Kenya’s Strategy to Make Liquefied Petroleum Gas the Nation’s Primary Cooking Fuel

Will Kenya meet the 35 percent target it has set for adoption of LPG as a cooking fuel by 2030?

A low level of use and high end-user price currently cloud the outlook

Universal access to modern energy services by 2030 is one of the three goals of the Sustainable Energy for All (SE4All) initiative launched by the United Nations in 2011. After Kenya joined SE4All in 2012, a stocktaking revealed that Kenyans relied predominantly on traditional sources of cooking energy. About 84 percent of the population cooked with solid fuels (wood, charcoal, or agricultural residue), and 5 percent used kerosene. Cooking with these fuels affects the health of millions of Kenyans while causing environmental and social damage. An estimated 15,000 Kenyans die each year from air pollution, and at least 40 percent of childhood deaths are caused by respiratory illness.1 Meanwhile, wood resources are being depleted faster than they can be replenished. (Between 1990 and 2005, Kenya lost 5 percent of its forest cover.) Wood fuel production, household cook stoves, and heating technologies are generally inefficient and wasteful.

To deal with the problem, Kenya’s government set a long-term goal of having 42 percent of households adopt clean cooking fuels. The goal was embedded in Kenya’s Vision 2030 Second Medium-Term Plan (2013–17) in alignment with the SE4All country action agenda. Liquefied petroleum gas (LPG) was to contribute 35 percent, biofuels 5 percent, and electricity 2 percent. A strategy was developed to reduce the cost of LPG and thereby expand its use among lower-income Kenyans.

The government converted the 35 percent goal into a benchmarked per capita consumption target of 15 kilograms of LPG per year by 2030—a sharp expansion from a baseline of just 2 kilograms in 2013 (table 1). Africa’s average LPG consumption is 3 kilograms per capita per year. South Africa, whose economy is roughly the size of Kenya’s, consumes much more: about 6 kilos per capita per year (as of 2015). As a result of effective government intervention, Senegal and Ghana, whose economies are smaller than Kenya’s, consume between 5 and 10 kilos per capita per year.

Even in Kenya’s top income quintile, only 10 percent of consumers use LPG, compared with 45–85 percent in comparable African countries. In the other quintiles less than 2 percent use it. Most Kenyans living in rural areas—which means most Kenyans—do not pay for their cooking fuel, as they tend to gather their own firewood. The largest potential market segment is formed by upper- and middle-income households living in urban areas.2

LPG is expensive in Kenya relative to the cost of competing fuels (table 2). No recent analysis has been done to persuade Kenyans of the energy cost efficiency of LPG. But in 2013 the cost of one year of cooking with LPG (approximately $350) was much higher than the cost of cooking with kerosene ($200) or coal ($150). In 2017, kerosene (inclusive of value-added tax, VAT) was still cheaper than LPG (which is now exempt from VAT).

---

1 According to the 2016 Global Burden of Disease study, the figure was 16,600.

2 According to Dalberg–GLPGP (2013), lower-income households have an income of less than K Sh 10,000/month; middle-income households, between K Sh 10,000 and 40,000; upper-income households, more than K Sh 40,000/month. US$1 ≅ K Sh 100.
LPG is expensive in Kenya relative to the cost of competing fuels. No recent analysis has been done to persuade Kenyans of the energy cost efficiency of LPG. In 2017, kerosene (even with VAT) was still cheaper than LPG (now exempt from VAT).

Several factors contribute to the high consumer price. Apart from fluctuations in the international import price, the landed supply cost is persistently high owing to the absence of an open tender system for bulk storage of LPG, and the margins retained by dealers, distributors, and retailers are unusually high (table 3). To this must be added the substantial costs consumers pay for their cylinders, the stove, and accessories needed to use the gas. The top five of Kenya’s 44 licensed LPG dealers account for about 80 percent of the market. Cylinders are available in 1, 3, 6, 13 kilogram sizes. Seventy percent of current demand is for the 6 kilogram size; 20 percent for the 13 kilogram size. Small, inexpensive burners fit on 6 kilogram cylinders, but the 13 kilogram size requires a more expensive stove. Because the larger cylinders are heavy and refilling points are few, consumers also face the expense of transportation to have their cylinders refilled.

Most retailers raised their prices by 15 percent in early 2017, following a global surge in gas prices (figure 1). Retail prices in the first quarter of 2018 remained where they stood at the end of 2017. The 2017 monthly average retail price was about $1.6/kg. A 6 kilogram cylinder costs about $26. No recent breakdown of the components of the retail gas price has been performed, but a 2013 breakdown concluded that margins accounted for nearly 32 percent and landed supply costs for a disproportionally high 62 percent (table 3). A current cost breakdown would likely show similar results, though with a lower global reference price than in 2013.

The consumer price of LPG has been deregulated since 1994. However, regulations that took effect in 2009 (based on the 2006 Energy Act) permit the retail price to be regulated, and a new Energy Bill, not yet enacted, provides for wholesale price regulation.
Uptake is presently measured as a percentage of consumers (individuals and households) using LPG, but this metric reflects neither the intensity nor the sustainability of LPG use. Nor does it account for the simultaneous use of multiple fuels, a practice known as fuel stacking. Therefore, the measure tells us little about reductions in the use of traditional cooking fuels.

How has the strategy fared?

Multiple challenges persist along the relatively long and complex LPG value chain—including inconsistent measures to track uptake, a high consumer price, ineffective regulation, and low popular awareness of LPG’s advantages

Kenya’s LPG value chain is long and complex, extending from the government as strategist and planner through importation, bulk storage, wholesaling, and retailing before reaching the consumer (figure 2). Consumer receptivity hinges, of course, on their awareness of LPG’s advantages and willingness to alter longstanding cooking and heating practices, but also (and critically) on their ability to afford both the fuel and the stoves that burn it.

Uptake is presently measured as a percentage of consumers (individuals and households) using LPG, but this metric reflects neither the intensity nor the sustainability of LPG use. Nor does it account for the simultaneous use of multiple fuels, a practice known as fuel stacking. Therefore, the measure tells us little about reductions in the use of traditional cooking fuels. Because data on quantities of LPG consumed (reported in table 1) include industrial use and are affected by irregularities in the refilling of cylinders, the apparent upward trend in consumption until 2017 is not reliable enough to justify a conclusion of sustainable adoption of LPG as cooking fuel. Indeed, the 2017 price and sales figures (reported in tables 1 and 2) suggest a contrary conclusion.

The price remains high in part because, as noted, Kenya has no properly functioning open tender system for bulk storage of LPG (as it does for other petroleum products). Bulk storage for imported volumes is limited, and handling in port is dominated by a single firm. Compounded by inadequate inland storage, the insufficient bulk storage capacity has resulted in the importation of shipments of uneconomic size. Together, these factors explain the high landed supply costs that raise prices to Kenyan consumers.

Uptake is further undercut by the weak enforcement ability of the relevant regulatory authority. Its enforcement power is weak because the legal status of the exchange pool is not clearly defined in the 2006 Energy Act and because of the absence of any system for tracking cylinders bearing various dealer brands, which makes it impossible to monitor compliance with the cylinder-exchange requirements upon which effective competition, as well as safety, depend. The threshold for becoming a member of the pool is just

---

**Figure 1.** Retail price of LPG by month, 2016 and 2017


Note: US$1 = K Sh 100.

---

**Figure 2.** The LPG value chain in Kenya

Source: Dalberg–GLPGP (2013), with author’s modifications.
An audit is needed to understand the cost components behind the LPG retail price and to support the introduction of a regulatory pricing model. Once that is done, publication of indicative LPG pricing (and reasonable margins) will encourage price competition among brands and raise consumer awareness. If the implementation of an open tender system does not lower retail prices, price caps could be considered.

Revisions to the LPG Exchange Pool Regulation should introduce a cylinder tracking system and raise the threshold for participation in the exchange pool to reduce irregularities in refilling.

What is Kenya’s government doing to meet these challenges?

Projects are under way to improve the government’s capacity to revise the legislative framework surrounding LPG, to lower the price of the fuel, to manage the LPG subsidy campaign, and to remedy deficiencies in the supply, distribution, and storage infrastructure.

In early 2015, the Ministry of Energy and Petroleum embarked on a six-year World Bank–funded technical assistance project (dubbed KEPTAP) to strengthen its capacity to manage the petroleum sector. Several reforms and capacity-building actions, including the development of an LPG distribution model and public awareness plan, are being pursued. An agency working group was established in 2016 and a review of regulations affecting LPG was scheduled for 2017. The 2017 electoral campaign delayed enactment of the new Energy Act and revision of the related regulations (including the LPG Exchange Pool decree) until 2018.

Kenya’s entire supply of liquefied petroleum gas (LPG) has been imported since production at the Mombasa refinery, which had met half of domestic demand, was halted in 2013 so that the refinery could be renovated. Eight percent of Kenya’s LPG is imported overland from neighboring Tanzania; the remaining 92 percent comes in through two terminals at the port of Mombasa, most of it through the privately owned terminal.

The private terminal has a bulk storage capacity of about 26,000 metric tons and a temporary floating facility of 14,000 metric tons. The closed Mombasa refinery and the publicly owned terminal are able to store just 3,000 metric tons. So far the government has not opted to create a national buffer stock, though doing so would enable it to stabilize prices—for example, in the case of unforeseen supply shortfalls.

Additional storage facilities (port and inland), a new jetty, and a supply pipeline are scheduled to be completed by 2019. Looking further out, the import storage capacity is slated for further expansion. In the meantime, overland Tanzanian imports equivalent to about 40,000 metric tons per year were suspended in mid-2017 to minimize illegal cross-border trade.

The VAT on LPG was cut from 16 percent to zero in mid-2016, but a 16 percent VAT and 25 percent import duty still apply to cylinders and accessories (gauges, valves, hoses). High-efficiency cook stoves are subject to a lower VAT than less-efficient models. To make kerosene less cost-competitive, a further increase from the current 15 percent VAT is being considered.

Since 2016, pilot projects have tested smaller sizes bottles, non-metal cylinder fabrics, and the use of mobile phone tokens for refills and down payments. Evaluations of these pilots are ongoing.

A government program—the Mwananchi gas project—to subsidize the cost of cylinders was launched in July 2017 (figure 3). Under the multi-year program, between 5 and 15 million cylinders (1.2 million cylinders per annum), each fitted with a cooking stove, are to be provided to low-income families. The subsidy covers 60 percent of the price for the package. Implementation of the program has been entrusted to the National Oil Corporation of Kenya, but, in
Kenya’s Strategy to Make Liquefied Petroleum Gas the Nation’s Primary Cooking Fuel

Until the retail price of LPG has been brought down substantially, it is unlikely that lower-income Kenyans will sustainably switch to LPG even after receiving a subsidized cylinder. For now, therefore, upper- and middle-income consumers are the primary groups to target.

View of the company’s small share of the LPG market (5 percent), its capacity will have to be expanded to execute the program. The cylinder subsidy project is expected to be financed from what remains of the former kerosene subsidy fund.

What could the government do differently to accelerate sustainable LPG uptake?

More-stringent regulation, a long-term economic view, annual targets using a single uptake metric, and expanding the market among higher-income groups are the places to start.

Kenya’s government can put its lagging LPG adoption program back on track to achieve the country’s clean cooking goal by 2030. To do so, it should consider some or all of the following recommendations.

Take strong regulatory steps to bring down the retail price and minimize unlicensed LPG sales. An audit is needed to understand the cost components behind the LPG retail price and to support the introduction of a regulatory pricing model. Once that is done, publication of indicative LPG pricing (and reasonable margins) will encourage price competition among brands and raise consumer awareness. When the common import storage facility is completed, an open tender system will introduce competitiveness and may bring down the landed supply cost. If reduction in the landed cost does not decrease the retail price, retail price caps could be considered. Revisions to the Exchange Pool Regulation should introduce a cylinder tracking system and raise the threshold for participation in the exchange pool to reduce irregularities in refilling.

Review the economics underpinning the intervention scheme. The commercial viability of the infrastructure projects and the cylinder subsidy program, as well as the potential of the fiscal revenue stream along the value chain, need to be clarified. Various actions and conditions—notably the rollout of an open tender system for imports upon completion of the infrastructure projects and the distribution of 15 million subsidized cylinders—should be synchronized to optimize revenue and effectiveness.

Promote demand for LPG among upper- and middle-income consumers. Until the retail price of LPG has been brought down substantially, it is unlikely that lower-income Kenyans will sustainably switch to LPG even after receiving a subsidized cylinder. In the meantime, the 2015–16 National Household Budget Survey (released in March 2018) and an energy cost efficiency analysis of all cooking fuels should drive the methodology to make LPG attractive to as many consumers as possible.

Develop annual targets and a clear metric to track progress in LPG uptake and to make possible timely changes to the implementation program. The deepening of LPG use should be tracked in terms of consumption per capita. The 2019 census will verify actual population growth over the level assumed in 2013. On that basis, a target should be developed for yearly total demand to 2030. Integrating the per capita rates thus set with the country’s national plans, beginning with the Third Medium-Term Plan (2018–22), will foster performance tracking and timely adaption of execution plans.

Figure 3. An advertisement for Kenya’s new subsidized LPG program

Keny A’S STrAteGy T o MAKe LIQuEFied PEtROLEUM GAS The NATION’S PRIMARy COOKING fueL

Sources


Acknowledgments

I would like to express my gratitude to the task team leaders of the Kenya Petroleum Technical Assistance Project, Alexander Huurdeman and David Reinstein, who provided me with their valuable support. Furthermore, I am thankful to Masami Kojima and Richard Hosier, senior energy specialists at the World Bank, who offered their expertise.

Disclaimer

This work is a product of the staff or a consultant of the World Bank with external contributions. The findings, interpretations, and conclusions expressed in this work do not necessarily reflect the views of the World Bank, its Board of Executive Directors, or the governments they represent. The World Bank does not guarantee the accuracy of the data included in this work. The boundaries, colors, denominations, and other information shown on any map in this work do not imply any judgment on the part of the World Bank concerning the legal status of any territory or the endorsement or acceptance of such boundaries.
The *Live Wire* series of online knowledge notes, an initiative of the World Bank Group’s Energy and Extractives Global Practice, offers rich insights from project and analytical work done by the World Bank Group.

Every day, Bank Group experts apply their knowledge and expertise to solve practical problems in client countries. *Live Wire* captures the rich insights gained in the field, allowing authors to share their findings with other practitioners, policy makers, and planners.

**Shouldn’t you be connected to Live Wire?**

Since 2014, the 80 briefs in the series have dealt with vital topics such as energy demand and supply; renewable energy; energy efficiency; energy policy; economic growth; environmental protection; climate change mitigation; power systems; rural and urban development; access to energy; infrastructure economics; private sector participation; access to finance; and regulation.

- **Topic briefs** offer technical knowledge on key energy issues.
- **Case studies** highlight lessons from experience in implementation, often with insights from private sector engagement.
- **Briefs on global trends** provide analytical overviews of key energy data and developments.
- **Bank views** portray the Bank Group’s energy and extractives sector activities.

The format is accessible, rigorous, and concise enough to be easily shared. The 4–12 pages of each brief make ample use of graphics. Briefs are peer-reviewed by seasoned practitioners within the World Bank Group and professionally edited and produced. While their main channel of dissemination is online, Live Wires are available in print-ready files for specific client needs.

Please visit the World Bank Group’s Open Knowledge Repository to browse the Live Wire collection and download the issues important to you: [www.worldbank.org/energy/livewire](http://www.worldbank.org/energy/livewire)
Contribute to

Do you have something to say? Say it in *Live Wire*!

Those working on the front lines of energy and extractives development in emerging economies have a wealth of technical knowledge and case experience to share with their colleagues but may not have the time to write for publication.

*Live Wire* offers prospective authors a support system to make it easier to share their knowledge:

- Staff from the Energy and Extractives Global Practice are available to assist operations staff in drafting Live Wire stories.
- User-friendly guidelines help authors mold their contribution to the expectations of the Live Wire audience.
- A professional series editor ensures that the writing is punchy and accessible.
- A professional graphic designer assures that the final product looks great—a feather in your cap!

Since 2014 the Energy and Extractives Global Practice has produced 80 Live Wire briefs under the bylines of 240 staff authors. Live Wire briefs have been downloaded thousands of times from the World Bank’s Open Knowledge Repository and circulated in printed form for countless meetings and events.

Live Wire aims to raise the profile of operational staff with practical knowledge to share—wherever they are based.

An invitation to World Bank Group staff

If you can’t spare the time to contribute to *Live Wire* but have an idea for a topic or case we should cover, let us know! We welcome your ideas through any of the following channels:

- Via the Communities of Practice in which you are active
- By participating in the Energy and Extractives Global Practice’s annual Live Wire series review meeting
- By communicating directly with the Live Wire team (contact Jonathan Davidar, jdavidar@worldbankgroup.org)

Become a *Live Wire* author and contribute to your practice and career, while modeling good “knowledge citizenship” by sharing your insights and experience with others.