DEVELOPING GAS MARKETS; LESSONS LEARNED FROM THE NETHERLANDS

Case example:

The Dutch Gas Market

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ABSTRACT

This paper provides a historic review of the development of the Dutch natural gas market and illustrates and explains the remarkable success and speed of the natural gas penetration in the Dutch energy mix. The lessons learned in the Netherlands may help emerging economies to make a rapid transition to natural gas as a main source of energy.

The paper will outline the challenges associated with such a transition arising from, the stakeholders involved and their different interests, the realisation of a transportation infrastructure, the various socio-economic implications and the definition of the newly targeted structure of the energy demand. Next, it will identify how the Netherlands successfully dealt with these challenges and provide thoughts about the pre-requisites to successfully substitute coal and oil both in the household and the industrial sector. Special attention will be paid to the critical role the various stakeholders played and how they succeeded in aligning their initially different interests. The paper will show what the lessons learned and solutions found may mean for emerging markets today, in the context of their specific institutional and economic setting.
Abstract

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INTRODUCTION

Natural gas is the fuel of choice for a growing number of countries. Compared to the main competing fuels, oil and coal, natural gas is significantly less harmful to the environment. The usage of natural gas does not produce any dust or smoke and the emissions of SO$_2$ and NO$_x$, which cause acid rain and smog, are minimal. Moreover, per unit of energy the emission of greenhouse gases (mainly CO$_2$) is much lower than when using oil or coal. Moreover, it is generally accepted that natural gas forms an ideal bridge from the “coal & oil-era” towards a sustainable future, when most energy will be produced from sources like wind, biomass and solar energy.

Given these beneficial environmental characteristics, governments take their responsibility and try to move away from oil and coal towards gas. This seems an important step as individual stakeholders in the energy market in a country generally lack the incentives or the power to do so.

Governments, however, can not operate in isolation. First of all, they need the support of the citizens (also voters). Furthermore, they need the cooperation with companies that buy, import, transport, distribute and market the gas. These industries have to invest significant sums in order to enter the market. Finally, industries and citizens, as consumers, should be enticed to switch from oil and coal to natural gas. In addition, there is a large group of less central stakeholders, which may play a crucial role in a transition; these involve municipalities, construction companies, appliance providers etc. Of course, governments can use a variety of instruments to influence stakeholders.

The goals of the various stakeholders are often conflicting. End consumers want cheap, easy to use and reliable fuel supplies. Producers, transporters and distributors of gas want a reasonable return on their investments. Marketers, traders, importers of gas want to be sure that the gas that they buy, often on long term contracts, can be sold at an acceptable price.

Often, these different considerations hinder the development of a gas market. Why should an end consumer switch to gas if he is worried about the future gas prices or the safety of the product? And why should an investor build a transport pipeline if he has only a guarantee that he can transport gas for a couple of years? The effect is that the stakeholders in the gas chain, sometimes because of lack of knowledge, sometimes due to unequal power, have a lack of trust which significantly slows down the transition towards a gas based economy.

In the 1960's, the Netherlands was facing exactly these problems. The motivation for the transition from oil and coal toward natural gas was the discovery of a huge gas field in the country in 1959: the Groningen field. Using a typical Dutch approach, that strived to create commitment from the various direct stakeholders and societal fractions involved by focussing on consensus (later referred to as the “poldermodel”), the Netherlands succeeded in introducing natural gas very quickly, as is illustrated in the figure below.

This paper discusses the process of transition in the Netherlands, the problems that occurred and the measures taken to overcome them. The aim of the paper is to provide some insights in the main elements of an effective, broadly supported, strategy to introduce natural gas in an economy.
CONSIDERATIONS WHEN DEVELOPING A NEW MARKET

Stable Vision of Government

The development of a gas market requires significant investments which are to be utilized for a number of decades. Such investments will be severely held up when a clear longer term vision is lacking. First of all, the government should give an unambiguous signal about its seriousness to introduce natural gas as a fuel in society. This requires a certain degree of political and social stability. It is important for investors that they can be confident that decisions taken by the current government will be respected to a large extent by the successor governments.

The reason behind this is that governments usually have large powers to encourage or discourage the utilization of natural gas. Moreover, details in the legislation – sometimes unintended – have important consequences on the natural gas market. For instance, a stricter environmental legislation will of course encourage the usage of gas, but exemptions for current (or even future) users of coal and oil may discourage switching. Other examples of instruments for a government to promote (or not) natural gas are (energy) taxes, safety regulation and permit procedures.

Trust and Expectations of Market Participants

The future is uncertain. The preferred option of parties facing too much uncertainty is usually to do nothing. Why should an industrial energy user switch from heavy fuel oil to natural gas when he is not sure of the availability and the price of gas in future? And why should a potential investor build a pipeline while he is not certain that it will be used and that he will receive reasonable price, in order to recover his investments plus a reward?
Often, expectations among the various parties differ, because of their specific interests, experiences, history, knowledge and information. This may result in a general lack of trust. Customers will fear the monopoly power of the gas transport company. The gas transport company fears tough regulation by the government. The government fears to become vulnerable to geopolitics and to gas producers, withholding gas supply to influence prices.

**Roles and Responsibilities of Market Participants and Government**

Energy is essential to the functioning of modern society. Society requires an energy system that satisfies its essential goals: a clean, affordable and reliable supply of energy. In essence, a government will have to devise policies to attain these goals. In practice, much of the executive work to actually reach these goals will be delegated towards the various market participants. The role of the government then, is to formulate guidelines and conditions which are to be met by the various market participants.

In actual practice, often these responsibilities remain unclear. In respect of supply reliability, for example the question arises who is responsible. Should the suppliers guarantee that there is always sufficient gas? Is it the role of the transport company, or is it a task for the end consumer to contract back-up gas? Should a supplier guarantee sufficient gas and enter into a long term purchase contract, or should he wait and see how the market develops with the risk that, he will not have sufficient affordable gas available to supply the market? Similar issues arise regarding to the construction of pipelines. Should a transport company take the initiative to build a pipeline because it expects profits can be made in the future, or should it wait until it gets profitable transmission contracts, or until the government tells it to build?

Although the various parties may share the same objectives with respect to the development of the market in general, they will have competing aspirations in respect to the value chain. Each of the participants will struggle to get a maximal piece of the value pie. In this respect, the role of governments is complicated. First of all, a government that intends to promote the use of natural gas should allow investors in the natural gas chain a reasonable return to recover their investments, including an appropriate risk premium. Secondly, the government should keep the market participants from abusing their market power to create excessive returns. This implies that a government should have a very good knowledge about what exactly is going on in the market, in order to be able to firmly navigate between these two. The alternative to in-depth market knowledge is to embark on a trial and error process that will introduce a lot of uncertainty in the market.

The general effect of unclear roles and responsibilities is that market participants start waiting for each other. This will hinder the development of the gas market.
BACKGROUND INFORMATION ABOUT THE NETHERLANDS

Before we take a closer look at how these issues were addressed in the Dutch situation it is useful to take note of the situation in the Netherlands at the time the decision to develop the market for natural gas was made, in the late 1950’s.

By then, the country was at the end of a period of the reconstruction and development, following the end of the Second World War. By the 1950’s a period took off of further industrialization and strong economic growth. As a result energy demand was steeply on the rise. Environmental concerns and limits to growth had not yet settled in the minds of the general public and the policy makers. In 1960, 55% of the Dutch households with central heating used coal as energy source. Yet, over the 1950’s the usage of heating oil had been gradually increasing. There was also a significant usage of town gas, manufactured on the basis of cokes and petroleum, which was primarily used for heating water and cooking. In 1960, many major towns had a public gas company which operated one or more (heavy polluting) gas factories, using a low pressure town gas network to move the gas to (mainly domestic and small commercial consumers). The demand for (heavy fuel) oil in industry had also significantly increased over the 1950’s, while there was a more or less stable usage of coal. Coal was imported or produced domestically in Limburg, a province in the South of the Netherlands. Coal production was carried out by the Dutch State Mines (DSM) and a private enterprise. All together some 50,000 people were employed in this industry. Some crude oil was produced in the Netherlands, but most petroleum was imported. Notwithstanding the activities in exploration and production of natural resources, the prevailing mining law dated back to the era of Napoleon and was quite incomplete on taxation, royalties, tendering procedures and the allocation of acreage and safety issues. Moreover, the regime under which gas has been made available to consumers was strongly geared towards the public provision of town gas to domestic consumers and not to the large scale exploitation of natural gas.

MARKET DEVELOPMENT PROCESS IN THE NETHERLANDS

The introduction of natural gas meant turmoil in the Netherlands. As is show in Figure 1 the introduction of natural gas went rather quick. Starting from almost zero in 1965, natural gas already reached a 40% share of the total energy consumption in 1970. This share further increased to more than 45% in 1975.

The primary parties involved in the market development in the Netherlands where the private companies Shell and ExxonMobil (Standard Oil of New Jersey) and the Dutch Government. Shell and ExxonMobil’s joint venture called NAM “Nederlandse Aardolie Maatschappij” (translated; Dutch Oil Company) found the Groningen field in 1959 and owned the right of exploitation. The government was involved not only because it owned the reserves according to the mining law but also because the existing legislation provided that the state would purchase the gas reserves upfront, which implied that the state was basically bankrupt after the discovery of the giant field. A crucial decision in the market development process was the decision to bundle strengths and knowledge in a separate new company and to delegate the task of building and maintaining the transport network and selling the gas to the market to this company. The company was established in 1963 as N.V. Nederlandse Gasunie, a joint venture between Royal Dutch/Shell and ExxonMobil (25% each) and the Dutch Government (50%). The state delegated the actual negotiations and later participation in the joint venture to DSM, the State Mining company, because it was experienced and knowledgeable in the international energy market. Furthermore, the private parties involved strongly preferred an indirect and non transparent participation of the state because they feared the new Dutch joint venture might force them to create similar models with more unstable governments in other countries.
Since the 70’s, after other (much smaller) gas fields were discovered in the Netherlands, the task of Gasunie was extended to incorporate also the production from these fields in its sales portfolio. Later on, in order to preserve the national gas resources, the Netherlands started to import gas and also this task was dedicated to Gasunie. After liberalization, the transport grid of Gasunie was unbundled from the sales division. Today, there are two companies: NV Nederlandse Gasunie, which is a gas Transport company and Gasunie Trade & Supply, the part of Gasunie which buys and sells gas.

This particular set up served a number of objectives. The presence of the two private partners guaranteed that Gasunie would work as efficient as the oil companies. Moreover, these parties contributed their international experience, know-how and programme management skills throughout the development phase of the venture. A principal role of the Dutch government was to secure the public interest such as safety, affordable prices and security of supply. The private partners were fully aware that they had to cooperate with the government and enable the government to reach their goals.

Important was that from the beginning, all main shareholders had a significant influence in the decision making process. Therefore they were equally well informed about the advantages and drawbacks of (alternative) proposals on investments or sales strategies. This flow of information proved to be a significant advantage, since it eased the various negotiation processes between the developing gas industry and the government in its role as legislator, permitting office and price watchdog.

For the design and construction of the transmission grid Gasunie contracted the American firm Bechtel whose knowledge and experienced made a significant contribution to the safe and fast
construction of the grid. The participation of Shell and ExxonMobil in Gasunie has undoubtedly secured that all of this was done on a sound contractual basis and at a competitive price.

The contribution of the government to the construction of the transmission grid was twofold: it convinced the general public that this grid was an issue of the national interest. Secondly it helped to streamline permitting procedures and negotiations with local authorities. An important step was the procedure which was put in place to allow construction of pipelines over farm land. Landowners where paid a generous but limited fee as a compensation. This ensured that no single land owner could obstruct the construction by demanding high levels of compensation for the right of passage over his land.

Regarding the marketing of the gas the parties made an important decision to not only sell the gas to large consumers such as power plants, steel mills and the chemical industry but also to small consumers such as households. This approach was not common at the time. Of course it had a significant impact on the scope of the venture, the length of the transportation grid and the further development of both the institutional as well as technical system. Whereas the presence of natural gas in the North of the country might have been a reason for industrial users to relocate their facilities, the decision to sell gas to the domestic households meant that it had to be brought to their doorstep.

The decision to target households as consumers of natural gas meant that a lot of new parties would now be involved. Not only the households themselves, but also their prevailing town gas suppliers. These town gas manufacturers and distributors were mostly owned by the municipalities. These manufactures were offered an acceptable deal to participate. They were paid a fee for each connection and a mark-up over their purchase price for the gas, to cover costs for the distribution, metering and billing and command a small profit.
End consumers switching to gas are mainly interested in costs. They had gotten used to the costs of oil, town gas, petroleum or coal, and their expectations about the gas price differed of course. In order to ease the switch from oil to gas, a special pricing mechanism was constructed so that the gas price would mirror the price of the most adequate substitute fuel. Thus, industry had to pay a gas price which was equal to the equivalent price of heavy fuel oil and households had to pay a gas price which was equal to the equivalent price of heating oil. In fact, this was the birth of the oil-related gas prices, which are still in use in Europe (on the continent) and Asia. Furthermore, a policy was put in place that provided that the government had to approve any revision to the gas price formula. This system convinced the Dutch industry to refrain from maintaining their expensive fuel oil installations as a safeguard in case gas prices would increase above the well known oil parity.

The public local town gas companies got the task to distribute the natural gas in the cities and villages. This was a not to difficult decision as most of these companies possessed a network that they used to distribute their town gas. These networks could be adapted to transport natural gas. This was a major project, since all appliances that used town gas had to be reconfigured or replaced in order to be able to use natural gas. At a high rate people were trained to install new gas fired appliances or in case possible appliances were adjusted, to be made compatible with natural gas from the Groningen field, which through its high nitrogen content had a low Wobbe number. One after the other, Dutch cities were being connected to the natural gas transmission grid.

Gasunie launched a big advertisement campaign to announce the arrival of natural gas to every household. The advantages were pointed out and the instructions for safe use were communicated on a wide scale.

In order to promote a safe and reliable usage of gas, a special law was put in place in which Gasunie got the duty to approve any industrial gas installation before they were connected to the natural gas network. Furthermore, a monitoring programme was constructed in which Gasunie was ordered to check industrial installations for safety. The checking of household appliances was delegated to the former town gas companies.
The task to assure security of supply was dedicated to Gasunie. The capacity planning for very cold winters was carried out annually. The outcome of that process, including the assumptions made, was subsequently discussed with the private shareholders and the government. Long term security of volume was achieved by an annually established plan for gas supply and demand (“Plan van Gasafzet”), with a rolling time horizon of 25 years. This horizon was demanded by the government to allow for timely adjustments. The supply planning was also discussed with all shareholders.

The introduction of gas into the Netherlands forced out coal for domestic use and for most of the industrial market. The Dutch government announced the closure of the Dutch coal mines shortly after the introduction of gas, in 1965. Although the closure was directly related to gas, in fact, Dutch coal mines were rather inefficient. So the closure may have been speeded up a few years. In 1963, the Dutch mining industry employed about 50,000 people in a relative small region which was more or less completely dependent on it. Therefore the closure of the Dutch coal mines was accompanied by a social programme supported by the government. First of all, the shutting down was carried out gradually, with the closure of the last mine in 1973. Secondly, the State Mines embarked on a second life as a major producer of plastics and chemicals, called DSM. Also other industries were created in Limburg with the objective to diminish the negative employment effects of the closure of the mines. Thirdly, many employees of the mines were transferred to Gasunie. Last but not least the government delegated its presence in the venture largely to DSM (To date, DSM is fully privatized and a separate 100% state owned agency called EBN (Energie Beheer Nederland) is the venture partner on behalf of the State). Although the closure of the mines was certainly not without social impact, the problems were partly mitigated and did not hinder the development of the gas market.

The introduction of natural gas has contributed significantly to a wealthier and more convenient way of life. Replacing coal and oil as heating fuel implied a cleaner atmosphere and put an end to the storage requirements.
CONCLUSION AND LESSONS LEARNED

Although it’s almost half a century ago the Dutch gas market was developed as an emerging market by creating a pipeline transport system whereas today LNG ships cruise the oceans this case study still provides interesting lessons for emerging gas markets today.

The first lesson it that a working model and relationship was created between government and private industry which serves the overall public interest while operating efficiently. It has shown that the different interest of the government and private industry do not necessarily conflict and that they can be harmonised in a mutually beneficial way. An important element is the sharing of information, within the context of the joint venture, instead of having the industry at arms’ length from the state, a notorious cause of asymmetry in information. Moreover, the participative development of this structure contributed to broadly legitimating the institutional framework and providing a high degree of trust. This proved to be an important asset, when, in later stages, serious discussions arose over the exploitation of the gas system.

The second lesson is that skills are very important. Shell and ExxonMobil brought in many skills and, in case skills were lacking, like in the design of the pipeline network, other (international) companies were hired.

Third lesson is that an active role of the government is required. The government provided a contractual framework which provided long term stability and security of supply and demand, thus enabling the gas market to develop in a relatively balanced way.

Fourthly, the government used gas prices as an industrial policy instrument and compensated the parties that lost out. It reacted to emerging problems and communicated the benefits of gas to both citizens and industry.

The switch to gas of industries and consumers has been encouraged by the pricing principle in which government more or less guaranteed that using gas, they would not pay more than for using oil. It resulted in further costs savings because this made it possible for industry to eliminate the expensive dual-firing equipment, that otherwise should have been in place as a safeguard against very high gas prices.

Finally, somewhat controversial, the system caused a degree of de-politisation of many issues under discussion. This on one hand, made it manageable to a high extend, securing a certain rationality and stability. On the other hand, it has caused all kinds of allegations of misuse, secrecy and domination of the system by the industry, at the expense of the citizens. The specific nature of the system, perhaps, made it more difficult for the state as well as the industry to refute or prove these allegations.
REFERENCES


