Kerosene to LP Gas Conversion Programme in Indonesia

A Case Study of Domestic Energy

Jointly written by PT Pertamina (Persero), Indonesia & the WLPGA, France
Contents

04 Abstract
06 1.0 The Situation before the Program
06 2.0 Subsidy and the Demand for Kerosene
08 3.0 Why LP Gas as the Conversion Fuel?
09 4.0 Program Structure
10 5.0 Planning Phase
12 6.0 Challenges faced
13 7.0 Distribution of LP Gas Packages
13 8.0 LP Gas Terminals
13 9.0 Cylinder Filling Stations
14 10.0 Program Progress
14 11.0 Program Benefits
15 12.0 Benefits to the Business Community
16 13.0 Benefits to the Environment
16 14.0 Benefits to End Users
17 15.0 LP Gas accidents in Post Switching Program
19 16.0 Key Success Factors
20 17.0 Conclusions
21 18.0 Continuing Challenges
22 19.0 Suggestions for Countries with Potential Conversion Programs
23 References
The Indonesian project to convert over 50 million users of kerosene to LP Gas attracted the interest of many countries keen to understand the issues involved and consider adopting a similar initiative.
Abstract

Over 2 billion people in the world have no access to modern energy relying heavily on wood, coal, charcoal, animal waste and kerosene as their primary domestic energy.

The WLPGA has recently embarked on a project with the UN called ‘Cooking for Life’ to encourage the switch from these high polluting fuels used for domestic cooking to the clean burning LP Gas.

There have been several initiatives around the world to encourage the use of LP Gas in domestic applications.

One of these was in Indonesia where the government’s recent program to switch users of kerosene to LP Gas attracted much attention because of the sheer size of the project, the very ambitious target and ultimate successful implementation.

In 2007 Indonesia undertook this massive energy program to convert its primary cooking fuel from kerosene to LP Gas in more than 50 million households within five years.

This megaproject provided an improved household cooking fuel, with its associated benefits in user costs, cleanliness, convenience, and environment, and reduced the government’s huge subsidy for petroleum fuels.

The Indonesian project to convert over 50 million users of kerosene to LP Gas attracted the interest of many countries keen to understand the issues involved and consider adopting a similar initiative.

This joint publication by Pertamina and the WLPGA is an updated summary version of a comprehensive paper (Budya and Arofat, 2011) authored by Pertamina for a 2011 special issue of the journal Energy Policy (Energy Policy, 2011, Vol. 39, Issue 12). It describes this ambitious program including the preparatory analytical work, targeted-market surveys and tests - and the subsequent building of the financial, technical and institutional models for carrying out the program on an expeditious schedule.

It also presents the project’s major execution steps, the results of the program to date, and the unique institutional roles of each party, including the activities and benefits for the government, Pertamina, the public, the industry, and the crucial agents in the fuel supply chains.

Finally there is a retrospective policy analysis and a discussion of key factors and challenges in the execution of Indonesia’s largest-ever energy initiative to provide an improved cooking fuel for the population.

The publication uses photographs taken by the WLPGA and Pertamina during the course of the project.
1.0 The Situation before the Program

Kerosene, the main fuel for households and fisheries, had been subsidized for decades by the Government of Indonesia. However, with the rising population and an increasing oil price, this subsidy became a huge burden for the government.

Between 2001 and 2008 the cost of subsidies ranged from 9% to 18% of total state expenditures peaking in 2005. Furthermore, the subsidy for kerosene became the largest contributor among the petroleum products. In 2006, before the conversion program was launched, the subsidy for kerosene was 57% of the state’s total petroleum product subsidy.

Meanwhile, the policy to reduce the petroleum fuel subsidy by increasing the kerosene price became an increasingly sensitive social issue with the potential of disturbing the country’s stability.

Modern Indonesia is highly dependent on petroleum fuels, including kerosene, and for many years these fuels have been a huge burden on the state budget.

Elimination of energy subsidies had been one of the most crucial economic and social problems facing Indonesia.

One key reason for the removal of the kerosene subsidy was that it simply was not reaching the end user.

Often the subsidized fuel was being diverted into areas of misuse; mixing with other non subsidized fuels in the industrial and commercial sectors or smuggling abroad where kerosene was more expensive, were two examples.

In 2006, before the conversion program was launched, the subsidy for kerosene was 57% of the state’s total petroleum product subsidy.

2.0 Subsidy and the Demand for Kerosene

In 2004 kerosene was consumed by 48 of 52 million households. The majority of households used it for daily cooking. Most had a low-to-medium expense, under USD 150 per month.

In addition, a much smaller portion of kerosene was used as lighting fuel by households, fishermen and small industries.

From government’s perspective, the kerosene subsidy had a very big role in the state budget.

Figure 1 shows how the kerosene subsidy increased from 2001-2011, despite the parliamentary-imposed quota on the volume of usage.

The main factor for this increase was the increasing petroleum prices. The huge subsidy provided a strong incentive for establishing the kerosene conversion program to significantly reduce the petroleum subsidy. In fact, in 2007 and 2008 when the program began, despite the decrease in volume the subsidy still increased because of the increasing international oil price.
However as the program commenced, the kerosene subsidy dramatically fell below 1 Billion USD in 2011, with the total subsidy (both LPG and kerosene) equal to 3.11 Billion USD.

In 2004 kerosene was consumed by 48 of 52 million households.
3.0 Why LP Gas as the Conversion Fuel?

Replacing kerosene with LP Gas as the primary household cooking fuel would greatly reduce the fuel subsidy.

Based on the end-use calorific value of energy delivered for cooking, and the subsidy per unit of fuel, the LP Gas subsidy is significantly lower than that of kerosene. Based on end-use “energy equivalent” calculations, one litre of kerosene equates to 0.57 kg of LP Gas. However, local research indicated that usage of one litre of kerosene equates to 0.39 kg LP Gas. This value was used in the subsidy calculations showing savings of $2.17 billion USD, a significant fraction of the state budget, would be achieved in 2006.

- LP Gas is cleaner than kerosene. Many studies worldwide have analyzed advantages and disadvantages of various household cooking fuels and concluded LP Gas has the following advantages compared to many other traditional fuels:
  - Improves health for the many poor people directly affected by indoor pollution from household fuels;
  - Reduces emissions of greenhouse-related pollutants compared to solid fuels, such as biomass and coal in traditional stoves;
  - Reduces deforestation;
  - Increases availability of agricultural waste for soil enhancement and other purposes in some regions;
  - Eliminates time and labour devoted to gathering biomass fuels and reduces efforts devoted to cooking and cleaning, especially benefiting women and children.

- LP Gas has the most readily implemented infrastructure compared to other alternatives such as coal and natural gas. For urban populations, natural gas and electricity are alternatives to kerosene, each having advantages and disadvantages. However, not so in rural areas where electricity and natural gas are not yet widely available. Although there has been considerable progress in development of solar and biogas systems, they are not yet widely and commercially developed for household use in Indonesia. In contrast, LP Gas cylinder filling and distribution technologies have long been available in many countries. The use of LP Gas in 12 kg or 3 kg cylinders offers a ready and attractive energy source for many households.

- Subsidized LP Gas programs have been successfully implemented in neighboring countries such as Malaysia and Thailand. In Malaysia, LP Gas subsidies have long been implemented under a system called “Automatic Pricing Mechanism” (APM). In Thailand, the government applies an LP Gas subsidy system for households only.

If compared specifically to kerosene, LP Gas has following disadvantages and advantages:

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Comparison of LP Gas and Kerosene as cooking fuels</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ease of usage</td>
<td>Kerosene is easily managed and may be bought and stored in small containers</td>
</tr>
<tr>
<td>Safety</td>
<td>Kerosene can cause problems of safety in usage and storage, including potential child poisoning, household fire, and fire injuries. LP Gas safety problems may arise from leaking equipment; however an odourant can warn of leakage.</td>
</tr>
<tr>
<td>Supply system</td>
<td>Kerosene doesn’t need special ship transportation and storage</td>
</tr>
<tr>
<td>Impact of air pollution</td>
<td>LP Gas pollution is lower</td>
</tr>
<tr>
<td>Greenhouse pollutants</td>
<td>Kerosene produces more greenhouse gases</td>
</tr>
<tr>
<td>Distribution network</td>
<td>LP Gas distribution is more complex</td>
</tr>
<tr>
<td>Impact on (women’s) cooking time</td>
<td>Kerosene requires more time for cooking and kitchen cleaning</td>
</tr>
<tr>
<td>Household investment costs</td>
<td>Kerosene stoves are cheaper</td>
</tr>
</tbody>
</table>
4.0 Program Structure

The program was phased over a number of years following a feasibility study and a one-month market test by Pertamina in areas of Jakarta. The initial task organization for program execution was the following:

2. Pertamina: Procurement of 3 kg LP Gas cylinders and supply of LP Gas.

The Ministry of Energy and Mineral Resources (Indonesian Ministry of Energy and Mineral Resources, 2010) was later appointed as the government’s authorized representative leading the program. Pertamina, as sole NOC in Indonesia, was eventually appointed as sole program executor. On May 2007, this program was launched in Jakarta. A Presidential Decree to authorize the program was released in December 2007. Meanwhile, the roadmap and program plan were improved as the execution proceeded. Pertamina would finance all aspects of the program and then be reimbursed by the government.
5.0 Planning Phase

The initial program goal was to convert 42 million households and micro businesses nationally. This was later increased to 54-58 million units. All citizens meeting the program requirements would have the right to receive the free “Initial Package”, consisting of a 3 kg LP Gas cylinder, a first gas-fill, and a one-burner stove, hose, and regulator.

The program execution was based on certain priorities: 1) areas with LP Gas infrastructure readiness, and 2) areas with high consumption of kerosene. The program was launched in Jakarta. A major effort would be required to plan an infrastructure that could be built within the first three years, starting immediately, and followed shortly afterwards by distribution. The Pertamina regional units would have to be accepted by local government, local NGOs, and the communities themselves, each with a different opinion. Based on this complexity, Pertamina decided to test the market at small and medium scales prior to a full scale program.

Although Pertamina was convinced that LP Gas is safer, more efficient, cleaner, and more environmentally-friendly than kerosene, it was important to know society’s perception. To design the correct model to implement the program, Pertamina needed to find out how society would respond to the execution of a massive conversion program. For that purpose, Pertamina tested the market of 500 families in central Jakarta on August 1, 2006. Pertamina distributed for free the initial packages and worked with an independent consultant to assess feedback.

<table>
<thead>
<tr>
<th>Item</th>
<th>% Respondent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Package of 3 kg LP Gas is sufficient (not too big and not too small)</td>
<td>92%</td>
</tr>
<tr>
<td>2 Do not see obstacles in the use of LP Gas, but the fear of leakage and possible fire danger remains</td>
<td>60%</td>
</tr>
<tr>
<td>3 Using 3 kg LP Gas within 6-8 days</td>
<td>67.8%</td>
</tr>
<tr>
<td>4 LP Gas Refill Price per cylinder was cheap</td>
<td>86.4%</td>
</tr>
<tr>
<td>5 LP Gas is more efficient and cheaper than kerosene</td>
<td>97.6%</td>
</tr>
<tr>
<td>6 Prefer LP Gas to kerosene for the main reasons: faster, economical, practical and clean</td>
<td>99.8%</td>
</tr>
</tbody>
</table>

Results of market testing in Cempaka Baru Village, Kemayoran District, Central Jakarta, August 2006.

Although the results were sufficiently positive, Pertamina also received feedback that people wanted to have more sales locations for refills of 3 kg LP Gas cylinders. They also considered it important to continue and improve socialization and education programs on proper LP Gas handling and use in cooking.
To test society’s acceptance and the previous distribution model, a second market test was done on 25,000 households with the same respondent profiles but on a larger scale. The test was conducted in December, 2006, with no survey research, but only distributing the packages and observing people’s reactions as a whole. In general, the market test showed that the society’s acceptance was adequate, reinforcing the belief that the distribution model could be used on a still larger scale.

Based on the above market tests and pilot projects, Pertamina concluded that the best program models should include:

1 - Learning from Local Government
National specification of targeted localities for conversion would be done centrally under control of the conversion team established by Pertamina. Meanwhile, detailed schedules and execution steps were established by a conversion team in each Pertamina Region. In addition, Pertamina would coordinate with key stakeholders from provincial, district, and sub-district governments.

2 - Preparing Agents and Retailers
This step was done to ensure the readiness of LP Gas supply during and after distribution activities, including the monitoring of refilling that would be done by local enterprises in the area to be converted. Pertamina had the key role of converting kerosene agents and retailers to become LP Gas agents and retailers. This step requires a great amount of time and energy to socialize with and encourage these enterprises to become LP Gas entrepreneurs, after more than a decade of enjoying the kerosene business, with all its inherent financial attraction!

3 - Conducting Surveys
This phase identified the areas and households that met the requirements to receive the initial packages, to ensure that packages were submitted to the right targets. The survey and distribution activities were done by a third party/independent consultant. Areas given priority for conversion were those areas 1) with high kerosene consumption and 2) in a specific area for easy kerosene withdrawal and minimum infiltration of kerosene from unconverted areas. In addition, the readiness of network infrastructure (LP Gas filling stations and LP Gas Terminals) was a final consideration in choosing areas to be converted.

4 - Distribution and Socialization
Distribution was the delivering of packages to those who were entitled, based on the above surveys. It was directly followed by socialization and education activities, including the use and handling of the gas stove and the 3 kg LP Gas cylinder, and designation of 3 kg LP Gas refill locations.

5 - Kerosene Withdrawal
Kerosene withdrawal was done only in areas in which the conversion packages were distributed completely. The withdrawal was accomplished by gradually cutting the agents’ allocation and kerosene supply. In accordance with this process, agents and retailers also functioned to supply LP Gas to converted areas. 50% withdrawal of kerosene allocation in an area was carried out if the conversion packages were distributed to 80% of the distribution targets in the area. This withdrawal would be done in the following month. This withdrawal amount would then increase a minimum of 10% in the following weeks, taking into account any special situations in the field, until the total kerosene withdrawal was 100%. If the withdrawal caused any serious disturbances in the local community, kerosene would be restored temporarily in the amount of 10% of total kerosene withdrawn from the area.
6.0 Challenges Faced

Pertamina faced and continues to face challenges in the form of special interests of the many different stakeholders. The government has three main interests in establishing this program: 1) to greatly reduce the petroleum fuel subsidy; 2) to divert kerosene into other more beneficial uses such as jet fuel for aviation use; 3) to provide a cleaner and healthier fuel to the end users.

On the contrary, the main target groups of the conversion – domestic households and micro enterprises - have a very different interest. Their primary concern is to have a convenient form of fuel which is cheap and always available. Kerosene agents and retailers are also key players and targets of the conversion, since they will become LP Gas agents and retailers. They are interested in having, at a minimum, the same profit margin and a low investment. In addition to the domestic households and micro enterprises, there are also several third parties such as student movements, local business communities & trade associations, opposition political parties, and media. Some of them supported the program while others opposed it.

The different interests of each of the parties needed to be reconciled, and the gaps between them minimized. The gaps led to the following challenges during the program.

1 - Demonstrations of Resistance to the Program
In May 2007, as the program was started, it faced an extraordinary number of resistance actions. Demonstrations happened everywhere because of asymmetry of information and different and sometimes conflicting interests. The demonstrations, although they had been predicted, generated significant concern among the many parties in the program. The frequency of demonstrations gradually declined, once the conversion program had been implemented and began to provide benefits.

2 - Occurrence of Inflation as Kerosene was Withdrawn
The prices of both kerosene and LP Gas rose significantly during the withdrawal period. During distribution of the initial package from May to December 2007, kerosene prices rose 150 – 200%; this became the second biggest contributor of inflation during the period of kerosene withdrawal. As the kerosene supply was reduced, some demands continued, in part because LP Gas was temporarily scarce in various areas due to distribution problems and supply shortages. On the whole during 2008, domestic fuel contributed 1.16% to the overall annual inflation rate of 11.6%.

3 - Kerosene Leakage from Unconverted to Converted Areas
During execution of the program, kerosene scarcity occurred not only in areas already converted but in nearby areas as well. This was mainly because subsidized kerosene was taken illegally from unconverted to converted areas. Some parties responsible for this were identified, buying kerosene in large quantities and selling it for a higher price in converted areas.

4 - Simultaneous Kerosene and LP Gas Scarcity
At the end of 2007 and early in 2008 there were major reports in the mass media about a scarcity of kerosene in areas that were not conversion targets. Pertamina’s attributed this scarcity to groups that bought kerosene outside converted areas and sold it in converted areas. In addition, the supply of LP Gas did not meet demand in some areas. Chaos occurred when both kerosene and LP Gas were unavailable. Soon after this, Pertamina realized that improved planning and additional LP Gas buffer stocks were crucial; despite potential additional costs, each and every area converted should be provided with adequate LP Gas supplies.

In addition to improved control of the kerosene supply and provision of LP Gas in areas converted and areas experiencing conversion, socialization efforts by Pertamina and the society’s increased awareness and program acceptance all contributed to a smoother implementation later in the program.
7.0 Distribution of LP Gas Packages

Distribution of initial conversion packages started in May 2007. By the end of 2008, 19 million conversion packages had been distributed. By 2009, Pertamina had distributed 24 million packages. In 2010-2011, 10 million packages were distributed. At the end of the program LP Gas volume is predicted to increase 4 to 5 times that compared to the pre-program Pertamina sales volume. This required planning and rapid infrastructure development on a large scale.

8.0 LP Gas Terminals

As the demand for LP Gas increased, the capacities of existing LP Gas terminals had to be increased and improved. In its “pessimistic scenario” in the program plan, Pertamina estimated that LP Gas consumption would increase from 1.1 million MT in 2006 to 4.7 million in 2012. To provide adequate reliability in meeting this estimated demand for LP Gas, Pertamina estimated the following requirement:

- Two Refrigerated LP Gas Terminals in Java to receive LP Gas cargoes domestically and refrigerated LP Gas from abroad. These terminals are on-going projects.

- Pressurized LP Gas Terminals to facilitate distribution to LP Gas cylinder filling stations all over Indonesia. To meet the need for pressurized LP Gas Terminals, Pertamina contracted storage facilities and issued contracts for new pressurized LP Gas storage facilities.

- Strategic steps have been taken to ensure the security of supply and availability of LP Gas (5 and 10 year contracts).

- To anticipate increasing future needs, LP Gas terminals are designed to be expanded. In the transitional period until storage construction is completed, floating facilities were required for additional storage.

9.0 Cylinder Filling Stations

Filling Stations were an inevitable requirement for the conversion program. With the geographic spreading of the program, filling stations were needed all over Indonesia. Key policies on filling stations are as follows:

1 - The government had asked Pertamina to establish extensive opportunities for the private sector to invest in building private filling stations for 3 kg cylinders in specific areas based on throughput capacities ranging from 30-50 tons per day. Standard specifications for form and design of the filling stations were prepared by Pertamina.

2 - Considering that constructing a filling station takes 1-2 years, existing filling stations serving non-subsidized LP Gas (12 and 50 kg cylinders) were used to fill 3 kg LP Gas cylinders temporarily.

3 - LP Gas transportation from LP Gas storage to the filling stations. Supply points were handled by Pertamina who hired specific transporters for LP Gas transportation.
10.0 Program Progress

Through to mid 2012, the program has been implemented in 23 provinces throughout Indonesia, with 53.9 million conversion packages provided to citizens. 13 provinces have been designated as “closed and dry”, meaning that distribution of the first packages was completed and all subsidized kerosene was withdrawn.

As indicated below Pertamina will continue the program in all orange-colored provinces. There remain provinces (blue) to be converted in 2012, and yellow area are considered not to be converted for technical reasons.

11.0 Program Benefits

In less than 6 years since the program started, Pertamina had distributed initial packages to almost 54 million households and small-medium enterprises, i.e., 93% of the target. Pertamina withdrew 8.2 million kiloliters of kerosene by 2012 and replaced it with 3.2 million MT of LP Gas; this means that 1 liter kerosene equals 0.39 kg LPG.

The large volume of subsidized kerosene withdrawn and replaced with LP Gas provided a very significant saving for the state. By 2012 the state’s gross subsidy saving was more than 6.9 billion US dollars.
In less than 6 years since the program started, Pertamina had distributed initial packages to almost
54 million households and small-medium enterprises, i.e., 93% of the target.

In contrast, the volume of subsidized LP Gas experienced a rapid growth from zero MT in 2007 to more than 225,000 MT per month in May 2010. In December 2010 the volume of LP Gas reached 272,000 MT per month, reaching an annual total 3.6 million MT in 2012.

12.0 Benefits to the Business Community

Impacts on economic development include establishment of new industrial facilities and creation of jobs associated with them. Most prominent among these are 6 LP Gas terminals and 10 LP Gas Depots, 67 LP Gas cylinder factories, 27 stove factories, 16 regulator producers, and 360 filling stations. It is predicted that by 2013, 2.5 billion US dollars of investment and 38,000 new employees will be hired as a result of the construction of new refrigerated terminals and filling stations.

The conversions also eliminate the dependence on imported kerosene, which had reached approximately 3 million kiloliters in 2006. In addition, up to mid 2012, Pertamina has been able to export its surplus kerosene production of 4.7 MMBbl which contributes to Government revenue.
13.0 Benefits to the Environment

LP Gas is overall a cleaner fuel than kerosene. A number of empirical studies have demonstrated that LP Gas has lower greenhouse gas emissions as well as lowering several other important air pollutants. Because of the wide variations in kerosene quality and the types of kerosene stoves in use, air pollution emission estimates are generally more difficult for kerosene than for LP Gas. In a number of studies results show that kerosene emissions are lower than from solid fuel stoves (including biomass) but higher than from LP Gas stoves. (Smith et al., 1993; Smith et al., 2000; Smith et al., 2005).

In 2008, Pertamina engaged GreenworksAsia, an Indonesian consulting company, to provide Pertamina with calculations of greenhouse gas emission reductions for the kerosene conversion program. Their analysis (Greenworks Asia, 2008) showed that each canister of LP Gas substituted for kerosene reduces the CO₂ emissions by 2.818 kg., yielding a substantial decrease in carbon dioxide emissions from Indonesia’s fossil fuel household cooking systems.

A reduction of approximately 6 million kiloliters of kerosene/year would reduce CO₂ emissions by 8.4 million tonnes per year. In other terms, the reduction would exceed the CO₂ emissions from the total number of cars sold annually in Indonesia. There would also be a reduction of other air pollutants such as particulates, methane, carbon monoxide, and nonmethane hydrocarbons.

14.0 Benefits to End Users

Several surveys of 3 kg LP Gas consumers were conducted by various parties to examine people’s experience in using 3 kg LP Gas units and to obtain input on future improvements. A large majority of the recipients of conversion packages said that they can cook faster, have a cleaner kitchen, and most importantly, reduce their expenditure for cooking fuel by approximately 30%. Some conclusions are as follows:

1 - On average, respondents depleted a 3 kg LP Gas cylinder in 10.6 days, with a daily cooking time of 1.92 hours. On average the respondents using only LP Gas bought each month three refills of the 3 kg LP Gas cylinder at a cost of Rp. 13,800 per refill (1.38 USD). Of the 62.1% of respondents who use only kerosene for cooking, the average uses 4.4 litres of kerosene a week at a cost of USD 12.52.

2 - Future use of LP Gas:
   a - 69.4% would be more likely to cook with LP Gas, with occasional kerosene use
   b - 28.3% are more likely to use kerosene, with occasional LP Gas use.

3 - Ease of use of LP Gas stoves: 8% of respondents said it was difficult, 20% said moderate, 66% stated easy, and 6% said very easy.
LP Gas accidents in Post Switching Program

By mid 2010, when more than 43 million household had been given the initial package of 3 kg cylinder and stove, accidents related to LP Gas equipment were occurring. The mass media reported incidents occurring frequently. It appeared that the frequency of accidents of 3 kg and 12 kg LP Gas cylinders was primarily due to inadequacies on the part of general consumers on how to use the devices.

The number of accidents compared to the number of initial packages distributed is very small, however the impacts were very big and the successfulness of the program could have been eroded significantly. Steps were taken between inter government departments and Pertamina. Most prominent of them were following:

1. The government established an integrated team to determine the root of the problem and to formulate a solution. Pertamina executed a “Crisis Centre” that consisted of several dedicated task force teams – monitoring 24 hours a day - in order to minimize the number of accidents occurring in all the areas that had been converted. Numbers of LP Gas incidents were exaggerated by media and this led to a worse perception of LP Gas. Dedicated teams were built up in several regions to provide a quick response to all the accident reports. Within two hours there was a follow up on the report unless the area was too difficult to reach. Where the accidents were proven to be caused by LP Gas victims were compensated.

2. Several product quality improvements have been taken especially improving the quality inspection in the distribution channel.

3. Socialization programs to increase society’s understanding of the LP Gas system were implemented. An intensive and continuous socialization on LP Gas safety usage was done by the taskforce to eliminate the perception. More than 5000 events of socialization and re-socialization were done throughout hundreds of cities and villages, and advertisements were placed through TV, radio and newspapers.

Results from other surveys concluded:

1. The budget fraction for fuel in every household decreased after the respondents began to use LP Gas. When using kerosene, the average budget fraction for fuel reached 84.3% of total household expenditure. After using LP Gas, the fuel budget decreased to 58.3%.

2. The average monthly savings in using LP Gas instead of kerosene is Rp 16,420 (1.64 USD).

3. 83.3% used the initial package which they were given. 16.7% did not use the initial package. 72.9% then retained the package, 15% gave it away, and the rest are unexplained. 81.6% said they will buy refills, 8% would not purchase refills, and 10.4% had no opinion.

4. Ease of buying LP Gas: Easy (84.0%); Difficult (4.5%); no opinion (11.5%).

5. 84.5% said a good quality stove was received in good condition. Similarly, 92.4% of respondents said a good quality cylinder was received in good condition.

6. 87.2% said they agreed with the Conversion Program.
By 2011, there had been a significant drop in the number of accidents. Accidents might still happen in this huge program of converting more than 50 million households from using kerosene to LP Gas. To minimize the possibility of accidents ongoing HSE reviews and improvements will be implemented.
16.0 Key Success Factors

The end users are most interested in the economical factor, since most of them have monthly expenses less than 150 USD.

In its analysis and evaluation of the Conversion Program to date, Pertamina identified three key factors it believes led to a successful program.

1 - Strong Governmental Policies
The policies in establishing, supporting, and accelerating this program have been very strong. Pertamina is convinced that without these strong policies, the program could not have been successfully implemented, considering its huge scale, its major impacts on so many diverse parties and factions, and its potential for impacting state stability. In particular, focused coordination of the program by one Ministry with Pertamina as the sole executor of the program, supported by relevant ministries and local governments was seen as important.

The establishment of the program’s legal basis and parliamentary approval with appropriate legal instruments was another important issue. Finally, establishment of broad support for the program was another key factor.

2 - Effective Business and Implementation Model
“,Business model,” used here refers to the overall execution of the conversion program, involving business entities and all parties, beginning from program plan, readiness of initial packages to be distributed for free, distribution lines and infrastructure preparations, and final program execution.

3 - Having Clear Benefits to All Parties
The program has to be beneficial not only to government and the program’s initiator, but also has to provide real benefits to the program targets, namely, end users. LP Gas is not only more practical, safer, and cleaner but also more economical. The end users are most interested in the economical factor, since most of them have monthly expenses less than 150 USD; the fuel budget is a major portion of their expenditures. If the program doesn’t provide a benefit to the end users, acceptance will be extremely difficult.

Also, there are two additional success factors that may specifically be learned from the Indonesian case as follows:

1 - Readiness of Packages and Straightforward Planning Stage
The readiness of the initial packages was strongly supported by governmental policy, in this case the Ministry of Industry, which prompted development of an Indonesian National Standard, SNI, for the conversion package. Most importantly, the ministry immediately issued an SNI certification and licensing requirement for cylinders, stoves, and hose manufacturers. But notably, the number and capacities of the manufacturers were limited and unable to meet demand early in the program. In order to support manufacturers in fulfilling increasing demands, government took several steps, including providing more permits to increase manufacturers.
2 - Focused Ownership of Model
The business model of appointing Pertamina as the state-owned enterprise executing the program enabled the initial packages to be acquired through Pertamina as sole purchaser of all packages. The procurement was executed by Pertamina through a tender using Pertamina’s funds which the government later reimbursed. This business model encouraged Pertamina to create a range of opportunities for private partners to cooperate with Pertamina in building private depots, private filling stations, and private skid tanks. Because private investment is almost 90% of the total investments, the program is essentially a pure business venture with almost no government investment. Upon completion of the conversion program, the only government financial transactions remaining are the LP Gas refill subsidy, including operating costs of all infrastructures and reimbursement of initial LP Gas packages. Pertamina’s status as sole NOC and a non-political state-owned enterprise played a major role in approaching local governments.

In summary, according to Pertamina, a conversion program can be run successfully by delegating program execution to a capable business entity and enabling normal business transactions, thus minimizing the government’s bureaucratic role. The business entity can also play a crucial role as program executor in the field to approach all relevant parties so that the program runs smoothly. It was also important that the business and implementation models could be replicated easily in all geographic areas to be converted.

17.0 Conclusions
With an urgent need to reduce subsidies, the government of Indonesia (GOI) launched this program quickly. In terms of investment capital, the project was not extraordinarily large, but was of extremely large scale throughout the entire country and socially very risky. The strong role of prominent leaders in central government, supported by relevant ministries, is a key factor in this program’s success. One important indicator is the financial return, even before program completion. Capital investment of USD 1.4 billion yielded a subsidy saving of USD 5.54 billion within the same year.

1 - The program is run using a business model executed by a business entity deemed capable of executing it. Indonesia has an advantage with a sole NOC as “the leverage arm” of the Government. It used this leverage in an attempt to maximize the role of private institutions, particularly those already participating in the previous commercial system and those effective in gaining societal support. The short lead-time and program speed had a negative impact on development of needed capacities, and this should be improved in the future.

2 - Using a strong social approach, all phases of the implementation model can be replicated quickly and efficiently in other conversion areas throughout the country. This ranges from coordination with local governments to withdrawal of existing fuel. Rapid program execution requires post-program socialization to increase societal awareness.

3 - The program was beneficial to a wide range of parties, including government, national industries, and end users. However, it required extra efforts to convert the distribution chain, and it increased the market risk of competition.
18.0 Continuing Challenges

As a result of the desired rapid program, the government tried to accelerate and improve the cylinder manufacturers’ production capacity. The number of local manufacturers, which was only 13 in 2006 (before the program), increased to 67 in 2012 resulting in excess cylinder production capacity (7 million cylinders per month).

There are still many challenges to be faced, even after program execution is almost complete.

1 - Improving Good Safety Practices in the Indonesian LP Gas Industry

LP Gas is a clean, modern fuel that brings comfort to tens of millions of consumers worldwide. However, as with any fuel, safety in operations and handling is imperative for consumers and for the industry. The effects of safety incidents do not necessarily stop at the factory gate but can impact people, property and the environment outside the enterprise, sometimes at considerable distances.

In addition to the human cost and material damage, the reputation of the product can be significantly impaired if safety is not managed appropriately (Guidelines for Good Safety Practices in the LP Gas Industry, WLPGA 2008).

Some of the improvements that need to be continually done:

- Ensuring end to end value chain meet the product specifications
- Improving safety in all LP Gas storage, filling stations and distributors operations to eliminate extreme risks
- Audit to implement good safety practice inspections in all distribution node with periodically reference renewal
- Pertamina and the WLPGA worked together to address this challenge and held a Best Practice workshop with all stakeholders to identify the issues and draw up an action plan to improve things.

2 - Excessive Cylinder Manufacturing Capacity

As a result of the desired rapid program, the government tried to accelerate and improve the manufacturers’ cylinder production capacity. The number of local manufacturers, which was only 13 in 2006 (before the program), increased to 67 in 2012 resulting in excess cylinder production capacity (7 million cylinders per month).

This excess capacity has had a serious negative impact on the business climate, resulting in a large number of illegal cylinders circulating in the market. These cylinders are difficult to control once they have entered the LP Gas refilling system.
19.0 Suggestions for Countries with Potential Conversion Programs

The paper has described a “megaprogram” of household fuel and technology conversion in a socially-sensitive institution of Indonesia. This sensitivity is not unique to Indonesia. In many emerging economies, government policies and programs related to household fuels have long been a flashpoint for controversy and social unrest. For governments struggling with fuel conversion issues, there may be useful lessons from the Indonesian experience. Although Pertamina, as sole NOC, plays a special role in the national economy, countries with an NOC are increasingly common and important on the world energy scene. NOCs accounted for 52% of global oil production, controlling 88% of proven oil reserves in 2007 (U.S. Energy Information Administration, 2007).

The following section summarizes some of these specific Indonesian lessons in the form of advice or guidance,

1 - Institutional Roles
In initiating this program, the Government (or its energy sector regulator) should appoint or contract directly a (or a few) capable public company/institution to implement the program. It will serve as intermediary between the government, the targets of conversion and other stakeholders.

- The government or the regulator must support the implementing companies/ institutions with a clear consistent financing and regulatory scheme.
- The implementing institution must work closely with both local and central governments to support the program.

2 - Minimization of Negative Impacts and Social Risks
- The current fuel (e.g. kerosene) should initially be drawn down gradually but then increasingly rapidly to limit the period of consumer pain.
- The current fuel should remain available but at its economic/unsubsidized price.
- A monitoring center should be created to mitigate risks and provide the consumer with call/contact points to solve issues that may appear.
- Safety should be considered first priority when designing products and program execution.

3 - Key Implementer Steps in Converting the Fuel Market
- Initially increasing the implementer’s own capability to build adequate infrastructures and allocate financial resources.
- Establishing a positive footprint by choosing an appropriately-limited geographical target area enabling rapid and significant positive impact.
- Understanding its target and overcoming the target’s initial obstacles, e.g., providing a free initial package to the end user.
- Communicating the program effectively using easy verbal language and integrated continuous marketing communication through mass media and to specific targeted users, e.g., with cooking demonstrations and post-program socialization.
- Using existing fuel distributors (kerosene agents and retailers) and nurturing an environment to reduce social risks in their new business. Providing easy financing should they need additional capital for the new business.
References

Budya, Hanung and Yasir Arofat, Muhammad, 2011, Providing cleaner energy access in Indonesia through the megaproject of kerosene conversion to LPG, Energy Policy, Volume 39, Issue 12, 7575-7586.


Siyanbola, W.O. et al., 2004, Determination of energy efficiency of non-bio-fuel household cooking stoves, Nigerian Journal of Physics 16(2), 171-179


Umar Said, 2000, Subsidy, Equity and Sustainability of Oil Supply, Proceedings of the 50th Anniversary of the Economic Faculty, University of Indonesia, Jakarta


Acknowledgements:
The original paper ‘Providing Cleaner Energy Access in Indonesia through the Megaproject of Kerosene Conversion to LPG’ was written by Hanung Budya & Muhammad Yasir Arofat of PT Pertamina (Persero) and published in Energy Policy, 2011, Vol. 39, Issue 12. David Tyler of the WLPGA and Muhammad Yasir Arofat of PT Pertamina subsequently updated this case study with support from Irto P Gintings and Gustiar Widodo of Kerosene to LP Gas Conversion Team Pertamina. The authors also acknowledge the suggestions and assistance of Wesley K. Foell of Resource Management Associates of Madison, Wisconsin, in writing this case study and Simon Leysen of Morris-Chapman for preparing the layout and for providing some of the photographs. Other photographs were provided by David Tyler and Hermansyah Y Nasroen of Pertamina. The material and opinions expressed in this paper are those of the authors and do not in any way represent those of Pertamina or the WLPGA.