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Report No: PAD935

INTERNATIONAL BANK FOR RECONSTRUCTION AND DEVELOPMENT
PROJECT APPRAISAL DOCUMENT
ON A PROPOSED LOAN
IN THE AMOUNT OF US\$ 500 MILLION

TO THE

ARAB REPUBLIC OF EGYPT

FOR AN

EGYPT HOUSEHOLD NATURAL GAS CONNECTION PROJECT

June 27, 2014

Sustainable Development Department
Middle East and North Africa Region

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CURRENCY EQUIVALENTS

Exchange Rate Effective: May 31, 2014

Currency Unit = Egyptian Pound (LE)
LE 7.15 = US\$1

Fiscal Year
July 1 – June 30

Abbreviations and Acronyms

AFD	<i>Agence Française de Développement</i> (French Development Agency)
BCF	Billion Cubic Feet
BD	Bidding Documents
CE	Citizen Engagement
CNG	Compressed Natural Gas
CSC	Customer Service Centers
DA	Designated Account
E&P	Exploration and Production
EGAS	Egyptian Natural Gas Holding Company
EGPC	Egyptian General Petroleum Corporation
EIRR	Economic Internal Rate of Return
ESIAF	Environmental and Social Impact Assessment Framework
ESMMF	Environmental and Social Management and Monitoring Framework
ESMP	Environmental and Social Management Plan
EU	European Union
FIRR	Financial Internal Rate of Return
FM	Financial Management
FMIS	Financial Management and Information System
FY	Fiscal Year
GANOPE	Ganoub El Wadi Petroleum Holding Company
GASCO	Egyptian Natural Gas Company
GDP	Gross Domestic Product
GOE	Government of Egypt
GPS	Global Positioning System
HSE	Health, Safety, and Environment
IBRD	International Bank for Reconstruction and Development
IDA	International Development Agency
IDF	Institutional Development Fund
ISN	Interim Strategy Note
KPI	Key Performance Indicators
LDC	Local Distribution Company
LE	Egyptian Pound
LNG	Liquefied Natural Gas
LPG	Liquefied Petroleum Gas

MENA	Middle East and North Africa
MOP	Ministry of Petroleum and Mineral Resources
NGO	Non-Governmental Organization
NPV	Net Present Value
O&M	Operations and Maintenance
OP	Operational Policy
ORAF	Operational Risk Assessment Framework
P&A	Property and Appliance
PAP	Project Affected Persons
PDO	Project Development Objectives
PMU	Project Management Unit
PRS	Pressure Reduction Station
QRA	Quantitative Risk Assessment
RAP	Resettlement Action Plan
RPF	Resettlement Policy Framework
SDO	Social Development Officers
SSN	Social Safety Nets
T&D	Transmission and Distribution

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Country Director:	Hartwig Schafer
Sector Director:	Junaid Kamal Ahmad/ Charles Feinstein
Sector Manager:	Charles Joseph Cormier
Task Team Leader:	Husam Mohamed Beides Mohab Awad Mokhtar Hallouda Fowzia Hassan

ARAB REPUBLIC OF EGYPT

EGYPT: HOUSEHOLD NATURAL GAS CONNECTION PROJECT (P146007)

TABLE OF CONTENTS

	Page
I. STRATEGIC CONTEXT	1
A. Country Context.....	1
B. Sectoral and Institutional Context.....	5
C. Higher Level Objectives to which the Project Contributes	13
II. PROJECT DEVELOPMENT OBJECTIVE(S).....	14
A. Project Development Objective (PDO)	14
B. Project Beneficiaries	14
C. PDO Level Results Indicators	15
III. PROJECT DESCRIPTION	15
A. Project Components	15
B. Project Financing	18
C. Lessons Learned and Reflected in the Project Design.....	19
IV. IMPLEMENTATION	21
A. Institutional and Implementation Arrangements	21
B. Results Monitoring and Evaluation	22
C. Sustainability.....	22
V. KEY RISKS AND MITIGATION MEASURES	23
A. Risk Ratings Summary Table	23
B. Overall Risk Rating Explanation	23
VI. APPRAISAL SUMMARY	24
A. Economic and Financial Analysis.....	24
B. Technical.....	27
C. Financial Management.....	27
D. Procurement	28
E. Citizen Engagement	29
F. Social (including Safeguards).....	29
G. Environment (including Safeguards)	31
Annex 1: Results Framework and Monitoring.....	32
Annex 2: Detailed Project Description	36
Annex 2A: List of Governorates with Household Connections and PRSs.....	45
Annex 2B: Targeted Areas Poverty Mapping and Household Affordability	49
Annex 3: Implementation Arrangements.....	54
Annex 4: Operational Risk Assessment Framework (ORAF)	72
Annex 5: Implementation Support Plan.....	78
Annex 6: Project Economic and Financial Analyses	81
Annex 7: Financial Analysis of the Gas Sector and EGAS	92

PAD DATA SHEET

Egypt, Arab Republic of
EG: Household Natural Gas Connection Project (P146007)

PROJECT APPRAISAL DOCUMENT MIDDLE EAST AND NORTH AFRICA MNSEE

Report No.: PAD935

Basic Information					
Project ID P146007	EA Category A - Full Assessment	Team Leader Husam Mohamed Beides Mohab Awad Mokhtar Hallouda Fowzia Hassan			
Lending Instrument Investment Project Financing	Fragile and/or Capacity Constraints []				
	Financial Intermediaries []				
	Series of Projects []				
Project Implementation Start Date 24-Jul-2014	Project Implementation End Date 28-Dec-2018				
Expected Effectiveness Date 27-Feb-2015	Expected Closing Date 30-Jun-2019				
Joint IFC No					
Sector Manager Charles Joseph Cormier	Sector Director Junaid Kamal Ahmad	Country Director Hartwig Schafer	Regional Vice President Inger Andersen		
Borrower: Government of Egypt, Ministry of International Cooperation					
Responsible Agency: Egyptian Natural Gas Holding Company					
Contact: Telephone No.: 20222642930	Engineer Ahmed Farag	Title: Email: amfarrag@egas.com.eg	Project Manager		
Project Financing Data(in USD Million)					
<input checked="" type="checkbox"/> Loan	<input type="checkbox"/> IDA Grant	<input type="checkbox"/> Guarantee			
<input type="checkbox"/> Credit	<input type="checkbox"/> Grant	<input type="checkbox"/> Other			
Total Project Cost:	1473.90	Total Bank Financing:	500.00		
Financing Gap:	0.00				
Financing Source					Amount
Borrower					473.00
International Bank for Reconstruction and Development					500.00
European Neighborhood Instrument					78.90
FRANCE French Agency for Development					96.00
LOCAL BENEFICIARIES					326.00
Total					1473.90
Expected Disbursements (in USD Million)					
Fiscal Year	2015	2016	2017	2018	2019
Annual	50.00	150.00	150.00	100.00	50.00
Cumulative	50.00	200.00	350.00	450.00	500.00

Proposed Development Objective(s)				
The project development objective is to assist the Arab Republic of Egypt to increase household access to reliable, lower cost, grid connected natural gas supply.				
Components				
Component Name				Cost (USD Millions)
Gas Network Expansion and Household Connections				1,395.00
Financial Support for Household Connection Charges in Disadvantaged Areas				61.20
Institutional Strengthening				17.70
Institutional Data				
Sector Board				
Energy and Mining				
Sectors / Climate Change				
Sector (Maximum 5 and total % must equal 100)				
Major Sector	Sector	%	Adaptation Co-benefits %	Mitigation Co-benefits %
Energy and mining	Oil and gas	100		
Total		100		
<input checked="" type="checkbox"/> I certify that there is no Adaptation and Mitigation Climate Change Co-benefits information applicable to this project.				
Themes				
Theme (Maximum 5 and total % must equal 100)				
Major theme	Theme	%		
Urban development	City-wide Infrastructure and Service Delivery	40		
Urban development	Urban services and housing for the poor	30		
Economic management	Other economic management	30		
Total		100		
Compliance				
Policy				
Does the project depart from the CAS in content or in other significant respects?			Yes[]	No[X]
Does the project require any waivers of Bank policies?			Yes[]	No[X]
Have these been approved by Bank management?			Yes[]	No[]
Is approval for any policy waiver sought from the Board?			Yes[]	No[X]
Does the project meet the Regional criteria for readiness for implementation?			Yes[X]	No[]
Safeguard Policies Triggered by the Project		Yes	No	
Environmental Assessment OP/BP 4.01		X		
Natural Habitats OP/BP 4.04			X	
Forests OP/BP 4.36			X	
Pest Management OP 4.09			X	
Physical Cultural Resources OP/BP 4.11		X		
Indigenous Peoples OP/BP 4.10			X	
Involuntary Resettlement OP/BP 4.12		X		
Safety of Dams OP/BP 4.37			X	
Projects on International Waterways OP/BP 7.50			X	
Projects in Disputed Areas OP/BP 7.60			X	

Legal Covenants			
Name	Recurrent	Due Date	Frequency
Implementation Arrangements	X		
Description of Covenant			
To facilitate the carrying out of the Project, the Borrower shall make the proceeds of the Loan available to EGAS under a Subsidiary Loan Agreement between the Borrower and EGAS and both parties shall maintain and enforce the Subsidiary Loan Agreement throughout Project implementation (Section I.B of Schedule 2 to the Loan Agreement; Section I.A of the Schedule to the Project Agreement)			
Name	Recurrent	Due Date	Frequency
Implementation Arrangements	X		
Description of Covenant			
The Borrower shall carry out Part A of the Project through EGAS, and to that end, EGAS shall enter into EGAS Implementation Agreements with the relevant entities (Section I.B.2 of the Schedule to the Project Agreement). The parties shall maintain and enforce EGAS Implementation Agreements throughout the duration of Project implementation (Section I.B.3 of the Schedule to the Project Agreement).			
Name	Recurrent	Due Date	Frequency
Implementation Arrangements	X		
Description of Covenant			
EGAS shall establish and thereafter maintain implementation arrangements for carrying out activities under Part B of the Project, including mechanisms for the provision of financial support for connection fees for households in disadvantaged and poor areas (Section I.B.4 of the Schedule to the Project Agreement).			
Name	Recurrent	Due Date	Frequency
Implementation Arrangements		01-Sep-2015	
Description of Covenant			
The Borrower through its relevant entities shall carry out Part C of the Project and shall prepare and submit to the Bank, an action plan for the implementation of Part C.2 of the Project acceptable to the Bank (Section I.A.2 of Schedule 2 to the Loan Agreement).			
Name	Recurrent	Due Date	Frequency
Implementation Arrangements	X		
Description of Covenant			
EGAS shall provide adequate funding necessary for the timely and efficient implementation of the Project (Section I.B.6 of the Schedule to the Project Agreement).			
Name	Recurrent	Due Date	Frequency
Implementation Arrangements	X		
Description of Covenant			
EGAS, Egypt Gas and Town Gas shall carry out the Project in accordance with the provisions of the Project Implementation Manual (Section 5.02 (c) and Section I.C of Schedule 2 to the Loan Agreement) and the provisions of the Financial Management Manual (Section I.B (ii)(A) of the Schedule to Project Agreement).			
Name	Recurrent	Due Date	Frequency
Institutional Arrangements	X		
Description of Covenant			
EGAS shall maintain, throughout the implementation of the Project, the Project Management Unit (PMU) with adequate staffing, resources and terms of reference satisfactory to the Bank (Section I.A.1 of Schedule 2 to the Loan Agreement; Section I.B.1 of the Schedule to the Project Agreement).			

Name	Recurrent	Due Date	Frequency
Environmental and Social Safeguards	X		
Description of Covenant			
EGAS shall carry out the Project in accordance with the ESIAF, ESIA, ESMP, RPF, RAP and QRA (Section I.E.1 of Schedule 2 to the Loan Agreement; Section I.D.1 of the Schedule to the Project Agreement).			
Name	Recurrent	Due Date	Frequency
Environmental and Social Safeguards	X		
Description of Covenant			
EGAS shall establish and make operational a grievance redressal mechanism prior to the commencement of project activities to address any issues that may arise in connection with the implementation of the RPF or RAPs (Section I.D.2 (d) of the Schedule to Project Agreement).			
Name	Recurrent	Due Date	Frequency
Environmental and Social Safeguards	X		
Description of Covenant			
EGAS, Egypt Gas and Town Gas shall provide to the Bank consolidated quarterly reports on the status of compliance with the implementation of the ESIAF and respective site-specific ESIA's and ESMPs, RPF and respective site-specific RAPs and the QRA (Section I.D.3 of the Schedule to the Project Agreement).			
Name	Recurrent	Due Date	Frequency
Environmental and Social Safeguards	X		
Description of Covenant			
In the event that land for the Project is purchased by EGAS, Egypt Gas and Town Gas from owners on a voluntary basis, EGAS, Egypt Gas and Town Gas shall carry out adequate consultations, enter into contracts and address direct impacts on people who may be adversely affected in accordance with the provisions of the RPF and relevant RAP (Section I.D.4 (c) of the Schedule to the Project Agreement).			
Name	Recurrent	Due Date	Frequency
Environmental and Social Safeguards	X		
Description of Covenant			
EGAS shall ensure that no activities involving the use of land shall be carried out prior to the review of the legal status of the land by EGAS in a manner acceptable to the Bank and shall also ensure that no activities shall be carried out involving land, for which there is legal uncertainty over ownership and use rights (Section I.D.4 (a) and (b) of the Schedule to the Project Agreement).			
Conditions			
Source Of Fund	Name	Type	
IBRD	Article V of the Loan Agreement 5.02 (a)	Effectiveness	
Description of Condition			
The Subsidiary Loan Agreement has been executed on behalf of the Borrower and the Project Implementing Entity.			
Source Of Fund	Name	Type	
IBRD	Article V of the Loan Agreement 5.02 (b)	Effectiveness	
Description of Condition			
The EGAS Implementation Agreement between the Project Implementing Entity and Egypt Gas Company and ReGas, and the EGAS Implementation Agreement between the Project Implementing Entity and Town Gas Company, ReGas, Sianco and SinaiGas have each been entered into.			
Source Of Fund	Name	Type	
IBRD	Article V of the Loan Agreement 5.02 (c)	Effectiveness	
Description of Condition			
The Project Implementing Entity has prepared and adopted a Project Implementation Manual in form agreed with the Bank and substance satisfactory to the Bank.			

Team Composition			
Bank Staff			
Name	Title	Specialization	Unit
Mohamed Yahia Ahmed Said Abd El Karim	Sr Financial Management Specialist	Sr Financial Management Specialist	MNAFM
Syed I. Ahmed	Lead Counsel	Legal	LEGAM
Sudeshna Ghosh Banerjee	Senior Economist	Senior Economist	SEGEN
Husam Mohamed Beides	Lead Energy Specialist	Task Team Leader	MNSEE
Nina Bhatt	Lead Social Development Specialist	Lead Social Development Specialist	MNSSU
Daniel Camos Daurella	Economist	Economist	MNSEE
Rome Chavapricha	Senior Energy Specialist	Senior Energy Specialist	EASTS
Amal Nabil Faltas Bastorous	E T Consultant	E T Consultant	MNSSU
Harikumar Gadde	Carbon Finance Specialist	Carbon Finance Specialist	GCCCF
Mohab Awad Mokhtar Hallouda	Senior Energy Specialist	Co-Task Team Leader	MNSEE
Fowzia Hassan	Energy Specialist	Co-Task Team Leader	MNSEE
Elizabeth Hassan	E T Consultant	Legal	LEGAM
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Africa Eshogba Olojoba	Senior Environmental Specialist	Senior Environmental Specialist	MNSEE
Luis R. Prada Villalobos	Senior Procurement Specialist	Senior Procurement Specialist	MNAPC
Andrianirina Michel Eric Ranjeva	Finance Officer	Finance Officer	CTRLA
Norhan Mohamed Sadik	Temporary	Temporary	MNSSU
Chaogang Wang	Senior Social Development Specialist	Senior Social Development Specialist	MNSSU
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Name	Title	City	
John Bowers	Gas Consultant	Embsay, Skipton	
Ihab Mohamed Shaalan	Environmental Consultant	Cairo	
Matthew John Yaquinto Jr.	Gas Consultant	Houston	

I. STRATEGIC CONTEXT

A. Country Context

1. **Egypt is in the midst of an historic socio-political transition since the January 2011 Revolution.** In July 2013 a twelve month roadmap was announced by an interim Government designed to usher in a new political system. Two pillars of the roadmap have concluded with the approval of the new Constitution by referendum in January 2014 and completion of the presidential election in June 2014. The next step of the roadmap is expected during the summer or the fall of 2014 when parliamentary elections are planned to be held.

2. **The transition has been accompanied by rising fiscal pressures, a dampening of the growth trajectory, and a rise in the poverty rate.** In Fiscal Year 2013 (FY13), the fiscal deficit and public debt reached 14 percent and 100 percent of gross domestic product (GDP) respectively. As in the past years, fuel subsidies remained a substantial component of the Government budget in FY 2012/13, and accounted for 22 percent of budget expenditures, amounting to seven percent of GDP. Since 2011, the economic growth rate has averaged one to two percent per year, which is markedly lower than the five percent growth rate in 2010. Inflation reported the highest three-year average of about eleven percent in July to December 2013. The unemployment rate continues to rise, disproportionately so for women and youth, and has reached about 13 percent in 2013. As a result, poverty has shown an upward trend at 26 percent in 2013 compared to 25 percent in 2011. Poverty in some regions is consistently above the national average, in particular in rural Upper Egypt, where the poverty rate is 50 percent.

3. **The focus of the interim Government has been to ‘jump-start’ the economy by way of two stimulus packages.** The stimulus is primarily aimed at creating jobs and improving public service delivery, which includes a program to support households access a safer, more reliable and lower cost energy source for cooking by shifting from Liquefied Petroleum Gas (LPG) cylinders to grid connected natural gas. The Government intends to support 2.4 million households switch from LPG cylinders to natural gas in the next three years. The proposed project supports this goal by expanding the gas distribution network and financing 1.5 million natural gas connections of which 1.1 million connections will be located in eleven governorates including three governorates (Sohag, Qena and Aswan) located in Upper Egypt, where poverty levels are the highest. This is a significant scale up, building on the Egypt Natural Gas Connections Project which supported the expansion of natural gas connections to more than 365,000 households in the Greater Cairo area. That project was approved by the Board in January 2008 and is scheduled to close in October 2014. By 2020, the number of households connected to the natural gas grid is expected to increase by more than 40 percent from 5.8 million to 8.2 million households.

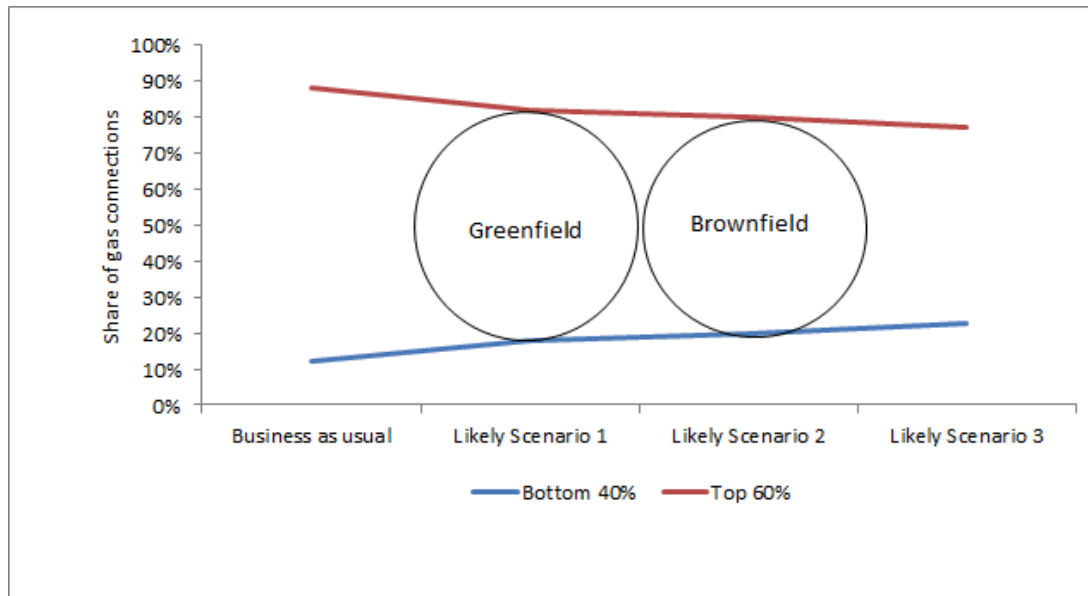
4. **A detailed poverty mapping shows that 52 percent of targeted neighborhoods of this proposed project have average poverty rates higher than the national average, taking into account that the poverty line falls within the second quintile.** A further disaggregation indicates that 75 percent of targeted neighborhoods have poverty rates above the national average where the grid already exists, with the share being 40 percent for greenfield areas. In addition, 59 percent of the targeted urban areas are poorer than the average national urban areas, and 48 percent of targeted rural areas are poorer than average national rural areas. Financial support is included in the project design to ensure that poor and disadvantaged households will be able to connect. Specific data on household income profiles will be available during the

project implementation, after households are connected. Ex-post surveys will be carried out at the mid-term to assess the income profile of the beneficiaries and address any issue associated with connectivity among poor households in the project target areas. The poverty mapping is included as Annex 2B.

5. **This is consistent with lessons learned from international experience in scaling up access to electricity networks**, which shows that in the early stage of network expansion, high-density urban areas - with relatively low percentage of poor households – are connected first. Once the network infrastructure is established, further scale up in more disadvantaged and poorer areas takes place, followed by targeting at the household level. In the Natural Gas Connections Project which finances connections in Greater Cairo, and which is about to close in October 2014, 24 percent of the targeted areas have average poverty rates higher than the national rate. In the proposed project, 95 percent (19 out of 20 of the targeted areas) of the targeted areas in Giza Governorate which is part of Greater Cairo have poverty rates higher than the national rate.

6. **The program has the potential to almost double the percentage of the poorest who are connected to the gas grid – which currently stands at 12 percent from the bottom two quintiles.** Of the 2.4 million new connections under the program various likely scenarios can be simulated assuming poverty profiles of households. In a Business-as-Usual Scenario, where the bottom 40 percent will receive 0.3 million connections, the existing proportion is maintained. In a scenario where 75 percent of the new connections in the brownfield areas go to the bottom 40 percent and a Business-as-Usual pattern is maintained for new connections in greenfield areas – the share of connections of the bottom 40 percent of the population would improve to 18 percent. Assuming that 75 percent of the new connections in the brownfield areas go to the bottom 40 percent of the population and for new connections in greenfield areas either 25 percent of the connections go to the bottom 40 percent (Scenario 2) or are equally distributed between the bottom two quintiles and the rest of the population (Scenario 3), the share of gas connections provided to the bottom 40 percent would be 20 and 23 percent respectively. The extent that connections are taken up by the bottom 40 percent will depend on technical characteristics of grid expansion as well as the ability of the project to design connection plans for poorer neighborhoods that allows progressive targeting. The willingness to pay and affordability survey carried out as part of project preparation indicated that customers are willing to pay for gas connections; however, some may not be able to afford to pay up-front for the connection fees. The project has been designed to include the component financed by an EU grant to provide financial support for household connection charges in disadvantaged areas

Figure 1: Distribution of Household Connections



7. **The majority of beneficiaries of the program are in disadvantaged and poor areas and it is often the women,** who on a daily basis must navigate the inefficient distribution network for LPG, deal with persistent shortages, and pay informal market prices often with exorbitant rents. For most households in Egypt, accessing LPG supply is at times challenging, as the distribution network is informal and inefficient. As women are entrusted with the task of cooking, the burden of ensuring a continuous access of LPG primarily falls on them. This often involves long waiting lines, seeking cylinders from stores, grocers, vendors, house guards and non-governmental organizations, and carrying these heavy cylinders back to the household. In a socio-economic survey carried out as part of project preparation, upwards of 60 percent of respondents cited persistent shortages of cylinders, and 38 percent reported high prices, which can reach up to six times the official price¹. As more households switch to natural gas, disadvantaged and poor areas that continue to be supplied with LPG will indirectly benefit from the project as LPG supply shortages are alleviated. In parallel, the Government is also investing about US\$410 million to improve LPG storage capacity and processing and to debottleneck LPG networks in particular for Upper Egypt, which consists of poor governorates. Finally, official prices are being increased which has reduced the black market premia and improved the supply of LPG.

8. **The project will provide safety and convenience benefits and promote citizen engagement.** The project promotes what is perceived in Egypt as access to a safe, clean and more reliable cooking fuel. Throughout the various public consultations during the preparation of the proposed project, the consulted communities and stakeholders expressed overwhelming support toward the project and eagerness to expedite its implementation. They also raised safety concerns regarding leakages from LPG cylinders, especially since due to the black market prices, households store extra filled cylinders in their homes. The selection criteria for neighborhoods will be fully disclosed by the implementing agency (EGAS) and progress will be monitored and reported in the project progress reports. As part of project implementation, a citizen's

¹ The official price is 8 LE per cylinder as on April 30, 2014

engagement program will strengthen the role of customer service centers and establish a grievance redress mechanism. Local Social Development Officers will be involved in providing targeted beneficiaries with information regarding the project. This will be complemented by safety awareness campaigns especially targeting the safe use of cooking appliances, and monitoring key indicators to maintain high quality service to consumers by the gas distribution companies.

9. **The project will contribute to the twin goals of poverty reduction and achieving shared prosperity, by promoting quality of life, increasing household disposable incomes, contributing to job creation and providing subsidy savings to Government.** The project will improve quality of life by expanding household access to natural gas including in poorer governorates, targeting areas where cooking gas is currently in short supply or where households have to pay exorbitant prices. It will also be providing targeted support towards connection charges in disadvantaged areas. At the household level, switching to natural gas also provides gains in disposable income for all quintiles of the population – estimated at LE 93² equivalent to US\$13.60 per household per year, assuming constant levels of consumption between LPG use and natural gas. The average annual household expenditure is LE 234 (US\$34) for LPG compared to LE 141 (US\$20.40) for Natural Gas. The project will create a number of job opportunities during construction and maintenance, which will be targeted at youth and women from host communities. As many as 6,000 direct jobs are expected to emerge, in addition to the 10,000 daily wage workers required for construction, 240 temporary jobs for semi-skilled workers, 570 indirect jobs for the installation of water heater ventilations, and 800 jobs for bill collection. The project supports a reduction in Government costs – assessed at US\$ 210 million per year – related to fuel subsidies. This is achieved through fuel switching from LPG, a highly subsidized, largely imported fuel with cost recovery rates of merely six percent. In comparison, natural gas is domestically produced and enjoys cost recovery rates of 70 percent. Going forward, rationalizing energy subsidies will become even more critical as the Constitution has explicitly stated that eleven percent of GDP should be allocated to education, health, research and development.

10. **In the context of the political transition and economic adjustment that Egypt is going through, the Bank has a critical role to support a pragmatic and sequenced approach to sector reform.** In fragile political transitions such as Egypt's, government attention is often targeted first at ensuring security and creating a degree of social stability in a highly volatile situation by improving service delivery and creating job opportunities, before implementing major sectoral, pricing and subsidy reforms. This proposed project follows a similar pragmatic approach by focusing on the Government of Egypt (GoE) priority of scaling up household access to natural gas, while supporting the nascent sectoral reform that is being pursued in the gas sector. While Egypt is expected to experience some gas shortages until 2016, Government has adopted a reform program to address gas shortages overall, to incentivize exploration and production and to improve the performance of gas utilities. It is also committed to ensure supply of gas to the household sector, which remains three percent of total gas consumption.

11. **The project is also anchored in a broader Bank engagement to support the GoE's goal of providing a reliable and efficient energy supply.** The Bank's engagement in the energy sector in Egypt covers technical assistance, lending and policy dialogue in the areas of energy

² Based on analysis of HIECS, 2013

generation, energy efficiency, renewable energy, transmission and distribution, and sector reforms. In the gas sector, the Government has adopted a reform program to address gas shortages overall, to incentivize exploration and production and to improve the performance of gas utilities. In the longer term, Government needs to address the structure of the gas market, promote the financial viability of the sector and improve governance performance. The proposed project will support these reforms in two specific areas: (i) the design and implementation of a financial management information system that will be critical to improve monitoring of financial management and cash flow in the sector; and (ii) the establishment and operation of a new gas regulator.

12. Beyond the household gas sector and on the broader energy challenges, the World Bank is also providing technical assistance to support Government in its efforts to rationalize energy subsidies and strengthen social safety nets. This support consists of (i) just-in-time technical and advisory support on pricing and subsidy reform and (ii) a recipient-executed Technical Assistance Project on Energy/ Social Safety Nets (SSN) Sector Reform, which is financed by a grant from the Middle East and North Africa (MENA) Transition Fund. The objective is to support Government in the development of a comprehensive medium-term energy pricing strategy, a cash transfer program and a communication plan to mitigate the impact of fuel subsidy reforms on the poor and vulnerable. In April 2014, Government raised the price of natural gas for residential and commercial consumers by up to 400 percent. This follows reforms in 2012, when Government implemented major increases in natural gas prices for specific consumer groups as follows: (a) for a group of energy intensive industries, a 33 percent increase for fertilizer, cement, petrochemical, and metal industries and up to a 43 percent increase for glass, ceramic, and porcelain industries; (b) for large consumers, including cement and brick companies an additional price, an increase of up to 50 percent; and (c) adjustments in fuel-for-electricity prices were implemented including a 76 percent increase in natural gas prices for power generation. With these increases, gas prices to large and energy intensive industries are above cost recovery, but remain substantially below cost recovery for other consuming sectors and in particular the power sector (where cost recovery is roughly 50 percent). Further subsidy reforms are expected as sustainable and comprehensive longer term measures will be essential for securing the commercial viability of the energy sector in Egypt.

B. Sectoral and Institutional Context

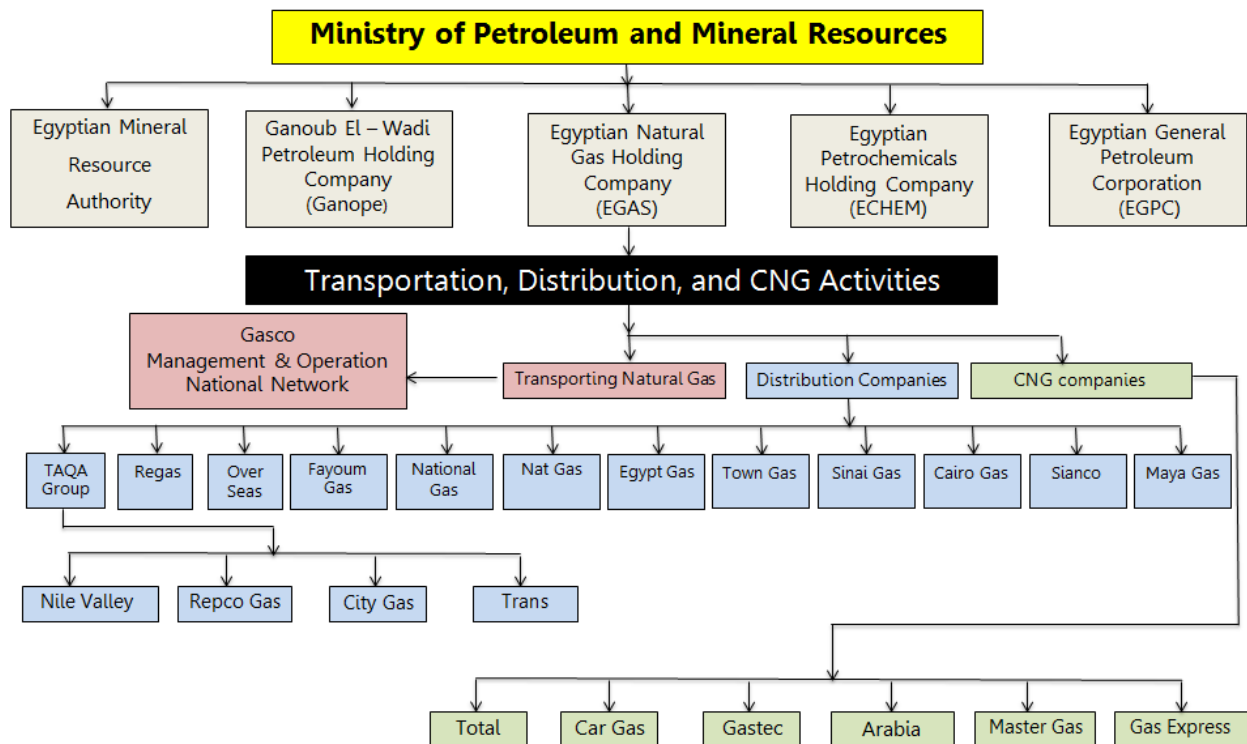
Institutional Structure

13. The gas sector in Egypt operates under the overall direction of the Ministry of Petroleum and Minerals Resources (MoP) which also operates the oil, petrochemicals, and mining industries. The Egyptian General Petroleum Corporation (EGPC) was created by a law in 1957 to handle the exploration, production, processing, as well as transport and distribution activities of petroleum products. In 2001, the Egyptian Natural Gas Holding Company (EGAS) was created to organize and manage natural gas development in Egypt. EGPC has 100 percent ownership of EGAS and has been gradually delegating natural gas activities to EGAS, including those in domestic gas transportation, Liquefied Natural Gas (LNG) exports, and more recently upstream gas explorations. The national gas transmission network is managed, operated, and maintained by the Egyptian Natural Gas Company (GASCO). EGAS however maintains ownership of the transmission and distribution assets, including the natural gas grid (see Figure 2).

14. **EGAS is the main owner of Egypt’s domestic natural gas pipeline network and until recently derived a major share of its revenues from LNG export.** EGAS was established in 2001 in accordance with the provisions of the Public Enterprise Sector Law No. 203 (1991). Until recently, its main revenue-generating activity has been LNG export. As the use of natural gas in households is relatively small at three percent of total usage, the gas transportation and distribution to households has been carried out on a not-for-profit cost-recovery basis. Effectively, the LNG export has been cross-subsidizing the natural gas transmission and distribution activities.

15. **Over the past few years, EGAS has increased its engagement in natural gas exploration activities.** EGAS has taken on a larger role in natural gas explorations, and is currently responsible for active exploration concessions in Egypt in partnerships with international petroleum companies. Therefore, EGAS’ revenue from sales of gas derivatives to EGPC—the wholesale single buyer of natural gas in Egypt—has been increasing in the past four years. New exploration concessions are being concluded, and expected to further increase EGAS’ revenue from gas derivatives.

Figure 2: Gas Sector Organization



Source: EGAS

16. **EGAS uses the private sector for operations and maintenance (O&M) of the distribution system in a concessions approach.** The O&M of the distribution sector was opened up to private sector participation in 1997 and was divided into a number of concession areas. Concessions were awarded to sixteen Local Distribution Companies (LDCs) along geographical boundaries and nine of them are privately owned. The largest of the LDCs (with respect to number of consumers) are Town Gas and Egypt Gas, which are both publicly owned. The LDCs are responsible for providing O&M services of the distribution network as well as

extending access to new household and commercial customers, while EGAS is responsible for financing expansion of the distribution networks.

Overall Supply and Demand of the Gas Market

17. **During the 1990s and 2000s, Egypt made substantial new gas discoveries and tripled its proven gas reserves.** The rise in gas reserves (from 347 billion cubic meters (bcm) in 1989 to 2.2 trillion cubic meters (tcm) in 2010) led the Government to promote the domestic use of gas and to seek export options in the form of Liquefied Natural Gas (LNG) and piped gas. It successfully created a domestic market, built three LNG trains with a capacity of 18 bcm/year, and implemented the Arab Gas Pipeline system with an approximate capacity of 10 bcm/year.

18. **The demand for natural gas in Egypt reached 52.2 bcm in 2013, and shows no signs of abating.** Domestic consumption increased rapidly from 20 bcm in 2000 to 52.2 bcm in 2013 at an average annual growth rate of 8.5 percent. This growth is largely attributed to two factors; (i) the growing demand from the power sector (demand rose from 5 bcm in 1991 to 29 bcm in 2013, and is expected to reach 50 bcm by 2017 when the present five-year generation expansion plan (2012-2017) is implemented); and (ii) increased consumption in other sectors fueled by low domestic gas prices. In 2013, the share of natural gas consumption per sector was as follows: 57 percent (29.6 bcm) for electricity, 28 percent (14.7 bcm) for industry, eleven percent (5.7 bcm) for petroleum/petrochemicals, three percent (1.5 bcm) for the residential sector and one percent (0.5 bcm) for compressed natural gas (CNG).

19. **From 2010 to 2013, gas production has leveled off, and the volume of exports has significantly declined.** From 2000 to 2009, the production of natural gas increased at an average rate of 11.3 percent per annum (from 21 bcm in 2000 to 63 bcm in 2009), but production has leveled off since 2009 (60 bcm in 2013). The volume of gas export has significantly declined between 2010 and 2013 due to growing domestic gas demand and decline in production. In 2013, Egypt's exports of LNG reached an equivalent of 5.7 bcm and exports via pipeline reached about 1 bcm³. This represents a significant decline compared to 2009, when the exports were in the order of 18 bcm.

20. **If Egypt is to retain its position as a net gas exporter beyond 2016, it will need to further incentivize exploration and production.** CEDIGAZ⁴ has estimated that the domestic consumption of natural gas in Egypt would rise to 60 bcm by 2015 and 78 bcm by 2020. CEDIGAZ has further estimated that to recover and sustain gas exports at the 2009 level of 18 bcm and meet the planned growth in domestic consumption, production would need to increase to 79 bcm by 2015, and to 96 bcm by 2020. Over the last three years EGAS and EGPC have had many challenges in covering Egypt's gas needs; these challenges were exacerbated by the growing energy subsidies associated with the rising electricity consumption, and the increases in payment arrears to foreign petroleum exploration companies.

³ Source: EGAS Annual Report 2012/13

⁴ CEDIGAZ is an international association dedicated to natural gas information, created in 1961 by a group of international gas companies and the *Institut Français du Pétrole (IFP)*.

Major Challenges in the Overall Gas Sector

21. **The legal, institutional and regulatory framework needs improvement to ensure efficient gas market development and operation.** The Egyptian gas industry functions with relatively insufficient legislation. The key legislative instruments are concerned with the establishment, duties and functions of the state-owned oil and gas companies operating with concession agreements for upstream and downstream operations. The delegation of EGPC's upstream gas business and gas ownership to EGAS has not been fully implemented. EGPC continues to be the majority owner of Egypt's share of natural gas, while EGAS largely owns the gas network assets. EGAS also continues to outsource some new investments in the gas network to GASCO, effectively using GASCO as a vehicle in raising debt financing for EGAS' assets. The LDCs continue to operate largely as construction, operation and maintenance contractors in supplying gas to end-users, as they do not take ownership of the gas commodity or of the gas distribution network. Despite this, Egypt has some elements of the legal, regulatory, institutional apparatus that could be further developed to increase gas production, enhance accountability and transparency, and ultimately improve service delivery to consumers. For example, the private sector involvement is pronounced in upstream exploration and production as well as in LDC-led gas distribution and supply. It also has a functionally separate transmission system operator in GASCO.

22. **The financial viability of the gas sector is eroding.** Despite increases of natural gas prices in 2012 and in April 2014 for domestic users, prices for end users remain below the economic cost of supply⁵. As a result of increased gas shortages, the Government decided to reduce gas exports to meet domestic demand, which has further eroded the financial ability of EGPC and EGAS. The deteriorated financial performance of EGPC and EGAS and the convoluted commercial and cash flow relations between sector companies created substantial accumulated arrears between sector companies and with foreign production partners as well. The accumulated receivables and payables (including arrears) booked at EGAS reached about four percent of GDP in FY2012/13.

23. **Shortages of gas supply have emerged, and are expected to continue until at least 2016.** The demand-supply gap has risen during the last three years due to the increase in domestic gas demand and lack of sufficient financial incentives to produce more gas and expand upstream exploration activities. Domestic gas prices remain substantially below international prices. A significant challenge for Government remains the creation of a gas demand-supply balance that can be sustained over the medium and long term. This would require (a) reducing wasteful consumption of gas and supporting energy efficiency both in demand and supply sides; and (b) incentivizing increased exploration and production of gas. Both actions relate closely to addressing fuel subsidies and in particular promoting the economic pricing of natural gas and the development of an efficient regulator and market structure for the gas sector. Other initiatives under development are measures to increase generation from other sources, such as renewable energy, and measures to reduce demand, such as targeted demand-side management or improve the efficiency of energy supply, such as the conversion of open cycle to combined cycle gas fired

⁵ The average cost recovery for natural gas is above 70 percent depending on type of users. The cost recovery for gas supply to major energy intensive industries is above 100 percent, while it is about 50 percent to the power sector and less than 50 percent to residential consumers.

generation. The Government is also considering coal imports, limited to the cement sector, and the development of civilian nuclear energy.

24. **These shortages of gas supply are not expected to impact the residential sector.** The additional projected demand from the residential sector is expected to be less than 1 bcm by 2016, when taking into account the additional 2.4 million connections planned over the next three years. As such, the residential sector will continue to represent less than three percent of the natural gas demand and will remain a key national priority due to its social and economic benefits. Furthermore, Government is expected to continue using domestic natural gas supply for the residential sector.

25. **Investment needs to support asset expansion are high.** EGAS has an ambitious plan to expand the national gas transmission networks, which complements MoP's efforts to further develop the production gas fields and to supply power generation plants and other consumption centers. However, the inadequate gas pricing policy and shortages of gas supply, as well as the weak coordination between natural gas production plans and electricity generation requirements have led to underinvestment in the national gas network and have constrained the efficient operation of the domestic supply facilities. Significant capital investments are also required by EGAS in particular to finance the growing expansion of distribution networks that is rapidly taking place under a robust Government program to increase household access to the natural gas networks.

The Government Reform Agenda for the Overall Gas Sector

26. **The Government is pursuing a gas sector reform program encompassing short and medium term measures to mitigate the challenges constraining sector performance.** The gas reform program is described as follows: :

- **Increasing exploration and production (E&P) activities to improve gas supply prospects, and restructuring and reimbursing the arrears owed to international oil companies.** Since 2013, the Government has improved the terms of its E&P contracts with international partners and has successfully awarded twenty nine new concession contracts in 2013 (six of which were amendments of existing contracts). The minimum drilling commitment under these contracts is 126 wells representing a minimum investment of US\$1.8 billion. A new round of international tenders for oil and gas exploration has been launched in December 2013 in 23 new blocks, of which, eight are in areas belonging to EGAS. According to MoP, eight projects are also currently under implementation which would expand production of existing gas fields by a total reserve of two billion cubic feet (bcf), and another four projects related to new gas discoveries are about to begin implementation with a total estimated reserve of six bcf. Sizable gas production from these fields is expected by 2016. The World Bank will support the MoP on best international experiences for improving terms of E&P contracts. To encourage increasing production and development of existing gas fields, the Government has also been negotiating with foreign oil and gas production companies to improve contractual terms and to settle large accumulated arrears owed to them. The arrears are estimated at US\$6 billion, of which US\$1.5 billion were paid in December 2013, and US\$1.5 billion has already been restructured.

- Establishing a framework for improving the financial management and cash flow between EGAS and EGPC, supported by a Financial Management and Information System (FMIS).** The Government has formed a committee to develop and oversee implementation of measures that would resolve the convoluted financial and commercial arrangements between EGAS and EGPC, including the transfer of E&P contracts to EGAS. As of December 2013, the total number of E&P contracts fully transferred to EGAS has reached seventeen, while twelve E&P contracts remain with EGPC but are under EGAS management. Furthermore, a framework for compensating EGAS for managing EGPC contracts and operating the gas networks has been agreed with the Government, which would lead to the improved financial performance of EGAS. In support of these initiatives, this proposed project will finance the installation of a modern Financial Management and Information System (FMIS) initially to be implemented at EGAS, which could be expanded to its affiliated companies. The FMIS will aim to enhance the timely availability and reliability of financial and accounting information at EGAS, track cash flow and balances between EGAS and EGPC, and improve the performance monitoring of EGAS and affiliated distribution companies through subsequent development and monitoring of Key Performance Indicators (KPIs) for the gas utilities.
- Reforming the gas market structure and implementing a functioning gas regulator to improve sector efficiency and stimulate private sector participation.** Under an ongoing EU Technical Assistance, MoP and EGAS are developing a strategy to reform the gas sector and create a competitive market structure with active participation of the private sector in downstream supply. A transitional plan for the development of the gas market is underway which aims at providing third party access to the national gas networks and supply, the establishment of a gas regulator and the preparation of a draft gas law. This law, which would lay out the vision for short, medium and long term development of the gas sector, will be submitted to the new parliament to be elected in summer of 2014 for its consideration. The regulator will be responsible for development and subsequent application of the gas network codes and transportation tariffs, licensing and monitoring. In support of these reforms, this proposed project will include a component supporting the startup operation of the new transitional gas regulator once it is established and capacity building for the development and implementation by the regulator of gas sector regulations.
- Rationalizing the energy pricing strategy.** In April 2014, Government raised the price of natural gas for residential and commercial consumers by up to 400 percent⁶, which is

⁶ The new price of natural gas for these consumers will be as follows: LE0.4 (US\$0.06) per cubic meter for gas consumption below 25 cubic meters per month; LE1 (US\$0.14) for consumption levels between 25 and 50 cubic meters per month; and LE1.5 (US\$0.21) for consumption levels above 50 cubic meters per month. Prior to this decree prices were extremely low at LE0.1 per cubic meter for consumption levels that are below 30 cubic meters per month, while any extra consumption was charged at LE0.5 per cubic meter. This latest increase followed reforms in 2012, when Government implemented major increases in natural gas prices for specific consumer groups as follows: (a) for a group of energy intensive industries, a 33 percent increase for fertilizer, cement, petrochemical, and metal industries and up to a 43 percent increase for glass, ceramic, and porcelain industries; (b) for large consumers, including cement and brick companies an additional price, an increase of up to 50 percent; and (c) adjustments in fuel-for-electricity prices were implemented including a 76 percent increase in natural gas prices for power generation. With these increases, gas prices to large and energy intensive industries are above cost recovery, but remain below cost recovery for other consuming sectors and in particular the power sector (where cost recovery is roughly 50 percent)

expected to result in savings of EGP1 billion (US\$145 million) annually. Further subsidy reforms are expected in recognition that sustainable and comprehensive longer term measures will be essential for securing the commercial viability of the energy sector in Egypt. The Technical Assistance Project on Energy/ Social Safety Nets (SSN) Sector Reform supports the development of such a comprehensive strategy for fuel subsidies reform.

Egypt Household Gas Connection Program

27. **Egypt's success in the promotion of natural gas use to substitute for expensive oil was initially focused on the power and industrial sectors, which is consistent with the approach in many other gas producing countries.** These sectors represent the greatest opportunity for fuel substitution at scale, while fuel switching in the residential sector takes place at a much more gradual pace. In recent years, the Government has emphasized the supply of gas in particular to residential sector⁷, and by end of 2013 it has completed residential connections to about 5.8 million household consumers through a dedicated program.

28. **The Government implements a subsidized connection policy to support the household gas connection program. The total cost of a household gas connection is estimated at LE 5,000 (US\$725) including supply and labor costs⁸.** According to the policy of 2005, gas connections to households are subsidized by EGAS. EGAS contributes LE 1,000 per household connection as part of the connection total cost to the LDC. This contribution is paid to the relevant LDC upon verification of connection. In addition, EGAS pays the cost of gas off taking facilities including high pressure pipelines and pressure reductions stations estimated in 2005 at LE 2,000 per household. Households pay only LE 1,500 (equivalent to one third of total cost) for new connections to the gas network.

29. **EGAS will annually require about US\$400 million⁹ in network infrastructure investments to meet its targets.** In the next three years the program aims at connecting 2.4 million households, of which 1.1 million connections will be financed by the International Bank for Reconstruction and Development (IBRD) under the proposed project and co-financing arrangements with the *Agence Française de Développement* (AFD), 400,000 connections will be financed by an ongoing loan from the Kuwait Fund for Economic Development and the remaining 900,000 connections will be financed by the Government's own resources provided to EGAS.

30. **Disadvantaged and poor areas that will continue to be supplied with LPG will indirectly benefit from the project** through the expected increase in LPG supply resulting from a reduction in LPG consumption in the project targeted areas. In parallel, the Government is investing about US\$410 million to improve LPG storage capacity and processing and to debottleneck LPG networks. This consists of a) improving the efficiency of LPG transport between Alexandria, Suez and Cairo; b) doubling the transportation capacity of the LPG pipeline

⁷ Gas customers by end of 2012 included: 5.4 million households, 12,000 commercials, 2,000 factories, 162 CNG fueling stations, and 45 power stations.

⁸ Breakdown of household gas connection cost: LE 2,000: Cost of gas off taking facilities including high pressure pipelines and pressure reductions stations: LE 1,000; Cost share of ground network inside cities: LE 800; Cost share of building external networks: LE 700; and cost share of building internal networks and conversions and LE 500 for foreign exchange fee, as well as labor and supply costs. Total Cost: LE 5,000.

⁹ Assuming connection cost: LE 5,000 (excluding taxes) – LE 1,500 paid by consumers. US\$/LE exchange rate: 6.89.

between Ghareb and Assuit in Upper Egypt; c) establishing a receiving station in Sokhna port to receive high capacity of LPG; d) establishing an LPG transmission pipeline in Upper Egypt between Assuit and Sohag; and e) increasing the storage capacity in Sohag and increasing storage capacity in south Alexandria.

Rationale for Bank Involvement

31. **The Bank’s continued partnership in the energy sector is needed during the current transition stage when the Government focuses on improved energy services and job creation.** The proposed project builds on the active World Bank engagement in the power and gas sectors in Egypt. The program has made significant contributions to the generation capacity, security and reliability of electricity supply, development of renewable energy, and scaling up natural gas connections to households in greater Cairo. The Bank’s program has also provided technical assistance including advisory support on best international experience on fuel subsidy reform, generation planning, and energy efficiency.

32. **The proposed project builds on the successful implementation experience of increasing household access to natural gas in Egypt.** The Bank financing of the Egypt household gas connection program represents an efficient intervention by the Bank to support the Government’s policies to expand the use of its domestic natural gas resources, reduce its fiscal deficit, improve service delivery, and increase opportunities for economic growth and employment through more inclusive infrastructure investments. The Egypt Natural Gas Connections Project supported the expansion of access to natural gas connections to 365,637 households in the Greater Cairo area. A key benefit of the project was the reduction in the LPG subsidy to connected residential consumers, equivalent to US\$65 million per year. EGAS also reported that the project created more than 3,000 jobs primarily in installation and maintenance, 190 indirect jobs for the installation of water heater ventilations, and 5,000 jobs for daily wage workers engaged in construction. Community surveys carried out as part of the impact assessment of the project, recorded consumer appreciation for higher safety, convenience, and reliability standards of natural gas connections compared to LPG. The proposed project aims to scale up the program in eleven governorates bringing in 1.5 million consumers to natural gas use and generating similar benefits beyond the greater Cairo area.

33. **The proposed project will enable the Bank to deepen its partnership with the Government to support the development and implementation of a nascent reform program in the gas sector.** At the broader sectoral level, the proposed project will include a technical assistance component to implement reform actions currently under development by parallel technical assistance provided under the Technical Assistance Project on Energy/ Social Safety Nets (SSN) Sector Reform and the EU technical assistance program. At the utility level, the technical assistance component financed by the proposed project will also contribute to development of a framework for improving the governance structure, fiscal transparency and accountability at EGAS and enhancing the service delivery outcomes by the LDCs.

34. **The importance of the gas sector in Egypt is underscored by the interest of several key development partners and offers a setting that is enabling the Bank to support and leverage a broader platform of development assistance.** The Kuwait Fund for Economic Development has been supporting natural gas connections to households in Egypt. By co-financing the current operation, the AFD is entering this sector in Egypt for the first time. The EU is also providing grant financing for technical assistance and subsidizing connections for the

poor. It is expected that the proposed project will also enhance confidence in the sector operating environment and allow new financiers, especially from Arab Funds and the Islamic Development Banks, to participate bilaterally or through parallel financing arrangements, to ensure that the Government's objective of universal access to services is achieved.

C. Higher Level Objectives to which the Project Contributes

35. **The proposed project will contribute to the twin World Bank Group goals of Ending Extreme Poverty And Promoting Shared Prosperity** by extending the natural gas network to poorer areas, providing targeted support towards connection charges in disadvantaged and poor areas, enhancing the disposable incomes of consumers, creating job opportunities, and improving the quality of supply for the household consumers. The project is also in line with the MNA Regional Strategy drivers of inclusion, governance, jobs and growth. A poverty mapping of the areas targeted for household connections show that 52 percent of the targeted areas have average poverty rates higher than the national average of 26 percent¹⁰. The project will also create jobs at the construction and maintenance stages - these jobs opportunities would be available to youth and women from nearby communities.. As many as 6,000 direct jobs are expected to materialize; in addition, there could be 240 jobs for semi-skilled workers on temporary basis, 570 indirect job openings for workers expected in connection with the need for installation of water heater ventilations. 10,000 daily wage workers will be needed for digging activities at the construction phases, and 800 new bill collectors could be sourced as well. These projections are underpinned by a preliminary needs assessment by Town Gas and Egypt Gas as well as the ongoing experience of the Egypt natural gas connection project.

36. **The proposed project is consistent with the World Bank's Energy Directions Paper entitled "Toward Sustainable Energy Future for All: Directions for the World Bank Group's Energy Sector", which was considered by the Board in July 2013.** The Directions Paper supports the Sustainable Energy for All objective of universal access to modern energy services by 2030. In Egypt, LPG and natural gas are the primary cooking fuels and both are considered modern cooking solutions. Egypt is one of the few developing countries that are ahead in making progress towards full access. The proposed project accelerates Egypt's efforts to promote access to natural gas, which is considered more cost effective, environmentally sound, and socially sustainable than LPG. The Directions Paper also highlights support to interventions that reduce fossil fuel subsidies, provided appropriate mitigation mechanisms are implemented. The proposed project provides for a subsidy to the poorest to ensure they are able to afford switching from LPG to natural gas. LPG remains the most subsidized energy item in Egypt as it represents 20 percent of total energy subsidies.

37. **The proposed project is consistent with the World Bank Interim Strategy Note (ISN) (Report No. 66443-EG) for Egypt and supports its three pillars:** (i) improving economic management through control of the fiscal deficit and initiating reforms to enhance transparency in government operations; (ii) job creation, through direct emergency lending and initiating steps to improve the environment for private sector led growth and job creation; and (iii) fostering inclusion, which involves ensuring broader access by disadvantaged segments of the population. The proposed project supports the objectives of these three pillars through reducing the Government's large fiscal deficit attributed to LPG subsidy, fostering inclusion by

¹⁰ The Egyptian national poverty line is of EGP 3,921 per person per year, which is equivalent to US\$ 1.56 per person a day which is in the middle of the second national expenditure quintile.

improving energy services to its citizens including scaling up household access to natural gas all over Egypt and increasing opportunities for economic growth and employment through inclusive infrastructure investments. The project is also aligned with the new Egypt Country Partnership Framework (CPF) which is currently under preparation.

II. PROJECT DEVELOPMENT OBJECTIVE(S)

A. Project Development Objective (PDO)

38. The proposed project development objective is to assist the Arab Republic of Egypt to increase household access to reliable, lower cost, grid connected natural gas supply.

B. Project Beneficiaries

39. **The direct beneficiaries for this proposed project are the households connecting to the natural gas networks.** With the elimination of LPG cylinders and access to piped natural gas, households- in particular women - will gain from improved delivery of energy services and will have access to a reliable and safer source of energy, with significant convenience benefits as well as improvements in safety and health impacts. There are significant risks associated with the storage of cylinders containing gas under pressure (up to 15 bars) within household premises, unsafe practices arising from the manipulation of heavy cylinders to apartment buildings, as well as inconveniences arising from the time and effort required to exchange cylinders on a regular basis. In Egypt, the LPG cylinders in use tend not to have the modern safety connections used to minimize the escape of LPG during change-over. Natural gas is lighter than air and disperses readily to the atmosphere if leaks were to occur, whereas LPG is heavier than air and tends to settle in pockets at low points within buildings creating an explosion hazard.

40. **The household consumers in the targeted governorates will benefit from citizen engagement measures that have been incorporated in the project design.** The proposed project will establish new customer service centers (CSCs), which will enable citizens to monitor the LDC's performance in the delivery of high quality and continuous gas supply services to their households. Through citizen engagement, LDCs will be expected to become more responsive to client needs. The CSCs will also implement safety awareness campaigns targeted towards women customers who will be using natural gas appliances particularly for cooking.

41. **Beneficiaries of the proposed project also include the Government, EGAS, the LDCs, as well as Egyptian society.** The proposed project would result in government budgetary savings in LPG subsidy in the amount of US\$210 million per year, which could potentially be redirected towards expenditures in other social sectors such as health and education or for cash transfer programs targeting the poor and vulnerable. The staff of EGAS and LDCs (Town Gas and Egypt Gas) will also benefit from the technical assistance and capacity building component including activities for improving the financial, accounting, administrative and utility operations and performance monitoring. It is envisaged that the project will create employment as well. As many as 6,000 direct jobs are expected to materialize; in addition to 240 jobs for semi-skilled workers on temporary basis and 570 indirect job openings for workers are expected in connection with the need for installation of water

heater ventilations. 10,000 daily wage workers will be needed for digging activities at the construction phases, and 800 new bill collectors could be sourced as well.

C. PDO Level Results Indicators

42. **The project development objective will be measured using the following outcome indicators, on the basis of the parameters and targets set out in the results framework provided in Annex 1:**

- Natural gas household connections financed by the project in the targeted project areas (Number)
- Government annual savings from reduction in LPG imports due to decreased LPG consumption in the targeted project areas (US\$ million)
- Gas leaks per 1000 consumers per year in distribution networks installed in targeted governorates do not exceed agreed reliability level of 5 (Yes/No)
- Direct project beneficiaries¹¹ (number) of which (percent) female and of which (percent) poor benefiting from financial support to connection fees.

III. PROJECT DESCRIPTION

A. Project Components

43. The proposed project will connect 1.5 million households to the gas distribution networks, of which 1.1 million households will be connected in eleven Governorates during the project's first three year implementation period, in areas under the concessions of four LDCs: (i) **Town Gas** in the Giza, Ismailia, and Alexandria Governorates (ii) **Egypt Gas** in Qalubia, Menufia, Daqahlia, Qena, Gharbia, and Aswan Governorates (iii) **Regas** in Sohag and Marsa Matrouh Governorates; (iv) **Sianco** in the Alexandria governorate; and (v) **Sinai Gas** in Ismailia Governorate.

44. The 1.1 million household connections were selected by the LDCs by applying their multistage selection criteria for determining the targeted areas for expanding the gas distribution gas networks. In the first stage, targeted Governorates and districts are selected based on:

- Areas with documented difficulties of obtaining LPG cylinders due to lack of supply and/or high demand.
- Areas where LPG cylinders are known to be sold at much higher prices than the subsidized price.
- Disadvantaged and popular areas (poor roads and buildings types), provided the areas meet the required specifications for gas connections.
- Proximity to existing natural gas networks

45. During project preparation, LDCs undertook initial surveys to estimate the households that could be connected to the gas networks in the identified areas in each of the participating Governorates. Based on initial surveys the LDCs prepared feasibility studies for the 1.1 million

¹¹ The estimated total number of beneficiaries will be measured by assuming an average size of 4.5 persons per household.

households assessing detailed cost estimates of the various network and household connection costs, as shown in Annex 2. The total cost for connecting 1.1 million households is estimated at US\$785 million (excluding taxes) and the average cost of a household connection is about LE 5,000 (US\$725) excluding taxes. Once the funding becomes available, the LDCs will carry out Property and Appliance (P&A) surveys to prepare a final list of consumers eligible for gas connections and will initiate the detailed design and subsequent implementation of the project.

46. An assessment of the LDC selection criteria by a detailed poverty mapping of 84 out of the 88 targeted areas in the eleven initial Governorates shows that 52 percent of these targeted areas have average poverty rates higher than the national average of 26 percent. The poverty mapping also shows that 53 percent of the targeted areas will be poorer than the average of the Governorate in which they are located. The analysis (summarized in Annex 2-B) concludes that in populated urban areas in Governorates where gas networks already exist, the poor will be targeted to a greater extent. While in other Governorates where the expansion of the gas networks will be in large part in greenfield areas, the sequencing of expansion of gas networks and thus the household targeting must take into account proximity to the newly developed gas networks and the required technical and safety specifications for connections that must be met.

47. The project will connect an additional 400,000 households to the gas network in the fourth year of implementation. These households could be located in designated districts in the eleven Governorates, new districts in those Governorates, or in other Governorates. The final selection will be contingent on the preparation of feasibility studies and applicable documentation required by the project Environmental and Social Impact Assessment Framework and Resettlement Policy Framework that is site specific. The project will create jobs at the construction and maintenance stages - these jobs opportunities would be available to youth and women from nearby communities.

48. The proposed project will have the following components:

- **Component 1: Gas Network Expansion and Household Connections (Estimated Cost US\$ - 1120 million, of which IBRD US\$500 million¹²):** This component will finance investments necessary to expanding the gas networks in the project areas and connecting 1.5 million households to the distribution networks. The investments financed by this component are included in the following four subcomponents:
 - **Subcomponent 1.1: Gas Transmission Connections and Pressure Reduction Stations (PRSs) (Estimated Cost: US\$285 million¹³).** This subcomponent includes installing the high pressure transmission pipeline networks to provide the capacity to supply gas to the new project areas. For the 1.1 million household connections in the eleven Governorates, 25 high pressure pipeline connections are currently being considered ranging from 50m – 38km, totaling about 200 km in aggregate. These high pressure pipelines will be supplying gas to the 25 PRSs required for the expansion of the distribution networks in the eleven Governorates. Feasibility studies to be prepared for the additional 400,000 household connections may identify the need for *additional high pressure pipelines and PRSs to scale up from 1.1 million to 1.5 million connections. It is proposed that the project will finance the supply of*

¹² Net of taxes and contingencies

¹³ Net of taxes and contingencies

goods and materials and selective work and installation contracts for the installation of the high pressure pipelines and PRSs and work contracts for special crossing under this subcomponent.

- **Subcomponent 1.2: Gas Distribution Network and Connections (Estimated Cost: US\$805 million¹⁴).** This subcomponent consists of the expansion of the intermediate (IP), medium (MP) and low pressure (LP) gas distribution networks, the installation of control systems, main regulators, customer connections and conversions of customer appliances to allow the supply of gas to 1.5 million households in the project areas. *The proposed project will finance supply of goods and materials and selective work contracts including special crossing under this subcomponent.* EGAS will be responsible for the cost of work and labor including cost of road and construction sites reinstatement.
- **Subcomponent 1.3: Strengthening Capacity for Connection Scale Up (Estimated Cost – US\$ 5 million¹⁵).** *This subcomponent will support the supply and delivery of tools, equipment and service vehicles to improve the capacity of the participating LDCs in project implementation.* This subcomponent will enable the scaling up of connection installations, the construction of network operations and improved service delivery to consumers. The proposed project will finance the supply of equipment and tools under this subcomponent.
- **Subcomponent 1.4: Establishment of Customer Service Centers (Estimated Cost – US\$ 25 million¹⁶).** *This subcomponent will support the establishment of customer service centers in the targeted areas to ensure high quality service to consumers during the project operation stage.* It is envisaged that a minimum of eleven customer service centers will be established by the LDCs in their targeted areas. The average cost of establishing a service center is assumed at US\$ 2.5 million. The subcomponents will be financed by the participating LDCs.
- **Component 2: Financial Support for Household Connection Charges in Disadvantaged Areas (Estimated Cost: Euro 45 million).** The scale-up of the natural gas connections as envisaged under this project will expand the grid to eleven Governorates that will include relatively poorer areas of Egypt. To ensure access among vulnerable households and no delay in project implementation due to consumer affordability, this component will provide financial support for connection fees for households in disadvantaged and poor areas. The component will be financed by an EU Grant¹⁷, managed by AFDn. The methodology for identifying the disadvantaged households that will benefit from the financing mechanism for the provision of the financial support will be based on socio-economic characteristics of the targeted areas developed by an ongoing AFD consultancy assignment.
- **Component 3: Institutional Strengthening (Estimated Cost: Euro 13 million).** This component will be financed by the AFD-managed EU Grant and will be jointly

¹⁴ Net of taxes and contingencies

¹⁵ Net of taxes and contingencies

¹⁶ Net of taxes and contingencies

¹⁷ The EU Grant will be funded by the European Neighborhood Instrument

supervised under the Project. This component will contribute to the improvement of the governance structure and fiscal transparency and accountability at EGAS and will support development of the gas sector regulations. The institutional strengthening will be divided into two subcomponents as follows:

- **Subcomponent 3.1 Development of a Financial Management and Information System (FMIS) (Estimated Cost – Euro 10 million)** The FMIS will seek to enhance the timeliness and value of financial and accounting reports and improve the performance monitoring of EGAS and affiliated distribution companies. The new FMIS system will make the financial information more reliable, transparent and comparable to other gas utilities and produce enhanced and improved data for developing, monitoring and benchmarking of Key Performance Indicators (KPIs) for the gas utilities. This subcomponent will finance i) a technical assistance to for the preparation of the design, implementation support of the new FMIS. The technical assistance will evaluate options for the FMIS and may recommend the development of the FMIS module as part of a more elaborated Enterprise Resource Planning (ERP) system; and ii) supply and installation of the new FMIS.
- **Subcomponent 3.2: Technical Assistance for Gas Sector Regulatory Development (Estimated Cost – Euro 3 million).** This subcomponent will support the startup operations of a transitional gas regulator in Egypt including technical assistance for the development of enabling gas sector regulations, an assessment of various options for gas market design to be developed by the transitional gas regulator once it is established.

B. Project Financing

Lending Instrument

49. The proposed project will be financed by an Investment Project Financing (IPF) instrument¹⁸. The proposed IBRD loan will be with the Arab Republic of Egypt (“the Borrower”) represented in the Loan Agreement by the Ministry of International Cooperation and a Project Agreement between EGAS and the Bank. The Borrower shall make the proceeds of the Loan available to EGAS under a *Subsidiary Loan Agreement* between the Government and EGAS.

Project Cost and Financing

50. The total project cost is estimated at US\$1,473.9 million. The total financing requirement for Component 1 of the proposed Project is estimated at US\$1395 million (including taxes and 10 percent contingency) of which US\$500 million will be financed by IBRD, Euro 70 million (equivalent US\$ 96 million¹⁹) by AFD, about US\$ 326 million by consumer connection fees and the remaining US\$473 million will be financed by EGAS as shown in Table 1. Components 2 and 3 will be financed by the EU Grant, managed by AFD. Additional financing of up to Euro 10 million may become available from the EU Grant to finance Component 1 as part of AFD financing. In that case, AFD financing could be increased after IBRD and AFD loans

¹⁸ A Program for Results (PforR) instrument was initially explored for financing the Egypt Household Gas Connection Project, but this option was not pursued given the safeguards Category A for the proposed operations.

¹⁹ Assuming 1.36 Euro/US\$ exchange rate

effectiveness to Euro 80 million subject to Government of Egypt requesting changes to the project financing plan.

Table 1: Project Costs and Financing

Project Component	Cost (millions)
Component 1: Gas Network Expansion and Household Connections	
Subcomponent 1.1: Gas Transmission Connections and PRSs	US\$285
Subcomponent 1.2: Gas Distribution Network and Connections	US\$805
Subcomponent 1.3: Strengthening Capacity for Connection Scale Up	US\$5
Subcomponent 1.4: Establishment of Customer Service Centers	US\$25
Total Component 1 without contingencies	US\$1120
Contingencies (10%)	US\$110
Tax and Custom	US\$165
Total for Component 1	US\$1395
World Bank Financing of Component 1	US\$500
AFD Financing of Component 1	US\$96 (Euro 70)
Customer Connection Charges ²⁰	US\$326
EGAS Financing of Component 1	US\$473
Component 2: Financial support for household connection charges in disadvantaged areas	US\$61.2 (Euro 45)
EU Grant (AFD managed) Financing of Component 2	US\$61.2 (Euro 45)
Component 3: Institutional Strengthening	
Subcomponent 3.1: Development of a Financial Management and Information System (FMIS)	US\$13.6 (Euro 10)
Subcomponent 3.2: Technical Assistance for Gas Sector Regulatory Development	US\$ 4.1 (Euro 3)
Total for Component 3	US\$17.7 (Euro 13)
EU Grant (AFD managed) Financing of Component 3	US\$17.7 (Euro 13)
Project Total	US\$1473.9

51. IBRD and AFD funds will be provided for investments under Subcomponents 1.1, 1.2 and 1.3 of Component 1 to finance the supply of goods and materials and selective works and installation contracts that will be procured competitively according to the World Bank procurement guidelines. IBRD and AFD financing for these subcomponents will be based on joint co-financing arrangements with IBRD providing 84 percent and AFD 16 percent of contract payments.

52. If a contract is eligible for Bank financing under Component 1, but not eligible for AFD financing due to supplier debarment rules applicable to AFD, then either EGAS will cover AFD's share of that contract or the Borrower will request the Bank to consider changes to these arrangements.

53. The EU Grant managed by AFD and implemented according to AFD procurement and financial management procedures, will provide 100 percent financing for Components 2 and 3 based on parallel financing arrangements managed by AFD.

C. Lessons Learned and Reflected in the Project Design

54. **The proposed project builds on lessons learned from the Egypt Natural Gas Connection Project which financed household gas connections to households in Greater Cairo.** The project is expected to close on October 31, 2014. The project managed to connect more than the targeted 365,637 connections, but experienced delays in the construction of the

²⁰ Customer connection charges = 1.5 * (1500/6.89) = US\$ 326

PRSs and in processing some of the procurement packages, in part due to their large numbers. The lessons learned from that project which were considered in project design include:

- i) the need for a reduced number of procurement packages, which will be achieved by combining lots to a manageable number;
- ii) allowing advance procurement to avoid delays in project implementation;
- iii) allowing flexibility to scale up household connections in targeted governorates beyond initial targets and starting project implementation in areas with existing infrastructure;
- iv) improving the mechanism of selecting and acquiring the land for the PRSs through early consultation with local communities, developing strong commitment from local authorities and initiating land acquisition and PRS development at early stage of project implementation;
- v) including in the project design specific component to provide financial support for households in disadvantaged areas to ensure scale up targets are achieved in these areas; and
- vi) relying on the largest two LDCs (Egypt Gas and Town Gas) who have an existing track record above 200,000 connections a year and including in the project design a capacity building component to enhance capacity of the participating LDCs for scaling up.

55. Lessons learned from international experience in scaling up access to electricity networks show that in the early stage of network expansion, high-density urban areas - with relatively low percentage of poor households – are connected first. Once the network infrastructure is established, further scale up in more disadvantaged and poorer areas takes place, followed by household targeting. The same logic applies to the early stages of the gas network expansion in Egypt. These lessons learned are confirmed by experience from the ongoing Gas Connections Project in Greater Cairo. In this project 24 percent of the targeted areas have average poverty rates higher than the national one, while under the new project scaling up gas connections in areas in Greater Cairo 19 out of 20 of the targeted areas will have average poverty rates higher than the national rate.

56. In many fragile political transitions such as Egypt’s, government attention is rightly targeted at creating a credible transition process, improving service delivery and expand job opportunities, followed by the implementation of major sectoral and fuel subsidy reforms. This proposed project follows a pragmatic approach of supporting the Government’s priority of scaling up household connections to a large number of the population. The project will also support a reduction in Government costs related to fuel subsidies, while at the same time, complementing the nascent reform efforts with incremental measures to improve the gas sector performance and the subsequent development and implementation of medium to long-term actions. Critical in this approach is to sequence sector reforms with improved service delivery.

57. Another lesson learned is that additional financial resources are needed to sustain an ambitious agenda of scaling up natural gas connections like EGAS’ program. The proposed project catalyzes and strengthens the effective coordination of the Bank, AFD and EU in the energy sector in Egypt.

IV. IMPLEMENTATION

A. Institutional and Implementation Arrangements

58. **EGAS will be the Recipient of the proposed World Bank loan as it owns all assets in the natural gas network and is mandated to finance material costs related to expanding the network.** The proposed project will mainly finance i) supply of goods and materials required by the participating LDCs to expand the transmission connections and distribution networks household connection installations, ii) selected supply and installation contracts for the installation of the high pressure pipelines and pressure reductions stations; iii) and supply of equipment, tools and service vehicles for capacity building of the participating LDCs. All contracts will be procured competitively according to the World Bank procurement guidelines. The implementation arrangements are developed on the basis that EGAS is the owner of the network assets and under concession agreements with LDCs is responsible for the supply of materials and goods which could be procured directly by EGAS or by the participating LDCs with oversight by EGAS. Given that Town Gas and Egypt Gas are the largest two LDCs with highest warehouse storage and implementation capacity and to benefit from economy of scale in procurement of goods and materials, the agreed implementation arrangements have Town Gas and Egypt Gas to be the two LDCs responsible on behalf of EGAS for the procurement of activities financed by the proposed project.

59. **EGAS established a Project Management Unit (PMU)²¹ that will be responsible for the overall project implementation as well as coordination and reporting to the Bank.** The key staff at the PMU has been appointed including the project manager, procurement and financial officers, and technical, environmental and planning managers. The procurement and financial officers from EGAS will be the main focal points who will be responsible for coordinating procurement and financial management activities with Town Gas and Egypt Gas, and who will coordinate with the Bank.

60. **In accordance with lessons learned from the Natural Gas Connections Project, land acquisition is on the critical path for the timely delivery of services for Component 1.** Under the agreed implementation arrangements, Town Gas and Egypt Gas will be responsible for procurement and implementation of contracts and activities financed by the proposed project in their service areas as well as on behalf of Regas, Sianco and SinaiGas. To mitigate against implementation delays, Town Gas and Egypt Gas are already in advanced stages of discussions for the identification of land to be acquired during the first year of operation. EGAS environmental department has been strengthened with additional staff to ensure timely preparation of safeguards requirements and along with Town Gas and Egypt Gas they stand ready to prepare the Environmental and Social Impact Assessments (ESIAs) and Resettlement Action Plans (RAPs) as soon as the specific land area has been identified. The draft Implementation Manual will also be prepared by the PMU by effectiveness, which will spell out the respective role of EGAS, PMU, Town Gas, Egypt Gas and participating LDCs in project implementation and coordination. In addition, EGAS will be required to enter, by the project effectiveness, into Implementation Arrangements with the participating LDCs, satisfactory to the Bank, to ensure that goods and services financed out of the proceeds of the IBRD loan benefit the participating LDCs and are implemented according to the project design, allowing the LDC

²¹ Established on June 19, 2014 by Administrative Order No. 242 of 2014

to perform its obligations under the implementation agreements between them and EGAS as an implementing agency.

61. **For Component 2, to ensure the timely and efficient implementation of the Project**, the Government is expected to work with AFD and EGAS to implement the component in a manner satisfactory to all the financiers of the project, and make arrangements to provide, out of the proceeds of the EU grant, managed by AFD, financial support for connection fees for households in disadvantaged and poor areas residing in the Selected Areas in accordance with methodology and targeting criteria satisfactory to all financiers of the project, as will be stated in the Project Implementation Manual.

62. **To ensure the timely and efficient implementation of Component 3** that will be funded by the EU grant, managed by AFD, it is expected that the Government will establish a transitional Gas Regulator by early 2015, which will be responsible to carry out an assessment of the gas market design options to be developed and implemented by said gas regulator, all in a manner satisfactory to the Bank.

B. Results Monitoring and Evaluation

63. **The Project will be monitored and evaluated on the basis of the indicators and targets set out in the results framework** provided in Annex 1. The Bank will carry out regular implementation support missions during which project progress, outputs and work plan updates will be reviewed. Moreover, the PMU in coordination with the participating LDCs will be responsible for monitoring progress and achievement of the performance indicators and report accordingly to the Bank. The PMU will be required to submit comprehensive progress reports on implementation aspects quarterly that will include reporting on procurement, financial management, physical implementation and environmental and social aspects among others. Further, to enable proper monitoring of funds and physical progress in the targeted governorates, the annual external audit of the project will incorporate technical audit components in addition to the financial audit.

C. Sustainability

64. **The ability of EGAS and participating LDCs to develop and operate the project successfully and long term sustainability of the project are confirmed by the following:**

- The strong commitment of the Government to scaling up the household gas connections nationwide is demonstrated by its inclusion as a priority in the Economic Development Program for addressing subsidy, improving energy services to consumers, and creating job opportunities. Equally robust is the ownership of EGAS and the LDCs which is demonstrated by the high level of preparedness and the effort by EGAS and the LDCs to expedite project preparation, and the finalization of documentation including feasibility studies and safeguards documents.
- The Project operations will not be subject to shortages of gas supply in Egypt given that even with the additional 2.4 million connections²², household gas consumption will continue to represent less than three percent of the natural gas demand. Sustainability is

²² Additional gas demand by the new 2.4 million household connection is expected not to exceed 0.75bcm a year assuming a 24 m3/month average for household monthly consumption.

also ensured as the project will remain a key national priority due to its social and economic benefits. Additionally, there is no safe or economic method of ‘load-shedding’ for gas distribution networks, and gas delivery can only be interrupted in the case of emergencies or for pre-planned, routine maintenance. Therefore the allocation of gas supply to the distribution network has the highest priority of all other gas consuming sectors.

V. KEY RISKS AND MITIGATION MEASURES

A. Risk Ratings Summary Table

Risk Category	Rating
Stakeholder Risk	Moderate
Implementing Agency Risk	
- Capacity	Substantial
- Governance	Substantial
Project Risk	
- Design	Substantial
- Social and Environmental	Moderate
- Program and Donor	Substantial
- Delivery Monitoring and Sustainability	Substantial
- Other – Shortage of gas supply	Moderate
Overall Implementation Risk	Substantial

B. Overall Risk Rating Explanation

65. **The overall implementation risk for the project is assessed as Substantial mainly due to:**

- Delays in project implementation that may arise due to the large scale of the proposed project, the ambitious target of connecting 1.5 million households in 11 governorates, and the potential lack of coordination between EGAS and the distribution companies. The Bank’s sensitivity analysis indicates that the full realization of project benefits is dependent on the timely implementation of gas connections. As a mitigating measure, EGAS and the distribution companies have been able to scale up gas connections to more than 500,000 connections a year and have adequate capacity to design, prepare and implement the investments to be financed by the proposed project. EGAS and Town Gas, one of the two LDCs implementing the project, have experience working with the World Bank and have a successful record in the Egypt Natural Gas Connection Project. The proposed project will have investments similar to the ongoing project and will follow similar implementation procedures. Furthermore, EGAS will establish a Project Management Unit (PMU) that will be responsible for the overall project implementation as well as coordination with the participating LDCs.
- The project will finance investments with potential multi-dimensional environmental and social concerns in the project areas and in particular related to the construction of the PRSs and high pressure pipelines. A major challenge for the project implementation is the ability of EGAS and participating LDCs to secure and acquire land for the PRSs and right way for the high pressure gas pipelines in a timely manner. Environmental and

Social Impacts Assessment Framework (ESIAPF), Resettlement Policy Framework (RPF), and a Chance Find Procedures related to OP 4.11 are prepared, disclosed and included as an annex to the ESIAPF. These safeguards instruments assess environmental and social impacts of the project and provide clear guidance on the requirements for the preparation of the site-specific safeguards instruments. Capacity building will also be provided to EGAS for the preparation and supervision of the safeguards requirements to ensure that site specific ESIAAs and necessary RAPs are developed in timely manner once locations of sites are finally determined. EGAS is also committed to improving the mechanism of selecting and acquiring the land for the PRSs at early stage of project implementation.

- AFD cofinancing of Component 1 could delay project implementation especially if the AFD loan is not approved in a timely manner aligned with the IBRD loan. The cofinancing may also cause delays in procurement activities and project implementation. The preparation of the AFD Loan is however progressing well and was approved by the AFD Board on June 19, 2014, prior to the consideration of the proposed project by the Bank's Board. The Bank and AFD are already cofinancing the Egypt Farm-Level Irrigation Modernization Project (FIMP) and the experience with AFD cofinancing has been satisfactory in that project. Clear cofinancing arrangements have also been agreed upon and will be included in the Project Implementation Manual.
- Given that the residential sector has the lowest share of demand and is the highest priority of all other gas consuming sectors, it is not expected that gas shortages will extend to the residential sector. However, the long term sustainability of the gas sector in Egypt and financial viability of EGAS remain at substantial risk. Any improvement depends on the Government's ability to advance a comprehensive reform agenda, including (but not limited to) the development and implementation of gas sector reform, energy pricing programs and strengthening the sector governance and institutions arrangement. This is particularly difficult during political transitions.

VI. APPRAISAL SUMMARY

A. Economic and Financial Analysis

Project Economic and Financial Analyses

66. **The project aims to switch 1.5 million households from LPG to natural gas primarily for cooking purposes.** Egypt's focus on laying natural gas networks is consistent with global experience. Natural gas is a cleaner fuel than LPG and in the absence of subsidies, it is cheaper compared to LPG per unit of energy and households will choose natural gas when both LPG and natural gas are available (Kojima, 2011). The natural gas connection program in Egypt has emerged as an important social priority and serves as one of the Government's flagship endeavors to improve service delivery outcomes. The implementation of this project contributes substantially to Government of Egypt's target of reaching 2.4 million consumers in the next three years with natural gas. The project will be implemented over four years with 200,000 connections planned for FY15, 400,000 in FY16, 500,000 in FY17, and 400,000 in FY18. An economic and financial analysis is carried out to arrive at an economic internal rate of return (EIRR) as well as a financial internal rate of return (FIRR).

67. **The project is economically viable in a scenario of no price distortions in the economy.** The economic analysis is carried out in the unsubsidized environment and considers the opportunity cost of domestically produced natural gas, which would be the export parity price. The counterfactual analysis compares the economic cost of natural gas infrastructure to the LPG infrastructure for the 1.5 million consumers that this project envisages to serve. The discounted cash flow assessment between the LPG and natural gas cost streams suggests that natural gas is cheaper for the economy in an unsubsidized environment. The EIRR is estimated at 36 percent. From a purely economic point of view - if there were no price distortions in the economy, it makes economic sense to invest in natural gas networks.

68. **A financial cost-benefit analysis taking into account subsidies also yields a financial viable project.** The financial cost-benefit analysis carried out in the present subsidized environment indicates that the Government will gain from switching to natural gas in subsidy savings as cost recovery of natural gas is higher than LPG. The FIRR is estimated to be 11.7 percent with a Net Present Value (NPV) of US\$351 million in the baseline scenario. This baseline assumes a cost of gas to be US\$3.7/mmbtu as the average domestic production cost between 2014-2020. The annual subsidy savings is estimated to be US\$210 million annually when all the 1.5 million connections are implemented. Scenarios are simulated assuming the cost of gas in the immediate future and beyond given the supply-demand imbalances and probable gas imports for the next few years before the ongoing domestic production picks up. For instance, financial returns will be much lower at 7.2 percent if an import cost of US\$13/mmbtu is assumed until 2019 and the average domestic cost of US\$3.7/mmbtu thereafter.

69. **The switching from LPG to natural gas is also environmentally friendly as the emissions from natural gas are lower.** The emission factor for LPG is 63.1 ton CO₂/TJ compared to natural gas at 56.1 ton CO₂/TJ. Given the large group of households envisaged to switch under the project, the annual GHG emissions savings can amount to as much as 649,915 ton CO₂. The annual value of these emissions would be US\$3.2 million if valued at the currently depressed European Emissions Trading System price of US\$5/tCO₂.

Gas Sector Financial Analysis

70. **This financial analysis evaluates the financial situation of Egypt's natural gas supply sector and of EGAS²³.** EGAS is the legal owner of the natural gas transmission and distribution (T&D) network in Egypt and the entity responsible for servicing the loans for the gas network.

71. **Egypt's natural gas sector has experienced substantial financial distress following the 2011 Egyptian revolution and the economic difficulties that followed.** The key related issues include:

- a. Large increases in unpaid bills for natural gas consumed in Egypt, totaling LE 67.8 billion by FY 2012/13, especially from the electricity sector which accounted for almost 60 percent of domestic gas demand;
- b. Increases in payment arrears to the international petroleum companies under the petroleum production sharing agreements. This has contributed to disruptions of natural gas production in Egypt, and consequently a sharp decline in LNG production and exports;

²³ EGAS assessment is carried out on a nonconsolidated basis. EGAS does not prepare consolidated financial reports.

- c. Decreases in LNG exports. During the latest FY2012/13, LNG exports from Egypt totaled 5.7 bcm of piped gas equivalent, which were below the overall capacity of about 17 bcm²⁴;
- d. Disruptions of natural gas exports via the Arab Gas Pipeline (to Jordan and beyond) due to a series of gas pipeline explosions.

72. **Consequently, EGAS' financial results for the latest FY2012/13 have declined from prior years.** Net operating cash flow was reduced to only LE 53 million, and net investment/capital spending was reduced to LE 0.4 billion. In FY 2012/13, the total revenue was reduced to LE 4.7 billion, profit before taxes was reduced to LE 1.1 billion, and profit after taxes was reduced to LE 272 million. In that same fiscal year, total assets rose to LE 89.5 billion, but this included LE 67.8 billion of accounts receivable and arrears (mostly from the electricity sector). In FY2012/13, total liabilities increased to LE 78 billion, including LE 71 billion of accounts payable and arrears (mostly to EGPC). The company has a relatively low, but growing, financial debt (predominantly to national creditors) relative to its capital as reflected in a long-term debt/obligation-to-equity ratio of 1.2 by end FY2012/13. In summary, although EGAS recorded a small profit for the year, its cash flow was tight, and its receivables and payables had risen substantially in recent years.

73. The financial outlook for EGAS is weak due to the following:

- a. The decline in and uncertainties of future LNG exports;
- b. The increases in sales of gas derivatives to EGPC (from EGAS' concessions) may not generate the expected cash flow for EGAS. This is because EGPC may offset certain amount due to EGAS (e.g. for gas derivatives) with the amount due to EGPC from EGAS (e.g. for gas transportation); and
- c. No profits from the gas transportation business. EGAS continues to operate on a not-for-profit cost recovery operation basis.

74. **The Government and EGAS have undertaken a number of measures to address the situation:**

- a. **Making payments to international petroleum companies.** The authorities have gradually started to pay outstanding bills to the international petroleum companies. This is expected to help increase gas production and LNG exports;
- b. **Raising gas tariffs.** In 2012 the authorities had raised gas tariffs for a number of industrial users toward US\$ 2–4 per mmbtu, which represent about 40 percent of gas demand in Egypt. The gas tariffs for the electricity sector—the largest consumer accounting for 57 percent of domestic demand—was raised to US\$ 1.76 per mmbtu (LE 0.44 per cubic meter). The new gas tariffs are estimated to increase the overall domestic gas sales to over LE 30 billion (US\$ 4.3 billion) each year²⁵. If assuming an economic cost of gas in Egypt at US\$3.7 per mmbtu, the new average gas tariffs would equal about 64 percent of the economic cost;

²⁴ Combined capacity of LNG plants at Idku and Damietta. Source: The companies.

²⁵ World Bank staff estimates based on FY2012/13 domestic gas demand.

- c. **Reducing budgetary subsidies for LPG by switching to natural gas.** The authorities remain committed to the household and commercial natural gas connections program, including this project. The benefits from reducing LPG subsidies are larger than the cost of the natural gas connections program. Such benefits could be shared with the gas sector to ensure its financial viability; and
- d. **Shifting some of EGAS debt** for its future investments from national creditors to external creditors could improve significantly maturity structure and servicing cost of EGAS future debt.

B. Technical

75. **The project builds on the ongoing Egypt Natural Gas Connections Project which was carried out in the Town Gas concession areas but only in Greater Cairo area.** The proposed works will be mainly implemented by either Town Gas or Egypt Gas and, as in the previous project. Egypt Gas will also act as a contractor to Town Gas principally for the construction and installation of the distribution pipelines and the household connections. Both companies are long-established and have considerable experience of gas distribution activities. Egypt Gas has substantially more resource capacity than other LDCs in terms of manpower, equipment, vehicles and warehousing for materials and hence they also provide services to the other LDCs. Both Town Gas and Egypt Gas have training centers for their operatives and are in the process of increasing their resources for the increased work levels which are being proposed for this project. Both companies prepare their own designs, supervise the works in their concession areas and operate and maintain their networks, including providing CSCs. The estimated quantities of materials being proposed are based on the feasibility studies and previous experience of similar work and the unit prices for the individual items are based on the most recent purchase orders placed.

C. Financial Management

76. **The Financial Management (FM) arrangements at EGAS and Town Gas were reviewed earlier for the Egypt Natural Gas Connection Project and are consistently monitored during the Bank implementation support missions.** A similar review for Egypt Gas Company has taken place during preparation of this project. Overall, the current financial management arrangements are satisfactory to the Bank. The ongoing project has complied with the Bank FM policies in terms of maintaining satisfactory accounting system and fulfilling the reporting and auditing requirements during the previous years of implementation. As of June 2014, no audit reports were overdue. There will be a Loan Agreement between the Government and the Bank and a Project Agreement between EGAS and the Bank. EGAS will cause, through contractual arrangements satisfactory to the Bank, Town Gas and Egypt Gas companies, who have the concessions in most of the project areas, with implementing the gas connection activities.

77. **Risks:** The main potential FM risks identified under the proposed project relate to the (i) coordination between EGAS and the two implementing entities with regards to flow of information and flow of funds; (ii) reliability of estimated materials needs per connection; (iii) applicable controls in warehouses; and (iv) verification of physical progress and satisfactory completion of works. To address these risks, the following measures are pursued: (i) the project implementation manual will detail the roles and responsibilities of each party and a contractual

relationship will be established between EGAS and the two implementing entities to ensure the commitment of all parties; (ii) identification of the specific project targeted areas and households under the gas connections expansion program; (iii) to enable proper monitoring of funds and physical progress, and assessing reliability of budget estimates, the external audit terms of reference will incorporate technical audit component in addition to the financial audit.

78. **Flow of Funds:** To ensure that funds are readily available for project implementation, EGAS will open a Designated Account (DA) in an acceptable bank in Egypt. Deposits into, and payments from the DA, will be made in accordance with the provisions stated in the loan agreement and the disbursement letter. Disbursement under this loan will be made according to the transaction-based disbursement procedures that include withdrawal applications for direct payment, reimbursement and requests for the issuance of special commitments.

79. **Reporting and Auditing:** EGAS will report to the Bank on the project accounts. Such reporting will include all sources of project funding and all expenditures related to the project. The following will be submitted to the Bank within six months after the end of the fiscal year: (i) project financial statements and audit reports; (ii) EGAS financial statements and audit reports (as the revenue generating entity to pay back the loan); and (iii) Town Gas and Egypt Gas annual audit reports (as the entities responsible for carrying out the project activities).

D. Procurement

80. **A procurement capacity assessment of EGAS was not carried out because procurement activities will be done by Town Gas and Egypt Gas.** However, as mentioned under the project implementation arrangements, a PMU will be created under EGAS and will include a procurement manager and two procurement officers, one from each of the gas companies. The role of procurement in the PMU will be to coordinate the various activities and more important, to carry out a quality assurance role.

81. **The procurement capacity assessment of Town Gas and Egypt Gas covered the companies' organizational structure** and in particular the proposed structure for implementing the project, staffing, procurement systems and past experience. It has been concluded that Town Gas has adequate experience and capacity to carry out procurement activities under the proposed project. Town Gas gained considerable experience in World Bank procurement under the ongoing Natural Gas Connections Project. Although Egypt Gas is not familiar with Bank procurement procedures, they have extensive experience in the type of procurement expected under the project. The procurement implementation arrangements will allow Egypt Gas to benefit from Town Gas experience. Mostly procurement of goods (pipes, valves, meters, etc.) will be carried out. In addition, it is expected that some minor works and consulting services will also be procured. The procurement packages have been discussed and agreed taking into account technical and geographical constraints and grouped in a way that will be easily managed by each of the LDCs. Most packages will be subject to Bank's prior review.

82. **Procurement of the major packages is expected to begin before the loan becomes effective under the "advanced procurement" arrangement in order to speed-up project implementation.** Procurement staffs in EGAS, Town Gas, and Egypt Gas have worked closely with the Bank procurement specialist during project preparation to familiarize themselves with Bank procurement rules and procedures. Considering the above, the procurement risk has been assessed as substantial.

83. **The procurement plan for the project was received by the Bank on June 9, 2014 and found to be acceptable.** It will be updated at least annually (or as required) to reflect project implementation needs. A summary of the procurement capacity assessment and project procurement implementation arrangements are provided in Annex 3. More details are available in the project files.

84. **The procurement arrangements agreed with AFD for joint financing of Component 1 will fully and entirely follow the World Bank Procurement Guidelines, using the World Bank's Standard Bidding Documents (BDs) and managed by the World Bank.** AFD's Statement of Integrity will not be part of the BD's and the BDs will not be amended with AFD debarment list nor at any stage will such debarment list impact the procurement process and bid evaluation. AFD will carry out its own due diligence at the stage of contract award. AFD's Statement of Integrity will be included in the Project Implementation Manual were AFD's requirements on bidder eligibility will be explained. In the event that a bidder is found to be ineligible by AFD, then AFD will not finance that particular contract. If a contract is eligible for Bank financing under Component 1, but not eligible for AFD financing due to supplier debarment rules applicable to AFD, then either EGAS will cover AFD's share of that contract or the Borrower will request the Bank to consider arrangements to for the Bank to fully finance that contract.

E. Citizen Engagement

85. To address demand side aspects of the service delivery, EGAS already has a continuous Citizen Engagement plan in place to build and maintain a productive relationship over time with the project hosting communities. This process extends throughout the life of the project and encompasses a range of activities and approaches, from information sharing and consultation, to participation, negotiation, and partnerships.

86. The proposed project will build on this Citizen Engagement focus. It will support the development of a framework for household gas service delivery performance improvement by developing and monitoring key performance indicators, monitored by the project, to maintain high quality services to the consumers by the gas distribution companies. As a relevant tool for citizen engagement, EGAS and the participating LDCs will be strengthening the role of the customers' service centers (CSC's) to a more engaging role with citizens. Initially prior to the implementation of the proposed project, the Bank will also support a safety awareness campaign geared toward the more rural areas, where concerns on the safety of usage of natural gas connections and appliance were raised during the social consultations. Once the project is moved to implementation this will be sustained by the Social Development Officers hired by the project.

F. Social (including Safeguards)

Social

87. **Social benefits.** The proposed project is expected to yield significant social benefits which include employment generation and improved safety, health and convenience from the elimination of LPG cylinders. The project will particularly benefit the handicapped, elderly and women who are reported to experience difficulty in accessing the LPG cylinders.

88. **Willingness to pay and affordability.** The socio-economic survey of 1,904 households in the targeted areas show that more than 98 percent of the households surveyed expressed

willingness to pay to be connected to natural gas. The assessment by the survey of the affordability of the connection charges and methods of payments revealed that on average one third of the sample surveyed are willing to pay in cash, about two thirds prefer to pay by installments offered by financing program for gas connection fees run by the National Bank of Egypt and facilitated by the gas utilities, while the remaining two percent did not express interest in connecting to the gas network. More people prefer longer term installment schemes that last for four years and one third of the surveyed sample expressed preference to pay the installment in 84 months. These financing schemes allow low income consumers to pay as little as LE28 (US\$4.1) a month for connection charges. The tenure of the payment can go up to seven years and it is progressively more affordable for households. In addition to the installment schemes, financial support for household connection fees in disadvantaged areas will be provided by the EU Grant. This is summarized in Annex 2B of the PAD.

89. **Public consultation.** Extensive consultation has been carried out with various stakeholders, particularly the potential beneficiaries during the project preparation. Three public hearing meetings were conducted in Giza (November 24, 2013), Sohag (November 26, 2013) and Monoufia (November 28, 2014) Governorates. A diverse group of people, including potential beneficiaries, women, governmental officers, NGOs, community leaders, media, academia, participated the meetings. Consultations were also conducted at all eleven targeted governorates through focused group discussions and individual interviews with potential beneficiaries. The findings and results are summarized in the Environmental and Social Impact Assessment Framework (ESIAP) and the Resettlement Policy Framework (RPF). During project implementation Environmental and Social Impact Assessments (ESIAs)/ Environmental and Social Management Plans (ESMPs) and Resettlement Action Plan (RAPs) will be prepared, cleared and disclosed prior to the commencement of any construction work.

90. **Gender.** The proposed project aims to replace the use of LPG with reliable and directly connected natural gas, mainly to be used for cooking in the households. In a typical household women and girls are responsible for securing LPG from the market and waiting in long lines to obtain the cylinders. Time spent in these long lines comes as an opportunity cost for income generation and education. Through providing reliable natural gas connections to 1.5 million households, the project could potentially offer new pathways for women's economic empowerment. Women will have more time to participate in productive activities, owning businesses, and earning income. In addition, the consultations and households' survey were carried out in a gender sensitive approach to understand particular issues and concerns of women for the project design. Over 55 percent of the households' survey sample targeted women and over quarter of the participants in the various plenary public consultation sessions were of women.

91. **Potential adverse social impacts.** The potential adverse social impacts are mainly related to the permanent land acquisition and temporary land use for construction of 25 PRSs and 187 km of high pressure gas pipeline. It is estimated that the project will need about four hectares of permanent land acquisition and 180 hectare temporary land use. Since the exact locations of PRSs and alignment of gas pipeline cannot be finally determined at this stage, an RPF has been prepared to mitigate the potential resettlement impacts. The RPF establishes the principles for resettlement impact mitigation and the organizational arrangements for preparation and implementation of resettlement action plans which may be needed during project implementation. The RPF summary is included in Annex 3.

G. Environment (including Safeguards)

92. This Project is assigned a Category A based on the nature of the activities that will be financed such as the expansion of pressure (intermediate and low) gas distribution networks; the construction of Pressure Reduction Stations (PRSs) to connect the distribution networks; and the extension of the gas high pressure transmission network to supply gas to the new PRSs. These activities may produce adverse and significant environmental impacts. The Environmental Assessment (OP/BP 4.01), Involuntary Resettlement (OP/BP 4.12), and Physical Cultural Resources (OP/BP 4.11) safeguards policies were triggered; accordingly, the following safeguards instruments were prepared: An Environmental and Social Impact Assessment Framework (ESIAF) and Resettlement Policy Framework (RPF).

93. The choice of an ESIAF and RPF was informed by the fact that details of pipeline routings, locations of PRSs, and exact households to be connected was not known at appraisal. The frameworks set the road maps during the implementation phase, as site-specific Environmental and Social Impact Assessments (ESIAs), Quantitative Risk Assessments (QRAs) and Resettlement Action Plans (RAPs) will have to be prepared upon finalization of project details. The ESIAF and RPF were prepared, reviewed, approved, disclosed in-country and at the Infoshop on March 23, 2014 and March 24, 2014 respectively.

94. The ESIAF revealed a number of negative impacts such as traffic congestion and loss of access due to excavation and installation works, air emissions, elevated noise levels, structural effects on cultural sites and antiquities, potential risk to weak structures, damage to underground utilities during excavations, possible disruption or displacement of ecological systems, and solid and liquid waste disposal. These negative impacts have detailed and defined mitigation measures contained in the instrument.

95. Three entities will be responsible for the implementation of the environmental and social management plans (ESMPs) during the implementation phase: EGAS, Town Gas and Egypt Gas. These three entities already have an environmental management structure with Health, Safety and Environment (HSE) staff. The designated environmental and social specialists in will follow up on the implementation of the safeguards instruments and ensure that civil works contractors and their supervising consultants abide by the mitigation measures and guidance contained in the respective ESMPs. The project will support capacity building of the designated specialists, local consultants, contractors and supervising consultants with respect to the Bank safeguards policies and application of the safeguards instruments.

Annex 1: Results Framework and Monitoring

Country: Egypt, Arab Rep

Project Name: EG: Household Natural Gas Connection Project (P146007)

Results Framework

Project Development Objectives

PDO Statement

The project development objective is to assist the Arab Republic of Egypt to increase household access to reliable, lower cost, grid connected natural gas supply.

These results are at Project Level

Project Development Objective Indicators

Indicator Name	Baseline	Cumulative Target Values				
		YR1	YR2	YR3	YR4	End Target
Natural gas household connections financed by the project in targeted areas. (Number)	0.00	200,000.00	600,000.00	1,100,000.00	1,500,000.00	1,500,000.00
Government annual savings from reduction in LPG imports due to decreased LPG consumption in the targeted project areas. (Amount(USD))	0.00	54,000,000.00	162,000,000.00	298,000,000.00	406,000,000.00	406,000,000.00
Gas leaks per 1000 consumers per year of distribution networks installed in targeted governorates not to exceed agreed reliability level of 5. (Yes/No)	No	Yes	Yes	Yes	Yes	Yes
Direct project beneficiaries (Number) - (Core)	0.00	900,000.00	2,700,000.00	4,950,000.00	6,750,000.00	6,750,000.00
Female beneficiaries (Percentage - Sub-Type: Supplemental) - (Core)	0.00	0.00	50.00	50.00	50.00	50.00
Direct project beneficiaries who are poor benefiting from financial support to connection fees. (Percentage - Sub-Type: Supplemental) ²⁶	0.00					0.00

²⁶ Targets will be set when the financial support mechanism is determined.

Intermediate Results Indicators

Indicator Name	Baseline	Cumulative Target Values				
		YR1	YR2	YR3	YR4	End Target
Kilometers per year of new distribution networks installed in target areas (Number)	0.00	2,000.00	4,500.00	7,000.00	8,500.00	8,500.00
Reduction of LPG consumption in the target area. (Tones/year)	0.00	66,000.00	198,000.00	363,000.00	495,000.00	495,000.00
PRSs developed and operational serving targeted areas (Number)	0.00	5.00	15.00	25.00	25.00	25.00
Customer service centers in targeted areas established and operational. (Number)	0.00	0.00	3.00	7.00	11.00	11.00
LDC average response time per 1000 calls by household consumers in targeted area calling the emergency national phone number (129) not exceeding 15 minutes (Yes/No)	No	Yes	Yes	Yes	Yes	Yes
Targeting and disbursement mechanism for the financial support of connection charges to the poor is in place. (Yes/No)	No	Yes	Yes	Yes	Yes	Yes
EGAS Financial Reporting by the new FMIS. (Yes/No)	No	No	No	No	Yes	Yes
Establishment of a Gas Regulator. (Yes/No)	No	No	Yes	Yes	Yes	Yes

Indicator Description

Project Development Objective Indicators

Indicator Name	Description (indicator definition etc.)	Frequency	Data Source / Methodology	Responsibility for Data Collection
Natural gas household connections financed by the project in targeted areas.	This indicator measures the number of installed household connections financed by the project and hence household access to gas supply. The number of connections will be reported by the participating LDCs and EGAS and will also be verified by the annual technical audit required by the project.	Quarterly	EGAS, Town Gas and Egypt Gas progress reports	EGAS, Town Gas and Egypt Gas
Government annual savings from reduction in LPG imports due to decreased LPG consumption in the targeted project areas.	This indicator measures the fiscal savings of the Government due to reduction LPG import resulting from decreased LPG consumption in the targeted areas. The LPG savings will be calculated using the reduction of LPG consumptions in the targeted areas monitored by intermediate indicator defined below multiplied by the LPG import price. Estimates for the targets are based on import price of LPG of \$822/ton (five year average between 2011 and 2013).	Quarterly	EGAS, Ministry of Petroleum, progress report	EGAS, Ministry of Petroleum
Gas leaks per 1000 consumers per year of distribution networks installed in targeted governorates not to exceed agreed reliability level of 5.	This indicator measures the reliability performance of the gas networks and household gas installations. The LDCs keep reports of actual gas leaks in their networks and indicator can be reported and monitored. Gas Leaks is defined as all leak reports on mains and services, external and internal installations and appliances and not including other reports	Annually	EGAS, Town Gas and Egypt Gas progress reports	EGAS, Town Gas and Egypt Gas
Direct project beneficiaries	Direct beneficiaries are people or groups who directly derive benefits from an intervention (i.e., children who benefit from an immunization program; families that have a new piped water connection). Please note that this indicator requires supplemental information. Supplemental Value: Female beneficiaries (percentage). Based on the assessment and definition of direct project beneficiaries, specify what proportion of the direct project beneficiaries are female. This indicator is calculated as a percentage.	Quarterly	EGAS, Town Gas and Egypt Gas quarterly progress reports	EGAS, Town Gas and Egypt Gas
Female beneficiaries	Based on the assessment and definition of direct project beneficiaries, specify what percentage of the beneficiaries are female.	No description provided.	No description provided.	No description provided.
Direct project beneficiaries who are poor benefiting from financial support to connection fees.	No description provided.	Quarterly	EGAS, Town Gas and Egypt Gas quarterly progress reports	EGAS, Town Gas and Egypt Gas

Intermediate Results Indicators

Indicator Name	Description (indicator definition etc.)	Frequency	Data Source / Methodology	Responsibility for Data Collection
Kilometers per year of new distribution networks installed in target areas	This indicator measures the length of the new distribution networks gas pipelines installed in the targeted areas necessary for scaling up household connections. The indicator will be available to the LDCs and can be reported and monitored	Quarterly	EGAS, Town Gas and Egypt Gas quarterly progress reports	EGAS, Town Gas and Egypt Gas
Reduction of LPG consumption in the target area.	This indicator measures the reduction of LPG consumptions in the targeted areas due to connecting households to the gas distribution networks. It will be estimated based on average household consumption of 2 LPG bottles per month (equivalent to 33.3 kg of LPG)	Quarterly	EGAS, Ministry of Petroleum, quarterly progress report	EGAS, Ministry of Petroleum
PRs developed and operational serving targeted areas	This indicator monitors and reports the number of PRs that will be constructed in the targeted areas and will be necessary feed gas to the distribution networks expanded by the project. The indicator will be closely monitored and reported to ensure the project implementations will not be delayed.	Quarterly	EGAS, Town Gas and Egypt Gas quarterly progress reports	EGAS, Town Gas and Egypt Gas
Customer service centers in targeted areas established and operational.	This indicator monitored the establishment of customer service centers in targeted areas. Participating LDCs will determine in which targeted localities the centers will be located depending on number of connection achieved and requirements of operation.	Quarterly	EGAS, Town Gas and Egypt Gas quarterly progress reports	EGAS, Town Gas and Egypt Gas
LDC average response time per 1000 calls by household consumers in targeted area calling the emergency national phone number (129) not exceeding 15 minutes	This indicator will focus on the response time of the participating LDCs to consumer calls to the emergency national phone number (129) to ensure timely response by the LDCs emergency calls. LDCs keep records of emergency calls and the indicator can be reported and monitored.	Quarterly	EGAS, Town Gas and Egypt Gas quarterly progress reports	EGAS, Town Gas and Egypt Gas
Targeting and disbursement mechanism for the financial support of connection charges to the poor is in place.	The focus of this indicator is to ensure that the targeting and disbursement mechanism for the financial support, provided under Component 2, of connection charges to the poor is in place and functioning.	Quarterly	EGAS, Town Gas and Egypt Gas, quarterly progress report	EGAS, Town Gas and Egypt Gas
EGAS Financial Reporting by the new FMIS.	This indicator informs on the successful implementation, functioning and hence utilization of the FMIS at EGAS that will be installed	Quarterly	EGAS, quarterly progress reports	EGAS
Establishment of a Gas Regulator.	This indicator informs on the establishment of a functioning gas regulator which will be an important institution to support development of a reform program for the gas utilities and market in Egypt and monitor the utilities performance.	Quarterly	EGAS, Ministry of Petroleum, , quarterly progress reports	EGAS, Ministry of Petroleum

Annex 2: Detailed Project Description

Egypt – Household Natural Gas Connection Project (P146007)

Scope of Household Connections and Connection Criteria

1. The proposed project will connect 1.5 million households to the gas distribution networks, of which 1.1 million households will be connected in eleven Governorates during the project first three year implementation period in areas under the concessions of four LDCs: (i) **Town Gas** in the Giza, Ismailia, and Alexandria Governorates (ii) **Egypt Gas** in Qalubia, Menufia, Daqahlia, Qena, Gharbia, and Aswan Governorates (iii) **ReGas** in Sohag and Marsa Matrouh Governorates; (iv) **Sianco** in the Alexandria Governorate; and (v) **SinaiGas** in Ismailia governorate.

2. The 1.1 million household connections were selected by the LDCs applying their multistage selection criteria for determining targeted areas for expanding the gas distribution gas networks and identifying household for gas connections. In the first stage, targeted Governorates and districts are selected based on:

- Areas with documented difficulties of obtaining LPG cylinders due to lack of supply and/or high demand.
- Areas where LPG cylinders are known to be sold at much higher prices than the subsidized price.
- Disadvantaged and popular areas (poor roads and buildings types) without however contradiction with natural gas required specifications for gas connection.
- Proximity to existing natural gas networks.

3. In the second stage the LDCs undertake initial surveys to estimate the households that could be connected to the gas networks in the identified governorates and areas. The initial surveys include:

- A team of surveyors visits city councils or governorates to obtain all the available data with regards to number of potential residential, commercial and/or industrial customers. These numbers would typically be an estimate based on the numbers of electricity company consumer databases.
- An observation phase follows where the team visits the area and notes the conditions of the roads and buildings, safety, and technical compliance.
- The team then develops an approximation of the number of customers in buildings and roads not meeting the required safety and technical criteria. These are classified as “NO GAS”²⁷.

²⁷ “NO GAS” is designated during the initial stage for the following reasons:

- i. The utilities in the road do not allow for laying natural gas pipes.
- ii. The pipes proximity in that road is not technically accepted.
- iii. The condition of the building is not safe.
- iv. The place is used as storage.
- v. There is no access for placing the riser for the gas connection.
- vi. The place is not well ventilated.

- The team identifies the availability of utilities in the area and their conditions (electricity, water, telephone lines, and sewage) through requesting data and maps from the relevant authorities.
- In the last step of the initial survey, the team locates the nearest PRSs or gas networks, if available.

4. In the last stage and once initial surveys are approved and funding becomes available to finance household connections in the targeted areas, the LDCs will carry out Property and Appliance (P&A) surveys to prepare a final list of consumers for gas connection and initiate the project final design and installation:

- The company establishes cadastral maps using Total Stations instrument, either by True Coordinates gathered by Global Positioning System (GPS) devices or by local coordinates in case of no GPS points are available.
- A team identifies GPS coordinates of the sites and initiates a land survey for locating each road and building to insert them on the corresponding map.
- The GPS team then develops a land survey map which will be later collected by the P&A survey team to identify each customer with a unique customer reference number (C.R.N) and each building, block, and sector in that area.
- The final (C.R.N) will be associated to the customer name, address, appliances, and data.
- Finally, an isometric drawing for each building, location of service, and riser routes is created and reviewed by the surveyors and delivered to the Installations Department
- All the data is entered into a central database and Geographic Information system (G.I.S) system for review by a design team in the Installation Department
- The Design team determines pipe sizing, type, regulator capacity & locations, and routing assuming that each unit to be connected will require two appliances to be modified (stove and heater).

Poverty Mapping of Targeted Areas

5. Assessment of LDC selection criteria by a detailed poverty mapping of 84 out of the 88 targeted areas in the eleven governorates benefiting from the 1.1 million household connection shows that 52 percent of these targeted areas have average poverty rates higher than the national average of 26 percent. The poverty mapping also shows that 53 percent of the targeted areas will be in areas that are poorer than the average of the Governorate in which they are located. The analysis (summarized in Annex 2-B) shows that targeting of the poor is higher in populated urban areas in Governorates where gas networks already exist. While in other Governorates where the expansion of the gas networks will be in large part in Greenfield areas, the sequencing of expansion of gas networks and targeting areas for household connection must take into account proximity of targeted area to the newly developed gas networks and the required technical and safety specifications for connections that must be met.

vii. The width of the atrium is not enough to place the scaffolds.

Project Costs

6. Based on initial surveys identifying 1.1 million connections in the targeted areas in the eleven governorates the LDCs prepared feasibility studies assessing detail cost estimates for various network and household connection components as shown in Table 2.1 below. The estimated quantities of materials and labors are based on the initial surveys and previous experience of similar work. The unit prices for the individual items are based on the most recent purchase orders placed. Table 2.1 shows the total cost for connecting 1.1 million households is estimated at US\$ 800 million (excluding taxes) about half of which is the cost of materials and the other half is the cost of work and installation. Table 2.1 also shows that the average cost of a household connection is about LE 5,000 (US\$725) excluding taxes.

Table 2.1: Cost Estimates for the proposed 1.1 million connections

No.	Description	Description of all Items	Financed By World Bank	Financed By EGAS	
			Cost (USD)	Cost (USD)	
			Materials	Materials	Labor
1	HP pipelines & PRS	Up-Stream	91,993,431	170,714	65,321,972
		Down-Stream & Special Crossings	54,726,207		
2	Distribution, connection & conversion	Distribution	53,688,973	0	255,807,385
		Installation	163,913,175		
		Conversion	29,505,431		
3	Other Costs	Equipment & Tools	2,178,375	215,000	83,416,049
		Vehicles	2,208,571		
		Info Centers & Reinstatement	0		
		Permitting & Design Requirement	0		
			398,214,163	385,714	404,545,406

Total number of Connections	1,125,000
Total Cost (USD)	803,145,283
Total Cost (LE)	5,589,891,172
Unit Cost per connection (USD)	714
Unit Cost per connection (LE)	4969
Total Cost, HP & PRS (USD)	212,212,324
Total Cost, HP & PRS (LE)	1,476,997,775
Unit Cost, HP & PRS (USD)	189
Unit Cost, HP & PRS (LE)	1313
Total Cost, Distribution & Installation (USD)	473,409,533
Total Cost, Distribution & Installation (LE)	3,294,930,353
Unit Cost, Distribution & Installation (USD)	421
Unit Cost, Distribution & Installation (LE)	2929
Total Cost, Conversion (USD)	29,505,431
Total Cost, Conversion (LE)	205,357,800
Unit Cost, Conversion (USD)	26
Unit Cost, Conversion (LE)	183
Total Other Costs (USD)	88,017,995
Total Other Costs (LE)	612,605,244
Unit Cost Other Costs (USD)	78
Unit Cost Other Costs (LE)	545

7. The project will also connect additional 400,000 households to the gas networks in the fourth year of implementation. These households could be located in designated districts in the eleven Governorates, new districts in those Governorates, or in other Governorates. The final selection will be contingent on the preparation of feasibility studies and applicable site specific safeguards documentations required by the project Environmental and Social Impact Assessment Framework and Resettlement Policy Framework.

8. Assuming the unit costs for the additional 400,000 household connections will be the same as the unit costs for the 1.1 million household connections assessed by the feasibility studies, the cost estimates for the 1.5 million connections are summarized in Table 2.2.

Table 2.2: Estimated Cost for 1.5 million connection (Excluding Taxes)

	Description	Materials (US\$ m)	Work/Labor (US\$ m)	Total (US\$ m)
1.1 million connections		400	400	800
	HP Pipelines and PRSs	145	65	210
	Distribution Networks including reinstatements, permitting and design	255	335	590
400,000 connections		145	145	290
	HP Pipelines and PRSs	52	23	75
	Distribution Networks including reinstatements, permitting and design	93	122	215
1.5 million Connections		545	545	1090
Equipment, Tools and Vehicles		5	0	5
Contingency (10%)		55	55	110
Taxes²⁸		110	55	165

Project Components

9. The proposed project will have the following components:

- **Component 1: Gas Network Expansion and Household Connections (Estimated Cost - US\$1120 million, of which IBRD US\$500 million):** This component will finance investments necessary to installing the gas networks and connecting 1.5 million households to the gas distribution networks in order to provide them access to natural gas supply. The investments financed by this components are included in four subcomponents:
 - **Subcomponent 1.1: Gas Transmission Connections and high Pressure Reduction Stations (PRSs) (Estimated Cost US\$285 million²⁹).** This subcomponent includes installing the high pressure transmission pipeline network to provide the capacity to supply gas to the new project areas. For the 1.1 million household connections in the eleven Governorates, twenty five high pressure pipeline extensions or connections are currently being considered ranging from 50m – 38km, totaling about 200 km in aggregate. These high pressure pipelines will be supplying gas to the twenty five PRSs required for the expansion of the distribution networks in the eleven

²⁸ Assumed taxes: 10 percent for Labor, work and installation, 20 percent on materials

²⁹ Net of taxes

governorates. The list of Governorates with length of proposed high pressure pipelines and associated number of PRSs to be financed by the project is included in Annex 2-A. Feasibility studies to be prepared for the additional 400,000 household connections may identify the need for additional high pressure pipelines and PRSs to scale up from 1.1 million to 1.5 million connections.

These bulk transmission pipelines are generally operated at pressures between 30 barg and 70 barg and are constructed of welded steel pipes. The pipes have anti-corrosion coatings and are also provided with cathodic protection systems for additional corrosion control. Pipe sizes are determined based on the additional capacity requirements estimated. The PRSs provide an essential control function by ensuring that the downstream distribution systems are operated accurately at the lower pressure levels to meet the associated safety requirements. The control valves in these stations all have fail-safe facilities to protect consumer installations from over-pressurization. Electronic SCADA (Supervisory Control and Data Acquisition) systems enable the operators in a central control room to monitor gas pressures and flows and also to remotely operate certain safety valves in the event of emergencies.

The estimated costs for the materials, work and labor for the investments under this subcomponent are as follows:

Description	Materials (US\$ m)	Work/Labor (US\$ m)	Total (US\$ m)
HP Pipelines and PRSs	197	88	285

It is proposed that the project will finance the supply of goods and materials and selective work and installation contracts for the installation of the high pressure pipelines and PRSs and work contracts for special crossing under this subcomponent.

- **Subcomponent 1.2: Gas Distribution Network and Connections (Estimated Cost: US\$805 million³⁰).** This includes expansion of the intermediate, medium and low pressure gas distribution networks, installation control systems, main regulators and customer connections and conversions of customer appliances to allow connection of, and supply of gas to 1.5 million households. For the 1.1 million household connections proposed in the eleven Governorates, the list of targeted areas with number of proposed household gas connections to be financed by the project is included in Annex 2- A. Feasibility studies and detailed design to be prepared for the additional 400,000 household connections will identify the areas and governorates where these household connections will be connected.

Distribution systems are generally constructed of either high density (HDPE) or medium density (MDPE) polyethylene pipes (often referred to as mains) which are inherently resistant to corrosion. They are buried at between 0.8 and 1m depths under roads, verges or footways and joined by heat fusion (a form of welding) to minimize the need for mechanical joints. Service pipes, which connect from the main to the individual buildings, use similar materials and procedures.

³⁰ Net of taxes

The estimated costs for the materials, work and labor for the investments under this subcomponent are as follows:

Description	Materials (US\$ m)	Work/Labor (US\$ m)	Total (US\$ m)
Distribution Networks including reinstatements, permitting and design	348	457	805

The proposed project will finance supply of goods and materials and selective work contracts including special crossing under this subcomponent. EGAS will be responsible for the cost of work and labor including cost of reinstatement of road and construction sites.

- **Subcomponent 1.3: Strengthening Capacity for Connection Scale Up (Estimated Cost – US\$5 million³¹).** This subcomponent will support the supply and delivery of tools, equipment and service vehicles to improve the capacity of the participating LDCs in project implementation and scaling up connection installations, network operations and service delivery to consumers. The proposed project will finance the supply of equipment and tools under this subcomponent.
- **Subcomponent 1.4: Establishment of Customer Service Centers (Estimated Cost – US\$25 million³²).** This subcomponent will support the establishment of customer service centers in the targeted areas to ensure high quality gas supply services to consumers during the project operation stage. It is envisaged that a minimum of eleven customer service centers will be established by the LDCs in their targeted areas. The average cost of establishing a service center is assumed US\$ 2.5 million. The subcomponents will be financed by the participating LDCs.
- **Component 2: Financial Support for Household Connection Charges in Disadvantaged Areas (Estimated Cost - Euro 45 million).** The scale-up of the natural gas connections as envisaged under this project will expand the grid to eleven Governorates that will include relatively poorer areas of Egypt. To ensure access will be provided to vulnerable households and project implementation will not be delayed due to consumer affordability, this component will provide financial support for connection fees for households in disadvantaged and poor areas. The component will be financed by an EU Grant, managed by AFD. The methodology for identifying the disadvantaged areas that will benefit from this component and the financing mechanism for the provision of the financial support will be based on socio-economic characteristics and poverty mapping of the targeted areas developed by an AFD consultancy assignment.
- **Component 3: Institutional Strengthening (Estimated Cost: Euro 13 million).** This component will be financed by the EU Grant and will contribute to improvement of the governance structure and fiscal transparency and accountability at EGAS and will support development of the gas sector regulations. The institutional strengthening will be divided into two subcomponents as follows:

³¹ Net of taxes

³² Net of taxes

- **Subcomponent 3.1 Development of a Financial Management and Information System (FMIS) (Estimated Cost – Euro 10 million).** The FMIS will seek to enhance the timeliness and value of financial and accounting reports and improve the performance monitoring of EGAS and affiliated distribution companies. The new FMIS system will make the financial information more reliable, transparent and comparable to other gas utilities and produce enhanced and improved data for developing, monitoring and benchmarking of Key Performance Indicators (KPIs) for the gas utilities. This subcomponent will finance i) a technical assistance to for the preparation of the design and implementation support of the new FMIS in EGAS. The technical assistance will evaluate options for FMIS and may recommend the development of the FMIS module as part of a more elaborated Enterprise Resource Planning (ERP) system , and ii) supply and installation of the new FMIS in EGAS.
- **Subcomponent 3.2: Technical Assistance for Gas Sector Regulatory Development (Estimated Cost – Euro 3 million).** This subcomponent will support the startup operations of a transitional gas regulator in Egypt including technical assistance for the development of enabling gas sector regulations, an assessment of various options for gas market design to be developed by the transitional gas regulator once it is established.

Project Financing

10. The total financing requirement for Component 1 of the proposed Project is estimated at US\$1395 million (including taxes and ten percent contingency) of which US\$500 million will be financed by IBRD, Euro 70 million (equivalent US\$96 million³³) by AFD, about US\$ 326 million by consumer connection fees and the remaining US\$473 million will be financed by EGAS as shown in the table below. Components 2 and 3 will be financed by the EU Grant, managed by AFD.

³³ Assuming 1.36 Euro/US\$ exchange rate

Project Component	Cost (millions)
Component 1: Gas Network Expansion and Household Connections	
Subcomponent 1.1: Gas Transmission Connections and PRSs	US\$285
Subcomponent 1.2: Gas Distribution Network and Connections	US\$805
Subcomponent 1.3: Strengthening Capacity for Connection Scale Up	US\$5
Subcomponent 1.4: Establishment of Consumer Service Centers	US\$25
Total Component 1 without contingencies	US\$1120
Contingencies (10%)	US\$110
Tax and Custom	US\$165
Total for Component 1	US\$1395
World Bank Financing of Component 1	US\$500
AFD Financing of Component 1	US\$96 (Euro 70)
Customer Connection Charges ³⁴	US\$326
EGAS Financing of Component 1	US\$473
Component 2: Financial support for household connection charges in disadvantaged areas	US\$61.2 (Euro 45)
EU Grant (AFD managed) Financing of Component 2	US\$61.2 (Euro 45)
Component 3: Institutional Strengthening	
Subcomponent 3.1: Development of a Financial Management and Information System (FMIS)	US\$13.6 (Euro 10)
Subcomponent 3.1: Capacity Building for Establishment of the Gas Regulator	US\$4.1 (Euro 3)
Total for Component 3	US\$17.7 (Euro 13)
EU Grant (AFD managed) Financing of Component 3	US\$17.7 (Euro 13)
Project Total	US\$1473.9

11. IBRD and AFD funds will be provided for investments under Component 1 to finance supply of goods and materials and selective works and installation contracts that will be procured competitively according to the World Bank procurement guidelines. IBRD and AFD financing for Component 1 will be based on joint co-financing arrangements with IBRD providing 84 percent and AFD 16 percent of contract payments. The EU Grant managed by AFD and implemented according to AFD procurement and financial management procedures, will provide 100 percent financing for Components 2 and 3 based on parallel financing managed by AFD.

Capacity of Town Gas and Egypt Gas for Scaling Up Gas Connection

12. Town Gas Company began operations in year 2000 and is mandated to carry out design, construction, management, operation and maintenance for all natural gas activities related to domestic, commercial and industrial consumers in its specified concession areas which are the Governorates of Cairo, Giza, Alexandria, Ismailia and Port Said. It has developed its management systems in accordance with and accredited to ISO 9001, 14001 and OHSAS18001 requirements. The company has a good safety record in terms of its gas operations with low levels of gas leakage and dedicated ‘emergency’ teams available to respond quickly to any reports of suspected gas leakage.

13. The Operations Department has 18 operations areas each with Customer Service Centers which cover all the company's concession areas. There are 21 emergency bases, manned 24hours/7days continuously dealing with all reported or suspected emergency situations.

14. The total number of new household connections completed in recent years is as follows:

³⁴ Customer connection charges = 1.5 * (1500/6.89) = US\$ 326

Year	2009	2010	2011	2012
Connections completed	157,955	237,501	264,360	265,653

15. Under the proposed project, Town Gas is expecting to connect a further 552,500 households over a three year period.

16. Egypt Gas was established in 1983 and its responsibilities are similar to those of Town Gas although it also operates as a contractor to other LDCs in Egypt and pioneers the development of CNG filling stations for natural gas vehicles. It also has accredited management systems in accordance with ISO 9001, 140001 and OHSAS18001 together with ISO 17025 accreditation for its metering repair, maintenance and calibration Centre. The company operates 26 Customer Service Centers, which cover all the company's concession areas. Its emergency bases are manned 24hours/ 7days continuously; dealing with all reported or suspected emergency situations.

17. Egypt Gas has connected almost three million households since its inception with the following number in its own concession areas.

Year	2009	2010	2011	2012	2013 (est.)
Connections completed	176,761	176,947	176,856	169,139	191,784

18. Under the proposed project, Egypt Gas is expecting to connect a further 545,500 households in its own concession areas over the three year period.

Annex 2A: List of Governorates with Household Connections and PRSs

Egypt – Household Natural Gas Connection Project (P146007)

Table 3: Town Gas Execution Plan for Connection 552,500 Households to Gas Networks

Governorate	Area		First Year	Second Year	Third Year	Total customers	Pressure Reducing Stations (PRS)	High Pressure Pipeline (HPP) (m)
	English	Arabic	2014/2015	2015/2016	2016/2017			
North of Giza Areas	Ousim	أوسيم	45,000	-	-	45,000	1	8,000
	Baragil West	غرب البراجيل	40,000	-	-	40,000		
	AlkoumAlahmer	الكوم الأحمر		11,000		11,000		
	Mohamed Island	جزيرة محمد		10,000		10,000		
	skel	سكيل		5,000		5,000		
	Shnbary	شنباري		6,000		6,000		
	tanash	طناش		8,000		8,000		
	Bortos	برطس			10,000	10,000		
	Alkarateen	القراطيين			9,000	9,000		
	Alabadia	الأبعادية			1,000	1,000		
South of Giza Areas	Atifih	أطفيح		15,000		15,000	1	15,000
	Shabramnt	شبرامنت		4,000		4,000		
	Abu El Numros	أبو النمرس		10,000		10,000		
	Manyalsheha	منيل شيحة		10,000		10,000		
	OumKhannan	أم خنان		10,000		10,000		
	Elhwamdia	الحوامدية		30,000		30,000		
	Tamouh	طموه			5,000	5,000		
	El manawat	المنوات			12,000	12,000		
	Elbadrasheen	البدراشين			40,000	40,000		
	Met Rahima	ميت رهينة						
Giza Total	إجمالي الجيزة	85,000	119,000	77,000	281,000	2	31,000	
Alexandria	Rest of area 6 (Almandara) Sectors (4, 5, 9)	بقية المنطقة 6 (المنذرة) قطاعات (4، 5، 9)	-	50,000	-	50,000		
	Toson	طوسون						
	Altabia	الطابية						
	Rest of area 6 (Almandara) Sectors (11, 12, 13)	بقية المنطقة 6 (المنذرة) قطاعات (11، 12، 13)						
	area 9 (Albaktoshy, Almohagren, Khorshed, Alzwaيدا)	المنطقة 9 (الباكتوشي، المهاجرين، خورشيد، الزوايدة)	-	-	45,000	45,000		
Al Amiriya	العامرية	10,000	42,000	32,000	84,000	1	2,500	

Governorate	Area		First Year	Second Year	Third Year	Total customers	Pressure Reducing Stations (PRS)	High Pressure Pipeline (HPP) (m)
	English	Arabic	2014/2015	2015/2016	2016/2017			
Alexandria Total		إجمالي الإسكندرية	10,000	92,000	77,000	179,000	1	2,500
MarsaMatrouh	MarsaMatrouh	مرسى مطروح	-	15,000	15,000	30,000	1	4,000
MarsaMatrouh Total		إجمالي مرسى مطروح	0	15,000	15,000	30,000	1	4,000
Ismalia	Alkantara East Old	القنطرة شرق - قديمة	-	10,000	-	10,000	1	1,000
	Alkantara East New	القنطرة شرق - جديدة	-	-	15,000	15,000		
	Alkantara West	القنطرة غرب	-	17,000	-	17,000	1	1,000
	Fayed	فايد	-	15,000	-	15,000	1	1,500
	Abou Sower	أبو صوير	-	-	5,500	5,500	1	3,500
Ismailia Total		إجمالي الإسماعيلية	0	42000	20500	62500	4	7,000
Total of Plan			95,000	268,000	189,500	552,500	9	44,000

Table 4: Egypt Gas Execution Plan for Connection 572,500 Households to Gas Networks

Governorate	Area		First Year	Second Year	Third Year	Total customers	Pressure Reducing Stations (PRS)	High Pressure Pipeline (HPP) Meters
	English	Arabic	2014/2015	2015/2016	2016/2017			
Qalyubia	El-Khosos	الخصوص	84,000	-	-	84,000	-	-
	Qaha	قها	-	4,000	-	4,000	1	50
	Shebin El-Qanater	شبين القناطر	18,000	-	-	18,000	-	-
	El-Ramla	الراملة	-	4,500	-	4,500	-	-
	Mit El-Attar	ميت العطار	-	-	1,000	1,000	-	-
	Warwarah	ورورة	1,500	-	-	1,500	-	-
	Balqas	بلقس	13,000	-	-	13,000	-	-
	Ezbet El-Ward	عزبة الورد	-	-	3,000	3,000	-	-
	ShahatMusturad	شحات مسطر						
Qalyubia Total	إجمالي القليوبية		116,500	8,500	4,000	129,000	1	50
Gharbia	Sibirbay	سيبرباي	-	-	6,000	6,000	-	-
	El-Santah	السنطة	-	-	6,000	6,000	-	-
	Qotour	قطور	-	-	3,500	3,500	1	100
	MahallaZayed	محلة زايد	-	-	5,000	5,000	-	-
	Bashbish	بشبيش	-	-	5,000	5,000	-	-
	HayyGouffran	حي الغفران	4,000	-	-	4,000	-	-
Gharbia Total	إجمالي الغربية		4,000	0	25,500	29,500	1	100
Daqahlia	Sherbeen	شربين	-	15,000	-	15,000	-	-
	Belkas	بلقاس	-	17,500	-	17,500	1	100
	El-Senbellawein	السنبلوين	-	-	23,500	23,500	-	-
	El-Manzalah	المنزلة	-	-	14,000	14,000	1	16,000
	Aga	أجا	-	-	10,000	10,000	-	-
	MitSalsil	ميت سلسيل	-	-	10,000	10,000	1	12,000
	Tami El-Amdid	تمى الأمديد	-	-	5,000	5,000	-	-
	BaniEbeid	بنى عبيد	-	-	10,000	10,000	-	-
	Dekernes	دكرنس	-	-	15,000	15,000	1	25,000
	Menyet El-Nasr	منية النصر	-	-	3,000	3,000	-	-
	Nabarouh	نبروه	6,000	-	-	6,000	-	-
	Sectors Mansoura	قطاعات المنصورة	3,000	-	-	3,000	-	-
Sectors Talkha	قطاعات طلخا							
Daqahlia Total	إجمالي الدقهلية		9000	32500	90500	132000	4	53100
Menufia	El-Shohada	الشهداء	-	5,000	-	5,000	-	-
	El-Batanoun	البتانون	-	8,000	-	8,000	-	-

Governorate	Area		First Year	Second Year	Third Year	Total customers	Pressure Reducing Stations (PRS)	High Pressure Pipeline (HPP) Meters
	English	Arabic	2014/2015	2015/2016	2016/2017			
	Ashmoun	أشمون	-	10,000	-	10,000	-	-
	MitKhaqan	ميت خاقان	4,000	-	-	4,000	-	-
	Hurayn	هورين	3,500	-	-	3,500	-	-
	Shinta	شنتا	-	-	5,000	5,000	-	-
	Mit Umm Saleh	أم صالح	-	-	4,000	4,000	-	-
	Janzur	جنزور	-	-	4,000	4,000	-	-
	MitBarah	ميت برة	6,000	-	-	6,000	-	-
Menufia Total	إجمالي المنوفية		13500	23000	13000	49500	0	0
Ganoub El-Wadi Qena	Qena	قنا	-	38,000	-	38,000	1	7,000
	Qous	قوص	15,000	-	-	15,000	-	-
	Deshna	دشنا	10,000	-	-	10,000	-	-
	Farshout	فرشوط	-	9,500	-	9,500	-	-
	Nakada	نقادة	-	4,500	-	4,500	1	6,000
	Qeft	قفط	-	8,000	-	8,000	1	100
	El-Waqaf	الوقف	-	2,500	-	2,500	1	8,500
	Abo Teshet	أبو تشيت	-	4,000	-	4,000	1	6,000
Qena Total	إجمالي قنا		25000	66500	0	91500	5	27600
Ganoub El-Wadi Aswan	Sharq Aswan	شرق أسوان	20,000	-	-	20,000	-	-
	Komombo	كوم أمبو	-	10,000	-	10,000	1	23,000
	Edfwo	إدفو	-	17,000	-	17,000	1	38,000
Aswan Total	إجمالي أسوان		20000	27000	0	47000	2	61000
Ganoub El-Wadi Sohag	Tama	طما	12,000	-	-	12,000	1	8,000
	Tahta	طهطا	20,000	-	-	20,000	1	2,500
	El-Maragha	المراغة	-	5,500	-	5,500	-	-
	Akhmem	أخميم	10,000	-	-	10,000	-	-
	El-Manshaah	المنشأة	-	-	5,000	5,000	-	-
	Gerga	جرجا	22,000	-	-	22,000	1	14,000
	El-Balena	البلينا	-	4,500	-	4,500	-	-
	SharqSohag	شرق سوهاج	15,000	-	-	15,000	-	-
Sohaj Total	إجمالي سوهاج		79000	10000	5000	94000	3	24500
	Total of Plan	إجمالي العملاء بالخطة	267,000	167,000	138,000	572,500	16	166,350

Annex 2B: Targeted Areas Poverty Mapping and Household Affordability

Egypt – Household Natural Gas Connection Project (P146007)

1. **The proposed project will connect 1.5 million households to the natural gas network, of which 76 percent live in urban areas.** About 1.1 million of these households will be in 88 targeted areas in eleven Governorates (listed in Annex 2-A) and will be connected during the first three years of implementation. The targeted areas for the remaining 400,000 households will be determined during project implementation. The poverty mapping analysis in this annex focuses on 84 out of the 88 targeted areas. The population of these areas is 3.1 million people representing eight percent of the population of the eleven Governorates of the project, equivalent to four percent of the Egyptian population. About 1.1 million people in the project areas are deemed poor³⁵ – constituting ten percent of the poor population in the eleven Governorates and five percent for Egypt respectively.

Poverty Mapping

2. **Overall, 65 percent of the new connections will be in disadvantaged or poor areas³⁶.** Based on information received from Town Gas for Giza, Alexandria, and Ismailia Governorates, 53 percent of the new connections (292,500 out of a total of 552,500) will be in disadvantaged and poor areas. Based on information received from Egypt Gas for Aswan, Gharbia, Dakahlia, Menufia, Qalyubia, Sohag, and Qena Governorates, 75 percent of the new connections (427,500 out of a total of 572,500) will be in poor areas.

3. **A poverty mapping of the 84 areas shows that 52 percent of these targeted areas report average poverty rates higher than the national average of 26 percent.** This figure can be disaggregated as 59 percent of the targeted urban areas being poorer than average national urban areas, and 48 percent of targeted rural areas being poorer than average national rural areas. When compared to national level, 53 percent of the new connections are found to be in targeted areas that are poorer than the national average.

4. **53 percent of the new connections will be in targeted areas that are poorer than the average of the Governorate in which they are located.** Based on the results of the poverty mapping summarized in the table below, the size of the positive differential of this 53 percent of connections is considerably deeper than the size of the negative values obtained for the remaining Governorates.

³⁵ The Egyptian national poverty line is of EGP 3,921 per person per year, which is equivalent to US\$ 1.56 per person a day which is in the middle the second national expenditure quintile.

³⁶ Utilities characterize those areas with a combination of the following characteristics: inadequate access to safe water; inadequate access to sanitation and other infrastructure; poor structural quality of housing; overcrowded; have troubles to get LPG cylinders; and get the LPG cylinders with extra high prices

Table 1: Within Governorate poverty levels

Governorate	% of project connections	Governorate poverty rate	Δ between project targeted areas and overall Governorate Poverty Level	Project Targeted areas poorer than overall Governorate Poverty level	Δ between project targeted areas and national poverty level	Project Targeted areas poorer than national Poverty level
Marsa Matrouh	2.7%	30%	26%	1 out of 1	29%	1 out of 1
Alexandria	15.9%	13%	20%	6 out of 6	8%	4 out of 6
Giza	25.0%	33%	10%	13 out of 20	17%	19 out of 20
Ismailia	5.6%	12%	7%	4 out of 4	-8%	1 out of 4
Aswan	4.2%	44%	2%	2 out of 2	20%	2 out of 2
Gharbia	2.6%	11%	-1%	2 out of 5	-16%	0 out of 5
Dakahlia	11.7%	14%	-1%	3 out of 13	-14%	1 out of 13
Menoufia	4.4%	17%	-3%	0 out of 9	-12%	0 out of 9
Qalyubia	11.5%	23%	-5%	2 out of 8	-9%	0 out 8 of
Sohag	8.4%	57%	-8%	1 out of 7	22%	7 out of 7
Qena	8.2%	60%	-18%	2 out of 9	16%	9 out of 9

5. **The targeting of poor areas is higher in populated urban areas in governorates where gas networks already exist (Giza, Alexandria, and Ismailia).** Currently, access to natural gas in Egypt is predominantly in urban areas. As illustrated in the above table, the project will further extend access to gas supply in these governorates to households in 77 percent of the targeted areas (23 out of 30 in the above three Governorates) with poverty rates higher than their governorate rates. In the other eight governorates, the expansion of the gas networks will in large part be in greenfield areas without access to gas networks. About 20 percent (11 out of 54) of the targeted areas in these governorates have poverty rates higher than their governorate poverty rates and 37 percent (20 out of 54) of the areas have poverty rates higher than the national poverty rate. The choice of the targeted areas in these governorates has been driven by the LDC selection criteria focusing on disadvantaged and poor areas.

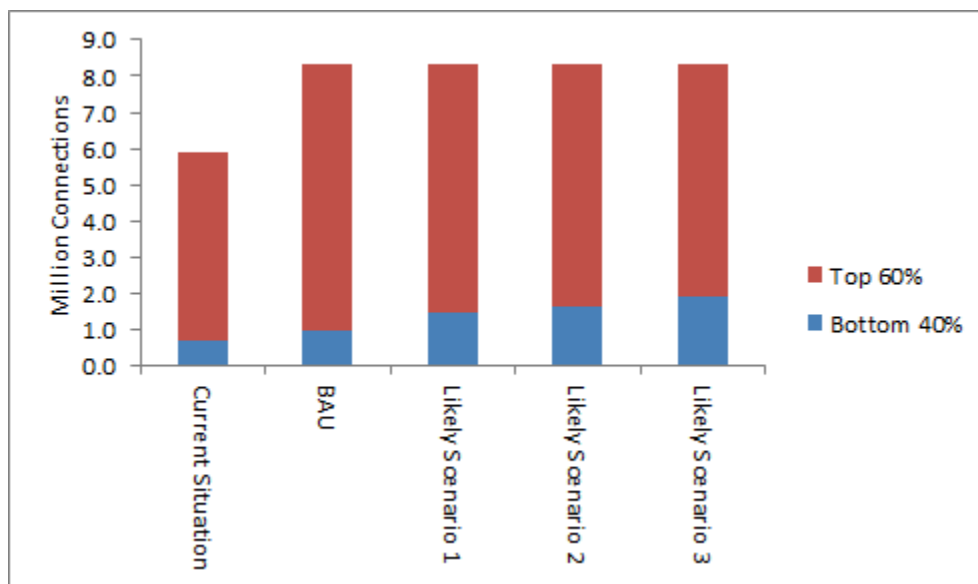
6. **There are physical limits to targeting at the household level.** The sequencing of expansion of gas networks and targeting areas for household connections must take into account proximity of targeted areas to the newly developed gas networks and the required technical and safety specifications for gas connections that must be met. Further in Egypt the poorest localities have been growing into illegal neighborhoods (“Ashwa`iyyat”) which have developed without residential building permits nor formal road and utility access. These Ashwa`iyyats do not meet the technical and safety requirements for gas connections. However, once Ashwa`iyyats are legally formalized and their utility access is permitted by local authorities, they become priority targeted areas for household gas connections.

7. **Egypt has 5.8 million household gas connections – with about 12 percent of those connected belonging to the poorest 40 percent of the population assuming similar pattern as evident in the nationally representative household survey.** As such, about 0.7 million are in the bottom 40 percent of the population. The Government is planning to deploy 2.4 million new connections in the next three years – of which 1.5 million as part of this project. About 72 percent of the new connections will be in greenfield areas where gas networks do not exist and

the remaining 28 percent in brownfield areas. Therefore, there are 0.7 million connections in the brownfield areas and 1.7 million connections in the greenfield areas. As is typical of infrastructure projects, expansion of the network in greenfield areas will lay the platform for the poor to connect in the future. In the brownfield areas, this project is an opportunity for the poor to connect to the existing network as the richer population is already connected.

8. **On this basis, a few scenarios have been developed.** (A) Business-as-usual – where bottom 40 percent will receive 0.3 million connections and top 60 percent will receive 2.1 million connections. This way, the existing proportion is maintained (B) Scenario 1 – where 75 percent of the new connections in the brownfield areas go to bottom 40 percent of the population and remaining to top 60 percent of the population and business-as-usual pattern is maintained for the new connections in greenfield areas. (C) Scenario 2 – where 75 percent of the new connections in the brownfield areas go to bottom 40 percent of the population and a progressive situation is assumed for the new connections in greenfield areas where 25 percent of the new connections will go to bottom 40 percent of the population. The EU grant will facilitate the ability to connect in the poor and vulnerable neighborhoods, therefore this progressive situation is plausible. (D) Scenario 3 – where no distinction is made between greenfield and brownfield areas and the new connections are equally distributed – that is, 1.2 million is added to the population belonging to the bottom 40 percent.

Exhibit 1: Scenarios for Distribution of Household Connections



9. **These scenarios suggest that improvements are possible compared to the business-as-usual situation.** However, to what extent the connections are taken up by the bottom 40 percent will depend on technical characteristics of grid expansion as well as ability of the EU grant to design connection plans for poorer neighborhoods that allows progressive targeting in the greenfield and brownfield areas.

10. **Disadvantaged and poor areas supplied with LPG which at this stage will not be targeted for gas connection will indirectly benefit from the project** through the expected increase in LPG supply to these areas resulting from LPG supply reduction in the project targeted areas. The Government is investing about US\$ 410 Million in projects to improve LPG

storage capacity and processing and to debottleneck LPG networks. The projects include a) improving the efficiency of LPG transport between Alexandria, Suez and Cairo; b) doubling the transportation capacity of the LPG pipeline between Ghareb and Assuit in Upper Egypt; c) establishing a receiving station in Sokhna port to receive high capacity of LPG; d) establishing an LPG transmission pipeline in Upper Egypt between Assuit and Sohag; and e) increasing the storage capacity in Sohag and increasing storage capacity in south Alexandria.

11. **Lessons learned from international experience in scaling up access to electricity networks show that in the early stage of network expansion, high-density urban areas - with relatively low percentage of poor households – are connected first**, and that once the networks infrastructure is established, further scale up in more disadvantaged and poorer areas takes place. The same logic applies to the early stages of the gas network expansion in Egypt.

12. **These lessons learned are confirmed by experience learned from the ongoing Gas Connections Project in Greater Cairo under final stage of implementation.** In this project 24 percent of the targeted areas have average poverty rates higher than the national one, while under the new project scaling up gas connections in areas in Greater Cairo 19 out of 20 targeted areas will have average poverty rates higher than the national rate.

Willingness to Pay and Household Affordability

13. **The affordability of low income households to pay for connection fees can be managed through available financing schemes.** The Government of Egypt has not increased the connection fees (LE 1,500 or US\$220) paid by consumers since 2005 and it is expected that low income consumers will continue to manage to pay the connection fees through available financing schemes facilitated by the LDCs and local banks including: LE138 (US\$20)/Month for 12 months; LE74 (US\$10.80)/Month for 24 months; LE52 (US\$7.6) /Month for 36 months; LE42 (US\$6.1) LE/Month for 48 months; LE35 (US\$5.1)/Month for 60 months; LE31 (US\$4.6)/Month for 72 months; and LE28 (US\$4.1)/Month for 84 months.

14. **These financing schemes allow low income consumers to pay as little as LE28 (US\$4.1) a month. The length of payment can go up to seven years and it is progressively more affordable for the households.** Based on Town Gas consumer database of households with gas connections, about 40 percent of consumers have paid connection fees upfront in full, 34 percent have paid within seven years and 21 percent within three years. The monthly instalment is only one to two percent of household budget if paid over seven years in any quintile of population. However, the interest burden on households is concomitantly higher with time ranging from LE156 (US\$23) if paid within 12 months compared to LE852 (US\$125) if paid within the maximum of 84 months.

15. **A socio-economic survey of 1,904 households in the project areas of the eleven Governorates show that a 98 percent majority of the households surveyed expressed willingness to be connected to the natural gas networks.** The assessment by the survey of the affordability of the connection charges and methods of payments revealed that on average one third of the sample surveyed are willing to pay in cash, two thirds preferring to pay by installment to the program run by National Bank of Egypt and the remaining two percent did not express preference for connecting to the gas network. The households were asked about the least and most they were willing to pay in cash. As shown in the table below, this ranges from EGP 802 (US\$118) to EGP 1,334 (US\$196) on average. However, the monthly charges by

installments are affordable and impose a minimal burden on households, particularly if spread over the higher end of the installment program that allows the consumers to pay back within seven years. When households were asked to propose a strategy to support the poorest households to get connected, 83 percent referred to paying by installments, and around 10 to 15 percent responded either to form a money pool (Gameia), borrow money, or that the gas company should provide targeted schemes to help.

Table 2: Average willingness to pay for natural gas in Egyptian Pounds (LE)

Governorate	Least amount of money to be paid in cash	Most amount of money to be paid in cash	Least amount of money to be paid as advance payment for NG instalment	Most amount of money to be paid as advance payment for NG instalment	Least amount of money to be paid as monthly instalment	Most amount of money to be paid as monthly instalment
Alexandria	395	1200	144	303	19	36
Aswan	531	762	209	391	44	83
Daqahlia	977	1467	229	389	41	69
Gharbeia	1168	1498	235	395	48	84
Giza	804	1420	199	370	38	70
Ismailia	367	795	199	410	32	59
Matrouh	632	1064	153	306	66	125
Menoufia	904	1397	261	463	46	80
Qalubia	813	1424	214	398	39	69
Qena	960	1400	229	405	53	98
Sohag	527	1005	206	337	49	88
Total	802	1334	204	377	40	72

Source: Econserve, 2014

16. **In addition to the installment schemes facilitated by the LDCs, financial support for household connection fees in disadvantaged areas will be provided by an EU Grant.** To ensure access will be provided to vulnerable households and project implementation will not be delayed due to consumer affordability an EU Grant, managed by AFD, will support the payment of interest charges on connection fees for households in disadvantaged areas. AFD appointed a consultant to support the operationalization of the EU Grant mechanism. The objective of the assignment is to develop a methodology for identifying the disadvantaged locations that will benefit from the grant mechanism. The proposed methodology should be fair, transparent and based on objective criteria. The assignment has commenced..

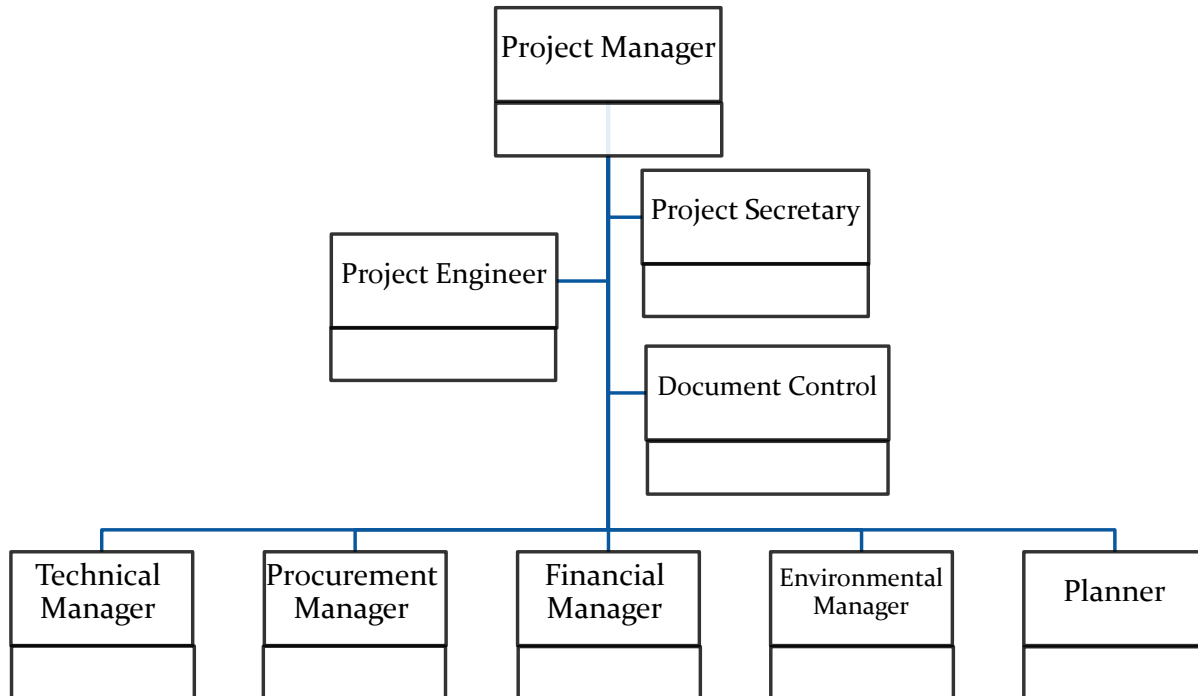
Annex 3: Implementation Arrangements

Egypt – Household Natural Gas Connection Project (P146007)

Project Institutional and Implementation Arrangements

1. **EGAS will be the beneficiary of the proposed World Bank loan as it owns all assets in the natural gas network and is mandated to finance material costs related to expanding the network.** The proposed project will mainly finance i) the supply of goods and materials required by the participating LDCs to expand the transmission connections and distribution networks as well as household connection installations; ii) selected supply and installation contracts for the installation of the high pressure pipelines and pressure reductions stations; and iii) supply of equipment, tools and service vehicles for capacity building of the participating LDCs. All contracts will be procured competitively according to the World Bank procurement guidelines. The implementation arrangements are developed on the basis that EGAS is the owner of the network assets and under concession agreements with LDCs is responsible for the supply of materials and goods which could be procured directly by EGAS or by the participating LDCs with oversight by EGAS. Given that Town Gas and Egypt Gas are the largest two LDCs with highest warehouse storage and implementation capacity and to benefit from economy of scale in procurement of goods and materials, the agreed implementation arrangements have Town Gas and Egypt Gas to be the two LDCs responsible on behalf of EGAS for the procurement of activities financed by the proposed project.

Exhibit I: PMU Structure



2. EGAS has established a Project Management Unit (PMU)³⁷ that will be responsible for the overall project implementation as well as coordination and reporting to the Bank. The PMU key staff has been appointed including, the Project Manager, Procurement and Financial officers, and technical, environmental and planning managers. The structure and staffing of the PMU is shown in Exhibit I. The Procurement and Financial Officers from EGAS will be the main focal points with the Bank who will be responsible for coordinating procurement and financial management activities with Town Gas and Egypt Gas.

3. **Under the agreed implementation arrangements Town Gas and Egypt Gas** will be responsible for procurement and implementation of contracts and activities financed by the proposed project, in their service areas as well as on behalf of Regas, Sianco and SinaiGas. To ensure efficient implementation and coordination of the project activities, the project implementation structure will be established and the detailed responsibilities of the EGAS, PMU, Town Gas and Egypt Gas and other participating LDCs will be defined, as part of the draft Project Implementation Manual that will be prepared by the PMU in time for the World Bank board presentation. In addition, EGAS will be required to enter by project effectiveness in Implementation Arrangements with the participating LDCs that are satisfactory to the Bank to ensure that goods and services financed out of the proceeds of the IBRD loan are benefiting the participating LDCs and implemented according to the project design.

Financial Management and Disbursements

Executive Summary

4. The project will be implemented by Town Gas and Egypt Gas. Both companies have a long-standing experience extending and maintaining gas distribution network and connections. There will be a Loan Agreement between the Government of Egypt (GOE) and the Bank, and a Project Agreement between EGAS and the Bank. By virtue of a Subsidiary Agreement between the GOE and EGAS, the GOE will on-lend the Bank loan proceeds to EGAS. In addition, EGAS will be required to sign by effectiveness Implementation Arrangements with Town Gas and Egypt Gas that are satisfactory to the Bank to ensure that goods and services financed out of the proceeds of the IBRD loan are benefiting the participating LDCs and implemented according to the project design.

5. The Financial Management (FM) arrangements at the Egyptian Gas Holding Company (EGAS) and Town Gas were reviewed earlier for the ongoing Gas Connection Project and are consistently monitored during the Bank implementation support missions. A separate review for Egypt Gas has taken place during project preparation. Overall, the current arrangements are satisfactory to the Bank. The ongoing project has complied with the Bank FM policies in terms of maintaining satisfactory accounting system and fulfilling the reporting and auditing requirements during the previous years of implementation. At the time of this assessment in April 2014, no audit reports were overdue.

6. **Risks:** The main FM risks identified under the proposed project relate to the (i) coordination between EGAS and the two implementing entities with regards to flow of information and flow of funds; (ii) reliability of estimated materials needs per connection; (iii) applicable controls in warehouses; and (iv) verification of physical progress and satisfactory

³⁷ The PMU was established by EGAS on June 19, 2014 by Administrative Order No. 242 of 2014.

completion of works. To address these risks, the following measures are pursued: (i) the project implementation manual will detail the roles and responsibilities of each party and implementation arrangements will be established between EGAS and the two implementing entities to ensure the commitment of all parties; (ii) identification of the specific project targeted areas and households under the gas connections expansion program. Estimated material needs are based on surveyors' field visits, aerial photography and land survey maps of project targeted areas. Feasibility studies are conducted with cost estimates guided by similar activities and most recent purchase orders placed; (iii) Periodic inventory counts are conducted. The accounting system in place maintains detailed inventory records; and (iv) to enable proper monitoring of funds and physical progress, and assessing reliability of budget estimates, the external audit terms of reference will incorporate technical audit component in addition to the financial audit.

7. To ensure that funds are readily available for project implementation, EGAS will open, a Designated Account (DA) in an acceptable bank in Egypt. Deposits into, and payments from the DA, will be made in accordance with the provisions stated in the loan agreement and the disbursement letter. Disbursement under this loan will be made according to the transaction-based disbursement procedures that include withdrawal applications for direct payment, reimbursement and requests for the issuance of special commitments. EGAS will report to the Bank on the project accounts. Such reporting will include all sources of project funding and all expenditures related to the project. The following will be submitted to the Bank within six months after the end of the fiscal year: (i) project financial statements and audit reports, (ii) EGAS financial statements and audit reports (as the revenue generating entity to pay back the loan), and (iii) Town Gas and Egypt Gas annual financial statements and audit reports (as the entities responsible for carrying out the project activities).

8. The diagnostic studies conducted by the Bank that covered financial management at the country level (ROSC, CFAA, PEFA) identified some weaknesses in the reporting and auditing environment in Egypt. The overall fiduciary risk associated with public financial management was assessed to be significant. This was taken into consideration in assessing the project risks and in designing the project FM arrangements.

Risk Assessment and Mitigation Measures (MM):

Inherent Risks:

Risk	Risk Before MM	Mitigating Measures (MM)	RiskAfter MM
EGAS monitoring and control over LDCs' implementation of the project activities.	S	Implementation Arrangements will be signed between EGAS and LDCs to detail each party's responsibilities. The project activities will be coordinated by an established PMU with designated staff from EGAS and LDCs.	M
Aggressive expansion plans may give rise to risks of errors and potential noncompliance.	S	Reviews of budgets, inventories and physical progress will be consistently monitored.	M
			M
Inherent Risk Before MM	S	Inherent Risk after MM	M

Control Risks:

Risk	Risk Before MM	Mitigating Measures (MM)	Risk After MM
Budgeting process capacity to manage additional business activities and reliability of estimates of material needs.	S	Budgets are prepared at the activity level per location to allow subsequent detailed follow up. It follows a systemic process with inputs from the relevant technical departments and consolidated by the planning and projects department. Material estimates are guided by the project Feasibility Studies and by most recent purchase orders of similar activities.	M
Lack of specifically identifiable connections locations represents impediment to output verification. Warehouse controls are also critical	S	Targeted areas have been identified by LDCs following their generally practiced selection criteria. Number of connections per targeted areas has also been assessed based on initial surveys. During project implementation more detail building surveys will be carried out and household connections will be monitored and reported to ensure scale up targets in the project areas are achieved. Periodic inventory counts are conducted. The accounting system in place maintains detailed inventory records. Technical audits will be used.	
Existing information system may not be able to support the required reporting on the project components.	S	The Project will follow the same reporting formats used under the ongoing project financed by IBRD, which are satisfactory to the Bank.	M
The Project reports will have to be audited in accordance with Bank policies.	S	An independent external auditor will be hired under terms of reference satisfactory to the Bank.	M
Control Risk Before MM	S	Control Risk After MM	M

H: High S: Substantial M: Moderate L: Low

Implementing Entities:

9. EGAS was established in 2001 as an Egyptian joint stock holding company under the Public Business Sector law no. 203 for year 1991. It reports to the sectoral Minister (Minister of Petroleum) unlike other companies under the same law which report to the Minister of Investment. EGAS' main activities include:

- Promoting investments in gas and proposing related development plans.
- Preparing feasibility studies for gas investment projects.
- Participating in managing and maintaining gas networks.
- Implementing liquefied gas projects (separately or jointly).
- Exploring, extracting and exporting natural gas.
- Expanding and connecting gas to residential and industrial areas directly or through third part companies.

10. EGAS will be the actual counterpart for the Bank with regards to signing the project agreement as well as paying back the loan. The two implementing LDCs are Egypt Gas and Town Gas. EGAS will be required to enter in arrangements with the participating Town Gas and Egypt Gas that are satisfactory to the Bank to ensure that goods and services financed out of the

proceeds of the IBRD loan are benefiting the participating LDCs and implemented according to the project design.

Internal Controls:

11. *Materials Cost:* The costs of materials are estimated based on required project quantities, previous projects implemented by LDCs, recent bids and adjusted for price escalation. In addition, price and physical contingencies are added.

12. *Warehouses Controls:* Since the project will finance large amounts of goods required for planned connections procured by the Town Gas and Egypt Gas, special attention is paid to their warehouse controls in order to assess their ability to properly safeguard the project's assets and account reliably for the cost of purchases, the classification of cost components, and the measurement of inventory costs. Since EGAS will be the owner of the materials, materials will be subject to EGAS checks and physical counts while in LDC warehouses and on sites.

13. *Physical Progress:* Linkages between the materials dispatched to operations, inventory at the company and the sites warehouses, the physical progress in networks and connections, and the expenditures incurred are vital to validate the proper use of funds. These linkages will be based upon standard/average material requirements for networks and house connections. The prepared budgets of material quantities and costs per quarter will set the basis for subsequent follow up on physical progress. These budgets are based upon inputs from the relevant technical departments (projects, operations and procurement) and are consolidated at the planning and follow up department.

14. *Verification of New Connections:* The Bank has agreed with EGAS the project targeted specific areas/locations. Reporting on the physical progress and new connections will be verified by the project external auditor whose terms of reference would explicitly require technical audit in addition to the financial audit.

Accounting and Reporting:

15. A dedicated Project Management Unit (PMU) housed at EGAS will be responsible for the overall project implementation and reporting to the Bank. The Procurement and Financial officers in the PMU will be responsible for coordinating procurement and financial management activities with both LDCs (Town Gas and Egypt Gas). Procurement of goods and works will be administered by LDCs, goods will be supplied to LDCs warehouses, and complete accounting records for the project transactions will be kept by each LDC. The LDCs will submit quarterly reports to EGAS which will consolidate the project reports for further submission to the Bank.

16. As agreed with each of the two LDCs, separate codes in the respective accounting software will be opened for the project transactions, as it is the case in Town Gas under the ongoing Bank financed project (P095392). After the signing of contracts by LDCs, implementation progress, and approving suppliers' invoices by LDCs, payment packages will be sent to EGAS for reviewing and effecting payments to suppliers/contractors.

17. The Bank reporting requirements include interim financial reports on a quarterly basis as well as annual financial statements. The same reporting formats used under the ongoing project with EGAS will be used. As the continuing revenue generating entity receiving the loan, EGAS financial statements will also be submitted to the World Bank within six months after the closing of the fiscal year.

External Audits:

18. As a revenue-generating entity that will pay back the loan, EGAS financial statements should provide an acceptable basis for reliance on their reported information for financial analysis purposes and for the assessment of EGAS continued financial viability. A ministerial decree was issued in July 2006 requiring all companies, including SOEs to adopt the new Egyptian Accounting Standards (EAS) which are aligned with IFRS with few exceptions, explicitly disclosed in the introduction to the EAS. Due to its ownership structure (100 percent owned by Egyptian General Petroleum Authority), EGAS is required by law to be audited by the Central Auditing Organization (CAO). As such, EGAS is required to submit to the Bank the annual audit report prepared by the CAO within six months following the end of the fiscal year. In addition, Town Gas and Egypt Gas will also be required to submit their annual audit reports to the Bank.

19. The Project will remit to the Bank not later than six months after the end of each year the audit report of the Project. The external audit report shall encompass all Project activities and shall be in accordance with International Standards on Auditing (ISA). In addition to the audit reports, the auditor will prepare a "management letter" identifying any observations, comments and deficiencies, in the system and controls, that the auditor considers pertinent and shall provide recommendations for their improvements. The TOR for the auditor will be prepared and submitted for the Bank's 'no objection'.

20. The below table summarizes the financial reporting arrangements required under the project.

Report	Due Date	Responsibility	Sent to:	Language	Scope
Project interim financial reports	45 days from end of quarter	EGAS	Bank	English	Review
Project annual audited financial statements	6 months from end of the fiscal year	EGAS	Bank	English	Audit
EGAS, Town Gas and Egypt Gas annual audited financial statements	6 months from end of the fiscal year	EGAS	Bank	Arabic/English	Audit

Flow of Funds & Disbursement Arrangements:

21. The table below specifies the categories of Eligible Expenditures that may be financed out of the proceeds of the Loan ("Category"), the allocation of the amounts of the Loan to each Category, and the percentage of expenditures to be financed for Eligible Expenditures in each Category.

Category	Amount of the Loan Allocated(expressed in USD)	Percentage of Expenditures to be financed
(1) Goods, works, and non-consulting services under Part A of the Project	500,000,000	84%
(2) Interest Rate Cap or Interest Rate Collar premium	0	Amount due pursuant to Section 2.07(c) of this Agreement
Total Amount	500,000,000	

22. To ensure that funds are readily available for project implementation, EGAS will open, a Designated Account (DA) at an acceptable bank in Egypt. Deposits into, and payments from the DA, will be made in accordance with the provisions stated in the loan agreement and the disbursement letter. Disbursement under this loan will be made according to the transaction-based disbursement procedures that include withdrawal applications for direct payment, reimbursement and requests for the issuance of special commitments. Withdrawal applications and replenishments of the DA should be duly signed by authorized signatories as determined by EGAS. The names and corresponding specimen of signature of authorized signatories will be submitted by EGAS to IBRD through the Ministry of International Cooperation before the Bank can disburse the funds. EGAS will apply to get access to the Bank’s “Client Connection” website in order utilize electronic disbursement function, follow up on the status of its withdrawal applications and reconcile its records with the Bank records. Given the expected sizable material supply contracts, direct payments are expected to be significantly used for paying suppliers. While procurement and implementation are led by LDCs, disbursements will be managed by EGAS based on documentation received from LDCs and verified by EGAS.

23. **Co-financing and Counterpart Funding:** The Bank loan (USD 500 million) is entirely allocated to financing Component 1 of the project (Gas network expansion and household connections). Contracts eligible for World Bank financing will be co-financed by AFD allocation of Euro 70 million (equivalent to about USD 96 million). The financing shares will be 84 percent by the Bank and 16 percent by AFD. The remaining costs of this component will be covered by EGAS and customers’ contribution to the connection costs. Components 2 and 3 will be entirely financed by EU and managed by AFD.

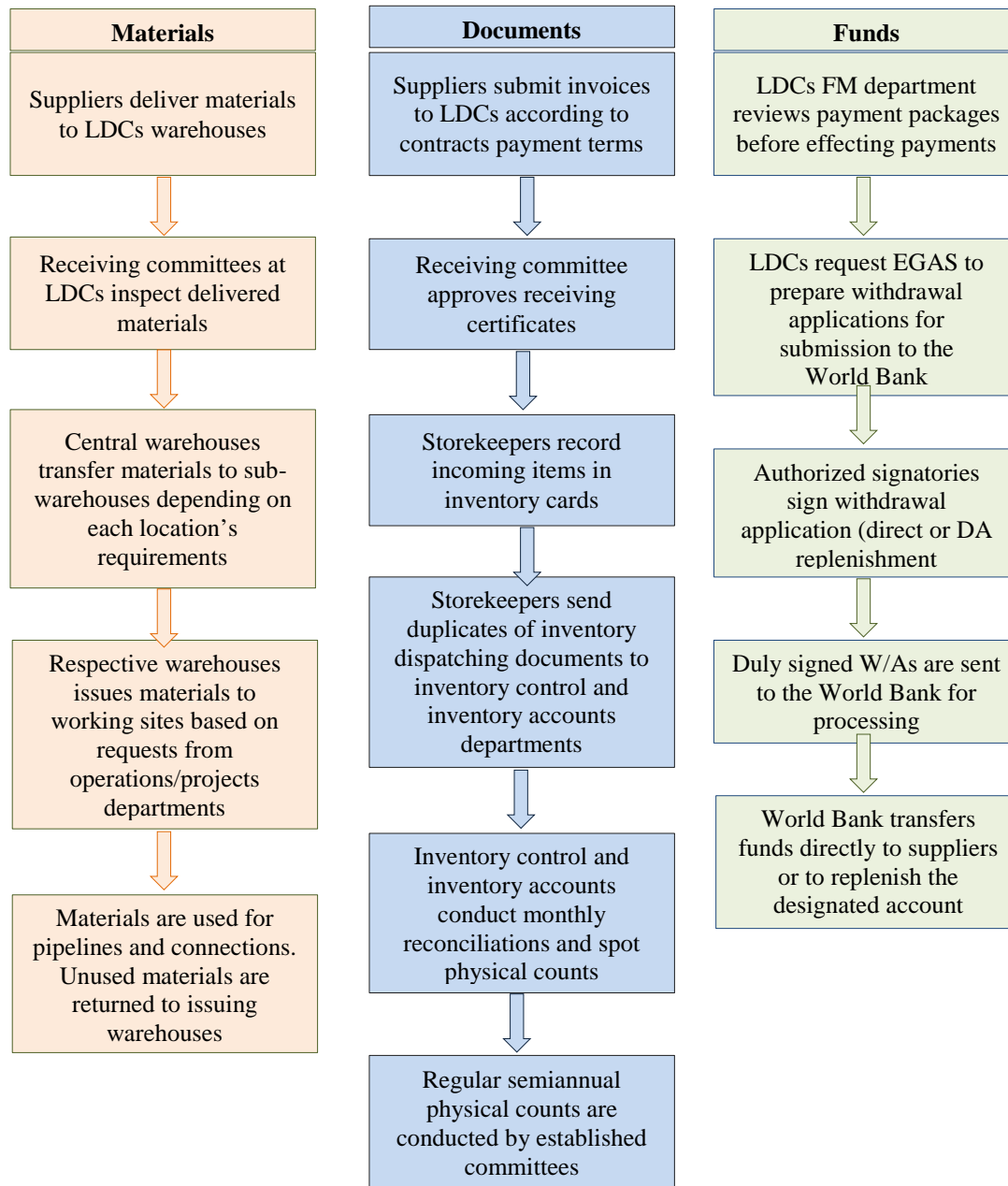
24. The following table shows the financing shares per financier in equivalent USD amounts (All figure are in millions).

	World Bank	AFD	EU	EGAS	Customers	Total
Component 1	500	96		473	326	1,395
Component 2			61.2			61.2
Component 3			17.7			17.7
Total	500	96	78.9	473	326	1473.9

Implementation Support Plan

25. At least two implementation support missions will be carried out annually. Follow up visits will be conducted as deemed necessary. The review and audit reports of the interim and annual financial statements respectively, in addition to management letter, will be reviewed on a regular basis by the Bank FM Specialist and the results or any issues will be followed up during implementation support missions. Also, during the Bank’s missions, the Project’s financial management and disbursement arrangements will be reviewed to ensure compliance with the Bank’s requirements and to develop the financial management rating for the Implementation Status and Results Report (ISR).

Flow of Materials, Documents and Funds:



PROCUREMENT

26. General: Procurement activities under the project will be carried out in accordance with the World Bank's "Guidelines: Procurement of Goods, Works and Non-Consulting Services under IBRD Loans and IDA Credits and Grants by World Bank Borrowers" dated January 2011 and the provisions which will be stipulated in the Legal Agreement. The Guidelines on Preventing and Combating Fraud and Corruption in Projects Financed by IBRD Loans and IDA Credits and Grants", dated October 15, 2006 and updated January 2011, shall apply to the Project.

27. For each contract to be financed by the Grant, the different procurement methods and consultant selection methods, estimated costs, prior review requirements, and time frame has been agreed between the Borrower and the Bank in the Procurement Plan dated June 9, 2014. The Procurement Plan will be updated at least annually or as required to reflect the actual project implementation needs and improvements in institutional capacity.

28. **Procurement of Works:** Procurement of Works includes special crossings such as railways, canals and roads, customer service centers and reconditioning of testing facilities. Procurement will be carried out using the Bank’s Standard Bidding Documents (SBDs) for International Competitive Bidding (ICB) and the Standard Bidding Documents (SBDs) for National Competitive Bidding (NCB) agreed with the borrower.

29. **Procurement of Goods:** Procurement of Goods includes pipes, meters, valves, fittings, pressure reduction stations (PRS), SCADA equipment, IT software, etc. Procurement will be carried out using the Bank’s Standard Bidding Documents (SBDs) for International Competitive Bidding (ICB) and the Standard Bidding Documents (SBDs) for National Competitive Bidding (NCB) agreed with the borrower.

Summary of Procurement Arrangements

<i>Expenditure category</i>	<i>Contract value threshold (US\$ thousands)</i>	<i>Procurement method</i>	<i>Contracts subject to prior review</i>
Works	>10,000	ICB	All contracts above US\$10 million
	≤ 10,000	NCB	1st contract
	≤ 200	Shopping	N/A
Goods and non-consulting services	>1,000	ICB	All contracts above US\$1 million
	≤ 1,000	NCB	1st contract
	≤ 100	Shopping	N/A
Direct Contracting n			All cases regardless of the amounts involved

30. **Advanced Procurement:** It is expected that procurement activities will start before the loan becomes effective under the “advanced procurement” arrangement in order to speed-up project implementation.

31. **Assessment of the agency’s capacity to implement procurement.** A procurement capacity assessment of EGAS was not done because procurement activities will be carried out by Town Gas and Egypt Gas. The procurement capacity assessment of Town Gas and Egypt Gas covered the companies organizational structure and in particular the proposed structure for implementing the project, staffing, procurement systems and past experience. It has been concluded that Town Gas has adequate experience and capacity to carry out procurement activities under the proposed project. Town Gas gained considerable experience in World Bank procurement under the Natural Gas Connections Project (7502-EG – P095392). Although Egypt Gas is not familiar with Bank procurement procedures, they have extensive experience in the type of procurement expected under the project. Furthermore, the procurement implementation arrangements have been designed in a way that allows Egypt Gas to benefit from Town Gas experience. After discussing the pros and cons, it was agreed that each company will carry out its own procurement activities independently of each other. The procurement packages have been discussed and agreed taking into consideration technical and geographical constraints and grouped in a way that will be easily managed by each of the gas companies. Most packages will

subject to Bank's prior review. As mentioned under the project implementation arrangements, a project management unit (PMU) has been created under EGAS and includes a procurement manager and two procurement officers, one from each of the gas companies. The role of procurement in the PMU will be to coordinate the various activities and more important, to carry out a quality assurance role.

32. **Key issues and risks concerning procurement and corrective measures agreed to mitigate the potential procurement risks.** The procurement risk has been assessed as Substantial. The following measures will be required to mitigate the inherent risks:

- EGAS to select a procurement team including a procurement manager for the PMU with extensive experience in World Bank procurement procedures.
- Town Gas and Egypt Gas to appoint their most experienced staff in the respective Procurement Departments in sufficient numbers for this project.
- Town Gas and Egypt Gas respective Procurement Managers to be fully involved in all the critical stages of the procurement process.
- EGAS, Town Gas and Egypt Gas senior management, in close coordination with the World Bank project team, to closely monitor and follow up on all procurement activities under the project.
- Procurement staff in EGAS, Town Gas and Egypt Gas to work closely with the Bank procurement specialist who will provide hands on training during project preparation and implementation in order to familiarize them with Bank procurement rules and procedures.

33. **Procurement Plan.** The draft Procurement Plan for the project, prepared by the implementing agencies was received by the Bank on June 9, 2014 and found to be acceptable. This plan will be updated annually or as needed to reflect the latest project requirements.

Details of Procurement arrangements involving international competition

Goods

1	2	3	4	5	6	7
Ref. No.	Description	Estimated Cost US\$ Millions	Procurement method	Domestic Preference (Yes/No)	Review by Bank (Prior/Post)	Comments
TOWNGAS						
1	PRS & accessories	6.85	ICB	NO	Prior	
2	Fitting, regulators, etc.	5.58	ICB	NO	Prior	
3	Construction Equipment	1.3	ICB	NO	Prior	
4	Pipes, meters, etc.	31.58	ICB	NO	Prior	
5	Pipes, fittings, tubes	10.16	ICB	NO	Prior	
6	API pipes, fittings, etc.	12.34	ICB	NO	Prior	
7	Regulators, flues, etc.	2.46	ICB	NO	Prior	
8	Fixtures, PVC material, etc.	2.17	ICB	NO	Prior	
9	PRS & accessories	9.89	ICB	NO	Prior	
10	Fittings, pipes, etc.	5.58	ICB	NO	Prior	
11	Equipment/Vehicles	3.02	ICB	NO	Prior	
12	Steel pipes, gas meters	31.58	ICB	NO	Prior	
13	PE pipes, copper tubes	10.16	ICB	NO	Prior	
14	API pipes, fittings, etc.	7.64	ICB	NO	Prior	
15	Regulators, flues, etc.	2.46	ICB	NO	Prior	
16	PVC material, etc.	2.17	ICB	NO	Prior	
17	PE pipes, gas meters, etc.	26.50	ICB	NO	Prior	
18	PVC materials, fixtures, etc.	5.42	ICB	NO	Prior	
	SUB-TOTAL:	176.86				
EGYPTGAS						
1	PRS & accessories	18.5	ICB	NO	Prior	
2	meters, valves, fittings, etc.	52.5	ICB	NO	Prior	
3	PVC, PE pipes & fittings	50.8	ICB	NO	Prior	
4	Steel pipes, meters, etc.	53.8	ICB	NO	Prior	
5	Tubes, fittings, etc.	18.5	ICB	NO	Prior	
6	Miscellaneous material	3.3	ICB	NO	Prior	
7	PRS & accessories	9.90	ICB	NO	Prior	
8	Gas meters, joints, etc.	4.99	ICB	NO	Prior	
	SUB-TOTAL:	212.29				
	TOTAL:	389.15				

34. Frequency of Procurement Implementation Support: The capacity assessment of the Implementing Agencies has recommended two annual implementation support missions.

CITIZEN ENGAGEMENT

35. To address demand side aspects of the service delivery, the project will have Citizen Engagement (CE) focus. Informed and inclusive consultation activities were conducted as part of the process of the ESIAF and RPF preparation. Regional and Governorate level consultative workshops were conducted with balanced representation of potentially affected stakeholders from the districts where the project will be implemented. The representation included Governmental organizations, NGOs, women, youth and media. These inclusive consultations set a foundation for designing more effective mechanisms to support CE in the project. The ESIAF also drafted a CE plan driven from the findings of the consultations. Preliminary CE

interventions under consideration could include standardizing across LDCs, surveys for assessment of household consumer satisfaction with services to cover a broader scope of issues (service delivery and complaints handling) after implementation start. Multiple channels for disseminating the surveys would be considered including distribution at the CSCs, The assessment of survey results would provide a benchmark for the continuous improvement of customer satisfaction and gas service delivery to households by the participating LDCs.

36. The Bank will support EGAS in increasing customer awareness about natural gas (ie., safety awareness, government plans, CSC services, grievance redress) through multiple communication channels in the existing connected communities as well as communities where the proposed project will be implemented. A brochure will be developed to (i) increase safety and general awareness of the program and procedures queries before and after the connections; and (ii) informing communities of the hotline for complaints. Hotline numbers – both for emergencies and other queries and complaints – will be included in the dissemination materials to ensure two way communication with customers and for provision of feedback. These will be disseminated during consultations, awareness sessions, and CSCs. The project will also explore disseminating messages about safety awareness through radio spots to be aired on national radio channels. Prior to the implementation of the proposed project, the Bank will finance a safety awareness campaign geared towards the rural areas, where concerns on the safety of usage of Natural Gas connections and appliance were raised during the social consultations. Many concerns were raised in areas where the more uneducated customers would not be able to communicate their concerns, who were mostly women in the rural areas. Individual women consultants or NGOs will be commissioned to go door to door and provide safety awareness to targeted to pre-identified areas where illiteracy is high, talking to women and children on safety measures. Once the project is moved to implementation this will be sustained through by the Social Development Officers hired by the project.

ENVIRONMENTAL AND SOCIAL (INCLUDING SAFEGUARDS)

37. The Project is assigned a Category A based on the nature of the activities that will be financed. The Project will support the following activities: expansion of pressure (intermediate and low) gas distribution networks; construction of Pressure Reduction Stations (PRSs) to connect the distribution networks; and extension of the gas high pressure transmission network to supply gas to the new PRSs. These activities may likely produce adverse and significant environmental impacts. The Environmental Assessment (OP/BP 4.01), Involuntary Resettlement (OP/BP 4.12), and Physical Cultural Resources (OP/BP 4.11) safeguards policies were triggered; accordingly, the following safeguards instruments were prepared: An Environmental and Social Impact Assessment Framework (ESIAP) and Resettlement Policy Framework (RPF). The specific environmental and social impacts arising from the wide geographical, socioeconomic, physical, and development variations between the areas of the proposed project (elven governorates) will be addressed in the detailed site-specific ESIA, QRAs which will be prepared once final project details are known during project implementation.

38. The environmental and social advantages of switching household fuel from LPG cylinders to natural gas pipelines are quite diverse. The proposed project provides improved safety, reduced physical/social/financial hardships, and secures supply. At the national level, it reduces the subsidy and import burden; and at the global scale, the project involves cleaner fuel with reduced carbon footprint. Beyond the economic benefits, the project enhances safety due to

low pressure (20 mbar) compared to cylinders, limits possible child labor in LPG cylinder distribution, and significantly lower leakage and fire risk compared to LPG. The ESIAF had a thorough analysis of potential positive and negative environmental and social impacts which are summarized below.

39. **Potential Positive Impacts.** According to the ESIAF, achieving the project objectives will yield many positive benefits and impacts at both the construction and operation phases. During the construction phase, the project will provide direct job opportunities to skilled and semi-skilled laborers; and create indirect job opportunities such as increased economic activity in project areas (food products, water and construction materials) and the flourishing of national pipes and scaffold business/factories. During the operation phase, the project will (i) ensure constantly available and reliable fuel for home use; (ii) reduce expenditure on LPG importation and subsidies; (iii) eliminate LPG hardships to the physically challenged, women, and the elderly; and (iv) limiting the LPG cylinder “black market” due to lower demand.

40. **Potential Negative Impacts.** The ESIAF identifies the following negative impacts during construction:

- Traffic congestion and loss of access due to excavation and installation works
- Air emissions from heavy machinery and generators; and dust from excavation activities
- Elevated noise levels from heavy machinery and asphalt breaking; as well as other construction/demolition for extending natural gas piping into households
- Risk of damage/breakage of underground utility lines and piping during excavations
- Possible disruption or displacement of ecological systems
- Potential risk to weak structures may arise in areas where building standards are not followed or in areas where high groundwater levels affect integrity of foundations
- Structural and aesthetic effects on culturally-valuable sites and antiquities
- Management of solid, liquid and hazardous waste from handling and temporary storage to transportation and final disposal
- Potential impacts of PRS Construction (related to handling of construction wastes, noise and air pollution from construction machinery)
- Potential negative impacts during operations which include user health and safety, improper handling of the odorant, noise of the PRS, safety aspects of PRS operation, and integrity of the pipelines.

41. The mitigation measures to address these potential negative impacts are well presented and detailed in the Environmental and Social Management and Monitoring Framework (ESMMF) contained in the ESIAF. The objective of the ESMMF is to outline a mechanism for minimizing or eliminating potential negative impacts and for monitoring the application and performance of the mitigation measures. The ESMMF identifies roles and responsibilities for different stakeholders for implementation and monitoring of mitigations, and whenever applicable, the ESMMF is designed to accommodate alternative context-specific mitigation and monitoring measures. The estimated budget for implementing the recommended environmental management and monitoring activities as contained in the ESMMF is US\$790,000 excluding the

gross cost of recruiting full-time HSE personnel and the cost of work in antiquities and culturally sensitive areas. This budget is indicative and would be revised upon preparation of the site-specific ESIA.

42. **Institutional Structures for ESMMF implementation.** Three entities namely EGAS, Town Gas and Egypt Gas will be responsible for the implementation of the ESMMF and by extension the site –specific ESMPs. These entities have well qualified environmental and social staff, with well-defined Health, Safety and Environment (HSE) departments. EGAS Environment staff and Town Gas HSE personnel have received training on environmental auditing, EIAs for industrial establishments and environmental legislation. Further, the environmental departments in both EGAS and Town Gas gained experience through the implementation of the ongoing Natural Gas Connections Project in Greater Cairo; as they were involved in planning, tendering and construction procedures. The roles and responsibilities of the environmental departments and HSE units of these three entities includes compliance with Bank safeguards; monitoring and reporting; and communication with and responsiveness to targeted communities (including ensuring that the established grievance redress mechanisms are functioning properly and that the individual sub-projects are implemented in an environmentally and socially sustainable manner). The ESMMF also recommended training programs for EGAS/Town Gas/Egypt Gas staff to build their capacity for environmental and social management. The entities will also benefit from guidance from the Bank Safeguards team members.

43. **Consultations.** Consultation activities (scoping, interviews, focus group discussions, and public hearing/consultations/scoping sessions) were held with various stakeholders and community members in host communities in the eleven Governorates. These consultations were in compliance with World Bank policies related to disclosure and public consultation (BP 17.50 and OP 4.01) and Egyptian regulations related to public consultation (Law 4/1994 modified by Law 9/2009). Throughout the various consultation and engagement activities, the work teams experienced and recorded overwhelming public acceptance, by the communities and the governmental stakeholders towards the proposed project. Aside from limited concerns regarding arrangements for the Natural Gas installation payments and street restoration, all participants expressed their eagerness for commencement of project implementation without much delay and many others requested the extension of the project to additional areas.

Resettlement Policy Framework

44. Permanent land acquisition and temporary land use will not be avoidable for construction of 25 pressure reduction stations (PRS) and 187 km of high pressure gas pipeline. It is estimated that the project will need about four hectare of permanent land acquisition and 150 hectare temporary land use. Since the exact locations of PRS and alignment of gas pipeline cannot be finally determined at this stage, a resettlement policy framework (RPF) has been prepared to mitigate the potential resettlement impacts.

i) Key Principles

45. Resettlement and land acquisition issues under the proposed Project and subsequent subprojects will be addressed under the guidance of the laws governing the Arab Republic of Egypt to this regard which is mainly Law No. 10 of year 1990 and the World Bank's OP 4.12.

The RPF established the following principles for resettlement planning and implementation during the project implementation.

- (a) Acquisition of land and other assets, and resettlement of people will be minimized as much as possible. Where land acquisition is unavoidable, the project will be designed to minimize adverse impact on the project affected persons (PAPs), especially the vulnerable groups;
- (b) All PAPs will be compensated, relocated and rehabilitated, if required, so as to improve their standard of living, income earning capacity and production capacity, or at least to restore them to pre-Project levels;
- (c) All PAPs residing in, or cultivating land, or having rights over resources within the components area of the socioeconomic survey are entitled to compensation for their losses and/or income rehabilitation. Lack of legal right to the assets lost will not bar the PAP from entitlement to such compensation, rehabilitation and relocation measures;
- (d) The rehabilitation measures to be provided are (i) compensation at full replacement cost for houses and other structures; (ii) compensation for land acquisition and resettlement subsidy for the affected villages and farmers; (iii) dislocation allowance and transition subsidies; (iv) full compensation for crops, trees and other similar agricultural products at market value; and (v) other assets, and appropriate rehabilitation measures to compensate for loss of livelihood;
- (e) Replacement house-plots, place of business and agricultural land will be as close as possible to the land that was lost, and acceptable to the PAPs;
- (f) Land-for-land is the preferred option. Land-for-land may be substituted by cash provided that: (i) land is not available in the proximity of the subproject area; (ii) PAP willingly accept cash compensation for land and all assets on it; and receive full replacement value without any deductions for depreciation; and (iii) cash compensation is accompanied by appropriate rehabilitation measures which together with project benefits results in restoration of incomes to at least pre-subprojects levels;
- (g) The resettlement transition period will be minimized, land-for-land and/or cash compensation provided to the PAP completed prior to the expected start-up date of works in the respective components.
- (h) Resettlement plans will be implemented following consultations with the PAPs, and will have the endorsement of the PAPs;
- (i) The previous level of community services and access to resources will be maintained or improved after resettlement;
- (j) Any acquisition of, or restriction on access to resources owned or managed by PAP as common property will be mitigated by arrangements ensuring access of those PAP to equivalent resources on a continuing basis;
- (k) Financial and physical resources for resettlement and rehabilitation will be made available as and when required;

- (l) Resettlement program will include adequate institutional arrangements to ensure effective and timely design, planning and implementation of resettlement and rehabilitation measures;
- (m) Adequate arrangements for effective and timely internal and external monitoring will be made on implementation of all resettlement measures.

ii) Valuation Method of Compensation

46. The valuation of losses in physical assets will be carried out by a compensation committee. The value of compensation will be determined based on the market value of the assets, if known, and estimating the replacement cost. Replacement cost is simply calculated as the cost of replacing the lost assets plus any transaction costs associated with bringing the asset to pre-displacement value. The valuation of crops will be mainly relied upon the price lists developed by the Agriculture directorate and revisited annually.

iii) Procedures for preparing and approving RAP

47. **Identification of resettlement impacts:** During project implementation, EGAS Governmental Relations Department will cooperate with SDOs of EGAS, Town Gas and Egypt Gas, to carry out social screening to determine whether or not the project components will result in any resettlement impact and accordingly SDOs from EGAS, and LDCs will decide the need for the preparation of a resettlement action plan or an abbreviated Resettlement Action Plan.

48. **Inventory Survey:** Following the identification of the sub-projects that may involve involuntary resettlement, EGAS Governmental Relations Department in cooperation with SDOs of the LDCs will carry out a socio-economic study and census survey, in which baseline data within the sub-project's target areas is collected.

49. **RAP preparation, review and approval:** Once the census survey completed, SDOs of Egypt Gas and Town Gas will prepare the RAPs. The RAP, including the proposed mitigation measures within the plan, will need to be reviewed and approved prior to making a decision on whether or not the sub-project shall be implemented. The RAP will be reviewed by EGAS Governmental Relations Department and approved by EGAS SDO then will be sent to the WB for final review and approval.

50. **RAP disclosure and implementation:** Once the RAP is approved by the Bank, it will be translated into Arabic and disclosed locally as well as in InfoShop at the Bank. The LDCs are responsible for implementation of the RAP. The SDOs of the LDCs will arrange meetings with the PAPs to document the lands acquired by the sub-project throughout the implementation period and discuss the compensation process. The PAP will be required to sign a contract detailing the acquired land plots and / or partially or completely affected structures and the corresponding types of compensation (i.e. cash or in-kind) that have been agreed upon. The signature of the compensation contracts as well as the actual payments and in-kin transfers shall be made in the presence of at least one public official from the village authorities.

iv) Grievance Redress Mechanisms

51. EGAS, Town Gas and Egypt Gas adopt multi-levels of GRM. Three stages will be functioning. They are as follows:

- (a) Stage 1, any person aggrieved by any aspect of the resettlement document can lodge an oral or written grievance to the SDOs of Town Gas or Egypt Gas. The SDOs should provide resolution within 10 days;
- (b) Stage 2, if the aggrieved person is not satisfied with the decision of the SDOs of Town Gas or Egypt Gas at Stage 1, s/he can present the case to EGAS SDO where he should provide resolution within 15 days.
- (c) Stage 3, if the aggrieved person is still dissatisfied with the decision of EGAS SDO at stage 2, the case may be submitted for consideration by the Court in accordance with relevant procedures.

v) Public Consultation

52. Extensive consultation has been carried out during project preparation. During project implementation, when resettlement impacts are involved and a RAP needs to be prepared, consultations with affected persons will be carried out as part of the RAP preparation process. Prior to or during the consultation, the PAPs should be well informed with the following information:

- Project components
- Project impacts
- PAPs' legal rights and entitlements
- Compensation policies
- Resettlement activities
- Grievance and redress Mechanism
- Implementation schedule
- Public consultation and disclosure of information.
- Organizational responsibilities.

vi) Vulnerable Groups

53. In this project, specific attention should therefore be paid to the needs of the following vulnerable groups, including: a) Persons below the poverty line, the landless; b) Project affected persons who may not be protected through national land compensation legislation. Vulnerable people will be identified at socio-economic survey stage and assistance program will be developed and included in the RAP.

vii) Resettlement Monitoring and Evaluation

54. Internal monitoring the implementation of the resettlement activities will be carried out by the SDOs of the LDCs and supervised by EGAS SDO, monitoring will be held every three months, results and findings will be included in quarterly project progress report. The report will mainly cover the compensation standards, resettlement progress, delivery of resettlement compensation, provision of development and transitional assistance to PAPs (especially vulnerable groups), implementation schedule, fund disbursements, land or structure allocation, and grievances and redress. External Monitoring might be required to ensure that the overall

objective of the resettlement plan is achieved in an equitable and transparent manner and ensure the effectiveness of the monitoring. By the time of project close, an evaluation will be carried out by the LDCs and EGAS to ensure the objectives set forth in the RAP.

viii) Budget and Sources of Funding

55. The actual resettlement cost and budget will be included in the RAP which will be prepared during project implementation. The budget shall consider all of the anticipated impacts under the project and calculate the cost according to actual replacement costs. EGAS is fully responsible for any compensation for land acquisition. In addition, the Local Distribution Companies namely Egypt Gas and Town Gas will be responsible for paying the compensation to the PAPs based on the price lists developed by EGAS in coordination with the Agriculture Directorate. Thereafter, the compensation costs will be reimbursed from EGAS.

Monitoring & Evaluation

56. The Project will be monitored and evaluated on the basis of the indicators and targets set out in the results framework provided in Annex 1. The Bank will carry out regular implementation support missions during which project progress, outputs and work plan updates will be reviewed. Moreover, the PMU in coordination with the participating LDCs will be responsible for monitoring the progress of project implementation and achievement of the performance indicators in Annex 1 and accordingly report to the Bank. The PMU will be required to submit comprehensive progress reports on implementation aspects quarterly that would include reporting on procurement, financial management, physical implementation and environmental aspects among others. Further to enable proper monitoring of funds and physical progress in the targeted governorates the annual external audit of the project will include will incorporate technical audit component in addition to the financial audit.

Annex 4: Operational Risk Assessment Framework (ORAF)

Operational Risk Assessment Framework (ORAF)

Egypt, Arab Rep: EG: Household Natural Gas Connection Project (P146007)

Project Stakeholder Risks						
Stakeholder Risk	Rating	Moderate				
<p>Risk Description:</p> <p>(i) Low income household affordability for connection charge may be prohibitive to scaling up gas connections to their households.</p> <p>(ii) Government ownership and commitment to the project may be compromised due to change of Government after summer 2014 election.</p>	Risk Management:					
	<p>(i) The Government of Egypt has not increased the connection fees (LE 1,500) paid by consumers since 2005, and it is expected that low income consumers will continue to manage to pay the connection charge through available financing schemes facilitated by the LDCs and local banks of which certain schemes could allow low income consumers to pay as minimum of LE 28 a month for their connection fees. Further the project will include a component financed by an EU grant to provide financial support for household connection charges in disadvantaged areas</p>					
	Resp:	Status:	Stage:	Recurrent:	Due Date:	Frequency:
	Client	In Progress	Implementation	<input type="checkbox"/>	28-Dec-2018	
	Risk Management:					
	<p>(ii) Given the economic and social impact of connecting households to the natural gas network, there has always been always strong commitment from successive governments in Egypt to scaling up the household gas connections nationwide as also demonstrated by including it as a priority program in its Economic Development Program. Equally robust is continued ownership of EGAS and the LDCs to the project which is demonstrated by the high level of preparedness and the effort by EGAS and the LDCs to expedite preparation the project documentation including feasibility studies and safeguards documents. Further the project is part of EGAS three year investment program to connect 2.4 million household connections which is approved by the Ministry of Petroleum and required cofinancing by EGAS for the project will be required by the project Legal Agreement.</p>					
	Resp:	Status:	Stage:	Recurrent:	Due Date:	Frequency:
	Client	In Progress	Implementation	<input type="checkbox"/>	28-Dec-2018	
Implementing Agency (IA) Risks (including Fiduciary Risks)						
Capacity	Rating	Substantial				
<p>Risk Description:</p> <p>(i) Delay in project implementation may be caused due to the large scale of project scope connecting 1.5 million households to the gas networks in eleven governorates requiring the LDCs to finalize detailed designs for investments to be financed by the project including timely preparation of the tender documents and required site specific ESIA's and necessary RAPs for the PRSs and high pressure pipelines.</p>	Risk Management:					
	<p>(i) EGAS and the distribution companies have been able to scale up gas connections to more than 500 thousands connection a year and have adequate capacity to, design, prepare and implement the investments to be financed by the proposed project. Further EGAS and Town Gas, one of the two LDCs implementing the project, have experience working with the World Bank and successful record in implementing the ongoing gas connection project. The proposed project will have investments similar to the ongoing project and follow similar implementation procedures. In addition, most of the procurement activities and contracting will be carried out in early period of the project implementation and advance procurement will be allowed after the project appraisal.</p>					

<p>(ii) EGAS may face financial liquidity problem due to LNG export sales disruptions impacting its ability to meet its co-financing obligations of the project.</p> <p>(iii) The main potential FM risks identified under the proposed project relate to the (i) coordination between EGAS and the two implementing entities with regards to flow of information and flow of funds; (ii) reliability of estimated materials needs per connection; (iii) applicable controls in warehouses and verification of physical progress and satisfactory completion of works.</p>	<p>The project involves a framework approach to safeguards, which will require site specific safeguards documents to be developed during early stage of project implementation. EGAS environmental department and staff have been strengthened to ensure timely preparation and supervision of safeguards requirements.</p>					
	Resp: Client	Status: In Progress	Stage: Both	Recurrent: <input type="checkbox"/>	Due Date: 28-Dec-2018	Frequency:
	<p>Risk Management: (ii) The authorities allow EGAS to collect transportation fees at cost recovery and with the proceeds from EGAS' domestic sales of gas derivatives EGAS could avoid liquidity problems. Further, the Legal Agreement for the Project will cause the Government to ensure that required cofinancing funds will be available at EGAS to meet its project implementation obligations.</p>					
	Resp: Client	Status: In Progress	Stage: Both	Recurrent: <input type="checkbox"/>	Due Date: 28-Dec-2018	Frequency:
	<p>Risk Management: (iii) To address FM risks, the following measures are pursued:</p> <p>(a) the project implementation manual will detail the roles and responsibilities of each party and implementation arrangements will be established between EGAS and the two implementing entities to ensure the commitment of all parties.</p> <p>(b) Material estimates are guided by the project Feasibility Studies and by most recent purchase orders of similar activities.</p> <p>(c) Periodic inventory counts are conducted. The accounting system in place maintains detailed inventory records. To enable proper monitoring of funds and physical progress, and assessing reliability of budget estimates, the external audit terms of reference will incorporate technical audit component in addition to the financial audit.</p>					
Governance	Rating	Substantial				
<p>Risk Description: Lack of coordination between EGAS and the participating LDCs in preparing the project components and their implementation.</p>	<p>Risk Management: Most of the investments financed under the proposed project will be to the household connections in service areas of the two largest distribution companies, Town Gas and Egypt Gas who have been coordinating well with EGAS in preparation of the scope of the investments. Furthermore, EGAS will establish a Project Management Unit that will be responsible for the overall project implementation as well as coordination and reporting to the Bank. The PMU will include Procurement and Financial officers from EGAS as main focal points with the Bank who will be responsible for coordinating procurement and financial management activities with Town Gas and</p>					

Egypt Gas technical, procurement and financial management staff to ensure quality of procurement activities carried by the distribution companies and timely implementation of the project activities. Under the agreed implementation arrangements, Town Gas and Egypt Gas will be responsible for procurement and implementation of contracts and activities financed by the proposed project in their service areas as well as on behalf of Regas, Sianco and SinaiGas. To ensure efficient implementation and coordination of the project activities, the project implementation structure will be established and the detailed responsibilities of the EGAS, PMU, Town Gas and Egypt Gas and other participating LDCs will be defined, as part of the Project Implementation Manual. This Manual will be prepared by the PMU by project effectiveness. In addition, EGAS will be required to enter into Implementation Arrangements with the participating LDCs that are satisfactory to the Bank to ensure that goods and services financed out of the proceeds of the IBRD loan benefit the participating LDCs and are implemented according to the project design.

Resp: Client	Status: In Progress	Stage: Both	Recurrent: <input type="checkbox"/>	Due Date: 28-Dec-2018	Frequency:
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Risk Management:
Assessments of fiduciary risks (procurement, financial management) are carried during project preparation to ensure that adequate arrangements are in place for proper management and transparent use of project funds. Budget estimates by the relevant technical departments, warehouse controls safeguarding project materials, and physical progress/outputs will all be subject to independent verification.

Resp: Client	Status: In Progress	Stage: Both	Recurrent: <input type="checkbox"/>	Due Date: 28-Dec-2018	Frequency:
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Project Risks

Design	Rating	Substantial
<p>Risk Description: Due to the significant scope of financing gas household connections in eleven governorates, preparation of the final technical specifications and tender documents financed by the project could take longer time than scheduled delaying therefore project implementation.</p>		<p>Risk Management: The types of investments financed by the project follow similar investments financed and successfully implemented under the ongoing gas connection project. EGAS, Egypt Gas and Town Gas also have experience in preparing their technical specifications and implementing them. Furthermore, it is expected that most of the procurement activities will involve Procurement of Goods (pipes, valves, meters, etc.), Supply and Installation contracts for the PRS and some works contracts as well. A detailed procurement plan for the first 18 months of project implementation has been prepared. Procurement of the major packages is expected to begin after appraisal and before the loan becomes effective under the “advanced procurement” arrangement in order to speed-up project implementation. The following measures will be required to mitigate the inherent risks:</p> <p>(a) EGAS to select a procurement team including a procurement manager for the PMU with extensive experience in World bank procurement procedures.</p>

	<p>(b) Town Gas and Egypt Gas to appoint their most experienced staff in the respective Procurement Departments in sufficient numbers for this project.</p> <p>(c) EGAS, Town Gas and Egypt Gas senior management and PMU in close coordination with the WB task team, to closely monitor and follow up on all procurement activities under the project.</p>					
	Resp: Client	Status: In Progress	Stage: Both	Recurrent: <input type="checkbox"/>	Due Date: 28-Dec-2018	Frequency:
Social and Environmental	Rating		Moderate			
<p>Risk Description: The project will finance investments with potential multi-dimensional environmental and social concerns in the project areas and in particular related to the construction of the PRSs and high pressure pipelines. A major challenge for the project implementation is ability of EGAS and participating LDCs to secure and acquire land for the PRSs and right way for the high pressure gas pipelines.</p>	<p>Risk Management: Environmental and Social Impacts Assessment Framework (ESIAF), Resettlement Policy Framework (RPF), and a Chance Find procedures related to OP 4.11 has been prepared and included as an annex to the ESIAF. These safeguards instruments assess environmental and social impacts of the project, and associated monitoring and mitigation measures and have been disclosed in-country and at the Info shop prior to appraisal providing clear guidance on the requirements for the preparation of the site-specific safeguards instruments. Capacity building will also be provided to EGAS for the preparation and supervision of the safeguards requirements to ensure that site specific ESIA and necessary RAPs are developed in timely manner once locations of sites are finally determined. EGAS is also committed to improving the mechanism of selecting and acquiring the land for the PRSs through early consultation with local communities, developing strong commitment from local authorities and initiating land acquisition and PRS development at early stage of project implementation.</p>					
	Resp: Both	Status: In Progress	Stage: Implementation	Recurrent: <input type="checkbox"/>	Due Date: 28-Dec-2018	Frequency:
Program and Donor	Rating		Substantial			
<p>Risk Description: There is a risk associated with AFD co-financing of Component 1 will delay project implementation especially if AFD loan is not approved in time with the IBRD loan approval and the co-financing may also cause complication in procurement and financial arrangements.</p> <p>The preparation and approval of the EU Grant will be after the proposed project is approved by the Bank and AFD boards posing a high risk to implementing the activities of Components 2 and 3 especially if the Grant is not approved.</p>	<p>Risk Management: AFD Loan processing is progressing well and was approved by AFD Board on June 19, 2014. The procurement for contracts under Component 1 will follow World Bank guidelines. Clear co-financing arrangements have been agreed upon and will be clearly defined in the Project Implementation Manual.</p> <p>The current plan for processing the EU grant is to have in-principle agreement in June 2014 (before Board date), approval by end September and operational by the end of calendar year 2014.</p>					
	Resp: Client	Status: In Progress	Stage: Implementation	Recurrent: <input type="checkbox"/>	Due Date: 28-Dec-2018	Frequency:
Delivery Monitoring and Sustainability	Rating		Substantial			
<p>Risk Description:</p>	<p>Risk Management: (i) There is strong a commitment from the GoE to scaling up the household gas connections</p>					

<p>(i) The risk is moderate for the sustainability of the project development outcomes and ability of EGAS and participating LDCs to develop and operate the project successfully.</p> <p>(ii) Long term sustainability of the gas sector in Egypt remains at high risk.</p> <p>(iii) Long term financial viability and sustainability of EGAS remain at high risk.</p>	<p>nationwide as demonstrated by including it as a priority program in its Economic Development Program. Equally robust is continued ownership of EGAS and the LDCs to the project which is demonstrated by the high level of preparedness and the effort by EGAS and the LDCs to expedite preparation the project documentation including feasibility studies and safeguards documents. The participating LDCs have successful track records in operating and maintaining the distribution networks.</p>					
	Resp: Client	Status: In Progress	Stage: Implementation	Recurrent: <input type="checkbox"/>	Due Date: 28-Dec-2018	Frequency:
	Risk Management:					
	(ii) Any improvement depends on the GoE's ability to advance a comprehensive reform agenda, including (but not limited to) development and implementation of gas sector reform, energy pricing programs and strengthening the sector governance and institutions arrangement which are expected to be pursued by the GoE under various ongoing gas sector reform initiatives and technical assistance activities					
	Resp: Client	Status: In Progress	Stage: Implementation	Recurrent: <input type="checkbox"/>	Due Date: 28-Dec-2018	Frequency:
	Risk Management:					
	(iii) Since its inception in 2001, EGAS' gas transportation business has been cross-subsidized by other businesses, especially by LNG exports.					
Resp: Client	Status: In Progress	Stage: Implementation	Recurrent: <input type="checkbox"/>	Due Date: 28-Dec-2018	Frequency:	
Risk Management:						
(iv) Going forward, the authorities will need to allow a financially viable business model for gas transportation to take shape. This can be done comprehensively together with the broader energy pricing and subsidy reforms in Egypt.						
Resp: Client	Status: In Progress	Stage: Implementation	Recurrent: <input type="checkbox"/>	Due Date: 28-Dec-2018	Frequency:	
Other (Optional)	Rating Moderate					
Risk Description: Risk of shortages of gas supply to the residential sector.	Risk Management: The sustainability of the Project operations will not be subject to shortages of gas supply in Egypt given that even with the additional 2.4 million connections, household gas consumption will continue to represent about three percent of the natural gas demand and to remain a key national priority due to its social and economic benefits. Additionally, there is no safe or economic method of 'load-shedding' on gas distribution networks and gas delivery is only interrupted in the case of emergencies or pre-planned, routine maintenance. Therefore allocation of gas supply to the distribution network has the highest priority of all other gas consuming sectors					
	Resp:	Status:	Stage:	Recurrent:	Due Date:	Frequency:

	Client	Not Yet Due	Both	<input type="checkbox"/>		
Overall Implementation Risk:	Rating	Substantial				
<p>Risk Description: EGAS, Town Gas and Egypt Gas have experience in the physical implementation of the project components, which are fairly straight forward, however given the large scope and coverage of the investments financed by the project the project implementation risk is rated substantial.</p>						

Annex 5: Implementation Support Plan

Egypt – Household Natural Gas Connection Project (P146007)

Strategy and Approach for Implementation Support

1. The large scale of the proposed Project financing 1.5 million household connections to the piped gas networks requires during implementation a higher level of implementation support activities by both the Bank and AFD teams. In addition to the investments financed by the proposed project under Component 1, Component 2 and 3, financed by the EU Grant managed by AFD, will include financial support for the connection fees for vulnerable consumers and technical assistance for reforming the gas market and improving the financial performance of EGAS and therefore will also require higher level of engagement by the Bank team and coordination with AFD. Therefore the Implementation Support has been developed based on wide range of resources required by the three components and is designed to mitigate risks identified in the ORAF.

2. The project involves a framework approach to safeguards, which will require site specific safeguards documents to be developed during early stage of project implementation requiring careful review and subsequent supervision by the Bank safeguards team. In addition, most of the procurement activities and contracting will be carried out in early period of the project implementation. Therefore the first two years of the project implementation would require efforts to review technical, procurement and safeguard documents including project start up. In the subsequent years, the focus will shift to wider scale of project implementation and realization of household gas connections financed by the project. Detailed support from the Bank team during project supervision is outlined below:

- a) **Environmental and social safeguards**: The Bank safeguards team will provide implementation support for: (a) preparation of site specific safeguards documents for the PRSs and high pressure pipelines financed by the proposed project; (b) implementation of safeguards requirements through regular supervision missions to the project sites and surrounding communities, reviewing of required environmental monitoring and evaluation reports, and following up on any safeguards issues that may arise during to project implementation with EGAS, Town Gas, Egypt Gas and relevant government authorities, and (c) training on safeguards to staff from EGAS, Town Gas and Egypt Gas on preparation and supervision of implementation of the safeguards plans.
- b) **Procurement and technical**: The Bank team will provide implementation support for: a) reviewing procurement documents including technical specifications and providing timely feedback and no objection; (b) providing detailed guidance on the Bank's procurement guidelines to the procurement teams assigned to the PMT and in Town Gas and Egypt Gas; (c) monitoring procurement progress against the detailed Procurement Plan developed by EGAS; and (d) providing, as necessary, procurement training to members of the PMT, Town Gas, and Egypt Gas and related staff.
- c) **Financial management**: The Bank team will provide implementation support for (a) reviewing the Project's financial management system, including but not limited to accounting, reporting and internal controls and ensuring compliance by EGAS, Town Gas and Egypt Gas with agreed financial management arrangements for the proposed project, (b) working with the PMT, Town Gas and Egypt Gas in improving coordination

among different departments and units for financial management and reporting, and (c) providing, as necessary, financial management and disbursement training to members of the PMT, Town Gas, and Egypt Gas and related staff.

- d) **Anti-corruption**: The project is essentially about procuring contracts through International Competitive Bidding (ICB). The government has its own anti-corruption plan of action. Bank support will leverage the anti-corruption plan of the government and will also reinforce the preventive measures by reviewing main contracts and ensuring adherence to both government and Bank procurement guidelines. The Bank’s Anti-Corruption Guidelines apply to this Project, as with all Bank Projects.
- e) **Implementation Progress**: The Bank will closely monitor the overall progress of project implementation including number of households connected to the gas networks in the targeted governorates by reviewing the quarterly progress reports prepared by EGAS, Town Gas and Egypt Gas supported with technical audit reports prepared by independent consultants, the execution of the Procurement Plan, and the actual disbursement of the loan. The Bank will provide support by regularly visiting the project implementing utilities and sites, helping to identify arising issues which impede project progress and discussing and agreeing on actions to resolve critical issues.
- f) **Gas sector reform and policy dialogue**: Under Component 3 the project will support the Ministry of Petroleum and EGAS in developing and implementing programs for reforming the structure of the gas market in Egypt and improving the financial and operational performance of the gas utilities. In cooperation with AFD, support will be provided by the Bank staff, consultants and industry experts through Bank’s engagement and support to Component 3 and policy engagement in the gas sector. In addition the project supervision budget, the Bank budget will provide resources for such policy work, complementing available transition fund grant financing that has been obtained and donor resources supporting implementation of their technical assistance.

Implementation Support Plan

3. The proposed implementation support requirements are as follows:

Table 5.1: Implementation Support Focus and Resource Requirements

Time	Focus	Skills Needed	World Bank Resource Estimate	Partner Role
Years 1-2	Monitor and assist in procurement of the main contracts	Procurement Gas Engineer	4 1	Procurement of Component 1 will follow World Bank Guidelines Procurement for Components 2 and 3 will follow AFD Guidelines since it is fully financed by AFD managed funds
	Assist in setting up financial management systems and controls and monitor FM implementation and disbursement	Financial Management	3	AFD will follow its own guidelines for FM and disbursement of its funds
	Support preparation of site specific safeguards documents and	Environmental and social	6	World Bank safeguards policies will apply to the investment

Time	Focus	Skills Needed	World Bank Resource Estimate	Partner Role
	supervise safeguards implementation			component 1 of the project
	Monitor Project management and supervise project implementation progress	Project management Technical Operations officer	4 2 3	AFD and the Bank will plan to have regular joint supervision missions
	Gas sector Policy dialogue and financial performance	Gas sector expert Financial analyst	3 2	World Bank with AFD and EU team will jointly engage in gas sector policy dialogue and supervision of the technical assistance under Components 2 and 3.
Years 3-4	Monitor and supervise procurement activities and execution of the main contracts	Procurement Gas Engineer	3 2	Procurement of Component 1 will follow World Bank Guidelines Procurement for Components 2 and 3 will follow AFD Guidelines since it is fully financed by AFD managed funds
	Monitor and supervise FM implementation and disbursement	Financial Management	2	AFD will follow its own guidelines for FM and disbursement of its funds
	Supervise safeguards implementation	Environmental and Social	4	World Bank safeguards policies will apply to the investment component 1 of the project
	Monitor Project management and supervise project implementation progress	Project Management Technical Operations Officer	4 2 3	AFD and the Bank will plan to have regular joint supervision missions
	Gas sector Policy dialogue and financial performance	Gas Sector Expert Financial Analyst	2 2	World Bank with AFD and EU team will jointly engage in gas sector policy dialogue and supervision of the technical assistance under Components 2 and 3.

Table 5.2: Skills Mix Required

Skills Needed	Number of World Bank Staff Weeks	Number of Trips	Comments
Team Leader	16	3	Regional
Co-Team Leader	12	0	Country based
Gas Engineer	12	2	International
Financial Analyst	8	2	HQ
Economist	8	2	HQ
Environmental Specialist	10	2	HQ/Country Based
Social Specialist	10	2	HQ/Country Based
Procurement Specialist	14	0	Country based
Financial Management Specialist	6	0	Country based
Gas Sector Expert	8	2	International
TOTAL	104	15	

Annex 6: Project Economic and Financial Analyses

Egypt – Household Natural Gas Connection Project (P146007)

Economic and Financial Analysis

1. The project aims to switch 1.5 million households from LPG to natural gas primarily for cooking purposes. Egypt has been promoting a residential gas distribution network since the early 1990s but the program gathered pace in the mid-2000s. Over the years, this program has emerged as an important social priority and serves as one of the Government's flagship endeavors to improve service delivery outcomes. About 1.1 million households will be connected, in 88 targeted areas, within the eleven Governorates and they will be connected during the first three years of the project implementation period. The targeted areas for the remaining 400,000 households will be determined during project implementation and will be connect during the fourth year.

2. Egypt's focus on laying natural gas networks is consistent with global experience. In a comprehensive analysis, Kojima (2011) studied use of gaseous fuels for cooking purposes. Natural gas is a cleaner fuel than LPG and in the absence of subsidies, it is cheaper compared to LPG per unit of energy and households will choose natural gas when both LPG and natural gas are available. However, even in countries where natural gas infrastructure is fully developed, it could still be available only in urban and peri-urban areas where economies of scale could be exploited. As natural gas is a network infrastructure, it will be more expensive in areas without sufficient economies of scale where LPG will be cheaper. Therefore, in the long-run movement towards universal access to modern cooking solutions by 2030 is envisaged under Sustainable Energy for All initiative, LPG will be a transition fuel in urban and peri-urban areas until natural gas networks take over while LPG will remain prominent in rural areas. Use of natural gas is only going to increase in developing countries given the urbanization trends in the next four decades, where the urban areas are expected to absorb all the population growth as well as draw population from rural areas (UN, 2012).

3. The implementation of this natural gas connection program in Egypt will be spread over 4 years with 200,000 in year FY15, 400,000 in year FY16, 500,000 in year FY17, and 400,000 in FY18. The asset life is assumed to be 25 years going up to FY2039. An economic and financial analysis is carried out to arrive at an economic internal rate of return (EIRR) as well as a financial internal rate of return (FIRR). The analysis assumes that the current consumer prices will remain unchanged for the next 25 years. The sensitivity analysis, to some extent, models the variations in prices that could occur during its lifetime.

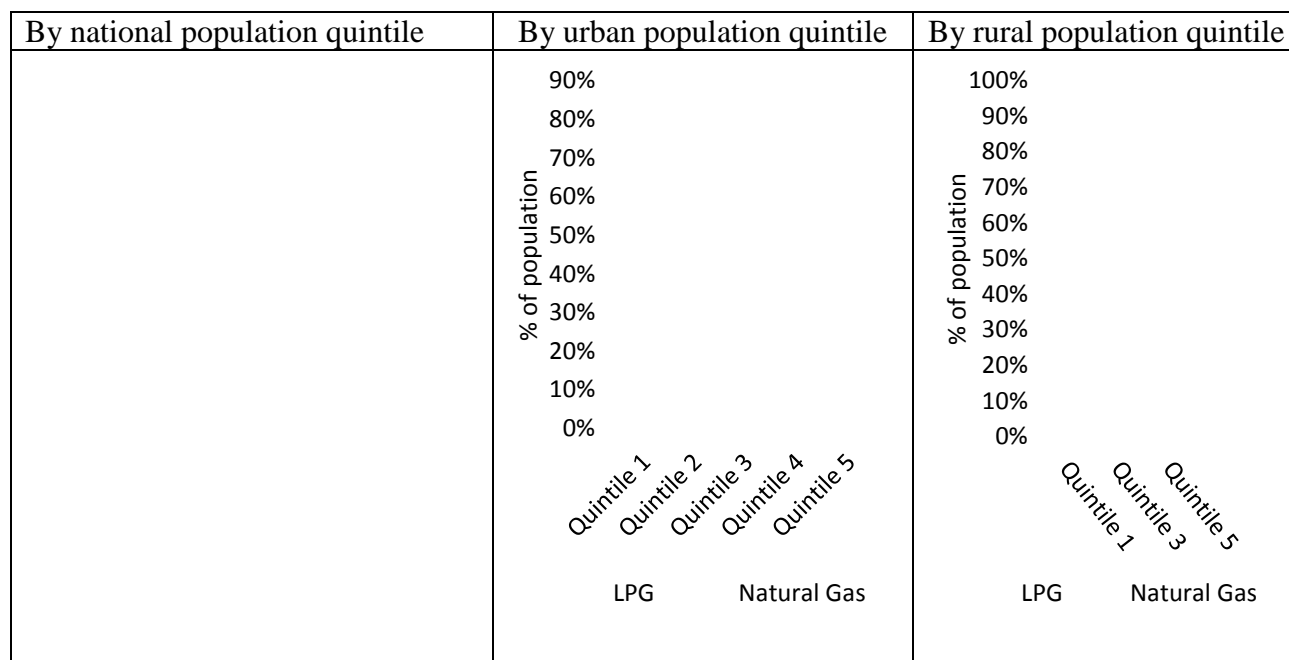
Access to modern cooking solutions

4. Globally, an estimated 2.8 billion people depend on solid fuels for cooking. Egypt is one of the handful countries where there is universal access to modern cooking solutions in the form of gas. An overwhelming 81 percent of the population uses LPG for cooking, and the remaining 19 percent depends on natural gas. Only a miniscule proportion of population relies on kerosene, electricity or other sources for cooking purposes

5. Use of natural gas so far has been overwhelmingly urban. Natural gas is irrelevant among rural population - even the richest among the rural population do not use this fuel for cooking

purposes. In the urban areas, however, natural gas has overtaken LPG in the richest quintile³⁸. About 17% in the poorest quintile among the urban population uses natural gas for cooking purposes (Figure 6.1). Within a period of two years between 2011 and 2013, the population dependent on natural gas as the primary fuel for cooking rose from 15 percent to 19 percent.

Figure 6.1: Cooking fuel use

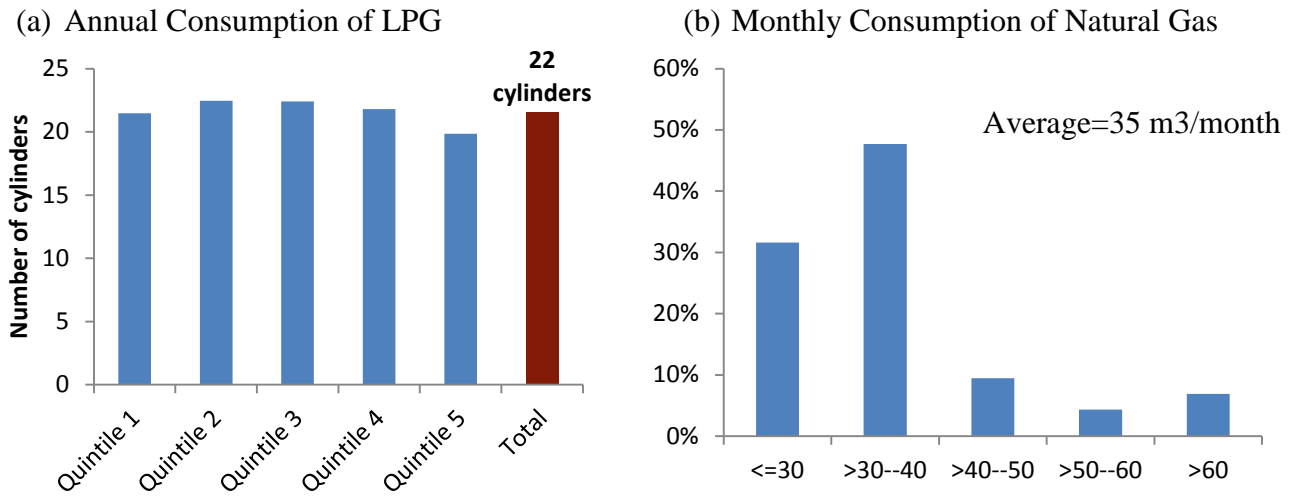


Source: Household Income, Expenditure, and Consumption Survey (HIECS, 2013)

6. The consumption of LPG for cooking is remarkably homogenous among consumer groups. On an average, households use 22 cylinders (1 cylinder=12.5 kg), that is, close to two cylinders a month. For natural gas, the average monthly household consumption is 35 m³ in Egypt and 48 percent of the households consume between 30 to 40 m³ a month and 32 percent consume less than 30 m³ a month (Figure 6.2). Converted to a common metric, the yearly average consumption of LPG is 14 mmbtu while the yearly average consumption of natural gas is 15 mmbtu. The relatively similar consumption levels points to the fact that the use of these two fuels is for cooking use only in the household that does not report dramatic variations. Unlike an energy source such as electricity, where the use is a continuum across income levels and is elastic to price changes, consumption for cooking is remarkably similar across expenditure quintiles and relatively unresponsive to price variation.

³⁸ Quintiles are division of population into five equal groups based on per capital expenditure levels. Urban quintiles are for urban population only, rural quintiles are for rural population only, and national quintiles are for all population.

Figure 6.2: Consumption of LPG and Natural Gas by households



Source: HIECS, 2013

Comparative Economic Cost of LPG and Natural Gas

7. What happens to the economy in the absence of this project? The counterfactual analysis compares the economic cost of natural gas infrastructure to the LPG infrastructure for the 1.5 million consumers that this project envisages to serve.

8. *Cost of LPG:* The economic cost streams of LPG include the following – import cost of LPG of US\$822/ton (five year average between 2009 and 2013), bottling and distribution within Egypt of US\$200/ton.

9. *Cost of natural gas:* The economic cost streams of natural gas include the following – capital cost, operations and maintenance (O & M) cost, and the economic cost of gas that will flow through the new networks. The economic cost of the infrastructure to connect a household is estimated to be LE5000 (US\$725) on average, excluding taxes and physical and price contingencies. Of this total, consumers pay LE1500 (US\$220), which they either contribute in lump-sum at the time of connection or take a loan from the National Bank of Egypt to pay in instalments over up to seven years. In addition to the capital investment, the O&M is conservatively estimated to be two percent of the capital cost or LE14 (US\$2) per consumer on an annual basis, although the LDCs about half of this estimate for O&M.

10. The economic cost is the real resource cost of gas; in economic theory prices set according to economic costs should result in an efficient use of gas and maximize the welfare benefit from the resource. Egypt exports natural gas in the form of liquefied natural gas (LNG), and this export trade has suffered significantly in recent years because of diversion of natural gas originally destined for exports to the domestic market, representing a large loss of revenue to the government. Under these circumstances, the economic cost of gas is the netback price of gas exported to southern Europe, such as Spain, which has been averaging about US\$13/mmbtu. Netting back the cost of liquefaction and transportation of US\$2.50/mmbtu, this cost emerges as US\$10.5/mmbtu. Further, Egypt has been increasing its gap between demand and supply due to an explosion in domestic demand for power generation as well as slowdown in exploration activities in domestic gas fields due to political uncertainty and domestic supply obligation

coupled with low domestic prices. This has squeezed the exports and the Government is actively considering import options at least in the short term, and import-parity prices would be even higher. A recent report suggests that unprecedented levels of new investments are expected in the next four years, but even then Egypt is unlikely to witness a historical production high of 4 bcfd. This is because new finds are smaller and going to be more expensive and more technically challenging to develop (Wood Mackenzie, 2014). There is a comprehensive study envisaged under the ongoing Transition Fund, Technical Assistance (TA) to the Government of Egypt on energy pricing and fuel subsidies that will carry out a long-run demand-supply projection and allow a more accurate estimation of economic price of gas.

11. The discounted cash flow assessment between the LPG and natural gas cost streams suggests that natural gas is cheaper for the economy in an unsubsidized environment. The EIRR is estimated at 36 percent (Table 6.1). From the purely economic point of view - if there were no price distortions in the economy, these calculations suggest that it makes economic sense to invest in natural gas networks. The sensitivity analysis also points to the robustness of these conservative estimates, the import price of LPG has to fall to US\$464/ton or economic price of gas can rise up to US\$21.8/mmbtu for the EIRR to fall to the hurdle rate of ten percent.

Table 6.1: Economic cost of LPG and Natural Gas

	Number of consumers	Import and Delivery Cost of LPG	Total Cost of delivering LPG	Capital cost of NG	O & M Cost	Price of gas	Total Cost of delivering NG	Net cost
FY15	200,000	67,567,759	67,567,759	144,927,536	2,898,551	26,214,660	174,040,747	106,472,987
FY16	400,000	202,703,278	202,703,278	289,855,072	8,695,652	78,643,979	377,194,704	174,491,425
FY17	500,000	371,622,677	371,622,677	362,318,841	15,942,029	144,180,628	522,441,498	150,818,821
FY18	400,000	506,758,196	506,758,196	289,855,072	21,739,130	196,609,947	508,204,150	1,445,954
FY19		506,758,196	506,758,196	0	21,739,130	196,609,947	218,349,078	-288,409,118
FY20		506,758,196	506,758,196	0	21,739,130	196,609,947	218,349,078	-288,409,118
FY21		506,758,196	506,758,196	0	21,739,130	196,609,947	218,349,078	-288,409,118
FY22		506,758,196	506,758,196	0	21,739,130	196,609,947	218,349,078	-288,409,118
FY23		506,758,196	506,758,196	0	21,739,130	196,609,947	218,349,078	-288,409,118
FY24		506,758,196	506,758,196	0	21,739,130	196,609,947	218,349,078	-288,409,118
FY25		506,758,196	506,758,196	0	21,739,130	196,609,947	218,349,078	-288,409,118
FY26		506,758,196	506,758,196	0	21,739,130	196,609,947	218,349,078	-288,409,118
FY27		506,758,196	506,758,196	0	21,739,130	196,609,947	218,349,078	-288,409,118
FY28		506,758,196	506,758,196	0	21,739,130	196,609,947	218,349,078	-288,409,118
FY29		506,758,196	506,758,196	0	21,739,130	196,609,947	218,349,078	-288,409,118
FY30		506,758,196	506,758,196	0	21,739,130	196,609,947	218,349,078	-288,409,118
FY31		506,758,196	506,758,196	0	21,739,130	196,609,947	218,349,078	-288,409,118
FY32		506,758,196	506,758,196	0	21,739,130	196,609,947	218,349,078	-288,409,118
FY33		506,758,196	506,758,196	0	21,739,130	196,609,947	218,349,078	-288,409,118
FY34		506,758,196	506,758,196	0	21,739,130	196,609,947	218,349,078	-288,409,118
FY35		506,758,196	506,758,196	0	21,739,130	196,609,947	218,349,078	-288,409,118
FY36		506,758,196	506,758,196	0	21,739,130	196,609,947	218,349,078	-288,409,118
FY37		506,758,196	506,758,196	0	21,739,130	196,609,947	218,349,078	-288,409,118
FY38		506,758,196	506,758,196	0	21,739,130	196,609,947	218,349,078	-288,409,118
FY39		506,758,196	506,758,196	0	21,739,130	196,609,947	218,349,078	-288,409,118
							EIRR	36%

Project justification

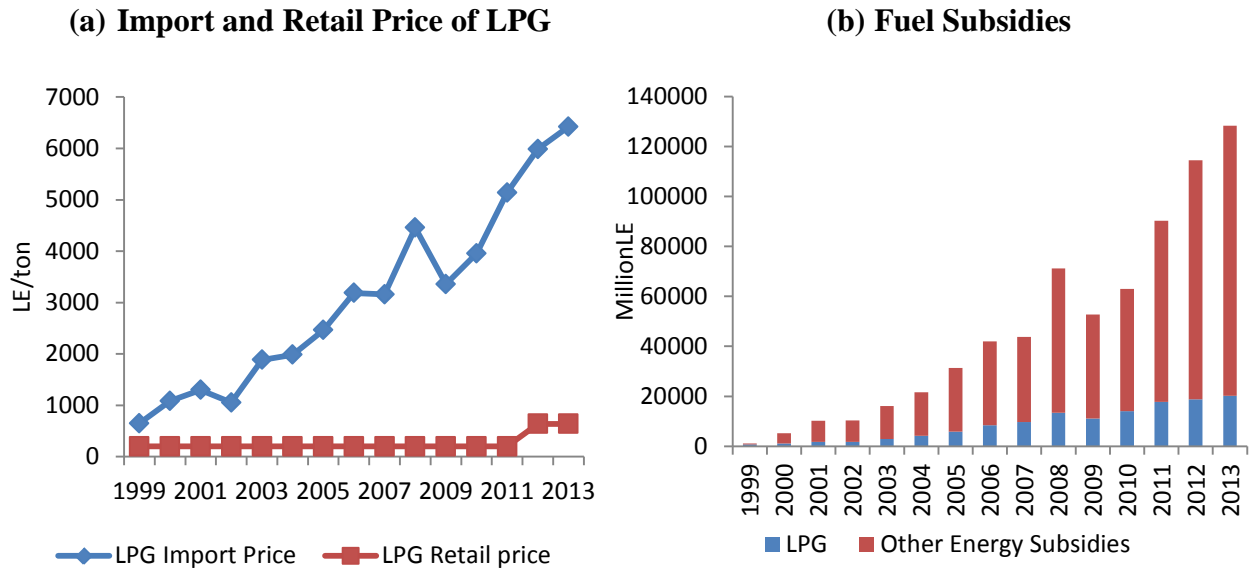
12. The value proposition of the project emerges from three sources – fiscal benefits; consumer benefits; and environmental premium.

13. *Fiscal benefits:* Both LPG and natural gas are subsidized energy products. Except for kerosene, all energy products in Egypt are charged below cost recovery. LPG is the most subsidized energy item in Egypt and accounted for about 16 percent of total energy subsidies of in 2013 (LE128 billion or US\$18 billion). Historically, LPG subsidies have hovered around 20 percent of total fuel subsidy expenditures. Among the five subsidized fuel products – LPG, gasoline, diesel, fuel oil and natural gas, subsidies on natural gas was the lowest at 8 percent of total fuel subsidies in 2013 (Figure 6.2).

14. The mismatch between the cost of LPG, which is largely imported, and the domestic retail price has been widening. A little more than half of LPG is imported and the import cost has experienced an upward trend. The past three year average of LPG import prices has been US\$933/ton and the past five year average has been US\$822/ton. The weighted average cost of LPG including both the domestic and international quantities was US\$756/ton in 2013. On the other hand, the retail price had been frozen at LE2.5 (US\$0.37) per cylinder for almost two decades since 1991, changing only in 2012 to LE8 per cylinder. This is equivalent to a tripling of sale price from LE200/ton to LE640/ton (=US\$91/ton). The cost recovery of LPG stands at 6 percent in 2013 based on budget estimates. Retail LPG prices in Egypt have been found to be among the lowest in the world (Kojima, 2013).

15. Unlike LPG where households are overwhelmingly the primary consumers, natural gas has many other users. Residential use of natural gas constitutes only three percent of total natural gas consumption, while energy-intensive industries and power generation are the largest consumers. Therefore, while the financial cost recovery in the residential sub-sector is 23 percent, the overall cost recovery for natural gas is about 70 percent. As is the case in many countries, the multiple uses of natural gas enable cross-subsidization of residential users. Since 2012, the Government has been able to adjust the prices of energy-intensive industries to levels in excess of cost recovery as well as achieving a cost recovery rate of 50 percent for power generation, while keeping residential consumer tariffs at much lower rates. Since May 2014, Egypt has imposed a three-block structure for residential consumers, where monthly use of less than 25 m³ is priced at LE0.40/m³ (about US\$0.06/m³) and monthly use between 25 and 50 m³ is priced at LE1/m³ (US\$0.14/m³) and those above 50 m³ is priced at LE1.5/m³ (\$0.21/m³).

Figure 6.3: LPG Subsidies



Source: EGAS, Ministry of Finance

16. *Consumer benefits:* Consumers saved on switching to natural gas from LPG. On average, households annually paid LE234 for LPG compared to LE141 for natural gas in 2013. The gains for switching are highest for the second quintile of the population. The LPG and NG expenditure are similar across the quintile groups respectively, suggesting household consumption of cooking fuels varies only slightly among the population groups. Energy expenses constitute 3.5 percent of the total household budget. In the poorest quintile, this proportion is about 5.1 percent and declines with a rise in the income, contributing 2.9 percent in the richest quintile (Table 6.2). It is important to note that the prices of natural gas has risen in May 2014³⁹, driven by the underlying thought that people should pay similar amounts for cooking – irrespective of the source. Therefore, these savings for people switching from LPG to natural gas may be non-existent going forward.

Table 6.2: Composition of annual household energy budget (for those consuming), LE

Quintiles of per capita consumption	Wood or coal	Liquid Fuel	LPG	Natural Gas	Electricity	Total energy expenditure	Total household budget	Energy expenditure as % of total household budget
Poorest	63	99	227	150	325	863	17099	5.05%
Quintile 2	60	60	238	131	365	854	20601	4.14%
Quintile 3	64	37	239	143	390	873	23033	3.79%
Quintile 4	74	37	238	135	428	912	25551	3.57%
Richest	73	41	229	143	549	1036	35767	2.90%
Total	65	49	234	141	431	920	25977	3.54%

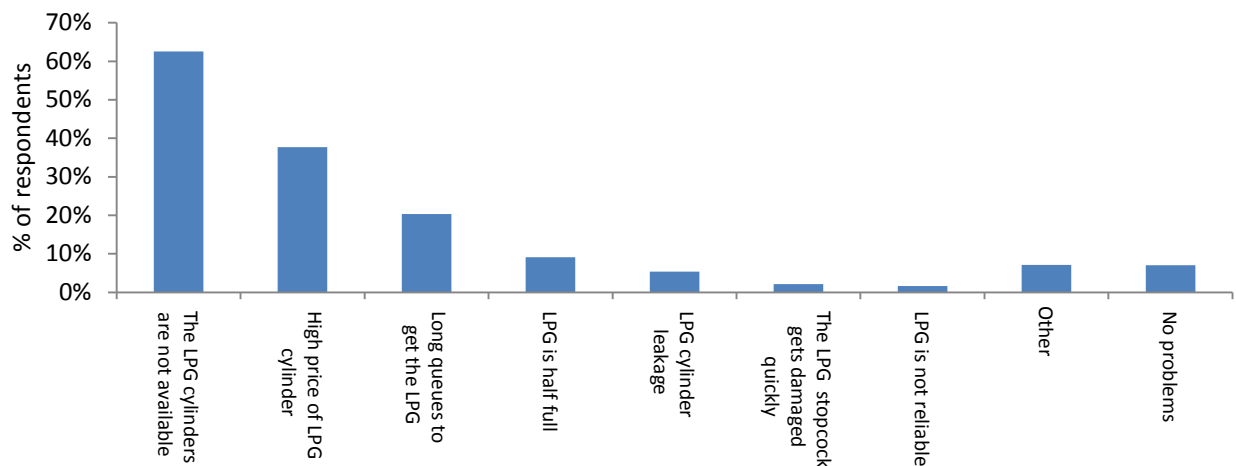
Source: HIECS, 2013

³⁹ The new tariff schedule is as follows: 0-25 m³=LE0.4/m³, 25-50m³=LE1/m³, More than 50m³-LE1.5/m³

17. As with fuel subsidies in many other markets, the large LPG subsidies in Egypt have led to acute market distortions with serious negative consequences for consumers, directly affecting their day-to-day lives. The Government has not been able to provide the mounting fiscal outlay, leading to LPG shortages. More crucially, the financial incentive to divert the subsidized LPG to black markets or smuggle it out of the country has increased with rising international price of LPG, exacerbating LPG shortages. Black market prices have soared, as queues to buy LPG at the official prices have become longer and longer. LPG shortages in winter have been the norm for some years, but in 2012, shortages did not ease in March. LPG shortages in November–December 2011 led to fights, injuries, and even two deaths and increased prices on the black market by as much as 20-fold. The dealer commission was too small and the reason cited by the petroleum minister in February 2012 for the flourishing black market and the serious LPG shortage across the country (Kojima 2013).

18. A socio-economic survey of 1904 households in the project areas of eleven Governorates carried out as part of project preparation reported that 55 percent of households source these cylinders from informal LPG distributors and about 32 percent from the LPG cylinder stores. The survey particularly highlighted the informal nature of the distribution system. In addition to the formal legal distribution, there are informal groups consisting of vendors, grocers, house guards and NGOs. As a result, there are significant problems faced by communities in accessing LPG cylinders at the official price, and the burden of purchasing LPG at or near the official price falls disproportionately on women. An upwards of 60 percent of respondents cited LPG shortages as the major challenge and about 38 percent reported high LPG prices which can go anywhere up to 50-60 LE/month (US\$7.4-8.8) (Figure 6.4) especially during periods of LPG supply shortages. On the other hand, natural gas consumers receive a formal bill, reflecting tariffs set by the Government, from known local distribution companies.

Figure 6.4: Problems faced with LPG



Source: Econserve, 2014

19. Compared to LPG, natural gas is considered safer. LPG constitutes a hazard for emissions and burning accidents and often brings into the homes in hollow spaces of the cylinder, insects and dirt gathered from the storage and transportation process. Natural gas is available around the clock, which eliminates inconvenience caused when the LPG runs out during usage. Households generally cope by keeping an extra back-up LPG cylinder in their

homes, but this adds to the startup cost and the space needed to store cylinders. Perhaps because of frequent LPG shortages, gas cylinder distributors in Egypt use very noisy tools to alert the neighborhood of their presence. LPG is housed in cylinders at higher pressure than that found in piped gas connections, which generates greater risks for fire and explosions than natural gas. It is recommended that LPG cylinders be housed in well-ventilated areas outdoors, a luxury that most residents of high rise buildings do not have, so they store them in poorly ventilated areas inside residences in close proximity to heat sources, increasing fire and explosion risks. In comparison, natural gas connections are safer and easier to control in case of leakages, in part because natural gas immediately rises upon release whereas LPG stays near the ground, when installed properly. Finally, the organized nature of natural gas distribution companies underscores the importance of consistent and customer-oriented service delivery.

20. The perception of the natural gas connections project among the surveyed population is therefore overwhelmingly positive, for the following main reasons - natural gas is available at all times (53 percent), it saves time and avoids the need to queue for purchase (44 percent), the price of the LPG cylinder is not uniform throughout the country and across time (39 percent), and natural gas is safer (16 percent). At the same time, 40 percent of households reported being afraid of a natural gas leakage.

21. Therefore, there is a value of time for people queuing up to purchase LPG for their homes. Based on very conservative estimates, if a household member stands in line for one hour in a month, the opportunity cost of time valued conservatively at 50 percent of formal sector minimum wages of LE1200 (US\$176)/month results in LE41(US\$6)/year.

22. *Global environmental premium:* The conversion from LPG to natural gas can be carbon friendly, depending on the amount of methane leaks during gas production and transportation. This project is likely to reduce the greenhouse gas emissions associated with the consumption of energy from relatively high carbon intensive sources such as LPG in the baseline. The emission factor for LPG is 63.1 ton CO₂/TJ compared to natural gas at 56.1 ton CO₂/TJ. Given the large group of households envisaged to convert under the project, the annual GHG emissions savings can amount to as much as 649,915 ton CO₂. The value of these emissions would be US\$3.2 million if valued at the currently depressed European Emissions Trading System price of US\$5/tCO₂. Considering this, it is expected that about US\$30 million of carbon revenues may be generated over the ten years crediting period. However, the social value of carbon savings is much higher. For instance, if these emissions savings were valued at a typically assumed social price of carbon at US\$30/tonCO₂, then the annual value could be US\$20 million.

Financial Cost-Benefit Analysis

23. As articulated in Section II, there are subsidies and price distortions in both LPG and natural gas markets. Therefore, the Government has two choices for intervention, either in the LPG or natural gas market, to improve service delivery outcomes and rein in fiscal profligacy, given that households use primarily one of these two gas fuels for cooking, and rapid uptake of electricity for cooking is unlikely in the near to medium term.

24. *First, to fix the LPG market.* LPG is widely used for cooking and to some extent for water heating purposes, therefore it makes logical sense to set the prices right with adequate social protection mechanisms for the poor. However, at this current time, this is unlikely to be politically feasible as retail prices need to increase at least ten times to reach cost recovery. If the

prices are set right, then shortages and queues would disappear. In addition to price changes, it is important to develop regulations on who uses LPG, for what purpose, and enforce them. As LPG is transferable among consumers and among uses, a differentiated price structure is almost impossible. In the recent years, low prices of LPG has meant that apparent consumption has increased unabated, including use as a substitute for other more expensive fuel products in small commercial establishments. In the Government's budget calculations, the LPG consumption has remained stable in spite of expansion of connecting many more households to natural gas, which serves as a substitute. Further, LPG is also being smuggled outside Egypt, and therefore the question of who will benefit from LPG price reforms remains unclear unless there is better enforcement of who uses LPG and for what purpose.

25. ***Second, to expand natural gas networks.*** For the Government, this has been a tool to substitute a subsidized largely imported energy commodity requiring a large fiscal outlay with one that can be cross-subsidized by other uses, thereby requiring a smaller fiscal outlay. Because of the way natural gas is distributed, natural gas connections do not lend themselves to transferability, and it is not possible to smuggle subsidized natural gas out of the country or divert it to black markets. Customer service programs are well-established in the local distribution companies, and the formal nature of service delivery ensures that consumer complaints are addressed within an acceptable timeframe. Therefore, the Government decided to push ahead with a national program for expanding natural gas connections that the World Bank has been supporting since 2008. Gerner and Sinclair (2008) undertook an analysis of residential gas connections and concluded that converting households, including low-income ones, to natural gas can be financially viable. The savings from avoiding subsidies on LPG and consumer savings can finance most of the costs of switching the residential load from LPG to natural gas.

26. A financial analysis is carried out for the project employing a discount rate of 10 percent where the cost streams are the following - capital cost, operations and maintenance (O & M) cost, production cost of gas, and transmission cost of gas that will flow through the new networks. The connection cost per household is LE5750 including taxes and contingencies, of which LE1500 will be paid by the consumer. The remaining is the cost incurred by EGAS. The annual O & M cost is LE50/consumer. The price of gas is considered to be the domestic production cost of gas, which is the average gas production cost from domestic gas fields between 2014 and 2020, and is estimated at US\$3.7/mmbtu. The transmission charge of gas by GASCO is estimated as LE0.01/m³.

27. The benefit stream is articulated as the subsidy savings for the Government. The difference between LPG cost and official retail price is the subsidy in LPG while the difference between natural gas production cost and sale price is the subsidy in natural gas. The difference between these two subsidy values is the subsidy savings to the Government. The subsidy savings is envisaged to be US\$210 million when the implementation is complete with 1.5 million connections.

28. The FIRR is estimated to be 11.7 percent with a NPV of US\$109 million in the baseline scenario (Table 6.3). The project is sensitive to the cost of gas as well as to monthly household consumption. The switching value of cost of gas at which NPV falls to zero is US\$ 4.2/mmbtu. A couple of alternate scenarios can be simulated regarding the cost of gas. First, cost of gas at

US\$6.21 encompassing a depletion premium⁴⁰ of \$2.5/mmbtu over and above the domestic cost of production. The FIRR in this case would be 6.9 percent. Second, given the supply-demand profile of Egypt, import of natural gas is a transitional possibility before the domestic exploration and production start delivering gas for consumption and exports. A probable import value of US\$13/mmbtu is used for five years between 2015 and 2019 and domestic production cost at US\$3.7/mmbtu is used thereafter. The FIRR in this case would be 7.2 percent.

29. In the baseline analysis, an average household monthly consumption of 24 m³ is considered, underpinned by the billing records of Petrotrade (the billing agency of LDCs). About 70 percent of consumers fall in the first block of 0-25 m³. However, the nationally representative household survey HIECS 2013 reports a higher average monthly consumption level of 35 m³ (Figure 6.2). The financial returns can only be better when a higher consumption level of 35 m³ is taken into account.

30. A single variable tolerance analysis suggests that the cost of household connection can go up from LE5750 to LE6399 or the LPG cost has fall to US\$17.7/mmbtu for the NPV to become zero (Table 6.4). The project envisages a certain connection implementation schedule in the baseline scenario. However, the connection rate could deviate from this schedule. A slippage in the first couple of years can reduce the financial returns substantially compared to the baseline scenario (Table 6.5).

Table 6.3: Financial cost-benefit analysis

Year	Number of consumers	Capital investment by hhs (\$)	Remaining Capital investment (\$)	O & M cost (\$)	Production Cost of gas (\$)	Transmission cost of gas (\$)	Total Cost (\$)	Subsidy Savings (\$)	Total Benefits (\$)	Net Benefits (\$)
FY2015	200,000	43,478,261	123,188,406	1,449,275	7,780,511	83887	175,896,453	31250644	31250644	-144645809
FY2016	400,000	86,956,522	246,376,812	4,347,826	23,341,533	251661	361,022,692	88092784	88092784	-272929908
FY2017	500,000	108,695,652	307,971,014	7,971,014	42,792,810	461378	467,430,492	154643863	154643863	-312786628
FY2018	400,000	86,956,522	246,376,812	10,869,565	58,353,832	629152	402,556,731	210199833	210199833	-192356898
FY2019	0	0	0	10,869,565	58,353,832	629152	69,223,398	210199833	210199833	140976435
FY2020				10,869,565	58,353,832	629152	69,223,398	210199833	210199833	140976435
FY2021				10,869,565	58,353,832	629152	69,223,398	210199833	210199833	140976435
FY2022				10,869,565	58,353,832	629152	69,223,398	210199833	210199833	140976435
FY2023				10,869,565	58,353,832	629152	69,223,398	210199833	210199833	140976435
FY2024				10,869,565	58,353,832	629152	69,223,398	210199833	210199833	140976435
FY2025				10,869,565	58,353,832	629152	69,223,398	210199833	210199833	140976435
FY2026				10,869,565	58,353,832	629152	69,223,398	210199833	210199833	140976435
FY2027				10,869,565	58,353,832	629152	69,223,398	210199833	210199833	140976435
FY2028				10,869,565	58,353,832	629152	69,223,398	210199833	210199833	140976435
FY2029				10,869,565	58,353,832	629152	69,223,398	210199833	210199833	140976435
FY2030				10,869,565	58,353,832	629152	69,223,398	210199833	210199833	140976435
FY2031				10,869,565	58,353,832	629152	69,223,398	210199833	210199833	140976435
FY2032				10,869,565	58,353,832	629152	69,223,398	210199833	210199833	140976435
FY2033				10,869,565	58,353,832	629152	69,223,398	210199833	210199833	140976435
FY2034				10,869,565	58,353,832	629152	69,223,398	210199833	210199833	140976435
FY2035				10,869,565	58,353,832	629152	69,223,398	210199833	210199833	140976435
FY2036				10,869,565	58,353,832	629152	69,223,398	210199833	210199833	140976435
FY2037				10,869,565	58,353,832	629152	69,223,398	210199833	210199833	140976435
FY2038				10,869,565	58,353,832	629152	69,223,398	210199833	210199833	140976435
FY2039				10,869,565	58,353,832	629152	69,223,398	210199833	210199833	140976435
									FIRR	11.7%
									NPV	\$109,330,744

⁴⁰ Economic rent (resource value) of non-renewable resources. The depletion premium is assumed to be \$2.5/mmbtu considered a mid-point between a range of \$1.4-3.5/mmbtu reported in Razavi, Hossein . 2009. "Natural Gas Pricing in Countries of MENA." *The Energy Journal* 30 (3)

Table 6.4: Switching values

Switching Value	Baseline	Value at which NPV=0
Connection Charge (LE/month)	5750	6399
Cost of LPG (\$/mmbtu)	18	17.5
Cost of gas (\$/mmbtu)	3.71	4.2
Residential gas consumption (m3/month)	24	22

Table 6.5: Sensitivity to implementation schedule

	Year 1	Year 2	Year 3	Year 4	Year 5	FIRR	NPV (US\$)
Baseline	200,000	400,000	500,000	400,000	0	12%	\$109,330,744
Scenario 1	100,000	400,000	500,000	500,000		12%	\$141,079,666
Scenario 2	0	400,000	500,000	500,000	100,000	12%	\$89,295,030
Scenario 3	0	200,000	500,000	300,000	500,000	6%	(\$183,500,800)
Scenario 4	0	0	500,000	300,000	700,000	4%	(\$289,229,513)
Scenario 5	0	100,000	400,000	500,000	500,000	7%	(\$129,404,017)

Annex 7: Financial Analysis of the Gas Sector and EGAS

Egypt – Household Natural Gas Connection Project (P146007)

A. Main Financial Risks Facing EGAS and the Gas Sector

1. EGAS is the main owner of Egypt’s domestic natural gas pipeline network and a key entity responsible for liquefied natural gas trading business. EGAS was established in 2001 in accordance with the provisions of the Public Enterprise Sector Law No. 203 (1991). The main revenue-generating activity has been Liquefied Natural Gas (LNG) trading. EGAS also owns much of the gas transmission and distribution (T&D) networks in Egypt. However, the gas transportation activity has been carried out on a not-for-profit cost-recovery basis. Effectively, the LNG trading business has been cross-subsidizing the natural gas T&D business.
2. **Increasing engagement in natural gas exploration activities.** In addition, EGAS has taken on a larger role in natural gas explorations, and is currently responsible for three active exploration concessions in Egypt in partnerships with international petroleum companies. Therefore, EGAS’ revenue from sales of gas derivatives to EGPC—the wholesale single buyer of natural gas in Egypt—has been increasing in the past four years. New exploration concessions are being concluded, and expected to increase EGAS’ revenue from gas derivatives further.
3. EGAS and gas sector companies work as agents or contractors for EGPC. EGAS engages with the sole gas transportation company GASCO and gas distribution companies (e.g. Town Gas and Egypt Gas) in the day-to-day operations, maintenance and construction of the gas network. Effectively, GASCO and the distribution companies act as contractors to EGAS and receive fees for their T&D services. There is no transfer of ownership in the gas commodity among EGAS, GASCO and the distribution companies since natural gas for domestic consumption is wholly-owned by the single gas buyer EGPC.
4. Egypt’s natural gas sector has experienced substantial financial distress following the 2011 Egyptian revolution and the economic difficulties that follow. The key related issues include:
 - a. Increases in unpaid bills for natural gas consumed in Egypt, especially from the electricity sector;
 - b. Increases in unpaid bills to the international petroleum companies under the petroleum production sharing agreements. This has contributed to lower-than-expected natural gas production in Egypt, and consequently a sharp decline in LNG production and exports;
 - c. Decreases in LNG export revenue; and
 - d. Disruptions of natural gas exports via the Arab Gas Pipeline (to Jordan and beyond) due to a series of gas pipeline explosions.
5. Revenue and cash flow pressure stemmed from lower LNG trading margin. EGAS’ margin on LNG sales could be negatively affected by multiple factors such as (i) the cost of LNG charged by EGPC to EGAS; (ii) changes in contracted LNG prices, including EGAS’ share; (iii) changes in spot LNG prices; (iv) quantity of LNG belonging to Egypt and correspondingly to EGAS; and (v) foreign exchange rate movement.

6. Large investment planned for the next five years. EGAS' revised budget for FY2014–FY2017 includes an investment plan of LE 1.3–3 billion per year, totaling approximately LE 8.7 billion, compared to approximately LE 20 billion of fixed assets and investment by end FY2012/13.

7. Financial ability to cross-subsidize natural gas transportation business. A significant decline in LNG trading margins would impact EGAS' ability to cross-subsidize its natural gas transportation business. This may force EGAS to delay its investment program or to become more leveraged in order to supplement any cash shortfall.

8. Large outstanding gas bills (arrears). EGAS has acted as a facilitator in collecting natural gas bills from gas users on behalf of the gas owner EGPC. Legacy gas bill receivables and payables were transferred from EGPC to EGAS upon its establishment. However, these outstanding amounts have continued to increase substantially (e.g. by LE 19 billion in just one year from FY2011/12 to FY 2012/13). In terms of cash flow this pass-through arrangement has limited impact on EGAS, but could become more convoluted with EGAS' cash flows from the growing gas exploration activities.

9. EGAS financial risks are mitigated by the following factors:

- a. The company has a relatively low, but growing, financial debt relative to its capital as reflected in a long-term debt/obligation-to-equity ratio of 1.2 by end FY2012/13.
- b. In the future the authorities could allow EGAS to generate some return on investment from the natural gas transportation business to supplement the LNG trading margins.
- c. EGAS' investment in subsidiaries and affiliated companies may generate incremental revenue and cash flow for EGAS following their construction/initial operation phase.
- d. Construction of Egypt's two LNG facilities was completed in the 2000s. Both facilities now have substantial operational experience, higher ability to manage operating costs, and may have a declining level of fixed cost amortization associated with capital expenditures during construction. These could help maintain or improve LNG trading margins for EGAS.
- e. Collectively, EGAS should be in a position to maintain a sound financial status and carry out its natural gas mandate for Egypt on a sustainable basis. However, certain variables -- such as the level of gas transmission margin -- are not directly under the control of EGAS and will require policy and regulatory supports.

B. Main Financial Risks Facing GASCO, Town Gas and Egypt Gas

10. GASCO, Town Gas and Egypt Gas work as contractors for EGAS in the operations, maintenance, and construction of the natural gas transmission and distribution network.

11. Any substantial delay in cash transfers from EGAS and EGPC to GASCO, Town Gas and Egypt Gas could incur cash flow constraints for these companies, especially pass-through transfers to cover expenditures related to EGAS and EGPC's assets. Effectively, GASCO, Town Gas and Egypt Gas could be required to use their own cash resources in constructing servicing loans related to EGAS and EGPC's assets.

Table 6.6: Summary of EGAS Financial Results and Indicators

	2009	2010	2011	2012	2013
Balance Sheet Summary-Million LE	<i>Actual</i>	<i>Actual</i>	<i>Actual</i>	<i>Restated</i>	<i>Preliminary</i>
<u>Assets</u>					
Cash	1,112	728	539	1,042	500
Other current assets, net	23,659	26,533	32,877	48,379	67,934
Fixed assets, net	4,831	6,879	9,754	11,322	13,163
Investments	1,404	6,056	6,909	6,926	7,072
Total assets	32,280	41,057	50,796	68,297	89,501
<u>Liabilities & Equities</u>					
Current portion of long-term debt	1,195	440	686	659	766
Due to GASCO	3,218	2,180	3,370	5,590	7,450
Other current liabilities, net	20,928	24,863	31,945	46,244	64,055
Long-term liabilities, net	2,997	4,618	4,756	5,156	6,077
Total liabilities	28,338	32,101	40,757	57,649	78,348
Retained earnings & reserves	3,400	4,116	4,525	5,134	5,639
Total Equity	3,942	8,956	10,039	10,649	11,153
Income Statement Summary-Million LE					
<u>Revenue</u>					
Sales -- LNG	4,422	1,311	1,508	1,582	948
Sales -- Gas/derivatives production	544	1,528	2,125	2,312	2,174
Sales -- others	1,753	1,812	2,523	1,215	1,632
Investment income	50	40	222	248	278
<u>Expenses</u>					
Operating expenses	(4,833)	(3,252)	(4,134)	(3,276)	(2,666)
Financing expenses	(212)	(244)	(369)	(393)	(452)
Depreciation/amortization	(250)	(332)	(461)	(523)	(596)
Taxes	(280)	(374)	(420)	(339)	(330)
<u>Net Income</u>	1,115	831	755	661	272

* Other current assets are largely gas sales receivables, including arrears. Other current liabilities are largely payables to EGPC.

Table 6.6 (continued):

	2009	2010	2011	2012	2013
Cash Flow Summary-Million LE	<i>Actual</i>	<i>Actual</i>	<i>Actual</i>	<i>Restated</i>	<i>Preliminary</i>
Changes in working capital	461	(96)	(1,823)	(198)	(1,042)
Operating cashflow - net	1,871	1,067	(77)	2,139	53
Investment cashflow - net, of which	(3,336)	(2,728)	(194)	(1,544)	(415)
<i>Capital expenditures</i>	(3,225)	(2,381)	(206)	(1,647)	(772)
Financing cashflow - net, of which	1,252	1,277	172	8	(180)
<i>Repayment</i>			(451)	(685)	(290)
<i>Disbursement</i>			623	733	95
Net change in cash	(213)	(384)	(98)	603	(542)
Beginning cash balance	1,325	1,112	728	521	1,042
Ending cash balance	1,112	728	539	1,042	499
Financial Ratios					
Profitability					
EBITDA margin	29%	31%	36%	41%	50%
Net margin	17%	18%	12%	13%	6%
RoE	28%	9%	8%	6%	2%
EBITDA - Debt service coverage	no payment	1.0	2.8	1.9	2.1
Cashflow					
Debt service coverage	no payment	1.3	0.4	2.3	0.5
Debt service coverage, including GASCO	n/a	n/a	n/a	n/a	n/a
Interest coverage	9.8	5.4	0.8	6.4	1.1
Self finance	55%	11%	-118%	87%	-30%
Liquidity and leverage					
Current ratio	1.0	1.0	0.9	0.9	0.9
Receivables day	1284	2071	1946	3453	5205
Payables day	1854	3193	3211	6080	10525
Long-term debt to equity	0.8	0.6	0.5	0.5	0.5
Long-term debt+due to GASCO to equity	1.6	0.8	0.9	1.0	1.2
Cash on hand (days of revenue)	60	57	32	74	38
Physical Units					
LNG quantity (bcm piped gas, estimated)	3.9	3.9	1.4	1.0	0.6
Piped natural gas quantity (bcm)*	52.0	53.5	51.2	55.2	52.4

Source: EGAS

C. Future Financial Performance of EGAS

12. During early 2014 EGAS has updated its budget estimates for FY 2013/14 until FY 2016/17.

13. The highlights of the updated budget estimates include:

- a. **LNG business.** EGAS' LNG revenue is expected to decline further to about LE 0.7–0.8 billion per year, compared with LE 0.95 billion in FY 2012/13;
- b. **Revenue from gas derivatives.** This revenue is estimated to rise substantially to LE 4.5–5.6 billion per year, compared with LE 2.2 billion in FY 2012/13;

- c. **Gas transportation business.** The budget estimates have maintained a not-for-profit cost-recovery basis for this business based on the prevailing arrangement;
 - d. **Investment and other income.** Income from investment and other income are estimated at LE 1.6–1.9 billion per year, compared with LE 1.2 billion in FY 2012/13;
 - e. **New investments.** The updated budget has reduced the investment plan down to LE 1.3–3 billion per year⁴¹, totaling approximately LE 8.7 billion for this time period;
 - f. **Debt services.** The estimated debt services range between LE 1.2–1.5 billion per year of principal repayments plus another LE 0.4–0.5 billion per year of interest expenses;
 - g. **New debt financing requirements.** Based on the above revenue estimates and their related expenses, new debt financing requirements are estimated to be LE 1.5–3.6 billion per year.
14. Uncertainties of EGAS’ financial future. The latest budget estimates contain substantial uncertainties, especially related to the LNG business and the sales of gas derivatives (currently to EGPC as the single-buyer). Should these top two revenue earners not materialize as planned, this will directly impact EGAS’ ability to meet its investment and debt services obligations.
15. The financial outlook for EGAS is weak due to the following:
- a. The decline in LNG exports and uncertainties of future LNG exports;
 - b. The increases in sales of gas derivatives to EGPC (from EGAS’ concessions) may not generate cash flow for EGAS as expected. This is because EGPC may set-off certain amount due to EGAS (e.g. for gas derivatives) with the amount due to EGPC from EGAS (e.g. for gas transportation);
 - c. No profits from the gas transportation business. The authorities have not made the decision that would allow EGAS to generate profit margins from the gas transportation business. This continues as a not-for-profit cost recovery operations.

⁴¹ EGAS’s budgeted investments include those carried out by GASCO (Source: EGAS).

Table 6.7: EGAS Budgetary Estimates for FY 2013/14–2016/17

Billion Egyptian Pounds

Description	Budget			
	2013/2014	2014/2015	2015/2016	2016/2017
Revenues				
Activity Revenues	7.30	6.47	6.50	7.59
<i>LNG revenues (estimated)</i>	<i>1.851</i>	<i>0.735</i>	<i>0.840</i>	<i>0.840</i>
<i>LPG,NG& Condensate Derivitives</i>	<i>2.699</i>	<i>4.704</i>	<i>4.493</i>	<i>5.652</i>
<i>Rig Revenus</i>	<i>0.431</i>	<i>0.527</i>	<i>0.579</i>	<i>0.637</i>
<i>Dividends from (GASCO/Egypt Gas)</i>	<i>0.511</i>	<i>0.500</i>	<i>0.583</i>	<i>0.462</i>
<i>Gas transmission fees/commissions, etc.</i>	<i>1.808</i>	<i>0.000</i>	<i>0.000</i>	<i>0.000</i>
Total Activity Revenues	7.300	6.466	6.495	7.591
Mgt & Technical Services Fees(Gasco)	0.203	0.200	0.220	0.242
Other Revenues	1.095	1.090	1.178	1.407
<i>Marketing Overhead Recovery</i>	<i>0.549</i>	<i>0.498</i>	<i>0.548</i>	<i>0.603</i>
<i>EGPC-Sold-Services(Union Fenso)</i>	<i>0.101</i>	<i>0.000</i>	<i>0.000</i>	<i>0.000</i>
<i>Other Dividends</i>	<i>0.247</i>	<i>0.250</i>	<i>0.313</i>	<i>0.487</i>
<i>Others</i>	<i>0.198</i>	<i>0.342</i>	<i>0.317</i>	<i>0.317</i>
Total Other Revenues	1.095	1.090	1.178	1.407
Total Revenues	8.60	7.76	7.89	9.24
(Dividends + Other Revenues)	1.606	1.590	1.761	1.869
Expenses & Costs				
<i>LNG cost, liquifaction cost, etc</i>	<i>0.674</i>	<i>0.23</i>	<i>0.275</i>	<i>0.275</i>
<i>LPG,NG& Condensate Derivitives</i>	<i>1.34</i>	<i>2.355</i>	<i>2.297</i>	<i>2.839</i>
<i>Spare Parts, Fuel , Material & Feeds</i>	<i>0.015</i>	<i>0.035</i>	<i>0.039</i>	<i>0.043</i>
<i>Administration, salaries, etc.</i>	<i>0.255</i>	<i>0.248</i>	<i>0.307</i>	<i>0.379</i>
<i>National Gride Maintenance</i>	<i>0.117</i>	<i>0.185</i>	<i>0.203</i>	<i>0.223</i>
<i>Expenses for Operations (LNG Plants)</i>	<i>0.883</i>	<i>0.235</i>	<i>0.24</i>	<i>0.24</i>
<i>Marketing & billing comission of Gas companies</i>	<i>1.808</i>	<i>0</i>	<i>0</i>	<i>0</i>
<i>Operational expense (AL-AMARYA LPG plant)</i>	<i>0.13</i>	<i>0.143</i>	<i>0.157</i>	<i>0.172</i>
<i>Purchased Services</i>	<i>0.545</i>	<i>0.64</i>	<i>0.701</i>	<i>0.768</i>
<i>Depreciation & amortization expenses</i>	<i>0.604</i>	<i>0.665</i>	<i>0.731</i>	<i>0.804</i>
<i>Financing (e.g. interests, fees)</i>	<i>0.452</i>	<i>0.387</i>	<i>0.426</i>	<i>0.468</i>
Other Expenses	0.496	1.323	1.292	1.403
Deffered&Income Tax	0.533	0.899	0.925	1.100
Total Expenses & Costs	7.852	7.345	7.593	8.714
Net Profit	0.746	0.411	0.300	0.526

Billion Egyptian Pounds

Description	Budget			
	2013/2014	2014/2015	2015/2016	2016/2017
Usage Of Funds :				
National Gas Grid Projects	1.263	1.972	2.477	2.972
Investments In Subsidiary & Affilated Co.	0.006	-	-	-
Cost Recovery For Local Dist. Co.	0.121	0.094	0.103	0.113
Loans Installment	1.178	1.282	1.410	1.551
Total Usages Of Funds	2.568	3.348	3.990	4.636
Source Of Funds :				
Loans	1.459	2.529	3.242	3.593
Self Fundings	1.110	0.819	0.748	1.043
Total Source Of Funds	2.569	3.348	3.990	4.636