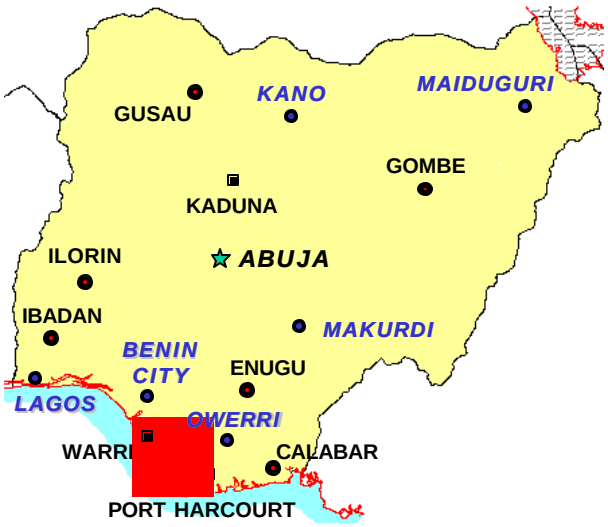
Nigerian LP Gas Sector Improvement Study

March 2004



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Preface

1. Despite their huge national energy resource, many Nigerians do not have access to quality, modern energy services. For those with access, energy supply all too often lacks reliability, especially in the case of Liquefied Petroleum Gas or LP Gas. Nigeria is a world-class producer of an estimated 4 million tons of LP Gas in 2003, but its consumption collapsed to about 50,000 tons that same year, most of which was imported! How could a country which produces so much export-quality LP Gas, consume so little of it, 0.5 kg/h/year or the smallest per capita consumption of the Region, which stands at 3.7 kg/h/year, as in many net-import, neighboring countries. Simply reaching that level would imply a sevenfold increase in domestic Nigerian consumption.

2. Nigeria produces large volumes of associated gas rich in natural gas liquids (NGLs) and LP Gas, and nearly half of which is presently flared, a situation the Federal Government of Nigeria (FGN) wants firmly corrected by 2008. The country also produces and exports large quantities of LP Gas, which prompted the FGN, in its effort to eliminate gas flaring, to ask the question why domestic usage is so low. It also asked whether the fuel could have played a more significant role in domestic energy supply and, hence, in improving peoples lives, in helping mitigating the negative environmental impacts of alternative fuel usage, and assist with ongoing poverty alleviation efforts deployed by the FGN and the World Bank. This study falls within the realm of the Strategic Gas Plan for Nigeria which aims at eliminating gas flaring by 2008 and which has been analyzed in depth in previous studies, including *Strategic Gas Plan for Nigeria*, ESMAP Formal Report 279/04.

3. An earlier Regional LP Gas Study, undertaken jointly in 2001 by the World Bank Oil and Gas Division and the World LP Gas Association, revealed the very low per-capita usage of LP Gas in Nigeria compared with other neighboring countries of West Africa. LP Gas enjoys worldwide recognition as a clean, versatile, transportable, and environment-friendly fuel. Preliminary investigation indicated certain problems in the Nigerian LP Gas sector, most notably, an inadequate supply to the domestic market, lack of access to existing infrastructure, and shortcomings in the institutional and regulatory framework. It asserted the need for this study which will look in depth, into the structural reasons for this market failure. It will propose realistic ways and means, to address it and bring Nigeria's LP Gas consumption in line with its resource-based capabilities and closer to the Region's average, as a first step. This study was endorsed by the FGN who fully supported it until its conclusion.

Acknowledgments

The study underlines the Nigerian government's strategic role in promoting orderly and proactive gas development schemes and the drive for change in gas flaring reduction for a better use of Nigeria's gas resources. Mourad Belguedj, Lead Energy Specialist of the World Bank's Oil, Gas, Chemicals, and Mining Department who initiated this effort in response to the Federal Government of Nigeria, designed and managed the project. This study follows previous work undertaken in Nigeria as part of the World Bank and the government's strategic gas plan and the decision to cease all gas flaring by 2008 and feed all associated gas into productive uses. The Consulting firm C.I.Services Limited (CIS) of Ireland, carried out this study with financing from the Energy Sector Management Assistance Program (ESMAP). ESMAP is a global technical assistance program that helps build consensus and provides policy advice on sustainable energy development to developing countries and economies in transition. Its goals relate directly to this study's intent. The study will also be useful to policymakers, industry, and practitioners in identifying projects in the gas and LP Gas sectors, addressing key policy issues, and enriching the debate on energy sector reforms in Nigeria. The author wishes to thank the Federal Government of Nigeria, and the public and private sector entities visited, for their support and cooperation.

The author also wishes to thank all the colleagues who greatly contributed to the review and analysis of this work, namely: Robert Bacon, Manager; Mark Tomlinson, Nigeria Country Director; Andrew Alli, IFC Lagos Country Manager; Charles McPherson, Senior Adviser; Eleodoro Mayorga Alba, Lead Petroleum Specialist; Masami Kojima, Lead Energy Specialist; and Akin Oduolowu, Lead Energy Specialist; Peter Law, Senior Energy Specialist; and Adegbite Adeniji, Legal Counsel. This report was edited and desktop published by Esther Petrilli-Massey from COCPO; Gregory Prakas from the Bank's Cartography Department provided Bank-cleared maps, and Marjorie K. Araya from ESMAP coordinated its publication, distribution and dissemination.

Abbreviations and Acronyms

AIP	ALPGAM Investment Plc.
BPE	Bureau of Public Enterprises
C3	Propane
C4	Butane
CIS	C.I. Services Limited.
DPR	Department of Petroleum Resources
EGP	Escravos Gas Project
FCC	Fluid Catalytic Cracker
FCT	Federal Capital Territory
FGN	Federal Government of Nigeria
FOB	Free on Board
IFC	International Finance Corporation
LNG	Liquefied Natural Gas
LPG/LP Gas	Liquefied Petroleum Gas
MOU	Memorandum of Understanding
N	Naira
NALPGAM	Nigerian Association of LP Gas Marketers
NAPIMS	National Petroleum Investment Management Services
NGA	Nigerian Gas Association
NGC	Nigerian Gas Company
NGCC	Nigerian Gas Cylinder Company
NGL	Natural Gas Liquid
NGO	Nongovernmental Organization
NIPC	Nigerian Investment Promotion Commission
NLNG	Nigeria LNG Limited
NNPC	Nigerian National Petroleum Corporation
NPDC	Nigerian Petroleum Development Company
PMS	Petroleum Motor Spirit
PPMC	Pipelines and Products Marketing Company
SON	Standards Organization of Nigeria
TAM	Turnaround Maintenance
UNDP	United Nations Development Programme
WLPGA	World LP Gas Association

Units of Measure

Kg	Kilogram
Km	Kilometer
m	million
Mj	Megajoule
mmscf/day	Million standard cubic feet per day
MT	Metric ton
scf/day	Standard cubic feet per day
tpd	Metric tons per day
tpy	Tons per year

Currency Equivalents

US Dollar (US$)	N130

Executive Summary

Introduction

1. This report represents a further step in the Nigerian LP Gas Sector Improvement Study. It follows the report on the fact-finding mission and study work plan, submitted initially in December 2002, and updated in January 2003. The preliminary report submitted in March 2003, incorporated additional fact finding (including the findings of a household survey), and an analysis of critical issues. These critical issues are addressed in this final report through a set of strategies and related action plans outlined in Chapter 15, and set out in roadmap format in Chapter 17. The recommendations are included in this Executive Summary. A final stakeholders workshop was held in Abuja on December 11, 2003. At this workshop, held under the auspices of the Federal Government of Nigeria and the World Bank, the study consultants, C.I.Services, and the World Bank Team jointly presented their study findings, and most importantly, the strategic roadmap to bring the sector back to sustainable development. Following on the workshop, and at the suggestion of the World Bank, the Federal Government of Nigeria recommended that a steering committee be set up to pilot, promote, and monitor the implementation of the roadmap.

Study Objectives

2. The objectives of this study are to:

- Investigate and identify reasons for the LP Gas market failure in Nigeria
- Develop a strategy for reviving Nigeria's domestic LP Gas market
- Expand LP Gas access to all, including to the poor, in Nigeria.

3. The target is to achieve per capita LP Gas consumption equivalent to the average for comparable West African countries. According to data in the World Bank/WLPGA (World LP Gas Association) Study for West Africa this is approximately 3.7 kg per capita per year and will represent a seven-fold increase in recent annual consumption in Nigeria. It should be emphasized that this would result in an industry with an annual revenue of about N37 billion.

Findings and Strategies

4. The key issues and strategies are summarized here and are set out in more detail in Chapter 15, and in roadmap format in Chapter 17. The matrix for the roadmap is on the last page of the report.

Objectives

5. The best prospect for extending LP Gas access to the poor is from a well-founded industry. No realistic prospect of achieving this second objective in a sustainable

manner is feasible, until the first objective has been implemented, that is, until sector recovery becomes a reality.

Current Status

6. The LP Gas industry in Nigeria has experienced a dramatic contraction of its market in recent years. This followed a period of rapid expansion in the number of licensed marketers. Development strategies have given way to survival strategies, but with little consolidation. Plants have been closed to await better times.

7. Actual and potential LP Gas consumers face a marketplace of uncertain supply and extremely volatile pricing. End user prices are effectively set by final resellers many of whom exploit a real or contrived scarcity to raise prices arbitrarily. When LP Gas becomes available, resellers may be forced to reduce prices equally arbitrarily. Prospective consumers are deterred by the uncertainty regarding future prices and availability. A less turbulent market is essential for sector recovery, that is, to maintain existing users and encourage prospective LP Gas users to make the necessary initial cash outlay.

Policy

8. The successful attainment of the study objectives depends critically on consistent government policy, clearly stated and demonstrably supportive. The following principles would form the basis of a thriving LP Gas sector:

- Strong government commitment to support the development of the domestic LP Gas sector, as part of its zero flare policy and set clear target dates for achieving results on the ground, commensurate with the country's resource base and absorptive capacity.
- Energy provision should be competitive with prices being set by the international market as they are today.
- Taxes and tax differentials should not distort the market. Given the health benefits of LP Gas over kerosene and traditional cooking fuels, tax on LP Gas should neither reduce its competitiveness nor discourage its use. To the contrary, appropriate incentives should be investigated to facilitate access and affordability of initial investments for consumers.
- LP Gas should be a key component of energy supply where natural gas is not available or not likely to be available in the near future.
- LP Gas supply to the domestic market should be adequate and should be sustained, if necessary, at the expense of exports.
- Barriers to market entry and participation should be removed. Financial or regulatory impediments to investment should not be allowed to discourage responsible industry players. Appropriate incentives should be put in place to encourage, for at least a period,

the heavy front end investments required to start or restart local LP Gas activities, upstream, midstream, and downstream.

- Regulatory processes should promote public and consumer safety by updating related health, safety, and environmental rules and regulations and by insisting on appropriate standards while openly penalizing irresponsible practices.

9. Key policy issues should bring the LP Gas sector into the government gas policy, zero flaring objectives for 2008, and the overall gas master plan and strategy. Government recognition of the need for clear supportive policies is evident in the communiqué issued following the LP Gas workshop (attached hereafter as Annex 4).

Legislation/Regulation

10. The legal framework for the sector is very weak and needs serious upgrading and consolidation to enable the sector to develop as a "stand alone" industry. Simple but specific legal and regulatory measures are required to attract interest and investment in the sector.

11. The LP Gas industry relationship with its principal regulatory body—the Department of Petroleum Resources (DPR)—emphasizes on licensing of facilities and statistics. There is little evidence of ongoing constructive dialogue between the industry and the Department of Petroleum Resources. The DPR also has adopted a standard-setting role but lacks a specific department or division for LP Gas affairs. The Standards Organization of Nigeria (SON) has a limited role, backed by minimal resources. The regulators must be independent and competent. Capacity building is needed here to bring the regulators to an accepted state-of-the-art level, as was achieved in the power sector.

12. Future legislation should take account of the role and needs of the LP Gas sector. Central to this are clarification of cylinder ownership; standardization of cylinder sizes, valves, and regulators; and responsibility for maintenance and replacement. Policy for LP Gas must be clearly stated and supported at the government level. Regulation should be coherent and support sector recovery within the framework of national energy policy. The functions of the DPR and SON with respect to LP Gas and the interface between them need clarification.

13. At the LP Gas Workshop the Chair of the Gas Resources Committee in the House of Representatives stated that, although specific legislation for LP Gas did not exist, a bill is being prepared in an effort to improve access to LP Gas. The steering committee should follow up this initiative and include the initiative in its forthcoming agenda.

Industry Structure

14. The domestic LP Gas market is highly fragmented and the industry acknowledges the need for a single and more representative "LP Gas Association" to realize its full potential and for effective communication with the government. Following from the LP Gas Workshop of December 11, 2004, the Nigerian Association of Liquefied Petroleum Gas Marketers (NALPGAM) and the LP Gas Group in the Lagos Chamber of

Commerce have agreed to pursue this objective urgently. The steering committee should also include this item in its forthcoming agenda.

Supply/Economics

15. The domestic LP Gas market depended effectively in the past on the refineries. The refineries have proved to be unreliable suppliers to the extent that currently the domestic market depends on imports and will continue to do so in the immediate short term. Consumers have switched from LP Gas to kerosene, which has been cheaper and readily available. However, much of that kerosene is imported and represents an economic burden for the nation.

16. LP Gas importers must pass their costs on to the consumers who find prices prohibitively high. Import duty, VAT, shipping, and unnecessary and avoidable demurrage costs, represent a significant part of current retail prices. Removal of import duty and debottlenecking import facilities would immediately reduce costs and enable marketers to reduce prices to consumers by nearly half. Government recognition of the need for these immediate actions is evident in the communiqué issued following the LP Gas Workshop.

17. Greater diversity of indigenous LP Gas supply is essential and feasible through gas processing from associated gas or "wet gas" resources readily available in the country. This is not true of kerosene, which either comes from the refinery stream or is imported.

18. A more orderly market, adequately supplied and properly controlled, will lead to more stable and competitive pricing. Many respondents to the household survey, which was undertaken as part of the study, stated that they would use LP Gas if it were available at the same price as kerosene.

19. In the medium term, the interim strategic option to supply LP Gas for the domestic market should come from either the existing or new gas processing projects, augmented (when feasible) by refinery production. The commitment by FGN to encourage LP Gas market supply from domestic production is reflected in the communiqué issued following the LP Gas Workshop. Firm FGN policy directives should nevertheless encourage existing producers to plan for dedicating at least part of their production to the domestic market as soon as possible.

Distribution and Transportation

20. There is an extensive distribution infrastructure capable, following some rehabilitation, of supplying a much enlarged market. Currently, road transport is the only practical option for inland distribution. Other modes of transport such as rail, road, and pipelines as well as additional capacity of existing stock, will be required.

21. Debottlenecking the import facilities at the port of Lagos by urgently dedicating an existing jetty to LP Gas and by constructing a new jetty, dedicated specifically to LP Gas trade, is a first priority. Government support for this is evidenced by its inclusion in the post-workshop communiqué.

22. The government/NNPC-owned butanization depots should be brought back into use, in a manner conducive to sector recovery and market development. Lagos and Calabar Depots should be the first priority and government commitment to this is again evidenced by its inclusion in the post-workshop communiqué and should be translated into action as soon as possible. This will give a positive sign to industry and the business community that the FGN is serious about putting these plans into action immediately.

Cylinders

23. Most of the cylinders in circulation are in poor condition from the lack of proper maintenance and renewal. The country has the capacity to manufacture and refurbish steel cylinders in a limited range of sizes. Certain market sectors may require other types and smaller sizes of cylinders, which have proven to improve access and affordability in similar markets in the Region.

24. The presence of 12, 13, and 15 kg cylinder sizes, in this particular range make it difficult for consumers to make price comparisons while different valve/regulator combinations can be a hazard as well as a constraint to switching between suppliers. Most countries have standardized on a single cylinder capacity and on valve/regulator combinations. The introduction of smaller (3 and 6 kg cylinders) may serve a particular niche market as well as the 50 kg at the upper end of the range.

25. The ownership of cylinders, the right to refill them and responsibility for their maintenance should be codified and enforced both for commercial and safety reasons. The suitability of smaller, lighter (for example, composite) cylinders should be evaluated for particular applications and market sectors together with the concept of cylinder deposits, which ensure greater care in handling and durability.

26. Marketer participants at the LP Gas Workshop asserted that the breakdown in the control of cylinder filling contributed to market failure. NALPGAM is studying a cylinder standardization scheme to be managed by the Association.

Safety

27. While many consumers express satisfaction with LP Gas there is a strong perception that it is unsafe. The household survey disclosed widespread safety concerns, especially following technical incidents or dramatic domestic accidents. Early information and education of consumers is an essential preventive tool known to have worked effectively in similar countries in the Region. A formal and competent system of accident reporting and analysis is required in order to target specific causes of accidents and undertake appropriate preventive as well as corrective actions.

28. Safety concerns were highlighted in the workshop presentations—especially the need for greater emphasis on safety at the consumer end of the supply chain, where the industry's image and perception of it are the poorest. These concerns were echoed at the workshop by the Chair of the Gas Resources Committee of the House of Representatives who referred to the importation of substandard cylinders from the Far East and the need for continuing consumer education in the safe use of LP Gas.

Access to the Poor

29. An abundant supply of LP Gas will help to revitalize the industry and extend availability geographically and across socioeconomic groups. It will deal with the issue of product availability and price stability. Affordability, however, would require the whole gamut of facilitating targeted measures such as lowering the costs for cylinders and equipment by tax and duty exemption, ready access to soft financing (especially in peri-urban and rural areas) and other complementary measures without which the high front-end investments and initial cost of becoming an LP Gas consumer will remain a barrier to access to many but especially for the poor. Low-cost consumer credit is a rarity in Nigeria and virtually unknown in rural communities. Initiatives in this direction should be recommended and monitored. The LP Gas workshop debate did not investigate nor identify sources of soft loans, or easy financing mechanisms, which would help poor households to become LP Gas consumers. Further input from experts in microfinance and innovative, small-scale credit provision will be required to guide the project.

Household Cooking and Lighting Demand

30. The household survey revealed a significant suppressed demand for LP Gas. Many households are forced to use kerosene when the preferred cooking fuel is LP Gas. Other household uses of LP Gas, for example, for lighting and refrigeration, are unusual in Nigeria, despite a very unreliable electricity supply. Additional uses of LP Gas would help the viability of the industry and reduce the hardship associated with electricity outages.

Investment/Funding

31. Sector recovery will call for significant investment in physical assets and in institutional development and training. Fresh, external investment will be required if sector recovery and access to the poor are to be achieved without inordinate delay. Certain initiatives, such as LP Gas production, will meet commercial investment criteria but certain others, such as cylinder renewal, may not. The investment needs of the LP Gas sector are inflated by duties and taxation payable on imported equipment and materials.

32. Positive government policies and regulatory reform will help to attract investment. Serious investors in LP Gas marketing expect regulatory processes that reflect relevant technical standards and safety practices and are evenly and competently, enforced.

33. At the LP Gas Workshop a presentation by the IFC, outlining their interest in the sector and their known investment criteria, attracted much interest. IFC will support good, bankable projects upstream, midstream, and downstream, especially those with positive environmental assessment and social fallouts. Direct forex lending is available but soon Naira lending will follow suit.

Implementation

34. Ideally, the LP Gas industry/private sector should initiate and carry through the recovery strategy and action plans with the government/public sector acting as the guiding force and promoter.

35. A stronger, more representative industry association is required. This new grouping should identify and seek support from organizations with the development skills and capacity relevant to its needs.

36. The LP Gas Workshop participants concluded that the roadmap actions should be categorized into short-term, medium-term and long-term measures relating to:

- Key urgent policy decisions
- Economic/fiscal issues
- Market development

37. At the suggestion of the World Bank, the FGN decided that a steering committee should be created to assure that the roadmap and proposed strategy are adequately implemented and monitored, in a timely manner in the foreseeable future. This steering committee will include both industry and government acting as partners, with the Bank's guidance and support, to guide and promote the implementation of the roadmap.

38. The newly constituted, high-level steering committee held its inaugural meeting on March 8, 2004, with a view to implement the roadmap recommendations as soon as feasible.

Recommendations

39. The following is a summary of the main recommendations relating to the critical issues. These recommendations are set out in more detail in a roadmap format in Chapter 17 of this final report.

Policy/Regulation

- Government endorsement of the study objectives and strategies by:
  - Adopting a policy of LP Gas promotion as the preferred cooking fuel where natural gas is not yet available.
  - Harmonizing energy and fiscal policies to ensure that neither tax nor tax differentials impede LP Gas sector recovery and access to the poor. On the contrary, excessive taxation should be removed and tax and financial incentives should be considered along the lines of the Gas Strategy adopted by the FGN from upstream to consumer credit
- The FGN should establish a regulatory structure and process which will facilitate the policy of LP Gas promotion while protecting public and consumer interest by:
  - Aligning policy, legal framework, and regulatory processes relating to the LP Gas sector

- Bringing LP Gas technical standards and regulations into line with modern practice
- Establishing clear lines of functional responsibility between the regulatory authority and the industry
- Providing the designated regulatory authority with the requisite policing and enforcing powers and resources.

Availability/Distribution

- Introduce new sources of LP Gas supply for the domestic market by one or more of the following measures:
  - Diverting LP Gas destined for export into the domestic market
  - Developing associated gas separation/fractionation projects (from existing or new gas streams) specifically to supply the domestic market
  - Promoting LP Gas supply/purchase agreements between the marketers and the gas producers/processors.
- Improve evacuation of LP Gas when it is available at the refineries by:
  - Giving higher priority to LP Gas evacuation than hitherto
  - Upgrading evacuation facilities (both ship and road tanker loading) at the refineries
- Reactivate the butanization depots so that they become the primary LP Gas supply/distribution depots, as originally envisaged by:
  - Transferring ownership and/or operational control of the depots to the private sector to be run on a commercial and strictly "open-access" basis, with Lagos and Calabar as the first priority
  - Rehabilitating the depots in order to restore them to safe working condition, in preparation for divestment
- Rationalize and debottleneck both inland and coastal LP Gas transport by:
  - Facilitating secondary distribution through the primary depots
  - Removing physical and organizational impediments to efficient coastal tanker operations
  - Providing a dedicated LP Gas berth / jetty for Lagos

- Seek to improve the economics and safety of long distance inland transportation by determining the feasibility/viability of a) rail and b) pipeline and any other modes of transportation along a South–North axis.

Institutional Development

- Establish a new more fully representative LP Gas industry association which will:
  - Be empowered and resourced to deal effectively with industry issues
  - Provide a focus for dialogue with stakeholders
  - Promote the benefits and safe use of LP Gas
  - Secure recognition from policymakers and the regulatory authority
  - Work with the regulatory authority and with SON to develop or adopt appropriate technical standards and codes
  - Affiliate with the Nigerian Gas Association (which is currently dominated by natural gas)
  - Gain access to global LP Gas expertise and institutions through membership of the World LP Gas Association.
- Prepare an institutional development plan for the LP Gas sector by:
  - Sourcing funding and practical assistance from agencies which are active in institutional development
  - Enlisting appropriate specialist support to develop the plan.

Safety and Standards

- Revive safety awareness and practice within the industry by:
  - Adopting the World LP Gas Association Guidelines on Safety and Good Industry Practice
  - Making cylinders marketer-owned, not user-owned, with the owners solely responsible for maintenance allied to a customer cylinder deposit system
  - Making illegal cross filling and the filling of defective/out-of-test cylinders unlawful
- Rationalize cylinder sizes and facilitate safe, easy exchange by standardizing cylinder valves and regulators

- Remove unsafe cylinders progressively from the market and replace with safe cylinders
- Establish an expert working group to determine:
  - The core technical and safety standards to be adopted industrywide
  - The practical measures to implement changes in respect of ownership, filling and safety maintenance of cylinders
  - The safety monitoring and enforcement process.
- Improve consumer safety by:
  - Initiating safety awareness programs
  - Addressing the particular needs of new users.

Access to the Poor

- Adopt LP Gas access to the poor as an objective of government policy.
- Evaluate alternative, less expensive modes of serving the poor without compromising safety, by facilitating access to microfinancing and soft credit for the acquisition of first equipment.
- Source affordable LP Gas appliances which meet the needs of poor households, urban and rural.
- Promote and monitor consumer credit schemes which facilitate access to LP Gas.

Investment Needs and Opportunities

- Establish the market and regulatory conditions for sustainable sector recovery and future expansion.
- Promote awareness of the potential worth of the market—N37 billion per year at the target per-capita consumption—through investment seminars and media briefings.
- Target financial institutions—domestic and international—which have declared an interest in the Nigerian oil and gas sector.
- Establish a point of contact for prospective investors to obtain details of specific projects identified in the study, that is:
  - Primary (coastal, rail, pipeline, road) transportation
  - Primary storage/supply depots
  - LP Gas supply

- Cylinder and equipment manufacture
- Cylinder filling/retail / maintenance infrastructure.

Steering Committee

- Ensure that the steering committee is adequately resourced to enable it to fulfill its functions.
- Provide the steering committee with appropriate guidelines, terms of reference, and a clear initial, time bound, work plan.

1

Introduction

Study Background

1.1 This study forms part of a broader poverty reduction program being undertaken jointly by the FGN and the World Bank. The Bank has long recognized the linkage between poverty and inadequate access to modern energy provision. Moreover, dependence on traditional fuels, such as firewood and charcoal, is directly connected to a variety of social, health, and environmental problems.

1.2 Coincidentally with this LP Gas Sector study the World Bank is advising the FGN on its overall gas strategy while measures aimed at reducing "gas flaring" are adding to Nigeria's production of LP Gas. Obviously, LP Gas and its future role in energy provision should be an integral part of the gas strategy.

Historical Background

1.3 In Nigeria, Liquefied Petroleum Gas (LPG or LP Gas) is a long-established, well-accepted, but minor component of energy supply. It is used principally as a cooking fuel in households and in catering. However, LP Gas is a clean, versatile fuel with a wide range of other uses in household, commercial, and industrial energy applications and examples of these can also be seen in Nigeria.

1.4 LP Gas is produced in oil refining and in gas processing. It represents a modest part of refinery output—typically 2–3 percent—but may be more significant in gas processing. Commercial grade LP Gas is primarily a mixture of butane and propane and the ratio of these constituents can vary widely.

1.5 Although normally used in gaseous form, LP Gas is readily transformed to liquid for storage and transport. Liquid LP Gas weighs about half as much as water and is much more energy intensive than in gaseous form. However, these useful attributes come at a cost in that the LP Gas container must be robust, and the gas must be drawn from it in a controlled manner. Hence, LP Gas storage and transportation tends to be more expensive than other fuels. This is significant in a country such as Nigeria.

1.6 Originally, LP Gas was available only from the coastal refineries at Port Harcourt and Warri. Distribution was largely restricted to Lagos and to towns close to the

supply sources. The opening of a third refinery in Kaduna created a source of LP Gas for northern states and the possibility of wider availability. To date, the "midstream" oil and gas sector (for example, gas processing) has not developed as a source of LP Gas supply for the domestic market.

1.7 Initially, LP Gas distribution was handled only by those oil marketing companies with retail operations in the country. However, they were soon joined by a small group of "independents," that is, companies whose sole business was the marketing of LP Gas and the appliances and equipment associated with its use. All the marketers—oil companies and independents—purchased and maintained their own LP Gas cylinders which they branded and to which they fitted their distinctive valve. Consumers were given the use of a cylinder (usually in exchange for a cash deposit) which was refilled by the marketer on a full-for-empty basis. The distinctive valve and ownership of cylinders effectively discouraged consumers from changing suppliers. That system required that the marketer invest in "circulating" cylinders to support those being used by consumers, and thus maintain the supply chain. The marketer accepted the obligation to maintain the cylinders and had the opportunity to do so when they were returned to him for refilling. The cost was recovered through the margin on the LP Gas. Market penetration was low, partly because the initial cost (cooker, cylinder deposit, and LP Gas fill) was beyond the means of the majority of householders.

1.8 Officially, LP Gas prices were controlled and, during periods of high domestic inflation, marketers' margins were squeezed to the point where they cut back on investment in cylinders. The FGN responded to this by authorizing NNPC to import cylinders and by licensing additional independent marketers. The NNPC cylinders were sold at subsidized prices (and given to staff) and while a specific cost provision was made for their long-term maintenance, this was never implemented on the ground.

1.9 It is a condition of the license for new marketers that they should purchase a stock of cylinders but enforcement has been incomplete. While the "majors" were generally constrained to respect price controls and the rules regarding cylinder filling and upkeep, many of the newcomers and their retailers were less scrupulous. As a result LP Gas became an expensive product and a profitable business for some while it became increasingly difficult for the older, cylinder-owning, compliant marketers.

1.10 In the 1980s there was growing awareness of social and environmental problems associated with the dependence on woodfuel, especially in the northern states. Given the popularity of LP Gas with those Nigerian households that had access to it, the potential for domestic LP Gas production and its widespread international use in rural energization, the government initiated a "butanization" program and authorized NNPC to construct a network of strategic depots for the primary distribution of LP Gas. An NNPC subsidiary, PPMC, already operated depots for the primary distribution of "white" petroleum products. The name "butanization" was borrowed from an earlier, and highly successful, LP Gas utilization project in Senegal.

1.11 Nine butanization depots were constructed at strategic locations throughout Nigeria (at Lagos, Calabar, Enugu, Ibadan, Ilorin, Makurdi, Kano, Gombe, and Gusau). All but one—Apapa, Lagos—were situated alongside existing white products depots and (in common with them) were to be supplied from the refineries at Kaduna, Warri, and Port Harcourt. A Merox unit was added at Kaduna to enhance the output of LP Gas. However, while the white products are supplied to the depots by pipeline, road transportation was judged to be the practical mode for LP Gas supply to the inland butanization depots. There was an established coastal movement of LP Gas from the refineries to the marketers' storage terminals in Lagos port and the butanization depots at Calabar and Lagos were to be similarly supplied.

1.12 The commissioning of the butanization depots, in the mid-1990s coincided with successive shutdowns at the NNPC refineries, which, in turn, led to large-scale importation of refined products for the domestic market. These problems are ongoing and are the principal reason that the butanization program has stalled. Only the two coastal depots—Calabar and Lagos—were brought into operation and, of these, Calabar has had very little throughput. Matters were not helped by the failure of PPMC to conclude satisfactory arrangements for LP Gas transportation to the inland depots partly because of supply inadequacies. Supply to Calabar and Lagos was hampered by congested ports and by the consistently low priority given to LP Gas ships on the loading/discharging berths.

1.13 Faced with extremely limited LP Gas supply from the refineries (and no availability from gas processing) PPMC arranged for some imports, mainly through the Lagos depot. The aggregated cost included a penal rate of import duty and proved to be unsustainable. In 2000, PPMC relinquished the sole right to import LP Gas for the domestic market, thus giving marketers the opportunity to import. Simultaneously, restrictions were placed on the use of their private berthing facilities. In effect, the limited scale of the import facilities, along with the added costs and price manipulation at the retail level have made LP Gas prohibitively expensive for the majority of consumers.

1.14 NNPC has not helped the domestic market by setting the ex-refinery price of LP Gas at a high level—well in excess of the netback available from export. Large quantities of LP Gas are being extracted in three gas-processing projects. To date, efforts to divert such LP Gas to the domestic market have been frustrated. It must be acknowledged that the composition of some of the exported product makes it unsuitable for the local market and the export infrastructure is not readily adaptable to domestic supply.

Current State of the LP Gas Industry

1.15 For our present purpose, the LP Gas industry comprises the players in the marketing and distribution chain—traders and shippers, road haulage contractors and manufacturers/vendors of LP Gas cylinders, tanks, appliances, and ancillary equipment. Neither the refineries (despite their key role as suppliers) nor the gas processors can be described as seriously engaged with the LP Gas industry. Active participation of several producers in the LP Gas Workshop indicates renewed interest in the domestic market and is

a positive outcome of the study. Contacts made with producers during the fact-finding mission had previously disclosed very limited awareness of the domestic market potential.

1.16 The LP Gas market within Nigeria has shrunk to much less than half its former size.

Table 1.1: Domestic LP Gas Market (000 metric tons)

1990	*1998*	*2002*
110	56	50 Est.

1.17 By contrast, market growth in four neighboring countries of West Africa—Cameroon, Cote d'Ivoire, Ghana, and Senegal—averaged 9.5 percent per year from 1990 to 1999. In those four countries, per capita LP Gas consumption averages 3.7 kg while the corresponding figure for Nigeria is approximately half a kilogram. Consumption in West Africa is denoted in Table 1.2.

Table 1.2: West African LP Gas Consumption

Country	*LP Gas (MT)*	*POP. (million)*	*Per Capita (kg/yr)*
Cameroon	28	14.9	1.9
Cote d'Ivoire	50	15.7	3.2
Ghana	40	19.2	2.1
Senegal	100	9.5	10.5
TOTAL	**218**	**59.3**	**3.7 Average**
Nigeria	58	125	0.5

1.18 Historically, the domestic market enjoyed low Naira-denominated wholesale (that is, ex-refinery) prices combined with official price control at the retail level. It could not sustain the international market prices for imported LP Gas, which was required to make good the supply shortfall from the refineries. Meanwhile, all LP Gas produced from gas processing was solely for export. Imported kerosene was subsidized and the LP Gas/kerosene differential became wider at the retail level.

1.19 Nigerian households were becoming poorer as the Naira dropped in value against stronger currencies. Imported goods (including LP Gas appliances and equipment) became prohibitively expensive.

1.20 A decade of unrealistic price and margin controls followed by a decade of limited, uncertain product supply, together with a breakdown in good business practices, have left the Nigerian LP Gas industry in a seriously weakened condition.

1.21 The LP Gas market is highly fragmented with few large national businesses and many small, local operators. Final selling prices are effectively set by an ineffectively regulated, informal sector. One major company—Shell—withdrew from the market, others have closed and the survivors tend to be ticking over, at best. The remaining cylinder manufacturer receives few orders and is facing closure. Crucially, cylinders are not maintained correctly and leaking valves are common, putting consumers and the wider public at risk. LP Gas transport is often in dilapidated trucks, many purchased second hand and now worn out. Ship owners and traders attempting to supply the market have mostly withdrawn after incurring large financial losses. One importer who has persevered, reported ship turnaround times of up to 20 days at Lagos port with penalizing demurrage costs, passed on to consumers. The decline in LP Gas sales has allowed marketers to withdraw some defective and "out-of-test" cylinders from service and so avoid the cost of repair/replacement but, generally, the cylinders in circulation are in very poor condition.

1.22 Despite the difficulties, the LP Gas industry remains confident about the market, if only certain problems could be resolved and, in particular, if adequate and affordable supplies of the product were available. It is a fact that the distribution infrastructure is extensive and has a large, underused capacity. One participant in the workshop stated that 85 percent of filling plants are closed. However, it will be expensive to restore rundown plants to recover their original capacity, and attempts to increase their output without renewed investment could prove hazardous.

1.23 Industry players have adopted survival strategies for difficult times and many would respond positively to a more benign business climate. However, a growing LP Gas market needs specific skills and ongoing investment in assets such as cylinders and transport. A viable LP Gas industry also requires disciplines and good business practices, which are not currently evident in Nigeria.

1.24 The problems of the Nigerian LP Gas sector and its consumers are extreme but by no means unique. Similar problems have been experienced elsewhere and solutions have been found. The LP Gas sector can recover and make a significant contribution to the domestic energy supply. Fresh investment is essential; hence the need for conditions favorable to long-term investment.

2

LP Gas Industry Structure

Nigerian National Petroleum Corporation (NNPC)

2.1 NPC is an integrated, government-owned oil company and is involved (directly, and through subsidiaries and joint ventures) in all aspects of the oil and gas industry in Nigeria. Some years ago, the oil refineries were restructured as separate companies but, while steps have been taken toward divestment, they remain wholly owned subsidiaries of NNPC. Another wholly owned subsidiary, Pipeline and Products Marketing Company (PPMC), is responsible for the supply of refined products (including LP Gas) to the domestic market. Therefore, NNPC and certain of its subsidiaries are responsible for the production and primary distribution of LP Gas, apart from any imports made directly by the marketers. In practice, the marketers and their haulage contractors collect LP Gas from the refineries when it is available. NNPC/PPMC sets the wholesale, that is, the ex-refinery, price of LP Gas—currently at a notional "import parity."

Ministry of Petroleum Resources

2.2 This ministry oversees and directs the oil and gas sector. It is responsible for the largest single area of the economy and for over 90 percent of Nigeria's export earnings. The sector is monitored by the Department of Petroleum Resources (DPR) through its directorate based in Lagos.

2.3 The domestic LP Gas market was deregulated in 1998 to the extent that retail price control was officially ended—belated recognition of the market reality. Subsequently, the private sector has been permitted to import LP Gas and has done so (through Lagos) on a limited scale.

2.4 The DPR exercises a regulatory function through a licensing system. New LP Gas facilities must comply with certain standards and criteria while existing plants are subject to inspection as a condition of license renewal. The license duration was recently extended to two years and the renewal inspection fee doubled.

2.5 LP Gas retailers are required to register with one particular supplier/ marketer and their premises are also subject to DPR inspection. According to the industry,

these rules are not enforced and this failure has contributed to one of its major problems, that is, loss of control of cylinders and their refilling.

2.6 The LP Gas industry complains that the DPR criteria for license approval tend to be arbitrary and inconsistent—"little knowledge but a lot of power"—while the DPR complains that state local authorities have sometimes approved new LP Gas facilities in locations unacceptable under their regulations.

2.7 The DPR undertook a review of its standards in 2002, after which the Engineering and Standards Division apparently drafted new regulations. These were circulated internally and to other government agencies. There does not appear to have been a formal consultation with the LP Gas industry. The DPR's Procedure and Requirements for the Grant of Approval to Construct an LP Gas Plant is based on the Petroleum Regulations 1967, and was updated in 2002. It contains information on minimum safety distances, safety system requirements, and so forth. The Mineral Oil Safety Regulation *1997* contains general safety, health, and environment rules and regulations for the petroleum industry. The DPR's *Environmental Guidelines and Standards for the Petroleum Industry in Nigeria*, was updated in 2002. This has little or no reference to LP Gas, except for upstream/processing.

2.8 The DPR collects statistics for the oil and gas industry, which are published in an annual report. PPMC is required to furnish details of LP Gas marketers' purchases from the refineries while marketers are required to report sales monthly with a state-by-state breakdown. The DPR maintains a monitoring presence at each of the oil refineries. Our review of the statistics in the LP Gas sections of the report for 2000 revealed some discrepancies.

2.9 The DPR has a divisional structure and has plans to establish a new gas division to handle all gas-related matters. Historically, the DPR's interest in gas has focused on flaring of associated gas and imposing penalties.

Bureau of Public Enterprises (BPE)

2.10 The BPE has a role in identifying and preparing government-owned companies which are candidates for privatization. In the oil and gas sector, BPE identified the refineries and PPMC's white products depots which are now set for privatization in 2004.

2.11 BPE has prepared a presentation of the white products depot system with a view to attracting investors. We have drawn BPE's attention to the butanization depots which are also controlled by PPMC and form part of its assets.

Nigerian Association of LP Gas Marketers

2.12 The Nigerian Association of LP Gas Marketers (NALPGAM) dates from 1986 when the original independent LP Gas marketers saw the need for a trade association to represent their interests in an industry dominated by the oil "majors."

2.13 NALPGAM is recognized by the FGN and represents the LP Gas industry in negotiations with NNPC/PPMC. Once a company receives an LP Gas marketing license, it becomes a member of NALPGAM. According to the 2002 Annual Report, NALPGAM has 151 members. Members pay an annual membership fee and, in addition, a levy on each load of LP Gas collected from the refineries or depots.

2.14 NALPGAM has experienced financial difficulties arising from its efforts to secure imported LP Gas supplies for its member companies. According to NALPGAM's 2002 Annual Report these difficulties have mostly been resolved. Furthermore, in 2003, NALPGAM announced that it had incorporated a new subsidiary company, ALPGAM Investment Plc. (AIP) to engage in the business of petroleum products marketing, including LP Gas.

2.15 Given its fragmented nature and the challenging business environment, it is desirable—perhaps essential—for the LP Gas industry to have an authoritative and representative trade association. NALPGAM does not appear adequately resourced for that role and, besides, it represents certain of the marketers—not the industry.

2.16 At the stakeholder workshop, NALPGAM and the LP Gas Trade Group in the Lagos Chamber of Commerce undertook to work more closely together. A more buoyant industry would be better able to fund its association but the association, in turn, must be dynamic and needs a strategic vision of the future role and structure of the LP Gas industry in Nigeria.

Nigerian LP Gas Association

2.17 This organization was formed in early 2002, apparently through the initiative of Tunji Lawal-Solarin, Chairman of Eterna Oil and Gas. Mr. Lawal-Solarin was helpful and effective in organizing our initial meeting with the LP Gas industry players in Lagos. We were unable to ascertain specific details of membership but were advised by the Chairman of NALPGAM that his association had no prior knowledge of the NLPGA.

Chamber of Commerce

2.18 When the independent marketers first set up their trade association—the predecessor of NALPGAM—it was affiliated with the Lagos Chamber of Commerce. Some marketers are members of the LP Gas Trade Group in the Lagos Chamber of Commerce.

Nigerian Gas Association

2.19 The Nigerian Gas Association (NGA) was formed in 1999 and its principal focus is natural gas. Its membership includes the oil producers, all of whom are striving to meet the "flare-down" deadline and some of whom, such as Chevron, Mobil, and the NLNG consortium, are busily "monetizing" their associated gas. The NGA is actively—and very successfully—raising the profile of gas in Nigeria but LP Gas is not benefiting from the new gas awareness. Either directly or through certain of its member companies,

the NGA has an input to gas strategy planning but with the emphasis on natural gas—not on LP Gas.

Conclusions and Recommendations

2.20 The LP Gas industry does not need two representative associations. It would rather be recommended that, as in most countries, one body, say "The Nigerian LP Gas Association" (NLPGA), represents all sectors and industry players—not just the marketers. The NLPGA should represent the LP Gas industry within the NGA and seek affiliation with the international LP Gas community through membership of the World LP Gas Association.

2.21 The WLPGA is based in Paris and has approximately 120 member companies and organizations from every part of the world. Its members include LP Gas marketers (large and small), equipment manufacturers and national LP Gas associations. It offers a range of services to its members and organizes an annual forum for the exchange of information and technical expertise. It has produced several publications including guidelines for safety, good business practices, and rural energization, which will be useful for the NLPGA in dealing with its members and with the regulatory authorities.

2.22 Properly constituted and resourced, the NLPGA will service its membership and work cooperatively with the relevant authorities for LP Gas sector recovery. Thus, it can work for the public good and for the interest of its members. It will become the preferred point of contact between the industry and the authorities whose responsibilities may not be matched by the required technical expertise in LP Gas operations. There are examples available internationally of positive cooperation between regulatory authorities and the LP Gas industry, notably in the area of safety and standards but also in respect to modern energy provision. In South Africa, the formal links between the Department of Minerals and Energy, the Bureau of Standards, and the LP Gas Association provide an excellent model for such cooperation.

2.23 The NLPGA can be actively involved in monitoring and evaluating progress with the implementation of the strategies and action plans for achieving the objectives of this study.

2.24 The NLPGA’s objectives should be clearly stated in its Articles of Association together with a Code of Conduct for members, which will encourage the adoption of good business and safety practices in the interest of the LP Gas industry, its consumers, and the general public.

2.25 A Board of Directors that fully represents the industry should set the agenda to be implemented by the NLPGA executive. Obviously, it will need sufficient resources to enable it to function effectively and to achieve recognition. The existing funding arrangements of NALPGAM are geared to marketers and the volume of their LP Gas purchases and would need to be modified for other sector players.

2.26 The regulatory role and function of the DPR should be reviewed in conjunction with the LP Gas industry to:

- Ensure that the public interest is defined and reflected in regulations
- Establish consistency and transparency in specific regulatory processes
- Avoid duplicating efforts and interagency conflict.

2.27 The Gas Act currently being drafted is designed to strengthen the legislative basis of natural gas regulation and to rationalize the processes. It should, however, be noted that natural gas and LP Gas operations are very different and that the regulatory processes reflect these differences. Most countries choose to regulate their LP Gas sector operations under petroleum products legislation. The regulatory controls and processes should be justified on the basis of public interest and need, not as revenue generators.

2.28 The statistics gathering and dissemination function of the DPR should be evaluated and, where necessary, strengthened to ensure the requisite detail and reporting accuracy. Senior members of the LP Gas industry are familiar with the obligation to provide statistical information to the DPR but some were unaware of the Statistical Bulletin published annually by it. Valuable statistical data is collected and should be made more readily available to those responsible for planning the expansion of LP Gas availability and access.

3

Legal and Regulatory Structures

Department of Petroleum Resources

3.1 Part VI of the Petroleum Regulations includes statutory provisions for LP Gas operations, embracing plant design, layout, and equipment; cylinder handling; and transportation.

3.2 The DPR has a regulatory function for establishing and operating LP Gas plants, that is, facilities that receive and store LP Gas in bulk and fill it into cylinders for distribution. This regulatory function also extends to the storage and handling of LP Gas cylinders by retailers, that is, by traders supplied from the plants.

3.3 A promoter of a new LP Gas plant project is required to obtain an operating license and, for this, must comply with certain standards and criteria set out by the DPR in their *Procedure and Requirement for the Grant of Approval to Construct an LP Gas Plant*. These were revised in late 2002 as part of an overall review of regulations being carried out by the DPR. The licensing procedure functions, not least because the marketer cannot obtain a supply of LP Gas from PPMC without it. The plant-operating license is subject to periodic renewal—recently extended from one to two-year intervals.

3.4 It is acknowledged by the industry and by the regulator that the licensing function is much less effective at the retail level. In particular, the important requirement that retailers register with one marketer for supply is not enforced.

3.5 The DPR has the legal power to regulate the LP Gas industry even if the specifics of regulation and enforcement, require attention. Therefore, there is an existing regulatory structure on which to build.

Standards Organization of Nigeria

3.6 The Standards Organization of Nigeria (SON) has long sought improved safety in the LP Gas sector, especially with respect to cylinders and tanks. One current SON project is producing a *Specification for Inspection and Periodic Testing of LP Gas Cylinders.* In the past they have also published two standards relating to cylinders, valves, and regulators, that is, *Standards and Specifications for Refillable Liquefied Petroleum Gas Cylinders* (revised in 1987), and *Specifications for LP Gas Cylinders—Regulators and*

Valves. SON also has produced a *Code of Practice for Gas Cylinder Test Stations 1975*, which is followed by the DPR in the inspections. SON is currently engaged in an awareness campaign to promote cylinder safety. This is designed to ease compliance on mandatory inspection and the withdrawal of defective cylinders.

State Planning Authorities

3.7 The State Planning Authorities are responsible for physical planning, including the siting of industrial premises such as LP Gas plants. There have been reported instances of State Planning Authorities giving approval for new LP Gas plants without reference to the DPR and their criteria. However, the DPR has the power to withhold its license and, without this, the developer cannot obtain an LP Gas supply from PPMC, or any marketer.

Nigerian National Petroleum Corporation

3.8 NNPC does not have a regulatory function in respect of the LP Gas industry. However, it is a requirement of PPMC that marketers produce evidence of their DPR license before they are allowed to take product from the refineries or the depots. PPMC is required to supply details of marketers' LP Gas purchases to the DPR.

Health, Safety, and Environment (HSE)

3.9 The Mineral Oil Safety Act 1997 provides the statutory basis for HSE regulation in the oil and gas industry. The DPR has produced the Comprehensive Environment Guidelines and Standards for the Petroleum Industry in Nigeria (EGASPIN). This document was revised in 2002 and includes a brief section dealing with LP Gas.

Gas Act

3.10 The gas strategy study recently undertaken by the FGN and the World Bank has identified the need for a new gas act, which is currently being drafted for submission to the legislature. The gas act provides the legal basis for changes in natural gas norms and safety of operations. It is natural gas specific and LP Gas should not be brought under its scope. At the LP Gas Stakeholders Workshop the invitee from the House of Representatives confirmed that a new bill covering LP Gas was being drafted.

LP Gas Industry Regulation

3.11 The thrust of LP Gas industry regulation should refer to:

- Safety of users, workers, and the general public
- Good, user-friendly business practice
- Product quality/measurement.

3.12 Regulations supportive of these objectives must have a sound basis in law and be legally enforceable. Serious prospective investors in the domestic LP Gas market

will expect this. The present debilitated condition of the LP Gas sector and the rate of consumer incidents can be traced, in large part, to shortcomings in regulation. Member countries of the European Union have responded to strong consumer protection directives by developing new regulations and technical standards. One relevant example from the United Kingdom is the Gas Safety (Installation and Use) Regulations 1998, which, in turn, provided a model for similar regulations in South Africa.

3.13 Many countries regulate their LP Gas sectors under petroleum regulations having their legal basis in a wide-ranging Petroleum Act, which is revised and updated periodically. The Nigerian Petroleum Regulations date from 1967 and have not been kept up to date with respect to LP Gas operations, especially consumer safety.

3.14 The World LP Gas Association publications—*Guidelines for Good Safety Practice and for Good Business Practice*—deal with these concerns and will provide an excellent basis for regulation.

3.15 Legislation should distinguish between technical standards and regulation. The standards organization should develop, or adopt, technical standards but should not be responsible for regulation. Equally, the regulator should not develop technical standards in isolation. Technical standards and regulations should be developed in conjunction with the LP Gas industry, where the relevant expertise is likely to be found. This is normal practice in most countries. The legal framework should provide for consultation between the standards setter, regulator, and industry and should define their respective roles. Standards and regulations should be kept under review and revised, when necessary, to keep abreast of advances in LP Gas technology.

Comments and Proposals

3.16 Clearly, the LP Gas industry participants should comply with the regulations established under the relevant laws and with the regulatory agencies appointed by the government. The industry and its consumers can benefit from constructive policy-driven regulations, regularly updated and effectively administered.

3.17 In Chapter 3, Conclusions and Recommendations, it was proposed that legal and regulatory functions be reviewed in conjunction with the LP Gas industry. This is to:

- Ensure that the public interest is defined and reflected in regulations
- Establish coherence and transparency in specific regulatory processes
- Avoid duplicating efforts and interagency conflict.

The guiding principles are set out in the chapter on LP Gas Industry Regulations above.

4

LP Gas Supply

Refinery Supplies

4.1 To date, NNPC is the sole oil refiner in Nigeria and all four of its refineries—Old Port Harcourt, New Port Harcourt, Warri, and Kaduna—were built with the capacity to fractionate LP Gas to butane and propane. As refining ceased at Old Port Harcourt some years ago, only three are now relevant as LP Gas producers. The maximum design capacity of the operational refineries is around 400,000 tons of mixed LP Gas per year.

4.2 Normally, LP Gas production is merely incidental to the mainstream operations of the refineries but often LP Gas must be removed (to a greater or lesser extent) in order to meet product specifications, notably that of gasoline, or Petroleum Motor Spirit (PMS) Therefore, LP Gas production is primarily a function of crude oil process runs. Surplus LP Gas can, when necessary, be flared at the refinery. A refinery may have to be shut down if certain heavy products cannot be evacuated and storage capacity is exhausted, but not LP Gas. This flexibility may influence evacuation priorities to the disadvantage of the LP Gas market.

4.3 Certain refinery processes, such as fluid catalytic cracking and HF alkylation, have an impact on LP Gas recovery. Kaduna was equipped (some years after initial commissioning) with a Merox processing unit to enhance LP Gas recovery. Certain petrochemical products consume propane as feedstock and, at Warri, demand from the nearby polypropylene production plant can reduce LP Gas availability. Spasmodic operation of certain process units contributes to uncertainty about supply availability. As an extreme example, the Merox unit at Kaduna was commissioned but has never operated on a continuous basis.

4.4 Over the past number of years there have been ongoing maintenance problems, which have resulted in serious shortfalls in the production of LP Gas at the refineries. This is reflected in the Nigerian Oil Industry Statistical Bulletin, which summarizes the total LP Gas production at the refineries as follows:

- 1997—27,440 tons
- 1998—114,320 tons

- 1999—88,820 tons
- 2000—14,930 tons
- 2001—42,810 tons

4.5 Following visits to all four refineries we can summarize the supply/production situation as follows:

- *Warri Refinery:* We were informed that the total production of LP Gas at Warri for 2001 was 3010 tons, and for 2002 to the end of November was 5,482 tons. The Fluid Catalytic Cracker (FCC) has been down for the greater part of the past year with minimal production. The FCC, along with the refinery, is presently undergoing a major turn around maintenance (TAM), which could last through this year. At 90 percent capacity, that is,, a crude charge of 15,410 tpd, LP Gas production at Warri should reach 3.5 percent, that is, 540 tpd. At a ratio of 70/30 butane/propane this works out at 380 tpd of butane and 160 tpd of propane. However, with the HF Plant in operation, butane production is reduced to 30 percent, and with the polypropylene plant in operation, propane production is zero. The total production figures for 2001 and 2002 reflect the ongoing maintenance difficulties at Warri, which have continued through 2003.
- *Port Harcourt (PH) Refineries:* Both the PH old and new refineries feed into one common FCC unit. However, the old refinery has not been working for some time now, so all LP Gas is produced from the new refinery. At 90 percent crude charge of 18,500 tpd, LP Gas production from the new refinery is around 3.34 percent, that is, 620 tpd. At a ratio of 75/25 butane/propane this works out to 470 tpd of butane and 150 tpd of propane. However, during 2002, approximately 50 percent of the LP Gas produced was flared. This was because of problems with evacuation priority for LP Gas at the jetties, jetty loading arm problems, and inadequate storage to deal with the build up of LP Gas. When the HF alkylation plant is in operation it requires 2 percent of the crude charge, but the likelihood of it coming back onstream is very small.
- *Kaduna Refinery:* Operating at 100 percent of installed capacity, LP Gas production from the FCC and distillation units would amount to 300 tpd. At 100 percent capacity, the Merox unit would produce an additional 300 tpd. This gives a total design capacity of around 200,000 tons per year. The reality is that the refinery has suffered a succession of major problems—most recently a fire which affected the operation of the FCC unit—and, in recent years, there have been

long periods during which LP Gas was not available. The FCC is now scheduled for resumption in the first half of 2004. During 2002, 1,617 tons of LP Gas were supplied to the market while 26,631 tons were flared. The equivalent figures for 2001 were 56 tons supplied to the market and 13,926 tons flared.

Existing Refinery LP Gas Infrastructure

Storage Facilities

4.6 Individual refinery storage capacities are set out in Table 4.1:

Table 4.1: Refinery Storage Capacity

Refinery	*Fuel Type*	*Vessels*	*Tons*
Port Harcourt Refinery	Butane	3	6264
	Propane	2	1734
	Mixed	2	1904
	Day tanks	3	924
	Unstenched	1	280
Warri Refinery	Butane	2	7308
	Propane	2	3264
	Dedicated	5	1345 (HFA and Polypropylene)
Kaduna Refinery	Propane		650
(LP Gas in 8 vessels)	Butane		1500
	Mixed		6500

Evacuation Facilities

4.7 The situation at the refineries with respect to evacuation of LP Gas is as follows:

- *Port Harcourt Refinery:* There are two operational truck loading arms handling 10–15 vehicles per day. A third loading arm (dedicated to unstenched product) is in place but not yet commissioned. There are four ship loading arms for the two jetties A and B, each with an outer and inner berth. Of these, only the arm on the outer berth of jetty B is functioning. Severe corrosion of the LP Gas pipeline to jetty A has put its two loading arms out of operation. There is a long-standing problem of ship access to the inner berths and the necessary dredging has not been carried out.
- *Warri Refinery:* There are two truck loading arms of which one is operational and handles an average of six trucks per day when

product is available. There are ship loading arms for butane and propane on the jetty but none has been in use for the past six years and all would now require complete refurbishment.

- *Kaduna Refinery:* There are four truckloading arms each with the capacity to load up to 10 trucks per day. At present only one is functional. In addition, there is a railcar loading facility, which has never been put into operation.

Comments on Refinery Supply

4.8 All three refineries suffer from a range of problems; which, in recent years, have resulted in serious shortfalls in the production of refined products. These shortfalls, in turn, have resulted in enormous expenditure on imported oil products and the loss of expected revenue from exports. The volume of imports has led to congestion on the available jetties and berths. In this context, and given the political imperative to maintain supplies of transport fuels, it has been difficult to get recognition—much less priority—for LP Gas.

4.9 No company operates an oil refinery solely to produce LP Gas and NNPC cannot be expected to do so. Equally, the LP Gas industry cannot play its part in energy provision without assured supply at a sustainable cost. The domestic market could, in a short time, absorb the LP Gas volumes available from the current installed refinery capacity and offer a better netback than export. Therefore, any programs to revitalize the refinery sector should take appropriate account of the potential and the requirements of the LP Gas market. For its part, the LP Gas industry must find alternative indigenous supply to reduce its current dependence on the refineries and imports. It is envisaged therefore that in the future the refineries will be incremental suppliers to the domestic market, that is, the refineries will not be the main source of domestic supply, but what product they do produce will be taken up by the domestic market or alternatively will be available for export.

Existing NGL/LP Gas Processing Projects

4.10 There are three major existing NGL/LP Gas production projects for export currently in operation in Nigeria. These are as follows:

- *The Chevron-Texaco Escravos Project:* This is an offshore operation, and it currently exports mixed refrigerated LP Gas. Their future Escravos Gas Project, EGP 3, due in 2005, will fractionate down to separate C3 (propane) and C4 (butane), and will have an onshore element. It is not a viable option for domestic supply at present.
- *The NLNG Project:* Train 3 is now in production. and this will produce 1.25m tons of LP Gas per year for export. The Articles of Association of the company apparently do not allow it to deal with product for the local market. The export product is all refrigerated

and at no stage is any pressurized product produced or stored. Our initial reaction therefore is that this is not an option for domestic supply.

- *Exxon Mobil's OSO Condensate Project:* This produces refrigerated propane and butane for export at Bonny Island. Exports for 2001 were over 7m barrels of propane and over 4m barrels of butane. Part of this product is "owned" by NNPC, and they sometimes export it directly or Mobil arranges for it on NNPC's behalf. Mobil's product share is covered through Gas Purchase Agreements for the next couple of years. At first glance it does appear that it is worth pursuing NNPC/NAPIMS with respect to determining whether their portion of the product is an option for domestic supply. In 2001, Mobil Producing Nigeria (MPN), made a presentation to NNPC, through NAPIMS/DPR, arguing that more money could be made by selling to the domestic market rather than exporting it. NAPIMS/ DPR did not accept this. It should also be noted that MPN and NNPC are currently considering a social project to provide some LP Gas to their local communities. MPN are currently handling 1.2 billion scf/day of gas, 71 percent of which is used. They have a number of planned gas projects which will handle this flared gas and other gas streams.

Imports

4.11 Imported LP Gas is not a long-term viable option. LP Gas is subject to 37 percent import duty (inclusive of levies), with the result that the landed price does not allow for market expansion. The landed cost is around N52,000 (US$400 @ 130N per US$) per ton, excluding any demurrage delays or costs. Companies that have imported in the past few years (including NALPGAM, on behalf of the marketers), have suffered financially; because once product became available from the refineries, they were left with their product, or having to sell at the refinery price, at a considerable loss. The domestic LP Gas market wholly depended on imports through 2003.

Potential Gas Production Projects

4.12 Of the independent or smaller potential gas producers, there are a number that may have domestic supply possibilities, and are worth pursuing further. These are as follows:

- *Pan Ocean* is a small independent oil producing company, which currently flares approximately 60 mmscf/day. They have a plan (supposedly along with NPDC) to install a modular Natural Gas Liquid (NGL) plant at their production location, which is well located, some 1 km from the natural gas trunk pipeline, and 15 km from Koko jetty. Their NGL plant will have an initial capacity of 70

mmscf/day, expanding to 200 mmscf/day subject to NNPC's agreement. The company will soon enter into a Gas Purchase Agreement with the Nigerian Gas Company (NGC) for the lean gas while the disposal of surplus propane remains a major constraint. The economics will drive what products they eventually decide to produce. Their product was to be purchased by Dynergy but this is no longer the case, and Pan Ocean have confirmed that they are keen to discuss the options relating to producing product for the domestic market.

- *NPDC/Andy Boyo/Niger Delta/Edo State.* Niger Delta is currently proceeding with an NGL extraction project in the Ogbelle field, to produce 50–60 tons of LP Gas per day, for the domestic market. It, Andy Boyo, and Edo State is competing for a potential second project, at the Oredo, Abura, and Oziengbe fields, where they are trying to sign a supply agreement with the producer, NPDC, a subsidiary of NNPC, to take the three gas streams and fractionate to produce some 250 to 300 tons of LP Gas per day. The project is complicated because there is a need for NPDC to relocate the existing flow station at Oredo to allow for further development of the field. However, NPDC informs us that a contractor has recently been given a letter of intent for this contract. Niger Delta claims to have MOUs in place from marketers prepared to take all the LP Gas they produce. The three companies have submitted commercial offers to NPDC, which are under consideration.

- *Yinka Folawiyo Petroleum Co. Ltd.* is a small indigenous producer with between 650 mmscf to 1200 mmscf/day gas reserves in two wells. They are considering a project to produce gas for power generation and also extract NGLs/LP Gas. They are only now developing their plans, which will become clearer in 2004.

- *Global Energy*. In 2003 Global Energy signed a gas stream takeup agreement with Shell. This will give them 100 mmscf per day of associated gas from which they will extract NGLs, returning the lean gas to the natural gas trunk pipeline. Global confirm that their LP Gas has all been presold for the foreseeable future. However, the company has stated that it could identify and deliver a source of feedstock suitable for producing LP Gas for the domestic market, if suitable investors/finance could be found.

- *Addax Petroleum Development* has a planned project to extract LP Gas from its associated gas, which is currently flared. It has a joint venture with an indigenous operator to monetize their natural gas and confirmed it will sell its LP Gas " across the fence" to marketers,

by installing a truckloading facility. They plan to produce some 50,000 tons of LP Gas per year.

Gas Composition and Constraints

4.13 The LP Gas mix that is normally specified for the Nigerian domestic market is one that is butane rich, that is, a 70/30 or 75/25 butane/propane mix. The primary butanization infrastructure depots are designed for a 50/50 mix. NGL-rich associated or nonassociated gas streams are normally found to contain considerably more propane than butane. This is a logistical constraint, in that after fractionation of the NGLs, there is normally surplus propane to deal with. Aside from reinjection, a petrochemical plant or a polypropylene plant may be able to take the surplus propane. Otherwise it has to be exported, and where small quantities are involved, this is commercially difficult to justify.

Pricing

4.14 The LP Gas that is currently being exported from Nigeria is sold FOB effectively at export netback prices. It is also the case when surplus LP Gas is exported directly by the refineries, which is very rarely the case. The imported price of LP Gas is obviously much higher, and currently is equivalent to around US$400 per ton (although US$800 a ton has been mentioned by some importers during the workshop), landed cost, inclusive of 37 percent import duty/levy. The one thing that has been made clear to us by the marketers is that the import price is not viable for market expansion. At the refineries the marketers are charged a set figure of N37,500 per ton, which is the equivalent of around US$288 per ton. This is closer to import parity than export netback. In order to revitalize and expand the market the price paid by marketers should be as close as possible to the export netback price. In the short term, while the domestic market wholly depends on imports, the refinery price is merely academic. The removal of import duty would help to make imported LP Gas more affordable.

4.15 The export netback price is the price available for the product when delivered to a foreign customer's receiving terminal less the cost of shipping, cargo finance, and so forth. Large-scale export of LP Gas from Nigeria is in refrigerated oceangoing tankers, and much of the product is destined for the United States and is discharged at Mount Belvieu. Some additional processing may be required to achieve international/US market specification and price. Both the "posted price" at Mount Belvieu and shipping rates are variable, making the valuation of future deliveries highly speculative. However, this is normal in the international LP Gas trade.

4.16 During 2002, the Mount Belvieu (M.B.) posted price for specification-grade butane and propane was in the range US$185–265 per ton (the M.B. price is quoted in cents per U.S. gallon) while freight charges for single voyages were in the range US$55–60 per ton. The netback price during 2002 would, therefore, have been US$125–210, excluding financial costs and, possibly, a discount for further processing charges. This is between half and one quarter of the cost of LP Gas imported recently in Nigeria, thus the

incentive to look further into the domestic market unrealized potential by some local oil and gas producers.

Realistic Domestic Market LP Gas Supply Options

4.17 Both the Niger Delta Ogbelle gas processing project and the Addax deflaring project will produce welcome but relatively small quantities of LP Gas for the domestic market. Further domestic supplies could become available from the existing producing fields of Pan Ocean and Yinka Folawiyo Petroleum. Clearly, there is adequate potential LP Gas available from potential gas processing projects while refinery production can be incremental in the future to the overall domestic market supply. However, a specific major domestic supply option is required and this should require a significant dedicated facility, from an entirely new source. The Nigerian Government should fully support this new domestic supply project and there are strong indications (post-workshop) that such support is developing rapidly. One way that this could be initiated is by the FGN floating an "Expression of Interest" enquiry to attract potential investors/developers for such a project. Ideally this should be supported by a commitment from the domestic marketers to take up the LP Gas produced from this new gas-processing project. Initiating and implementing this new project has to be the top priority of the government and industry, if the domestic LP Gas market is to be revitalized.

5

LP Gas Distribution Infrastructure

Import/Export Facilities

5.1 The LP Gas export facilities of Chevron and Exxon-Mobil were designed only for large-scale cargoes of refrigerated product and are not immediately relevant to the domestic market. The same is true of the LP Gas export facilities constructed as part of the NLNG project.

5.2 As described in Chapter 5 of this report, the NNPC refineries at Port Harcourt and Warri have berthing facilities for LP Gas ships. These are designed for smaller ships and to handle pressurized cargoes. However, the LP Gas ship loading arms at Warri have remained unused for some years and are not capable of operation at the moment. Some reinstatement may be undertaken as part of the ongoing TAM program.

5.3 At times, LP Gas was exported from Port Harcourt using the one ship-loading arm that is operational and accessible. Two loading arms are mounted on berths that have become inaccessible because of silting and the pipeline linking them to the refinery has been deemed unusable because of heavy corrosion. A third loading arm on one of the outer (accessible but congested) berths is unserviceable.

5.4 PPMC's butanization depots at Calabar and Apapa (Lagos) are designed to receive pressurized LP Gas by sea and have a storage capacity of 1,000 and 4,000 tons respectively. A ship loading arm has been erected (belatedly, because of berth construction works) at Apapa but not yet commissioned. When LP Gas is imported a makeshift, temporary ship unloading arrangement is used. There is a tie-line to Unipetrol's LP Gas storage close to the PPMC butanization depot in Apapa.

5.5 Three other companies—Totalgaz, Nidogas, and AP—have independent berthing and LP Gas storage in Apapa. The largest of these—Totalgaz—has 1,000 tons of storage. All were designed to receive LP Gas by coastal tanker from Warri and Port Harcourt or, exceptionally, from abroad.

Primary Depots

5.6 In Nigeria, the NNPC subsidiary, Pipeline and Products Marketing Company (PPMC), is responsible for the primary distribution of refined oil products. To

discharge this responsibility, PPMC operates a network of "white products" depots, which are supplied by pipeline from the refineries. The policy objective is to make products available in all parts of the country and at a common price, irrespective of location. Licensed marketers are responsible for onward distribution from the depots.

5.7 The butanization depots were planned to operate on similar lines to the white products depots and were (with the exception of Apapa) located alongside them. The white products depot chiefs would exercise management control of the butanization depots. In effect, the butanization depots are part of the primary distribution system, but dedicated to a single product—LP Gas. Arguably, the independent import terminal facilities of Totalgaz, Nidogas, Unipetrol, and AP are also primary depots.

5.8 The nine butanization depots are located at Apapa (Lagos), Calabar, Enugu, Makurdi, Ibadan, Ilorin, Kano, Gombe, and Gusau. All have 1,000 tons of LP Gas storage capacity, except Apapa, which has 4,000 tons. Their intended function is to receive LP Gas in bulk and make it available to licensed marketers for local distribution in bulk and in cylinders. As the new capital, Abuja, has expanded rapidly over the past few years, an argument can be made for constructing an additional butanization-type primary depot there.

Marketers and Distributors Facilities

5.9 From the data given to us by NALPGAM and our own internal records, we have put together a summary list of the LP Gas plants nationwide. This is included as Annex 3 within this report. This denotes a total of 200 LP Gas plants nationwide, though not every single plant may have been picked up. Obtaining definitive data can be difficult. The list also does not include the nine butanization depots. The list is divided geographically, as this is obviously interesting to determine which plants can be serviced from which butanization depot or refinery. The LP Gas plants are broken down geographically as seen in Table 5.1:

Table 5.1: LP Gas Plants Nationwide

Location	*No. of LP Gas Plants*	*Location*	*No. of LP Gas Plants*
Port Harcourt	26	Kano	9
Enugu	34	Gombe	6
Calabar	9	Gusau	2
Makurdi	2	Ilorin	3
Lagos	53	Plateau	12
Ibadan	13	Kogi	1
Warri	21	Niger	1
Kaduna	15	Abuja (FCT)	3

5.10 It can be seen from the Table 5.1 that the northern locations (Kaduna, Kano, Gombe, and Gusau) are not as well serviced as the other more southerly locations. From

the data available the storage capacity at the LP Gas plants varies from 7 to 339 tons (excluding the major Total, AP, and Nidogas import terminals/plants in Lagos). This works out to an average of 48 tons storage per LP Gas plant, discounting those 26 plants whose storage data was not obtained for this report. It is important to note that many plants are not operational. One participant at the workshop stated that 85 percent are idle.

Proposals for the Effective Use of the Primary Depots

5.11 In concept and operation, the white products depot system has proved highly successful as the conduit for the primary distribution of refined products. The phased extension of the depot and pipeline network has eased congestion at the refineries and on the roads while helping to ensure availability of products, at a common price, nationwide.

5.12 The butanization depots were planned to follow this operational model but with LP Gas supply by coastal tanker and by road, in the initial phase. Although the project concept was to site the inland depots close to the rail line, those responsible for implementing the butanization project considered that the railway system was not sufficiently robust for safe, efficient LP Gas transportation. Also, it would be some time before LP Gas volumes would become sufficient to warrant pipeline transportation. While the butanization depots (with the exception of Apapa and Calabar) have not been brought into operation—principally because of lack of supply from the refineries—they are central to the revival of the LP Gas sector.

5.13 Management of the depots by PPMC is not ideal. LP Gas is a minor part of a much larger operation, and PPMC has shown neither appetite nor aptitude for it. Any proposal to change the ownership or management control of the butanization depots should take account of their potential in the LP Gas sector and in bringing the benefits of gas to the largest possible numbers, especially rural dwellers in areas remote from the production centers. Any piecemeal disposal would inevitably lead to "cherrypicking" and would most likely undermine a national approach to LP Gas distribution. Crucially, "open access" and "equality of price" must be maintained. It is vitally important therefore that owners/operators, with both the financial and technical capability required, be brought in to take on the operation and day-to-day running of the depots in accordance with best LP Gas industry HSE standards and procedures.

5.14 It is worth noting that the process of privatization of PPMC and/or the white products depot system (22 depots overall) is now being carried out by BPE. Any such scheme should obviously take account of the nine butanization depots, their strategic importance in future domestic energy provision, and their economic worth.

Health, Safety, and Environment Mitigation

5.15 Throughout LP Gas marketing, including the primary distribution stage, health, safety, and environmental issues mostly relate to safety. LP Gas is hazardous unless kept under control and risk tends to be highest during product transfer, for example, during loading and discharge operations. The owners of the primary distribution infrastructure,

PPMC and the three private sector companies, understand the HSE issues but must operate in a low-maintenance, low-safety awareness environment.

5.16 The butanization depots were designed and equipped to international LP Gas industry standards and operator training was provided at the time of commissioning. However, the depots have not been maintained and many of the original workers were reassigned when the depots did not progress to commercial operation. A full review and updating of HSE systems and procedures, including training, would be required before the depots are brought into operation. The existing private sector primary depots come within the scope of the DPR regulations and are monitored by its inspectorate. No doubt, the DPR and the depot owners will have considered the impact on their operations of the DPR's recent review of its standards.

5.17 There are no process operations at the primary depots and worker numbers are small, minimizing any industrial-type environmental impact.

6

Transportation

Coastal Transportation

6.1 There is an established pattern of LP Gas transport by ship from the coastal refineries to receiving facilities in Apapa and in neighboring countries. In recent years, coastal transportation patterns have changed with problems of limited refinery supply and harbor congestion. One indigenous company currently has a ship available for this traffic but it must also seek work elsewhere.

6.2 With limited LP Gas storage capacity, the established private sector terminals often shared cargoes to improve the transportation economics. The opening of PPMC's Apapa depot more than doubled receiving terminal capacity in Lagos.

6.3 Coastal transportation is the logical way to supply Lagos and much of its hinterland but, at present, the economics are undermined by supply uncertainty and delays at both loading and discharging berths. One workshop participant who is active in importing LP Gas spoke of a 20-day turnaround time for ships at Lagos port, with consequent costs of demurrage on the landed product.

6.4 At times, LP Gas has been exported from Port Harcourt using the one shiploading arm that is operational and accessible. Two loading arms are mounted on berths that have become inaccessible because of silting and the pipeline linking them to the refinery has been deemed unusable because of heavy corrosion. A third loading arm on one of the outer (accessible but congested) berths is out of service.

Inland Transportation

6.5 Currently, inland transportation of LP Gas is by road and is likely to remain so in the immediate future. Road transport is not ideal over long distances but, at present, is the only practical method, given the limitations of the rail system.

6.6 Generally, bulk LP Gas transport is in marketer-owned road tankers with only limited haulier participation. Some marketers will transport LP Gas (usually from a supplying refinery to a cylinder filling plant) on behalf of other marketers. At least one company (an associate of the coastal shipper) has expressed interest in participating significantly in road transportation of LP Gas.

6.7 Some distributors use general-purpose trucks to transport LP Gas in cylinders. Ideally, LP Gas cylinders should be transported in trucks designed and equipped for that purpose.

Future Requirements

6.8 The planned improvements in the domestic LP Gas sector will increase the market size and, hence, the transportation requirements—coastal and inland.

6.9 A sustained restoration of LP Gas supply from Kaduna will improve the efficiency of inland transport as marketers from the northern states will no longer need to send their trucks to Port Harcourt. There will be a double benefit through reductions in the distances traveled and through reduced waiting times. There will be significant and readily realizable improvements in transport use when there will be speedier evacuation from the refineries.

6.10 Coastal movements from the refineries (or other new supply sources with ship or barge access) are the logical way of supplying the Lagos area and the terminal capacity at Apapa is underused. However, roads around Apapa are heavily congested with both trucks and motor vehicles. Much needs to be done to reduce waiting times and the associated costs. At times, the position has been so bad that Lagos-based marketers brought product by road from Port Harcourt, adding to the volumes of LP Gas on congested, hazardous roads.

6.11 The LP Gas industry needs the flexibility of road transportation (especially for short haul) as supply sources become more diversified and the product begins to penetrate rural markets more intensively.

6.12 Alternative modes of transport—rail and pipeline, in particular—should be kept under review and evaluated. The FGN has announced plans for a major upgrading of the rail system and it may play a part in future inland LP Gas transportation. Similarly, projects to extend the white products and natural gas pipeline networks should be monitored for opportunities to transport LP Gas within or alongside them.

6.13 A north-south trunk supply line (pipe or rail) linking the coastal area to Abuja and to the larger cities of the north—Kaduna and Kano—would facilitate the safe, economical inland transportation of LP Gas and relieve the isolation of the north. Two options worth urgent consideration and evaluation are:

- Upgrading the existing railway line from Lagos to the North to an appropriate standard together with the provision of locomotives and dedicated LP Gas rail tankers and dedicated rail loading and offloading facilities along the rail line.
- Adapting the planned north-south trunk gas pipeline to carry LP Gas and natural gas.

6.14 The attraction of the rail option is the existence of a permanent way and of a functioning railway. An upgraded rail line would carry freight in addition to LP Gas and would help to decongest the road system. The principal attraction of a shared gas pipeline, that is, one transporting both natural gas and LP Gas simultaneously, is that the basic economics would be supported by the transport of natural gas, principally for power generation. The pipeline would also be safer. It is normal oil-and-gas industry practice to transport "wet gas," that is, methane in combination with heavier hydrocarbons such as propane and butane, in pipelines unless "pure" methane is required, for example, in a natural gas export line. In Nigeria, wet gas is collected for processing, for example, in the existing LNG and Chevron export projects. However, a specific study will be required to determine the technical and economic feasibility of transporting the desired natural gas/LP Gas mixture in the yet to be designed north-south gas pipeline. Turbines used for large-scale power generation are generally tolerant of moderate quantities of the lighter LP Gas fractions in the fuel gas.

6.15 The present system of LP Gas transportation is haphazard with marketers uncertain about supply and, therefore, unable to plan efficient transport use—whether ship or truck. Meanwhile, most of the primary distribution system remains unused. There is a need for integrated distribution planning, incorporating the primary depots and professional haulage operators. It would allow the LP Gas industry to concentrate on market development and prevent a proliferation of truck numbers.

Health, Safety, and Environment (HSE)

6.16 Here again, safety is the principal HSE concern, partly because of the nature of the product but also because of the poor condition of many trucks and the hazardous nature of road travel in Nigeria.

6.17 The LP Gas industry, its suppliers and the regulatory authorities should agree standards and an implementation program to improve safety by a phased elimination of substandard trucks. Normal industry practice would deny access to supply sources and primary depots for noncompliant transport.

Preferred Option

6.18 Coastal movements are prefered where appropriate and where facilities are in place. Road transport is indispensable for short-haul movements in bulk and in cylinders. For long-haul trunk transportation to the North the preferred option is rail in the short term with shared pipeline in the medium to long term. The economics of rail and pipeline transportation have not been examined as part of this study.

7

Cylinders

Manufacturers

7.1 There are two manufacturers of LP Gas cylinders—Nigerian Gas Cylinder Company (NGCC), based in Ibadan and Midland Gas Cylinders (Midas), based in Abeokuta. Both manufacturers have accreditation from the Nigerian Standards Organization and have facilities for cylinder reconditioning, testing, and revalidation. The status of Midas is unclear. A third company—Setamec, formerly based in Isolo, Lagos—is no longer active in cylinder manufacturing. Because of the current state of the LP Gas sector, NGCC has stated it is in imminent danger of closing down.

7.2 NGCC claims manufacturing capacity for up to 1 million standard 12.5 kg cylinders per year (on three-shift working) but, in recent years, has operated at a fraction of that capacity, currently around 5 percent. Midas was not producing cylinders at the time of the fact-finding mission.

Ownership

7.3 Ownership of cylinders is a critical issue as it raises questions regarding the right to refill and the obligation to maintain. There is uncertainty—and not a little confusion—about the ownership of LP Gas cylinders, a problem not peculiar to Nigeria. Resolution of this uncertainty is essential. In most countries, the LP Gas marketer owns and maintains the cylinder while the consumer pays rental, or a deposit, for its use.

7.4 The original marketers issued cylinders to their appointed distributors and consumers but retained ownership, together with the sole right to refill and responsibility for safety and upkeep, including periodic testing and revalidation. This system began to break down when NNPC introduced cylinders of which the user (in many cases) became the owner and when new independent marketers and distributors entered the market. The objective of standardization of valves for easy interchangeability of cylinders encountered opposition and was dropped at a time of indifferent governance. In recent years, there has been some importation of used cylinders by traders.

Crossfilling

7.5 The term "crossfilling" is used to describe unauthorized filling, that is, refilling of marketer-owned cylinders by others. This activity often provokes a reaction whereby plant operators refill every, and any, cylinder offered to them. The practice tends to increase when product is in short supply.

7.6 The apparent convenience of crossfilling has negative consequences for safety and "traceability." Free from accountability, the filler may underfill or accept a defective cylinder for refilling, thereby denying the customer value for money or putting him (and possibly others) at risk.

7.7 All too often, the first consequence of crossfilling is a rapid decline in the appearance and quality of cylinders. Inevitably, without the exercise of proper controls, accidents follow.

Maintenance/Certification

7.8 An LP Gas cylinder is a pressure vessel and is certified accordingly at the time of manufacture. This certification is renewed at specified intervals during the life of the cylinder. It is given a unique identification number and often has the names of both the manufacturer and the owner-marketer permanently embossed and marked on it. Thus the wariness of bona fide operators to accept "wild," backyard crossfillings.

7.9 Cylinders should be checked for defects at each refilling and have a more detailed, expert inspection and test at the time of recertification. They should not be refilled if "out-of-test" or if they fail to meet specific criteria for serviceability. Crossfilling undermines this system of which consumers may be unaware but, in any event, cannot be expected to arrange or undertake themselves.

7.10 The Standards Organization of Nigeria has published a code of practice for gas cylinder test stations.

7.11 The DPR Procedure and Requirements for the Grant of Approval to construct a liquefied petroleum gas plant includes "cylinder maintenance facilities" as a condition of initial licensing. Cylinder maintenance might include minor repairs such as valve replacement. Following its recent review of regulations, the DPR plans to specify cylinder-testing equipment in new license applications. Cylinder testing for requalification is a specialist procedure and technically more demanding than routine maintenance.

Cylinder Technology

7.12 Most LP Gas cylinders in service worldwide are made of steel and fitted with brass valves. In Nigeria, the most commonly used cylinder carries a 12.5 kg fill and the tare weight is in the range 14–17 kg, that is, up to 30 kg when full. The weight is a problem for anyone who needs to carry it. The steel is subject to impact damage and to external corrosion and the consumer cannot see the contents. The weight problem has

been addressed in other countries by the use of stainless steel and aluminum to replace mild steel but there is a cost penalty. Smaller capacity cylinders have been introduced in many countries, including Nigeria, but while they are lighter they require more frequent refilling.

7.13 Recent advances in materials technology and fabrication methods have created new possibilities for LP Gas cylinders. In particular, composite materials are now available with the required strength and durability and with much-reduced weight compared to steel. Initially, these benefits came at a significant cost but, more recently the cost differential has been reduced. One European manufacturer of composite cylinders has claimed cost parity with steel for the household size. Other attractions of composite cylinders are translucency (making the contents level visible to the consumer) and good safety performance in the event of a fire.

Future Proposals

7.14 The LP Gas industry must ensure safety and accurate filling, together with accountability—none of which can be assured at present. Regulatory provisions and policing should be directed toward achieving positive results rather than just imposing penalties. Initiatives to improve LP Gas access for the poor should resist pressure to compromise safety in order to reduce costs. As noted earlier, the problems currently evident in Nigeria are not unique. Other countries (for example, Brazil, Chile, and Kenya) have experienced them and some have developed strategies for recovery. We can learn from successful experience elsewhere. As an example in the Philippines there was a Memorandum of Understanding signed between all the major marketers to deal with the cylinder issues. It was signed under the auspices of the regulatory authority and was an agreement to cooperate to solve the issues, in a way appropriate to the Philippines situation. A bill now before the House of Representatives will give legal status to the agreement. This, or comparable legislation from another country, could be used as an initial guideline by the marketers in Nigeria.

7.15 Clearly, a growing LP Gas market will require additional cylinders. There are advances in cylinder technology, which will be explored. Irrespective of technology, funding will be required for new cylinders and to bring existing cylinders (where practical) to an acceptable standard. Neither the industry nor its customers can be expected to bear this burden without assistance. However, a project to produce composite cylinders at competitive prices in Nigeria would benefit from growing regional markets, in addition to growing domestic demand.

7.16 A proposal was put forward some years ago to pool the existing national stock of cylinders and to launch a major refurbishment program but this did not attract wide support and it has not progressed. NALPGAM reported that it is studying a cylinder standardization scheme to be administered by its association.

7.17 The arbitrary seizure or withdrawal of old, out-of-test cylinders has been mooted but would create hardship for consumers unless a safe replacement cylinder is immediately available.

7.18 It should be noted that, for a number of years, PPMC collected a levy on marketers' LP Gas purchases for the express purpose of financing cylinder purchases. Industry representatives have asserted that funds collected were not expended for the intended purpose. NNPC and the FGN could contribute to the resolution of this problem, which is partly of their making.

8

Household Cooking/Lighting Demand

Household Energy

8.1 Household energy demand arises from lighting, media, cooking, space heating/cooling, water heating, refrigeration, and power-operated appliances. Electricity is at the top of the hierarchy of household energy supply sources and commands an image of modernity, versatility, and cleanliness. It is indispensable for media and powered appliances, and is preeminent in lighting, space cooling, and refrigeration.

8.2 Gas is less versatile and is ranked lower than electricity. It is often the preferred fuel for cooking and can be substituted for electricity in some other household energy applications. Gas includes natural gas and LP Gas. In Nigeria, natural gas is used almost exclusively for power generation and industry, while household gas is LP Gas.

8.3 Kerosene is ranked lower again, lacking the versatility of electricity and the cleanliness of gas, but capable of providing sufficient heat for cooking and a reasonable standard of lighting.

8.4 Candles and battery-operated lamps serve a single need, lighting, in a very limited fashion. They have the advantages of portability and of quick response in a power failure. Candles have a low unit purchase price.

8.5 Collectively, biomass fuels (for example, wood, crop residues, dung) rank lowest among household fuels, being bulky, dirty, and lacking in versatility. They are normally associated with economic and social deprivation, but, nevertheless, wood is preferred for certain rituals and for specialized or festive cooking. There is growing recognition of health risks (especially for women and smaller children) in the use of biomass as cooking fuel. However, for the poorest households, biomass may represent the only accessible fuel.

Economic and Demographic Data

8.6 With a population of around 120 million people, Nigeria is the most populous country in Africa. Despite a long-established drift to the towns and cities, the majority are rural dwellers and more than half the workforce is engaged in agriculture. The highest population density is in the central lowlands and in the west of the country.

The largest city, Lagos, has an estimated 12.5 million inhabitants. Nigerians have a life expectancy of 53 years with infant mortality of about 75 per 1000 live births.

8.7 Despite abundant natural and human resources, the country is impoverished and the majority of the population is classified as poor. The percentage living below the US $1 per day poverty line is variously estimated at between 60 and 80 percent. (The figure is sensitive to the Naira/US$ exchange rate used in calculating poverty levels. In 1998, the official rate was N88 while, in late 2002, the commercial rate was N120 to the US$).

8.8 During the years 1992–1998, the rate of growth in real GDP, at 2.6 percent, was below the rate of population growth. In 1998, the GDP of Nigeria was officially recorded as being 2,837 billion Naira.

8.9 Poverty reduction is central to the current FGN macroeconomic strategy. The FGN also openly recognizes the linkage between economic upliftment and modern energy provision. Between 1999 and 2000, electricity generating capacity increased by about 170 percent to 4,000 MW. However, delivery continues to fall well short of demand.

Market Price Deregulation

8.10 The retail price of LP Gas has been deregulated for some years. Since deregulation, LP Gas has mostly been in short supply, that is, a market price has not been established on the basis of fully satisfied demand nationwide.

Competitive Fuels

8.11 The household survey findings show that more households would use LP Gas and existing consumers would increase their usage, probably at the expense of kerosene, if the price differential between these fuels can be reduced.

8.12 The official retail price of kerosene was raised in mid-2003 to N32 per liter, although the actual market price ranges N60–80 per liter depending upon scarcity and location. The retail price per 12.5 kg fill of LP Gas ranged between N1,000 to N2,000, throughout the six survey locations (discounting the lowest and highest prices). In a direct comparison, using the calorific value/stove efficiency as set out in the World Bank/WLPGA West African Study, one can determine the relevant net energy per Naira for kerosene and LP Gas for these price ranges.

Kerosene:

- 37.5 MJ/Liter gross with 35 percent stove efficiency = 13.125 MJ/Liter
- Low-range energy output per Naira is 13.125 MJ/Liter x 1Liter/N32 = 0.41 MJ/Naira
- High-range energy output per Naira is 13.125 MJ/Liter x 1Liter/N60= 0.22 MJ/Naira

LP Gas:

- 48.4 MJ/kg gross with 45 percent stove efficiency = 21.78 MJ/kg
- Low range energy output per Naira is 21.78 MJ/kg x 12.5 kg/N1,000 = 0.27 MJ/Naira
- High range energy output per Naira is 21.78 MJ/kg x 12.5 kg/N2,000 = 0.14 MJ/Naira

8.13 Thus at the current range of retail prices LP Gas at its lower retail price is seen to be comparable to kerosene at the top end of the kerosene retail price range. It should be noted that the retail price range of a 12.5 kg fill of LP Gas would have to be reduced as follows to equate directly to kerosene, based on the current official retail price range of kerosene:

- 21.78MJ/kg x 12.5 kg / 0.41MJ/N = N665 per 12.5 kg fill

8.14 As can be seen from the above the aim should be to get LP Gas into the market at a retail price of well less than N1,000 per 12.5 kg fill, in order to have LP Gas comparing favorably with the official kerosene retail price.

8.15 It should be noted however that the above does not take into consideration any additional benefits, health, environmental, and so forth, which comes from switching to LP Gas from kerosene. Nor does it take into consideration the historical subsidy applicable to the wholesale price of imported kerosene. In 2001, 461,000 tons of kerosene were imported at an average landed cost of N24.2 per liter, while the (controlled) ex-refinery/depot price payable to NNPC was N18.8 per liter. Unlike LP Gas no import duties are imposed on imported kerosene.

8.16 Following recent (mid-2003) deregulation, the retail price band of kerosene is N60–80 per liter and the use of LP Gas is now more cost effective. Increased supply at lower cost will undoubtedly allow the market to expand and the LP Gas industry to achieve economies of scale. Lower retail prices will enable LP Gas to begin the process of penetrating peri-urban and rural poor communities, which currently have minimal access.

9

Household Survey

Purpose

9.1 As part of the study, a household survey was undertaken to establish patterns of energy use, availability, preference, and expenditure. The requirement for a survey was identified during contract negotiations for the study when the World Bank provided an outline survey design.

9.2 The survey was undertaken using 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; e) amounts spent on fuels; and so forth. The format of the survey questionnaire was agreed after discussion with the World Bank. The questionnaire is in two parts: Part A to be completed at retailers and Part B to be completed at households. A copy of the survey questionnaire is attached hereafter within Annex 1 of this report.

9.3 Key issues to be addressed in this survey exercise included determining:

- 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
- Hurdles to switching to LP Gas for various consumer categories
- Economic data on population
- Market-price deregulation

Survey Design and Methodology

9.4 The outline survey design suggested a target sample size of 1,000 households to be drawn from various "clusters" in 5–10 major urban centers. The survey took in six widely dispersed locations, representative of the whole country, that is, Lagos,

Kano, Benin, Owerri, Makurdi, and Maiduguri, (in order of population density). The survey avoided locations close to the refineries where oil products are usually more readily available, and may therefore not be representative of what pertains in the rest of the country.

9.5 Figure 9.1 shows the six survey locations in Nigeria; the existing refineries at Warri, Port Harcourt, and Kaduna; and the butanization LP Gas depots at Lagos, Ibadan, Ilorin, Calabar, Enugu, Makurdi, Kano, Gusau, and Gombe. The map also denotes the main roads and rail infrastructure. All the inland LP Gas depots are adjacent, but not connected, to rail lines, and Lagos and Calabar are coastal depots with marine access. Three of the survey locations, Lagos, Kano, and Makurdi, also have LP Gas depots. From the map it is clear that midcountry and Northern locations should be supplied by Kaduna Refinery. While a location like Maiduguri is a considerable distance from Kaduna, it is much further from Port Harcourt. Locations such as Benin and Owerri, and as far north as Makurdi or Ilorin, would normally be supplied by Port Harcourt or Warri Refineries, or from the Lagos or Calabar coastal LP Gas Depots.

Figure 9.1: Map of Nigeria

9.6 The survey was organized and overseen by the Nigerian members of the study team. Local knowledge and contacts were judged to be essential. With many years of senior-level experience in the marketing operations of PPMC and TOTAL in Nigeria, the Nigerian members of the study team are familiar with all aspects of liquid fuels marketing, distribution, and utilization. They provided guidance to the survey teams and their co-coordinators in the survey work and in the follow-up reports.

9.7 In each survey location, sampling was carried out in four socio-economic groups—urban high income, urban middle income, peri-urban, and rural poor. A total of 2,039 households participated, broken down as follows:

Table 9.1: Household Survey

	Urban High	*Urban Middle*	*Peri-Urban*	*Rural Poor*	*Total*
Lagos	101	105	105	105	416
Kano	95	68	68	89	320
Benin	47	147	119	39	352
Owerri	61	120	61	60	302
Makurdi	75	73	75	75	298
Maiduguri	87	87	91	86	351
Total	466	600	519	454	2,039

9.8 Qualified area coordinators with survey experience were appointed for each location to supervise a total of 31 field workers—seven in Lagos, four in Makurdi, and five in each of the other locations. Details of the area coordinators and their field workers are included within Annex 1 of this report.

9.9 Householders' responses were collated and tabulated electronically for each location on statistical spreadsheets. These raw data spreadsheets were issued to the World Bank as a separate backup record document for each of the six locations. These spreadsheets were then tabulated on an overall summary spreadsheet of survey responses, which is attached hereafter within Annex 1 of this report. A brief explanatory preamble to the summary spreadsheet is also included within Annex 1.

9.10 Notwithstanding the as-expected variations and shortcomings in some of the survey replies, enough data was obtained, from a sufficiently diverse number of households, to enable us to comment authoritatively on the key issues set out in the brief above.

Main Overall Survey Findings

9.11 Attitudes toward LP Gas are generally favorable among those with the experience of cooking with it, including former users who can no longer afford to do so. However, some rural dwellers simply did not know the product, nor what it costs, nor what benefits might arise from its use.

9.12 Of the households surveyed, 83 percent used kerosene as one of their cooking fuels, 61 percent as the fuel most used in cooking. The comparative figures for LP Gas were 35 and 20 percent respectively.

9.13 LP Gas for cooking was preferred in 44 percent of households compared with 41 percent for kerosene. The preference for LP Gas is higher again when households with no experience of LP Gas are excluded.

9.14 If LP Gas were available, 21 percent of users stated that they would have used more, while 19 percent had been out of LP Gas for some time when they were able to make their most recent purchase. The findings generally clearly indicate suppressed demand for LP Gas.

9.15 Electricity supply existed in 96 percent of households and, of these, 95 percent were connected to NEPA. Just over half reported daily power cuts. Kerosene is the fuel most widely used for lighting when electricity is cut. LP Gas usage for lighting is minimal. None of the households without electricity used LP Gas for lighting. Less than 1 percent used LP Gas for lighting during power failures.

9.16 The high incidence of NEPA connections merits comment. The survey locations are major cities and are, of course, better served by the NEPA grid than the country as a whole and, most especially, rural communities. In urban high, urban middle, and peri-urban categories there were 1,585 households of 2,039 surveyed. Furthermore, informal and unauthorized NEPA connections are common in Nigeria, especially in multiple-occupancy urban and peri-urban buildings. The connection may be taken directly from NEPA or from an adjoining household. The latter, especially, may consist of no more than a single light and, in common with the authorized connection, mostly inactive.

9.17 LP Gas collection by the purchaser is virtually universal, and the option of home delivery is unusual.

9.18 The average age of LP Gas stoves was over eight years and there were few recent purchases of LP Gas stoves, nor of other LP Gas appliances.

9.19 Almost 80 percent of respondents stated that they did not have access to low-cost credit, nor was there a low-cost credit organization in their area. This percentage would be higher but for a high (and possibly anomalous) positive response from peri-urban and rural households in Makurdi.

9.20 Many existing, past, and prospective LP Gas consumers are discouraged by perceived high cost, uncertain supply and safety concerns. As fuel scarcity has

become endemic, the domestic fuel market has become distorted. Lines regularly form at fuel stations in response to actual, or rumored, scarcity. Panic purchases are reflected in black market prices. LP Gas has never been in abundant supply nationwide and availability can be manipulated more readily than kerosene. Consumers become unsure when and at what price the next cylinder will become available. Hoarding and predatory pricing by street sellers or resellers exacerbate the problem.

9.21 One consequence of this is variable, seemingly random pricing. Often, the per-kg price of the larger cylinder may be higher than smaller sizes because, once purchased, supply is assured for longer. Statistical analysis of historic prices is of limited value in seeking to identify trends or to forecast future prices.

9.22 The perception of danger associated with LP Gas usage is widespread (almost half of survey respondents) and represents a major challenge both for sector improvement and for extending LP Gas access to the poor.

Survey Findings by Location

9.23 Based on the reports and survey questionnaires returned from the various area coordinators, and on the statistical spreadsheets, the findings can be summarized at each of the six survey locations, as follows:

Lagos

9.24 Lagos is a sprawling metropolis of an estimated 12.5 million people. All four socioeconomic groups are represented in Lagos and its environs. For the Lagos survey, the sample size and the number of field workers were increased. A total of 416 households were surveyed.

9.25 There are many cylinder filling plants and retail outlets for LP Gas in the Lagos area but the product is often in short supply and prices vary accordingly.

9.26 LP Gas is the preferred cooking fuel among the urban high- and middle-income families—151 out of 206 households—while peri-urban and rural households expressed a preference for kerosene.

9.27 Of the widely used cooking fuels, kerosene attracts the largest number of users—266 from 416—followed by LP Gas at 181. LP Gas is the cooking fuel most often used in urban households while kerosene is the most often used fuel in peri-urban and rural households. Overall, the percentage of households regularly using firewood is 15 percent but this rises to 50 percent among rural dwellers.

9.28 Multiple cooking fuel usage is the rule in urban households with the choice at any given time mostly depending on price and availability. Urban high-, and middle-income households need kerosene as the reserve cooking fuel, when the preferred fuel, LP Gas, is not available. They also need kerosene for lighting during power failures. Urban high-income households may resort to firewood for festive occasions.

9.29 The high cost of LP Gas caused complaints from about 53 percent of households, 43 percent said it was dangerous, while 24 percent complained about supply and the hassle associated with obtaining refills. Satisfaction level was highest among the high-income groups.

9.30 A significant number of high-income households have access to privately generated electricity. Generally, households depend on kerosene lamps, candles, and standby generators for lighting during electricity outages.

9.31 Generally, self-collecting is the rule for LP Gas supplies but the survey noted some instances of home delivery springing up in urban high-income and middle-income areas. While a household may be physically close to an LP Gas retailer, the time taken to obtain a refill may vary in the range of 5 to 45 minutes, depending on traffic and whether the nearest retailer has LP Gas in stock. Kerosene is more widely and readily available, often from street hawkers and in small quantities.

9.32 At the time of the survey, LP Gas was readily available in Lagos at prices in the range N1,200–1,300 per 12.5 kg fill. The lowest price encountered was N950 at a retailer close to a filling plant while the highest was N1,500 in a rural village. Respondents said that prices react quickly to reports of scarcity and may reach N1,800–2,000 for the 12.5kg fill.

9.33 Many high-income households suggested an appropriate/affordable price for a 12.5 kg fill as being N600 and above. However, other householders asserted that they would use more LP Gas if the price went below N500 per fill. Many would use LP Gas exclusively if it were regularly available and cost no more than kerosene. This is an issue dealt with in more detail in Chapter 9 and noted elsewhere in these survey findings.

9.34 LP Gas stoves are available in urban stores and from some retailers. Prices range from N1,800–2,500 for a single burner, N3,000–5,800 for double burners and up to N25,000 for others. Stoves were available in one peri-urban location but not in rural areas.

9.35 Two respondents reported a connection with a credit organization but neither believed that its funds would be available for the purchase of LP Gas equipment.

Kano

9.36 LP Gas is available to retailers through the independent marketers, for example, TOTAL and Agip, but not from the PPMC depot. Most retailers pay cash for LP Gas and few enjoy credit terms for their purchases.

9.37 From the sample of 320 households, 152 named LP Gas as their preferred cooking fuel but only 106 named it as the fuel most frequently used—an indication of suppressed demand. Conversely, while 136 households named kerosene as the fuel most frequently used, only 102 voiced a preference for it.

9.38 While irregular supply is a problem, expense is the single largest factor where LP Gas is not the primary cooking fuel. Most consumers complained about the cost of LP Gas.

9.39 Kerosene and candles are the most frequently used alternatives for lighting during electricity outages.

9.40 Generally, supply to consumers is "self-collect" with LP Gas availability ranging from 10 minutes (urban and middle income) to 31 minutes (rural poor). However, kerosene availability ranges from 7 to 10 minutes.

9.41 Reliability of supply and a lower retail price are the stated requirements for market growth. A target price of N500–700 per 12.5 kg fill is suggested, together with safety devices on cylinders to prevent leakage. Householders reported prices ranging from N1,200–2,200 per 12.5 kg fill.

9.42 One of the principal barriers to switching to LP Gas for potential customers is the initial cost of the equipment. One cluster in the urban middle-income group stated that they had access to credit. On enquiry however, it was established that these respondents all worked in the same organization and that the staff had set up an in-company cooperative. The majority of respondents did not have access to consumer credit and the survey did not disclose any microfinance or easy payment system which could be relevant to the acquisition of LP Gas equipment.

Benin

9.43 Benin is an important city of about 1.5 million population in the south of the country and LP Gas usage is well established there. Of 352 households surveyed, the majority (almost 90 percent) were in urban and peri-urban groups.

9.44 LP Gas is overwhelmingly the preferred cooking fuel—230 households indicated a preference for it but only 60 households cook most regularly with LP Gas, indicating a significant suppressed demand. Kerosene is more widely used as 249 households (including many former LP Gas users) cook regularly with it but only 92 named it as the preferred fuel. Most households regularly use two or more cooking fuels—only 5 percent of households use one fuel exclusively.

9.45 The high cost of LP Gas caused complaints in 64 percent of households, while 50 percent complained about availability, and a high 66 percent stated that the product is dangerous. In some cases householders stated that children who are allowed to light a kerosene stove are not permitted to touch an LP Gas stove.

9.46 LP Gas is sold on a self-collect basis and, for urban and peri-urban dwellers, is normally available within about 10 minutes (by vehicle). Kerosene availability is within about 5 minutes.

9.47 Kerosene lanterns, candles, and battery lamps—but not LP Gas—are used for lighting during electricity outages.

9.48 The retail price of LP Gas ranged from N800 to N1,800 per 12.5 kg fill. Kerosene prices ranged from N76 to N280 per 4 liters. Such wide fluctuations—usually associated with scarcity—unsettle consumers and their fuel usage patterns.

9.49 Although the survey in Benin was weighted toward urban middle income and peri-urban groups, none of the respondents claimed to have access to credit. According to the area coordinator, there is no credit institution in Benin available to householders and "the idea seems foreign to people."

Owerri

9.50 A total of 302 households were surveyed of which 181 were in the urban high/urban middle-income groups. Of the total, 140 households periodically used LP Gas as one of their cooking fuels. However, of these households only 56 named LP Gas as their most often used fuel while 134 named LP Gas as their preferred fuel. Again this suggests a real suppressed demand.

9.51 Kerosene was the most frequently used cooking fuel in 222 households, as against only 143 households stating kerosene to be their preferred fuel. Most of the households use LP Gas, kerosene, firewood, and charcoal as cooking fuel, partly for economy but also for reasons of availability. LP Gas usage would increase if the product were always available and more affordable. Under economic pressure, households have tended to increase their use of cheaper and more available kerosene at the expense of LP Gas.

9.52 LP Gas and kerosene are sold on a self-collect basis. LP Gas is normally available within 20–30 minutes (by vehicle): kerosene within 15–20 minutes.

9.53 The retail price of LP Gas varied within the range of N800 to 2,500 per 12.5 kg fill while kerosene was within the range of N80 to N90 per liter. The highest reported price of LP Gas was N2,500 per 12.5 kg fill in the urban high area.

9.54 The high cost of LP Gas caused complaints among 63 percent of respondents complained, 33 percent complained about the cost of the stove/cylinder, 32 percent about availability, and 38 percent stated it was dangerous. Specific safety concerns voiced by respondents included reference to incidents at retailers' outlets.

9.55 Kerosene lanterns, candles, and, to a lesser extent, battery-operated lamps were used for lighting during electricity outages. There was no reported use of LP Gas for lighting.

9.56 Just over 42 percent of respondents indicated a preference for the 12.5 kg cylinder and there was also a certain interest in a 6 kg size. A significant number considered a cash outlay of N500 and upward for a 12.5 kg fill to be appropriate/affordable but there was a sizeable minority opting for an outlay of N400–500 per 12.5 kg fill.

9.57 Only nine respondents, in the urban high and urban middle categories, claimed to have access to low-cost credit.

9.58 Stove prices were reported as N2,500–3,500 for a single burner and N4,800–5,500 for a double burner.

Makurdi

9.59 Three LP Gas retailers supply the local market and all bring their supplies directly from Kaduna—a distance of 450 kilometers. Many households complained that LP Gas is not affordable while recognizing that the fuel must bear the additional cost of transport from Kaduna. LP Gas is not available from the local PPMC depot.

9.60 Of the 223 urban and peri-urban households surveyed, 109 named LP Gas as the preferred cooking fuel and, while 71 used LP Gas periodically, only 24 named it as the fuel most frequently used. In 174 households, kerosene is the fuel most frequently used, but as against that it is the preferred fuel in only 108 households out of 223.

9.61 Kerosene is the most widely used cooking fuel in all four socioeconomic groups, being cheaper and more accessible than LP Gas. However, it is clear that respondents would use more LP Gas if it were affordable and in regular supply, as 69 percent of households complained about the cost.

9.62 Nearly 53 percent of the 298 households expressed concern about LP Gas safety. As in Maiduguri, safety concern may be a barrier to extending LP Gas usage to rural communities.

9.63 LP Gas is available on a self-collect basis only and may involve a journey of several kilometers (or up to 45 minutes). By comparison, kerosene is available within 5 to 15 minutes for peri-urban and rural poor households. Of 75 rural households surveyed, 3 had LP Gas stoves but none was using the fuel.

9.64 The retail price of LP Gas varied between N1,300–1,400 per 12.5 kg fill while kerosene ranged from N120 to 180 per 4 liters. Householders stated that a price less than N500 per 12.5 kg fill would encourage them to switch to a wider use of LP Gas. Only 42 households were prepared to pay N600 or higher. In the rural poor area, 54 of the 74 households stated that they felt an appropriate price for a 12.5 kg fill was no more than an unrealistic N200. This emphasizes the difficulties that rural poor have in affording LP Gas on any sort of a realistic basis.

9.65 Two households from a total of 298 had LP Gas lanterns and the majority used kerosene for lighting during electricity outages.

9.66 The survey did not disclose any significant access to credit/low-cost financing for LP Gas equipment among urban households. Low-cost credit organizations appear to be active in the peri-urban and rural communities surveyed.

Maiduguri

9.67 TOTAL is the principal supplier of LP Gas at this location.

9.68 Maiduguri is in an arid zone with few trees available for firewood. The distance to a commercial firewood supplier may be as much as 5 Km. Nearly all (98

percent) the respondents in the rural poor category gather firewood for their own use, as do 8 percent of respondents in the peri-urban sample.

9.69 LP Gas is the preferred cooking fuel among urban high-income and middle-income households—92 out of 174 surveyed. This is against 34 households in those categories currently using LP Gas as their most often used fuel, again indicating a suppressed demand for LP Gas. LP Gas usage is highest among such households and declines to zero among the rural poor. Kerosene was named as the cooking fuel most often used in 205 of the 353 households, and was stated as the preferred fuel by 150 households.

9.70 Firewood is predominant in rural poor, being used most often by 65 of the 86 rural poor households. The absence of LP Gas from rural households is attributed primarily to cost, closely followed by safety concerns. Perceived danger was second only to expense (and well ahead of supply uncertainty/hassle) among the reasons given for not using LP Gas.

9.71 When LP Gas is available, the price is in the range N1,200–1,300 per 12.5 kg fill while kerosene prices ranged from N120 to 220 for a 4 liter package.

9.72 LP Gas is never delivered to consumers and some respondents lived some 10 km from the nearest LP Gas depot. While some respondents were 5–10 km from a kerosene station, it was easily available locally, from street hawkers.

9.73 There were few LP Gas stoves to be found in stores, only a single stove in those serving the peri-urban households.

9.74 Enquiries about consumer credit elicited zero response from survey respondents at this location.

Survey Conclusions

The principal conclusions of the survey, broadly applicable across the various locations are as follows:

- LP Gas is often the preferred fuel among existing users but is considered too expensive by all but a small number of high-income households. Some satisfied LP Gas users have been forced to switch to cheaper fuel. This surely is a bad omen for the poor and the fuel choices available to them.
- Most households use more than one fuel for a given application, for example, cooking and lighting. The reasons for such multiple fuel use are primarily availability and expense.
- Kerosene is the fuel most frequently substituted for LP Gas in cooking and for electricity in lighting. LP Gas is not used for lighting even as standby for the frequent electricity outages.

- LP Gas is not substituted for other fuels in refrigeration. In effect, household LP Gas use is wholly for cooking.
- LP Gas is affordable for high-income and certain middle-income households only, as shown in the survey responses and, in particular, those forced to switch from LP Gas to kerosene. LP Gas is not remotely affordable by the poor.
- A disturbing number of existing LP Gas consumers thought that the product is not safe and this perception extended to nonusers also. Respondents quoted both direct and anecdotal accident experiences.
- The numbers of LP Gas users diminish markedly as the survey moves from urban high to peri-urban and rural poor.
- Kerosene is much more readily accessible than LP Gas in both urban and rural areas, especially in northern states. In Maiduguri, only one household in the rural poor category was regularly using LP Gas, out of a total of 86 respondents. In Makurdi, the comparable figure was 6 from 75 respondents in the rural poor category.
- Self-collect is generally the rule for cylinders adding to the difficulties of access for the less affluent, especially rural dwellers.
- While some households reported access to low-cost credit, followup enquiries indicated that such schemes are few and are usually for productive, or income-generating, purposes and not likely to be available for the purchase of household appliances.
- Field workers reported difficulty in getting replies to the question (in Part D2, of the survey questionnaire) regarding affordability of LP Gas equipment and availability of credit for the stove and cylinder, attributing it to lack of experience with the concept.
- Nigeria is predominantly a cash economy and credit for householders is unusual and virtually unheard of for rural communities.
- A preference for larger (12.5 kg and 50 kg) cylinders may be influenced by concerns about continuity of supply and greater familiarity with these rather than smaller sizes.
- Kerosene was considerably cheaper than LP Gas (liter for liter) at market prices prevailing at the time of the study. On an energy equivalent basis the gap narrows, however there was still a

significant margin to be reduced or closed to enable market recovery and penetration.

- Most importantly, however, the summary spreadsheet of survey responses denotes a suppressed demand for LP Gas in that householders' choice of LP Gas as a preferred fuel far exceeds those for whom it is currently the most frequently used cooking fuel. The opposite applies to kerosene.
- Reliable supply, lower prices, and safer cylinders are considered necessary for LP Gas market growth. In addition to availability and affordability, safety concern is a barrier to acceptance of LP Gas by rural households in this location. Access for the rural poor appears to be a remote prospect, using traditional marketing methods.

Switching to LP Gas

9.75 For all consumer categories, the hurdles of switching to LP Gas are cost, availability, and safety concerns. The household survey included householders who dismissed LP Gas as "only for the rich," and others—existing users, former users, and nonusers—who expressed safety concerns based on direct experience, hearsay, and intuition. The sharp decline in the Nigerian domestic LP Gas market (at a time when markets elsewhere in Africa have expanded) indicates a switch out of LP Gas. This has not been by choice or to preferred fuels. The image of LP Gas has also been damaged by adverse publicity, the loss of branding, the lamentable condition of cylinders, and the absence of attractive, affordable gas appliances.

9.76 The cost hurdle for new LP Gas consumers includes the initial outlay for the appliances (usually a stove), the acquisition of at least one cylinder, and possibly, a pressure regulator. The cheapest LP Gas stove is a single burner unit supported on a cylinder and connected directly to the valve. While this might suffice for a single person using very limited home cooking, it is not well suited to family use. A two or three-burner countertop stove with flexible hose/regulator connection to a single 12.5 kg cylinder would be typical of urban households using LP Gas. A heavy-duty variant would be required to support the larger cooking pots often used in traditional cooking and by larger families. The survey of retailers found single-burner light duty stoves at N2,500–N3,500 and double-burners at N4,800–N5,500. Householders reported paying N30,000 for western style stoves, and that was some years ago. The minimum entry cost, assuming a single-burner stove, a used 12.5 kg cylinder, regulator/hose, and initial fill, is around N8,000. It must be emphasized that, with limited availability of stoves and of serviceable cylinders, the price asked on any given day is not readily predictable. It should also be remembered that rural householders, with larger families, and more traditional cooking, would need much larger, more expensive stoves. They would probably also require a reserve cylinder. As noted elsewhere in this report, Nigeria is fundamentally a cash economy. Consumer credit is unusual and virtually unheard of for rural dwellers. There

has been unhappy experience with government-sponsored credit institutions and community schemes (where they exist) lend for productive projects, not for consumption. LP Gas consumer equipment would not qualify.

9.77 The household survey disclosed problems of LP Gas availability, in terms of absolute scarcity, the lack of home delivery, and the distances traveled to collect refills. Even in urban locations with the nearest LP Gas retailer minutes away, consumers often travel further afield in search of refills. Many rural areas do not have an LP Gas retailer. The hurdle of availability may deter householders fearing that the initial financial outlay may be wasted in the absence of regular, and reasonably convenient, availability. Those without their own transport, for example, the rural poor, would suffer disproportionately unless availability and packaging are improved.

9.78 LP Gas availability in Nigeria (and elsewhere) has tended to be best close to the sources of supply, especially when supply is limited and when end user prices are regulated. LP Gas marketers and distributors find it easier, and more profitable, to allocate limited supplies to the easily accessed locations and communities. They may only give serious attention to the more difficult, remote locations when the easier ones have been saturated. Therefore, the availability hurdle affects rural locations and households most severely.

9.79 It is readily apparent from the condition of LP Gas cylinders, and from the manner in which the industry now operates, that safety standards and practices fall well short of good LP Gas industry practice. However, the extent of safety concerns encountered throughout the household survey is somewhat alarming. Almost 50 percent of the total survey sample declared that LP Gas is dangerous and 19 percent of nonusers mentioned safety concern as a reason for not using the fuel. This is a major hurdle to switching to LP Gas and it was recorded in all consumer groups. It was least among experienced LP Gas users.

9.80 Through its membership of the World LP Gas Association, the NLPGA and its members can draw on proven consumer education programs for new LP Gas users. Initiatives to expand LP Gas access to the poor must include well-planned consumer education programs to ensure safety in LP Gas use. Women's groups have proved effective in the delivery of household safety programs in other countries. This is particularly true in cultures where women have little direct contact with the LP Gas supplier or where men have little involvement in food preparation and cooking.

10

Household Appliances

LP Gas Appliances

10.1 *Burners:* Burners and rings are often imported and later incorporated into catering stoves, water boilers, and the like. The assembly work tends to be done in craft workshops and in limited quantities. The Nigerian Gas Cylinder Company devised a stove that uses cylinder foot rings as cooking pot supports. This Easi-Cooker proved practical and popular.

10.2 *Cookers:* There is no industrial-scale gas cooker manufacturer operating in Nigeria but a limited range of imported cookers may be found in stores in the large cities. The imports tend to be flimsy and of the tabletop variety, that is, better suited to single city dwellers than to rural-dwelling families.

10.3 *Others:* None on display in stores.

Comments and Proposals

10.4 Not surprising, given the uncertainty surrounding LP Gas availability and cost, household appliances sell slowly and there is no indigenous factory-scale production.

10.5 Obviously, a range of household LP Gas appliances to meet different needs and budgets is essential for new consumer formation. However, demand will be limited until consumer confidence in LP Gas is reestablished. The initial cost will present problems, particularly in extending LP Gas access for the poor. Much can be learned from experience in other countries about the design and manufacture of household appliances adapted to local cooking practices.

10.6 Other household uses of LP Gas, such as lighting and refrigeration, can enhance the quality of life—especially for rural dwellers—but only if the appliances are available and affordable.

10.7 The LP Gas Association should be proactive in helping the household appliance trade to identify and develop the market for LP Gas appliances.

10.8 LP Gas has many uses in farming and in craft work but there is always the requirement for combustion equipment and controls. Again, the LP Gas Association should work with small industry and farm cooperatives to identify applications that can add value to their enterprises.

11

Safety/Image

Existing Safety Problems

11.1 The DPR Inspectorate and the Standards Organization tend to focus on technical and safety aspects of plant operation and cylinder manufacture. Given the condition of LP Gas cylinders, the random refilling practices and the difficulty of policing the final sellers, it seems likely that there are more accidents involving LP Gas use than are officially reported. The household survey disclosed both specific accident experience and a disturbing level of safety concern linked to LP Gas usage.

11.2 The marginal nature of some LP Gas marketing businesses probably forces some industry participants to take risks with safety. Consumers struggling with problems of price and availability have little choice but to share such risks. Generally, the low level of safety awareness and practice in so many activities must have an impact on transactions involving LP Gas.

11.3 The safety issue is exacerbated by the image that the LP Gas industry has. Media coverage tends to highlight accidents along with the undoubted problems that the industry has, specifically, shortages of product, overpricing, street sellers, shortfilling, and so forth.

Solutions and Proposals

11.4 The clarification of cylinder ownership control and responsibility would be an important step toward improving safety, especially for LP Gas consumers. Real progress will depend on the rate at which the condition of cylinders—whether by refurbishment or renewal—can be brought to an acceptable standard.

11.5 More efficient LP Gas supply and primary distribution will reduce the duration of journeys and exposure to the hazards associated with road transport.

11.6 As the LP Gas industry moves toward improved economic viability, safety standards can be raised by the removal from the market of substandard cylinders and trucks.

11.7 The LP Gas cylinder itself can be used to carry safety messages that are reinforced with each delivery. Tamperproof seals (not in evidence in Nigeria) have

become standard LP Gas industry practice. They help to reassure the consumer and discourage unauthorized cylinder filling.

11.8 LP Gas appliances should carry appropriate safety and operating instructions. The Standards Organization should set standards for appliances, backed by a certification system. The LP Gas Association might introduce a seal of approval as additional endorsement and reassurance for consumers, but only when the Association itself has achieved authority and recognition.

11.9 Programs to extend LP Gas to the poor will be accompanied by pressure to minimize initial costs at the expense of safety. New consumers, rich or poor, should enjoy the benefits of LP Gas without avoidable exposure to risk. The introduction of composite cylinders, of smaller capacity, lighter, transparent, and safer, for the rural poor would help greatly to allay potential consumer's concerns. This is also true for the urban areas if 12.5 kg composite cylinders were introduced.

Consumer Education

11.10 Consumer education should consist of clear, direct messages relevant to consumers' 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.

12

Investment/Funding

Industry Needs

12.1 Generally, the LP Gas industry is capital intensive, especially during the development phase when new facilities, additional equipment, and more working capital are needed.

12.2 The investment profile includes occasional, but sometimes sizeable, physical asset construction or acquisition, regular renewal of operating equipment, and ongoing cylinder acquisition.

12.3 Normally, LP Gas supplies must be paid for long before the consumers' money reaches the marketers' bank account. There is always pressure to reduce the initial cost burden on new consumers. Many factors combine to keep otherwise successful businesses heavily borrowed and cash-poor.

12.4 In Nigeria, investment is needed to ensure adequate and reliable LP Gas supply. If the refineries were working efficiently, a modest investment in evacuation facilities would quickly be repaid through increased LP Gas sales. However, supply diversification is essential and, for that, substantial investment will be needed in LP Gas recovery from gas processing plants.

12.5 Sector recovery will require significant new investment in distribution infrastructure, partly to bring existing facilities, equipment, and practices to an acceptable level of efficiency and safety. Market development, outreach to the poor, and institutional development will all represent continuing demands for investment, not all of which will show immediate, nor readily quantifiable, returns.

12.6 An orderly, adequately supplied, and correctly regulated market will attract serious long-term investors and will force out the irresponsible opportunists. Hence the need to adopt and implement the strategies outlined in this study and set out in the roadmap.

Funding

12.7 A prosperous LP Gas industry will generate funds and attract new investment in the medium and longer term. In the short term, the LP Gas industry needs

to explore every available source of funding and to present itself as a worthwhile business prospect, capable of meeting relevant investment criteria.

12.8 Some indigenous financial institutions have shown interest in the domestic oil and gas industry. A number of Nigerian banks have established energy funds, some of which may prove responsive to approaches from the LP Gas sector.

12.9 At the government level, the Nigerian Investment Promotion Commission (NIPC), The Environment Fund, the Nigerian Government's Small-Scale Equity Investment Scheme, and The Poverty Eradication Program may be persuaded to work with the LP Gas sector.

12.10 Externally, the international funding agencies include some with a particular interest in modern, environment-friendly energy provision for which LP Gas is eminently suited. The World LP Gas Association has published a special report on funding sources for its members, which can act as a useful guideline for the Nigerian LP Gas sector.

12.11 At the stakeholder workshop a presentation by the IFC, outlining their interest in the sector and their known investment criteria, attracted much interest. IFC will support good, bankable projects upstream, midstream, and downstream especially those with positive environmental and social fallouts. Direct foreign exchange lending is available but soon Naira lending will follow suit.

Opportunities for Investors

12.12 The medium-term goal set for the LP Gas industry in this study is per capita consumption of 3.7 kg per year, equal to the average in four neighboring countries of West Africa—Cameroon, Cote d'Ivoire, Ghana, and Senegal. This will result in a domestic market of 462,500 tons. Assuming that all the LP Gas is sold at a price equivalent to N1,000 per 12.5 kg, (that is, at the lower end of the current price range), the retail value of the market will then be N37 billion per year. Not surprisingly, numbers of potential investors have already expressed an interest in investing in downstream opportunities in the LP Gas sector in Nigeria. What is required is to persuade them, and other potential investors/funding agencies that the LP Gas sector has real potential and can be a thriving and potentially lucrative area to invest. Some specific areas for potential investors in the short to medium term would be in:

- The project to produce LP Gas for domestic supply
- The rail/pipeline project to bring LP Gas from the South to the North
- The rehabilitation, operation, and running of the primary distribution depots
- The construction of a new primary distribution depot at Abuja

- The setting up of a composite cylinder manufacturing plant for cylinders for Nigeria
- The setting up of a manufacturing plant to produce appliances suitable for the rural poor

12.13 Obviously, once the supply issue is solved, and as the market expands, entrepreneurs will start to invest further in additional LP Gas storage and filling plants, in locations that are not yet well serviced, or that require additional facilities.

12.14 Investors should be made aware also of the longer-term potential for the Nigerian LP Gas market. Other similar or developing countries that have successfully developed their LP Gas industries over the past 10 to 15 years are Brazil, Morocco, Egypt, Thailand, and Malaysia, each of which have expanded their LP Gas consumption to around 40 kg per capita per year. On that basis the Nigerian market potential can realistically be estimated as around 5 million tons per year in the longer term.

Initiatives/Incentives

12.15 One low-cost/high-impact initiative to grow the market would be to upgrade LP Gas evacuation facilities at the refineries and higher priority for loading ships and road tankers when product is available. This depends, of course, on the resumption of LP Gas production at the refineries. An extension of this initiative would bring the butanization depots into service as proposed in Section 6.15. This would also be low cost since the depots are in place, even if in need of some rehabilitation.

12.16 The FGN could provide incentives for initiatives through:

- Realistic pricing of LP Gas supply from the NNPC refineries to the domestic market
- Divesting the primary depots on terms that assist the study objectives.

12.17 Realignment of regulatory procedures to promote the study objectives would cost little and are a prerequisite for major LP Gas industry players to engage seriously with the domestic market.

12.18 The present depressed condition of the LP Gas sector is exacerbated by the breakdown in cylinder ownership and management structures. The breakdown derives largely from earlier government interventions in cylinder provision and failure to enforce relevant regulations. Having created the problem, government should sponsor corrective initiatives. One such initiative would be to prohibit importng used, or substandard cylinders, coupled to the introduction of modern cylinder technology to facilitate the removal of obsolescent, dangerous cylinders.

12.19 Collectively, such initiatives would undoubtedly help to attract serious industry players, remove rogue players, and encourage more householders to make the necessary financial commitments to become LP Gas users.

13

Access to the Poor

General

13.1 The present study is just one element of a larger program of assistance from the World Bank to the FGN for the mitigation of poverty-related issues. LP Gas is widely recognized as a fuel capable of meeting a range of energy needs. Expanded LP Gas access to the poor is the second priority objective of the study.

13.2 Modern energy provision is essential for economic development. LP Gas is a proven modern fuel that is particularly suited to countries such as Nigeria, which lack comprehensive, functioning, natural gas and electricity supply networks.

13.3 The study terms of reference expect:

- A determination of how LP Gas could be made more accessible to, and more affordable by, the poor once it is available locally and in larger volumes at lower prices
- Identification and definition of propoor incentives and other promotional measures

13.4 One of the key findings reported following the fact-finding mission was that the best prospect of extending LP Gas access to the poor is by outreach from a viable, dynamic LP Gas industry. Implementing the second objective of the study would depend on achieving the first objective. This is still the case. It does, of course, imply a delay before significant progress can be made toward the second objective. However, it does not, nor should it, preclude forward planning, including the definition of relevant incentives and other promotional measures supportive of the objective. This should be part of the implementation process of the first objective.

Butanization

13.5 Some 20 years ago, the then Government of Nigeria embarked upon a program to expand LP Gas usage. This was largely driven by a wish to halt deforestation, especially in Northern States threatened by desert encroachment, and the further impoverishment of rural communities. However, it was implemented nationally.

13.6 Butanization included the introduction of large quantities of new cylinders, retail price control of LP Gas, distribution of stoves, enhanced LP Gas production at the Kaduna refinery, and construction of strategically located LP gas depots. The program soon foundered. The completion of the depots (which were intended to improve local availability of LP Gas) coincided with an extended period of indifferent governance and of unreliable refinery performance. Few of the cylinders reached or remained in the households for which they were intended, while the manner of their introduction contributed to today's hazardous conditions. While butanization was not specifically propoor, there are useful lessons (well known to industry players) to be noted for future initiatives.

Experience Elsewhere

13.7 LP Gas features in a variety of national and international programs to bring modern energy to deprived communities. Within sub-Saharan Africa, for example, there is much valuable experience available from South Africa where the government has sponsored a large program to provide modern energy (in part, with LP Gas) to reduce dependence on kerosene and woodfuel.

13.8 One participant at the stakeholder workshop reported being favorably impressed by what had been achieved using appropriate technology elsewhere in West Africa, for example, in Burkina-Faso with a burner directly mounted onto a 6 kg cylinder.

13.9 LP Gas has also featured in some of the renewable energy programs aimed at underserved communities in many countries.

13.10 A current initiative, the UNDP Sustainable Energy Program, places LP Gas at the center of modern energy provision for the poor. This program is being supported by the World LP Gas Association. Workshops and pilot projects are planned in association with the LP Gas sector and relevant government agencies in Ghana, South Africa, Honduras, Morocco, Vietnam, and China. Nigeria should not miss the opportunity to participate in and benefit from serious professional efforts to expand LP Gas access to the poor. Knowledge and experience gained elsewhere will help to inform and to enhance the program in Nigeria.

Consumer Safety

13.11 The household surveys disclosed a high level of safety concerns among both LP Gas users and nonusers. Little information was found about accidents but some must be associated with defective cylinders, cylinder valves, and the valve to regulator connection. This is predictable, given their physical condition and the absence of a functioning maintenance regime.

13.12 Programs to extend LP Gas access to the poor will be accompanied by pressure to lower the initial cost barrier at the expense of consumer safety. Experienced LP Gas users will have greater awareness of safety and the danger signs but all consumers, rich and poor, should enjoy the benefits of the fuel without avoidable

exposure to risk. By insisting on safety improvement as part of the sector recovery program, we safeguard existing users and reduce the risk to vulnerable new users.

Impediments to Switching to LP Gas

13.13 All prospective new consumers face barriers of cost, availability, and safety, which are similar in kind, but not in degree. The cost barrier is acute for the poor, however defined and wherever they live, and is highest for those who must first acquire the equipment. The availability barrier is at its highest for the rural poor, but lower for households in the better-served urban communities.

13.14 An intriguing, less tangible, barrier to switching is the attachment to woodfuel and the perception that certain food dishes taste better when cooked over wood. Experience elsewhere suggests that, having become LP Gas users, some households continue to use wood for some of their cooking. This is more marked in rural than in urban communities. The strength of the attachment to woodfuel is less clear in Nigeria because of the multifuel usage forced on households by the factors described in this report. The household survey showed that high-income urban dwellers associate woodfuel with festive cooking.

13.15 Many households already owning LP Gas equipment, but no longer using it because of cost, would resume regular usage if availability were assured and their cost targets were met. The target cost of LP Gas among such households is in the range of N800—N1,000 for a 12.5 kg refill.

13.16 At the next level, there are households which could make the cash outlay but have declined to do so because of unavailability and the ever-increasing cost of the fuel. The number of such households will only become apparent as these hurdles are lowered sufficiently for them. Then there are households that could afford to pay for the fuel (at the target cost range given above) but not the initial equipment.

13.17 Finally, there are those households (probably a sizeable majority of poor households, that is, those with an income of less than the equivalent of US$1 per day) who could not pay the N800–N1,000 for a refill even if the equipment was provided free. Some of these would be helped if the fill size were smaller, and correspondingly cheaper.

Consumer Credit

13.18 In some countries, consumer credit is available for the acquisition of household appliances. Community-based schemes, such as credit unions, helped many poor people who would not have access to commercial bank credit. To date, such schemes have proved unsuccessful in Nigeria.

13.19 The general nonavailability of consumer credit (totally unavailable in rural communities) is a major obstacle to market development strategies based on soft loan or microfinance institutions and is a barrier to access to the poor. The problem exists (to some extent) in other countries targeted by various energy provision initiatives, including the UNDP Sustainable Energy Program. Stakeholders in the Nigerian project should

connect with, and learn from, experience in other countries, using the sources referred to in this report.

Summary

13.20 The second main future study objective, access to the poor, can only progress when the first objective, sector revival, has been achieved. In the interim, the LP Gas industry should plan for the second objective and develop strategies to surmount the obstacles to access.

13.21 As an LP Gas producer, Nigeria enjoys significant advantage when compared with other countries working toward the objective of LP Gas access to the poor. Nigeria should not address this objective in isolation, but should seek to benefit from relevant experience elsewhere, using available conduits, for example, UNDP and the WLPGA. Nigeria should take advantage of technological advances, notably in cylinder technology, to make LP Gas accessible to the poor.

13.22 In gradually but progressively displacing kerosene and woodfuel, LP Gas can begin the process of bringing modern energy to the poor. Clear linkages have been identified between poverty and the lack of modern energy. Cooking with traditional fuels, including kerosene, is linked to specific respiratory illnesses, chiefly affecting women and smaller children. Woodfuel collection duties deny women the chance of other productive activities and children the time for study and schooling. Poor health and illiteracy impose huge social and economic costs on a community. The environmental benefits to the country, from a deforestation perspective, would be considerable.

13.23 The obstacles to LP Gas access to the poor are real, especially the financing of the initial equipment. Here too, there is scope for cost reduction and innovation. Introducing a smaller, lighter cylinder will also be one of the key ways in which the rural poor, or at least some of them, will be persuaded to move to LP Gas. Setting up new retail outlets specifically to service the rural poor, will create job opportunities for small-scale entrepreneurs nationwide, as will the transport of cylinders for the poor within each region. Therefore, success in the first objective will bring benefits to poor households who are to be found everywhere—not just in rural communities. It has recently been estimated that some 70 percent of the population of Nigeria, which amounts to some 80 million plus people, can be defined as "poor," that is, earning less than US$1 per day.

14

Critical Issues/Strategies/Action Plans

Critical Issues/Constraints Summary

14.1 *Objectives:* The fact-finding mission has reinforced the earlier belief that the best prospect for extending LP Gas access to the poor is from a well-founded, dynamic industry. No realistic prospect of achieving this objective, in a sustainable manner, is possible until the first has been achieved and implemented. The route therefore to the second objective is via the first.

14.2 *Current Status:* The LP Gas industry has suffered economically through the dramatic contraction of its market and profitability in recent years. Many companies have been forced to abandon development strategies in order to concentrate on survival. Potential investors are deterred from entering the industry. Nevertheless, despite limited resources, some LP Gas industry players are keen to participate in the sector improvement program. Actual and potential LP Gas consumers face a market in which supply is uncertain and prices are extremely volatile. Final resellers effectively set enduser prices and many exploit a real or contrived scarcity to raise prices arbitrarily. When LP Gas becomes available, resellers may be forced to reduce prices equally arbitrarily. The uncertainty regarding future prices and availability deters prospective consumers. A less turbulent market is essential in order to retain existing users and to encourage prospective LP Gas users to make the necessary initial cash outlay.

14.3 *Policy:* Government policy has not been supportive of the LP Gas industry and its actual and potential customers. While Nigeria has become a major LP Gas exporter, nothing has been done to secure domestic supply from indigenous sources in the absence of refinery supply. Gas strategy planning appears to be focused on natural gas while the policy of butanization has not been sustained. Following the stakeholder workshop, there is evidence of more positive policies and awareness at the government level. The first action in this direction is the appointment of a high level, joint, government-industry steering committee, to be the main driver for the sector's recovery.

14.4 *Industry Structure:* The most visible representative organization is the Nigerian Association of LP Gas Marketers (NALPGAM) but its membership is confined to certain of the marketers. NALPGAM's relationship with NNPC/PPMC (effectively the monopoly domestic supplier) tends to be adversarial rather than constructive.

14.5 *Regulation:* The LP Gas industry relationship with its regulatory body—DPR—has emphasis on the licensing of facilities and on statistics. There is little evidence of any ongoing constructive dialogue between the DPR and the LP Gas industry. The DPR also has adopted a standard-setting role but lacks a specific department, or division, for LP Gas affairs. The Standards Organization of Nigeria (SON), has a limited role that appears to be confined to checking the standards of cylinders and valves, as manufactured or imported, plus overseeing weights and measures checking. LP Gas regulation and its implementation should be reviewed and, in particular, the functions of DPR and SON relevant to the domestic LP Gas sector and the interface between these agencies. Future legislation for gas should take account of the role and needs of the LP Gas sector. Basic legislation dating from 1967 is outdated.

14.6 *Supply:* The domestic LP Gas market depends effectively on the refineries, and they have proved to be unreliable suppliers. Greater diversity of indigenous supply is required since importation is not commercially viable, nor should it be necessary. In the future, refinery supply of LP Gas will become incremental to supply from gas processing.

14.7 *Refineries:* Over several years, poor refinery performance has starved the domestic market of LP Gas. The LP Gas price from the refineries has been aligned more to "import parity" than "export netback parity." Inadequate loading facilities and low priority have consistently impeded evacuation when LP Gas was available.

14.8 *Distribution Infrastructure:* While key elements of the primary distribution infrastructure need rehabilitation, there is an extensive network in place (both government-owned and private sector) capable of serving an enlarged market.

14.9 *Transportation:* Coastal transportation is an effective means of supplying Lagos but has been hampered by low prioritization resulting in high shipping costs including demurrage. Additional capacity (and modernization) will be required to supply a growing inland market by road. Alternative modes—rail and pipeline—will be required to augment road transportation.

14.10 *Cylinders:* Most of the existing cylinders are in poor condition, because of age and lack of proper maintenance. Significant inputs will be required to supply new consumers and to bring the cylinders of existing consumers to a reasonable standard. Ownership, refilling rights and responsibility for maintenance need to be codified and enforced both for commercial and safety reasons.

14.11 *Access to the Poor:* Household surveys have indicated a suppressed demand for LP Gas nationwide and across different socio-economic groups. Without subsidy or soft financing, the initial cost of becoming an LP Gas consumer will be a formidable barrier to access for the poor. Outreach retail outlets and appropriate sized cylinders for the poor in rural areas are lacking. The survey indicated a perception that moving to LP Gas from traditional fuels may be dangerous.

14.12 *Household Appliances:* Currently, there are few LP Gas appliances available because of the unpredictable pattern of fuel supply and cost. Low-cost appliances, well adapted to local needs and preferences, are essential for market development.

14.13 *Safety/Image:* While many consumers express satisfaction with LP Gas, there is a perception that it is unsafe. No statistical record of accidents was found but the incidence may be significant, given the condition of cylinders and prevailing practices. Despite positive consumer attitudes toward the product, the LP Gas industry has a poor public image. Media coverage tends to highlight the industry's problems. The household survey reports disclosed specific accident experience and safety concern.

14.14 *Investment/Funding:* Sector recovery will call for significant investment in physical assets and in institutional development and training. The rate at which such investment can be deployed and how effectively it is used will strongly influence the rate of sector recovery and extension of LP Gas access to the poor. Dependence on funds generated from business activities of the industry would imply an extended timescale. Rehabilitation and renewal of assets, for example, cylinders, may not show returns to satisfy commercial lending or investment criteria and will probably need a measure of soft financing or other financial assistance.

14.15 *Implementation:* Currently, the LP Gas industry lacks the capacity to implement the sector recovery program in line with the objectives of the Study, and as set out in the action plans hereunder.

Strategies/Action Plans

Table 14.1: Objectives/Target

Objectives	*Target*
Develop a Strategy for reviving the LP Gas market.	Per capita LP Gas consumption at average for comparable countries of West Africa.
Expand LP Gas access to the poor	

Table 14.2: Critical Issues, Strategies, and Action Plans

	Critical Issues	*Strategy*	• *Action Plan*
1	*Objectives:* The study has two main future objectives, revival of the domestic LP Gas market and expanded access of LP Gas to the poor. The best prospect for extending LP Gas access to the poor is from a well-founded, dynamic industry. No realistic prospect of achieving the second objective is possible until the first has been implemented.	Concentrate initially on the first objective while planning for the second.	• Commence implementation of the recovery program in accordance with the final agreed roadmap • Determine priorities and timescale for implementation of the roadmap.
2	*Government Policy / National Gas Strategy:* The commendable government in itiative with butanization has not been sustained and, while Nigeria has become a major LP Gas exporter, nothing has been done to secure domestic supply from indigenous sources other than the all too uncertain refinery production. Gas strategy planning is receiving serious attention but appears to be focused on natural gas to the exclusion of LP Gas. Yet access to LP Gas can advance the FGN's mission to eradicate poverty through modern energy provision. Supportive government policies are essential for attainment of the study objectives.	Secure formal government endorsement of the study's roadmap. Generally, government should exercise an enabling function with industry responsible for implementation.	• Complete and present the report incorporating the strategic roadmap and follow up as necessary to secure acceptance by relevant government agencies, that is, Ministries of Petroleum and Industries. • Secure endorsement of the minister/ presidential adviser on petroleum for the target set (per capita usage) for recovery and access to the poor. • Secure clarification of the role of LP Gas in energy planning within a coherent fiscal and legal framework. • Identify the resources required to implement the sector recovery strategies. • Identify available skills, quantify the skills/resource deficit, and propose measures to match resources to requirements. • Prepare a short- and medium-term institutional development plan for the LP Gas industry. • Allow the LP Gas industry to represent itself and participate in energy and gas strategy planning. • Brief the relevant committees of the House of Representatives and Senate with a view to securing their support and appropriate government action.

	Critical Issues	*Strategy*	• *Action Plan*
3	*LP Gas Industry Structure/Market Controls:* • The industry comprises a variety of players—large and small- but lacks a single authoritative and representative organization to be its voice and to provide focus. • The LP Gas industry has suffered economically from the dramatic contraction of its market, and its profitability, in recent years. The industry focus is currently on survival, not development. • Marketers need to recover control and margins from distributors and resellers. A more orderly market, adequately supplied and properly controlled, will be reflected in more stable and competitive pricing.	Develop an effective LP Gas industry association representative of all sectors—not just marketers—with a brief to support the sector recovery program.	• Establish a new association for the industry players, The Nigerian LP Gas Association (NLPGA), possibly by reorganization of NALPGAM. Members to support the sector recovery program and to provide the necessary resources for effective functioning of the new association. • Affiliate the NLPGA with the Nigerian Gas Association and maintain an appropriate profile therein. • Enroll the NLPGA in the World LP Gas Association and use the services available to WLPGA members. • Empower and resource the NLPGA to deal with industry problems.
4	*Regulation:* The legal basis for regulations, that is, the Petroleum Act of 1967, is outdated. The LP Gas industry's relationship with its regulatory body—the DPR—has emphasis on licensing and statistics, with little evidence of ongoing constructive dialogue. The DPR has adopted a standard-setting role but lacks a specific department, or division, for LP Gas affairs. The Standards Organization has a limited role—and very limited resources. The appropriate interface between the DPR and SON, and their respective regulatory functions in regards to the LP Gas industry needs clarification and direction.	Having secured formal government endorsement of the study roadmap, seek to strengthen and rationalize legislation and the regulatory functions in order to facilitate sector recovery and future development.	• Prepare a submission to the minister/ presidential adviser on petroleum setting out the LP Gas industry vision of its role, highlight any regulatory and structural impediments, and make recommendations, where appropriate, for legislative action to facilitate policy objectives and to reflect current conditions and technology. • Secure clear definition of the functions of Government, regulatory authorities and industry, supportive of relevant gas policy objectives. • Develop a constructive dialogue with the relevant agencies and authorities for collaboration in efforts to bring the benefits of LP Gas to the largest possible number of consumers. • Press for the establishment of an LP Gas Department in the DPR (or any successor regulator) with strict enforcement of regulations to discourage market/price manipulation, promote safety, and encourage good industry practice. • Press for clear definition of the regulatory functions of the DPR and SON and for the elimination of any overlap, for example,

	Critical Issues	*Strategy*	• *Action Plan*
			with respect to pressure vessel testing and certification.
5	*LP Gas Supply/Refineries/Storage/Distribution:* • The LP Gas industry effectively depends upon the refineries/imports for supply and, at times, supply has been insufficient, overpriced and unreliable. • Inadequate facilities and low priority have consistently impeded evacuation when LP Gas was available at the refineries. • Large quantities of LP Gas are being exported while the domestic market is undersupplied. • Inland transportation infrastructure for LP Gas is underdeveloped. • The butanization depots and some LP Gas plants have been left idle and are in various states of disrepair. • Coastal shipping and road transport incur high costs and suffer low operational efficiency. Many road tankers are dilapidated.	LP Gas marketers must secure adequate and reliable product supply and distribution at a cost that facilitates market recovery. Refineries to be regarded as providing incremental supplies in the future. New economical alternatives for long distance inland transportation of LP Gas, for example, by rail or pipeline, should be developed. Abundant indigenous supply, distributed through a structured network, is the key to an orderly, competitive market.	• Identify prospective sources of supply additional to the refineries through the floating by government of an Expression of Interest in a specific gas-processing project for domestic supply, fully supported by the industry. • Encourage the LP Gas industry to initiate a constructive dialogue with NNPC/PPMC regarding the economic and social benefits that will arise from timely and efficient LP Gas evacuation when the product is available at the refineries. • Seek to ensure that any divestment of the butanization depots is congruent with the LP Gas sector recovery strategy; in particular, that depots are divested only to new owner/operators: (a) with the financial and technical capacity for their rehabilitation; (b) committed to their operation on an "open access/transparent price" basis. • Ensure that moribund plants are properly refurbished for safety/license compliance before they are permitted to reopen for business. • Encourage suppliers and supply chain operators to improve shipping and inland transport performance and standards. • Promote the introduction of alternative transportation modes, for example, rail and pipeline for safer and more economical inland supply of LP Gas. • Raise and enforce technical standards in order to remove substandard equipment and practices. • Encourage investment/participation by professional shipping and transport operators.

	Critical Issues	*Strategy*	• *Action Plan*
			• Remove import duty (initially meant to protect domestic production) on LP Gas, pending development/restoration of indigenous supply.
6	*LP Gas Cylinders:* Many cylinders are in poor condition from age and lack of proper maintenance. Leaking cylinder valves are common. Unauthorized cylinder filling has helped to undermine the former disciplines of periodic inspection and maintenance. There is no clear accountability or traceability in the event of an accident or of underfilling.	Issues surrounding the identity, rights, and obligations of cylinder owners and users to be resolved, codified, and enforced.	• Determine who should be the lawful owners of cylinders, the rightful refillers of cylinders, and who should have the duty or capability to maintain them. • Prepare and cost a program to rehabilitate and renew LP Gas cylinders. • Ensure that national standards and regulations do not preclude the use of new technologies, such as composite cylinders. • Encourage the LP Gas industry to work with the appropriate regulatory authority for the progressive and permanent removal of dangerous cylinders from the market, avoiding disruption, panic, and hardship for consumers.
7	*LP Gas Appliances:* Currently there are few LP Gas appliances in the market, and those that are available, are expensive. Very low-cost appliances, adapted to rural needs and preferences, have been developed in other countries, such as India and South Africa, but are not available in Nigeria.	Suitable, affordable appliances to be made available to prospective LP Gas consumers throughout Nigeria.	• Have LP Gas marketers to work with the manufacturers and vendors to secure suitable, affordable appliances.
8	*Safety/Image***:** While many consumers express satisfaction with LP Gas there is a public perception that it is unsafe. The household survey highlighted safety concerns among both users and nonusers that may impede progress toward achieving the objectives of the study. The LP Gas industry has a poor public image and media coverage tends to dwell on its problems, including accidents.	Improve LP Gas safety throughout the distribution system and at the point of use.	• Improve the quality of cylinders and valves by clarifying ownership, reinstating maintenance, eliminating sub-standard cylinders and banning unsafe practice such as unauthorized and illicit filling. • Consider the use of composite cylinders as a new "safe" branded product to attract new consumers and those who have safety concerns. • Adopt and enforce good LP Gas industry standards and practices, for example, *The Guidelines for Safety and Good Practice* as published by the World LP Gas Association. • Promote safety standards and practices through: (a) seminars for industry players; (b) securing formal commitment of industry

	Critical Issues	*Strategy*	• *Action Plan*
			players; and (c) a properly designed and funded consumer safety awareness campaign. • Ban the importation of used cylinders, without proper, adequate recertification.
9	*Access to the Poor:* The initial cost of becoming an LP Gas consumer is a real barrier for the poor, not least because consumer credit is a rarity in Nigeria. Uncertainty regarding availability and pricing, together with safety concerns, are deterrents.	LP Gas access to the poor to be formally adopted as an objective of the LP Gas industry and its association.	• Monitor relevant programs in other countries to ensure that the plans of NLPGA and industry players take account of experience gained by the LP Gas sector and NGOs elsewhere. NLPGA and industry players are to be monitors for the program. • Update the household survey findings and use the data in planning and evaluating pilot projects in poor communities. • Report periodically to NLPGA members and other stakeholders on progress toward the objective. NLPGA will write the report.
10	*Investment/Funding/Implementation:* The sector recovery program calls for significant new investment and sustained effort for its implementation. Dependence on funds generated internally would imply an extended timescale for recovery, and hence, for progress toward the second objective. Certain essential elements may not meet commercial investment funding criteria. The LP Gas industry does not have the capacity to implement the action plans in any reasonable timescale.	Attract external local or foreign investment and skills essential for the implementation of the sector recovery program.	• Identify and seek support from organizations with institutional development skills and capacity relevant to the needs of the LP Gas industry. • Organize seminars and presentations for financial institutions and prospective investors. • Use publications such as the WLPGA's *Special Report on Funding Sources* to extend the range of possible investors and facilitators. • Introduce new resources and structures to enable the action plans to be implemented. The LP Gas industry needs to take this responsibility

The Way Forward

14.16 Implementation of the final, agreed roadmap depends critically on commitment from key stakeholders—government and industry. Commitment to LP Gas sector recovery and extended access, together with clarification of the respective roles of government and industry, are essential outcomes. They must also be set in an agreed, realistic timeframe.

14.17 The thrust of this study is that the LP Gas industry/private sector should initiate and carry through the various action plans while government/public sector acts as the enabler. In order to achieve this the LP Gas industry will need to put in place the resources and structures necessary to implement many of the action plans essential for achievement of the study objectives.

15

LP Gas Workshop

Stakeholders Workshop

15.1 The consultant's terms of reference for the LP Gas sector study stipulated a stakeholder's workshop prior to completion of the Final Report. This workshop was undertaken in Abuja on December 11, 2003 and was attended by 41 participants including potential investors and industry players. Dr. Mourad Belguedj, Senior Energy Specialist at the World Bank and task manager for the study chaired the workshop sessions.

15.2 Following a Keynote Address by Alhaji Ja'afaru A. Paki, Special Assistant to the President on Petroleum Matters, the study background and objectives were reviewed by the task manager and the consultant's team. This review culminated in a presentation of the study findings and conclusions.

15.3 The goals and actions essential for LP Gas sector recovery were presented by the consultant's team and debated with a high level of participation from those present. The relevant comments and conclusions have been incorporated into this report.

Workshop Debate

15.4 There was a full and active debate by the participants at the workshop whose goals were identified at the outset as:

- Defining a workable strategy to ensure the LP Gas sector's transformation and growth
- Increasing LP Gas domestic consumption to at least the average regional consumption level
- Setting specific policies and regulations that are conducive to growth, and to improving access to the poor
- Adopting the recommended strategies outlined in the roadmap, with appropriate monitoring of progress.

Communiqué

15.5 Following on the completion of the successful stakeholders' workshop a communiqué was released by the Office of the Presidential Adviser on Petroleum Matters. This communiqué demonstrates the FGN's commitment to the LP Gas sector revival and is attached hereafter in Annex 4.

16

Roadmap Goals and Action Plan

Roadmap Goals

16.1 The roadmap goals are as follows:

Table 16.1: Roadmap Goals

Goal 1	LP Gas policy that supports the study objectives and modern energy provisions within a coherent legal and regulatory code.
Goal 2	Improved availability and distribution of LP Gas through specific domestic supply projects and appropriate distribution/infrastructure improvement projects.
Goal 3	Ensure that the LP Gas industry has the resources and structures for appropriate institutional development.
Goal 4	World-class safety and standards throughout the LP Gas industry and resolution of cylinder issues.
Goal 5	LP Gas product, equipment and appliances more accessible and affordable to the poor.
Goal 6	Additional investment needs and opportunities are identified and made known to prospective investors.

Goal 1—LP Gas Policy and Regulation

Goal 1	**LP Gas policy that supports the study objectives and modern energy provisions within a coherent legal and regulatory code.**

16.2 Although Nigeria is the largest LP gas producer in sub-Saharan Africa, with a production of more than 2 million tons in 2002, only about 50,000 tons was available for the domestic market. The market is now a fraction of its former size and the industry sector is seriously weakened. The butanization policy of expanded LP Gas access has not been sustained and has backtracked on progress that was achieved in the early 1990s. Poverty reduction is central to the FGN's current macroeconomic strategy. The FGN and international financing institutions recognize the linkage between economic upliftment and modern energy provision.

16.3 The gas strategy study recently completed by the FGN and the World Bank is concerned with natural gas but has helped to create awareness of both natural gas and LP Gas for the domestic energy market. However, it has also highlighted the huge investment needed to extend natural gas distribution nationwide. The LP Gas sector, however, has an established, if debilitated, distribution infrastructure in place in the form of 13 primary and approximately 200 secondary facilities throughout the country.

16.4 It is opportune to define government policy with respect to the domestic LP Gas sector, and the role in LP Gas energy provision. The household survey clearly demonstrated a suppressed demand for LP Gas that is currently met by woodfuel and kerosene, incurring significant social and health costs. Having endorsed the study objectives and strategies, the government must establish and maintain a fiscal/regulatory regime which will promote and facilitate the implementation of the roadmap. The LP Gas industry, for its part, must provide a representative and authoritative focus for communication with the government and with the regulatory authorities. This should be done by creating a strong industry association, which will fully represent the industry. Access to LP Gas is directly linked to affordability of the product, and LP Gas cylinders and appliances, which, in turn, can be influenced by fiscal policy, such as, duties and taxes. The government's mission is to provide access to LP Gas and fiscal measures should not unwittingly impede it. The present arrangements for regulating the domestic LP Gas sector derive in part from the Petroleum Act of 1967 and are now outdated. New regulatory processes, technically up-to-date and with a sound legal basis, are now required.

Table 16.2: Goal 1—LP Gas Policy and Regulations

Step	*Action*	*Responsibility*	*Priority 1*	*Priority 2*	*Priority 3*
1.1	Secure endorsement of the study objectives and strategies by government:				
	Adopting a policy of LP Gas promotion as the preferred cooking fuel where natural gas is not available.	FGN/WB	*		
	Harmonizing energy and fiscal policies to ensure that neither tax, nor tax differentials, impede LP Gas sector recovery and access to the poor.	FGN	*		
1.2	Establish a regulatory structure which will facilitate LP Gas promotion policy while protecting public and consumer interest by:				
	Aligning policy, legal framework, and regulatory processes relating to the LP Gas sector.	FGN/WB	*		
	Bringing technical standards and regulation in line with modern LP Gas industry practice.	FGN / NLPGA with specialist support.	*		
	Establishing clear lines of functional responsibility between the regulatory authority and the industry.	FGN/NLPGA	*		
	Providing the designated regulatory authority with the requisite policing/enforcing powers and resources.	FGN	*		

Goal 2—Availability and Distribution

Goal 2	**Improved availability and distribution of LP Gas through specific domestic supply projects and appropriate distribution /infrastructure improvement projects.**

16.5 The domestic LP Gas market has effectively depended upon the refineries for supply. Given the failed state of the refineries this is no longer sustainable and LP Gas marketers must secure an adequate and reliable new product supply through a specific associated gas-processing project. Various options require determination such as: (a) diverting LP Gas destined for export back into the local market; (b) encouraging potential gas processors such as Addax, Pan Ocean and Yinka Folawiyo, to make the LP Gas they produce available for the domestic market; or (c) by initiating a specific new gas, processing project for the domestic market from a new gas stream. The existing LP Gas marketers will be required to support any new initiative through the signing of LP Gas purchase agreements. The domestic market could easily take up an immediate 100,000 tons of LP Gas per year, assuming the price is equivalent to existing export netback prices.

16.6 Assuming that the refineries are rehabilitated, it is anticipated that product from the refineries will still be taken up by the domestic market and thus there is a need to improve the LP Gas loading facilities (both road and coastal tanker) at the refineries along with providing an improvement in the priority given to evacuation of the product. Improved access and ship turnaround are essential at the receiving terminal jetties in Lagos.

16.7 The butanization depots have remained moribund for a number of years, but they can and must be brought back into operational mode. The study team has a detailed knowledge of the refurbishment requirement for each depot, and the total refurbishment can be done at a relatively moderate cost of less than US$5m. The depots will act as strategic primary depots and need to be operated on a commercial and strictly open-access basis, by being divested to the marketers or private sector companies.

16.8 The existing LP Gas road tanker stock is in generally very poor condition and is inadequate to cater for an expanding buoyant market. In general the industry needs newer, safer tankers and the services of capable haulage contractors to participate in a rational pattern of primary and secondary road transport distribution. The responsibility for primary transport of LP Gas to the primary depots should be taken on by the company, or companies, operating the depots. Debottlenecking in the port of Lagos will require government intervention. It will be the responsibility of the marketers/ distributors to organize their own transport from the primary depots to their own filling plants throughout the country.

16.9 However, in the longer term transporting significant quantities of LP Gas by road tankers from the South to the strategic depots countrywide is not a safe or sensible option. An alternative strategic rail or pipeline LP Gas supply route option must be investigated with a view to implementation once the domestic market consumption increases to beyond approximately 250,000 tons per year. Part of the national gas strategy is a natural gas pipeline to the North and the possibility of a shared gas pipeline, that is, one transporting both natural gas and LP Gas, should be investigated. The attraction of the rail option is the creation of a permanent way and of a functioning railway, which could carry freight in addition to LP Gas and would help to decongest the road system. The attraction of the gas pipeline would be in cost sharing with the natural gas pipeline and the possibility of transporting a LP Gas mix, which needs only simple separation from methane at the receiving end.

Table 16.3: Goal 2—Availability and Distribution

Step	*Action*	*Responsibility*	*Priority 1*	*Priority 2*	*Priority 3*
2.1	Introduce new alternative sources of LP Gas supply for the domestic market by one or more of the following:				
	Diverting LP Gas destined for export back into the domestic market	FGN/Industry	*		
	Developing and implementing associated gas separation plants, from existing/new gas streams, to specifically supply the domestic market	FGN/Industry/ Private Sector	*		
	Floating publicly and advertising for "Expressions of Interest" from potential producers/investors for a specific domestic LP Gas supply project	FGN/Industry/ Private Sector	*		
	Arranging for LP Gas purchase agreements, as required, between the LP Gas marketers and the gas producers.	Industry/Private Sector	*		
2.2	Improve evacuation of LP Gas at the refineries by:				
	Giving better priority to the evacuation of LP Gas than exists at present	FGN/NNPC	*		
	Upgrading evacuation facilities (both ship and road tanker loading) at the refineries.	FGN/NNPC	*		

2.3	Arrange for the butanization depots to become the strategic primary LP Gas depots, as originally envisaged, by:				
	Divesting the depots to interested private-sector companies to be run on a commercial and strictly "open-access" basis	FGN/NNPC/ Private Sector	*		
	Rehabilitating the NNPC-owned LP Gas Depots in order to bring all nine depots back into safe working order.	FGN/NNPC/ Private Sector	*		
2.4	Rationalize/debottleneck LP Gas transport—both inland and coastal by:				
	Introducing a rational pattern of primary and secondary road transport distribution	Industry/FGN with WB support.		*	
	Improving access and ship turnaround at the receiving terminal jetties in Lagos.	Industry/FGN with WB support.		*	
2.5	Determine the feasibility/viability of a specific rail/pipeline route for LP Gas from the South of the country to the North.	Private Sector/ FGN—Ministry of Transport with specialist support			*

Goal 3—Institutional Development

Goal 3	**Ensure that the LP Gas Industry has the resources and structures for appropriate institutional development.**

16.10 The LP Gas industry in Nigeria lacks a single authoritative and representative organization to be its voice. It is therefore vital that a new association, the Nigerian LP Gas Association, is set up to represent all aspects of the industry, not just marketers. This new association must be empowered to deal with LP Gas issues and the industry must ensure that it has adequate manpower and financial resources to enable it to do so. The new association should affiliate with the Nigerian Gas Association and join the World LP Gas Association to benefit from the past two decades of sector improvement in LP Gas safety and standards.

16.11 The new association must take a leading role in preparing and coordinating the implementation of the proposed roadmap. Initially, its main mandate will be to actively support the sector recovery program, and thereafter, extended access to the poor. In order to ensure that it is in a position to do this the association must secure official recognition from the government and the designated regulatory authority.

16.12 The industry will need an institutional development plan and the new association must take a leading role in sourcing funds for its preparation and implementation. The plan should make recommendations to government and industry regarding the role to be played by the association in the development or adoption of standards and codes, in the policing of LP Gas regulations, in the promoting of the use of LP Gas to the general public, and in gathering statistical data relating to the industry. The existing legal, regulatory, policing, and enforcement setup in South Africa should be evaluated as a role model, as it has the advantage of having both developed and developing country characteristics and, like Nigeria, is in the sub Saharan African region. The equivalent South African LP Gas association plays a very active role in legal, regulatory, policing issues in South Africa, fully supported by the government.

Table 16.4: Goal 3—Institutional Development

Step	*Action*	*Responsibility*	*Priority 1*	*Priority 2*	*Priority 3*
3.1	Establish a new association, the Nigerian LP Gas Association (NLPGA), fully representative of the domestic LP Gas sector which association should:				
	Be fully empowered and resourced by the LP Gas industry to enable it to adequately deal with the LP Gas industry issues	FGN/Industry	*		
	Secure recognition from the government and the designated regulatory authority	FGN/NLPGA	*		
	Secure affiliation to the Nigerian Gas Association	NLPGA	*		
	Join the World LP Gas Association.	NLPGA	*		
3.2	Prepare a short-/medium-term institutional development plan, reviewing and making recommendations on how the NLPGA should:				
	Source funding from agencies active in institutional development	NLPGA/WB with specialist support		*	
	Work with the designated regulatory authority and SON in developing or adopting specific LP Gas standards and codes	FGN/SON/ NLPGA with specialist support		*	
	Work actively with the designated regulatory enforcement authority, in	FGN/NLPGA		*	

policing the LP Gas regulations relating to licensing, facility inspections and approvals, cylinder maintenance and re-testing/recertification, training of LP Gas installers, and approval of LP Gas appliances			
Promote the benefits and safe use of LP Gas to the general public	NLPGA	*	
Gather statistical information on LP Gas sales/consumption for use by its members and government.	NLPGA		*

Goal 4—Safety and Standards

Goal 4	**World-class safety and standards throughout the LP Gas industry and resolution of cylinder issues.**

16.13 The technology for LP Gas distribution and use is mature and the basic safety requirements are well known to the established industry players. While the principal knowledge base is to be found within the industry, others—regulatory authorities, users, and new industry entrants—require an understanding of LP Gas safety related to their specific needs. New consumers are particularly vulnerable, especially when standards are low. While most LP Gas accidents occur at, or close to, the point of use, the regulatory authority in Nigeria tends to emphasize safety in LP Gas plant operations.

16.14 The poor condition of cylinders, the failure to maintain appropriate safety procedures for cylinders, and the breakdown in accountability, are all matters of particular concern. Public and consumer safety cannot be assured while issues surrounding the filling and maintenance of cylinders remain unresolved and consumers are faced with having to accept unsafe cylinders. The following measures are designed to correct the decline in safety and to create a sound basis for the longer term:

- Cylinders to be marketer-owned, marked accordingly and not sold but provided in exchange for a refundable deposit.
- Crossfilling to be made unlawful.
- Owners, that is, marketers, to be responsible for cylinder maintenance.
- Consumers to be responsible for security of cylinders while in their possession.
- Cylinder sizes, valves, and regulators to be rationalized to facilitate safe easy exchange.
- Marketers to sell through retail outlets and authorized dealers on a sole agency basis, but marketers to freely exchange each other's cylinders.

16.15 LP Gas technical standards are developed by a relatively small number of countries, most of which have ongoing programs to update standards in line with technical and regulatory developments. A majority of countries either adopt or adapt internationally recognized standards as their national standards. Nigeria should follow this latter course. An expert working group will be established by the steering committee

to identify and adopt appropriate technical and safety standards. *Guidelines for Safety and Good Industry Practice*, published by the World LP Gas Association are written in less technical language than standards but are firmly based in knowledge and experience. They should be adopted and used while national standards are under preparation and later, used as a basis for safety programs.

Table 16.5: Goal 4—Safety and Standards

Step	*Action*	*Responsibility*	*Priority 1*	*Priority 2*	*Priority 3*
4.1	Adopt the World LP Gas Association Guidelines on Safety and Good Industry Practice.	FGN / NLPGA / Industry	*		
4.2	Establish an expert Working Group to determine:				
	Core technical and safety standards to be adopted.	NLPGA/SON with specialist support		*	
	Resolve the issues related to ownership, filling and maintenance of cylinders, in order to establish good practice and accountability.	NLPGA/ Industry with specialist support	*		
	Safety monitoring and regulatory processes.	NLPGA/ Regulator with specialist support		*	
4.3	Introduce mandatory cylinder maintenance/renewal and sanctions for noncompliance.	NLPGA/ Regulator		*	
4.4	Progressively remove unsafe cylinders from the market and replace with safe cylinders.	NLPGA/ Industry		*	
4.5	Initiate a consumer safety awareness program.	NLPGA/ Industry			*
4.6	Ensure that the safety needs of new consumers are addressed when expanding LP Gas access.	NLPGA/ Industry			*

Goal 5—Access to the Poor

Goal 5	**LP Gas product, equipment and appliances more accessible and affordable to the poor.**

16.16 LP Gas access to the poor is the second of the two objectives of the sector improvement study. Poor households—urban, peri-urban and rural—depends heavily on wood and other traditional fuels for their cooking needs and are more exposed to the well-documented social, health, and economic problems associated with such dependence. Many countries and agencies have identified LP Gas as the ideal household fuel for the poor, especially the rural poor.

16.17 The cost of the traditional 12 kg steel cylinder and basic two-burner LP Gas stove is in the order of US$55, excluding LP Gas. The initial cost can be reduced by, for example, volume production and direct selling of stoves and by offering smaller capacity cylinders. Smaller cylinders also mean smaller cash outlays for refills. However, the initial cost will continue to present a barrier to access in a country where average annual income is about US$2 per day. Some countries have well-developed, community-based, credit schemes (for example, credit unions) which may be used to finance purchases which are beyond the reach of the poor. To date, such consumer credit schemes have met with little success in Nigeria, which remains predominantly a cash economy. Our household survey reported that credit is virtually unheard of in rural communities. It is unrealistic to expect low-cost credit schemes to be available for LP Gas schemes in the absence of a general availability of consumer credit for household appliances.

16.18 Other countries face the same difficulty in dealing with LP Gas access to the poor. By accessing this experience and testing it (together with local knowledge) in Nigeria, the LP Gas industry can be ready to move purposefully when conditions are right, that is, when abundant supply and an enlarged, competitive market combine to make LP Gas more affordable and more generally available.

16.19 Once LP Gas production for the domestic market builds up, the industry and its consumers will have the important advantage of indigenous availability in Nigeria as against the many countries that depend on imports. However, given the weakened condition of the domestic LP Gas industry, access to the poor (either in urban or rural areas) can only progress on a significant scale when the first objective—sector recovery—is attained and is evidenced by sustained, abundant product availability together with price competition at the retail level. Poor people cannot compete successfully for LP Gas that is in limited supply. Similarly, poor people cannot make the outlay for initial access without confidence in future LP Gas availability and affordability.

Table 16.6: Goal 5—LP Gas Access to the Poor

Step	*Action*	*Responsibility*	*Priority 1*	*Priority 2*	*Priority 3*
5.1	Adopt access to the poor as an objective.	FGN/WB	*		
5.2	Access relevant knowledge and experience, including micro-finance/consumer credit schemes, from other countries/agencies.	WB/NLPGA with specialist support.		*	
5.3	Evaluate new/alternative modes of serving the poor, for example smaller, lighter cylinders.	Industry with specialist support		*	
5.4	Source suitable affordable LP Gas appliances.	NLPGA/ Industry		*	
5.5	Undertake pilot projects in poor communities.	FGN/WB with specialist support			*

Goal 6—Investment Needs and Opportunities

Goal 6	**Additional investment needs and opportunities are identified and made known to prospective investors.**

16.20 The target for the revitalization of the domestic LP Gas market is to achieve per capita consumption of 3.7 kg per year. This would result in an annual consumption of some 462,500 tons per year, which would mean a retail LP Gas industry of some N37 billion per year. This will generate significant opportunities for existing industry players and new investors. The initial investment needs will be approximately US$130 million. This is to cover the domestic supply project, the rehabilitation and privatization of the butanization depots, the initial replacement of unsafe cylinders, the upgrade of refinery evacuation facilities, and the setting up and resourcing of the new association. The actual costs will largely depend on the chosen option for the domestic supply project, its scale, and whether it is utilizing a new gas stream rather than diverting product destined for export.

16.21 Once the domestic market expands significantly, substantial additional investment needs and opportunities will arise, and examples of these are indicated in the following table, that is, the rail/pipeline LP Gas route project, further primary depots, additional supply projects, additional filling plants, transport infrastructure, retail outlets, and cylinder maintenance and manufacturing facilities. It is estimated that at least US$200 million will be required to be invested in respect of these additional projects. The LP Gas industry must introduce sufficient internal resources and structures in order to enable it to achieve the goal of identifying those opportunities and ensuring that investors/financial institutions are fully aware of them. This will be done through the organization of seminars and presentations for financial institutions and prospective investors.

Table 16.7: Goal 6—Investment Needs and Opportunities

Step	*Action*	*Responsibility*	*Priority 1*	*Priority 2*	*Priority 3*
6.1	Organize seminars/presentations to financial institutions/ prospective investors to highlight investment opportunities in projects such as:				
	Implement the South to North rail/pipeline LP Gas supply route.	FGN/Industry/ Private Sector			*
	Construct additional primary storage depots at Abuja and other strategic locations.	Industry/Private Sector		*	
	Increase domestic LP Gas supply projects as demand increases.	Industry/Private Sector			*
	Increase filling plants to service new consumer growth areas.	Industry/Private Sector			*
	Develop short-haul road transport infrastructure to service new consumer growth areas from strategic primary depots.	Industry/Private Sector		*	
	Introduce properly structured countrywide retail outlets.	Industry			*
	Setting up cylinder maintenance facilities/cylinder manufacturing facilities.	Industry/Private Sector			*

Annex 1

Household Survey

Annex 1.1—Household Survey Questionnaire

Annex 1.2—Survey Personnel

Annex 1.3—Explanatory Preamble to Summary Spreadsheet

Annex 1.4—Summary Spreadsheet of Survey Responses

Annex 1.1—Household Survey Questionnaire

NIGERIA HOUSEHOLD SURVEY—LP Gas

State ……..…….. **Local Govt. Area** ……
City / Town …… **Community / Village** ……

Part A: Price and Availability (Visit and collect data from Stores and Traders In each socio-economic area)

1. Price	**Naira per unit**	**Store**	**Street / Market**
	(Indicate price range where applicable)		
LPG	**……Kg fill**	……	……..
	……. "	……	……..
	……. "	……	……..
	…….Kg deposit	……	……..
	……. "	……	……..
	……. "	……	……..
LPG	**Stove (single)**	……	……..
	(double)	……	……..
	" (other)	……	……..
	Kerosene per Litre	……	……..
	How sold—Quantity	……	……..
	" —Container	……	……..
	(can, bottle, and so forth)		
	Firewood per …….	……	……..
	…….	……	……..
	(List units in which firewood can be purchased)		
	Charcoal per …….	……	……
	……	……	……
	(List units in which charcoal can be purchased)		
	Coal per …….	……	……
	…….	……	……
	(List units in which coal can be purchased		
2. Availability		**Store**	**Street / Market**
(List quantity in stock at time of survey)			
LPG	**Cylinders (full)**	……	……..
	" (empty)	……	……..
	" (for sale/deposit)	……	……..
"	**Cookers / Burners**	……	……..…
Kerosene Fuel		……	……
	Stoves	……	……

Firewood Fuel	**……**	**……**
Electric Stoves	**……**	**……**

3. <u>Comments on Price and Availability</u>

……..
……..
…….
…….
…….
…….
…….

Compiler: **……..**
Signed: **……..** **Date:** **…….**
Checked: **……** **Date:** **…….**

NIGERIA HOUSEHOLD SURVEY—LPG

State ……..…….. **Local Govt. Area** ……
City / Town …… **Community / Village** ……

Part B. Household Fuel Usage **Visit Number** ……..
(Visit and collect data from households in each socio-economic area)

District ……

1. Household size and profile
Head of Household: Gender: …… Age: …… Occupation: …….
Household numbers: Adults …… Children ……
(Adults and children for whom food is regularly cooked)
Location: …… Urban / Peri-Urban / Village / Rural (Delete as appropriate)

---

2. Fuel Use Pattern
List the fuels which you use for cooking …….
……
……
Which fuel do you use most often for cooking ……
Which is your preferred fuel for cooking …….
Have you used LPG for cooking …….
If the primary cooking fuel is not LPG, why not (Tick as applicable)
(a) the fuel is expensive …….
(b) the LPG stove and cylinder are expensive …….
© LPG supply is uncertain …….
(d) getting the cylinder refilled is a hassle …….
(e) LPG is dangerous, can cause a fire or explosion …….
Do you have electricity supply …….
If yes, NEPA , Local / Municipal, or Private ……..
" how many power cuts during past 7 days …….
For how many hours was power cut during past 7 days …….
What did you use for lighting during black-outs ……..
If not electricity, what do you normally use for lighting ……..

Part C. Logistics and Purchase

1. LPG
What is the distance to your nearest supplier ……Km……mins.
Is LPG delivered or do purchasers collect ……..
Do you have an LPG cylinder: if so, how many ……..
Which LPG Brand / Marketer cylinder(s) ……..
……..
When did you purchase your last re-fill ……..

Were you out of gas and waiting for a re-fill ……..

What size fill and how much did you pay ……Kg N ……
How much LPG have you used in the past month … Fills …….. Kg
" " " year ….. " ……. "
" more would you have used if available …… " ……. "
" " " cheaper ……. " ……. "

---

2. Kerosene

What is the distance to your nearest supplier ……. Km ……mins.
Is kerosene delivered or do purchasers collect ……..
How much kerosene do you buy at a time ……..
" " use per month ……..
How much was your last purchase ……litres N……

---

3. Firewood

Can you buy firewood in your area and how far
To the nearest place where you can purchase ……...Km ……mins
What quantity and how much do you pay …… N…….
Do you gather firewood for your own use ……
Do you gather firewood for sale ……
How much firewood do you buy per month ……
How much do you spend on firewood per month N…….

---

4. Coal

Can you buy coal in your area and how far to the
nearest place where you can purchase ….Km ……..Mins
What quantity and how much do you pay ……Kg N ……..
When was your last purchase ……..
How much coal do you buy per month ……Kg
How much do you spend on coal per month N ……..

==========

Part D Household Appliances / Expenditures

1. LPG Users

How long have you had your LPG stove ……..
If new when purchased, how much did you pay N……
If used " " N ……...
Have you other LPG appliances, e.g. lights,
Refrigerator (please specify) ……

---

2. Non-LPG Users

Why don't you use LPG ……
Would you use LPG if it was always available …….

Would you use LPG if the fuel was more affordable ……..
Would you use LPG if the cylinder and fill were smaller ……...
Could you afford to use LPG if the stove and cylinder
Were more affordable ……..
Could you afford to purchase the equipment and use LPG
Regularly if credit was available for the stove / cylinder ……..

---

3. LPG Cylinders

What size cylinder would you prefer ……3 kg
…….6 "
……12.5 "
…….50 "

(Small cylinders require more frequent re-fill purchases but less cash per purchase)

How much cash outlay per purchase would you consider appropriate N…….

4. General

Have you access to low-cost credit ……..
Is there a low-cost credit organisation in your area ……..
Is credit available for LPG cooker, cylinder purchase ……

==========

Part E Survey Compiler's Comments

……
……
……

Signed: …… Date: …….
Checked: …… Date: …….

Annex 1.2—Survey Personnel

A.1.1 The following is a list of the Survey personnel that undertook the Household Survey under the guidance and supervision of Nigerian members of the C.I.Services Study Team:

Kano
Area Coordinator:
Attahiru Abubakar
Field Workers:
Hannata Bello, B.A. Comm
Mariya Shehu, Dip. Pub. Admin.
Rabi Abdullahi, Dip. Pub. Admin.
Maryam Usman, Dip. Bank. Fin.
Ramatu Hussaini, Dip. Catering.

Makurdi
Area Coordinator:
Solomon. A. Fatokun
Field Workers:
Huan F. Bunde, Bsc. Chem.
Onuh Richard, B.Agric.
Tersoo Clement, B.Agric.
Odang E. Mike, Vet. Doctor

Lagos
Area Coordinator:
Yemi Olyonju
Field Workers:
Nkechi Odiaka, H.N.D. Tech.
Kanayo Ugwu, H.N.D. Tech.
Akin Ogunduyile, O.N.D. Tech.
Tolu Akinyemi, B.Sc. Tech.
Nosa Oka, Dip. Marketing.
Grace Nyong, B.Sc.
Obiageli Onnubiko, H.N.D.

Maiduguri
Area Coordinator:
Dr. Walter C. Ndubuisi
Field Workers:
Innocent Inoha, B.A. Comm.
C.O.Odo, B.SC. Food
Alhaja S. Medawaki, B.Sc. Econ.
Modestus Dioka, B.Sc. Comp. Sc.
Yvotte Onette, B.A. History

Benin
Area Coordinator:
Mrs. G.O.Alege
Field Workers:
M. Mokayi, Teacher
S.Idowu, Teacher
G.Osawe, Teacher
F.I.Avbiorukoma, Teacher
Terry I. Mokayi, Univ. Student

Owerri
Area Coordinator:
Ngozi Osigne
Field Workers:
S. Uzozie
C. Anukanti
O. Osigne
N. Uchendu
E. Ogbuebile

Annex 1.3—Explanatory Preamble to Summary Spreadsheet

A.1.2 The various responses obtained from the household surveys carried out at each of the six locations, that is, Lagos, Kano, Benin, Owerri, Makurdi, and Maiduguri were summarized in a separate spreadsheet for each socio-economic area for each location, that is, 24 spreadsheets in all.

A.1.3 The following summary spreadsheet summarizes in tabular form the 24 spreadsheets.

A.1.4 This summary spreadsheet sets out, statistically, the summary totals given by the household respondents to the various questions. They are not a summary of findings or conclusions. The spreadsheet follows the same format as the survey questionnaire and extends to five separate sheets.

A.1.5 The summary spreadsheet is divided into the six locations, with each location further subdivided into the four socio-economic areas, Urban High (UH), Urban Middle (UM), Peri-Urban (PU), and Rural Poor (RP).

A.1.6 In general the figures are the total number of responses to a specific question. Items such as the age of respondent, and so forth, are given as averages, and noted thus in the questions.

A.1.7 Items denoted as nil indicate that no response to that specific question was received from that socio-economic group for that particular location.

A.1.8 It should be noted that, despite the field workers' best efforts, it was not possible to obtain answers from all respondents to all the questions. This should be noted when reviewing the summary spreadsheet.

A.1.9 Based on the responses set out in the summary spreadsheet, and on commentaries received from the six area coordinators, we have outlined our findings and conclusions in Chapter 9 of this report.

Annex 1.4—Summary Spreadsheet of Survey Responses (Sheets 1-5)

Nigerian LP Gas Sector Improvement Study
Summary Spreadsheet of Survey Responses

Survey Question	Lagos				Kano				Benin				Owerri				Makurdi				Maiduguri				Totals		
	UH	UM	PU	RP	UH	UM	PU	RP	UH	UM	PU	RP	UH	UM	PU	RP	UH	UM	PU	RP	UH	UM	PU	RP	Total	Average	% of Total
No. of Respondents :	101	105	105	105	95	68	68	89	47	147	119	39	61	120	61	60	75	73	75	75	87	87	91	86	2039		
PART B - FUEL USAGE																											
B1. HOUSEHOLD SIZE AND PROFILE																											
B.1.1. Head of Household																											
Male	62	52	52	65	70	49	50	79	30	107	86	24	47	67	45	36	45	25	38	73	65	61	67	53	1348		66.1%
Female	37	53	53	40	18	17	13	10	13	39	31	14	14	52	14	22	28	47	37	2	22	24	24	32	656		32.2%
B.1.2. Age (average)	42.7	41.4	37.1	40.7	42.6	42.0	43.8	45.2	36.0	58.5	Nil	Nil	40.4	43.3	42.3	42.4	41.2	43.4	37.0	34.9	43.1	40.0	39.8	40.0		41.7	
B.1.3. Occupation																											
Civil Servant / Government	23	8	8	2	23	17	13	6	6	29	8	1	13	27	9	15	29	40	6	23	35	41	26	9	417		20.5%
Trader / Businessman	24	41	39	35	31	23	30	33	10	63	54	23	31	34	25	27	11	15	52	11	19	18	23	28	700		20.5%
Teacher / Academic	5	7	7	3	3	5	5	4	4	15	6	1	3	17	16	8	11	5	1	3	8	5	5	0	147		7.2%
Professional	10	31	5	10	16	9	2	2	14	11	16	0	3	1	5	2	9	3	0	0	10	5	3	0	167		8.2%
Pensioner / Retired / Not Working	6	6	0	13	8	7	1	11	6	8	5	5	1	10	2	2	2	2	0	1	0	9	6	9	120		5.9%
Other	32	12	44	39	21	7	11	32	6	20	29	9	8	30	3	5	13	8	16	37	13	7	23	36	461		22.6%
B.1.4. Number of Adults (average)	3.6	4.1	3.2	3.8	3.9	4.6	3.7	4.4	4.1	3.6	3.2	2.4	2.9	3.0	3.2	2.5	4.8	4.6	3.1	5.3	3.9	3.2	3.0	3.3		3.6	
B.1.5. Number of Children (average)	2.5	2.9	3.3	4.9	4.3	3.3	4.8	5.9	2.5	2.6	3.1	4.2	2.9	2.9	2.5	2.2	3.8	3.5	3.7	6.6	3.8	2.8	2.7	5.2		3.6	
Total Household Size (average)	5.1	6.0	6.0	8.6	7.6	7.1	8.5	9.2	6.0	5.9	6.0	6.4	5.6	5.8	5.6	4.7	8.3	7.9	6.8	11.8	6.4	5.4	5.6	7.5		6.8	
B.2. FUEL USE PATTERN																											
B.2.1. List the Fuels which you use for cooking																											
a) Kerosene	35	74	84	73	75	58	58	59	39	137	109	37	56	112	59	53	72	71	75	71	77	83	80	41	1688		82.8%
b) LP Gas	87	68	22	4	76	42	13	3	36	27	37	4	37	51	27	25	31	36	4	6	51	18	4	1	710		34.8%
c) Firewood	1	2	35	66	16	19	27	66	10	39	32	25	22	50	15	26	47	48	58	44	26	34	45	72	825		40.5%
d) Coal	1	1	0	1	3	4	1	3	0	4	0	0	1	2	7	4	0	1	0	0	2	0	0	0	35		1.7%
e) Electricity	20	6	2	5	11	10	1	3	5	2	3	1	3	1	0	0	1	0	0	1	4	4	1	0	84		4.1%
Number of Fuels (average)	1.4	1.4	1.4	1.4	1.9	2.0	1.6	1.5	1.9	1.4	1.5	0.0	2.0	1.8	1.8	1.8	2.0	2.1	1.8	1.6	1.8	1.6	1.4	1.3		1.6	
B.2.2. Which fuel do you most use for cooking?																											
a) Kerosene	14	48	77	49	37	33	44	33	18	120	91	20	47	97	44	34	54	55	65	53	50	69	63	23	1238		60.7%
b) LP Gas	81	55	13	1	53	26	9	1	26	17	14	3	13	16	14	13	8	13	3	0	26	7	1	0	413		20.3%
c) Firewood	0	0	14	48	7	5	9	50	1	8	12	16	1	6	0	12	13	7	8	22	8	11	25	63	346		17.0%
d) Coal	0	0	0	1	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	3		0.1%
e) Electricity	5	1	1	2	1	2	0	0	1	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	15		0.7%
B.2.3. Which is your preferred fuel for cooking?																											
a) Kerosene	12	37	61	52	24	19	37	40	7	33	38	14	16	63	36	28	32	19	57	54	29	41	54	26	829		40.7%
b) LP Gas	84	67	22	6	61	42	17	7	39	110	72	9	44	48	21	21	39	53	17	1	51	36	22	3	892		43.7%
c) Firewood	0	0	12	38	4	2	8	36	1	2	3	14	0	7	0	1	3	3	1	22	2	6	13	56	234		11.5%
d) Coal	0	0	0	1	0	0	0	0	0	0	0	0	0	0	2	1	0	0	0	0	0	0	0	0	4		0.2%
e) Electricity	3	0	1	2	4	4	0	0	0	0	1	0	1	0	0	0	0	0	0	0	1	0	1	0	18		0.9%
B.2.4. Have you used LP Gas for cooking?																											
Yes	92	79	33	19	76	49	17	5	46	105	84	12	41	62	28	33	42	57	24	5	70	42	20	2	1043		51.2%
No	8	21	67	82	19	18	43	74	0	39	34	24	18	56	27	18	33	16	51	69	12	39	65	76	909		44.6%
B.2.5. If the primary cooking fuel is not LP Gas, why not?																											
a) the fuel is expensive	34	40	82	63	28	33	52	59	15	103	73	35	50	58	44	38	72	45	37	51	43	51	69	43	1218		59.7%
b) the LP Gas stove and cylinder are expensive	13	28	60	49	18	17	38	64	13	95	66	34	28	36	32	12	50	7	4	0	31	29	52	13	789		38.7%
c) LP Gas supply is uncertain	16	22	35	37	17	25	31	55	15	90	55	17	30	21	33	14	39	23	2	1	32	27	41	8	686		33.6%
d) getting the cylinder refilled is a hassle	9	19	38	34	19	18	33	54	16	94	58	20	25	16	33	18	36	2	2	1	23	27	38	15	648		31.8%
e) LP Gas is dangerous, can cause a fire or explosion	11	28	68	70	22	24	38	71	14	94	72	35	23	40	30	22	59	25	36	39	34	53	64	39	1011		49.6%
B.2.6. Do you have electricity supply?																											
Yes	101	105	90	74	93	68	64	73	46	147	118	39	60	119	61	58	74	73	75	75	86	86	89	79	1953		95.8%
No	0	0	15	30	1	0	0	15	1	0	1	0	0	1	0	0	0	0	0	0	0	1	2	8	75		3.7%
B.2.7. If yes, is it:																											
a) NEPA	101	105	88	74	89	68	64	71	46	146	119	39	59	114	60	57	74	73	74	75	85	85	89	79	1934		94.9%
b) Local / Municipal	0	1	0	0	0	0	0	1	1	2	0	1	1	3	1	0	0	0	0	0	10	1	1	0	23		1.1%
c) Private Generator	61	28	1	0	33	18	7	3	20	7	7	1	6	7	0	1	2	21	1	0	41	7	5	2	279		13.7%

Nigerian LP Gas Sector Improvement Study
Summary Spreadsheet of Survey Responses

Survey Question	Lagos				Kano				Benin				Owerri				Makurdi				Maiduguri				Totals		
	UH	UM	PU	RP	UH	UM	PU	RP	UH	UM	PU	RP	UH	UM	PU	RP	UH	UM	PU	RP	UH	UM	PU	RP	Total	Average	% of Total
No. of Respondents :	101	105	105	105	95	68	68	89	47	147	119	39	61	120	61	60	75	73	75	75	87	87	91	86	2039		
B.2.8. If yes, how many power cuts in the past 7 days?																											
Daily	65	50	56	21	44	43	37	49	12	70	58	18	37	85	29	33	10	42	26	1	61	59	71	65	1042		51.1%
Few	1	3	0	2	3	3	2	5	17	5	38	12	4	2	4	1	0	0	1	0	3	1	3	2	112		5.5%
None	0	0	0	13	0	0	0	1	3	9	3	2	1	5	1	0	2	8	0	0	0	1	0	1	50		2.5%
1	2	4	2	1	3	1	2	0	4	3	5	1	0	1	1	0	2	2	0	35	0	0	0	0	69		3.4%
2	13	5	4	9	20	5	5	3	2	11	2	2	4	2	4	2	18	12	0	32	1	1	2	0	159		7.8%
3	10	7	18	5	3	4	2	1	2	23	3	1	5	5	3	5	31	2	12	6	3	2	2	2	157		7.7%
4	11	14	9	10	4	3	2	1	6	9	8	1	0	4	4	7	7	2	15	0	1	9	1	3	131		6.4%
5	3	14	3	6	3	0	0	1	2	14	1	1	4	4	8	6	3	3	10	0	7	3	4	1	101		5.0%
6	1	3	3	3	15	2	4	0	1	2	1	0	5	2	4	1	0	4	13	0	2	1	0	1	68		3.3%
B.2.9. For how many hours was power cut during 7 days?																											
1	2	1	11	5	1	0	1	0	2	12	5	2	1	0	1	1	4	5	0	5	1	1	0	0	61		3.0%
2	6	7	5	1	10	2	7	2	3	22	2	2	3	5	7	0	6	3	0	24	2	0	2	2	123		6.0%
3	7	1	3	0	4	1	2	3	0	16	4	1	1	4	6	3	6	2	0	16	3	2	5	2	92		4.5%
4	0	6	8	2	5	1	1	6	2	3	11	0	4	3	5	5	2	3	0	6	0	1	1	2	77		3.8%
5	1	10	4	0	4	5	2	7	1	0	2	1	5	9	6	5	0	0	0	11	3	0	3	1	80		3.9%
6	0	5	3	1	2	0	4	2	2	1	1	0	1	2	6	1	10	8	2	6	1	2	0	1	61		3.0%
7	3	9	0	0	0	3	4	2	2	0	1	0	1	4	1	2	5	0	3	4	7	1	0	0	52		2.6%
8	0	1	0	0	2	2	1	3	0	1	1	0	2	7	0	4	3	3	3	1	1	1	0	0	36		1.8%
9	0	0	0	0	1	1	0	0	0	1	0	0	0	1	0	0	7	3	0	0	0	0	0	0	14		0.7%
10	0	2	0	0	14	1	0	1	1	4	0	0	4	5	2	0	1	1	13	0	1	0	0	0	50		2.5%
11	0	0	0	0	1	1	0	0	1	0	0	0	2	1	0	2	2	0	1	0	0	0	0	0	11		0.5%
12	0	5	0	0	1	0	0	2	2	1	2	0	3	2	0	9	5	2	13	0	1	2	0	0	50		2.5%
13	0	0	0	0	3	1	0	1	0	0	0	0	0	1	0	0	0	1	7	0	1	0	0	0	15		0.7%
Few	10	0	0	1	10	0	0	0	13	6	37	10	1	1	0	0	0	0	0	0	1	5	5	0	100		4.9%
Many	68	57	51	41	38	42	40	27	13	69	50	17	24	63	20	25	18	34	33	0	48	53	61	59	951		46.6%
B.2.10. What did you use for lighting during black-outs?																											
a) generator	61	28	0	0	31	18	5	3	20	7	7	1	6	7	0	1	2	20	1	0	35	7	4	1	265		13.0%
b) gas lamp	0	4	0	0	0	1	0	0	1	2	3	0	1	2	1	0	1	0	0	0	0	0	0	0	16		0.8%
c) lantern	14	52	38	65	34	40	32	64	5	55	22	5	8	18	12	7	37	7	25	0	18	17	40	27	642		31.5%
d) candles	12	22	28	5	25	19	11	12	17	23	39	16	14	17	12	4	18	10	0	22	19	32	20	14	411		20.2%
e) kerosene lamp	6	2	28	2	25	5	10	0	11	66	52	26	43	64	35	43	26	32	46	54	9	43	31	42	701		34.4%
f) rechargeable battery	30	30	6	2	38	23	7	7	13	16	31	3	7	26	7	4	1	10	3	2	13	19	9	0	307		15.1%
B.2.11. If no mains electricity, what do you normally use for lighting?																											
a) generator	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2		0.1%
b) gas lamp	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0.0%
c) lantern	0	0	0	5	0	0	0	10	0	0	0	0	0	0	0	0	1	0	0	0	2	0	2	3	23		1.1%
d) candles	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	1	0	0	0	1	1	0	0	5		0.2%
e) kerosene lamp	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	4	5		0.2%
f) rechargeable battery	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0.0%
PART C - LOGISTICS AND PURCHASE																											
C.1. LP GAS																											
C.1.1. Distance to your nearest supplier?																											
a) kilometres (Average)	5.8	1.7	1.0	2.0	7.0	3.3	2.6	26.0	2.6	3.3	2.6	4.0	9.4	3.4	3.4	9.9	2.7	2.1	1.0	3.0	4.5	5.5	4.4	Nil		4.8	
b) minutes (Average)	26	21	20	40	22	19	19	11	18	16	25	23	29	20	26	24	45	17	23	54	14	16	17	Nil		24	
C.1.2. Is LP Gas delivered or purchaser collects?																											
a) delivered	15	12	2	0	10	1	0	0	4	0	2	0	2	0	2	2	0	1	0	0	2	0	0	0	55		2.7%
b) purchaser collects	72	50	15	4	63	41	16	5	39	51	39	5	34	53	29	23	38	41	4	5	57	20	5	1	710		34.8%
C.1.3. How many LP Gas cylinders do you have?	2	2	1	2	2	2	2	1	3	2	2	2	3	1	2	4	2	2	2	1	2	2	2	0		2	

Nigerian LP Gas Sector Improvement Study
Summary Spreadsheet of Survey Responses

Survey Question	Lagos				Kano				Benin				Owerri				Makurdi				Maiduguri				Totals		
	UH	UM	PU	RP	UH	UM	PU	RP	UH	UM	PU	RP	UH	UM	PU	RP	UH	UM	PU	RP	UH	UM	PU	RP	Total	Average	% of Total
No. of Respondents :	101	105	105	105	95	68	68	89	47	147	119	39	61	120	61	60	75	73	75	75	87	87	91	86	2039		
C.1.4. Which LP Gas brand of cylinder?																											
a) Mobil	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	3	0	0	5	2	1	0	15		0.7%
b) Total	49	35	7	2	36	24	9	1	25	26	18	3	19	18	6	9	26	28	1	4	45	8	4	0	403		19.8%
c) NNPC	16	17	3	1	3	0	0	0	13	7	15	1	12	10	7	10	0	1	0	0	3	0	0	0	119		5.8%
d) Nidogas	13	10	1	1	3	2	0	1	5	4	10	1	0	0	1	0	2	0	0	0	5	1	1	0	61		3.0%
e) Eagle	4	8	0	0	0	1	0	0	1	4	2	0	6	0	0	0	1	0	0	0	4	3	1	0	35		1.7%
f) Agip	0	0	0	0	17	5	2	0	4	4	6	0	5	2	0	1	2	6	0	1	1	0	0	0	56		2.7%
g) Unigas	0	0	1	0	0	0	0	0	2	0	0	0	0	0	3	1	0	0	0	0	0	0	0	0	7		0.3%
h) Util	0	0	0	0	0	0	0	0	4	5	2	0	2	0	1	0	0	0	0	0	0	0	0	0	14		0.7%
i) Other	10	3	0	0	11	8	3	0	4	9	1	0	3	16	6	2	5	16	0	0	5	0	0	0	102		5.0%
C.1.5. When did you purchase your last re-fill?																											
a) within last month	53	36	10	1	47	23	7	0	19	14	22	3	7	24	11	7	2	18	3	0	27	7	1	0	342		16.8%
b) within last two months	17	17	2	1	17	9	0	2	5	3	7	0	6	4	7	3	5	2	0	0	9	2	0	0	118		5.8%
c) within last three months	5	6	2	1	6	5	2	0	2	3	1	0	5	2	1	1	2	4	0	1	6	2	1	0	58		2.8%
d) longer	7	4	3	1	6	8	5	1	11	30	9	1	19	20	8	20	29	17	1	4	15	6	5	0	230		11.3%
C.1.6. Were you out of LP Gas and waiting for a re-fill?																											
Yes	65	11	11	1	51	31	12	2	12	15	17	1	22	22	17	18	27	16	1	0	28	7	1	0	388		19.0%
No	65	51	4	3	24	10	1	1	28	22	19	1	8	25	10	9	10	19	2	3	28	11	4	0	358		17.6%
C.1.7. What size re-fill and how much did it cost?																											
a) fill size, kilograms (average)	24	14	15	25	23	20.4	30	31	31	18	22	13	20	15	15	16	13	15	13	13	18	11	13	Nil		18.5	
b) cost in Naira (average)	2257	1169	1054	1917	2166	1795	2623	3950	2876	1017	2245	1450	2503	1806	1714	1753	1340	1845	1300	1200	2109	1507	1213	Nil		1861	
Naira / Kilogramme (average)	90.50	85.74	76.00	80.00	99.53	94.9	95.69	115.0	102.3	65.31	108.5	116.0	126.4	136.6	119.0	113.1	125.4	114.2	104.0	96.00	138.0	129.2	96.00	Nil		105.5	
C.1.8. How much LP Gas have you used in the past month?																											
a) fills (average)	1.7	1.4	1.2	1.0	1.5	1.3	1.4	0.7	1.9	0.6	1.4	2.0	Nil	1.8	1.6	2.1	1.1	1.8	3.0	2.0	1.9	1.7	0.6	Nil		1.5	
b) kilograms (average)	52.6	19.0	20.5	31.3	29.8	23.4	48.6	20.8	46.2	10.8	32.0	25.0	Nil	27.3	23.6	45.1	13.6	20.4	37.5	25.0	284.3	17.8	3.1	Nil		39.0	
C.1.9. How much LP Gas have you used in the past year?																											
a) fills (average)	8.9	7.7	10.7	2.5	7.9	8.8	5.2	8.0	13.2	6.3	11.8	18.5	6.8	5.4	5.5	3.4	5.5	9.5	25.5	7.3	8.5	5.5	1.8	Nil		8.4	
b) kilograms (average)	379.4	103.0	202.8	106.3	180.6	173.9	152.1	250.0	346.7	102.2	257.3	231.3	150.5	224.2	102.8	53.1	69.8	136.8	328.1	91.7	201.1	70.1	15.8	Nil		170.8	
C.1.10. Would you have used more if it was available?																											
Yes	10	15	4	1	54	32	13	2	25	21	35	4	27	26	19	17	33	37	3	5	37	11	2	0	433		21.2%
No	41	31	8	1	5	2	0	0	4	18	1	0	0	8	3	0	0	14	1	0	0	4	1	0	142		7.0%
C.1.11. Would you have used more if it was cheaper?																											
Yes	14	22	5	1	59	34	12	2	25	31	32	4	30	30	17	16	33	42	3	5	35	15	4	0	471		23.1%
No	37	26	8	1	1	1	0	0	3	7	1	0	0	6	5	0	0	0	1	0	0	0	0	0	97		4.8%
C.2. KEROSENE																											
C.2.1. Distance to your nearest supplier?																											
a) kilmetres (average)	1.5	1.0	1.5	1.3	6.6	1.9	2.7	8.6	1.9	2.1	2.0	1.5	3.6	2.8	2.5	3.1	2.8	1.2	1.0	3.1	2.6	3.3	2.3	3.1		2.7	
b) minutes (average)	15	8	11	11	12	10	8	6	15	11	14	12	16	18	19	13	15	12	16	44	11	11	12	5		13	
C.2.2. Is kerosene delivered or purchaser collects?																											
a) delivered	7	11	13	9	12	3	0	1	0	4	1	1	3	13	2	4	0	0	1	2	17	23	17	0	144		7.1%
b) purchaser collects	25	61	72	60	54	52	55	60	35	134	117	34	52	113	54	48	72	71	71	70	59	57	73	77	1576		77.3%
C.2.3. How much kerosene do you buy at a time?																											
a) gallons (average)	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil		Nil	
b) litres (average)	16.7	10.4	10.6	8.9	10.1	9.8	14.0	4.6	35.3	13.7	12.0	11.1	27.7	17.5	16.4	25.8	19.8	21.9	11.8	10.6	21.7	12.0	12.7	5.6		15	
C.2.4. How much kerosene do you use per month?																											
a) gallons (average)	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil		Nil	
b) litres (average)	11.7	19.6	22.4	11.6	27.4	22.1	41.3	25.8	65.3	18.7	19.3	24.1	37.1	25.3	23.6	29.6	20.9	30.4	22.0	12.7	22.5	22.9	20.0	10.2		24	

Nigerian LP Gas Sector Improvement Study
Summary Spreadsheet of Survey Responses

Survey Question	Lagos				Kano				Benin				Owerri				Makurdi				Maiduguri				Totals		
	UH	UM	PU	RP	UH	UM	PU	RP	UH	UM	PU	RP	UH	UM	PU	RP	UH	UM	PU	RP	UH	UM	PU	RP	Total	Average	% of Total
No. of Respondents :	101	105	105	105	95	68	68	89	47	147	119	39	61	120	61	60	75	73	75	75	87	87	91	86	2039		
C.2.5. How much was your last purchase?																											
a) litres (average)	11.0	8.4	8.6	7.0	14.7	9.4	16.3	7.8	33.9	13.4	13.7	11.1	32.7	18.8	16.6	30.0	18.8	23.5	22.6	10.5	15.8	10.4	7.4	2.9		15.2	
b) cost in Naira (average)	319	501	325	200	550	347	492	210	931	397	386	341	1056	558	539	669	483	714	575	297	627	586	304	151		482	
Naira / Litre (average)	38.91	44.53	42.46	44.38	54.86	56.42	70.76	40.21	30.50	30.70	35.65	30.29	34.84	29.38	32.01	26.46	29.20	31.26	26.77	32.57	43.36	61.45	45.67	44.32		39.9	
C.3. FIREWOOD																											
C.3.1. Can you buy firewood in your area and how far away?																											
a) Yes	1	2	18	36	20	25	32	64	16	43	43	24	29	46	27	33	37	48	57	38	26	27	48	50	790		38.7%
No	0	0	0	0	0	0	0	0	2	51	16	1	0	84	0	0	0	0	0	4	0	1	1	0	160		7.8%
b) kilometres (average)	Nil	Nil	8.3	Nil	4.0	1.5	2.4	2.9	3.1	0.5	1.2	1.3	3.0	4.5	2.6	1.7	1.7	4.3	0.0	3.5	2.8	2.4	2.3	2.8		2.7	
c) minutes (average)	30	6	24	15	6	11	9	8	6	6	8	12	14	20	25	13	39	30	12	14	12	17	9	7		15	
C.3.2. What quantity and how much do you pay?																											
a) bundles (average)		1	11	3	6	2	8	6	1	4	1	1	3	2	2	2	11	10	1	1	3	4	3	2		4	
b) cost in Naira (average purchase)	100	35	295	185	116	43	176	91	110	229	188	341	391	171	224	239	336	183	51	26	615	239	323	103		200	
C.3.5. Do you gather firewood for your own use?																											
Yes	0	0	2	44	5	8	15	38	3	6	13	20	11	19	14	7	25	23	21	39	10	16	32	56	427		20.9%
No	1	2	11	5	12	12	14	19	8	32	18	1	15	20	9	21	11	23	28	7	13	15	14	14	325		15.9%
C.3.6. Do you gather firewood for sale?																											
Yes	0	1	0	2	1	0	8	18	0	3	8	9	1	10	0	2	0	1	9	1	0	1	0	10	85		4.2%
No	1	1	17	39	19	24	21	45	13	37	27	15	26	844	26	32	37	46	48	45	28	34	48	57	1530		75.0%
C.3.7. How much firewood do you buy per month?																											
a) bundles (average)	Nil	Nil	39	18	5	26	38	30	6	13	8	2	7	5	5	6	17	21	15	9	7	17	25	21		15	
b) cost in Naira (average)	100	800	1479	625	1125	636	1520	1407	325	592	1166	1233	789	593	531	627	500	389	958	190	816	1392	1097	923		826	
C.4. COAL																											
C.4.1. Can you buy coal in your area and how far away?																											
a) yes	1	1	2	1	3	5	2	5	3	7	5	7	7	3	10	2	1	2	0	0	1	0	0	0	68		3.3%
b) no	0	0	0	0	0	0	0	0	1	66	22	2	0	1	1	0	0	0	0	0	1	2	0	0	96		4.7%
c) kilometres (average)	Nil	Nil	1.0	1.0	11.0	3.0	2.0	Nil	10.0	2.0	1.3	1.4	17.3	15.5	2.4	3.0	Nil	Nil	Nil	Nil	25.0	Nil	Nil	Nil		7	
d) minutes (average)	20	Nil	5	15	20	9	35	5	45	21	16	13	36	25	19	40	15	13	Nil	Nil	60	Nil	Nil	Nil		23	
C.4.2. What quantity and how much do you pay?																											
a) kilograms (average)	Nil	Nil	Nil	Nil	4	2	5	2	25	1	6	2	5	5	42	50	25	25	Nil	Nil	Nil	Nil	Nil	Nil		14	
b) cost in Naira (average)	500	50	330	120	150	76	350	28	375	3599	474	203	430	217	309	425	120	85	Nil	Nil	600	Nil	Nil	Nil		444	
C.4.3. When was your last purchase?																											
a) 1 month ago	1	1	1	1	2	3	1	3	1	4	3	6	1	0	7	1	0	0	0	0	0	0	0	0	36		1.8%
b) longer	0	0	1	0	1	2	1	1	1	3	2	1	6	3	3	1	1	2	0	0	1	0	0	0	30		1.5%
C.4.4. How much coal do you buy per month?																											
a) kilograms (average)	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil		Nil	
b) cost in Naira (average)	500	600	390	430	400	253	400	285	2800	2115	487	423	588	267	406	200	20	60	Nil	Nil	1600	Nil	Nil	Nil		643	
PART D - HOUSEHOLD APPLIANCES / EXPENDITURE																											
D.1. LP GAS USERS																											
D.1.1. How long have you had your LP Gas stove?																											
a) years (average)	9	7	8	9	8	8	9	24	13	12	10	13	6	4	7	7	9	11	2	5	8	5	7	Nil		8.7	
D.1.2. If new when purchased, how much did you pay?																											
a) cost in Naira (average)	19873	17250	8889	22000	13732	20556	19083	5000	19533	2188	4316	Nil	3981	3119	6011	4376	960	1549	3733	Nil	7660	3773	2938	Nil		9072	
Given free	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil		
D.1.3. If used when purchased, how much did you pay?																											
a) cost in Naira (average)	8933	3500	Nil	Nil	9908	4917	Nil	Nil	35	13627	650	Nil	9500	1217	4570	5125	Nil	Nil	2500	400	5000	Nil	Nil	Nil		4991	

Nigerian LP Gas Sector Improvement Study
Summary Spreadsheet of Survey Responses

Survey Question	Lagos				Kano				Benin				Owerri				Makurdi				Maiduguri				Totals		
	UH	UM	PU	RP	UH	UM	PU	RP	UH	UM	PU	RP	UH	UM	PU	RP	UH	UM	PU	RP	UH	UM	PU	RP	Total	Average	% of Total
No. of Respondents :	101	105	105	105	95	68	68	89	47	147	119	39	61	120	61	60	75	73	75	75	87	87	91	86	2039		
D.2. NON LP GAS USERS																											
D.2.1. Why don't you use LP Gas?																											
a) price	8	30	56	53	17	18	42	51	6	92	56	30	29	53	29	38	54	31	29	69	17	37	70	35	950		46.6%
b) appliances are expensive	0	0	2	1	0	2	0	0	1	0	0	0	1	6	0	0	1	0	5	1	0	0	0	1	21		1.0%
c) LP Gas supply is uncertain	1	3	5	3	1	2	1	2	4	21	9	2	16	6	2	8	1	5	13	17	7	3	4	2	138		6.8%
d) cylinder re-fill is a hassle	1	1	0	2	0	0	0	0	0	1	0	1	2	1	2	1	1	1	8	0	0	1	0	0	23		1.1%
e) LP Gas is not safe	3	15	40	37	4	10	9	16	2	37	29	6	5	17	4	4	3	16	21	23	15	37	19	17	389		19.1%
f) other reason	1	4	4	19	1	2	2	15	2	4	1	1	0	0	3	0	2	0	0	0	4	2	3	23	93		4.6%
D.2.2. Would you use LP Gas if it was always available?																											
Yes	10	28	47	47	17	17	30	39	9	98	53	30	47	51	33	47	40	29	53	56	19	36	52	19	907		44.5%
No	4	9	43	47	3	9	12	27	1	19	10	1	3	33	3	3	4	11	18	15	13	28	24	35	375		18.4%
D.2.3. Would you use LP Gas if it was more affordable?																											
Yes	11	31	52	55	18	15	32	43	9	97	58	31	49	50	33	47	44	30	54	55	21	39	64	26	964		47.3%
No	3	9	37	44	3	11	11	25	1	18	9	1	1	14	3	3	0	19	17	16	12	25	20	28	330		16.2%
D.2.4. Would you use LP Gas if the cylinder and fill were smaller?																											
Yes	8	17	42	47	15	10	28	39	6	77	50	25	18	37	31	25	32	29	54	56	16	23	42	15	742		36.4%
No	3	16	42	50	2	12	13	26	2	31	11	7	29	22	5	22	11	11	17	15	15	28	26	32	448		22.0%
D.2.5. Could you afford to use LP Gas if the stove and cylinder were cheaper?																											
Yes	9	33	50	55	19	15	33	40	10	98	56	31	48	51	32	42	44	31	54	56	21	38	63	27	956		46.9%
No	4	6	39	44	1	10	10	28	1	16	8	3	2	13	4	6	0	9	17	15	11	25	19	26	317		15.5%
D.2.6. Could you afford to use LP Gas if credit was available for the stove/cyl?																											
Yes	7	32	48	55	12	10	26	14	8	91	53	30	42	39	30	39	41	34	53	56	17	30	45	18	830		40.7%
No	4	8	39	43	7	15	15	52	3	23	8	2	5	23	5	8	4	8	18	15	14	31	24	33	407		20.0%
D.3. LP GAS CYLINDERS																											
D.3.1. What size cylinder would you prefer?																											
a) 3kg	0	0	5	7	6	1	1	0	1	9	0	0	2	5	5	1	0	0	16	0	7	4	6	1	77		3.8%
b) 6kg	0	2	11	6	9	2	8	1	0	7	6	1	12	23	14	4	5	0	26	2	5	3	8	3	158		7.7%
c) 12.5kg	46	71	22	29	32	35	12	6	22	90	70	13	32	47	27	39	62	58	17	58	35	17	16	10	866		42.5%
d) 25kg	0	0	0	0	0	0	0	0	1	0	2	0	0	0	0	0	0	0	0	0	2	1	0	0	6		0.3%
e) 50kg	34	16	1	1	29	11	11	3	26	25	24	1	10	16	3	5	5	5	0	0	14	14	4	1	259		12.7%
D.3.2. How much cash outlay would you consider appropriate?																											
a) 3kg re-fill, in Naira (average)	Nil	Nil	100	200	250	150	200	Nil	Nil	91	Nil	Nil	40	450	420	250	Nil	Nil	294	Nil	900	1167	1340	Nil		418	
b) 6kg re-fill, in Naira (average)		750	356	242	492	260	275			192	521	200	229	692	542	300	413		452	70	1000	750	586	2000		516	
c) 12.5kg refill, in Naira (average)	601	511	429	547	796	681	579	550	597	338	676	551	477	752	668	658	522	624	312	147	683	738	522	279		552	
d) 25kg re-fill, in Naira (average)	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil		Nil	
e) 50kg re-fill, in Naira (average)	1997	1996	700	3000	1630	2391	1940	2500	2358	1078	2289	1500	3111	2449	2333	2833	1200	1900	Nil	Nil	1365	813	575	200		1825	
D.4. GENERAL																											
D.4.1. Have you access to low-cost credit?																											
Yes	9	9	1	1	13	3	2	0	1	1	3	2	2	8	0	0	3	1	11	38	2	2	1	1	114		5.6%
No	84	85	86	84	76	57	57	71	28	122	47	26	51	107	53	49	71	72	64	38	76	71	83	54	1612		79.1%
D.4.2. Is there a low-cost credit organisation in your area?																											
Yes	1	0	0	0	15	0	2	0	1	0	2	0	0	15	2	0	4	1	74	38	1	1	2	1	160		61.8%
No	90	94	87	85	72	59	57	70	29	122	45	28	53	93	50	49	70	68	1	27	78	70	81	54	1532		75.1%
D.4.3. Is credit available for LP Gas cooker, cylinder purchase?																											
Yes	0	1	0	0	15	2	2	0	0	9	1	0	2	2	3	1	1	1	3	12	0	1	0	0	56		2.7%
No	90	93	87	84	71	58	56	70	30	120	33	11	52	108	47	45	72	67	72	53	78	69	82	53	1601		78.5%

Annex 2

Summary of Estimated Costs of Rehabilitation of Butanization LP Gas Depots

SUMMARY OF ESTIMATED COSTS OF REHABILITATION OF BUTANIZATION LP GAS DEPOTS

S/NO.	ITEMS/DEPOT	APAPA	IBADAN	ILORIN	KANO	GUSAU	GOMBE	MAKURDI	ENUGU	CALABAR	TOTAL
1	Bottling/ Filling Plant	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	3.78
2	Product Storage/Instruments	9.24	4.30	4.30	4.30	4.30	4.30	4.30	4.30	4.30	43.64
3	Loading and Unloading Bay	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	2.97
4	Diesel Tank Calibration	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.90
5	Telecommunication	2.00	0.95	0.95	0.00	0.00	0.00	0.00	0.00	0.95	4.85
6	Water Treatment Plant	0.56	0.56	0.56	0.56	0.00	0.56	0.56	0.00	0.00	3.36
7	Servicing of Borehole	0.33	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.33
8	Drilling of New borehole	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.00	0.91	7.28
9	Sundry Remedial Mech/Elect Works*	2.00	1.00	1.50	1.50	1.60	2.00	1.60	1.70	1.20	14.10
10	Civil Works and Painting	8.40	2.00	2.00	2.00	2.50	10.50	0.40	0.25	0.25	28.30
11	Generator 350KVA	0.00	9.60	0.00	0.00	0.00	0.00	0.00	0.00	0.00	9.60
12	Transformer	0.00	0.00	0.00	0.00	0.00	0.00	10.00	0.00	0.00	10.00
13	Commissioning Cost	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	4.05
14	Materials	5.20	5.76	2.26	14.68	20.98	21.89	31.37	1.98	1.98	106.10
15	Miscellanous - Materials	1.04	0.95	1.09	1.12	0.74	0.74	0.74	0.74	0.74	7.90
16	Contingency includes Taxes	3.10	2.73	1.49	2.64	3.23	4.22	5.12	1.03	1.16	24.72
	SUB TOTAL	**34.08**	**30.06**	**16.36**	**29.01**	**35.56**	**46.42**	**56.30**	**11.30**	**12.79**	**271.88**
17	Fire Truck	0.00	9.42	9.42	9.42	9.42	9.42	9.42	9.42	9.42	75.36
18	1no.10" Smith Flow LPG Meter E3-S6	15.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	15.40
19	2nos. 3" Smith Flow LPG Meter	10.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.40
20	Gombe Special Water Project	0.00	0.00	0.00	0.00	0.00	10.00	0.00	0.00	0.00	10.00
	SUB TOTAL	*25.80*	*9.42*	*9.42*	*9.42*	*9.42*	*19.42*	*9.42*	*9.42*	*9.42*	*111.16*
	GRAND TOTAL	**59.88**	**39.48**	**25.78**	**38.43**	**44.98**	**65.84**	**65.72**	**20.72**	**22.21**	**383.04**

(Figures in million Naira)

Annex 3

Details of Marketers LP Gas Plants Nationwide

PORT HARCOURT

	MARKETER'S NAME	PLANT ADDRESS	STORAGE CAPACITY(MT)
1	AFRICAN PETROLEUM	Port Harcourt	20
2	MOBIL	Port Harcourt	
3	TRANSRICIA	27 Abuloma Road, PH	12.5
4	SUNGAS	Mobil Depot Recreation Rd. PH	59
5	JESAD	Km 2 Ekere Rd, Ohia PH	22.4
6	ABESCO	2, Ahamadi Anna Layout, PH	36
7	SYCO-UNIT	Plot 93, Trans Amadi Ind. Est. PH	31
8	GREENWAY	Km 17 PH/Aba Exp. Way, PH	30
9	OBALICE	Pabod Feed Mill, Elimgbo, PH	30
10	GARLIC	Aba/PH Road, Oyigbo, PH	25
11	JONYSON	Umunze/Ekwulobia Rd. Ndikelionwu	21
12	ARDEN GAS	Ohia Ihunda Ehere Vill. Aba	28
13	HS	Km 17 PH/Aba Exp. Way, Obio Akpor	45
14	G.N. ENTERPRISES LTD	East/West Rd, Rumuokoro Obio Akpor	30
15	HOME & IND. GAS	Eleme Road, PH	80
16	ROKANA	Plot 5, Mission Road, Umualum Nekede	60
17	EXCEL GAS	Km 16, Old Owerri/Aba Rd. Agbala, Owerri	13.5
18	A. A. SKYLINE	Orlu/Ihiala Rd. Ihioma Orlu, Owerri	30
19	BASIC SERVICES	Ugba Junction, Owerri/Inta Road, Owerri	62
20	SUMEZ	Umueze Vill. PH/EN Exp. Way, Abayi	60
21	JULIROSE	21-23 MCC Rd., Aba	90
22	ROCK OIL	Aba/PH Exp. Way, PH	57
23	GAMMA	12, Chief Adaenu Rd., Aba	25
24	ADROSE GAS		
25	F & G GAS NIG LTD		
26	SANTIAGO AGENCY		
	TOTAL		**867.4**

ENUGU

	MARKETER'S NAME	PLANT ADDRESS	STORAGE CAPACITY (MT)
1	U. GAS	Umunya Oyi LGA Umunya	90
2	BIKON	Plot 44 Eriene Ind. Layout, Enugu	60
3	PRIMGAS	Plot 51/52, Abruba Avenue, Emene, Enugu	120
4	INTRA	Emene Rd. Enugu	35
5	LOPA	Plot 11/13 Emene Ind. Layout, Enugu	60
6	DENZ	Plot 26, Ind. Layout, Emene, Enugu	40
7	CITIGAS	Owo River Layout EN/PH Road, Enugu	105
8	NOKSON	Plot IN/33 Emene Ind. Layout, Enugu	62
9	WILLSON	40C Orba Rd. Enugu	40
10	LANDMARK	Awgu Junction, Off EN/PH, Road	33
11	WHIZ OIL	Plot 217 Aga Awku Ind. Layout, Awka	132
12	PHERANZY	Plot 278, Awka Ind. Layout, Awka	60
13	BEZER	Plot 256, Awka Ind. Layout, Awka	22
14	JUHEL	Plot EZ 60 Awka Ind. Layour, Awka	30
15	FIRSTGAS	Off Anukwa Rd., Okwogwodwo, Enugu	67
16	SWANAK	Ezekwuabo Vill. Otolo Nnewi	10
17	IBETO	Nnewi/Okugwu Rd, Otolo, Nnewi	60
18	JUMEX	Umuanuka Vill. Otolo Nnewi	70
19	CIFO	Km 4 Nkpor - Umuoji Rd. Obosi	70
20	TRINITY	Km 2 Nkpor - Obosi Rd. Obosi	60
21	FELIXO	Oba/Okigwe Rd., Orvokiokwu	86
22	SAMED	Km 7, Onitsha - Owerri Rd, Onistha	35
23	PETROGAS	1, Atani Rd., NigerBrghead., Ind. Est. Onitsha	75
24	ZITO	Plot IN130-31 Nigerbridgehead Ind. Est. Onitsha	55
25	PREMIER	Plot IN/79 Nigerbridgehead Ind. Est. Onitsha	60
26	CENTURY	Azu-Ogbunka Enugu, Onitsha Rd, Onitsha	60
27	DOZZY	IN/162 Niger bridgehead Ind. Layout, Onitsha	60
28	AFRITECH	Tollgate Approach, Ogbunika Oyi, Onitsha	50
29	ARIZONA NIG LTD	Mile 5, Abakaliki Rd, Enugu	35
30	EVERGAS	Benin/Asaba Rd., Asaba	60
31	MC-MERG	Km 5 Asaba/Benin Rd, Asaba	51
32	DANDILAS CO. (W.A.) LTD		
33	POCO	136 Ogwashi-Ukwu/Ubulu Rd, Ogwashi-Ukwu	61
34	JOE PET NIG. LTD	Agwumba - Oduke Umuezei Quarters, Asaba	27
	TOTAL		**1941**

CALABAR

	MARKETER'S NAME	PLANT ADDRESS	STORAGE CAPACITY (MT)
1	WINMOS	Uyo - Idoro Rd, Uyo Iga, Uyo	51
2	EKONOH	Km 10 Umuahia/Ikot Ekpene Rd	24
3	UTILGAS	Km 8 M/Mohammed Estate, Calabar	42
4	TRUTHFAITH	Km 7 Uyo - Oron Road, Mbai Eti, Uyo	69
5	TRUTHFAITH	110 Anansa Road, Calabar	131
6	CANON BELL	1, Nsemo Close, Ikot Effang, Calabar	15
7	JUHEL NIGERIA LTD		
8	PHERANCY GAS NIG LTD		
9	NOSSIEN NIG LTD	Ikot Ifa Itiam Etoi, Uyo	28
	TOTAL		**360**

MAKURDI

	MARKETER'S NAME	PLANT ADDRESS	STORAGE CAPACITY (MT)
1	AUSTOMA ENT. LTD	Km 4 Otokpo Rd. Makurdi	30
2	HENOWAMA NIG LTD	8 Ahmadu Bello Way, Otukpo	35
	TOTAL		**65**

LAGOS

	MARKETER'S NAME	PLANT ADDRESS	STORAGE CAPACITY(MT)
1	AGIP	8 Kayode Street, Apapa	250
2	TOTAL	Bonny Road, Apapa	1075
3	MOBIL	1 Mobil Road, Apapa	240
4	AP	AP House, 54/56 Broad Street, Lagos	840
5	UNIPETROL	8/10 Kayode Street, Marine Beach, Lagos	125
6	ELF	Mile 2 Badagry Express Way, Lagos	7
7	TEXACO	4 Macarthy Street, Lagos	-
8	JACOBOD	Plot 100 Amuwo Odofin Ind. Scheme, Lagos	79
9	GRENIGAS	1 Adeyemi Bero Crescent, Illupeju, Lagos	150
10	REAMS	Plot 212 Happy Home Ave. Kirikiri, Lagos	100
11	KARON	Mile 13 Ikorodu Road, Lagos	36
12	VINEEGAS	7th Avenue Festac Town, Lagos	75
13	JOHNSON WAX	13/14 Abimbola Street, Isolo, Lagos	80
14	BODAX	Plot 10 Badejo Kalesanwo Street, Mushin, Lagos	40
15	CHIMONS	Agia Village, Kirikiri, Lagos	88
16	ALLAN-DAY	Expressway, Ago Okota Palace, Isolo, Lagos	70

17	TOM - TAN	Plot C11 Amuwo Odofin Ind. Scheme, Lagos	90
18	TUDAKA	Oregun Rd, Behin National OIL S/S, Lagos	120
19	UTILGAS	Plot 9-11 Awori-Ora Estate Apapa/Oshodi	86
20	JAYCOKE	Abike Jokogbola Street, Ikorodu, Lagos	33
21	GASOLINES & AUTO PROD.	Plot 16 Ind. Estate, Ikorodu, Lagos	50
22	CROWN HEAD INV. COY LTD	3 Lambo Lasunwon Rd., Araromi Village, Ikorodu	80
23	T. CAPITAL	Ijoko Ojodu Road, Via Agbado, Lagos	45
24	GAS MESSENGERS	Km 15 Ijoko Road, Olembe Village, Lagos	30
25	DELMAN	Ijeha St. Of Akute Rd. Akute Town, Lagos	60
26	UNIVERSAL GASES	Km 1 Ijoko Rd. Otta	70
27	FENICO	Veepee Ind. Opp. Olympic Ind. Otta	87
28	SESANTECH	Km 40 Lagos/Abeokuta Road, Otta	35
29	COTGAS	Plot 14 Ind. Estate Ado-Odo, Otta	36
30	EMMASCO	Plot 4 BLKXII Area 1, OPIC Estate, Lagos	55
31	FOWOBI	Sagamu Benin Exp. Way Ijebu Ife	100
32	NIDOGAS	23 Creek Road, Apapa, Lagos	550
33	PETROCHIN LTD	Km 33 Badagry Exp. Way, Morogbo, Village	70
34	FLAME PETROLEUM LTD	Ikorodu Industrial Estate, Odogunyan, Ikorodun	78
35	ELOLAD NIGERIA LTD	Ojodu - Akute Road. Akute	30
36	ARCHERS NIGERIA LTD	Plot C1 9B Amuwo Odofin Ind. Scheme, Lagos	23
37	MAJORS GAS	Plot 19 Kolex Avenue, Ajao Estate, Oshodi	67
38	AGFA GAS	Surelere	40
39	ALLIED GAS LTD	Ogba	50
40	PACIFIC GAS COY. LTD	13 Pacific Close, Oregun Ind. Est. Ojota	90
41	AVINA IND. LTD		
42	DEGALTY GAS	Ikeja	100
43	FAMAK GAS LTD	Obanikoro	
44	HONEYLEGION (NIG) LTD	Ketu	79
45	MASVOGUE NIG LTD	Ikorodu	
46	NOKSON	Fola Agoro	
47	PISCES PETROLEUM	Apapa	
48	RUBICON GAS	Oregun	60
49	ROSIM NIG. LTD		
50	SEA PET & GAS COY LTD	Lekki	60
51	SUNGAS NIG. LTD	Ikeja	40
52	CAANIT GAS LTD	Victoria Island	
53	GAS OIL ENGR. LTD	14 Fred Anyiam St. Off Adelabu ST. Surulere	60
	TOTAL		**5629**

IBADAN

	MARKETER'S NAME	PLANT ADDRESS	STORAGE CAPACITY(MT)
1	TOTAL	Aleru Village, Lagos/Ibadan Rd. Ibadan	68
2	FOWOBI	Sagamu - Benin Express Way, Ijebu Ife	100
3	FANDILAB	2 Emmanuel Alayande St. Oluwole Ibadan	60
4	GENERAL GAS	Prov. Dev. Corp. Orita Bashirun	128
5	HOME GAS	Plot 11 Block A Metropolitan Estate, Ibadan	30
6	BOVAS	Plot 6B IMG Layout Oke Ogbere Rd. Ibadan	30
7	SOLAR GAS	Ajoda Town, Ibadan	180
8	NIDOGAS	Plot 2 Block 1 Oluyole Estate, Ibadan	55
9	FAMAK	Ondo/Akure Rd. Ondo	56
10	SOKA GAS	Awoyaya Ind. Layout, Ondo/Ore Rd. Ondo	40
11	JOHN OLATUNDE	Km 5, old Owo Rd., Akure	15
12	ABRAM ASHLEY	Ibadan	
13	ABIKE GAS LTD	Ibadan	
14	SOLACE GAS LTD	Ibadan	
15	THE PET MARKETERS	Block E, Plot 486, Off Ondo Rd, Akure	28
16	HORIZON VENTURES	New Epe Rd. Ikoto, Ijebu Ode	56
	TOTAL		**846**

WARRI

	MARKETER'S NAME	PLANT ADDRESS	STORAGE CAPACITY(MT)
1	UNIPETROL	Warri Refinery Complex, Warri	174
2	AGIP	Km 6 Benin/Sapele Road, Benin	55
3	TOTAL	Km 8 Benin/Sapele Road, Benin	62
4	ZICO	Ward 48, Aduwawa Area Benin.Auchi, Benin	90
5	MOFOR	Ovwian Aladja - Effurun Road, Benin	77
6	GRESTFIELD	Km 4 Sapele Road, Benin	12
7	GROWN OIL	231 Evbvoriawa Rd. Off Sapele Rd. Benin	120
8	TARIGONA	km 1 Ekuvgbo Effurun-Otor Rd. Benin	15
9	METRO GAS	km 1 Eku Amukpe Rd. Sapele	17.4
10	JOKSON	New Benin/Agbor Rd, Agbor	130
11	SEDEG	1 Udu Bridge Road, Enerhen Warri	-
12	UTILGAS	Km 12 Benin -Sapele	66
13	GAILDOLF	5 Commercial Avenue, Sapele	25
14	ODA	Okosun Ind. Estate, Ukhum Rd. Ekpoma	56
15	SUNGAS	159/161 Upper Missiom Rd. Ekpoma	50
16	BEACH INVESTMENTS	2 Udu Bridge, Enerhen, Warri	18
17	MEKAVAL PET LTD	Benin - Agbor Exp. Way, Agbor	45

18	EVER GAS LTD	Asaba	
19	MC MERG	Asaba	
20	S. C. MOTAN NIG LTD		
21	SUUPABETH NIG LTD	Km 11 Asaba/Benin Exp. Way, Delta	35
	TOTAL		**1047.4**

KADUNA

	MARKETER'S NAME	**PLANT ADDRESS**	**STORAGE CAPACITY(MT)**
1	TOTAL	2 Dasuki Av. Kakuri Kd/Kano Ind Est. Kaduna	30
2	UNIPETROL	Textile Road, Kaduna	62
3	ALMO	Km 11 Kachia Rd, Kaduna	339
4	KOBAG	Tsaunin Kura Off PPMC, Kaduna	100
5	WHANU	Western By-Pass Kudenda Ind, Kaduna	34
6	GALMA	Plot 3 Road C Mando Ind. Layout, Kaduna	60
7	MANFU	16, Lashka Road, Malali, Kaduna	50
8	REGAL OIL	New Refinery Rd, Refinery Layout, Kaduna	50
9	WORK & WORKSHOP	9 Nnmadi Azikiwe Way, Rimi Ind. Layout, Kaduna	52
10	BOLDLINK	Km 2 Suleja Minna Rd., Kwamba Village, Suleija	40
11	MOCHA	Km 15 Ganaja Lokoja, Kogi	20
12	SEA PETROLEUM	Plot 219 Cadastral Zone, Karu District, Abuja	40
13	MOVEN J	Plot 33/34 Kero Dist Jikuji Karu, Abuja	30
14	BEE DEE	Karmo Village, Idu Industrial Area, Abuja	45
15	A-Z PETROLEUM	Plot 361 Idi Ind. Layout, Idu Village, Abuja	116
	TOTAL		**1068**

KANO

	MARKETER'S NAME	**PLANT ADDRESS**	**STORAGE CAPACITY(MT)**
1	TOTAL	Kano Industrial Estate, Kano	28
2	AGIP	16/17 Kundila Road, Kano	110
3	UNITED GASES	Plot 13 Chalawa Ind. Area, Kano	25
4	UNIPETROL	Club Road, Kano	7
5	A.A. PETROLEUM	Km 6 Hadejia Road, Kano	110
6	A.T.A. NIG LTD		
7	FIRST VENTURES		
8	FUTURE GAS		
9	ULTIMATE GAS	Plot 83 Off Km 9 Hadejia Rd, Nassarawa, Kano	130
	TOTAL		**410**

GOMBE

	MARKETER'S NAME	PLANT ADDRESS	STORAGE CAPACITY(MT)
1	TOTAL	Geldam Road, Maiduguri	35
2	TOTAL	Bukuru, Behind Police Barracks, Jos	56
3	AGIP	Km 18 Zaria/Jos Road, Opp NNPC Jos	50
4	PIECES	Off Feruma Road, Maiduguri	70
5	SABR HOLDINGS	212 Anas St. Off Airport Road, Maiduguri	83
6	SKOM	Plot 6909 Bauchi Ring Road, Jos	30
	TOTAL		**324**

GUSAU

	MARKETER'S NAME	PLANT ADDRESS	STORAGE CAPACITY(MT)
1	UNIPETROL	Gusau Road, Sokoto	57
2	UNITED MARINA	Km 4 Sokoto-Birnin Kebbi Rd, Sokoto	20
	TOTAL		**77**

ILORIN

	MARKETER'S NAME	PLANT ADDRESS	STORAGE CAPACITY(MT)
1	TOTAL	Jebba Road, Ilorin	22
2	SUNIAD	Off Ilorin/Ajase Rd. Old Afon Rd, Ilorin	25
3	ADISA BAKARE NIG LTD	14 Adewole Estate, Ilorin	40
	TOTAL		**87**

PLATEAU

	MARKETER'S NAME	PLANT ADDRESS	STORAGE CAPACITY(MT)
1	NEVIC GAS LTD		57
2	LEO SKOM GAS		20
	TOTAL		**77**

KOGI

	MARKETER'S NAME	PLANT ADDRESS	STORAGE CAPACITY(MT)
1	MOCHA ENTERPRISES LTD		57
	TOTAL		**57**

NIGER

	MARKETER'S NAME	PLANT ADDRESS	STORAGE CAPACITY(MT)
1	MOI GROUP OF CO. LTD		57
	TOTAL		**57**

FCT

	MARKETER'S NAME	PLANT ADDRESS	STORAGE CAPACITY(MT)
1	A - Z PETROLEUM LTD		
2	ABUJA GAS MKT CO. LTD		
3	LINGO OIL & GAS CO. LTD		
	TOTAL		**0**

Annex 4

Communiqué on LP Gas Workshop

12th December, 2003

Press Release

COMMUNIQUE ON LP GAS WORKSHOP HELD AT ABUJA ON DECEMBER 11th 2003.

1. Over 40 stakeholders' representatives met at a one-day LP Gas Workshop in Abuja on 11th December 2003. The participants reviewed the LP Gas Study Findings and proposed a Roadmap. During Workshop, participants agreed with the critical problems and the issues presented and the need to take a number of immediate lines of action among which are:

2. The LP Gas industry players understood the urgent need for a single industry Association capable of gathering together the combined public and private resources of the industry, so as to deal with the issues and actions required.

3. During the "Open Forum" afternoon Plenary Session there were major contributions from the participants, these include such suggestions as:

- Debottlenecking the import facilities at Lagos ports by urgently dedicating an existing jetty to LP Gas or by constructing a new jetty dedicated specifically for LP Gas trade.
- Privatization of the Lagos and Calabar Butanization LP Gas Depots.

4. Participants at the Workshop were unanimous that the momentum on efforts to develop Nigeria's LP Gas industry should be kept going while recommending that the Federal Government meets with and listen to the practical solutions by industry stakeholders to confirm Government's support for the sector recovery.

5. The consensus of the Workshop was that Government must play an enabling role, officially supporting the Roadmap and it's objectives by a strong positive endorsement.

6. The International Finance Corporation (IFC), the private arm of the World Bank Group was also present and expressed its willingness to support socially and environmentally friendly projects which were financially and economically viable.

7. With respect to the Roadmap, it was agreed that the necessary steps to be taken should be organized into short-term, medium-term and long-term actions. The short-term actions that industry stakeholders look forward to include:

POLICY AND REGULATION RECOMMENDATIONS:

- The Government should consider as one of its highest priorities its commitment to encourage LP Gas market supply from domestic production.
- The Government will need to closely monitor the safety of the industry and of the consumer.

Fiscal Incentives

- Reduction or removal of LP Gas duties which were originally imposed to protect the domestic production. The fiscal contribution is insignificant whereas the effect on the LP Gas retail price to the consumer is huge.

Market Development

- The Government should consider as of high priority, the expansion of LP Gas trade and distribution in Nigeria. A strong private-sector driven marketing and distribution infrastructure would improve access to clean fuels whilst creating thousands of permanent jobs in the distribution, retail and maintenance areas.

8. A Steering Committee should be set up, involving industry and Government to implement the Report / Roadmap conclusions and recommendations.

Ends

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Insert roadmap matrix here.