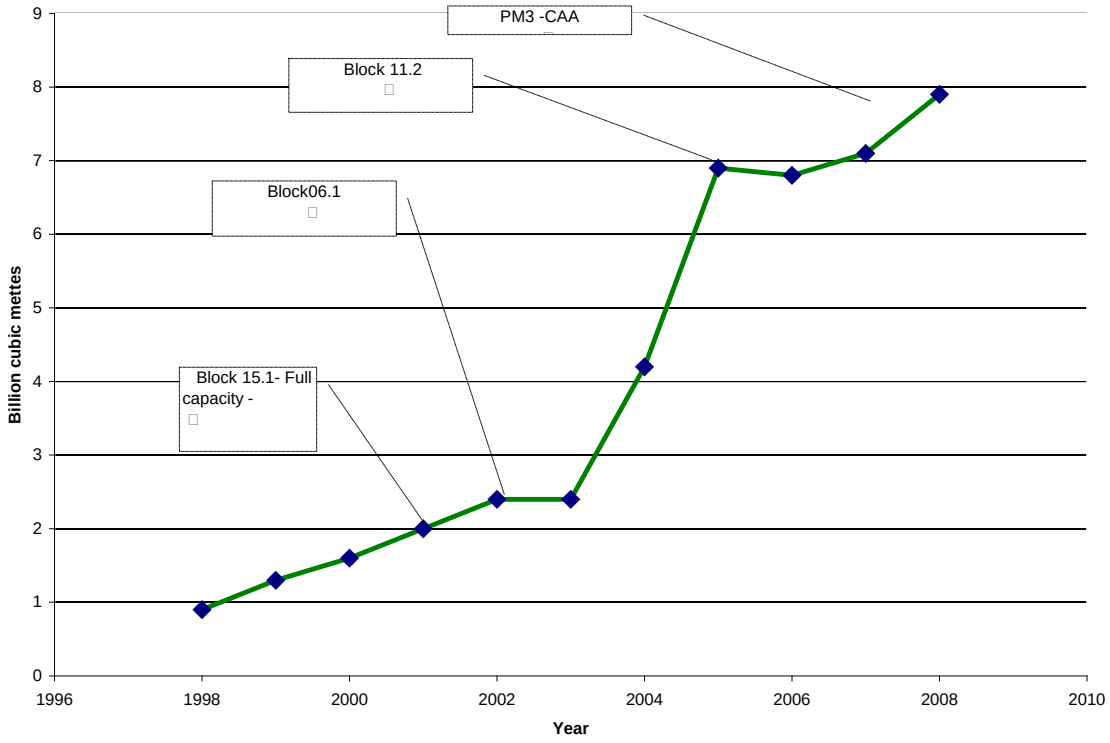
In 2003, when natural gas production from block 06.1 of the Nam Con Son basin, off Vietnam's southeastern coast, started to come on-stream to supply natural gas to the Phu My Power Complex, the production of both the Nam Con son and Bach Ho systems increased to 2.4 BCM per year. Three years later, in 2006, block 11.2 of the Nam Con Son basin produced an additional volume of natural gas and the total output increased to nearly 7 BCM, the expected capacity of the Lan Tay – Dinh Co Terminal – Phu My pipeline when it was initially designed. In the future, this pipeline may be used to transport natural gas from other fields within the Nam Con Son basin onshore; and to supply gas to users in Phu My, Dong Nai, and Ho Chi Minh City – Vietnam's major center of population and commerce. The pipeline is owned by PetroVietnam, BP, and

[3] "Vietnam Oil and Gas Report Q1 2010," *Business Monitor International Ltd,* page 12.

ConocoPhillips; BP operated the pipeline from its establishment in 2003 until 2008, when it was transferred to PVN.

In 2007, the Ca Mau pipeline was completed in the PM3 Commercial Arrangement Area (CAA) at the southern tip of Vietnam and national production surpassed 7 BCM with the transportation of natural gas from Block PM3 CAA and the Cai Nuoc field – an offshore area administered jointly with Malaysia. This gas goes to the Ca Mau 1 and 2 power plants, which have a capacity of 2 BCM per year. In the Ca Mau gas distribution station, there is a future tie-in for the Ca Mau fertilizer plant which consumes around 500 MMCM of gas per year, as well as other users in Ca Mau province. The pipeline system is funded completely by PVN; PVGas operates this pipeline system on behalf of PetroVietnam.

Figure 1: Increasing natural gas production in Vietnam



Figures from BP Statistical Review of World Energy, 2009

Figure 1 illustrates that the production of natural gas in Vietnam has increased dramatically with an average annual growth rate of 126 percent and the volumes growing seven fold between 1998 and 2008 (consumption has also skyrocketed). This growth has contributed significant energy for Vietnam's economic development. In the future, two potential reserves in southern Vietnam will be developed. First, natural gas will be supplied from the Chevron-operated Blocks B52/97 and 48/95 to Ca Mau, to be further distributed to the O Mon power complex and other users in Can Tho province south of

Ho Chi Minh City. The capacity of the pipeline system is around 6.5 BCM per year and a business cooperation contract setting up the joint venture between PVGas and other foreign parties was signed on March 11, 2010.[4] PVGas holds a 51 percent stake with other foreign participants including Chevron, Mitsui Oil Exploration, and Thailand's Exploration & Production PLC.[5] The first gas from this venture is expected to be produced in 2014. Secondly, natural gas will be produced from Blocks 5.2 and 5.3 of the Nam Con Son basin and transported through a second pipeline, Nam Con Son 2, onshore in southeastern Vietnam.[6] In addition, the Government has a plan to develop a southeast-southwest pipeline system to interconnect these two areas of the country. However, the timing for these projects is still unclear due to technical and commercial issues.

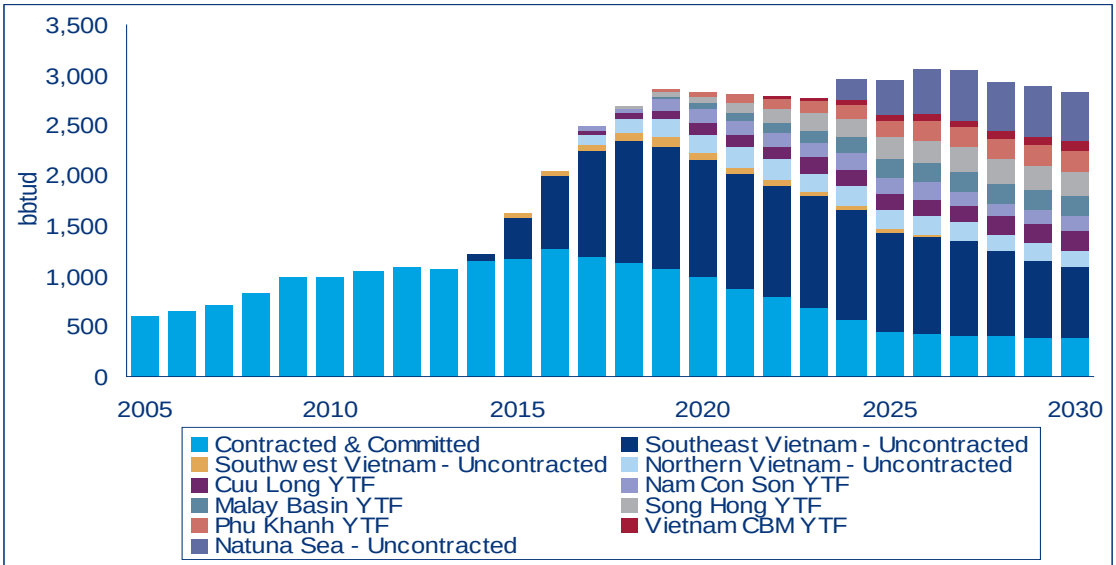
Gas supply

Gas reserves have been found in five of Vietnam's seven offshore basins – Song Hong, Phu Khanh, Nam Con Son, Cuu Long and Malay-Tho Chu – with total proved reserves of 0.56 trillion cubic meters.[7] Commercially viable reserves are located mainly off the southern coast of Vietnam, relatively close to most prospective markets, although there are marginal and CO_2 content fields found in the Song Hong, Phu Khanh and Red River[8] basins in northern and central Vietnam.

According to the Wood Mackenzie report of Vietnam's total gas production forecast, contracted and committed gas production in Southern Vietnam will grow steadily and peak at around 1.3 billion British thermal units per day (bbtud) in 2016, then gradually decline at a rate of 5-15% if a new contract is not signed. However, the potential for the contracted volume is large, up to around 1.5 bbtud from 2025 to 2030.[9]

[4] "BCC Contract Signed for Billion Gas Pipeline Project," PetroVietnam, March 11, 2010, http://english.pvn.vn/?portal=news&page=detail&category_id=11&id=3278.
[5] "PetroVietnam, Chevron to Build $1 Billion Gas Line," *Oil and Gas Journal*, March 16, 2010; http://www.ogj.com/index/article-display/5231874103/articles/oil-gas-journal/transportation-2/pipelines/construction/2010/03/petrovietnam_-chevron.html.
[6] "Gas and Power Service, Vietnam Fundamentals, Executive Summary," *Wood Mackenzie*, December 2009, page 17
[7] BP Statistical Review 2009 and World Bank
[8] The Red River Basin is located onshore in northern Vietnam.
[9] "Gas and Power Service – December 2009," *Wood Mackenzie*, page 18.

Figure 2: Vietnam's total gas production profile[10]



Source: Wood Mackenzie

Gas demand

At present, natural gas is used in Vietnam for energy purposes, i.e. for power generation, fertilizer production, C2 + extraction sectors (the production of liquid natural gas and condensate), and industry. Demand for gas for non-power uses will be at about 22% of the whole market on average from 2010 to 2030.[11]

Most gas consumption comes from the power sector. Since 1995, nine gas-fired power plants have been built near proven reserves in southern Vietnam, and are currently in operation. Natural gas consumption in the power sector is forecasted to reach over 7 BCM in 2010.[12]

The industrial sector is also a consumer of natural gas, though it uses lower pressure gas than the power sector. Consumption in this sector reached 242 MMCM in 2005 and is forecasted to reach around 0.5 BCM in 2010.[13]

In spite of the financial difficulties of using gas for fertilizer production, the Vietnamese Government has decided to invest in two plants in the southern part of Vietnam. Phu My fertilizer plant was completed and began operations in 2004; this plant has a capacity of

[10] Ibid. Chart reprinted with permission of Wood Mackenzie
[11] Gas and Power Service, Vietnam Fundamentals, Supply Demand Balance, *Wood Mackenzie*, December 2009, page 1.
[12] The data is from PVGas, but BMI's forecast is higher with total demand of 11 BCM in 2010.
[13] The data is from PVGas.

740,000 tons/year and consumes 500 MMCM of gas each year. A fertilizer plant with the same capacity is currently under construction at Ca Mau.

Finally, several chemical projects based around materials such as methanol, ammoniac, polypropylene, and polyethylene are being planned by the state-owned Vietnam National Chemical Group (Vinachem) and, if they come to fruition, will be significant consumers of natural gas. However, these projects will only be taken into consideration if the gas supply is reasonably priced and plentiful.

In the future, therefore, there will be a strong demand for gas. However, due to expected gas supply constraints in 2013-2014, gas demand will be lower in that period. In 2015-2020, thanks to the new gas supply from the Malay-Tho Chu basin which will come online in 2014, gas demand in the southeast will see a slight decline.

Gas demand is expected to grow again in the power sector in the southeast around 2020 and this will lead users to turn to natural gas and liquefied natural gas (LNG) to meet the widening gap from 2015 to 2020.

The Future Balance

There are different figures forecasted for the gas balance in Vietnam from many sources. However, the final conclusion is that Vietnam will suffer a lack of gas in the coming years due to increased demand for power generation, and insufficient growth in supply. This situation may worsen in the future if new gas sources are not found. Based on the Government's current estimates, electricity demand grew by 15 percent in 2010 and will continue to increase by 12 percent annually over the coming five years.[14]

[14] "Vietnam unveils ambitious oil and gas plans," *Oil and Energy Trends*, Vol. 32, Iss. 12 (December 2007).

Figure 3: Vietnam's gas supply mix (2005-2005)

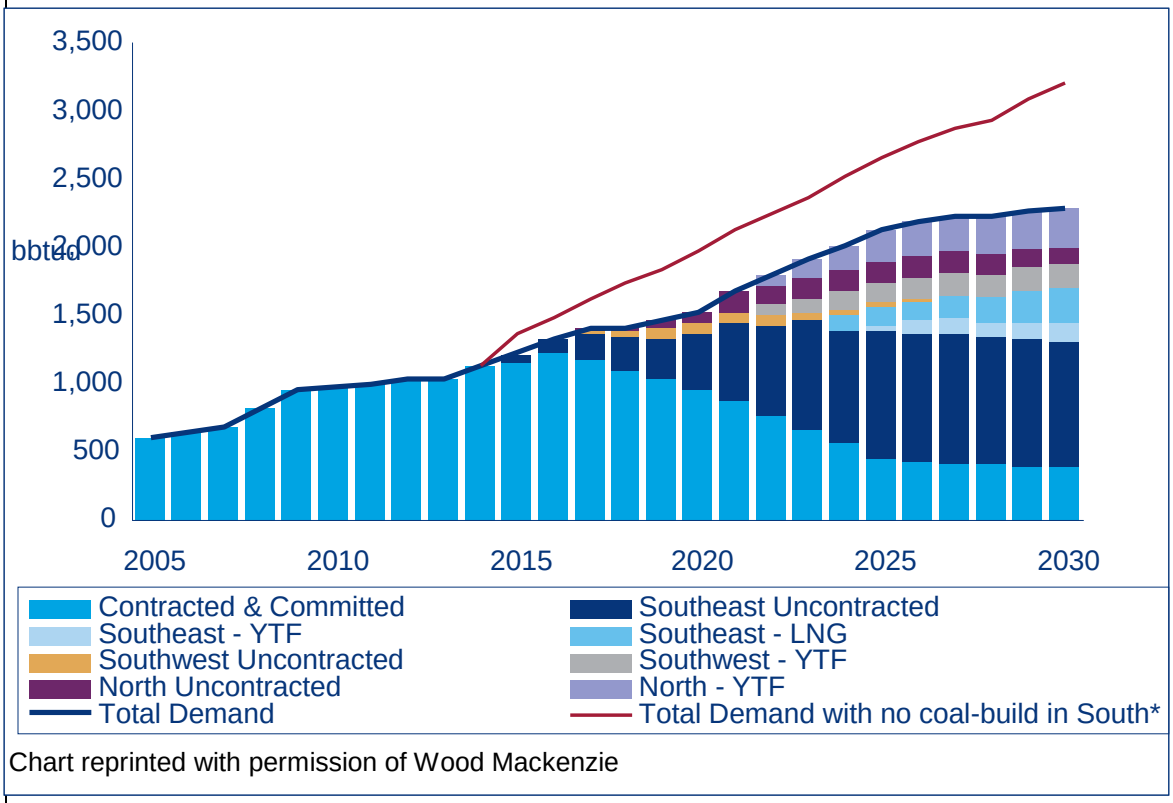


Chart reprinted with permission of Wood Mackenzie

Structure for Decision Making

Until the present, the Prime Minister's office has been the main entity responsible for the energy sector and energy sector policy. Before 2003, the Ministry of Planning and Investment (MPI) was responsible for energy policy management including coordination of other ministries to formulate the policy and regulations to submit for Government approval. In 2003, the Government decided to place oil and gas sector management under the Ministry of Industry and Trade (MOIT).[15] The responsibilities of MOIT are wide ranging and cover many areas regarding the energy sector, such as directing and implementing the national strategy, the energy master plan, and management of daily operations. However, PetroVietnam is responsible for monitoring programs in the natural gas sector and monitoring activities by production sharing contracts (PSCs); PVN reports to both the Office of the Prime Minister and MOIT. The Prime Minister's decisions are therefore often based on PVN's proposals. This situation is due to a lack of human resources and the capability of the state sector management.[16]

[15] "Establishing a Legal and Regulatory Framework for the Downstream Gas Sector in Vietnam," The World Bank, Energy Sector Management Assistance Program, 2003, page 8.
[16] The energy and oil, gas department of MOIT has only four staff members.

The petroleum industry is directly controlled by the Office of the Prime Minister due to its important relationship with the national economy. The Prime Minister has final decision making authority on regulations and long term planning—for example, the National Strategy for the Energy Sector, Gas Master Plan, and Energy Master Plan, among others—must all be approved by the Prime Minister. The Office of the Prime Minister also proposes petroleum laws and projects of national importance for approval by the National Assembly. Furthermore, some strategic documents such as the petroleum strategy need to be submitted to the Politburo of the Central Committee of the Communist Party of Vietnam for comments and approval before being submitted to the National Assembly.

The Ministry of Industry and Trade is responsible for the preparation of approval documents or coordinating the drafting of strategic documents relating to the petroleum industry, such as the Gas Master Plan and Energy Master Plan. MOIT is also responsible for coordinating submissions to the Prime Minister for his approval: petroleum contracts; investment projects, and field development plans.[17] Via its Energy and Petroleum Department, this government agency therefore has direct influence on the development of natural gas policy.

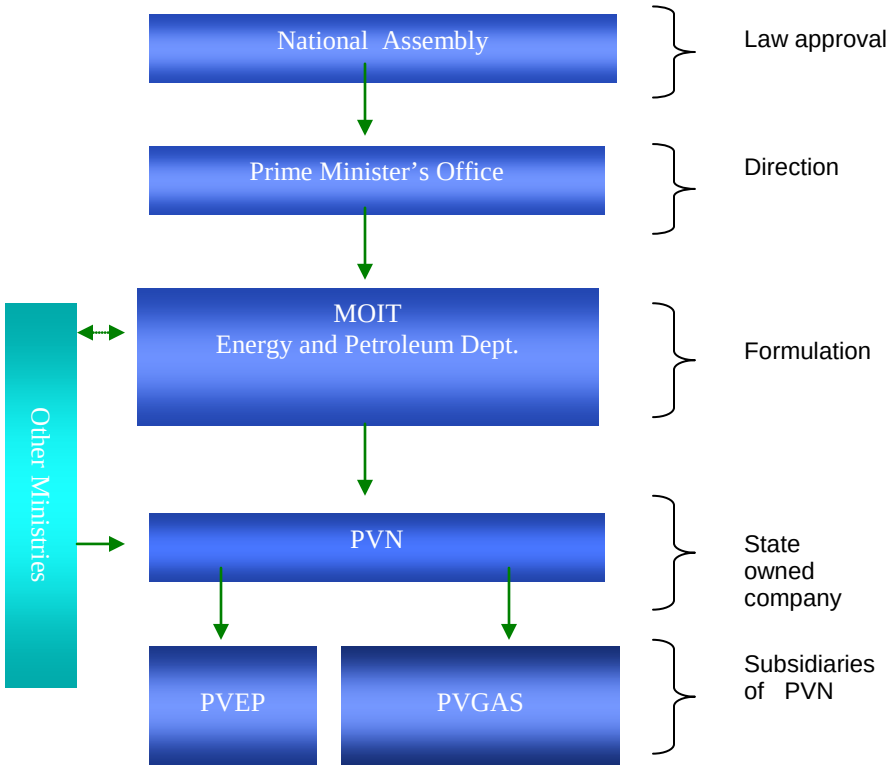
Other ministries, such as the Ministry of Finance (MOF), Ministry of Planning and Investment (MPI), Ministry of Construction (MOC), and Ministry of Natural Resource and Environment (MONRE), also fulfill duties relating to the petroleum sector. For example, MPI is responsible for managing the socio-economic development of the country including management of industrial zones for the gas industry, encouraging foreign direct investment, and reviewing major investment projects. MOF is an important provider of funding and drafts the tax regulations for the oil and gas sector. MONRE is in charge of environmental regulations and working with the MOC to issue permission for land use. MOC is responsible for monitoring the construction process of pipelines, processing plants, or other infrastructure projects.

PetroVietnam, or PVN, is the national oil company and is responsible for signing petroleum contracts with international oil companies. PVN has the right to participate in all petroleum projects in Vietnam via its subsidiary, Petrovietnam Exploration and Production (PVEP). Under PVN, there are a number of subsidiaries such as PVEP and PVGas which are responsible for the development, implementation and daily operation of the petroleum projects. PVEP is responsible for exploration and production and PVGas is in charge of processing, transportation, and distribution of natural gas and its products such as liquefied petroleum gas (LPG) and condensate. They are directly controlled and overseen by PVN, whom they report directly to. The organization, key personnel, plans, and other important matters of PVN must be approved by the Prime Minister on

[17] The Ministry of Industry (MOI) was created in 2003 under Decree No. 55/2003/ND-CP to take over the responsibility of policy development and implementation in energy sector. This responsibility is also stated in the Petroleum Law in 2008. It has been merged with the Ministry of Trade to form the Ministry of Industry and Trade.

recommendation from the Politburo of the Party Central Committee. This consultation and decision making structure is illustrated in Figure 4.

Figure 4: Structure of decision making



Existing Government Policy and Regulation

For many years there was no formal or comprehensive statement of policy regarding the Vietnamese gas industry. The first Petroleum Law was passed in 1993, followed by a number of amendments in 2000 and 2008. Implementation decrees are issued by the Prime Minister to guide the involved parties to implement the Petroleum Law. However, the Petroleum Law focuses mainly on policies and regulations for the upstream sector, governing oil and gas exploration and production in Vietnam. There is still no legislation for the downstream gas sector such as gas transmission or the distribution system.

The Petroleum Law in 2000 gave responsibility to the Office of the Prime Minister, PVN, MPI, and other Ministries to set up a state management body and separate oil and gas policy making and regulation from operations; this body is now the general directorate of energy in MOIT. In the areas of policy and management, this body drafted and submitted strategies and plans for development of the petroleum industry; important petroleum

investment projects; the policy of oil and gas exploration and exploitation; and examining, inspection, and supervision petroleum activities.[18]

In 2004, based on PVN's proposal, the Prime Minister issued a technical regulation to ensure safety for the system of onshore gas pipelines. This regulation provides assurances for the safety of people, properties and the environment along the pipes of gaseous hydrocarbon and gas products; ensuring the safe and efficient operation and exploitation of the system of such pipelines.

In 2007, the National Strategy on Energy Development (NSED) up to 2020 was issued by the Prime Minister. This document describes the overall objectives for the petroleum sector and summarizes the Government's energy policies in four main areas: 1) energy supply; 2) energy prices; 3) utilizing energy economically and efficiently; and 4) environmental protection. One of the overall objectives for the petroleum sector is to achieve "a strong shift to a state-controlled market mechanism." The NSED also provides policy orientation to the mid and downstream of the oil and gas sectors: " State management functions over the petroleum sector should be concentrated in one agency and a legal basis established for activities in the petroleum sector, paying special attention to the mid-stream and downstream activities, of which there are important tasks of economic and technical management in the gas sub-sector such as licensing gas transmission and distribution, approving gas price, price of gas transmission and distribution, technical specification etc."[19]

To implement these objectives, the 2008 Petroleum Law gave new responsibilities to the MOI which cover the preparation and submission to the Prime Minister for approval the legal documents, strategies, and master plans on development of the oil and gas industry; submission of oil and gas contracts and oil and gas investment projects; results of bidding contracts; review, monitoring and report on the development; and results on exploration, prospecting, exploitation and domestic sale and export.[20] However, there is no reference to the regulation of the mid and downstream gas sector as stated clearly in the NSED. Although the Petroleum Law and the regulation sets up the government agency as the regulating entity for the petroleum sector, the reliance on PVN to perform the regulatory functions is still heavy and this leads to conflicts of interests.

Policy practices are determined on a project-by-project basis. This provides flexibility in dealing with the specific characteristics of each project but it creates confusion, involves a multitude of bureaucratic administration and provides opportunities for government intervention in projects. Consequently, it often leads to general policy failure and project delays. This also leads to uncertainties for IOCs wishing to invest in natural gas projects in Vietnam.

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[18] Law amending and supplementing a number of articles of the Petroleum Law, No. 19/200/QH10 of June 9/200 and Detailing the implementation of the petroleum law, No 48/200ND-CP of September 12/2000.
[19] The relevant document is Decision on Approving the NSED up to 2020 Vision to 2050, No 1855/QD-TTg, of December 2007.
[20] Law amending and supplementing a number of articles of the Petroleum Law, No. 10/2008/QH12 of June 3, 2008.

Conversely, before being approved, projects have to go though lengthy, inflexible, and cumbersome administrative approval procedures, which often lead to the same result – project delays. In addition, gas projects develop through separate negotiations on all aspects including gas pricing. This leads to long lead times for all projects and learning experiences from earlier projects cannot be applied to later ones.

III. General concepts for gas policies

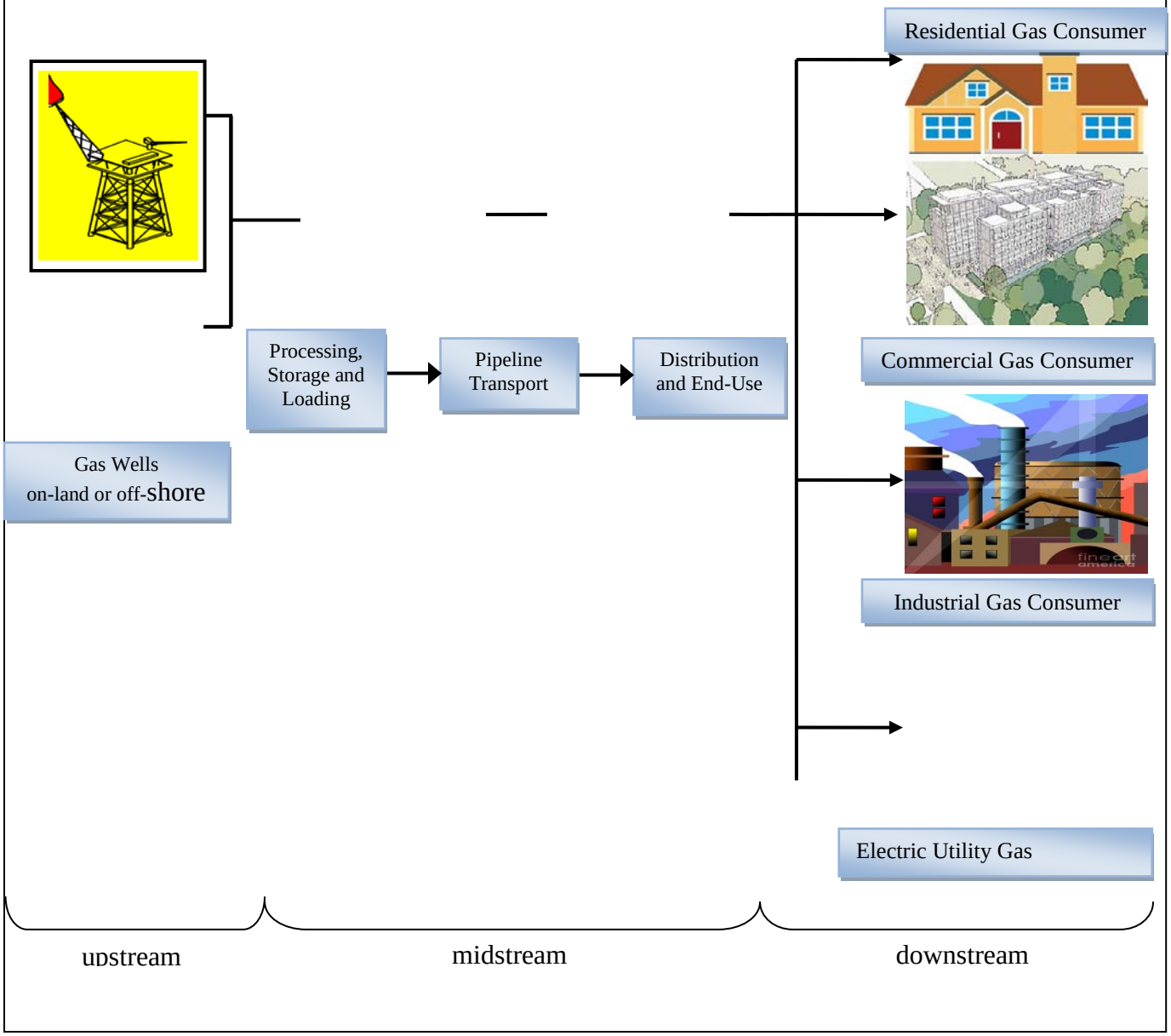
This section aims to address general approaches toward natural gas policies for a country that may be facing development of its gas industry. Gas policies are a complex subject in all areas such as fiscal provision, revenue management, market development, energy security, role of the government and state-owned enterprises, monopoly elements in the gas chain, and others. This section focuses on the main issues relating to the emerging industry, and includes introduction of the structure of gas industry models, stages of market development, and gas pricing methodologies.

Industry Structure

The natural gas chain consists of activities related to the initial exploration of gas reserves, the extraction of gas, production, and transportation from the source to the market and to end users.[21] The first component in the gas chain is usually given to commercial contracts for exploration and production. The next participant in the gas chain is the transmission company, normally an independent company that operates the pipeline, which would also be a sort of middle man between the producer and the whole sale buyer. The final stage in the chain is normally a power plant, fertilizer plant, or industrial consumer who would use the natural gas to generate electricity, feedstock, or fuel respectively.[22] Though there are exceptions, the gas chain can be divided generally into the upstream (producers), midstream (transporters), and downstream (consumers).[23]

[21] Hemantha Herath and Anil K.Malhotra, "Analysis of the integrated gas chain," Asia Technical Department, The World Bank, Departmental Paper Series, No. 16 (December 1996), pages 1-2.
[22] Harry G. Broadman, W. David Montgomery with the assistance of Mary Beth Zimmerman, *Natural Gas Markets after Deregulation: Methods of Analysis and Research Needs*, Washington DC, Resources for the Future, Inc., 1983, page 6.
[23] Roland Priddle, Sanjoy Rajan and Kazim Saeed, "Vietnam Gas Sector Development Framework," Energy Sector Management Assistance Program, The World Bank, January 2010, http://www.esmap.org/esmap/sites/esmap.org/files/P111444_Vietnam_Gas%20Sector%20Development%20Framework_Spencer.pdf, page 8.

Figure 5: The gas chain[24]



The gas chain differs from the oil chain in a number of ways. First, gas is almost exclusively transported via pipelines (rather than by tankers, for example), the design and construction of which often require major investments. Furthermore, pipelines cannot be easily re-routed after they have been built. These two factors help lead to a natural monopoly, which requires economic regulation to avoid the owners of these facilities from exercising their market power. Secondly, partly because of the mode of

[24] Based on a presentation by Dennis Stickley, University of Dundee, Centre for Energy, Petroleum, and Mineral Law and Policy.

transportation, gas must be consumed in proximity to its production site – which also means that production sites are only effective if they are near viable markets. This lack of fungibility results in the different gas prices around the world. Finally, gas is often seen as an alternative to oil or coal, but gas itself may be replaced by other products.[25]

Main characteristics of the gas chain

- Long and firm chain
- Physically fixed links from well-head to power consumers
- Interruptions in upstream affect down-stream and vice versa
- High capital investment along the chain
- Inflexible market with fixed capacities

Source: "Long-term gas contracts: principles and applications," The World Bank, Energy Sector Management Assistance Program, 1993.

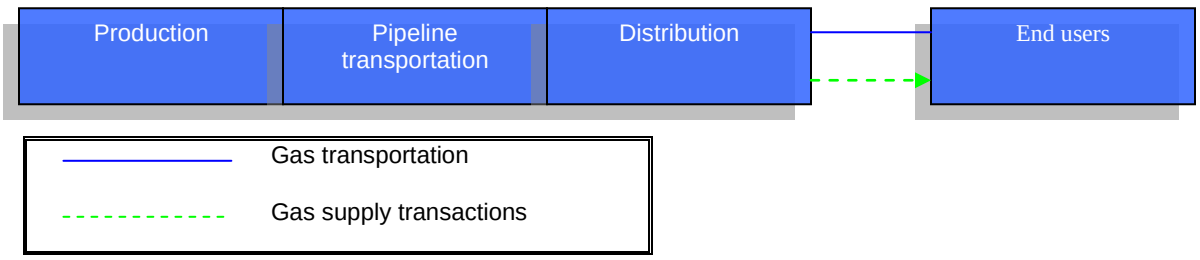
There are four structural models for the development of a gas industry, which are outlined in some detail by Andrej Juris in his paper for The World Bank, "The emergence of markets in the natural gas industry." The following section borrows heavily from Dr. Juris's paper.[26]

Model 1: Vertically Integrated Industry

In a vertically integrated industry, all links of the gas chain downstream are controlled by one company that fixes quantities and prices for all parts of the chain downstream. This company monopolizes the supply of natural gas to end users, meaning that there is no opportunity for wholesale or retail competition – a circumstance which requires heavy regulation. This model may exist both in the gas importing country and the gas exporting country. See Figure 6, below.

[25] Hemantha Herath and Anil K.Malhotra, "Analysis of the integrated gas chain," p. 1.
[26] Andrej Juris, "The emergence of markets in the natural gas industry," The World Bank, Working Paper No. 1895, March 1998, http://www-wds.worldbank.org/external/default/WDSContentServer/WDSP/IB/1998/03/01/000009265_3980429111452/Rendered/PDF/multi_page.pdf.

Figure 6: Model 1 – Vertically Integrated Industry[27]



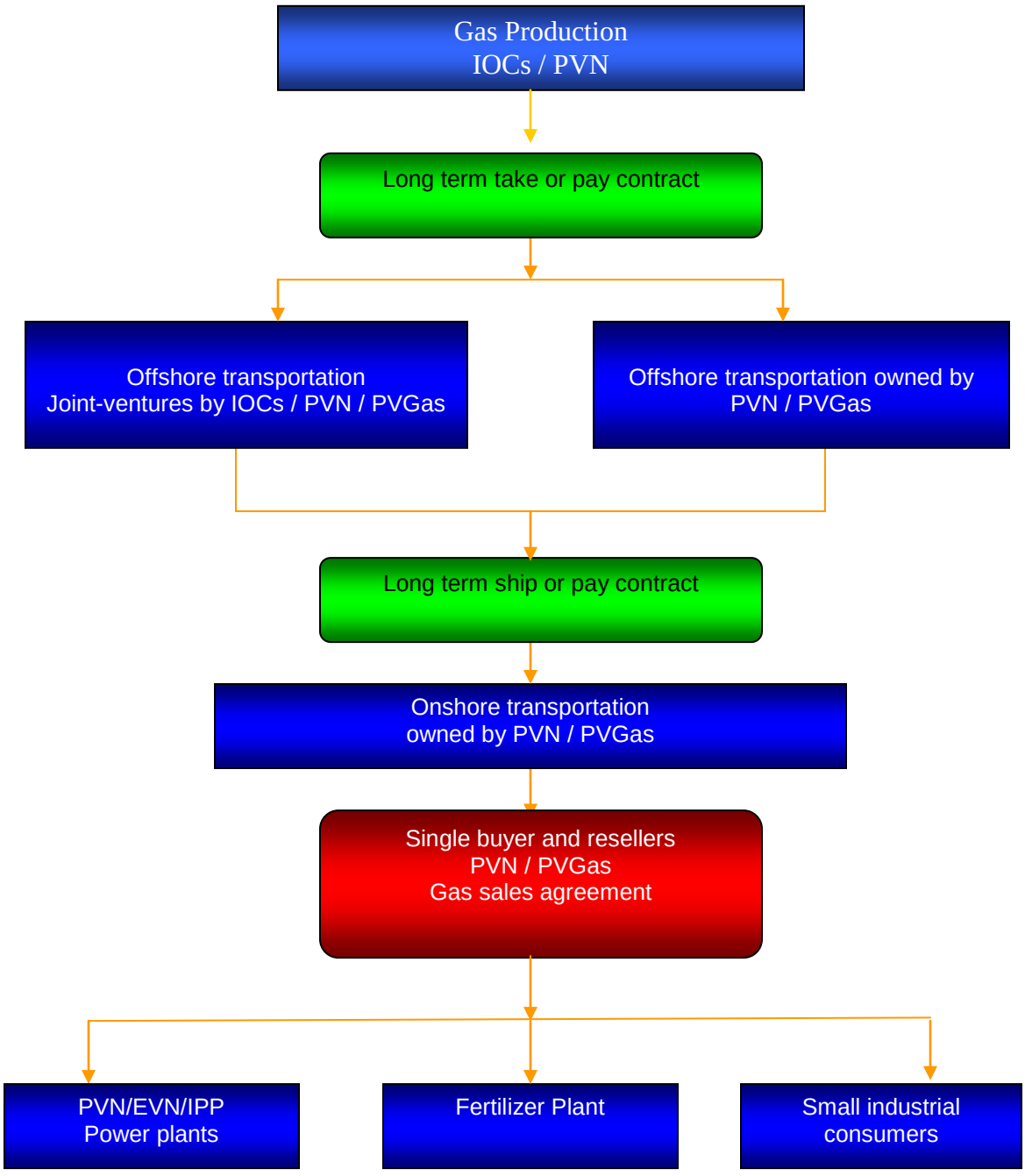
The advantage of this model is that it makes gas projects easier to finance because the revenue is determined by a fixed commercial arrangement. However, there are a number of disadvantages of this model.

1) The biggest disadvantage is that there is no incentive for the monopoly to minimize the cost as there is no competition.
2) This model is not very flexible, and regulation often fails to lead to efficient operation of the industry.
3) There may be distortions in the gas chain if price is mainly driven by administrative decisions rather than by market forces. Consequently, there is a risk of political intervention.

Political issues may impact on the economics of the gas industry. For example the government may decide to set gas prices below the actual cost to subsidize state-owned fertilizer plants. Without proper regulation, this model tends to discourage investors from investing in the upstream sector due to locative inefficiency in the gas market: gas prices in Vietnam are artificially low, in order for the government to subsidize the power generation and fertilizer industries. As a result, investment in the upstream is limited as investors or producers do not want to invest when the output sale is at low imposed prices. In addition, the locative inefficiency in the gas market may be passed on to the power market due to gas-fuelled generation.

[27] Ibid.

Figure 7: The structure of Vietnam's gas industry[28]

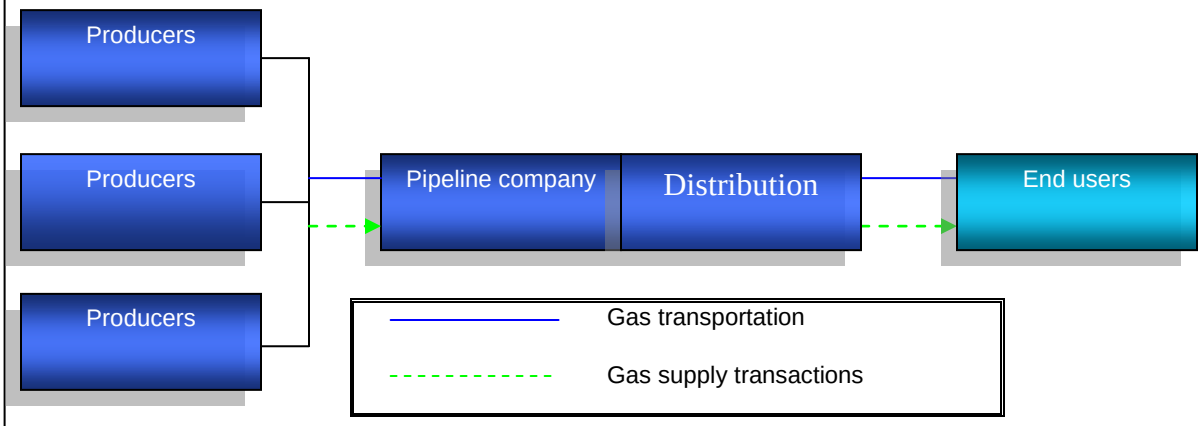


[28] Ibid.

Model 2: Competition among Natural Gas Producers

The "competition among producers" model is similar to the "vertically integrated" model, but there is competition among the gas producers, resulting in more efficient production. Gas is produced by many producers, but transportation and distribution, from upstream to downstream, remain the responsibility of one single monopoly entity. Once again there is a lack of competition and there is a risk of owners of the transportation and distribution system abusing their "dominant position" to obtain abnormal profits. See Figure 8, below.

Figure 8: Model 2 – Competition among Natural Gas Producers[29]



The most obvious advantage of this model is that the cost of gas supply may be reduced by the competition among gas suppliers, and buyers therefore have an opportunity to enjoy the lowest prices from the most economical resources. But, the transportation system must be developed to accommodate the competition among the suppliers. For example, if consumers – such as a state-owned enterprise – are not geared toward profit, they may not have incentives to buy gas at a minimum cost. The contracts between the transportation and distribution company and gas producer may be negotiated case-by-case, under the control of the government, rather than by a market mechanism.

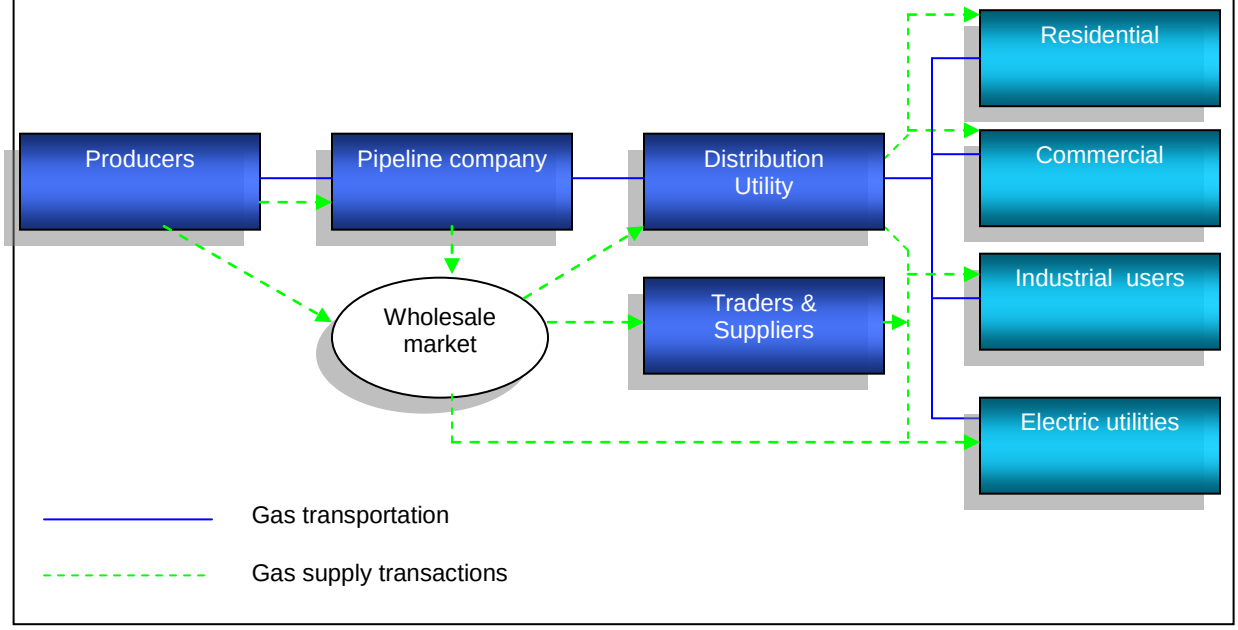
In addition to lacking incentive to minimize costs by buying gas from the cheapest suppliers, the single buyer may also fail to operate its infrastructure in an efficient manner. Unless the gas price is so high that the consumer turns to other fuels, an excess cost of supply and inefficiencies still occur due to a lack of competition in the midstream sectors.

[29] Ibid.

Model 3: Open Access and Wholesale Competition

The "wholesale competition" model negates the disadvantages posed by both the "competition among producers" model and the "vertically integrated" model. This model allows open competition for transportation and distribution (normally through pipelines) of natural gas. The transporters and distributors provide two kinds of services: supplying natural gas to consumers and supplying transportation services to large consumers who purchase natural gas in the wholesale market under commercial arrangements between the producer and the consumer.[30] See Figure 9, below.

Figure 9: Model 3 – Open Access and Wholesale Competition[31]



There is no direct regulation of tariffs, or access to the pipelines, except for those created by rules of nondiscrimination, which expects that all market players would have open access to a pipeline and that transporters would not have the right to refuse transportation from producer to consumer. Such rules are necessary if the transporters refuse to transport gas for a commercial arrangement between producers and customers. This principle ensures that the links of the gas chain must be open and transparent so that the parties involved in the gas chain are treated equally. Gas prices are limited by alternative fuels and may be lower because of gas-to-gas competition.

[30] Ibid.
[31] Ibid.

The great advantage of the open access model is that gas is supplied in an efficient manner, at the lowest cost in the wholesale gas market since the monopoly in the "competition among natural gas producers" model, Model 2 above, is eliminated and the sellers and buyer are linked directly. The producers benefit because of the increasing the number of buyers, and the consumers enjoy the lowest gas price due to the competition among the producers. Thus there is a clear incentive for efficiency, as efficient producers will likely realize higher profits than inefficient producers. However, compared with Model 1 and Model 2, the transporters face the difficulty of coordinating transportation of their own, and a third party's gas, through the pipeline network.

There is a condition for this model to be operated efficiently: monopolies involved in the market need to be regulated to ensure that services are fairly priced and equally available to all competing suppliers. If a monopoly transportation and distribution system has a major share of the upstream, it may easily discriminate against other competitors in accessing the gas infrastructure. This potential weak point may be corrected by regulators. The best option is for the gas transportation and distribution system to be owned by an independent entity to ensure fair access to these systems. For example, PVGas should be an independent entity and it should neither be fully controlled by nor belong to PVN.

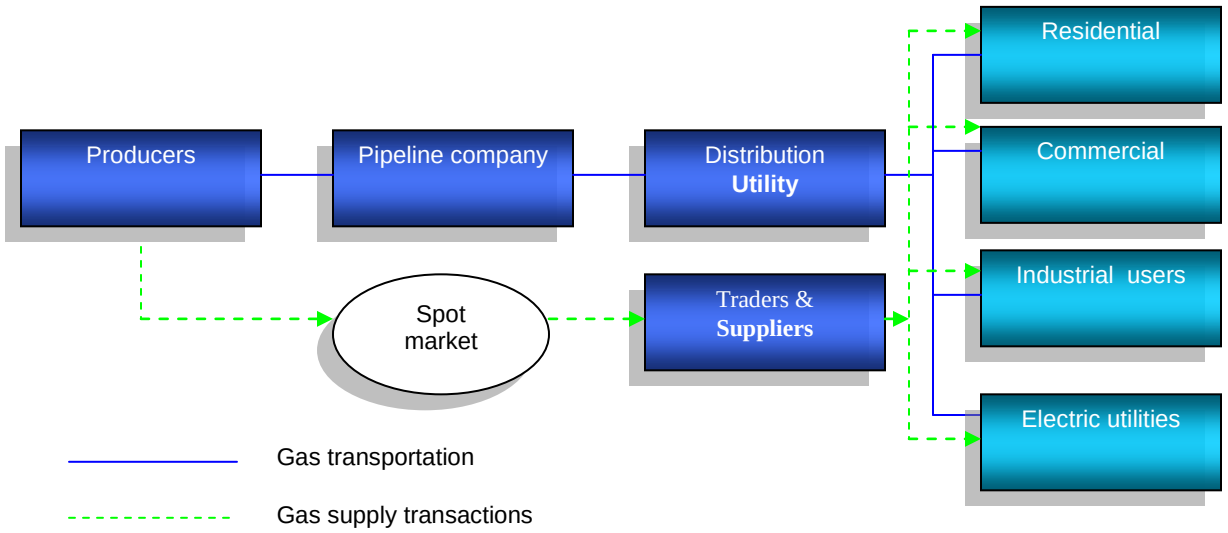
To move from Model 2 to Model 3, there are a number of conditions.

1) It is necessary to separate the retail supply of gas from the transportation and distribution system.
2) Laws and regulations need to be implemented to ensure equal access to the transportation and distribution network.
3) Smaller consumers need incentives to participate in the gas market.
4) Compared with large consumers and power consumers, small consumers often hesitate to move away from the traditional suppliers due to their negotiation power for contracts, although they are offered lower gas prices from other suppliers. Therefore, the process of switching suppliers should be simple and the tariffs and services should be transparent and comparable.

Model 4: Unbundled Industry and Retail Competition

This model separates natural gas supply from transportation and distribution and introduces full deregulation of the natural gas market. This model provides a level playing field for all participants in the gas chain and increases the competition among the supply companies to reduce the gas price. The market in this model allows more flexible trading and more contractual arrangements than in Model 3.[32]

Figure 10: Model 4 – Unbundled Industry and Retail Competition[33]



Based on the degree of competition in the gas market, the balance between gas imports and exports, and the development of the gas infrastructure, the aforementioned models of the gas market may be modified into other models such as mature exporters with vertically integrated monopolies; recent developers with vertically integrated monopolies; a dominant gas supplier with competition at the edges; a monopoly or dominant supplier with transportation pricing issues; importers with wholesale competition and single buyers; evolving retail competition and customer choice.[34]

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[32] Juris, p 9.
[33] Ibid.
[34] These models are described in Asia Pacific Energy Resource Centre, "Natural Gas Market Reform in the APEC Region," Institute of Energy Economics, Japan, 2003, http://www.ieej.or.jp/aperc/pdf/project2002/gas-market.pdf, page 1.

General Concept of Gas Price

The gas price plays a very important role in gas market development as it determines the degree of market competition. It encourages gas consumption by not only providing incentives for users to switch to gas but also giving producers revenue and reasonable returns on their investment. The best way to set the gas price is to establish of a competitive market.

According to a paper on Vietnam's natural gas industry published jointly by the World Bank and Vietnam's Ministry of Industry and Trade, gas pricing methodology must consider two major objectives:[35]

1. The creation of incentives for IOCs to invest in exploration and development of the upstream sector;
2. The creation of incentives for gas users to use gas rather than alternative energy sources.

How to determine the gas price plays a significant role in gas policies. In general, there two main approaches to gas pricing:

1. Cost-plus approach: Gas is priced to reflect the cost of production, transmission, storage, distribution and rate of return on investment.
2. Market replacement value/netback approach: Gas is priced according to the closest alternative fuel. This concept is intended to estimate the actual or potential value in the market resulting from replacing some other fuel by gas.

The cost-plus approach reflects a seller's approach and this seems to be more straightforward than net back pricing. However, there are a number of elements which should be considered, such as how to determine exploration costs, cost of production assumptions, and allocation costs. For example if gas is associated gas (located near oil deposits), the question arises as how to allocate the cost of common facilities to oil and associated gas. The buyer and the seller may take a long time to reach agreement on this. As a result, the negotiation process is prolonged and the project is delayed for commercial reasons.

Compared with a cost-plus approach, the netback approach does not refer to the decision of the producers, but this approach requires a variety of decisions in the marketplace to be taken at present or at a point in the future. For example, power plant owners should take into account different factors before buying gas, such as the cost of alternative fuels, the cost of replacement, the reliability of the gas supply, environmental issues and so on, which are difficult to express in monetary terms.

The cost-plus approach is found in countries with rich gas reserves where the cost of gas supply is often cheaper than other energy sources. In countries with small reserves and

[35] Priddle, Rajan, and Saeed, "Vietnam Gas Sector Development Framework Final Report," ESMAP January 2010, page 47. This section borrows heavily from this paper.

marginal fields, the cost of gas supply may be high and the netback approach is more appropriate, as the cost of gas supply may be higher than that of alternative fuels. For these countries, the net back price approach is a transparent methodology for both gas suppliers and consumers and it is the foundation for leading changes in the market conditions.

The biggest gas consumer is often power generation. Therefore, the gas price must be determined by this sector and pegged to the alternative fuel competing for power generation, the international coal price. A competitive price in the power sector is determined by the economic feasibility of a combined cycle gas turbine plant compared with that of a modern steam plant burning international coal. This tie-in with coal will help to develop the gas and coal resources in an economically efficient manner.

In the first phase of market development, the gas price may be set across a range to protect the suppliers and producers from extreme price volatility. Then, in the next phase the gas price will be determined by negotiations between suppliers and consumers. To avoid this process being prolonged, the price formula for gas sales contracts should be stated in the PSCs. This will make the gas price predictable and clear for both investors and users. During the negotiations of the PSCs, the gas price may be calculated and adjusted with other commercial factors such as indexation, ceiling and floor prices and fiscal terms such as cost recovery, profit sharing etc. This will ensure the economic feasibility of the gas projects in difficult conditions such as the level of water depth and high CO_2 content.[36]

IV. Achievements and Challenges for Vietnam

The objective of this section is to examine the current state of Vietnam's gas industry including its structure, stage of market development, gas pricing, and the role of PVN. These are fundamental issues that the country has to face and need to be addressed when formulating the gas policy for the country**.**

Structure of Vietnam's Gas Industry

Vietnam's gas industry is at an early stage of development. The gas industry is in a stage of transition from a monopoly model to the next stage. First, PVN, a state owned company, purchases gas from several companies producing gas offshore from Vietnam based on take or pay contracts.[37] However, PVN also plays the role of a producer as requested by the Government and has, via its subsidiary PVEP, some interest in all of the offshore gas blocks.

In the next stage, as the government has appointed PVN as the exclusive gas transporter and trader to develop the gas market in Vietnam, natural gas is transported by an on-shore

[36] Priddle, Rajan, and Saeed , pp. 45-73
[37] Robert B. Helms, *Natural Gas Regulation*: *An Evaluation of FPC Price Controls,* American Enterprise Institute for Public Policy Research, National Energy Study 2 July 1974, p. 16.

pipeline system owned by PVN and operated by its subsidiary PVGas. Finally, PVN, as the single buyer in the process, resells the gas to the state power company (EVN) and a number of independent power producers, small industrial consumers, and fertilizer plants. Recently, PVN has been appointed by the Government to invest in a number of power generation projects fuelled by natural gas supplied by PVN. This model may be described as a "Competition among Natural Gas Producers" model as PVN seems to monopolize the gas chain from the mid to downstream, and there is competition among several gas producers in the upstream in Vietnam. However, this competition is still weak due to increased gas demand and due to the project-by-project development approach in Vietnam's gas industry. Vietnam's gas industry structure remains characterized by Model 2 – Competition among Natural Gas Producers, as depicted in Figure 8 on page 18.

In this structure, PVN is responsible for the development of the natural gas industry including development of the onshore transportation infrastructure, and even consumption. This state owned company is granted the right to import and purchase gas supplies and supply gas to the Vietnamese market.[38] PVN acts as the link between producers and gas users, entering into long term gas purchasing and transportation contracts with producers and sales/supply contracts with gas users.

From the perspective of the Vietnamese government, this structure has a number of advantages:

- Considerable government influence on the gas industry.
- The use of the gas industry as a means of implementing social and political policies of the Government, for example setting low gas price for fertilizer and sometimes for the power sector.
- The exclusive right to establish market power relative to sellers.

However, there are some disadvantages of this structure. First, there exists a conflict of interest for PVN as it plays many roles in the gas chain. PVN or its subsidiary (PVEP) is involved in PSC contracts as a gas producer and, therefore, plays both the role of gas producer and monopoly buyer. In the midstream, PVN is also a single buyer and single reseller and, in the downstream, PVN negotiates Gas Supply Agreements with the consumers (EVN, PVPower, and IPP) which also results in a conflict of interest as PVPower is one of PVN's subsidiaries, for whom PVN and its monopoly position provide a number of favorable conditions**.** Secondly, the commercial and economic decision making of the enterprise sometimes clashes with its political requirements if PVN is required to invest in social projects and suffer financial losses – in fertilizer projects, for example.

The most common form of industrial intervention is the requirement to cross-subsidize some users,[39] which leads to distorted consumption and investment and gives rise to

[38] Due to projected lack of gas supply in Vietnam in the future, PVN has been asked by the Government to develop a plan to import gas by pipelines or LNG from other countries.
[39] Asia Pacific Energy Research Centre, "APEC Energy Pricing Practices: Natural Gas End–use Prices," Institute of Energy Economics, Japan, March 2001, http://www.ieej.or.jp/aperc/2001/Pricing.pdf, page 2.

inequalities in resource allocation. If the Government wants to provide subsidies to implement its policies, the price subsidies should be paid directly from the Government's budget. This approach will create transparency for the market. For example, it is better to allow a fertilizer plant to pay the actual market cost of gas supply and to price its output accordingly, than to subsidize the input price and generate a lower output price.[40] The increased risk and uncertainty of such outcomes will discourage investors from participating in the industry in both the upstream and downstream. In addition, the monopolizing position of this state owned company may fail to encourage efficiency in terms of service and lead to high costs to users. This structure creates a risk of inefficiently allocated resources, and slows down market development. Consequently, the gas industry may not fulfill its mission to match supply to the demand created by economic growth.

Vietnam's Gas Market

Vietnam's current gas market is influenced by the industry structure – a vertically integrated monopoly with a bilateral project approach. As a result, there is no functioning market, which causes a number of obstacles for the development of the gas industry. The gas market is currently, and potentially will be, developed on a project-by-project approach. The infrastructure is underdeveloped – there are no national network pipelines – and this leads to no gas commodity market.

In general, as a single buyer, PVN, on behalf of the Government, negotiates with gas producers, dominating the market and trying to reduce the gas price as much as possible, which will lead to project delays. Consequently, development has been slowed down. This model is often seen in countries with smaller gas reserves at an early stage. The advantage of this model may be essential for securing the investment capital that is needed and it may be easier to finance production facilities and associated pipelines if it is known in advance that the revenue is secured by the long term contracts.[41]

In the future, to develop the gas market, the Government has a plan to establish a competitive market aimed at encouraging private investment and supporting the evolving competition in the power generation market. In 2007, the National Strategy on Energy Development (NSED) up to 2020 was issued by the Prime Minister. This document contains all the elements of the energy policy and in the long term the Government attempts:[42]

- To gradually build an energy market and diversify modes of ownership and business toward the best ways to satisfy consumer needs.
- To speed up the elimination of subsidization and the monopoly to eradicate the implementation of social policies via energy prices.

[40] Ibid, p. 4.
[41] Asia Pacific Energy Research Center, "Natural Gas Market Reform in the APEC Region," p. 36.
[42] The relevant document is "Decision on Approving the NSED up to 2020," Vision to 2050, No 1855/QD-TTg, of December 2007.

The Government also urges PVN to privatize its monopoly transmission and distribution company, PVGas. If this happens PVGas will be an independent onshore transportation business and other the functions of PVGas, such as gas import or purchase, will be separated from the onshore transportation services. However, it is still unclear when, and how much of their interests will be sold. PVN seems likely to maintain a controlling stake in the monopoly position in the gas midstream sector.[43]

Vietnam's Current Gas Pricing Policy

Although the Government policy on energy pricing is summarized in the NESD as "Quickly eliminate monopoly, subsidization in production and utilization of energy and determine energy prices pursuant to market mechanism," gas pricing in Vietnam is still controlled by the Government. The general pricing system, and energy pricing in particular, were previously based on a highly centralized economy whereby the Government set prices for every type of good and service, including energy items. This mechanism, which followed the motto "to stabilize the pricing," consequently led to huge wastes of energy and no encouragement or stimulus for energy supply and consumption organizations to operate efficiently.

In the management mechanism for energy pricing, the Government applies control over price setting for major energy products: hard pricing for electricity; maximum pricing for fuel/petrol; control over coal price to be sold to the power, cement, fertilizer industries and other sectors. Pricing for other types of energy is based on demand-supply and decided by each business. As compared to other sectors, the gas industry is still subject to strong intervention by the Government. The *doi moi* policies were implemented with the adoption of a market oriented mechanism, yet the Government is still more concerned about the general pricing policy, especially on gas pricing. Like other developing countries, Vietnam has applied low pricing for all energy products at the initial state of economic development which has created favorable conditions for social and economic development over the past decades.[44] Yet it has also revealed some drawbacks:

- Waste of gas sources and distortion of gas demand.
- Serious consequences for the state budget deficit, which resulted in insufficient capital investment for gas projects.
- There are no incentives for attracting private and foreign investors to the gas industry.

In the upstream sector, gas prices are subject to negotiation between the gas suppliers and PVN as a single buyer, and in the downstream between consumers and PVN as single reseller. The gas price is determined by a cost-plus methodology and on a project-by-project approach, which is calculated according to well head price, transportation costs, and the rate of return for the investors—there is no common gas price template for this.

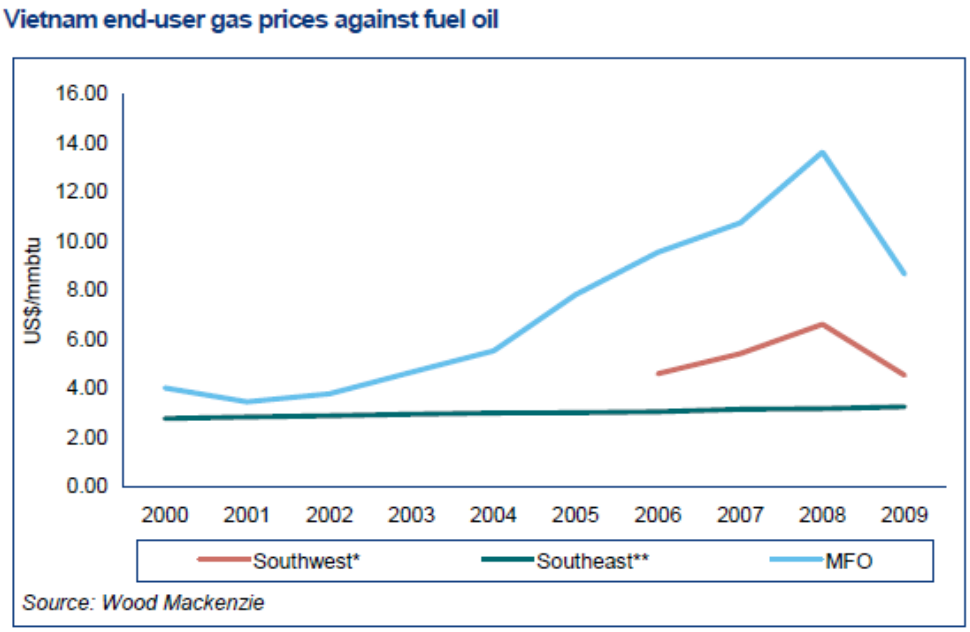
[43] Gas and Power Service –Wood Mackenzie December 2009 –page 5.
[44] Nguyen Minh Due, the text from a workshop on "Determination of Energy Price and the Role of State in Energy Price Management." The workshop was organized by the Vietnam–France Financial Forum in Hanoi, August 2009.

Furthermore, this price always needs to be approved by the Government before contracts are signed by negotiators. The gas price for power generation downstream is also controlled by the Government.

In the long term, the potential for gas price reform will be based on the commercial arrangement with the biggest gas consumer – EVN. However, in the near future, further gas price increases will be difficult to pass on to the power sector as, at the present, the Government is concerned that this increase may impact on the current inflation rate.[45]

The cheapest gas supplied as associated gas has come from the Cuu Long basin and there is a trend toward higher pricing from other basins such as Nam Con Son and the Malay-Thochu basin. The gas price in the southwest is higher than the prices in the southeast. The current gas pricing - key upstream gas contract is illustrated in Figure 11, below.

Figure 11: Vietnam end-user gas price against fuel oil[46]



*Based on PM3 CAA contracted delivered pricing. ** Based on Lan Tay/Lan Do contracted delivered pricing to Phu My.
Note: Prices are in nominal terms.

Chart reprinted with permission of Wood Mackenzie.

[45] http://vnexpress.net/GL/Kinh-doanh/2010/04/3BA1A5B4/
[46] "Gas and Power Service," Wood Mackenzie December 2009, p. 10.

Recent prices for associated gas from the other fields in Cuu Long basin have been around US$1-1.5/mmbtu and the processing fee US$0.4 mmbtu (flat nominal). Gas prices including transportation tariffs from Block 06.1 in the Nam Con Son basin are at 3.26 US$/mmbtu with escalation at 2 percent per annum. The price of gas from PM3 CAA contracts in the Malay-Tho Chu basin is partly linked to sulfur fuel oil (MFO). Transportation tariffs charged by PVN are unclear and all projects assume an average 12 percent rate of return. Gas prices in the power sector are often based on "back to back" contracts with the upstream gas price. However, the gas price in the fertilizer sector is also not clear and it is assumed that it is not heavily subsidized. With the growing gas consumption from the power sector, gas prices in this sector are under pressure to increase, otherwise this sector may lack gas supply in coming years. The current gas price for the power sector is illustrated in Figure 12, below.

Figure 12: Gas price for power generation[47]

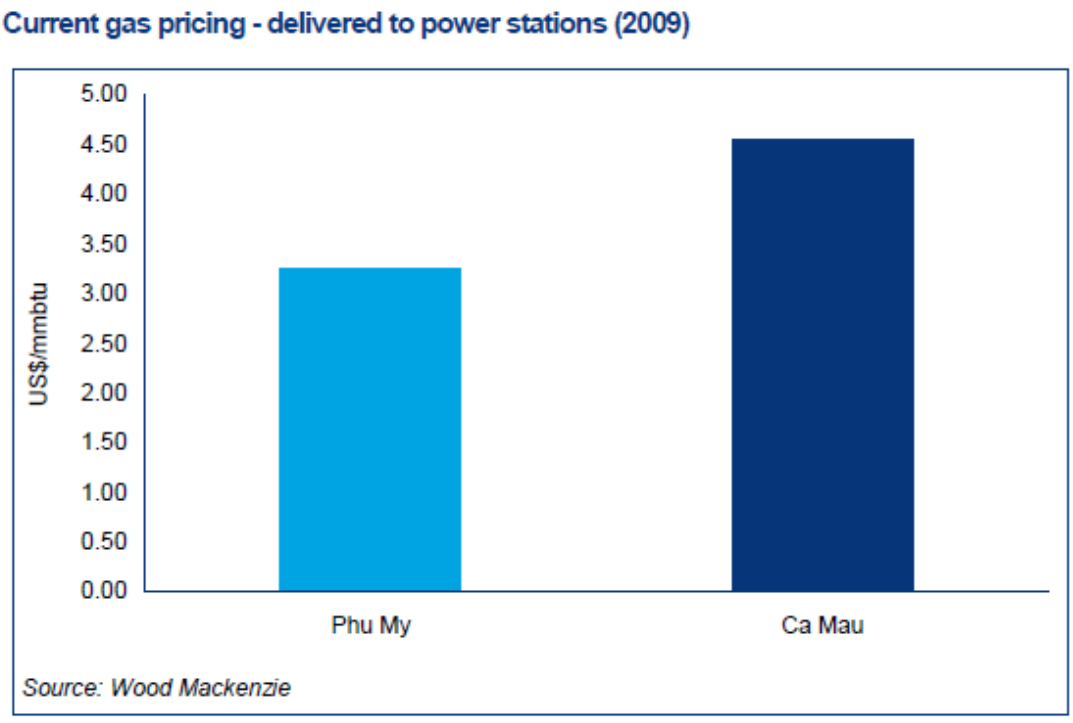


Chart reprinted with permission of Wood Mackenzie.

[47] "Gas and Power Service," Wood Mackenzie December 2009, p. 13; chart re-printed with permission of Wood Mackenzie.

Based on recent analytical reports from Wood Mackenzie, in the short term the current gas price in Vietnam is relatively low compared with the alternative fuels for the existing power plan. The upper boundary gas price for Steam Turbine with MFO fuel and Combine Cycle with HSD fuel are 16.54 US$/mmbtu and 15.13 US$/mmbtu respectively. In the long term if the gas price is competitive with coal as the alternative fuel, the upper boundary gas price for Australia and Indonesian coal from which Vietnam intends to import coal for its coal power plants are 7.01 US$/mmbtu and 6.53 US$/mmbtu respectively.[48] The main reason the government wishes to maintain a low gas price is that the cost of power consumption plays a key role in determining the price of electricity. To develop the economy and society, the Government administratively wants to control gas prices to maintain the low electricity price. However, this leads to cross-subsidization with its adverse problems.[49] Therefore, there is an urgent need to create and implement an appropriate methodology for the gas pricing policy in Vietnam.

The Role of the National Oil Company, PVN

PVN was established in 1977 and is responsible for oil and gas exploration, production, storage, transportation, distribution, and all related services. Although PVN has recently diversified its activities to other areas such as real estate, hotels, finance, banking, insurance, and securities, its core business is still within the oil and gas sectors. Petrovietnam Exploration Production (PVEP) manages all upstream operations, while PVGas is responsible for gas transmission and distribution. As the monopolizing gas supplier, PVN relies on PVGas to facilitate the necessary investment and coordination required to commercialize gas supply; PVN has the sole right to invest and develop the gas infrastructure. PVN also contributes advice to Government on gas policy matters. PVN is moving slowly towards privatization and the non-core business areas, such as insurance, finance, real estate and tourism, as well as some related service companies, are the areas being privatized first. At present, PVN holds 100% of five major companies including PVEP, PVGas, PVPower, and the Dung Quat Oil Refinery No. 1. It also possesses the majority share (over 50 percent) of 14 joint stock companies.[50]

PVN still maintains a controlling stake in the monopoly-held midstream gas sector in Vietnam, and plays a key role spanning the gas sector from upstream contract partners to power generation. But recently, PVN has developed a plan to privatize PVGas and PVPower.

At present, PVN contributes nearly 23 percent of the government's budget and, as mentioned, is also an instrument for the government to implement its social and political policy. Due to its prominent role in the Vietnamese economy, PVN is under the strict supervision of the Government, which makes all major strategic decisions with regard to areas such as planning, budgets, important projects, and key personnel. The Chairman of

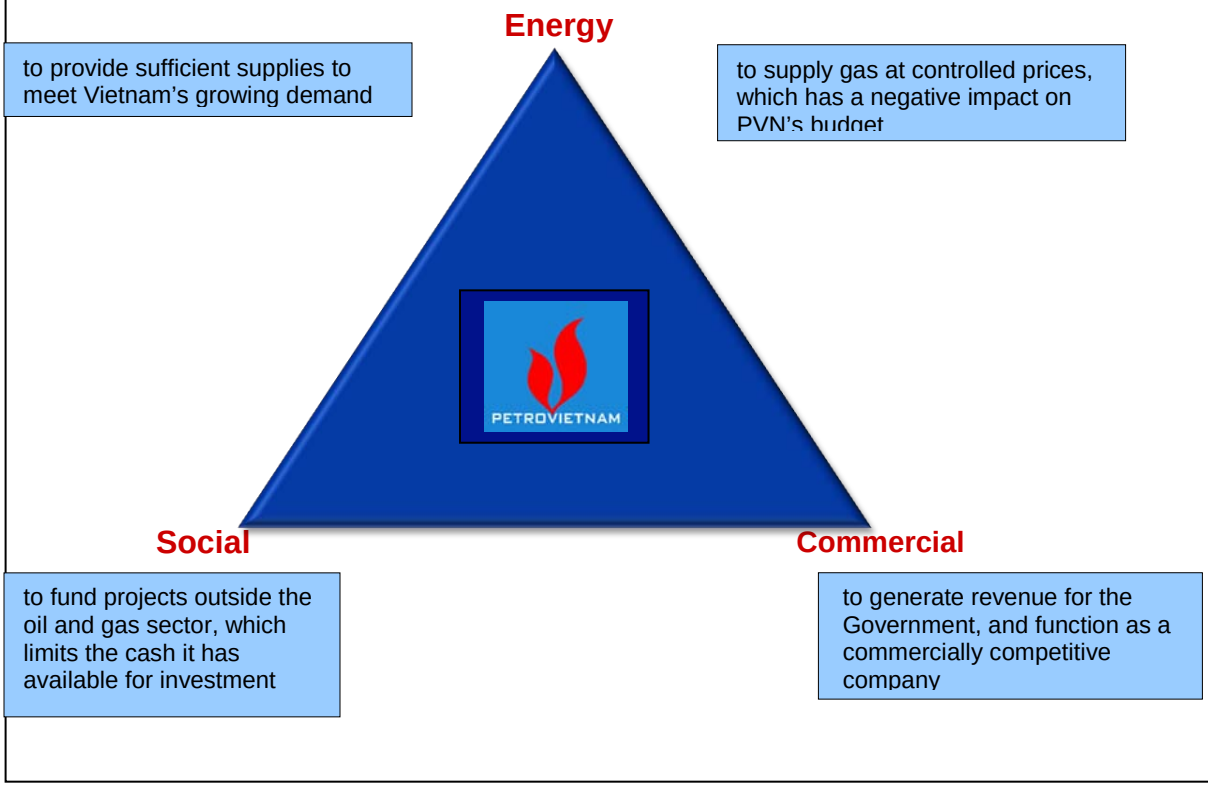
[48] *Gas and Power Service ,Vietnam Fundamentals December 2009*, Wood Mackenzie, pp. 11-15
[49] The detailed research on the cross-subsidization related to the gas price is found in the research of the Asia Pacific Energy Research Centre, "APEC Energy Pricing Practice: Natural Gas End-User Prices."
[50] Vietnam Oil and Gas Group, "Subsidiaries," http://english.pvn.vn/?portal=news&page=detail&category_id=82&id=1058, accessed March 29, 2011.

the Board of Management of PVN is a member of the Communist Party Central Committee and the President of PVN must be selected by the Prime Minister. Due to the strong relationship between PVN's leaders and the Government, PVN has a certain influence over Government policies to protect its interests. The Government and PVN's leaders have a strong desire to develop PVN to imitate the successful NOCs in neighboring countries, such as PETRONAS in Malaysia, the China National Offshore Oil Corporation Ltd (CNOOC), or China National Petroleum (CNPC), among others.

At present, however, the role of PVN is a bit unfocused and this hinders the development of PVN and the petroleum industry as well. Currently, the company carries out two functions on behalf of the Government: promoting the Government's economic and financial interests in the petroleum sector[51] and assisting in a delegated regulatory and supervisory function. Obviously, these dual roles create the potential for conflicts of interest.

In addition, the demand on PVN from the Government perspective also conflicts broadly speaking, PVN is responsible for three main tasks illustrated in the below figure.

Figure 13: Conflict in demands on PVN



[51] PVN contributes 23 percent of Vietnamese State budget, according to PVN's annual report.

Conflicting demands from the Government has limited PVN's ability to invest in oil and gas – its core business. In addition, due to working as a Government agency, PVN has low levels of both strategic and operational autonomy compared with the NOCs which leads to PVN facing many difficulties in relation to its main commercial duties.[52] Commercialization increases the autonomy of an enterprise and places a focus on profitability. China is a good example of this: from the 1950s to the 1990s, to achieve self sufficiency, China's government adopted a command and control governance system and petroleum enterprise fell under direct supervision of the central government. However, this policy did not achieve the results expected. After the 1990s the Chinese government started to reform the petroleum industry including decentralization in petroleum pricing, production, and administration and giving Chinese NOCs complete operational autonomy.[53] This policy has contributed a lot to the great success of Chinese NOCs.

On the other hand, as Vietnam's Petroleum Law states, MOIT is responsible for policy development and determining the terms and conditions of the PSCs in collaboration with the relevant Ministries who are empowered to exercise direction and regulation over PVN and other participants in the gas industry. However, the aforementioned authorities have insufficient technical and industry expertise—at present the Energy Department of MOIT is staffed by four people. Therefore, PVN is requested to take a major role in the formulation and implementation of policies whether it wishes to do so or not. The commercialization of PVN highlights the conflict between core commercial activities and any regulatory or supervisory activities that the Government delegates to it (or which PVN undertakes by default).

In respect to its long term objectives, the government should create a level playing field for all investors and desirable conditions for all participants. There are, therefore, a number of suggestions regarding PVN's role:

1. Its current role is to manage all the PSC contracts with its partners, on behalf of the Government, which leads to a conflict of interest as PVN via PVEP is one partner in the PSC contract. It may, therefore, use this managerial function to make decisions for personal gain. This function should be separated from PVN as soon as possible.

2. PVN's participation in all PSCs, its link in the gas chain, as well as its current role as the single buyer and reseller of all gas, may not contribute to adding value in the gas chain, in particular in the mid stream where PVN exerts natural characteristics of a monopoly. Therefore, PVGas as a subsidiary of PVN should be equally treated as any investor in terms of services and prices.

3. PVN should not play any technical or economic regulatory role in the petroleum industry as it currently does. This should be implemented by an agency that is independent from the Government. As the regulator, PVN may take advantage of this role for its own benefits and disregard benefits for private investors. PVN as

[52] National Oil Benchmarking, Presentation for VPI, *PFC Energy*, 5 November 2009.
[53] Bo Kong, *China's International Petroleum Policy*, 2010 Praeger Security International, p. 9.

regulator and supervisor may use the information it acquires about participants in the industry to advance its commercial interests.

4. PVN is a source of policy advice to the Government on petroleum matters and this advice must be consistent with Government policy. It may have an incentive to advocate for its commercial interests, rather than for the national interest, by failing to perform its regulatory and supervisory functions as diligently as an independent body would. In addition, on occasions the advice from PVN may not be consistent with the Government strategy and policy.

5. PVN's benefits from the upper stream should not be used to discriminate or be in favor of its own products. For example, PVGas has used the cheap gas that they buy from PVN to produce LPG, the price of which is less than half of LPG imported by other companies. PVGas may also provide more favorable conditions to PVPower in terms of gas supply than to other third parties.

In the long run, PVN should focus on its commercial duties and expand its capabilities in terms of operational management, finance, and expertise. It should consider the essential means to provide management focus and control the diversity of operating entities within PVN. It should also consider its responsibility to its shareholders rather than its political responsibility.

PVN's key role is to help ensure the timely development and exploitation of the nation's hydrocarbon resources in a well controlled and profitable manner, then organize these in such a way that they become key parts of its core business. It must ensure that all other functions are aligned to the service commands and requirements of the core business.

To sum up, the gas industry in Vietnam plays a vital role in the nation's energy economy and is growing at a good pace. The gas industry has attracted considerable foreign investment in the upstream petroleum sector. This has been facilitated by the government policy set out in the Petroleum Law and subsequent amendments and implementing decree and the system of PSCs in the upstream sector. However, in the downstream there is no clear policy for the gas sector. As a result, this sector has been developed in "a business as usual" fashion and is faced with three main challenges: industry structure, sector management, and the development of a gas market.

First, the current industry structure is an example of a traditional "Competition Among Natural Gas Producers" structure, where natural gas and transportation services are sold by a single buyer and reseller to the final consumer. The Government has controlled gas prices and intervened in the operation and investment decisions of the gas companies. This leads to distorted prices, inefficient operation and a weak infrastructure.

Second, although a regulatory body has been established by Petroleum Law, PVN is still dominant in the downstream sectors and in supervising the upstream activities on behalf of the Government. Consequently, there are unregulated monopolistic behaviors in downstream and conflicts of interest in upstream.

Finally, the gas market is not functioning and is being developed on a project-by-project basis. The policy of maintaining the low gas price in the downstream tends to discourage investment in gas exploration and development in the upstream. In addition, due to the lack of a pricing template or a workable generic approach, the actual gas price is not clearly defined and transparent. As a result, gas supply will not be sufficient for economic development in coming years, especially from 2015.

To overcome these challenges, two options for the development of Vietnam's gas industry need to be considered:

Option 1: Take the approach of a NOC such as Malaysia's Petronas, or China's CNOOC, CNPC, or SINOPEC, each of which have had great achievements in their international operations. But outright mimicry will not work, and several aspects need to be considered relative to Vietnam, including:

- the existence of large reserves and low costs of production;
- high international energy prices;
- the ability to develop large volumes; and
- the ability of a NOC to accumulate the resources and to develop the capability to be competitive in the international marke**t.**

Vietnam should consider all these factors if it wants to follow Malaysia and China; compared to those two countries, Vietnam has smaller reserves and energy prices are controlled purely by the Government, among other differences.

Various combinations of these factors have had an impact on the industry structure for those countries which have developed their gas industries. For example, proven natural gas reserves of Malaysia and China in 2008 were 2.46 TCM and 2.39 TCM respectively, whereas Vietnam's reserves are only 0.56 TCM.[54] China and Malaysia have been able to finance both economic growth and the development of their gas industries from large oil and LNG exports. Also, in China, the expansion of NOCs into overseas markets has been strongly supported by low cost loans from the state banks or by being allowed to use the income from the international upstream profit to offset the losses in the downstream market.[55] However, Vietnam's recoverable gas reserves are often marginal and there are many uncertainties about the cost of development. In addition, the distance offshore and in some cases, significant gas processing cost, and the presence of high CO_2 content fields, produces a relatively high cost of gas supply.

Option 2: Reform the natural gas industry by introducing a competitive environment in the mid and downstream. This process must be supported by the restructuring of sector management, establishing an effective regulatory framework for the natural monopoly in the transportation and distribution system, and the liberalization of gas pricing.

[54] BP Statistical Review, 2009
[55] Erica S. Downs, "Who's Afraid of China's Oil Companies?" chapter in *Energy Security: Economics, Politics, Strategies, and Implications*, Brooking Institution Press 2010, pps. 76-79.

There are a number of advantages of this option. First, the gas resources will be developed in an economically efficient way. Secondly, the private investors (IOCs) will have an incentive to invest in the gas sector in Vietnam and Vietnamese gas resources will contribute to the Vietnamese economy and society. Thirdly, the gas supply will be developed on time and will meet the demands of economic growth and energy security. This option also meets the objectives of the energy strategy and economic policy of the Government. Finally, this option is an international trend in Asia, Europe, and North and South America and so Vietnam's economy will be more integrated with the world economy.

V. Suggested Pathways for Vietnam

Reform of the gas industry to boost efficiency and attract private investment in the natural gas industries is an unavoidable trend for many countries around the world. There are both good and bad lessons to be learned from other countries, but Vietnam's uniqueness should be considered in applying these experiences. There is no common model for all of the countries around the world.

Based on the current state of the gas industry and international practice, the main recommendations resulting from this paper are as follows:

1. **Comprehensive national natural gas policy:** To meet the ambitious objectives for the development of the gas industry in Vietnam, there is an urgent need for the country to formulate and publish a blue print for a comprehensive national natural gas policy covering the issues of gas exploration, production, distribution, pricing, and imports. The policy should also provide the financial and fiscal terms to attract foreign investment in the gas projects, especially in deep water and international border areas. A clear and formal statement of the government's objectives for long term development for natural gas should be addressed in the aforementioned policy.

2. **Establish a comprehensive gas law:** Gas law should provide a clear legal expression of government policy and strategy for gas industry development and the ground rules for operation of the gas industry. In addition the gas law should focus on the mid and downstream businesses to deal with specific characteristics of the gas chain which is under a natural monopoly. The role and responsibilities of the participants should be clearly defined and the regulatory principles in the gas industry are needed to reduce conflicts of interests and to ensure equal access to transmission and distribution infrastructures.

3. **Enforce the regulatory entity for energy:** The Energy, Oil, and Gas Department (EOID) of MOIT has a widening range of responsibilities but its human resources are limited. In addition, they do always not have necessary knowledge on complex issues related to the energy industry. This leads them to depend on PVN to provide the expertise. If the government wishes to remove the policy making

and regulatory functions from PVN, it needs to strengthen its own ability and resources for policy-making and regulation, for example by building strong information and analytical capabilities. EOID must, therefore, focus on policy development, industry studies and coordination. As the gas and power sector are so closely linked, it is necessary for EOID to coordinate the gas master plan and power master plan to ensure their integration.

4. **Move from the Competition among Natural Gas Producers model to the Open Access and Wholesale Competition model:** Reform the gas market step by step to move from the Competition among Natural Gas Producers model to the Open Access and Wholesale Competition model. In the current market, there is a single buyer and there is a big gap between the current situation and the requirements for a competitive market. An interim phase is needed to create the right conditions for a competitive market. In the interim phase, the single buyer will continue with the competitive gas pricing and regulation of transmission and distribution. However, the single buyer monopoly will be dismissed by direct negotiation between the producers and large consumers and by competition for transportation. After this, the wholesale competitive gas market model will be established with the presence of negotiations between multiple buyers and sellers, a national network and transportation services negotiated within a range recommended by the regulator.[56]

5. **Remove gas price controls and take a new approach:** Gas price is a crucial measure in reforming a gas market and it needs to be formulated to provide mutual benefits to all participants. Current gas prices are influenced by the economic and social objectives of the country. There is, therefore, a real need for the Government to go beyond the cost-plus approach by implementing a new methodology: a netback approach that would encourage investment in the gas industry. The current control of gas price should be removed and ensure the viability of each link in the gas chain. The gas price should be calculated by the alternative fuels which the buyers would be willing to buy. Prices for gas sold for power generation should take into account environmental benefits of gas over coal. In addition, the policy for this must be transparent to both producers and consumers.

6. **Lessen pressure on gas demand:** Current gas demand is under high pressure to increase. The experience of the U.S. shows that to reduce pressure on gas demand requires energy efficient consumption and fuel switching and diversity.[57] In the Vietnamese context, in the short term, the Government should implement regulations to review and upgrade the efficiency of power generation. In the long run, removal of gas price controls to provide market price signals to consumers to facilitate efficiency gas consumption is required. In addition, the government should have a policy to encourage the development and use of other renewable energy sources such as wind power, solar, and nuclear power.

[56] Priddle, Rajan, and Saeed ,pp. 80-83.
[57] Balancing Natural Gas Policy, National Petroleum Council, Volume 1, Page 57-58