

Document of  
The World Bank

Report No: ICR0000967

IMPLEMENTATION COMPLETION AND RESULTS REPORT  
(TF-56541 TF-57406)

ON A

Grant

IN THE AMOUNT OF  
US\$ 5.1 MILLION EQUIVALENT

TO THE

Fundación Promigas

FOR A

Natural Gas Distribution for Low Income Families  
in the Caribbean Coast Project

September 15, 2008

GPOBA  
Colombia  
LAC

## CURRENCY EQUIVALENTS

(Exchange Rate Effective 03/31/08)

Currency Unit = Colombian Peso (COP)  
US\$ 1.00 = 1,821.60

## ABBREVIATIONS AND ACRONYMS

ARI	Acute Lower Respiratory Infection
AVAD	Años de Vida Ajustados a la Discapacidad (Disability-adjusted Life Year)
CAS	Country Assistance Strategy
COP	Colombian Peso
COPD	Chronic Obstructive Pulmonary Disease
DALY	Disability-adjusted Life Year
DFID	Department for International Development
DGIS	Directorate General for International Cooperation
DNP	Colombian Department of National Planning
ESE	Estratificación Socio-Económica
EPOC	Enfermedad Pulmonar Obstructiva Crónica (Chronic Obstructive Pulmonary Disease)
FM	Financial Management
GND	Natural Gas
GPOBA	Global Partnership on Output-based Aid
ICR	Implementation Completion and Results Report
IFC	International Finance Corporation
IVA	Independent Verification Agent
LOA	World Bank Loan Department
LPG	Liquefied Petroleum Gas
M&E	Monitoring and Evaluation
OBA	Output-based Aid
PDO	Project Development Objective
TCF	Trillion Cubic Feet
TTL	Task Team Leader

Vice President: Pamela Cox

Country Director: Axel van Trotsenburg

Sector Manager: Susan Goldmark

Project Team Leader: Cledan Mandri-Perrott

ICR Team Leader: Lars Johannes

# Colombia

## Natural Gas Distribution for Low Income Families in the Caribbean Coast Project

### CONTENTS

#### Data Sheet

- A. Basic Information
- B. Key Dates
- C. Ratings Summary
- D. Sector and Theme Codes
- E. Bank Staff
- F. Results Framework Analysis
- G. Ratings of Project Performance in ISRs
- H. Restructuring
- I. Disbursement Graph

1. Project Context, Development Objectives and Design .....	1
2. Key Factors Affecting Implementation and Outcomes.....	3
3. Assessment of Outcomes .....	6
4. Assessment of Risk to Development Outcome .....	7
5. Assessment of Bank and Borrower Performance.....	8
6. Lessons Learned.....	10
7. Comments on Issues Raised by Grantee/Implementing Agencies/Donors.....	11
Annex 1. Project Costs and Financing .....	12
Annex 2. Outputs by Component.....	13
Annex 3. Economic and Financial Analysis .....	14
Annex 4. Grant Preparation and Implementation Support/Supervision Processes .....	16
Annex 5. Summary of Grantee's ICR and/or Comments on Draft ICR .....	17
Annex 6. List of Supporting Documents.....	18
MAP	

<b>A. Basic Information</b>			
Country:	Colombia	Project Name:	Natural Gas Distribution for Low Income Families in the Caribbean Coast.
Project ID:	P102095	L/C/TF Number(s):	TF-56541,TF-57406
ICR Date:	04/06/2009	ICR Type:	Core ICR
Lending Instrument:	SIL	Grantee:	FUNDACION PROMIGAS
Original Total Commitment:	USD 8.6M	Disbursed Amount:	USD 4.9M
<b>Environmental Category: C</b>			
<b>Implementing Agencies:</b> Gases del Caribe S.A. E.S.P Surtigas S.A. E.S.P. Gases de la Guajira S.A. E.S.P. Gases del Occidente S.A. E.S.P.			
<b>Cofinanciers and Other External Partners:</b>			

<b>B. Key Dates</b>				
Process	Date	Process	Original Date	Revised / Actual Date(s)
Concept Review:		Effectiveness:	07/14/2006	
Appraisal:		Restructuring(s):		
Approval:	05/19/2006	Mid-term Review:		
		Closing:	03/31/2008	03/31/2008

<b>C. Ratings Summary</b>	
<b>C.1 Performance Rating by ICR</b>	
Outcomes:	Highly Satisfactory
Risk to Development Outcome:	Low or Negligible
Bank Performance:	Satisfactory
Grantee Performance:	Highly Satisfactory

<b>C.2 Detailed Ratings of Bank and Borrower Performance (by ICR)</b>			
Bank	Ratings	Borrower	Ratings
Quality at Entry:	Satisfactory	Government:	Satisfactory
Quality of Supervision:	Satisfactory	Implementing Agency/Agencies:	Highly Satisfactory
<b>Overall Bank Performance:</b>	Satisfactory	<b>Overall Borrower Performance:</b>	Highly Satisfactory

<b>C.3 Quality at Entry and Implementation Performance Indicators</b>			
<b>Implementation Performance</b>	<b>Indicators</b>	<b>QAG Assessments (if any)</b>	<b>Rating</b>
Potential Problem Project at any time (Yes/No):	No	Quality at Entry (QEA):	None
Problem Project at any time (Yes/No):	No	Quality of Supervision (QSA):	Satisfactory
DO rating before Closing/Inactive status:			

<b>D. Sector and Theme Codes</b>		
	<b>Original</b>	<b>Actual</b>
<b>Sector Code (as % of total Bank financing)</b>		
Oil and gas	100	100
<b>Theme Code (Primary/Secondary)</b>		
Infrastructure services for private sector development	Primary	Primary

<b>E. Bank Staff</b>		
<b>Positions</b>	<b>At ICR</b>	<b>At Approval</b>
Vice President:	Pamela Cox	Pamela Cox
Country Director:	Axel van Trotsenburg	Isabel M. Guerrero
Sector Manager:	Susan G. Goldmark	Susan G. Goldmark
Project Team Leader:	Xavier Cledan Mandri-Perrott	Xavier Cledan Mandri-Perrott
ICR Team Leader:	Lars Johannes	
ICR Primary Author:	Lars Johannes	

## **F. Results Framework Analysis**

### **Project Development Objectives (from Project Appraisal Document)**

The objective of the Project is to connect to the natural gas distribution network an estimate of 35,000 families of the Colombian Caribbean and Western Coast in the income strata 1 and 2 (as per government classification).

### **Revised Project Development Objectives (as approved by original approving authority)**

**(a) PDO Indicator(s)**

Indicator	Baseline Value	Original Target Values (from approval documents)	Formally Revised Target Values	Actual Value Achieved at Completion or Target Years
<b>Indicator 1 :</b>	Connect up to 35,000 household to the natural gas distribution network.			
Value quantitative or Qualitative)	0	35,000		35,000
Date achieved	06/01/2006	12/31/2007		12/31/2007
Comments (incl. % achievement)	100% - All connections were made, but for 862 households households connections were made after Jan 08 so that the disbursement trigger of three months of service could not be satisfied.			

**(b) Intermediate Outcome Indicator(s)**

Indicator	Baseline Value	Original Target Values (from approval documents)	Formally Revised Target Values	Actual Value Achieved at Completion or Target Years
<b>Indicator 1 :</b>	Provide 35,000 households with three months of service after connection.			
Value (quantitative or Qualitative)	0	35,000		34,138
Date achieved	06/01/2006	12/31/2007		03/31/2008
Comments (incl. % achievement)	98%			

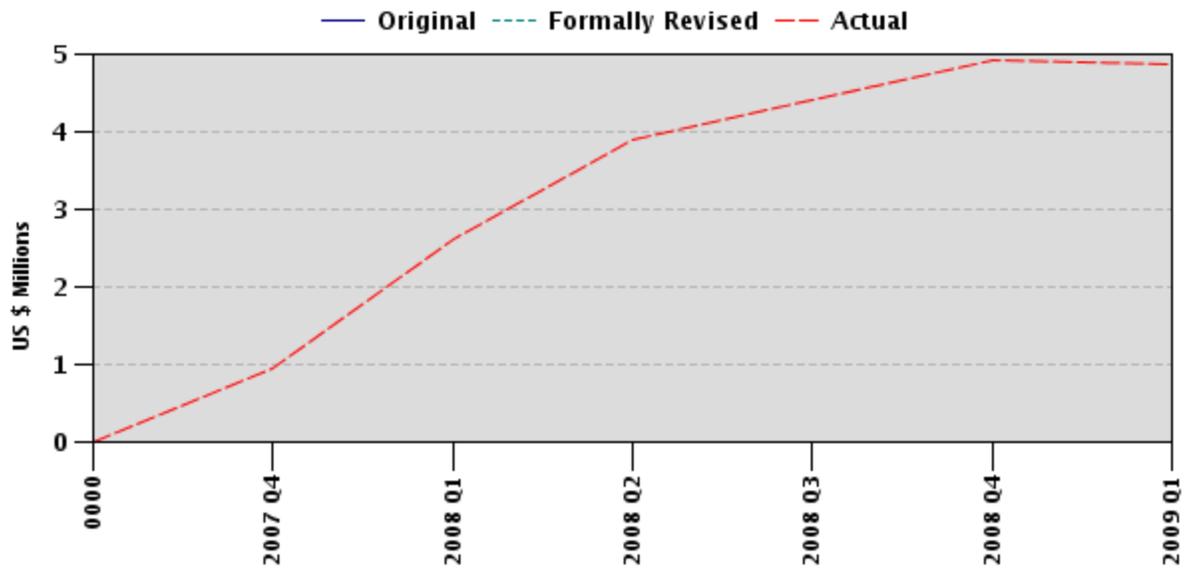
**G. Ratings of Project Performance in ISRs**

No.	Date ISR Archived	DO	IP	Actual Disbursements (USD millions)
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**H. Restructuring (if any)**

Not Applicable

## I. Disbursement Profile



## 1. Project Context, Development Objectives and Design

### 1.1 Context at Appraisal

Colombia is slowly showing signs of recovery after years of guerrilla warfare and insurgency. The number of Colombians living below the poverty line has declined by over 5 percentage points from 2002 to 2004 (to 52.6%). Over 1.4 m people moved out of poverty between 2002-2004, reducing the number of poor to approximately 23 million, and over 1.5 million moved out of *extreme* poverty in the same period.

In Colombia, the highest levels of unsatisfied needs, poverty and misery are present in the population living in the Caribbean Coast. Households are formed by 5 to 7 members and children are forced to work from an early age; the average family income, based on the informal economy, is less than the monthly legal minimum wage of US\$168 equivalent.

Colombia has proven natural gas reserves estimated at 4.2 trillion cubic feet (TCF), which, at current production rates of 0.28 TCF per year, should be sufficient to provide approximately 15 years of continuous consumption, a relatively large reserve-to-production ratio taking into account other countries which are also significant gas users such as the United States (reserve-to-production ratio of approximately 9.6 years).

Colombia has achieved a large and rapid expansion in natural gas penetration, bringing major economic and social benefits to the urban population. Following expansion of the natural gas transportation network during the second half of the 1990s, coverage of natural gas in urban areas nationwide had reached more than 3.5 million homes throughout 382 municipalities in the country at the beginning of the project. This represents a total population of 17 million, or about 40% of the total population of the country, of which about 85% belong to the poorer socioeconomic strata of Colombian society. The arrival of natural gas has brought substantial benefits to the urban population. First, natural gas is a far more economic fuel for domestic cooking and heating than LPG or any of the other commonly used alternatives, meeting basic household needs at about half of the equivalent cost for LPG or electricity. Second, natural gas is much safer than highly flammable alternatives, such as gasoline and wood.

However, the key barrier that often prevents households reaping these benefits is the high switching costs, amounting to around US\$400. The target households in strata 1 and 2 cannot afford the connection fee of US\$370<sup>1</sup> (more than 220% of their annual income), despite local distribution company financing plans up to 6 years. The proposed US\$5.0 million GPOBA subsidy would provide a 38% connection cost subsidy (equivalent to US\$141 per connection). The remaining connection cost of US\$229 will be financed by the local gas distribution companies with financing plans of six years.

Promigas is Colombia's largest private gas transmission and distribution Company, accounting for approximately 51% of the total gas transported in the country. The recipient is Fundación Promigas, a charitable foundation funded by Promigas. Promigas holds stakes in several natural gas transmission and distribution companies. Four of

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<sup>1</sup> Equivalent to COP\$850,000 (at appraisal)

those distribution companies Surtigas, Gases del Caribe, Gases de la Guajira and Gases del Occidente were implementing agencies for the project.

## **1.2 Original Project Development Objectives (PDO) and Key Indicators**

The primary objective of the OBA scheme is to connect to the natural gas distribution network an estimated 35,000 families in the lowest income strata (1 and 2) in the Colombian Caribbean Coast and to demonstrate demand by providing evidence for three months of paid bills for gas consumption. To make sure that households are able to benefit from the service they will be provided with a basic stove.

New gas connections are expected to contribute to the following:

- Health: use of natural gas directly improves safety by reducing fire hazards and smoke-induced respiratory diseases, especially in children
- Environment: Natural gas also offers substantial benefits relative to fuels such as fuel oil and diesel, through far lower emissions. Depending on the type of fuel, these benefits can include emissions reductions in nitrogen oxides (up to 63%); suspended particles (up to 66%); and carbon monoxide (up to 93%). Due to the replacement of firewood as fuel in the target area, it is estimated that the implementation of the project would result in preservation of up to 34 hectares of forest or mangrove swamp land
- Finances: For the residential sector, gas competes with LPG and electricity for cooking and water heating. LPG and electricity prices are typically 1.4 and 4 times the price of gas, respectively. Estimates indicate that typical residential consumers, using 20 m<sup>3</sup> per month in stratum 2, save between US\$10 and US\$19/month, respectively.

Key indicators are the number of connections made to strata 1 and 2 households for which a stove was provided and three bills for gas consumption were collected.

## **1.3 Revised PDO**

No revision

## **1.4 Main Beneficiaries,**

Eligibility to the subsidies is restricted to households in strata 1 and 2 of the Estratificación Socio-Económica (ESE) rating system. The ESE is a means proxy-means testing targeting instrument has been in operation since 1965. This system classifies neighborhoods and rural areas in six strata, 1 to 6 (from poor to rich) based on the external characteristics of houses and neighborhoods. It is applied by municipalities for urban and rural areas following procedures and guidelines provided by the National Planning Department (DNP). It is based on a questionnaire that is applied in the field by trained people and a weighting system (not known publicly) to get to the six strata.

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<sup>2</sup> The average per household consumption even for strata 1 households has been confirmed at about 20cbm/month by the government information system for the sector (Sistema Unico de Informacion de Servicios Publicos - <http://www.sui.gov.co>);

## **1.5 Original Components**

### **Component 1: Promotion and Establishment of New Natural Gas Service Connections**

The grant recipient was responsible for marketing the natural gas connections to eligible beneficiary households, including carrying out of at least one public stakeholder consultation event by each recipient. The main project activity consisted in installing natural gas connections for about 35,000 Beneficiary households, providing such households with basic gas stoves and providing on-going service. The recipients are to provide evidence of collected bills of at least three months of consumption per connected household.

### **Component 2: Project Management, Monitoring and Evaluation**

Promigas is responsible for coordinating the allocation of grant funds among the gas distribution companies and for consolidating and processing payments of withdrawal applications, based on Stratification Certificates, Technical Certificates and Installation of Connection Certificates as held by the Recipients.

The auditor of Promigas is responsible for carrying out of audits and of monitoring and evaluation activities to assess the progress and performance in the implementation of the Project, including spot checks on connections made under Part 1 of the Project.

## **1.6 Revised Components**

No revision

## **1.7 Other significant changes**

Before the start of project implementation the Grant Agreement was amended to include the International Finance Corporation (IFC) as a donor, in addition to the original donor, the United Kingdom Department for International Development (DFID).

## **2. Key Factors Affecting Implementation and Outcomes**

### **2.1 Project Preparation, Design and Quality at Entry**

The project built on the experiences gathered by a pilot project funded by the Dutch Directorate General for International Cooperation (DGIS). This project of approx. US\$ 1.54m aimed at connecting 10,003 households between July 1, 2005 and June 30, 2007. This initial pilot project had focused exclusively on unconnected areas and subsidized all strata 1 and 2 households, including such that could have afforded the service without subsidies.

The following lessons from the pilot were incorporated in the project:

- Project focused mainly on increasing the number of gas customers in areas that already had access to gas. As many of the strata 1 and 2 households that could afford service without a subsidy were already connected to the gas grid, this decision increased the targeting effectiveness of the project.
- Project introduced payments from the donor to Promigas that were only disbursed after connections were made and verified. The DGIS project relied on the disbursements of advances into a special account held by Promigas, which was used to make connections on an output-basis.

- As was the case with the pilot, the project provided beneficiaries with a stove to enable them to benefit from the access to natural gas and using the social stratification system for targeting.

The project preparation included the analysis of a number of risk factors, such as the demand risk for gas connection and exchange rate related risks. The demand risk was substantial, given that natural gas was a new service for all beneficiaries and for some beneficiaries it was the first utility service at all that required them to regularly pay bills. The output-based design mainly transferred to the project's implementing agency, which took a number of steps to reach out to potential beneficiaries and to encourage demand.

The four participating distribution utilities were responsible for ensuring a participatory process of project implementation and for marketing gas connections (at the subsidized rate) to eligible low income households. To ensure involvement of the beneficiaries and publicity as to the availability of subsidized connections, the beneficiary and implementing agencies organized outreach activities and a local media campaign. Outreach activities included the participation of mayors and other community representatives.

## **2.2 Implementation**

The project was not restructured and was never at risk. The use of output-based aid facilitated regular output reporting and independent verification that outputs had been delivered.

The implementing agency faced several minor challenges it resolved without need for intervention from the Bank. Initially beneficiaries were reluctant to apply for connections, as for a number of them natural gas is the first service they receive that requires them to pay regular bills. This prompted the implementing agencies to increase outreach and communication efforts.

Another issue was that some beneficiaries preferred not to use gas until the credit for the connection was paid down. As a result there was a risk that a substantial portion of households would not meet the disbursement criterion that required three months of successful billing. Implementation agencies took a number of steps to promote the use of gas, to be described in more detail in the lessons learned section. Only a total 863 connections (2% of planned connections) were ineligible for re-imbusement at the end of the project, because the implementing agency could not meet this criterion.

During project implementation the US\$ devaluated against the COP, leading to confusion regarding the disbursement arrangements. The disbursement letter states that funds would be disbursed in COP "using the exchange rate in effect at the date disbursements are processed by the Bank". However, the recipient requested and the Bank made the first disbursement in US\$. As it became apparent that the US\$ devaluation would result in significantly lower unit subsidies, the recipient requested disbursements to be made in COP, to which the LOA officer agreed. The recipient took this to be an agreement that allowed charging the real unit subsidy granted to the beneficiaries of COP 325,000, not the subsidy of US\$ 141 in COP using the exchange rate in effect at the date disbursements are processed by the Bank. As a result the recipient requested disbursements that were higher than the amount agreed in the project documentation,

which were approved by LOA. When this mistake was discovered, the TTL requested the recipient to adjust future disbursement request and deduct any excess payments made from the next disbursement request. The recipient agreed to this.

### **2.3 Monitoring and Evaluation (M&E) Design, Implementation and Utilization**

The grant recipient had the primary responsibility for monitoring project progress. The beneficiary used its existing customer database to report on outputs provided as well as consumption patterns and bills paid of project beneficiaries.

The output reports and project accounts were audited by Deloitte, acting as auditor for the project and independent verification agent (IVA). Deloitte verified eligibility of beneficiaries and that the criteria for disbursement of Bank funds were met for all reported households. The verification process included visits to a random sample of 300 households to physically verify connections, presence of a subsidized stove and three month of billed consumption.

The recipient retained the University of Cartagena to do a study, validating the development impacts on indoor air pollution of the project. The study found a significant reduction in respiratory diseases as a result of the project.

### **2.4 Safeguard and Fiduciary Compliance**

Fundación Promigas complied satisfactorily with Bank fiduciary policy and standard requirements. The project management staff was skilled in its tasks. Project statements of expenditure and disbursement requests were submitted in a timely manner, as were the audit reports. The procurement of consultant services and goods were conducted in full compliance with the applicable Bank procurement guidelines and principles. No internal control issues arose to during project implementation.

### **2.5 Post-completion Operation/Next Phase**

The project beneficiaries are showing an excellent payment record, with only 2% of bills unpaid within thirty days of billing. This supports the argument that there is a sustainable demand for the service at existing tariffs as a result of natural gas being more cost effective than alternative sources of energy.

The subsidized connections are being serviced on an on-going basis by the implementing agencies, which have a demonstrated capacity to do so. All beneficiaries belong to strata I and II of the social stratification system and are entitled to a tariff subsidized, which are funded out of a national subsidy fund. This subsidy is funded by higher charges for the two wealthiest strata and is not a typical cross-subsidy, that distribution companies receive higher revenues from wealthier private and commercial clients regardless of the number of poor customers served. Instead, distribution companies have to apply for subsidy reimbursement from the subsidy fund, based on the amount of service actually provided to subsidized beneficiaries. This provides distribution companies with an incentive to provide sustainable service to subsidized customers.

The recipient was requested to report on the status of the project at the first and second anniversary of the closing of the project. Both recipient and implementing agencies are interested in continuing the project, but need to identify additional sources of grant funding.

### **3. Assessment of Outcomes**

#### **3.1 Relevance of Objectives, Design and Implementation**

The project had the twin goals of piloting output-based aid and achieving development objectives.

The 2002 CAS calls for “adequate provision of physical infrastructure” as the “third key element in returning Colombia to a path of fast and sustainable growth”. The projects objective of working with the private sector to improve infrastructure services to the poor is in line with the goals of the CAS. The project was based on the findings of a 2004 World Bank report on Recent Economic Developments in Infrastructure in Colombia (document 32085). The document highlights the benefits of the use of natural gas in areas that can be economically connected to the gas grid.

#### **3.2 Achievement of Project Development Objectives**

The main objective of the project of piloting OBA as an approach to provide infrastructure services and to connect approximately 35,000 families in the lowest income in the Colombian Caribbean Coast to the natural gas grid and to demonstrate demand by providing evidence for three months of paid bills for gas consumption was fully achieved. The average consumption of beneficiaries for the first three months billed has been approximately 13m<sup>3</sup>.

While the gas connection, delivery of a stove and minimum consumption targets are being referred to as “output” for the purpose of output-based payment, providing access to the natural gas grid and ensuring the three months of consumption and successful billing can be more appropriately considered a intermediate project outcome for the purpose of project evaluation.

Other outcomes of the project are estimated, based on empirical studies of benefits of gas connections undertaken by the grant recipient. This is considered the best approximation of benefits accruing to the project, as the small size of the project and broad geographic scope is not expected to allow seeing a discernable impact on aggregate figures of health expenditures, the environment and economic growth.

Studies undertaken by the Health Economics Group of the University of Cartagena on behalf of Fundación Promigas, show that the reduction in respiratory diseases caused by the connections funded under the project has resulted in significant health expenditure savings. The study found that the project’s impact on respiratory illnesses was highly cost-effective (US\$ 20 per disability adjusted life year saved – DALY) compared to pneumococcal vaccine (between US\$ 154 and US\$ 5,252 in different countries in Latin America). The project is estimated to have avoided over 5,500 outpatient visits and nearly 1,700 hospitalizations during the study period. For every US\$ 100 of subsidy, the project is expected to provide between US\$ 65 and 96 of benefits per year, resulting from a reduced burden of disease and economic savings.

Given that the project has been fully implemented, it is expected that the reduction in firewood used has resulted in preservation of up to 34 hectares of forest or mangrove swamp land (see PDOs).

### **3.3 Efficiency**

The project is estimated to cost US\$ 20 per DALY gained (compared to at least US\$ 154 per DALY for pneumococcal vaccines). This means that the project can achieve health outcomes more cost-effectively than many health care interventions.

Discounting the consumption subsidy provided by the Colombian state for strata I and II, the economic rate of return of the project over 10 years is 62%, taking into account cost savings for medical treatments and expenditures as well as economic savings due to households switching to natural gas.

### **3.4 Justification of Overall Outcome Rating**

Rating: Highly satisfactory

The project has delivered the expected results within the existing time frame, despite adverse conditions caused by the US\$ devaluation. The highly innovative approach required the grant recipient as well as the implementing agencies to adapt their way of operating to local conditions. This is particularly evident in how the implementing agencies reached out to potential beneficiaries to provide many of them with the first utility service that requires them to pay monthly bills. The very high rate of bills paid by the beneficiaries indicates the demand for natural gas and satisfaction with the service.

### **3.5 Overarching Themes, Other Outcomes and Impacts**

#### **(a) Poverty Impacts, Gender Aspects, and Social Development**

The project has exclusively focused on delivering gas connections to households from the two poorest strata. Connections to wealthier households were not eligible for reimbursement. The project has retained an independent verification agent to ensure that the targeting criteria of the project were met.

The use of natural gas helps poor households in that it both reduces expenditures on alternative sources of energy and time spent in gathering fuel wood. While the former has an immediate impact on disposable income, the latter frees time for more productive activity or, in cases where children are responsible for gathering fire wood, for education.

A reduction in indoor air pollution as a result of the use of natural gas has been shown to be a cost-effective health intervention, reducing both the burden of disease and medical expenditure. The benefits accrue chiefly to women, who traditionally have the task of food preparation and children, who are frequently at home, being exposed to smoke. This improvement in child health is also beneficial for women who bear the main burden of giving care to children.

#### **(b) Institutional Change/Strengthening**

The project relied on existing structures.

#### **(c) Other Unintended Outcomes and Impacts (positive or negative)**

None identified.

## **4. Assessment of Risk to Development Outcome**

Rating: Low

Colombia has abundant reserves of natural gas and gas consumption for the two lowest strata of the population is subsidized out of a fund replenished with a levy on gas companies. The implementing agencies have a record of continuous service provision with very short interruptions, mainly for the purpose of maintenance.

Both beneficiaries of the project and households from strata I and II have very good payment records with only 2% of bills unpaid 30 days after billing. This is an indication that prices are affordable to the target group and that the target group has a demand for natural gas.

## **5. Assessment of Bank and Borrower Performance**

### **5.1 Bank Performance**

#### **(a) Bank Performance in Ensuring Quality at Entry**

Rating: Satisfactory

The project preparation ensured a high likelihood of meeting PDOs. The selected grant recipient and implementing agency had demonstrated an excellent track record and a proven capacity to deliver the outputs. The selection of competent implementing agencies was instrumental to ensuring the project's success. As the output-based approach resulted in funding only being disbursed after independent verification of output delivery, the risk to the Bank was at all times low.

The output-based nature of the project shifted the demand risk and other operational risks to the recipient and implementing agencies. This ensured a very strong ownership and helped to ensure that PDOs were reached. As a result the recipient and implementing agencies took actions to address the initial slow up-take of the project.

The combination of self-reporting through the implementing agencies database with independent verification of outputs ensured that progress was constantly monitored and the Bank was regularly updated on the number of outputs delivered. Regular progress reports also provided information on the natural gas consumption of beneficiaries and estimated expenditure savings.

During project preparation the task team assessed the recipient's procurement and financial management capacity. As this capacity was found satisfactory the project relied on the recipient's and implementing agencies' procurement and FM arrangements, resulting in a more efficient project implementation. The recipient's financial auditor, Deloitte, which acted at the same time as independent verification agent, had the task to ensure the recipient's compliance with procurement and FM standards. Using the existing capacity of the service provider to procure inputs for the project helped to reduce transaction cost and to speed up implementation. The fixed reimbursement on verified outputs effectively protected the Bank against procurement and FM-related risks.

#### **(b) Quality of Supervision**

Rating: Satisfactory

The fact that payments were conditional on the delivery of outputs ensured that the project focused on PDOs. Making three months of successful billing a disbursement

condition, helped to transfer an incentive for ensuring that development objectives are reached to the recipient. A high quality of performance reporting was assured, as disbursements were conditional on the Bank receiving audited and independently verified output reports, including names and addresses of beneficiaries, strata they belong to and consumption of gas for the first three successfully billed months. The accuracy of those reports was certified by the independent verification agent, reviewing the documentation and visiting a random sample of households for physical verification.

The use of the recipient's procurement and FM systems, ensured through regular audits by a reputable audit firm, is considered best practice. The use of an output-based aid modality in combination with regular audits ensured that the World Bank was protected against procurement and FM-related risks.

Supervision is not rated as highly satisfactory due to an issue in the disbursement process. The disbursement letter states that funds would be disbursed in COP "using the exchange rate in effect at the date disbursements are processed by the Bank". However, the recipient requested and the Bank made the first disbursement in US\$. The Bank agreed to this. As it became apparent to that the US\$ devaluation would result in significantly lower unit subsidies, the recipient requested disbursements to be made in COP of the full amount of local currency subsidy of COP 325,000, not the subsidy of US\$ 141 in COP equivalent. As a result the recipient requested disbursements that were higher than the amount agreed in the project documentation. The Bank approved disbursement for the higher unit subsidy amount. The Bank and the recipient resolved this issue amicably and the recipient delivered the agreed outputs, absorbing exchange-rate related losses.

**(c) Justification of Rating for Overall Bank Performance**

Rating: Satisfactory

**5.2 Borrower Performance**

**(a) Government Performance**

Rating: Not applicable – no government involvement.

**(b) Implementing Agency or Agencies Performance**

Rating: Highly satisfactory

The implementing agency was selected for its capacity to successfully implement the project. Gas installations and billing were carried out by the existing staff of the gas distribution companies, who are successfully providing the same services for unsubsidized commercial customers. The project was managed out of the recipient's investment division. Outreach activities were undertaken jointly between the recipient, implementing agencies and charitable foundations funded by the recipient and implementing agencies that also were in constant contact with local mayors and other representatives of beneficiaries.

The recipient's and implementing agencies' efforts in addressing issues arising during the project preparation is considered best practice. Examples for this are outreach activities to promote the use of natural gas and the safety concern when installing natural gas connections in dwellings that were not made of brick. In such cases the implementing

agencies built a brick stand on which the gas stove could be operated securely and a low brick wall where the gas reader could be attached securely.

Both financial audits and verified output reports were delivered in a timely manner. Reporting relied on the customer and billing databases of the implementing agencies. As a result of the deteriorating exchange rate, the implementing agencies invested a significant amount of own funds in providing subsidies to poor households. Similarly the implementing agencies waived a part of the refund of subsidies for beneficiaries who did not meet the criterion of three months of successful billing.

**(c) Justification of Rating for Overall Borrower Performance**

Rating: Highly Satisfactory

**6. Lessons Learned**

- The grant amount was stated in the Grant Agreement as US\$ 141 so that the recipient and the implementing agencies bore the exchange rate risk of the project. During the project duration the value of the COP rose by approximately 30% against the US\$. The implementing agencies absorbed this shortfall as part of their charitable work. However, it cannot be expected that recipients or implementing agencies habitually absorb currency fluctuations, as in most cases the effect of such fluctuations would surpass their financial strength. Therefore careful consideration should be given to structuring a mechanism whereby the risk of exposure to foreign currency is not placed on the project implementers, just as in a public-private partnership regime the risk is typically not placed on the private implementer.
- Deloitte Touch was auditor of both the recipient and the implementing agencies before the project and thus was familiar with the companies and could easily appreciate all relevant aspects of the project. Adding auditing of project accounts and independent verification of outputs to Deloitte Touches existing tasks helped saving money and ensuring smooth operations.
- The role of Fundación Promigas as grant recipient, administering the project and interfacing with the four implementing agencies, has been instrumental for the success of the project. Fundación Promigas provided support to the distribution companies in selecting beneficiary communities and in targeting beneficiaries. Throughout the project Fundación Promigas conducted visits to beneficiary communities and helped clarify issues relating to project implementation with the implementing agencies
- The appropriate application of the World Bank's fiduciary procedures to an output-based arrangement allowed minimizing the fiduciary risk of the Bank without encroaching on the implementers' freedom to use its own systems to deliver outputs. The project has confirmed that paying on outputs effectively transfers procurement and FM-related risks to service providers.

The project has addressed this issue by targeting subsidies to areas that already had access to the natural gas network for some time, so that households able to afford the connection fee were likely already connected when the project started. The recipient

suggested that it may also be possible to construct a targeting tool based on data of the health status of households, focusing on areas with high incidence of diseases that primarily affect poor people, such as respiratory diseases and diarrhea.

- While the provision of basic cooking stoves has contributed to the success of the project, there were households that already had stoves for the use with LPG. For such cases the distribution companies offered vouchers for the value of the basic cooking stove that counted towards the cost of connection.

## **7. Comments on Issues Raised by Grantee/Implementing Agencies/Donors**

### **(a) Grantee/Implementing agencies**

The recipient and implementing agencies have provided very positive feedback on the project. The OBA mechanism has enabled them to rely on their own systems, which significantly has contributed to avoid delays and meeting the project's objectives.

The recipient and implementing agencies raised the issue of exchange rate-related losses.

### **(b) The Independent Verification Agent**

The IVA shares the recipient's view on the appropriateness of OBA and exchange rate related issues. Additionally, the IVA suggested thinking about using a standardized format of Interim Financial Reports adapted to the OBA.

## Annex 1. Project Costs and Financing

### (a) Project Cost by Component (in USD Million equivalent)

Components	Appraisal Estimate (USD millions)	Actual/Latest Estimate (USD millions)	Percentage of Appraisal
Establishment of Natural Gas Connections	4,935,000.00	4,813,458	98%
Project Management, Monitoring and Evaluation	150,000.00	67,860	45%
<b>Total Baseline Cost</b>	5,085,000.00	4,881,318.00	96%
Physical Contingencies	0.00	0.00	N/A
Price Contingencies	0.00	0.00	N/A
<b>Total Project Costs</b>	5,085,000.00	4,881,318.00	96%
Project Preparation Costs	50,000.00	42,624.17	85%
<b>Total Financing Required</b>	5,135,000.00	4,923,942.17	96%

### (b) Financing

Source of Funds	Type of Cofinancing	Appraisal Estimate (USD millions)	Actual/Latest Estimate (USD millions)	Percentage of Appraisal
Trust Funds		0.00	0.00	
Global Partnership on Output-based Aid		5.09	4.88	96%

## **Annex 2. Outputs by Component**

### Component 1: Promotion and Establishment of New Natural Gas Service Connections

Gas Distribution Company	Projected connections	Verified connections meeting disbursement criteria		
		Stratum I	Stratum II	Total
Gases del Occidente	13,000	5,446	8,258	13,704
GasCaribe	10,000	5,137	2,356	7,493
Surtigas	10,000	8,030	2,969	10,999
GasGuajira	2,000	979	963	1,942
<b>Total</b>	<b>35,000</b>	<b>19,592</b>	<b>14,546</b>	<b>34,138</b>

### Component 2: Project Management, Monitoring and Evaluation

The IVA produced 6 verification reports.

### Annex 3. Economic and Financial Analysis

A detailed ex-post cost benefit analysis was undertaken by the University of Cartagena. It includes analysis on the burden of disease prevented and economic gains resulting from the project. The ERR analysis focused on benefits from avoided medical treatment costs and financial savings.

The following tables and figure summarize the findings of the report:

TABLE 4. BURDEN OF DISEASE IN THE LOCALITIES OF THE PROJECT. COLOMBIA 2008

(ARI) Events < 5 years	In the absence of the OBA Project			In the presence of the OBA Project		
	Base Case	Lower Limit	Upper Limit	Base Case	Lower Limit	Upper Limit
Outpatient cases	6.562	6.288	7.382	2.165	2.075	2.436
Hospitalizations	1.969	1.572	2.584	650	519	853
Deaths	79	47	129	26	16	43
DALYs	96.049	75.697	127.723	31.696	24.980	42.149
(COPD) Events > 60 years						
Outpatient cases	6.049	4.906	9.006	4.476	3.631	6.664
Hospitalizations	1.815	1.227	3.152	1.343	908	2.332
Deaths	145	61	347	107	45	257
DALYs	19.764	12.822	35.711	14.625	9.488	26.426
<b>Total avoided events</b>						
Outpatient cases avoided of ARI				4.068	3.899	4.577
Hospitalizations avoided for ARI				1.220	975	1.602
Deaths avoided for ARI				49	29	80
DALYs avoided for ARI				59.550	46.932	79.188
Outpatient cases avoided of COPD				1.573	1.276	2.341
Hospitalizations avoided for COPD				472	319	820
Muertes por EPOC evitadas				38	16	90
AVAD por EPOC evitados				5.139	3.334	9.285

TABLE 5. COSTS OF BURDEN OF DISEASE IN THE LOCALITIES OF THE PROJECT. COLOMBIA 2008

(ARI) Events < 5 years	In the absence of the OBA Project			In the presence of the OBA Project		
	Base Case	Lower Limit	Upper Limit	Base Case	Lower Limit	Upper Limit
Outpatient cases	616.810	591.109	693.911	234.388	224.622	263.686
Hospitalizations	1.748.065	1.396.024	2.294.335	664.265	530.489	871.847
<b>Subtotal costs ARI</b>	<b>2.364.874</b>	<b>1.987.133</b>	<b>2.988.246</b>	898.652	755.111	1.135.533
(COPD) Events > 60 years						
Outpatient cases	3.024.324	2.453.063	4.502.883	2.238.000	1.815.267	3.332.133
Hospitalizations	9.279.836	6.272.482	16.119.419	6.867.079	4.641.637	11.928.370
<b>Subtotal costs COPD</b>	<b>12.304.160</b>	<b>8.725.545</b>	<b>20.622.302</b>	9.105.079	6.456.903	15.260.503
<b>Total Cost Burden</b>	<b>14.669.035</b>	<b>10.712.678</b>	<b>23.610.547</b>	<b>10.003.731</b>	<b>7.212.014</b>	<b>16.396.037</b>
<b>Total costos avoided by the project</b>				<b>4.665.304</b>	<b>3.500.664</b>	<b>7.214.511</b>
<b>Total installation costs of GND</b>				<b>4.984.002</b>	<b>4.335.399</b>	<b>5.803.290</b>
<b>Cost/Deaths avoided for the period</b>				<b>3.682</b>	<b>-8.289</b>	<b>18.473</b>
<b>Cost / DALY avoided for the period</b>				<b>5</b>	<b>17</b>	<b>-16</b>
<b>Total neto costs for the period</b>				<b>318.698</b>	<b>-1.411.221</b>	<b>834.735</b>

TABLE 6. Financial return of the project for households for 20 years. Colombia 2008

Ítems	Average	Lower Limit	Upper Limit
Total household income	1.096.087.341,3	865.834.808,4	1.569.325.590,3
Spending on different fuel to GND	57.009.359,7	50.367.234,2	63.652.387,1
GND spending without subsidy	25.109.209,4	21.970.558,3	28.247.860,6
GND spending with subsidy	13.182.335,0	11.926.874,5	14.437.795,4
State subsidies	11.926.874,5	10.043.683,8	13.810.065,2
Savings without subsidies	31.900.150,3	28.396.676,0	35.404.526,5
Savings with subsidies	43.827.024,8	38.440.359,8	49.214.591,7
Internal Rate of Return without subsidies	42%	37%	46%
Internal Rate of Return with subsidies	57%	50%	64%

FIGURE 3. INTERNAL RATE OF RETURN OF THE PROJECT. COLOMBIA 2



## Annex 4. Grant Preparation and Implementation Support/Supervision Processes

### (a) Task Team members

Names	Title	Unit	Responsibility/ Specialty
<b>Lending/Grant Preparation</b>			
Dirk Sommer	Senior Infrastructure Specialist	IEF	TTL
Luis Tineo	Senior Procurement Specialist	IEF	Procurement Specialist
Jeannette Estupinan	Financial Management Specialist	LCSFM	FM Specialist
Jose M. Martinez	Senior Procurement Specialist	LCS	Procurement Specialist
Jose C. Janeiro	Senior Finance Officer	LCS	Finance Officer
Tatiana Cristina O. de Abreu Souza	Finance Analyst	LOA	Finance Analyst
Marta A. Cervantes-Miguel	Finance Assistant	LCS	Finance Assistant
Georgina Dellacha	Consultant	IEF	Consultant
Luis Fernando Rios			
<b>Supervision/ICR</b>			
Cledan Mandri-Perrott	Senior Infrastructure Specialist	FEU	TTL
Luis Tineo	Senior Infrastructure Specialist	FEU	FM Specialist
Otto Bolanos			
Claudia Cardenas Garcia	Consultant	LCS	Consultant
Jeannette Estupinan	Financial Management Specialist	LCSFM	FM Specialist

### (b) Staff Time and Cost

Stage of Project Cycle	Staff Time and Cost (Bank Budget Only)	
	No. of staff weeks	USD Thousands (including travel and consultant costs)
<b>Lending</b>		
<b>Total:</b>	9.37	42,624.00
<b>Supervision/ICR</b>		
<b>Total:</b>	9.12	47,358.00

**Annex 5. Summary of Grantee's ICR and/or Comments on Draft ICR**

Grantee did not have substantive comments on the ICR.

## **Annex 6. List of Supporting Documents**

Alvis Guzman, Nelson and Luis Alvis Estrada, “Health and economic impact of connection poor households to natural gas at home in Colombia 2007”, Study prepared for the project, February 2009

Yepes, Luis Augusto, “Colombia: Desarrollo Económico Reciente en Infraestructura: Balanceando las necesidades sociales y productivas de infraestructura” The World Bank, September 2004

World Bank, Country Assistance Strategy of the World Bank Group for the Republic of Colombia, December 2002

# MAP

IBRD 36629



FEBRUARY 2005