

PARTNERSHIP FOR CLEAN INDOOR AIR (PCIA)



PCIA BULLETIN

FEBRUARY 2011 | Issue 26

This quarterly newsletter reports on the activities of the Partnership for Clean Indoor Air (PCIA) and its Partners to improve health, livelihood and quality of life by reducing exposure to indoor air pollution, primarily among women and children, from household energy use. Currently, 450 Partner organizations are working together to increase the use of affordable, reliable, clean, efficient and safe home cooking and heating practices. Visit www.pciaonline.org to join!

This issue's introduction was written by Jonathan Saul Benchimol, President of the Ibero American LPG Association (AIGLP).

Improving and solving problems related to indoor air pollution and its impacts on human health is a big challenge. Although more efficient wood-burning stoves—such as those with furnaces to channel emissions into the outdoors—are a definite improvement over older models, they are not necessarily the best solution. A better stove will improve quality of life; however, it will not solve other negative impacts on society resulting from the use of biomass.

For example, the use of wood as cooking fuel can have a variety of negative impacts on both the environment and human life such as deforestation and the use of children or women as laborers. A portion of wood used as fuel comes from illegal deforestation sites and the collection of wood in most countries is conducted by children and/or women. Through this practice children sacrifice their education, and both children and women are subject to injury during the collection process. Additionally, in many countries, fuel wood is collected in natural parks, which has a tremendous effect on biodiversity and causes soil and river erosion. Burning wood results in harmful emissions of

particulate matter, carbon monoxide and polycyclic aromatic hydrocarbons, as well as greenhouse gases and black carbon which have been correlated with global warming. Because of these long-term negative impacts on society, biomass fuels are not a sustainable solution.

Liquefied petroleum gas (LPG) may be the best possible solution for cleaner cooking fuel in many locations as it's available, easy to transport and store, and has low

In This Issue

Project NINA.....	p.2-3
LPG: a Prospective Solution for Poverty and Deforestation in Haiti.....	p.3
Rural LPG in Colombia: an Alternative Fuel with Multiple Benefits.....	p.4
LPG: Safety Issues and Responsibilities.....	p.5
Social Engineering Through Energy Conversion.....	p.6-7
Chart: LPG Supply by Million Tonnes	p.6
Chart: Relative Pollutant Levels	p.7
Seeking Clear Objectives with Liquefied Petroleum Gas in South Africa.....	p.8
LPG: an Alternative Domestic Cooking Energy in Uganda	p.10
Additional LPG Resources	p.10
LPG Distribution Chain	p.11

5th Biennial PCIA Forum

Over 350 household energy and health experts will convene at the Forum. Look for Forum highlights in the April issue of the Bulletin and on the [proceedings page](#).

emissions and results in no indoor air pollution. Although natural gas and electricity also have low emissions and result in no indoor air pollution, they are not typically available in remote areas of developing countries. As such, they are not realistic, clean cooking fuel options for many rural areas at this time.

There are several examples of current projects promoting LPG as a cleaner cooking fuel option:

Colombia: Rural Gas—Households in remote locations are given a cylinder, stove, regulator and hose, as well as the first two cylinder refills. So far residents have been very satisfied with the new cooking fuel.

Peru: Kerosene substitution—The government of Peru is conducting a large-scale project that involves replacing

Kerosene stoves with LPG stoves with government support and subsidies.

India: Biomass Cooking Fuel substitution—The Indian government is subsidizing the shift of 60 million households from biomass cooking fuels to LPG. The federal government is providing the stoves and local governments are providing the cylinders, regulators and hoses.

Indonesia: Kerosene substitution—Kerosene stoves are being replaced with LPG stoves through a government subsidy program.

In this issue of the Bulletin, some of the groups currently using LPG as a cleaner, more efficient cooking fuel option share their experiences. I hope that their experiences inspire others to begin promoting the use of LPG in their own programs.

FEATURE ARTICLES

Project NINA

Author: Luis Alberto De La Torre Vivar, Repsol, LADELATORREV@repsol.com

Repsol Gas Downstream Peru, an international LPG distributor, signed a contract with the Ministry of Energy and Mining of Peru in April 2010 to develop the NINA project to improve the quality of life of low-income families in Peru through the replacement of household kerosene use by LPG. The name “NINA” is derived from Quechua, an ancient Peruvian language, which means “Goodness of Fire.”

NINA is supported by the United Nations Development Programme (UNDP), which is responsible for administrative and financial support and monitoring results within the target market. Repsol Gas Downstream is responsible for the distribution, installation, maintenance and post sale customer support.

The NINA project supplies free LPG equipment



Delivering LPG equipment.



Installing LPG in a home.

to households across Peru in order to ensure kerosene replacement. Over 40,000 households throughout the country, where biomass and kerosene are common sources of heat, were preselected to receive free supplies. A standard kit composed of five elements—a two burner stove, a pressure regulator, a hose, a clamp and a 10 Kilo steel cylinder from Solgas Repsol—was developed for the project and distributed to each household. Additionally, each customer received vouchers for two refills. Through this process, households changed their behaviors and lifestyles from utilizing kerosene, firewood, charcoal and dung to using a cleaner fuel.

LPG utilization results in many positive impacts on health, such as a drastic decrease in exposure to indoor pollution from traditional cooking fuels. These pollutants typically affect a disproportionate number of women and children and reducing their use can result in lower incidence of respiratory diseases, lung cancer and pre and post-natal diseases. Other indirect benefits include improving learning environments in schools by decreasing the amount of time

school children spend collecting firewood around their homes instead of attending classes or studying.

Moreover, decreasing the use of traditional fuels may also have a positive impact on the environment through a reduction in CO₂ emissions and in rates of deforestation in the highlands and jungles of Peru.

LPG: a Prospective Solution for Poverty and Deforestation in Haiti

Renzo BEE, TOTAL, renzo.bee@total.com

As a direct result of charcoal and wood usage—for cooking and heating homes—deforestation has left only two percent of Haiti's forests alive and healthy.

To combat this continuous destruction, the United Nations Environment Programme (UNEP) is encouraging the use of LPG as an alternative to the current use of biomass, including charcoal and wood throughout Haiti. With a burning efficiency three times better than charcoal, LPG has the ability to save \$100 per household per year in costs—helping to improve economic conditions for families throughout the country.

As a fuel resource that has 50 percent lower carbon emissions than biomass, LPG is viewed as a mechanism to not only reduce further environmental damage, but also to improve poverty rates in this country—helping to achieve one of the United Nation's Millennium Goals to eradicate extreme poverty and hunger.



Pictured is a SHESHA bottle—a stove mounted on a 6kg bottle—in South Africa. TOTALGAS is operating its LPG outreach in 45 countries, many of which are facing similar challenges to Haiti.



Installing a cylinder package—a stove and a 6 kg bottle—in a camp in Haiti.

Partnering for a Better Future in the Aftermath of the Earthquake

The primary infrastructure needed to utilize LPG—import terminals, storage and filling plants known as cylinders—did not suffer any damage from the tremendous and deadly earthquake that hit Haiti in January 2010. However, continued investment in the current infrastructure is needed to ensure that they are properly maintained and operate safely.

UNEP—through a partnership with TOTALGAS—has formed the LPG Work Group, under the Haitian Ministry of Public Works, Transport and Communication, to gather industry professionals, advocacy groups and nonprofits together for this cause. United for a common cause, the Work Group's mission is to understand the barriers that stand in the way of wide LPG usage, design a proper distribution model for LPG cylinders in Haiti, and secure funding.

The Work Group hopes to apply for funds from the Reconstruction Committee of Haiti and other humanitarian organizations. In the meantime, several cylinders have been distributed to earthquake victims in living in camps. The response to the cylinders in the communities has been positive, and they recognize the benefit of using LPG for their cooking needs.

Rural LPG in Colombia: an Alternative Fuel with Multiple Benefits

Author: Nickolay Urbina, Confedegas,
nickolay_urbina@confedegas.org.co

The Rural LPG project began in 2004, when Colombian LPG producers and distributors discovered that over 20 percent of households used wood and carbon as cooking fuel; in rural areas the percentage was as high as 60 percent. To reduce this reliance on wood and carbon, as well as to improve quality of life for the Colombian rural population, project founders developed and implemented a plan to introduce LPG to rural communities. Indoor air pollution studies were conducted that detailed the negative impacts of using wood for cooking fuel, particularly when cooking was done indoors. In Colombia, 97 percent of households cooked indoors, with 63 percent of these homes having no stove ventilation. These studies also indicated that Colombia consumed 50 kg of LPG per year per household—the lowest average consumption in the region.

Project implementation was simple—families were given a kit free of charge that included a stove, a cylinder and a refill. The kits were distributed by local companies and cost less than \$50 USD per kit.

The project garnered interest from many partner organizations, despite sometimes difficult logistics in less populated, less accessible areas of the country. In these cases, partner organizations adapted their fleets and established relationships with various distribution points to assist in LPG delivery. By the end of the program in 2008, 377,572 kits had been distributed throughout the country.



Delivering LPG to a rural Colombian home.

Container refill tracking, as well as the additional purchase of LPG without assistance, was monitored over a five-year period. At the end of this time, the communities first introduced to the project exhibited a significant shift in the types of household cooking fuel consumed: 64 percent of households used a combination of combined wood and LPG, 21 percent used only LPG, 11 percent used only wood and 4 percent used a combination of electricity and LPG.

Although the goal of the project was a total replacement of wood by LPG, the results are still encouraging and the reported partial replacement reduced wood consumption by 590,541 tons per year (1.564 kg/year/home). This encouraging result, in addition to an estimated reduction in household health costs of \$153 USD per year per family, amounts to a savings of \$57 million USD each year.

There continue to be some social and economic barriers to LPG adoption throughout Colombia. The biggest of these being that community members do not understand the environmental and health impacts of wood-fueled cooking. Increasing community understanding of the negative consequences of wood-fueled cooking will be essential to ensuring permanent access to LPG.



Transporting LPG across a river.

LPG: Safety Issues and Responsibilities

This information was adapted from the UNEP publication, [Guidelines for Good Safety Practices in the LPG Industry 2008](#).

LPG is stored as a liquid under pressure and therefore presents unique safety concerns compared to wood, biomass and other types of cooking fuels. The majority of LPG-related incidents occur at or close to the point of use. Housing LPG appliances indoors introduces a risk of carbon monoxide poisoning, and installations must include adequate ventilation to reduce this risk, as well as to dispose of combustion products. Containment and leak control are another primary concern as escaped LPG can pose a risk of fire or explosion. The most serious incidents are often associated with the storage or transportation of large quantities of LPG.

In order to minimize these safety risks, the LPG Industry, along with consumer organizations and national authorities, should work together on consumer safety awareness campaigns that emphasize:

- The link between quality and safety.
- The risk associated with inferior installation practices.
- The need for adequate ventilation.
- How to recognize the smell of odorized LPG.

The Guidelines for Good Safety Practice in the LPG Industry, developed by the World LPG Association (WLPGA) and supported by UNEP, provide global LPG industry participants with a tool for ensuring that the marketplace, and more importantly the customer, is not compromised by unsafe practices.

All participants in the supply chain, from LPG advertisers to equipment manufacturers to consumers cooking with LPG in their homes, have a responsibility to understand their role in the safe use of LPG.

Supply Chain Member	Safety Issues and Considerations	Resources
Marketers and Suppliers of LPG	<ul style="list-style-type: none"> • Ensure personnel receive formal training in normal operations and emergency response. • Maintain operational safety of the facility where LPG is stored or transferred. • Be responsible for the quality of the product supplied. 	<ul style="list-style-type: none"> • LPG Safety: Quantified Risk Assessment for LPG Operations European LPG Association [refer: www.aegpl.com]
LPG Equipment and Appliance Manufacturers	<ul style="list-style-type: none"> • Meet required safety standards for products. • Provide clear instruction to installers and consumers on product safety • Offer a choice of safe and energy efficient appliances compatible with the local market. 	<ul style="list-style-type: none"> • The minimum safety information on a cylinder should include the net fill amount, a flame symbol and the word 'Flammable.'
LPG Appliance Installers	<ul style="list-style-type: none"> • Achieve and maintain service proficiency through training and experience. • Meet all regulatory and code requirements for a safe installation. • Educate consumers about the safe use of their appliance. 	<ul style="list-style-type: none"> • Some national authorities regulate the activities of installers. An example may be seen in the Gas Safety (Installation and Use) Regulations of the UK [refer: www.opsi.gov.uk]
Consumers Using LPG	<ul style="list-style-type: none"> • Insist that LPG Installers and servicemen be properly qualified. • Understand and comply with instruction on the safe use of their appliances. • Know the proper response to a gas emergency. 	<ul style="list-style-type: none"> • Users may install an LPG detector or alarm, but should not become over-dependent on them to identify a safety issue in the home.
National Authorities	<ul style="list-style-type: none"> • Make sure that safety issues associated with handling, distribution and use of LPG are addressed by relevant public bodies. • Adopt technical and safety standards for LPG, LPG appliances, equipment and installation. • Institute broad-based consumer regulations including standards for LPG grades, containers and appliances and installations. 	<ul style="list-style-type: none"> • Users of LPG should consider adopting ISO 14000 standards on Environment, Health [refer: www.iso.org] • APELL - Awareness and Preparedness for Emergencies at Local Level: A Process for Response to Technological Accidents UNEP [refer: www.unep.org]
The LPG Industry Association	<ul style="list-style-type: none"> • Promote good safety practices in the LPG Industry. • Seek to be consulted on preparation of relevant legislation or regulation. • Include LPG appliance and installer sectors as well as suppliers in membership. 	<ul style="list-style-type: none"> • National LPG Associations are urged to maintain membership and open communication with the WLPGA, particularly in addressing international LPG issues.

Source: *LPG: Exceptional Energy*, World LPG Association, www.worldlpgas.com

Social Engineering Through Energy Conversion

Author: Achmad Faisal, PT Pertamina,
 Contact: Wianda Arindita Puspongoro,
 wianda@pertamina.com

For more than four decades, the government of Indonesia subsidized the price of kerosene. This subsidy program specifically targeted poorer community members and increased domestic kerosene consumption annually, with a peak consumption rate of almost 11 million kL per year in 2005.

In 2006, crude oil prices reached a record high of more than \$100 USD per barrel, which created a significant increase in kerosene subsidy costs for the government of Indonesia. In response, the government explored alternative energy options that would reduce the subsidy cost burden and ultimately opted to conduct a large-scale, country-wide conversion of kerosene to LPG.

Pertamina, a state-owned oil and gas company, was appointed to implement the program within a three year time period. In mid of 2006, the government drafted the Road Map of National Kerosene to LPG Conversion. To begin conversion, the government distributed LPG kits,

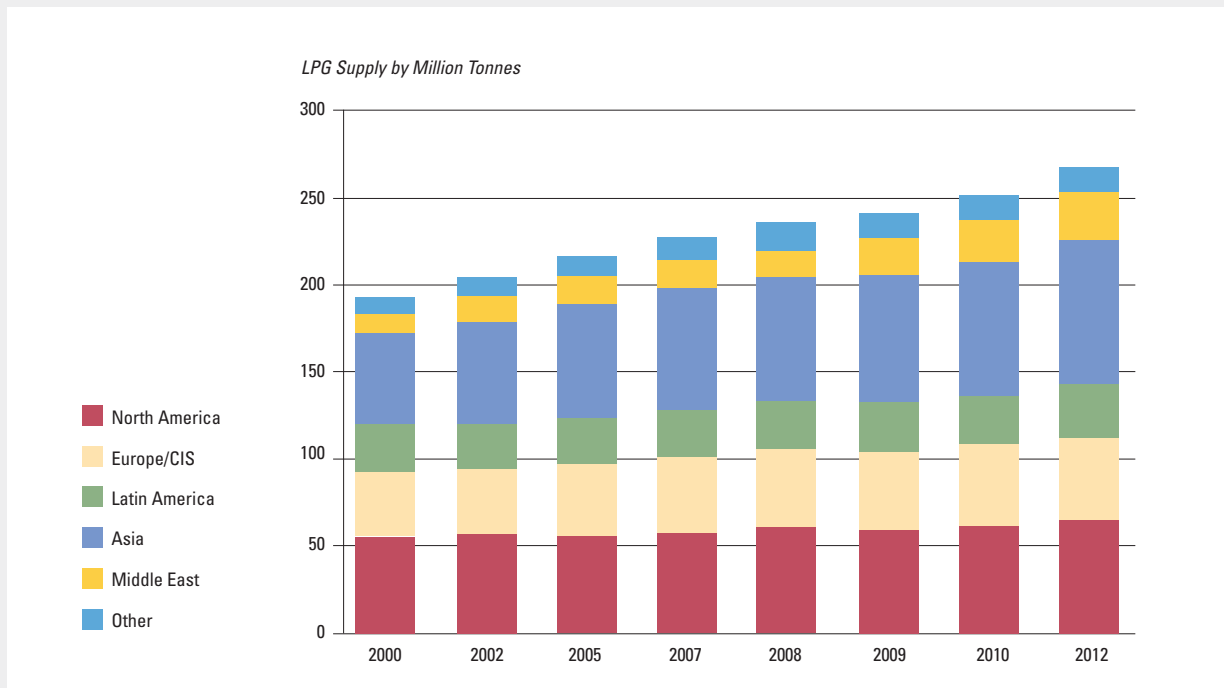
consisting of an LPG stove, tube, accessories and initial gas, at no cost to approximately 55 million households and micro-enterprises around the country. Once households received their LPG kits and began using them, the government discontinued kerosene subsidies.

Initially the project met with a variety of obstacles, such as a lack of proper infrastructure, inadequate supplies of LPG supplies and kerosene sellers' rejections. Despite these obstacles, Pertamina continued with the project and conducted a trial conversion with 30,000 households in Kemayoran, Central Jakarta. The full project then launched on March 8, 2007, in



LPG small businesses create job opportunities.

LPG: FAST FACTS



Source: LPG: Exceptional Energy, World LPG Association, www.worldlpgas.com



Women cooking with LPG at a local festival.

Jakarta. Initial results indicated that almost 90 percent of the pilot projects' targets were satisfied with LPG.

Through strong government commitment and collaboration, Pertamina successfully withdrew all subsidized kerosene in Jakarta (approximately 3,200 kL) in one year. The project was next implemented in western Java without significant obstacles.

As of November 30, 2010, Pertamina distributed 47,858 million LPG kits and will continue to expand distribution to new areas. Once the program is completed and the

government no longer subsidizes kerosene, it will save roughly Rp 40 trillion (around \$4.4 billion USD) per year.

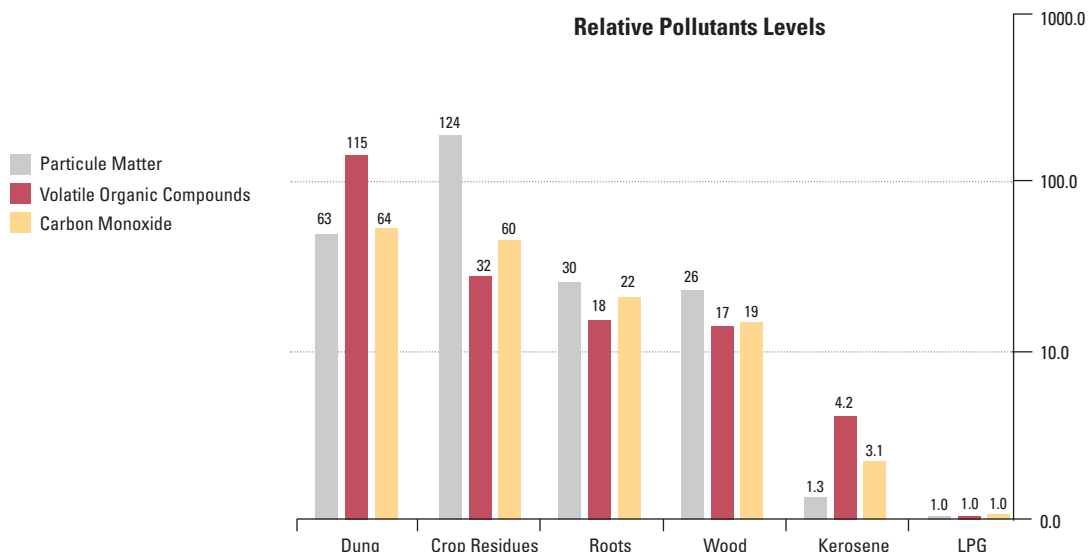
In addition to governmental subsidy savings, increased LPG utilization results in positive economic effects on a local level, such as new jobs in supporting industries including LPG stations, manufacturers and transportation. The program also resulted in significant positive environmental impacts through the replacement of 10 billion kL of kerosene with LPG, which equates to planting 50 million trees.

Although tremendously successful, the replacement program had some weaknesses, most notably LPG accidents. These accidents were most likely attributed to substandard equipment and limited user knowledge, but reinforce the need to educate the community about how to safely use LPG.

The kerosene replacement project is more than simply a logistical or economic project. It is a social engineering project. Its success required the community's involvement by changing their behavior and allowing LPG to become a part of their culture. Because of this, the program has enormously affected society and the country in a very short time and continues to bring positive environmental and economic impacts to the community.

LPG: FAST FACTS

FACT: The World Health Organization (WHO) estimates that providing people with access to LPG would bring a payback of \$ 91 billion USD per year on an investment of \$ 13 billion USD to halve the number of people cooking with solid fuels worldwide.



Source: World LPG Association, www.worldlpgas.com

Seeking Clear Objectives with LPG in South Africa

Author: Nelisiwe Magubane, Department of Energy of South Africa

Contact: Kate Modise, Kate.Modise@energy.gov.za

The South African government is committed to ensuring that all of its citizens, including poor and rural communities, have access to diverse, sustainable energy sources at affordable prices. The goal is to support economic growth and alleviate poverty, while taking into account the effects of energy sources on human health and the environment. For these reasons, the Department of Energy of South Africa developed a national strategy to make LPG a choice energy for thermal applications. Through this strategy, the government aims to achieve the following objectives:

- Provide access to safe, clean, efficient, portable, environmentally benign and affordable thermal fuel for all households nationwide;
- Switch low-income households from using coal, paraffin and biomass to LPG as a thermal fuel;
- Contribute to demand-side management by minimizing the use of electricity for cooking and space heating;
- Enhance the level of quality of energy services currently available to residential users throughout South Africa; and
- Contribute to a green economy by reducing the emissions of greenhouse gases.

The first initiative the government undertook—to promote LPG as an appropriate household energy for thermal purposes—was an LPG Pilot Project. Two LPG bottle filling plants were built in two townships around the city of Tshwane. The objective of these plants was to offer households an alternative energy source for cooking and space heating, thus enabling them the opportunity to switch from electricity to LPG.

A lesson learned from the positive response of these communities is that price and proximity play a major role in the acceptance of LPG as an alternative source of energy for thermal purposes. This knowledge led to another initiative to make the price of LPG affordable, especially for poor households. The South African government promulgated a regulation which set the maximum price at which LPG

could be sold to residential consumers, which resulted in a savings of over 200 million for consumers.

The government also discovered the enormity of possible savings when LPG is used as an alternative to electricity for cooking and heating. To measure these savings, 30,000 households that formerly used electricity were supplied with LPG. Household spending was measured over a nine month period and savings amounted to 1,377 megawatts of electricity. The government, therefore, strongly believes that by switching households from using electricity for thermal applications to LPG, the construction of some coal-fired power stations could be deferred. This will be a major contribution to the reduction in emissions in the country.

Example of LPG marketing materials

**EXCEPTIONAL
TIMES
REQUIRE
EXCEPTIONAL
ENERGY**

If we are to battle climate change and have healthier living conditions we need cleaner and efficient energy sources and technologies. Now.

LPG is a clean, lower carbon, efficient and innovative energy source. LPG is immediately available anywhere and supports the use of renewable technologies.

WORLD LP GAS ASSOCIATION
WWW.WORLDPGAS.COM

For more information,
please visit:
www.exceptionalenergy.com

LPG
EXCEPTIONAL
ENERGY

LPG: an Alternative Domestic Cooking Energy in Uganda

Author: *Emmy Wasirwa, Wana Energy Solutions Ltd, e.wasirwa@wanaenergysolutions.net*

Over 2 billion people worldwide rely on wood as their main source of domestic energy. Most of these people live in developing countries, such as Uganda, where more than 90 percent of the population cooks with wood fuel. Unfortunately, this energy source poses a health threat to residents and family members as it produces indoor air pollution, which has been associated with a variety of health concerns, including pneumonia-related illnesses.

According to The United Nations Children's Fund and WHO, there are about 150 million incidents of pneumonia-related illness each year among children under five in developing countries. In Uganda alone, there were 27,000 pneumonia-related deaths in 2008.

Uganda, like many other developing countries, could benefit from appropriate interventions to reduce the impact of cooking with wood. One such intervention is the development of a clean, readily available, portable and affordable alternative energy source such as LPG which can be distributed even in rural areas inaccessible by most forms of transportation.

Although LPG is a fossil fuel, it burns without emitting harmful indoor air pollutants and has less of an effect on human health and the environment. Establishing LPG infrastructure also results in commercial activities in suburban and rural areas where electricity is inaccessible. As children and women are often tasked with the collection of fuelwood, they tend to not have enough time to perform other personal or business activities. However, investing in



Wana Staff deliver gas to customers for a refill.

LPG would help alleviate this burden. For these reasons, LPG is a great alternative to wood fuel in the developing world.

Wana Energy Solutions (WeS) was established to address the negative impacts of woodstove cooking in Uganda and introduce LPG to community members. Initially, WeS established a three-month payment plan to offset initial LPG costs, which include a stove, LPG cylinder and fuel, for its customers. To date, WeS has introduced LPG to over 6,000 families, hospitals, schools and hotels.

WeS now also offers a no-interest payment plan to attract more community members to begin cooking with LPG. Although the company has not yet conducted consumer energy savings or health evaluations, it is likely that families using LPG have already experienced positive impacts. WeS will conduct a community survey through local hospitals to evaluate the program's impacts in the near future. In the next two-to-three years, WeS plans to expand its business into three additional cities.

Uganda is one of many sub-Saharan countries that does not have solid LPG marketing and distribution regulation. Since maintaining health and safety is essential during LPG distribution, WeS is championing the implementation of an LPG regulatory board in Uganda. It is also working to address importation and transportation issues related to the land-locked geography of the country.

Although there is no one specific silver bullet to address energy poverty and improve access to clean energy in the developing world, LPG is one of the cleaner energies that can be employed in developing countries to address the ill effects of traditional cooking fuels.



Complete package offered to customers.

Additional LPG Resources:

[Developing Rural Markets for LPG: Key Barriers and Success Factors](#): Research and case studies of programs for expanding LPG in rural areas of developing countries.

[Energy for Cooking in Developing Countries](#): Chapter 15 contains information from World Energy Outlook (WEO) 2006.

[Exceptional Energy](#): Resources for promoting LPG use for health and environmental benefits.

[Fuel for Life: Household energy and Health](#): A publication designed to bring attention to cookstove-related indoor air pollution.

[Guidelines for Good Safety Practices in the LPG Industry](#): Stakeholders and responsibility for safety throughout the LPG distribution chain.

[Healthy Energy for a Changing World](#): A comparison of pollution and health impacts from different fuel source.

[Household Fuels and Ill-Health in Developing Countries: What improvements can be brought by LPG?](#): A study about how the use of LPG can reduce the health burden associated with indoor air pollution and other problems associated with solid fuel use.

[LPG: Exceptional Energy](#): An overview of LPG markets and future outlook.

[LPG Rural Energy Challenge](#): A public private partnership between the WLPGA and the UNDP designed to create viable and sustainable markets for LPG delivery and consumption.

[The Voice](#): A newsletter for LPG Stakeholders.

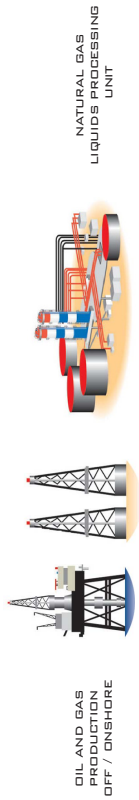
[WLPGA Annual reports from 2005 to 2010](#): An over view of progress and activities of the WLPGA.

[World Energy Outlook Reports](#): WEO 2008 and prior are available as free downloads.

LPG DISTRIBUTION CHAIN

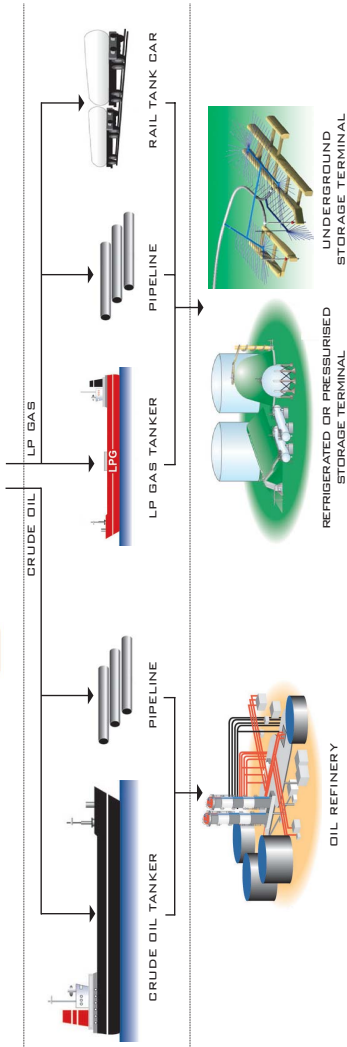
STEP 1 PRODUCTION

The production of "field grade LP Gas" is the result of the treatment of NGLs. This treatment is necessary to produce: a) Oils that are suitable for transport to refineries, and b) Natural gases that correspond with commercial specifications.



STEP 2 TRANSPORTATION

While crude oil is transported from the production sites to refineries by tankers or pipelines, LP Gas is transported to storage terminals by large LP Gas carriers, pipelines or train.

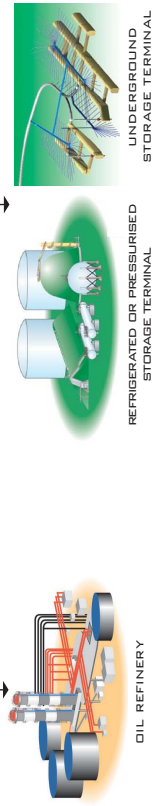


EQUIPMENT MANUFACTURES

Companies around the world provide filling, storage, controlling and safety equipment as well as services to the LP Gas industry and end users.

STEP 3 REFINING AND STORAGE

Butane and propane can also result from the oil refining processes. LP Gas storage terminals store products that are imported in large quantities.



TANK MANUFACTURING



CYLINDER MANUFACTURING



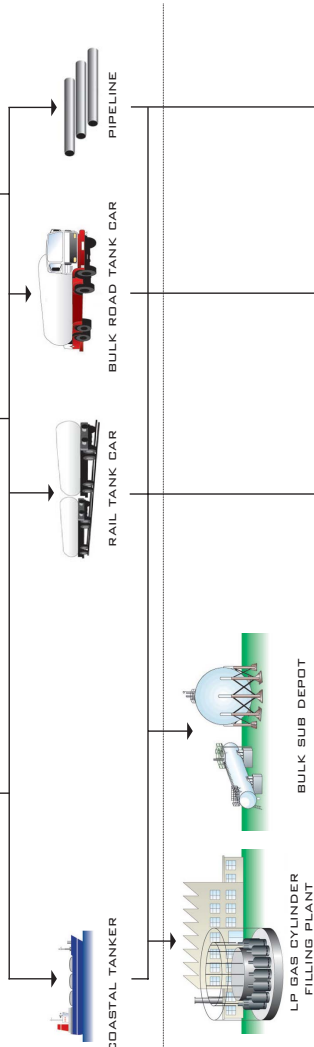
ENGINE USE LP GAS EQUIPMENT



LP GAS APPLIANCES AND EQUIPMENT

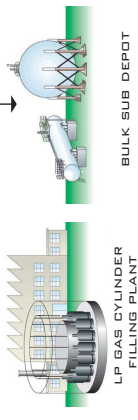
STEP 4 TRANSPORTATION

The LP Gas is then delivered by train, road, coastal tanker or pipeline to cylinder filling plants and intermediate-size storage areas.



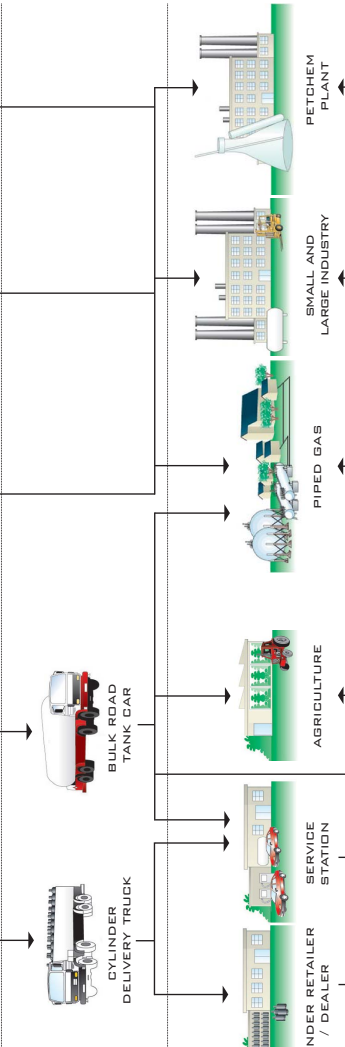
STEP 5 BOTTLING AND STORAGE

Cylinders are filled with butane and propane at bottling plants. LP Gas is generally stored in pressurised tanks (vessels or spheres) in intermediary storage centres.



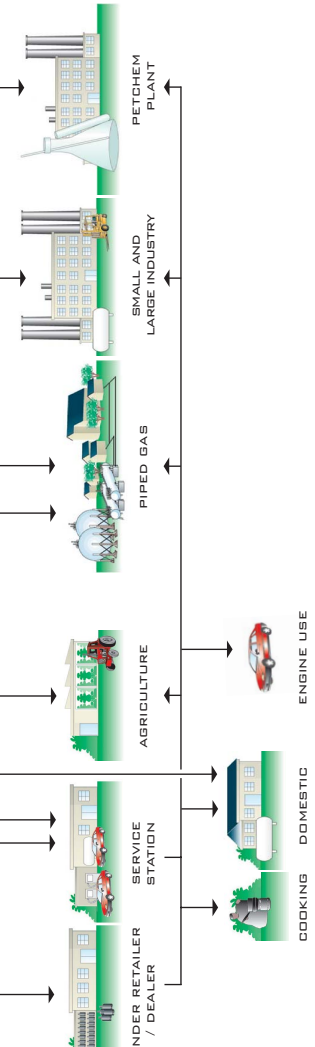
STEP 6 DISTRIBUTION

LP Gas can be transported virtually anywhere, either in cylinders or bulk. Trucks transport butane and propane cylinders from the bottling plant to retailers, as well as to private and professional customers. Meanwhile, small bulk trucks distribute LP Gas from the storage centres to various consumers.



STEP 7 END USERS

LP Gas is easily available to end users through cylinder sales points such as commercial stores or service stations close to their locations. Customers requiring larger volumes can purchase LP Gas in bulk.



World LP Gas Association - 9, rue Anatole de La Forge-75017 PARIS - France - Phone: +33 1 5902 3800 - Fax: +33 1 5905 2801 - visit our website: www.worldlpgas.com
 Copyright © World LP Gas Association - All rights reserved. Neither this publication nor any part of it may be reproduced, stored in a retrieval system, or transmitted in any form or by any means: electronic, mechanical, photocopying, recording or otherwise, without the prior permission of the World LP Gas Association. All information in this publication is verified to the best of the author's ability. However, the World LP Gas Association does not accept responsibility for any loss arising from reliance on it. Design by ICF AEGIS ULBANK