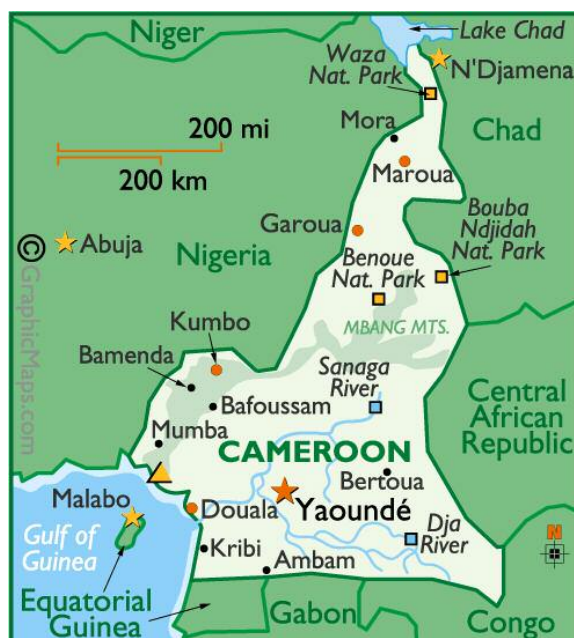


**VOLUME I****CAMEROONIAN LP GAS SECTOR STUDY**

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Oil and Gas Policy Division*

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## Acknowledgements

This study is a small-scale follow-up to an earlier World Bank study that analyzed the market failure of LPG in Nigeria and developed a roadmap to develop the use of LPG in that country to its full potential. Given the success of the Nigerian LPG work, it seemed obvious that other oil- and gas-producing countries could benefit from the insights gained in Nigeria.

Not unlike Nigeria, Cameroon has a thriving oil industry, yet it continues to flare most of its associated gas, burning more than enough LPG in the process to meet all its domestic needs and leave more for exports, while at the same time, it is importing LPG at world prices. Clearly, if any country qualifies for an LPG policy review, it is Cameroon.

Mourad Belguedj, Lead Energy Specialist of the World Bank's Oil, Gas, Chemicals, and Mining Department, who initiated the original Nigerian LPG effort, designed and managed the Cameroon project. The original author of this study was Joël Nkoto-Angoula, B.S./M.S. Electromechanics, Ecole Nationale Supérieure Polytechnique, Yaoundé, M.S. Petroleum Engineering, Ecole du Pétrole et des Moteurs, Institut Français du Pétrole, Paris, and MBA Ecole des Hautes Etudes Commerciales (Graduate School of Management), University of Montreal, who has 25 years of experience in all phases of the Cameroonian petroleum industry. Mr. Nkoto-Angoula is the General Manager of CREAD, Cabinet de Réalisations d'Etudes en Analyse de Décision, a Cameroonian Consulting Firm. Coordination and analytical and editorial guidance was provided by Helmut Merklein, President of Merklein and Associates, Inc. The study also draws on previous work by various consulting firms, government and international institutions listed on the following page. (See also Africa Gas Initiative, Cameroon, by Mourad Belguedj, February 2001. ESMAP, vol. III)

Current plans call for a review and discussion of this study at a round-table event, where the authors and government and industry experts will ponder whether and how practical policy implications may be derived from this work and to develop a roadmap for the introduction of policy recommendations that will emerge from these discussions.

## Abbreviations and Acronyms

<b>AGI</b>	Africa Gas Initiative
<b>COCPO</b>	Oil and Gas Center Policy Division / World Bank
<b>CREAD</b>	Cabinet de Réalisations d'Etudes en Analyse de Décision, a Cameroonian Consulting firm
<b>CSPH</b>	Caisse de Stabilisation des Prix des Hydrocarbures, the Hydrocarbon-Price Stabilization Board
<b>ECAM</b>	Enquête Camerounaise sur les Ménages, A Survey on Household Consumption conducted by the Ministère de l'Economie et des Finances
<b>EEIC</b>	EEIC Consulting, (Enseignement, Editique, Informatique et Communication), a Cameroonian Consulting Firm
<b>ESMAP</b>	Energy Sector Management Assistance Program, a World Bank Program
<b>FCFA</b>	Franc de la Communauté Financière Africaine, the Monetary Unit of Cameroon, FCFA-to-US Dollar exchange rate as of December 18, 2006 was 501.75/FCFA/US\$
<b>GDP</b>	Gross Domestic Product
<b>GGFR</b>	Global Gas Flaring Reduction
<b>GPP</b>	Groupement des Professionnels du Pétrole, Association of Petroleum Professionals. The members of this Association are the Subsidiaries of the International Oil Companies.
<b>kg/cap/yr</b>	Kilogram per capita per year
<b>LPG</b>	Liquefied Petroleum Gas
<b>MINCOMMERCE</b>	Ministère du Commerce, Ministry of Trade
<b>MINEE</b>	Ministère de l'Eau et de l'Energie, Ministry of Water and Energy
<b>MINEFI</b>	Ministère de l'Economie et des Finances, Ministry of Economy and Finance
<b>MINEPN</b>	Ministère de l'Environnement et de la Protection de la Nature, Ministry of Environment and Nature Conservation
<b>MINTRANS</b>	Ministère des Transports, Ministry of Transportation
<b>MT</b>	Metric Ton
<b>MTOE</b>	Metric Tons of Oil-Equivalent
<b>PSRSE</b>	Program to Secure Energy-Sector Revenues
<b>SCDP</b>	Société Camerounaise des Dépôts Pétroliers, the LPG Bulk Storage Company (51% State-owned)
<b>SCTM</b>	Société Camerounaise de Transformations Métalliques, the Cameroon Metal Works, a private-sector LPG cylinder manufacturer and marketer
<b>SCT/GPL</b>	Technical Ad Hoc Subcommittee on LPG Distribution Problems
<b>SNH</b>	Société Nationale des Hydrocarbures, the National Oil Company
<b>SONARA</b>	Société Nationale de Raffinage, the National Refinery
<b>VAT</b>	Value-Added Tax

# Executive Summary

## Introduction

1.1 This report is a sequel to the Nigerian LP Gas Sector Improvement Study of 2004. The objective of the Nigerian study was to investigate and identify reasons for the failure of the LPG market in Nigeria to live up to its potential, to develop a strategy for reviving Nigeria's domestic LPG market, and to expand LPG access to all, including to the poor, in Nigeria.

1.2 In light of the successful outcome of the Nigerian LPG Sector Improvement Study, it has been suggested that lessons learned should be tentatively applied to other countries likely to benefit from similar investigative and analytical work. The main objective in the present study is to identify two or more countries, investigate the situation there, and if and where impediments similar to those in Nigeria are found, to prepare a business proposal for mitigating pertinent problems that currently inhibit the sound development of LPG markets in those countries.

1.3 This report addresses LPG problems in Cameroon, which is one of the countries that have been identified as potentially being in need of corrective policies.

1.4 Since independence in 1960, Cameroon has pursued a developmental policy that envisioned internal regional balance coupled with the implementation of five-year economic, social and cultural development plans. The original focus was on the promotion of export products and on intensifying the exploitation and commercialization of the country's natural resources in order to generate funding needed to stimulate economic development in other sectors of the economy. A drawback of this policy has been the development of an essentially outward-looking economy that depended to a large extent on erratic movements of raw-material prices (cocoa, coffee, cotton, oil) over which Cameroon had little or no control.

1.5 Following the 1985 collapse of the Cameroonian economy, in part because of the combined effect of a decline in raw material prices and the strengthening of the US dollar, the focus on economic policies shifted to structural adjustments that included attempts to make indigenous fuels, especially LPG, more readily available throughout the country. As a result, the share of LPG relative to the consumption of oil products in Cameroon increased from less than 1% in 1976 to 4.5% in 2004 (or from 0.4 kg per capita per year {kg/cap/yr} to 2.5 kg/cap/yr). Still, compared with some neighboring countries, Cameroon's per-capita consumption remains low and is unequally distributed.

## LPG Industry Structure

1.6 There are three major participants in the Cameroonian LPG market: the government, quasi-public corporations, and private operators. While the distribution of LPG is done mostly by private corporations, the state retains the right to monitor its supply and to control prices..

1.7 The five principal marketers in the LPG distribution sector in Cameroon are:

- The Société Camerounaise de Transformations Métalliques (SCTM), a private-sector company that controls 50.3% of the market through 781 retail outlets. SCTM is also a manufacturer of LPG cylinders.
- TOTAL which controls 22.7% of the market through 188 retail outlets;
- CAMGAZ, with 18.7% of the market and 48 retail outlets;
- MOBIL, with 4.9% of the market and 14 retail outlets; and
- TEXACO, with 3.5% of the market and 91 retail outlets.

## **Legal and Regulatory Structure**

1.8 A number of laws, decrees, and orders govern every aspect of the LPG sector. Among them, Decree Nbr. 022/MINEE, dated September 28, 2001, is the most important legal document. It spells out licensing requirements for all downstream petroleum activities including refining, imports, exports, storage, quality and quantity controls, as well as retail activities.

1.9 A state-owned Hydrocarbon-Price Stabilization Board, the Caisse de Stabilisation des Prix des Hydrocarbures or CSPH, is charged with the domestic stabilization of petroleum product prices, in the face of variable and sometimes capricious price movements in international markets, and the equalization of these prices across the country. This is done through the collection of stabilization and equalization taxes, which are re-injected as needed to dampen price spikes abroad and to compensate for uneven delivery costs at home.

## **LPG Demand**

1.10 LPG consumption in Cameroon rose from 3,070 MT in 1976 to 41,926 MT in 2004, which reflects the strongest growth rate of all petroleum products in the country. Almost all of that volume, 93% to be exact, is used in households, while the balance of 7% is used as commercial and industrial fuel.

1.11 According to a survey undertaken by EEIC Consulting in October 2005, LPG demand is expected to continue to grow during the next 20 years. A most likely growth scenario based on historical trends projects Cameroon's LPG consumption to be 122,375 MT by 2025, raising the per-capita gas consumption rate from its 2004 level of 2.5 to 4.04 kg/cap/yr. A high-growth scenario has the 2025 consumption rate at 173,373 MT, with an equivalent rise in per-capita consumption to 5.72 kg/cap/yr. The corresponding numbers in a low-growth scenario are 73,346 MT of LPG consumption in 2025 which, in the face of a rapid population growth (2.8-2.83% per year), implies a slight reduction in the yearly average per-capita LPG consumption rate to 2.42 kg/cap/yr.

## **LPG Supply**

1.12 For many years, LPG consumption in Cameroon depended mainly on production from the national refinery (SONARA) which is located at Limbé, on the Atlantic Ocean coast, northwest of Douala. However, beginning in 2000, imports became a more and more important source of supply for the domestic market. Rising from 10% of domestic LPG consumption in 1998, imports reached 30% in 2004.

1.13 LPG is imported in Cameroon through the port of Douala following tenders published under the authority of CSPH. The imported LP gas enters the supply chain through the



SCDP storage facilities in that city, for delivery to retailers as needed, exactly as is the case for the LP gas delivered from the SONARA refinery.

1.14 In spite of the Government's desire to liberalize LPG prices in domestic markets, prices are still controlled, and partially subsidized, for the purpose of providing a lower-cost fuel to the poor and to prevent further desertification, especially in Cameroon's three northernmost Provinces. Gas prices remain inflexible because of the way they are structured. No price differentials have been observed in the market from one distributor to the other.

### **LPG Distribution Infrastructure**

1.15 By any standard, the distribution of LPG in Cameroon is highly uneven. In terms of retail sales by region, three of the country's ten Provinces consume nearly 94% of the LPG sold to households. Measured in terms of consumer wealth, 30.1% of the well-to-do/non-poor households represent 93.7% of the total residential LPG consumption. The average access rate to LPG in 2004 was 19.5%; it was 38.1% in urban zones and 3.1% in rural areas.

1.16 The only company that maintains primary storage facilities outside the SONARA Refinery is SCDP, whose current storage capacity has remained unchanged for more than 20 years at 2,260 MT, leading to a 2005 total SCDP capacity shortage of 3,077 MT. In terms of regional capacities, all SCDP storage facilities have significant capacity shortfalls in relation to current legal requirements. That will be an enormous handicap for the future development of the LPG sector, unless urgent measures are taken by the state to find a solution to the storage capacity problem.

1.17 Primary LPG storage is not the only sector where capacity problems exist. In Cameroon, the transportation of LPG and other petroleum products is performed by sea, by railway and by road. The current transportation capacity in Cameroon is characterized by shortages that are expected to become more pronounced over time, especially with regard to an aging fleet, poorly maintained tank trucks and rail tanks.

1.18 Except for some bulk deliveries of gas to industry and a few hotels, most of the LPG distribution in Cameroon is done by way of using bottled gas. The gas-cylinder inventory in the country rose from 45,551 bottles in 1975 to 969,652 bottles in 2002. These cylinders come in various sizes. Bottles of 12.5 kg, which is the favorite size used by households, represent 88.7% of the cylinder inventory. Smaller bottles of 6 and 3 kg, used predominantly by poor households, accounted for 9.7%, while the remaining large bottles account for 1.6%. The uneven geographical distribution of these cylinders mirrors that of the Cameroonian LPG consumption.

1.19 Gas cylinders are owned by marketers. Consumers pay a deposit for their use. The amount of that deposit varies because there is a lack of bottles in the country. For example, in Yaoundé, the deposit for a 12.5 kg bottle may vary from 10,000 FCFA to 25,000 FCFA and in the hinterland, it ranges from 15,000 to 30,000 FCFA. The problem is that cylinders are not readily available in the market, which is a major inhibitor of bottle interchangeability, although SCTM is a cylinder manufacturer.

### **Household Cooking and Lighting Demand**

1.20 As mentioned earlier, LPG in Cameroon is mostly consumed in households which absorb about 93% of the gas sold in the domestic market. This is the place where gas directly competes with other types of energy such as electricity, kerosene, wood, charcoal and

agricultural waste. Wood, often free to use, remains the most important source of energy, at 61.3% of the country's total energy consumption, while LPG, at less than 1%, remains a marginal commercial energy source. Its availability is very limited in some Northern Provinces, notably the three farthest from supply sources i.e., Adamaoua, North and Far North, where the per-capita gas consumption averages 0.3 kg/cap/yr, dropping to a mere 0.1 kg/cap/yr in the Far North Province.

## **Household Appliances**

1.21 Most of the LPG is used for cooking, with some limited use for lighting, and refrigeration. A variety of cooking devices are used, ranging from simple gas plates to stoves with ovens. They range in price from 10,000 FCFA for simple gas plates to 500,000 for high-quality gas stoves. Prices of refrigerators and gas freezers vary from 800,000 to 1.5 million FCFA. These devices are also used by well-to-do/non-poor households in rural zones where there is no electricity.

## **Safety and poor image of LPG**

1.22 In its daily use, including the production, storage, transportation, distribution and consumption of LPG, personal injuries and material damage to goods and the environment occur with alarming frequency, mostly due to the failure to observe and/or enforce, basic safety rules.

1.23 At storage facilities, severe infractions are not uncommon. These safety lapses include non-observance of operational safety rules, inadequate training of staff working with LPG, careless handling, and proximity to dwellings, just to name a few.

1.24 Similar problems are encountered in LPG transportation where, for example, a serious accident occurred in 2004 on a bridge crossing the Moungo River on the road from Limbé to Douala. The accident, which involved a loaded LPG tank truck, led to the collapse of the bridge, with severe human and material losses. Reckless driving, poor training and lack of monitoring lead to inadequate enforcement of existing safety rules, notably as regards truck inspections, which are amongst the chief contributors to truck-related LPG accidents.

1.25 In rail transportation, which is carried out exclusively by CAMRAIL, the now-privatized successor to the National Railway Corporation, safety lapses include leaks and spills while charging or discharging products to and from tank wagons, inadequate training of railway engineers and operational personnel, who are only trained in general railway security and have no specific training in petroleum-product safety. This, combined with general indiscipline as well as vandalism and theft, the latter at times in collusion with the guards assigned to protect the LPG storage or equipment, close the loop on this regrettable aspect and negative perception of this industry by the general public.

1.26 More often than not, safety issues in the gas distribution sector are relegated to the background. Among the safety problems discerned on a random inspection, the most compelling ones were outright negligence in the handling of gas bottles, inadequate testing of cylinders if at all, and non-use of proper vertical storage racks, in the appropriate configuration.

1.27 Individually limited in extent, but cumulatively more accident-prone than any other LPG sub-sector is the consumption sector which directly affects the largest consumer segment but also the most exposed. Some 20,955 households have experienced gas-related accidents in 2004, resulting in the deaths of 279 people and injuring 4,270. This corresponds to

3.3% of the LPG-consuming households, one of the highest rates in the world. These LPG-related accidents in the consumer sector are generally due to leaks caused by bad connections between cylinders and appliances, often the result of old rubber or plastic pipe, deteriorated conditions of bottle integrity that were either exposed to impact during transport or whose maintenance programs were not adhered to, failure to fully close valves, and deteriorated conditions of appliances and burners, including spillage leading to fires and cylinder explosions. Little or no targeted communication campaign towards the exposed public have been attempted by industry or the authorities, and these are essential in curbing easily preventable accidents and increasing consumer and LPG user awareness of the dangers associated with outright negligence.

### Automotive Use of LPG

1.28 Even though, as of 2004, Cameroon had an estimated automotive fleet of 300,000 vehicles, LPG has not yet been put to use as an automotive fuel, at least on record. The use of this source of energy as an automotive fuel is not expected to occur any time soon, because of the safety problems associated with LPG and because of the poor condition of the vehicles in circulation. It is also due to the lack of information and dissemination of the advantages of this fuel of choice which has captured several niches in the transportation segment of many developed as well as developing countries that are similar to Cameroon.

### Investment and Funding

1.29 By 2010, when the current project to recover Cameroon’s associated gas and to export it to Equatorial Guinea is completed, the country will have at its disposal some 300,000 MT of LPG per year, part of which will be used for domestic consumption and the rest exported. Based on the assumption that Cameroon will reach an average per-capita consumption level of 3.7 kg/cap/yr, and given its projected population of 20,015,000 inhabitants by 2010, its LPG consumption that year will be around 74,000 MT. This will require the implementation of an urgent program to invest in storage facilities and transportation equipment, and it will call for the acquisition of new LPG cylinders and the expansion of retail outlets. A private sector driven market development, especially if supported by a sound anti-deforestation policy by the Government, may allow the country to absorb most if not all this prospective growth in LPG supply.

1.30 Taking into consideration all LPG sub-sectors, a total of 78.535 billion FCFA will be needed between now and 2025 if the most likely consumption scenario prevails. These investment requirements are shown in Table below.

**Table 1.1: Projected Investment Needs in the LPG Sector  
(Millions of FCFAs)**

<b>Designation</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>Totals</b>
Storage	13,688	2,728	5,207	13,393	35,016
Transportation	1,250	2,135	3,378	5,595	12,358
Gas Bottles	7,704	4,124	3,663	5,196	20,688
Retail Outlets	1,250	1,595	2,036	2,598	7,480
LPG Promotion	500	638	814	1,039	2,992
<b>Total</b>	<b>24,394</b>	<b>11,222</b>	<b>15,100</b>	<b>27,824</b>	<b>78,534</b>

1.31 The investment requirements listed above do not include the creation of a regulatory agency for the petroleum product distribution sector, nor the allocation of sufficient human, material, and financial resources as required, to fulfill the regulatory obligations incumbent on the proposed regulatory institution. This does not include either the significant physical, human and capacity building requirements of the safety and monitoring aspects which usually go hand in hand with a safe and sound development of the LPG sector.

### **Access to LPG by the Poor**

1.32 With 40% of the Cameroonian population below the 2001 poverty line of US \$1.08 per day, and only 3.7% of the poor using LPG, access by the poor is very low. The average access rate to LPG in 2004 was 3.1% in rural areas. The remote areas of northern Cameroon are particularly hard-hit by non-accessibility to LPG. This is the region that is the most prone to drought, the most exposed to desertification, and the least likely to have access to affordable commercial fuels, for it is at the very end of the supply line.

1.33 All things considered, the far northern provinces of Zone III have the lowest accessibility rate, since there is only one retail outlet per 151,300 inhabitants. This compares to 14, 300 inhabitants per retail outlet for Cameroon as a whole, and to 4,900 for Littoral, which is by far the highest per-capita use province in the country.

1.34 Cameroon committed itself, as part of its structural adjustment program, to eliminate subsidies on certain products of basic necessity such as domestic gas, yet the very structure of the sales price of this product drives up its cost through items like the stabilization and equalization tax.

1.35 In the final analysis, supplies will flow to where the incentives are. That means that the pricing structure needs to be re-examined for its efficiency in allocating LPG to the areas where it is needed most, assisted by a determined government policy to eliminate, or at a minimum reduce, the current deforestation in the northern part of Cameroon. It also means the development of a targeted growth policy that will stimulate the absorptive capacity of the LPG-starved provinces in the north, once the new LPG availability from the Equatorial Guinean gas export program is completed.

### **Critical Issues**

1.36 Even though the Cameroonian LPG market has grown substantially over the years, it has failed to fully achieve its remarkably untapped potential. Total LPG consumption has more than tripled over the last twenty years and per-capita consumption has doubled, but much of the country's associated gas, rich in liquids especially LPG, is still being flared and will continue too be flared for at least another 4 years, until a major associated-gas recovery project is completed. Perhaps the greatest hurdle Cameroon still has to overcome is the achievement of a deeper and more evenly-spread, overall market penetration. Practically no LPG is used where it is needed most, in the Far North Province where deforestation has and is still taking its heaviest toll, where alternative commercial fuels are least available, and where the LPG per-capita consumption is 0.1 kg. Efforts to stabilize the domestic price of LPG in the face of volatile international markets have been partially successful, but they have introduced a rigid pricing

mechanism that keeps market forces at bay. This has led to capital shortages in the industry and to shortages and obsolescence in equipment, which resulted in a sluggish growth and uneven use patterns, often dependent on product availability. In response, there have been suggestions regarding the need to entice industry to expand into areas where, under the current system, little incentive exists for LPG to be delivered. Mandatory market adjustments generally signal the absence of effective incentives. If implemented, they would merely compound the existing capital shortage. Therefore, other innovative ways and approaches need to be investigated here and this is the purpose of this research paper.

1.37 There is one area that does require compulsory action, and that is in the enforcement of safety and other regulations, especially in light of the dismal country record in the field. A review and an upgrading of the current regulatory and monitoring system, especially in terms of Health, Safety and Environmental issues and solutions, is urgently needed, including a determination of the composition and mission of the oversight board, its independence and non-involvement in operational activities, its ability to adequately monitor and enforce mitigating measures and, where required, to develop and impose, enforceable sanctions.

### **Strategies and Action Plans**

1.38 This and other individual similar LPG country reports will be presented in draft form to government officials, potential investors, and industry players for discussion by means of a stakeholders workshop. The objective of the workshop will be to investigate and define a common ground for workable strategies, to ensure the transformation and growth of the LPG sectors by developing specific policies and regulations that are conducive to that objective. A country-by-country as well as an overall summary will present the relevant comments and conclusions at the end of the workshop in which the country consultants will be able to actively participate. These conclusions will be incorporated into the final report, including a roadmap that will delineate the steps to be followed in implementing the recommendations flowing from the workshop. The roadmap as outlined and discussed during the workshop will be fleshed out by the main consultant, in coordination with the country consultants and under the guidance and supervision of the Task Team Leader, to be integrated in the final Report.

# 1

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## Introduction

### Study Background

1.1 In 2002, the Oil and Gas Policy Division (COCPO) of the World Bank launched an investigation of the Nigerian LPG market with a view to identify the reasons for its failure to live up to its potential. Nigeria produces and exports over two million metric tons (MT) a year of LPG and consumed, at the peak of its domestic market development in the early 1990's, close to 200,000 MT/year. During the following decade, the market shrunk to less than 50,000 MT. The main cause for the decline was the failure of the refining sector to produce enough LPG for the local market. Little or no LPG produced from the large volumes of processed associated gas was going to the domestic market either. In fact, Nigeria even imported at the time LPG from the Congo while exporting around 2 million MT of its domestically produced LPG, mostly propane, to overseas markets.

1.2 The Nigerian Government commissioned the Oil and Gas Policy Division to design and supervise an LPG Sector Improvement study, with funding by the World Bank / Energy Sector Management Assistance Program (ESMAP), which investigated the root causes of this market failure and proposed viable solutions. COCPO eventually proposed a plan of action to turn around the sector and provide the ways and means to ensure a sustainable, private-sector driven, full recovery of the LPG market supply and growth of the domestic LPG sector. Today, this plan is under implementation with the recent completion of the new LPG legal and regulatory framework and the ongoing privatization of the LPG storage capacity throughout the country.

1.3 In light of the successful outcome of the Nigeria LPG Sector Improvement Study, it has been suggested that lessons learned should be tentatively applied to other countries likely to benefit from similar investigative and analytical work. The main objective in the present study is to identify two or more countries, investigate the situation there, and if and where impediments similar to those in Nigeria are found, prepare a business proposal for mitigating pertinent problems that currently inhibit the sound development of LPG markets in those countries.

1.4 This report addresses LPG problems in Cameroon, which is one of the countries that have been identified as being in need of corrective policies.

### Geography





1.6 Cameroon, is shaped in the form of a triangle stretching from the 2<sup>nd</sup> to the 13<sup>th</sup> degree north and from the 9<sup>th</sup> to the 16<sup>th</sup> degree east. It covers a surface area of 475,400 km<sup>2</sup>, roughly the size of California, and has a population of 16.9 million inhabitants (evaluation of 2004). Defining a city as an agglomeration of at least 10,000 inhabitants, the rate of urbanization of the country was somewhere between 35 and 40% in 2004.

1.7 The economic capital of Cameroon is the port of Douala whose population was estimated in 2001 at 1.5 million inhabitants. Yaoundé, the political capital, had an estimated 1.35 million inhabitants that year. Thus, about 16.9% of the country's total population lived in these two cities in 2001. Demographically, Yaoundé and Douala contain about two fifth of the total urban population of the country, and half of the urban population residing in cities with a population of 50,000 inhabitants or more.

1.8 Administratively, Cameroon is divided into ten Provinces. In 2002, when the population of the country was estimated at 16.1 million inhabitants, their distribution by Province was as shown below:

1. Littoral Province, capital Douala, 2.2 million inhabitants;
2. Southwest Province, capital Buea and biggest city Limbé, 1.3 million inhabitants;
3. West Province, capital Bafoussam: 1.9 million inhabitants;
4. Northwest Province, capital Bamenda, 1.7 million inhabitants;
5. Center Province, capital Yaoundé 2.6 million inhabitants;
6. East Province, capital Bertoua, 0.82 million inhabitants;
7. South Province, capital Ebolowa, 0.45 million inhabitants;
8. Adamaoua Province, capital Ngaoundéré, 0.76 million inhabitants;
9. North Province, capital Garoua, 1.6 million inhabitants;
10. Far North Province, capital Maroua, 2.7 million inhabitants.

1.9 In 2002, Cameroon counted 3.2 million households with an average size of 5 persons per household. Demographic data show a fast-paced urbanization of the country and a massive exodus of rural populations toward cities, in particular of farming youngsters of working age.

## **The Cameroonian Economy**

1.10 Since independence, Cameroon has pursued a developmental policy that envisioned regional balance coupled with the implementation of five-year economic, social and cultural development plans. The focus was on the promotion of export products and on intensifying the exploitation and commercialization of the country's natural resources in order to generate funding needed to stimulate economic development in other sectors of the economy. A drawback of this policy was the development of an essentially outward-looking economy that depended to a large extent on erratic movements of raw-material prices (cocoa, coffee, cotton, oil) over which Cameroon had no control.

1.11 Until 1976, the Cameroonian economy exhibited an average annual growth rate of 4%. Agriculture contributed 30% to the country's Gross Domestic Product (GDP), against 20% and 50%, respectively, for industry and the tertiary (service) sector. From 1977, the annual



growth rate increased significantly, from 4% to 13%, following the development of the country's first oil fields. This acceleration spilled over to the other two sectors, tripling the growth rate in agriculture and doubling it in services.

1.12 From 1985, due to the combined effect of a decline in raw material prices and the strengthening of the US dollar, the GDP collapsed and the country experienced economic stagnation until 1994, following the devaluation of the CFA Franc (FCFA) and the implementation of structural adjustment programs, with the assistance of the international financial community.

1.13 These structural adjustments included an increase in oil taxes designed to enhance the country's revenues, which led to an increase of domestic fuel prices and, as a consequence, to a reduction in the growth rate of oil-product consumption. In addition, a policy of revising fuel prices on a monthly basis was adopted in 1998, taking in account the movement of oil prices in the international market and the exchange rate of the U.S dollar.

## **Oil Products in the National Energy Balance**

1.14 The share of oil products relative to the total energy consumption in Cameroon has increased considerably in the last 25 years, rising from 16% in 1976 to 25% in 1986, before dropping back to about 20% in 2004.

1.15 Although the share of LPG relative to the consumption of oil products in Cameroon was characterized by a significant increase, going from less than 1% in 1976 to 4.5% in 2004 (or from 0.4 kg per capita per year {kg/cap/yr} to 2.5 kg/cap/yr), it remains low and is unequally distributed. With a population of 16.9 million inhabitants, the LPG consumption level in Cameroon in 2004 was 41,926 MT, mainly for residential use. By contrast, the LPG consumption in Senegal for the same year was more than 100,000 MT, even though that country's GDP and population size (10.9 million inhabitants) were smaller. This low-level LPG consumption in Cameroon is due to the high cost of this energy source (400 FCFA/kg in 2004, compared to 280 FCFA/kg in Senegal, where LPG sold in 3 and 6 kg bottles is highly subsidized) in relation to the standard of living of the majority of the population, as well as to an ineffectual distribution system.

1.16 An oil-producing country since 1977, Cameroon has not been able, at least not until now, to find a way to make use of the associated gas that is produced with the oil in order to increase in a meaningful way the consumption of LPG by its population (see Africa Gas Initiative AGI, 2001). Even though an associated gas recovery project was initiated with the assistance of the World Bank (Global Gas Flaring Reduction, GGFR), this gas continues to be flared on oil production platforms.

1.17 Starting in 1987, a shift in energy policy was introduced in the Cameroon economy. Following the implementation of a structural adjustment program, with the assistance of the IMF and the World Bank, the gas sector in Cameroon entered a trend towards market liberalization that resulted in the entry of new operators. Thus, except for primary LPG storage operations that are still carried out on an exclusive basis by the Société Camerounaise des Dépôts Pétroliers (SCDP), a monopoly long held in the gas distribution business by the subsidiaries of international oil companies (TOTAL, AGIP, MOBIL, SHELL, and TEXACO) came to an end

with the adoption of Decree 022/MINEE of September 28, 2001. That Decree opened up the market and spelled out the requirements that must be met to carry out activities related to the oil downstream sector, which permitted other companies to enter into the LPG distribution business.

1.18 Additional operational requirements were introduced by Order Nbr. 023/MINEE, also dated September 28, 2001, which established minimum storage levels, defined geographical storage regions and set up operational and regulatory requirements for petroleum products. The Order divided the country (that is, its ten administrative Provinces) into three LPG Regions as follows:

- The Limbé-Douala-Bafoussam-Bamenda Region (Zone I), which accounts for 43.8% of the total population, consumes 53.3% of the LPG and covers the Southwest Province (Capital Limbé), the Littoral Province (Douala), the West Province (Bafoussam) and the Northwest Province (Bamenda);
- The Yaoundé-Bertoua-Ebolowa Region (Zone II), accounting for 24.2% of the total population, consumes 42.9% of the LPG and covers the Center Province (Yaoundé), the East Province (Bertoua) and the South Province (Ebolowa);
- The Ngaoundéré-Garoua-Maroua Region (Zone III), that contains 32% of the total population, only consumes 3.8% of the LPG and covers the Adamaoua Province (Ngaoundéré), the North Province (Garoua) and the Far North Province (Maroua).

1.19 The 2004 overall per-capita LPG consumption rates in these three regions are listed below:

- 3.0 kg/cap/yr in Zone I;
- 4.4 kg/cap/yr in Zone II;
- 0.3 kg/cap/yr in Zone III.

1.20 One of the objectives of this study is to identify the problems that prevented a more balanced development of the LPG sector in Cameroon, to identify pressing issues such as those related to supply and demand, transportation, and health, safety and environmental (HSE) issues and to propose realistic solutions to deal with them. This includes measures to remedy current market failures in the country and to achieve a per-capita LPG consumption rate equivalent to that of comparable West African countries.

# 2

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## LPG Industry Structure

### The Government

2.1 While the distribution of gas in Cameroon is operated by private corporations, the state retains the right to monitor its supply and to control prices.

2.2 In Cameroon, the oil industry in general, and the LPG sector in particular, contain three principal classes of market participants. These are the government, quasi-public corporations of the LPG sector, and private operators. (See Fig. 2.1).

2.3 The Government has political, regulatory, technical and financial oversight responsibilities in the LPG sector, as outlined below.

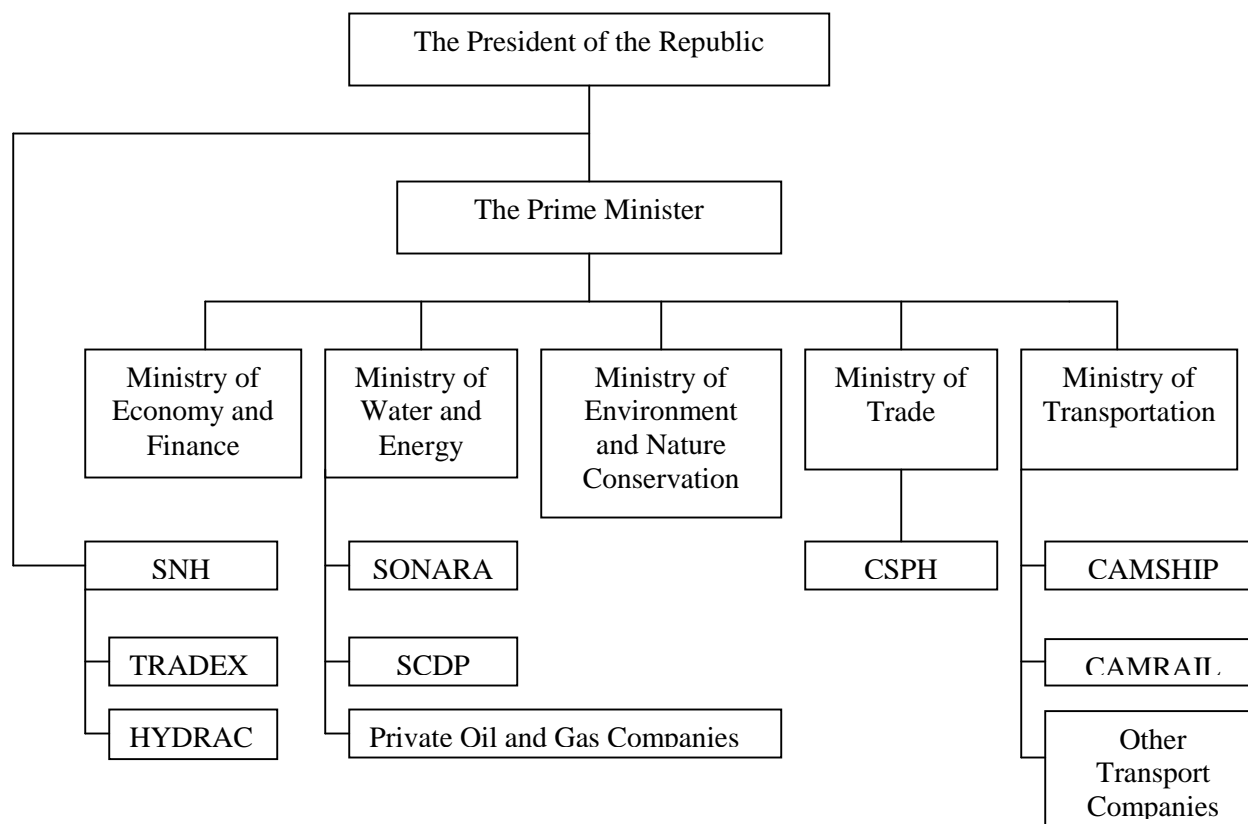
- The President of the Republic has broad oversight responsibility for the national oil sector as a whole, and he assumes direct technical and financial control of the National Hydrocarbons Corporation (SNH); Cameroon's National Oil Company;
- The Prime Minister coordinates the actions of all ministries, including those in charge of the LPG sector;
- The Ministry of Water and Energy (MINEE) is the lead agency for all administrative and technical activities of the petroleum products industry. It develops and implements new legislation and is in charge of all regulatory activities in the petroleum products sector;
- The Ministry of Trade (MINCOMMERCE) issues corporate licenses to all operators in the oil industry, it sets official prices for domestic petroleum products, and it has technical and administrative oversight responsibilities over the Hydrocarbon-Price Stabilization Board (CSPH);
- The Ministry of Economy and Finance (MINEFI) is in charge of fiscal policies and customs control regarding oil sector activities. The MINEFI also coordinates the activities of the Program to Secure Energy-Sector Revenues (PSRSE) as well as those of the National Anti-Fraud Committee on Petroleum Products
- The Ministry of Transportation (MINTRANS) is responsible for the technical supervision of corporations carrying petroleum products on waterways, railways and roads;
- The Ministry of Environment and Nature Conservation (MINEPN) deals with issues related to the environment.

## Quasi-Public Corporations of the LPG Sector

2.4 The quasi-public corporations in the LPG sector are:

- The Hydrocarbon-Price Stabilization Board (CSPH). This is a public institution that assures uniformity of oil products prices. The CSPH is also in charge of regulating the distribution sector, and it issues requests for tenders for the importation of that part of the petroleum products (20%) that is not reserved for SONARA, in accordance with commitments made by the Government to international financial institutions within the framework of its structural adjustment program;
- The National Hydrocarbon Corporation (SNH) is a 100% state-owned corporation that manages the country's interests in the hydrocarbon sector;
- The National Refining Corporation (SONARA) is a 66% state-owned company that provides about 75% of the supply of domestic petroleum products;
- The SCDP is a 51% state-owned company, that ensures the bulk storage of gas and the refilling of LPG cylinders, except for those sold by the SCTM and AZA AFRICA;
- HYDRAC, a 51% state-owned company and a subsidiary of SNH, is in charge of quality and quantity controls of crude oil and petroleum products ;
- TRADEX, a 44% state-owned company, also a subsidiary of SNH, operates in the petroleum-product import and export sector.

**Figure 2.1: Organizational Diagram of the LPG Sector**



## **Private Operators of the LPG Sector**

2.5 Private operators of the LPG sector in Cameroon can be classified in seven sub-groups as follows:

- The Cameroon Metal Works (Société Camerounaise de Transformation Métallique or SCTM) manufactures gas cylinders. It is also a seller of LPG;
- Companies that sell LPG through their own petroleum-product distribution chains include TOTAL, MOBIL and TEXACO;
- Companies that only sell LPG are SCTM, CAMGAZ and AZA AFRICA;
- Cameroon Shipping Lines (CAMSHIP) is in charge of maritime shipments of petroleum products from the SONARA refinery in Limbé to the SCDP primary storage facilities in Douala;
- The Cameroon Railway Corporation (CAMRAIL) handles railway shipments of petroleum products from the Douala storage facilities to those of Yaoundé, Bélabo and Ngaoundéré;
- Companies in charge of quality and quantity controls, including SGS and POLYTECHNICS;
- Companies in charge of road transportation of LPG cylinders.

2.6 Based on 2004 data, the five largest LPG marketers operate 1,122 retail outlets in Cameroon. They are:

- SCTM, which holds 50.2% of the domestic market, and controls 781 retail outlets;
- TOTAL, ranked second, with 22.7% of the domestic market, has 188 retail outlets;
- CAMGAZ, ranked third, with 18.7% of the domestic market, uses 48 retail outlets;
- MOBIL, fourth, with 4.9% of the domestic market and 14 retail outlets;
- TEXACO, fifth, with 3.5% of the domestic market and 91 retail outlets.

2.7 These 1,122 retail outlets are regionally distributed as follows:

- 695 retail outlets (62%) are located in the Limbé - Douala - Bafoussam - Bamenda Zone (Zone I);
- 383 retail outlets (34%) are in the Yaoundé-Bertoua-Ebolowa Zone (Zone II);
- 44 retail outlets (4%) are in the Ngaoundéré-Garoua-Maroua Zone (Zone III).

## **The Cameroon Gas Association**

2.8 In order to promote the gas industry in Cameroon, the Cameroon Gas Association was created on October 26, 2006, on the initiative of the National Oil Company, SNH. Members of the Association are SNH, CSPH, and all oil exploration/production companies including TOTAL EXPLORATION AND PRODUCTION, PERENCO, PECTEN CAMEROON COMPANY, SONARA, SCDP, as well as other operators in the sector.

## General View of the Domestic LPG Market

2.9 LPG is sold in Cameroon in cylinders (or “bottles”) of 3, 6, 12.5, 15, 18 and 36 kg capacity. The most popular cylinders, those of 12.5 kg, are used in households. Cylinders of 15 to 36 kg are used in apartment buildings, hotels and industry.

2.10 An analysis of recent gas data in Cameroon shows that LPG consumption increased at an average annual rate of about 7% between 1998 and 2003, rising from 26,183 to 35,871 MT. In 2004, the consumption of LPG increased dramatically, by 16.8%, over 2003.

2.11 Sold generally in cylinders, both the LPG produced by SONARA and the imported LPG are stored in primary storage facilities of the SCDP (Société Camerounaise des Dépôts Pétroliers). Its depots are located in Douala (1,500 MT of capacity), Yaoundé (500 MT), Bafoussam (165 MT), and Ngaoundéré (95). These storage facilities are used to fill LPG cylinders for subsequent sale in retail markets, except for bulk deliveries.

2.12 Apart from supplies shipped to Bafoussam, which is done directly from SONARA in Limbé, the storage facilities in Yaoundé and Ngaoundéré receive their supplies from the Douala depot, which serves as a transfer depot of LPG from SONARA and for imported LPG. Douala being a river port, the sizes of LPG vessels are limited for both imported LPG and LPG shipped from SONARA.

2.13 LPG transportation from SONARA to Bafoussam is by road, while LPG is shipped by rail tanks from Douala to Yaoundé and from Douala to Ngaoundéré.

2.14 There were about 969,650 gas cylinders in Cameroon in 2002. Of these, 54.7% were in the Limbé-Douala-Bafoussam-Bamenda Region, 40.3% in the Yaoundé-Bertoua-Ebolowa Region and the balance of 5% in the Ngaoundéré-Garoua-Maroua Region. These gas cylinders are not always interchangeable, which is a real problem for consumers.

2.15 The availability of gas cylinders mirrors the LPG consumption, which is not uniform throughout Cameroon:

- The Limbé-Douala-Bafoussam-Bamenda Region, which accounts for 43.8% of the population, consumes 53.3% of the country’s LPG and holds 73.7% of the cylinders.
- The Yaoundé-Bertoua-Ebolowa Region, that shelters 24.2% of the population, consumes 42.9% of the LPG and holds 22.1% of the cylinders.
- The Ngaoundéré-Garoua-Maroua Region, that contains 32% of the population, only consumes 3.8% of the LPG and holds 4.2% of the cylinders.

2.16 In addition, according to investigations undertaken in 2004 by the Technical Ad Hoc Subcommittee on LPG Distribution Problems, the overall access to LPG in Cameroon is limited to 19.5% of households and it is not evenly distributed. In urban areas, LPG access is 38.1%, whereas in rural areas it is only 3.1%. Within each of the three regions listed above, there is a significant disparity in the rate of access to LPG.

2.17 The distribution of LPG in Cameroon is beset with major problems that interfere with efficient market operations, such as:

- Unavailability of LPG, especially storage capacity, in rural areas;

- Free availability of competing fuels such as kerosene and firewood;
- Shortage of gas cylinders relative to the numbers required;
- Poor road conditions;
- Insufficient returns on sales;
- SONARA's inability to meet demand;
- Inadequate LPG storage capacities and deteriorated storage facilities;
- Lack of interchangeability of gas cylinders preventing consumers from discarding cylinders belonging to marginal distributors in favor of better equipped competitors;
- Inadequate regulatory supervision and enforcement.

2.18 Interchangeability of household gas cylinders means the ability of distributors to exchange recovered bottles anywhere within their respective distribution areas. This allows a consumer with an empty gas cylinder to obtain supplies from another distributor of his choice, regardless of cylinder ownership. In accordance with the regulations currently in force, the cylinders in circulation in Cameroon are supposed to be interchangeable on those terms.

2.19 However, this interchangeability is limited to cylinders of the same type, and conditioned upon reaching agreement regarding financial compensation between participating distributors. In reality, the regulatory provisions governing interchangeability are unsatisfactory, since the legislator has yet to find a way to overcome the refusal by an operator to provide financial compensation to his competitor for the recovery of empty cylinders. This explains the present inability of the Cameroonian LPG market to ensure the free circulation of cylinders.

**Table 2.1: Geographical Distribution of LPG Consumption in 2004**

Provinces	LPG Consumption		Population		Rate
	MT	%	Number	%	Kg/cap/yr
Southwest	252	0.6	1,328,312	7.8	0.2
Littoral	18,364	43.8	2,347,672	13.8	7.8
West	3,228	7.7	1,990,359	11.7	1.6
Northwest	503	1.2	1,764,421	10.4	0.3
<b>Total Zone I</b>	<b>22,347</b>	<b>53.3</b>	<b>7,430,764</b>	<b>43.8</b>	<b>3.0</b>
Center	17,693	42.2	2,758,965	16.3	6.4
East	168	0.4	870,885	5.1	0.2
South	126	0.3	474,962	2.8	0.3
<b>Total Zone II</b>	<b>17,986</b>	<b>42.9</b>	<b>4,104,812</b>	<b>24.2</b>	<b>4.4</b>
Adamaoua	587	1.4	807,255	4.8	0.7
North	797	1.9	1,737,412	10.2	0.5
Far North	210	0.5	2,877,873	17.0	0.1
<b>Total Zone III</b>	<b>1,593</b>	<b>3.8</b>	<b>5,422,540</b>	<b>32.0</b>	<b>0.3</b>
<b>General</b>	<b>4,1926</b>	<b>100.0</b>	<b>16,958,117</b>	<b>100.0</b>	<b>2.5</b>

2.20 As shown on the preceding Table:

- three Provinces representing 41.8% of the population of the country consumed 93.7% of the total LPG supplied in 2004. Those Provinces are the Littoral, which includes Douala, with 43.8% of the country's total consumption, the Center Province, including Yaoundé, with 42.2%, and the Western Province (Bafoussam) with 7.7%.
- the seven remaining Provinces of the country representing 58.2% of the population only consumed 6.3% of the total GPL in 2004;
- the Far North Province which, at 2,877,873 inhabitants, is more heavily populated than any of the others, has the lowest per-capita consumption (0.1 kg/cap/yr) because of its remoteness from Limbé and Douala, the two feed points into the petroleum-products distribution network in Cameroon.



# 3

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## Legal and Regulatory Structure

### Relevant Laws, Decrees and Legal Orders

3.1 Except for the Hydrocarbon-Price Stabilization Board (CSPH), which is the state-owned company in charge of regulating the petroleum-products distribution sector in Cameroon, all operators in the LPG sector must adhere to the provisions of Decree Nbr. 022/MINEE, dated September 28, 2001. The Decree spells out licensing requirements for all downstream petroleum activities including refining, imports, exports, storage, quality and quantity controls, as well as distribution activities. In addition to Decree Nbr. 022/MINEE, operators in the LPG sector must also adhere to the following laws, decrees, and legal orders:

- Law Nbr. 90/031 of August 10, 1990, specifying operating procedures for trading activities in Cameroon;
- Law Nbr. 96/12 of August 5, 1996, which establishes the legal framework for environmental protection;
- Law Nbr. 98/015 of July 14, 1998, dealing with dangerous, unhealthy or inconvenient business establishments;
- Law Nbr. 98/020 of December 24, 1998, on devices operating under gas and steam pressure;
- Law Nbr. 99/013 of December 22, 1999, concerning the petroleum code;
- Law Nbr. 2002/004 of April 19, 2002, relative to the charter covering investments in the Republic of Cameroon;
- Decree Nbr. 74/19 of December 5, 1974, bestowing on CAMSHIP exclusive fluvial and maritime transportation rights in the territorial waters of Cameroon;
- Decree Nbr. 95/135/PM of March 03, 1995, modifying certain provisions of Decree Nbr. 77/528 of December 23, 1977, on regulating the storage and distribution of petroleum products;
- Decree Nbr. 99/818 of November 09, 1999, covering the establishment and operation of dangerous, unhealthy or inconvenient enterprises;
- Decree Nbr. 2000/935/PM of November 13, 2000, establishing rules and regulations for oil operations in the downstream sector;
- Order Nbr. 016/MINEE of July 13, 1995, establishing regulatory methods and procedures to be used in connection with petroleum products;
- Order Nbr. 009/MINT/DTT of February 23, 1998, dealing with rules and regulations for the transportation by road of hazardous goods;

- Order Nbr. 04/98/MNDIC/MINEE of July 03, 1998, spelling out technical specifications for petroleum products sold in Cameroon;
- Order Nbr. 023/MINEE of September 28, 2001, establishing minimum quantities, geographic storage regions, and managerial and regulatory requirements for petroleum product stocks;
- Order Nbr. 025/MINEE/MINEFI/MINDIC of October 05, 2001, setting the level of surety bonds to cover liabilities of operators in the downstream petroleum sector;
- Order Nbr. 00009/MINDIC/MINEE of February 21, 2002, establishing standards for LPG (propane/butane) cylinders to be used in the Republic of Cameroon.

3.2 The principal task of the State-owned Hydrocarbon-Price Stabilization Board is the stabilization and price equalization of petroleum products. That includes the responsibility to pass through, in full or in part, LPG price increases in international markets and to stabilize hydrocarbon prices through direct involvement in hydrocarbon exploration and production activities, refining operations, and in petroleum product distribution activities.

### **Price Equalization**

3.3 Price equalization means the elimination of price differentials for a given good within a defined territory that results from differences in the distance between the point of production and the point of consumption (inter-regional equalization), or for products where the difference in price would result from unequal production costs (inter-product equalization).

3.4 In the case of inter-regional equalization, consumers living close to the point of production pay a surplus to subsidize the price that would otherwise be charged to distant consumers. The inter-regional equalization permits the establishment of a uniform selling price for a given product throughout the national territory.

3.5 In the case of inter-product equalization, those who consume products with low production costs pay an extra charge to subsidize the price of consumers who are faced with high-cost products.

### **Price Stabilization**

3.6 This technique is used to prevent price fluctuations of petroleum products in international markets from spilling over to domestic markets. It involves the collection of levies from consumers that are paid into a reserve fund, to be drawn on during price hikes.

3.7 In addition to dividends that the CSPH derives from its equity holdings in private companies, its revenues accrue essentially from a surcharge on the price of petroleum products sold domestically or exported. This surcharge is levied in the form of equalization and stabilization taxes.

## The Evolution of LPG Regulation in Cameroon

3.8 Since its creation in 1974, the CSHP went through four important phases in regulating LPG prices in Cameroon, as shown below:

- From 1974 to 1981, a period during which the domestic consumption of petroleum products was entirely dependent on imports, the principal mission of the CSHP was the stabilization of domestic prices in accordance with objectives set by the Government.
- From 1982 to 1991, after the launching of the National Refining Company SONARA and the creation of the National Oil Company SNH, the stabilization of petroleum product prices was achieved by controlling crude-oil prices on deliveries to SONARA at stable levels. This isolated the economy from international price fluctuations and left the CSHP with the task of price-equalization, which meant making sure that fuel prices would be equal in different parts of the country, taking into consideration delivery distances and the purchasing power of the people living in different parts of the country.
- From 1991 to 1997, the CSHP was tasked to harmonize fuel prices throughout the national territory. This harmonization of prices was considered necessary for the following reasons:
  - To overcome the remoteness of the refinery from different consumption areas, forcing consumers located away from coastal areas, whose living standards were generally lower than those of the people living on or near the coast, to buy their oil products at higher prices;
  - To prevent smuggling of oil products from the neighboring Republic of Nigeria into the regions far removed from the refinery (the Adamaoua Province, the North Province and the Far North Province), where illegal incursions are relatively easy;
  - To offset the unequal distribution of SCDP storage facilities across the country that impeded access to oil products from SONARA by the population of the inland regions.
- Starting in 1998, the oil-product distribution sector became increasingly market-oriented with the suppression of certain monopolies and subsidies. This period is characterized by the exposure of SONARA to realistic market conditions in a competitive environment in which crude-oil price stabilization programs and subsidies had been eliminated.

3.9 This new policy made it possible to adjust petroleum-product prices at the SONARA refinery outlet in accordance with international market indicators (Brent prices, dollar exchange rate, commercial conditions) which, among other measures, led to:

- the renegotiation of freight rates with CAMSHIP covering the transportation of both, crude oil and petroleum products;
- the reduction of SONARA's production costs, based on a performance contract signed with the state to ensure competitiveness with comparable refineries in the region;
- the development of a formula for monthly revisions of domestic fuel prices, taking in account the evolution of oil-product prices on the international market;

- the suppression of the monopoly status of SONARA in the supply of oil products to domestic market;
- the elimination of the SCDP monopoly regarding oil-product storage and the granting of unimpeded access by all downstream operators to its storage facilities, at a compensatory transit fee established by the Board of Directors of the SCDP. This measure has led to the optimization of storage capacities and a reliable supply of oil products in the country through the diversification of supply sources;
- the liberalization of mark-ups in the distribution sector.

3.10 Several legal and regulatory issues can be identified from the foregoing discussion that may need to be resolved following deliberations at the round-table meeting. Among those issues are:

- Whether and where market domination occurs in the LPG sector and, if so,
- How to prepare a viable sectoral restructuring that will open the market to increasing competition, and
- How to promote access to LPG in the Northern provinces, taking into consideration the drastic increase in domestic LPG supply by 300,000 MT that will put an end to imports and lead to exceptional pressure on all components of the existing LPG handling infrastructure already under stress (storage, transport, marketing and distribution).

# 4

## LPG Demand

### Past Consumption

4.1 LPG consumption in Cameroon rose from 3,070 MT in 1976 to 41,926 MT in 2004. This reflects the strongest growth rate of all petroleum products in the country, Table 4.1.

**Table 4.1. Consumption of LPG and Other Oil Products over the Last Thirty Years**

Year	LPG, MT	Other Petroleum Products, MT	TOTAL, MT	LPG, % of All Prod's
1976	3,070	347,361	350,432	0.9
1977	3,344	392,628	395,972	0.8
1978	3,837	455,231	459,068	0.8
1979	4,380	524,743	529,123	0.8
1980	4,923	594,432	599,355	0.8
1981	5,466	664,121	669,587	0.8
1982	9,539	678,654	688,193	1.4
1983	11,765	735,429	747,193	1.6
1984	12,710	755,725	768,434	1.7
1985	12,176	808,031	820,207	1.5
1986	19,132	860,690	879,822	2.2
1987	24,841	847,664	872,505	2.8
1988	27,094	767,378	794,472	3.4
1989	31,902	703,838	735,740	4.3
1990	30,012	689,238	719,250	4.2
1991	22,644	618,715	641,359	3.5
1992	26,313	604,134	630,447	4.2
1993	21,323	604,481	625,804	3.4
1994	20,934	675,879	696,813	3.0
1995	23,567	692,153	715,719	3.3
1996	24,232	699,283	723,515	3.3
1997	25,450	723,794	749,244	3.4
1998	26,668	777,670	804,338	3.3
1999	30,674	804,452	835,126	3.7
2000	35,076	815,107	850,183	4.1
2001	36,572	865,608	902,180	4.1
2002	37,860	911,432	949,292	4.0
2003	39,193	936,658	975,851	4.0
2004	41,926	931,160	973,086	4.3

Source GPP/CREAD

4.2 Following a strong growth pattern through 1989, LPG consumption declined until 1994 due to an increase in poverty resulting from general economic stagnation in the country. A contributing factor was the market entrance of the Société Camerounaise de Transformations Metalliques (SCTM, the first private Cameroonian company to enter the LPG distribution market, not counting subsidiaries of major oil companies) that gave rise to cylinder interchangeability problems.

4.3 Of the 41,926 MT of LPG consumed in 2004, 93% was used in households, and the balance of 7% was used as commercial and industrial fuel.

4.4 To develop a better understanding of the factors affecting national LPG consumption, a survey conducted by the Technical Ad Hoc Subcommittee on LPG Distribution Problems (SCT/GPL) revealed that, in 2004, Cameroon counted 3,380,704 households of which 1,588,257 (47%) were located in urban zones and 1,792,447 (53%) in rural areas. In the urban zones, 605,126 households (38.1%) were gas consumers, against 55,566 households (3.1%) in the rural areas, for an overall market penetration of 660.692 households, or 19.5%. The survey also revealed that:

- 93.4% of Cameroon's LPG consumption takes place in urban households, industries, and service sectors;
- 6.6% of the national LPG consumption occurs in rural households;
- the average annual consumption in LPG-consuming urban households is 60.0 kg,
- compared to 48.9 kg in rural households.

## **Demand Forecast**

4.5 A survey undertaken by EEIC Consulting in October 2005 projected continued growth in LPG demand over the next 20 years (Table 4.2).

4.6 According to EEIC's low-growth scenario, the demand of LPG will rise from 44,500 MT in 2006 to 73,346 MT in 2025. That corresponds to an average annual growth rate of 2.7%. Given the current population growth rate in Cameroon which, according to data published by the Ministry of Planning, averages 2.80 to 2.83% per year, this implies a slight reduction in the yearly average LPG consumption rate, from 2.50 kg/cap/yr in 2004 to 2.42 in 2025.

4.7 Based on a mid-case or most likely scenario that assumes a reduction in poor households in the country from 40% in 2006 to 31.3% in 2025, with poor-household consumption remaining constant at 3.7 kg/cap/yr, Cameroon's LPG consumption will rise from 44,500 MT in 2006 to 122,375 MT in 2005. Thus, the yearly average rate of per-capita gas consumption will increase from 2.5 kg/cap/yr in 2004 to 4.04 kg/cap/yr in 2025.

4.8 A high-growth case, based on an assumed growth rate of 7.2%, leads to an increase in LPG demand from 40,500 MT in 2006 to 173,373 MT in 2025, with an equivalent rise in per-capita consumption from 2.5 kg/cap/yr in 2004 to 5.72 in 2025.

4.9 The growth scenarios presented are derived from two methods: the econometric method which led to the low growth trend and the analytical method which led to the medium and high growth scenarios. The econometric method is based on GDP- and population-growth forecasts and assumes that the sectoral consumption of the LPG will remain constant at 93% for

households and 7% for industrial use. The analytical method is based on the evolution of the households LPG consumers versus the evolution of the industrial consumption of LPG, taking in account the GDP growth forecast.

**Table 4.2: LPG Demand Forecast**

Year	LPG DEMAND FORECAST, MT's		
	Low Growth	Medium Growth	High Growth
2006	44,570	44,516	44,701
2007	46,130	46,118	46,268
2008	47,744	47,779	47,891
2009	49,415	49,500	49,572
2010	51,145	51,757	52,878
2011	52,697	54,363	57 160
2012	53,581	57,040	61,807
2013	55,188	59,850	66,850
2014	56,844	62,800	72,323
2015	58,549	65,896	78,263
2016	60,306	69,778	85,816
2017	62,115	73,892	94,130
2018	63,979	78,251	103,281
2019	62,962	82,871	113,355
2020	64,827	87,768	124,263
2021	66,448	93,807	132,802
2022	68,109	100,240	141,939
2023	69,812	107,124	151,716
2024	71,557	114,491	162,178
2025	73,346	122,375	173,373

Source: EEIC

4.10 These forecasts do not take in consideration the implementation of governmental energy-savings policies, nor do they consider possible restrictions imposed by a lack of gas distribution facilities, which will require heavy investments.

# 5

## LPG Supply

### Supply Sources

5.1 For many years, LPG consumption in Cameroon depended mainly on production from the national refinery (SONARA) which is located at Limbé, on the Atlantic Ocean coast, northwest of Douala. However, beginning in 2000, imports became a more and more important source of supply for the domestic market. Thus, imports that only represented 10% of domestic LPG consumption in 1998 reached 30% in 2004. That year, the sources of the nation's supply were as follows: 30,119 MT from the SONARA refinery and 11,807 MT from imports secured through tenders by CSPH. Cameroon's LPG supplies, by source, are shown for the years 1998 to 2004 in Table 5.1.

**Table 5.1: LPG Supply from 1998 to 2004  
(Metric Tons)**

<b>Year</b>	<b>SONARA</b>	<b>Imports</b>	<b>Total</b>
1998	24,629	3,384	28,013
1999	30,062	1,971	32,033
2000	22,902	10,497	33,399
2001	23,879	10,696	34,575
2002	21,857	13,935	35,792
2003	23,023	12,927	35,950
2004	30,119	11,807	41,926

Source: SONARA and SCDP

### ***The National Refining Company***

5.2 The National Refining Company (SONARA) was created on December 07, 1976. To formalize its relation with the state, SONARA signed a covenant with the Government on January 11, 1978, under which it was placed under the technical tutelage of the Ministry of Water and Energy, the governmental entity currently in charge of all petroleum products.

5.3 At present, SONARA is capitalized 17.8 billion FCFA and is owned by the following shareholders:

- Public shareholders (Ministry of Finance, SNH, CSPH, National Investment Corporation): 66%
- Private shareholders (TOTAL, MOBIL, SHELL): 34%.



5.4 When it was first started in 1981, SONARA had a monopoly for the domestic supply of petroleum products. In 1998, however, in deference to international investors, the Government committed itself to open up 20% of the market to petroleum-product imports.

5.5 With a nominal crude-oil through-put capacity of 2.1 million metric tons per year, the Limbé refinery, a simple hydro-skimming plant, held 6.14% of the total 2002 refining capacity of the Gulf of Guinea Region stretching from Angola to Senegal, Table 5.2.

5.6 Rated at more than 98% efficiency, the SONORA refinery is among the most efficient plants of the type in Gulf of Guinea Region.

**Table 5.2: Total Refining Capacity in the Gulf of Guinea in 2002**

<b>Country</b>	<b>Nominal Capacity (MT)</b>	<b>Percentage</b>
ANGOLA	1,950,000	5.70
CAMEROON	2,100,000	6.14
COTE D'IVOIRE	3,260,000	9.53
GABON	865,000	2.53
GHANA	2,250,000	6.58
NIGERIA	21,938,000	64.12
SENEGAL	1,350,000	3.95
SIERRA LEONE	500,000	1.46
<b>Total</b>	<b>34,213,000</b>	<b>100.00</b>

Source: IFP

### **Imports**

5.7 LPG is imported in Cameroon through the port of Douala following tenders published under the authority of the CSPH. The imported gas enters the supply chain through the SCDP storage facilities, for delivery to marketers as needed, exactly as the gas delivered by SONARA.

### **Domestic LPG Prices**

5.8 In spite of the Government's desire to liberalize LPG prices in domestic markets, prices are still controlled, and partially subsidized, for the purpose of providing a lower-cost fuel to the poor and to prevent further desertification, especially in the three northernmost Provinces.

5.9 To control the domestic LPG sales price, it has been structured on the basis of 20 components that are published monthly by the CSPH. These price components and their FCFA allowances as of January 31, 2006 are listed below.

**Table 5.3: LPG Sales Price  
(in FCFA, as of January 31, 2006)**

		<b>Amount</b>	<b>Percentage</b>
1	The LPG bulk price	150,000.00	31.25%
2	Customs duties	15,000.00	3.13%
3	Coastal freight from Limbé to Douala	6,891.00	1.44%
4	VAT on coastal freight	1,326.52	0.28%
5	Stabilization tax	60,000.00	12.50%
6	Port fees	3,188.00	0.66%
7	VAT on port fees	613.69	0.13%
8	Cylinder-filling costs	17,482.00	3.64%
9	Storage fees	13,638.60	2.84%
10	VAT on storage fees	2,625.43	0.55%
11	Overhead expenses	20,750.00	4.32%
12	Financial expenses	4,725.50	0.98%
13	Profits	46,800.84	9.75%
14	Casting (manufacturing) of cylinders	3,344.90	0.70%
15	Amortization of cylinders and vats	12,797.50	2.67%
16	Maintenance of cylinders and vats	23,465.93	4.89%
17	City deliveries	22,225.38	4.63%
18	VAT on city deliveries	4,278.39	0.89%
19	Price equalization tax	36,283.65	7.56%
20	Retail margin	34,562.67	7.20%
	<b>Total price for 1000 kg</b>	<b>480,000.00</b>	<b>100.00%</b>
	Total price for 1 kg	480.00	
	<b>Unit price for a 12,5 kg cylinder</b>	<b>6,000.00</b>	

Note: For other localities, an amount of 117,47 FCFA/MT/KM is added to the CFA 6,000 which is the price at the nearest SCDP Storage facilities.

Source: CSPH

5.10 Items 1 through 5 in the preceding list reflect the LPG price, ex SONARA refinery, which is equivalent to the import price in Douala. The price of the bulk product is presumed to reflect the cost of LPG at the Limbé refinery outlet gate. That cost includes the acquisition cost of crude oil, the refining cost, and the profit charged by SONARA. Since SONARA is an offshore refinery, petroleum products that are produced there do not pay customs duties until delivered to domestic markets. A coastal transport fee from Limbé to Douala is added to reflect the cost of transportation by sea of the LPG from the refinery to the SCDP storage facilities in Douala.

5.11 Items from 1 through 19 constitute the LPG wholesale price at the SCDP storage facilities throughout the country. The stabilization and equalization taxes are levies that are collected by CSPH. The funds so collected enable CSPH to cover differences that may arise between the LPG ex-refinery cost and the official domestic sales price. In addition, these funds

also cover part of the cost of transporting the gas to remote or hard-to-reach regions, and to moderate import-price fluctuations. Port fees serve to defray the port of Douala. Storage fees cover the storage of gas in SCDP storage facilities. Cylinder-filling costs cover the refilling of empty gas cylinders. Items 11 through 17 cover the expenses and profits of LPG distributors. All taxes accrue to the state.

5.12 In spite of the price liberalization that was officially introduced in 1999, gas prices remain inflexible because of the way they are structured. No price differentials have been observed in the market from one distributor to the other.

# 6

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## LPG Distribution Infrastructure

### The LPG Supply Chain

6.1 As mentioned, the distribution of LPG and other petroleum products in Cameroon depends on deliveries to domestic markets from the SONARA refinery and through imports. The LPG supply chain to be discussed in this chapter has been subdivided into three parts:

- Primary LPG storage;
- LPG transportation;
- The LPG distribution network.

### Primary LPG Storage

6.2 SONARA and SCDP are the only companies that have primary gas storage depots which they operate in five of the country's ten Provinces. The locations of these facilities are listed below, by company:

- SONARA: Southwest Province;
- SCDP: Littoral Province, West Province, Center Province, and Adamaoua Province.

### *SONARA Storage Facilities*

6.3 SONARA, whose primary storage depots are all located at the refinery in Limbé in the Southwest Province, has quadrupled its storage capacity since the refinery went on line, from 1,211 MT in 1981 to 5,511 MT in 2003. The SONARA storage facilities consist of five spherical tanks, as follows:

- Two spheres with capacities of 197 MT each;
- A third sphere of 817 MT capacity;
- A fourth sphere of 1,000 MT capacity ;
- A fifth sphere of 3,300 MT capacity.

The first three spherical tanks were put in service in 1981, when the refinery went on line, the fourth sphere followed in 1990 and the fifth in 2003.

6.4 In addition to these five primary LPG storage spheres, SONARA has a port for loading and discharging tankers of 30,000 to 80,000 MT dead weight, and a coastal wharf

capable of handling vessels up to 10,000 MT dead weight for deliveries to the SCDP storage facilities in Douala. The company also owns and operates a truck loading rack.

### **SCDP Storage Facilities**

6.5 Created in 1979, the Cameroon Petroleum Storage Company (SCDP) has ten primary petroleum storage facilities in 6 of the country's 10 Provinces. However, the company stocks LPG only in 4 of these facilities. They are located in Douala in the Littoral Province, in Bafoussam in the West Province, in Yaoundé in the Center Province and in Ngaoundéré in the Adamaoua Province. Table 6.1 below traces the development of the SCDP's LPG storage capacity over time.

**Table 6.1 LPG Storage Capacity of SCDP  
(Metric Tons)**

<b>Storage</b>	<b>1979</b>	<b>1980</b>	<b>1981</b>	<b>1982</b>	<b>1983</b>	<b>2004</b>
Douala	0	500	1,000	1,000	1,500	1,500
Bafoussam	15	15	15	165	165	165
Yaoundé	0	0	500	500	500	500
Ngaoundéré	35	35	35	95	95	95
<b>Total</b>	<b>50</b>	<b>550</b>	<b>1,550</b>	<b>1,760</b>	<b>2,260</b>	<b>2,260</b>

Source SCDP

6.6 As Table 6.1 shows,

- The depots in Douala represent 66.4% of the total primary LPG storage capacity of SCDP;
- The depots in Yaoundé come in second, with 22.1% ;
- The depots in Bafoussam represent 7.3%;
- The depots in Ngaoundéré represent only 4.2% of the total LPG storage capacity of the SCDP;
- In spite of on an increase in national LPG consumption from 11,765 MT in 1983 to 41,923 MT in 2004, or 256%, SCDP has not expanded its primary storage capacity during those 20 years.

6.7 Taking into consideration that Douala and Bafoussam are located in Zone I which includes the Littoral Province, the Southwest Province, the West Province and the Northwest Province, and discounting the SONARA storage facilities in Limbé, it is worth noting that:

- Zone I, which shelters 43.8% of the country's total population, holds 73.7% of SCDP's total primary LPG storage capacity;
- Zone II, with 24.2% of the population holds 22.1% of the company's LPG storage capacity;
- Zone III, with 32% of the population only holds 4.2% of the total LPG storage capacity.

6.8 These facilities are configured as follows:

- The LPG storage facilities in Douala are composed of three spherical tanks of 500 MT each;

- The LPG storage facilities in Bafoussam are composed of one sphere of 150 MT and a horizontal tank of 15 MT;
- The LPG storage facility in Yaoundé has a sphere of 500 MT;
- The LPG storage facilities in Ngaoundéré are composed of three horizontal tanks of which the oldest has a capacity of 35 MT and the two others have a capacity of 30 MT each.

6.9 In addition to the storage tanks proper, every SCDP depot has various auxiliary installations mainly used for the refilling gas cylinders and the loading of tank trucks, among them pumps and piping, truck bays and loading arms, control instrumentation, and fire fighting equipment.

### **Total Primary LPG Storage – SONARA and SCDP**

6.10 As mentioned, the primary LPG storage capacity in Cameroon is concentrated in Zone I. As shown in Table 6.2 below:

- Zone I holds 92.34% of the country’s primary LPG storage capacity;
- Zone II holds 6.43% of the total primary storage;
- Zone III holds 1.23% of the total primary storage.

**Table 6.2 Total Primary LPG Storage Capacity  
(Metric Tons)**

Storage/Zone	Storage Capacity			Percentage
	SONARA	SCDP	Total	
Limbé	5,511	0	5,511	70.92%
Douala	0	1,500	1,500	19.30%
Bafoussam	0	165	165	2.12%
Bamenda	0	0	0	0.00%
<b>Total Zone I</b>	<b>5,511</b>	<b>1,665</b>	<b>7,176</b>	<b>92.34%</b>
Yaoundé	0	500	500	6.43%
Bélabo	0	0	0	0.00%
Ebolowa	0	0	0	0.00%
<b>Total Zone II</b>	<b>0</b>	<b>500</b>	<b>500</b>	<b>6.43%</b>
Ngaoundéré	0	95	95	1.22%
Garoua	0	0	0	0.00%
Maroua	0	0	0	0.00%
<b>Total Zone III</b>	<b>0</b>	<b>95</b>	<b>95</b>	<b>1.22%</b>
<b>Total Storage</b>	<b>5,511</b>	<b>2,260</b>	<b>7,771</b>	<b>100.00%</b>

Source: SONARA/SCDP (Minor Discrepancies due to Rounding)

### **Balancing Primary LPG Storage and Population**

6.11 In accordance with Article 10 of Decree 2000/935/PM dated November 13, 2000, covering operations in the downstream petroleum sector, “the minimum storage capacity of a petroleum-product depot must permit the permanent maintenance of required minimum consumption stocks in addition to minimum stocks needed for import/export- and transfer activities”. The second paragraph of the same Article also stipulates that “the minimum capacity

of a petroleum product storage facility must not be less than 10,000 cubic meters for liquid products, and 100 MT for LPG.”

6.12 Since current regulations only spell out minimum consumption stocks of 45 days’ duration based on preceding consumption levels, the minimum stocks for import/export- and transfer activities are left to the judgment of the operators. However, the ad-hoc Committee responsible for monitoring LPG markets on a monthly basis estimates that, for the storage facilities subject to all four activities like Douala and Ngaoundéré, the minimum stocks for export/import operations and for transfers should each be 10% of the minimum consumption stocks. Based on these data, and a minimum technical capacity requirement of 10% of the required operational capacity, SCDP capacity shortfalls have been calculated and are presented in Table 6.3. The required storage capacities in this Table are based on the preceding year’s respective LPG consumptions. They do not take into consideration the practical aspects of storage in the northern hinterland, where long distances imply longer lead times for delivery and, therefore, higher storage-capacity requirements for given throughput volumes

**Table 6.3: SCDP Storage Capacities of LPG in 2005**

Designation	SCDP Deposits, MT				Total
	Douala	Bafous.	Yaoundé	Ngdéré	
2004 Consumption	18,807	2,273	11,552	1,502	34,134
Minimum Consumption Stocks	2,319	280	1,424	185	4,208
Minimum Import/Export Stocks	232	0	142	19	393
Minimum Transfer Stocks	232	0	0	19	251
Required Operational Capacity	2,782	280	1,567	222	4,852
Minimum Technical Requirements	278	28	157	22	485
Total Storage Requirements (C)	3,060	308	1,724	244	5,337
Existing Storage Capacity (S)	1,500	165	500	95	2,260
<b>Capacity Surplus/Shortage (S-C)</b>	<b>- 1,560</b>	<b>- 143</b>	<b>- 1,224</b>	<b>-149</b>	<b>- 3,077</b>

6.13 As seen in the preceding Table, it appears that all SCDP storage facilities have significant capacity shortfalls in relation to current legal requirements. That will be an enormous handicap for the future development of the LPG sector unless urgent measures are taken by the state to find a solution without delay.

6.14 Taking into consideration that the Bafoussam depot provides primary consumption storage for the populations of the West Province and the Northwest Province, and that the Southwest Province is directly supplied by SONARA, the per-capita LPG storage capacities for the relevant SCDP depots in the nine Provinces are listed in Table 6.4.

**Table 6.4: Provincial Per-Capita Storage Capacities, SCDP**

Storage	Existing Capacity		Provinces	Population		Per-Capita Capacities (kg/cap)
	MT	%		Inhabitants	%	
Douala	1,500	66.4	- Littoral	2,347,672	15.0	0.639
Bafoussam	165	7.3	- West - Northwest	3,754,780	24.0	0.044
Yaoundé	500	22.1	- Center - East - South	4,104,812	26.3	0.122
Ngaoundéré	95	4.2	- Adamaoua - North - Far North	5,422,540	34.7	0.018
<b>Total</b>	<b>2,260</b>	<b>100.0</b>		<b>15,629,804</b>	<b>100.0</b>	<b>0.145</b>

Source: CREAD

6.15 Since, for the year 2004, the average per-capita LPG storage capacity in the nine Provinces served by SCDP was 0.145 kg/cap, it appears from the data shown in Table 6.4 that Littoral was the only Province that had an adequate capacity.

### The Transportation of LPG

6.16 In Cameroon, the transportation of LPG and other petroleum products is performed by sea, by railway and by road. The equipment at hand for LPG transportation, as of December 31, 2004, is listed in Table 6.5 below.

**Table 6.5: LPG Transport Capacities in 2004**

Designation	Marine Tanker	Rail Tanks	Tank Trucks	Total	Percentage
<b>Bulk gas</b>					
Number of Units	1	4	14		
Capacity (MT)	400	120	262	782	76.7%
Percentage	51.2%	15.3%	33.5%	100.0%	
<b>Bottled Gas</b>					
Number of Units	0	0	21		
Capacity (MT)	0	0	238	238	23.3%
Percentage	0.0%	0.0%	100.0%	100.0%	
<b>Total capacity (MT)</b>	<b>400</b>	<b>120</b>	<b>500</b>	<b>1,020</b>	<b>100.0%</b>
<b>Percentage</b>	<b>39.2%</b>	<b>11.8%</b>	<b>49.0%</b>	<b>100.0%</b>	

Source: GPP/CAMRAIL



6.17 Coastal transportation, which represents nearly 49% of the total transport capacity, takes place between the refinery at Limbé and the primary storage facility in Douala, while railway transportation, at near-12% of the total capacity, is used for transfers between the Douala depot and the Yaoundé depot, as well as between Douala and Ngaoundéré. Road transport, which represents approximately 50% of the total capacity, not including rental trucks, is used for transfers from the refinery to the depots of Bafoussam and from the Douala depot to Bafoussam and Yaoundé.

### **Coastal Transportation**

6.18 The transportation by sea assures the transfer to the SCDP depots of Douala of more than 80% of the production at the SONARA refinery. This coastal transport is performed by the Cameroon Shipping Lines (CAMSHIP), which uses for this purpose a full-time vessel, the CAPE LIMBOH and a contract vessel, the KYRNIKOS.

6.19 From 12,900 MT in 1992, the quantities of LPG transported by sea rose to 18,804 MT in 2004. That corresponds to an average grow rate of 2.9% per year against 4.5% for other petroleum products. According to statistical information provided by SONARA, the share of LPG relative to the total quantities of petroleum products transported by sea represented only 2.2% in 2004.

### **Railway Transportation**

6.20 The SCDP storage depots in Yaoundé and Ngaoundéré receive LPG deliveries by rail. CAMRAIL, the successor to the National Railway Corporation following privatization, carries out the transportation of LPG using four tank wagons with a combined capacity of 120 MT. This represents 11.8% of the LPG transport capacities by all means of transport.

6.21 From 6,500 MT in 1992, the quantities of LPG transported by rail rose to 16,831 MT in 2004. This corresponds to an average growth of 3.2% per year against 4.5% for other oil products. On the other hand, according to statistical data provided by SCDP, the share of LPG relative to the total quantities of petroleum products transported by railway rose from 2.6% in 1992 to 4.2% in 2004.

### **Transportation by Road**

6.22 According to statistical data obtained from a survey covering all participants in this sector, there were 962 tank trucks, including operator-owned and rental trucks, in Cameroon in 2004 hauling petroleum products, as shown in Table 6.6.

**Table 6.6: Distribution of Tank Trucks by Product Type**

<b>Designation</b>	<b>White Fuels</b>	<b>LPG</b>	<b>Fuel Oil</b>	<b>Total</b>
Number of Units	902	52	8	962
Average Capacity (MT)	24	9.5	10	23
Total Capacity (MT)	21,353	496	80	21,929
<b>Percentage</b>	<b>97.3%</b>	<b>2.3%</b>	<b>0.4%</b>	<b>100.0%</b>

6.23 As noted from Table 6.6:

- The transport capacity dedicated to white products (motor gasoline, kerosene and gasoil, which is essentially diesel fuel) represents 97.3% of the transportation capacities by trucks;
- At 0.4%, road transportation of fuel oil is marginal;
- The transport capacity by truck dedicated to LPG represents 2.3%.

LPG tank trucks are owned by individuals as well as enterprises.

**Table 6.7: LPG Truck Distribution by Marketer**

Designation	Marketer				Total
	SCTM	TOTAL	CAMGAZ	TEXACO	
<b>Bulk Gas</b>					
Number of Trucks	8	0	5	1	14
Capacity (MT)	173	0	73	12	258
Percentage	67.1%	0.0%	28.3%	4.7%	100.0%
<b>Bottled Gas</b>					
Number of Trucks	20	15	0	3	38
Capacity (MT)	112	105	0	21	238
Percentage	47.1%	44.1%	0.0%	8.8%	100.0%
<b>Total LPG Trucks</b>					
Number of Trucks	28	15	5	4	52
Total Capacity (MT)	285	105	73	33	496
Percentage	57,5%	21,2%	14,7%	6,7%	100,0%

6.24 As seen in Table 6.7,

- 52% of the LPG transport capacity by road is dedicated to bulk gas and 48% to bottled gas;
- SCTM holds the most important road transport capacity for LPG, at 57.5% of total capacity. The company holds 67.1% of the total bulk gas capacity and 47.1% of the bottled gas capacity;
- While TOTAL does not transport bulk gas, its share in bottled-gas capacity is 44.1%;
- CAMGAZ, the third-ranked transporter in terms of total LPG capacity, is second in terms of bulk transport capacity, at 28.3% of the total;
- TEXACO holds 6.7% of the total LPG road transport capacity.

### **Competitiveness Between Different LPG Transportation Modes**

6.25 The configuration of the LPG transportation network in Cameroon prohibits a meaningful analysis of competitiveness because of specific constraints that confer monopoly status to some of the transportation modes, as shown below:

- Maritime navigation is only possible between Limbé and Douala;
- The railroad only joins the cities of Douala, Yaoundé, Bélabo and Ngaoundéré;
- Roads between some LPG depots and delivery points are sometimes impassable in the rainy season, raising delivery costs.

6.26 Table 6.8 below shows the existence of LPG transport modes and the average distances between the entry-point depots in Limbé and Douala and other primary storage facilities.

**Table 6.8: Average Distances between Limbé and Douala and Other Depots, km**

Route	Sea	Railway	Road
Limbé-Douala	50	non-existent	70
Limbé - Bafoussam	non-existent	non-existent	326
Limbé - Yaoundé	non-existent	non-existent	318
Limbé - Ngaoundéré	non-existent	non-existent	1,025
Douala-Bafoussam	non-existent	non-existent	250
Douala-Yaoundé	non-existent	259	245
Douala-Ngaoundéré	non-existent	884	965

6.27 Duration of round trips and transport quantities, by transportation mode, are shown in the following Table.

**Table 6.9: Transport Quantities and Round-Trip Times by Transport Mode**

Race	Transport Mode	Distance	Transport Quantity	Round-Trip Time
Limbé-Douala	Sea	50 km	400 MT	56 hours
Limbé-Bafoussam	Road	326 km	23 MT	2 days
Douala-Bafoussam	Road	250 km	23 MT	2 days
Douala-Yaoundé	Railway	259 km	120 MT	3 days
Douala-Yaoundé	Road	245 km	23 MT	2 days
Douala-Ngaoundéré	Railway	884 km	120 MT	8 days
Douala-Ngaoundéré	Road	965 km	23 MT	6 days, dry season
Douala-Ngaoundéré	Road	965 km	23 MT	15 days, rainy season

6.28 As shown in Figure 6.9,

- Coastal transport is the most efficient mode of transportation between the refinery at Limbé and the principal depot at Douala. The coastal route permits the delivery of 400 MT of gas per trip, with a round-trip time of 56 hours. That corresponds to 1.5 times the total capacity of the entire truck fleet. To transport such a quantity of LPG by road, 18 tank trucks would be required, which would have to spend time waiting in delivery lines and would contribute to the clogging of roads that are already overloaded between the two cities;
- Shipments from the refinery at Limbé to the depot of Bafoussam can be done only by road because that is the only existing transportation artery between those two cities;
- The transfer from Douala to Yaoundé is more efficient by rail, because 120 MT of LPG can be hauled in one trip. As to deliveries by tank trucks, their use is limited because the road between these two cities is already overloaded and the LPG trucks would present a significant hazard;

- Some sections of the Douala-Ngaoundéré road are not black-topped which makes GPL deliveries by truck difficult during the rainy season;
- Given the limited number of LPG rail tanks, shipment of the gas between Douala and Yaoundé and between Douala and Ngaoundéré is done by a combination of rail and road transport in spite of the added cost to consumers.

## Distribution System – LPG Cylinders

6.29 Except for some bulk deliveries of gas to industry and a few hotels, most of the LPG distribution in Cameroon is done with bottled gas. The gas-cylinder inventory rose from 45,551 bottles in 1975 to 969,652 bottles in 2002. Their distribution by size and marketer is listed in Table 6.10. below, which shows that:

- Bottles of 12.5 kg used in general by households represent 88.7% of the inventory;
- Bottles of 6 and 3 kg used in poor households come in second and third, respectively;
- The other types of bottles (from 15 to 38 kg) are used by industry, hotels and restaurants;
- SCTM controls 62.2% of the bottle inventory, which in effect makes SCTM a quasi monopoly.

**Table 6.10: Distribution of LPG Cylinders in Cameroon, 2002**

Marketer	3 kg	6 kg	12.5 kg	All Other Sizes	Total	Percentage
SCTM	0	31,400	570,830	615	<b>602,845</b>	62.2%
CAMGAZ	27,312	0	161,492	6,430	<b>195,234</b>	20.1%
TOTAL	0	35,691	110,139	1,407	<b>147,237</b>	15.2%
TEXACO	0	0	9,390	6,613	<b>16,003</b>	1.7%
MOBIL	0	0	8,045	288	<b>8,333</b>	0.9%
<b>Total</b>	<b>27,312</b>	<b>67,091</b>	<b>859,896</b>	<b>15,353</b>	<b>969,652</b>	<b>100.0%</b>
Percentage	2.8%	6.9%	88.7%	1.6%	<b>100.0%</b>	

Source: Comité ad-hoc de suivi du GPL (Minor Discrepancies due to Rounding)

6.30 Table 6.11 below reflects the geographical distribution of gas bottles, which is uneven, confirming the regional disparity of LPG stocks mentioned earlier. As that Table shows:

- Consumption Zone I holds 54.7% of the total bottle inventory;
- Zone II accounts for 40.3% of the bottles;
- Zone III holds 5% of the bottles.

**Table 6.11: Geographical Distribution of Gas Cylinders, 2002**

Province	3 kg	6 kg	12.5 kg	Other Sizes	Total	Percentage
Littoral	4,080	22,942	336,049	5,736	368,807	38.0%
Southwest	0	1,332	21,768	135	23,235	2.4%
West	6,588	8,684	100,490	1,046	116,808	12.0%
North-West	0	1,870	19,630	300	21,800	2.2%
<b>Total Zone I</b>	<b>10,668</b>	<b>34,828</b>	<b>477,937</b>	<b>7,217</b>	<b>530,650</b>	<b>54.7%</b>
Center	12,027	17,738	310,533	7,718	348,016	35.9%
East	0	4,753	20,625	104	25,482	2.6%
South	0	582	16,843	16	17,441	1.8%
<b>Total Zone II</b>	<b>12,027</b>	<b>23,073</b>	<b>348,001</b>	<b>7,838</b>	<b>390,939</b>	<b>40.3%</b>
Adamaoua	4,617	2,812	13,114	269	20,812	2.1%
North	0	4,163	13,792	0	17,955	1.9%
Far North	0	2,215	7,052	29	9,296	1.0%
<b>Total Zone III</b>	<b>4,617</b>	<b>9,190</b>	<b>33,958</b>	<b>298</b>	<b>48,063</b>	<b>5.0%</b>
<b>Total</b>	<b>27,312</b>	<b>67,091</b>	<b>859,896</b>	<b>15,353</b>	<b>969,652</b>	<b>100.0%</b>
<b>Percentage</b>	<b>2.8%</b>	<b>6.9%</b>	<b>88.7%</b>	<b>1.6%</b>	<b>1000%</b>	

Sources: Marketers and EEIC (Minor Discrepancies due to Rounding)

6.31 Based on the results of a 2002 survey by the Ministry in charge of the oil products:

- The five marketers (SCTM, CAMGAZ, TOTAL, MOBIL and TEXACO) supplied LPG to 71 communities through a total of 1,122 LPG retail outlets.
- There were no LPG retail outlets in some provincial departments (the equivalent of U.S. counties)
- 33 communities out of a total of 71 were served by only one marketer;
- All five principal marketers had a presence in only three communities of the 71 on record, those of Douala, Yaoundé and Bafoussam.
- SCTM alone had 781 retail outlets;
- CAMGAZ had 48 retail outlets;
- TOTAL had 188 retail outlets;
- MOBIL had 14 retail outlets;
- TEXACO had 91 retail outlets;
- The three subsidiaries of the multinationals (TOTAL, MOBIL and TEXACO) had 26% of the retail outlets. They generally distribute their LPG through their service stations;
- SCTM and CAMGAZ distribute their gas through a separate network of authorized dealers;
- In service stations, gas bottles are generally stored in metal racks;
- Apart from service stations, very few dealers have ventilated storage facilities for empty or full bottles, and the bottles are stored on the ground and sometimes even in residences.

**Table 6.12: LPG Distribution by Zone and Province, 2002**

Province	Population	Area in km <sup>2</sup>	Number of Retail Outlets	Bottle Inventory	LPG Sales, kg
Littoral	2,221,525	20,220	455	368,807	15,499,848
South West	1,256,938	24,910	90	23,235	209,000
West	1,883,411	13,890	131	116,808	2,712,632
North West	1,669,614	17,300	19	21,800	409,420
<b>Total Zone I</b>	<b>7,031,488</b>	<b>76,320</b>	<b>695</b>	<b>530,650</b>	<b>18,830,900</b>
Center	2,610,718	68,942	338	348,016	14,981,064
East	824,090	118,900	24	25,482	157,432
South	449,441	47,190	21	17,441	89,000
<b>Total Zone II</b>	<b>3,884,249</b>	<b>235,032</b>	<b>383</b>	<b>390,939</b>	<b>15,227,496</b>
Adamaoua	763,879	61,990	10	20,812	497,816
North	1,644,056	67,798	16	17,955	680,037
Far North	2,723,237	34,260	18	9,296	175,000
<b>Total Zone III</b>	<b>5,131,172</b>	<b>164,048</b>	<b>44</b>	<b>48,063</b>	<b>1,352,853</b>
<b>Total Cameroon</b>	<b>16,046,909</b>	<b>475,400</b>	<b>1,122</b>	<b>969,652</b>	<b>35,411,249</b>

Source: EEIC

6.32 Tables 6.11 and 6.12 summarize the large disparity in LPG availability in Cameroon, as shown below:

- Zone I, representing 43,8% of the population and covering 16% of the surface area of Cameroon, has 62% of the country's retail outlets and 55% of its bottle inventory;
- Zone II, with 24,2% of the population and 49% of the surface area, holds 34% of the retail outlets and 40% of the bottle inventory;
- Zone III, with 32% of the population and 34,5% of the surface area only has 4% of the retail outlets and 5% of bottle inventory.
- The Provinces with the highest density of LPG retail outlets are the Littoral Province (4,882 inhabitants per retail outlet), the Center Province (7,724 inhabitants per retail outlet), the Southwest Province (13,966 inhabitants per retail outlet) and the West Province (14,377 inhabitants per retail outlet);
- The Far North Province is the region with the lowest density of LPG retail outlets. It has an access rate of 151,291 inhabitants per retail outlet.

**Table 6.13: LPG Distribution by Zone and Province, in Percent**

Province	Population	Area	Number of Retail Outlets	LPG Bottle Inventory	LPG Market
Littoral	14%	4%	41%	38%	44%
South West	8%	5%	8%	2%	1%
West	12%	3%	12%	12%	8%
North West	10%	4%	2%	2%	1%
<b>Zone I</b>	<b>44%</b>	<b>16%</b>	<b>62%</b>	<b>55%</b>	<b>53%</b>
Center	16%	15%	30%	36%	42%
East	5%	25%	2%	3%	0.4%
South	3%	10%	2%	2%	0.3%
<b>Zone II</b>	<b>24%</b>	<b>49%</b>	<b>34%</b>	<b>40%</b>	<b>43%</b>
Adamaoua	5%	13%	1%	2%	1%
North	10%	14%	1%	2%	2%
Far North	17%	7%	2%	1%	0.5%
<b>Zone III</b>	<b>32%</b>	<b>35%</b>	<b>4%</b>	<b>5%</b>	<b>4%</b>
Cameroon	100%	100%	100%	100%	100%

Source: Elaboration CREAD Consulting (Minor Discrepancies due to Rounding)

6.33           Cylinders are owned by marketers and consumers pay a deposit. The amount of that deposit varies because there is a lack of bottles in the country. For example, in Yaoundé, the deposit for a 12.5 kg bottle may vary from 10,000 FCFA to 20,000 FCFA. The problem is that cylinders are not available in the market, which is a major inhibitor of bottle interchangeability.

# 7

## Household Cooking and Lighting Demand

7.1 As mentioned in Chapter 4, LPG in Cameroon is mostly consumed in households which absorb about 93% of the gas sold in the domestic market. This is the place where gas directly competes with other types of energy such as electricity, kerosene, wood, charcoal and agricultural waste.

7.2 The total consumption of energy in Cameroon was 5,674,550 metric tons of oil-equivalent (MTOE) in 2002. Table 7.1 shows energy consumption in metric tons and as a percentage of the national total, by source.

**Table 7.1: National Energy Consumption, 2002**

Energy Source	Consumption in OET	Percentage
Wood	3,480,276	61.33%
Charcoal	35,872	0.63%
Agricultural Waste	52,416	0.92%
Electricity	895,759	15.79%
Oil products, including	1,210,237	21.33%
- LPG	37,860	0.67%
- Aviation Fuel	839	0.01%
- Super Gasoline	370,804	6.53%
- Kerosene	180,383	3.18%
- Jet Fuel	75,003	1.32%
- Gasoil	480,654	8.47%
- Fuel Oil 1500	64,069	1.13%
- Fuel Oil 3500	625	0.01%
<b>Total</b>	<b>5,674,560</b>	<b>100.00%</b>

Source EEIC (Minor Discrepancies due to Rounding)

7.3 As Table 7.1 shows,

- Wood remains the most important source of energy, at 61.3% of total consumption;
- Oil products come next, at 21.3% ;
- Electricity, with a consumption of 17.8% comes in third, in spite of the enormous potential that is available in the country ;
- Kerosene, with a consumption of 180,383 MTOE, represents more than 3% of the total energy consumption;



- Since only 37,860 MTOE of LPG were consumed in 2002, that fuel still remains a marginal energy source.

7.4 From the information provided in Chapters II and IV it follows that the low GPL consumption is mainly due to its non-availability in most regions. In fact, three Provinces (Littoral, Center, and West), having a combined population of 41.8% of Cameroon's total population, consumed more than 93% of the country's total LPG supply. This means that the seven other Provinces, that account for well over half of the population (58.2%) consumed only 7%. Given the non-availability in LPG, the populations of these seven Provinces turn to other, less expensive, energy sources such as wood, agricultural wastes and kerosene.

7.5 Moreover, the three Provinces that are threatened by desertification (Adamaoua, North and Far North) are those with the lowest availability of gas. The Far-North Province, which has the largest population of all Provinces in Cameroon (2,877,873 inhabitants) and which is the most threatened by desertification, has the lowest per-capita gas consumption in the country (0.1 kg/cap/yr). This is due in part to its remoteness from Limbé and Douala, the two feed points into the oil-products network in Cameroon, and in part to the low number of storage facilities, gas cylinders in circulation, and retail outlets in the region.

7.6 To overcome these deficiencies, the Government will need to implement an aggressive policy designed to stop the deforestation and to fight effectively the cutting of wood that is so damaging to the ecosystem. In pursuing such a policy, the Government should adopt the following priority measures.

- Use appropriate incentives to encourage SCDP to construct primary depots in the Provincial Capitals of those Provinces that do not have any (Bamenda - Northwest Province; Bélébo - East Province; Ebolowa - South Province; Garoua - North Province; and Maroua - Far North Province).
- Encourage every LPG distributor through appropriate incentives to develop a retail outlet, over the next two years, in each Provincial Capital since, as mentioned, the five principal gas marketers are only present in three Provincial Capitals.

# 8

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## Household Survey

8.1 The limited budget assigned to this study, and the time constraint that this implies, made it impossible to conduct a rigorous, or even a casual, household survey on LPG consumption. However, information was developed by the Enquête Camerounaise sur les Ménages (the Cameroonian Household Survey, ECAM II), in 2001/2002, and by a survey initiated by the Technical Sub Committee for LPG (SCT/GPL), which showed that:

- 30.1% of the non-poor households consume 93.7% of the total residential LPG supply, or 87.1% of the national consumption;
- 3.7% of the poor households consume 6.3% of the total residential LPG consumption, or 5.9% of the national consumption;
- The average LPG access rate in 2004 was 19.5%, or 38.1% in urban zones and 3.1% in rural areas.

8.2 It is recommended that the two cited surveys be reviewed to determine whether they are still valid and whether the coverage corresponds to current needs, which have certainly changed with the prospect of adding 300,000 MT of LPG by 2010. This is a matter to take up at the round table discussion. If the consensus at that forum is that a new, and perhaps differently focused, household survey is needed, the terms of reference for such a survey should be developed as part of the round-table roadmap.

8.3 The survey to be undertaken should use a survey questionnaire, designed in consultation with the World Bank, with sections dealing with: a) household size and profile; b) fuel use pattern; c) supply logistics; d) fuel preference; and e) amounts spent on fuels. Specific attention should be given to LPG access in rural vs. urban areas and in the south, mid, and northern provinces. The format of the survey questionnaire should be developed jointly by the relevant Cameroonian Ministry and the World Bank.

8.4 The questionnaire should contain two parts: Part A to be completed by retailers and Part B to be completed by households.

8.5 Key issues to be addressed in this survey exercise should include:

- Countrywide availability and affordability of LP Gas to consumers, particularly the rural poor,
- Changes needed to restore consumer confidence and achieve desired growth in the domestic/household LP Gas market,

- Incentives that might be used to overcome barriers to entry, especially for low-income households and in remote regions, in particular in Zone III,
- Hurdles to switching to LP Gas for various consumer categories, including prices of and taxes on household appliances and prices and, if applicable, subsidies on competing fuels,
- Economic data on population,
- Effectiveness of current market-price regulation

# 9

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## Household Appliances

9.1 As mentioned, 93% of the LPG consumption in Cameroon takes place in households where gas is used for cooking, lighting, and refrigeration. As to cooking, a variety of devices are used, ranging from simple gas plates to stoves with ovens.

9.2 Gas plate prices vary in price from 10,000 FCFA to 30,000 FCFA. They are principally used in poor households in both urban and in rural areas.

9.3 Gas stove prices vary from 100,000 FCFA to 500,000 FCFA, depending on the manufacturer's reputation. Gas stoves are used in non poor households.

9.4 Gas lamps are used for lighting in rural zones where there is no electricity. Their prices vary from 10,000 to 50,000 FCFA. Gas lamps are generally used by non poor households that do not wish to use kerosene, which typically has poor illuminating power.

9.5 Prices of refrigerators and gas freezers vary from 800,000 to 1.5 million FCFA. These devices are used by non poor households in rural zones where there is no electricity.

9.6 Generally, the use of LPG for lighting or food conservation remains weak.

9.7 As mentioned in Chapter 8, a household study should be performed that will include a review of prices of, and taxes on, appliances, as well as amounts of and variations in LPG cylinder deposits.

# 10

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## Safety and Image

10.1 In its daily use, including the production, storage, transportation, distribution and consumption of LPG, personal injuries and material damage to goods and the environment occur with alarming frequency due to the failure to observe safety rules.

10.2 This Chapter analyzes safety problems in the distribution chain of LPG, which is widely considered to be the most dangerous of the oil products, and it suggests solutions to some of them.

### Safety in Storage

10.3 A visit to several SCDP depots in Douala and Yaoundé led to the following observations:

- Access, fences, lighting and security are compliant with existing safety standards;
- The depots are well conceived and are generally equipped with all necessary and indispensable elements needed for their effective operation;
- The fire fighting systems are well designed and are in good working order;
- The refuelling operations are entirely automated for bottles of 6 kg and 12.5 kg;
- The depots are fully equipped with bottle testing and re-certification facilities;
- The depots have paint shops to rehabilitate bottles with damaged or worn markings;
- The sealing of gas bottles, however, is not well performed;
- The condition of the bottles and their poor handling represent a permanent danger for these sites. Their inspections at the time of arrival in the depots often do not conform to existing standards. Some bottles come out of the refueling center without protective valve collars, which can cause accidental gas leaks. In the Yaoundé depot, bottles are rolled on the ground after refueling;
- The depots are situated too close to dwellings, in violation of regulations on hazardous business establishments.

10.4 In short, the depots that have been inspected do not scrupulously comply with existing safety standards and regulations. To enforce safety standards, it is recommended that:

- LPG depots be closely monitored for adherence to existing safety regulations;
- Formal training for staff working in depots be instituted.

## **Safety in Transportation**

10.5 A serious accident occurred in 2004 on a bridge crossing the Moungo River on the road from SONARA to Douala. The accident, which involved a loaded tank truck, led to the collapse of the bridge, with severe human and material losses. This calamity demonstrates the need for the management of safety problems and the protection of the environment in all operations related to the transportation of oil products.

### ***Marine Transportation***

10.6 Decree Nbr. 74/19 of December 5, 1974, granted CAMSHIP the monopoly of fluvial and maritime transportation in the territorial waters of Cameroon. The transportation by sea of LPG and other oil products between the Limbé refinery and the deposit of Douala is done by a tanker belonging to CAMSHIP, the CAPE LIMBOH. During discharge operations in Douala, the LPG is transferred to the depot through a pipeline.

10.7 The CAPE LIMBOH is a double-hulled vessel, compliant with international regulations for the transportation of oil products. However, tankers that haul imported products are not generally double-hulled and are not always inspected before being admitted to the port of Douala.

10.8 Since 2001, tankers discharging oil products in the port of Douala no longer dock in the separate oil harbor because of the destruction that year of a pipeline (the Albes line) that had been used to serve coastal vessels. This situation has serious safety implications as shown below:

- The discharge of tankers close to other commercial activities in the port does not comply with international standards;
- The new surface pipeline joining the port with the SCDP depot is not safe from accidents or acts of vandalism. In addition, the line is too close to dwellings and sometimes its site is used as a playground by children;
- Since the buried pipeline joining the oil harbour to the SCDP depots is no longer in use, it is exposed to premature corrosion.

### ***Transportation by Railway***

10.9 The transportation of LPG and other oil products by railway is done exclusively by CAMRAIL, by contractual arrangement. Transportation by rail is used for oil product shipments between the depot of Douala and depots of Yaoundé, Bélabo (oil products only, no LPG), and Ngaoundéré. Loading and discharging of products to and from tank wagons is performed on SCDP sites, with CAMRAIL assuming overall responsibility for safety during transportation. Tank wagons are subject to the laws and regulations concerning the storage and transportation of hazardous products and must follow environmental rules and regulations.

10.10 Observations regarding rail transportation are listed below:

- Loading and discharging of tank wagons in SCDP depots are performed in the presence of CAMRAIL security agents who certify quantities delivered and transported;

- Security during the transportation of oil products is assured by a security service company;
- A program to test and re-test tank wagons has been developed;
- After the discharge of fuels in certain depots, including Yaoundé, vandals, acting in concert with SCDP staff, have been known to drain rail tanks by opening their bottom valves;
- Railway engineers are only trained in railway security. They have no training in petroleum-product safety;
- Safety and accident-prevention signs are affixed on tank wagons (“Flammable Liquids”, “No Smoking”, etc.) ;
- A maintenance and repair contract for fire extinguishers has been signed between CAMRAIL and a company specializing in this field;
- Leaks are commonly observed when charging or discharging products to and from tank wagons, resulting in the pollution of groundwater that has been noted at certain depots, including Yaoundé;
- There have been instances where members of the population at large have stolen petroleum products from tank wagons stationed in rail yards. A huge fire at the SCDP depot in Douala, in February 1998, was triggered by people stealing petroleum products. The accident resulted in numerous deaths and serious injuries.

### ***Road Transportation***

10.11 The transportation of oil products by tank trucks is governed by the provisions of Decree Nbr. 009/MINT/DTT of February 23, 1998, on the regulation of hazardous material by road transport. The transportation of LPG by road uses routes between the Douala depot and the depots of Bafoussam and Yaoundé and, more generally, from the various primary LPG depots throughout the country to retailer outlets.

10.12 The transportation of oil products falls under the jurisdiction of the National Oil-Products Commission, in accordance with provisions of Decree Nbr. 2000/935 of November 13, 2000, that governs the activities of the down-stream petroleum sector.

10.13 The transportation by road of oil products is the responsibility of distributors. To the extent that some road shipments are made with leased trucks, marketers generally require that vehicle rental agencies take out insurance for the transportation of hazardous material. The marketers buy liability insurance for their own operations. With this dual coverage, the marketers are in a position to claim full reimbursement for any cargo losses, no matter what disaster brought them on.

10.14 The tank trucks are more or less in satisfactory working condition. Marketers who are members of the GPP require that trucks hauling their products comply with all regulations in force and they provide close technical supervision on an ongoing basis. Newcomers in the sector are less rigorous in the enforcement of truck regulations.

10.15 The following comments are offered with regard to oil-product transportation by tank trucks:

- Some marketers such as TOTAL, MOBIL and TEXACO use licensed experts to train drivers hauling their oil products, in keeping with international norms;

- Other marketers require that freight companies have their drivers take training courses on the safety of oil-product transportation that are offered by SONARA and SCDP. These drivers receive a one-year certificate that gives them access to loading and discharging operations on all sites owned by these two companies;
- The technical surveillance of tank trucks used in hauling oil products lacks the required rigor. It is performed as a mere formality by public agencies that don't always have the expertise to do the job right;
- Some tank trucks are not subjected to the required original or follow-up hydraulic tests before being put on the road. This is the reason why tank trucks engaged in oil-product transportation are at times seen to have deformed tanks;
- Some trucks don't even carry fire-fighting equipment or, if they do carry it, it is substandard or past their warranty period, or else the drivers don't know how to use it;
- Alarm systems in case of danger or distress call systems more often than not are not carried on board.

10.16 Every year, there are many accidents in Cameroon involving tank trucks used for oil-product transportation. The sight of speeding drivers behind the wheels of tank trucks, endangering their own lives and those of others on the road, and placing their cargos at risk, is not uncommon.

10.17 To ensure the protection of the environment, of the people, and of the LPG they carry, it is recommended that:

- The government of Cameroon emulate international practices by introducing regulations covering the transportation and handling of oil products, and by strictly enforcing them.
- National oil-product distributors are made to apply the rules as rigorously as the subsidiaries of multinational companies do;
- A strict regulatory regime be instituted to develop, monitor and enforce safety rules for tank trucks;
- A safety program to train truck drivers be introduced.

### **Safety in LPG Distribution**

10.18 Except for TOTAL, MOBIL and TEXACO which distribute LPG through their networks of filling stations, other operators use authorized distributors to sell their products. Unfortunately, safety issues in the gas distribution sector are relegated to the background, as operators are primarily focused on gaining market share. Among the safety problems discerned on a first review, the most compelling ones are:

- Gas bottles are handled with appalling negligence throughout the delivery cycle, from charging to transportation, discharging, and storage. The bottles are at times thrown on the ground so that their valves bend under the impact, causing them to leak;
- While in circulation, bottles are more often than not submitted late for hydraulic testing and re-certification. There is no systematic approach in Cameroon to enforce safety regulations of gas bottles, even though they are required to be tested once every five years;



- Except for TOTAL, MOBIL and TEXACO which use metal racks for the storage of gas bottles in their filling stations, other retail outlets are generally simple shops where cylinders are stored on the floor, in unventilated enclosures and generally in disorderly ways. These shops have no safety devices and no fire-fighting equipment;
- The retailers are simply traders who have had no training in working with oil products, let alone gas.

10.19 To improve safety conditions in the distribution of the LPG, it would be desirable to adopt the following measures:

- That gas cylinders be transported in an upright position, rather than lying on their sides;
- To observe scrupulously the rules concerning hydraulic testing and re-certification of cylinders as well as their periodic maintenance;
- To compel all operators to stock their gas bottles in racks and in well ventilated locations and to have at fire-fighting equipment on site;
- To make sure that gas marketers and retailers employ trained staff in their distribution operations who are knowledgeable in the use of petroleum products and gas.

### **Safety in LPG Consumption**

10.20 Most of the LPG in Cameroon is consumed in households. According to a recent survey by the Institut National de la Statistique (INS, the National Statistical Institute), 20,955 households have experienced gas-related accidents in 2004, resulting in the deaths of 279 people and injuring 4,270. This corresponds to 3.3% of the LPG-consuming households. These LPG-related accidents in the consumer sector are generally due to leaks caused by:

- Bad connections between cylinders and appliances;
- Deteriorated conditions of bottles that were either exposed to impact during transport or whose maintenance programs were not adhered to;
- Failure to fully close valves;
- Deteriorated conditions of appliances.

### **Safety Training**

10.21 Safety is perhaps the most neglected and potentially most damaging part of the LPG sector. Gross violations of safety regulations occur from the very beginning of the supply chain all the way to and including the end-user. It is not clear whether the problem lies with the adequacy and relevance of the regulations or whether this is a matter of indifferent or incompetent enforcement. Be this as it may, to mitigate the current unacceptable safety regime in Cameroon, a detailed review of the regulatory institution is required. At the moment, that is the Ministry of Water and Energy (MINEE). Questions to be asked are whether the country would be better off by having the regulatory institution developed as an independent agency, whether stricter laws or additional funding, or both, are needed, and whether criminal sanctions are warranted in cases of blatant or wilful non-compliance by suppliers and in the face of spectacular accidents that could easily have been avoided.

10.22 The introduction of a strict enforcement regime will have to be backed by an educational effort on both the suppliers' and end-users' side. As to suppliers, training courses

need to be developed or, to the extent that they exist already, participation in them and the passing of rigorous examinations need to be made a condition for awarding operator's licenses, similar to the way the international oil companies screen their LPG affiliates before they allow them to enter the market on their behalf. That goes for all supply sectors, from storage operations to all transport modes and on to LPG retailing and distribution.

10.23 Even more rigorous training needs to be administered to safety inspectors. The regulatory agency needs to have enforcement offices in key points throughout the country, to expose safety violators to sanctions wherever they are, and they need the equipment that will make enforcement a reality, such as vehicles, computers and standard office equipment. They also need to have sufficient compensation to make them less vulnerable to pay-offs.

10.24 The specific violations to guard against are too numerous to list here. Some, but by no means all, have been mentioned in the various sub-sector discussions of this Chapter.

10.25 As to end-users, it is strongly recommended that the government design and implement a media information campaign to sensitize the population to LPG safety rules. Consumer education should consist of clear, direct messages relevant to consumer needs and should not be confused with technical instructions. Extension of LP Gas supply to new areas and consumers should be preceded by consumer information and education programs. The programs should be devised and delivered by the LP Gas industry.

# 11

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## **Automotive Use of LPG**

11.1 Even though, as of 2004, Cameroon had an estimated automotive fleet of 300,000 vehicles, LPG has not yet been put to use as an automotive fuel. The use of this source of energy as an automotive fuel is not expected to occur any time soon, because of the safety problems associated with LPG and because of the poor condition of the vehicles in circulation.

11.2 As part of this study, 73 motorists have been interviewed, and no one considered driving a car using gas as automotive fuel. Thus, for the time being, gasoline and diesel fuel will remain the only relevant motor fuels.

11.3 That said, LPG represents a huge market potential to be developed, especially in light of the additional supply, in 2010, of 300,000 MT to come from flared gas captured from the Rio del Rey oil fields.

# 12

## Investment and Funding

12.1 As seen in Chapter 1, the consumption of LPG in Cameroon was 2.5 kg/cap/yr in 2004, low in terms of the consumption potential of the country and roughly the same as in most neighboring countries, except Senegal where the LPG sold in small bottles is highly subsidized. For four countries in the region, Cameroon, Côte d'Ivoire, Ghana, and Senegal, the average per-capita consumption rate was 3.7 kg/cap/yr.

12.2 By 2010, when the current project to recover Cameroon's associated gas and to export it to Equatorial Guinea is completed, the country will have at its disposal some 300,000 MT of LPG per year, part of which will be used for domestic consumption and the rest exported. Based on the assumption that Cameroon will reach an average per-capita consumption level of 3.7 kg/cap/yr, and given its projected population of 20,015,000 inhabitants by 2010, its LPG consumption that year will be around 74,000 MT. This will require the implementation of an urgent program to invest in storage facilities and transportation equipment, and it will call for the acquisition of new LPG cylinders and the expansion of retail outlets.

12.3 This Chapter analyzes the short-term and long-term investments that will be required to permit a consumption level in Cameroon corresponding to the medium-growth scenario presented in the Chapter 4, i.e., to 122,375 MT in 2025. The analysis that follows breaks the LPG investment requirements down to the storage, transportation, and distribution sub-sectors.

### Investment Requirements for LPG Storage Capacity

12.4 Table 12.1 shows the projected shortages of LPG storage capacities in current facilities owned by SCDP.

**Table 12.1: Projected Shortages in SCDP Storage Capacity  
(Metric Tons)**

Depot	2010	2015	2020	2025
Douala	- 2,265	- 3,299	- 4,891	- 7,412
Bafoussam	- 466	- 638	- 905	- 1,327
Yaoundé	- 2,854	- 3,770	- 5,187	- 7,429
Ngaoundéré	-186	- 262	- 381	- 569
Total	- 5,771	-7,969	- 11,365	- 16,737

Source: EEIC (Minor Discrepancies due to Rounding)

12.5 Table 12.2 reflects the investments that will have to be made to meet the projected requirements in existing SCDP primary storage depots through 2025, as well as those in Limbé (owned by SONARA) and a new facility to be constructed in Maroua by SCDP.

**Table 12.2: Supplementary Storage Capacities Needed  
(Metric Tons)**

<b>Depot</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>Totals</b>
Douala	2,500	1,000	1,500	2,500	7,500
Limbé	10,000	0	0	0	10,000
Bafoussam	500	150	250	500	1,400
Yaoundé	3,000	1,000	1,500	2,000	7,500
Ngaoundéré	200	100	100	200	600
Maroua	50		35		85
<b>Total</b>	<b>16,250</b>	<b>2,250</b>	<b>3,385</b>	<b>5,200</b>	<b>27,085</b>

Source: EEIC

12.6 The primary depot to be constructed at Limbé will provide sufficient bottling capacity to meet needs consumption in the Southwest Province. The depot at Maroua will boost LPG consumption in the Far North Province, in line with the government's aggressive policy to contain the ongoing desertification in that Province.

12.7 In addition to the expansion of storage capacities, the following infrastructure improvements will be required:

- The rehabilitation and upgrading to current regulatory standards of existing storage facilities (Douala, Bafoussam, Yaoundé and Ngaoundéré) to optimize operations there;
- The modernization and the expansion of SONARA's loading stations.

12.8 According to a survey by EEIC, the cost to rehabilitate, upgrade and modernize existing LPG storage facilities and to build new ones to required levels over the next 20 years is 35.018 billion FCFA, Table 12.3.

**Table 12.3: Investment Requirements to Update Storage Capacities, 2007 to 2025  
(Million FCFA)**

Period	Depot	Douala	Limbé	Baf'sam	Y'dé	Ng'déré	Maroua	Total
2010	Increase in Capacity	3,191	5000	638	3,829	255	0	12,913
	Rehabilitation	25	0	0	0	0	0	25
	Modernization	0	0	0	750	0	0	750
	<b>Total</b>	<b>3,216</b>	<b>5,000</b>	<b>638</b>	<b>4,579</b>	<b>255</b>	<b>0</b>	<b>13,688</b>
2015	Increase in Capacity	814	0	122	1,629	163	0	2,728
	Rehabilitation	0	0	0	0	0	0	0
	Modernization	0	0	0	0	0	0	0
	<b>Total</b>	<b>814</b>	<b>0</b>	<b>122</b>	<b>1,629</b>	<b>163</b>	<b>0</b>	<b>2,728</b>
2020	Increase in Capacity	1,559	0	260	3,118	163	57	5,157
	Rehabilitation	0	0	0	0	0	0	0
	Modernization	50	0	0	0	0	0	50
	<b>Total</b>	<b>1,609</b>	<b>0</b>	<b>260</b>	<b>3,118</b>	<b>163</b>	<b>57</b>	<b>5,207</b>
2025	Increase in Capacity	6,633	0	1,039	5,307	416	0	13,395
	Rehabilitation	0	0	0	0	0	0	0
	Modernization	0	0	0	0	0	0	0
	<b>Total</b>	<b>6,633</b>	<b>0</b>	<b>1,039</b>	<b>5,307</b>	<b>416</b>	<b>0</b>	<b>13,395</b>
Totals	Increase in Capacity	12,197	5,000	2,059	13,883	997	57	34,193
	Rehabilitation	25	0	0	0	0	0	25
	Modernization	50	0	0	750	0	0	800
	<b>Grand Total</b>	<b>12,272</b>	<b>5,000</b>	<b>2,059</b>	<b>14,633</b>	<b>997</b>	<b>57</b>	<b>35,018</b>

Source: CREAD Consulting

### Investment Requirements for LPG Transportation

12.9 The current transportation capacity in Cameroon is characterized by shortages that are expected to become more pronounced over time as demand increases. The investments required to keep transportation capacities at par include:

- Maintenance of coastal transportation from Limbé to Douala;
- Rehabilitation of the existing fleet of tank trucks;
- Increase in size of the tank truck fleet;
- Increase in the number of rail tanks;
- Modernization of loading facilities.

12.10 Assuming an increase in LPG consumption corresponding to the medium-growth scenario presented in the Chapter 4, i.e., to 122,375 MT in 2025, the capacity needs in the LPG transportation sector are presented in Table 12.4, in MT.

**Table 12.4: Projection of Required Transportation Capacities, 2010 to 2025, (Metric Tons)**

<b>Routes</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>
Limbé-Douala	47,150	60,031	79,957	111,484
Limbé-Bafoussam	4,606	5,865	7,811	10,891
Douala-Yaoundé-Ngaoundéré	24,222	30,839	41,076	57,272
Ngaoundéré-Garoua	983	1,252	1,668	2,325
Ngaoundéré-Maroua	259	329	439	612
<b>Total</b>	<b>77,220</b>	<b>98,316</b>	<b>132,971</b>	<b>184,609</b>

Source: EEIC

- As mentioned, the shipment of LPG between Limbé and Douala is possible only by sea or road. Because the roads are already overcrowded, only investments in coastal transportation have been considered here;
- The shipment of LPG from Limbé to Bafoussam can only be done by truck;
- LPG shipments from Douala to Yaoundé and Ngaoundéré can be done by rail or trucks. Because of overcrowding on the Douala-Yaoundé road and the dilapidated condition of some sections of the Douala-Ngaoundéré road, only rail shipments have been used in the calculations that follow;
- LPG shipments from Ngaoundéré to Garoua and Maroua can only be done by road.

12.11 The project to recover and export to Equatorial Guinea the associated gas that is currently produced and flared in Cameroon, which is expected to generate the production of an additional 300,000 MT of LPG per year, will require substantial investments for its delivery in Douala. In the estimates that follow it was assumed that those investments are part of the Equatorial Guinea project and are included as part of that project. Hence, these investment needs have not been taken in consideration here.

12.12 Thus, the program to bring the transportation facilities to a level compatible with the projected growth in LPG demand has been estimated by EEIC to cost 12.158 billion FCFA, based on:

- The modernization of loading facilities: 0.1 billion FCFA;
- The rehabilitation of tank trucks: 0.1 billion FCFA;
- The increase in the number of tank trucks: 2.434 billion FCFA;
- The increase in the number of rail tanks 9.724 billion FCFA.

12.13 Table 12.5 shows the projected investment requirements over time.

**Table 12.5: Investment Requirements for Transportation Sector  
(Million FCFA)**

Designation	2010	2015	2020	2025	Cumul
Modernization of Facilities	100	0	0	0	100
Rehabilitation of Tank trucks	100	0	0	0	100
Increase of Tank-Truck fleet	0	525	762	1,147	2,434
Increase of Rail Tanks	1,050	1,610	2,616	4,448	9,724
<b>Total</b>	<b>1,250</b>	<b>2,135</b>	<b>3,378</b>	<b>5,695</b>	<b>12,358</b>

Source: EEIC

### Investment Requirements for LPG Distribution

12.14 In addition to the required expansion of storage and transportation capacities, the investment requirements include the optimization of retail facilities, meaning increases in the number of gas cylinders and retail outlets.

#### *Increasing the Number of Gas Cylinders*

12.15 A study conducted by EEIC Consulting as to what it takes to keep up with the projected growth in LPG consumption in Cameroon revealed that the number of required gas bottles will rise from 969,652 in 2004 to 3,222,772 in 2025. Table 12.6 sums up the growth pattern, required acquisitions, and the cost of the requisite bottles.

**Table 12.6: Investment Requirements for LPG Bottles**

Designation	2010	2015	2020	2025	Total
Required Bottles	1,424,292	1,849,003	2,446,472	3,222,772	3,222,772
Bottles to be Acquired	454,640	424,711	597,469	776,300	2,253,120
Cost (Thousand FCFA)	7,704,418	4,124,256	3,663,013	5,196,740	20,688,427

Source: EEIC/CREAD Consulting

#### *Increasing Retail Outlets*

12.16 Conformant with the preceding assumptions, the relevant facilities in the LPG distribution sector are:

- Filling stations;
- Redistribution centers;
- Retail outlets;
- Refueling microcenters.



12.17 A Redistribution center is an installation equipped for wholesale and retail services, including: a minimum inventory of 500 bottles of 12.5 kg equivalent capacity, a ventilated building for the storage of bottles, and an administrative office.

12.18 An LPG retail outlet is an establishment that has a minimum inventory of 200 bottles of 12.5 kg equivalent capacity and a ventilated building for the storage of bottles;

12.19 A refueling microcenter is an installation equipped to handle the acquisition, short-term storage and sale at retail of LPG. It can have a maximum of two horizontal tanks up to 20 MT each.

12.20 Since LPG is mostly being consumed in urban zones, the following assumptions were made in calculating the required number of retail outlets.

- A ratio of 5,000 inhabitants per retail outlet in urban zones as currently observed in the Littoral Province ;
- A ratio of 15,000 inhabitants per retail outlet in rural zones.

12.21 Considering that the 2002 population of 16,046,910 inhabitants consisted of 5,529,316 urban dwellers and 10,517,694 rural inhabitants, Cameroon should have had 1,807 retail outlets that year, 1,106 of them in urban zones and 701 in rural zones.

12.22 Taking into account these ratios, the expenses associated with the creation of retail outlets (7.48 billion FCFA) and those that are required for the implementation of a promotional campaign for the use of LPG (0.5 billion FCFA for the respective periods under review), the investment required for optimizing the LPG distribution in Cameroon has been estimated to be 10.47 billion FCFA, considering a rate of inflation of 5% per year.

**Table 12.7: Investment Requirements for Retail Outlets and Promotion**

<b>Designation</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>Total</b>
Retail Outlets	1,250	1,595	2,036	2,599	7,480
Promotional Campaign	500	638	814	1,039	2,992
Total Cost (Millions of FCFAs)	1,750	2,233	2,850	3,638	10,472

Source: CREAD Consulting

### **Promotional Campaign**

12.23 A troubling situation has developed in the Far North Province, where the use of wood as the dominant fuel has led to a significant fuel shortage and has brought on the desertification of substantial parts of the Province. That, and low LPG consumption point to an urgent need to develop and implement a promotional campaign to encourage the use of gas, in order to reduce the pressure on the ecosystem. The promotional campaign has been estimated to cost 500 million FCFA per period. The relevant amounts, inflated at 5% per year, are shown in Table 13.7.

## Total LPG Investment Requirements

12.24 When the associated-gas recovery and export project with Equatorial Guinea is completed in 2010, Cameroon will have some 300,000 MT of LPG per year at its disposal, part of which will be used to supply the domestic market. To absorb the new LPG supplies resulting from the associated-gas recovery project, substantial investments totaling 78.535 billion FCFA will have to be made in the gas sector over the next 20 years. These investments will need to be made in the various LPG sub-sectors as shown in Table 12.8

**Table 12.8: Projected Investments Needs in the LPG Sector, Million FCFA**

<b>Designation</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>Totals</b>
Storage	13,688	2,728	5,207	13,393	35,016
Transportation	1,250	2,135	3,378	5,595	12,358
Gas Bottles	7,704	4,124	3,663	5,196	20,688
Retail Outlets	1,250	1,595	2,036	2,598	7,480
LPG Promotion	500	638	814	1,039	2,992
<b>Total</b>	<b>24,394</b>	<b>11,222</b>	<b>15,100</b>	<b>27,824</b>	<b>78,534</b>

12.25 As mentioned, the investments associated with the Equatorial Guinea project have been considered to be part of that project, and have not been included here.

# 13

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## Access to LPG by the Poor

13.1 Based on a household survey conducted by ECAM II in 2001, the poverty line in Cameroon has been determined to be 232,547 FCFA per household per year, or US \$1.08 per day, using 2001 exchange rates. Based on that level, 40% of the population is poor and 60% is classified as non-poor. Only 3.7% of the poor use LPG. This low consumption of residential gas among the poor is essentially due to the high prices of gas appliances, as mentioned in Chapter 9, and to the relatively high market price of the gas (6,500 FCFA for a 12.5 kg bottle in Douala, Bafoussam, Yaoundé and Ngaoundéré).

13.2 As mentioned in Chapter 6, the discrepancy in bottle deposits is another barrier to access by the poor. In Yaoundé, the deposit for the most popular 12.5 kg bottle ranges from 10,000 to 20,000 FCFA.

13.3 Other impediments to LPG accessibility, especially in Zone III, which encompasses the three northern-most Provinces of Adamaoua, North Province and Far North Province, are the lack of retail outlets and bottle inventories. Even though that Zone accounts for 32% of the population and 34,5% of the surface area of Cameroon, it only has 4% of the retail outlets and 5% of bottle inventory.

13.4 A similar picture emerges with regard to primary storage capacities. The North and Far North Provinces have no primary storage capacity, even though, between them, they account for 21% of the total surface area of Cameroon.

13.5 All things considered, the far northern provinces of Zone III have the lowest accessibility rate, since one retail outlet only serves 151,300 inhabitants. This compares to 14,300 customers per retail outlet for Cameroon as a whole, and to 4,900 for Littoral, which is by far the highest per-capita use province in the country.

13.6 Cameroon committed itself, as part of its structural adjustment program, to eliminate subsidies on certain products of basic necessity such as domestic gas, yet the very structure of the sales price of this product drives up its cost through items like the stabilization and equalization tax.

13.7 In the final analysis, supplies will flow to where the incentives are. That means that the pricing structure needs to be re-examined for its efficiency in allocating LPG to the areas where it is needed most, assisted by a determined government policy to eliminate, or at a minimum reduce, the current deforestation in the northern part of Cameroon. It also means the development of a targeted growth policy that will stimulate the absorptive capacity of the LPG-

starved provinces in the north, once the new LPG availability from the Equatorial Guinean gas export program is completed.

# 14

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## Critical Issues- Strategies and Action Plans

### Critical Issues

14.1 *Current Status:* Even though the Cameroonian LPG market has grown substantially over the years, it has failed to fully achieve its potential. Total LPG consumption has more than tripled over the last twenty years and per-capita consumption has doubled, but much of the country's associated gas is still being flared and will continue to be flared for another 4 years, until a major associated-gas recovery project is completed. Perhaps the greatest hurdle Cameroon still has to overcome is the achievement of deeper and more evenly divided market penetration. Practically no LPG is used where it is needed most, in the Far North Province where the per-capita consumption is 0.1 kg. Efforts to stabilize the domestic price of LPG in the face of volatile international markets have been partially successful, but they have introduced a rigid pricing mechanism that keeps domestic market forces at bay. This has led to capital shortages in the industry and to shortages and obsolescence in equipment, which resulted in a sluggish growth and uneven use patterns. In response, there have been suggestions regarding the need to compel industry to expand into areas where, under the current system, little LPG is being delivered. Mandatory market adjustments generally signal the absence of effective incentives. If implemented, they would merely compound the existing capital shortage.

14.2 There is one area that does require compulsory action, and that is in the enforcement of safety and other regulations. A review of the current regulatory oversight mechanism is needed, including a determination of the character of the oversight board, its independence and non-involvement in operational activities, and its ability to develop and impose sanctions.

14.3 *LPG Industry Structure:* The three major participants in the Cameroonian LPG market are the government, quasi-public corporations, and private operators. While the government is clearly committed to move the industry away from government ownership and towards relatively unimpeded private-enterprise markets, its presence and influence in the market continue to be pervasive.

14.4 *Legal and Regulatory Structure:* A number of laws, decrees, and orders govern every aspect of the LPG sector. Among them, the Caisse de Stabilisation des Prix des Hydrocarbures under the Ministry of Trade is in charge of regulating the LPG distribution sector, where it operates the country's price stabilization and equalization programs. Meanwhile, the Ministry of Water and Energy is the lead agency for all administrative and technical activities of the petroleum products industry, including the development and implementation of legislation

and oversight responsibility of all regulatory activities in the petroleum products sector. Both Agencies are discussed in more detail later in this Chapter.

14.5 *LPG Demand:* Almost all of the LPG consumed in Cameroon is used by the household sector. Under almost any scenario, LPG consumption is expected to rise substantially over the foreseeable future, which gives rise to concern how the demand increase will be accommodated.

14.6 *LPG Supply:* The completion of the ongoing associated-gas project to capture natural gas currently flared at the wellhead, to strip it and ship the methane components to Equatorial Guinea for liquefaction and export, will create a new source of supply of some 300,000 MT of LPG per year for consumption in Cameroon. While this is an extraordinary opportunity, it is also a challenge since such a dramatic increase in LPG availability will require substantial investments to handle them.

14.7 *LPG Distribution Infrastructure:* The entire LPG supply chain, from storage facilities and transportation to the distribution network is underdeveloped and in urgent need of upgrading, rehabilitation, and new capacity development. The principal storage company in Cameroon, SCDP has not expanded its storage capacity in 20 years. As of 2004, SCDP storage capacity was 3,077 MT below legal requirements. Similar problems exist in coastal transportation, where there is a shortage of safe (double hulled) marine vessels, and in railway and road transportation where serious regulatory and safety problems place equipment and people in jeopardy.

14.8 *Household Cooking and Lighting Demand:* In 2002, wood constituted by far the most important energy source in Cameroon, at 61% of the country's total energy consumption, with oil products running a distant second at 21%. Within the various oil products, LPG ran second to last, out of seven categories of oil products, at 3.1%, aviation fuel being last. In other words, LPG consumption was, and continues to be, a relatively insignificant source of energy in Cameroon.

14.9 *Household Survey:* A household survey conducted in 2001/2002 revealed that LPG consumption is unevenly distributed across the nation. Forty percent of the population lives below the poverty line, and only 3.7% of the poor households use LPG. This divergence in LPG consumption also manifests itself regionally and in terms of urban vs. rural consumption.

14.10 *Household Appliances:* Almost all of Cameroon's LPG is consumed in households, where it is used mostly for cooking, with limited use for lighting and refrigeration in rural zones that have no access to electricity household.

14.11 *Safety and Image:* In Cameroon, LPG has the reputation of being an unsafe fuel, and for good reason. In 2004, 20,955 households have experienced gas-related accidents resulting in the deaths of 279 people and injuring 4,270. This unacceptably high accident rate is almost exclusively attributable to careless handling of the gas in all sub-sectors of the LPG market, including storage, transportation, distribution, and above all consumption. The situation requires more vigorous enforcement of existing safety regulations in the LPG industry, better training of professionals in the LPG sector, and a serious safety campaign among residential end-users.

14.12 *Investment and Funding:* Serious under-investment characterizes the Cameroonian LPG industry. There are shortages in storage capacities of major depots, an undersized and in part deteriorated truck fleet, a severe shortage of retail outlets and of LPG cylinders, to name a few. These shortages will become worse as consumption rises, unless the government finds a mechanism to attract investors into the market.

14.13 *Automotive Use of LPG:* Even though, as of 2004, Cameroon had an estimated automotive fleet of 300,000 vehicles, LPG has not yet been put to use as an automotive fuel. The use of this source of energy as an automotive fuel is not expected to occur any time soon, because of the safety problems associated with LPG and because of the poor condition of the vehicles in circulation.

14.14 *Access to LPG by the Poor:* Only 3.7% of the poor households use LPG as a residential fuel. The average LPG access rate in 2004 was 19.5% for the country at large; it was 38.1% in urban zones and 3.1% in rural areas.

## **Strategy and Action Plans**

14.15 This and other individual LPG country reports will be presented in draft form to government officials, potential investors, and industry players for discussion by means of a workshop. The objective of the workshop will be to define a common ground, if any, for workable strategies to ensure the transformation and growth of the LPG sectors by developing specific policies and regulations that are conducive to that objective. Country-by-country findings as well as an overall summary report will present the relevant comments and conclusions at the end of the workshop in which the country consultants may be able to actively participate. These conclusions will be incorporated into the final report, including a roadmap that will delineate the steps to be followed in implementing the recommendations flowing from the workshop. The roadmap as outlined in the workshop will be fleshed out by the main consultant, in consultation with the individual country consultants, and presented in a final joint report.