2249

COMITE PERMANENT INTERETATS DE LUTTE CONTRE LA SECHERESSE DANS LE SAHEL

COMMISSION DES COMMUNAUTES EUROPEENNES

REGIONAL LPG PROGRAM

REGIONAL STUDY ON LPG PRICES AND SUPPLY

Part I : PRICES

- April 1992 -

Seed

Stratégie Energie Environnement Développement
11 bd Brune, 75014 PARIS, France. Tél 33.1.45.45.90.32 - Fax 33.1.45.45.31.08

TABLE OF CONTENTS

PART C - ANNEXES

FOREWORD

SUBSTITUTION ISSUES IN THE SAHEL

Deforestation

The Sahel has to cope with an important and increasing problem of deforestation. Although reliable data are missing, the loss of the natural forest cover is commonly estimated to about hundreds of thousands of hectares per year. The loss is mainly due to clearing new land for agriculture, overgrazing and bush fires.

Without being the main cause of deforestation, cutting trees for firewood and charcoal-making takes also part to the degradation of the environment. Wood shortages have appeared in some areas, every year more worrisome.

The problem is more acute in the supply zones of the big urban centers. It is there where the pressure on land is often the most acute and also where wood producers cut very closed to the ground and rushed by an immediate profit logic not really compatible with the concern of natural regeneration. If in most of the cases, supply areas are within a radius of 50 - 100 km around the city, for a city like Dakar where charcoal comes from 400 to 600 km, it covers most of half of the South of the country.

The necessity to substitute

Facing this threat, the countries of the sub-region have multiplied actions to fight deforestation and projects have been implemented since the beginning of the seventies: numerous wood plantations, village woodlots, agro-forestry, natural forest management or improved stoves.

But one should recognize these actions have achieved mixed outcomes:

- reforestation rates are well below needs and many problems arise concerning the sale of plantation products, as cost prices of planted wood are well above actual selling prices of fuelwood on the market,

- the management of natural woodlands seems nowadays as one of the most promising actions, is still under developed and has to cope with problems which are far from been solved in most of the countries, problems such as regulation, fiscality, and land tenure,

- the dissemination of stoves is trampling in most of the countries and, based on the results obtained so far, a 10% savings is a reasonable expectation, which is hardly more than the urban demographic growth which is often between 5 and 8%.

Then, knowing the limits of the actions on plantation and those on dissemination of improved stove, encouraging the use of substitute fuels appears to be a necessity.

Consequently most CILSS countries, since the mid-eighties, have moved towards the implementation of more global household energy strategies in which substitution plays an important role. Among the alternatives to fuelwood and charcoal, LPG is a promising fuel.

Heterogeneity in the situations

However, the LPG substitution issue takes different terms depending on the country.

Differences are primarily perceived at the forestry resource level. In fact, countries where there are no or hardly any forestry resources, like Cape Verde or Mauritania, are condemned to substitute, and in general, as it will be explained later, in these countries substitution has already been well engaged for some years. On the contrary, countries with still fair wood resources, first like Guinea Bissau but also like Mali and to a lessen extent Burkina Faso and Senegal, resorting to substitution is perhaps less pressing.

But the differences are also expressed in terms of fuels used and food habits:

- on one hand, charcoal has been dominated, in main costal cities, like Dakar or Nouakchott, since quite a longtime, on the other hand, firewood remains largely used in a capital city like Niamey or Ouagadougou: switching from charcoal which is already a modern fuel to LPG represents probably a change in the habits less important than switching from firewood, a traditional fuel, to LPG,

- rice is the main staple in Senegal and in Mauritania and can be easily cooked with LPG, although "touo" widely spread in Mali and in Niger causes problems as it must be frequently "twisted" during cooking and requires a high stability in the stove.

On the contrary, if differences are important based on the forestry resources and habits, most CILSS countries share some common points that imply that substitution policies must be designed and implemented carefully:

- their economies are fragile and their balances of payment deeply in deficits: heavy use of imported substitute fuels could aggravate the situation,

- the fuelwood supply networks to the cities are real economic sectors that create incomes, often essential, to thousands of economic agents notably in rural areas: a speedy development of the substitution will undoubtedly lead to job losses in the networks and will cause social problems as a consequence.

REGIONAL STUDY ON LPG PRICES AND SUPPLY

For some years, some countries have launched programs to promote LPG, and others are starting to do so. CILSS, with the assistance of the European Commission (CCE) is implemented the LPG Regional Program (PRG), which is an important support program for the entire sub-region.

The LPG price and the cost of purchase of related cooking device are among the parameters that impede the development of LPG: in some countries, high prices limit the use of LPG to a well-off fringe of the population; in other countries, better studied prices allow to stimulate the penetration of the fuel in the majority of the households.

Four CILSS countries - Burkina Faso, Mali, Niger and Chad - have to cope with a particular problem as they are landlocked countries. They have to face important logistical and transport cost constraints to bring LPG to consumption centers. Actual solutions must be reconsidered to take into account the expansion of the domestic markets of these countries.

In some cases, these prices can be substantively readjusted. The cost structures are often unadapted and do not correspond to expanding markets. Most of the structure headings can be reduced if appropriate choices on supply and investments are made. Tax regimes have sometimes been established when LPG was considered as a luxury good and therefore should be reviewed.

In the framework of the PRG noticeable improvements on prices have been made in some State members. However, it has appeared necessary to carry out a critical analysis of LPG prices and related equipments for the nine countries as a whole, and actual transport conditions to eliminate remaining distortions and move towards an harmonization of the price structure at the sub-regional level.

It is in this context that the present study was launched, after a short list tender, this document presents the regional study, the terms of reference are given in Annex 1. Field missions started at the end of September 1991 and lasted until the end of October 1991. The three consultants hired for the study visited, respectively, the following countries, staying from two to four days in each country:

- Gérard Madon, project leader : Guinea Bissau, Mauritania, Niger and Senegal,
- William Matthews: Burkina Faso, Cote d'Ivoire, Ghana, Nigeria and Chad,
- Jean Pierre Mehr: Cape Verde, Gambia and Mali.

During their missions in the CILSS countries, the consultants have received a valuable support from the LPG national representative (CNG), the national CILSS representative (CONACILSS) and the advisers of the Delegations of the ECC, the consultants would like to take this opportunity to express their thankfulness.

Following these mission, an interim document was elaborated. The document was presented and discussed during the PRG monitoring committee which was hold in Bamako, January 13-16, 1992.

The final version of the document was written taking into account discussion which took place during the Bamako meeting, and the written comments from CILSS, CEE delegations in Burkina Faso, Mali and Chad, transmitted to the consultants at the end of February 1992. The objective of this document is to present to the CILSS and to the State members, on the basis of critical analysis undertaken, concrete proposals and suggestions on:

- Part I :

  (a) the possibilities to reduce the prices of LPG and related equipments in acceptable economic conditions, via a readjustment of the regulations, price structure headings and tax regimes,

  (b) ways and steps to achieve the harmonization of the national price structures in order to obtain a tarification scheme optimally economical at the sub-regional level,

- Part II :

  (c) the improvement of the supply conditions of the landlocked countries with a specific investment program.

SUMMARY

The market

Butane gas market in CILSS member countries has increased from about 15,000 tons in 1980 to more than 50,000 tons in 1990, that is an average annual growth rate of 14% over the last decade. According to the current forecasts, this volume could exceed 150,000 ton/yr towards 2000. It is therefore a fast expanding market.

However the speed of development of the gas market varies from one country to another; two categories can be distinguished:

- The countries where the market is confirmed: Cape Verde, Mauritania and Senegal, representing altogether about 90% of the total butane gas consumption of CILSS countries. These countries are actually going under a period of substitution of wood fuels by butane gas.

- The countries where the market is at an early stage: Burkina Faso, The Gambia, Guinea Bissau, Mali and Chad. In these countries, households are still in the process of acquiring their equipment, which means that the gas remains a secondary fuel for most households who use it.

As regards the competition between gas and other household fuels, the same classification is found:

- Gas is the cheapest fuel in Mauritania and Senegal, and the second cheapest fuel (after kerosene) in Cape Verde.

- Butane gas is the most expensive fuel in all other countries.

Butane gas consumed in the nine CILSS countries comes partly from coastal refineries and partly from sources outside the region (Northern Europe, Mediterranean). Regional offer of butane gas comes from the following countries:

- Nigeria: this country has an export potential from its refineries which is estimated at about 20,000 ton/yr, and could reach 55,000 to 75,000 tons from 1992. It also has a potential of gas recoverable from natural gas fields, which is estimated at more than 1 million ton/yr.

- Cote d'Ivoire: the potential available for marketing will reach 55,000 ton/yr in 1994, as a result of refinery optimization and the use of natural gas from "Foxtrot" field.

- Ghana: limited recoverable quantities, depending on projects, the profitability of which is not proved, such as: extension of the refinery and investment for a cracking, recovery from offshore petroleum.

- Chad: butane production depending on the "petroleum project" (beyond 1996).

- Cameroon: butane produced by the refinery with a potential increase.

These countries as well as Togo, which has storage capacities, can also work as importers on the international market for the benefit of inland countries.

Sector organization

In five countries out of nine (Burkina Faso, Cape Verde, Guinea Bissau, Mauritania, Senegal), the monopoly for imports of butane and other petroleum products belongs by law or by fact to a national company or to a company in which the State is co-owner with petroleum companies; this company is the owner of port terminals and of main storage installations. In Mali, Niger and Chad, the product is imported by two petroleum companies. The Gambia is the only country where independent companies dominate the market.

Butane distribution most usually is the responsibility of two operators, seldom three (Burkina Faso, The Gambia). Retailers are very few, except in the three countries where the market is the most developed.

The legal framework is generally limited to regulating the monopoly in the countries where it exists and to relations between State and companies. The opening of the market to new operators, equipment safety, national security stock levels are not regulated.

The four landlocked countries preferably buy butane from one single source (Cote d'Ivoire or Nigeria): importers tend to give preference to security and reliability of supply from a well-known supplier rather than seeking the lowest cost and benefiting from the competition between several alternative suppliers. There are two justifications for this strategy: on one hand limitations of infrastructures, on another hand the mode of price fixing, which does not create incentives for operators to look for alternative solutions.

Inland transport is done exclusively by road and in most cases is subcontracted to private transporters within a competitive framework.

Inland distribution is done mainly in bottles and not in bulk. There is generally a deficit of bottling plants outside of capital towns, making the whole supply system suboptimal. Reservoirs generally remain the property of distributors and consumers pay a deposit.

Prices

Prices are fixed by governments in seven countries out of nine, the exceptions being The Gambia and Mauritania (in the latter case however, a project for a price structure has been established). In most countries, the procedures for fixing retail prices and price structures have been gradually adjusted to those of other petroleum products. The elements of structures are defined by decrees on the basis of proposals from operators and of costs calculated ex-post. Structures usually include a high number of headings, which correspond to real costs, but are not always representative in terms of costs values. The butane is subsidized and taxes have been suppressed in a majority of countries; only three countries do not subsidize butane gas: The Gambia, Guinea-Bissau, Mauritania.

A process for the liberalization of prices of petroleum products has started in some countries (Senegal, Mali). Indexing of CIF prices on international prices was the most important reform, which is entering in application in Senegal and soon should be adopted in other coastal countries such as Cote d'Ivoire and Ghana.

- In price structures, supply costs vary in large proportions and do not reflect actual ex-refineries and coastal depots costs, which should not be in excess of 100,000 CFAF/ton. Some steps were taken in recent years, which resulted into a reduction of prices. But various constraints limit the impacts of operators' initiatives: no long term contracts, lack of infrastructures, lack of incentives for operators, banking procedures.

- Road transport tariffs considered in price structures were significantly reduced in some landlocked countries were transport was deregulated; they remain high in those where the market is limited and where operators experience difficulties in increasing the frequency of voyages (Niger, Chad).

- As regards the costs of importation, storage, bottling and distribution as a whole, great variations are observed from one country to another. High values of these costs are partly justified in countries with very small markets (Niger, Chad), but are less justified e.g. for Cape Verde where the market is in excess of 5,000 t/yr. In Senegal, Mauritania, Burkina Faso and Guinea Bissau, the prices fixed in the structures correspond to reasonable operating efficiencies for the operators.

- Retailers margins vary between 12,000 and 18,000 CFAF/ton. In several countries, they seem to be a sufficient incentive for encouraging retailers to develop their activities.

- Butane is fairly cheap in three coastal countries: Guinea Bissau, Mauritania (180 CFAF/kg), Senegal (120 CFAF/kg). Two landlocked countries, Burkina Faso and Mali, are in a position to offer the product at a competitive price (i.e. about 240 CFAF/kg) versus other fuels, thanks to a subsidy. In Cape Verde and in The Gambia, a different organization of activities should allow a significant reduction of costs in the medium term. In Niger and Chad, a reduction of retail prices is possible, but will be limited owing to the small market size.

- The prices of deposits for 3 and 6 kg reservoirs are fairly high in Niger and Chad. Equipments are subsidized in a large number of countries; purchase prices are fairly low in Mali and Niger.

Recommendations

In view of reducing border CIF prices, the following actions are recommended:

- For landlocked countries, negotiating with coastal supplier countries the indexation of purchase prices on international prices.
- Within price structures proper to each CILSS country, indexing CIF prices on international prices (this measure being facilitated by the above measure).
- A coordination between the buyers of coastal countries, for tendering procedures on international markets.

The implementation of additional storage and bottling infrastructures will allow landlocked countries to put various supplier sources in competition and will give them more independence in front of their main supplier.

Measures for liberalizing imports and distribution are then recommended, as incentives for the operators to improve their efficiencies, such as:

- Closer involvement of companies to the operations usually conducted by the import monopolies, participation of the other operators in the capital of importing companies, regular exchange of information among operators.
- Opening of the market to independent companies, mainly as regards the supply and distribution in bottles. This opening will be careful and gradual for safety reasons.
- Adjustments of legislation on distribution, introduction of remunerative margins for retailers.

Actions for dynamizing the market and incentives for operators must be accompanied by measures regarding prices structures and relationships between the State and operators:

- Simplification of price structures in six items, suppression of taxes.
- Gradual liberalization of prices, possibly going through an intermediate phase of indexing the structure elements on international prices and on national prices indexes, and maintaining a stabilization of prices during this transient phase.
- Medium term agreements between the State and operators, support to the negotiation of supply contracts with coastal countries, implementation of systems for the follow up and control of prices.

The adjustments of prices structures will be seen in the perspective of a regional harmonization of prices.

As regards the prices of bottles deposits, of burners and stoves, organizational changes in the market and the distribution of these products would allow to reach a total cost for the first equipment of a household around 11,000-12,000 CFAF without subsidy. As an example, the target price for the 6 kg bottle deposit could be 4,000 CFAF for coastal countries and 5,000 CFAF for landlocked countries. 2,000-2,500 CFAF for the burner and 3,000-4,500 CFAF for the stove (depending on its complexity) seem to be realistic objectives.

The CILSS can play an important role for helping the States in implementing these measures:

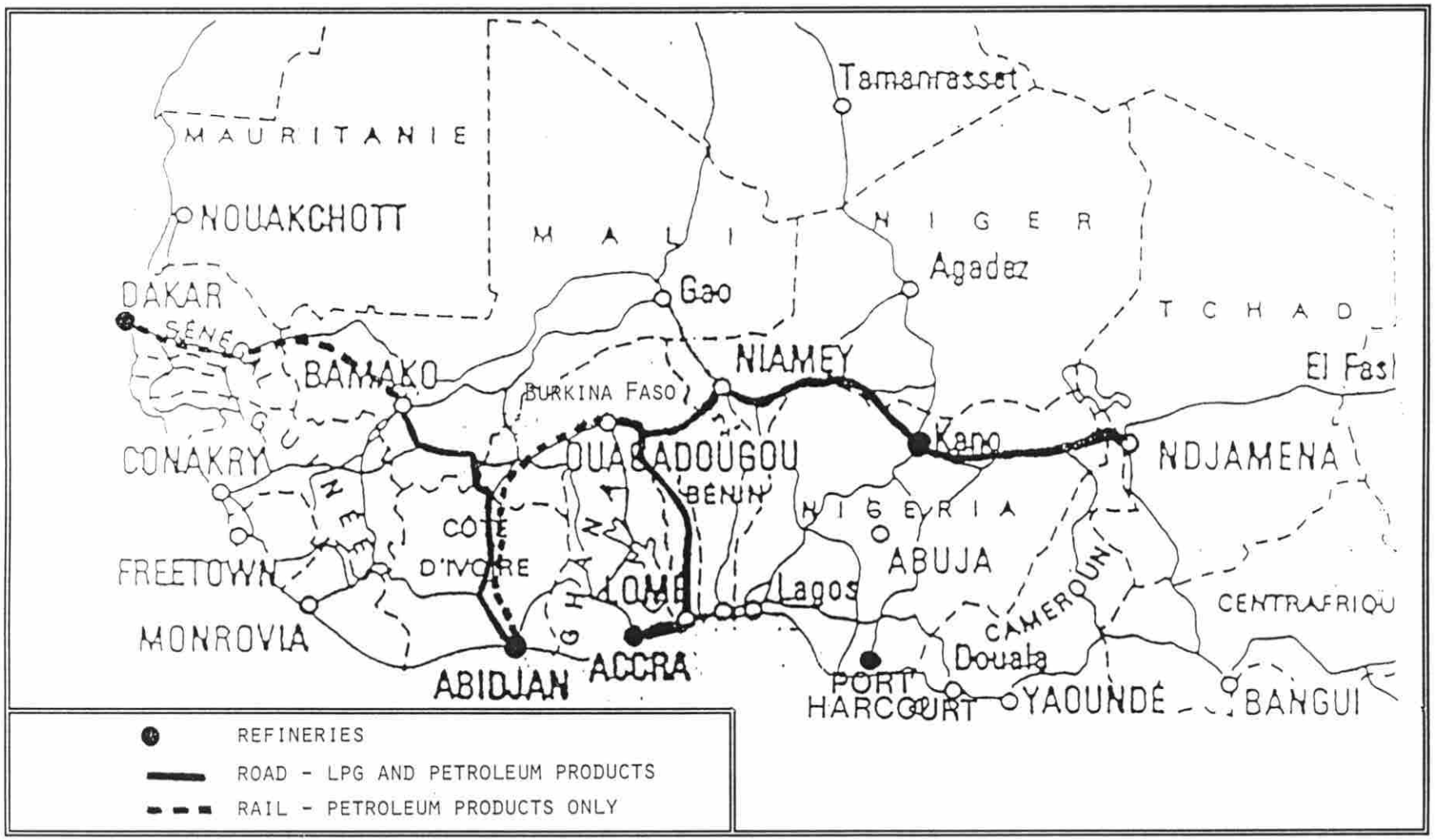
- by providing a technical assistance to ministries and national coordinators, as well as to operators, for adjusting prices systems, for prices negotiations with supplier countries, and for developing coordination: common tenders, exchange of information, follow up of international prices.

- by financing studies concerning new supplying modes.

- by offering a financial support for the implementation of storage and bottling investments.

The 455,000 ECU budget available in the frame of the RGP can be used for financing specialized experts missions on priority selected areas and for installing a line of credit for operators.

WEST AFRICA LPG SUPPLY SOURCES AND ROUTES



Part A
ANALYSIS OF THE PROBLEM

1. LPG MARKET

1.1 THE CILSS MARKET

The LPG [1]/ market in the CILSS countries went through a steady growth during the eighties when the market for the other petroleum products were stationary or went through a kind of recession in several countries for years.

According to available data, LPG sales have increased from a little less than 15,000 tons in 1980 to a little more than 50,000 tons in 1990 all countries taken into account, or an average growth of about 14% per year. If one takes into consideration the estimates established in the household energy studies made by the World Bank [2]/, this growth should continue at least during the current decade and sales could be higher than 150,000 tons/per year before the year 2000, tripling their actual volume.

Therefore, the LPG market in the CILSS countries is, undoubtedly, a market in real expansion. However, global figures indicated above hide important discrepancies between countries in terms of market shares, sale growth, and consumption per inhabitant, as it is showed in tables 1 and 2 presented below. For example, Senegal only counts for more than 60% of the LPG sub-regional market, LPG sales in Mauritania have increased by more than 40% per year during the first half of the eighties, and the annual consumption per city dweller is 300 times higher in Cape Verde than in Chad.

Nevertheless, at first the CILSS countries can be divided in two main categories:

- countries where the market is confirmed, on one side: it concerns Cape Verde, Mauritania and Senegal, the three countries representing today of the order of 90% of the CILSS total LPG consumption, and should still represents more than 80% in the year 2000. In these countries, the LPG consumption per city dweller is more than 10 kg/per year,

- countries where the market is currently embryonary, on the other hand: Burkina Faso, Gambia, Guinea Bissau, Mali, Niger and Chad. In these countries, which represents 10% of the sub-regional market, the LPG consumption per urban dweller is at the most of the order of 3 kg/per year or 3 times less than the other group.

But significant differences exists also within these categories, notably in terms of market nature. In fact, some countries are currently in an "equipment phase" meaning that households are buying stoves although they use gas as a back-up fuel or combined with traditional fuels, although other countries have already entered into a "substitution phase" meaning that LPG is used as the main cooking fuel and effectively replaces traditional fuels.

---

[1]/ Caracteristics, uses and specifications of the so called LPG are given in Annex 2.

[2]/ ESMAP Reports (Joint UNDP/World Bank/Bilateral Aid Energy Sector Management Assistance Program), available for Burkina Faso, Cape Verde, Mali (draft), Niger and Senegal.

Table 1: TREND IN LPG CONSUMPTION IN THE CILSS COUNTRIES

	Sales				Growth rate			Estimates		
in tons	1980	1985	1990		1980-85	1985-90	1980-90	1995	2000	
Group A:										
Cape Verde (a)	1,137	3,116	5,508	11%	22,3%	12,1%	17,1%	12,000	16,000	10%
Mauritania (a)	693	4,124	9,035	17%	42,9%	17,0%	29,3%	15,000	22,500	14%
Senegal (a)	9,880	14,635	32,111	62%	8,2%	17,0%	12,5%	50,000	90,000	58%
Sub-total	11,710	21,875	46,654	90%	13,3%	16,4%	14,8%	77,000	128,500	82%
Group B:										
Gambia (b)			800	2%				1,200	2,000	1%
Guinea Bissau (c)	440	440	600	1%	0,0%	6,4%	3,2%	800	1,100	1%
Mali (a)(f)	199	266	1,047	2%	6,0%	31,5%	18,1%	4,000	12,000	8%
Sub-total	639	706	2,447	5%				6,000	15,100	10%
Total	12,349	22,581	49,101	95%				83,000	143,600	92%
Landlocked:										
Mali (a)	199	266	1,047	2%	6,0%	31,5%	18,1%	4,000	12,000	8%
Burkina Faso (d)	571	760	2,085	4%	5,9%	22,4%	13,8%	3,300	5,900	4%
Niger (a)	510	370	556	1%	-6,2%	8,5%	0,9%	3,200	4,500	3%
Chad (e)			200					1,500	2,500	2%
Sub-total	1,280	1,396	3,888	7%				12,000	24,900	16%
Total CILSS	13,430	23,711	51,942	100%				91,000	156,500	100%

Sources:
(a) Direction de l'Energie/PNG; average of the ESMAP's estimates
(b) Division de l'Energie; estimates based on a 10% growth rate per year
(c) Ministère du Plan; estimates based on about a 6.4% growth rate per year
(d) SONHABY et GPP; estimates based on about 12.5% growth rate per year
(e) mission's estimates
(f) Mali (fast growing market): accounted for in two different groups, but aggregated in the total

Table 2: LPG CONSUMPTION PER INHABITANT IN THE CILSS COUNTRIES IN 1990

	Population '000s hab	Urban population '000s hab	LPH consumption		
			tons	kg/pers/yr	kg/urban/yr
Burkina Faso	9,055	815	2,085	0.23	2.6
Cape Verde	387	177	5,508	14.23	31.1
Gambia	875	250	800	0.91	3.2
Guinea Bissau	400	200	600	1.50	3.0
Mali	8,446	1,605	1,047	0.12	0.7
Mauritania	1,953	879	9,035	4.63	10.3
Niger	7,622	1,448	500	0.07	0.3
Senegal	7,430	2,824	32,111	4.32	11.4
Chad	5,649	1,638	200	0.04	0.1

Source: figures on total and urban populations from the "World development report 1991" (World Bank), except for Cape Verde, Gambia and Guinea Bissau

1.11 Countries with a confirmed market

In these countries, Cape Verde, Mauritania and Senegal, the LPG promotion policy towards medium income households is already old: as an example, the LPG campaign was launched in Senegal in 1974, 17 years ago.

The LPG market is mainly a household market. Hotels, restaurants, as well as industries and handcraft activities represent only a small share of the market, however, a share that should only develop very slowly due to the economic slump these countries have to cope with.

These countries have already a market with a significant size for which growth has been high and steady over the last ten years, with nevertheless a noticeable slowdown in recent years in Cape Verde, where the substitution phase is already old and where we are probably observing a beginning of the saturation of the market but also in Mauritania, a normal phenomenon after a particularly impressive expansion phase (the highest CILSS growth rate for the 1980-85 period).

On the other hand, LPG sales have speeded up in Senegal since 1987 (date of the re-establishment of an intentional subsidy policy. In fact, this country seems, after having known a long equipment phase which allowed it to achieve the highest rates of penetration (almost 60% of the households of the five most important cities of the country, on average, were already equipped with at least one gas stove in 1986), to have entered today into the substitution phase: indeed, the number of households in Dakar using gas as their main cooking fuel has increased from less than 25% in 1987 to more than 40% in 1991, and the LPG consumption has almost double in 3 years.

1.12 Countries with an embryonary market

It has not been a long time since these countries thrown themselves into butanization and still the equipment rates in gas stoves are relatively low. As a consequence, hotels, restaurants, as well as industries and handicraft activities represent a significant share of the consumption. It is the case, in particular, of Gambia where the hotel industry is one of the largest LPG consumer.

All these countries are currently in an equipment phase. However, they can be divided in two sub-groups:

- countries where the market is expanding rapidly, like Mali, but also Burkina Faso, where the current growth rates of LPG sales (more than 17% per year over the last five years) are higher than those of the countries with a confirmed market. It is probably true that if the current trend is not disturbed, these countries will get into the substitution phase in a near future. According to estimations, these countries which today represents only 6% of the current CILSS market could double their relative market share before the year 2000,

- countries where the consumption is stationary or is growing relatively slowly, like Gambia, Guinea Bissau, Niger and Chad. One should take into account that in these countries, butanization actions have been very recently launched (Gambia, Niger and Chad) or have not yet begun (Guinea Bissau), and the equipment phase has just started.

1.13 The competitions

In all CILSS countries, LPG competes with other household fuels and primarily with traditional fuels, wood and charcoal.

In fact, everywhere, it takes the position of a substitute to charcoal in particular. It is obviously the case in Mauritania and in Senegal, countries where charcoal has been the main fuel used in cities for years: in these countries, charcoal has already largely penetrated the urban middle income classes of the population. However, it is also the case in Mali where the penetration of charcoal has been strong in recent years. This phenomenon is often explained as charcoal is a modern fuel that reflects a noticeable and already old urbanity and therefore, for consumers switching to LPG is an quiet natural trend in their conditions of living.

On the other hand, in the other countries where wood is the dominate fuel, switching to LPG often represents for housewives a jump into modernity that they are not always ready to do: LPG is recognized as a modern fuel but also as a dangerous fuel, and reserved to rich and "intellectuals". In these countries, the captive market is made of the income classes the richest of the population and the European and the North-American expatriates. Probably, it seems that the LPG penetration into middle income classes will be slower.

In two countries, Cape Verde and Niger, LPG is also in competition with kerosene. In Cape Verde, LPG has progressively taken over kerosene which was largely widespread among households (at least those who could afford it) who use it by necessity due to the firewood shortage caused by the lack of forestry resources.

In Niger, the situation is different. Niger is, indeed, the only CILSS country currently engaged in a concrete promotion program of kerosene stoves. If kerosene is primarily a competitor to wood among the middle classes of the urban population, however, it also competes with LPG among the upper middle classes.

Table 3, given below, indicates the nature of the competition between the different fuels used for cooking in the capital cities of these countries. Undoubtedly, it shows that in general, there is a cause to effect relationship between the LPG price level and the penetration rate, even if this relationship is probably not as direct as one could think. Indeed:

- LPG is the cheaper fuel in Mauritania and in Senegal, and the second cheapest in Cape Verde (after kerosene), a country where the penetration is already very well engaged,

- LPG remains the most expensive fuel, on the other hand, and often by far, in all the other countries where it is hardly widespread.

Table 3 : COMPARISON IN THE PRICES OF FUELS USED FOR COOKING

	Fuel	Currency (cU)	Unit (u)	calorific value MJ/u	Retail price cU/u	Retail price cU/MJ	Stove efficiency	Cost cU/MJ use
Burkina Faso	Firewood	CFAF	kg	17	20	1.2	17%	6.9
	Charcoal	CFAF	kg	30	45	1.5	22%	6.8
	LPG (*)	CFAF	kg	46	250	5.5	45%	12.2
Cape Verde	Firewood	E CV	kg	17	40	2.4	17%	13.8
	LPG (*)	E CV	kg	46	62	1.4	45%	3.0
	Kerosene	E CV	liter	34	32.5	0.9	40%	2.4
Guinea Bissau	Charcoal	PG	kg	30	550	18.3	22%	83.3
	LPG	PG	kg	46	2,800	61.3	45%	136.2
Mali	Firewood	CFAF	kg	17	15	0.9	17%	5.2
	Charcoal	CFAF	kg	30	68	2.3	22%	10.3
	LPG (*)	CFAF	kg	46	240	5.3	45%	11.7
Mauritania	Charcoal	UM	kg	30	24	0.8	22%	3.6
	LPG	UM	kg	46	52	1.1	45%	2.5
Niger	Firewood	CFAF	kg	17	20	1.2	17%	6.9
	LPG (*)	CFAF	kg	46	240	5.3	45%	11.7
	Kerosene	CFAF	liter	34	95	2.8	40%	6.9
Senegal	Charcoal	CFAF	kg	30	64	2.1	22%	9.7
	LPG (*)	CFAF	kg	46	121	2.6	45%	5.9
Chad	Firewood	CFAF	kg	17	23	1.4	17%	8.0
	Charcoal	CFAF	kg	30	63	2.1	22%	9.5
	LPG	CFAF	kg	46	307	6.7	45%	14.9

(*) popular bottle: 3 and 6 kg
Nota: The cost in cU/MJ use is calculated from the fuel retail price taking into account the stove efficiency.

1.2 LPG REGIONAL SUPPLY

1.21 International Supply

Information on main supply sources, consumption centers and international LPG trade are given at the Annex 3. Traditional supply sources for small tanker LPG cargoes to West Africa has been the Tenerife refinery, Canary Islands and Western Mediterranean refineries, primarily in Spain and Portugal. Algeria, with its large production of LPG from natural gas fields and its proximity to the region, has also been a regular supplier to West Africa. Algeria produces some 5 million tons per year of LPG and exports about half of this amount. Angola is an other African oil and gas producer outside the immediate region, it produces and exports about 200 thousand tons per year from offshore oil production; mostly all exported to Brazil.

1.22 Nigeria

Nigeria is the major oil and gas producer within the region as well as having the greatest refining capacity. The total crude processing capacity in 4 plants is some 21 million tons per year. While it is the largest producer of LPG in the region, at about 125 thousand tons per year (1990) this is all from refinery production at present. It does not produce any LPG from associated or non-associated gas as yet, but has enormous potential for LPG recovery from this source, in relation to both its own and the total region's present consumption.

Refinery LPG Availability: There are four refineries in Nigeria: Port Harcourt I, Port Harcourt II, Warri, and Kaduna. The following table indicates the recent supply/demand balance for Nigerian LPG are presented in Annex 4.

The total supply for 1991 is projected to be about 135 thousand tons with a surplus for export of about 20 thousand tons. Most of the export is by marine tanker in 3 to 4 kt cargoes to customers outside the region.

The potential LPG supply from total Nigerian refining is much higher than the 135 kt estimated for 1991, and much higher than present and anticipated short and medium term levels of domestic demand. Kaduna refinery alone will have a capability of 100 kt/yr by November 1991, with the startup of a new Merox unit and associated splitter. The total potential yearly LPG production, with all refineries functioning normally at throughputs required to produce the necessary slate of other products is estimated at 300,000 tons.

The Kaduna refinery is designed primarily to serve the north of the country. Since the LPG demand in all the northern region of Nigeria is only some 25 kt/yr, at startup of the new LPG recovery unit there will be a surplus over usual tributary needs of at least 55 kt/yr and up to 75 kt/yr if run at full capacity. This should certainly allow for unconstrained exports by truck from Kaduna in the future.

Potential Recovery of LPG From Natural Gas: Nigeria presently produces some 3 BCF (billion cubic feet) per day of natural gas associated with crude oil production of which about 80% is flared at the production site. The energy equivalent of the flared gas alone is some 18 million tons of LPG per year. Although no definitive composition figures could be obtained regarding the content of gas liquids in the natural gas streams it is said to be considerable. The major use of the gas is for electricity generation near Lagos. The gas is transmitted on the Escravos-Lagos pipeline which has a capacity of about 1.2 BCF/day but presently runs at about 0.4 BCF/day. An LPG recovery plant on this pipeline has been proposed which would recover an estimated 100 kt/yr of LPG at present reduced throughput rates. Gross LPG recovery potential from the remaining gas now being flared is estimated to be in the area of some 400 kt/yr.

In addition to present gas production there is LPG production potential from two proposed projects which seem to be going ahead. The LPG production potential was poorly defined but is thought to be several 100 thousand tons per year from the combination of these two projects, which are:

- LNG project at Bonny to liquefy and export some 5 to 10 million tons per year of natural gas from non-associated fields,

- Oso Condensate project-to produce some 100,000 bpd of very light 47° API crude.

In conclusion, there is probably in excess of an additional 1 million tons per year of LPG production potential recovered from natural gas.

Nigerian LPG Demand Growth Perspectives: The present consumption of LPG in Nigeria, some 120 kt/yr is quite low for a country with 115 million people, very low relative prices and an economy with a considerable proportion of urban households of sufficient revenue to be potential consumers. Assuming the same consumption per capita urban as Senegal at present, Nigeria would have a LPG consumption of some 450 kt/yr. Nigeria, through NNPC, is presently engaged in a LPG program which has much the same objectives as the programs elsewhere in the region.

1.23 Cote d'Ivoire

The Cote d'Ivoire has the second largest refining capacity in the region and is also a minor oil and gas producer. The sole facility in Abidjan is owned and operated by the Société Ivoirienne de Raffinage (SIR).

SIR refinery. The refinery has a crude processing capacity of 3 million tons/year, and mostly treats Nigerian crude - Bonny Light and Medium, Forcados, Brass River. Cote d'Ivoire crude (Espoir) is depleted now. A new natural gas field has been discovered "Foxtrot" which has a bit of liquids (300 -350 b/d) which, will be recovered from two-phase gas/liquid stream piped to refinery, starting in 1994, primarily as refinery fuel/feed for hydrogen plant.

The Abidjan harbor has a port capability for crude oil receiving up to 250,000 DWT (dead weight tons); fuel oil loading/unloading up to 80,000 DWT; and clean products loading/unloading up to 30,000 DWT.

Gross production capability for commercial LPG, for all dispositions is in the range of 45 to 50 thousand tons per year at a reasonably full capacity operation; the yield will vary depending on the type of crude run and the severity of the processing operation. The actual recovery of product for sale as commercial LPG depends on the use in-house for (1) feedstock for hydrogen production, (2) refinery fuel for boilers and process heaters, and (3) blending to gasoline for octane up to vapour pressure limits. The production and disposition of commercial LPG over the past six years is presented in Annex 4.

At present, though a bit more LPG could be produced for sale, the amount is presently limited to about 30 kt/yr due to minimum in-house needs for hydrogen feed,

refinery fuel and gasoline blending. This potential amount for sale should increase by 1994 to about 55 kt/yr (at 2,500 kt/yr crude run) due to two projects:

- increase in hydrocracking capacity, producing about 5 to 6 kt/yr more C4,

- natural gas available to the refinery by pipeline from the "Foxtrot" field, the main effect being to release some 20 kt/yr from hydrogen feed and refinery fuel use; the reservoir fluid analysis also indicates that if 80% of the commercial LPG in the two-phase stream, were recovered at the refinery, an incremental 10 kt/yr of commercial LPG product would be yielded.

Due to the potential sources described above, and if taking into account possibly higher crude runs than 2,500 kt/yr, it is felt that the 55 kt/yr potential LPG production capability for sale is conservative and could be as high as 65 kt/yr from the SIR refinery after 1994.

Potential LPG recovered from PETROCI - "FOXTROT" natural gas. The Cote d'Ivoire has discovered a natural gas field "Foxtrot" offshore with recoverable reserves of 530 BCF (15 bcm). Under the management of PETROCI, production is anticipated to start in 1994 at an initial rate of 50 MMCFD. A combined two phase-stream from the production platform, comprising both gas and liquid streams from the separator, will be piped to the SIR refinery. The gas will be conditioned there, including recovery of some hydrocarbon liquids for the refinery and about 10 MMCFD of natural gas will be used as refinery fuel and hydrogen plant feedstock. The remaining 40 MMCFD will be piped to a power plant for electricity generation in Abidjan. The potential for LPG recovery by the refinery from this gas stream could be about 10,000 ton/yr.

1.24 Ghana

Ghana is another refining source of LPG in the region as well as being a minor past and potential oil and gas producer.

GHAIP refinery, Tema. The supply source for Ghana's LPG is the GHAIP refinery, located in Tema on the coast, some 30 km east of Accra. The refinery is a simple hydroskimmer with a crude capacity of 1.0 million tons per year and runs primarily on a mix of light Nigerian crudes. Running at capacity on a typical mix of 50% Bonny Light(37° API) and 50% Brass River (40° API) the potential recoverable LPG is about 12,000 ton/yr. This potential recoverable is very sensitive to the crude feedstock mix, however. The very light Brass River grade has a much higher LPG content. Running 100% Brass River would yield some 18,000 to 20,000 ton/yr of LPG. It should be pointed out that this is a hypothetical operation and, due to altered yield patterns on other products, would not generally be technically or economically feasible. LPG is a byproduct and crude oils are selected based primarily on the economic optimization on the production of main fuel products - gasoline, jet/kero and gasoil. Based on the need for a slightly higher proportion of Brass River in the future crude mix, maximum recoverable commercial LPG is expected to be in the range of 15,000 ton/yr.

The order of priorities for disposition of the potential LPG production is :

- local market,
- export market: until now only by road tanker to Togo, Benin and Burkina Faso,
- refinery fuel use, after using all refinery gas and a minimum base load of HFO (heavy fuel oil) in the boilers,
- Flaring.

If there is insufficient consumption in the first three dispositions then, once the refinery LPG storage is full, there is no choice but to completely waste the material to flare. In this case the LPG has a slightly negative opportunity value as there is some operating and maintenance cost to the flaring operation.

The total storage capacity in the refinery is 1,200 tons. A minimum security stock of 700 tons is maintained for the country at all times, leaving a maximum ullage of 500 tons. This ullage is equivalent to only about 10 days production at the enhanced production rate indicated for the near future. The short-term imbalance between production and offtake has frequently resulted in the flaring of LPG due to limited storage capacity. The refinery is considering the installation of a 1,200 ton-capacity sphere for additional storage. It is intended not only as additional working storage to balance production with offtake for the domestic market, but also to build decent-sized cargoes (e.g. 1,000 tons) for the export of any surplus. As part of a recent World Bank-financed rehabilitation project the refinery has installed a LPG line to the dock for cargo exports. This facility could be easily adapted as a receiving line for cargo imports.

There is currently a study underway by Foster-Wheeler USA, financed by USAID, of expansion and upgrading options for the refinery. In the case where a catalytic cracker would be installed, combined with a 50% increase in crude running capacity, total LPG production capability would be some 50,000 tons per year. In the consultant's view it is unlikely that such a scheme would be feasible and financable.

The refinery crude runs, net production of LPG for sale and sales disposition over the past five years are given in Annex 4.

Other Potential Ghana Sources - Offshore Petroleum. GNPC is presently engaged in drilling the seventh well in the offshore South Tano crude oil/natural gas field as well as in an extended well test program, in order to further define and delimit the formation, preparatory to production. Some 17 MMCFD of natural gas will be piped ashore to feed an electric power generation (combined cycle gas turbine) facility. Roughly 6,000 bpd of 28° API crude oil will also be produced. Although there is a potential LPG production of about 12,000 t/yr which has been identified, GNPC has indicated that the studies to date have shown that its recovery is not economically feasible. No information was available to further investigate or verify this conclusion. It does indicate, however, that in general there is some potential for production of LPG from offshore Ghana petroleum resources.

1.25 Chad

Chad is a very minor consumer of LPG at the moment and has no indigenous supplies. The country has extensive sedimentary areas and has been recognized for some years to have good petroleum prospectivity. Esso Exploration and Production Tchad Inc. is active in petroleum exploration, primarily in the South around Doba. They will also be the operators of the future Sedigi field crude production with proven reserves of about 10.5 million barrels (north of Lake Chad) on behalf of a consortium which includes Shell and Chevron. The field will be produced into a pipeline to N'Djamena for feedstock to a mini-refinery to be built there. The company designated to manage the design and construction of the pipeline and mini-refinery in N'Djamena to run on Sedigi crude, and eventually run the facility is the Société d'Etude et d'Exploitation de la Raffinerie du Tchad (SEERAT). It is 51% owned by the Government of Chad and 49% by the Sedigi producing consortium, who have also provided key staff. Startup of the facility is slated for 1995.

Future indigenous supply possibilities are estimated as follows:

- SEERAT Refinery: The proposed pipeline and mini-refinery, to be financed by World Bank and EC (EIB) funding, operating at expected starting rate of 3,000 bpd could produce some 8,000 ton/yr of commercial LPG if fully recovered.

- SEDIGI Associated Gas: The proposed production operation would flare all the associated gas which is given off from the field separator and stabilizer. At a 3,000 bpd production rate there is potentially another 10,000 to 12,000 ton/yr of commercial LPG which could be recovered.

- Associated Gas From Southern Oil Fields: If, as the present exploration activity seems to indicate, crude oil is likely to be found in the south in sufficient quantity to justify a pipeline to tidewater, then there would be potential LPG recovery. The amount of LPG which could be recovered would depend on composition and gas-oil ratio but the likelihood would be potential supplies many times the Sedigi quantities indicated.

Even if supplies are priced at low opportunity values it will be difficult to find economic markets for even the mini-refinery volumes, and even more difficult to place the volumes recoverable from the Sedigi field. Even if Chad were to consume, by the 1995-2000 period, the same amount per urban household as Senegal at present the total consumption would only be some 20,000 tons, equivalent to all the Sedigi potential. This Chad market growth is unlikely and the long distances and difficult logistics involved with export markets precludes much potential for exporting the surplus.

1.26 Cameroon

Cameroon can be a source of supply for Chad, until the new refinery in N'Djamena is put in operations.

Butane is produced by the refinery in Douala-Limbe, which processes crudes from various origins, mainly from Nigeria. North Cameroon is supplied with petroleum products

and butane gas by four petroleum companies, TOTAL-Cameroon, AGIP, CAMGAZ and MOBIL. The closest depot to the North Cameroon is located in Ngaoundere, with two cylinder-type storage units of 35 tons each, that is a total capacity of 70 tons, managed by SCDP.

1.27 Togo

Togo is supplied with butane gas from Nigeria and Ghana by road. STSL storage in Lome consists of three units of 66 m3 each, which is used mainly for the needs of Togo. Installations do not allow imports by sea. The operators had designed a project for a 1,000 m3 spheric storage together with a sea terminal, which however would be economic only if Burkina Faso, Niger and Mali commit themselves to buy the product from this terminal or if they contribute to the actual capital of the depot.

2. ORGANIZATION OF THE SECTOR IN THE NINE CILSS COUNTRIES

2.1 INSTITUTIONAL AND REGULATORY FRAMEWORK

The general organization of the LPG sector in the CILSS state members is summarized in Table 4 given below.

2.11 The operators

In six countries out of nine, the monopoly for the importation of petroleum products is detained by a state company (Burkina-Faso, Cape Verde, Guinea Bissau), or by a company in which the government is a shareholder (Mauritania, Niger, Senegal). Such a monopoly is institutionalized in Burkina-Faso, in Cape Verde and in Senegal. In Mauritania, the government of Algeria holds 33% of Somagaz. With the exception of Gambia, Mali and Chad, countries where the LPG market is limited in comparison with other petroleum products and where it was not possible to establish a national company.

- In Gambia, the relatively liberal options of the economic policy are rather unlikely to encourage the creation of a monopoly.

- In Mali, up to now, the creation of Petrostock is a failure. Moreover, with Niger, Mali is the only country where independent petroleum companies can legally import petroleum products.

- In Chad, the creation of SEERAT (51% of the shares held by the state) will lead, if the Sedigi deposit is exploited and if a refinery is built to a monopoly in the supply of refined products.

- In Niger, NIGERGAZ had the monopoly de facto on LPG until 1989. Since then, a new company, SONIGAZ (SONIDEP-TOTAL) has entered into the market. The national company SONIDEP has the monopoly of gasoline not including LPG. It seems reasonable to think that the two operators, NIGERGAZ and SONIGAZ, will continue to coexist under the same today prevailing conditions.

In all cases, except Senegal, the sole importing company owns the main storage capacity and in costal countries, maritime terminals as well as part of the gas filling capacities. In most countries, the only importing company is also a distributor.

Concerning purchasing, the importing company can benefit from a support of the petroleum groups established in the country and active in the LPG sector.

Table 4: LPG SECTOR - INSTITUTIONAL FRAMEWORK

	Burkina Faso	Cape Verde	Gambia	Guinea Bissau	Mali	Mauritania	Niger	Senegal	Chad
Import monopoly	SONABHY	ENACOL		DICOL		SOMAGAZ		SAR	
Importers			M & C GAMGAS SHELL MA AWA GAS		SHELL TOTAL/TEXACO MOBIL		NIGERGAZ SONIGAZ (Sonidep-Total-Texaco)		TOTAL SHELL
Distributors	TOTAL/TEXACO SHELL STD	ENACOL SHELL	M & C GAMGAS SHELL MA AWA GAS	DICOLGAZ	SHELL TOTAL/TEXACO MOBIL	SOMAGAZ	NIGERGAZ SONIGAZ	SENGAZ (Total) SHELL GAS	TOTAL SHELL
Controlled prices	X	X		X			X	X	X
Taxed LPG	X				X	X	X	X	X
LPG subsidy	X	X		X	X		X	X	X

In four countries (Cape Verde, Guinea Bissau, Mauritania, Senegal), the expansion of the LPG market was accompanied by a readjustment of the commercial status of LPG aligned on the gasoline status, specially concerning the system of controlled prices. In general, the operators have obtained the set-up of a fixed price structure which would guarantee a minimal margin per kilo of LPG in exchange of their commitment to invest in bottle-filling equipment and distribution. In several countries, new price structures and are not yet fully set-up.

The LPG regime differs from the one applied to gasoline mainly by its progressive tax exemption measures and its mechanism on subsidies, more important in Cape Verde, Mali, Niger and Senegal. It is a new situation, LPG being until now mostly reserved to an elite, and therefore taxable like gasoline. Senegal only subsidizes the bottles of 3 and 6 kg, and not the 12.5 kg.

LPG distribution is ensured by a small number of operators: two in general (Cape Verde, Mali, Senegal and Chad), one in Guinea Bissau and in Mauritania, three main companies in Burkina and in Gambia. The small number of operators is explained by the tightness of the market in most of the cases, but also, in countries where the market is growing, by the necessity to cope with rather important investments to meet the demand and to increase the efficiency of the supply and the distribution systems.

SHELL is a distributor in six countries, TOTAL in five.

In countries where the market is limited, distributors themselves ensured the small scale distribution, possibly with a few authorized agents for some distributors. In some countries like in Guinea Bissau, there are neither wholesalers nor retailers. The number of retailers become more important in countries with a growing market. Sometimes, they are managers of gas services or ordinary retailers.

In general, the petroleum sector is under the responsibility of several ministries which are responsible for the following sectors: industry, energy, finance and trade. Lacking of sufficient and skilled staff, few ministries have means to supervise efficiently the operations of the petroleum sector.

2.12 The regulatory framework

In countries where a monopoly has been established, laws which regulate the petroleum sector mostly deal with the status of the monopoly. In countries where an independent sector or even the existence of an informal sector has been encouraged alongside the modern sector (Mali, Niger) decrees define the set of technical, commercial, financial and safety conditions that operators must meet. Inconsistencies still exist among decrees often issued by different ministries as well as between laws and their enforcement.

The main operators are regulated by conventions or the so-called "contrat-plans" negotiated with the government. In Senegal for example, the SAR convention is under review. A contract plan is under negotiation between the government and the two LPG distributors, SENGAZ et SHELL. This contract plan includes the following:

- on one hand, commitments of the government on: the price structure, promotion campaigns, a support to blacksmiths to produce gas stove supports, and the set-up of a working capital fund available for distributors.

- on the other hand, the commitment of the distributors: to build new storage facilities and secondary bottle-filling capacities to facilitate the entry of wholesalers in business and the purchase of bottles by new consumers, and to communicate sale statistics to relevant ministries.

The safety of the installations is mainly the operator responsibility, whose practices are adapted from those applied in industrial countries. There are no standards; in most countries, public authorities do not have the means to control the safety regulations whatever the petroleum product be. New regulations are progressively passed in countries with a growing market.

Stock levels maintained by the operators are "working stocks" compatible with the market volume and deliveries; in practice none of the countries has required security storage facilities at least for LPG.

2.2 SUPPLY NETWORK

For six countries out of nine, LPG comes from a refinery located in a costal country: SOMIR (Mauritania), SAR (Senegal), SIR (Cote d'Ivoire), GHAIP (Ghana), PORT-HARCOURT or KADUNA (Nigeria), or transits through the storage facilities of these refineries or those of the importing companies. At least three of these costal countries are regular LPG importing countries: Mauritania, Senegal and Cote d'Ivoire. Nigeria is also an importing country but on occasional basis.

Only CILSS costal countries (Cape Verde, Gambia, Guinea Bissau, Mauritania, Senegal) have access to the international market and can get their supply from Northern Europe or from the Mediterranean area. For these countries (not including Gambia and Guinea Bissau), purchases are through direct tender on the spot market on the basis of one cargo at a time, which is a good method to obtain the market price. In Cape Verde, Senegal, and also in Mauritania, but only in these countries, supply procedures are coherent and are in accordance with the best practices of the profession; The efficiency of the system is satisfactory.

The landlocked countries are mainly supplied by one source for a long period of time: Mali and Burkina-Faso from Cote d'Ivoire, Niger and Chad from Nigeria. All these countries could choose among several supplies, even Chad; the extension of storage and loading facilities and rail-road transfer investments would facilitate this choice. However:

- In some cases (niger), procedures on the delivery of a prior authorization by the administration impedes to resort to other supply sources;

- Operators often prefer a reliable and a regular supply instead of looking for the least cost; it is the case of the Gambian retailers who purchase LPG in Europe and import it in tankers at a cost price of about 1,000 US$/ton, import procedures from Senegal seems cumbersome to the importers; it is also the case of the Malian petroleum companies which have hardly tried to source from Ghana (200 US$/ton ex-GHAIP instead of 390 US$/ton from Abidjan).

Inter-Africa road transport (to supply storage and filling facilities) is largely sub-contracted to private transporters who, in principle, should meet conditions and security standards. However, independent transport is notably established in Niger and Gambia where each distributor own one or two trucks, in Burkina Faso where operators (STD) own their trucks. The official price structures ensure a good return to transport firms. In Senegal, measures are envisaged to free transport by introducing more competition in the sector and in reducing tariffs.

In Burkina-Faso, eight transporters have all together ten LPG truck tankers with an average capacity of 20 tons. This capacity is in excess for the Burkinabe market and transporters provide their services to Mali and Niger. In Chad, every petroleum company has only one road tanker (12 and 18 ton), but this is quite sufficient for the actual needs.

LPG is entirely supplied by road. Rail supply of Mali from Senegal is not an alternative that can be considered due to the lack of equipment and storage facilities in Bamako. Actual rental rates for wagon-tankers range from 26,000 CFAF/ton for ordinary gasoline to 31,570 CFAF/ton for super gasoline. The cost of freight from Dakar to Bamako would be 25% less expensive by railroad than Abidjan to Bamako all products considered.

2.3 DOMESTIC DISTRIBUTION NETWORKS

Only five countries (Burkina-Faso, Cape Verde, Mali, Mauritania and Senegal) have one or two small bottle-filling facilities outside the capital city. Domestic transport is mainly done in bottles.

In countries where the market is rapidly expanding, the transport distribution network in bottles is sub-optimal; especially, handling bottles too frequently leads to a rapid worn-off requiring frequent sanding and painting and eventually to withdraw the bottles from the market within five years.

In several countries, operators consider that investing in bottle-filling capacities and increasing the bulk transport would lead to savings on bottles. It is the case in Mauritania, where SOMAGAZ, at present has tried to develop its sales to secondary centers, and must transport bottles on long distances on roads often in bad condition. It is also the case in Cape Verde, where bottles have to be transported by maritime, and then by road leading to a double run-off. In Cape Verde, small bottle-filling facilities are supplied by 1 ton containers.

In Gambia, two operators have a truck filling-tanker used for delivery in bulk and it constitutes the only mean to fill bottles for one of the operators. Until now, deliveries in bulk concern large consumers who have a tank, mostly hotels (Cape Verde, Gambia, Senegal).

None of the countries has chosen a distribution system in bulk, organized around small decentralized storage centers that could be used as mini bottling centers like those seen in North America or in Asia. Many reasons explained this situation:

- such a distribution network entails an important technical risk due to the difficulty to find qualified pump attendant in remote areas.

- distribution of gas in bottles gives the opportunity for the distributor to systematically check the condition of the bottles when they are exchanged, that a local pump attendant cannot do.

- this solution is may be expensive when LPG market is limited to the only cooking end use. Distribution from a fixed tanker with a bottle-filling facility has a better return if LPG is also used as fuel for vehicles.

Only some large consumers (hotels) are delivered in bulk by 1 ton tankers, generally.

The transport for distribution is sub-contracted to small licensed transporters. In the countries where the market is expanding (Senegal, Cape Verde, Mauritania), transport costs (distribution) represent an important burden and is fully passed on the final consumer. A deregularization of transport is desirable and should lead to more competitive costs.

In general, bottles belong to distributors and are returnable; it is probably the most appropriate solution to maintain the distributor's control over the condition of bottles.

Distributors, when they are petroleum companies, sale part of their LPG supply in service stations where the most common type of contract is the free management. The development of the market is accompanied with an increasing number of small retailers and licensed agents authorized by the distributors (mainly in Cape Verde and Senegal).

3. PRICES

3.1 LPG PRICES

General indications on the LPG price mechanisms on the international market and the scale effect on the maritime freight and storage costs are proposed in Annex 5.

3.11 The Price structure

Prices are controlled by the government in seven countries out of nine. Prices are totally free in Gambia; in Mauritania, a proposal of a detailed price structure is defined in a decree which has not been enforced so far. In Cape Verde, price structure is not public. The price structure in Burkina-Faso, Mali, Niger and Chad can be considered as very detailed and relatively simplified in Guinea Bissau and in Senegal. The structure proposal in Mauritania was also rather very detailed.

LPG retail prices and price structures are in general fixed by decrees issued by ministries of trade on the basis of proposals from the profession . These structures are fixed and cannot be modified for months, years even so. But decrees or orders give value, but (at the exception of Senegal) they do not define the calculation procedures for the structure headings or the periodicity of the review and the computation procedure of transport differentials.

The CIF price, taken into account in the price structures, is revised based on the companies real cost of acquisition. In some countries, the CIF price is fixed for each cargo according to the terms of the contract with the supplier, the exchange rates and the financial charges.

A new system is underway in Senegal. The price ex-SAR would include part of the import parity price, adjusted on a quarterly basis in order to follow the international market, and a fixed component passing on the refinery charges which are higher than its international competitors. The import parity price includes the European FOB price, the maritime freight, miscellaneous import charges (port and terminal charges, financial charges).

Road transport is taken into account in the structures on the basis of the operators real transport cost and the most usual tariffs in practice by the transporters who sub-contract.

Installation charges of the distributor (storage, bottling costs, amortization, maintenance of the bottles, commercialization, overheads) which are negotiated between the government and the distributors are based on the companies financial situation. These charges are periodically reviewed on the companies request but on irregular basis as for the other petroleum products.

Retail margins are established on the same principles.

Domestic transport costs (for distribution in bottles) are generally passed on the final price in the following countries: Burkina-Faso, Mali, Mauritania, Niger, Senegal, Chad. The

geographical differential corresponds to the difference in the transport costs. It is also the case in Gambia, but the differential depends on the willpower of the distributors and their agents. The LPG retail price is homogeneous in Cape Verde and in Guinea Bissau.

In Senegal, the government has committed itself to establish a national stabilization mechanism for price and a consultancy has been lauched in the PRG framework to study this issue.

Recent trends. Few countries intend to deregulate the price of the petroleum products. Encouraged by the World Bank, Mali has implemented an overall policy to liberalize prices, which does not yet cover water and energy prices (petroleum products, electricity), such caution been justified today. In Senegal, the CIF price indexation on the international price is the most important reform. Undoubtedly, the costal countries (Cote d'Ivoire, Ghana) dos not seem to rush to adopt liberalization measures.

LPG policies. Few countries have committed themselves in a deliberate and real LPG policy. As early as 1974, the Senegalese government was the first to start to subsidize LPG and to promote stoves adapter to the consumer's needs. The results are impressive: consumption increased from 2,700 ton in 1974 to 32,000 ton in 1990. LPG is today a popular fuel with 80% of the households in Dakar equipped with one or more LPG stoves. Almost 50% of the households equipped use LPG as a main fuel.

Nowadays, the Senegalese government has intended to progressively reduce the net subsidy on LPG, that should result in a 8% increase in the price of the popular bottles (2.7 and 6 kg) effective in January 1992.

In Burkina-Faso, a national committee for the promotion of LPG has been set-up. In 1990, the government has introduced new price structures for LPG including a subsidy and a 75% rebate on customs duties in order to boost the demand. The first purchase of gas stove benefitted from a 5,000 CFAF subsidy. Loans have been offered to purchase bottles.

In Chad, the objectives of the LPG program is to reach the level of an annual consumption of 1200 ton in three years. The components of the program are in accordance with the regional LPG project. The implementation of the program would get support from the National Committee of Household Energies newly created (CNED). Mali and Niger have also taken measures to promote LPG as stated in the PRG

Costal countries (Cote d'Ivoire, Ghana) intend to launch LPG programs that could lead to a LPG deficit in these countries in 5-10 years; in the distant future, cargos to landlocked countries would be exclusively imported.

3.12 Regional comparisons

A comparative analysis on the price structure and the cost breakdowns of the nine countries is presented below as shown in the graph below. Eight headings are described:

- Supply costs: includes elements composing the CIF price at the port from where the country is supplied (notably Abidjan or Lome for landlocked countries) or the price ex-refineries (SAR, SIR, Kaduna, Port Harcourt, etc.).

- Road transport: mainly concerns landlocked countries; includes the transport itself, insurance, transit costs, miscellaneous charges. For costal countries, it only includes transport and storage costs.

- Importation and license: margin and license duties of the importing company.

- Taxes: include customs duties, VAT, specific taxes on petroleum products and other levies.

The sum of the four first headings gives the cost price at the intrance of the main storage facility.

- Distribution costs: cover the following costs: storage, loses and security stock costs, filling, amortization and maintenance of the bottles, commercialization costs, distributor's overheads, distributor's margin and costs of delivery in cities.

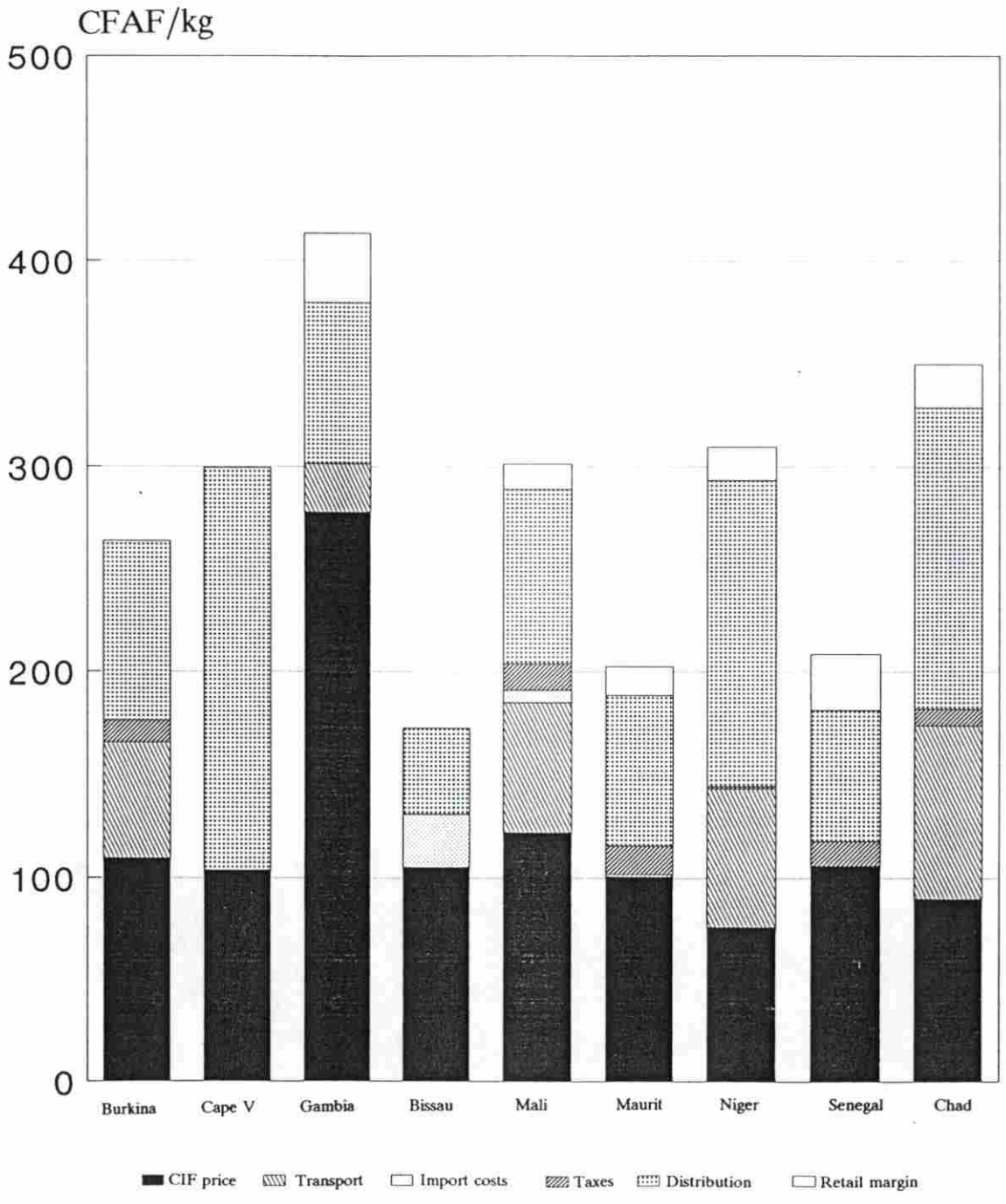
- Distributor margin, also called margin or rebate to the retailer.

- Subsidy.

- Retail price resulting from all headings mentioned above.

The detailed price structures following these eight headings are presented in Annex 6.

LPG PRICE STRUCTURE
Without subsidy



Source: Annex 6

3.121 Supply costs

While ex-refinery prices or import official prices should be indexed on the international prices, large discrepancies between the different sources, and even discrepancies between the prices offered by the same supplier to two neighboring countries are observed.

The cost at the costal storage or ex-refinery varies actually between 100.000 and 120,000 CFAF/ton depending on the countries. This price margin explainable for costal countries supplied by maritime tankers (Cape Verde, Guinea Bissau, as well as up-country countries supplied for example from Cote d'Ivoire). The countries whose prices are not within the margin are the following:

- in Senegal, the price ex-SAR has recently decreased to 73,168 CFAF/ton, to which a door dusty of about 32,925 CFAF is added;
- proposed prices to Niger and Chad by Nigeria at the beginning of 1991 have decreased to 250 US$/ton or about 75,000 CFAF/ton;
- in Gambia, a totally different situation, the CIF price of the tankers purchased in Europe is 280,000 CFAF/ton.

In Cape Verde, where the CIF price is the most directly linked to international prices and freight costs: the average CIF price in 1990 (five cargos) is 366 US$/ton or the equivalent of 100,000 CFAF/ton.

SIR in Abidjan has quite different prices for Burkina-Faso (100,000 CFAF/ton ex-refinery) and Mali (110,000 CFAF/ton). depot throughput Vridi, port taxes and storage taxes are very similar in the two cases and amounted to 11,000 CFAF/ton.

For the last two years, Ghana has the most competitive prices about 200 US$ or 55,000 CFAF/ton ex-refinery. Nevertheless, this source of supply is neither reliable nor regular, and GNPC requests that the full payment be deposited in a bank acceptable to GNPC, in advance of loading (when for the other supply countries deliveries are paid within 30 days).

Prices ex-Nigeria are extremely irregular (case of Niger and Chad): since 1989, prices fluctuate between 200 and 350 US$/ton ex-Kano or ex-Kaduna. The price the most recently used is 250 US$/ton, or 70,000 CFAF/ton. However, Nigeria often suspends its export towards CILSS landlocked countries. Moreover, LPG run-outs are relatively frequent in the north of the country. Such shortages constraint operators to supply from Port-Harcourt, even or from Ghana, adding a transport differential that can amount to 100,000 CFAF/ton !

Some prices have decreased for the last three or four years in a noticeable way: for example, the transfer price between SIR and Burkina-Faso has decreased from 140,000 CFAF/ton in 1986 to 100,000 CFAF/ton in 1990, although the prices of the petroleum products remained constant during the same period.

Countries with an efficient supply are those that have an easy choice, like Senegal, Cape Verde and Burkina-Faso where Bobo-Dioulasso and Ouagadougou are quite far from Abidjan and Tema respectively.

The other landlocked countries have a main source of supply, Cote d'Ivoire or Nigeria. Constraints that limit that choice are primarily infrastructure constraints but also the price determination mechanism:

The states and the companies from the landlocked countries have mobilized their effort to obtain better conditions from their costal suppliers for almost a year. Initiatives have been taken, notably following workshops and meetings organized with the support of the PRG. Significant results have been achieved, like those in Burkina Faso with Cote d'Ivoire. However:

- The Governments from landlocked countries do not have the capabilities to negotiate with the petroleum companies and the costal countries, notably with Nigeria, that has just suspended its LPG exports following a favorable period for exports and prices as the latter had decreased to 250 US$/ton from 350 US$/ton. The national companies from landlocked countries have very few contacts with the ministries and the national companies of the coastal countries, there is only one example of a medium term contract, between Burkina Faso and Cote d'Ivoire.

- The petroleum companies or the operators in charge of importing LPG are not induced to obtain better conditions from their suppliers: at present, operators are not encouraged by the procedures which fix prices, according to the petroleum companies, as the real supply cost are at posteriori passed on the structure. Only Togo has indexed the CIP price on international prices, from that is known. Senegal fixes it ex-SAR prices on the enhanced "import parity", as referred in the Rotterdam market (Platt's) and the posted freight costs. Regular exchange of information also takes place between SAR and the Ministry in charge.

- In some countries, infrastructure constraints restrict the option among supply sources: in Mali, supply from Senegal is rather impossible due to the lack of specialized wagon tankers and the lack of loading-deloading facilities that would allow to transport tankers on flat wagons. Moreover, Tema is clearly at a farther distance from Bamako that from Abidjan. For Niamey, Ghana (via Lome) is in fact a back-up supply in case of a run-outs in Nigeria. Chad does not have this option.

- Commercial and banking constraints impede some operators: Ghana is a neglected source for Mali or Niger, although this source currently offers the best prices, as cargos must be paid in advance in US dollars.

3.122 Importations and license

In all the countries, this heading is not separated from the rest of the price structure except in Mali: "intention charges" are 1,230 CFAF/ton; banking charges are fixed by a law at 3% of the CIF price. In Niger, the license is included in the transit charges.

The margin of the importing company is not anymore distinct from the distributor margin as it is the same firm in most of the cases.

Financial costs represent an important heading in Guinea Bissau: these charges can amount up to 32% or 25,000 CFAF/ton when DICOL has to request a one-year loan in foreign currencies to finance the payment of the cargo.

3.123 Road transport

The cost of the road transport is insignificant for costal countries. In the case of Cape Verde, maritime transport in bulk to filling facilities located on the islands, which is included in it, has a cost which is rather high cost due to numerous run-outs.

For the four landlocked countries, the transport cost from the refinery or the costal storage facility to the main storage-filling center varies between 60.000 and 80.000 CFAF/ton including transit charges, transport taxes and other charges.

Estimated reference costs for bulk LPG road transport from its components (capital investment, fixed costs, km cost, etc.) are given in Annex 4 of Part II, as an example. Estimates given a km/ton price of about 44-45 CFAF (1 US$= 280 CFAF) when two rotations per month are done per month on a 1,000 to 1,5000 km distance. Road transport prices in the CILSS landlocked countries are in general between 10% higher (Mali) and 40% (Burkina).

The transport cost taken into account in the price structure has already deceased significantly for some years:

- Burkina Faso: 71,000 CFAF/ton (or 62 CFAF/ton/km) at Bingo against 85,000 CFAF/ton in 1986, or 53,500 (or 65 CFAF/ton) against 60,000 for the depot in Bobo.

- Niger: 50,000 CFAF/ton (or 50 CFAF/ton/km) for Kano-Niamey against 64,000 in 1990, 65,000.

- Chad: 65,000 CFAF/ton (or 60 CFAF/ton/km) from Kaduna against 83,000 in 1989.

The cheapest transport cost at present is on the Abidjan-Bamako link: 49 CFAF/ton/km. Due to the relatively easy road and the price liberalization in Mali which has led to a decrease from 10 to 20% in the cost of road transport.

The economic conditions of transport are slightly different between, on one hand Mali where operators can make frequent rotations, and on the other hand Chad where supply conditions are more difficult: a normal rotation N'Djamena-Kaduna takes three weeks with sometimes the necessity for a petroleum tanker (Shell) to load its cargo at Port-Harcourt when the product is not available in Kaduna (it is true that companies have nowadays no incentive to shorten their trips as one truck rotation every second month can meet the demand).

The miscellaneous transportation costs (insurance, other charges, transit) are insignificant between 2,500 to 4,000 CFAF/ton. In two countries (Niger, Chad), the heading transport loses are added on, they are rather high in Niger (5,500 CFAF/ton) as calculation is based on the ex-depot price when it should be only on the purchased price transport included.

3.124 Taxation

Customs duties, VAT, specific taxes on petroleum products and other levies have totally been canceled on LPG in three countries only: Cape Verde, Gambia and Chad. Cape Verde is a particular case as the government is guaranteed of important incomes through the national company ENACOL. These taxes are less than 13,000 CFAF/ton in all countries except in Guinea Bissau (20,000 CFAF/ton).

In Niger, the only tax maintained is a solidarity community levy (PCS) that is theoretically applied to all CEAO countries. In Mali, a TPS of 15% on throughput charges is added on. In Burkina-Faso, LPG is taxed the same way as gasoline (with different rates). Senegal applies a door levy and a VAT.

Detaxation measures are still possible when compatible with the tax regulation.

3.125 Distribution costs

This heading of the price structure is made of two components:

- charges on depot throughout which include loses, security stock, overheads of the company responsible for the storage, part of the filling costs.

- distribution charges: amortization and maintenance of the bottles, filling, commercialization and promotion, overheads and margins of distribution companies (or wholesaler), delivery costs in cities.

In Burkina-Faso, these two components correspond to the costs of separated enterprises (on one side the national company which has the monopoly on importation, and distributors, on the other side). To a certain extent it is the case in Senegal and in Cape Verde, in the latter, the ENACOL charges include services offered to SHELL. In Guinea Bissau and in Mauritania, a sole company is responsible for the whole chain. In the other four countries, this heading of the structure concerns two or the three companies that ensure storage and distribution at the same time. Therefore, it is difficult to compare on a country

basis storage on one hand and distribution on the other. The analysis should be made on the aggregate of this component, the so called distribution costs.

For this heading, slightly large disparities between the different countries exist: from 63,400 CFAF/ton in Senegal to 155,600 CFAF/ton in Cape Verde. Especially these two countries have similar situations in terms of the volume of market and infrastructure, besides domestic maritime transport needs in Cape Verde. In landlocked countries, a clear difference exists between Mali and Burkina-Faso on one side (85,000-87,000 CFAF/ton) and Niger and Chad on the other side (about 130,000 CFAF/ton).

Undoubtedly, the distribution costs retained in the structure are very high in Cape Verde, although the infrastructure have a reasonable size compared with the market, and can be easily amortized, and the inter-island transport, sub-contracted for a large part, represents less than 15,000 CFAF/ton. Estimations give 70,000 CFAF/ton for the structure costs which includes on depot throughput, filling, maintenance of the bottles, against less than 30,000 CFAF in Senegal, a country with comparing facilities.

The high cost in Niger and in Chad is mainly due to the size of the market, inadequate to amortize fixed costs. A simulation realized in Niger has shown that installation costs of the distributor would decrease to 85,000 CFAF/ton if the market is expanding up to 1,400 ton/year (or the Burkina-Faso actual market), and operators being granted an income at least an equivalent.

Depot throughput charges [3]/ are explicit in the structure of five countries only. They have reasonable level in Senegal (20,000 CFAF/ton) and in Burkina-Faso (about 27.500) but achieve high levels in Mali (40,000 CFAF/ton including filling costs, however) and in Chad (43,000, to which overheads are added on that do not only cover distribution). In Mauritania, depot throughput and "conditioning" charges (about 63,000 CFAF/ton in total) include part of the distribution costs apparently.

The distribution costs per se (including amortization and maintenance of the bottles and commercial margins) are relatively uniform in the six countries where there are explicit: from 43,000 to 45,000 CFAF/ton. In some cases, part of the retailer margin is included in this cost.

This heading is much more lower in Mauritania (in the new structure proposal) where nevertheless it is compensated by the relatively high depot throughput cost.

In most of the cases, the margins of the distribution company are set up after a common agreement is reached between the companies and the authorities. In Mali, the "profit margin" comes from the investment code and is set up based on the import price.

---

[3]/ Recent assessments on referenced costs of depot throughput and storing for 3 different market sizes are given in Part II, Annex 2 and 3.

3.126 Retailer margin

It is also called margin or rebate to the retailer. It varies between 12,000 to 18,000 CFAF/ton according to the countries. In Mali, where it is included in the official structure at 12,000 CFAF, petroleum companies give back 18,000 CFAF/ton to the retailer.

In several countries, a distinction is made between the size of the bottles, and the retailer margin calculated in kg, the margin can double for the small bottles.

3.127 Subsidy

Three countries do not officially subsidize LPG: Gambia, Guinea-Bissau, and Mauritania.

Senegal applies the highest subsidy (on the 2.7 and 6 kg bottles): 88,000 CFAF/ton, as a consequence, the retail price on average is by far the lowest compared with the other countries. However, the subsidy compensates an ex-SAR door levy of 32,925 CFAF/ton and a VAT of 11,865 CFAF/ton. The subsidy is paid by the National Fund for Energy which has several functions among which: income collection, stabilization fund (subsidy between products), adjustment fund, and fund for the financing of energy projects.

In Niger, the subsidy of 70,000 CFAF/ton compensates for high storage and distribution charges. They amounted at 50,000 CFAF in Mali, about 40,000 CFAF in Cape Verde and vary between 3,000 and 15,000 CFAF according to the origins in Burkina-Faso.

3.128 Retail prices

Countries should be divided into three groups:

- Three countries where LPG is really cheap: Senegal where the price is 120 CFAF/kg (for the 3 and 6 kg bottles), or half of the current price of 240 CFAF/kg, due to a subsidy of 70 CFAF/kg. In Guinea Bissau and in Mauritania, where the retail price is 188 CFAF/kg or two-third of the price the most applied elsewhere, without subsidy.

- Three countries where the retail price is around 240-250 CFAF/kg: Burkina-Faso, Cape Verde, Mali with a subsidy less than 50 CFAF/kg.

- Three countries where the price is slightly higher and ranges from 300 to 330 CFAF/kg: Gambia, Niger, Chad, in spite of a subsidy of 70 CFAF/kg in Niger, and 43 CFAF/kg in Chad.

The price structure which induce the retail prices mentioned above are summarized in Table 5 below.

Table 5: PRICE STRUCTURE

	Burkina	Cape Verde	Gambia	Guinea Bissau	Mali	Mauritania	Niger	Senegal	Chad
LPG origin selling point National currency/CFAF	Ghana Ouaga 1	Market inter Territory 4	Market inter Banjul 34	Market inter Bissau 0.077	Cote d'Ivoire Bamako 1	Market inter Nouakchott 3.5	Nigeria Niamey 1	Market inter Dakar 1	Nigeria N'Djamena 1
CIF price	109,706	104,000	277,984	105,231	122,090	100,834	76,362	106,094	90,000
International transport	55,457	0	23,528	0	62,872	1,008	66,788	0	83,438
Importer costs	0	0	0	25,641	5,980	0	0	0	0
Levies and taxes	10,741	0	0	0	13,048	13,955	1,048	11,865	8,446
Distributor cost	87,855	195,600	78,200	41,431	85,350	72,599	149,400	63,401	146,882
Retail margin	0	0	34,000	0	12,000	14,000	16,000	27,200	21,095
Subsidy	-13,759	-40,000	0	0	-50,000	0	-69,598	-87,726	-43,000
Retail price	250,000	259,600	413,712	172,303	251,340	202,396	240,000	120,834	306,861
of which, net tax (a)	-3,018	-40,000	0	0	-36,952	13,955	-68,550	-75,861	-34,554
Price without tax	3,018	299,600	413,712	172,303	288,292	188,441	308,550	196,695	341,415

(a) Levies and taxes less subsidy

3.2 PRICES OF EQUIPMENT

3.21 The bottles

The amortization and the maintenance of the bottles is in general financed by the LPG structure of price as well as the difference between the deposit on the bottle and the real value of the bottle.

The consumer pays a deposit when the bottle is first purchased, the deposit is in general lower than the commercial value. The price to the consumer is in general lower in countries with an important subsidy on the product, like Senegal. The prices are given in table 6. They are on average the following:

- 2.7 kg bottle: from 2,500 to 3,500 CFAF/kg. The lowest price is in Cape Verde at 1,200 CFAF. In Chad, the deposit is CFAF 4,000.
- 6 kg bottle: 3,000 CFAF in Senegal, 4,000 CFAF in Mali, and up to 6,000 CFAF in Chad, and finally 7,500 CFAF in Niger
- 12.5 kg bottle: it is wider the price range: 4,500 CFAF in Senegal, 8,000 CFAF in Burkina Faso and in Mali, 10,000 CFAF in Niger and 13,000 CFAF in Chad, which is in fact the price without margin.
- 38 kg bottle: 12,000 CFAF in Burkina Faso and in Senegal. The real cost is higher, of the order of 30,000 to 40,000 CFAF.

3.22 The stoves

The cost price of the stoves (support and burner included) ranges from 6,500 to 10,500 CFAF. More than the size of the bottle (3 or 6 kg), the quality and the complexity of the cooking device constitute an important parameter. The first stove is subsidized in Burkina Faso, in Cape Verde, in Niger, in Senegal and in Chad. In general, the level of subsidy is 5,000 CFAF per unit. The price to the consumer is thus from 1,500 to 5,600 CFAF. The lower prices are in Cape Verde and in Niger.

The cost (without subsidy) of a burner ranges from 2,300 to 3,800 CFAF.

Table 7, shown below presents a summary of available information on the price structure of the LPG stoves.

Table 6: LPG - PRICE OF THE DEPOSIT
(Price in CFAF per bottle)

COUNTRY	TYPE OF BOTTLE							
	2.75 kg		6 kg		12.5 kg		38 kg	
	Cost price	Deposit consumer price	Cost price	Deposit consumer price	Cost price	Deposit consumer price	Cost price	Deposit consumer price
Burkina Faso	6,710	2,500		5,000	12,900	8,000	41,664	12,000
Cape Verde		1,200				4,000		
Gambia		2,000-5,700		3,500-6,000		6,800		
Guinea Bissau		N.D.		N.D.		N.D.		N.D.
Mali		3,500		4,000		8,000		
Mauritania	5,150		8,200		10,400			
Niger		6,000		7,500-9,000		10,000		
Senegal				3,000		4,500		12,000
Chad		4,000		6,000		13,000		

Table 7: LPG STOVE AND SUPPORTS: PRICES
(in CFAF per unit)

	Wholesale	Retail	Wholesale	Retail	Wholesale	Retail
BURKINA FASO	Blip Sahel n°2, 3 kg		Carena Grill, 3 kg		Faitou N'Bora, 3 kg	
Burner	2,430	2,730			2,430	2,730
Frame, wind screen	6,317	7,737			6,182	6,450
S.Total	8,747	10,467	7,132	8,080	8,612	9,180
Subsidy		5,000		5,000		5,000
TOTAL, consumer price		**5,467**		**3,080**		**4,180**
CAPE VERDE	Feu-R, 6 kg		Carena, 6 kg			
Burner and leg frame		700		1,350 to 1,750		
GAMBIA	N.D.					
GUINEA BISSAU	N.D.					
MALI	Guateli, 6 kg		Demaba, 3 kg		Sahel, 3 kg	
Burner	1,994	2,917	3,790			3,790
Support, wind screen	3,419	5,000	3,765			5,580
S.Total	5,413	7,917	7,555			9,370
Subsidy		5,000	5,000			5,000
TOTAL, consumer price		**2,917**	**2,555**			**4,370**
MAURITANIA	N.D.					
NIGER	Nigergaz, 3 kg		Nigergaz, 3 kg		Total tex, 6 kg	
Burner		2,350		2,350		3,000
Support		4,090		4,250		5,000
S.Total		6,440		6,600		8,000
Subsidy		5,000		5,000		5,000
TOTAL		**1,440**		**1,600**		**3,000**
SENEGAL	Nopale, 6 kg					
Burner	1,775	2,080				
Support	2,896	3,261				
TOTAL, consumer price	**4,671**	**5,341**				
CHAD	Shell Kanoune		Total Ladaye			
Burner and support		10,675		9,208		
Subsidy		5,000		5,000		
TOTAL, consumer price		**5,675**		**4,208**		

Part B
RECOMMENDATIONS

4. REVIEW PRINCIPLES

The principles recommended to review the LPG price structure and associated cooking devices (bottles and stoves) is based upon three main points which are the following:

- **To reduce the CIF-border prices.**

- **To liberalize progressively:**

  - imports and distribution,
  - retail prices but in maintaining a certain stabilization.

- **To progressively harmonize the price structure at the regional level.**

A proposal concerning the contribution of the Regional LPG Program to this framework is presented in this Chapter.

4.1 A PRIORITY: TO REDUCE THE CIF-BORDER PRICE

The ex-costal depot CIF price, as seen before, has increased from 70,000 to 110,000 CFAF/ton. For costal countries (Senegal, Mauritania, Guinea Bissau), the CIF price represents between 55 to 60% of the LPG retail cost price. In the landlocked countries, the cost of road transport, and the high structure costs of the operators (mainly due to the tightness of the market) are added to the cost price; But the ex-costal depot CIF price still represents between 27 and 35% of the final consumer cost price. Therefore, a reduction of the supply cost can have significant impact on the consumer price.

Reducing the CIF border price implies to overcome both technical and commercial obstacles.

4.11 Technical obstacles

They are mainly due to the inadequacy of the storage and transport means which limit the country access to certain supply sources, and therefore, their possibility to push several sources into competition.

Among the costal countries, only Gambia is really under-equipped as it can only import a 12 tons load tanker at the most at a time. Guinea Bissau has for the moment a large surplus. Cape Verde, Mauritania, Senegal, are in the normal process of increasing their storage capacities in order to follow the market growth: Cape Verde will have to build a second storage facility with a large capacity (700 to 1,000 tons), probably in the island of São Vincente. In Mauritania, the load capacity of the wharf is limited to LPG tankers with a load ranging from 1,000 to 1,500 tons, and the extension or the terminal throughput will not be realized before four or five years. In Senegal, the investments actually programmed will allow to receive LPG tankers with a larger capacity.

In the case of the up-countries, the main obstacles are:

- The lack of rail transport means for LPG between Senegal and Mali.
- The lack of road infrastructure between Tema and the north.

4.12 Trade obstacles

They mainly concern the up-countries that have difficulties to negotiate with suppliers from the costal countries, and to set up a regular supply from sources more cost efficient (notably Ghana). Many reasons exist:

- few State-to-State relations,
- lack of information on the availability of products, practiced prices, and payments conditions,
- little exchange of information between the different landlocked countries,
- a working stock maintained at a level too low by the operators, and therefore, they are frequently required to source in emergency from the first source available.

Gambian companies, as well, have difficulties to establish durable flows from Senegal and have purchased too little to African supplies until now.

There has been no coordination among the costal buyers (Senegal, Cape Verde, Guinea Bissau, Mauritania). Although in certain cases pooling purchases would allow to obtain better conditions from the supplier, as well as better transport conditions in freighting larger tankers, even with multiple unloading points.

The potential benefits are important, as it would imply to reduce the LPG ex-costal depot CIF price towards a price close to the new ex-SAR price, or FOB North-West Europe or FOB Mediterranean plus freight. The average prices that Gambia, Mali, Burkina Faso, Niger and Chad have obtained, stay largely below this level even if sporadically a purchase made in Ghana leads to a compensation.

Recommendations

The following actions are recommended:

Indexation of the CIF prices on the international prices

The ex-costal depot CIF prices should not be based any longer on the ex-post purchase price of the product, the cost of each cargo being totally passed on the structure. The base price imposed by the structure should be calculated from the North Europe spot price, as they are published in the Platts. The system is actually under implementation in Senegal for all petroleum products.

The system would immediately stimulate the operators to search more actively for more cost efficient sources, for example Mali or Burkina-Faso to source more regularly from Ghana.

The implementation of such a system to LPG in all CILSS countries would be facilitated if:

- it was implemented to the same extent to the other petroleum products,
- the costal suppliers, notably Cote d'Ivoire, would adopt it first.

The export prices and the refinery selling prices in Ghana and Nigeria are already defined according to this principle: in Nigeria, the export prices are calculated on a CIF NW Europe basis less a differential of about 30 US$/ton for the landlocked African countries.

Opening of relations between operators from the different countries

The purpose of opening relations is to facilitate communications between the different countries and to lead to pool orders for the costal countries, notably in:

- collecting information concerning operators from each country and its diffusion, on a systematic basis
- missions of companies' representatives to neighboring countries in order to organize the coordination of the purchases

Investments on additional depots and bottling infrastructure

Investments to be made in this area are presented in Part II "Transport" of the present document. It is also necessary to study more in detail the technical and the economic feasibility of a rail supply for Mali from Dakar (Senegal) and for Bobo (Burkina Faso) from Abidjan (Cote d'Ivoire).

4.2 MARKET AND PRICE PROGRESSIVE LIBERALIZATION MEASURES

4.21 Actual trends

Only three countries, Gambia, Mali and Niger, have adopted liberalization measures which have led to the co-existence of an independent sector next to petroleum companies. In Mali, independent operators control 25% of the gasoline supply; In Niger, import authorizations only concern kerosene, except when it is made on the behalf of SONIDEP. Independent operators in Mali and in Niger are mainly firms from the informal sector which sometimes participate to illegal import (for example they do not pay taxes and the stabilization fee in Mali).

Independent operators for the moment hardly involves the LPG market, except in Gambia. Prices remain based on fixed structure controlled by the State. The only modifications actually envisaged are the introduction of an "import parity" prices, for example in Senegal.

LPG supply and commercialization have a tendency to follow schemes used for the other petroleum products. Nevertheless, concerning detaxation and subsidies, LPG is often treated as kerosene.

In the liberalization measures, imports, distribution, and prices are distinct.

4.22 Import liberalization measures

Questioning import monopolies, in the costal countries, supposes that the second or the third operator can finance storage facility investments or have access to existing facilities for their imports. In Cape Verde, the acquisition by SHELL of a new storage facility in Mindelo would contribute to different competition conditions between the two operators. In Senegal, SENGAZ or SHELL GAZ could dispose of their own import equipments. Nevertheless, investments seem too important for a third operator to compete with the existing companies.

However, it is not certain that the share-out of the receiving and storage facilities would contribute to improve contracts with suppliers as they would reduce unit volumes and would reduce the information transparency between operators. In Gambia, a country which applies the most liberal options, the prices are the highest.

In landlocked countries, opening the market to independent operators (in Mali for example) and transport liberalization measures have allowed price rebates to certain consumer groups, mainly on gasoline anywhere in Mali, and on kerosene in Niger.

Recommendations

The following actions are recommended:

- In the framework of the existing monopolies: a **closer association between companies and operators**, and if possible petroleum company partnership in import firms, like in Senegal or in Cote d'Ivoire, thus a system which stimulates operators. Also, to a certain extent, in Cape Verde where Shell is informed on Enacol's operations and can contribute to look for competitive supply sources.

- In countries that have already adopted liberalization measures (Gambia, Mali and Niger): **opening of the market to independent operators**, which is practically an authorization for retailers to import LPG in bottles from neighboring countries. Such a measure could, for example, facilitate the supply of West Mali from Senegal or East Niger and Chad from Nigeria.

- Nevertheless, the import authorization for independent agents should be delivered only if they are in **agreement with the rules of the profession and if trade and security conditions are respected**: import-export license, storage facilities, bottle stock, stock financing, safe facilities.

In Mali, it is possible that one or two independent operators among the most important ones enter into the LPG market in the medium term and invest in filling facilities in order to be able to import in bulk. An increase in the number of operators is foreseen as the development of the market is almost certain.

In the medium term, Nigeria envisages to set up decentralized storage facilities of 1 to 2 tons capacity, equipped with a system of direct bottle filling at the station. Trucks transporting in bulk could also carry out deliveries in Niger, in the border zone.

4.23 Distribution liberalization measures

Liberalization measures in distribution can have an impact and lead to compress the structure headings dealing with distribution charges, at least as much as on import. The Gambian system is to a certain extent a model as competition allows to maintain a relatively low retail price while the system is relatively inefficient on imports. Should the introduction of new operators be encouraged then?

- For costal countries, new distributors implies that they purchase LPG in bulk to the company which has the import monopoly. Such possibility is envisageable mainly in Senegal but also in Mauritania. However, the investments required to compete with the existing companies can be very important.

- For the up-countries, the appearance of new distributors in Mali, Niger and Chad seemed realistic only if they are also importers and are in charge of the entire chain. The operation could be profitable if the national market represents more than 3,000 tons.

Recommendations

The following actions are recommended:

- To adopt, when necessary, **new laws to free LPG distribution** respecting commercial and security rules. Notably in Burkina Faso where new operators should be authorized to buy from SONABHY.

- To ensure profit margins to distributors as a stimulating factor (see below recommendations on the price structures), in particular in Mali where the official margin is actually inadequate.

In several countries (Mali, Niger), searching for new agents and retailers is a market development factor.

4.24 Price Restructuring and conditional liberalization measures

For the moment, it is reasonably estimated that the progressive introduction of rigid price structures copied from the structures of the other petroleum product, notably in up-countries (Mali, Burkina Faso, Niger, Chad), and more particularly where there is no monopoly, has not favored a reduction in the LPG retail prices, on the contrary.

Moreover, the most of the actual structures contains too many headings. Values given to certain cost headings, such as facility losses, filling costs, bottle amortization, bottle maintenance or reconditioning, etc., are not, in most of the cases, representative and do not correspond to the accounting of the companies, although they correspond to real charges. Moreover, they are very different from one country to the other.

Nevertheless, the system of controlled prices, has some advantages:

- possibility for the authorities in charge to know in detail the price formation and to follow price trend,

- maintaining stable retail prices and facilitating the establishment of subsidy mechanisms,

- comparison between countries, clear identification of the headings on which reductions can be achieved, and finally, compression of certain headings.

The question today is not to abandon right away the controlled price system. On the other hand, it can be progressively liberalize prices based on the following favorable factors:

- several countries can in the next coming years adopt free price policies for the other petroleum products: such measures should be rather anticipated for LPG as it is not a strategic product for the States, without saying LPG be used as a pilot product for implementing liberalization measures,
- if it is likely to maintain import monopolies, distribution could be, on the contrary, opened to a greater number of competitive operators.

Recommendations

The following measures are recommended:

More simple structures

It is proposed to retain seven headings, the retail price resulting from the headings from the overall structure:

- Ex-coastal depot CIF price, including: FOB, freight and insurance, harbor charges;
- Road transport, for landlocked countries: transport and losses, insurance and taxes, transit, miscellaneous charges;
- Taxes et customs duties;
- Importer set up charges: financial charges (working stock and security stock), depot throughput costs and losses;
- Distribution charges;
- Resaler, wholesaler and retailer margins;
- Subsidy.

Removal of taxes

As LPG is from now on considered as a popular fuel of substitution to woodfuel, legal obstacles to remove customs duties and fiscal levies should be eliminated without difficulties. Losses for the State budget are part of the price to pay for the struggle against deforestation.

Retail price conditional freedom

While the time of a complete price liberalization has come, which will not be effective before several years, a transition phase of conditional liberalization can be envisaged, and could be soon implemented. It would mean:

- either to set up an indexation scheme for the different price structure headings based on parameters relevant for each country, such as a general price index, or external to the country, such as LPG international prices. The retail price could then fluctuate between a lower and an upper margin, which could be updated on an indexation formula,

- or to authorize operators to practice rebate on the official retail price as defined in the structure.

Operators should be obliged to regularly announce to the authorities prices the prices they want to apply.

Accompanying measures

This progressive liberalization movement should be accompanied with the following measures:

- Negotiations with the contract-plan operators leading to, in exchange of the State's commitment to promote LPG and facilitate supply, the petroleum companies' commitment to progressively reduce prices as the market is expanding. It concerns more particularly the landlocked countries with a market in development; operators seem ready to progressively reduce their margins and still covering their fixed costs;

- Negotiation of long term supply contracts with the costal countries or to assist companies in negotiating such contracts, for some CILSS landlocked countries;

- Setting up a simple monitoring, follow up and supervision system on prices by the Ministries in charge in order to reduce risks of slipping, such risks are in fact are very small. It should include a brief but regular analysis of the financial balance sheets and the profits of the companies;

- Guarantee of a return on the capital invested by the operators.

4.25 Retail price temporary stabilization

A complete price liberalization would imply that retail prices pass on fluctuations in international prices and other cost components. In the case of Cape Verde, the CIF price has fluctuated in 1990 between 200 US$/ton and a maximum of 535 US$/ton (a relatively exceptional impact of the Gulf crisis at the end of the year). If this difference was entirely pass on the retail price, this would imply a gap of about 100,000 CFAF/ton which can have negative impacts in the countries where the LPG market is still small.

The setting-up of floating retail prices supposes a progressive education of the consumers; in most West African countries, reductions in international prices have never been passed on the final retail price, or very late so that the consumer has little confidence that such price reductions could occur. In this case, the consumers react all the more to price increases since they suspect that they will never be followed by reductions.

Fluctuations in retail prices should be accompanied with information actions from the governments. In the future, a floating price system could be established if gasoline is also subject to such a system and if the consumer has been familiarized with it.

Recommendations

The following approach is recommended:

- Prices will be liberalized in the medium term (within 5 years) if the prices of the other products are also liberalized in most of the CILSS countries.
- The indexation of the CIF costal price on international prices could be set up in a very near future in several countries: first in the costal countries: Senegal (ongoing), Cape Verde, Mauritania, Gambia, then in some landlocked countries such as Mali where liberalization measures in the petroleum sector have been envisaged.
- On this basis, the stabilization action could be maintained and serve as a buffer between a fixed retail price or hardly floating and the international prices. Setting up the indexation would be accompanied with a commitment from the States to regularly payback to the operators the amount corresponding to the stabilization.

4.3 LPG NATIONAL AND REGIONAL PRICE HARMONIZATION

4.31 Feasibility of a national retail price stabilization

Today only a few countries have similar LPG prices. There are very few disadvantage regions in terms of a high LPG price and the corresponding markets (even potential) are very limited: it is notably the case in eastern Senegal, in east Mali, in north and east Niger. If a price liberalization should occur in the future, it would be incompatible with fixing a similar price on the entire national territory.

Setting up a national stabilization scheme is complicated; it requires to account in detail for the consumption of each part of the country and to have a tight control over transport cost and companies' activities. In Gambia where prices are freed, the inland towns are nevertheless regularly supplied and the retail prices are not very different from those in Banjul. Moreover, similar price systems would create distortions in the border zones between countries.

It seems that the price harmonization at the national level could complicate the actual price structures and delay liberalization measures. Other solutions, already mentioned among the preceding recommendations, are envisageable to facilitate the supply of sites distant from the storage and filling centers:

- To plan adequate margins for the semi-wholesalers and retailers. Part of the transport differential could be covered by the distributor margins;
- To authorize retailers in the distant sites to source directly from the supply countries.

4.32 Classic example of a price structure

The regional harmonization of the price structures will result from the implementation of the measures inspired by the recommendations presented in this chapter, once analyzed by the authorities of each country and eventually be the subject of a regional debate.

This harmonization will be facilitate by a permanent exchange of information between operators who belong very often to the same international groups.

Recommendations concerning the calculation formula and the periodicity of the review of the classic structure headings towards which the different CILSS members should lead are proposed in the following table. These recommendations are largely inspired by the principles applied in Senegal.

Classic example of a recommended price structure

Heading	Reference level	Calculation formula	Review
CIF price: ▪ FOB price in $US/ton ▪ Maritime freight in $US/ton ▪ CIF price in $US/ton ▪ Exchange rate (ER) ▪ CIF price	▪ Platts LP Gaswire ▪ International Butane Propane Newsletter ▪ Banque Centrale (BCEAO)	▪ Average of spot quotations published for FOB NW Europe and Mediterranean ▪ Average of low and high freight Algeria quotations for NWE * 540% ▪ FOB price + freight ▪ Monthly average ▪ CIF price in $US * ER	▪ Quarterly ▪ Quarterly ▪ Quarterly ▪ Quarterly ▪ Quarterly
Road transport	▪ 0,16 $US/ton.km	▪ Reference level * ER * Distance in km	▪ Annual and when a change in gasoline prices
Importer charges: ▪ depot throughput ▪ Financial charges ▪ Importer charges	▪ Maxi 70 to 80 $US/ton (losses included) ▪ LIBOR (London Interbank Offered Rate) for 3 months (TL3)	▪ Reference level * ER ▪ CIF value of the working stock * (TL3/90 + 1,6%) * Duration in working stock days ▪ Depot throughput charges + Financial charges	▪ when new expansion and/or rehabilitation investments ▪ Quarterly ▪ Quarterly
Duties and taxes		▪ Complete tax exemption	

Classic example of a recommended price structure (continue)			
Heading	**Reference level**	**Calculation formula**	**Review**
Distributor margin		• Negotiations with distributors on the basis of their exploitation accounts	• Annual
Retail margin		• Negotiations with resalers and retailers on the basis of market trend	• Annual
Subsidy		• no subsidy	
Retail price		• Sum of the above headings	• Quarterly

4.33 Short and medium term harmonization objectives

The structure classic example could only be implemented progressively. Two examples of interim structures are proposed below to guide the debate in each country on the modification of the structures, and then on the progressive adjustment of the prices.

Table 8 is dated of 1992. The structure could constitute a short term harmonization objective for the CILSS countries. It is composed of six headings and a seventh which is the resulting retail price. The following remarks can be made:

- CIF price: they are prices ex-refinery or ex-storage facility of the main supply source of the country, estimated from the actual prevailing conditions on the international market. These prices, which are in fact very similar for the nine countries, rely on the following assumptions:
  - slightly more competitive prices obtained by Cape Verde and Guinea Bissau from their usual supplies, as well as Mauritania from its main supply, notably due to a dialogue between operators of the three countries with Senegal leading to pool orders,
  - beginning of an alignment on the international prices of the prices offered by SIR to Burkina Faso and Mali, but still remaining largely below the SAR prices,
  - road supply of Gambia from Senegal,
  - supply of Niger and Chad from Kano or Kaduna in Nigeria, at the current prices practiced for the last two years;
- Road transport: the real price differences between the four landlocked countries reflect the distance differentials and the somewhat more difficult conditions for Niger and Chad. The Dakar-Banjul road transport cost is over-evaluated to take into account delays in setting up the supply flow;
- Importer's charges and margin: since a large number of the storage facilities are also filling centers for at least a large share of the market, the filling cost has been integrated in the heading; another convention could be adopted, to integrate it to the distribution charges. The progressive harmonization between the nine countries supposes important efforts from the part of the operators in Cape Verde, Niger and Chad. Nevertheless, taking into account the small size of the market in Niger and Chad, the example proposed keeps relatively comfortable margins for these two countries;

Table 8: EXAMPLE OF NEW STRUCTURES - 1992 OBJECTIVE
(en CFAF/ton)

	Burkina Faso	Cape Verde	Gambia	Guinea Bissau	Mali	Mauritania	Niger	Senegal	Chad
Origin	SIR Abid-jan	Eur. Medit.	Senegal road	Eur. Medit.	SIR Abid-jan	Mediter.	Nigeria	Eur. Medit.	Nigeria
CIF price ex-refinery or ex-costal country storage facility	90,000	85,000	80,000	90,000	90,000	85,000	85,000	73,000	85,000
Road transport (included insurance, transit, taxes, miscellaneous charges)	65,000	0	25,000	0	58,000	0	63,000	0	70,000
Duties and taxes	0	0	0	0	0	0	0	0	0
Importer's charges (financial charges, depot throughput)	27,000	40,000	35,000	35,000	37,000	35,000	50,000	20,000	50,000
Distribution charges	40,000	50,000	43,000	35,000	45,000	37,000	32,000	40,000	65,000
Retail margin	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000
Subsidy	0	0	0	0	40,000	0	60,000	30,000	60,000
Retail price	242,000	195,000	203,000	180,000	210,000	177,000	223,000	123,000	230,000
Current price (1991)	250,000	259,000	413,712	172,303	239,340	188,396	240,000	120,834	306,861
Reduction obtained	-3%	-25%	-51%	4%	-12%	-6%	-7%	2%	-25%

- Distribution charges: they are already relatively similar among the nine countries, again except in Cape Verde, Niger and Chad. In the example given, the margins of these two countries are maintained at a high level for two reasons, the tightness of the market and the distributors' return;

- Resalers, wholesalers and retailers margins: a similar value which seems a minimum proposed for the nine countries; there is no argument to differentiate them;

- Subsidy: the levels of subsidy proposed respond to two concerns: to reduce the retail price in the landlocked countries and to begin the implementation of the objective retained to progressively remove subsidies;

- Retail price: with the exception of Senegal, the price remains low, varying between approximately 180 and 240 CFAF/kg, or a slight smaller the range when compared to the current situation.

Table 9, dated of 1997, shows the kind of harmonization that could be achieved in the medium term in implementing the classic example structure:

- Alignment of CIF prices on the current price obtained in Senegal;

- Harmonization of the import, storage, filling, and distribution costs; it was assumed that as the markets in Niger and Chad are sufficiently developed, the operators could reduce their margins;

- Total removal of the subsidies;

- Only the transport cost cannot be reduced, and the retail price can hardly get below 200 CFAF/kg.

The table is only given for information, and supposes a LPG stable price on the international market.

Moreover, it illustrates the price formation in a five year span rather than the trend of the official price structures, as a liberalization process should occur in some of the countries at least before then.

Table 9: EXAMPLE OF NEW STRUCTURES - 1997 OBJECTIVE
(in CFAF)

	Burkina Faso	Cape Verde	Gambia	Guinea Bissau	Mali	Mauritania	Niger	Senegal	Chad
Origin	SIR Abid-jan	Eur. Medit.	Senegal rout.	Eur. Medit.	SIR Abid-jan	Mediter.	Nigeria	Eur. Medit.	Nigeria
CIF price ex-refinery or costal country storage facility	80,000	75,000	75,000	78,000	80,000	75,000	75,000	73,000	75,000
Road transport (including insurance, transit taxes, miscellaneous charges)	50,000	0	25,000	0	58,000	0	50,000	0	55,000
Duties and taxes	0	0	0	0	0	0	0	0	0
Importer's charges (financial charges, depot throughput)	27,000	30,000	30,000	30,000	33,000	30,000	40,000	20,000	40,000
Distribution charges	40,000	40,000	38,000	35,000	40,000	35,000	50,000	35,000	50,000
Resaler, retailer margin	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000
Subsidy	0	0	0	0	0	0	0	0	0
Retail price	217,000	165,000	188,000	163,000	231,000	160,000	235,000	148,000	240,000
Current retail price (1991)	250,000	259,600	413,712	172,303	239,340	188,396	240,000	120,834	306,861
Reduction obtained	-13%	-36%	-55%	-5%	-3%	-15%	-2%	22%	-22%

4.4 REGIONAL HARMONIZATION OF THE PRICE OF THE COOKING DEVICES

Recommendations

The following price levels are recommended:

Deposit cost

As for the fuel, the price of the bottles for the up-countries is penalized by the transport cost. A subsidy on the first cooking device implemented with the PRG should allow to develop the market and to progressively reduce prices.

- For Niger, a desirable objective would be a deposit of 4,000 CFAF for a 3 kg bottle and approximately 5,000 CFAF for a 6 kg bottle. The deposit in Chad has already reached this level.

- For costal countries where prices to consumers are not fixed precisely (Gambia, Guinea Bissau, Mauritania), the objective is about 3,000 CFAF for the 3 kg bottle and 4,000 CFAF for the 6 kg bottle.

Stoves and supports

- For the burner, a price ranging from 2,000 to 2,500 CFAF per unit seems a realistic objective.

- The price of the support depends on its complexity, and most of the countries should have reached a level ranging from 3,000 to 4,500 CFAF per unit, at the end of the subsidy phase.

In some countries, the real costs already reach these levels, but the consumer price is burdened both by taxes (VAT) and the importers' distribution margins. A total cost for the first device (burner, support, deposit, LPG bottle) of a maximum of 11,000 to 12,000 CFAF without subsidy in the overall CILSS countries, should be reached after adjustments.

4.5 THE CONTRIBUTION OF THE REGIONAL PROGRAM

The application of above described principles for the reorganization and harmonization of price structures is the responsibility of each CILSS member State. Chapter 5 furtherbelow describes the measures which should be taken by each State in the short and the long term.

However, the CILSS could play an important role for helping the States implementing these measures, by providing:

- Specialized technical assistance required: support to administrations in charge of butane gas, which have limited means for controlling the appropriate level of prices, but are motivated for doing it, support to the operators with the purpose of improving supply conditions and contracts.

- Financial support to accelerate the implementation of priority investments identified in Part II.

The budget necessary could be covered by the 157 million CFAF (about 455,000 ECU) available in the frame of the RGP and initially foreseen for the acquisition of transport means.

Recommendations

Technical assistance for the implementation of measures for rearranging and equalizing the price structures of butane gas

1. Support to decision and negotiation

Three components: support to ministries, support to operators, and dissemination of information:

1.1 Technical assistance to administrations in charge of butane gas

Technical assistance can be provided on request on the following subjects:

- Rearrangements of price structures: reference prices for the calculation of various headings, methods of estimation, advice for the definition of price structure elements, texts of regulations.

- Procedures for the follow up of prices and of costs elements entering in price structures, and for exchanging information between operators and government authorities, allowing to detect more easily the inconsistencies, and allowing the States to participate more efficiently to negotiations of supply contracts with supplier countries. These procedures are simple (enquiries without a legal obligation) and can be computerized.

- Formulas for indexing prices, linked to their gradual liberalization: indexing of CIF prices on international prices, indexing of each component of the structure and of retail prices on parameters linked either to international prices, or to internal price indexes. Modalities for price liberalization, laws. Institutional arrangements allowing the opening of the market to new operators.

1.2 Support and advice to operators

This support also benefits to administrations and government authorities which are deeply involved in activities:

- Technical advice (Cape Verde, Guinea Bissau, Mauritania, Senegal) for joint purchases by international tenders on the international market and grouped deliveries. Research of information, financing of missions of operators at regional level (for instance Cape Verde-Continent), financing of technical means which may prove necessary.

- Contribution to price negotiations between CILSS countries and coastal supplier countries.

Recommendations (continued)

- Financing of information missions for developing new supply flows: Ghana to Burkina Faso or Mali, Senegal to Gambia. Negotiations of supply contracts and prices.

- Regular consultations of main sources of supply and transporters, subscriptions to specialized publications.

1.3 Dissemination of information

- Systematic collection and diffusion for the whole region of data supplied by each country, regarding: results of tenders (FOB prices, freight, other expenses), prices offered by african exporters, payment conditions, constraints faced by imports; evolutions of policies and of prices levels and structures.

- Follow up of FOB prices from Northern Europe and the Mediterranean, among others through the Platt's.

- Communication in real time of prices posted by suppliers from coastal countries: Cote d'Ivoire, Ghana, Nigeria, Senegal. Follow up of butane gas development policies and of internal prices of suppliers countries.

2. Feasibility studies for new supply flows and routes

The purpose here is to contribute to accelerate the implementation of supply investments in the region by initiating contacts with potential donors (EIB, Caisse Française de Coopération, KFW, etc.) and if necessary by conducting prefeasibility studies.

This component addresses mainly two projects: rail transport (Mali, Burkina Faso) and supplying The Gambia by road; the corresponding terms of reference are given hereafter.

2.1 Study on the LPG supply of landlocked countries by rail

The purpose of the study is to analyze the interest of using the railway for supplying LPG in bulk or in container, to conduct an economic evaluation and to assess the institutional implications, for two rail systems:

- SNCS/RCFM, from Dakar to Bamako, for supplying Mali (Bamako, but also Kayes region).

- SICF, from Abidjan to Bobo-Dioulasso and Ouagadougou, for supplying Burkina Faso, but also Mali and Niger as well as a possible option.

Recommendations (continued)

The study will consider the following aspects:

a. Context and description of the two systems:

- existing infrastructures, terminals, vehicles, capacities, constraints.
- organization and management, human resources.
- costs and tariffs for petroleum products and other goods.
- mode of operations; financial results.

b. Determination of equipment requirements for the supply of LPG (butane gas) with two possible technical solutions: tanker and containers wagons. Costs estimates:

- Numbers of containers and tanker wagons, specifications, costs.
- Loading and filling equipment; required capacities, costs.
- Modifications of railroads: railways, ballasts, haulage; costs.
- Unloading means, depots.

c. Evaluation of costs and tariffs for rail transport and comparison with road transport.

d. Conclusions. Recommendations on management and organizational structures; restructuring needs.

The study could be done in two phases: a first phase devoted to the diagnosis and clarification of the problem, a second phase defining more precisely the technical solutions. It will be undertaken in collaboration with railways companies, transport ministries, petroleum companies.

2.2 Study on the supply of The Gambia and Guinea Bissau from Senegal by road

The purpose of this study would be to evaluate the technical, economic and commercial viability of the supply by tanker trucks from Dakar, compared to the current mode of supply by sea. It would prepare and accompany negotiations with the Senegalese Government and operators to reach a framework agreement on annual quantities and authorizations for purchases in Dakar for Gambian operators and for Guinea Bissau.

The study would consider the following aspects:

- Availability of the product in Dakar. Political, customs, legislative constraints possibly interfering with the trade of butane between Senegal on one hand and The Gambia and Guinea Bissau on the other hand.

- Contractual terms with the Senegalese supplier(s).

Recommendations (continued)

- Organization and economy of road transport. Techno-economic comparison with existing solutions for the direct supply on the international market.
- Possible arrangements of installations and of the organization of the storage in The Gambia and Guinea Bissau.

At least some aspects of this study could be taken into account in the study recently planned by the EIB on the feasibility of a new LPG storage in Banjul (SUNUGAS project).

3. **Necessary resources**

The total budget for aid to decision and negotiation is evaluated at 150,000 ECU, distributed as follows (these quantities are estimates):

- Technical assistance to national institutions: 45,000 ECU.
- Advice to operators, including the financing of inter-country missions: 55,000 ECU.
- Dissemination of information: 10,000 ECU. One important part of this action can be secured by existing structures of RGP.
- Study of the supply by rail (first phase): 30,000 ECU.
- Contribution to the study on the supply of The Gambia and Guinea Bissau by road: 10,000 ECU.

In the frame of this budget, two solutions can be envisaged:

a. short missions of specialized experts, in three areas:
   - one expert of petroleum products tarification, knowing the fixed pricing as well as free pricing systems (indexing methods, liberalization processes, approaches adopted in various countries), and having experience on legislative texts.
   - one expert of LPG international markets: mechanisms for price fixing, tenders, supply contracts, markets and freight rates, sea transport practices.
   - one expert of rail transport of LPG and more generally of petroleum products in Africa: infrastructures, LPG transport and handling techniques, management, cost structures, transport contracts. As this is essentially a study, it could be contracted with a company.

Recommendations (continued)

The total duration of these assignments is estimated at 8-9 man-months, split among the three above experts in proportion with the above budgets.

The first two experts will not be able to conduct more than two missions each; these therefore suppose a close coordination of actions between different countries, in order to maximize the profit of each mission.

b. a full time technical advisor (one year), with the RGP if this is extended; He will secure all above defined missions from the base office in Ouagadougou and will provide at the same time technical assistance to the RGP and to national gas coordinators, in particular as regards the diffusion of information. In this case, the advisor will have all above specified capabilities.

Recommendations (continued)

Financial support to the implementation of storage, bottling and transport investments

1. Terms of reference

The main objective is to encourage operators to anticipate their investments for:

- On one hand increase the capacities of main storage infrastructures, with the purpose of strengthening capabilities for negotiating with suppliers and of diversifying supplies.
- On the other hand to install decentralized storage and bottling plants, in order to favor the development of the market inside the countries.

The available budget will be allocated to the implementation of a line of credit offered to operators, to petroleum companies or petroleum independent marketers, to finance one share of envisaged investments.

In this respect, the country having the highest priority is Chad; its requirements have been identified in the transport part of the report:

- Installation of two additional storage capacities of 50 tons each in N'Djamena. The total investment is estimated at 300,000 US$.
- Installation of mini storage and bottling centres of 25 tons each in Sarh. The total investment is estimated at 400,000 US$.

2. Budget

The estimated budget is about 305,000 ECU.

5. SPECIFIC MEASURES FOR EACH COUNTRY

The present chapter provides a list of priority actions that should be carried out by each CILSS country in agreement with the general recommendations mentioned above.

5.1 BURKINA FASO

5.11 Short term measures

5.111 Simplification of the price structure

The different headings of cost are currently set at a modest level. The effort should be done not really to reduce costs, but rather to simplify and to adjust the price structure into six headings as indicated in the general recommendations:

- Removal of taxes and customs duties (10,000 CFAF/ton).

- Regrouping three transport components into one heading which remains almost at the current price level, or 53,500 CFAF/ton for the trip SIR-Bobo, and 71,000 CFAF/ton for the Tema-Bingo trip. It should be reminded that these prices correspond to a tariff ranging from 62 to 65 CFAF/ton.km, a rather high tariff when compared with the neighboring countries. The simulation of the cost structure for a tank-truck given in annex 4 in the transport document gives approximately 45 CFAF/ton.km, that should be the reference for fixing tariffs. A tariff reduction in Burkina Faso should be all the more simple to obtain since it exists a strong competition between transporters (overcapacity of fleet).

- Regrouping importer's set-up costs into three headings:

  - Importer costs, transfer to stock, financial charges, depot throughput, filling: 27,000 CFAF/ton corresponding to the sum of the current headings "SONABHY's charges, security stock, SONABHY storage losses",

  - Distribution costs regrouping the current headings "amortization and bottle maintenance, general costs and petroleum companies' margins, dissemination fund": about 37,000 to 40,000,

  - Retailer (those margin should be identified separately): about 20,000; It is recommended to keep the actual margin of about 23,000 if it does not go entirely to the retailer.

As a result, this action will contribute, for the LPG sector, to the measure package for the petroleum sector scheduled for 1992 by the Ministry of Industry, Trade and Mines, and which aims at reducing the cost of the petroleum products and at simplifying the tarification system.

The new structure can be implemented with a simple order, the structure being defined by the General Directorate of Price within the Ministry of trade with the support of

the LPG Promotion National Committee in agreement with SONABHY and the petroleum companies.

5.112 Search for a regular supply flow from Ghana

It refers essentially to a negotiation of a medium term contract between SONABHY and GNPC on the guarantee of supply, payment terms, and regular removals.

The objective pursued is to diversify and to improve the security in supply, and to strengthen exchanges with Ghana which could also have impacts on the supply to the other petroleum products. Later, setting-up a price indexation on the international prices (as mentioned below) would induce SONABHY to look for the cost-efficient source and to really push SIR and GNPC into competition.

SONABHY with its monopoly position has to be responsible for such negotiations with the support of the LPG National Committee and the PRG technical assistance which could finance one or two information missions in Ghana.

5.113 Negotiation with SIR on a CIF price reduction

The result pursued is a price reduction, under current conditions, from 109,000 to less than 100,000 CFAF, or even 90,000 CFAF/ton.

Here again, SONABHY would carried out negotiations with the support from both the LPG National Committee and the PRG (financing missions if needed). The following justifications can be given:

- Current international price levels (less than 80,000 CFAF CIF Abidjan).
- the next ex-SIR price indexation (for the domestic market) on the international prices
- The SIR's exploitation of LPG resources in increasing the market in Burkina-Faso,
- The shareholder position of the Burkinabe government in SIR.
- The possible competition of the Ghana source.
- The implementation of the package of measures would lead to a retail price of 220-230 CFAF/kg without subsidy which can be considered as a good result for a landlocked country and would be an example for the neighboring countries. At that level, the subsidy which is already relatively small could be definitively removed.

5.12 Medium term measures

5.121 Negotiation with SIR on a CIF price indexed on international prices

The price is linked to the indexation that will be implemented at SIR. The negotiation mainly carried out by SONABHY will lead to include an indexation formula in the medium term supply contract.

5.122 Indexation of the Burkina Faso CIF price structure on international prices

This should be possible when the export posted prices in Cote d'Ivoire will be calculated from the international market price. The CIF price ex-SONABHY depot will then be determined from the LPG international quotations and the freight rates, and will be consistent with the indexation formula obtained by SIR. SONABHY will then be free to source at the best conditions either with SIR or with Ghana, and thus to obtain a margin.

This system which incites operators to source at the least cost guarantees the supply cost of the country.

This measure is a significant change in the price structure and its definition, and it will require a new order from the Ministry of Trade prepared by SONABHY and the operators concerned.

5.123 Distribution liberalization

It deals with the delivery of authorizations to distributors and independent agents to remove bulk product at SONABHY.

The purpose is to facilitate and to develop distribution in the inland part of the country.

The authorization will be delivered to a limited number of professionals who fulfill the technical, commercial and security conditions which will be strictly set in the new regulation.

Progressive liberalization of the retail price in creating a price margin in which distributor could operate; the retail price will be indexed on the import parity price and on the other domestic price indexes.

Confirmation of the supply flow from Ghana when the transit will be improved by the ongoing road infrastructure investments in Ghana.

5.2 CAPE VERDE

5.21 Short term measures

5.211 Retail price reduction

This first emergency measure would constitute both a signal for the consumer and an incitation for the State and the operators to rationalize the supply system. The current price is in fact very high compared to the market volume and ENACOL's access to cheaper sources.

It will be done in temporary reinforcing the subsidy; the price objective should be at the most equal to 50 ECV/kg. The decision can be taken by a simple government decree.

5.212 Dialogue with Senegal and the other countries (Guinea Bissau, Mauritania) to tender on pool purchases in the international market. Purchases will still be tendered in the spot market but for tankers with a larger capacity delivering for example Dakar and Praia alternatively and Nouakchott.

Such action could generate profits estimated at about 5 to 10% of the CIF price.

The PRG would finance technical means that could be required, the collection of information or even some travel expenses such as Cape Verde-mainland trips, such expenses are relatively marginal compared to the potential savings.

5.213 Indexation of the CIF price on the international prices, like the system currently under implementation in Senegal.

This measure, that should be taken by decree, will clarify both the role of the State and those of the importers, and will constantly induce the operator to source at the least cost. In taking Senegal as a reference, the CIF price can today be estimated at 85,000 CFAF/ton or 21,000 ECV/ton against 26,000 on average in 1991.

The PRG will provide a technical assistance to set up this indexation formula.

5.214 Clarification and publication of the price structure composed of six headings as suggested in this document, notably in separating depot throughput and distribution. The number of heading may be reduced to five as Cape Verde does not have road transport (except for distribution and supply in secondary centers); for example

- Importer costs, financial charges, security stock, depot throughput and filling : 40,000 CFAF/ton or 10,000 ECV/ton. The simulation on the depot throughput costs given in annex II of the transport document, has been taken as a reference, it gives 174 US$/ton for a storage of the size of Cape Verde, capital cost included. But as the installations in Praia have already been amortized, and based on the conditions of their financing, today, they should in fact cost less than 100 US$/ton.

- Distribution costs: 50,000 CFAF/ton or 12,500 ECV/ton. At this level, the distribution costs are still higher than the distribution costs in landlocked countries such as Burkina Faso and Mali.

- Resaler and retailer margin: 20,000. A sole price was retained for the entire region which properly pay the retailers. Retailers in Cape Verde are not different from retailers from other countries, in terms of geographic conditions.

It should be noticed that this objective, although representing a significant margin reduction, remains at a higher level than the margins occurring in most of the countries of the region, except for two landlocked countries, Niger and Chad. Furthermore, the progressive reduction of the depot throughput, filling, and distribution costs should be possible under the ongoing reorganization in ENACOL, and by the progressive increase of the market share of the national company in the distribution.

This measure is part of the ongoing measures on the reorganization and the financial restructuring of the sector, the proposed price levels constitute a short term objective for LPG.

Such reductions would lead to a retail price of 200 CFAF/kg or 50 ECV/kg without subsidy, and therefore, a price lower than the current price whereas rapidly removing subsidies.

5.215 Implementation of the LPG promotion program and supports to the production and/or improvement of stoves in the framework of the PRG.

5.22 Medium term measures

5.221 Progressive implementation of a price indexation on international and domestic cost parameters, and a formula progressively liberating retail prices. Notably, the indexation of a CIF price on the international prices. This measure will be followed by the continued efforts to reduce the price structure.

The implementation of such a formula will guarantee the lowest price possible for the consumer and constitute a constant incitation for the operator to rationalize both the supply and the distribution system.

Formulas will be established by decree after the agreement of the operators.

5.222 Institutional and regulatory strengthening of the LPG sector

The creation of a new storage facility that would probably be installed at Mindelo would provide a good opportunity to take restructuring measures in the LPG sector, such measures could deal with:

- SHELL's participation in the capital of the new facility. Opening of ENACOL to shareholders,

- information and mutual control procedures on supply of the two companies,
- price liberalization, starting with the retail prices.

5.3 GAMBIA

5.31 Short term measures

5.311 Maintaining the current system of free, not controlled prices, without subsidy. Nevertheless, setting up a State price monitoring procedure, simply requiring that operators communicate in advance to the Ministry of Economy the price of the imported cargos and any modification in the retail prices.

This measure simply consists in introducing a sound but simple procedure to exchange information between the operators and the organizations in charge, that by the way, have for the moment excellent relations. It would allow the National LPG coordinator to follow prices and to detect inconsistencies more easily. The information obtained would also provide more arguments to the Energy Division of the Ministry and therefore allowing it to intervene efficiently in negotiating supply contracts with Senegal.

The procedure would be implemented by the Ministry of Trade, Industry and Employment (Energy Division) and by the Ministry of Finance and Economic Affairs. It is a simple survey for which it should not be necessary to have a regularly text.

5.312 Search for a regular supply road flow from Senegal

To negotiate with operators and the Government of Senegal a supply contract and institutional conditions to render this contract effective. These negotiations should lead to a "general agreement" on annual amount and removal authorizations in Dakar for the Gambian operators taken as a whole.

Such contract should allow to reduce the Dakar CIF price to 75,000 - 85,000 CFAF/ton, and achieve a retail price in Gambia of about 200 CFAF/kg without subsidy. No other solution would achieve such a result.

If negotiations are successful and if a supply flow can be established on a sustainable way, the Senegal source should be the least cost solution for Gambia. The issue on the installation of a new costal storage facility to have a direct supply from LPG tankers would then be out of date, except if the market reaches at least 10,000 tons/year, and if other factors intervene such as the installation of a new petroleum storage facility equipped with port receiving facilities.

The existing companies will operate as they currently do it and under even more better conditions. The PRG could contribute to strengthen the storage and filling facilities; for part of these facilities, operators can invest jointly, for example in the SUNUGAS framework.

For the reasons mentioned above, it is recommended that the IEB scheduled study on a possible centralized and high capacity storage facility (SUNUGAS project) be completed by an analysis on the supply from Senegal, accounting for the technical, economic, institutional and regulatory aspects.

5.313 Launching of a national LPG program

This program would be launched in the PRG framework when the security in the supply will be on the way of being settled. Stove and support promotion will be the main focus. The program will also include the regular publication of the operators' prices.

5.32 Medium term measures

5.321 Monitoring of supply trend and prices

The Gambian authorities (notably the Ministry of Trade, Industry and Employment, Energy Division) will monitor over a 12 - 18 month period the conditions on import from Senegal, the flow terms, prices, administrative formalities, and will draw the consequences concerning interventions with operators and Senegalese authorities. In the case of lasting and overwhelming difficulties for this supply flow, the sea terminal and large capacity storage facility project should be reanalyzed.

5.322 Continuation of the LPG program

The program will notably focus on stove and support promotion and the local production of some parts.

5.4 GUINEA BISSAU

5.41 Short term measures

5.411 Dialogue on joint imports with Senegal, Cape Verde and Mauritania

Purchases would continue to be done on tender on the spot market, but for larger capacity tankers delivering alternatively Dakar or Praia, then Bissau, for example.

This pooled supply procedure could allow:

- to gain on the CIF price (at least 5%),
- cargos with a smaller volume (for example 200 tons instead of 600), and therefore, a gain on the financial costs as the immobilization time is reduced.

DICOLGAZ logically would be responsible for the organization of the pool purchases for Guinea Bissau. The PRG would finance the technical means that could be required, the collect of information and if necessary some business trips between Bissau and Dakar, which represent a marginal cost compared with the potential savings.

5.412 Assessment of the feasibility of road import from Senegal

It is recommended that the study which aims at evaluating the technical, economic, and commercial feasibility of truck-tankers from Dakar also compares the conditions of the current maritime supply. The study will deal with the following aspects:

- availability of the product in Dakar. Political, customs, regulatory constraints that could burden LPG trade between Senegal and Guinea Bissau,
- contract terms with the Senegalese supplier(s),
- organization and economy of the road transport,
- possible modifications in the storage facilities and in their organization in Guinea Bissau.

The study will also analyze the Gambian experience and will follow the actions which aim at establishing a regular flow from Senegal (as described above).

5.413 Clarification of the price structure

It is proposed to readjust the headings of the price structure according to relative costs of each cargo. As stated in the general recommendations on the simplification of the price structures, the new structure would include the following headings:

- Importer costs: financial costs, financing of the security stock, depot throughput, filling: 35,000 to 40,000 CFAF/ton or 450,000 to 520,000 PG/ton. The simulation on

the depot throughput costs given in annex II of the transport document, was taken as a reference, that gives 174 US$/ton or 4,000 CFAF/ton for a storage of the size of Guinea Bissau, capital cost included. But as the installations in Praia have already been amortized and based on the conditions of their financing, today, they should in fact cost less than 100 US$/ton. The share of the financial costs is determinant in the particular case of Guinea Bissau.

- Distribution costs: 30,000 CFAF/ton or 390,000 PG/ton. This price is consistent with the current "structure" and therefore, does not imply a financial effort for the operator.

- Retailer margin: 18,000 to 20,000 CFAF/ton or 250,000 PG/ton showing an increase when compared with the current margin, in the prospect of a market development and new distributors in business.

The global storage and distribution costs are slightly the same as the current levels. If pool purchases with the neighboring costal countries can be organized, this will lead to a reduction in the CIF price, and therefore, a reduction in the retail price could be anticipated, passing below 170,000 CFAF/ton or 2,200 PG/kg, without subsidy.

A simple government order is required to adjust the price structure (prepared by DICOGAZ and the Direction de l'Energie).

5.414 Implementation of the national LPG program

The program will follow the PRG directions, and will focus on cooking devices, bottle deposits, purchasing of bottles.

5.42 Medium term measures

5.421 CIF indexation on international prices

The system currently under implementation in Senegal will be taken as a reference. This measure which requires a decree, will result in clarifying both the role of the State and the importers, and will constantly induce the operators to obtain the least cost supply. Taking Senegal as a reference, the CIF price can be estimated in current terms at 90,000 CFAF/ton or 1,170,000 PG/ton against 1,368,000 on average in 1991.

The PRG will provide a technical assistance to implement the indexation formula.

5.422 Measures to liberalize imports, distribution and prices

It notably concerns:

- institutional reorganizations allowing for the market opening to a possible second operator that would import by road from Senegal.

- liberalization of distribution, and encouragement to retailers to enter in the market, notably with a specific heading in the price structure. New retailers or agents will receive removal authorization for bulk or bottled products with DICOLGAZ, if they meet the technical, commercial, and security requirements defined in detail in the regulatory texts.

- to index the different headings of the price structure on domestic and external parameters (petroleum price, transport costs, general price index), thus to progressively liberalize the retail price in creating a margin within which the distributor can operate.

These measures that induce the operators to improve their performances, will lead to a slight price reduction. The formulas will be defined by decree after agreement of the operators.

5.5 MALI

5.51 Short term measures

5.511 Simplification of the price structure

It is recommended to regroup the cost elements into six headings as stated in the general recommendations, with notably only one heading for transport which in its present presentation is extremely desegregated while transport is generally under-treated. The mains heading would be as follows:

- CIF Abidjan price, it is recommended to renegotiate with SIR (see below);
- Road transport, transit, other related transport costs. Costs would approximately remain at their current level of 63,000 CFAF (costs and taxes included). As a reminder, the price given in annex 4 of the transport document, which gives about 45 CFAF/ton.km or 54,000 CFAF/ton for the Abidjan-Bamako trip to which a cost of 4,000 CFAF is added, the total obtained leave a margin when compared with the actual level, therefore, there is a possibility to reduce it;
- Importer costs and storage: financial costs, security stock, depot throughput, filling: the current import and license headings (5,980) and depot throughput (40,099) amount at about 46,000 CFAF/ton, level that should be maintained. Based on the simulation given in annex 3 of the transport document, a depot throughput of 40,000 CFAF/ton or 140 US$, includes amortization for an important part. A level of 100 US$/ton seems more reasonable if the today facilities are adequate to cope with a limited increase in the market, and based on their age. The operators should at least maintain the cost of depot throughput at the same level in constant francs;
- Distribution costs: 45,000 CFAF/ton corresponding approximately to the overall actual headings: profit margin of 37,287, reconditioning 4,400, urban delivery 3,564;
- Resaler, retailer margin: 18,000 to 20,000 CFAF. It is 12,000 today, but according to the petroleum companies it is inadequate to attract agents distant from the center.

The price structure review will result of a dialogue between PNG, the Ministry of Trade, and the petroleum companies, and will be legalized by a decree of the Ministry of Trade. Such simplification will later facilitate the reviews of the price structure, as well as the regional comparisons, and will also facilitate a possibly price liberalization. The reference indicated above and that will be discussed by the working group, will serve as a starting point. The PRG can provide a technical support.

5.512 Encouraging and supporting operators in negotiating a long term supply contract with GNPC in Ghana

Establishing a regular supply flow from Ghana supposes to obtain supply guarantees, to implement payment procedures, and to start operations for testing this supply solution.

The objective pursued is the diversification and a better security in supplies, and the strengthening of the exchanges with Ghana, that could also have some impact on the supply of the other petroleum products. Afterwards, the establishment of a price indexation on the international prices (as mentioned below) would induce the petroleum companies to look for the least cost source, and to really push SIR and GNPC into competition.

The two petroleum companies are responsible for the negotiations, and any interested potential independent operators, if need be. A joint interim mission could prepare these negotiations, the mission composed by the public sector and private operators, could receive both the support of the National LPG Committee and the PRG's technical assistance, the PRG could finance one or two missions and provide a financial and banking expert.

5.513 Negotiations with SIR and reduction in the CIF price

A price reduction from 122,000 to less than 100,000 CFAF or even 90,000 is the pursued outcome, it is justifying by:

- the international price current levels (less than 80,000 CFAF for CAF Abidjan),
- the next indexation of the ex-SIR prices (for the domestic market) on the international prices,
- the exploitation of the LPG available at SIR due to an Market expansion in Mali, which seems to be the most promising market among the landlocked countries,
- the possible competition of the Ghana source.

This action would lead to balanced relations with SIR and a rational price system.

This action is under the responsibility of petroleum companies, supported by the RGP, which can finance missions in Abidjan.

Setting up the package of measures would lead to a retail price of 260-270 CFAF/kg without subsidy. A retail price of 220-240 CFAF/kg would also be obtained with a subsidy less than its actual level.

5.514 Study on rail supply from Senegal

Rail supply concerns firstly Bamako, but also the north-west part (Kayes region) of the country. Terms of reference are presented in the Transport document. At first, it will contribute to clarify the problem, and will be launched by the PNG with the collaboration of the railways company, the Ministry of transports, and the petroleum companies.

5.515 Continuation of the LPG promotion program

In the PRG framework, effort will be made, notably to improve stoves and supports to adapt them to the Malian cooking needs (so that LPG does not remain a side fuel), and to somewhat reduce the distribution margins on stoves and supports. A harmonization with

neighboring countries on the deposit charges and on the price of cooking devices will be pursued.

5.52 Medium term measures

5.521 Negotiations with SIR of a CIF price indexed on international prices

This price is linked to the indexation that SIR will set up. The negotiations carried out on the initiative of the two petroleum companies will lead to include an indexation formula in the medium term supply contracts. It can be envisaged a support from a regional expert notably to prepare the contractual scheme, if it can be combined with other countries.

5.522 Indexation of the CIF price as defined in the price structure on international prices

This will be facilitated when the announced export prices in Cote d'Ivoire will be calculated from the international prices. The CIF price ex-storage Bamako will then be determined in advance and on a monthly basis from the international quotations for LPG and the freight rates, and will be consistent with the indexation formula obtained in the best conditions either from SIR or from Ghana, and to realize then a margin.

This system guarantees a rational and a stable price, demanding very little effort to maintain its level, easy to implement and facilitating the operators' understanding. It constitutes also an incitation for the operator to supply at the least cost.

This measure is a substantial modification to the price structure as it is set up, and will require a new decree from the Ministry of Economy and Finance, based on the draft prepared by the Service of Domestic Trade and Prices in collaboration with the OSRP and the operators concerned, with the support of the LPG National Coordination Bureau.

5.523 Indexation and opening of the price structure

It is recommended:

- to index each heading of the price structure to parameters linked either to the international prices or to the domestic prices,
- to progressively liberalize retail prices in creating price margins within which distributors can operate,
- to liberalize, in a distant future, LPG prices following the liberalization of the other petroleum products.

These measures have been partly defined in the petroleum sector liberalization project, which implementation depends today on both the willingness of the authorities (Government, OSRP) and the operators.

5.524 Confirmation of a supply flow from Ghana, notably when transit will be facilitated after ongoing road infrastructure investments in Ghana.

5.525 Support to operators

Search for financing opportunities for investments to expand storage and bottle fleet, and a support to independent operators who want to enter into the LPG market, in particular in the distant zones.

5.6 MAURITANIA

5.61 Short term measures

5.611 Dialogue with other costal countries (Cape Verde, Guinea Bissau, Senegal) for pool purchased tendered on the international market. The purchases would still be based on tender on the spot market, but for tanker with a larger capacity delivering Nouakchott and Praia alternatively. The PRG would finance the technical means that could be required, the collect of information, and some information trips if need be, representing marginal costs when compared with the potential savings.

A coordination on purchase and search for better supply conditions should allow to reduce the CIF costal depot price from 100,000 CFAF/ton or 90,000 CFAF/ton, or about 25,000 CFAF/ton.

5.612 Indexation of the CIF price on the international prices, following what is currently under implementation in Senegal.

This measure, that can be taken with a decree, will clarify both the roles of the State and those of the importers, and will constantly induce the operator to obtain the least cost supply.

The PRG will provide a technical assistance to set up the indexation formula.

5.613 Price structure

In the short term, the Ministry of Hydraulic and Energy can choose between maintaining the actual system (no official structure) and institute a structure by decree.

- It is recommended to maintain a statu quo and only to intervene in fixing a ceiling retail price to consumers. The current system ensure a reasonable price to the consumer, lower than any price resulting from the implementation of the proposed structure (a 1989 decree) which has not been enforced. In this case, taxes on the product should be removed, and a price monitoring system and a flexible indexation of the retail price on the international prices and on the domestic price indexes should be introduced.

- In this case, the 1989 decree would be followed by an enforcement decree, it is recommended to simplify the proposed structure into six headings:

- Removal of all taxes and customs duties;

- CIF price indexed on the international prices (according to Platt's quotations and freight rates);

- Regrouping the headings concerning storage and distribution into two headings, as mentioned in the general recommendations. These headings should not be indexed on the international prices (or only partially), but rather on parameters linked to the

price indexes in Mauritania. The cost level of the structure should correspond to those actually practiced;

- Resaler, retailer margin: 4,000 to 5,000 Ouguiyas/ton.

In all these cases, the measures mentioned above would allow to maintain a retail price without subsidy below 50 Ouguiyas/kg or about 175,000 CFAF/ton.

5.614 LPG promotion program

Continuation of the promotion program supported by the PRG. Stove and support promotion. Fixation of the deposit charge to a value equivalent to about 3,000 CFAF or 850 I'M for the 3 Kg, 4,000 CFAF or 1,150 Ouguiyas for the 6 kg.

5.62 Medium term measures

In the case the option on a fixed price structure were retained, it is recommended an overall indexation of elements of the structure on, on one hand, on the international prices and on the domestic prices on the other hand, to guarantee a retail price as low as possible and to create an incitation for the operators to get the lowest supply costs possible.

Later, a reduction in the prices will be obtained due to investment currently under consideration:

- possibility to receive in Up LPG tanker with a large capacity,
- purchase of a tank truck to transport LPG in bulk between the refinery and the Somagaz storage facility in Nouadhibou.

5.7 NIGER

5.71 Short term measures

5.711 Simplification and compression of the price structure

A six heading price structure is recommended:

- CIF price ex-refinery or ex-supplier storage; for example Kaduna;
- Road transport and charges: the current quotation for Kano-Niamey or Kaduna-Niamey trip, losses included, miscellaneous costs, insurance, transit is about 65,000 CFAF/ton, or more than 65 CFAF/ton/km. The simulation on the cost structure for tank truck presented in annex 4 in the Transport document gives about 45 CFAF/ton/km, which should be the reference to fix tariffs. According to Soniden, miscellaneous costs (insurance, taxes, transit, losses, financial costs) can amount to 6,000 to 7,000 CFAF/ton. The current tariff, which corresponds to 8,000 CFAF for a truck from Kaduna, is considered as a good one by the operators. A value between 55,000 and 60,000 CFAF/ton will be the objective for this heading (transit and miscellaneous costs included). For the Tema (Ghana)-Niamey trip via Lome, the cost is slightly higher and can amount to 75,000 CFAF/ton;
- Taxes and customs duties: have been removed (with the exception however, of the community charge on solidarity which theoretically is applied in all the CEAO countries);
- Importer charges, depot throughput, financing of security stock, and other financial costs, filling: 45,000 CFAF/ton against 75,000 CFAF/ton today, in the case the total market would increase to 800-1,000 tons/year;
- Distribution cost, amortization and bottle maintenance, general costs and margins: 55,000 CFAF/ton against about 85,000 CFAF/ton today.

The two last headings taken together represent today about 146,000 CFAF/ton or 1,800 CFAF per bottle, their share has been estimated with the operators (see document: "Energy II Project") in 700-800 CFAF per 12.5 kg bottle for depot throughput and filling and 1,000 CFAF for distribution. Distributors have already made a provision for reduction at 1,000 CFAF for the two headings taken globally, or 80,000 CFAF/ton if the market reaches 800 tons/year.

If the total LPG market in Niger increases from 500 tons today to 1,000 tons, and if the importer setting up costs + storage + distributor from 145 CFAF/kg to 100 CFAF/kg, the distributors' global income nevertheless increases by 33% while the fixed costs stay practically unchanged.

- Retailer margin: this margin is actually 200 CFAF per 12.5 kg bottle or 16,000 CFAF/ton. It is not really attractive for retailers operating in a zone distant from the very few distributors' sales points. As the LPG promotion concerns mainly

the 6 kg bottles, it is recommended to increase the margin to at least 20,000 CFAF/ton or only 120 CFAF per 6 kg bottle;

- Keeping the subsidy: its objective is to sufficiently reduce the price to encourage the development of the market, that would later lead the operators to progressively reduce their unit margins. A subsidy of 40,000-50,000 CFAF/ton would maintain the retail price to 240 CFAF/ton. It is recommended to limit the subsidy to the 3 and the 6 kg bottles (popular gas).

Later, if the market reaches 1,000 tons/year, the reduction of the different headings, as mentioned above would lead to a retail price of 250 CFAF/kg without subsidy, then the subsidy will be definitively remove.

The new structures will be established by a decree of the Ministry of the Economic Promotion on a proposal of the Direction of Domestic Trade and Prices and the Direction of Energy, wit the collaboration of the professional, SONIDEP, TOTAL and NIGER GAZ.

The Directorate of Internal Commerce and Prices (DCIP) of the Ministry of Economic Promotion should at the same time dispose of a procedure for the follow up of prices and costs, which is needed for defining the elements of the price structure, and for negotiating the proposals submitted by operators : regular consultations of main supply sources and of transporters, subscriptions to specialized publications.

5.712 Search for medium term contracts with Nigeria and Ghana; indexation of prices on international prices

Negotiations will be carried out with NNPC and other operators in Nigeria, with GNPC in Ghana, and will be on the guarantee of supply, terms of payments, and the setting up of payment schemes, regular removal by the Nigerien operators.

The objective pursued is a diversification and a better security in supplies, and the strengthening of the exchanges with Ghana, that could also have some impact on the supply of the other petroleum products. Afterwards, the establishment of price indexation on the international prices (as mentioned below) would induce the importer-distributors to look for the least cost source, and to really push Nigeria and Ghana to compete.

SONIGAZ and NIGER GAZ, with the assistance of SONIDEP and the Nigerien State, should study with Nigeria the official supply conditions and a base of reference to set prices that would be fair either for NNPC or for the other Nigerien buyers. One of the results that Nigeria should achieve is a reduction in the export price of the ex-Kaduna cost prices instead of ex-Port Harcourt, and therefore avoiding to pass on the final price the entire transport cost per truck between the cost and Kaduna.

The price should also be indexed on the international prices, and in the future should be linked to any indexation for export and above all for the domestic prices that would be implemented in Nigeria and in Ghana.

An agreement would also lead to maintain the ex-Kaduna price to about 250 US$/ton, which is actually the CIF costal depot price.

Negotiations with either Nigeria or Ghana would benefit from the support of the LPG National Committee and the technical assistance of the PRG that would finance one or two information missions.

5.713 Implementation of the liberalization on import and on LPG trade

In Niger, import and LPG trade are in principle authorized for all professionals. Nevertheless, the market remains tight and the new and the important operators that would enter into the market would only make a profit not before the market reaches 3,000 tons/year, although the actual market is fair to the existing companies.

Some retailers actually benefit from the authorization to import in bottles, maintaining such an authorization should be encouraged as the retailers meet conditions concerning the storage means, an adequate bottle fleet, their capacity to finance their stock, their respecting the security rules, and the possession of an import-export license.

The transport differential in the official price structure should take into account the existence of the direct supplies from Nigeria.

5.714 Price of bottles and cooking devices

Two suggestions could be made:

- All the 6 kg bottles should have the same deposit that would allow to reduce the price of the first equipment;
- The subsidy rate when compared with the retail price of the 3 kg stove should be reduced to the same level as the 6 kg, that would restore a more fair competition between the two models.

5.72 Short term measures

5.721 Indexing of CIF prices of the structure on international prices

This should be possible when export posted prices from Nigeria and Ghana are based on prices of the international market. ex-depot CIF prices in Niamey will then be fixed in advance and monthly from international quotations of butane and freight, and will be consistent with the indexation formula negotiated with supplier countries.

This system, which is an incentive for operators to purchase at the minimum cost, is a guarantee for the country on its supply cost.

This measure is a substantial modification of the price structure and of its mode of definition, and will require a new decree from the Ministry of Economic Promotion.

5.722 Gradual liberalization of retail prices

It is recommended to index prices on import equivalent prices and on other internal price indexes; this can be further followed in the long term by a full liberalization of gas prices, together with other petroleum prices.

5.8 SENEGAL

5.81 Short term measures

5.811 Adjustments in the price structure

The price structure should not be deeply modified;it is simply recommended, in the perspective of a reduction in the net subvention, the simultaneous removal of the door-duty and taxes (VAT). The storage losses will also be aggregated with the depot throughput costs.

5.812 Dialogue with the importers from the neighboring countries (Cape Verde, Guinea Bissau, Mauritania) for pool purchased on the international market. The purchases would still follow the same procedure (tender on the spot market), but for tanker with a larger capacity delivering for example Dakar or Praia alternatively and Nouakchott. The advantage for Senegal would be to be able to receive LPG tankers up to 3,000 tons without obliging the tanker to wait off shore for a week as it is the case today, that the level of stock is reduced (this method being imposed due to an inadequate capacity). This action would have a 3 to 5% impact on the CIF price. The same result would be obtained when the new storage facilities will be installed, that will allow to unload a 3,000 tons in one operation in Dakar.

The PRG would finance the technical means that could be required, the collect of information, and some professional missions Cape Verde-mainland, if need be, representing marginal costs when compared with the potential savings (notably for Cape Verde).

These negotiations should lead to a base agreement on the annual amounts and the authorizations to remove in Dakar for all Gambian operators.

5.813 Dialogue with Gambia and Guinea Bissau for their road supply from Senegal

A LPG export liberalization in Senegal towards Gambia seems really a necessity today, not only in the interest of gambia but also Senegal.

At first, the Senegalese authorities would adopt a policy concerning Gambia supply: implications on the general agreements on trade between the two countries, setting up annual amount, purchasing regulatory procedures.

Then it is recommended that a cooperation continues between the administrations and the operators from the two countries: exchange of information, follow up of flows, technical cooperation to promote equipment. The PRG will contribute if necessary.

Establishment of a road export flow towards Guinea Bissau will draw lessons from the Gambian experience, as mentioned above (paragaphes on Guinea Bissau in this Chapter), a study on the supply network will first be done under the supervision of the PRG; if the conclusions are positive, an agreement on the exchanges will then be established.

5.814 Study on rail supply to Mali from Senegal

It can be reminded that the study has be discussed in the paragraphs on Mali in this Chapter.

5.82 Medium term measures

5.821 Progressive implementation of an indexation of prices on the international and the domestic cost parameters, and a formula progressively liberating the retail prices. This action is in the line of the CIF price indexation on the international prices, and leading to a progressive liberalization of the retail price in setting up a price margin within which distributors can operate. To a more distant future, the liberalization of LPG price after the petroleum products.

Setting up such a formula will guarantee the lowest price to the consumer and will constantly induce the operator to rationalize the supply and distribution system. The formulas will be fixed by a decree after agreement with the operators

5.9 CHAD

5.91 Short term measures

5.911 Simplification of the price structure

It is recommended that the number of heading be six:

- CIF price ex-refinery or ex-storage, for example Kaduna;

- Road transport and costs: the current cost to transport Kaduna-N'Djamena is 76,500 CFAF/ton, to which storage losses, insurance, transit, and miscellaneous expenses are added on, or a total of about 7,000 CFAF/ton. The simulation on the cost structure for tank truck presented in annex 4 in the Transport document gives about 45 CFAF/ton/km, which should be the reference for fixing tariffs. For the trips Kano-N'Djamena or Kaduna-N'Djamena, that will give a transport cost of 45,000 CFAF/ton. The current structure must account for the low frequency of the rotations essentially due to the overcapacity of the transport means compared to the market. The CRG June 1990 mission concluded a 65,000 CFAF/ton, or possibly 65,000 all costs included;

- Taxes and customs duties: have be removed;

- Import expenses: financial charges, security stock, depot throughput costs, bottling: the current value of this item (depot capital and maintenance, losses, financial charges, overheads) is 80,000 CFAF/ton. Referring to simulations provided in annex 3 of the transport part, the depot throughput cost would be 40,000 CFAF/ton or 140 US$, even including an important share of capital. A level at 100 US$/ton seems more reasonable if existing installations are sufficient to meet a limited growth of the market and considering their age. The Regional Gas Coordinator mission in 1990 evaluated this cost at 40,000 CFAF/ton, of which 25,000 for capital and 15,000 for maintenance, to which 3,000 CFAF can be added for losses.

Therefore a gradual reduction of this component down to 50,000 CFAF/ton is recommended, assuming that the market would increase up to 800-1,000 ton/yr.

- Distribution costs, amortization and maintenance of reservoirs, overheads and margins: the current value of the item is 66,000 CFAF/ton. RGC mission in 1990 gave an evaluation at 59,000 CFAF, of which overheads 35,000 + 6,600, amortization of reservoirs 5,500, delivery in town 12,000. An increase of the market would allow operators to lower this margin down to 55,000-60,000 CFAF/ton, while keeping the same level of revenues and even increasing it.

For these two components, it is worth noting that if the gas total market in Niger increases from 400 tons now to 1,000 tons, and if at the same time the total costs for import + storage + distribution are reduced from 145 CFAF/kg down to 100 CFAF/kg, the global revenue of distributors will nevertheless increase by 33%, while fixed costs remain virtually unchanged.

- Retailer margin: it is recommended to maintain this margin at the current level, i.e. about 20,000 CFAF/ton.

- Maintaining the subsidy: the function of this subsidy is to lower the price at a sufficiently low level to favor the development of the market, which will then enable the operators to gradually lower their unit margins. If the subsidy is fixed at 40,000-50,000 CFAF/ton, this would lower the retail price at 240 CFAF/kg under present conditions. Subsidy should be limited to 3 and 6 kg bottles.

Later on, if the market reaches 1000 ton/year, reducing the various components according to the above indications would allow to reach a retail price of 260-270 CFAF/kg without subsidy; the subsidy will then be definitely suppressed.

New structures will be fixed by decrees of the Ministry of Economy and Finance on proposals from the Ministry of Mines, Petroleum and Energy, in relation with professionals (mainly SHELL and TOTAL).

The National Gas Coordinator and the Division of Internal Trade should at the same time dispose of a procedure for following prices and costs, which is needed for defining the elements of the price structure, and for negotiating the proposals submitted by operators: regular consultations of main supply sources and of transporters, subscriptions to specialized publications.

5.912 Research of medium term supply contracts with Nigeria, possibly with Cameroon; indexation of prices on international prices

Negotiations will start with NNPC and other operators in Nigeria, regarding the guarantee of supply, terms and modalities of payment and commitment for regular offtakes from operators in Niger.

In the perspective of a diversification and a better security of supply, it is also recommended to organize meetings with the government and the petroleum sector in Cameroon.

Internal prices in Cameroon and structures which can be applied for exports are fairly high: the Ngaoundere ex-depot price is in excess of 200,000 CFAF/ton, while Ngaoundere is still far from N'Djamena. But the ex-refinery price in Douala is at a competitive level, i.e. 90,000 CFAF/ton. The most convenient mode of supply has to be studied, either using the railway and the road, this implying several loading/unloading operations, or taking the product directly in Douala. The Directorate of Energy (Ministry of Mines and Energy of Cameroon) shows interested in developing contacts with its correspondents in Chad.

Later on, the implementation of a system indexing prices on international prices would be an incentive for importers-distributors to look for the most economic source of supply, and to develop competition between Nigeria and Cameroon.

TOTAL and SHELL, with the support of the Chadian State, should study with Nigeria the official supply conditions and define a reference basis for price fixing which is acceptable both for NNPC and for Chadian buyers. One of the expected results is to base Nigeria export prices for Chad on cost-prices in Kaduna and not Port-Harcourt, and so to avoid that the final price reflects the whole of trucking costs between the coast and Kaduna.

The price should also be indexed on international prices, and in the future should be linked to any indexation to be implemented in Nigeria and Cameroon for export as well as for domestic prices.

An agreement would also result in maintaining ex-Kaduna prices at about 250 US$/ton, which is the current level of the CIF price ex-depot on the coast.

Negotiations with Nigeria as well as with Cameroon would benefit from the support of the National Committee for butane gas and technical assistance from the RGP, which could finance one or two information missions.

5.913 Opening of gas imports and marketing to other operators

The Chadian market now remains very small and the entering of new important operators would be profitable for them, while remaining acceptable for existing operators, only if the market reaches 3,000 ton/yr.

Authorizations for imports in bottles can be given to some traders, if these meet conditions regarding storage means, a sufficient stock of reservoirs, their capability to finance the stock, complying with safety rules, and import-export license.

5.914 National Gas Program

The continuation of this program is recommended, including measures for the promotion and dissemination of equipment, including if possible a reduction of prices of deposits, stoves and burners.

5.92 Medium term measures

5.921 Indexing of CIF prices of the structure on international prices

This should be possible when export posted prices from Nigeria as well as Cameroon are based on prices of the international market. ex-depot CIF prices in N'Djamena will then be fixed in advance and monthly from international quotations of butane and freight, and will be consistent with the indexation formula which will have been preliminarily negotiated with supplier countries.

This system, which is an incentive for operators to purchase at the minimum cost, is a guarantee for the country on its supply cost.

This measure is a substantial modification of the price structure and of its mode of definition, and will require a new decree from the Ministry of Economy and Finance.

5.922 Gradual liberalization of retail prices

It is recommended to index prices on import equivalent prices and on other internal price indexes; this can be further followed in the long term by a full liberalization of gas prices, together with other petroleum prices.

5.923 Follow up of the petroleum project

It seems today that the petroleum project is suffering a new additional delay. According to on-going studies, the crude from Sedigi or from other fields could be transported to N'Djamena to be directly burnt in diesel engines or gas turbines; in this case, it is recommended to study the economics of butane separation directly at the well head (or on the pipeline end in N'Djamena).

Part C
ANNEXES

Annex 1: TERMS OF REFERENCE FOR THE STUDY

COMITE PERMANENT INTERETATS DE LUTTE CONTRE LA SECHERESSE DANS LE SAHEL (C.I.L.S.S)

---------<***>-------

PROGRAMME REGIONAL GAZ BUTANE

-----<*>-----

TERMES DE REFERENCES

POUR UNE ETUDE REGIONALE SUR LES
STRUCTURES DE PRIX ET LES CONDITIONS
DE TRANSPORT INTER-AFRICAIN DU GAZ AU SAHEL

I. CADRE DE L'ETUDE

La présente étude s'inscrit dans le cadre de l'exécution d'un vaste programme régional de promotion de l'utilisation du gaz butane comme combustible de substitution au charbon de bois et au bois de chauffe dans le Sahel.

Les pays concernés par ledit projet sont : Burkina Faso, Cap-Vert, Gambie, Guinée-Bissau, Mali, Mauritanie, Niger, Sénégal et Tchad.

L'objectif recherché est celui d'alléger la pression de la demande en bois de feu (pour des besoins alimentaires) des populations urbaines sur ce patrimoine forestier déjà très marqué par de longues années de sécheresse et de désertification.

Pour ce faire, il avait été au préalable envisagé une politique de vulgarisation de foyers améliorés. Malgré le bon résultat obtenu, il s'est malheureusement avéré que cette solution n'est point suffisante pour résorber le problème de déficit entre l'offre et la demande de bois au Sahel.

Par ailleurs, devant une population à "faible revenu", il est difficile d'exiger des gouvernements un réajustement du prix du bois à sa valeur économique. Cependant, il convient de préciser que plusieurs efforts ont été déployés pour l'instauration d'une

politique rigoureuse de coupe du bois et l'augmentation de son prix de vente -confirmant ainsi la ferme volonté des autorités administratives à la résolution de cet épineux problème d'énergies domestiques- Les énergies de substitution (gaz et kérosène) y sont en quasi-totalité importées.

S'agissant particulièrement du gaz, sa promotion est restée souvent conditionnée par son prix non compétitif par rapport à celui du bois. La "complexité" de ces structures de prix ont contraint certaines administrations au maintien des prix élevés et peu conformes à la volonté politique des Etats en matière de vulgarisation des énergies de substitution.

En début d'année 1990, le prix du gaz au Sahel variait, dans les capitales des pays membres du CILSS, de 120 Frs/kg à plus de 700 Frs/kg. Selon les explications reçues, cela provenait de plusieurs facteurs dont :

- le prix d'achat élevé au niveau de certaines raffineries notamment la SIR :

- la situation géographique de certains pays (enclavés) qui entraînait des charges de transport élevées - du dépôt côtier au centre emplisseur du pays.

- la faiblesse du taux de consommation qui se caractérisait par des coûts d'exploitation très élevés :

- le manque de contrôle du prix de vente des produits (au niveau de certains pays).

Les efforts fournis au niveau de la Cellule Régionale de Coordination (CILSS) ont permis la réforme de certaines structures de prix et même dans certains cas la mise en place d'un fonds de subvention -dégressive- pour stimuler la croissance de la consommation.

S'agissant du problème de transport du gaz butane dans les pays enclavés, un budget de 157 millions de Frs CFA a été mis à la disposition du CILSS pour aider ces Etats à l'acquisition de wagons ou camions citernes dans le but de réduire le coût d'importation de leur produit.

Mais, il convient ici de souligner que les recherches effectuées de ce côté sont restées bloquées à cause :

- du prix très élevé des camions citernes par rapport aux besoins de ces Etats et/ou à l'objectif recherché -souci d'une vision à long terme :

- des réalités nationales qui sont très variables d'un pays à l'autre. Ex. : Le Burkina dispose d'un nombre important de camions citernes avec un coût de transport très élevé (85 000 FCFA pour 1100 km). Par contre, les trois autres pays : Mali, Niger, Tchad n'ont

pas assez de véhicules de transport et sont ainsi obligés de faire appel à l'aide extérieure et à l'utilisation des camions citernes de petites capacités (11 tonnes).

C'est donc dire que la réduction du prix du gaz au Sahel et/ou la mise en place d'une meilleure harmonie dans les politiques tarifaires (gaz butane) dans les pays membres du CILSS nécessite l'analyse de plusieurs paramètres sinon même l'examen critique de l'ensemble du système d'approvisionnement, de stockage et de distribution du gaz butane dans les pays ci-dessus cités.

Compte tenu de l'importance du sujet dans le cadre de l'exécution du projet régional gaz butane/CILSS, une attention particulière sera donc portée à la compétence et à l'expérience du ou des experts.

II. OBJECTIFS DE L'ETUDE

Au regard de cette situation, la présente étude vise donc trois grands objectifs à savoir :

a- la "révision générale" des structures de prix (gaz et équipements) actuellement en vigueur dans les états membres du CILSS (bilan critique*) pour faire les suggestions éventuelles aux Etats pour la réduction effective du prix du gaz sans toutefois perdre de vue les intérêts des parties prenantes (avoir une vision neutre et objective sur les problèmes actuellement en discussion, analyse de l'évolution des prix en fonction du niveau de consommation).

b- une mise en cohérence des grilles nationales de prix tendant à minimiser les risques de détournement des flux commerciaux et des propositions quant aux voies et moyens d'aboutir à une grille tarifaire économiquement optimale au niveau régional (sur base de propositions éventuelles de réforme et programmes d'investissement visant la réduction des coûts). Dans ce cadre, il sera proposé une base de référence servant de guide à la fixation des prix de ces produits (simplification et harmonisation progressive des postes des structures de prix).

c- L'obtention des propositions concrètes pour l'approvisionnement des pays enclavés : il convient ici de préciser que l'objectif recherché est la réduction effective du coût d'importation du gaz butane. L'expert devra par conséquent faire un bilan critique des pratiques actuelles en matière de transport du produit et de sa tarification et ne point perdre de vue l'objectif du programme régional à savoir la croissance de la consommation (vision à long terme). Il proposera à cet effet des critères d'affectation des crédits disponibles.

(*) (Bilan critique basé sur les grilles tarifaires nationales actuelles et les structures de coût).

RESULTATS ATTENDUS

Comme indiqué, les résultats attendus sont :

a) A court terme

Des propositions pour une réforme des "mauvaises" structures de prix restant encore en vigueur (dans certains pays membres du CILSS) :

* examen des pratiques en vigueur
* élaboration des bilans critiques
* mise en évidence des anomalies
* rentabilisation de la gestion de l'enveloppe financière prévue pour l'achat des wagons citernes.
* formulation des contre-propositions.

L'objectif étant la réduction du prix du gaz et des équipement au Sahel

b) A long terme

La simplification et/ou l'harmonisation des méthodes de fixation de prix de gaz et des équipements au Sahel :

* remaniement des postes
* propositions sur la "fourchette" de prix et les possibilités éventuelles de péréquation.

Remarque : Il est à noter que certains Etats ne disposent pas encore de structures de prix et/ou ont opté pour la politique de libéralisation des prix.

DEROULEMENT DE L'ETUDE

Pour le déroulement de cette étude, il est envisagé deux grandes étapes :

- la première consistera à des travaux d'investigation dans les pays membres du CILSS et au Siège pour :

  * la collecte des informations adéquates
  * le contrôle des méthodologies de calcul (tarification)
  * l'élaboration des premiers drafts de bilans critiques et contre-propositions qui pourraient permettre de recueillir sur place les réactions des opérateurs concernés.

- en deuxième phase. il s'agira de l'élaboration des rapports finaux devant faire ressortir :

* la présentation de la situation actuelle
* les contraintes en matière d'importation, de stockage et de distribution
* les systèmes de fixation des prix
* les bilans critiques
* les propositions retenues
* les conclusions des réflexions sur l'harmonisation de ces structures de prix (propositions).

Compte tenu de la particularité du problème posé en matière de transport (seuls quatre pays sont concernés). Ce sujet fera l'objet d'un rapport distinct.

Ces deux rapports devront être établis en 35 exemplaires dont 5 en anglais et 30 en français.

Les frais de traduction sont à la charge de l'attributaire.

COUT - PROGRAMMATION

Au regard de l'état d'avancement de ce projet gaz, cette étude présente une certaine urgence. Sa durée a été estimée à 45 jours environ.

S'agissant du coût. il est à noter qu'elle (l'étude) fait l'objet d'un appel d'offres restreint. Le soumissionnaire devra joindre à son offre le curriculum vitae de la (ou les) personne(s) désignée(s) pour l'étude ainsi qu'une note de méthodologie pour chacun des deux aspects de l'étude.

Annex 2: LPG CHARACTERISTICS

Definitions

Liquefied petroleum gas (LPG) is the term used by the oil industry for a mixture of petroleum hydrocarbons consisting mainly of propane and butane. Although LPG may be produced and sold in the form of pure propane and pure butane, it is rarely required in this state and most LPG sold whether designated as commercial propane or commercial butane is actually a mixture of propane and butane which complies to certain specifications as promulgated by the country authority. LPG is characterized by being in the vapour state at normal ambient temperature and pressure but being easily liquefiable through the application of modest pressure.

The two principal sources of LPG are oil or gas fields and petroleum refineries. Natural gas, whether produced from a pure gas field, or separated from crude oil at a producing field generally is a mixture of methane as the predominant component with varying amounts of heavier hydrocarbons ethane, propane, butanes and pentanes and heavier. Depending on the concentration of these components in the gas stream, and other factors relating to localized petroleum economics these liquefiable components may be economically recovered at the producing field or along the gas pipeline route. The fractionation and secondary processing of crude oil in oil refineries results in the production of significant volumes of LPG into the in-house refinery gas streams. It is usually economic to recover the LPG components from these refinery streams for sale as a commercial product rather than burning as refinery fuel.

LPG is a highly versatile fuel and feedstock with more than 2,000 known applications. Its technical characteristics allow its bulk transport in road, rail and marine tankers and pipelines as well as its distribution to final consumers in bottles and skid-mounted tanks. Readily vapourized at the end-consumer location, it has the same degree of easy control and turn-down, cleanliness, lack of odour and combustion efficiency as natural gas. The predominant end-use application of LPG in low-income developing countries is for cooking (both household and commercial). The LPG product in these countries is generally commercial butane. The use of a butane-predominant mix has developed for two primary reasons:

- the traditional source has been from oil refineries which tend to have a high butane, low propane mix in their gas streams (as opposed to gas/oil field sources which are high propane/low butane),

- most of the LDC's are in tropical regions with relatively high ambient temperatures suitable to vapourization of the heavier butane product.

The term natural gas liquids is a broader reference to all hydrocarbon liquids from ethane, propane, butanes, pentanes and heavier which may be recovered from natural gas produced in association with crude oil or from pure gas fields. It subsumes the propane/butane compounds referred to as LPG.

Specifications

Since the physical and chemical properties of the pure LPG compounds propane, n-butane and isobutane are fixed and known, official specifications apply only to the mixes of "commercial" products. The single most important specification is the maximum allowable vapour pressure at a given temperature. Such a specification is a measure of the volatility of the LPG mix and is critical to ensure that the pressure of a given mixture is less than that which the steel shell of a containing vessel (storage tank, cylinder etc.) is designed to withstand. Statutory regulations in various countries require the maximum vapour pressure of commercial LPG to be specified, the reference temperature varying from country to country, e.g. France 50oC, U.K. 45oC . Minimum volatility is usually also specified in some manner to ensure that the LPG is sufficiently volatile to provide for a prescribed gas offtake rate (to burners) by natural vaporization. This latter specification may be in the form of a minimum vapour pressure or in the form of the maximum allowable temperature at which 95% of the LPG is evaporated. The following table illustrates some key physical properties of the pure LPG components as well as the vapour pressure/volatility specifications for commercial Butane in both France and the U.K.:

LPG PROPERTIES AND COMMERCIAL BUTANE SPECIFICATIONS

Vapour pressure kg/cm2	Pure propane	Pure isobutane	Pure n-butane	Commercial butane	
				France	U.K.
45°C .	15.5	5.9	4.3		5.9 max 4.9 min
50°C	17.5	7.0	4.9	7.5 max	
95% Evaporated				2.0°C max	2.2°C max

As indicated both the French and British commercial butane specifications are more volatile than pure n-butane or a typical blend of pure n-butane and pure iso-butane, allowing for a proportion of propane in the commercial butane product without exceeding the maximum vapour pressure limit. The French specification is more volatile than the British and, assuming a typical 1/3:2/3 iso/normal butane mix, will allow up to about 15% by weight of propane in the commercial product.

Annex 3: LPG WORLD SUPPLY, CONSUMPTION AND TRADE

Production

The following table summarizes the world trend in LPG production in the major region over the past twenty years. As indicated the total world production in 1990 was 139.0 million tons, up from 70.0 million tons in 1970.

WORLD LPG PRODUCTION, BY MAJOR REGION, 1970-1990
(million tons)

	1970	1980	1990	1990 share %
North America	41.0	39.1	45.1	27.6%
Latin America	4.7	9.6	17.2	12.4%
Western Europe	11.1	15.1	18.7	13.4%
USSR/Central Europe	5.7	9.8	10.6	7.6%
Middle East	3.3	13.4	23.0	16.6%
Africa	0.3	1.7	6.9	4.9%
Asia & Australasia	4.5	6.6	17.58	12.7%
Total world	70.5	97.3	139.1	100.0%
of which LDCs	9.0	27.5	55.7	40.0%

As indicated the major growth areas for production of LPG has been in the Middle East, Africa and Latin America. This has mainly been from the major petroleum producing countries in these regions who have been recovering increasing proportions of the potential natural gas liquids from rapidly increasing oil and gas production; the ratio to oil production of associated gas (and contained liquids) flared has been declining. The high LPG production growth from natural gas in these regions is reflected in the growth shown for LDCs, as opposed to industrialized countries which are more dependent on production from refineries. Production from natural gas as opposed to refining is predominant, accounting for some 70% of world supplies in 1990.

Consumption

WORLD CONSUMPTION OF LPG, BY MAJOR REGION, 1970-1990
(million tons)

	1970	1980	1990	1990 share %
North America	38.6	37.8	44.4	33.4%
Latin America	5.9	9.5	17.8	13.4%
Western Europe	10.7	17.3	21.2	16.0%
USSR/Central Europe	5.6	9.5	10.0	7.6%
Middle East	0.5	1.5	4.2	3.2%
Africa	0.5	1.9	3.6	2.7%
Asia & Australasia	7.4	17.7	31.5	23.7%
Total world	69.2	95.2	132.7	100.0%
of which LDCs	7.6	16.1	34.5	26.0%

Trade

The total amount of LPG in international seaborne trade (in 1990) is some 26 million tons. A comparison of the foregoing production and consumption tables indicates that the area of major production surplus is the Middle East and the major deficit area is Asia/Australasia. This reflects the single largest international trade movement of LPG from the Middle East, the largest exporter, to Japan, the largest importer; this movement totalled 11.3 million tons in 1990. Other important seaborne export sources are Algeria, primarily to Western Europe and the Far East (primarily Indonesia and Malaysia) to Japan. The North Sea field-related production is an important source of LPG for Western Europe. A summary of international LPG trade in 1990 compared with 1980 is as follows:

INTERNATIONAL SEABORNE TRADE IN LPG
(million tons)

TO	FROM	1980	1990
Japan	Middle East	8.2	11.3
	Far East	1.4	3.2
	North America	0.2	-
	TOTAL	9.8	14.5
Western Europe	Middle East	2.0	2.9
	North sea	0.5	3.3
	Algeria	0.2	1.8
	Others	0.3	0.6
	TOTAL	3.0	8.6
USA	Middle East	0.1	0.3
	Latin America	0.9	1.3
	Others	0.1	1.3
	TOTAL	1.1	2.9
TOTAL ALL TRADE		13.9	26.0

Major Trading Centres

The major trading centres of the world for LPG, for which market prices are quoted in the trade literature, reflect the above supply, consumption and trading patterns. These are:

- Japan,
- Saudi Arabia,
- UK North Sea,
- North West Europe -Amsterdam, Rotterdam, Antwerp (NWE-ARA),
- U.S. Gulf Coast (USGC, Mont Belvieu).

Annex 4: PRODUCTION OF THE REFINERIES IN THE REGION

NIGERIA - REFINED LPG SUPPLY/HOUSEHOLD DEMAND AND TRADE
(in thousands of tons)

	1986	1987	1988	1989	1990
Port Harcourt (I & II)	10.6	8.0	7.0	50.0	98.0
Warri	8.7	17.0	80.0	26.0	14.0
Kaduna	16.0	22.0	26.0	13.0	13.0
TOTAL SUPPLY	35.3	47.0	113.0	89.0	125.0
Household demand	73.0	91.0	110.0	105.0	110.0
IMPORTS	37.6	44.0		16.0	
EXPORTS			3.0		15.0

LPG PRODUCTION FROM REFINERIES - **NIGERIA**
POTENTIAL 1992-94 (in kt/yr)

Port H. I (*)	90
Port H. II	60
Warri	70
Kaduna	80
TOTAL	300

(*) Currently out of service.
Should be in operation in march 92.

SIR REFINERY, ABIDJAN, **COTE D'IVOIRE**
PRODUCTION AND COMMERCIAL LPG END-USE

	1985	1986	1987	1988	1989	1990
Refined crude, kt	2104	2606	2383	2859	2578	2645
Butane production, kt	44.4	41.6	33.6	50.6	45.9	51.8
Butane yield, % weight	2.1	1.6	1.4	1.8	1.8	2.0
Consumption in the refinery, kt *	23.9	20.2	11.2	27.4	20.4	26.6
Sales in Cote d'Ivoire	20.0	21.0	22.0	23.2	23.4	22.8
Export sales, kt **	0.5	0.5	0.5	1.2	2.1	2.4

* for H2 production, refined fuel, gasoline additive
** towards Mali and Burkina Faso

GHAIP REFINERY, TEMA, **GHANA**.
PRODUCTION AND LPG SALES (COMMERCIAL BUTANE)

	1986	1987	1988	1989	1990
Refined crude, kt	858	901	852	932	836
LPG net production, kt *	6.2	6.3	5.9	6.9	7.3
LPG yield, % weight	0.7	0.7	0.7	0.7	0.9
Sales in Ghana, kt	4.6	4.6	4.9	6.0	6.1
Export sales, kt **	1.6	1.7	1.0	0.9	1.2

* after autoconsumption and flaring
** mainly towards Togo, marginally towards Benin and Burkina Faso

Annex 5: LPG PRICE MECHANISMS

PRICE FORMATION

There is significant potential for increased LPG supply for export from Middle East and other major crude oil/natural gas producing sources. There is limited potential, however, to consume this potential supply in "premium" markets such as residential, commercial and industrial cooking/heating applications and in vehicle carburetion. Surpluses must, on the margin, be consumed in the price-sensitive petrochemical feedstock-steam cracker markets in competition with other feedstocks such as ethane, mostly from natural gas, and naphtha produced in refineries.

The main market-clearing mechanism is replacement of naphtha as feedstock in the large number of flexible steam crackers producing ethylene and other olefins, located in the U.S. (Gulf Coast primarily) Western Europe and Japan. This mechanism of the replacement of a product derived, through refining, from crude oil allows for a price relationship between LPG and crude oil to be calculated. This petrochemical naphtha substitution mechanism tends to set the range of "floor" price for LPG; i.e. the price at which significant extra volumes will be consumed.

For incremental demand to develop in the petrochemical market the CIF price relationship of LPG vs. naphtha must be about 85% to 90% on a weight basis in the major consuming centres. The corresponding relationship between LPG price and crude price (e.g. marker North Sea Brent) may be calculated: If LPG is priced below about 100% to 110% of crude on a weight basis it will be attractive to petrochemical users. LPG prices can and have exceeded this price range when there is a shortage of supply in relation to premium markets. This has particularly occurred on a short-term basis due to excessively cold winters and/or temporary logistics and storage constraints.

The above analysis applies mainly to propane or propane-rich blends and butane is expected to follow a different pattern over the next few years. Butane has traditionally been a premium octane blendstock for gasoline. The large gasoline market in the U.S. has resulted in the gasoline blending disposition being the predominant use there and has usually pushed up the U.S. price of butane in relation to propane on a weight basis. In the other major world markets identified above the price per ton of propane and butane has usually been very close. There are two opposing trends in the butane demand situation which will affect this situation:

- Vapour pressure reduction constraints on gasoline, now in effect, particularly in the U.S. during the summer, are forcing butane out of the gasoline pool - throwing up more supply;

- Future requirements for reformulated "green" gasoline, with the above vapour pressure reductions combined with other requirements such as minimum oxygen content and maximum benzene and total aromatics is promoting the use of oxygenate blendstocks such as MTBE. The two feedstocks for MTBE production are isobutylene and methanol. Isobutylene is produced from butane through dehydrogenation and large, increasing quantities will be required.

These two trends are expected to result in a scenario where there will be seasonal (summer) surpluses of butane for the next two or three years followed by shortages as the MTBE plants now being designed or planned come on stream and require massive amounts of C4 feedstocks. This implies that average butane prices in major markets should reflect the petrochemical incremental market clearing discussed above until about the mid 90's, followed by a strengthening in prices relative to crude when supplies are used up as MTBE feedstock.

Historical Price Relationship - NWE

The following table illustrates the actual butane/crude price relationship that prevailed in Northwest Europe over the past six years.

BUTANE VS. CRUDE OIL SPOT MARKET PRICES NORTHWEST EUROPE

	1985	1986	1987	1988	1989	1990
North Sea Brent crude US$/barrel	27.51	14.38	18.43	14.96	18.20	23.81
US$/ton	208	109	139	113	137	180
Butane NWE spot FOB ARA $/ton	224	110	144	119	135	201
Butane % crude	108	101	104	105	99	112

In addition to the FOB spot price basis quoted in the trade literature (Platts LPGaswire) NWE-ARA, there is a CIF price quoted for NWE which is typically some $ 20 to $ 30/ton higher than the FOB basis.

It is quite normal for a product used in residential/commercial heating to exhibit a seasonal fluctuation in prices. Winter prices for LPG in relation to crude oil usually average some 15 to 20% higher than summer prices. During the last two years there were two short-term phenomena which caused an unusual "spike" in the international LPG prices above the longer-term trend line in relation to crude oil prices:

- the extreme North American "winter market" of November 1989 through February 1990; much colder than normal temperatures exacerbated by some temporary logistics constraints pushed up prices to record levels in North America. Prices in the other major international markets were affected with spot NWE LPG peaking at about $ 200 per ton or 120% of Brent crude price at the time.

- the Iraq/Gulf war caused a severe run up in crude prices August/90 through January/91, and an even greater increase in LPG prices due to the coincidence of the crisis with the winter heating season. The price run-up effect was relatively greater in Europe than in North America; the spot NWE price for butane peaked at about $ 350/ton in January/91, representing about 180% of Brent crude price at the time.

LPG TRANSPORTATION AND STORAGE

Because LPG is a product that is gaseous at normal ambient temperature and pressure, and as well is a hazardous product, highly specialized, capital intensive equipment is required for proper containment during transport, storage and handling.

The principal mode of bulk transport of LPG in international trade from main supply/trading points to receiving depots near end-use markets is by ocean-going tanker. The most economic mode for the entire shipping depot, tanker and receiving depot system for large volume movements such as the AG-Japan business is in refrigerated form at normal ambient pressures. The considerable reduction in capital cost of non-pressurized storage and tankers greatly outweighs the extra running costs of refrigeration. Practically all the tankers above about 5,000 tons capacity are refrigerated while almost all the tankers in the small "coastal" size 500 to 1,000 tons, are pressurized. In the size range between 1,000 to 5,000 tons there is a mix of pressurized and refrigerated vessels.

Costs/Economies of Scale

The oil business in general is characterized by high capital intensity, high fixed costs and low marginal operating costs of the infrastructure. There are significant economies of scale in construction and operation of the equipment. Because of the even more specialized nature and pressure-containment aspects of LPG, the high capital costs and attendant returns to scale are even more significant.

Tankers and Freight Rates

The capital and operating costs of LPG tankers do not increase proportionately with size. A typical bare-boat charter rate for a 500 ton tanker would be about $ 6,000/day, while a 3,500 ton vessel could be obtained for about $ 14,000 per day. The effect of these relative tanker costs on the landed cost of LPG in a hypothetical Europe- W.Africa voyage for two different market sizes is illustrated in the following table:

Assumptions:

- Country A market = 500 tons every 6 weeks[1]/, or 4,333 t/yr
- Country B market = 3500 tons every 6 weeks, or 30,433 t/yr
- Total voyage and port time Europe-WAfr-Europe = 30 days
- Fuel and port charges simplified at 10% added on to charter rate.

1/ The choice of cargo frequency, 6 weeks in this case, has been selected for illustrative purposes but should actually be selected based on an optimization of total marine freight, inventory financial charges and depot capital/operating costs; 2 months is usually the maximum interval, but each case must be studied on its merits.

The resultant freight rates for LPG to each country and resultant landed cost, assuming a common FOB price of $ 150 per ton would be:

	$/ton	
	A	B
FOB price Europe	150	150
Freight rate	396	132
Total landed cost	546	282

This illustrates the order-of-magnitude of difference in landed cost for a country consuming some 30,000 tons per year and one consuming 4,000 tons per year, assuming a voyage distance for each that corresponds to Europe-Gulf of Guinea. About the lowest freight rate that could be achieved for this distance would be about $ 30 per ton for 10,000 ton vessels, requiring a market exceeding 100,000 tons per year at one receiving location. The landed cost for this case would be only $ 180 per ton, 1/3 of that of country A with a 4,000 t/yr market.

Depots/Throughput Costs

The economies of scale in coastal depots for receiving marine cargoes, storing and onward shipping (truck loading, bottling) are significant, especially in the small to medium size range typical of the capacity required for countries A and B defined above. In the medium to large depot range, the unit cost vs. volume curve tends to flatten out (at lower market/throughput levels) than for tankers. The principal reason for economies of scale is the fact that the ancillary facilities in the depot (besides pure storage) and staffing tends to be about the same for a small depot as a medium-sized one.

On the bases of estimates made recently on the investment and the operating costs of a project (see Annexes 1 and 2, Part II), the scale effect on hypothetical depots defined for countries A and B above is as follows:

VOLUME	A	B
Tons	4,000	30,000
Annual market	1,000	7,000
Depot size		
US $ Million		
Capital cost	5.0	17.0
ROI + depreciation 20%	1.0	3.4
Fixed operating costs	0.1	0.1
Variables operating costs	0.004	0.03
Total costs	**1.104**	**3.53**
Throughput cost $/ton	253	118

Summary - Ex-Depot Cost Comparison

The total cost ex-depot for the two hypothetical countries of different sized markets would be as follows:

Costs ($/ton)	A	B
FOB price Europe	150	150
Freight rate	396	132
Total landed cost	546	282
Depot throughput	253	118
Total ex-depot	799	400

Annex 6: CURRENT LPG PRICE STRUCTURES

	BURKINA-FASO		
Structures retenues Monnaie, convertie en FCFA		SIR Bobo FCFA	Tema Bingo FCFA
Approvisionnement	SIR	100000	
	Taxe de port	500	
Stockage raffinerie ou port	Passage Vridi	8000	
	Coulage dépôt Vridi	1206	
1. Prix CAF dépôt côtier ou front.	CAF Abidjan	109706	72000
Transport terrestre, transit et frais liés au transport	Vridi/Tema-Bingo/Bobo	53500	71000
	Bingo-Ouaga	0	9000
	Coulage transport		
	Débours		
	Assurance terrestre		
	Taxe assurance		
	Transit et TPS	1957	2598
2. Total transport		55457	82598
Importation et licence	Frais financiers		
3. Total frais importateur		0	0
Prix rendu dépôt (1+2+3)		165163	154598
Taxes et droits de douane	Droit fisc import	8050	8050
	Taxe statistique	700	700
	Droit de douane	875	875
	Prélèvement CBC	744	628
	Prélèvement ONAC	372	314
4. Total droits et taxes		10741	10567
Mise en place distributeur	Passag. dépôt, TPS		
	Coulage dépôt SONAB	3489	3091
	Stock sécurité	8000	8000
	Frais SONABHY	16000	16000
	Emplissage		
	Coulage rempliss		
	Amort bouteille	4500	4500
	Entretien bouteille	4866	4866
	Commercialisation		
	Fonds vulgarisation	3000	3000
	Frais gx, marg stés pétr	25000	25000
	Marge distrib/détail	23000	23000
5. Total coût distributeur		87855	87457
Marge de détail	Marge de détail	0	
6. Total marge de détail		0	0
7. Subvention	Subvention	13759	2622
8. Prix de détail		250000	250000

	CAP VERT		
Structures retenues Monnaie, convertie en FCFA	Taux Esc/FCFA	Esc CV	FCFA 4
Approvisionnement	FOB US$/T	187	748
	Fret US$/T	179	716
Stockage raffinerie ou port			
1. Prix CAF dépôt côtier ou front.	CAF Praia Ecv/T	26000	104000
Transport terrestre, transit et frais liés au transport			
2. Total transport		0	0
Importation et licence			
3. Total frais importateur		0	0
Prix rendu dépôt (1+2+3)		26000	104000
Taxes et droits de douane			
4. Total droits et taxes		0	0
Mise en place distributeur	Dépôt	13000	52000
	Structure	15000	60000
	Bottle maintenance Transport inter îles	2800	11200
	Distribution costs	10000	40000
	Marge sociétés 10 %	8100	32400
5. Total coût distributeur		48900	195600
Marge de détail			
6. Total marge de détail		0	0
7. Subvention		10000	40000
8. Prix de détail		64900	259600

	GAMBIE			
Structures retenues Monnaie, convertie en FCFA	Taux Dal/FCFA	Eur. vrac Dalasi	Séné. bout Dalasi	Eur. vrac FCFA 34
Approvisionnement	FOB Eur/Dakar	2765	5000	94010
	Port Anvers	372		12648
	Transport et fret	5039		171326
Stockage raffinerie ou port				
1. Prix CAF dépôt côtier ou front.		8176	5000	277984
Transport terrestre, transit	Port Banjul	622		21148
et frais liés au transport	Transport terrestre	70	1040	2380
2. Total transport		692	1040	23528
Importation et licence				
3. Total frais importateur		0	0	0
Prix rendu dépôt (1+2+3)		8868	6040	301512
Taxes et droits de douane				
4. Total droits et taxes		0	0	0
Mise en place distributeur				
	Frais généraux	2300	4000	78200
5. Total coût distributeur		2300	4000	78200
Marge de détail	Marge de détail	1000	1000	34000
6. Total marge de détail		1000	1000	34000
7. Subvention		0	0	0
8. Prix de détail		12168	11040	413712

	GUINEE-BISSAU		
Structures retenues Monnaie, convertie en FCFA	Taux PG/FCFA	PG	FCFA 0.077
Approvisionnement			
Stockage raffinerie ou port			
1. Prix CAF dépôt côtier ou front.	CAF "frontière"	1368000	105231
Transport terrestre, transit et frais liés au transport	Transports nationx	0	0
2. Total transport		0	0
Importation et licence	Frais financiers	333333	25641
3. Total frais importateur		333333	25641
Prix rendu dépôt (1+2+3)		1701333	130872
Taxes et droits de douane	Taxes douanières	0	0
4. Total droits et taxes		0	0
Mise en place distributeur	Fourniture, services	112500	8654
	Pertes dépôt	54720	4209
	Salaires	333215	25632
	Amortissements	23166	1782
	Frais remplissage		
	Impôts société	15000	1154
	Coût réservoirs		
	Marge distributeur		
	Marge grossistes		
5. Total coût distributeur		538601	41431
Marge de détail			
6. Total marge de détail		0	0
7. Subvention	Subvention	0	0
8. Prix de détail		2239934	172303

	MALI	
Structures retenues Monnaie, convertie en FCFA	Ex-SIR dépôt Bamako	FCFA
Approvisionnement	SIR	110000
	Taxe de port	790
Stockage raffinerie ou port	Passage Vridi	10800
	Taxe EMACI	500
1. Prix CAF dépôt côtier ou front.	CAF Abidjan	122090
Transport terrestre, transit	Abidj. Zégoua	36162
et frais liés au transport	Zégoua Bamako	22511
	Coulage transport	
	Commiss débours	
	Assur 0.26 %CAF ?	424
	TPS transport Z.B.	1575
	Transit (et HAD)	2200
2. Total transport		62872
Importation et licence	Frais banc 3%CAF	4750
	Frais d'intention	1230
3. Total frais importateur		5980
Prix rendu dépôt (1+2+3)		
Taxes et droits de douane	CPS 3% x CAF	4750
	PCS 1% x CAF	1583
	Fonds gar O.5%caf	700
	TPS 15 % Passag	6015
	DD 5 %CAF	0
4. Total droits et taxes		13048
Mise en place distributeur	Passage dépôt	40099
	Frais généraux	
	Coulage rempliss	
	Amort bouteille	0
	Reconditionnement	4400
	Marge bénéficaire	37287
	Livraison ville	3564
5. Total coût distributeur		85350
Marge de détail	Remise détaillant	12000
	Marge revendeur	
6. Total marge de détail		12000
7. Subvention	Subvention FED	50000
8. Prix de détail		239340

	MAURITANIE		
Structures retenues Monnaie, convertie en FCFA	Taux Oug/FCFA	Ouguiya	FCFA 3.5
Approvisionnement	FOB US$/T	195	
	Fret US$/T	152	
	Marge correct US$	0	
	Assurance Oug/T	141	492
Stockage raffinerie ou port	Frais financiers	562	1967
	Surestaries	0	0
1. Prix CAF dépôt côtier ou front.	CAF Oug/T	28810	100834
Transport terrestre, transit et frais liés au transport	Pertes en mer	288	1008
2. Total transport		288	1008
Importation et licence			
3. Total frais importateur		0	0
Prix rendu dépôt (1+2+3)			
Taxes et droits de douane	droits de douane	0	0
	Impôts et taxes	3987	13955
4. Total droits et taxes		3987	13955
Mise en place distributeur	Mise en dépôt	1200	4200
	Perte en dépôt	303	1060
	Frais fin, stck sécu	306	1071
	Conditionnement	16140	56490
	Entret amort bout	2300	8050
	Marge commerciale	493	1727
5. Total coût distributeur		20742	72599
Marge de détail	Marge revendeur	4000	14000
6. Total marge de détail		4000	14000
7. Subvention			
8. Prix de détail		53827	188396

	NIGER		
Structures retenues Monnaie, convertie en FCFA		Nigeria FCFA	Ghana FCFA
Approvisionnement	FOB	250 US$	
Stockage raffinerie ou port			
1. Prix CAF dépôt côtier ou front.	ex-Kano / Tema	76362	50000
Transport terrestre, transit et frais liés au transport	Transport	50000	79335
	Pertes trans 2%	5286	5346
	Débours		
	Assurance terrestre	862	862
	Taxe assurance		
	Transit et licence	10640	10640
2. Total transport		66788	96183
Importation et licence	Frais financiers		
3. Total frais importateur		0	0
Prix rendu dépôt (1+2+3)			
Taxes et droits de douane	DD, taxes 3 %		0
	TPP 17F/kg		
	PCS	1048	1048
4. Total droits et taxes		1048	1048
Mise en place distributeur	Passag. dépôt		
	Coulage dépôt		
	Stock sécurité		
	Frais généraux	125400	125400
	Emplissage		
	Coulage rempliss		
	Amort bouteille		
	Entretien bouteille		
	Commercialisation		
	Marge distributeur	24000	24000
5. Total coût distributeur		149400	149400
Marge de détail	Marge de détail	16000	16000
6. Total marge de détail		16000	16000
7. Subvention	Subvention	69600	72631
8. Prix de détail		239998	240000

	SENEGAL (6 kg)	
Structures retenues Monnaie, convertie en FCFA		FCFA
Approvisionnement	Ex-SAR Droits de porte	73168 32926
Stockage raffinerie ou port		
1. Prix CAF dépôt côtier ou front.		106094
Transport terrestre, transit et frais liés au transport		
2. Total transport		0
Importation et licence		
3. Total frais importateur		0
Prix rendu dépôt (1+2+3)		
Taxes et droits de douane	TVA SAR TVA	0 11865
4. Total droits et taxes		11865
Mise en place distributeur	Passage dépôt Pertes en dépôt	20000 367
	Marge distributeur	43034
5. Total coût distributeur		63401
Marge de détail	Marge grossiste Marge détaillant	10700 16500
6. Total marge de détail		27200
7. Subvention	Stabilisation	87726
8. Prix de détail		120834

	TCHAD	
Structures retenues Monnaie, convertie en FCFA	Ex-Kaduna	6 kg FCFA
Approvisionnement	FOB-Kaduna	90000
Stockage raffinerie ou port		
1. Prix CAF dépôt côtier ou front.		90000
Transport terrestre, transit et frais liés au transport	Transport	76500
	Coulage transport	3375
	Débours	2268
	Assur terr	495
	Taxe assurance	
	Transit	800
2. Total transport		83438
Importation et licence	Frais financiers	
3. Total frais importateur		0
Prix rendu dépôt (1+2+3)		173438
Taxes et droits de douane	Droit fisc import	
	Taxe statistique	
	Droit de douane	
	Taxe de gros	0
	Prélèvement	
4. Total droits et taxes		0
Mise en place distributeur	Entretien amort dépôt	40000
	Coulage dépôt	3469
	Frais financiers	2602
	Frais généraux	15457
	Entretien dépôt	19000
	Coulage rempliss	
	Amort bouteille	19200
	Entretien bouteille	7125
	Commercialisation	
	Fonds vulgarisation	
	Marge distributeur	28029
	Marge grossistes	
	Livraison ville	12000
5. Total coût distributeur		146882
Marge de détail	Marge revendeur	16891
	Frais fin. clients	4204
6. Total marge de détail		21095
7. Subvention	Peréquation fds gaz	43000
8. Prix de détail		298415