THE MASSIVE USE OF NATURAL GAS IN COLOMBIA:
A SUCCESSFUL EXPERIENCE

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ABSTRACT

Natural gas in Colombia generates economic and social development. The economy is positively influenced by this sector as the lines in which it participates grow at a higher rate than other sectors.

The social benefits that this business generates, however, largely exceed the financial benefits. In the case of Promigas, the pipeline runs through extremely poor areas. In fact, 70% of the region’s inhabitants live below the line of poverty and 22% do not fulfill their basic needs. In many of these small villages, with less than 5 thousand inhabitants, gas is the only utility and represents a significant improvement in their quality of life.

The arrival of natural gas to a town dynamizes the local economy as it motivates creation of small businesses such as bakeries and restaurants. In addition, they experience ecological benefits and improvement in health and sanitation conditions for the population given the substitution of firewood as a fuel.

In order to massify the use of gas and provide this utility to lower income customers, it has been necessary to implement a series of mechanisms aimed at overcoming barriers and at providing profitable investments for the private sector.

The Colombian experience proves that it is possible to develop a market with a low per capita income, through the combined effort government-private sector, using the regulations and proper incentives to accomplish it.
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1. INTRODUCTION

Natural gas has prompted a social revolution in Colombia. In addition to encouraging development, its benefits are much more than just a question of economic indicators.

By sharing with you the story of a Colombian woman we will be able to set you in the socioeconomic context of the population we have reached by fostering the massive use of natural gas.

Adela is 84 years old and lives in Arenal, a village located in the Caribbean Coast. She and her family subsist on a daily average of 3 dollars. Her house, which has soil for a floor, straw roof and only one room, has no public utilities and is occupied by her 3 sons and 8 grandchildren.

Ashes cover Adela’s kitchen while she tries to cook a meal using firewood.

Neither of them have a steady job. Occasionally a member of the family gets a temporary job as a day worker, with a pay of 3 to 4 dollars per 8 hours of work.

Since they can’t afford 8 dollars monthly for other energy substitutes, a member of the family requires up to 5 hours of daily firewood collection. This task is generally entrusted to the youngest that due to such household activities usually miss school.

Like him, many kids must miss school in order to fetch the firewood needed to cook in their homes.
Towards these situations of extreme poverty the government and the productive sectors must come up with creative formulas that can make these villages outgrow the misery line in which they live.

Colombia has 44 million people, a GDP of 124 billion dollars in 2005 and enough proven gas reserves for 14.9 years. Average natural gas consumption in the last five years was 17 million cubic meters per day (600 million cubic feet per day). The natural gas sector has made an important contribution to the nation's economy. For example, economic growth was 3.96% in 2004; that same year, natural gas transmission and distribution was up by 5.05%. In 2005, economic growth was 4.2% overall and this item increased by 4.91%. Savings are one of the prime benefits that come from using natural gas as a substitute for other more expensive and exportable fuels. In 2004, these amounted to one billion dollars.

Colombians have found that natural gas used as industrial fuel lowers costs and provides for cleaner and more environment-friendly production. When used to power vehicles, it generates important savings for both, the customer and the country.

Natural gas is used at the industrial, commercial and residential level in major cities. In villages and small towns, it has an even greater impact. Not only does it prevent deforestation and subsequent ecological damage, by being a substitute for firewood; it also gives customers more free time for productive activities and children enough time for their education. It improves the environment within the home and, therefore, has a positive effect on human health.

Therefore, the biggest advantage of this utility, particularly in the developing world, comes with household use. More than 20 million Colombians now use natural gas and enjoy its benefits. In fact, 85% are low-income customers, who live on a monthly budget ranging between 80 and 150 dollars.

The pipeline owned and operated by Promigas runs through an area where 70% of the people live below the poverty line and 22% are unable to satisfy their most basic needs. In many of these small villages and towns with less than five thousand inhabitants, natural gas is the only public utility. The very fact that it is available makes life better.

Arenal, Bolivar. One of many rural villages in which its inhabitants live below the poverty line.

Because of these significant advantages and because this evolution has been achieved in just 20 years, surpassing every goal set originally, we believe that the massive use of natural gas in industry, homes and as vehicle fuel in Colombia is an experience worth sharing.

This process was carried out from the joint and common effort between the national government and the private sector, who patiently and with a clear long term vision, have successfully widespread the access of natural gas for its massive use in Colombia in favor of the neediest sectors.
It is worth emphasizing that, contrary to the trend to develop a natural gas market based only on the industrial consumer which provides larger profits, after an in-depth analysis of the socioeconomic reality of our country, a decision was made as to focus on the residential sector which offered important potential consumption volumes, but above all a great social development opportunity.

In this process Promigas has actively proposed ways to make natural gas available to communities that were hard to reach because the size of the market was not attractive to private investors, however the schemes implemented are both attractive for investment, but furthermore prompt a huge social impact that ultimately contributes to the country's development.

We are a Colombian company and our business is to transmit and distribute natural gas. We have our own pipeline system (2,000 km.), which transmits 51% of the total natural gas consumed. Promigas also operates gas pipelines belonging to third parties (more than 900 km.) and has equity interest in more than half of the gas pipelines in our country. Indirectly we move more than 80% of the natural gas consumed in Colombia. As to distribution, we reach more than 1.6 million customers through the local distribution companies in which we have a stake. These customers represent around 8 million people.

2. MARKET DEVELOPMENT

The use of natural gas in Colombia dates back to a government initiative started on the Caribbean coast in the 1960's. The prospects were huge and this rising industry quickly caught the attention of the private sector.

In the beginning, the market was comprised mainly of electrical power stations and medium and large-scale industries in the two major cities on the country's Caribbean coast, with 1.27 million cubic meters (45 million cubic feet) transmitted and distributed daily. Today, this figure has grown to nearly 17 million MCMD (600 MCFD), with 179 (5.08) transmitted to the electrical sector, 8.78 (310) to industry, 2.35 (83) for residential use and 0.79 (28) for vehicle fuel.

The decision eventually was made to serve residential and commercial markets, as well as small industries. These were all potentially important consumers who could use natural gas as a substitute for more costly fuels that are difficult to obtain and/or harmful to the environment, such as LPG, electrical power, kerosene and firewood.

Upon initiative from Promigas, compressed natural gas for vehicles began to be used on the Caribbean coast in 1986. The objective was to gain a larger share of the market for natural gas in the transportation sector and to replace gasoline with a cleaner and more economical fuel. The savings obtained by those who use compressed natural gas as vehicle fuel are above 50% and their investment is recovered in 7 to 20 months, depending on consumption.

In 2005, vehicle conversion to natural gas broke all records in Colombia. Aside from making the country a leader in this business and paving the way for future inroads into international markets, this growth spells important environmental, economic and social benefits for the country as a whole.

The goal in 1999 was 115 thousand vehicles converted to natural gas within a ten-year period. By December 2005, it was 78% complete and probably will be surpassed in 2006, given the tendency in the sector, where 40 thousand vehicles were converted last year alone. Therefore, Colombia is expected to continue to consolidate its leadership in NGV business.

Because it requires no government subsidies and reduces fuel imports, the use of natural gas as vehicle fuel strengthens Colombia's trade balance. The country spent $7.5 billion dollars on liquid fuel subsidies during the past four years. If this money, which is used to subsidize the four million Colombians with vehicles, is spent on social investment, at least 20 million Colombians could be benefited. This is almost half of the population, all of it from the two lowest income brackets.
GNC S. A., a Promigas company, has 61% of the market for natural gas sold as vehicle fuel at service stations in Colombia and 59% of the sales volume.

In 1977, the decision was made to enter the residential, commercial and small industrial markets for natural gas, which were all potentially important customers and provided the significant socioeconomic impact to be achieved. Several strategies were used to expand sales in the residential sector, details of which are herein discussed later on.

Colombia now has more than 3.8 million natural gas customers. They, in turn, represent more than 20 million people or half the country's population. Although coverage averages 61% nationwide, in some regions such as the Caribbean coast, where Promigas operates, it is now above 95%. Moreover, 85% of these customers are in the low and middle income brackets, and more than 30% are located in towns with less than 20,000 inhabitants.

Following we show the evolution of the number of users:

<table>
<thead>
<tr>
<th>Year</th>
<th>Users (thousands)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1983</td>
<td>36</td>
</tr>
<tr>
<td>1987</td>
<td>187</td>
</tr>
<tr>
<td>1991</td>
<td>373</td>
</tr>
<tr>
<td>1995</td>
<td>925</td>
</tr>
<tr>
<td>1999</td>
<td>1,760</td>
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<tr>
<td>2000</td>
<td>2,100</td>
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<tr>
<td>2001</td>
<td>2,400</td>
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<tr>
<td>2002</td>
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<td>2003</td>
<td>3,155</td>
</tr>
<tr>
<td>2004</td>
<td>3,500</td>
</tr>
<tr>
<td>2005</td>
<td>3,800</td>
</tr>
</tbody>
</table>

Developing markets for natural gas necessitates a joint effort between the private sector and the government. This is due to the importance of establishing a stable regulatory and institutional framework that offers an incentive to private investment. In Colombia, this is now a mature sector. But, how did it happen?

3. OUR PRIMARY STRATEGIES

- Massive Use of Natural Gas Promotion Plan

In 1986 the Massive Use of Natural Gas Promotion Plan started with the following objectives:

- Widespread the access to natural gas and to its benefits to the largest possible population in Colombia,
- Increase the competitiveness of this fuel by stimulating private investment participation in the natural gas chain,
- Level prices to efficient production costs and service rendering,
- Optimize the use of natural gas reserves by guaranteeing an adequate supply,
- Optimize the use of the infrastructure and
- Take advantage of environmental benefits.

Being the most interested party, the government has played an active role in ensuring widespread access to natural gas for its massive use. Since the main potential customers were state-owned thermoelectric plants and large industries that used fuel oil, a number of initiatives were undertaken to meet the growing demand. For example, association contracts were signed to operate the gas fields, semi-public companies were established to transmit natural gas, and 50-year concessions were granted for its distribution.

The transmission systems had to be enlarged as well. This was accomplished through BOMT (Build, Operate, Maintain and Transfer) agreements to connect the country's major cities in the interior part with the large gas fields on the Caribbean coast.

To make the smallest potential markets viable, the government set up exclusive distribution areas with special incentives. These included the tax system, sole distribution rights, a tariff proposed directly by the distributor and tariff stability for 17 years. In addition, the regional gas pipeline program, through which a network of branches was built to convey natural gas to villages and small towns in the region was launched and a cross-subsidy scheme for the benefit of low-income customers was designed and implemented.

All these strategies offered investment possibilities and in conjunction to the definition of an appropriate and stable regulatory framework were attractive for multinational investors and fostered the active participation of national companies as local partners.

- **Developing the Necessary Regulatory Framework**

  The natural gas sector in Colombia now has a regulatory framework established in the 1990's that allows investors to develop activities under a regulation freedom regime.

  Since then, the regulation in Colombia has matured and government agencies have been established which made it possible to oversee the sector and also set the stage for attracting national and foreign investors. Following are some of what we consider most important highlights in this respect:

  - 1986: Onset of the Plan for Massive Use of Natural Gas
  - 1990: Creation of the National Tariff Board and other tariff mechanisms
  - 1996: Distribution Code
  - 1999: Overall Transmission Regulations
  - 2000 – 2004: Tariff methodologies, which depend on supply constraints.

  Law 142/1994 on public utilities for residential use is a particularly important milestone. Intended to encourage competition, it provides an incentive to private investment in market development and ensures investors stability and profitability on their investments. It also protects the customer by applying the principles of impartiality and solidarity to contend with misuse of dominant positions in the market. In addition, it gives the public utility sector a clear structure, establishes a system of tariffs and sets up exclusive areas rather than concessions.

  Lobbying before government agencies to foster the definition of policies aimed at encouraging the massive use of natural gas was one of the key actions undertaken by the private sector, and specifically by Promigas, at the onset of the market development.
• **Cross Subsidies Scheme**

Regulations in the natural gas sector also feature a unique system of cross subsidies. In fact, to our knowledge, Colombia is the only country in the world with a scheme of this type provided for by law. The following is a description.

There are a series of socio-economic brackets in Colombia based on the population's income and access to public utilities, ranging from extremely low (Bracket 1) to high (Bracket 6).

We believe the cross-subsidy scheme has been crucial to ensuring massive use of natural gas, particularly for the neediest sectors of the population. Customers in brackets 1 and 2 (the lowest) are charged for only 40% and 50% of the natural gas they consume. Customers in the neutral brackets; that is, 3 and 4, do not contribute to this scheme, nor are they subsidized. While customers in brackets 5 and 6 contribute the equivalent of 20% of the total natural gas bill, as does the commercial sector. The industrial sector pays an additional contribution equal to 8.9% of the amount invoiced. Additional percentages paid by brackets 5 and 6 and by large consumers subsidize the invoices from neediest sectors.

All these contributions are placed in a solidarity and income-redistribution fund, which collected 10 million dollars in 2004-2005, eight million of which were delivered in the form of subsidies. In other words, the fund operates with a surplus.

The impact of this scheme has been extremely important. It gives low-income customers access to the sector and substantially broadening its coverage, all of which generates enormous social benefits.

• **Special Quotas for Development**

Another mechanism provided for in these regulations is the system of special quotas for development, which constitute a fund comprised of contributions from large transmission customers who pay a surcharge equivalent to 1.5% of the volume actually transmitted. One of the objectives of this fund is to subsidize residential connections for low-income customers who otherwise could not afford them.

According to experience, when low-income sectors have access to natural gas and connections are subsidized, the service penetration increases to above 90% in one year, with subsequent benefits for the consumer. Without subsidies, it takes from two to three years to reach 75%.

• **Regional Gas Pipeline Program (Laterals)**

Another important feature which positively contributed to increase the massive use of natural gas is the regional gas pipeline program, which has a tremendous social impact. In many villages and towns, access to natural gas enables people to replace costly fuels and generates important savings for families, who destine this cash to basic unfulfilled needs such as food, education, health and hygiene, not to mention benefits for the environment and human health.

Once the major cities were connected, Promigas began to look for ways to make natural gas available to communities that were hard to reach because the size of the market was not attractive to private investors. With the support of the Colombian government, Promigas launched its regional gas pipeline program in 1988, when the first stage began to be constructed.

The technical, economic and environmental studies represented by these investments and their related costs were financed initially by the Colombian government. Currently, and due to the maturity of the market, these investments are being accepted through a negotiation process with the Energy and Gas Regulatory Committee and are compensated in the tariff charged for gas.
transmission. This mechanism makes it possible to finance the fuel for small communities in the region, which otherwise would not have access to this service.

In conjunction with the local distribution companies, Promigas identifies and selects potential communities for gas distribution on the basis of market criteria, as well as costs, location and social impact. Once an expansion plan has been approved, Promigas builds the regional pipelines (lateral), after which the local distribution companies are responsible for installing the residential networks.

Now that construction is finished, 50 thousand families in more than 150 small communities should be connected to natural gas in 2006.

The social impact of the regional gas pipeline program has been tremendous. In many of these communities, natural gas is the only public utility available. It helps to create jobs by fostering small businesses such as bakeries and restaurants that rely on natural gas as a source of energy.

The program makes an important contribution to sustainable development, since these are rural areas where poverty is widespread and development is limited at best. The following are some of its social benefits:

- Savings for customers by substituting more costly fuels such as firewood, kerosene and propane
- Less time spent cooking and collecting firewood; time than can be used for income-earning activities or studying, because usually children are appointed the firewood collection task.
- A better quality of life for people in the countryside by reducing health problems such as respiratory, visual and skin infections caused by constant use of firewood or coal and continuous exposure to smoke.
- Much less pollution inside the home, since natural gas is a clean fuel.

As to the environmental benefits, cutting down fewer trees to collect firewood for cooking avoids deforestation, erosion and loss of soil fertility, water pollution and flooding.

According to results from a survey conducted in January of 2006 in households and businesses of 10 small towns of the Colombian Caribbean, those families who use natural gas in their homes believe that their quality of life is better because of their use of natural gas. Should natural gas not been available, their quality of life would have decreases in 40%, according to their perception, mainly because their health will be affected from the smoke inhaled from cooking with firewood and the daily time spent to collect it. On the other hand, those who lack the service consider that their quality of life will get better by roughly 30%, given possible improvements on their health and savings possibility.
Despite the fact that the benefits of natural gas use are more evident in households, this study shows that creation of small businesses is prompted upon arrival of natural gas to small villages. In the towns surveyed, 80% of these businesses were established after the villages were connected to the service and 1 out of each 5 businesses depends on the fuel for its production. Let’s take Luruaco, a town of 5,000 families, as an example: one third out of total businesses use natural gas for their production.

The arrival of natural gas has broadened the possibilities for villagers to start small profitable businesses in their towns such as bakeries that require fuel for production.

Extrapolating this result to the more than 150 villages that have been connected to the natural gas service as part of the plan to foster its massive use, we can visualize that its influence in the population has been enormous.

Finally, the information collected in this study allows us to imply that businesses which require natural gas for their production generate almost 40% more jobs than those which do not need it.

Evidence of how natural gas has influenced the quality of life and sustainable development in these areas has come to the attention of international cooperation program, which are helping to pay for connections of a percentage of consumers in the lowest income brackets.

One example is the agreement recently signed between Promigas and the Dutch government to encourage private companies’ proposals and projects designed to reduce poverty and promote sustainable development. This particular initiative is consistent with some of the commitments made at the World Summit on Sustainable Development in Johannesburg. The summit ended with a pledge from the countries to support processes that help the earth offer a decent life for all, both now and in the future.

4. CONCLUSIVE REMARKS

Our successful experience in impelling the massive use of natural gas in Colombia shows that a market for this service can be developed in an emerging economy provided the conditions are right. However, it necessitates a joint and common effort between the government and private enterprise to establish an adequate regulatory framework that encourages private investment and protects the consumer’s interests.
The use of natural gas in industry and as fuel for vehicles clearly benefits the nation's economy and generates considerable savings for customers, while protecting the environment. Its residential use enhances the progress and well being of families at every socio-economic level, but particularly the neediest households.

In Colombia, all this has been accomplished in the last 20 years, with the implementation of the program to foster the massive use of natural gas, with the following results:

- There were 187 thousand users in 1986, before the program started. Now, there are more than 3.8 million; that is, over 20 million Colombians, 85% of whom are in the lowest income brackets.

- Thanks to the program, the number of communities with access to natural gas has increased from 191 to 382 in the last six years.

- The period between 1998 and 2003 saw a sustained annual increase of 8% in natural gas consumption in Colombian industry. This growth is expected to exceed 4% in 2004-2008.

- Colombia is one of the countries where the use of natural gas for vehicles has grown the most. There were 6,760 vehicles powered by natural gas in 2000, as opposed to more than 95 thousand in 2005.

- In 2004, the use of natural gas as a substitute for other fuels resulted in an estimated one billion dollars in savings.

Promigas has been involved at every stage of this successful experience and is proud to be part of the social revolution generated by the use of natural gas on a mass scale.

In our company we are long term investors, we have patiently contributed to the development of the sector and have faith in its future. We want to continue contributing to the construction of a better society, by developing activities that will allow us to expand the use of natural gas and its benefits.

We will persist in proposing and supporting actions that propitiate a greater development of the sector that, with adequate policies and appropriate and stable regulation schemes, will continue contributing to the growth of the economy.

In closing, we would like you to listen to what people in these regions have to say about how their everyday lives have benefited from access to natural gas.