

A young boy with short dark hair, wearing a purple t-shirt and blue jeans, is sitting in a field of cut wood. He is looking off to the side with a thoughtful expression, resting his chin on his hand. The background is filled with piles of cut logs and branches, suggesting a logging or wood processing site. The scene is outdoors with some greenery in the distance.

# Global Alliance for Clean Cookstoves

## Haiti—Cookstoves and Fuels Market Assessment

### Preliminary Report

# Introduction

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- The “Haiti Cookstoves and Fuels Market Assessment” was conducted by the Global Alliance for Clean Cookstoves (“the Alliance”) based on consultations with cookstoves and fuels manufacturers and distributors, NGOs, government representatives, academics, donors, and other in-country stakeholders. The work was supported by Global Affairs Canada, for whom the Alliance is designing a comprehensive strategy and action plan for catalyzing the clean cookstoves and fuels market in Haiti.
- The Alliance has completed market assessments on the cookstoves and fuel sector in 23 countries. These assessments have:
  - Enhanced sector market intelligence and knowledge;
  - Contributed to country and region prioritization for the Alliance;
  - Supported stakeholders in developing country action plans for clean cooking.
- This document is meant to provide a snapshot of the cookstoves sector in Haiti in terms of supply, demand, and the enabling environment, and begins to highlight emerging opportunities and challenges. It can and should be used in conjunction with a number of research papers, consumer surveys, and other sources to enhance the sector’s understanding of the market. It builds on the previous research and work of many organizations, including the Government of Haiti’s Bureau of Mines and Energy, Ministry of Environment, USAID, the World Bank, UNEP, and many others.
- In this first phase of market research, Alliance staff led the data collection and analysis on Haiti over a period of 3 months using a combination of literature review, dataset analysis, key informant interviews, and field visits throughout Haiti. The process was designed to build on and synthesize the research that has already been conducted in the sector (see bibliography).

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## Executive Summary (1/3)

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**Improved cookstoves entered the market in the 1980s with the Recho Mirak charcoal stove.** The introduction of the Recho Mirak was initially successful, however the project faced resource constraints and was plagued by counterfeiting. Despite several subsequent efforts to revive the Recho Mirak over the years, stove production remains largely artisanal. Repeated natural disasters lead to short-term influxes of ICS during times of crisis, but did not lead to sustainable market development.

**Solid fuels remain a critical part of the energy formula for almost all households.** 93% of households (equivalent to ~2.2 million households) use wood or charcoal as their primary source of cooking fuel. More than 80% of urban households use charcoal as their primary cooking fuel, compared to only 24% of rural households. Firewood use shows similar differences between urban and rural consumers – 72% of rural households use wood as their primary cooking fuel, versus only 7.1% of urban households. Only 3% of total households (6.2% of urban households) use LPG, natural gas, or biogas. Less than 1% cook with electricity, kerosene, or other improved fuel sources (DHS, 2012).

**The importance of the charcoal value chain is a distinguishing feature of the Haitian market.** Charcoal production is a significant source of income for rural households, women vendors, and those who transport the charcoal to urban markets. Initiatives that encourage fuel switching need to consider the potential negative consequences for this value chain.

**Historically, many have considered Haiti to be a hotspot for the use of non-renewable biomass and attributed deforestation and degradation to woodfuel harvesting for cooking fuel.** Globally, the fraction of non-renewable biomass (fNRB) is 27-34%. While there is significant debate about the fNRB in Haiti, a research analysis (2016) by Stockholm Environment Institute using the best available data determined the fNRB to be 9%. Further research, including more robust inputs, would deepen understanding of the link between the use of solid fuels and environmental degradation.



## Executive Summary (2/3)

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**The use of solid fuels and inefficient cookstoves has a significant impact on health outcomes and livelihoods, particularly for women.** Household air pollution (HAP) from cooking is the second leading risk factor for mortality in Haiti – the only greater risk factor for mortality in Haiti is high blood pressure (GBD, 2015). In 2015, over 8,000 deaths occur due to illness attributable to HAP from cooking with solid fuels. Women account for approximately 58% of these deaths, and 13% of HAP-attributable deaths are among children under 5 (IHME, 2015). In addition to health impacts, inefficient cookstoves and cooking practices result in a significant unpaid work burden for women.

**Based on the overall population, current cookstove ownership and fuel use patterns, and income segments, there is a clear market opportunity for cleaner and more efficient cookstoves and fuels – but there are substantial challenges to realizing that opportunity.** The overall market size in Haiti is 2.4 million households (HHs). As others have observed, urban charcoal purchasers are a critical segment to address – a market of over 1 million HHs. A slightly smaller and more challenging market would be rural firewood users who make up 42.7% of the market – the geographic spread of this population and their comparative poverty make this segment more challenging to reach than the urban consumers. A key challenge for all segments will be to ensure that improved cookstoves and fuels are affordable for the end-consumer (either by reducing the price point or by enhancing the availability of consumer financing).

## Executive Summary (3/3)

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**Clean cooking enterprises in the biomass space, both for-profit and non-profit, are small and early-stage, face significant business model challenges around supply chain, product demand/consumer behavior, ability to pay, etc.** The sector comprises a small number of low-profit/low-growth trajectory, highly risky enterprises. Due to the riskiness of investing in the sector, access to traditional capital remains a key challenge for all enterprises.

**Despite various projects over the past 30 years implemented by local and international organizations, governments, and the private sector, the Haitian market for clean cookstoves and fuels remains nascent.** Since the 1980s, there have been over 20 cookstoves and fuels projects and national strategies of various scope and scale. Though many plans and projects were well designed, a significant number were never implemented, and several terminated early due external factors. Yet, even when projects continued to the end of their timelines, the majority found that they had fallen short of projected impacts and expectations. The limited literature evaluating these projects and strategies in combination with key informant interviews identified three common barriers to realizing sustained impacts—**price, limited timeframes, and lack of institutions and regulation.**

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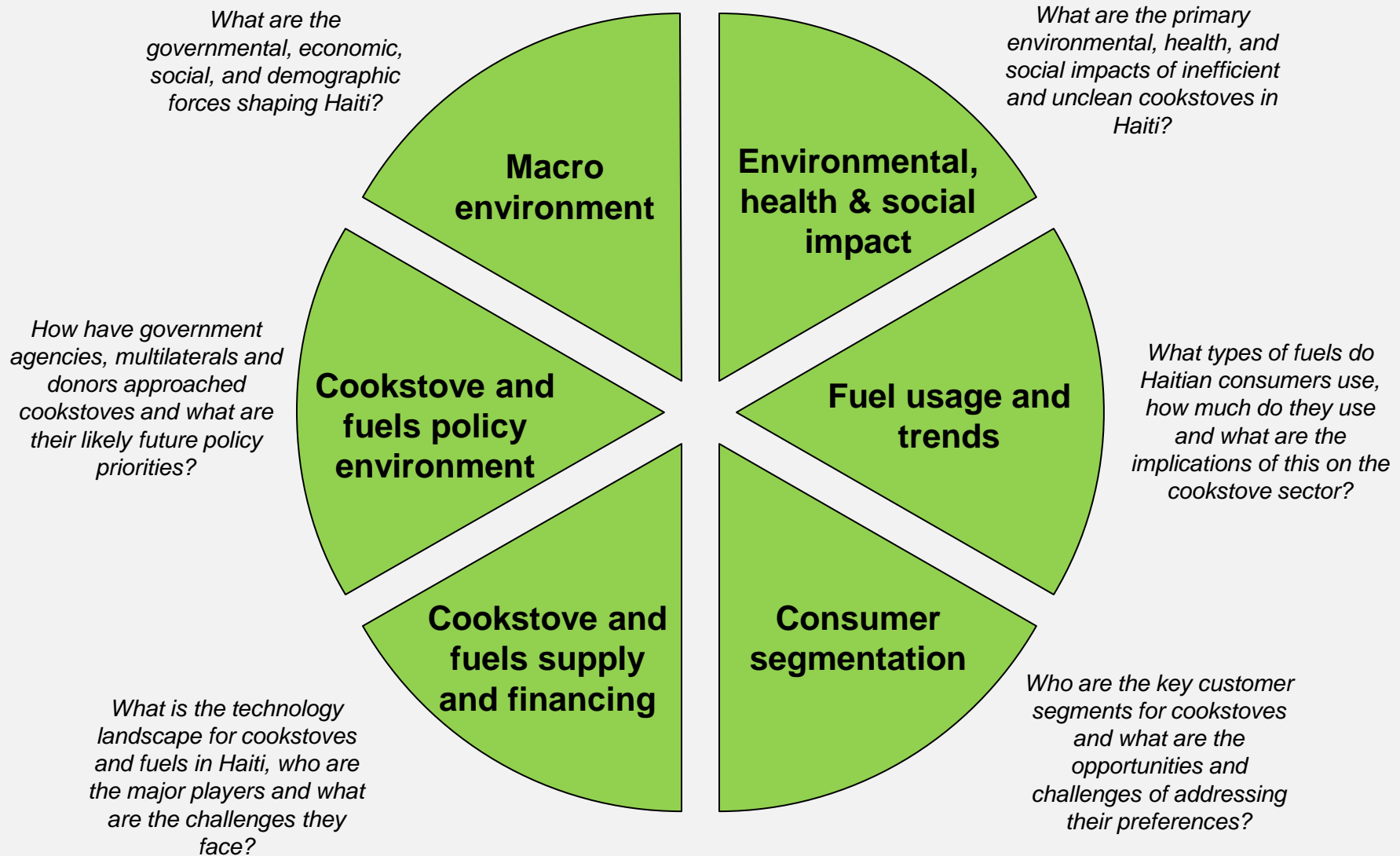
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## We conducted the assessment across six dimensions.





## We conducted a literature review of research and project assessments, interviewed key stakeholders, and conducted field visits throughout Haiti.

This market assessment was undertaken over the course of 3 months. It builds on existing work in the sector and seeks to consolidate findings.

### Key sources for this market assessment include:

- **Data** from a variety of surveys including information on household size, demographics, cookstove use, fuel use, and other indicators. Key sources included: the Global Burden of Diseases, Injuries (IHME); Risk Factors Study (GBD); Demographic and Health Surveys (DHS); and World Bank World Development Indicators.
- **Research** from academic papers, dissertations, and industry briefs.
- **Interviews with stakeholders** including local and international cookstoves and fuels manufacturers and distributors, government representatives, donors, energy/environment/agriculture academics, NGOs, and other key stakeholders.
- **Direct observation** of traditional charcoal production sites, clean cookstove and fuel manufacturing facilities, local markets, school kitchens, and bakeries throughout Port-au-Prince, Port Salut, Les Anglais, La Cawane, Gonaives, and Cap-Haitien.

### Some notes on the data and analysis:

- For a detailed understanding of the Haitian market and demographics, we relied on data from the 2013 Global Burden of Diseases, Injuries, and Risk Factors Study (GBD), the 2012 Haiti Demographic and Health Survey (DHS), and the 2014 World Bank World Development Indicators. We accept that there may be errors and variance in these data sets and this analysis can be updated with improved data if/when it comes available.
- In some analyses, totals may not add up exactly (i.e., percentages may not add up to exactly 100%) due to rounding.

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# After delayed elections, a new government took power in 2017 and each ministry received a roadmap to guide policy priorities under the new administration.

## Political structure

- *Haiti is a semi-presidential republic. The President is the head of the state and appoints the Prime Minister who is head of the government. There is a bicameral legislature of the Senate and the Chamber of Deputies.*
- *Presidential elections are held every five years; the last election was held on 25 November 2015, but a runoff election scheduled for 24 April 2016 was postponed.*

## Administrative structure

- **The country is divided into 10 departments (states): Artibonite, Centre, Grand'Anse, Nippes, Nord, Nord-Est, Nord-Ouest, Ouest, Sud, and Sud-Est.**
- **These 10 departments are further divided into 42 arrondissements (districts), which are further divided into 145 communes and 571 communal sections.**

## Current government

- After the October 2015 elections were overturned due to allegations of voter fraud, Jocelerme Privert served as interim president during 2016.
- The October 2016 elections were delayed due to Hurricane Matthew until November 2016 during which Jovenel Moise of the Tet Kale Party won the presidency with 55.6% of the vote.
- President Moise was a business man prior to taking office. He ran a banana export company and campaigned in part on a rural development platform.
- The new government was sworn in under the leadership of Prime Minister Jack Guy Lafontant in March 2017.

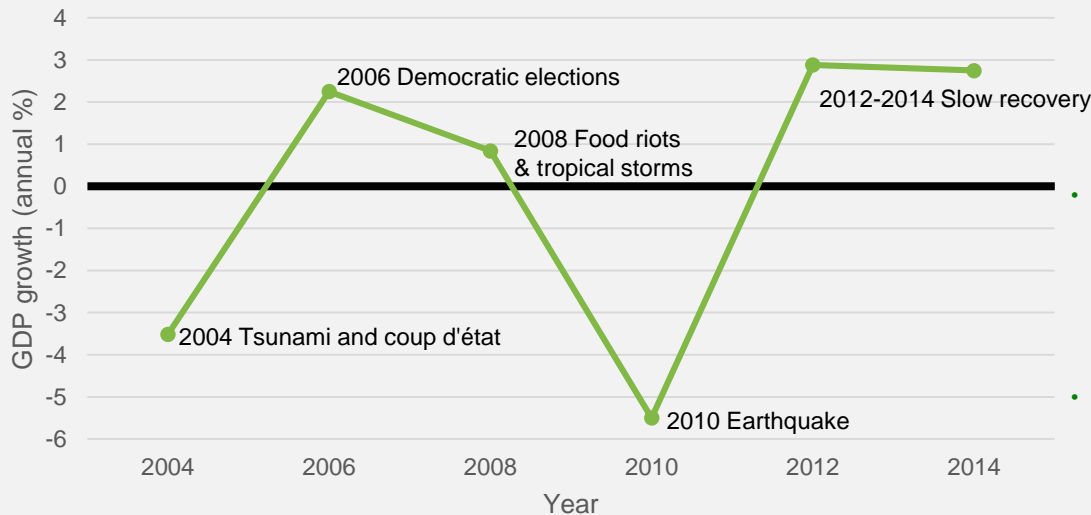
## Working with the government

- **Working with the government will be an important component of any nation-wide clean cookstove and fuel strategy. The strategy should seek to align with the new priorities of The Bureau of the Mines and Energy, the Ministry of Environment, the Ministry of Agriculture, and the Ministry of Women.**

# Haiti's growth has been erratic over the past decade, and has been impeded by natural disasters and political upheaval.

The GDP of Haiti is \$8.713 billion with a per capita GDP per capita of \$846 in 2014. Haiti ranks 168 out of 188 countries on the United Nations Human Development Index (HDI). More than 6 million out of 10.4 million (59%) Haitians live under the national poverty line of \$2.42 per day.

Haiti GDP growth rate (annual %), 2004-2014

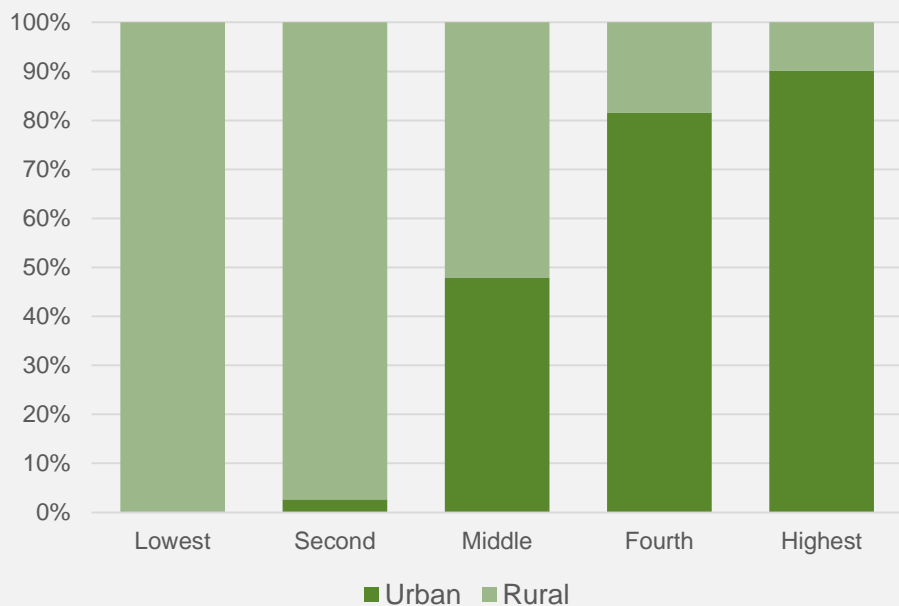


- After a 5.5% contraction in GDP in 2010 due to the earthquake, Haiti experienced from 2011 to 2015 a real growth rate averaging 3.4% and a per capita GDP growth of 2.0%, spurred in part by high levels of reconstruction aid and remittances.
- Overall economic activity last year only expanded by 1.7 percent, down from 2.8 percent the previous year. This expansion was supported by relatively strong growth in manufacturing and hospitality (growing at 3.5 percent and 5.0 percent, respectively), but was hampered by agriculture (contracting by 3.5 percent).
- Inflation has accelerated to 14.4%, mostly driven by higher local food prices following droughts. Large influxes of remittances can also drive inflation.

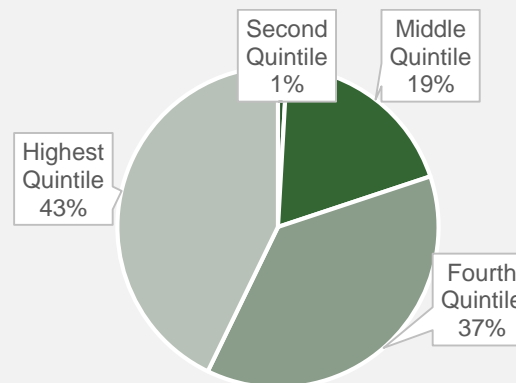
	2004	2006	2008	2010	2012	2014
<b>Growth rate:</b>	-3.5%	2.3%	0.8%	-5.5%	2.9%	2.7%

# Wealth Quintiles and Residence

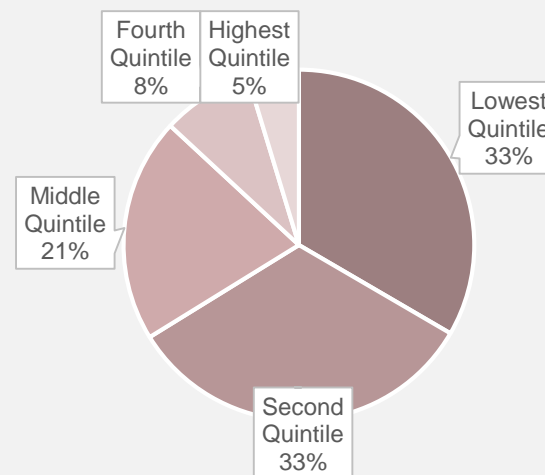
## Wealth Quintiles by Urban/Rural Residence



## Wealth Quintile Breakdown in Urban Areas



## Wealth Quintile Breakdown in Rural Areas

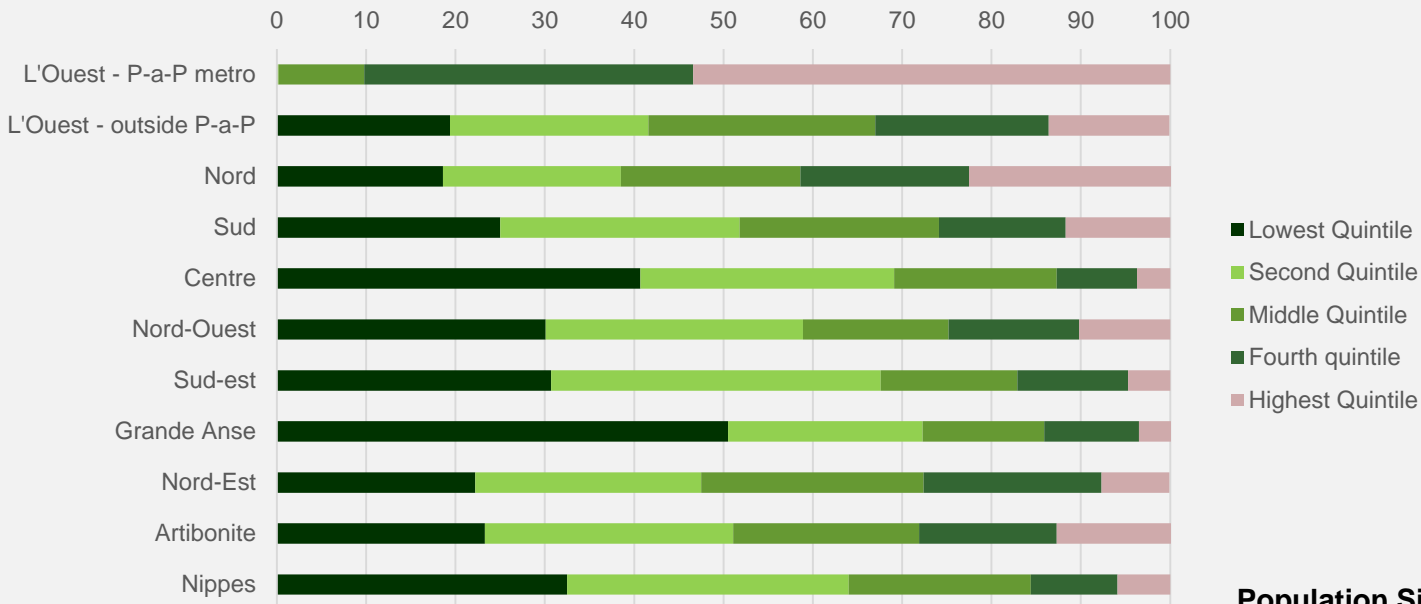


**The Haiti DHS 2012 data shows that, in general, poorer families live in rural areas while wealthier families live in urban areas.**

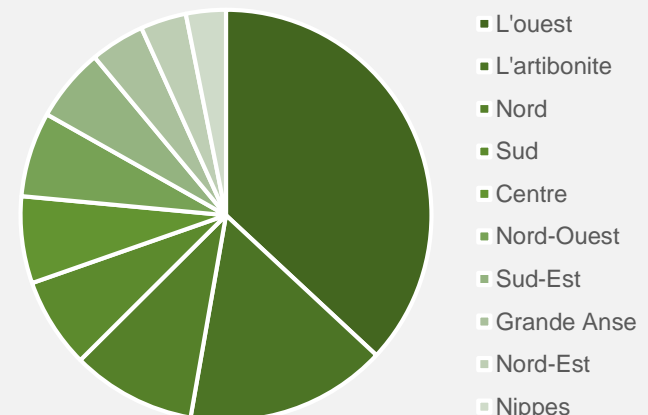
*Note: Some irregularities were found with these data when further analysis was conducted. While the specific statistics presented may be somewhat flawed or outdated, we believe that the general trends shown on this slide hold true.*

# Wealth Quintiles and Administrative Districts

## Wealth Quintiles in Administrative Districts



## Population Size of Administrative Districts





# Financial Sector Overview

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## Formal banking sector

The commercial banking sector provides formal credit to only about 1% of the Haitian population (approx. 90,000 people). Haiti's central bank, the Banque de la République d'Haïti, oversees nine commercial banks and two foreign banks operating in the country (see Annex F). Most banking takes place in the capital city of Port-au-Prince. For large scale importers, manufacturers, and distributors of LPG, financing from local banks and private investors is available and financing is not a major constraint, but it is a limiting factor for small businesses.

## Microfinance institutions (MFIs)

There are five active Microfinance Institutions (MFIs) in Haiti (ACME, FINCA-HTI, Fonkoze, MCN, SOGESOL) that in 2009 reported 96,315 borrowers and 155,517 savers, with savings totaling US\$11.8 million and credit totaling US\$50 million. The average loan per borrower was about US\$500.

## Credit cooperatives

There are over 220 credit cooperatives in Haiti, which in 2009 served more than 340,000 Haitians, with savings totaling US\$36.1 million and credit totaling US\$35.5 million.

## Remittances

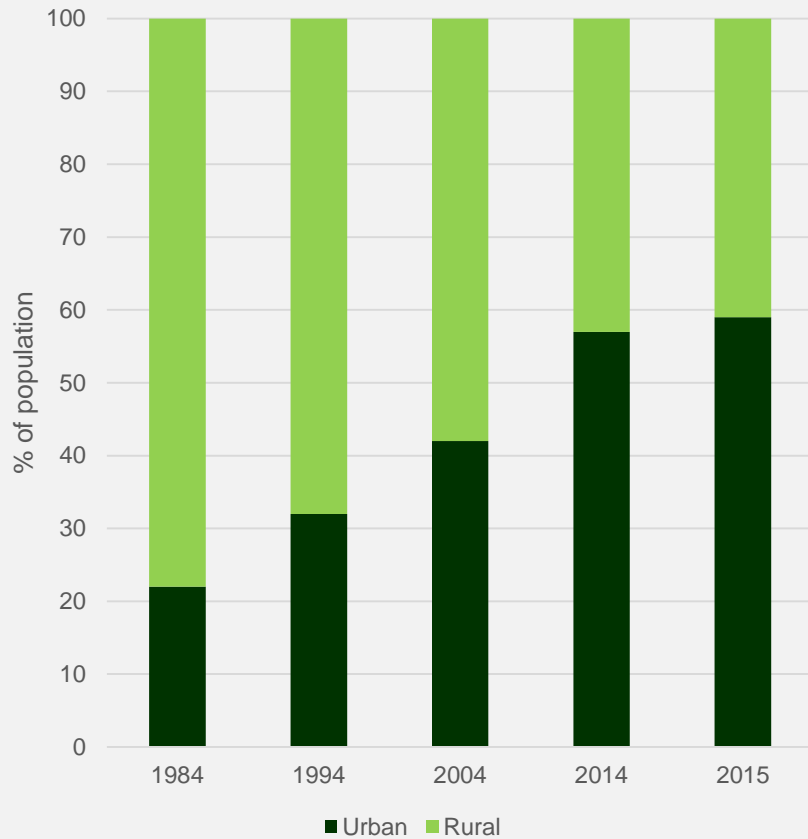
Remittances from the Haitian diaspora (approximately 1 million people) make up about 20% of Haitian GDP and are an important source of finance. In 2014, Haitians received almost \$2 billion in remittances.

## Mobile money

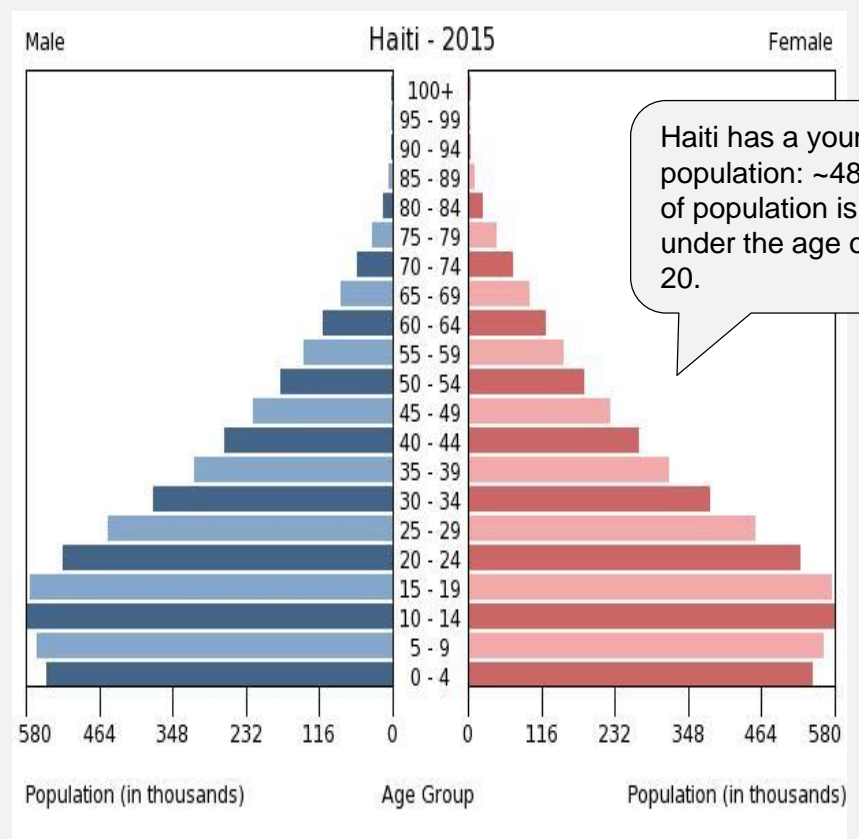
As of 2015, only about 60,000 Haitians held mobile money accounts.

# Haiti's population is predominantly urban and young.

**Rural vs. urban population breakdown, 1984-2015**  
(% of population)



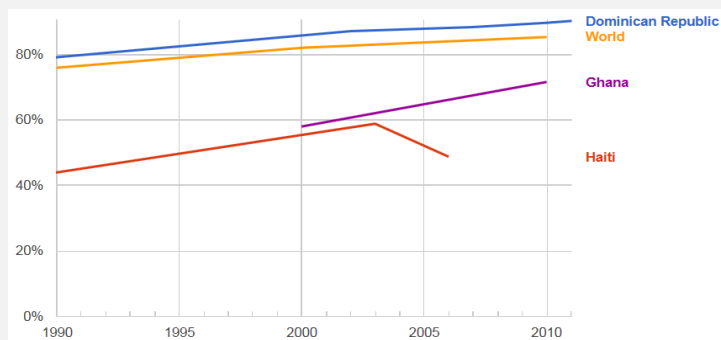
**Haiti's Population: Breakdown by Age, 2015**  
(% in each age category)



# While literacy rates are improving, a lack of education infrastructure continues to hamper Haiti's growth trajectory.

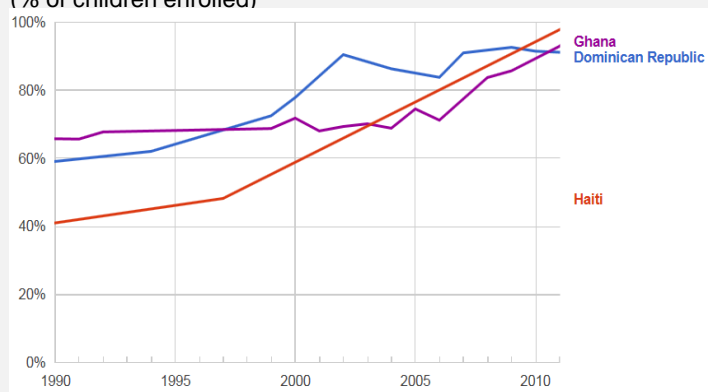
Although it has comparably low levels of literacy, Haiti is making an effort to educate its younger generations...

Literacy rate (Age 15+)



## Primary school completion

(% of children enrolled)



...however, the infrastructure to support the change is inadequate

Pupil teacher ratio in primary schools - 2014

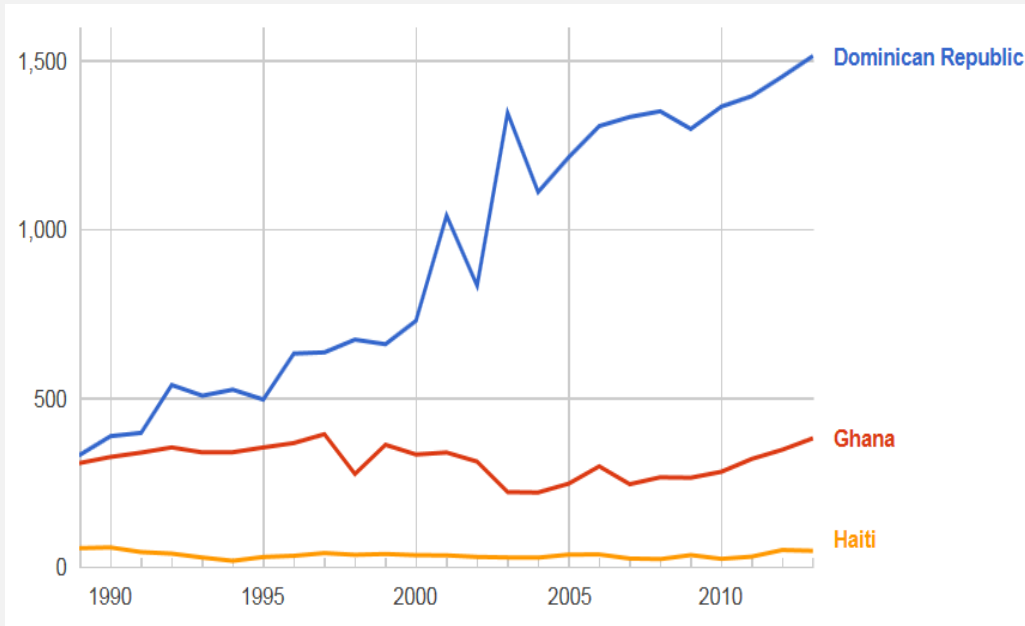


- **Lack of public schools:** 90% of Haiti's schools are private, and parents spend on average \$130 every year to enroll their children.
- **Lack of trained teachers:** Less than 40% of teachers have gone through a training program.
- **Lack of basic infrastructure:** Nearly 60% of Haiti's schools have no toilets and more than three-quarters lack access to water.

# Haiti is largely reliant on fossil fuels for electricity generation. Reliable access is a challenge, and household use remains low.

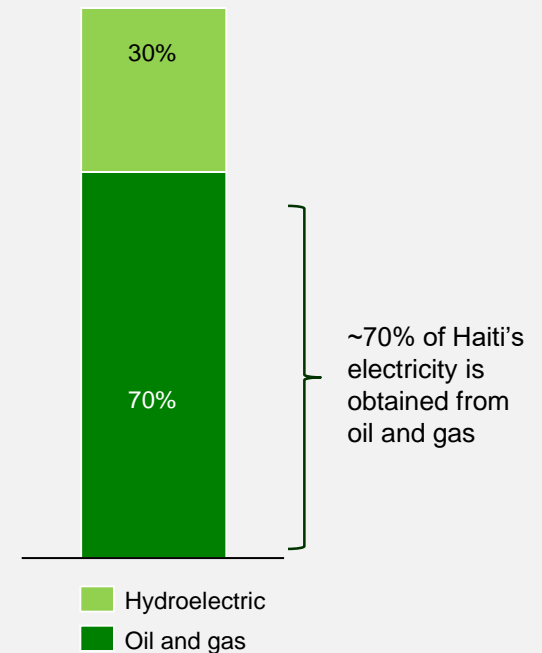
## Electricity consumption per capita

(Electricity consumption in kilowatt-hours per capita)



## Source of electricity

(% of Megawatts)

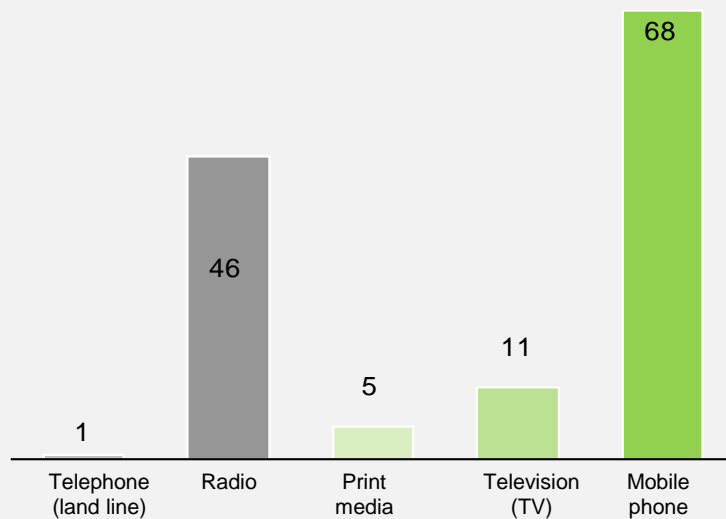


**Access to electricity is non-existent for the majority of Haitian households.**

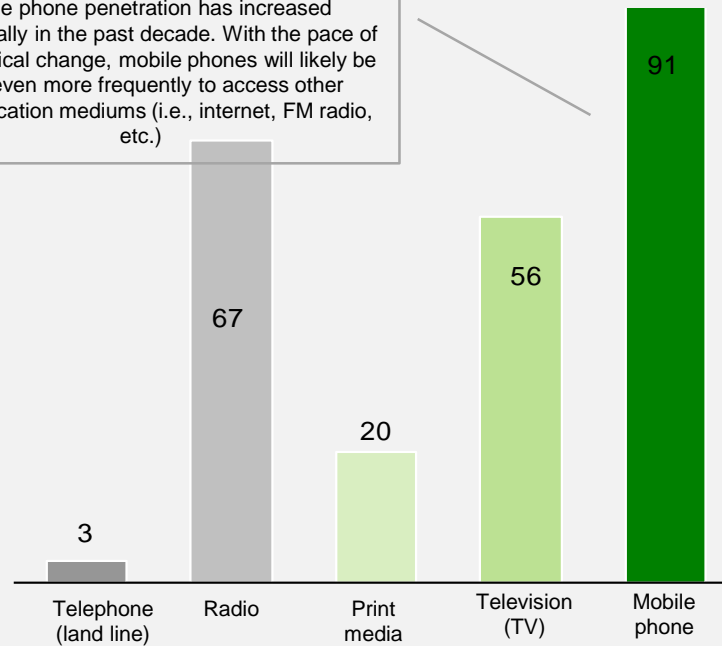
**Haiti relies heavily on fossil fuels as its main source of electricity.**

# Haiti's communications infrastructure relies primarily on mobile phones, radio, and television.

**Access to mass communication modes - Rural**  
(% of households)



**Access to mass communication modes - Urban**  
(% of households)



Mobile phone penetration has increased exponentially in the past decade. With the pace of technological change, mobile phones will likely be used even more frequently to access other communication mediums (i.e., internet, FM radio, etc.)

# Haiti's transportation infrastructure is extremely limited – it ranks 156<sup>th</sup> out of 223 countries.

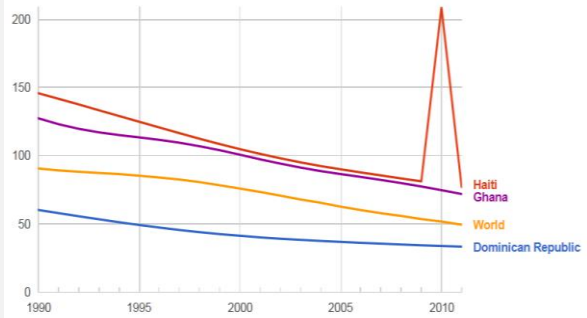
	Roadways	Railways	Waterways	Airways
Current situation	<ul style="list-style-type: none"><li>• Only 18% of Haiti's roads are paved (768 km of paved roads, out of 4,266km of roads total). In comparison, the Dominican Republic has 9,833km of paved roads.</li></ul>	<ul style="list-style-type: none"><li>• There are no functioning railways in Haiti. The Dominican Republic has 496km of railways.</li></ul>	<ul style="list-style-type: none"><li>• Haiti has 4 main ports: Cap-Haitien, Gonaives, Jacmel, and Port-au-Prince. This is comparable to 5 in the Dominican Republic.</li></ul>	<ul style="list-style-type: none"><li>• Haiti has 4 airports with paved runways. In contrast, the Dominican Republic has 16.</li></ul>
Government and donor priorities	<p><b>The Inter-American Development Bank (IDB) approved a \$27 million grant in May 2015 to help modernize and improve the management of Haiti's roads and ports, in cooperation with the Ministry of Economics and Finance. The project was projected to be complete by the end of 2016.</b></p>			



# The overall health landscape in Haiti lags when compared to other developing countries, but it is a key priority in national policy.

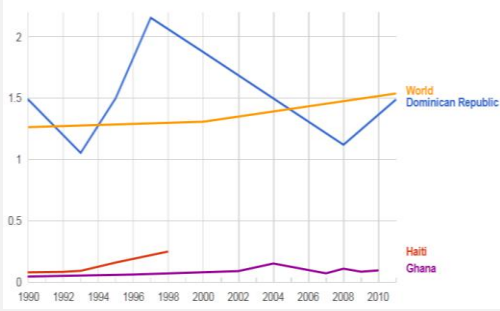
While improving, key health indicators in Haiti are lower than other developing countries...

**Mortality rate – under age 5**  
(per 1,000 live births)

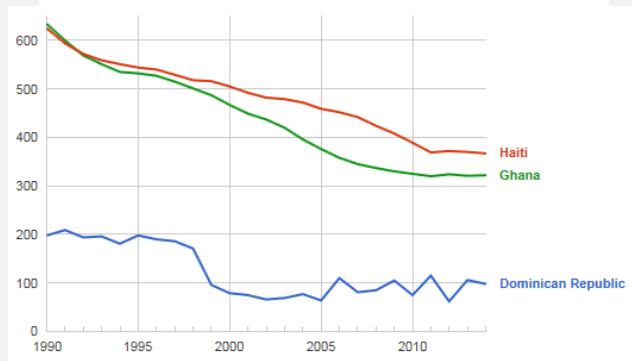


... and the infrastructure required to address these issues remains inadequate

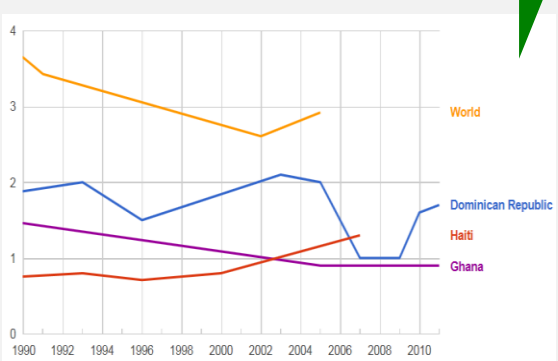
**Physicians**  
(per 1,000 people)



**Maternal mortality ratio**  
(per 100,000 live births)

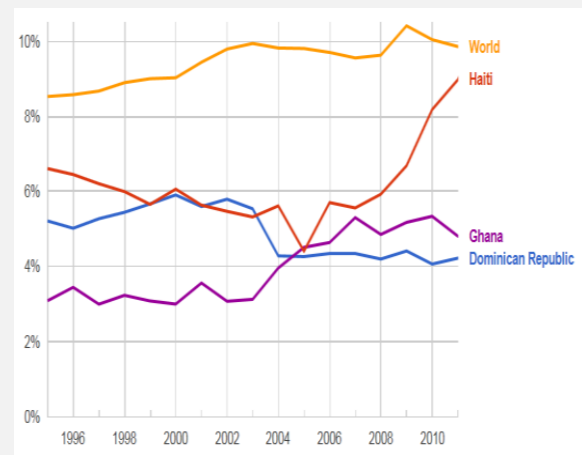


**Hospital beds**  
(per 1,000 people)



The government has made health a national priority area.

**Public health expenditure**  
(% of total GDP)



# Women have significant decision-making ability at the household level, but are less represented in political and managerial spheres.

Women manage 40% of the country's households and around 50% of Haitian women engage in economic activity outside the home to support their families. Additionally, more than 75% of the informal economy is comprised of women.

Gender equality statistics			
UNDP gender inequality index		142 out of 188 countries (2015 index)	
% of women in national government		3.5%	
Sex ratio		1.01 male per 1 female	
Maternal mortality ratio		630 deaths per 100,000 live births	
Adolescent fertility rate (births per 1,000 girls aged 15-19)		77 (rural); 53 (urban)	
		Male	Female
Literacy rate by age bracket (DHS, 2012)	15-19 years	82.9	86.2
	20-29 years	84.7	82.8
	30-39 years	77.3	65.7
	40-49 years	61.5	46.2

- The 2014 gender parity index (GPI) was 0.99 for primary school enrolment and 0.81 for tertiary enrolment.
- 17.5% of women are married by the age of 18.
- Female participation in labour force is 63.2% overall.

## Legal frameworks on gender

**YES** Law prohibits or invalidates child or early marriage

**YES** Law mandates paid or unpaid maternity leave

**YES** Mothers are guaranteed an equivalent position after maternity leave

**YES** Non-pregnant and non-nursing women can do the same jobs as men

**NO** Law mandates equal remuneration for females and males for work of equal value

**NO** Law mandates nondiscrimination based on gender in hiring

**NO** Legislation exists on domestic violence

## Gender-based violence

- 15% of women experienced domestic violence during 2012

# There is great diversity in food types, flavors and preparation styles, but there are several common cooking habits across the country.

## Food types

- The most important food in Haiti is rice (*diri*). Other important grains include corn, wheat, and millet (which the poorest families eat).
- Beans are another important component of the Haitian diet, and are consumed on a daily basis with rice as part of most families' main meal at noon.
- Poultry, especially chicken, is consumed more frequently than other types of meat.
- In some households, the noontime meal is the only one eaten by adults, given the lack of money to cook a meal for the entire family.
- While breakfast or supper need fairly short cooking time, the midday meal requires a longer cooking time, particularly in the case of mashed dry peas (*sos pwa*). Meals such as meat stew, braised vegetables and braised "leaves" with meat take a longer time to prepare.
- Regional variation is limited. Cashews are more prominently used in the North around Cap Haitien, and fish and seafood is more often eaten in the South near Jacmel and Jérémie.

## Cooking habits

- Most cooks are women and girls. Women and girls are responsible for the majority of cooking, which adds to their unpaid care work burden.
- Wealthy families often hire cooks, while others have *restaveks* (unpaid child servants that help cook).
- Most urban families cook seated with one-burner stoves called *rechos*, fuelled with small gas or propane tanks or charcoal (*charbon*). Rural households typically cook with firewood and a three-stone fire.
- The most used cooking techniques are boiling, frying, sautéing, and grilling.
- Cast aluminum rice pots (*chodye*) are used for cooking nearly every meal. The majority of households also use a narrow, thin bean pot (*bom*) which is used for cooking beans and heating water for bathing or boiling for water purification.
- Breakfast is typically eaten between 6:30am and 7:30am, and is consumed with sweetened coffee with milk. Food can include bread with peanut butter, cornmeal mush, oatmeal, spaghetti, or boiled plantains and eggs.
- Lunch is usually eaten around noon during the midday break that lasts several hours. It is usually rice and beans, with ham hocks, peas, or meat in a sauce if the family can afford it.
- Dinner is usually small. It consists of oatmeal, plantain puree, or boiled sweet potatoes with rice and beans.

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# Environmental and Climate Impacts

**Haiti has long been an archetype of woodfuel driven deforestation. However, recent analysis indicates that woodfuel harvesting is not a contributor.**

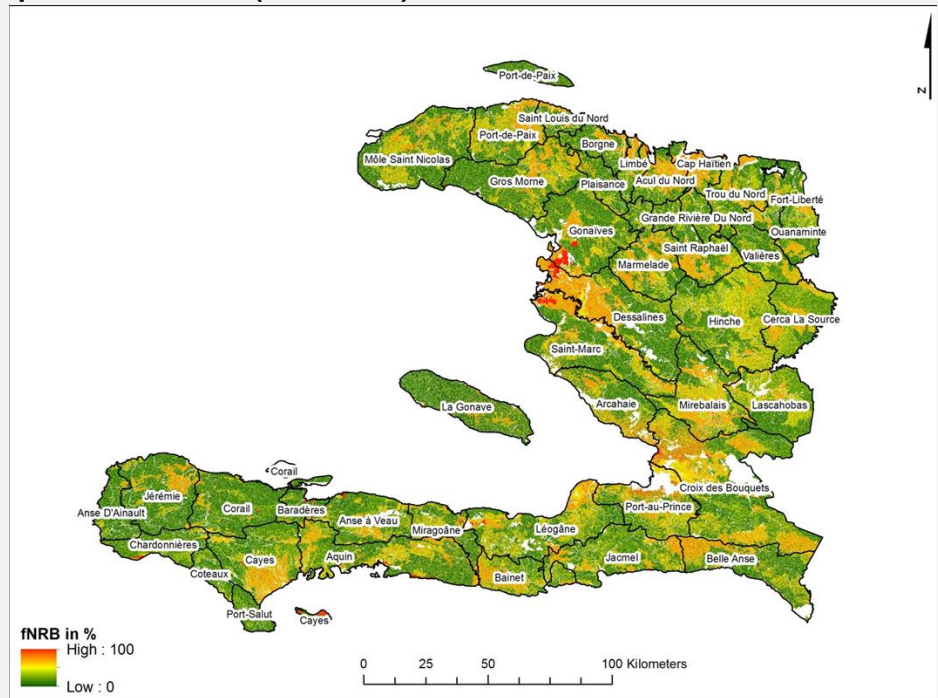
Clearing for agricultural production is considered the dominant driver of past deforestation in Haiti.

By examining higher resolution images that better capture the patchiness of Haiti's existing tree cover, Churches and colleagues find that forest cover in Haiti could exceed 30% (Churches, Wampler et al. 2014), and other analyses support these findings (Tarter, 2016).

Today, there is no indication that woodfuel harvesting contributes to deforestation. Despite the loss of much of the country's original forest cover, Haitians continue to meet their wood and charcoal demand. It is likely though, that in some areas woodfuel harvesting is contributing to forest degradation.

A recent analysis (2016) by Stockholm Environment Institute (SEI) supports this conclusion; they found that the fraction of non-renewable biomass is  $9\% \pm 3\%$ . However, the analysis also identified “hot-spot areas” where biomass sustainability is a major concern.

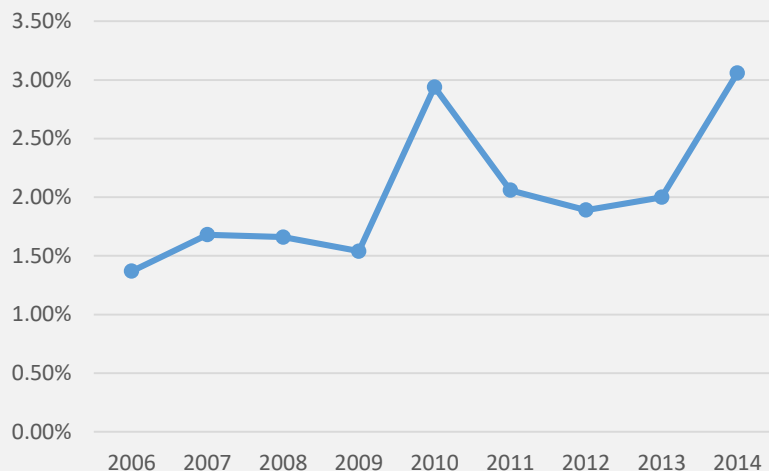
**Cumulative fNRB in the business as usual scenario for the simulation period 2003-2027 (Bailis et al)**



# Haiti's natural resources are being depleted and greenhouse gases / carbon emissions are increasing.

## Natural resources depletion

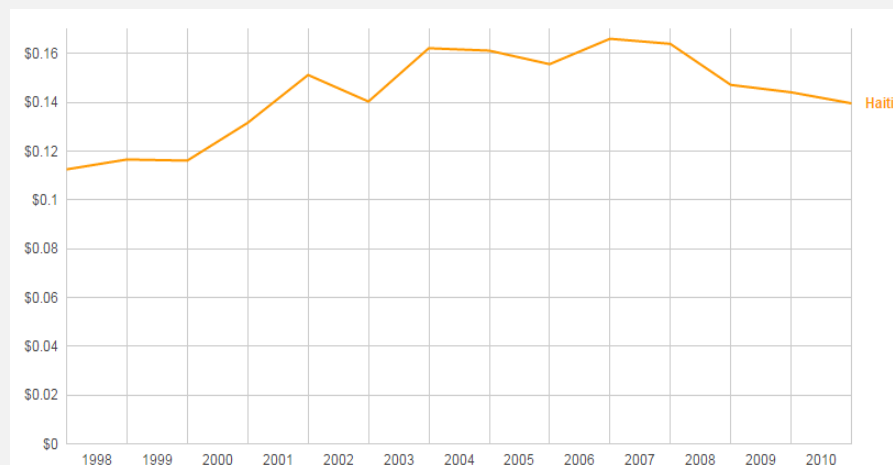
(the value of net forest depletion, energy depletion, and mineral depletion as a % of gross national income)



- Natural resource depletion is due in large part to heavy dependence on natural resources for domestic cooking fuel.

## Greenhouse gas emissions

(CO2 emissions - kg per PPP \$ of GDP)



- GHG emissions in Haiti have been steadily rising for the past decade.



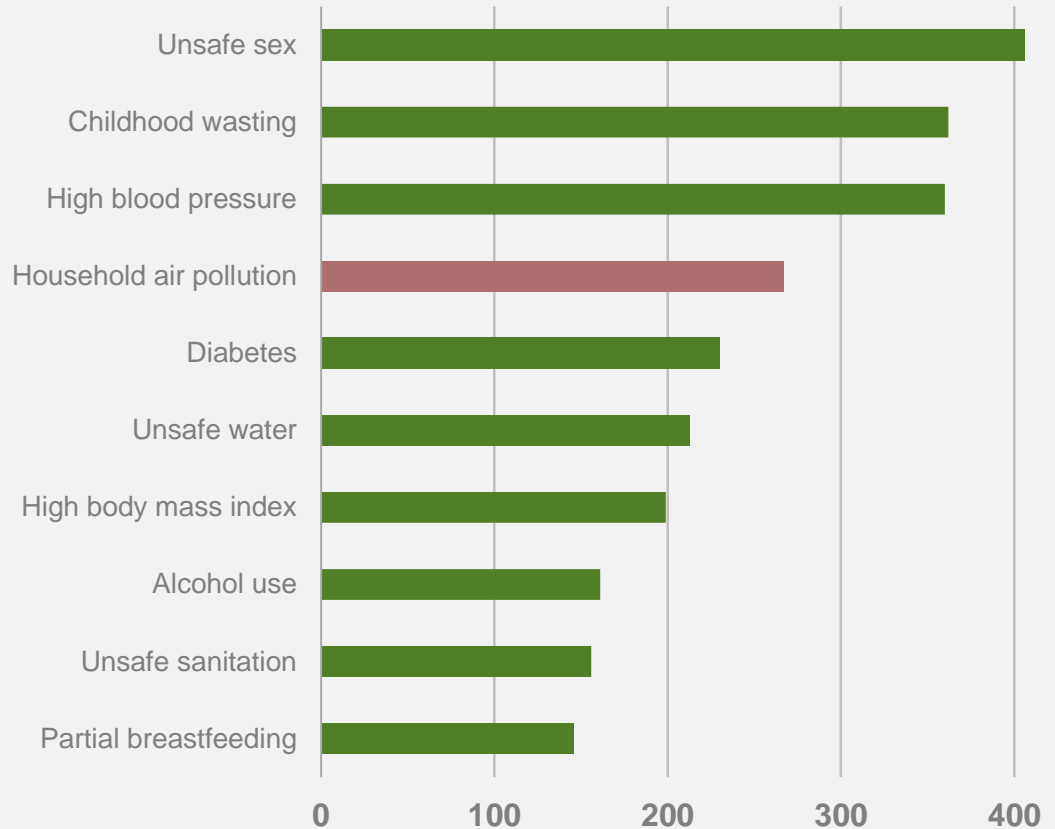
# Health Impacts

Household air pollution (HAP) is the 2<sup>nd</sup> highest risk factor for premature deaths in Haiti at over 8,000 deaths in 2015.

HAP is the 4th highest risk factor for combined morbidity and mortality measured in disability adjusted life years (DALYs).



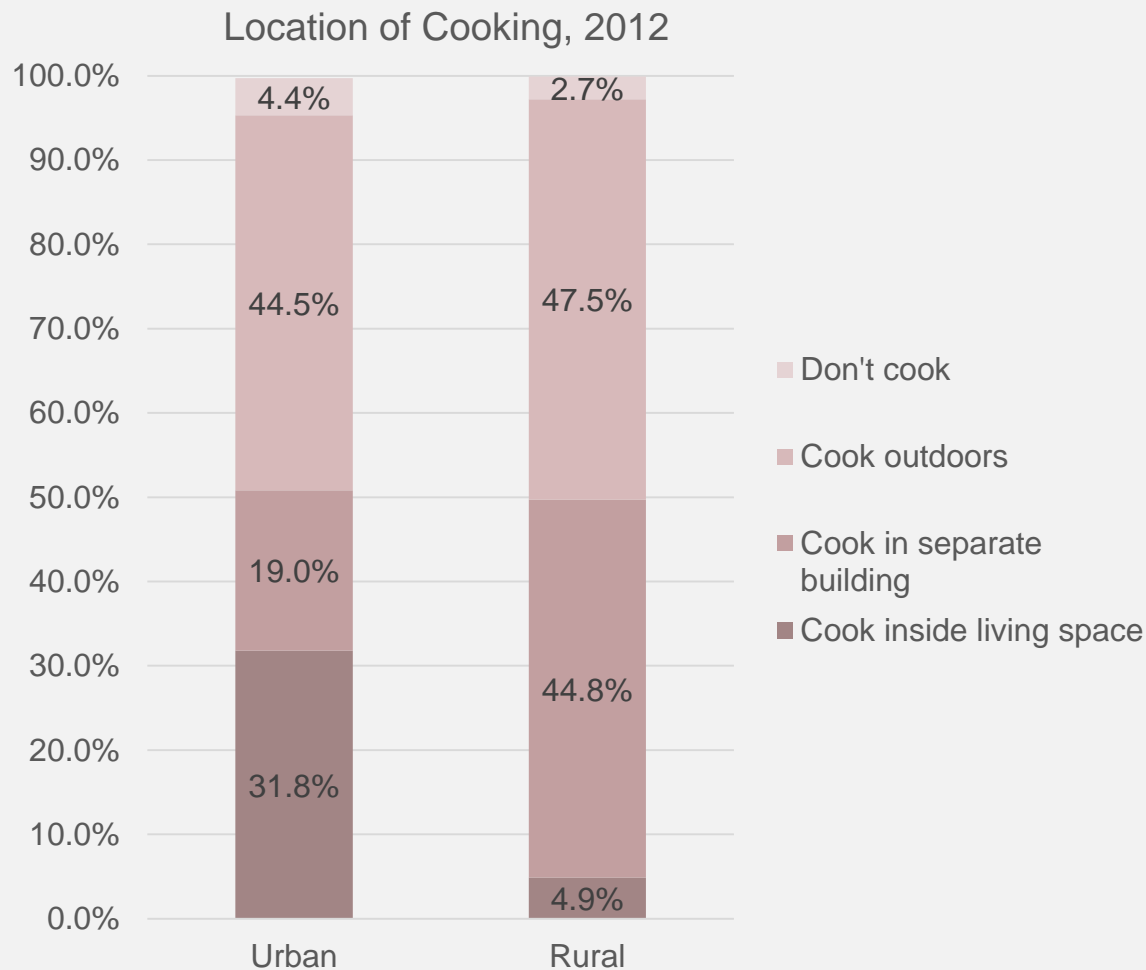
## LEADING DRIVERS OF DISEASE BURDEN IN HAITI



Disability Adjusted Life Years (DALYs '000)

**Household air pollution (HAP) from cooking with solid fuels is responsible for over 8,410 deaths each year in Haiti, 10 times the number of HAP related deaths in the Dominican Republic.**

# The health impacts from household air pollution are caused primarily by the burning of solid fuels in poorly ventilated conditions.



- *In both urban and rural areas, over 40 percent of households cook outdoors (weather permitting).*
- *Households in urban areas also frequently cook within the main living area, while households in rural areas are more likely to cook in a separate building.*
- *Living areas and separate kitchens both tend to be poorly ventilated, increasing the risk of inhaling smoke, gases, and particulates.*

# Gender and Women's Empowerment Impacts

## Impacts

### Cooking



- Women & children are more exposed to HAP than the rest of the household – for 3-7 hours cooking each day in Haiti.
- Burning solid fuels causes household air pollution (HAP) leading to acute lower respiratory infections, chronic obstructive pulmonary diseases, lung cancer, cataracts and other illnesses.
- Burns from open fires and unsafe cookstoves are another risk – globally more than 500,000 women suffer moderate to severe burns every year.

### Collection of fuels



- Regularly carrying heavy loads for long durations can expose women and children to head and spinal injuries and pregnancy complications.
- The amount of wood collected ranges from 6 to 35 lbs per day.

## Role of Women

Gender-informed approaches can be critical to scaling up use of clean cookstoves and fuels in Haiti because of the role women have in household and economic decision-making.

- Women manage 40% of the households
- 50% of women engage in economic activity outside the home
- More than 75% of the informal economy is comprised of women

Women can influence adoption of cleaner cookstoves and fuels at both the household and enterprise level as household cooks, product designers, sales agents, and business owners.

## Insights – Impacts

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The environmental, health, and social impacts of current cooking practices are particularly large in Haiti, which makes cooking a pressing development issue. Sustained resources dedicated to addressing the issue would have a substantial positive impact on the environment, health, and gender.

The environmental impacts of cooking practices have been the principal motivation behind cookstoves and fuels projects in Haiti. However, the extent to which cooking practices, particularly the production and combustion of charcoal, drives environmental degradation are a matter of recent debate. Recent estimates already put the fraction of non-renewable biomass (fNRB) consumed in Haiti much lower than previously thought. Further studies are underway (World Bank, Alliance, USAID) to deepen understanding of the issue. Greater clarity is critical to prioritizing and understanding the potential cost-effectiveness of the range of potential interventions that reduce pressure on biomass.

Awareness of the health impacts of current cooking practices appears to be limited in Haiti. Greater understanding of these impacts is starting to change the policy environment in a number of countries, but for many cookstove projects, health remains an afterthought. The weight that national policymakers give to health impacts relative to environmental impacts should also inform the selection of potential interventions. In some countries, an interest in health impacts has led to greater emphasis on switching to the cleanest fuels in the short-term. There is also potential for health funding to benefit cookstove programs that emphasize cleaner fuels.

Lastly, more research is needed to understand the time poverty and time burden aspects of clean cooking for women. Anecdotally, we know that women and girls are the primary fuel collectors in rural areas and this contributes significantly to time poverty, however further research should be conducted to quantify these impacts.

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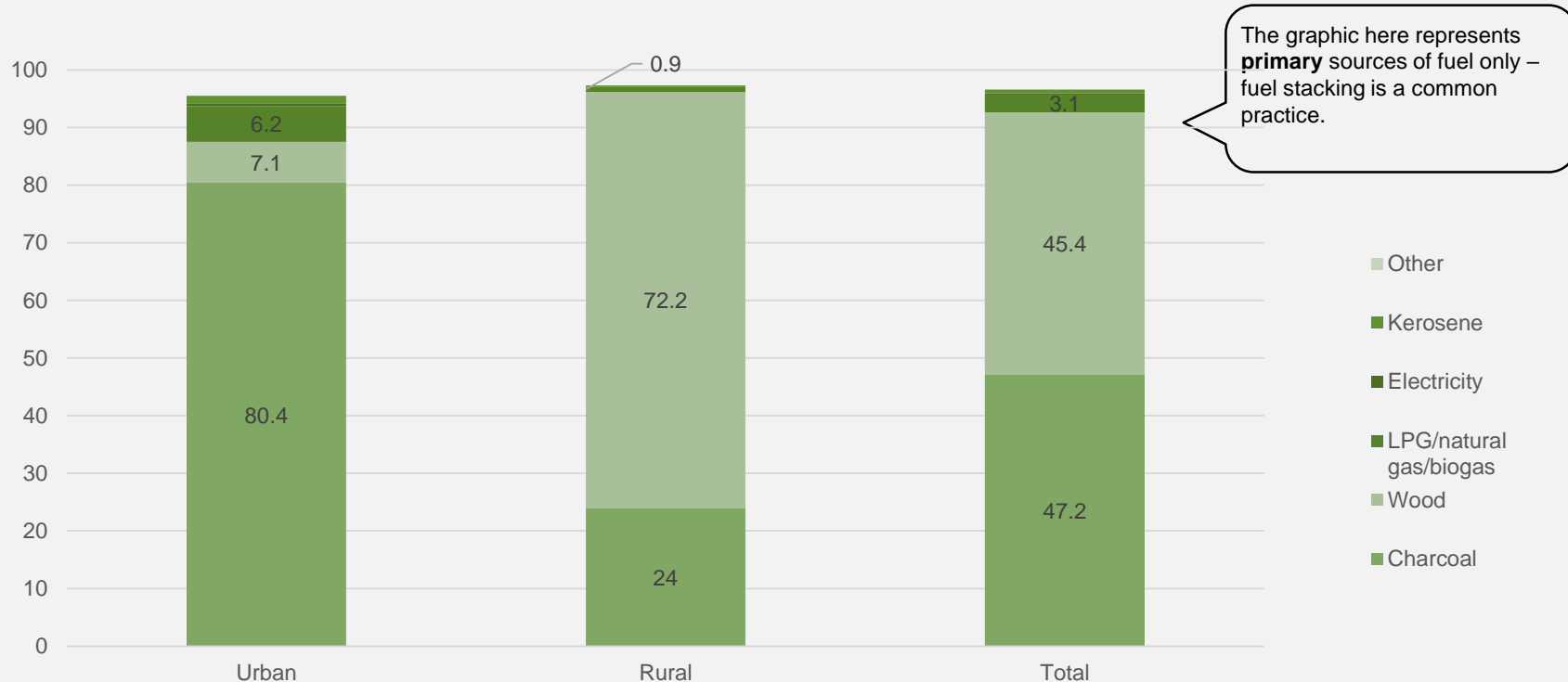
**Cookstoves and fuels supply and financing**

**Cookstoves and fuels policy environment**

**~93% of Haitian households rely primarily on solid fuel (wood or charcoal) for cooking. Charcoal dominates the urban market; wood dominates in rural areas.**

**Primary fuel usage breakdown (2012)**

(% of households)

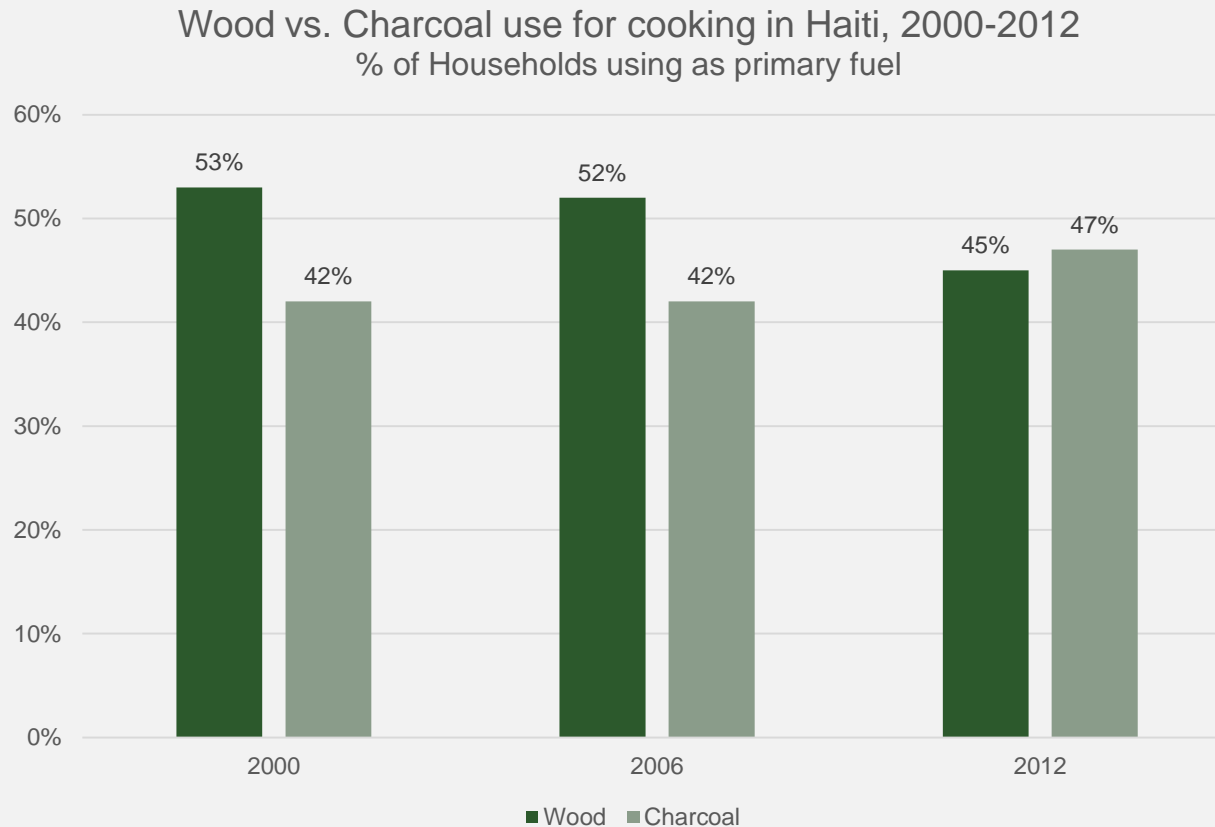


The graphic here represents **primary** sources of fuel only – fuel stacking is a common practice.

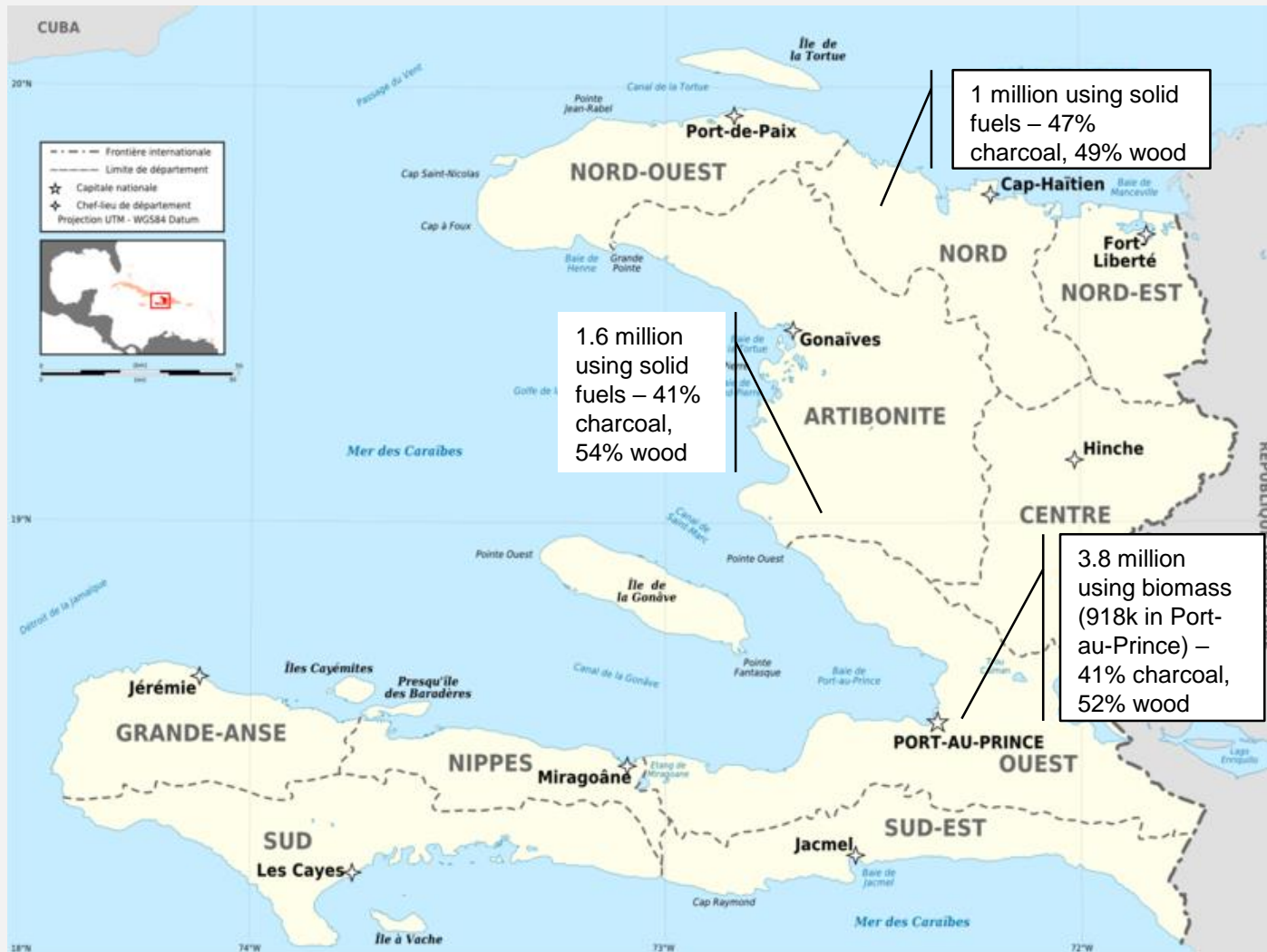
	Urban	Rural	Total
% of households relying on solid fuels:	87.6%	96.2%	92.7%

**Levels of solid fuel use have not decreased significantly over time – in 2000, 95% of households used solid fuels.**

**However, charcoal use has become more prevalent than wood use, likely driven by urbanization.**



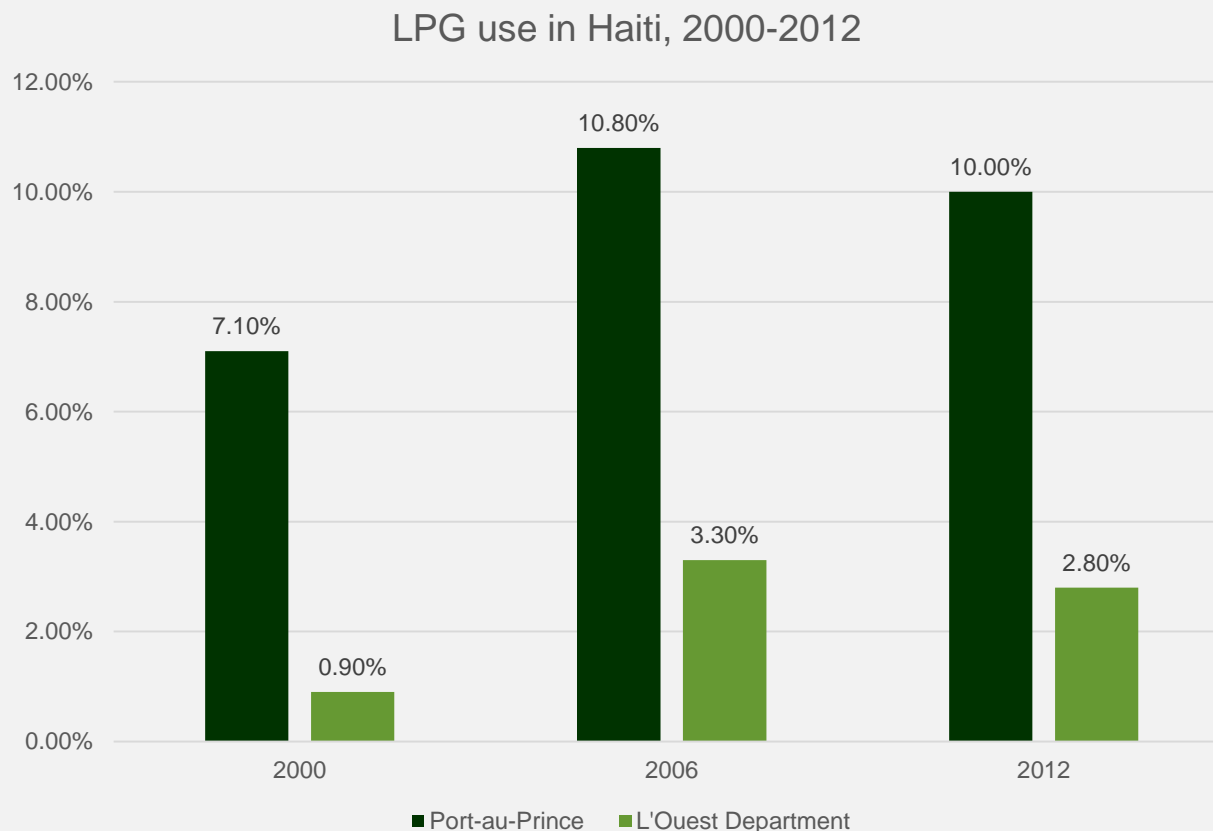
# Three of the ten departments (L'Ouest, L'Artibonite, and Nord) account for 62% of all household solid fuel use in Haiti.





## LPG is used by only 3% of total households in Haiti, primarily among wealthy families in Port-au-Prince.

L'Ouest department (where Port-au-Prince is located) is the only department in which more than 2% of households use LPG.



**According to surveys conducted by USAID, two of the main barriers to conversion from solid fuel to LPG are lack of money for upfront investments and fear of fire or explosion associated with the use of LPG.**

## Rural Households

**Rural households rely predominately on wood for fuel. Yet, they are often engaged in the charcoal value chain as either producers, transporters, or resellers.**

**83% of rural households primarily using wood for fuel; 15.6% primarily use charcoal.** Less than 1% are using LPG. The vast amount of cooking takes place outdoors.

**In 2015, rural households accounted for 41% of the population (over 4.4 million people).** However, per capita income for rural people is 1/3 of the income of urban households.

Rural populations suffer from extremely limited access to basic services; 10% have access to electricity and less than 8% have access to drinking water.

**Agriculture and commerce accounts for more than 85% of all economic activity in rural areas,** but 80% of farmers cannot produce enough food to feed their households and look elsewhere for additional income, including charcoal production. Charcoal production accounts for the largest share of secondary income (49%) for rural households in the South Department.



## Large Consumers – Bakeries

Large consumers of fuel in Haiti include institutions (orphanages and schools) and small and medium enterprises (SMEs) (bakeries, laundries, dry cleaners, street vendors etc.).

**An estimated 1,300 bakeries operate in Haiti using wood, LPG, and diesel.** Annual consumption is estimated between 156,000 to 208,000 tons of wood per year.

**Rural bakeries** exclusively use wood for fuel and are an important source of food for communities. Local resellers purchase bread from bakeries and then distribute it to the extended rural community.

**Rural bakeries predominately use wood for fuel.** A UNEP survey of 50 bakeries in the South Department (63% of bakeries in the South) found that 92% of surveyed bakeries use wood, 1 uses electricity, and 3 use LPG. The LPG fueled bakeries use 34 kilos of LPG every 3 days.

Firewood is sold in bundles called “douzaines”; on average rural bakeries use 8.6 douzaines of wood per week at 1 USD per douzaines. National estimates for rural bakeries calculate wood use at 200 kgs of wood per day for 3.2 sacks of flour.

In the South Department, men ran 76% of the bakeries and women ran 24%.

Additionally, leasing is a common practice amongst bakeries in Haiti. UNEP found that 74% of bakeries surveyed lease their bakeries to others (6 people on average).

**Bakeries express a willingness to change to alternative fuels.** 74% of surveyed bakeries expressed desire to switch to another energy source, complaining about the difficulty of obtaining wood and health concerns around dust and smoke fumes from wood use.

## Large Consumers – SMEs

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**LPG consumption for SMEs in metropolitan Port-au-Prince has doubled between 2014 and 2016. However, rural and non-metro PAP SMEs continue to rely heavily on wood for fuel.**

**Dry cleaners/laundries do not represent a significant share of fuel consumption when compared to households.** There are only 140 operating in Haiti using wood and diesel (23,000 to 25,000 tons of wood per year).

Laundries and dry cleaners generally do not consume charcoal and very few use wood. The 2010 Nexant report concluded that given the small number of laundries/dry cleaners in Haiti and the even smaller proportion using biomass, that laundries do not represent a significant source of deforestation or of negative health emissions.

**Rural dry cleaners/laundries almost exclusively use wood to fuel boilers.** However, there are few cleaners operating in rural areas. In the UNEP survey, the 4 identified rural cleaners received 1 truck load of wood per week and paid 800 gourdes a load.

**On the other hand, street vendors constitute a significant portion of charcoal demand.** In Port-au-Prince there are an estimated 6,417 street vendors cooking on a variety of fuels, including charcoal, LPG, wood, etc.

Street vendors play an important role for food security and nutrition, as many households rely on street vendors for at least one meal a day.

Additionally, street vendors are predominately women and offer an opportunity to enhance women's empowerment and involvement as leaders in clean cooking.

## Large Consumers – Schools

**Schools represent a significant amount of charcoal and wood consumption due to the number of schools providing feeding programs for students.**

**Schools represent a significant share of the fuel consumption in Haiti through school lunch programs.** 35% of the country's 13,599 primary schools cook and provide lunch for their students. Of the 4,464 schools with meal programs, 961 are public and 3,503 are private.

**35% of the country's 13,599 primary schools cook and provide lunch for their students.** 58.3% are rural and 41.7% are urban.

**The World Food Program currently feeds 400,000 children each day in public Haitian schools.** Private schools that provide meals typically include the cost in tuition fees. Private schools are more likely to have LPG and other improved stoves.

**On average, schools using charcoal require 0.4kg of charcoal per student,** resulting in a cost of 0.83 gourdes/student for charcoal and up to 32 metric tons of charcoal per school per day. The cost of fuel is a significant constraint on schools financial resources.

**Rural schools** face the difficulties of transportation, intermittent supply, and high fuel costs when considering switching to LPG.

**Stove stacking** is a common practice when old stoves are not removed from schools because of cultural beliefs about cooking beans and sauces on traditional stoves. Durability and the cost of repairs of improved stoves was cited as a concern and the primary reason for reverting back to charcoal stoves from LPG.

**Decision makers** are the administrators, not cooks, when it comes to who decides which type of stoves and fuels will be used.

## Insights – Fuel Usage

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Though there is a variety of data on fuel usage available, much of it is out of date. Challenges in comparability across datasets makes trend analysis difficult. More consistent data collection over time would greatly contribute to improvements in program design and evaluation.

Solid fuel use for cooking is dominant in Haiti, and does not appear to have changed greatly over time, which calls for greater understanding of the strengths and weaknesses of previous attempts at change.

The upward trend in the % of households using LPG between 2000 and 2006 does not appear to have continued between 2006 and 2012 – understanding why will be important. Anecdotally, LPG use in urban areas appears to have increased significantly since the last nationwide survey in 2012, but additional data is needed to confirm this finding.

More data is needed on households that rely primarily on wood, particularly in regard to collection vs. purchase practices; conventional wisdom suggests that there is little wood purchase, which would align Haiti with other countries, and would present a challenge in changing practices, since financial savings is often a motivation for change.

More data is needed on the practices of institutions (schools, bakeries, etc.) to determine which are appropriate targets for interventions aimed at achieving large-scale impacts.

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## Consumer Segmentation and Behavior Change

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Consumer segmentation is an approach to grouping a population by certain characteristics, such as income and awareness levels, to better understand barriers to behavior change and to design behavior change interventions. Commercial firms often use segmentation to identify potential customers, such as those most poised to transition from traditional cooking to cleaner cooking methods. Consumer segmentation relies heavily on household level data.

For Haiti, we have so far encountered sparse formal data focused on consumer attitudes and motivations related to clean cooking. There is, however, data on fuel use and wealth levels from the 2012 Haiti Demographic and Health Survey (DHS) 2012 and the 2003 Enquête sur les Conditions de vie en Haïti (Survey of Living Conditions in Haiti), implemented by the Institut Haïtien de Statistique et d'Informatique (IHSI, Haitian Institute of Statistics and Information). We also reviewed previous research conducted by the Alliance and other institutions in other countries that identify key indicators influencing clean cookstove and fuel use.

While most of our data was from the 2012 DHS, the data looking at fuel use by income distribution is based on the IHSI's 2003 survey. We used available knowledge regarding change in fuel use from 2003 to 2012 to adjust these data, but these estimates may not be perfectly accurate.



## Fuel Use by Income Quintile – all fuels used for cooking (2003)

### Percent distribution of households' cooking fuel use by income quintile

Fuels Used	Quintile of total household income					Total (sample size = 7,002)
	Lowest Quintile	Second Quintile	Middle Quintile	Fourth Quintile	Highest Quintile	
Charcoal	39.1	49.3	54.3	65.0	78.4	57.2
Wood	80.6	76.0	72.1	60.2	27.4	63.3
LPG/natural gas	0.8	0.9	2.2	3.6	18.4	5.1
Kerosene	1.6	2.6	4.3	8.2	19.5	7.2
Electricity	0.1	0.1	0.1	0.6	1.1	0.4
Other	0.6	0.3	0.7	0.3	0.8	0.5
Not Applicable	0.4	0.1	0.1	-	0.2	0.2

**The poorer you are, the more likely you are to use wood for cooking.  
The wealthier you are, the more likely you are to use clean fuels and charcoal.  
Fuel stacking is common across all quintiles.**

## Fuel Use by Income Quintile – primary fuel used for cooking (2003)

### Percent distribution of households' primary cooking fuel use by income quintile

Primary Fuel Used	Quintile of total household income					Total (sample size = 2,300)
	Lowest Quintile	Second Quintile	Middle Quintile	Fourth Quintile	Highest Quintile	
Charcoal	25.2	28.4	31.1	38.2	50.4	36.4
Wood	71.8	69.1	62.3	53.5	24.3	53.1
LPG/natural gas	-	0.3	0.6	2.5	10.2	3.4
Kerosene	3.0	1.9	6.0	5.7	15.1	7.1
Electricity	-	0.3	-	-	-	0.0
Total	100%	100%	100%	100%	100%	100%

**Charcoal and wood are used across all quintiles.  
LPG and kerosene are used mostly by the higher income quintiles.**

# How can we apply segmentation to prioritize efforts?

Main fuel by income group and locality						
	Income Quintile					Total
	Lowest	Second	Middle	Fourth	Highest	
<b>Charcoal</b>						47.3%
Urban	0%	0.3%	6.4%	14.4%	18.0%	39.1%
Rural	1.5%	3.0%	2.1%	0.9%	0.6%	8.2%
<b>Wood</b>						45.4%
Urban	0%	0.1%	0.8%	1.2%	0.6%	2.7%
Rural	17.2%	15.1%	7.0%	2.8%	0.7%	42.7%
<b>LPG/natural gas</b>						3.1%
Urban	0%	0%	0.05%	0.68%	2.33%	3.06%
Rural	0%	0%	0%	0%	0%	0%
<b>Kerosene</b>						0.83%
Urban	0%	0%	0.01%	0.25%	0.57%	0.826%
Rural	0%	0%	0%	0%	0%	0%

Commercial interest

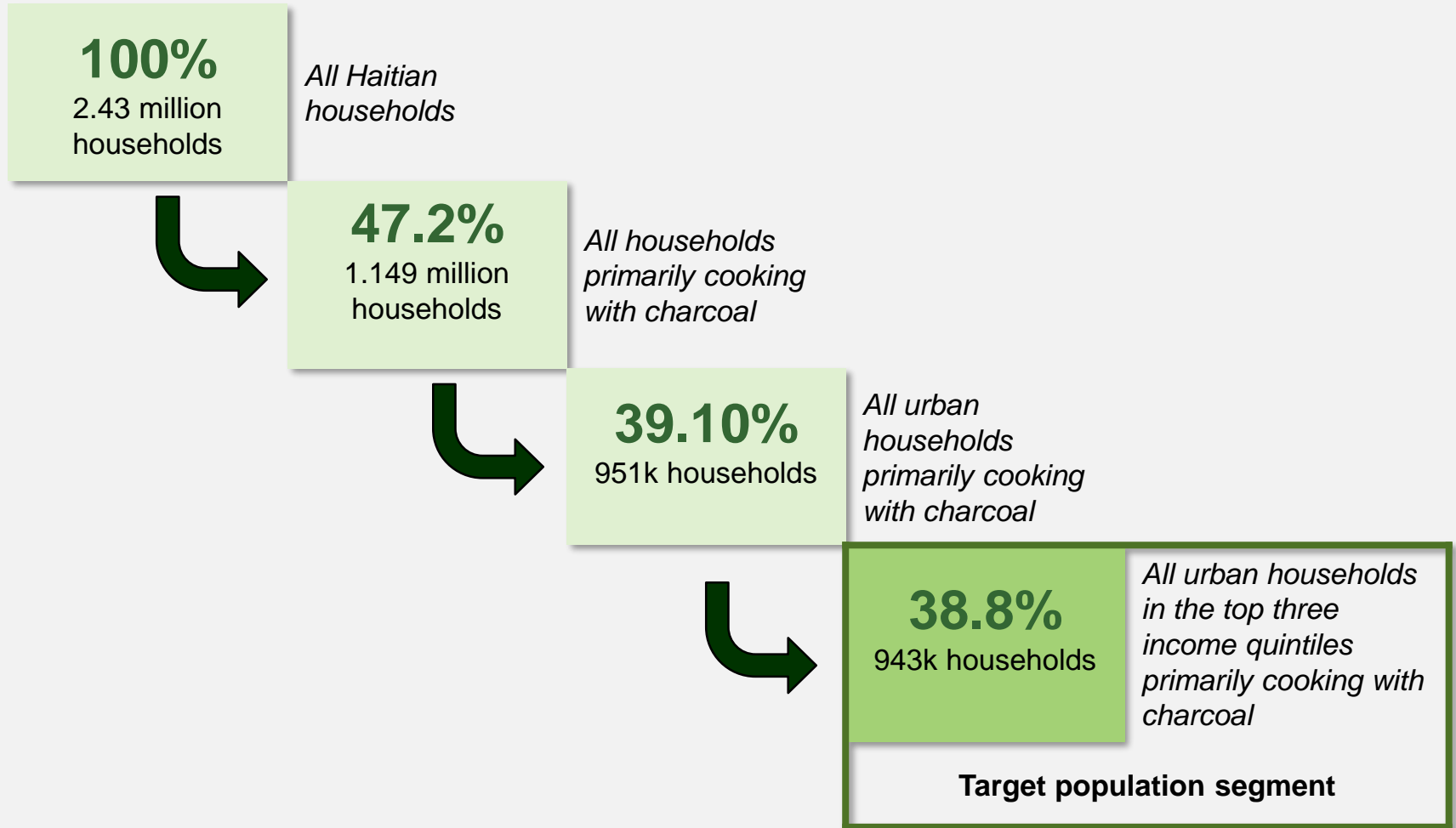
Public interest

	Lowest	Second	Middle	Fourth	Highest
<b>Charcoal</b>					
Urban		7,900	155,400	349,800	438,200
Rural	36,500	74,000	50,500	21,900	15,500
<b>Wood</b>					
Urban		1,300	20,400	29,800	14,900
Rural	418,000	366,600	170,400	68,300	16,400

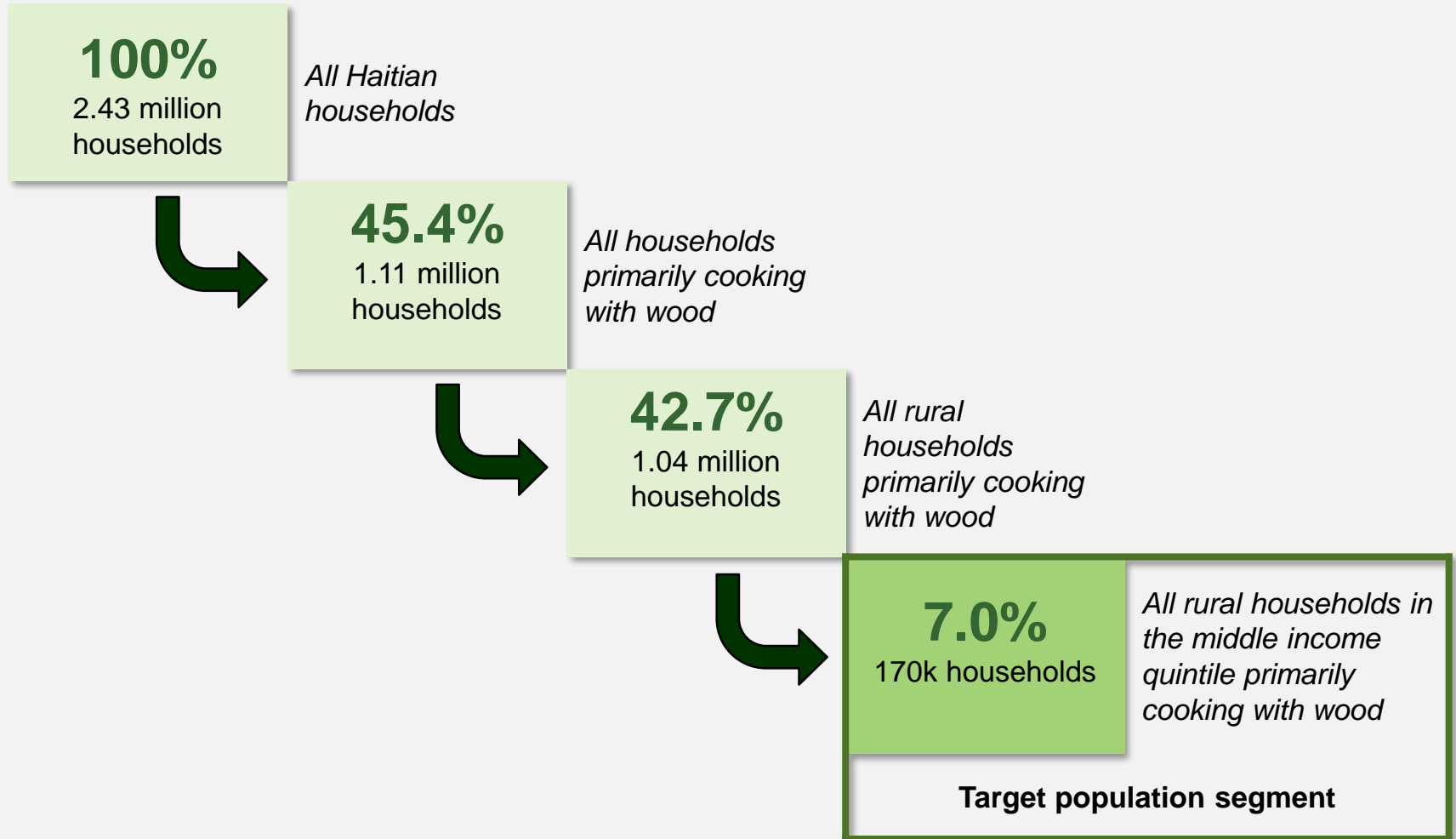
## How might a commercial firm apply segmentation to prioritize efforts?

Segment	Justification	Approximate market size
1. High and middle income urban charcoal users	High and middle income urban charcoal users make up over a third of the population of Haiti, creating potential for a significant shift in clean fuel and cookstove use if this segment is targeted successfully. Their middle and high income status will allow them to invest in cleaner cooking solutions, and since they already purchase (rather than collect) fuel, they have an incentive to transition to more efficient fuels. Additionally, their urban residence means that they are easier to reach through mass media and community events.	38.8% of total population 943,400 households
2. Middle income rural wood users	Middle income rural wood users represent a significant opportunity for marketers of clean cooking solutions. Although, the cost of fuel is a less of an issue for them, their purchasing power enables them to invest in modern home appliances. In areas where wood is becoming harder to collect in particular, they might have an additional incentive to consider clean and efficient cookstoves. In addition, they may be sensitive to other incentives such as convenience, cleanliness or speed-of-use.	7.0% of total population 170,400 households

# Consumer Segmentation Applied - illustrative



# Consumer Segmentation Applied - illustrative



# Consumers' willingness to adopt new technology will vary depending on the customer segment – what we know globally

## “Willingness to adopt” drivers

**Economic savings:** monetary savings due to decreased need for fuel (greater efficiency) lower cost of fuel (due to fuel switching) or more durable stove (limited replacement costs)

**Time savings:** recouped time from time not spent collecting fuel or from decreasing long cooking times (through more efficient stoves)

**Health concerns:** key issues include ensuring healthier children and mitigating chronic health issues such as eye irritation, difficulty breathing etc

**Cleanliness:** improving the look and overall cleanliness of the kitchen, utensils and home

**Aspirational technology:** perception that certain technologies or fuels indicate a higher social status

## Likely target audience

- Solid fuel purchasers (primarily male as the economic decision maker)
- Educated consumers
- Commercial/institutional buyers

- Higher income/educated rural consumers (with opportunities for alternatives livelihood)
- Solid fuel collectors (primarily female who have the most time burden from cooking)

- Female consumers (as primary caretakers of the house and children)
- Donor agencies and “mission-driven” institutional purchasers

- Female consumers (as primary cooks and presence in the kitchen)

- Both female and male consumers

**The customer segment to be targeted is critical in determining the design, price point and distribution strategy of any cookstove initiative**

# Behavior Change Communication in Haiti

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We conducted a review of previous BCC and Social Marketing interventions implemented in Haiti, including 3 campaigns aimed at promoting improved cookstoves, as well as several focused on HIV/AIDS prevention, WASH, and family planning. Some key findings from these interventions include:

## Effective channels of communication:

- **Television and radio:** raising awareness of new products and reaching wide audiences can be successfully realized through traditional mass media channels such as TV and radio.
- **Interpersonal communication/demonstrations:** to realize actual uptake and behavior change, these channels should be complemented by one on one and group level communication, as well as demonstration and other community level events where consumers have an opportunity to see and experience products first hand.

## Locations and Partners:

- If considering expanding programs to rural areas, consult (and partner with) local organizations to facilitate social marketing and behavior change components.

## Key Messaging:

- **Affordability/availability of stoves:** Advertise projected daily or weekly fuel savings. Explain payment options, such as monthly installments, available to consumers. Direct consumers to where stoves/fuels can be purchased.
- **Perceived safety of stoves/counterfeiting of stoves:** Implement and advertise a labeling program to provide assurance to consumers that they are purchasing a genuine improved cookstove. Seek endorsements from trusted leaders.
- **Aspirational quality of stoves:** Focus on building social status of using an improved cookstove.



## Insights – Consumer Segmentation and Behavior Change

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Effective segmentation – and therefore effective communication strategy design – is made more difficult by the relative lack of data on consumer attitudes. We need to know more about what motivates consumers and what they perceive to be the barriers to change to be able to help them change practices.

Anecdotally, there is likely a large segment of the population for whom the upfront investment in a new stove is the likely barrier. This suggests that consumer financing will play an important role in behavior change, complemented by communications efforts focused on benefits that matter to the consumer segment. More research is needed into which consumer financing schemes will show the most promise.

If institutional cooking practices are verified to have a large impact on the environment and/or health, then more study is required to understand the behavioral barriers to change in that segment.

The most easily addressable consumer segment of the market from a commercial point of view would be the large group of urban solid fuel purchasers; most cookstove projects have focused on that segment. However, that would leave a large rural segment largely unaddressed.

There is considerable “stove stacking” (use of different stoves and fuels in the same home), which suggests there is still a behavior change challenge within households that have already acquired a cleaner/more efficient technology.

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## Cookstoves Supply

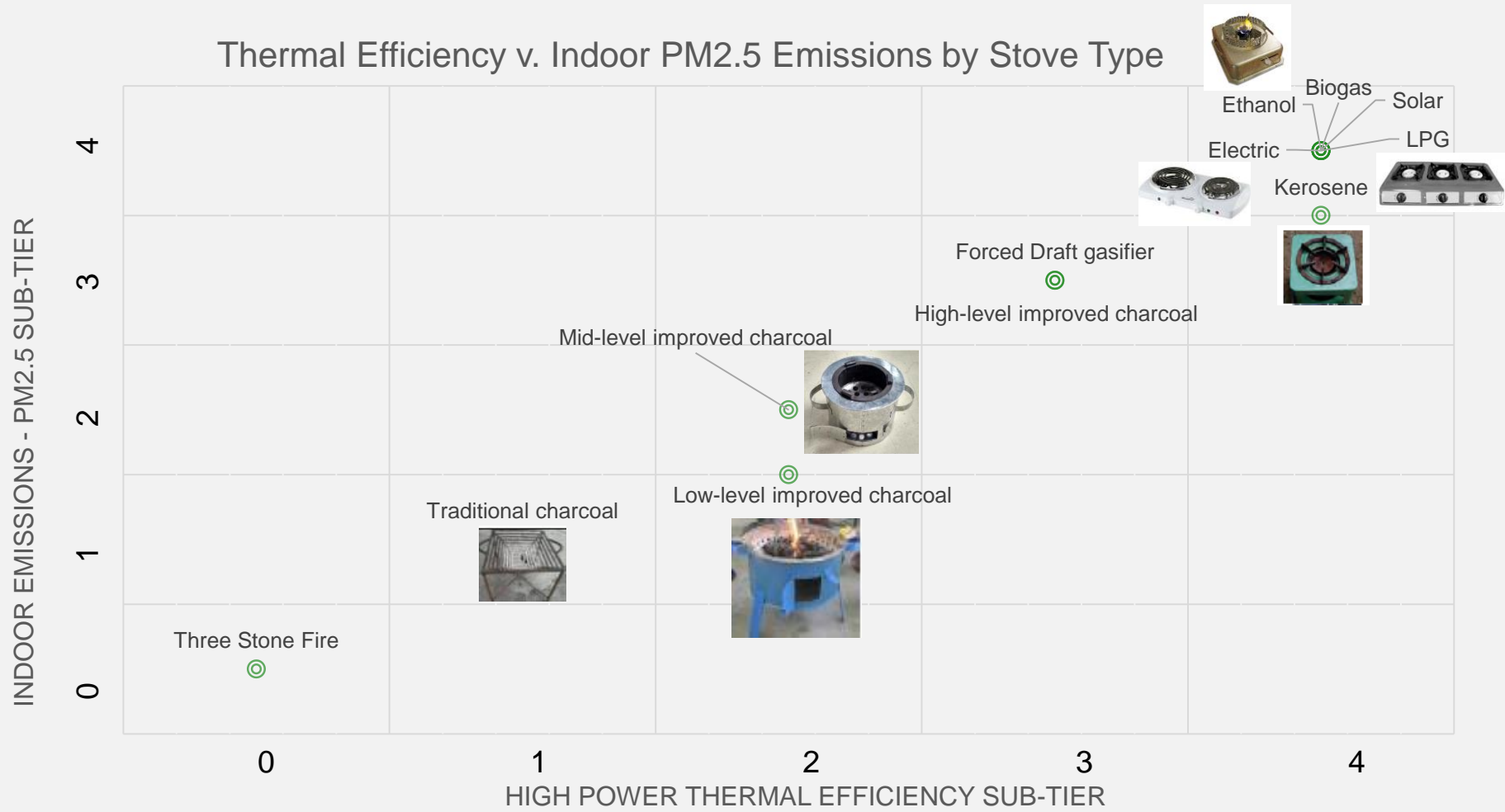


# Cookstove Models Available in the Haitian Market

STOVE TYPE	FUEL	EFFICIENCY	OVERALL EMISSIONS (AT POINT-OF-USE)	INDOOR EMISSIONS (AT POINT-OF-USE)	AVAILABILITY
Three Stone Fire	Wood	Tier 0	Tier 0	Tier 0	N/A
Traditional Charcoal (round and rebar)	Charcoal (wood) or briquettes	Tier 1	Tier 0	Tier 0	Widely available for purchase on the street and in markets
Improved Wood	Wood	Tier 2-3	Tier 2	Tier 2	Not commercially available
Improved Charcoal	Charcoal (wood) or briquettes	Tier 2-3	Tier 1-2	Tier 1-2	Availability largely limited to Port-au-Prince through a network of distributors
Gasifiers	Wood or pellets	Tier 2-4	Tier 2-4	Tier 2-4	Not commercially available
LPG	LPG	Tier 4	Tier 4	Tier 4	Available in urban areas (mostly Port-au-Prince)
Alcohol	Ethanol	Tier 4	Tier 4	Tier 4	Availability limited to Port-au-Prince
Electric	Electricity	Tier 4	Tier 4	Tier 4	Available in urban areas (mostly Port-au-Prince)
Solar Cookers	Solar	N/A	Tier 4	Tier 4	Not commercially available



# How clean and efficient are the stoves in the market? (illustrative mapping)



Note: The Alliance defines (1) stoves that achieve Tier 2 or higher for efficiency as efficient, (2) stoves that achieve Tier 3 or higher for overall emissions as clean as it relates to potential environmental impacts, and (3) stoves that achieve Tier 3 or higher for indoor emissions as clean as it relates to potential health impacts.

## Insights – Cookstoves Supply

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**Supply:** Very few improved biomass cookstove models are available on the market in Haiti, unlike in many other countries the Alliance works in. No biomass cookstoves are currently imported, and none of the local improved options are sold nationwide.

**Condition:** According to the USAID/Chemonics/CQuest study, after a year of use only 30% of improved stoves remained in “good” condition. Most of the damage was due to the corrosion of the combustion chamber and to the cracks in the clay based liners. Unlike traditional stoves the ICS were mostly stored indoors offering them greater protection.

**Design:** According to the USAID/Chemonics/CQuest longitudinal study, ICS are overwhelmingly perceived as easier to use than their traditional counterparts. The main design change requested by users are for 2 burners, and for a stove that is higher from the ground. Wooden handles are appreciated. Imported, factory made stoves are not always considered more “modern” than local stoves to Haitian households.

**Fuel savings and cooking speed:** USAID/Chemonics/CQuest’s real life measurement of fuel consumption for a variety of improved cookstoves in Haiti showed a significant decrease in charcoal consumption. Users also reported that the improved stoves cook the food faster than the traditional ones. However, additional verified testing data is needed for several models to enable accurate comparability.

**Value:** The user-estimated price of stoves was higher for imported stoves than for local ones. However, users estimated a price that was above the actual retail price for the local stoves, but below retail price for imported stoves. 20% of users said they were willing to consider borrowing money to buy ICS – but no consumer financing options are widely available.



# Fuel Supply



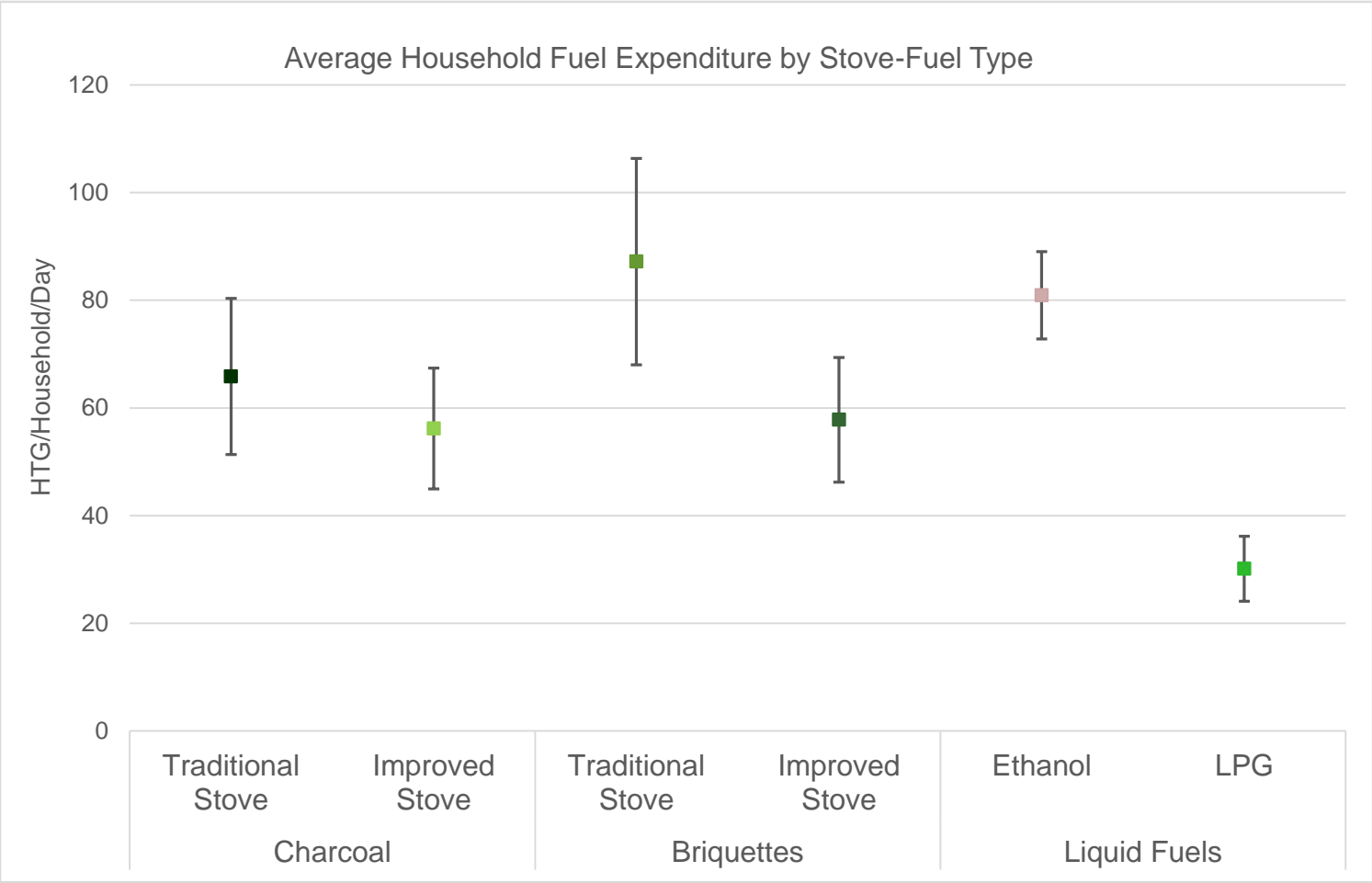
# Fuel Availability, Cost, and Production

FUELS	PRODUCTION	DISTRIBUTION	AVAILABILITY	UNITS	PRIMARY USERS
<b>Charcoal (wood)</b>	Mostly by rural households using traditional methods, on either a full-time basis, or on occasion when extra money is needed; percentage of supply may come from DR but exact quantity unknown	Sold on roadside and markets often by women in rural areas and transported to cities by truck; highest profit to transporters	Very widely available (multiple vendors on every street and on all roads and markets in rural areas)	Marmite (occasionally other single servings), small, medium, and large sack	Urban and rural households, urban food vendors, urban schools with feeding programs.
<b>Wood</b>	Mostly from trees grown on rural, privately owned land	Rural households collect from nearby fields/forests  Vendors cut on privately owned land	Widely available for free collection in rural areas  Specialized vendors sell wood to institutions/industries in rural areas and some urban areas	Wood typically collected for free by rural households.  Purchase is usually only by institutions in units of 28-30kg (called 'large packet,' 'charge,' & 'macoute')	Rural households, rural schools with feeding programs, rural bakeries.
<b>LPG (propane)</b>	Imported from international sources	Most LPG is transported by truck from PaP, with a small amount coming from across the DR border by smaller LPG companies	Widely available in urban areas (especially PaP and Cap Haitian), but supply very limited in rural areas.	Bip (5lb), 12lb, 25lb, 50lb, 100lb	Wealthy urban households; some urban schools; and urban bakeries
<b>Carbonized briquettes (from bagasse)</b>	Produced in Cap Haitien	Distribution from Cap Haitien to bulk buyers (who distribute to small vendors) and CRI-branded shops	Available in urban areas of PaP and Cap Haitien	Sold by marmite or large sack	Urban households previously using wood charcoal
<b>Ethanol</b>	Produced in USA by POET, shipped to Haiti	Distribution at designated retail shops in PaP	Available only in PaP	Sold in 20oz, 1.5L, and 5L containers	Urban households



# Price of A Day's Cooking by Fuel Type

(modeled based on prices observed in Alliance market visits in 2016)



## Firewood Collection and Purchase

The majority of firewood users collect small branches from areas near their home – there is not a strong culture of firewood purchase. Quantitative data on collection practices, however, is limited and should be examined more closely.

- The average weight of wood collected per trip varies, with estimates ranging widely from 3.3 lbs per trip (undertaken daily) to 35 lbs per trip (undertaken once or twice per week).
- The majority of cooking with wood is done over three-stone fires.
- Rural families reportedly will not spend the money for an improved cookstove because there is no fuel cost savings for them.
- To reach rural consumers, past initiatives suggest that marketing should focus on saving cooking time instead of cost.

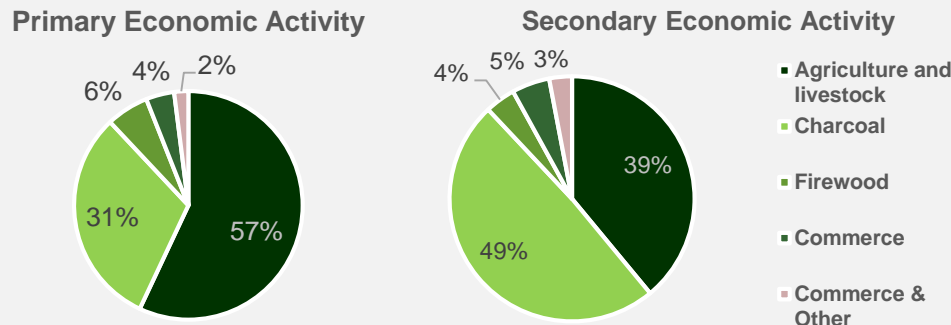


# Charcoal Value Chain

## Charcoal is a significant source of livelihood for many rural Haitians.

Charcoal production is a necessity for many rural households, constituting on average 25% of rural income. In the South Department, charcoal production can account for over 50% of monthly incomes (31% of primary economic activities for rural households and 49% of secondary economic activity).

While people in rural areas spend more time engaged in agriculture and livestock activities, charcoal contributes far more to rural incomes (25% versus 4%). In rural areas firewood does not factor significantly into people's income as it is primarily consumed as a cooking fuel.



Data Source: UNEP, 2016.

**Charcoal production is seasonal**, with production levels higher between September and December. Many rural households are occasional charcoal makers, especially around the beginning of school when extra money is needed to pay school fees and purchase uniforms.

When surveyed, families list three main motivators for producing charcoal: to buy food (38%), to pay school fees (28%), and to earn cash for household needs (27%). Additionally, charcoal producers tend to come from households with a high number of dependents (6.5 on average, compared to 4.4 at the national level).

**Charcoal producers are predominately male (77%), whereas women account for the majority of charcoal vendors.** However, charcoal trading represents 49% of primary economic activity for women in the South Department and 40% of secondary economic activity.

## Charcoal Value Chain

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**The largest beneficiaries of the charcoal trade are the transporters who bring charcoal to urban centers, in particular Port-au-Prince.**

On average traders receive 75 gourdes more per sack than charcoal producers. Charcoal transportation accounts for 50% of the profit earned on a bag of charcoal. Revenues realized from the charcoal value chain increase substantially between rural areas and Port-au-Prince.

Trees for charcoal are generally cut on one's own land (47%), purchased (22%), or a combination of both (23%). An additional 8% of producers pay to harvest wood from other's land. Land is purchased for approximately 3,000-4,000 gd (~\$75-100) for a little over a hectare.

Many rural communities are now exploring sustainable solutions to restore the severely depleted wood stocks in their areas by cutting trees using a method that allows them to naturally regenerate.

27% of respondents in the South have participated in a reforestation program. However, the extent of sustainable domestic charcoal production is a topic of debate, with little data available.

There is some charcoal trade between the Dominican Republic and Haiti through trucks crossing the border and in small boats leaving Anse-a-Pitre. However, the extent of the cross-border charcoal trade is debated – some estimates suggest that 70-86% of charcoal used in Haiti comes illegally from the Dominican Republic (Checo, 2009), while other sources claim the fraction of charcoal coming from DR is almost insignificant. Better data is needed to understand the cross-border dynamics.

# LPG Importation

LPG primarily enters Haiti through Sodigaz and Total, which are the only two companies with port facilities to land LPG from the sea. As of 2010, the terminals combined had the capacity to handle potentially up to 50,000 tons annually depending on the frequency of resupply. A smaller amount is also imported from the Dominican Republic via trucks by Ecogaz and Gazel.



Also as of 2010, Sodigaz accounted for 60 percent of imports or about 9,000 tons annually. Sodigaz had 850 tons in total storage capacity, of which actual working capacity is 745 tons. Because of limited capacity, Sodigaz imported LPG by ship every 2-3 weeks.

Total, which accounted for the remaining 40 percent of LPG imports, has 1,000 tons of working capacity and received 900 tons of LPG every two months.

# LPG Value Chain

## LPG Operators by Business Line

Business	Importation	Bulk Supply to Other Distributors	Bulk Supply to End Users	Micro-Filling Stations	Retail Cylinder Exchange
<b>TOTAL</b>	Important	Important	Important		Negligible
<b>Sodigaz</b>	Important	Important	Important	Important	Significant
<b>Ecogaz*</b>		Important	Important	Important	
<b>Canez Distribution</b>		Important	Important	Important	
<b>Progaz (small distributors)</b>				Important	

\*Used to fill cylinders until plant exploded in April 2009

The LPG market in Haiti includes three broad categories of companies: importers (Total and Sodigaz); large distributors (Ecogaz and Canez); and small distributors (Progaz and others). The importers set LPG prices and operate all along the value chain from LPG procurement to distribution.

Although Sodigaz and Total import 60 percent and 40 percent respectively of all LPG in Haiti, Canez and Ecogaz account for an estimated 70 percent of final distribution to customers, which include other smaller distributors like Progaz. Ecogaz's model is based on micro-filling sales and developing the operations of independent, smaller micro-filling operators. Ecogaz provides and installs micro-filling equipment in return for exclusive long-term supply contracts.



## Other Alternative Fuels

Less than 1% of households cook with other alternative fuels such as electricity, kerosene, solar, or ethanol.

### Electricity

Only 0.2% of all households in Haiti cook using electricity, due in large part to unreliable or non-existent supply.

### Kerosene

Kerosene is used by 0.7% of households. Several types of kerosene cookstoves are available on the market, including brass pressurized stoves, gravity fed wick stoves with fuel bottles (single, double, and triple-burner models), and multi-wick stoves (e.g., with 10-22 cotton wicks in a circle, which can be raised or lowered to adjust heat output). However, households complain that the taste of kerosene gets into the food and as a result it is unpopular.

### Ethanol

Ethanol fuel is currently imported from the United States and is available in the market in Haiti along with ethanol cookstoves. Several organizations have plans to produce ethanol domestically in the near future using sugarcane.

### Biomass pellets

While some pellet stoves have been piloted in Haiti, pellets are generally not found on the market.

### Briquettes from waste paper

Small-scale briquette production using paper waste has been tried by several organizations throughout Haiti. The largest project was in Carrefour Feuilles and is no longer operating.

### Solar

Haiti has a moderately high level of sunshine, with an index in the range of 5.0 hours per day of average sunshine. A range of solar cookers have been promoted throughout Haiti over the past decade, the majority of which were contributed via charitable donations.

### Carbonized briquettes from agricultural waste

At least two companies in Haiti have produced carbonized briquettes from sugarcane waste at moderate scale. Carbon Roots International is still operating with a base in Cap Haitien, while Ticadaie has closed operations.

## Insights – Fuel Supply

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Despite previous efforts, there is relatively little local production and distribution of alternative fuels at scale in Haiti. Additional study (some ongoing by the Alliance) is needed to better assess the viability of locally-produced alternative fuels, particularly from a feedstock availability point of view, and on the impacts of scaling up production of feedstocks.

Though there are challenges in purchasing small quantities, when viewed from the perspective of the average cost of preparing meals, alternatives to charcoal become financially attractive, some fuels perhaps reaching price parity in some areas. This could open up opportunities for long-term commercially viable production, if the barriers to stove acquisition can be addressed.

More analysis (some ongoing by the Alliance) is required to understand the viability of importing alternative fuels at much greater scale over the long-term, particularly from a balance of payments perspective.



## Cookstoves and Fuels Financing Landscape



# Haiti Investor Landscape – Key Findings

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## Demand

- Most commercial activity at scale within a small number of influential, wealthy families
- Anecdotally, have been told >90-95% of start-ups/social enterprises in this market ultimately fail
- Pipeline of for-profit cookstoves enterprises is very limited; limited number of non-profits as well
- Significantly more demand for grant capital; logical given greater donor activity versus investment in SME/social enterprise space
- Enterprises, both for-profit and non-profit, are small and early-stage, face significant business model challenges around supply chain, product demand/consumer behavior, ability to pay, etc.
- Therefore sector currently is a small number of low-profit/low-growth trajectory, highly risky enterprises – given unattractive risk/return ratio, unlikely near-term access to commercial capital

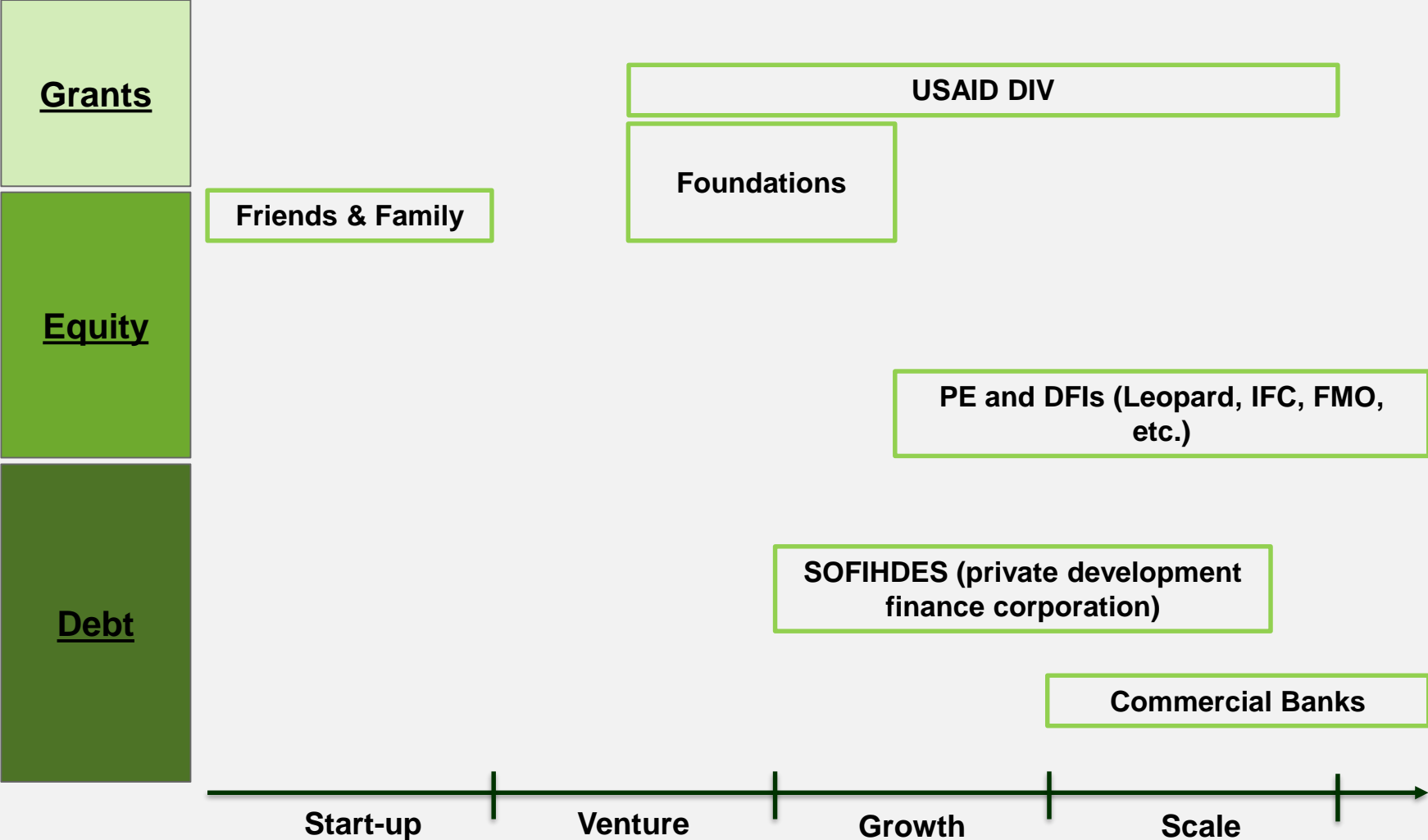
## Supply

- Foreign investment (debt and equity) limited by country risk factors/political instability, low ease of doing business
- However, domestic and (limited) foreign equity capital is accessible for demonstrably profitable business models
- Domestic debt capital is accessible to profitable businesses, and in particular to wealthy families given their diverse business interests and ability to provide collateral
- Given risk/return profile of cookstoves models at present, limited involvement of wealthy domestic entrepreneurs and investors with access to capital
- Over past 5+ years, limited impact-first investment through post-earthquake interventions e.g. Bush-Clinton Fund, but much of this is no longer active

# Financing Sources

	Grants	Equity		Debt
	Subsidies/TA	Seed/Start-up	Growth	SME
Sources	Governments, Foundations, Other donors	Friends and Family, Angels, Seed Funds, Foundations	Impact funds, VC, PE	Local banks, international banks
Current Depth of Market (global)	Medium	Low	High	High
Current Depth of Market (Haiti)	Low	Low	Low	Medium
Current engagement in cookstoves space	Low	Low	Low	Low
Future potential for cookstoves space (assuming sector growth)	Medium	Low	Low/Medium	High
Risk Appetite	High	High	Medium	Low
Basis for Funding Decision	Business model, management / developer track record			
	<ul style="list-style-type: none"> <li>• Dev impact</li> <li>• Sector status</li> <li>• Subsidy need</li> </ul>	<ul style="list-style-type: none"> <li>• Dev impact</li> <li>• Market potential</li> </ul>	<ul style="list-style-type: none"> <li>• Profitability</li> <li>• Growth prospects</li> </ul>	<ul style="list-style-type: none"> <li>• Balance sheet</li> <li>• Collateral</li> </ul>

# Haiti Cookstove Enterprise Funding Map



## Given the landscape, the needs are numerous.

- **Equity/quasi-equity/grants: long-term, general-use capital; accessible at early stages of growth (seed, venture, etc.)**
  - Investment in R&D and technology innovation capabilities
  - Funding to conduct pilot project/market trials and refine model
  - Capital investment in PP&E (machinery, real estate, etc.)
  - Investment in team (senior/middle management, sales/marketing, etc.)
  - Funding to establish strategic alliances and partnerships in the market
  - Investment in financial MIS (ERP, CRM, etc.)
- **Debt: short/mid-term capital; typically accessible by growth businesses with track record**
  - Inventory purchases/financing working capital (short term cash/receivables/payables mgmt.)
  - For manufacturers, improved credit terms for distributors (manage accts receivable)
  - For distributors, manage cash cycle with suppliers (manage accounts payable)
  - For distributors, offer consumer/end-user financing to customers

# Carbon Finance Programs

Three carbon credit projects are currently in implementation or in the registration process in Haiti.

- Since 2013, D&E Green enterprises has had a POA with ENEL, a European Electricity Company. The project title is “Replacement of traditional charcoal stoves with efficient EcoRecho stoves in Haiti” and it has a 28-year lifetime.

[https://cdm.unfccc.int/ProgrammeOfActivities/poa\\_db/45N2WHPB9DJYUFTELKR8ZIC7OQSAM6/view](https://cdm.unfccc.int/ProgrammeOfActivities/poa_db/45N2WHPB9DJYUFTELKR8ZIC7OQSAM6/view)

- The USAID/Chemonics project facilitated the development of a POA with C-Quest, “Improved Cookstoves for Haiti,” which has a 28-year lifetime.

[https://cdm.unfccc.int/ProgrammeOfActivities/poa\\_db/Y3SFOP8EVW7DQXRCLHJG014KNZ2MA/view](https://cdm.unfccc.int/ProgrammeOfActivities/poa_db/Y3SFOP8EVW7DQXRCLHJG014KNZ2MA/view)

- Lastly, Entrepreneur du Monde, a French entity involved in energy projects in Haiti has registered their LPG access project with the Gold Standard Foundation.

**USAID/Chemonics identified three major constraints to register and implement carbon credit projects in Haiti, including the high cost of registration (over \$150 USD); the long duration of the registration process (over 2 years); and institutional weaknesses (the National Designated Authority – ANDH – in Haiti is not fully functional).**

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**Cookstoves and fuels policy environment**



# Government of Haiti's Engagement on International Energy Policies and Agreements

- Haiti is a signatory on the Paris Agreement to combat climate change and to accelerate and intensify the actions and investments needed for a sustainable low carbon future.

- Haiti is a signatory on the Sustainable Development Goals (SDG) Agenda for 2030, which includes affordable and clean energy access as Goal #7.

## Accord sur le climat : points clés

Le texte juridiquement contraignant, adopté par 195 pays, entrera en vigueur en 2020



Températures 2100	Financement 2020-2025	Différenciation	Objectif d'émissions 2050
<ul style="list-style-type: none"> <li>Contenir le réchauffement «nettement en dessous de 2°C», « Poursuivre l'action menée pour limiter l'élévation des températures à 1,5°C »</li> </ul>	<ul style="list-style-type: none"> <li>Les pays riches doivent fournir 100 milliards de \$/an à partir de 2020, un «plancher»</li> <li>Nouvel objectif chiffré en 2025</li> </ul>	<ul style="list-style-type: none"> <li>Les pays développés doivent continuer de «montrer la voie» en matière de réduction de GES*</li> <li>Les pays en développement doivent «accroître leurs efforts d'atténuation» en fonction de leur situation</li> </ul>	<ul style="list-style-type: none"> <li>Plafonnement des émissions de GES «dans les meilleurs délais»</li> <li>À partir de 2050 : réductions rapides pour un équilibre entre émissions dues à l'Homme et celles absorbées par les puits de carbone</li> </ul>
Partage des efforts	Mécanisme de révision 2023	Pertes	
<ul style="list-style-type: none"> <li>Les pays développés doivent apporter des ressources financières pour aider les pays en développement</li> <li>Les autres pays sont invités à fournir un soutien «à titre volontaire»</li> </ul>	<ul style="list-style-type: none"> <li>Révision tous les 5 ans Premier bilan mondial en 2023</li> <li>Chaque révision représentera une progression par rapport à la précédente</li> </ul>	<ul style="list-style-type: none"> <li>Pour aider les pays vulnérables, il est nécessaire d'éviter, minimiser et prendre en compte les pertes dues au réchauffement</li> </ul>	

\*Gaz à effet de serre AFP

		17 Objectifs de Développement Durable pour répondre aux enjeux économiques, sociaux et environnementaux de la planète.		



# Government of Haiti Priorities on Clean Cookstoves and Fuels

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## Ministry of Environment – *Intended Nationally Determined Contributions (INDCs), 2015*

- Specific 2030 targets for clean cookstoves, fuels, and energy:
  - Reduce use of wood for fuel (charcoal and firewood) by 32%
  - Promote the replacement of traditional cookstoves with fuel-efficient cookstoves (with fuel savings of 25-30%)
  - Improve the energy efficiency of wood charcoal production (improving yields from 10-15% to 30-45%)
  - Create 10,000 hectares of managed forests for energy use by 2030.
- The status of funding and implementation of this plan is not clear.

## Ministry for Public Works, Transportation and Communications, Bureau of Mines and Energy – *Haiti National Energy Sector Development Plan (NESDP) 2007 – 2017*

- Specific 2017 targets for clean cookstoves and fuels:
  - 669,000 households converted to LPG (at cost of \$12 million USD)
  - 287,000 households converted to kerosene (at cost of \$2.8 million USD)
  - 166,000 new biomass stoves in households (at cost of \$997,000 USD)
  - 143,000,000 tons of charcoal imported to relieve pressure on national forests (at cost of \$4.7 million USD)
- According to meetings with Bureau of Mines and Energy officials, sufficient funding did not come through for this plan, so it has not yet been implemented at scale.

## Previous Nation-wide Programs and Plans

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### Ministry for Public Works, Transportation and Communications, Bureau of Mines and Energy

- ***Haiti Energy Sector Development Plan 2007 – 2017***
  - Lays out ambitious plans for 25% of urban biomass-using households (total target of 509,400 households) to convert from wood and charcoal to alternative fuels by 2015; the dissemination of improved stoves to 17% of the families in the urban area by the year 2015 (166,000 households); and an overall goal for 36% of the households using either kerosene, LPG or improved stoves by the year 2015.
  - Not achieved, due to lack of resources to implement.
- ***National Strategy for Improved Stoves in Haiti, 2011***
  - Long-term objective for 2020 was a decrease in wood consumption of 20% by 2016 and 30% by 2020.
  - Plan was not finalized or fully funded.

### World Bank Energy Sector Management Assistance Program (ESMAP)

- ***Haiti: Strategy to Alleviate the Pressure of Fuel Demand on National Woodfuel Resources, 2007***
  - The overall charcoal consumption was targeted to decrease by 20% over a 10-year period.
  - LPG and kerosene consumption targeted to grow twofold in 10 years.
  - Targeted reduction of CO2 emissions by 3,200,000 tons in 5 years and 99,400,000 tons over 20 years.
  - However, funding for plan was cut and program was never implemented.

# Cookstove Standards, Testing, and Labeling

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**There are no national policies in place on standards, testing, or labelling in Haiti. Cookstove manufacturers are not required to conduct testing or seek certification unless they want to access the carbon market.** Many are uninterested in certification because they do not see the benefits of doing so.

**The absence of legislation for the protection of intellectual property prevents some manufacturers from pursuing certification.** The most well-known example cited by stove manufacturers is a case study of the Mirak stove, which was created by BME and the World Bank. The Mirak is a high-performing stove model that is sold at 500 gourdes. Unfortunately, some local stove makers counterfeited the model and sell a poor-quality version for 100 gourdes. Consumers can't tell the difference between the certified and non-certified version, so the certification becomes useless.

**Through the USAID/Chemonics project, a national testing laboratory was created at the Faculté des Sciences, within the Université d'Etat d'Haiti (UEH). Very few stoves have been tested at this facility, and manufacturers are not yet confident in the quality of results.** There is only one part-time staff member at the facility, so there is often a long wait for results.

**Costs of testing can be significant.** Producers pay 34,000 gourdes (\$543 USD) to test stoves made in Haiti and 40,000 gourdes (\$639 USD) to test imported stoves. BME then requires the payment of \$400 USD for locally made stoves or \$500 USD for imported stoves for the certification.

## LPG Policy Framework

In Haiti, LPG has had special legal status since 1987 which makes it exempt from the customs tax. However, there are no quality control or testing mechanisms currently in place. Prices are not regulated, nor is the establishment or operating of filling stations. According to key informant interviews and the literature, better regulatory framework is necessary to enable LPG market expansion.

Between 2012 and 2015, several groups attempted to develop additional legislation on LPG, including USAID/Chemonics, Total Haiti, the Mevs Group, and the Ministry of Commerce and Industry. None of these succeeded in passing through the government.

The latest compromise bill, put together by the BME, is currently under consideration by the government but is getting little traction.



## Selection of Past Projects

Organization	Project	Date	Location	# stoves/fuels	Type of stove/fuel
BME, World Bank, Canada	Recho Mirak – design and distribution	1980s	Port-au-Prince	6,000 (AFVP)	Improved charcoal stove
Shell-Sodigaz	Distribution of LPG cookstoves	1990-1993	Port-au-Prince	80,000	Bip ti Cheri stoves
CARE, Bureau des Mines et de l’Energie (BME)	Promotion of improved charcoal stoves	1996-2002	Port-au-Prince	20,000	Recho Mirak stoves
World Bank and local contractors	Project Recho Mirak	2008-2009	Port-au-Prince	30,000	Recho Mirak stoves
COSAN	Project Gaia Ethanol Stove and Fuel Pilot	2010-2011	Léogane, Marigot, Port-au-Prince	no data	CleanCook Ethanol Stove, One-Burner
Chemonics, USAID	Improved Cooking Technology Program	2012-2015	MAP		Improved charcoal stove, LPG
CDIFEEH SA	Rechauds Ameliores: une bonne affaire	Proposed in 2012	Port-au-Prince	200,000 proposed	Recho Mirak Stoves

# Case study of a large-scale cookstove and fuel program in Haiti:

## *USAID/Chemonics Haiti Improved Cooking Technology Program 2012-2015(ICTP)*

The Chemonics/USAID Improved Cooking Technology Program (ICTP) was the most recent and largest scale cookstoves and fuels project implemented in Haiti in almost 30 years of efforts. During the formative research stage and in multiple informant interviews the Alliance identified the USAID/Chemonics project as a key resource for gaining insights into the Haitian clean cooking and fuels market. Given that the final evaluation was published in November 2015 and that many key stakeholders were involved in the project, a thorough understanding of the projects successes and shortcomings informed the Alliance's work.

Between 2012 and 2015 Chemonics implemented the ICTP under a USAID-awarded contract of 8.2 million USD with the objective of reducing wood demand for cooking. The Chemonics project followed several years of research and market evaluation (Nexant 2010).

### **The projects four goals were as follows:**

1. Promote the use of more efficient biomass cookstoves in individual households;
2. Expand the use of cleaner, more efficient commercial-grade LPG stoves in individual households and businesses such as street vendors, schools, orphanages, which consume large amounts of charcoal;
3. Strengthen the legal and regulatory framework for the safe distribution and commercialization of LPG; and
4. Increase the program's impact and sustainability through carbon financing.

The project was implemented in the metropolitan area of PaP with mixed results. The final evaluation found that 6% of households in the program area adopted improved cookstoves, and 44% of orphanages, 12% of schools, and 22% of street food vendors adopted LPG (Chemonics 2015). While the project established and strengthened local institutions and entities of the Government of Haiti to produce cookstoves and made progress towards regulating LPG, the increase in production was not deemed significant.

### **The final evaluation of the project identified five areas on which future projects should improve:**

(1) The financial burden associated with purchasing/switching to ICS is the most significant factor preventing adoption of the stoves as well supporting the sale of products that have been shown to not be durable in the local environment. (2) The perceived explosion risk and the question of funding prevented users from switching to LPG. (3) A more focused awareness project on benefits to health and the environment of fuel switching is needed. (4) External factors, i.e. the lack of a functional parliament and ineffective government prevented the establishment of a regulatory framework for LPG. The project recommended that a team of technicians be set up to reconcile and contextualize various draft bills. (5) Projects should include all potential partners from the beginning of any process in order to prevent friction and promote transparency.

# Insights from 20+ Years of Cookstoves and Fuels Programs

**From the 1980s until present, Haiti saw over 20 different cookstoves and fuels projects.**

- Volume:** Projects ranged in volume from few thousand stoves distributed in less than a year to 80,000 distributed over three years.
- Technology:** biomass cookstoves, ethanol, and propane (LPG). The vast majority of projects targeted populations in the metropolitan area.
- Organizations and donors in this space:** large development organizations (World Bank, USAID, UNEP, CEPALC), local government (BME and Ministry of Environment), major energy companies (Shell, Elf, Total, Sodigaz), international non-profits (CARE, International Lifeline Fund), and local enterprises.
- Though many plans and projects were well designed, a significant number were never implemented, and several terminated early due external factors.

**The limited literature evaluating these projects and strategies in combination with key informant interviews identified three common barriers to realizing sustained impacts:**

**Price**—all projects noted the price of the stoves compared to traditional stoves as the principal barrier to entry in the market. Few projects were able to reduce the price through a market-based approach and many turned to stove giveaways and direct subsidies to catalyze the market. Inability to coordinate the private sector and limited scale prevented long-term and substantial impact. Those who attempted to overcome the price barrier with strategic subsidies did not have an exit strategy or long-term sustained financing.

**Limited timeframe**—the vast majority of projects lasted less than three years. The short timeframes of past projects and plans hindered even the most well-developed proposals. Due to the many challenges of operating in Haiti, projects found that 1 to 5-year funding cycles were simply not sufficient amount of time to realize impacts.

**Lack of institutions and regulation**—the lack of standards and regulations, as well as the coordinating mechanisms, institutions, and distribution channels necessary to support the market have prevented enterprise scale-up. Specifically, for LPG and ethanol, the lack of existing regulation and high taxes and tariffs inhibit increased imports and scale. Additionally, the importance and pervasiveness of informal charcoal production with little clarity in government regulation challenged projects promoting alternative fuels.

***Key lessons learned from past projects include:***

1. Sustained, long-term financing is needed for a large-scale cookstoves and fuels strategy to succeed in Haiti.
2. Coordination and buy-in across sectors is imperative to ensure that the impacts on health, environment, agriculture, livelihoods, and women are measurably achieved.
3. Government support is crucial to ensure that the policy environment in Haiti is conducive to the scale up of cleaner, more efficient cookstoves and fuels.

# Guiding Principles for a Successful Large-scale Cookstoves and Fuels Strategy

## Market-based approach.

- Inclusive market-based interventions have proven more effective than stove giveaways at achieving the adoption of cleaner and more efficient cookstoves and fuels.

## Technology and fuel neutrality.

- While wood charcoal will remain a cooking fuel for the foreseeable future, consumers must be able to choose from a variety of cleaner and more efficient cookstoves and fuels.

## Women's empowerment.

- Capitalizing on women's role as clean energy entrepreneurs and leaders in national and local efforts lead to the development of effective, culturally-appropriate, and sustainable solutions.

## Long-term and sustained efforts.

- The substantial barriers to accessing cleaner and more efficient cooking energy requires a sustained investment to transform the market.

## Local expertise.

- Local ownership drives sustainability; building on lessons learned from past projects, and relying on the expertise of Haitian managers lends itself to more effective program design and implementation.

## Collaboration.

- Building on the ongoing work, knowledge, and expertise of local sector partners – including the many complementary donor, civil society, and private sector initiatives underway in Haiti, prevents duplication and allows for the design of more effective interventions.



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