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Cambodia Market Assessment ***Sector Mapping***

July 2013

- This Market Assessment was conducted by Domrei Research and Consulting Ltd., under the supervision of Nexus-Carbon for Development and Nexant, Inc.
- It is intended to provide an overall analysis of the Cambodian market and opportunities for improved cookstove (ICS) dissemination.
- Each Market Assessment has two parts:
 - Sector Mapping – an objective mapping of the sector
 - Interventions Options – suggestions for removing the many barriers that currently prevent the creation of a thriving market for clean cooking solutions.
- This report represents the Sector Mapping for Cambodia.
- This Market Assessment is based on the Market Assessment Toolkit provided by Global Alliance for Clean Cookstoves, which also provided valuable input during the design of the assessment.
- The conclusions presented here are based on a preliminary literature review, as well as on extensive local stakeholders interviews and a household survey targeting 800 households (360 peri-urban, 360 rural) in 2 provinces/municipalities (Kampong Speu and Phnom Penh) in order to gather updated data. Data from the Domrei household survey is represented by an asterisk (*) in order to differentiate it from national-level data.

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Executive summary

	Findings
<i>Social and Environmental Impact</i>	<p>An ICS program could have very high social and environmental impacts in Cambodia, where 90 percent of households rely on solid biomass fuels for cooking. There is a very limited level of awareness about the adverse health impacts associated with cooking-related indoor air pollution (IAP), which is a leading cause of disease and death.</p> <p>Deforestation is also a major issue. As wood becomes more scarce, charcoal production is expected to increase in the mid-term, furthering deforestation.</p>
<i>Consumers</i>	<p>Rural households are the most exposed to the adverse impacts associated with household cooking, since they often use the least efficient devices (three-stone stove) and cook with wood. They also more difficult to reach, earn less, and are less likely to see the advantage of saving fuel when fuel wood is available for free.</p> <p>Urban and peri-urban users generally leapfrog from wood to LPG with increased wealth. However, charcoal remains a common secondary fuel so ICS could play a role as a secondary cookstove (most households have 2 cookstoves).</p>
<i>Cookstove Industry</i>	<p>Cookstove production is a traditional industry in certain parts of the country, with producers and distributors well established. An ICS industry association already exists in Cambodia (developed by GERES).</p> <p>The industry suffers from a lack of national standards and testing centers that could provide policymakers, donors, investors, stove experts, and program managers with a credible basis for comparing stove performance and safety while providing experts with a common set of terms for communicating and understanding stove performance.</p>
<i>Carbon Financing</i>	<p>Cambodia is a Least Developed Country (LDC), and therefore all carbon accounting standards are eligible. Currently there is one ICS project registered, and is set to expire in 2013.</p> <p>There are experienced carbon finance service providers available to service the sector. There is also some baseline and monitoring data available for the country.</p>

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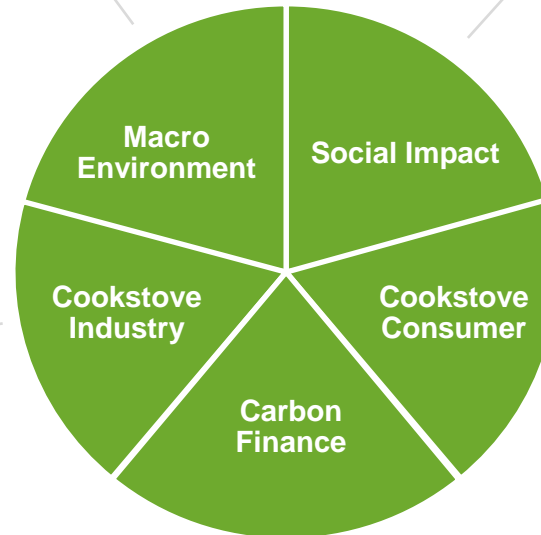
Sector Mapping Approach

Project Approach

Sector Mapping of the cookstove sector was conducted across five dimensions:

- *Social:* What is the country demographics & population distribution across regions?
- *Political:* How stable is government & what political risks will any program face?
- *Economic:* How much money do our potential customers have & what is the economic cycle?
- *Technological:* How sophisticated is the infrastructure & what is the plan for progress?
- *Environmental:* How do ecological conditions impact the success of cookstove programmes?
- *Gender:* How does gender play a role in clean cookstove use and purchase?

- What cooking devices are currently used within the region?
- Who are the main players active in the cookstove sector?
- What are the opportunities / threats for current & future cookstove programmes?
- How commercially attractive is the sector & what are likely to be some of the industry challenges?



- What carbon financing options exist for the country?
- What structures exist which can be leveraged for future carbon financing components?
- Which entities are likely to fill the required roles in the carbon finance operating model?

- How do people cook and what fuels are used in the region?
- What is the current IAP exposure profile of our target market? (Primary cause of IAP and size of problem)
- What are the other impacts caused by the use of poor cooking stoves?
- How does the impact of cookstoves stack up against other health & social priorities?

- What is the profile of the target population?
- How can the customer population be segmented / categorized?
- How big is each customer segment and what are its characteristics?
- What are the specific needs of each customer segment?

Acknowledgments

Project Approach

Many organizations made valuable contributions to this study with their knowledge of Cambodia and/or experience in cookstove initiatives.



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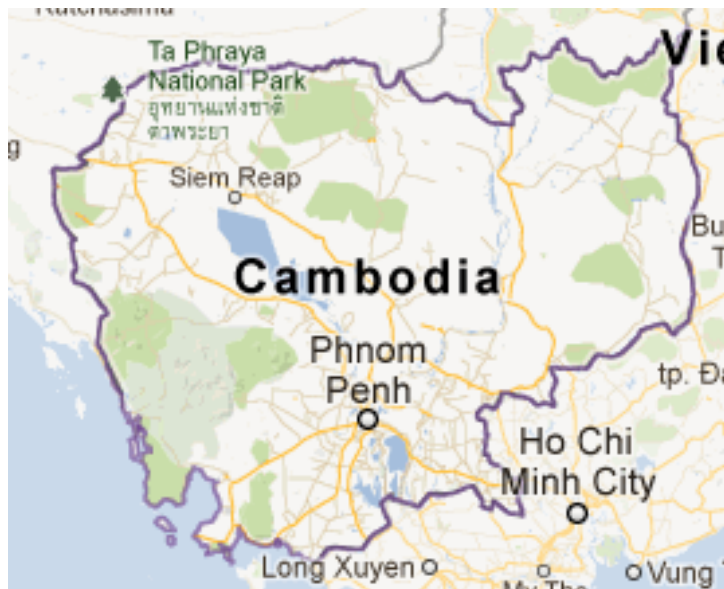
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Geography and climate

Macro Environment

Cambodia is an agricultural country located in the Lower Mekong region of Southeast Asia. The climate is tropical and subject to monsoons, with two distinct seasons - rainy and dry. This sets the rhythm of Cambodian agriculture and rural life more generally.



Indicator	Value
Population	15.2 million (2013 est.)
Surface area	181,035 km ²
Population density	75 habitants per km ²
Arable lands	22%
Forest cover	59%
Elevation extremes	0m (Gulf of Thailand) 1,810m (Phnom Aural)
Climate	Tropical; Monsoon patterns
Dry season	December - April
Rainy season	May - November
Neighboring countries	Thailand; Laos; Vietnam

- Implications -

Moderate temperatures year-round reduce the use of cookstoves for heating and increase options for cooking outdoors or in highly ventilated areas. High forest cover and rural populations make wood a popular cooking fuel.

Social environment

Macro Environment

Cambodia has a very homogenous society. 90% of the population is ethnic Khmer, 95% speak Khmer (the official language), and 96% practice the official religion (Buddhism).

Context

- Rural: 80% of the population lives in rural areas and is highly dependent on agriculture.
- Strong social and family hierarchy: Power and status determine the place of individuals and families within society. Women are of lower status than men, and primarily responsible for the household.
- Low level of education: 49.6% of people over the age of 24 completed at least primary education.
- Religion: 96.4% Buddhist (official religion); 2.1% Muslim; 1.3% other (including Christian).

Indicator	Value
Population	15.2 million (2013 est.)
Population growth rate	1.67%
Urban/Rural split	20% / 80%
Population density	75 habitants per km ²
Population under 24	52.9%
Literacy rate	78%
Literacy rate (women)	71%
Life expectancy	63.4 years
Population below poverty line	20%
Average household size	4.7
HDI (ranking)	0.543 (138/187)

- Implications -

Programs that target the rural market will have the most impact on the overall population.

Political environment

Macro Environment

Following the Khmer Rouge and a decade of civil war, the Royal Government of Cambodia was established in 1993, along with a constitution, and the return of the monarch as the head of state, and the organization of national elections by the UN (UNTAC).



Political Structure

- Multi-party parliamentary democracy under a constitutional monarchy.
- Bicameral legislative branch: Senate (61 seats) and National Assembly (123 seats; members elected by popular vote) each serve five-year terms

Current Government

- Cambodian People's Party (CPP) holds ruling majorities in both legislative branches since 1998.
- Head of State: King Norodom SIHAMONI (since 2004)
- Head of Government: Prime Minister Hun SEN (since 1985)

Administrative Structure

- The country is divided into 23 provinces and 1 municipality (the capital Phnom Penh).

- Implications -

The government is stable, and committed to the socio-economic development of the country. Cooperation with governmental partners is critical to the long-term success of programs.

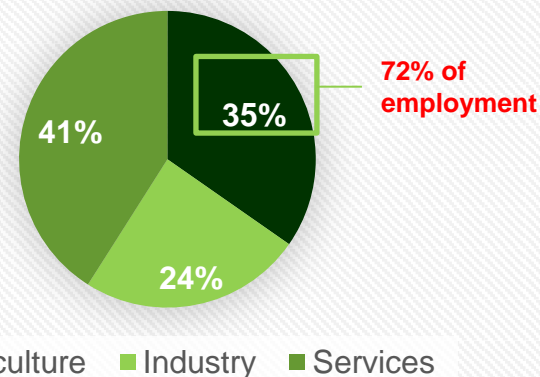
Economic environment

Macro Environment

In the last decade, Cambodia has experienced rapid economic growth, with average annual GDP growth rates of 5%. However, infrastructure is limited and per capita income remains low.

- Cambodia's economic policy focuses on opening commercial borders with its neighbors (Thailand, Vietnam, and Laos) and integrating the country into regional (ASEAN) and global (WTO) trading systems.
- Strong growth in the economy's main sectors:
 - Manufacturing (garment industry)
 - Agriculture
 - Construction
 - Tourism
- The economy is undiversified. Most of the labor force is in agriculture (over 72%), and the garment industry accounts for 70% of total exports.
- 20% of the population live below the poverty line, and corruption is endemic.
- Cambodia is classified as a Least Developed Country (LDC).

GDP Composition



Indicators (2012)	Value
GDP (PPP, current US\$)	36.64 billion
GDP growth	6.6%
GDP per capita (PPP, current US\$)	2,400

- Implications -

High economic growth should be carefully managed to ensure the benefits reach the entire population.

Although women outnumber men in Cambodia (94 men per 100 women), they still lag behind in key social indicators; primarily in education and key decision making positions within society.

Representation and Participation

- The education of girls is not always prioritized in Cambodian families. Girls are often given the role of caretakers and home helper. This gap increases with education level.
- Women are still under-represented in the national government, local decision-making bodies and within corporate management.

Cultural Background

- Women are traditionally responsible for most of the domestic tasks (e.g. cooking, finding firewood, etc.). This is especially true in rural areas.
- Women are seen as the managers of the home, and often make the household financial decisions.

Gender Equality Statistics

	Male	Female
Primary school completion	58.9%	42.8%
Progression to secondary school	51%	34.8%
Representation in National government	80%	20%
Literacy	85%	71%
Labor force participation rate	81.1%	70.2%

- Implications -

To maximize their effectiveness, cookstove programs should target women and the issues that matter to them as they are primarily responsible for household duties.

Ecological Environment

Macro Environment

Cambodia is characterized by rich biodiversity, and important natural resources. The main environmental challenge in Cambodia is deforestation. There is a lack of clear information available, and environmental issues remain highly sensitive. The country is a minor contributor of GHG emissions.

Deforestation

- Widespread use of wood and charcoal for cooking (over 80% of cooking fuels).
- Loosely regulated timber industry contributes to deforestation.
- Forest cover decreased from 73% in 1965 to 59% in 2006.
- Deforestation rate from 0.5% - 1.3% annually.



An Incomplete Legal Framework

- Increasing political actions in favor of environment protection:
 - National Forest Programme (1997)
 - Law on Forestry (2002)
 - Technical Working Group on Forestry and Environment (2004)
- However, institutions still need to strengthen their ability to enforce and implement their action plans.

Other issues

- Urban environment degradation.
- Waste collection and treatment.
- Water access and sanitation.
- Increasing amount of hydroelectric dams on Mekong River subsidiaries.

- Implications -

There is a need to limit deforestation, and provide people and communities with the tools to reduce reliance on unsustainable forestry activities.

Infrastructure and Energy

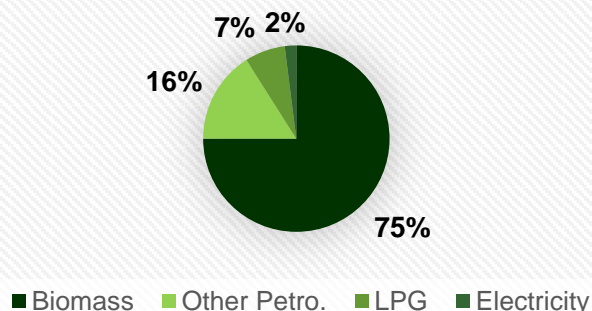
Macro Environment

Infrastructure in Cambodia is limited, especially in rural areas. The road network only covers a portion of the country and 6% of roads are paved. However, large foreign investments in construction and international cooperation programs are improving the situation.

Energy

- Cambodia has an energy deficit, and imports 71% of electricity consumed annually.
- Government plans to increase hydropower dams.
- Oil deposits found offshore in 2005, could dramatically change the energy and economic situation of Cambodia.
- Electricity access: 24% (2004).
- Significant share of wood fuel (75% of all energy).

Energy consumption in Cambodia



Transportation

- Road network is very limited:
 - 39,600 km of roads, versus 180,000 km in Vietnam and Thailand.
 - Paved roads: 6% versus 84% in Vietnam.
- 690 km of railways.

Health care and sanitation

- Improved sanitation: 73% (urban); 20% (rural).
- Improved water source: 87% (urban); 58% (rural).

Telecommunication

- 13.8 million mobile phones (2011).
- Internet users: 3.1% of population (2011).

- Implications -

Infrastructure limitations are likely to raise challenges concerning the retailing and transportation of improved cookstoves, especially for rural areas.

Millennium Development Goals

Macro Environment

Although Cambodia has experienced advances in social development in recent years, and significant progress has been made towards achieving the MDGs, the country still faces many development challenges.



Off Track

1 Eradicate Extreme Poverty and Hunger

Poverty in Cambodia declined from 47% in 1993 to 20% in 2012, although food poverty, malnutrition and child labor are still above target levels.



Off Track

5 Improve Maternal Health

Maternal mortality rates are still among the highest in the region, although service delivery options have expanded and family planning has improved.



Needs Attention

2 Achieve Universal Primary Education

Remarkable strides have been made in primary education access and enrollment in the last decade; Cambodia looks on target to achieve this MDG.



6 Combat HIV/AIDS, Malaria and Other Diseases

Significant gains have been made in reducing HIV prevalence, malaria, dengue fever, and TB.



Needs Attention

3 Promote Gender Equality and Empower Women

Cambodia is on track to reduce gender disparity in secondary education, wage employment and leadership positions. However, more can be done to change attitudes towards domestic violence against women.



Off Track

7 Ensure Environmental Sustainability

Deforestation continues to be a problem, despite efforts to increase protected areas. There is reduced dependency on biomass fuels, because of improved cookstoves and more access to modern fuels, but dependency is high.



4 Reduce Child Mortality

Remarkable progress has been made in this area. Targets for many indicators were already met or exceeded in 2010.



Moderately Off Track

9 Demining, ERW and Victim Assistance

Cambodia has made significant progress toward demining goals, but victims' assistance needs strengthening. A framework is in place to achieve these goals.

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Cooking Habits

Cambodian cuisine is not geographically diversified, with standardized dishes and simple cooking techniques practiced throughout the country. Rice is the staple food throughout the country, and is usually served together with soups and stir fried dishes.



Types of food

- Traditional family meals usually consist of white rice, grilled meat (usually fish), a soup and a stir fry.
- The majority of protein in the Cambodian diet comes from fish, with pork, chicken and beef also popular.
- Dishes are usually simple, and cooked with fresh ingredients. Herbs and seasonings are used extensively to balance the four flavors (sweet, salty, bitter, sour).

Cooking habits

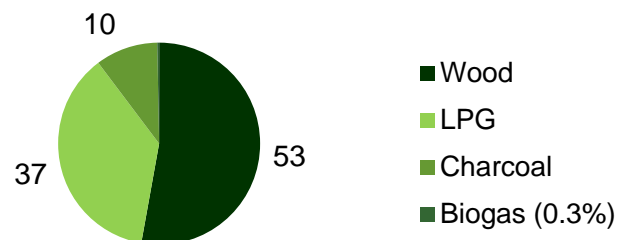
- Most households cook with biomass fuel (wood or charcoal). LPG use has surpassed biomass in urban areas (CDHS 2010).
- Several stoves are usually used when cooking a meal. The average household has two cookstoves.*
- Households prepare five dishes a day, and spend over 1.5 hours cooking.*
- Charcoal is preferred for longer cooking, such as boiling rice and soups. Wood is preferred for high heat, as needed for stir fries. Most households use more than one cooking fuel.*
- Cooking is primarily the responsibility of women (96%).*



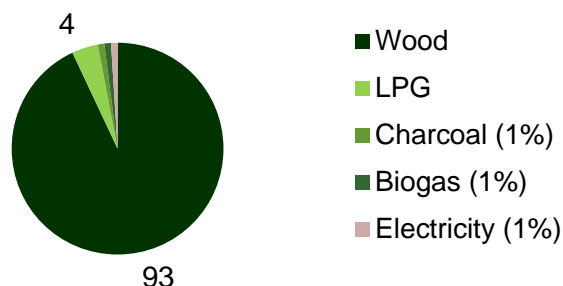
Fuel Usage & Availability (1/2)

Biomass is the prevailing fuel used for cooking in rural and peri-urban areas. It is used by about 80% of all Cambodian households. In urban areas, LPG is the primary fuel.

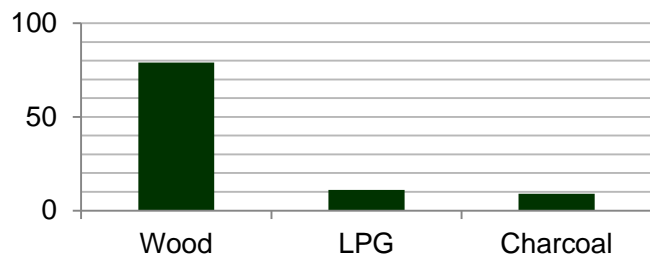
Main Fuel – Peri-urban Users*



Main Fuel - Rural Users*



Main Fuel Nationally



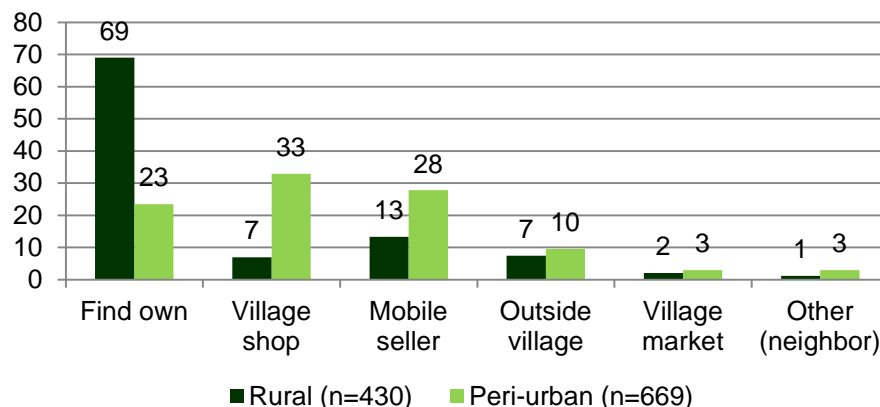
Fuel Use for Cooking

- The use of charcoal as a main cooking fuel is very limited, especially in rural areas. However, if including secondary fuels, charcoal use is 15%.
- LPG is the second most popular fuel in both peri-urban and rural areas. In peri-urban areas, it is used equally with wood (40% each).
- Households appear to switch directly from wood to LPG, with charcoal used primarily as a secondary fuel.
- In urban areas, wood accounts for only 28% of cooking fuels.

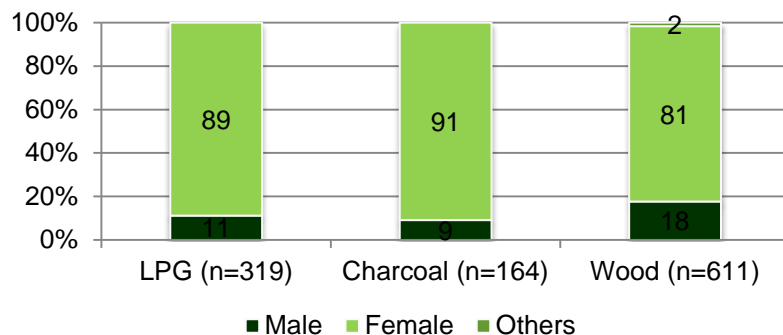
Fuel Usage & Availability (2/2)

Cambodia's abundant forests (59% of land) make wood an abundant and cheap fuel available in all areas.

Where Households Acquire Fuel*



Who is Primarily Responsible for Fuel Collection* ?



Fuel purchase

- **In peri-urban areas**, village shops and mobile sellers are easily accessible. They supply about 61% of household cooking fuels.
- **In rural areas**, more than 69% of the fuel used for cooking is collected in surrounding forests. Wood collection requires an average of 1 hour per day in rural areas, because of the increasing scarcity of wood resources.
- Women are primarily responsible for the collection/purchase of all fuels.

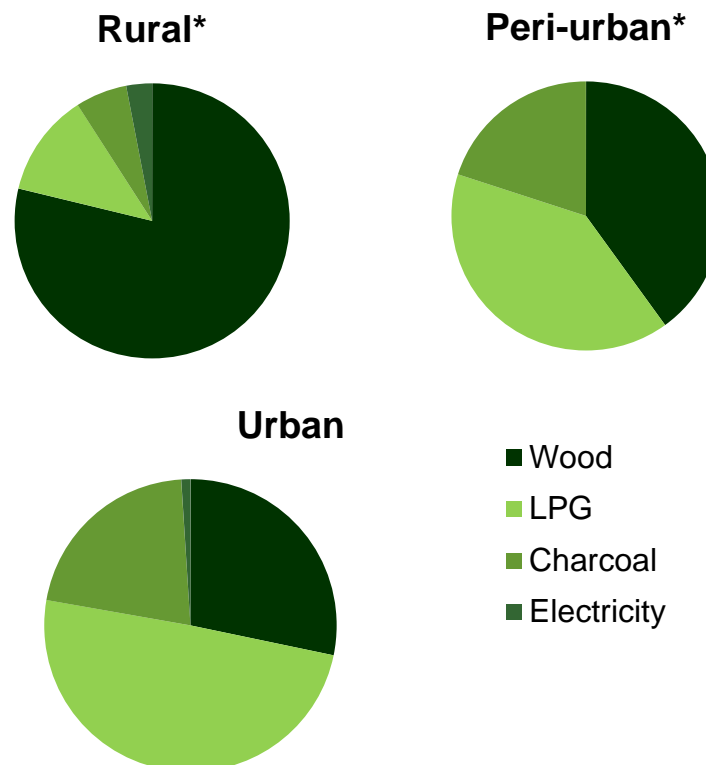
Available Fuel Cost

The use of solid fuels for cooking is not limited to low income populations and can be found across various income categories. There is no gas network in Cambodia. Most LPG is imported from Thailand.

- Wood and charcoal are significantly cheaper than LPG.
- Wealthier households switch directly from wood to LPG, although charcoal and wood remain popular secondary cooking fuels.
- Electricity is not a popular cooking fuel yet, even in urban areas. This is because of the availability of LPG and the high cost of electricity in Cambodia.

Fuel	Days/purchase	Price per unit	Yearly exptr.
Wood*	15-57	0 - \$3.70	Free to \$23
LPG*	3-18	\$0.75 - \$3.20	\$66.73 - \$91
Charcoal*	28 - 46	\$3 - \$7	\$39.70 - \$57

Cooking Fuel use by Household Location (all fuels)*



Indoor Air Pollution (IAP) (1/3)

Almost the entire Cambodian population is exposed to IAP, as cooking with solid fuels is still the norm among urban and rural households.

# Households Affected			
	Population (Households)	% Using Biomass *	Total exposed to IAP (HH)
Rural (80.5% of total pop.)	2.3 million →	96 % →	2.2 million
Urban (19.5% of total pop.)	521,710 →	48 % →	250,161
Total →			2.4 million (87% of total households)

Health Impact
<ul style="list-style-type: none">• Cambodia is exposed to IAP because of the prominent use of biomass fuel for cooking.• 65% of urban households and 35% of rural households cook inside their house*.• Cambodian women are more exposed to IAP since they are mainly responsible for cooking.

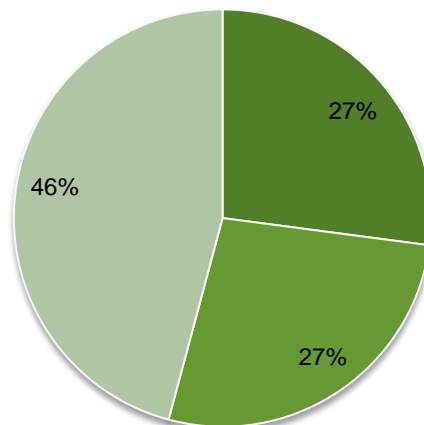
Indoor Air Pollution (2/3) – Exposure and awareness

Social Impact and Environment

There is very limited awareness about the linkages between health and IAP. In most households, cooking takes place indoors, with poor ventilation.

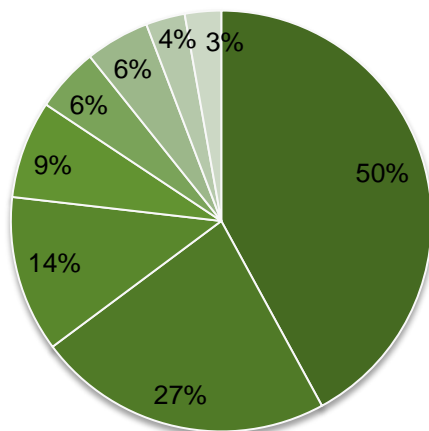
Cooking Place*

- Inside the house
- Inside a separate building
- Outdoors



Ventilation System if Cooking Indoor*

- Leave the door open
- Wall with holes
- Window in the room
- Chimney
- None
- Window near stove
- Fan integrated in the wall
- Others



Household Habits and Awareness

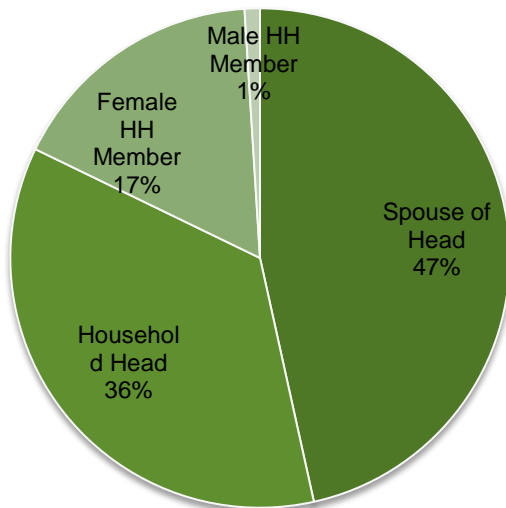
- Awareness of the dangers of IAP is extremely limited.
- Cooking often takes place outdoors or in a separate building, mainly to avoid the annoying effects of smoke rather than out of a concern for health.
- When cooking inside the house, some household usually have a separate room for cooking (37%).
- When cooking indoors, ventilation is achieved by leaving the door open.
- Based on available data, there appears to be no significant differences between rural and urban habits.

Indoor Air Pollution (3/3) - Gender issues and children exposures

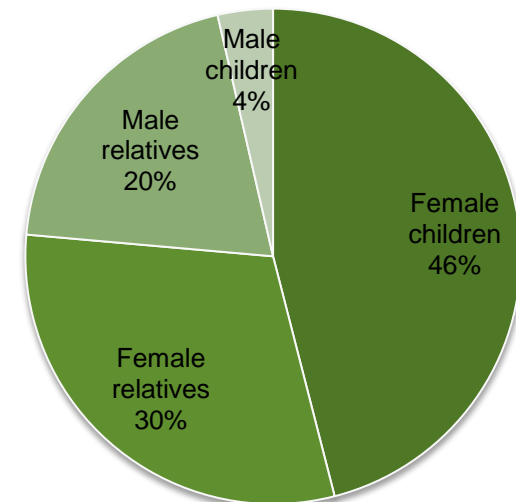
Social Impact and Environment

Household members are unequally exposed to IAP. Women and children are significantly more exposed.

Person Primarily Responsible for Cooking*



Who Else Helps Cook?*



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Consumer Landscape in Cambodia

Consumer Assessment

To understand and derive insight on the consumer landscape in Cambodia the population can be segmented based on geographical location:

Market (Rural / Urban)

The customer segmentation in this section is an illustrative example of how the market in Cambodia could be grouped. They are based on the following assumptions:

- The customer segmentation is designed to provide a high-level view of the market and strengthen the understanding of the customer base in Cambodia.
- The customer segmentation is based on a preliminary market assessment and has used a combination of both primary and secondary research. Further refinement of customer segmentation and customer profiles will be required for specific programmes and regions.
- Customer usage trends is the biggest gap in robust knowledge & research, therefore segment knowledge is sometimes based on consistent anecdotes from stakeholder interviews

Note: The attributes of the segmentation are illustrative based on only initial research

Segment Profiles

Consumer Assessment

The targeted population can be segmented into two groups: (1) Rural households; and (2) Urban and Peri-urban households

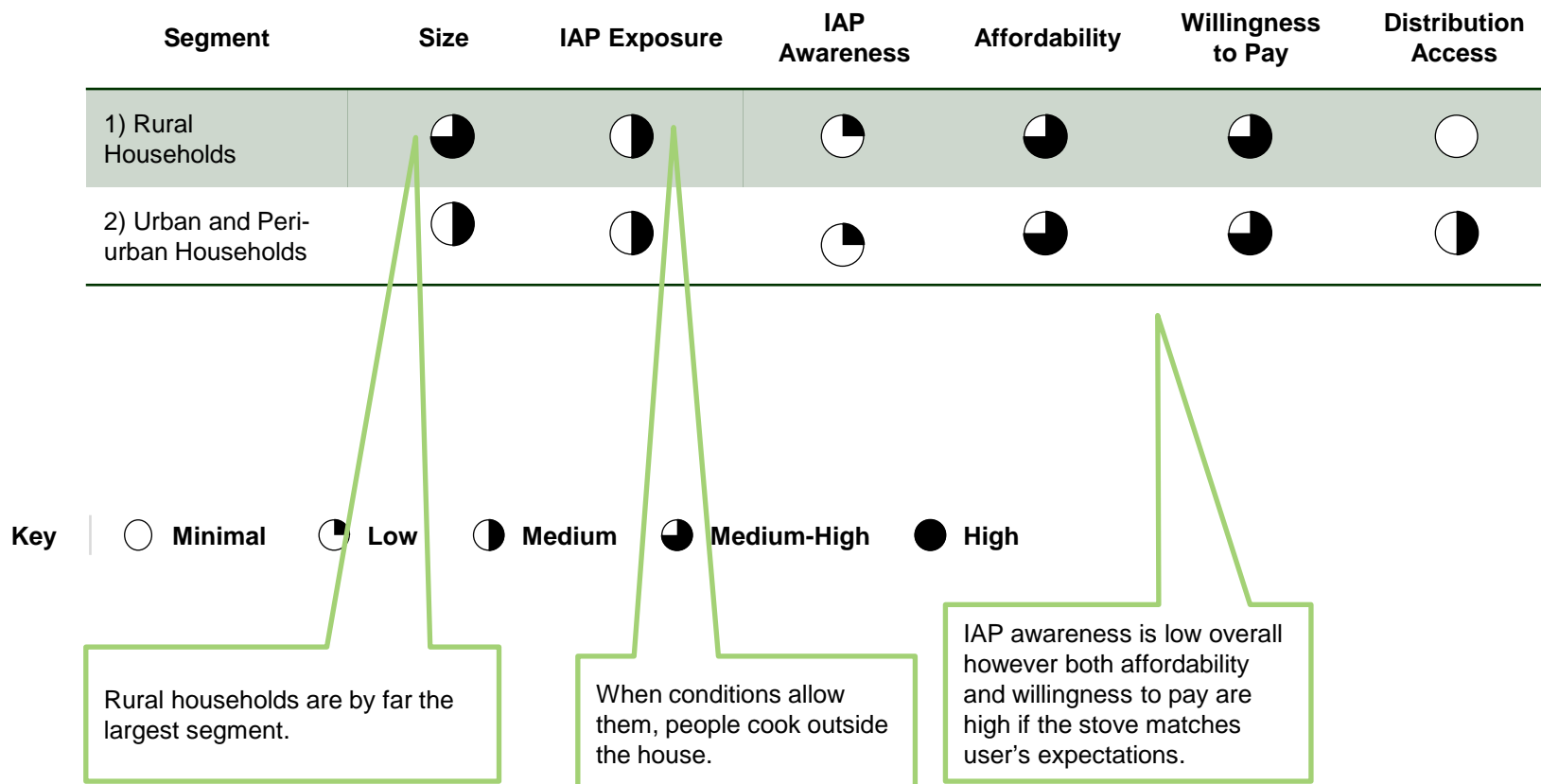
	Rural Households *	Urban / Peri-urban Households *
Size (# of Households)	• 2.3 million (80.5% of population)	• 521,710 (19.5% of population)
Profession	• Farming, Small business	• Small business, Government workers, Factory worker
Cooking Device & Fuel	• Traditional Stove (three stone, Traditional Lao Stove) • Fuel: Firewood	• Traditional Lao stove, Modern Fuel Stove, New Lao Stove • Fuel: Firewood, LPG or natural gas, Charcoal
Cooking Location	• Both indoors and outdoors is common	
Cooking Frequency	• Three meals per day (five types of food on average)	• Three meals per day (six types of food on average)
IAP Exposure	• High when cooking indoors	
IAP Awareness	• Low : villagers are used to it and are only aware of the short term effects	
Deforestation Impact	• Medium – Most of the time, Firewood is just collected (waste and residues)	• Medium – Firewood and charcoal are bought from shops
Barriers to Switch	• Availability of alternative stoves and fuels • Affordability	
Willingness to Pay	• Medium if expectations are met	
Purchase Drivers	• Convenience (easy to use, meets user needs) • Durability • Price	

Customer Segmentation Summary

Consumer Assessment

Peri-urban users seem to be the easiest segment to target, with a clear demand for improved cookstoves and good accessibility. However, reaching the rural segment will require more effort in promotion and retailing in particular, but is a larger market in terms of size and use of biomass fuel.

Customer Segment Characteristics



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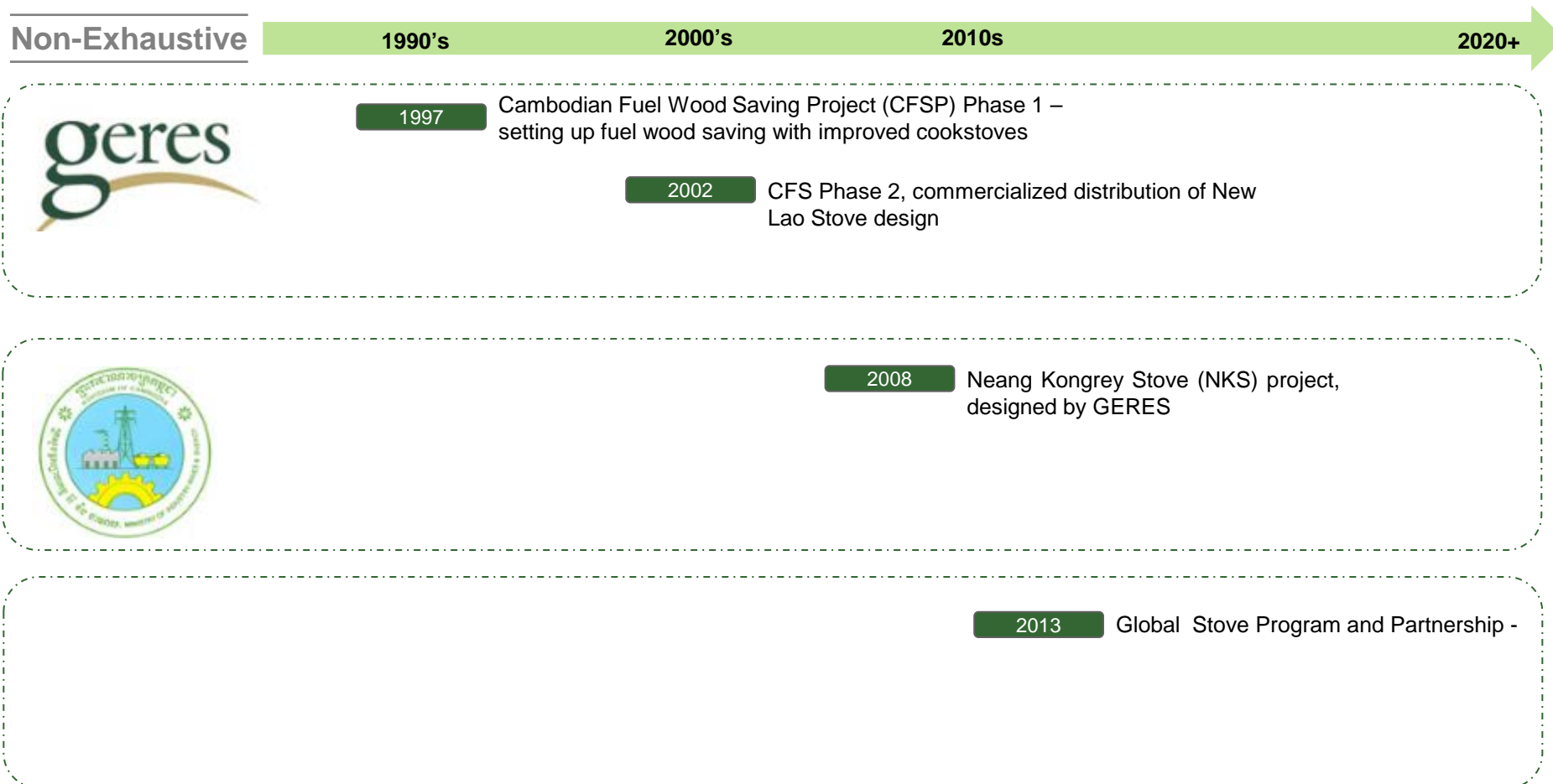
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History of Cookstoves in Cambodia

Cookstove Industry

Cookstove initiatives in Cambodia have taken place since the late 1990s. The main projects are lead by GERES Cambodia.



There is no legal framework related to energy efficiency or household energy policies; just a number of related laws on electricity, standards, etc.

Main Actors

- Ministry of Industry, Mines and Energy (MIME)
- The Electricity Authority of Cambodia (EAC)
- Electricite du Cambodge (EDC)
- National Standard Council (NSC)
- National Strategic Development Plan 2009-2013 (RGC)

Main Challenges

- No specific policies or strategies
- Lack of coordination between stakeholders
- Lack of specific regulations and laws
- Lack of public funding support
- Insufficient information on renewable energy potential for provincial level

Objectives for Future Actions*

- Prioritize planned actions to develop the policy, legal and regulatory framework for the energy sector and encourage the use of efficient energies with minimal impact on environment.

Case A :



Cookstove Industry

Key Project Elements

- **Organization:** GERES (Project Developer), Wood Energy Network of Cambodia (Partner), Development of Appropriate Technology (Partner)
- **Approach:** ICS (New Lao Stove) dissemination through value chain development
- **Provinces:** Siem Reap, Phnom Penh, Prey Veng, Takeo, Kandal, Kampong Speu, Battambang, Kampong Cham, and Kampong Chhnang
- **Stove & Fuel:** NLS - designed for charcoal
- **Price:** \$3.50-\$5.00
- **Funding:** European Union, Verified Carbon Units
- **Stoves Sold:** 2,000,000 (by Dec 2012)
- **Number of Producers:** 42 NLS producers

Achievements

- ✓ Increasing unit numbers sold every year
- ✓ Producers making successful business
- ✓ Promotional campaign success
- ✓ Regular quality control
- ✓ Creation of ICOPRODAC (Improved Cookstove Producers and Distributors Association of Cambodia)

Challenges

- Scaling up production while guarantying quality
- Convincing producers to only produce NLS
- Establishing national industrial standards



Case B :

geres



Cookstove Industry

Key Project Elements

- **Organization:** GERES, General Department of Energy (MIME)
- **Approach:** ICS (Neang Kongrey Stove)
- **Region:** Kampong Chhnang
- **Stove & Fuel:** NKS, wood and charcoal
- **Price:** \$1.50
- **Funding:** World Bank
- **Stoves Produced:** 8,000 stoves per month
- **Number of producers:** 5 production sites



Achievements

- ✓ Number of sold units increases every year
- ✓ Created jobs for men and women who can earn around \$2.5 a day
- ✓ Flexibility for female workers to work at home
- ✓ Affordability and popularity

Challenges

- Scaling up production while guarantying quality
- Establishing national industrial standards
- Expanding production centers to other provinces



Current Technology Landscape

These three types of traditional stove are the most commonly used in Cambodia (both by rural and peri-urban households).

3 Stone Stove



- Simple to build without consideration of aesthetics.
- Easy to use.
- Low energy yield and a risk spreading fires.

- Use
- Availability

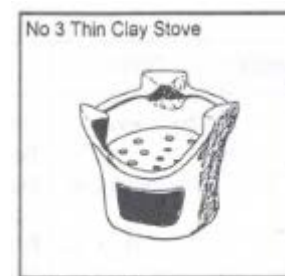
Traditional Lao Stove (TLS)



- One of the most commonly used stoves. This stove is made of clay and has metal for external protection.
- More efficient than tripods, but still very inefficient relative to ICS standards.
- Affordable - \$2 per stove

- Use
- Availability

Lao Kampong Chhnang Stove



- Traditional Cambodian stove made of clay.
- Offers 23 percent efficiency.
- Affordable - \$0.50

- Use
- Availability

Key | Minimal Low Medium Medium-High High

Illustrations of Current Technology landscape



Cookstove Industry

These three types of improved cookstove are the most commonly used in Cambodia, mostly in peri-urban areas. Different versions can also be found, with varying sizes and additional features.

New Lao Stove (NLS)





- It permits better air circulation and combustion.
- Consumes 22% less fuel than Traditional Lao Stoves.
- Made of heat resistant materials which ensures longevity.

- Use 
- Availability 

Neang Kongrey Stove (NKS)



- Simple ceramic stove that sells for less than NLS.
- It has 30% efficiency and can save up to 22% more biomass as compared to traditional stoves.
- More affordable than NLS.

- Use 
- Availability 

Gas Cooker



- Most commonly used in urban / peri-urban households and burns LPG.
- Some of these stoves can be found in rural areas working on small and rechargeable LPG bottles.

- Use 
- Availability 

Key |  Minimal  Low  Medium  Medium-High  High

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Market Attractiveness

Carbon Financing

The GERES-Cambodia New Lao Stove (NLS) has accessed carbon finance since 2007 through the voluntary market, disseminating over 2 million stoves from 2003-2012. No CDM projects have been registered.

	Designated National Authority (DNA) & Programs of Activities (PoA)	Stove & Program Accreditation	Carbon Baseline	Country Classification	Scale of Program	Monitoring & Evaluation
Best Case	Pre-existing DNA & related PoA	Pre-existing CDM-accredited stove program in country	Previous cookstove projects to leverage for baselining	Least Developed Country	Estimated income will significantly outweigh costs of registration & monitoring	Approved cookstove monitoring methodology in use in country
	Pre-existing DNA; No PoA	Pre-existing GS-accredited stove program in country	Similar projects (e.g. Biomass) to use as proxy for baselining	Advanced developing country	Unclear business case for carbon financing activities	Approved monitoring methodology in use in country
	Clear organizational candidate for role of DNA					Clear monitoring partnership opportunities and capabilities
Worst Case	No clear candidate or competing agencies	No accredited stoves or stove programs in country	No previous projects to use as reference	Developed Country	Costs of registration & monitoring will likely outweigh income generated by carbon credits	Lack of monitoring capabilities or partnership opportunities

- Implications -

The mechanisms for carbon financing are available and tested. However, due to the success of the NLS, the baseline stove efficiency has increased, making the benefit of carbon finance less certain for future stove programs.

Legend: Cambodia

Carbon Finance Programs

Carbon Financing

Two clean cooking programs in Cambodia have accessed carbon finance, both through the voluntary carbon market.

GERES – Cambodia New Lao Stove Program (NLS)

National Biodigester Programme (NBP)

Description

- Artisanal production of improved biomass cookstove designed after the “Thai Bucket” stove
- Stove saves 22% of wood and charcoal compared to traditional stoves

- Dissemination of domestic biodigesters as a sustainable energy source
- Household biodigesters produce renewable energy to replace reliance on wood for cooking and kerosene for lighting

Participants

- GERES – Cambodia
- General Department of Energy, Ministry of Industry, Mines & Energy (MIME)

- Ministry of Agriculture, Forestry and Fisheries (MAFF)
- SNV Cambodia

Progress

- 1st issuance in 2007
- More than 2 million stoves sold from 2003 – 2012
- Issued 1,464,625 VCUs from period from 2003 to 2011

- Gold Standard Registration 2011
- Issued credits in 2011 and 2012

- Implications -

Though there is a precedent for carbon financing, it has made the market wary of the benefits of carbon financing for cookstoves in the long run, as the New Lao Stove has increased the baseline efficiency for household stoves.

Example Colombia Carbon Financing Organizations (1/2)

Carbon Financing

Several organizations have experience developing carbon projects and/or offer carbon finance services in Cambodia.



- A non-profit association set up in 1976 following the first oil crisis, GERES carries out innovative sustainable development projects in France and eight African and Asian countries
- GERES – Cambodia introduced and implemented the New Lao Stove improved cook stove program
- Extensive experience with carbon market, having accessed carbon finance through the Verified Carbon Standard
- Involved heavily in research and design of efficient cookstoves
- Has a stove testing laboratory

Mekong Carbon Co., LTD.

- Mekong Carbon Co., LTD. provides a range of carbon finance and carbon project development services
- Founded in 2011
- Recent projects include:
 - Feasibility study project on renewable energy (wood and grasses) in Cambodia
 - Assessment of power consumption in Cambodia
 - MRV system for biogas production under Japan's Bilateral Carbon Offset Scheme
 - MRV system for biogas production
 - Rice husk gasification



- A cooperative of development organizations that support vulnerable communities by scaling up successful climate-friendly projects
- Members share expertise and services, access technical assistance and international funding opportunities such as carbon finance
- Nexus members benefit from economies of scale, reduced risks, and a strong voice in the global community
- Nexus has experience with carbon asset and technical assistance experience on carbon projects in Cambodia, including the NLS program and a ceramic water purifier program

Overall Carbon Finance Feasibility

Carbon Financing

Cambodia's success in promoting improved biomass cookstoves through carbon financing has increased the baseline of stove efficiencies and therefore may affect the ability of future stove programs to access carbon finance.

- Supportive Market Criteria -

Existing Designated National Authority: Ministry of Environment

Well-developed stove markets

There are multiple, competitive carbon financing organizations to implement the work

Carbon market is now better known across the country, with increasing carbon finance capacity

- Potential Risks-

The carbon market is still very new within local and national government

Difficult to prove additionality for programs due to developed market

Existing carbon finance cookstove projects have penetrated the Cambodian market, thereby increasing baseline stove efficiencies in urban areas

Monitoring of decentralized projects raises the transaction costs of carbon finance, and makes stoves with small increases in efficiency unattractive in the long term

Opportunities

- Cambodia is an LDC country, and therefore all standards are eligible. Currently there are no cookstove projects registered with the CDM.
- Well-established prior carbon finance programs; extensive baseline and monitoring data available
- High availability of resources and information on carbon markets.
- GERES New Lao Stove has high penetration in urban areas, but penetration in rural areas is lower, providing an opportunity for a rural-focused stove program to access carbon finance

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Cambodia is an agricultural country where wood fuel is cheap and widely used. There is a clear market for ICS, with large growth potential. In addition, basic cookstove production and distribution capacities are already in place.

Macro	Social Impact	Consumer	Cookstove Industry	Carbon Finance
<ul style="list-style-type: none">+ Increased attention on environmental issues by the government+ Deforestation is a major issue+ Government bodies are addressing the problems, but require increased capacity.+ Homogenous population, geography and cooking styles.- Limited infrastructure (6% paved roads)- Large availability of wood for fuel	<ul style="list-style-type: none">+ Health impacts of IAP are very serious, as around 90% of the population cooks with biomass fuels+ Benefits to women's participation in stove production are already validated+ Women and children are particularly exposed to IAP- In rural areas, wood fuel for cooking is collected on the ground and does not directly contribute to deforestation	<ul style="list-style-type: none">+ Willingness to pay for ICS in urban/peri-urban areas, and some rural areas+ Existing demand for more durable and efficient stoves+ Long habit of cooking with biomass fuels- Little IAP awareness- Use of three stone stoves is still common	<ul style="list-style-type: none">+ High clay stove production+ Existing network of clay cookstove producers and distributors- Limited previous programs on ICS	<ul style="list-style-type: none">+ Experienced carbon finance service providers available- Limited carbon financing precedent for ICS globally.- Previous projects (NLS) may have increased the baseline for new ICS.
Favorable	Favorable	Favorable	Moderately favorable	Moderately Favorable

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