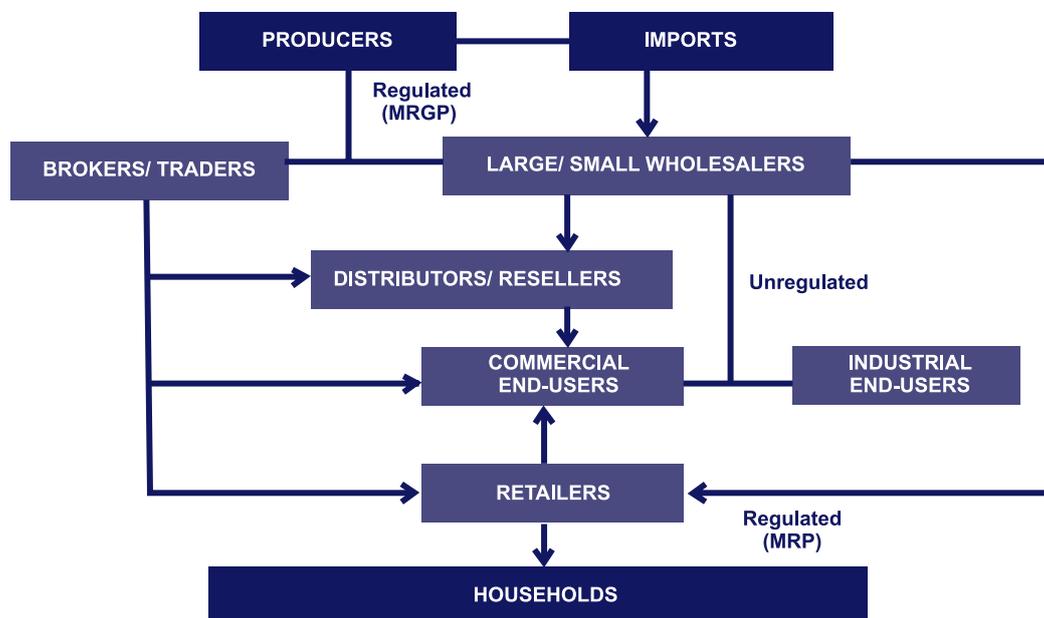


4. Dynamics of the LPG market in South Africa

- 4.1. The production and supply of LPG involves many players in the value chain, including the refineries/producers, wholesalers, distributors, dealers, retailers and end-users. Refineries or producers are typically involved at all levels of the supply value chain, from the acquisition of crude oil up to the cylinder or bottle retailing level. Some major wholesalers or distributors also participate in the downstream transportation, bottling, storage and distribution of LPG. Retailers or dealers may also be involved in filling LPG cylinders to sell to small industrial/commercial or household end-users. Figure 11 depicts the Commission's illustration of the LPG value chain.

Figure 11: LPG supply chain



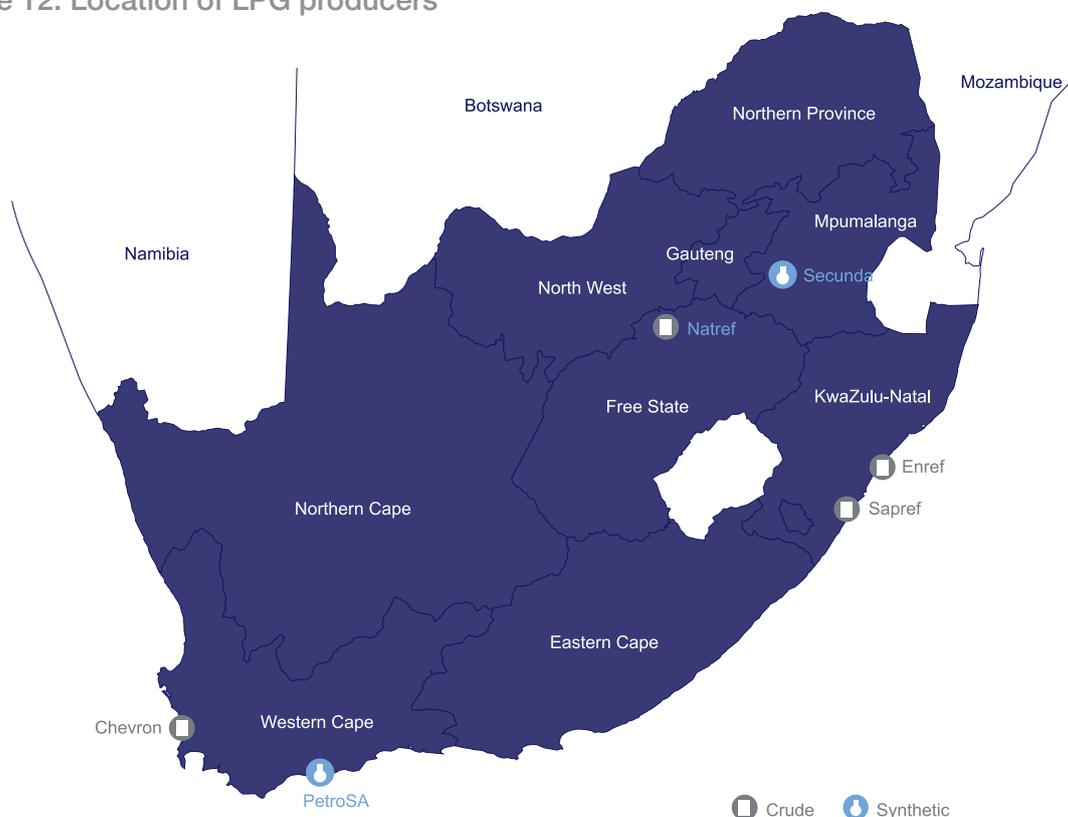
Source: Commission's classification

LPG producers

- 4.2. As discussed, in South Africa LPG is produced primarily as a derivative of the crude oil refining process. The manufacturers of liquid fuels involved at this level of the value chain include international oil firms Chevron, Engen, Shell and BP and local firms Sasol and the state-owned PetroSA.
- 4.3. There are six refineries located around South Africa, of which five produce LPG. These five refineries account for producing over 80% of LPG consumed in South Africa annually, while the remainder is imported to compensate for the shortfall. The Commission has identified the LPG-producing refineries in South Africa:

- 4.3.1. Shell and BP South African Petroleum Refineries (Pty) Ltd (“SAPREF”);
 - 4.3.2. Engen Petroleum Ltd (“ENREF”);
 - 4.3.3. Sasol Synfuels (Pty) Ltd;
 - 4.3.4. The Petroleum Oil and Gas Corporation of South Africa (Pty) Ltd (“PetroSA”);
and
 - 4.3.5. Chevron South Africa (Pty) Ltd (“CHEVREF”).
- 4.4. The National Petroleum Refiners of South Africa (Pty) Ltd (“NATREF”), being a joint venture between Sasol Oil and Total SA, does not produce LPG. This is due to the manner in which the refinery was configured and is unlikely to change.²⁹
- 4.5. Figure 12 shows the geographic locations of each of the different liquid fuel manufacturing plants (including NATREF). Sasol Synfuels is the only inland LPG producer. SAPREF and ENREF are both located in Durban, while Chevron is located in Cape Town and PetroSA is located in Mossel Bay.

Figure 12: Location of LPG producers

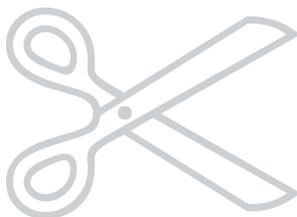


29 The Commission does, however, note that NATREF is a producer of propane and butane molecules. The Commission understands that the NATREF refinery does not combine the two molecules to produce LPG, though. (NATREF submission response to question 3.1 dated 9 April 2015)

Refinery production volumes

- 4.6. Figure 13 shows the volumes of LPG produced by each refinery in South Africa. As observed, **ENREF** is the largest producer of LPG in South Africa.
- 4.7. **SAPREF** is the second largest LPG-producing refinery. SAPREF is a joint venture between Shell and BPSA. The arrangement between the parties is one of toll manufacturing, where SAPREF manufactures the product on behalf of its shareholders [✂]. The products are owned by Shell and BPSA and are delivered to their respective customers. Thus, the LPG produced at this refinery is divided between Shell and BPSA, subject to the conditions agreed upon in the joint venture agreement.
- 4.8. **Sasol Synfuels** refinery in Secunda is the only inland refinery. The smallest LPG-producing refinery in the country is **PetroSA** and is based in Mossel Bay, Western Cape.

Figure 13: Domestic LPG Production (FY2010/11-FY2013/14)

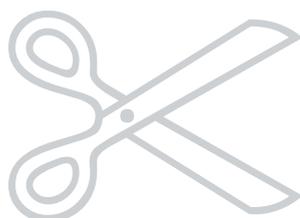


Source: [✂]

Volume of LPG supplied into the SA market by domestic refineries

- 4.9. LPG produced in South Africa is made available to third parties, with a portion of the LPG manufactured being consumed internally by some producers. For instance, in the 2013/14 financial year, [redacted] consumed over [between 50-100%] of the LPG produced by its refinery, while [redacted] and [redacted] consumed [between 30-50%] and [between 20-50%] respectively of the LPG produced at their facilities in the same financial year. [redacted] sold all of its LPG production to third parties, whereas [redacted] did not record the internal consumption of any LPG.
- 4.10. The balance of LPG produced (excluding the LPG is consumed internally) is made available to the South African market, either through sales to shareholders (as is the case with SAPREF) or directly to customers. Figure 14 shows the volumes of LPG actually available for supply into the South African market by the LPG producers. This is after refineries have accounted for their own internal consumption of LPG. It is clear that Sasol Oil is the largest supplier of LPG to third parties in South Africa, followed by SAPREF and Engen.

Figure 14: LPG supplied into the market



Source: [redacted]

Importers

- 4.11. When local supply is unable to meet demand, it is generally supplemented through imported product – especially during the peak demand season and when there are planned or unplanned maintenance shutdowns at refineries.
- 4.12. Import licenses for LPG are only issued to licensed manufacturers and wholesalers. These licenses are issued to applicants by ITAC on recommendation by the DoE.³⁰ At present, [redacted] and [redacted] are the only two market participants having imported LPG regularly. Other market participants like [redacted] and [redacted] have, on occasion, also imported LPG.
- 4.13. LPG is imported through the import facilities located in Richards Bay, Port Elizabeth and Durban. [redacted] import facility at Richards Bay [redacted] has a storage capacity of [redacted] tonnes [redacted] and handles nearly [redacted] tonnes of throughput per day.^{31,32} According to [redacted], such imports are usually kept for strategic emergency supply, implying that imported product is used when there is a shortage of LPG in South Africa.
- 4.14. Easigas sub-leases the import facility located in Port Elizabeth from Shell, which leases it from The National Ports Authority (“TNPA”) [redacted]. The facility has a storage capacity of [redacted] tonnes, and all equipment at the facility is owned by Easigas. [redacted] The remainder of the industry players do not have facilities to import LPG,³³ although [redacted] and [redacted] have previously used the Saldanha Bay facility on a temporary basis. [redacted] In particular, as the Saldanha Bay port does not have import facilities in place, the Commission is aware that wholesalers have made use of road-to-tank transfers to get access to the imported LPG at Saldanha Bay. The Commission is also aware that KayaGas has imported LPG at the Port of Cape Town. [redacted] Road-to-tank transfers have the disadvantage of allowing for smaller parcels of LPG (as compared to importing LPG using import facilities), and special permission is required from the TNPA.

30 *Guidelines governing the recommendations by the Department of Minerals and Energy to the International Trade Administration Commission regarding the importation and exportation of crude oil, petroleum products and blending components. Government Notice No. 1069 in Government Gazette (No. 29328 of 3 November 2006).*

31 DoE: Presentation to the Select Committee on Economic Development, update on LPG issues dated 2 November 2011. Available at https://www.google.co.za/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&ved=0CBwQFjAAhUKewjb77S0ht_GAhXuCtsKHcfYCiw&url=https%3A%2F%2Fpmpg.org.za%2Ffiles%2Fdocs%2F111102energy_0.ppt&ei=wIkNvduGEu6V7AbHsavgAg&usq=AFQjCNHbpuJTrVF-be7TraV4p2BwDthucA&bvm=bv.97949915,d.bGQ

32 Email from LPG distributor (anonymous), 28 October 2014

33 Submission from [redacted] dated 14 November 2014

- 4.15. LPG is normally imported from international traders like Petredec and Geogas. These traders supply imported LPG to wholesalers, who in turn on-sell to end-user customers. These international traders do not appear to supply end-user customers directly in competition with domestic wholesalers. In addition to these traders, there are several countries from where LPG can be imported to South Africa. These countries include Angola, Equatorial Guinea, Congo Brazzaville, Nigeria and Mozambique.

Brokers/Traders

- 4.16. Afrox defines brokers or traders as those entities that obtain allocations from the refineries but do not invest in any distribution or infrastructure and do not have a contracted customer base. Brokers or traders obtain an allocation from a refinery and on-sell it to the highest bidder, using a third-party distributor to deliver the product.

Major resellers/Wholesalers

- 4.17. The wholesale level of the value chain comprises those players that channel the LPG from producers or refineries towards end-users. Wholesalers procure and/or import LPG, after which they direct it in either bulk or cylinder form to: (i) Their own storage and other facilities; (ii) Industrial or commercial end-users; (iii) Distributors and/or resellers; and/or (iv) Households.
- 4.18. Factors determining which supply method is used to supply LPG to a customer include, inter alia, the type of application for which it will be used and the quantity of gas required for the application. Most small to medium-sized customers are supplied with LPG in cylinder form (for either single- or multi-user points).
- 4.19. Customers requiring significant amounts of gas, like industrial or commercial end-users, prefer a bulk storage or supply facility. Wholesalers will install a bulk storage tank in the form of a pressure vessel designed and manufactured under international standards, with a reticulation system connected to the end-users, be it at an industrial site or a shopping mall.
- 4.20. The wholesaling of LPG is relatively capital-intensive. Primary investment required comprises bulk transportation tankers, bulk storage facilities, cylinders, filling plants, delivery vehicles and installation equipment at customers' premises.
- 4.21. In summary, wholesalers' primary role and activities in the LPG value chain can be understood as: (i) The bulk purchasing of LPG from refineries or through imports;

(ii) Owning and operating bulk LPG storage facilities; (iii) Owning and operating LPG filling sites and equipment; and (iv) Distributing LPG in branded bulk and/or cylinder form.

4.22. The relative size of a wholesaler depends on its regional dominance, capital investment, infrastructure and associated logistics. The largest players in the wholesale market comprise companies like Afrox, Easigas, Reatile, Totalgaz and Oryx, some of which were previously vertically integrated with LPG producers.³⁴ These wholesalers' activities are briefly outlined:

4.22.1. African Oxygen Ltd ("Afrox") is a subsidiary of The Linde Group, a global company with headquarters based in Munich, Germany.³⁵ In 2015, Afrox had a level 3 B-BBEE rating³⁶ with 29.60% black ownership. Afrox is a major wholesaler and distributor of LPG in South Africa with operations in eight provinces (with the exception of the Northern Cape). Afrox is also present in South Africa's neighbouring countries like Namibia, Botswana, Zambia, Zimbabwe, Lesotho and Swaziland. Afrox procures LPG from several domestic refineries (through fixed contracts) including Sasol, Chevron, Engen and Petro SA and imports LPG through the Richard's Bay facility.

4.22.2. Afrox is the largest wholesaler and distributor of LPG in South Africa. It has cylinder-filling plants in 15 major cities throughout South Africa and actively distributes LPG between bulk sales and cylinder sales. The biggest Afrox customers are in the and sectors.

4.22.3. Easigas Proprietary Limited ("Easigas") was a 100% owned subsidiary of Rubis Energie based in France, supplying LPG to customers in Southern Africa. On 8 December 2015, the Commission approved Easigas's acquisition of Reatile Gaz (Pty) Ltd ("Reatile Gaz")³⁷ altering the ownership structure. Easigas is now 60% and 40% owned by Rubis Energie (France) and Reatile Gaz (South Africa) respectively.³⁸ Easigas operates as a supplier and distributor of LPG (in both bulk and cylinder form) to distributors, retailers and end-user customers throughout Southern Africa. In 2016, Easigas was certified with a level 5 B-BBEE rating³⁹ with 28.34% black ownership.

34 For example, Oryx entered the domestic LPG sector through the acquisition of BPSA's LPG business while Easigas was previously linked to Shell.

35 The Linde Group owns 50.47% of Afrox. Refer to Afrox Integrated Report 2015, p 6

36 Refer to Afrox Integrated Report 2015, p 46

37 2015Sep0525. Reatile Gaz, was a wholesaler and distributor of LPG located in the Gauteng region founded in 2006 as a division of Reatile Energy, a subsidiary of Reatile Group (Pty) Limited. Reatile Group (Pty) Limited is a black economic empowerment investment company founded by Simphiwe Mehlomakulu and Sizwe Hopa with investments in the energy, mining and chemical sectors in South Africa.

38 Available at <http://www.easigas.com/about-us--easigas.html#beecertifiacte>. Accessed on 2016.10.27.

39 Available at [http://www.easigas.com/assets/certificate---easigas-\(pty\)-ltd--be8443-s1-020916.pdf](http://www.easigas.com/assets/certificate---easigas-(pty)-ltd--be8443-s1-020916.pdf)

- 4.22.4. Easigas is the second biggest wholesaler in the industry by means of its ownership of 24 cylinder-filling plants situated throughout the Southern African region. The company's LPG activity is split between bulk sales [REDACTED] and cylinder sales [REDACTED].⁴⁰
- 4.22.5. Oryx Oil South Africa (“Oryx”) is ultimately controlled by The Addex and Oryx Group based in Malta [REDACTED] and is the third largest wholesaler in the LPG sector. In 2014, Oryx was a level 2 B-BBEE contributor⁴¹ with [REDACTED] black ownership. Oryx acquired BP SA's LPG business in 2013.⁴² The company also acquired Masana's LPG business, which marketed a variety of BP SA's LPG fuels to the business sector, including the supply of LPG to large commercial clients.
- 4.22.6. Oryx has three cylinder-filling plants, one in Gauteng, one in the Eastern Cape and the other in the Western Cape. Oryx supplies LPG in bulk to [REDACTED] distributors nationally that operate Oryx owned cylinder-filling plants. [REDACTED]
- 4.22.7. Totalgaz Southern Africa (Pty) Ltd (“Totalgaz”) is 100% owned by Total Outre-Mer based in France.⁴³ In 2015, Totalgaz was a level 3 B-BBEE contributor⁴⁴ with [REDACTED] black ownership. Totalgaz operates through a network of 13 depots and over [REDACTED] independent distributor-run sites. Totalgaz is also active in Botswana and Lesotho.⁴⁵ Totalgaz participates in the wholesale, distribution and retail levels of the LPG value chain and supplies LPG to the market mainly through cylinders [REDACTED] and the rest through bulk sales [REDACTED]. [REDACTED] Totalgaz acquired KayaGas (Pty) Ltd⁴⁶ on 11 February 2016.⁴⁷

40 Who owns Whom report, “Manufacture and distribution of gases via pipelines”, May 2014

41 Oryx submission dated 31 October 2014, para 1.1.3, p 2

42 2013May0185

43 Totalgaz submission dated 30 April 2015, p 1

44 <http://www.total.co.za/pro/about-b2b/total-southern-africa/totalgaz-south-africa.html>. Accessed on 2016.10.27

45 Totalgaz submission dated 15 April 2016, p 2 – 3

46 Case number 2015Nov0629

47 KayaGas was primarily based in the Cape Town region with branches in Pretoria, Johannesburg and Durban. It had a market share of approximately 1% before being acquired by Totalgaz.

4.23. There are several smaller players operating in the wholesale segment of the market. Some of the players include Top Gas, Wasaa and Camel Fuels amongst others:

4.23.1. Top Gas (Pty) Ltd (“Top Gas”) entered the LPG sector in 2008 and supplies LPG in cylinders to customers in the domestic, [X] and [X] sectors.⁴⁸ Top Gas is a regional player in Gauteng and parts of North West.

4.23.2. Wasaa Gasses (Pty) Ltd (“Wasaa”) is a level 1 B-BBEE company that entered the South African LPG sector in 2008 and established an LPG filling plant in KyaSands in 2010.⁴⁸ Wasaa invested in its own LPG tankers, logistic fleet, cylinders, storage tanks and gas cylinder-filling facility to service the domestic, [X] and [X] customer segments.

4.23.3. Camel Fuels (Pty) Ltd is a level 3 B-BBEE company that supplies and distributes bulk LPG and aviation spirit (avgas) throughout the SADC region.⁴⁹

4.24. Table 3 shows an assessment of wholesaler market shares over time. Afrox is estimated to be the largest wholesaler, closely followed by Easigas. The volumes of Afrox and Easigas have declined during 2013 and 2014 financial years against the 2012 base numbers. On the contrary, volumes of other competitors such Totalgaz, Wasaa have been increasing during the same period. The market shares of KayaGas and Reatile increased prior to their acquisitions by incumbent wholesalers.

48 Wasaa is active in the broader petrochemicals sector and supplies gas, chemicals, crude oil and fuels within the petroleum and commodities sectors.

49 <http://www.camelfuels.co.za/about/#1465810116208-209dc6e3-ca18>

Table 3: Wholesaler market shares over time (including imports)

Wholesaler	2012		2013		2014	
	Volume (tonnes)	%	Volume (tonnes)	%	Volume (tonnes)	%
Afrox	[X]	30-45	[X]	35-50	[X]	30-45
Easigas	[X]	20-35	[X]	20-35	[X]	20-35
Totalgaz	[X]	10-25	[X]	10-25	[X]	10-25
Oryx	-	-	[X]	0-15	[X]	10-25
Reatile	[X]	0-15	[X]	0-15	[X]	0-15
Wasaa	[X]	0-15	[X]	0-15	[X]	0-15
KayaGas	[X]	0-15	[X]	0-15	[X]	0-15
Other	[X]	10-20	[X]	-	[X]	-
TOTAL	394,752	100	328,658	100	360,307	100

Source: Volume figures from wholesale

4.25. Further segmentation of the wholesaler market shares into bulk and cylinder LPG sales indicates similar trends as observed in Tables 4 and 5. It is also apparent that:

4.25.1. Afrox is the leading wholesaler, regardless of the segment considered; and

4.25.2. Market shares are relatively stable.

Table 4: Estimated wholesaler market shares over time in the bulk segment (including imports)

Wholesaler	2012		2013		2014	
	Volume (tonnes)	%	Volume (tonnes)	%	Volume (tonnes)	%
Afrox	[X]	30-45	[X]	30-45	[X]	30-45
Easigas	[X]	30-45	[X]	30-45	[X]	20-35
Oryx	[X]	-	[X]	0-15	[X]	0-15
Reatile	[X]	0-15	[X]	0-15	[X]	0-15
Totalgaz	[X]	0-15	[X]	0-15	[X]	0-15
Wasaa	[X]	0-15	[X]	0-15	[X]	0-15
KayaGas	[X]	0-15	[X]	0-15	[X]	0-15
Other	[X]	10-20	[X]		[X]	-
TOTAL	266,131	100	216,254	100	241,414	100

Source: Volume figures from wholesalers

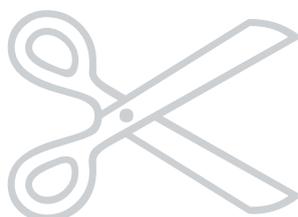
Table 5: Estimated wholesaler market shares over time in the cylinder segment (including imports)

Wholesaler	2012		2013		2014	
	Volume (tonnes)	%	Volume (tonnes)	%	Volume (tonnes)	%
Afrox	[REDACTED]	35-50	[REDACTED]	40-60	[REDACTED]	35-45
Totalgaz	[REDACTED]	15-25	[REDACTED]	15-25	[REDACTED]	15-25
Easigas	[REDACTED]	15-25	[REDACTED]	15-25	[REDACTED]	15-25
Oryx	[REDACTED]	-	[REDACTED]	0-15	[REDACTED]	0-15
KayaGas	[REDACTED]	0-15	[REDACTED]	0-15	[REDACTED]	0-15
Reatile	[REDACTED]	0-15	[REDACTED]	0-15	[REDACTED]	0-15
Wasaa	[REDACTED]	0-15	[REDACTED]	0-15	[REDACTED]	0-15
Other	[REDACTED]	10-20	[REDACTED]	-	[REDACTED]	-
TOTAL	128,621	100	112,404	100	118,893	100

Source: Volume figures from wholesalers

- 4.26. An analysis of the distribution of sales to customer groups by the major resellers reveals [REDACTED] and [REDACTED] achieve the majority of their LPG revenue through direct sales to end-users. [REDACTED].

Figure 15: Relative distribution of sales to customer groups for the period 2011–2014



Source: [REDACTED]

4.27. In addition to supplying domestic customers, wholesalers also export LPG procured from domestic refineries. Most wholesalers export LPG into the Southern African Development Community (“SADC”) region, to countries like Zimbabwe, Namibia, Botswana, Zambia, Mozambique, Lesotho and Swaziland. Wholesalers wishing to export to these countries are faced with several regulatory hurdles. Wholesalers indicated that factors like the availability of LPG in South Africa, access to appropriate long-distance logistics, and export permits required by the International Trade Administration Commission (“ITAC”) and the DoE impede the ability of wholesalers to penetrate external markets. In addition to naming these structural barriers to exporting, wholesalers also referred to loss of investment due to theft of cylinders as a factor that curbs exports. Table 6 shows the volumes of LPG exported by various wholesalers.

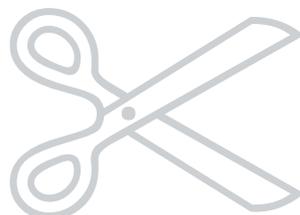
Table 6: Aggregate LPG export volumes (tonnes), 2010–2014

Years	Annual LPG exported (tonnes)
2010	2 584
2011	3 225
2012	14 528
2013	16 902
2014	33 450

Source: Department of Energy (www.energy.gov.za), accessed 02 December 2015

4.28. One of the new entrants into the LPG market, Wasaa, supplies most of the LPG it procures to the export market. In 2013 Wasaa exported [between 50-70%] of its LPG supply, although this declined to [between 20-40%] in 2014. The second largest exporter was Reatile, with exports accounting for [between 10-30%] of its supply in 2013 and [between 10-20%] in 2014. Afrox’s exports as a percentage of its total LPG supply decreased slightly from [between 10-20%] in 2013 to [between 10-20%] in 2014. Easigas exported [between 10-20%] of its LPG in 2014. Figure 16 captures the portion of each LPG wholesaler’s total supply exported in 2013 and 2014.

Figure 16: Wholesalers' exports as a percentage of their total LPG supply



Source: Wholesalers' information request, March 2015 submission

- 4.29. As stated earlier, wholesalers make provision to supply the domestic market. Despite their penetration of the SADC countries, wholesalers' total exports declined in 2014, likely because of LPG supplies that would have gone to the SADC countries being reverted to the South African market in response to domestic LPG shortages. Some wholesalers, like [✂], indicated that they only export LPG once domestic demand is met and that the availability of local supply plays a crucial role in export volumes. Another factor considered by wholesalers was the relatively higher price received in the export market.

Distributors/Resellers

- 4.30. Distributors/Resellers comprise market participants selling LPG to an end-user. In an effort to reach the vast network of customers to be serviced, wholesalers appoint **distributors** to act as their agents. Distributors like Sims Gas, Kulani Gas and The Gas Guy are exclusively contracted to wholesalers, forming an extension of the wholesalers' route to market. Wholesalers generally make certain investments in the operations of the distributors or resellers. Some distributors bear all costs related to the supply and distribution of LPG to customers, relying on the wholesale supplier for LPG product and cylinders only.

Retailers

- 4.31. Some retailers procure LPG in bulk to fill cylinders.⁵⁰ Most offer LPG as part of a much broader product offering and rely on the large wholesalers for equipment, cylinders and logistical support.
- 4.32. According to the DoE, there are an estimated 452 retailers in the form of fuel stations and 4 000 smaller dealers that sell LPG from informal shops and trading stores.⁵¹ Given the diverse range of retailers, it seems appropriate to categorise them according to type of outlet, namely filling stations, and hardware and camping shops.
- 4.32.1. Filling stations. Most filling stations offer refilling services to LPG customers. According to CADAC, customers are encouraged to take their cylinders to dealers who have been pre-approved by the LPG Safety Association of Southern Africa (“LPGSASA”) only to ensure that their cylinders are filled safely.
- 4.32.2. Hardware and camping stores. This category of retailer includes all shops (like MICA) with a hardware or camping division. These companies may choose to carry a specific LPG brand or a range of LPG brands. Given their stocking of more than just gas cylinders, it is customary to find a variety of brands. For instance, MICA offers a range of brands that include CADAC, Alva, Agrinet and Easigas.
- 4.33. Some retailers and distributors have filling facilities and can receive bulk product from wholesalers.⁵⁰ These market participants are usually contracted to a wholesaler maintaining ownership of the filling equipment, and supplying its own branded cylinders.⁵¹ These retailers and distributors do not sell LPG under their own brand name.
- 4.34. This level of the value chain is thought to act as a key channel to household end-users.

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Thus the inclusion of wholesalers: wholesalers have their own retail arm and do some distribution themselves but also use distributors.
Department of Energy (2013), Transformation of the Gas Sector. Presentation by Chief Director: Hydrocarbons Policy dated 13 August 2013.

End-users

- 4.35. End-users can broadly be classified as industrial/commercial users or domestic (household) users. LPG is supplied to these end-users in either bulk or cylinder form, depending on the customer's requirements. Industrial/Commercial users of LPG in South Africa account for approximately 85% of consumption, while domestic (household) users consume the remaining 15%.✂
- 4.36. Industrial/Commercial users mostly run operations that require LPG as an input into their production process. Most wholesalers install and maintain the infrastructure (tanks, equipment etc.) at these users' premises. Industrial customers also use cylinders depending on what their demand and physical space requirements are. Importantly, the price is negotiated between industrial/commercial users and wholesalers and is not regulated as in the case of LPG sold to households. Pricing regulation is elaborated on in Section 8.
- 4.37. Amongst household users, LPG use is still limited. According to many stakeholders, this is largely due to the concerns households have about the safety of LPG in their homes. Given the benefits of LPG and the electricity crisis facing South Africans, LPG represents a reliable energy alternative. A comprehensive analysis of household consumers' LPG consumption trends is provided in the following section.

LPG distribution channels

- 4.38. The distribution of LPG takes place in two forms, namely through cylinders and through bulk tanks. Submissions received from market participants indicate their choice of bulk or cylinder depends on the application, volume consumed and the cost.
- 4.39. To determine demand-side substitutability (to what extent customers can switch from bulk to cylinders and vice versa), information was gathered on the volumes of LPG they require and on the cost factors unique to the supply of bulk and cylinder LPG relative to one another. Market participants were also asked questions about the cost of switching between the two; about the periods for effective switching; and about their willingness and ability to switch in response to a price increase. Customers' responses were then considered in light of their volume requirements; the cost of switching; and the period involved in switching.

- 4.40. Regarding demand substitutability, volume requirements and cost differences emerged as the salient factors determining the willingness and ability of LPG end-users to substitute between LPG supplied in bulk format as opposed to LPG supplied in cylinder format.
- 4.41. For Puregas (Pty) Ltd (“Puregas”), their application of LPG differs depending on the scale or quantity required. According to Puregas, switching from bulk LPG to cylinder LPG would not be practical as bulk users normally use quantities that would be difficult to supply in cylinders. This view is shared by Anglo American Platinum Limited (“Anglo American”), an end-user customer of bulk LPG. Anglo American indicated that its volume usage of LPG is too high⁵² for it to switch to using cylinder LPG.⁵³ Similarly, [redacted] stated that as it consumes [between 2 000 to 3 000] tonnes of LPG per month, switching to LPG in cylinders would not be a practical solution to its requirements.⁵² To substitute [between 2 000-3 000] tonnes of bulk LPG, [redacted] would need to procure [between 41 000 to 62 500] units of 48 kg cylinders (the largest available).
- 4.42. [redacted] stated that the cost structures of using bulk as opposed to cylinder LPG are also significantly different. Cylinders attract significant additional costs for labour, distribution, capital outlay on cylinders, maintenance of cylinders, filling premises and plant. Puregas stated that the cost of switching from one form to the other was difficult to estimate. Concerning the period, it could take six to 12 months.⁵³
- 4.43. In addition to the MRGP and primary transport costs, cylinder customers carry more costs than those borne by bulk customers. According to Totalgaz, additional costs to be borne by a cylinder LPG distributor include those of the amortised cylinder and filling equipment, a wholesale margin, secondary transport costs from the refinery to the wholesaler’s filling depot, along with insurance and maintenance costs on large equipment. Similarly, retailer customers need to factor in the costs of secondary transport, cylinder and filling equipment amortisation and a wholesale margin. End-user customers end up bearing the same costs as a retailer but with the addition of a retail margin.⁵³
- 4.44. Regarding supply-side substitution (to what extent suppliers can switch from supplying bulk to cylinders and vice versa), the following factors were analysed: Cost to supply bulk as opposed to cylinder LPG; whether there is any difference in the product; and whether or not all wholesalers supply both bulk and cylinder LPG.

Cost to supply bulk LPG as opposed to cylinder LPG

- 4.45. The costs involved in supplying LPG in bulk as opposed to supplying it in cylinder form are considered. The additional cost to set up a cylinder operation once a supplier is already supplying bulk LPG is approximately R1 million. Although the cost of transporting the LPG from the refinery to the wholesaler's depot is the same, there are additional costs in getting the LPG into the cylinders. These include the cost of laying out the necessary capital to procure the cylinders, for filling the cylinders, and for transporting the cylinders from the depot to clients.
- 4.46. According to [redacted], the main difference between supplying LPG in bulk as opposed to supplying it in cylinders is cost-related, more specifically, transportation costs, filling fees and the depot operating costs. Other differences relate to the type of equipment needed (manifold as opposed to bulk tanks, vaporizers and piping). In terms of supplying cylinders rather than bulk, the barriers to entry include contractual obligations, the availability of cylinders and supply, and cylinder transportation costs. Further, the supply chain required to distribute cylinder LPG is more complex than that required for bulk. It is simpler to distribute bulk, as the LPG is taken from the refinery and distributed directly to the customer. Most of the LPG wholesalers use outsourced vehicles for the delivery of LPG to bulk customers.
- 4.47. The period for switching from the supply of bulk LPG to the supply of cylinder LPG ranges between one month and a year. [redacted] estimates the period to be 6 to 12 months, depending on factors such as, how long it takes to set up the filling plant and to comply with NERSA requirements, by-laws and environmental requirements, while [redacted] estimates the period to be approximately one month. According to [redacted], the time frame for gaining entry into the cylinder market should be calculated based on the time it would take to obtain the necessary approvals, for example, performing an environmental impact assessment ("EIA") for filling plants; carrying out the required major hazard installation ("MHI"); and obtaining approval from the local authorities. The lead times for procuring the necessary capital equipment and related installation time must also be taken into account. [redacted] estimated that the period would be approximately six to eight months. This includes the lead-time for cylinder purchases; acquiring the necessary equipment; completing MHI, EIA and achieving NERSA compliance; and raising capital for the installation costs.

- 4.48. When questioned about their willingness to switch between supplying LPG in the two different forms, [redacted] and [redacted] submitted that the increase in cost would be transferred to the customer as far as possible. [redacted] When this was no longer possible, they would decide whether to stop supplying LPG completely or to switch to supplying LPG in cylinder form. [redacted] Similarly, [redacted] submitted that it would not switch to only supplying LPG in cylinder form but would rather pass the cost on to its customers. [redacted] [redacted] submitted that it would not switch, because its strategy is to stay competitive in both markets. [redacted] [redacted] submitted that in applications where it is technically possible to supply using cylinders (not large-demand applications), it would switch from supplying bulk. [redacted]
- 4.49. The four major players in the market – Afrox, Easigas, Oryx and Totalgaz – and smaller players such as Reatile, Kayagas and Wasaa supply in both bulk and cylinder form. This indicates a wholesaler needs to supply LPG in both forms to be competitive in the LPG market.

Pricing comparison between LPG and alternative energy sources for low income households

- 4.50. Table 7 provides a comparison of energy prices, efficiency and cost for cooking for the low-income residential market. As may be observed, electricity per kWh is the most affordable energy source in terms of both price and cost to cook, while LPG is the most expensive cooking fuel for low-income households.
- 4.51. Low-income households with limited disposable income rely on subsidies from government for energy under the Free Basic Energy (“FBE”) Programme. The FBE programme is targeted at poor households and aims to provide sufficient energy for basic lighting, heating and cooking. The levels of service are 50kWh per household per month for consumers on a grid-based system.⁵⁴ However, for households without electricity access, LPG is an important source of clean energy. The Commission is of the view that government should consider subsidising LPG prices or providing some incentives for poor households as part of the Free Basic Energy programme.

Table 7: Comparison of energy sources for cooking in low income households

Energy source	Regulated price			Cooking appliance efficiency (%) ¹⁰⁶		Cost to cook
	Litre/kg/kWh	Per GJ	Per kWh			Per kWh
Paraffin (retail)	R8,47 /L	R227	R0,82	47%	Pump type	R1,72
LPG (retail)	R20,69 / kg	R431	R1,55	54%	Single burner	R2,85
Electricity ¹⁰⁹	R0,95 /kWh	R264	R0,95	75%	Electric coil	R1,27

Source: Department of Energy and WLPGA

- 4.52. These findings are different to those submitted by NERSA (Table 8) showing LPG is a cheaper energy source compared to paraffin, but is substantially more expensive than electricity for low income households (households that consume between 51 – 350 kWh).

Table 8: Price and efficiency comparison of energy sources in low income households (2014)

Fuel cost to heat two litres of water to boiling point in a pot						
Fuel Type	Fuel used to boil		Fuel Price		Cost to boil	Deviation from LPG as %
	Amount	Units	Unit price	Units		
Paraffin regulated max sales price (30 Sep 2014)	0,0374	kg	9,71	R/l	0,971	139,43%
LPG regulated max sales price (30 Sep 2014)	0,0273	kg	23,51	R/kg	0,6964	100.00%
Eskom home light Block 2 [51 – 350 kWh] (2014)	0,4381	kWh	0,9641	R/kWh	0,4224	60,65%
Eskom HomePower 4 [>600kWh] (2014)	0,4381	kWh	1,6251	R/kWh	0,712	102,23%

Source: NERSA submission dated 4 November 2014

Guidance from previous Commission investigations

- 4.53. The Commission noted in the Sasol/Engen matter⁵⁶ that:

“LPG could possibly be substituted with other energy sources such as natural gas, coal, heavy and light fuel oil, electricity, paraffin and diesel. For LPG to be substituted with natural gas the (bulk industrial) users must be close to a pipeline. Hence,

55 WLPGA. 2009. LP Gas: Efficient Energy for a Modern World.

Note: Percentages based on energy used per energy source to boil 1 litre of water based on efficiencies observed in India.

56 Case number 2004Nov1304

substitution could be a theoretical possibility. The degree of substitutability varies depending on the purpose for which the energy source is needed, but switching requires capital expenditure.”

- 4.54. Customers stated the ability to switch between energy sources was a theoretical possibility but it depended on the nature of LPG use. LPG is more reliable and environmentally friendly than other products; occupational health regulation renders LPG safe for in-house use relative to, for instance, petrol and diesel. Electricity was deemed costly for space heating and not reliable in industrial applications, whereas LPG is used in equipment uniquely designed for LPG use.
- 4.55. In the course of the *Reatile/Egoligas* merger,⁵⁷ a comparison was performed between LPG and natural gas. The Commission observed that natural gas and LPG are derived from different sources and require different processes to become a usable end-product; natural gas can be transported over long distances while LPG cannot; and the appliances/equipment that use natural gas are different from those that use LPG because of the differences in properties of the two fuels. In light of this, the following was presented regarding the substitutability of these products:
- 4.55.1. Customers and competitors stated they do not view natural gas and LPG being substitutable because of the costs of switching and the time that it would take to alter appliances correctly; and
- 4.55.2. None of the customers contacted ever switched prior to being contacted by the Commission.
- 4.56. A United Kingdom (“UK”) market inquiry into the supply of bulk LPG for domestic use found the closest functional substitute for LPG was natural gas. In Great Britain, the majority of customers are in locations that do not have access to the main network, so they do not have scope to switch to natural gas. This is also the case in South Africa, as natural gas networks are limited to a few places within the City of Johannesburg. Natural gas is substantially cheaper than LPG in both Great Britain and Northern Ireland (suppliers accepted that the price of natural gas was approximately half that of LPG).

- 4.57. For analysis, the Commission will focus its assessment on LPG supplied through cylinders and bulk tanks.

LPG consumption dynamics in South African households

- 4.58. The characteristics of LPG consumption in households were examined based on information sourced from the DoE's 2012⁵⁸ survey on energy-related behaviour in the South African residential sector, and as data captured in the National Income Dynamics Study ("NIDS"). A more detailed summary of the results of this analysis is provided in **Annexure B**.
- 4.59. South African households rely on multiple energy sources to meet their daily energy requirements. The types of energy sources used differ depending on what is available to the household (particularly the household's electrification status) along with the application the energy source is intended for (cooking, water heating or space heating).
- 4.60. The DoE's study found that using gas is greater amongst electrified households (20% of households) than non-electrified households (13% of households). The likelihood that gas will be selected as an energy source increases concomitantly with an improvement in the household's living standard (including its income level). In terms of geographic areas, the domestic use of gas is greater on rural farms and in formal urban areas, especially amongst higher-income electrical households.
- 4.61. Regarding cooking, the study found that only a marginal number (5%) of both electrified and non-electrified households used gas as their primary energy source. Across geographic areas, gas was usually found to be used for cooking amongst urban formal households; only 2% to 3% households in other geographic locations used it for this purpose. In terms of the energy mix in cooking, it was found that 60% of South African households used a single energy source (typically electricity) for their cooking requirements. Of the remaining 40% that used a range of energy sources for cooking, only 10% used a combination of gas and electricity.

58 Department of Energy. 2013. A Survey of Energy Related Behaviour and Perceptions in South Africa: The Residential Sector.

- 4.62. In terms of space heating, 41% of households used electricity while less than 5% used coal, gas and other energy sources. Using gas for space heating was only observed amongst households with medium and high living standards, and only to a marginal (5%) degree. Regarding the energy mix used for heating by households, using gas was only observed amongst electrified households with medium and high living standards. The combination of gas and electricity as a source of energy was most pronounced amongst households with a high living standard.
- 4.63. Similarly, the NIDS data showed that during 2008 to 2012, the portion of households that used gas as their primary source for heating was limited, although marginal growth over the 2010 to 2012 period was observed. Only 2.6% of households recorded gas as their primary energy source used for cooking in 2012.