Development of a Bulk LPG Import and Distribution Business in Puntland and Somaliland

TABLE OF CONTENTS

TABLES

CHARTS

Executive Summary

The 5-Year Development Plan 2014-18 of the Government of Puntland puts great emphasis on its determination to address the catastrophic environmental impact of widespread use of charcoal as a domestic fuel. It has set a target of 25% of households using LPG instead of charcoal within the plan period up to 2018.

Channoil sub-contracted a Nairobi based consultant having regional experience to lead the market survey work in Puntland and Somaliland, and a Garowe based consultant to conduct the field survey work and to organise Community Workshops key towns in Puntland and Somaliland. The sub-contractors worked under the direction of Channoil Consulting.

The survey focussed predominantly on households, recognised as the main target for making the switch from charcoal to LPG. 1,258 households were surveyed in Puntland, of which 83% were charcoal users. 968 households were surveyed in Somaliland, of which 85% were charcoal users. Kerosene hardly featured as a domestic fuel. The very extensive survey results have been logged and are available in electronic format.

Charcoal use is very extensive. It is sold in sacks/ packages having an average content of 36 KG. Prices vary widely and in Bosaso average 40$ per sack. LPG is imported into both regions both in cylinders and ISO Containers for filling cylinders in-country. Existing LPG prices are high and range across Puntland from 2-7 $/Kg. Usage is therefore confined to high income families and prepared food outlets.

The main barriers to growing the LPG market have been identified as:

- High cost of LPG refills
- Unreliability of supply
- Low public awareness of benefits of using LPG and fears concerning safety in the home

The high levels of household expenditure on charcoal and the current relative prices of charcoal and LPG suggest that if LPG could be imported at lower costs and were to be priced competitively with charcoal in energy equivalent terms, the potential to switch from charcoal to LPG is massive.

Historical LPG demand data is unreliable and does not lend itself to form a basis for estimating future demand. We estimate current annual demand as 400 tonnes per annum but believe this figure is conservative.

Our demand forecasts for Puntland are therefore based on there being an upward step-change in demand driven by Government policies and support designed to remove the main barriers to growth. We have developed three LPG demand scenarios based on different assumed levels of Government intervention and support. Our Base case assumes achieving a market demand of 10,000 tonnes per annum by year 3 of the new programme and 10% per annum growth thereafter.

LPG demand growth will be assured through:

- Reduced import costs arising from investment in a bulk import terminal and more competitive pricing
- Introduction of smaller cylinders and financial support to cover up-front costs of cylinders and burners
- No taxes on LPG or equipment allied if necessary to appropriate taxation of charcoal
- Improving public awareness of the benefits of LPG and allying concerns with regard to domestic use

1. Introduction

The first phase of this assignment has required us to undertake a market study with the objectives of:

- Reporting on the present supply and distribution channels for LPG into Puntland and Somaliland.
- Developing an understanding of current users, supply economics and market pricing.
- Identifying the opportunity for expanding the LPG market to reduce consumption of wood/ charcoal, to reduce the impact of deforestation on the environment, and to displace the use of kerosene, a fuel that, along with wood/ charcoal can present health hazards.
- Assessing market pricing strategies and their impact on future demand expectations.
- Gaining an understanding of the attitudes of the key energy market participants and other stakeholders to the prospect of a significant expansion of the LPG market.

Petroleum Focus Consultants (PFC)[1] of Nairobi were engaged as sub-consultants to lead the market survey work in Puntland and Somaliland. They designed the questionnaires targeted at different sectors of the market, which were used by Sahan Group (SG)[2] of Garowe, Puntland, a second sub-contractor, engaged to conduct the field survey work. SG also organised the Community workshops conducted in key towns, 3 in Puntland and 2 in Somaliland. The sub-contractors worked under the direction of Channoil Consulting.

The findings of this market analysis will be used:

- To develop forward demand estimates
- For designing and costing a bulk import terminal and an allied LPG bulk supply/ bottle filling plant
- For conducting a financial evaluation of the proposed investment

[1]PFC are highly qualified and experienced in LPG market study assignments in the region, having good knowledge of the Kenyan market, which in some respects could provide model solutions for Puntland/ Somaliland, and including market survey works and results analysis.

[2]Sahan Group is a highly qualified and experienced local consultancy having the experience and resources to conduct the field survey work.

The approach and methodology followed and the detailed analysis underlying the charts and other data provided herein are set out in a Supplementary Report, which may be viewed along with survey results in the Market Survey Puntland and Somaliland Dropbox Folder (access information to be advised).

2. Situational Review for LPG in Puntland

2.1 Overview

The consultants conducting this study have carried out a documentation review to gather information of a general socio-economic nature and, where available, that relating to LPG. Outside the UNDP sponsored studies of 2007[3] and 2010[4], overall, information is quite limited but we have been able to refer to the recently published Second Puntland Five Year Development Plan (2014-2018), which has proved to be useful reference for the current situation and future plans.

2.2 The Second Puntland Five-Year Development Plan 2014-2018 (PFYDP-2)

This document represents the most comprehensive and up to date source of socio-economic planning information for various sectors, including energy.

Throughout the plan there is an expression of urgency to address the environmental challenge caused by over-reliance on biomass for both domestic and institutional fuels and it emphasises the need to support increased use of alternative energy sources (LPG and kerosene) to redress and reverse environmental degradation. The plan commits preparedness by the State to participate in PPP projects and other fiscal measures to promote the use of these alternative energy sources.

The following summarises the areas of PFYDP-2 relevant to this study.

[3]Prepared for UNDP Somalia by ESD Africa 10th July 2007

[4]Reference not available

- **Economic Performance**

Table 1 below is a projection of GDPs, which indicates a 5.0% growth rate through the PFYDP-2 period. Per capita GDP projections are based on a population of 3.9 million. The GDP composition has a very high household expenditure component that dwarfs investments and government spending. The key revenue generators are livestock and agriculture exports, plus inflows from Diaspora remittances.

Remittances from the Diaspora contribute significantly to household incomes and provide substantial funding for small businesses and basic service provision. It is estimated that 1-5% of rural households receive remittances, while this figure could be as high as 20% in some towns.

TABLE 1: PFYDP-2 ECONOMIC GROWTH PROJECTIONS

	GDP (US$)	Per Capita GDP (US$)
2014	2,027,938,434	519.98
2015	2,129,335,355	545.98
2016	2,235,802,123	573.28
2017	2,347,592,229	601.95
2018	2,464,971,841	632.04

- **Financial Performance**

According to the PFYDP-2, tax collections are low, resulting in budget deficits and limited capacity by the state to finance development projects. Raising development funds from multilateral agencies is mostly restricted by Puntland state status within the federal government.

Financial resources that the government manages are very limited and cover only the recurrent budget, while the allocation for development is very insignificant due to lack of direct budgetary support from the international community to the Puntland Annual Budget.

- **Environmental Dilemma**

The PFYDP-2 confirms that charcoal production is the main environmental challenge currently confronting Puntland. Burning of rangelands and forests are a major cause of deforestation and environmental degradation. More than 97% of families rely on charcoal as a source of energy for cooking. Charcoal demand is very high and prices are rising.

The PFYDP-2 plan calls for increased environmental public awareness, while at the same time undertaking a program to introduce alternative sources of energy to replace charcoal.

- **Energy Plans**

Charcoal and firewood are mostly used for household and institutional heating in both urban and rural areas. Petroleum products are the second in terms of total energy use, while electricity (generated from diesel) ranks third in the total energy use. The PFYDP-2 specifically addresses energy and LPG as follows:-

- To address the environmental challenge related to deforestation, the plan specifically proposes promotion of alternative energy (LPG, kerosene, solar and wind energy).
- The PFYDP-2 specifically proposes lowering of taxes on LPG to promote conversion away from biomass. The plan also assumes participation of Puntland State in PPP LPG projects.
- The plan also commits government participation in raising public awareness on the adverse impacts of increased charcoal use.
- The PFYDP-2 has specifically targeted a 25% penetration of LPG in households within the development plan period (2014-18).
- The PFYDP-2 allocates US$17,750,000 for the alternative energy (LPG and Kerosene) programs and projects over the plan period 2014-2018.

Table 2 below is an Evaluation and Monitoring matrix detailed in the PFYDP-2 to specifically address performance in the promotion of LPG (and kerosene) over the plan period.

TABLE 2: EVALUATION & MONITORING PLAN FOR LPG (AND KEROSENE)

Evaluation & Monitoring Matrix (Alternative Energy)						
LPG & Kerosene	**Expected outcome**	**Indicator**	**Baseline**	**Targets**	**Means of Verification**	**Assumptions**
	Public and private sector partnership improved	25% of households using LPG for cooking	Limited number of households now use LPG for domestic cooking in major cities and towns	Affordable and easily available LPG and kerosene	Conduct yearly survey on the percentage increase or decrease of LPG and kerosene use in Puntland	Taxes on LPG are lowered. Public awareness of consequences of charcoal use is increased.

The above table reflects what is in the Government's Development Plan and makes reference to kerosene. The market survey work shows that kerosene is hardly used and it is well understood that its use is not to be encouraged because of health and safety reasons. However, the focus of this study is on LPG and developing the supply infrastructure and market so as to bring about a sea-change away from the use of charcoal.

Achievement of the 25% LPG market penetration target, a worthy and feasible one, is very much in the hands of the Government. This issue and the project feasibility from a financial perspective are covered in a subsequent report entitled 'Financial Evaluation & Market Development'.

2.2 Regulatory and Institutional Framework for Energy

As a sector, energy is neither sufficiently organized nor regulated. It was recently announced that the Puntland State Agency for Water, Energy & Natural Resources (PSAWEN) shall have inter alia the principal responsibility for energy affairs. The following ministries and agencies are expected to be actively involved in the promotion of LPG usage and trade:-

- Ministry of Environment
  - » Lead Initiator of project
- Ministry of Maritime Transport, Ports and Counter Piracy
  - » Provide support for development of LPG import facilities in Bosaso
- Ministry of Finance
  - » Define fiscal incentives for LPG investments and trade
  - » Define PPP financing structure
- Ministry of Commerce and Industry
  - » Promote and license LPG distribution and retail trade

To the best of our knowledge, there are currently no plans to formulate new laws to regulate energy trade, Health Safety and Environmental standards, and licensing, generally or specifically LPG.

3. Market Survey/ Community Workshops

In less developed countries such as Somalia, market demand will be largely driven by availability and affordability, in both cases relative to alternative energy sources such as wood, charcoal and kerosene.

A market survey was commissioned based on questionnaires designed by Petroleum Focus Consultants (PFC), Nairobi, an associated consulting company of Channoil Consulting and having extensive regional experience of conducting LPG market studies. The on the ground market survey work was undertaken by Sahan Group Company (SGC), based in Garowe, Puntland.

Although a more advanced form of questionnaires was developed, in SGC's opinion based on their

understanding of the local environment and social structures, to encourage openness by the respondents the simpler and shorter questionnaires were used. These are attached as Appendix 1 for ease of reference.

The overall aim was to target urban users of charcoal, i.e. non-users of LPG, to establish the economics of their use of charcoal and to determine their objections to switching to LPG.

In addition, Community Workshops were conducted by SGC in key towns, the results of which are set out in Appendices 2 (Puntland) and 3 (Somaliland) attached.

In our view, SGC met the essence and objectives of the market review by the combination of survey questionnaires and the Community Workshops.

The initial intention was to target the questionnaires at the three main categories of respondent as described in our First Report dated 26 May 2014[5].

However, in practice in the field this proved impracticable and interviewees were re-categorised into simpler groupings[6].

[5] *Category 1*

Captive high income salaried and business people residing mostly in urban areas who will purchase LPG (for cooking) as long it is available. These customers are likely to be already using LPG for cooking and electricity for lighting.

Institutions such as hotels, hospitals, universities, schools, military bases and light industries

Biomass (wood/ charcoal) are likely to be used only for emergencies.

As the economy grows, particularly in the cities and main towns, and as LPG availability improves and costs generally reduce, demand will increase substantially.

This category may not necessarily require government subsidies to grow demand.

Category 2

Middle/ lower income persons (rural and semi-urban) with regular incomes, who are already using charcoal and kerosene.

With good availability and competitive pricing, demand from this category of customers could grow substantially, particularly if usage is promoted through subsidies.

Category 3

Low/ subsistence income levels (mostly in rural areas), for whom LPG will remain mostly inaccessible unless heavily subsidised.

The following table summarises the questionnaire responses obtained from the households surveyed in each of the towns:

TABLE 3: SUMMARY OF HOUSEHOLD FUEL SURVEY - PUNTLAND

PUNT-LAND	# OF HOUSEHOLDS						TOTAL # OF HOUSE HOLDS
CITY	CHAR-COAL	LPG	ELEC-TRICITY	KERO-SENE	FIRE-WOOD	OTHER	
Badhan	205	17	188	2	24	16	222
Bocamo	150	0	143	3	18	7	150
Bosaso	188	41	165	3	23	20	229
Buhodle	175	11	161	1	20	11	186
Galkayo	272	11	203	1	77	68	283
Garowe	261	11	231	2	42	29	272
Overall	1251	91	1091	12	204	151	1342
% of HH	83%	7%	85%	1%	16%	12%	

TABLE 4: SUMMARY OF HOUSEHOLD FUEL SURVEY – SOMALILAND

SOMALI LAND	# OF HOUSEHOLDS						TOTAL # OF HOUSE HOLDS
CITY	CHAR-COAL	LPG	ELEC-TRICITY	KERO-SENE	FIRE-WOOD	OTHER	
Berbera	140	16	137	3	16	7	156
Borama	145		138		12	7	145
Burao	169	5	161	2	19	11	174
Erigavo	155	15	143	2	17	12	170
Hargeisa	356	31	329	8	65	30	387
Overall	965	67	908	15	125	67	1032
% of HH	85%	7%	94%	2%	13%	7%	

N.B. Community Workshops were conducted at those towns coloured in red.

Data collection was performed through face to face interviews with respondents during which the enumerators entered responses directly into the survey questionnaires.

[6] *Category 1 Charcoal Consumers - All Towns*

Category 2 LPG Domestic Consumers - Where Applicable

Category 3 Institutional and Commercial Consumers - Where Applicable

The data for both regions shows that the objective of focussing our survey work on households in which charcoal is the most predominant fuel for cooking was achieved. Sahan Group, who we sub-contracted to conduct the market survey work, were successful in covering the target potential market of households currently using charcoal. It is this section of the community that have the financial capability, subject to the right conditions in terms of availability and pricing, to switch from charcoal to LPG. The issues and proposed resolutions are covered in our later report, 'Financial Evaluation & Market Development'.

Sampled households represented 0.09% and 0.06% respectively of the total populations of the towns in Puntland and Somaliland. In both cases a very large proportion of households use electricity for lighting, firewood is the main alternative for charcoal and that kerosene is an insignificant source of energy.

4. Results of Market Survey and Key Findings

4.1 LPG Survey and Recording of Results

The market survey was designed to capture information from urban households having a higher potential to convert from charcoal to LPG usage as compared with rural households. Since the market survey provided a snapshot assessment at the time, time-based trend analysis is not practicable.

The results have been logged on Excel spreadsheets to ease review and analysis. Given the very large volume of data, results/ survey sheet summaries have been made available electronically.

4.2 Existing Market and Structure - Puntland and Somaliland

4.2.1 Charcoal and LPG Consumers[7]

The following is a summarized account of the general findings from the market survey:

a. The predominant fuel is charcoal. It is sold mainly in 50 kg sacks/ packages. The price varies from location to location. The average cost in Bosaso is around US $40 per sack.

b. The most commonly used charcoal stove is called a 'Birjico'.

c. LPG use has the highest concentration in Bosaso, the main import centre.

d. Kerosene does not feature prominently as an alternative household fuel.

e. Electricity is the most widespread source of lighting across all household income groups, pointing to a high level of domestic electricity connectivity.

f. The average size of urban households ranges from 3 to 8 persons, while incomes range from US$50 to US$2,500 per month.

g. LPG cylinder sizes vary from distributor to distributor and include 11 kg, 12 kg, 13 kg, 15 kg, 20 kg, 40 kg, and 50 kg. There is a wide disparity between the initial costs of LPG cylinders, even of the same size.

h. Prices for stoves and cookers vary, averaging US$45 for two-burner, over US$100 for a gas cooker.

i. Refill costs vary widely, from US$2.0/kg (in Bosaso) to as high as US$7.0/kg in other towns (Note: The July 2014 refill price in Nairobi is US$2.5 per kg).

j. Nearly all the non-domestic LPG consumer respondents were in the catering sector (cafeteria, restaurants, and hotels).

k. The main factors quoted as discouraging LPG use include;

- High initial costs (cylinder and stove)
- High cylinder refill prices
- Limited distribution network and availability

[7] *The survey focussed on domestic users, the target for LPG market expansion. Existing non-domestic LPG users (cafeterias, hotels, food outlets and others) already know the advantages of using LPG. Consumers of LPG, both domestic and non-domestic, are eager to support measures to reduce LPG supply costs/ prices.*

In practice the sacks are recycled from commodities previously imported. The actual weight of charcoal is reportedly 'variable' but it is understood that we should assume an average weight of charcoal of 36 Kg.

- Perception of LPG as unsafe.

4.2.2 LPG Importers – Puntland

The following information was obtained from importers/distributors surveys.

1. Imports are currently land at Bosaso and sourced from several countries, including the UAE and Yemen.
2. Product is imported in cylinders and ISO[9] Containers. Importing in ISO Containers implies that that there is cylinder filling taking place at Bosaso.
3. Importation and distribution functions are integrated.
4. Import landed costs from three importers is summarized in the Table 5 below.

TABLE 5: LGP IMPORT COST BUILD-UP - PUNTLAND

	SAHAL GAS	MUMTAZ GAS	PUNT GAS
SOURCE OF IMPORT	UAE	YEMEN	UAE
LOAD PORT	SHARJAH		
IMPORT ORIENTATION	ISO CONTAINERS	CYLINDERS	ISO CONTAINERS
FREE ON BOARD – SOURCE NOT PROVIDED	980.00 – 1,350.00	1,250.00	
FREIGHT	1,600	500.00	3,500.00
PREMIUM	0.00	0.00	0.00
COST AND FREIGHT (C N F) (USD/ MTON).	2,580.00 – 2,950.00	1,750.00	
MARINE INSURANCE (1.003*CNF*0.0770%)	100.00	0.00	0.00
WAR RISK INSURANCE (1.003*CNF*0.0275%)	0.00	0.00	0.00
COST INSURANCE AND FREIGHT (CIF)	2,680.00 – 3,050.00	1,750.00	
PORT CHARGES	100.00	100.00	140.00
CIFLW – COST INSURANCE FREIGHT LANDED WHARFAGE	2,780.00 – 3,150.00	1,850.00	
TAXES – ASSUMPTION 1 MONTH STORAGE	100.00	11.00	120.00
WAREHOUSING – ASSUMPTION 2 MONTHS STORAGE	700.00	600.00	140.00
TOTAL PRODUCT COST – US$/MT	3,580.00 – 3,950.00	2,461.00	
UNIT PRODUCT COST	3.58 – 3.95	2.46	

N.B. Where gaps exist in the table, information was withheld by respondents for 'confidentiality' reasons.

[9] ISO - International Standards Organisation

4.2.3 LPG Importers – Somaliland

It was not possible to obtain information to the same level of detail for Somaliland as for Puntland. However, we understand that the same sources and modes of delivery are employed so the costs for Somaliland will be very similar to those for Puntland.

In addition, in support of this study the ADESO Project Director, Abdi Mohamed Dahir and Fatima Jibrell (founder and a Senior Adviser to Adeso) have obtained the following information from Somgas Company, the main LPG distributor in Somaliland, concerning their business operation.

TABLE 6: SOMGAS COMPANY - SOMALILAND

Question	Response
Company established	January 2009
Shareholders	60
Corporate structure	Conventional Board of Directors headed by Chairman
Number of staff	40
LPG companies operating	2
Prior to start-up: • Feasibility Study • Business Plan • Development Plan for Establishing PPP to scale-up LPG Gas	Positive response to all with reference to UNDP study in 2007
Shore terminal in Berbera	Shore tanks and tanker discharge line
Storage capacity Berbera	1,000 tonnes
LPG distribution centres	24
Distribution mode	Trucks – by road
Number of depots	2
LPG Sources	Yemen, UAE, Saudi Arabia
Supply chain summary	Tanker, ISO Container, shore terminal, filling stations, distribution points, customer
Retail or wholesale	Both
Cylinder sizes	2Kg, 4Kg, 11Kg and 22Kg
Categories of customer	Higher/ middle income households, commercial e.g. restaurants, factories, other industries, public institutions e.g. hospitals, schools
Urban versus rural	Mainly urban
Government subsidy	Not direct, but tax exemption granted
Estimated % of households using LPG	2%
Percentage profit in LPG business	Break-even

4.2.4 Community Workshops

Community Workshops were conducted as follows:

Puntland:

Bosaso, Garowe and Galkayo

Somaliland:

Berbera and Hargeisa

The responses are summarized in Appendices 2 and 3 respectively.

The key outputs from the workshops are:-

Consumers & Other Interests

- LPG price fluctuations are a concern.
- Complaints of inaccurate and unreliable weight of filled cylinders.
- Both household and non-domestic consumers are eager to support measures to reduce their expenditure on LPG.
- Perception of LPG as unsafe fuel is a key deterrent to acceptance of LPG.
- Increasing cost of charcoal while LPG prices are unacceptable is unfair.
- Expect pushback on LPG promotion from NGOs and local companies dealing in alternative energy (wind, solar, electricity).
- Small time LPG traders welcome increased revenues from increased LPG sales.
- The cost of LPG needs to decrease.
- The initial cost to purchase cylinders and burners is high.
- Make arrangements for instalment payments for cylinders and burners.
- Charcoal business interests are fearful of losing their business.

Business Community/PPP

- Local LPG importers are ready to work with international and local participants to develop LPG business.
- Potential PPP participants include local and Middle East investors.
- Unstable supply and source of LPG are a challenge (imports from more than one country)
- Reign in unregulated LPG supply and trade (creates unfair competition)
- LPG importer says that a 1 or 2 Dollar per kg subsidy will not make much change. It is the 'initial cost' that needs to be addressed.
- The government needs to view LPG companies as partners and provide government incentives. Reduce financial levies on LPG companies.
- Reduce tax and even subsidise LPG imports.
- Introduce special trucks for LPG cylinders distribution, and not combine with other goods. This will provide safety assurance.
- Open PPP shareholding to the public.
- Separate the importers and distributors roles to create a wider distribution network.
- Large Somali companies want to participate in PPP to diversify business.
- There is lack of proper infrastructure in place.
- What role will the current distributors play (partners or competitors)?
- LPG distributors in Puntland are open to a formation of new PPP provided their businesses are not adversely affected.
- Potential PPP participants include large trading companies and financially adequate individuals.
- Government needs to view LPG businesses as partners, and should provide incentives and reduce levies.
- Provide subsidies on LPG imports.

Government [10]

- Supports LPG but is not sure how to go about growing demand.
- Has increased tax on charcoal while LPG remains expensive. This has increased household expenditure on fuels.

Public Communication Needs

- Emphasize environmental harm of using charcoal/firewood.
- Emphasize good points about LPG.
- Educate on how to safely use LPG.
- Use the available media channels to advertise LPG. These include radio and Somali satellite channels.
- Target both the Husband and wife in the household to give assurances on family safety against LPG hazards.

4.2.5 Charcoal and LPG Consumers

An understanding of charcoal and LPG consumers and their choices with regard to energy sources is crucial to the development of the feasibility study.

The distribution of charcoal consumers across the main income groups is shown in the following charts 1 and 2, which demonstrate that the main targets for LPG usage development are low income urban households:

CHART 1: HOUSEHOLD MONTHLY INCOME – CHARCOAL CONSUMERS PUNTLAND

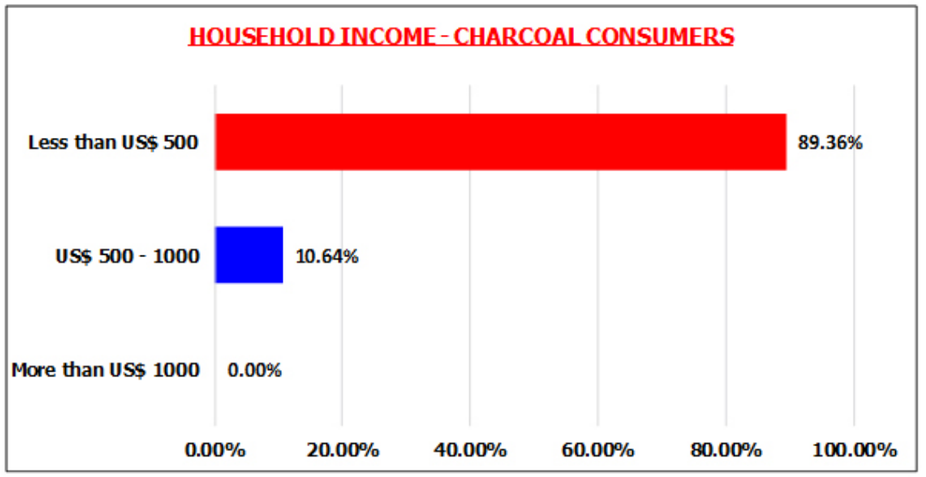
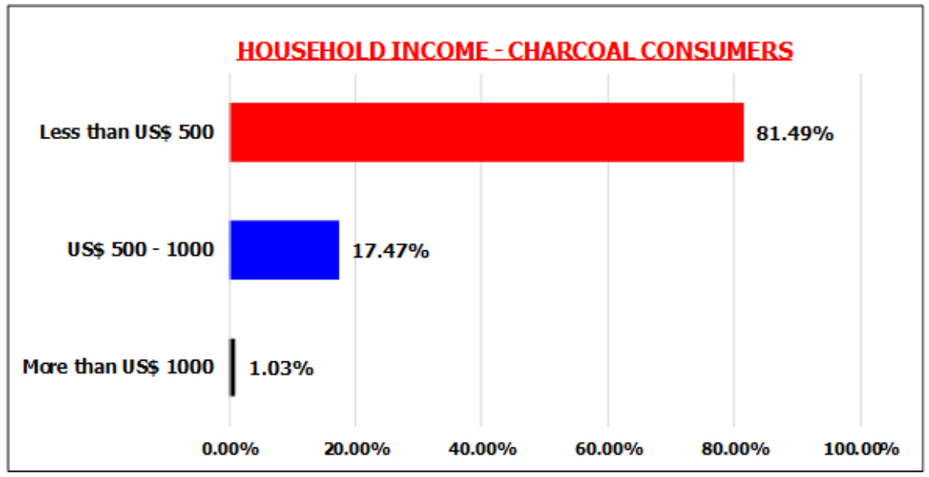


CHART 2: HOUSEHOLD MONTHLY INCOME – CHARCOAL CONSUMERS SOMALILAND



[10] *Puntland Government has recently decided to make LPG imports free of taxes/ duties. Same situation applies in Somaliland.*

Sources of household incomes were not surveyed but it is understood that small-time trading and remittances from relatives and friends abroad provide important income streams to households.

Out of 1,251 households surveyed in Puntland and 965 households surveyed in Somaliland, use of charcoal in households categorised as 'High Income' is negligible and constituted about 1% and 0% respectively.

The survey results revealed that between 83% and 88% of the households in Puntland and Somaliland fall within a monthly income bracket of US $222 and US $447, i.e. 'Low Income'. Overall, estimated average monthly income levels in Puntland and Somaliland fell between US $303 and US $289.

Household monthly spend for charcoal and LPG are shown in the following charts 4 to 6.

Charts 4 and 6 relate to existing household users of LPG and represent those households that can afford to pay for the convenience of using LPG at existing (high) supply costs and prices.

gThe variations in spend for each energy source occur mainly due to market and economic factors. The information provides interesting back- ground to the development of the LPG market but the data is not germane to market development as such. The patterns of expenditure in the main towns across the two regions for charcoal and LPG are not too dissimilar.

CHART 3: AVERAGE MONTHLY HOUSEHOLD SPEND ON CHARCOAL PUNTLAND

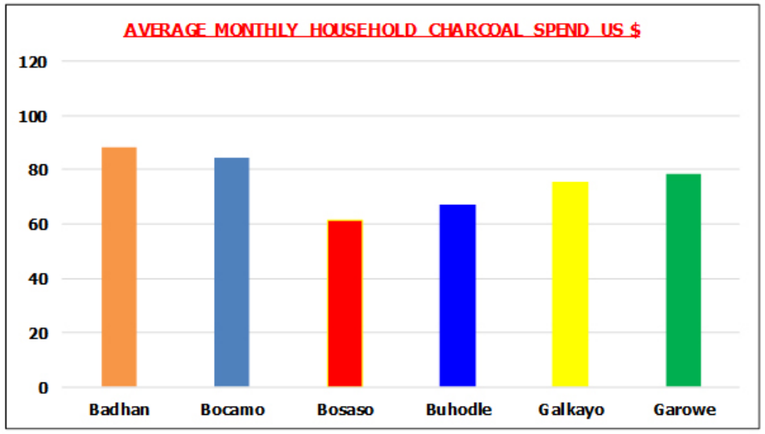
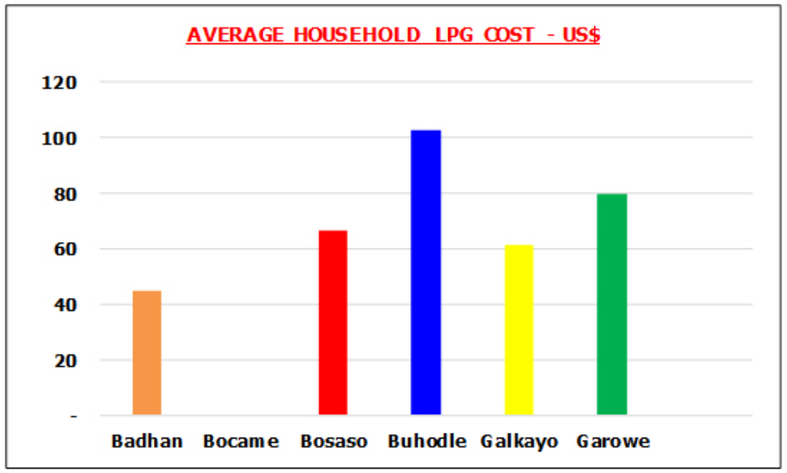


CHART 4: AVERAGE MONTHLY SPEND ON LPG PUNTLAND



With regard to Charts 3 and 4:

- The use of charcoal and firewood, based on household surveys, is linked to poverty and perceived under-development, not directly to the gender of household head, the size of household or cultural preferences.
- Low income households purchased charcoal in small quantities (single bags/ sacks) reflecting, in part, unpredictable income flows. The remaining users, with more stable income, purchased the fuel in larger quantities (two bags/ sacks plus per purchase).
- There were no significant variations observed in the relative use of firewood and charcoal between Puntland and Somaliland.
  - » In terms of relative contributions of different fuels used, the lion's share of household fuels consumption (76%) was met by charcoal and firewood (15%) in Puntland.
  - » In Somaliland the contributions were charcoal (80%) and firewood (12%).
- Households estimated to have consumed an average of 99 Kg (2.75 bags/ sacks for Puntland and 88 Kg (2.44 bags/ sacks) for Somaliland respectively.
  - » The daily per capita consumption of biomass in Puntland and Somaliland amounted to 3.3 Kilograms and 2.9 Kilograms per day per household.
  - » Household biomass consumption per inhabitant per day was estimated at 0.47 Kg in Puntland and 0.42 Kg in Somaliland.

CHART 5: AVERAGE MONTHLY HOUSEHOLD SPEND ON CHARCOAL SOMALILAND

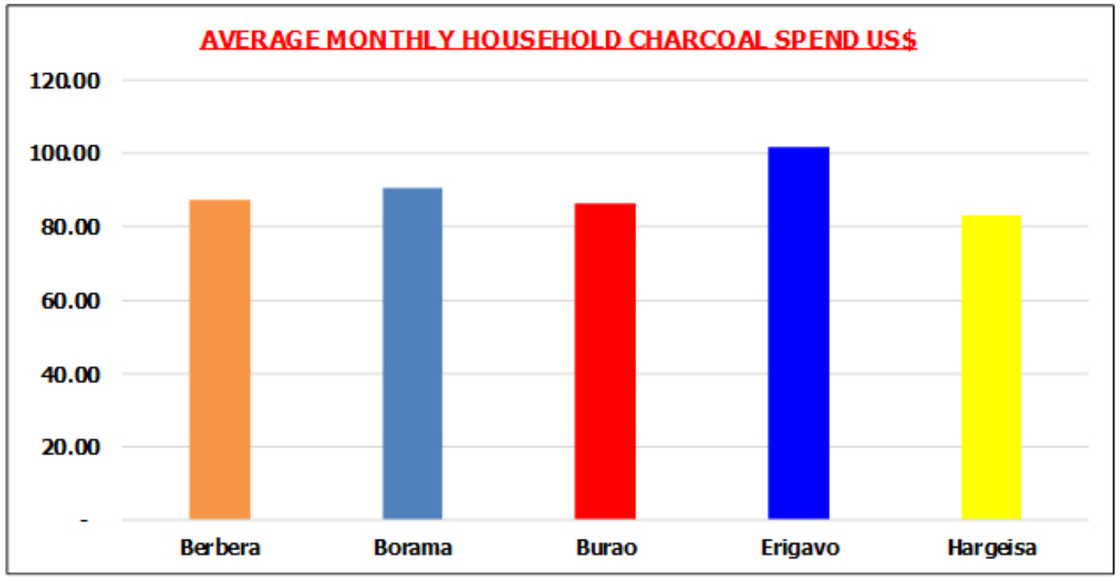
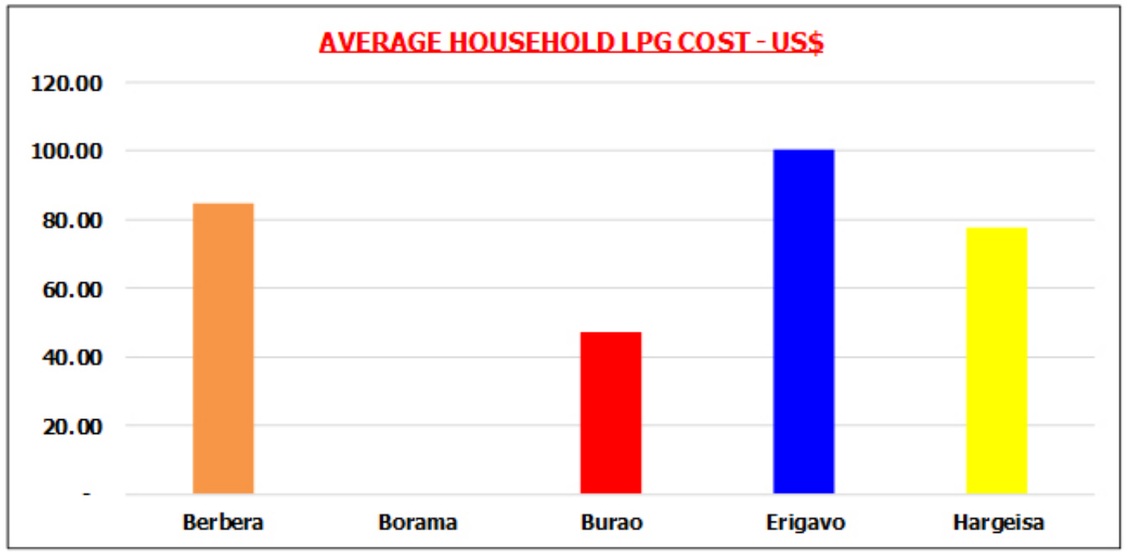


CHART 6: AVERAGE MONTHLY SPEND ON LPG SOMALILAND



Total monthly household fuel costs for the sampled households by town are shown in the following charts 7 and 8. There are effectively two markets in each town, one for charcoal and one for LPG, each driven by its own market dynamics/ economics. Some households that use LPG as the main fuel will resort to using charcoal as a back-up but they are very few and far between.

The charts themselves suggest that there is no correlation between charcoal and LPG expenditures in any particular town or across the market among towns.

CHART 7: MONTHLY FUELS SPEND SAMPLED HOUSEHOLDS PUNTLAND

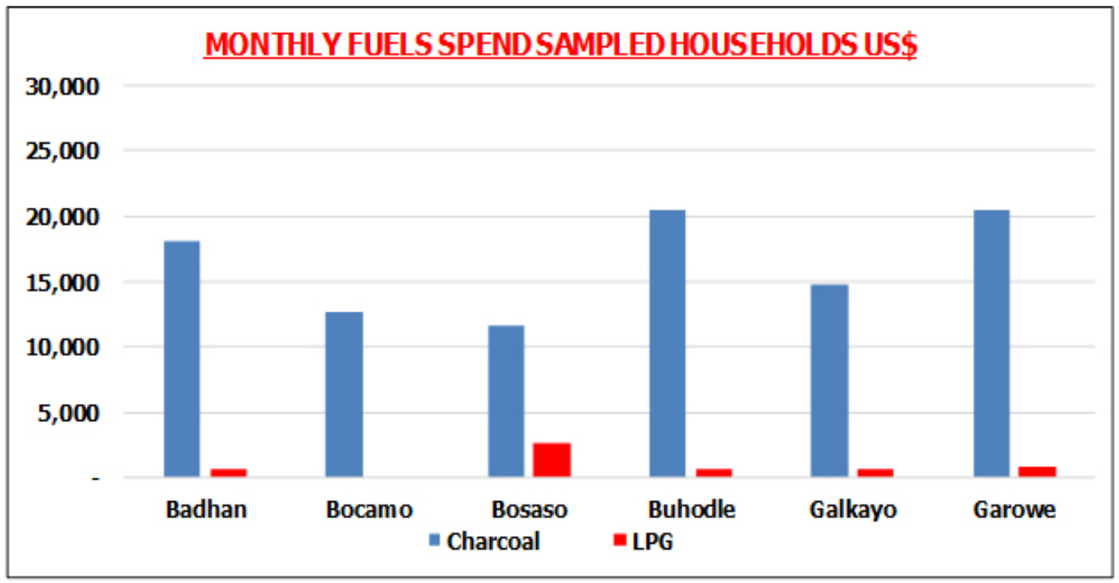
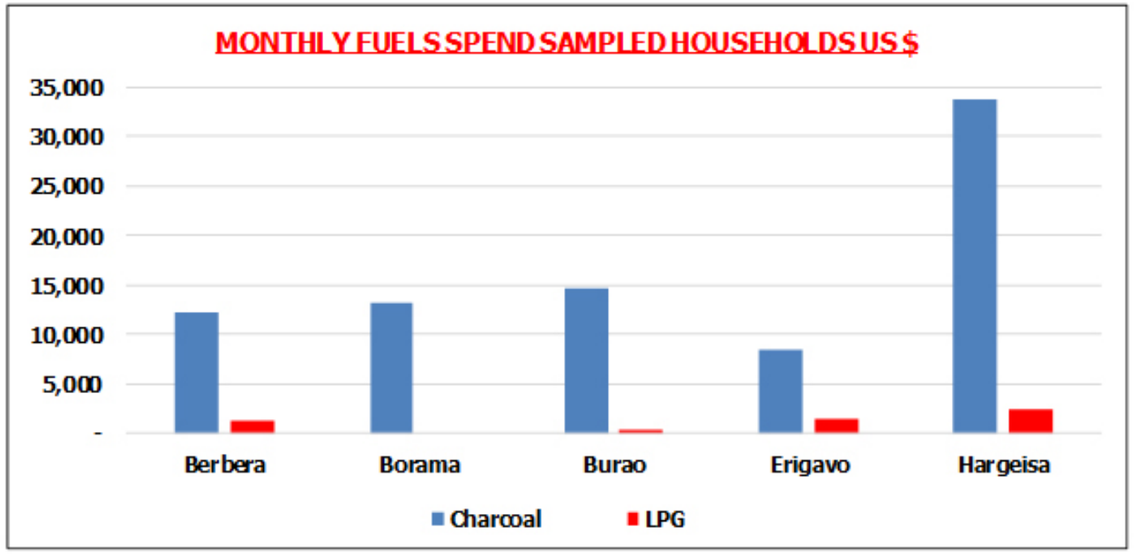


CHART 8: MONTHLY FUELS SPEND SAMPLED HOUSEHOLDS SOMALILAND

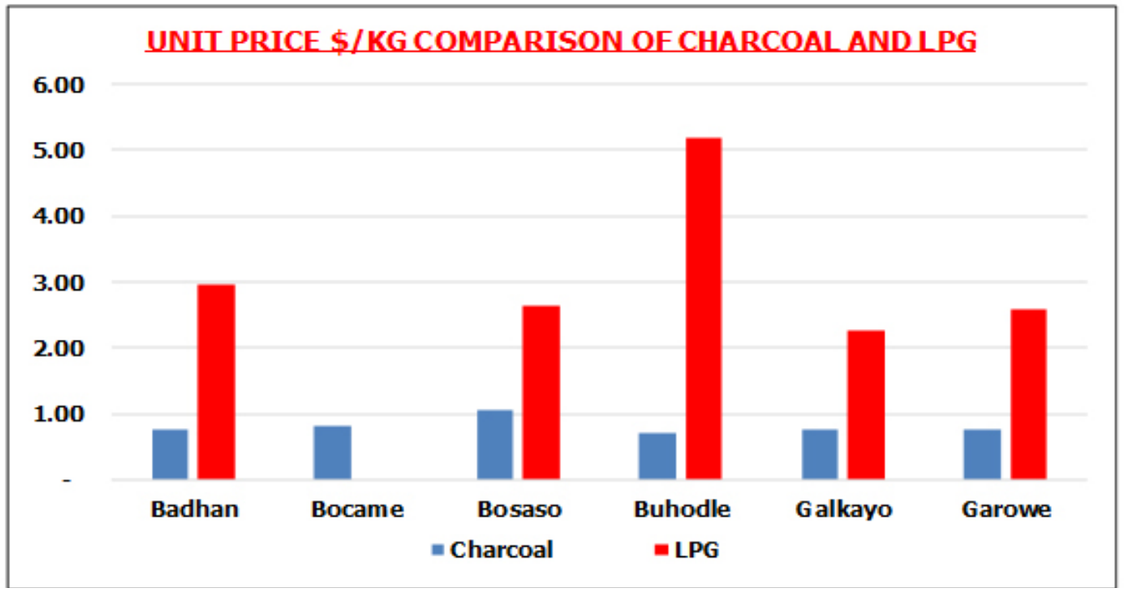


The levels of expenditure on charcoal in particular suggest that the potential to switch to LPG is high.

4.2.6 Relative Costs of Charcoal and LPG

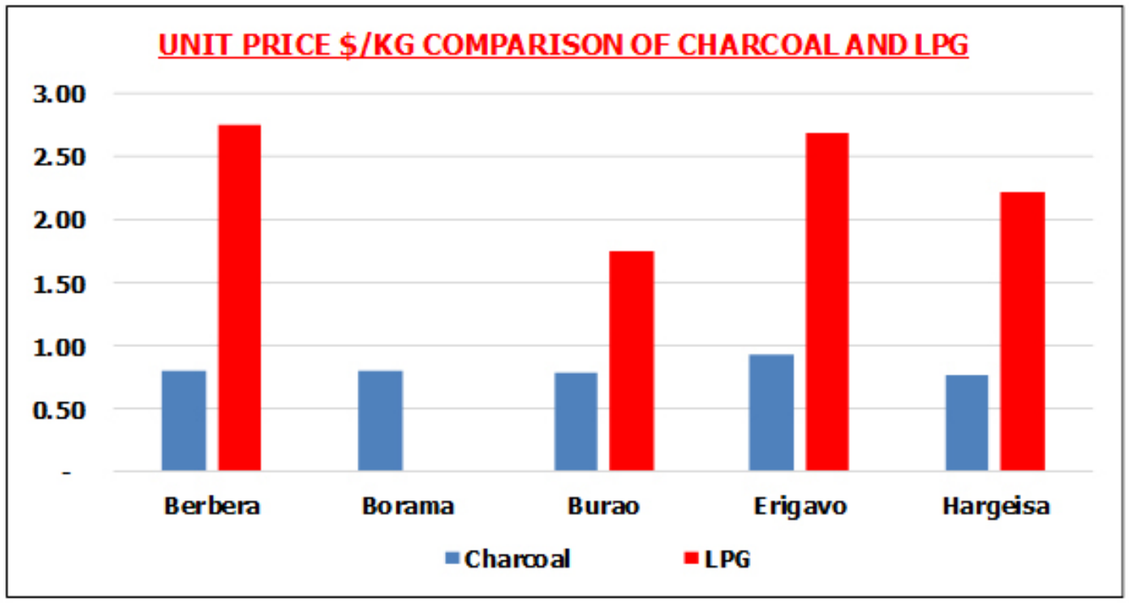
The average prices of charcoal and LPG are as shown in the following charts. The market survey was a one-off exercises and in the absence of comparable historical data from similar household surveys of Living Standards Measurement Surveys no regression or related analyses could be performed.

CHART 9: UNIT PRICES OF CHARCOAL AND LPG PUNTLAND



It is interesting to note that the unit cost of charcoal is higher in Bosaso than the other towns, whereas the unit cost of LPG is lower in Bosaso than other towns. In both regions we would put this down to differences in supply logistics costs and the relative spending power of households.

CHART 10: UNIT PRICES OF CHARCOAL AND LPG SOMALILAND



- A household is said to be in fuel poverty if it needs to spend more than 10% of its income on cooking and lighting fuels.
- Charcoal and LPG prices were only collected in sample towns.
- The results focus on units prices of charcoal and LPG:
  - » The mean unit cost for charcoal is US $0.81 per Kg compared to US $3.13 per Kg for LPG in Puntland.
  - » The mean unit cost for charcoal is US $0.82 per Kg compared to US $2.35 per Kg for LPG in Somaliland.
  - » Charcoal prices fluctuated between US $0.77 – 0.93per Kg in Somaliland and US $0.72 – 1.06 per Kg in Puntland, a fairly stable trend during the survey period.
  - » In particular, the unit price of charcoal peaked at US $1.06 per sack/ bag in the port city of Bosaso.
  - » LPG prices ranged from US $2.27 – 5.17 per Kg in Puntland and US $1.75 – 2.75 per Kg in Somaliland.
  - » The unit price of LPG reached the peak of US $5.17 per Kg in Buhodle, Puntland – the major factor that contributes to higher unit LPG prices is scarcity due to irregular imports.
- There were no households using LPG in Borama, Puntland and Bocamo, Puntland
- Household fuels price comparisons in June 2014 show that:
  - » LPG was about 3 times more expensive than charcoal in Somaliland.
  - » LPG was about 4 times more expensive than charcoal in Puntland and seven times more expensive in the town of Buhodle.

4.2.7 Factors Hindering LPG Market Development

From the above survey and workshop feedback, the following factors can be identified as hindering LPG demand growth. Also shown are processes that would unlock LPG demands.

- **High Cost of LPG refills**

These results from high supply chain costs associated with LPG imports in cylinders and ISO Containers, and impacts on LPG affordability for poorer households. Solutions would be:

- » Reduce LPG procurement unit cost by introducing bulk importation.
- » Introduce and promote smaller size LPG cylinders.
- » Increased market competition among importers and distributors.
- » Government fiscal Interventions to waive import taxes on LPG product, cylinders and appliances.
- » Reduce incentives to use charcoal (tax charcoal, environmental control legislation rules that make charcoal less available).

- **Unreliability of LPG availability**

This is as a result of low stocks of LPG due to slow turnaround of cylinders which are used both for imports, distribution and consumer locations. This issue can be addressed as follows:

- » Increase supply of LPG in Puntland through bulk imports.
- » Sufficient storage and cylinder filling capacity at Bosaso and possibly other key towns to improve cylinder turnaround.
- » Increase LPG distribution network and efficiency.

- **Insufficient public awareness on LPG use**

Entrenched use of charcoal and limited knowledge about benefits of LPG use limits LPG market penetration. Many respondents cited lack of awareness as a barrier to switching from charcoal to LPG. Our understanding is that this relates to all aspects of LPG use; simply the practicality of LPG as an alternative to charcoal, environmental and health benefits, safety issues in the domestic environment. These matters can be addressed through a public awareness/ education campaign jointly undertaken by government and business.

4.2.8 Barriers to LPG Use

The questionnaire responses indicate that in the minds of the interviewees the most overwhelming barrier to LPG use is the initial cost of the cylinder, see charts below:

CHART 11: BARRIERS TO SWITCHING FROM CHARCOAL TO LPG PUNTLAND

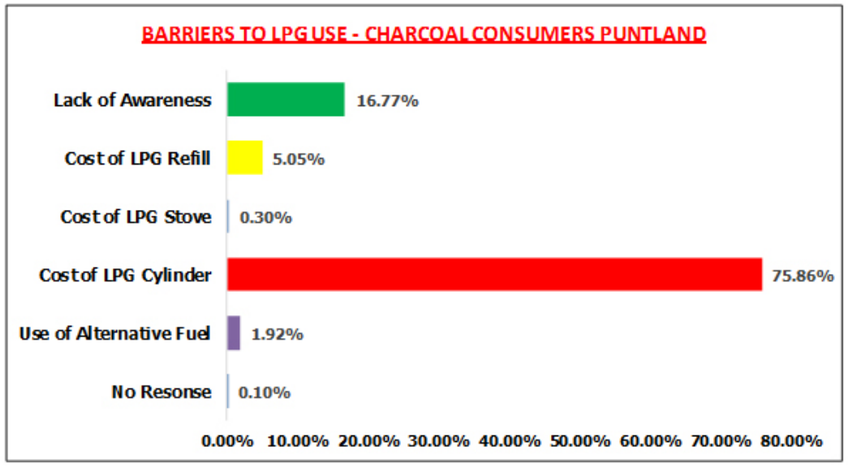
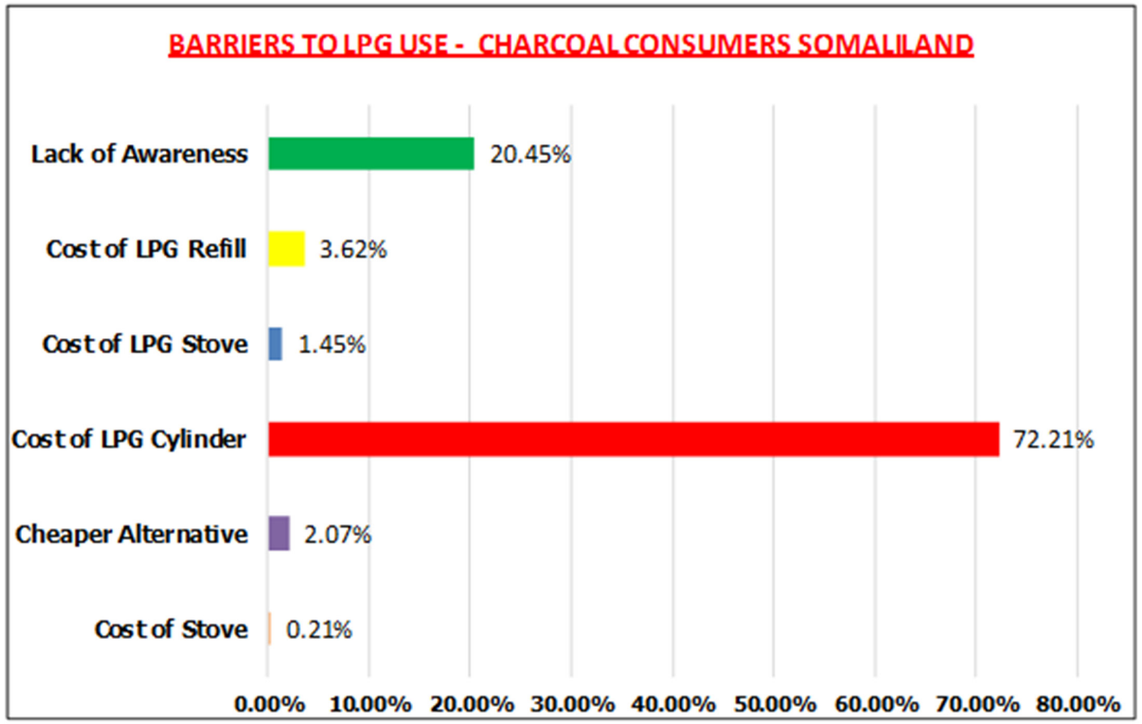


CHART 12: BARRIERS TO SWITCHING FROM CHARCOAL TO LPG SOMALILAND



Specific recommendations arising out of the above findings are detailed a later report entitled 'Financial Evaluation & Market Development'.

4.2.9 Other Observations

The following summarises other observations made from the market survey:

- There are currently no bulk LPG storage/ distribution terminals in Puntland.
- There are no LPG bottling plants in Puntland, save possibly those rigged up for filling bottles from ISO Containers.
- Present supply arrangements are unstructured, creating a 'free for all' market environment.
- It would appear that in general Health, Safety and Environment (HSE) standards, if any, are rudimentary.

4.2.10 LPG Market SWOT[11] Analysis – Puntland

From information obtained from the PFYDP-2 Plan (Section 2.2), other sources, and the field survey the SWOT analysis (Table 7 below) analyses the LPG market in Puntland.

This analysis sets the basis for assumptions to be used in LPG demands projections.

TABLE 7: LPG MARKET SWOT[11] ANALYSIS PUNTLAND

Strengths

- The PFYDP-2 plans and supports LPG as an alternative energy.
- The PFYDP-2 plans and supports PPP for LPG projects.
- Private local and Diaspora capital that can support PPP.
- Enterprising business community who can support and expand LPG business.
- A business friendly liberalized market environment.
- A clear environmental policy on deforestation mitigation using alternative energy.
- Strong goodwill from development partners and international NGOs.
- Short distance from Arabian Gulf sources of LPG imports.
- Location of Bosaso on the busy Red Sea marine route.

Weaknesses

- Insufficient accurate historical data and information on the LPG market in Puntland (but our new market survey provides a sound understanding of present market).
- Low existing base load LPG usage resulting in high unit costs.
- Absence of an efficient and cost effective LPG supply chain resulting in expensive LPG refills and frequent LPG unavailability.
- Cylinders are mostly of large size resulting in higher refill costs.
- The "State" status which may hinder direct LPG funding by multilateral agencies.
- Weak state revenue base, which may be insufficient to fund LPG development projects and subsidies.
- Absence of petroleum regulatory framework and standards.

Opportunities

- Huge LPG market growth potential due to strong government support for LPG as an alternative to charcoal.
- Potential high LPG demand from institutions, businesses, and middle/high income households if availability is guaranteed.
- Diaspora cash inflows for LPG supply chain development.
- Potential synergy of joint bulk LPG imports into Djibouti, Bosaso, Berbera, and Mogadishu Ports will reduce bulk import costs.
- Potential LPG re-exports to Western parts of Ethiopia.
- Increased employment opportunities from an expanded LPG supply chain.

Threats

- Potential insecurity situations.
- Fluctuating LPG global prices.
- Biomass energy cheaper than LPG.

[11] *SWOT: Strengths – Weakness – Opportunities – Threats*

5. Historical Market Demand

It has not been possible to source from the market or Government sources reliable data in respect of LPG imports. Information does suggest however that demand has been constrained by limitations on supply.

Estimates of demand have been made in two previous reports undertaken for the UNDP, namely:

- Energy For Sustainable Development Africa (ESD) - July 2007*
- Horn Consulting Association (HCA) – November 2010**

Table 8 below shows the estimated demand figures by ESD, HCA and by Petroleum Focus Consultants/ Channoil. By taking the average growth rate of 42% apparent between 2007 and 2011, we have assessed the likely level of demand in 2014 at 408 tonnes. However, given the general level of activity evident from the survey reports, we believe the actual level of market demand to be significantly higher.

TABLE 8: LPG DEMAND ESTIMATES

	Annual Demand (MT)	% Growth
2007	36*	-
2008	48**	34%
2009	64.4**	33%
2010	102**	58%
2011	142.6**	47%
2012	202.5***	42%
2013	287.5***	42%
2014	408.2	42%

*ESD Africa (July 2007)

**Horn Consulting Association (Nov 2010)

***Petroleum Focus Consultants/ Channoil (June 2014)

We consider that the huge leap in likely LPG consumption arises from the efforts of importers to increase supplies. The increased consumption is in this case is driven more by improved availability. For example the information received from field surveys indicates that LPG imports are already moving into the second level of supply sophistication through the use of ISO Containers.

Other than the anecdotal evidence from the survey work and Community Workshops, it is not possible to provide a breakdown of cylinder and bulk supplies/ main customers.

6. Supply Economics/ Value Chain Analysis

Examples of present supply channels and economics are provided in Section 4.2.3.

Detailed analysis of available data will be undertaken as a next step to identify the supply economics that will need to be in place to encourage a massive switch from charcoal to LPG. This will entail establishing:

- The selling price for LPG that will make it competitive with charcoal.
- The net-back to the point of importation from end-user selling prices after deduction of delivery charges and taxes.
- The 'throughput charge' for use of the 2,000 m3 import terminal and bottling plant that will justify the investment.
- The resultant 'target' import cost to make the project viable and how this compares with notional import parity costs over the last 12 months.
- The extent of subsidy and guarantees for investors that could be necessary.

This work will be progressed and the results covered in our next report entitled 'Financial Evaluation & Market Development'.

Prospective Market Demand – Puntland

7.1 LPG Market Penetration of 25% in the National Development Plan

The PFYDP-2 plan targets a 25% LPG market penetration within the 2014-2018 plan periods.

The market survey indicates that charcoal users will switch to LPG if their key concerns as set out in Section 4.2.5 are addressed. Assuming that the Regional Government of Puntland is fully committed to achieving its market penetration objective through financial support for procurement of cylinders and stoves and a form of subsidy for LPG supplies, the 25% penetration target may be taken as a basis for calculating forward demand.

7.2 Unrestricted LPG Supply Chain

A critical assumption for market development is that supply can be regarded as unrestricted. At least in the early stages, this will be the role of the bulk import terminal and bottle filling facilities, which we are assuming would be fully functional by 2017.

Modular design would be an option for development of the bulk terminal but the scope of the feasibility study requires us to consider in the first instance a terminal having a storage capacity of 2,000 cubic meters.

A further option to aid market development would be to establish bottling plants at key demand centres such as Garowe, Galkayo, Badhan, Buhotle and Bocamo, which would be fed with bulk LPG by truck from the Bosaso terminal. However, this option is beyond the immediate scope of this study, but is noted here for consideration later.

7.3 Optimisation of Cylinder Sizes

The field survey indicates that the current cylinder sizes include 11, 20, 40 and 50 kg. We would expect and will assume that that some rationalization will take place and that smaller units will be introduced in the market to make LPG a more attractive purchase for the consumer.

Rationalization of cylinder sizes to fit various income brackets should increase LPG affordability through reduced refill costs and the initial cost of cylinders. For example 3 kg and 6 kg cylinders would target lower income households; the 13 kg would be suitable for middle/higher income families; 40/50 kg units would be used initially to target the food industry and institutions.

7.4 Lower Barriers to Market Entry

We are assuming for the purposes of this study that the operating model and licensing of the bulk import facilities shall be on a common user basis (open access) that can be used by all licensed marketing companies. This lowers barriers to market entry and creates a more level playing field. It would serve to encourage and increase market participation and competition. It would accelerate investments in distribution capacity (e.g. inland storage, filling, delivery trucks).

"Common user" facilitation would be a regulatory intervention to be effected by the government during licensing. It could also be extended to privately owned LPG filling facilities with a requirement that hospitality services are extended to existing marketers and new entrants. This has the effect of reducing unit costs and also increasing fair market competition.

7.5 Government Interventions/Facilitation

It is assumed that the Government of Puntland (and Somaliland) will be a ready and willing partner in LPG demand promotion, driven primarily by the environmental policy obligations to reduce biomass consumption.

The areas that the study assumes will be implemented by the Government to promote LPG demands are:

- Removal of import taxes on LPG
- Removal of import taxes on LPG cylinders , and appliances (regulators and cookers)
- Public awareness campaign on use of LPG to 'save the forests'. This would increase household acceptance.

7.6 LPG Demand Promotion - Strategy & Action Plan

The market survey and Community Workshops performed in Puntland and Somaliland have identified barriers to LPG demand growth. In the case of Puntland, a partnership between Government and business/ investors shall require the following actions to unlock identified barriers and permit free growth of LPG demand. When this is achieved, LPG demand would in all likelihood be left to grow according to the state GDP growth rates, household incomes and of course LPG consumer prices.

TABLE 9: LPG PROMOTION – STRATEGY/ PLAN SUMMARY

	Interventions	Completion Date (Adeso Plan)	Responsibility
1.	LPG Supply Chain Upgrade (bulk import, distribution)	Complete by 2015	JV/PPP
2.	Cylinder Size Rationalization	Commence by 2015	Government, Business
3.	Import Tax Waivers	Commence by 2015	Government
4.	Public Awareness campaigns	Commence by 2014	Government, Business
5.	LPG Regulations & Standards	Commence 2015	Government

7.7 LPG Demand Forecast (Provisional)

7.7.1 Broad-Brush Assessment

The Government's target as described in Section 7.1 directionally provides an LPG demand expectation.

The population of Puntland is 3.9 million of which about 40% reside in urban areas. The median household size from the survey (e.g. Bosaso) is 8 persons. The target number of households is therefore 195,000. Average monthly LPG consumption by an urban household is about 20Kg. A 25% urban LPG penetration gives a demand of 975 tonnes per month, or 11,700 tonnes per annum for urban areas. This figure does not include rural areas, which would also be expected to carry a share of demand penetration. We take this as our Base Case.

We would say based on experience elsewhere that such a demand figure may be difficult to achieve in the short term, despite encouragement through subsidisation of LPG, cylinder and stoves costs, and a gradual build-up of volume will need to be allowed for in the early years of market development.

7.7.2 Modelling Demand Forecasts

Our initial intention was to use a propriety model for forecasting LPG demand. However, this process would require access to comprehensive and sound historical data in respect of the key parameters. Unfortunately, such information with the reliability needed is not readily accessible in the public domain. We will continue to examine available data and to assess the opportunity for adopting a modelling approach.

In addition, we will review the experience of similar ventures in similar markets and assess whether there are any indicators available that might point to market volume development in Puntland (e.g. Senegal, Kenya, Rwanda, and South Africa – Cape Town).

7.7.3 Volume Scenarios

In our view, there is a portion of the charcoal-using community that would switch to using LPG even with existing import and pricing arrangements providing supply to the market could be relied upon. However, we believe that the incremental volume so generated would be relatively small in the overall scheme.

The real step-change in demand will be driven by measures taken by the Government to put charcoal users in the situation where their economics of switching to LPG are at least break-even with or preferably better than using charcoal. Details of how this 'thresh-hold' price has been calculated are provided in Section 6 above.

In these circumstances, subject to other non-commercial issues being addressed, we see no reason why market penetration would be held back to 25% but with high consumer confidence could be extended to as high as 40%. We take this as our Optimistic Case.

In the event that the Government is more cautious in terms of proving forms of financial support, then market penetration is likely to fall short of target. We take this as our Pessimistic Case.

These alternative volume scenarios will be fed into our financial evaluation model to assess the feasibility of the project for the different cases.

7.7.4 Other Factors Affecting Growth Prospects for New Terminal

The issues to be addressed are as follows:

- We are not aware of any major infrastructure investments projected for Puntland that could materially affect demand in the future.
- It would seem that there are no other companies looking to set up competitive storage infrastructure/ bottling plants in the regional market/ wider Somalia market.

7.7.5 Volume Forecasts

The volume forecasts based on our scenarios are shown in the following table.

TABLE 10: VOLUME FORECASTS PUNTLAND

Puntland LPG - Market Growth Scenarios (Tonnes)											
Scenario	**Growth**	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Year 6**	**Year 7**	**Year 8**	**Year 9**	**Year 10**
Base Case	10%	5,000	8,000	10,000	11,000	12,100	13,310	14,641	16,105	17,716	19,487
Pessimistic Case	5%	3,000	5,000	8,000	8,400	8,820	9,261	9,724	10,210	10,721	11,257
Optimistic Case	15%	5,000	10,000	12,000	13,800	15,870	18251	20,988	24,136	27,757	31,920

Summary of Scenarios:

Base Case: Government of Puntland shows commitment to its market penetration target of 25% by enacting appropriate measures to ensure that the end-user economics of switching from charcoal to LPG are sufficiently attractive

Pessimistic Case: Government is slow to introduce required measures and end-use confidence remains low.

Optimistic Case: Government demonstrates through its actions that it means business, end-user confidence in respect of economics and safety issues soars and take up of LPG is high.

8. Main Conclusions

1. Only limited data is available on current demand. We believe the estimates are highly conservative and that demand is likely to be running at a significantly higher figure, prompted by the efforts of importers, especially semi-bulk using ISO Containers.

2. LPG demand is currently restricted by poor availability, high refill costs, and consumer anxiety with regard to safe handling.

3. Investment in the bulk import facility, filling and distribution facilities will unlock demand growth potential, even at current consumer prices because of improved availability. However, bulk imports will lower costs and prices, which in turn will trigger further increments in demand.

4. Demand will increase from existing charcoal consumers, some of whom will convert to LPG even at current prices if they are assured of LPG benefits and safety.

5. A further demand increase will be generated by current charcoal consumers (low and middle household incomes) who will be persuaded to shift to LPG if LPG prices are low enough and at or lower than the threshold price compared with continuing to use charcoal. If consumers use LPG for cooking, they will not use the equivalent quantity of charcoal.

6. Such improvements in end-user economics and interest in switching to LPG will arise from:

   - » Subsidies on LPG import costs
   - » Use of smaller cylinders to lower cylinder and refill costs and make LPG more affordable to less well-off households
   - » Removal of LPG taxes
   - » Increased taxation on charcoal
   - » Increased public awareness of health and safety issues (a) adverse health effects of using charcoal and (b) safe handling of LPG
   - » Environmental benefits

Our recommendations following on from the above conclusions are detailed in our subsequent report entitled 'Financial Evaluation & Market Development'.

APPENDIX 1: QUESTIONNAIRES USED AS BASIS FOR MARKET SURVEY

FORM 1: FUEL CONSUMPTION PATTERN QUESTIONNAIRE

SECTION I : FUEL CONSUMPTION PATTERN – ALL HOUSEHOLDS		
1	Name of Surveyor :	Date of Survey :
2	Name of Household Respondent:	Household size :
3	Average monthly household income:	
4	Name Of Town:	Tick if Urban ( ) Suburban( ) Rural( )
5	What Fuel is used for cooking?	LPG ( ) Electricity( ) Kerosene ( ) Charcoal ( ) Firewood ( ), Other specify ( )
6	What Fuel is used for Lighting?	LPG ( ) Electricity( ) Kerosene ( ) Charcoal ( ) Firewood ( ), Other specify ( )
7	Total fuel used per month (Kg, Litre)	
8	Unit cost of fuel	
9	Where is fuel source from?	
10	Type and cost of stove/cooker used?	
11	What prevents household from using LPG?	

SECTION II- LPG DOMESTIC CONSUMERS		
1	Name of Surveyor:	Date of Survey:
2	Name of Consumer:	Household size:
3	Average monthly household income:-	
4	Name Of Town:	Tick if Urban ( ) Suburban( ) Rural( )
5	How many LPG cylinders **and** their sizes?	Initial costs per cylinder :-
6	What type of cooker?	Initial cost of cooker :-
7	What is the cost of LPG per cylinder?	
8	How much LPG do you use in a month?	
9	How long have you used LPG?	Tick : Less than 1 year ( ), 1-3 years ( ) , More than 3 years ( )

9	Where do you purchase your LPG from?	
10	What prevents you from using more LPG?	
11	What other Fuels do you use **and** how much?	

FORM 2: LPG IMPORTERS/DISTRIBUTORS QUESTIONNAIRE

1	Name of Surveyor:	Date of Survey:
2	Name of LPG importer:	Year Registered:
3	LPG imports in 2008( ), 2009 ( ), 2010 ( ) 2011( ) 2012 ( ) 2013 ( )	
4	Countries and Ports of LPG Imports origin.	
5	In what form are LPG imports?	Tick : Bulk tankers ( ) Iso-containers ( ) , Cylinders ( )
6	How many shipments in a year?	
7	What are the LPG cylinder sizes?	
8	What are the initial costs of LPG Cylinders?	
9	How many shipments in a year?	
10	What are the latest unit import costs?	• FOB.....US$/Ton • Freight.....US$/ton • Insurance.....US$/Ton • Port charges.....US$/Ton • Warehousing costs.....US$/Ton • Taxes.....US$/Ton
11	What are margins like?	• Importer margin..... • Distributor margin..... • Retail margin.....

12	How do you plan to expand LPG business?	
13	What should the government do to help expand LPG demand and business?	• ..... • ..... • ..... • ..... • .....

FORM 3: LPG INSTITUTION/BUSINESS CONSUMERS QUESTIONNAIRE

1	Name of Surveyor:	Date of Survey:
2	Name of Institution:	Year Registered:
	Location • Town..... • Rural Area.....	Rural
4	Category of Institution (specify function or business)	• Business..... • Government..... • Private..... • Foreign Mission..... • NGO..... • Other.....
5	LPG Consumption in KGs	2008 ( ), 2009 ( ), 2010 ( ) 2011 ( ), 2012 ( ), 2011 ( )
6	Who are the LPG suppliers?	
7	What are the unit prices of LPG?	

8	What type of burning/ cooking/ lighting equipment do you use?	
9	What are your concerns on LPG supply and costs?	• ..... • ..... • ..... • ..... • .....
10	Are there any government interventions on LPG that you would wish to recommend?	• ..... • ..... • ..... • .....
10	Do you use other types of fuels and how much quantity?	• Electricity..... • Kerosene..... • Charcoal..... • Firewood.....

FORM 4: COUNTRY GLOBAL INFORMATION

	GENERAL COUNTRY INFORMATION	
1	Economic Indicators • Provide economic growth (GDP) figures for the years 2008-2013 • What are the key economic sectors and their GDP share? • What is the average monthly salary for the highest middle and lowest paid government employee? • What are the personal income tax rates?	
2	Population • What is the latest national population for the country? • What is the population growth rate? • What is the split between urban and rural population? • What are populations of the towns listed for the study?	
3	Infrastructure • What is the general condition of the roads between various towns (bitumen, all weather gravel, seasonal)? • What are the largest sizes of ships that can dock at port? • How is the supply of electricity across the country and in towns? • What are the consumer electricity prices? • How is electricity generated?	
3	Petroleum policies, laws ,regulation • Which ministries are in charge of petroleum, environment and internal trade? • Are there any specific policies, laws and regulations governing petroleum supply? • As there a body responsible for standards and also environment? • Are there any standards for LPG? • What is the tax structure for petroleum products and LPG in particular? • Are there any past studies done for the government on petroleum including LPG?	

4	LPG Business • Are total LPG imports/demands available for the year 2008-2013? • Can you list the largest individual consumers of LPG (universities, schools, hospitals, hotels, industries etc.) and the individual consumption? • Can you list all LPG importers and volumes imported in 2013? • Can you describe briefly how the LPG business and supply chain is organized from import to the final consumer?	
5	Other Fuels • Do you have any indications of relative costs of charcoal, firewood, kerosene? • How readily available is kerosene across all parts of the country? • Are there any regulations restricting use and trade in charcoal and firewood?	
6	Cross-border LPG trade • Approximately how much cross-border trade of LPG takes place with neighbouring countries both formal and smuggling?	

APPENDIX 2: COMMUNITY WORKSHOP PUNTLAND

Community Workshop – Puntland, City: Bosaso

Focus Point	Feedback
Potential supporters and blockers and reasons for positions taken	• The government is also a strong supporter of bringing LPG to Somalia, but are currently not entirely sure how it is to be done. They have increased taxes on charcoal but it has only made it more difficult for the low income groups to buy charcoal as well as LPG; therefore creating two problems instead of solving one.
Ideas on viable approaches to promoting LPG use across all categories of the market	• A two way approach, informing people of the harmful effects that charcoal and firewood has on the environment and how it will affect their livelihoods; and at the same time there should a promotion for LPG.
Interest of the different players in participating in specific elements of the supply chain from importation to final delivery to the customer either as solo operators or in JVs/ PPPs	• Two of the largest gas importers and new participants in the LPG market (Sahal Gas & Punt Gas), have expressed eagerness to work with international and local participants (public or private sector).
Potential participants in PPPs purely as investors	• Business companies in Somalia that have the capital to invest. • Middle Eastern Investors those are willing to invest in Somalia (Gulf Countries).
Perceived constraints to plans	• Stable supply and source of LPG, currently LPG is imported from more than one country • There should be an also a legal supply as well, because some LPG imports come from illegal means (black market).
Key issues to be addressed by Regional Governments to facilitate project moving forward in PPP format	• LPG Importers have expressed their scorn at the proposed “price reduction” for LPG. They stated 1 or 2 dollar discounts will not change anything. The biggest problem is the initial cost barrier that needs to be solved. • The government needs to view LPG companies as partners and provide government incentives to help foster alternatives to charcoal and firewood consumption in the region. The majority of the issues revolve around the financial constraints that are levied on LPG companies, the government needs to provide financial incentives such as tax reduction (0% tax) and even subsidize LPG imports.

Community Workshop – Puntland, City: Galkayo

Focus Point	Feedback
Potential supporters and blockers and reasons for positions taken	• The current LPG distributors in Puntland are open to a formation of new LPG Company/businesses and will support as long as their business is not adversely affected. • Individuals and businesses in the charcoal industry are fearful of losing their business. • Current consumers of LPG, either household or non-domestic consumers are eager to support any measure to reduce their current costs/expenditure on LPG • Ministry of Environment and other departments in the government are welcome to the idea of moving forward and protecting the countries natural resources from exploitation.
Ideas on viable approaches to promoting LPG use across all categories of the market	• Educating the consumers on how to "SAFELY" use LPG. From household consumers, safety issue is number one. They need re-assurance that their house will not "blow up". Some shop owners have even stated they refuse to allow businesses that use LPG to even rent their shop outlet due to fear of an "accident" taking place.
Interest of the different players in participating in specific elements of the supply chain from importation to final delivery to the customer either as solo operators or in JVs/ PPPs	• LPG Importers also play the role of distributors and unlike the charcoal/ firewood industry it is does not have as many layers of brokers (or people profiting in the middle). If the importers became strictly importers and provided significant discounts to distributors, the supply chain might be widened to reach a greater populace.
Potential participants in PPPs purely as investors	• Large trading companies that have the capital to invest and have experience in importing goods to Somalia. • Financially adequate individuals that wanted to invest in LPG before but didn't have the knowhow or experience in this industry and were wary of current importers.
Perceived constraints to plans	• LPG prices fluctuate and this causes concern to the importers and consumers. • Some people have complained that LPG cylinders are not always properly filled (i.e. they don't receive the exact quantity they pay for). Therefore there needs to be adequate quality control
Key issues to be addressed by Regional Governments to facilitate project moving forward in PPP format	• The government needs to view LPG companies as partners and provide government incentives to help foster alternatives to charcoal and firewood consumption in the region. The majority of the issues revolve around the financial constraints that are levied on LPG companies, the government needs to provide financial incentives such as tax reduction (0% tax) and even subsidize LPG imports.

Community Workshop – Puntland, City: Garowe

Focus Point	Feedback
Potential supporters and blockers and reasons for positions taken	• There are companies operating as an alternative and environmentally friendly provider of clean energy, such as solar energy and wind energy. A good example would be the current only provider of electricity in Garowe, which has decided to use wind to generate power. Companies such as these support all initiatives to bring environmentally friendly sources of fuel to the general public in hopes that they too will receive support and aid in the future. • Small time LPG traders are also welcome to new initiatives which they feel will increase their monthly and annual sales.
Ideas on viable approaches to promoting LPG use across all categories of the market	• A good approach to promoting LPG is using the available media channels to advertise LPG to the Somali public. Somali people like to stay updated with current events and the radio along with Somali satellite channels are the best means of promoting LPG usage throughout the country. • The promotion should also focus on all segments of the Somali household, meaning both Husband and wife. There have been instances where one partner was open to using LPG but was blocked by the other partner, due to fear for his children's safety (a gas leak/explosion).
Interest of the different players in participating in specific elements of the supply chain from importation to final delivery to the customer either as solo operators or in JVs/ PPPs	• Imported goods are distributed across the country by truck drivers/owners. Since LPG is different to the regular products trafficked across the country, it requires special transportation. If the current trucks can be adapted to transport LPG safely then this will increase participants in the industry.
Potential participants in PPPs purely as investors	• If investing was open to the public, there would be investors willing to buy shares in the company. • Large Somali companies that want to diversify their company portfolio and looking for new opportunities.
Perceived constraints to plans	• There is lack of proper infrastructure in place. • What role will the current distributors play? How will they work together? Will they be competitors or partners?

APPENDIX 3: COMMUNITY WORKSHOP SOMALILAND

Community Workshop – Somaliland, City: Berbera

Focus Point	Feedback
Potential supporters and blockers and reasons for positions taken	• **Potential supporters** are Government-because it is their responsibility to protect the environment • Pastoralists- their animals depend on the local environment and vegetation and will die if there is lack of fodder • **Potential blockers are**-Low income families-Because they can't afford to buy LPG and fear losing their cheaper fuel/energy sources. • Risk associated with LPG – Local populace afraid of a gas explosion happening in their home and risking their children lives
Ideas on viable approaches to promoting LPG use across all categories of the market	• Increase Awareness Campaign (Educating people on the uses & advantages of LPG ,and the safety procedures required) • Low price – LPG needs to be at a competitive price with charcoal –maybe even cheaper than charcoal • Distribute at every business centre\shop • Media Advertising: Local Radio and Somali Satellite TV Channels • Making sure that the LPG sold is of high quality and the right weight and cooker/stove is affordable • Provide credit- Allow for monthly instalments so customers can buy initial costs (cylinder and cooker).
Interest of the different players in participating in specific elements of the supply chain from importation to final delivery to the customer either as solo operators or in JVs/ PPPs	• Government can help ensure that there are no governmental regulations or restrictions on the LPG industry • Current Gas traders/importers • Charcoal/firewood traders might be willing to participate if their own business is outlawed • NGOs can be hired to increase awareness and provide training
Potential participants in PPPs purely as investors	• High Income individuals • Large corporations operating in the region such telecommunication and remittance companies • The general Population is willing to invest and buy shares in a public LPG company
Perceived constraints to plans	• How to reduce the price of LPG while still making profit. • Not all LPG importers are open to cooperation and are wary of new LPG initiatives • Poor knowledge on use –leaflet instruction in Somali • High taxes
Key issues to be addressed by Regional Governments to facilitate project moving forward in PPP format	• Tax exception • Policies –That safeguard the environment • Land provision –for building /storage • Improving the banking sector to allow for loans to be made available

Community Workshop – Somaliland, City: Hargeisa

Focus Point	Feedback
Potential supporters and blockers and reasons for positions taken	• **Potential supporters** are gas traders –because it is their business • Environmental activist –because they care strongly about their local environment and habitat • Gas users (HH, cafeteria, hotels and others)-they already know the advantages of using LPG. • **Potential blockers are**-Charcoal \wood traders – because they are afraid of becoming jobless because they don't have any other source of livelihood at the moment.
Ideas on viable approaches to promoting LPG use across all categories of the market	• Market should be open and free for healthy Competition. Monopolies will be harmful to the local economy. • Free delivery & local distribution at initial stage to provide incentives for people to buy LPG • Price Promotions such as buy two and get one for free • Home delivery- making it more convenient for the customers • Network marketing • Employ charcoal traders- therefore eliminating some of the resistance • Employing charcoal/firewood traders also allows you to tap into their own loyal customer base • Cylinders should be different sizes to meet different customer needs • Smaller cylinders should be made available for low income families • NGOs should help with fund to the traders

Interest of the different players in participating in specific elements of the supply chain from importation to final delivery to the customer either as solo operators or in JVs/ PPPs	• The government if it can receive funding from the international community will be willing to subsidize LPG prices • Suppliers of cylinders and cooking equipment are willing to reduce their prices if the government or LPG importers will buy in huge quantity. • Current LPG suppliers in Somaliland are wary of new competition entering the market but if they are chosen as sole operators they will participate and provide assistance.
Potential participants in PPPs purely as investors	• Large Business owners • Alternative Energy Companies that are already operating in the region • The Government or Government Officials?
Perceived constraints to plans	• Lack of proper Infrastructure-such as transportation, roads, storage tankers and no railway system • Poor market- Purchasing power is low • Cultural/Traditional barriers – The belief that LPG is a huge security risk • Supply- Availability & shortage of supply; Charcoal and Firewood is produced locally while LPG must be imported
Key issues to be addressed by Regional Governments to facilitate project moving forward in PPP format	• Government must develop -LPG storage/Depots • Mobile tankers • Improve road infrastructure • Government must establish, build and maintain strong relationships with the international LPG market participants • Government should help subsidize LPG costs

SECTION 3

Financial Evaluation/ Market Development Report

Ministry of Environment, Wildlife and Tourism

EUROPEAN UNION
Supporting the Somalia New Deal

Adeso

TABLE OF CONTENTS

Executive Summary

1. Most people interviewed during our market survey work have indicated that they would like to switch from charcoal to LPG.

2. LPG is traded extensively in the international market, where its price is set and which determines the import cost into Puntland. The selling price of LPG in the domestic market will be set by the price of charcoal, with which as a domestic fuel it will have to compete. From an economics point of view, LPG has a higher calorific value than charcoal and in use it should be more efficient to use. It should be possible, therefore, to sell LPG at premium prices over charcoal, but it will be a major challenge to convince potential customers of the economic as well as the environmental benefits of switching to LPG.

3. A suitable site for the new LPG import facilities and terminal has been identified, in the vicinity of Bosaso airport, which has been taken as the assumed location for the purposes of design and cost estimating. It has been agreed that the most cost effective option for product storage will be a conventional sphere. The design of the terminal and tanker berthing jetty will take into account the manner in which LPG is currently traded and supplied to East Africa and the Horn of Africa region.

4. To encourage consumers of charcoal to switch to LPG for domestic use, the prices of LPG would need to afford them at least break-even economics, which have been assessed taking into account calorific value differences and relative stove efficiencies. These derived prices have been netted back to the prospective Bosaso terminal taking into account current transport costs and estimated Distributor Margins and average 1,450 $/Tonne.

5. Investors in the prospective bulk LPG import terminal and distribution business will need to be assured that their investment is secure and will generate a return commensurate with the nature of the business and implied risks. Our financial evaluation model using Base Case assumptions suggests that the terminal throughput charge should be of the order of 150 $/Tonne.

6. Based on our proposed business model, our Base Case volume estimates and other Base Case assumptions and the above terminal throughput charge, the project will develop attractive rates of return, generating an IRR of between 15.2% (100% equity) and 18.3% (50% external finance). The key sensitivities are operating costs and land rental.

7. The price of charcoal in the domestic market is set by local market dynamics and taxation levels. The price for LPG in the international markets from which product would be sourced for the domestic Puntland market fluctuates due to seasonality factors, which are clearly not reflected in charcoal prices in the domestic market in Puntland. There is therefore a disconnection between price movements in the two markets that would need to be managed such as to assure investors with regard to the security of their investment in the terminal and distribution business. Several forms of subsidy arrangements are available, which will need to be considered and evaluated.

8. During Northern Hemisphere winter months, when international market LPG prices are relatively high, a form of price subsidy may be necessary to ensure investors' returns are secured but the medium and longer term outlook suggests the relevant international markets will be oversupplied, putting downward pressure on international prices and possibly obviating the need for inland market subsidies.

9. Rationalisation of the market offering, effective communications on economic and safety issues and extensive sales promotion will be essential to growing the market

10. The role of the Government as a potential market regulator, overall supporter of the initiative and provider of a secure operating environment will be crucial to the success of the venture.

11. Adeso will play a key role in supporting environment awareness campaigns and in the appointment of an Energy Adviser.

1. Introduction

A detailed market survey has been carried out focussing on that sector having the greatest potential to switch from charcoal to using LPG as the main domestic fuel, i.e. charcoal users resident in urban households, and existing LPG users, i.e. urban domestic, commercial (factories, cafes, restaurants) and institutional (diplomatic residencies, hotels).

Our Market Report dated July 2014, covering work undertaken between May to July 2014, indicates that, subject to appropriate responses and support from Government agencies and business communities, there is a clear case for establishing a new bulk cargo import terminal for LPG at Bosaso and developing the market for bottled LPG, in particular during the initial stages the domestic urban sector.

From the findings of this report, it is clear that although an existing LPG supply capability exists, it is fragmented and lacks the economy of scale to facilitate reductions in unit costs and allow suppliers to offer more competitive pricing.

It is also clear that there is a huge potential demand for LPG for domestic use in urban communities that would be unlocked by improving supplies through establishing a bulk cargo import and distribution capability and adopting the range of market development initiatives set out in the following sections of this report.

This document is designed to report on key matters relating to and the financial evaluation of the prospective investment in bulk import (shore terminal to receive cargo shipments from ocean going tankers) and distribution facilities (bottling plant and bottle sizes more economic and convenient for the end-user).

2. Liquefied Petroleum Gas (LPG)

This term refers to Propane (C3) and Butane (C4) or combinations of the two. The 'C' number refers to the number of Carbon atoms in each molecule. [LNG is Liquefied Natural Gas, i.e. Methane or C1, having one Carbon atom in each molecule.]

LPG gases are produced in oil refineries from crude oil distillation and from up-grading processes. Also, a source of growing importance is from field gas production, where LPG gases are generated as by-products along with associated gas liquids.

Both C3 and C4 are gaseous at ambient temperatures but may be liquefied under pressure or by refrigeration. Pressurisation is usually the process used for liquefying C3 and C4 for use as a convenience fuel, delivered to market in pressurised containers (e.g. cylinders and small tanks). We will advise in due course on the appropriate gas or blend suitable for the Puntland LPG market. Because the two gases have different vapour pressures, there may be implications for cylinder design criteria.

These two main sources produce respectively 'refinery quality' and 'field quality' having slightly different quality characteristics, especially with regard to purity.

Both C3 and C4 are heavier than air and in certain situations without adequate ventilation leaked product will 'creep' at ground level and/ or sink into lower levels when accessible, where it may find a source of ignition. Being naturally odourless, as a safety measure, LPG is therefore 'stenched' (this means the addition of a trace highly odorous compound) to ensure that in cases of leakage its presence can be detected by smell. Ensuring product awareness and knowledge of safe handling procedures are important aspects of domestic market expansion.

3. Volume Estimates - Puntland

Demand volume estimates as per our Market Report dated July 2014 are as shown in the following table.

TABLE 11: PUNTLAND LPG – MARKET GROWTH SCENARIOS

Puntland LPG - Market Growth Scenarios (Tonnes)											
Scenario	**Growth**	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Year 6**	**Year 7**	**Year 8**	**Year 9**	**Year 10**
Base Case	10%	5,000	8,000	10,000	11,000	12,100	13,310	14,641	16,105	17,716	19,487
Pessimistic Case	5%	3,000	5,000	8,000	8,400	8,820	9,261	9,724	10,210	10,721	11,257
Optimistic Case	15%	5,000	10,000	12,000	13,800	15,870	18251	20,988	24,136	27,757	31,920

An option for estimating forward demand would be to use a forecasting model and data based on historical demand and relevant economic parameters. Reliable market demand information and economic data is not readily available. Furthermore, the impetus for growth in demand will come from Government and institutional support. We have therefore adopted a scenario approach to demand estimating and we have based our further assessments on the above volume estimates.

4. Bosaso Terminal Location

4.1 Bulk Supply

The most suitable means of supply will be by sea to Bosaso in pressurised LPG ocean-going tankers. The original intention was that land for sitting of the new bulk import terminal with an area of 65,000 square metres could be secured within Bosaso Port but this has not been possible. An alternative suitable site has been identified in the general locality of Bosaso airport as shown in the map and site location provided in Appendix 1. The area of land is sufficient and the site should meet other key criteria in terms of access to the sea, water depth and easy access to transportation logistics and utilities.

The site has been reviewed and accepted for planning and development purposes by the Adeso team in Puntland in conjunction with local administrations, local communities, a locally based industrial engineer acting in an advisory role, Channoil Asia and Trident Engineering (Trident). Trident are in the process of undertaking the terminal design work, building up cost estimates for the terminal/ bottling plant and scoping the marine facility requirements. Full details including engineering drawings will be provided as a supplement to this report.

Concerning, moorings and water depth, pressurised tankers engaged in LPG supply for the East/ North East African coastline trade typically having the following dimensions:

TABLE 12: TYPICAL LPG PRESSURISED TANKERS

Typical LPG Pressurised Tankers		
Capacity M3	3,500	5,000
Capacity DWT Tonnes	1,800	2,500
Fully Laden Draft Metres	5.5	6.0
Length Overall Metres (LOA)	100	100

The tanker jetty and LPG discharge facilities will need to be designed accordingly. In all likelihood, at least initially, tankers will be engaged in multi-discharge activities and although cargo sizes will be relatively small, larger tankers will need to be accommodated. Essentially, 8.0 metres of draft will be required for vessels averaging 5,000 DWT or occasionally up to 8,000 DWT.

4.2 Terminal Capacity and Configuration

Adeso has indicated that the capacity of the terminal should be minimum 2,000 cubic metres. Based on this assumption and our assessed provisional

Base Case volume estimates set out in our market report (approximately 11,000 tonnes per annum, increasing in year 4 by 10% per annum), we would expect supply to be effected in the form of part cargoes of around 750 tonnes from pressurised vessels supplying a number of ports along the east African coastline.

However, if as is expected, the market volume grows significantly and quickly, it may be more economical to ship larger cargoes into the terminal and/or increase delivery frequency.

Our estimates of capital costs have assumed:

- Storage capacity of minimum 2,000 cubic metres
- Marine facilities having the capacity to handle and to discharge efficiently the range of vessel sizes as in Section 4.1 above (taking into account occasional high seas during the summer season)

During a recent meeting between the Adeso Project Director and Trident at Trident's offices in Glasgow, the safety advantages and disadvantages of large mounded LPG bullets versus LPG spheres were discussed and it was agreed in principle that the option of installing bullet storage would be progressed. However, it has subsequently emerged that there are weight restrictions in Bosaso Harbour and alternative Somalia harbours for receiving/ unloading large bullets or sections of bullets. If the design assumed smaller bullet storage vessels, then as a result the costs of valves, tank gauging and safety equipment would all increase proportionally.

Taking into account the above considerations, Trident have recommended installation of a traditional LPG sphere for receipt and storage, with associated fire-fighting systems /cooling water, as the most cost effective installation. A drawing of a typical storage sphere and ancillaries is provided in Appendix 2.

4.3 Tanker Moorings/ Discharge Pipelines

Since in all likelihood pressurised vessels (small) will be used for shipping LPG to Bosaso, it is not envisaged that cryogenic discharge pipelines will be needed. If refrigerated vessels (large) were to be used then we would expect the terminal storage to be ambient with the vessel heating/ warming the cargo on discharge, but this is an unlikely scenario.

There is not an existing jetty structure at the selected site. Therefore, a new tanker jetty will need to be constructed, which will be the most cost-effective solution.

4.4 Bottling Plant - Capacity

The market survey work suggest that the desired market penetration should initially be supported by the introduction of 3Kg, 6Kg and 13Kg cylinders for domestic users, in addition to 20 Kg cylinders (wealthy households and small catering businesses) and 50 Kg cylinders (institutions, hotels, larger catering businesses).

The bottling plant capacity will be sized to allow filling operations to run 240 days per annum on a single shift basis. Short term increases in demand could be met by double shifting and possibly week-end working.

Capital costs will be estimated accordingly.

5. LPG Supply Options - International Market Access

5.1 Current Supply Arrangements

Currently product is imported into Puntland and Somaliland in cylinders and ISO Containers, mainly from the UAE and Yemen.

The Arabian Gulf (AG) is a major source of LPG, which is mostly exported in refrigerated vessels (Very Large Gas Carriers – VLGCs) carrying +/- 45,000 tonne cargoes, primarily to Asian markets. The supply terminals do not usually permit loading of small pressurised LPG tankers, so as a direct source this supply option would not work for the relatively small cargoes required for Puntland. ENOC, from their Condensate Splitter Units in Jebel Ali, was but is no longer a supplier of small refrigerated cargoes since all their LPG production is absorbed into the UAE market.

CHART/IMAGE 13: VERY LARGE GAS CARRIER (REFRIGERATED)

Current practice is to supply the East African coastline from Kenya southwards (occasionally including Djibouti) from floating storage moored off Mauritius. Floating storage capacity is around 20,000 tonnes, all pressurised. Delivery is put into effect using VLGC's en route from the AG, which discharge a part cargo and proceed on to Asian destinations.

CHART/IMAGE 14: SMALL LPG TANKER (PRESSURISED)

To avoid piracy-affected areas, vessels carrying smaller cargoes can route alternatively south of Madagascar and run along the African coast, but this arrangement incurs high freight costs. Some supplies are made to northern areas (e.g. Djibouti) in refrigerated vessels out of regional refineries such as Sohar (Oman).

5.2 Market Traders

The main traders supplying this market are Shell, Vitol and Petredec, who should be contacted in due course. Their relevant offices and contact details are provided in Appendix 3.

6. LPG Pricing

LPG is priced into the whole Asian market at prices FOB AG set at the beginning of each month by Saudi Aramco, the so-called Contract Price (CP). Prices for supplies into the East African markets are established on the same basis with a premium added for freight, insurance, profit and risk.

The Saudi Aramco CP price comes into effect on the first day for the month and applies to all loadings ain that month. The CP price does not change during the month, irrespective of what happens to crude or other product prices during that month, rise or fall. Platts publishes daily prices for pressurised LPG cargoes, Argus for refrigerated LPG cargoes.

In terms of price hedging, the C3 swaps market is active but not for C4. The former may be used to hedge C4 price risk but the Basis Risk is high.

Historically, prior to the advent of piracy in the region, prices CFR Mombasa equated to CP + 125/150 $/Tonne. For the past 5/6 years or so prices have been significantly higher, and for the last 12 months CFR Mombasa prices have equated to CP + 300 $/Tonne. Prices CFR Philippines, for example, are lower, approximately CP + 100/140 S/tonne.

7. Proposed/ Recommended Business Model

For the purposes of this evaluation we have assumed that the business will be established on the basis of the principles outlined below:

- Participants from the public, private and international sector form a new joint venture enterprise (the JV) for the purposes of importing bulk LPG into Bosaso and distributing it to the market.
- JV invests in the establishment of the storage terminal, tanker discharge facilities, bottle filling plant and bottles for supply and distribution to the market (the terminal).
- JV secures LPG cargoes from the market on the most advantageous terms and imports into Bosaso.
- JV operates the terminal and bottling facilities in the most efficient and cost-effective manner consistent with internationally recognised standards of Health, Safety and Environment Protection.
- JV and Government agree that to attract investors the return on investment[12] and the operating costs of the terminal will be underwritten by the Government through payment of a unit throughput charge[13].
- JV sells bottled gas to Distributors ex-terminal at market prices less a Distributors Margin[14] (details of cylinder deposits and handling to be develop).
- JV sells semi-bulk LPG ex-truck to end-users using its own bulk vehicles[15].
- Difference between the netback from the market to the point of importation (selling prices minus Distributors Margin minus annual terminal throughput charge) and import cost of LPG to be covered by a Government subsidy payable to the JV (or if in credit paid to the Government by the JV).

[12] Return on Investment to be agreed and to be applied in perpetuity. Arrangement could be finessed by reducing the guaranteed return but allowing investors to reap any upside financial benefits.

[13] Charge to be set at the beginning of each year based on estimated throughput and adjusted at the end of each year based on actual throughput to keep investors whole.

[14] Distributors Margin in a free market would be set by market conditions but in the initial stages of market devolvement it will probably need to be regulated by the Government.

[15] This development is most likely to be a later business development rather than from the outset.

8. Methodology

8.1 Affordable Price for LPG

The market survey has generated valuable data relating to the 'affordable price' that an urban domestic charcoal user can justify paying, such that his fuel bill would be comparable with his existing cost of charcoal.

Besides its many health and environmental benefits, LPG offers two main economic advantages over charcoal:

- Its calorific value is higher
- LPG stoves used for cooking should be more efficient than charcoal stoves, even widely used 'Birjiko' stoves in the latter case

Comparative figures and the respective conversions are provided in the following table.

TABLE 13: CALORIFIC VALUES AND STOVE EFFICIENCIES

Calorific Values:			**Stove Efficiency[16]:**		**Conservative Estimate[5]:**	
Charcoal	MJ/Kg	29.6	%	22.8	%	35
LPG	MJ/Kg	46.1	%	53.15	%	50
Conversion		1.5574		2.3311	%	1.4286

What this means in its simplest form is that all other things being equal and ignoring hardware (cylinder and stove) costs, using the 'stove efficiency' figures above the end-user can afford to pay for LPG 3.63 times the $/Kg price he pays for charcoal (1.5574 X 2.3311) and using the 'conservative estimate' figures 2.22 times the price he pays for charcoal (1.5574 X 1.4286).

8.2 Netback Value to Bosaso from Affordable Price

The following table sets out the calculation of the netback from each of the towns surveyed in Puntland based on the above 'conservative estimate' figures.

TABLE 14: NETBACK VALUE

PUNTLAND	Average Unit Costs [1]		LPG Break Even Price vs. Charcoal[2]	Transport Cost[3]	Transport Differential[4]	Distributor Margin[5]	Netback Bosaso[6]
	$/Kg	$/Kg	$/Kg	$/Cylinder	$/Kg	$/Kg	$/Kg
CITY	CHARCOAL	LPG	LPG		LPG	LPG	LPG
Badhan	0.75	2.97	1.67	4.00	0.20	0.17	1.30
Bocame	0.81	-	1.79	4.00	0.20	0.18	1.41
Bosaso	1.06	2.63	2.35	1.00	0.05	0.23	2.06
Buhodle	0.72	5.17	1.61	4.00	0.20	0.16	1.25
Galkayo	0.75	2.27	1.67	4.00	0.20	0.17	1.30
Garowe	0.75	2.59	1.67	2.00	0.10	0.17	1.40
Average							1.45

1. Actuals from market survey	2. Charcoal price X 2.22
3. Actuals as advised	4. Basis 40 Kg cylinder containing 20 Kg of LPG
5. Assumes 10% of LPG selling price (2)	6. = 2-4-5

The foregoing table indicates that the average netback from the market at the affordable LPG price would be 1.45 $/Kg, or 1,450 $/Tonne.

N.B. The LPG break-even prices as calculated in the above table are highly competitive with the prices charged by importers under existing regimes as shown in our Market Report of July 2014, Table 5.

8.3 Bosaso Terminal Throughput Charge

Taking into account comparable throughput charges applicable in the region, we have based our Base Case assessments on assumed throughput charges of 150 $/Tonne and 200 $/Tonne.

Of course, the throughput charge (the total of unit charges levied for receiving, storing, delivering/ filling LPG bottles) may be set at any level but we believe that the JV will need to accrue revenues from levying charges of this order of magnitude to ensure its financial viability.

8.4 Import Cost and Margins

The average netback from the market to Bosaso is 1.45 $/Kg, i.e. 1,450 $/Tonne, refer Section 8.2. Subtracting the Bosaso Terminal Throughput Charge and the LPG Import Cost for the past 13 months gives an indication of the surplus (or deficit) that would have been generated during this period.

The results are shown in the following table.

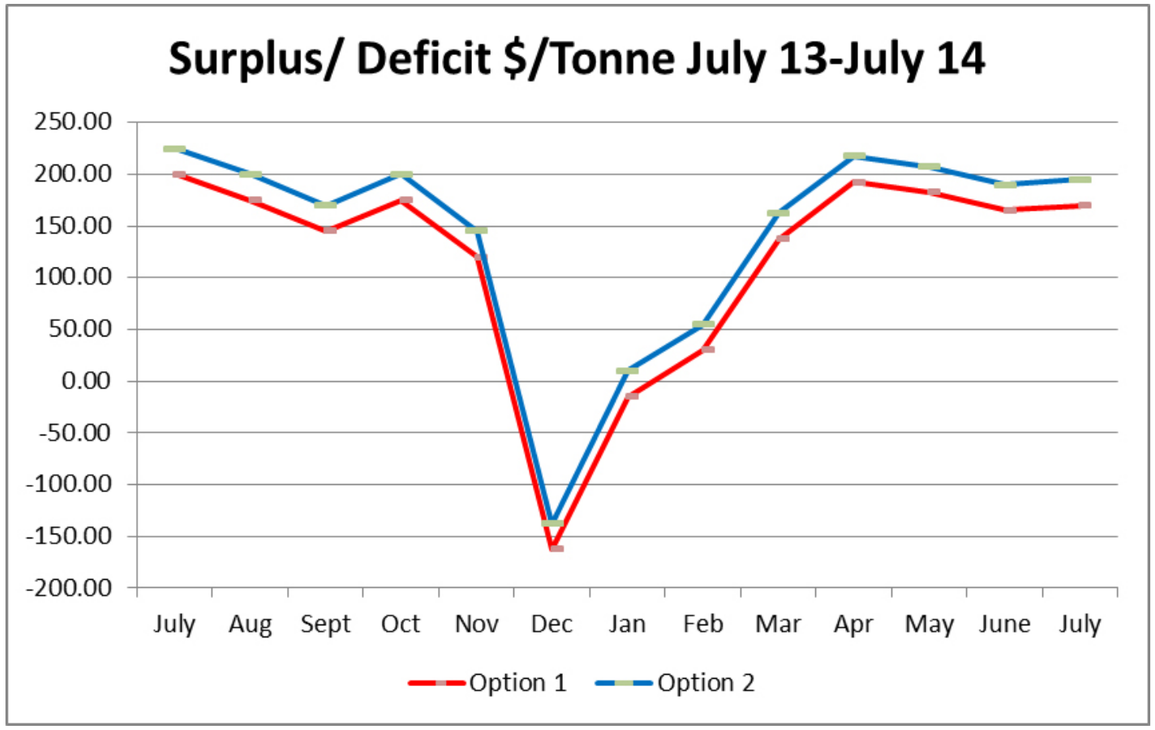
TABLE 15: SURPLUS/DEFECIT $/TONNE JULY13-JULY14

Saudi Contract Price FOB AG $/Tonne			Average $/Tonne	CFR[1] $/Tonne	Terminal $/Tonne		Netback $/Tonne	Surplus/ Deficit $/Tonne	
	C3	C4	C3+C4		Option 1	Option 2		Option 1	Option 2
2013									
July	795	805	800.00	1100.00	150	200	1450	200.00	150.00
August	820	830	825.00	1125.00	150	200	1450	175.00	125.00
September	850	860	855.00	1155.00	150	200	1450	145.00	95.00
October	820	830	825.00	1125.00	150	200	1450	175.00	125.00
November	875	885	880.00	1180.00	150	200	1450	120.00	70.00
December	1100	1225	1162.50	1462.50	150	200	1450	-162.50	-212.50
2014									
January	1010	1020	1015.00	1315.00	150	200	1450	-15.00	-65.00
February	970	970	970.00	1270.00	150	200	1450	30.00	-20.00
March	855	870	862.50	1162.50	150	200	1450	137.50	87.50
April	770	845	807.50	1107.50	150	200	1450	192.50	142.50
May	810	825	817.50	1117.50	150	200	1450	182.50	132.50
June	835	835	835.00	1135.00	150	200	1450	165.00	115.00
July	820	840	830.00	1130.00	150	200	1450	170.00	120.00
1. African East Coast Premium 300 $/Tonne									

[16] *Stove efficiency figures quoted in public sources are 'variable' and may be subject to revision.*

The following chart shows graphically the surplus (deficit) for the period concerned.

CHART/IMAGE 15: SURPLUS/DEFICIT $/TONNE JULY 13-JULY 14



It will be seen that a healthy surplus would have been generated for all months except December 2013 to January 2014, when a subsidy would have been required to maintain the throughput charge necessary to maintain the financial viability of the terminal and distribution operation.

The international market prices for LPG streams were relatively high during this period due to tight supplies and the onset of seasonally cold weather in the Northern Hemisphere and Northeast Asia, which (as would be expected) were not matched by increased charcoal prices in the Puntland towns. The volatility of the international price of LPG represents a threat to the commerciality of the business of importing and distribution, in respect of which investors would naturally seek firm assurances from Government.

Over the period concerned, assuming a throughput charge of 150 $/Tonne and a monthly throughput of 1,000 Tonnes per month, the net surplus position would have totalled US $1.5 million. Such an outcome could not be guaranteed for future periods but market commentary widely suggests that the growing boom in shale oil and gas production in the US will fuel very significant LPG exports from the US into already well supplied LPG markets in Asia, the traditional home for large refrigerated cargoes exported from the Arabian Gulf region.

The propensity medium to longer term will therefore be for the Saudi Contract price to come under increasing downward pressure, hence, all things being equal, reducing the risk of the need for a subsidy on inland LPG supplies.

9. Financial Analysis

9.1 Financial Model and Base Case Assumptions

We have developed a model for evaluating the financial feasibility of developing a new bulk LPG import and distribution business at Bosaso. The assumed Business Model is as described in Section 7 above.

The assumptions made are as set in the tables below (figures highlighted in yellow are entered figures in the financial model:

TABLE 16: CAPEX AND SCHEDULING

Capex and Scheduling					
Period	**Year -1**	**Year 0**	**Year 1**	**Year 2**	**Total**
Storage		2,000,000	665,000		2,665,000
Jetty		1,000,000	500,000		1,500,000
Pipes/ Pumps/ Tanker Loading		400,000	800,000		1,200,000
Electrical Installation		900,000	1,000,000		1,900,000
Civils/ Buildings/ Roads		1,500,000	700,000		2,200,000
Fire Protection		500,000	750,000		1,250,000
Security			250,000		250,000
Cylinder Filling Plant			500,000		500,000
FEED	160,000				160,000
PM/ Commissioning	30,000	100,000	240,000		370,000
Site supervision		200,000	280,000		480,000
Sub-total	190,000	6,600,000	5,685,000		12,475,000
Contingency @ +20%	38,000	1,320,000	1,137,000		2,495,000
Fixed Facilities Total	228,000	7,920,000	6,822,000		14,970,000
Cylinders/ tanks		1,367,361	820,417	546,944	2,734,722
Land					0
Total ($)	228,000	9,287,361	7,642,417	546,944	17,704,722

#Costs of land have been provisionally assessed as shown in the following table.

TABLE 17: LAND/WAYLEAVE COST ESTIMATES

# Land	Area	$/m2	Year 1 Cost $
Terminal	65,000	5	325,000
Wayleaves	0	15	
Annual Escalation %		2.0	

TABLE 18: LPG WORKING LOSSES

Assumed losses LPG	0.50%
Conversion m^3 Tonnes	1.908

TABLE 19: ANNUAL FIXED OPERATING COSTS

Annual Fixed Operating Costs $		
Salaries & social taxes		79,200
Marketing costs		30,000
Office costs		15,000
Insurance	0.50%	29,424
Utilities		50,000
Other fixed		50,000
Land rent		-
Total		253,624
Operating Cost Escalation		2%

TABLE 20: ANNUAL STAFF COSTS

Annual Staff Costs $				
		Daily Rate	**Daily Cost**	**Annual Cost**
Superintendent	1	50	50	18,000
Supervisors	2	30	60	21,600
Labourers	9	10	90	32,400
Sub-Total				72000
Benefits				10%
				79,200

TABLE 21: WORKING CAPITAL CALCULATION

Working Capital		
Stock		
Storage capacity cubic metres		2,000
Storage capacity Tonnes		1,048
Minimum stock days sales		10
Maximum stock % of capacity		90%
Assumed Import Cost $/Tonne		1,150
Days Sales		
Days sales financing		30
Total stock plus days sales		671,104
Interest Rates		
Capex finance		10.00%
Working Cap (premium)	0.20%	10.20%

TABLE 22: TERMINAL VALUE OF FACILITY

Terminal Value of Facility	
Methodology:	
Replacement Value minus Depreciation	
Assumptions:	
Cash Flow	10 years
Terminal Value	Assessed at Year 11
Replacement Value	Original Value escalated at 2% per annum
Assumed life of asset	30 years
Depreciation	Straight line

TABLE 23: VOLUME AND THROUGHPUT CHARGE PROJECTIONS

Volume and Throughput Charge Projections				
		Year 1	**Year 2**	**Year 3**
Annual Volume	Tonnes	5,000	8,000	10,000
Growth Post Year 3	10%			
Throughput Charge (Marine and Terminal) $/Tonne				
Base Case		150.00		
Annual Escalation	10%			

TABLE 24: DISCOUNTED CASH FLOW 100% EQUITY

Period	Year -1	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8
Income										
Loan	-	-	-	-	-	-	-	-	-	-
Sales Revenue	-	-	750,000	1,260,000	1,653,750	1,910,081	2,206,144	2,548,096	2,943,051	3,399,224
Cylinder Deposit			1,367,361	820,417	546,944					
Total Income	-	-	2,117,361	2,080,417	2,200,694	1,910,081	2,206,144	2,548,096	2,943,051	3,399,224
Outgoing										
Investment Terminal	228,000	7,920,000	6,822,000	-						
Working Capital			1,093,823	330,822	220,548	110,274	121,301	133,432	146,775	161,452
Investment Cylinders		1,367,361	820,417	546,944						
Operating Costs	-	-	329,884	336,481	343,211	350,075	357,077	364,218	371,503	378,933
Land/ Wayleave Rent			325,000	331,500	338,130	344,893	351,790	358,826	366,003	373,323
Interest	-	-	-	-	-	-	-	-	-	-
Loan Repayment	-	-	-	-	-	-	-	-	-	-
Total Outgoing	228,000	9,287,361	2,569,123	1,545,748	901,889	805,242	830,168	856,476	884,280	913,708
Net Cash Flow	- 228,000	- 9,287,361	- 451,762	534,669	1,298,806	1,104,840	1,375,975	1,691,620	2,058,771	2,485,516
Terminal Value										
Overall net cash flow	- 228,000	- 9,287,361	- 451,762	534,669	1,298,806	1,104,840	1,375,975	1,691,620	2,058,771	2,485,516
NPV (15%)	*$*	123,131								
NPV (10%)	*$*	3,572,454								
IRR		15.2%								

The 50% leveraged case, as shown below, assuming a unit throughput charge of 150 $/Tonne to cover operating costs and bank financing costs (10% interest with a 10 year loan repayment period) generates an IRR of 18.3%

9.2 Discounted Cash Flow Base Cases - Internal Rate of Return (IRR)

We have run two Base Cases as follows, both assuming a terminal throughput charge of 150 $/Tonne escalating at 5% per annum:

- Unleveraged – 100 % equity
- Leveraged – 50% bank borrowing at a commercial rate of 10%

As shown in the following Discounted Cash Flow, the unleveraged case assuming recovery of a unit throughput charge of 150 $/Tonne generates for investors an IRR of 15.2%.

TABLE 25: DISCOUNTED CASH FLOW 50% EXTERNAL FINANCE

Period	Year -1	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Income												
Loan	125,400	5,120,589	-	-	-	-	-	-	-	-	-	-
Sales Revenue	-	-	750,000	1,260,000	1,653,750	1,910,081	2,206,144	2,548,096	2,943,051	3,399,224	3,926,104	4,534,650
Cylinder Deposit			1,367,361	820,417	546,944							
Total Income	125,400	5,120,589	2,117,361	2,080,417	2,200,694	1,910,081	2,206,144	2,548,096	2,943,051	3,399,224	3,926,104	4,534,650
Outgoing												
Investment Terminal	228,000	7,920,000	6,822,000	-								
Working Capital			546,911	165,411	110,274	55,137	60,651	66,716	73,387	80,726	88,799	97,679
Investment Cylinders		1,367,361	820,417	546,944								
Operating Costs	-	-	329,884	336,481	343,211	350,075	357,077	364,218	371,503	378,933	386,511	394,241
Land/ Wayleave Rent			325,000	331,500	338,130	344,893	351,790	358,826	366,003	373,323	380,789	388,405
Interest	-	-	580,384	544,796	503,584	456,748	410,474	364,820	319,845	275,619	232,217	189,720
Loan Repayment	-	-	524,599	524,599	524,599	524,599	524,599	524,599	524,599	524,599	524,599	524,599
Total Outgoing	228,000	9,287,361	3,127,194	2,449,731	1,819,798	1,731,452	1,704,591	1,679,179	1,655,337	1,633,200	1,612,915	1,594,644
Net Cash Flow	- 102,600	- 4,166,773	- 1,009,833	- 369,315	380,897	178,630	501,553	868,918	1,287,714	1,766,024	2,313,189	2,940,006
Terminal Value												14,105,855
Overall net cash flow	- 102,600	- 4,166,773	- 1,009,833	- 369,315	380,897	178,630	501,553	868,918	1,287,714	1,766,024	2,313,189	17,045,860
NPV(15%)	$	1,109,948										
NPV(10%)	$	3,921,325										
IRR	18.3%											

Reducing the cost of finance to 7% increases the IRR to 19.7% and increasing the bank borrowing to 70% increases the IRR further to 23.20%.

9.3 Sensitivity Review

Our sensitivity review results are summarised in the following table.

TABLE 26: SENSITIVITY CASES

Sensitivity Cases	IRR @ 100% Equity		IRR @ 50% External Finance	
Throughput Charge $/Tonne	150.00	200.00	150.00	200
Base Case				
Volume	15.2	20.3	18.3	25.8
Capex + 20%	13.0	17.6	9.5	15.0
Capex – 20%	18.0	23.6	22.4	30.8
Rent 10 $/m2	12.6	17.7	14.4	21.8
Operating Costs +50%	13.9	19.0	10.7	16.3
Optimistic Case				
Volume	19.7	25.6	24.8	33.4
Capex + 20%	17.3	22.7	21.3	29.2
Capex – 20%	22.7	29.1	29.2	38.7
Rent 10 $/m2	17.3	23.3	21.2	29.7
Operating Costs +50%	16.1	22.1	19.4	27.9

The Base Case assumptions show that the project would generate attractive returns for investors at a throughput charge of 150 $/Tonne, which are significantly improved using the Optimistic Case assumptions.

The foregoing points to the following factors as being critical for the success of this venture:

- Financing the project through external finance does not improve the IRR that significantly. Whether external finance could be obtained from the independent banking sector might be uncertain given the general security situation in the region. Possible options would be the major institutions such as World Bank, IFC and African Development Bank.
- Success will be dependent on achievement of market volume projections, for which there would need to be relentless drive in terms of financial support to end-users and sales promotion initiatives.
- Success will also depend on the structure of the company and how the business is run and the supply chain costs of LPG imports.
- Close management of the engineering aspects of the project and cost control will be critical to completion within capex budgets and achievement of expected returns.
- The cost of land will be a major factor affecting the project economics and every effort should be made to limit initial rentals and escalation factors. With the structure and business model envisaged, it will not be possible to pass on higher land costs to consumers and they will need to be covered by or compensated for by subsidies or other forms of support.

10. LPG Market Promotion and Development

10.1 Overview

The latent demand for LPG in Puntland is substantial. Barriers to expanding the use of LPG have been affordability, unreliable/ limited availability and lack of public awareness with regard to LPG as a domestic fuel.

The Government wishes to promote the use of LPG to reduce deforestation and to ensure sustainability of forest cover. Government policies and the national development plan point to a commitment to promote LPG as an alternative fuel to wood based fuels (mainly charcoal and firewood).

Specific roles to be played by the Government include support for installation of bulk import facilities; participation in public awareness campaigns on LPG use; fiscal measures to reduce taxes on LPG product and appliances; and drafting appropriate regulations and standards to mainly ensure LPG safety and fair/ free trade.

10.2 LPG Demand Drivers

Table 27: LPG demand drivers

	LPG Demand Drivers	Outcomes
1	Macro-economic Factors: Per capita GDP growth Household incomes growth Population growth and Rural to Urban migration	Limited availability of reliable macro-economic and socio-economic data and information in Puntland hinders reliable modelling of LPG demand projections.
2	LPG Supply availability and reliability: Bulk LPG import infrastructure Expanded and efficient LPG distribution systems	Critical initial investment in terminal unlocks LPG demand. Investment reduces LPG unit supply costs (and price).
3	Affordability – reduced initial and refill costs: Reduced supply costs (bulk imports infrastructure) Introduction of smaller size cylinders Consumer credit for initial appliances costs Tax reduction on LPG product and appliances LPG product subsidies	Interventions lower LPG consumer entry and refill costs and promote more demand.
4	Public awareness: Market survey showed that after price, ignorance on LPG use is highest barrier to switch from wood-based fuels to LPG.	Emphasise: Economic benefits – higher unit price but correspondingly higher energy content (simplified message) Health benefits vs. charcoal Safe handling in domestic environment Environmental benefits to region and country
5	Government environmental interventions: Discourage use of charcoal by making it more expensive relative to LPG.	Introduce taxes on charcoal
6	LPG Legal and Regulatory Regulations: LPG safety regulations Open market regulations (promote fair competition) LPG trade licensing (ensures standards and legal trade)	Ensure safety and provide consumer confidence. Encourage private enterprise by ensuring free market and absence of harmful trade malpractices.
7	International support: Infrastructure funding Specific LPG promotion programs	Environmental protection is a global concern requiring global approach/ support.
8	Government Fiscal Interventions: Reduced taxes on LPG product and appliances Investor tax relief on construction materials import taxes and income tax	Lower entry threshold for lower income households. Consider tax incentives for investors.

10.3 LPG Market Development Action Plan

An LPG market development plan should prioritise implementation of the LPG demand drivers in a sequence that systematically adds impetus to LPG demand build up.

10.3.1 Legal, Institutional and Regulatory Framework

A legal and regulatory framework should provide the confidence for investors to provide their capital to develop facilities and businesses. This regulatory capacity should serve to facilitate achievement of safe LPG facilities, distribution processes and safety at consumer locations. If LPG safety is not perceived and assimilated by the potential consumers, it will be difficult to achieve widespread LPG acceptance in the market.

The Puntland Second Five-Year Development Plan 2014-2018 states that the Puntland State Authority for Water, Energy and Natural Resources Corporation (PSAWEN) in the Central Government body (Puntland level) is the sole institution responsible for water, energy and minerals. It is understood that in practice PSAWEN may not fully exercise its responsibilities in the energy sector. The Ministry of Environment is the Government agency responsible for the environment and it is understood that this ministry, and the Ministry of Commerce and Industry can be the competent authorities for development of LPG usage in Puntland.

Whatever the situation, in the absence of an all-encompassing Energy Law or a Downstream Petroleum Law, the Government should enact a stand-alone LPG Law that empowers the relevant competent authority (the authority) in respect of LPG trade thereby permitting it to draft and implement LPG regulations and standards.

The authority should be provided with resources (budget, personnel, training etc.) to make it an effective agency for LPG business promotion, regulation and monitoring. When capacity is established within the authority it should encourage international donors and NGOs to associate with Puntland in the promotion of LPG demand by providing the necessary resources.

It is recommended that the prospective new business enterprise is operated under the umbrella of the authority and is managed by a consortium of private companies governed by a board of directors.

10.3.2 LPG Supply and Distribution Chain

An efficient supply chain is the foundation for sustainable LPG demand growth that encompasses affordability and availability of LPG:

- **Bulk Import Facilities.**

Construction of appropriately sized bulk LPG import facilities is the critical base on which LPG demand shall grow. The facility permits increased LPG supplies at lower unit import costs.

In the initial years, project cash inflows for investors may be low due to carried higher initial installed capacity compared with the initial demand. It is therefore important that the Government be prepared to offer sufficient and attractive financial and, if necessary, fiscal (tax free) incentives to investors.

- **Joint Importation of LPG.**

Getting LPG importers in Puntland to organize themselves to undertake joint importation of bulk LPG will make it possible to create larger cargoes sufficient to attract lower freight cost by reducing dead-freight and demurrage. Joint shipments certainly improve economies of scale, with lower unit cost that translate to lower prices and finally higher LPG demands and this option will need to be explored in due course.

Opportunities for multi-port Joint importations (Bosaso-Berbera-Djibouti-Mogadishu) should be explored and developed as a further step to reduce unit import costs through increased economies of scale.

- **LPG Cylinder Filling and Distribution.**

In due course, at each of the key towns of Badhan, Bosaso, Buhotle, Garowe, Galkayo, there should be sufficiently sized intermediate storage and cylinder filling capacity. This shall permit increased distributorship network and competition. Transfers of LPG from the import depot to filling plants and to bulk institutional consumers shall involve investment in appropriately sized bulk LPG trucks.

Converting institutional consumers from cylinders to use of small bulk tanks (1 to 5 tons) medium term will further reduce costs, while making LPG re-orders more efficient.

- **Common User (Open Access) Facilities.**

To reduce market entry barriers, the Government should encourage and license import and filling facilities as common user facilities. This increases facility utilization while avoiding investment duplication. Common user and open access facilities reduce unit operating costs which finally translate to lower prices. This model of operations also helps to bolster competition by making market entry easier.

- **Dealers/ Distributors**

The future role and remuneration of dealers/ distributors, not only for LPG but also for charcoal, will need to be clearly defined and set out in legislation.

10.3.3 LPG Cylinders Rationalisation

- **Standardized Sizes of Cylinders.**

LPG market regulation could establish a set of standard cylinder sizes meeting consumer needs and achieving distribution and filling efficiency and convenience. Criterion for size selection is affordability (initial and refill) by various household income groups and ease of handling (total weight). The smaller size cylinders shall in particular lower the refill costs for lower income consumers while reducing the “initial equipment cost” barrier.

It is recommended that 3Kg, 6 Kg, 13 Kg, 40 (or 25 and 50) Kg be established as the standard cylinder sizes. The other “non-standard” cylinders could be phased out over time.

- **Smaller Size Cylinders**

In Kenya, which could be a model for LPG market development in Puntland, introduction of the 6 Kg cylinder has increased LPG household use. The 6 Kg cylinder comes with a simple grill fixture and therefore it does not require a separate burner/ stove. The initial costs and refill costs are relatively low and the cylinder is conveniently portable. The Kenyan market has subsequently introduced the 3 KG cylinder. By way of further example, Somgas supplies 2Kg, 4Kg, 11Kg and 22Kg cylinders in Somaliland. Cylinder sizes to be introduced to the market will have to be decided nearer the time of project launch.

TABLE 28: LPG CYLINDER DISTRIBUTION IN KENYA (2011)

Package	Estimated No. of cylinders	%age of sales
6 Kg	300,000	60%
13 Kg	250,000	30%
22 Kg	40,000	10%

The following table shows the initial entry costs for the main cylinder sizes in Kenya (July 2014).

Cylinder Size	LPG Refill US$	Hardware (US$)		Total Initial Cost US$
		Cylinder	Burner &Fittings	
13 Kg	35.6	40	60.4	136.0
6Kg	16.1	18	7.5	41.6
3Kg	8.0	5.1	7.5	20.6

Clearly, the 6 Kg cylinder is a very attractive option to be considered for the Puntland market.

- **Cylinder and Appliances Microfinance**

Credit is a very important step for LPG consumer entry, especially for the lower income households. Once the 6 Kg and 13 Kg and possibly other sized cylinders have been introduced, the next important and critical step is to link the LPG marketers with the microfinance sector to provide the initial cash to procure the cylinder and cooker. This may involve setting up loans and repayment through monthly instalments.

10.3.4 Public Awareness Campaign (Media Plan)

- **Responsibility For Campaigns**

The objective of the public awareness campaign will be to emphasize LPG as a cost-effective and safe fuel that is clean and convenient. The environmental

message should seek to educate the public on the need to preserve forests by turning towards the use of LPG. Public awareness campaigns are a shared responsibility between LPG marketers, Government and INGOs, NGOs etc. This is because there is the business interest and the national environmental significance.

- **Timing Of Campaign**

For full impact and effectiveness, market development launch campaigns should be undertaken once the regulatory framework is in place, infrastructure in terms of import bulk storage and the distribution network are established and cylinder sizes are rationalized. Adeso in consultation with the Ministry of Environment, and gas companies should lead this campaign.

- **Medium of information**

Communication should target the most popular medium that offers maximum outreach and impact and should consider the following:

» Language: The national language (Somali) should cover the target market.

» Print media: LPG supplements and advertisements in the local publications will greatly add to the information to be put across. Flyers and brochures should also be given out to the public from strategic points.

» Electronic Media: The use of television and radio advertisement and talk shows to reach the wider population.

» Demonstrations: Live demonstrations should be used on usage of LPG. This can be in form of road shows for targeted village groups.

10.3.5 Fiscal Interventions and Incentives

- **Reduced Import taxes.**

To reduce the threshold price that permits charcoal users to convert to LPG the Government may wish to consider reducing taxes on LPG product, cylinders and appliances.

- **Investor Incentives**

Should the return on bulk import facilities turn out as inadequate for investors, the Government should consider waiving import taxes on construction materials; and also providing income tax relief for an appropriate length of time.

11. Recommended Way Forward

11.1 Government Support

The extent to which the prospective bulk import facility can provide the means to facilitate a switch to LPG from charcoal for domestic use to the extent envisaged is highly dependent on the encouragement and support provided by the Government in respect of the critical success factors highlighted in this report.

It is uncertain at this stage whether the opportunity will attract investment from the independent banking sector, even though under any scenario bank finance will improve the IRR as compared with eh 100% equity case. We therefore propose that the Base Case 100% equity should in the first instance be taken as the reference point for further consideration of the project, which yields an IRR of 11.2% assuming the JV receives a throughput fee of 150 $/Tonne.

Whilst, given the economic and political situation prevailing, such a return might not be attractive to international bankers, it should be of interest to local investors and the international institutions sharing the Government's vision of environment protection by reducing charcoal consumption and, thereby, deforestation.

We have set out below the main risks to the venture and how the Government might provide necessary support through management and underwriting measures.

11.2 Import Cost Subsidy

As indicated in Section 8.4, based on historical data for the past 13 months, in general for much of the year the netback from the market minus the terminal throughput charge minus import cost will generate a surplus and for the northern hemisphere winter period a deficit will result.

We would suggest the following as an option for managing these imbalances:

» Credits to be accumulated and paid over by the JV monthly to a central fund managed by, say, the Ministry of Finance.

» A percentage, say 10% or 20% of any surpluses could be retained by the JV as an incentive to encourage efficiency in supply chain management, operating cost management and profitability improvement.

» The accumulated credit to attract interest, payable into the fund by the Central Bank.

» Deficits arising from high import costs to be claimed by the JV monthly for payment out of the central fund.

» A running balance to be maintained by the Treasury/ Ministry of Finance.

11.3 Market Price of Charcoal

Potentially under the influence of a growing LPG domestic market, the price of charcoal could diminish and in so doing undermine the fundamental economic drivers of the project. It will beholden on the Government to tax charcoal supplies to the extent necessary to ensure stability of the domestic charcoal price and that it does not become eroded. Taxation will impact on the rural community where the use of charcoal is widespread and the probability of consumers switching to LPG is lower, but such a measure is unavoidable and beyond the short terms will help to encourage LPG usage.

Since the charcoal price and public education are the key components determining the affordable LPG price and hence is a key driver for the project, it will need to be constantly monitored and managed by regulation to ensure that LPG remains the more economic fuel for domestic consumers.

11.4 Distributors and Distributor Margin

The Distributor Margin (DM) is a key component in the supply chain cost structure to market and impact directly on the netback calculation from which the surplus/ deficit over import cost is assessed.

Whilst ultimately it would be preferable for the DM to be established by competition in the market, it would be necessary initially at least for the DM to be regulated and set by the Government. The arrangements are likely to be complex, given possibly the different transportation costs that

distributors will have to cover out of the DM for the different towns but we would suggest that such arrangements would be unavoidable in the initial phases of the project and key to effective market development.

One solution, for consideration, would be for the JV to be responsible for and to cover the costs of delivery to the towns, with the distributors receiving a fixed DM irrespective of location. Consultation with distributors and other market participants will be necessary to achieve the appropriate solution.

11.5 Competition

From the market survey and analysis to date, it would seem that existing suppliers importing in cylinders and ISO Containers would not be in a position to compete effectively on cost grounds with the prospective new business importing in bulk and filling cylinders in-country.

That is not to say that with competition from the new JV business existing suppliers will not sharpen their supply chain cost management and position them to offer more competitive prices using their existing supply network. However, beyond the short term it is highly unlikely they would be able to compete with a bulk importer with a large and growing volume and existing suppliers are more likely to switch to becoming major distributors and participants in the venture rather than remain as competitors to it.

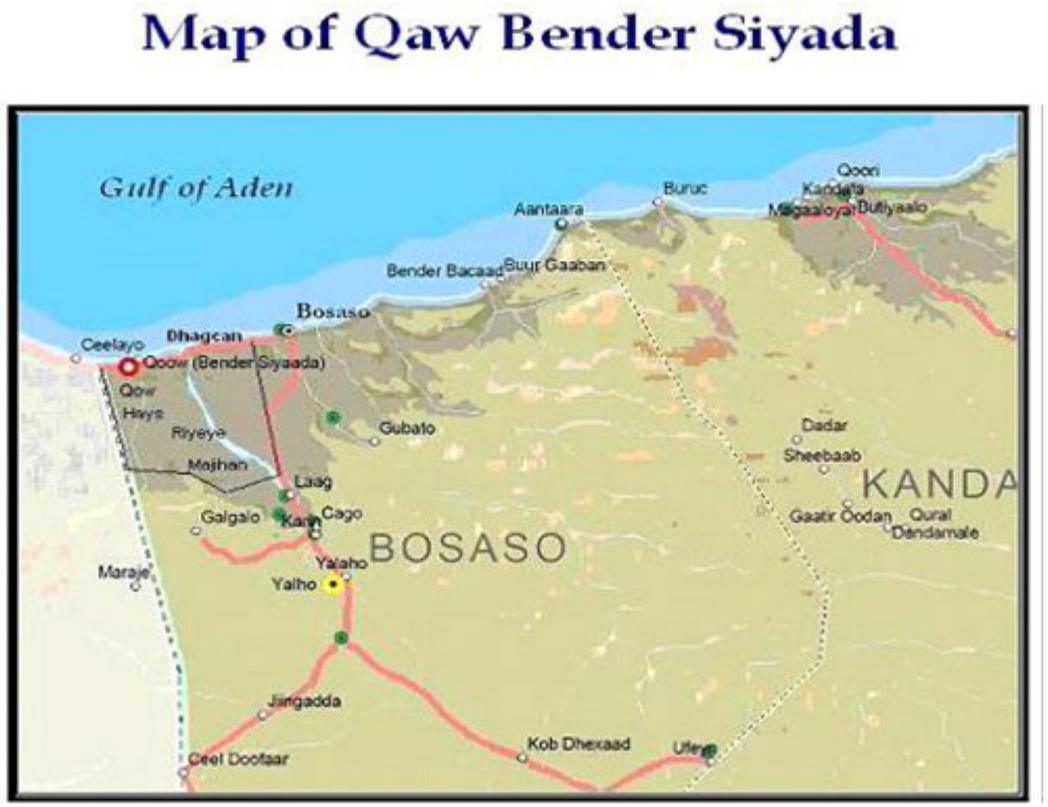
Recent new initiatives by existing suppliers such as offering free supply of a cylinder and stove in exchange for an undertaking from the customer to become a long-term customer may have to be taken into consideration in establishing the marketing strategy for the new JV.

11.6 Next Steps

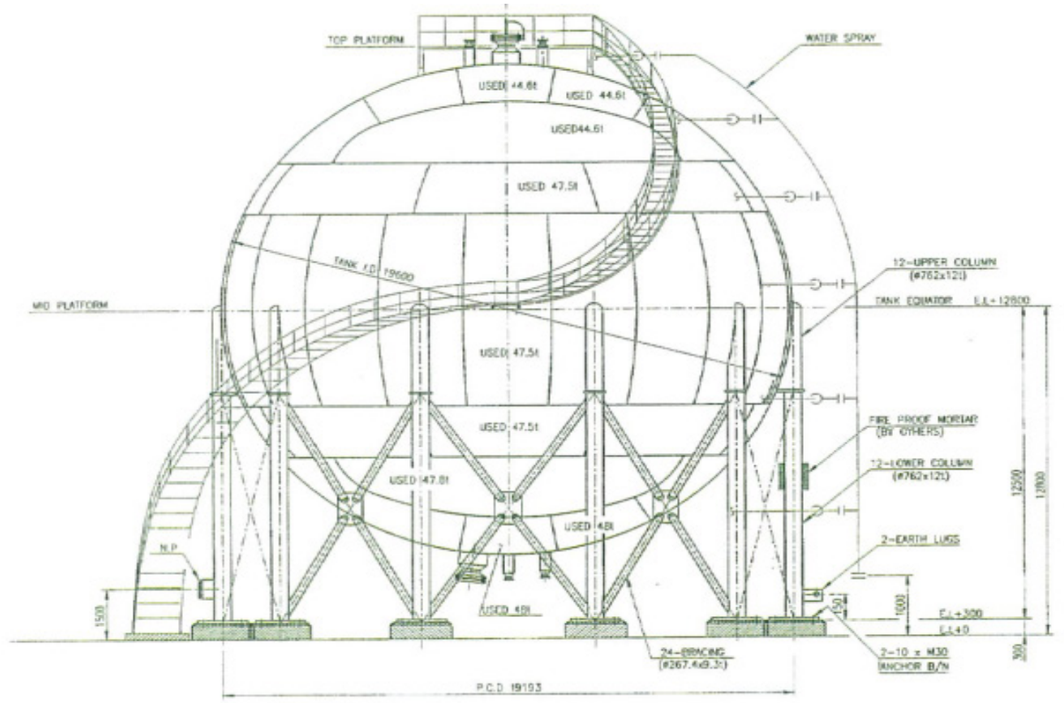
Given the importance of Government's role in ensuring the success of this venture, a Government Awareness Seminar has been arranged in Garowe, Puntland, and the aim is to:

1. Present the findings of our studies for both Puntland and Somaliland.
2. Secure the commitment in terms of the structures and financial support required from Government to ensure success of the venture.

Appendix 1 - Map and Site Location (Red Circle)



Appendix 2 - Example of a Typical LPG Sphere



Deegaankaagu waa noloshaada

Your environment is your life

Ministry of Environment,
Wildlife and Tourism

EUROPEAN UNION

Supporting the Somalia New Deal

Adeso