**Clean Cooking In India[[1]](#footnote-1)**

**Background**

In India, about 60 percent of the total population use solid fuel for cooking implying that about 600 million people, mostly women and children, are exposed to harmful household air pollution from cooking practices. For several decades most of the intervention in the cooking sector in India focused on making the use of locally available biomass fuel more efficient and cleaner (“*make the available clean*”).[[2]](#footnote-2) The efforts to design better biomass stoves have struggled with the twin objectives of increasing the thermal efficiency with which biomass is used and making such efficient cookstoves have lower emissions. The effort over the past three decades in India has focused designing and manufacturing biomass stoves with the desired performance, cost, durability and consumer acceptance. Till recently, these efforts have largely been a failure.

Recent effort in India has also focused on making clean modern fuels (such as LPG[[3]](#footnote-3)) available (“*make the clean available*”)[[4]](#footnote-4) to larger proportion of the rural population. The Government of India has launched an ambitious reform of the LPG subsidy program and for the expansion of LPG access. Starting with direct cash transfer of the subsidy, the government and the oil companies have launched a public campaign directed at urban consumers to voluntarily forego their subsidy. Called [#GiveItUp](http://mylpg.in/), the intention is to utilize the surrendered subsidy to provide LPG connections to households in urban and rural areas with income below the poverty line. The efforts to expand LPG access in rural areas (“*make the clean available*”) is focusing on developing rural distribution networks to expand LPG access.

**Cleaner cooking with biomass – some recent developments**

The challenge for cleaner cooking with biomass (“*make the available clean*”) is to, first, develop affordable and durable cookstoves attractive to the consumers and then to encourage business models for rural distribution and after sales service. Recent development with fan-assisted (“forced draft”) stoves has allowed biomass cooking achieve much greater user control of the cooking task in addition to meeting WHO indoor air quality standards. Rapid decline in solar photovoltaics and lithium battery cost has allowed improved reliability and reduction in cost of fan-assisted stoves. Better, cheaper, smaller and more efficient fans are now available due to continuous improvements in small fans for the computer industry. Development of small thermo-electric generators to replace photovoltaics and lithium batteries will further reduce costs and increase reliability. Technology refined in Europe for processing agricultural waste and other biomass for household heating using small, reliable and low cost pelletizers allow village production of consistent fuel to improve the performance of the new stoves. Some recent innovative design of stove attachments to improve combustion suggests that biomass stove emissions may be able to meet WHO indoor air quality guidelines without the use of fans (“natural draft” stoves). Development and the deployment of cheap remote sensors with the new stove technologies is beginning to allow identification and rectification of technology failures and collect information on consumer use and acceptance behavior that can allow rapid evolution of new design and technology. Success with carbon finance for deployment of stoves by the private sector, particularly in Africa, has provided insights on new ways of using result-based finance to monetize climate change, health and other social benefits from clean and efficient cooking programs. Finally, grass-root organizations and village level self-help groups in India have started to engage in the provision of energy services to rural communities. This allows the use of efficient and cost effective last-mile delivery and supply chains, including the provision of after sales service. The absence of last-mile delivery and supply chain has often caused failure of promising innovation.

Together, these recent developments signal possibilities for catalyzing transformative change in the way clean cooking services are delivered.

**World Bank’s engagement in the clean cooking sector in India**

Engagement in the clean cooking in India was initiated as a part of a South Asia Region effort to address the short-lived climate pollutants[[5]](#footnote-5) from transport, biomass burning for brick making and household biomass use in cooking. The work on clean cooking has focused on efficient and clean use of solid biomass for cooking, through the he following set of activities:

1. *Roadmap for the clean cooking sector* based on gathered market intelligence to identify and map private, social and government sector implementation capacity and business models. Activity has been completed and the roadmap has gone through stake-holder consultation.
2. *Clean burning biomass fuel*. Inventory of the technology for processing agro-residues and other waste biomass to standardized cooking fuels for cleaner burning has been prepared. Roadmap for pelletization of waste biomass to fuel is being prepared.
3. *Technology innovation through design competition through technology incubators*. Development of the concept and the framework for technology innovation to develop cleaner and more efficient cookstoves[[6]](#footnote-6) and fuel processing technologies has been developed in partnership with Tata Trusts. Institutional design and protocols for testing of new stove designs in rural kitchens have been developed. The new “consumer” test reports will facilitate and accelerate technology development and iterative improvement.
4. *Engagement of social enterprises* for efficient and cost effective last-mile delivery of innovations in the clean cooking space will be critical. Social enterprises should serve as an important partner in the effort to confirm consumer preference and to be the critical element in the supply chain for the clean cooking services. Such partners will be important to develop an effective communication strategies, define and refine business models utilizing the most appropriate technologies and financing options.
5. *Result based finance*. Develop and pilot the framework for monetizing co-benefits through result-based finance system for clean cooking incorporating benefits of health and gender benefits, fuel savings and climate benefits from clean and efficient cooking.
6. *Testing, monitoring and the use of remote sensors* to support the result-based finance instrument and technology development through monitoring of consumer behavior. The project has supported the development of a web-based open data platform for the remote monitoring with sensors and wireless technology targeting stove use, black carbon emissions and exposure to household air pollution.

These activities and findings of the review work are the basis for further discussions with stakeholders on the development of the next generation of the clean cooking program in India.

1. Note prepared by Chandra Shekhar Sinha (GSU018) on March 1, 2017. [↑](#footnote-ref-1)
2. GACC, 2011, *Igniting Change: A Strategy for Universal Adoption of Clean Cookstoves in Fuels*, Global Alliance for Clean Cookstoves, Washington 20036, USA, November 2011. [↑](#footnote-ref-2)
3. The spontaneous adoption of low cost induction stoves in rural areas with reliable supply of electricity has been an important development in the past few years. [↑](#footnote-ref-3)
4. Kirk R. Smith, 8 August 2014, In Praise of Power, *Science*, Volume 345, Issue 6197, p. 603. [↑](#footnote-ref-4)
5. Reducing Short-lived Climate Pollutants in South Asia region (P146366). [↑](#footnote-ref-5)
6. Ambuj D. Sagar and Kirk R. Smith, 2013, Pollution: An innovation price for clean cookstove, *Nature* 497:317 (16 May 2013). [↑](#footnote-ref-6)