

# Toward Universal Access to Clean Cooking

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EAP CLEAN STOVE INITIATIVE KNOWLEDGE EXCHANGE SERIES

## INDONESIA

### Key Messages

- **Forty percent of Indonesia's more than 60 million households continue to rely heavily on traditional biomass fuels for cooking.** Household air pollution from solid fuel combustion is linked to some 165,000 premature deaths in Indonesia each year.
- **In rural Indonesia, biomass is renewably harvested and abundant and affordable to the poor.** Scaled-up use of clean biomass stoves could mitigate the health risks of traditional biomass cooking and contribute to Indonesia's green growth agenda.
- **The biomass stove market is limited.** All commercially sold stoves are made by local artisan producers, and profit is the supply chain's major concern. Introducing new models would need to be linked to a higher profit margin and training in business development.
- **Achieving universal access to clean cooking by 2030 will require developing a thriving clean biomass stove market.** An integrated approach, using a results-based financing mechanism, is proposed to overcome supply- and demand-side barriers and institutional constraints.



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Photo credit: Laurent Durix.

## Changing Landscape of Household Cooking Fuels

Indonesia has made great strides in moving its citizens toward clean cooking solutions. Complementary programs across the archipelago reflect the country's diverse geography, culture, and cooking practices. Thanks to the government's highly successful Kerosene-to-LPG Conversion Program (2007–12), some 30 million households, mainly in urban areas, have switched to LPG. There is also a significant niche market potential for biogas, with more than 10,000 units already having been installed in rural areas with suitable conditions. Yet two-fifths of the population—some 24.5 million households—still rely on traditional biomass, mainly fuelwood, to meet most of their cooking needs. Nearly half of these households reside on the densely populated island of Java, while the other half are scattered throughout mainly lower-income provinces and sparsely populated rural areas (map 1). In many rural and peri-urban areas, biomass can be freely collected or cheaply purchased. Without significant policy shifts, traditional biomass cooking will likely remain high and may even increase in certain areas.

Map 1. Distribution of Households Reliant on Firewood as Primary Cooking Fuel, 2010



Source: BPS-Statistics Indonesia 2012.

## Mitigating the Health Risks of Biomass Cooking

Each year, an estimated 165,000 premature deaths in Indonesia can be attributed to household air pollution (HAP) linked to toxic smoke emitted from the incomplete combustion of solid cooking fuels. Solid fuels used for household cooking are closely linked with a high incidence of respiratory disease, especially among women and their young children. Switching to such modern fuels as LPG and electricity—the most effective way to reduce HAP—is unaffordable to most poorer rural households. But emissions could still be reduced by burning biomass fuels using improved or advanced biomass stoves. Thus, in areas where biomass cooking persists, the most effective way to mitigate HAP exposure is to promote better stoves that burn biomass energy in a cleaner, more efficient way.

## Sustained Demand for Firewood as Cooking Fuel

The main factors that influence household cooking fuel choices are affordability, availability, accessibility, and cultural acceptability. A 2009 household energy survey conducted by GERES identified fuel cost, among other desired attributes (i.e., easy to obtain, better-tasting food, cleaner cooking environment, and ease of use), as the main reason for switching fuels.<sup>1</sup> In 2006, reduced availability of the kerosene supply caused many rural households who either could not access or afford LPG to switch to firewood. Currently, LPG use is subsidized, with about 40 percent of it imported. But international price fluctuations could impinge on the government's fiscal ability to maintain today's subsidized price level. If subsidies were reduced and retail prices raised, many households would likely shift to firewood as an alternative fuel. Even now, many households are unwilling to pay for LPG, even at the subsidized price, if they can freely collect firewood from the local environment. Also, household cooking fuel choices vary by region. Many use a mix of fuels, especially when alternate ones are available at an affordable price. Rural households that cannot regularly access LPG may use kerosene to supplement their firewood use. Or peri-urban households that use LPG may supplement it with firewood that can be freely collected or cheaply purchased.

## Limited Biomass Stove Market and Types

Currently, the commercial market for biomass stoves is quite limited. Households either purchase or build their own rudimentary cookstoves and usually own more than one. The usable lifetime of stoves varies from about 6 months up to 4 years, given that many owner-built stoves are repaired on an ongoing basis. Markets do not yet exist in many rural and more remote areas, while they are fairly well-established in more developed regions (Java, Sumatra, and Sulawesi). Three biomass cookstoves commonly used in Indonesia are the Keren, Anglo, and Apollo, which are distinguished by the types of fuels used. The Keren is a firewood-burning stove, usually made of terra cotta or other materials. The Anglo, typically made of clay pottery, uses charcoal; while the Apollo uses sawdust and rice husk for fuel.

All commercially sold biomass cookstoves are based on the Artisan Production Model, meaning that local producers build stoves individually by hand. Production processes are slow, incurring high labor costs, and quality control is weak. Most businesses are family-owned and passed down from one generation to the next. About 40 percent are owned and operated by women. Business arrangements are mostly informal, based on mutual trust, with no legally binding conditions of sale and purchase. The traditional cookstove supply chain generally lacks

knowledge about better stove models and stove performance. A new model's acceptability depends on its potential to be sold. Since consumers are used to buying stoves at cheap prices, suppliers are interested in selling as many stoves as possible, not just ones that are more fuel-efficient. Thus, introducing a new stove model would need to be linked with a higher profit margin. It would also require training producers, wholesalers, and retailers in how to maximize benefits from participating in selling the new model to incentivize them to continue on.

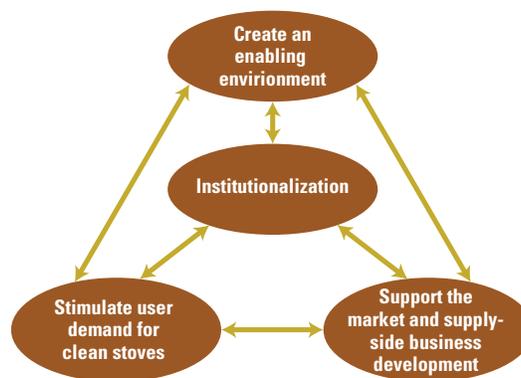
## Learning from Successful Clean Cooking Programs

Key principles underlying the success of the Kerosene-to-LPG Conversion Program and the Indonesia Domestic Biogas Programme (IDBP) can be adapted to a program designed to promote clean biomass cooking. The LPG conversion program has demonstrated the importance of strong government commitment and a firm policy objective, along with effective marketing and public-awareness campaigns, assured availability of an uninterrupted fuel supply, and effective monitoring and evaluation. The IDBP, better known as the BIRU (*Biogas Rumah*) program, has underscored the value of adopting a market-based approach, combined with targeted financial support to help households overcome high upfront system costs. The program has also emphasized the need for quality control and adherence to standards, verification of results and procedures, and local management.

## Key Policy Recommendations

Now there is a window of opportunity to apply the lessons from Indonesia's successful clean cooking programs to promoting better biomass stoves. Previous efforts to introduce improved biomass stoves lacked an integrated focus on consumer awareness and demand, product affordability and availability, and producer capability to make uniform products according to

Figure 1. Overall Strategy To Scale Up Clean Biomass Cookstoves in Indonesia



standards. Households are unaware of the harmful effects of HAP and the health benefits of stoves that perform better. Producers are hesitant to produce clean cookstoves without demonstrated consumer demand. And to date, no institution has championed clean biomass fuel for cooking.

The Indonesia CSI suggests that an integrated strategy is required to overcome these obstacles (box 1). The proposed strategy comprises three interrelated pillars—creating an enabling environment, stimulating user demand for clean stoves, and supporting the market and supply-side business development—with institutionalization at the center (figure 1). This strategy builds on and is consistent with the sector transformation strategy developed by the Global Alliance for Clean Cookstoves (GACC) and the World Bank’s “one goal, two paths” approach to achieving universal access to modern energy in the East Asia and Pacific region.

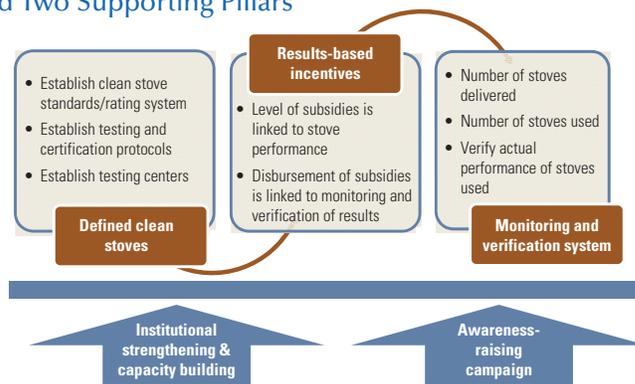
### Institutionalization

To institutionalize clean biomass cooking solutions, the study recommends establishing and strengthening an institutional champion; a cross-sector coordination mechanism; and a platform for networking, communication, and knowledge sharing. It is recommended that the MEMR’s Directorate-General of New and Renewable Energy and Energy Conservation (EBTKE) take the lead in developing a roadmap for scaling up access to clean biomass cooking solutions. A steering committee for national clean biomass cookstoves should be established, chaired by EBTKE and including the Ministries of Women’s and Children’s Empowerment, Health, Research and Technology, Industry, and Small and Medium Sized Enterprises, as well as the Bureau of Standardizations. In addition, an Indonesian alliance for clean cookstoves could play an instrumental role in promoting sector development.

### Mutually Reinforcing Pillars to Scale Up Stove Access

Creating an enabling environment is vital to scaling up access to clean stoves. It requires establishing and strengthening stove standards, testing, and certification; conducting research and development on improved and advanced stoves and fuel processing technologies; and developing a master plan for a national clean biomass stoves program. Also vital are stimulating user demand for clean stoves and government support of the market and supply-side business development, which must fit local conditions and target long-term sustainability. Where stove supply chains already exist, the CSI strategy recommends building awareness and capacity. In areas without stove supply chains, significant time and resources must be invested in building local supply chains and educating both producers and households in the use and benefits of the new stoves.

Figure 2. RBF Framework with Three Building Blocks and Two Supporting Pillars



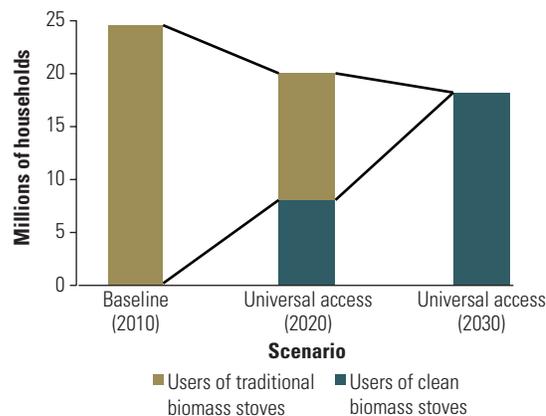
## Results-Based Financing

The Indonesia CSI recommends a Results-Based Financing (RBF) financing approach to promote clean stoves. The RBF scheme disperses public resources against demonstrated, independently verified outputs or outcomes instead of project inputs. This distinguishing feature can mean more effective and efficient use of public funds and improved support of market interventions. The conceptual framework for using RBF in programs to promote clean stoves could include three key building blocks—defined clean stoves, results-based incentives, and a monitoring and verification (M&V) system—supported by the pillars of institutional strengthening/capacity building and awareness-raising campaigns (figure 2).

## Scenario Analysis Results

How many clean biomass stoves will be needed to achieve universal access to clean cooking by 2030? To answer this question, the study conducted a scenario analysis. It assumed that, in 2030, about 18 million households will still use biomass as their primary cooking fuel.<sup>2</sup> By 2020, at least 10 million clean stoves, representing 40 percent market penetration, will need to be delivered to be on the path to universal access (figure 3).<sup>3</sup>

Figure 3. Scenario Analysis: Households Using Mainly Biomass for Cooking



## Box 1. Indonesia Clean Stove Initiative

In 2012, the World Bank, in collaboration with Indonesia's Directorate of Bioenergy, Ministry of Energy and Mineral Resources (MEMR), launched the Indonesia Clean Stove Initiative (CSI). The broad aim is to scale up access to clean cooking solutions for the 40 percent of households who will likely continue using solid fuels beyond 2030. The Indonesia CSI comprises four program phases: (i) initial stocktaking and development of the implementation strategy; (ii) institutional strengthening, capacity building, and piloting of the strategy; (iii) scaled-up program implementation; and (iv) program evaluation and dissemination of lessons learned.

Phase I activities have focused on in-depth assessments of household cooking fuel technologies and the existing stove market, review of the sector's policy and institutional framework, and lessons from the country's two most successful clean cooking programs that can be applied to new ones promoting clean biomass cooking.

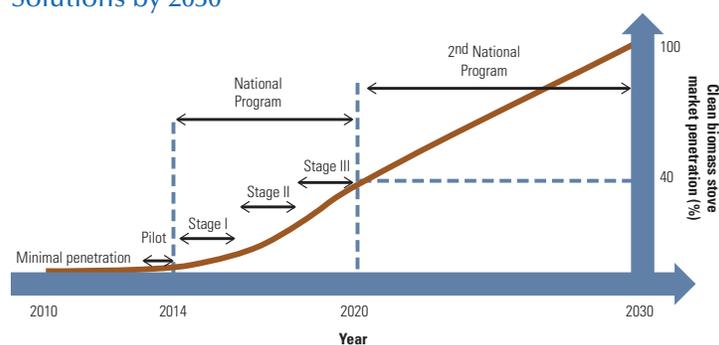
Data collection for the phase I study included a national survey of the biomass stove supply chain, covering 17 representative provinces, and two national stakeholder consultation workshops held in May and July 2012. Workshop participants included key representatives of the Indonesian government, nongovernmental organizations, academia, and the private sector. A CSI technical committee, chaired by the MEMR's Director of Bioenergy and including representatives of relevant ministries and national experts, was established to ensure the study would be completed in cooperation with the various stakeholders in accordance with existing policies. In addition, background case studies were prepared on the Kerosene-to-LPG Conversion Program, the Indonesia Domestic Biogas Programme, and biomass cookstove use in Yogyakarta and Central Java.

To reach this ambitious target, the study recommends implementing two consecutive national programs, using a phased approach with gradual geographic expansion (figure 4).

### The Road Ahead

The next steps for the Indonesia CSI are to establish stove standards and testing protocols, strengthen institutions and build stakeholder capacity, design and implement pilot programs, and design and prepare the master plan for rollout of the national program. Over the next 10–20 years, national economic development is expected to result in greater adoption of LPG. It is also expected that households who continue to use biomass cooking fuel will do so with a clean stove. The public sector will provide the private sector sufficient incentives and support to enable it to reach its customers. Ultimately, the market should decide which customers and locations to target and which types of technologies and fuels to focus on, with the freedom to innovate over time.

Figure 4. Roadmap to Universal Access to Clean Cooking Solutions by 2030



### Notes

1. GERES (Renewable Energy, Environment, and Solidarity Group), "Wood-fuel Flows in Central Java" (Aubagne, France: GERES, 2009).
2. The universal access scenario accounts for continued population growth and urbanization and increased adoption of LPG as the primary cooking fuel due to better infrastructure and higher income levels.
3. This figure takes into consideration that most households use a mix of fuels and multiple cookstoves.

This note summarizes the 2013 report, *Indonesia: Toward Universal Access to Clean Cooking*, published by the World Bank's Asia Sustainable and Alternative Energy Program (ASTAE).

The findings, interpretations, and conclusions expressed in this summary note are those of the authors and do not necessarily reflect the views of the Executive Directors of the World Bank, the Australian Agency for International Development, or ASTAE.