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Acknowledgements

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An always expanding list of Alliance partners is available within the Alliance community’s searchable online directory (http://community.cleancookstoves.org/). We are also grateful to those carbon market participants that provided additional survey information about their clean cookstoves market activities via Ecosystem Marketplace’s 2013 survey of carbon offset providers. For additional information on the results of that survey and a list of clean cookstove carbon offset provider respondents, see Maneuvering the Mosaic: State of the Voluntary Carbon Markets 2013, available for free download on the Ecosystem Marketplace website (http://www.ecosystemmarketplace.com/).

The Alliance is grateful for the generous financial and in-kind support for its monitoring and evaluation work provided by the Ministry of Foreign Affairs, the Netherlands; the Government of the Federal Republic of Germany; and INFOSYS; without which this report would not have been possible.

Photos courtesy of World LPG (front cover), Romana Manpreet (back cover), and Corinne Hart (back inside cover).
2012 RESULTS REPORT
Sharing Progress on the Path to Adoption of Clean Cooking Solutions
The Global Alliance for Clean Cookstoves (Alliance) was launched in 2010 with a goal to drive the adoption of clean cookstoves and fuels in 100 million households by 2020. In pursuit of this objective, the combined efforts reported by a wide range of Alliance partners working on different aspects of the issue are having positive impacts on public health, women’s empowerment, improved livelihoods, reduced environmental degradation, and enhanced energy access.

This report tracks partners’ global progress in 2012 toward their shared adoption goal, building on previous years’ results reporting conducted by the United States Environmental Protection Agency’s Partnership for Clean Indoor Air (PCIA).

This year, as part of its commitment to monitoring and evaluation, the Alliance assumed lead responsibility for annual results reporting.

In doing so, the Alliance has refined and further expanded results reporting to better enable a broader group of stakeholders to share progress and learn from one another.¹ The 2012 Results Report: Sharing Partner Progress on the Path to Adoption of Clean Cooking Solutions is envisioned to be the first in a series of annual results reports.

¹ The Alliance defines the cookstove sector to be all those involved in supporting the adoption of clean cooking practices and technologies, either directly (e.g., stove and fuel manufacturing and distribution); or indirectly (e.g., research, stove and fuel testing, consulting, philanthropy, and investment).
illuminating traction and trends in the cookstove and fuel sector. Since comparison with PCIA’s early data provides limited information on stove distribution trends, in most cases the information collected here will serve as the broader baseline for future reporting.

**Methods**

The Alliance has over 800 partners globally,² and the information presented in this report is based on data collected from that partnership base, including cookstove and fuel manufacturers, distributors, testing organizations, researchers, local implementing partners, consultants, carbon asset and offset project developers, multilateral institutions, investors, and other organizations.

The majority of the data was collected via an online survey designed by the Alliance with technical support from INFOSYS. The goal of the data collection effort was to help track activities relevant for each partner category. In addition, the Alliance partnered with Forest Trends’ Ecosystem Marketplace to obtain survey-based information on carbon offsets contracted from projects that

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² The Alliance had 745 partners when the survey was conducted.
reduce emissions from the distribution and use of clean cookstoves. The Alliance also partnered with Ecosystem Marketplace to analyze and present the results of the 2012 survey, culminating in this report.

Approximately one-third of partners responded to the survey. Submitted surveys were reviewed to clarify and confirm responses.

Findings are not meant to be definitive, but rather illustrate the momentum of the Alliance, its partners, and the sector in general. Readers should consider these findings as conservative, to be weighed alongside the rapidly expanding body of knowledge in this sector.

Results

Based on data from survey respondents, Alliance partners distributed approximately 8.2 million stoves in 2012, more than twice the number reported in 2011 (3.6 million) and accounting for almost half of all stoves distributed (17.5 million) since PCIA started tracking progress in 2006. Over half of all stoves (3.3 million) were sold directly to end users by manufacturers or other intermediaries. Another 2.5 million stoves were sold to intermediaries themselves, such as retailers or distributing organizations, to disseminate to end users in 2012 or in the future. Carbon offset project developers reported distributing the remaining 2.5 million stoves, but did not specify whether these stoves went to distributors or directly to end users.

Alliance partners reported on the income brackets and locations of the end users targeted by their activities. Poor and low-income consumers in urban or peri-urban areas were the most commonly targeted end users, followed by users within other income brackets in urban and rural areas. Rural residents represent 32% of cookstove end users, just slightly behind urban/peri-urban cookstove users at 33%. Emergency aid programs account

Figure 2: Stoves Distributed by End-User Country or Region
for only 1% of the 8.2 million cookstoves distributed, reaching around 0.7 million people. This indicates the large unmet need for better cooking technologies for the over 42 million people living in humanitarian contexts.

Testing

Testing cookstove and fuel performance with standardized methods enables more transparent information about and comparisons across various technologies and programs. Survey results demonstrate increasing activity by testing organizations providing services to other organizations, as well as by manufacturers testing their own products. Both types of testing are valuable - internal testing can be used for product development, and independent verification of testing results provides reliable reporting to consumers, investors, and donors. Around 84% of cookstove manufacturers reported testing their own stoves or enlisting third-party organizations to do so.

The sector is developing standardized testing methods to better evaluate technologies. A reported 12% of testing activities included safety testing. This expanded use of a relatively recently developed protocol indicates the sector’s willingness to quickly utilize new testing methods. Thus, anticipated developments for other testing areas can be expected to be adopted quickly.

Comparing testing data described in reports and publications to testing activities tracked in this survey, it is clear that only a small fraction of testing data is being reported publically. In many cases, testing data should remain proprietary, especially in the technology development phase. However,
increased openness and transparency of data can help the sector understand and improve performance and quality over time.

This report offers an informational baseline against which the Alliance will be able to track progress on the scaling up of more efficient and lower emissions technologies alongside the development and application of International Organization for Standardization (ISO) standards for the sector.

**Gender**

Women are the most exposed to and harmed by household air pollution and are therefore disproportionately impacted by the use of dirty and inefficient cooking practices and reliance on biomass for fuel. Because women are the primary cookstove users, their preferences and needs must be met in order for clean cooking technologies to be purchased, adopted, sustainably used, maintained, and replaced.

Many cookstove and fuel programs engage women in their activities. Only a handful of partners did not involve women in some way in their 2012 activities, and 172 partners actually prioritize women’s empowerment in their missions. While only one-third of respondents provided sex-disaggregated employment data, those that did reported that over half (54%) of positions were filled by women. Sex-disaggregated data is key to truly understanding the gender dynamics of the sector.

**Research**

Information is vital to furthering the adoption of clean cooking technologies and techniques, including investigating what consumers want, how they are using stoves and fuels, and the wide range of benefits they derive from doing so. In 2012, 87% of partners’ research activities were focused on household cooking devices, particularly related to users’ acceptance of cleaner technologies.

Geography and funding priorities helped shape partners’ research priorities. While market studies topped the research agendas in Africa and Latin America (16% and 19% respectively), it was the third-most researched issue in Asia, behind capacity building and technology adoption.

While around 4 million deaths are associated with household air pollution from cooking each year, few research efforts are being carried out on the health benefits of improved cookstove and fuel adoption.

**Financing for programs and enterprises**

Alliance partners operate at the crossroads of public, private-sector, and not-for-profit finance, where organizations’ activities may be simultaneously financed by multiple revenue streams. Beyond financial returns, these funding streams may expect to see additional results, including demonstrable benefits to the environment, public health, and/or livelihoods.

Sector-wide, the most commonly cited sources of partner funding were government grants (supporting 36% of respondents and combining domestic and international public giving); foundation grants (31%), individual donations (28%) and stove/fuel sales revenues (27%). Other major sources included private equity investments (another 30% of respondents) and multilateral grants (15%). Figure 4 depicts the sources of financing most commonly reported by partners across the value chain and presented according to partners’ roles and primary program beneficiaries. This report does not track the value of these financing arrangements, a topic ripe for future research.

In 2012, 4.1 million of the total 8.2 million cookstoves tracked in this report were distributed with at least some support from carbon finance, up from 15% in 2011. A total of 16.9 million carbon offsets were sold from cookstove projects in 2012, up from 4.2 MtCO$_2$e in 2011, and representing emissions reductions that have already resulted from partners’ activities or will in the future. These emissions reductions, valued at $167.3 million, are equivalent to closing between four and five coal-fired power stations for one year.

**Discussion**

The Alliance is already looking at lessons that can be drawn from the limited information presented in this report and is encouraged by the general alignment of partners’ missions with the overall Alliance mission, as well as the potential for continued growth.

Over time, and particularly as the Alliance continues its efforts to scale the global market for clean cooking technologies and fuels, this collective infor-
mation on partners’ progress can help inform the direction of Alliance efforts. For example, the data reveals strong engagement and momentum in the Alliance’s initial focus countries, and also a hint of other promising markets. It also sheds light on areas with less representation within the Alliance community that require attention – in the clean fuels and humanitarian sectors, for example.

This report is a first step toward developing a broad baseline to enable tracking of trends and identifying key highlights and challenges in the Alliance community, such as those described above. While the report suggests strong momentum among those partners who responded to the survey, there is still more work to be done, including developing a better understanding of the diverse needs of consumers and users; supporting enterprises in their distribution efforts; enhanced manufacturing through greater investment and brokering of partnerships; standardizing evaluation methods and data; and continued sharing of best practices and emerging research to further catalyze the sector while minimizing duplication of efforts.

The benefits of clean cookstoves and fuels will only be realized if they are sustainably adopted at scale. While this report is a key tool for benchmarking and tracking progress, it should be viewed as one component of the Alliance’s overall monitoring and evaluation strategy. Other components, including national results reporting, country-specific strategies in focus countries, qualitative and quantitative data on sustained adoption, and the development of tools for participatory approaches to monitoring progress, will be used to supplement this data on partner activities.

The Alliance is grateful to its partners that contributed valuable time to supporting data collection for this report, alongside their many other contributions to the sector.
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Table 5: Women’s Engagement in the Cookstove and Fuel Sector – By the Numbers  31
The Global Alliance for Clean Cookstoves was established in 2010 with a goal to drive the adoption of clean cookstoves and fuels in 100 million households by 2020. Both this objective and the paths that Alliance partners follow in its pursuit are sure to clear the way for significant public health progress, women’s empowerment, improved livelihoods, reduced environmental degradation, and enhanced energy access – alongside numerous other benefits.

Perhaps most significantly, it would help realize the Alliance’s motto, that cooking shouldn’t kill.

The Alliance continues to mobilize support from an array of partner organizations – and is neutral to partners’ region, sector, or market role as we work together toward this common, cleaner future.

With its partner community, the Alliance is targeting countries where market-based solutions can make a difference, by coordinating a plan for action across key sectors, globally. It is also raising awareness – from the household to policy-maker levels – about the benefits of adopting cleaner cooking techniques and technologies.

This report marks a first-of-its-kind effort by the Alliance to monitor and evaluate partner progress toward our shared goal of “100 by ’20”. While this inaugural edition tracks a conservative number of Alliance partners within the 800+ partner community, it is a first step toward illuminating trends in technology costs, distribution, adoption, and performance, as well as key highlights and challenges in the Alliance community and the sector more broadly.

The findings presented here are drawn from survey responses from approximately one-third of the Alliance’s Partners, so they are not meant to be definitive but rather illustrative of the momentum among partners and the broader sector. Readers should consider these findings as conservative, to be weighed alongside the rapidly expanding body of knowledge in this sector.

The Alliance is grateful to our partners that contributed valuable time to support our data collection, alongside their many other contributions to the sector. The Alliance remains fully committed to expanding the breadth and availability of this type of market-enabling, transparent information. Over time, and particularly as we move into the second phase of our efforts to scale up the global market for clean cooking technologies, this collective information on the progress of our partners will help inform the direction of Alliance efforts. We hope that the illuminating results presented here will inspire partners to share their progress in this and future years.

Sincerely,

Radha Muthiah
Executive Director, Global Alliance for Clean Cookstoves

2012 RESULTS REPORT
2. Results Reporting Approach

The 2012 Results Report: Sharing Progress on the Path to Adoption of Clean Cooking Solutions is the inaugural publication in a series of annual reports by the Alliance outlining the cookstove sector trends and growth. The methodology section describes the approach utilized to capture, compile, and present the report findings.

What are the objectives of this Results Report?

This Results Report is designed to provide a better understanding of the activities of the Global Alliance for Clean Cookstoves (“the Alliance”), including Alliance partners’ activities, results, and organizational goals – both forward-looking and carried out in survey year 2012. This is one of several monitoring and evaluation (M&E) activities undertaken by the Alliance to provide a credible and pragmatic framework to measure outputs, intermediate outcomes, and long-term impacts that result from the cookstove sector’s global activities.

How is the “cookstove sector”, as tracked in this report, defined?

In this report, the phrases “cookstove sector” or “cookstove market” describe all activities that support the adoption of cleaner cooking practices and technologies, either directly (e.g., stove and fuel manufacturing and dissemination); or indirectly (e.g., research, stove and fuel testing, consulting, and philanthropy and investment).

There is broad consensus across the sector that evidence of clean cookstove and fuel sales alone does not guarantee impact. Rather, stove sales are one indicator of success on the path to sustained clean cooking adoption and benefits. Thus, it’s valuable to track the number of stoves sold and adopted as an indicator of progress, without losing sight of the need to also assess other outcomes and impacts. This report tracks an array of key activities including stove and fuels manufacturing, testing, and dissemination; research; donor and investor activities; and carbon asset development and offset monetization.

How does this report series build upon other historical cookstove market tracking efforts?

Historically, the U.S. Environmental Protection Agency’s Partnership for Clean Indoor Air (PCIA) led efforts to track year-on-year progress within the cookstove sector, with a focus on recognizing partner accomplishments, publicizing collective results of efforts in the field, and tracking global progress in the use of cleaner, more efficient cooking and heating technologies and fuels.

For the 2012 report, the Alliance took over lead responsibility for annual results reporting from PCIA. In doing so, the Alliance has refined and further expanded results reporting to better enable a broader group of stakeholders to share progress and learn from one another. Since comparison with PCIA’s early data provides limited information on stove distribution trends, in most cases the information collected here will serve as the broader baseline for future reporting.

How did the Alliance collect partner and other data to inform this report?

The Alliance has over 800 partners globally, and the information presented in this report is based

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3 The Alliance defines the sector to be all those involved in supporting the adoption of clean cooking practices and technologies, either directly (e.g., stove and fuel manufacturing and distribution); or indirectly (e.g., research, stove and fuel testing, consulting, philanthropy, and investment).

4 The Alliance had 745 partners when the survey was conducted.
on data collected from that partnership base, including cookstove and fuel manufacturers, distributors, testing organizations, researchers, local implementing partners, consultants, carbon asset and offset project developers, multilateral institutions, investors, and other organizations.

The majority of the data was collected via an online survey designed by the Alliance, with technical support from INFOSYS. The goal of the data collection effort was to help track activities relevant for each partner category. The survey was available between March 18 and August 9, 2013.

In addition, the Alliance partnered with Forest Trends’ Ecosystem Marketplace to obtain survey-based information on carbon offsets contracted from projects that reduce emissions from the distribution and use of clean cookstoves. The Alliance also partnered with Ecosystem Marketplace to analyze and present the results of the 2012 survey, culminating in this report. For five years, Forest Trends’ Ecosystem Marketplace and Bloomberg New Energy Finance have published the State of the Voluntary Carbon Markets reports to shed light on trading volumes, credit prices, project types, locations, and the motivations of voluntary carbon offset buyers. Ecosystem Marketplace administered a survey to its 1,400-strong network of carbon offset project developers, retailers, and carbon asset developers to collect additional information regarding projects that leverage carbon finance to support clean cooking adoption alongside carbon emissions reductions.

What was the survey response rate?
Approximately one-third of partners responded to the survey. Submitted surveys were reviewed to clarify and confirm responses. It is critical to note that, due to partners’ geographic distribution, language barriers, and confidentiality issues regarding project finance and development, it is impossible to capture all partner activities.

Box 1. Beyond Results Reporting

This report is a key tool for benchmarking partner progress toward the Alliance’s goal of enabling 100 million homes to adopt new, clean stoves and fuels by 2020 (“100 by ’20”). Underpinning this target, the Alliance’s M&E strategy includes activities that range from top-down, to implementer-based, to participatory approaches. It incorporates qualitative as well as quantitative methods to assess a range of indicators spanning stove sales from dissemination to sustained adoption.

In addition to this annual results reporting effort, the Alliance is supporting:

1. National Results Reporting: The Alliance is partnering with the World Health Organization and the World Bank to ensure that survey questions are harmonized with influential top-down, routinely collected national survey instruments (including census, demographic and health surveys, UNICEF, etc.).

2. Measuring Progress in Focus Countries: The Alliance is developing M&E strategies tailored to Country Action Plans in each of its six Phase I focus countries: Bangladesh, China, Ghana, Kenya, Nigeria, and Uganda. A designated M&E point person will be appointed in each focus country to coordinate evaluation efforts. Country-specific indices of adoption will also be developed for each country.

3. Tools for Implementers: The Alliance is also developing detailed implementer tools to facilitate participatory approaches to monitoring progress. These tools will include mobile and web-based tools for monitoring sales and dissemination of cookstoves and fuels, and detailed survey instrument modules to assess indicators like adoption, severe burn rates, etc.

Armed with an ever-expanding suite of information tools, the Alliance and its partners are positioned to implement and evaluate various aspects of the organization’s phased business strategy, from Phase I (2012-2014: Launch global and in-country efforts to rapidly grow the sector); to Phase II (2015-2017: Drive investments, innovation, and operations to scale); to Phase III (2018-2020: Establish a thriving and sustainable global market for clean cookstoves and fuels).
Findings are not meant to be definitive, but rather illustrate the momentum of the Alliance, its partners, and the sector in general. Readers should consider these findings as conservative, to be weighed alongside the rapidly expanding body of knowledge in this sector.

**How does this report protect survey respondent confidentiality?**

This report presents only aggregate data; all raw survey data is treated as confidential. Additionally, this report does not present findings from any country, activity, or other variable for which fewer than three data points were reported – to protect the confidentiality of partner responses.

**How does this report account for and report quantitative findings?**

All financial figures presented are reported in US dollars unless otherwise noted. Whenever possible, findings are weighted by the number of stoves or fuels manufactured or distributed, or carbon offsets contracted. Numbers that are associated with carbon finance are measured in metric tons of carbon dioxide equivalent (tCO$_2$e) or million metric tons of carbon dioxide equivalent (MtCO$_2$e).
For over 40 years, numerous organizations – including partners of the Global Alliance for Clean Cookstoves (“the Alliance”) – have pioneered programs which propel the adoption of cleaner cookstoves and fuels. Adoption of cleaner cooking technologies has surged in the last decade, as social enterprises, governments, non-governmental and relief organizations (NGOs), and communities of stove users have increasingly recognized the diverse benefits of clean and/or more efficient stove and fuel utilization.

The Alliance’s partner organizations have distributed 17.5 million cookstoves since reporting in the sector began in 2006. Last year alone, partners distributed 8.2 million stoves, or more than twice the number tracked in 2011 (3.6 million), and almost half of all stoves distributed to date. Figure 5 illustrates this trend, where stove distribution has grown at an average rate of 74% year-on-year.

Within the Alliance partner community, the number of cookstove sector participants has grown at an increasing rate over the same period. A total of 246 partners responded to this report’s survey as being currently active in the cookstove sector. Overall, this represents one-third of the Alliance’s 745 surveyed partners (now 800+), though some roles are better represented than others (e.g., 82% of manufacturers responded).

Partner profiles

This report captures survey information from Alliance partners that may perform multiple functions in the cookstove and fuel value chain. In fact, 70% of surveyed partners report doing so, acting as both manufacturer and stove distributor, or providing both testing and other consultative services. At least 23 partners operate at five or more points along the value chain. Figure 6 compares survey respondents’ business activities to the partner community’s distribution across the value chain. Partners that engage directly with technologies – from designers to manufacturers to distributors – are the most numerous organizations among partners and survey respondents.
In 2012, partners reported distributing stoves and fuels to other distributors and/or end users in 59 countries – 44% more than 2011’s reach to 41 countries. Including partners that perform other sector functions, from donor governments to carbon asset developers, respondents reported working in 98 countries (Figure 8).

Here again, roles in the value chain vary slightly to significantly by respondent region (Figure 7). Reflecting the sector’s development focus, almost two-thirds (62%) of survey respondents are based in developing countries, or perform work in developing countries (80% of countries). This is particularly the case in Africa, home to 41 countries where partners are actively engaged and where 31% of them are based. As seen in Figure 7, these and other organizations based in developing countries were more likely to directly engage in cookstove or fuel production and distribution, while developed country partners worked slightly more on the side of research, carbon asset development, and humanitarian programs.

Finding funding at the crossroads

Alliance partners operate at the crossroads of public, private-sector and not-for-profit finance, where organizations’ activities may be financed by multiple revenue streams simultaneously. These funding streams each carry their own expected outcomes, from stove and fuel sales revenue to demonstrable benefits to public health and livelihoods. Sector-wide, the most commonly cited sources of partner funding were government grants (supporting 36% of partners, and combining domestic and international

Table 2: 2012 Alliance Partner Performance: By the Numbers

<table>
<thead>
<tr>
<th>Category</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Responses (# partners)</td>
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<tr>
<td>Stoves distributed</td>
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<tr>
<td>Stoves manufactured</td>
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</tr>
<tr>
<td>Fuels distributed</td>
<td>7.5 million kg</td>
</tr>
<tr>
<td>Fuels produced</td>
<td>6.4 million kg</td>
</tr>
<tr>
<td># countries where partners worked</td>
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</tr>
<tr>
<td>% manufacturers reporting stove/fuel testing</td>
<td>84%</td>
</tr>
<tr>
<td># countries where testing occurred</td>
<td>48</td>
</tr>
</tbody>
</table>

Source: 2012 Results Report, Global Alliance for Clean Cookstoves.
Notes: Based on 246 responses.
Figure 7: Distribution of Survey Response Rates (Region), Country Headquarters, & Sector Roles (Count and % Share)


Figure 8: Distribution of Regional Response Rates and Count of Reporting Partners Active In-country (Count)

public giving); foundation grants (31%), individual donations (28%) and stove/fuel sales revenues (27%). Other major sources included private equity investments (another 30%) and multilateral grants (15%).

As seen in Figure 9, partners’ engagement with multiple funding sources varies by their value chain role and activities. For example, while carbon finance only supports 6% of partners globally, it is the primary source of funding for those developing carbon projects or assets. In similar fashion, international government grants were the primary source of funding for domestic government programs, while stove and fuel sale revenues were the primary sustenance of partners working directly in distribution.

Where missions meet markets

Household stove users are the anticipated beneficiaries for 73% of surveyed partners. Given this, it is not surprising that the top funder and partner combinations shown in Figure 9 primarily target end users. Whether partners hail from public agencies, private companies, or NGOs, most of their organizational missions and objectives coalesce around themes related to this population. For example, when asked how the Alliance’s mission and values rank among partners' priorities, improving health topped the list, with 95% selecting it as “highly important” or “fairly important”. Creating local livelihoods was a close second (93%) and is reflected in the 76,188 people employed worldwide in the implementation of partners’ programs. While only one-third of respondents provided sex-disaggregated employment data, those that did reported that over half (54%) of positions were filled by women.

Improved access to energy is a primary objective of stove distribution programs. An overwhelming number of partners (200) cited energy efficiency as the key aim of their stove and fuel distribution efforts, closely followed by access to sustainable energy (173) and access to energy generally (160).
Stove and fuel producers are the first stop in the value chain for clean cooking solutions. Partners that identify as manufacturers make up the largest number of survey respondents (100), many of them overlapping with other roles like distribution (67) and design (58). While they may cover multiple areas within the distribution chain, manufacturers’ operations tend to be focused on producing only one type of stove (43%) and/or one type of fuel (87%). Almost all fuel producers also manufacture stoves.

In 2012, partners reported manufacturing 9.6 million stoves and producing 6.4 million kg of fuels, including 1.8 million kg of alcohol, gas, and methane. Stove manufacturers reported activities in 48 countries, while fuels were produced in 18 countries. Africa dominated the manufacturing sector, engaging actors in 22 countries. Manufacturers also operated in another 22 countries across Asia and Latin America.

Model attributes and material possessions

Overall, over half of stoves manufactured were biomass stoves (54%) – three-quarters of which originated from Africa-based programs. Portable, natural material stoves intended for cooking accounted for one-third of all stoves manufactured.

While the types of stoves and fuels produced and distributed vary by region, rocket stoves were the most prevalent technology produced (Figure 10). Defined in the survey as “side-feed, natural draft biomass” rocket stoves, these stoves topped the chart in every region, totaling 4.2 million manufactured. In contrast, 0.5 million side-feed, forced air biomass stoves were produced.

Charcoal stoves and coal stoves were also widely produced, though coal stoves were sourced from only a handful of partners. Liquefied petroleum gas (LPG) and gasifier technologies were produced and distributed in significantly smaller quantities.

Of all stoves manufactured last year – portable, fixed, cooking, and heating – three out of four stoves were made from clay, ceramic, brick, or cement materials. Around 30% of stoves manufactured last year were made from these natural or constructed materials. The remaining 70% were made from materials like plastic, metal, or glass.
year included a chimney – the vast majority of these were non-metal stoves.

Around 70% of all stoves manufactured by partners were portable. The majority of portable stoves (79%) were made from materials such as clay, bricks or cement (as opposed to metal), as were almost all fixed/built-in stoves. Metal stoves were also predominantly portable (70%).

Production costs
Respondents reported a wide range in the unit costs of production for various stove types. Unit costs for more common stove types range from $5-8/stove (coal and charcoal stoves) to an average $10.7/stove (rocket stoves). LPG and gasifier stoves had the highest costs of production reported – averaging $135 and up.

Manufacturers’ unit costs were impacted by stove attributes including technology and design elements like chimneys and primary stove materials, as well as permanence versus portability. These attributes may also influence stove lifespan.

As the sector better integrates manufacturing data with information on stove and fuel performance, price, and usability, future Results Reports can be expected to offer a clearer picture of whether manufacturers are focused on low-cost technology options with higher usability or higher performing technologies that may have higher prices.

Stove lifespan
The average lifespans of stove technologies are self-reported by manufacturing partners. Survey respondents described wide variability in the average lifespans of stoves produced. For example, rocket stoves were reported to have an average lifespan of 4.7 years, far longer than charcoal stoves (3.8 years), but the estimated ranges reported for all stoves overlap. Other stoves were reported to have comparably longer lifespans, like gasifier stoves at 5.4 years; alcohol stoves at 6 years; or LPG stoves at almost 7 years. Efforts to standardize methodology to quantify durability are ongoing, and improved estimates of durability can be expected in future years.

Parts and labor
The largest proportion of stoves manufactured in 2012 (81%) were constructed using 100% domestic parts, labor, and natural materials, addressing the goal of enhancing livelihoods through a market for
clean cooking solutions. Another 16% of stoves were imported devices or were assembled domestically from imported parts. However, imported parts may not always be readily available in some regions.

Africa as a region was the point of origin for the largest number of stoves manufactured (4.8 million), 78% of which originated in Ethiopia and Kenya. Asia accounted for another 4.3 million stoves manufactured. There, China was the world’s single largest country of origin for stoves manufactured in 2012 (at least 3.3 million stoves). Around 34% of these stoves were reported as being subsequently exported to distributors or end users in 23 other countries.

After China, Ethiopia, and Kenya, manufacturers in Cambodia, and Bangladesh were the fourth and fifth most prolific manufacturing countries, accounting for a combined volume of almost 1 million stoves of rocket and other undefined biomass stove varieties.

**Fuel production**

Likely due to resource availability and affordability, biomass-based fuels were the predominant fuel types reported as being produced, which include briquettes, pellets, and other types of unprocessed or minimally processed biomass.

This survey also tracked the production of alcohol, biogas, and methane fuels. These fuel categories cannot be disaggregated due to confidentiality concerns, but collectively, these clean-burning fuels comprised over 1.8 million kg, or around 30% of the total production in 2012. The majority of these fuels (97% or 6.2 million kg) were produced in Africa.

As data availability expands in future years, aligning fuel manufacturing data with stove manufacturing and dissemination data will enable the Alliance to track progress on whether appropriate fuel supply is matched to stove supply and is based on available environmental resources.
5. Testing and Standards

The clean cookstove sector has an increasingly diverse mix of practitioners and investors, with rising potential for different interpretations of terms like "clean" and "efficient". Thus, standardized methods and common and quantified terminology for describing performance and quality is needed. As seen in Box 2, the Alliance’s multi-pronged strategy for sectoral transformation includes promoting the development of international standards and rigorous testing protocols. Testing stove and fuel performance against commonly agreed-upon standards enables more transparent information about – and comparisons across – various technologies and programs.

Testing can be conducted internally by manufacturers or designers during stove development and can also be conducted by third-party testing organizations which provide independent results to report to consumers, investors, and donors. This section reports on testing activities that occurred in 48 countries – where 72 manufacturers tested their own stoves in 32 countries; and 103 third-party organizations (consultants, researchers, and universities) tested stoves and fuels in 38 countries. Among those manufacturers that tested their own models, 50 of the 72 organizations also contracted third-party testing services for at least one model.

Figure 13: Regional and Country Distribution of Testing Activities, Manufacturers, and Testing Centers

Notes: Based on responses from 246 survey respondents. Due to challenges in accounting for unique stove models as reported in the 2012 survey, it is possible that some models might have been reported as being tested more than once. Thus, this report tracks occurrences of testing – in which the test (but sometimes not the stove model) is unique.
Due to challenges in accounting for unique stove models as reported in the 2012 survey, it is possible that some models were reported as being tested more than once. Thus, this report tracks occurrences of testing – in which the test (but sometimes not the stove model) is unique. Despite this limitation, survey results demonstrate increasing activity by testing organizations providing services to other organizations, as well as by manufacturers testing their own products. Both types of testing are valuable – internal testing can be used for product development, and independent verification of testing results provides reliable reporting to consumers, investors, and donors.

Around 84% of cookstove manufacturers reported testing their own stoves or enlisting third-party organizations to do so. While not all manufacturing processes produce equally uniform products, the level of testing potentially covers a large proportion of the 9.6 million stoves manufactured in 2012.

Figure 13 depicts the locations of manufacturers or organizations that engage in testing that were active in 2012. Overall, occurrences of testing activities are comparable across the sector’s most active regions (Africa and Asia). Due to the high number of research and testing organizations based in the US and Canada as compared to other regions, a high proportion of testing activities were reported by American and Canadian organizations. Across all regions, most respondents to this survey section indicated that testing and research were...
their primary business activities, indicating a high level of independent testing by organizations that do not produce or distribute their own products. Some respondents were also engaged in distribution (15%), or manufacturing and/or design (8% respectively). NGOs made up half of all organizations performing testing.

**Testing protocols and indicators**

Figure 14 illustrates the wide variety of protocols available to organizations that engage in stove and fuel testing. While some test types saw significant application in 2012 – like lab-based Water Boiling Test (WBT) or safety tests – within these broad categories the use of different protocols or approaches may render different results, which indicates the need for further standardization of methodologies.

At a high level, the WBT is the most commonly applied test (in this data set and broadly speaking) for almost all tested stove types. Alcohol stoves were an exception, where respondents reported a larger number of occurrences of testing to the field-based Kitchen Performance Tests (KPT).

Evaluating stoves against safety guidelines to minimize user risk was also a common parameter of stove testing, tracked as the second most popular test type and commonly applied to rocket, charcoal, and plancha stoves. This expanded use of a relatively recently developed protocol indicates the sector’s willingness to quickly utilize new testing methods. Thus, anticipated developments for other testing areas can be expected to be adopted quickly.

Another field test, the Controlled Cooking Test (CCT), was applied to stove types that were not

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manufactured in large volumes but nonetheless underwent testing – including LPG, biogas, and forced air biomass stoves. Further down the list, Uncontrolled Field Tests were applied in 5% of testing instances, mirroring findings from the Alliance’s 2012 Stove Performance Inventory Report.

Figure 15 shows the number of testing instances reported for each stove type. Lab tests were applied only slightly more often (51%) than field tests. Typically, lab-based tests are more straightforward and inexpensive. Water Boiling Tests – a typical lab-based test type – are used to assess stoves’ technical performance in a controlled and repeatable manner, but may not reflect performance in everyday use. Controlled Cooking and Kitchen Performance Tests (CCT and KPT; 21% of testing activities reported) evaluate usage and performance data with typical users (CCT) and in households (KPT), so are more representative of actual use but are not as controlled and require larger sample sizes for reliable results.

Because of these different tradeoffs, laboratory and field testing are complementary. Of the testing activities that occurred in the field (145) or in a lab (153), at least 79 of these occurrences accounted for information obtained both in the field and lab.

In the lab and field, efficiency and fuel use indicators are used to evaluate potential for fuel savings and benefits for the environment. Emissions indicators are relevant for health and climate impacts. The stoves need to be used and displace traditional technologies to achieve these impacts, so usage is another important indicator. The testing activities reported in 2012 were fairly evenly focused across these broad areas, indicating relatively equal prioritization of health, environment, and adoption.

The most popular indicator measured in field testing was stove usage rates, the popularity of which may relate to the number of stoves that are certified to carbon standards that require regular reporting of stove usage over time.

**Looking ahead**

Comparing testing data described in reports and publications to testing activities tracked in this survey, it is clear that only a small fraction of testing data is being reported publically. In many cases, testing data should remain proprietary, especially in the technology development phase. However, increased openness and transparency of data can help the sector understand and improve performance and quality over time.

This report offers an informational baseline against which the Alliance will be able to track progress on the scaling up of more efficient and lower emissions technologies alongside the development and application of International Organization for Standardization (ISO) standards for the sector.
Standards that are based on rigorous testing methods are part of a mature technology sector and help to drive innovation, ensure quality and performance, and facilitate trade. In 2012, developing standards were a major focus of the Alliance and its partners, to strengthen the cookstove sector’s ability to evaluate and communicate performance and quality of cookstoves and fuels and improve the adoption of high quality and user-desirable technologies. With established standards for the clean cooking sector, consumers can make informed choices, entrepreneurs can affirm product quality, investors and donors have a credible basis for comparing options, and all stakeholders have a common terminology.

**Box 2. Alliance Standards Progress in 2012**

Standards that are based on rigorous testing methods are part of a mature technology sector and help to drive innovation, ensure quality and performance, and facilitate trade. In 2012, developing standards were a major focus of the Alliance and its partners, to strengthen the cookstove sector’s ability to evaluate and communicate performance and quality of cookstoves and fuels and improve the adoption of high quality and user-desirable technologies. With established standards for the clean cooking sector, consumers can make informed choices, entrepreneurs can affirm product quality, investors and donors have a credible basis for comparing options, and all stakeholders have a common terminology.

**International Organization for Standardization (ISO)**

Comprised of a network of 164 national standards bodies, the ISO process has been used to develop over 19,500 International Standards. The Alliance has partnered with ISO and national standards bodies to provide a consensus-based and transparent process for clean cooking sector experts to develop and approve standards.

**Progress to date – International Workshop Agreement (November 2012)**

International Workshop Agreements (“IWAs”) are a streamlined ISO consensus process that can be a first step toward formal ISO standards. Approved in February 2012, the cookstoves IWA provides a framework toward rating cookstoves on 4 indicators, each along 5 tiers. The IWA also identified 6 resolutions for additional work, which Alliance partners have been working together to address.

**This International Workshop Agreements (IWAs) framework:**

1. Acknowledges progress while setting aspirational goals
2. Allows organizations and countries to select indicators and tiers based on local priorities
3. Allows for harmonizing different protocols together (e.g., allows for harmonization of different protocols)
Ongoing Progress – ISO Technical Committee 285 on Clean cookstoves and clean cooking solutions

ISO/TC 285, the key body that will develop and approve standards, was approved in June 2013. Kenya and the United States will serve as Co-Secretariats of the committee. The committee will be comprised of experts from participating national committees and external liaisons. The first ISO/TC 285 meeting will be held 4-8 November 2013 in Nairobi, Kenya.

Additional Testing Activities in 2012

Developing a global network of centers for stove testing to catalyze regional activities

In fall of 2012, the Alliance awarded grants to over a dozen institutions in developing countries to build capacity as Regional Testing and Knowledge Centers (RTKCs). These institutions are strengthening their staff and equipment to be able to provide testing and knowledge-sharing services to catalyze regional cookstove activities. Beyond these institutions, the Alliance has also been working to establish a broad global consortium of testing organizations to share best practices and standardize results through regular in-person training workshops and webinars.

Integrating and sharing data about technology options

The Alliance has compiled stove performance data for laboratory and field testing performed over the last few decades and developed the Clean Cooking Catalog, a global guide to clean cooking solutions. This online resource has prices, performance, and characteristics of over 60 stove models and over 500 test results and integrates information from manufacturers and testing organizations.

Standards Development Process

- Discussions convened by Alliance
  - Protocol development
  - Draw tiers for protocols
  - Standardize reporting guidelines
  - Status: ongoing discussions

- International standards development
  - Follow established procedures
  - Status: IWA in February 2012 and new ISO technical committee established in June 2013
  - Technical committee meeting scheduled for November 2013

- Working group of experts start discussion to prepare a working draft

- First working draft shared with technical committee and with ISO CS

- Draft shared with all ISO national members for comments

- Final draft sent to all ISO members

- First working draft shared with technical committee and with ISO CS

- National Adoption and Implementation of Standards
  - Follow established procedures
  - Testing and certification
  - Labeling and enforcement

*Central Secretariat
As the “connective tissue” between stove and fuel producers and their ultimate end users, Alliance partners engaged in distribution saw their activities intensify in step with related sector trends – nearly outpacing distribution in all previous years combined.

Partners reported distributing a total of 8.2 million stoves, or 47% of all stoves that have been distributed and reported since reporting on stove distribution efforts began in 2006. This does not capture the number of stoves distributed globally by non-partners, partners that did not complete the survey, or any stoves distributed pre-2006. It does, however, offer a clear indication of expanding capacity and access to financing among distributors and their go-to channels for relaying technologies and tools to end users.

A total of 154 partners reported distribution activities in 2012, compared to 123 in 2011 – 37% of these were return respondents. Using the number of stoves distributed as a proxy for business expansion, the majority of return respondents did experience growth from 2011 to 2012, with the exception of distributors that supplied between 5,000 and 10,000 stoves. Overall, survey data reveals an average of 80% year-on-year growth in stove distribution among partners that responded to both years’ surveys.

Findings in this section are influenced by the sheer variety of distributing organizations and end user populations. As seen in other report sections, 1% of stoves were distributed via humanitarian organizations last year, while another 30% were

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**Figure 16: Comparison, Number of Stoves Manufactured and Distributed, 2012**


Notes: Based on 774 observations. “TLUD” references top-lit updraft gasifiers.
distributed by partners hoping to generate carbon offsets. Activities reported in-depth by the remaining 69% of stove distributors are the subject of this section.

Over half of all stoves (3.3 million) were sold directly to end users by manufacturers or other intermediaries. Another 2.5 million stoves were sold to intermediaries themselves, such as retailers or distributing organizations, to disseminate to end users in 2012 or in the future. Carbon offset project developers reported distributing the remaining 2.5 million stoves, but did not specify whether these stoves went to distributors or directly to end users. It is also impossible to determine market turnover for stoves that continue to change hands within the distribution chain, based on existing data.

It is also important to note that data presented in this section regarding technologies, fuels, or finance does not follow perfectly from findings presented about manufacturing trends. This is due to natural imperfections within the marketplace as well as incomplete data. Thus, while many trends do bear some similarities to other report sections, this report is limited in its ability to draw a perfect picture of the cookstove sector’s value chain in action. As manufacturers, distributors, and retailers continue to develop systems for serializing and tracking stoves, a more integrated system of reporting will be possible in future years.

Manufacturing and distribution data may not perfectly align – but many underlying trends are nonetheless fairly consistent. For example, the popularity of rocket stoves, preference for portability, and regional market share.

While rocket stoves currently dominate manufacturing, in the field they shared the stage more equitably with other stove types, including those that were charcoal- or coal-burning (mostly distributed

Figure 17: Stoves Distributed by End-User Country or Region
in Africa and Asia, respectively). Rocket stoves topped the charts for distribution volumes in Africa and Latin America, while in Asia partners reported a minimal distributed volume.

“Other” undefined biomass stoves were also a more popular category in practice. This category captures a few less-common stove types, including the distribution of 112,344 plancha stoves – a popular (primarily “built-in-place”) stove type in both Latin America and West Africa, where plancha stoves are very closely tied to particular cooking practices.

Overall, stoves that were built in place for heating or cooking were more commonly reported among distributors than by manufacturers/designers. Here, too, regional preferences for portability (65%) versus permanence (35%) were incredibly consistent across the board. Partners reported that the cost to end users for built-in models was, on average, 58% higher than for portable models.

The “other” category seen in Figures 16 and 17 captures more unique (and often costlier) stove types like LPG stoves and box or parabolic solar cookers. If analyzed independently, the volume of stoves distributed from these low- to zero-emissions stove types represents less than 0.1% of all stoves tracked – in the case of LPG, limited by the higher cost of the technology itself and consistent need for fuel. In support of this technology, however, partners report that 4 million kg or 54% of the total 7.5 million kg of fuels distributed were LPG. This is almost certainly a vast underestimate of the LPG distribution network and is most likely attributable to a limited response rate from LPG distributors.
Turning to materials, metal stoves comprised a larger proportion of stoves distributed than manufactured (1:3 versus 1:4) – representing 43%-45% of all stoves distributed in Latin America and Africa, but only one of every four stoves in Asia, where the regional preference is for stoves constructed from natural materials.

Region is of course a critical determinant of stoves preference (as seen in the case of plancha stoves), though some types like biogas and charcoal-burning stoves are universally distributed. Design elements like chimneys reveal themselves as regionally relevant, too, seeing sizable delivery in Asia only.

**From distributor to doorstep**

In a sector where 81% of products are made from 100% domestic parts and labor, distribution locales are often firmly linked to their operational headquarters. This is unsurprising given the characteristic challenges of reaching the so-called “last mile” to end users based in an array of challenging settings.

As seen in Figure 18, just over one-third of responding distributors are headquartered in Asia and primarily distribute cookstoves within the continent to a mix of distributors and end users. Africa- and Latin America-based distributors are also understandably internally focused entirely on domestic populations, predominantly end users.

Partners report that the process of getting stoves from distributor to doorsteps also varies significantly by region. In Africa, for example, distribution involves a complex mix of both direct and indirect (third-party) door-to-door sales and leveraging the existing distribution channels of

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Figure 19: Proportion of Stoves Distributed by End-User Setting and Income Level (% share)

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Source: 2012 Results Report, Global Alliance for Clean Cookstoves.

Notes: Based on 774 observations.
local implementing partners, NGOs, or other micro entrepreneurs. In Latin America, the direct door-to-door sales approach is slightly more common (40% of distributed stoves reported), while Asia-based distributors primarily harvested existing distribution channels as a proportion of all stoves distributed (60%). According to absolute numbers of stoves distributed, the strongest distribution channels were found in Africa – specifically those in Uganda and Ghana, which together channeled the distribution of just over 1 million stoves. It is unclear whether distribution in these countries are heavily dominated by one or a few players, or if the stoves are distributed at relatively equal volumes by a number of players.

**End-user demographics**

Among the more commonly reported end user demographics are poor and low-income stove users in urban areas, or on the “peri-urban” city outskirts, followed by users within several income brackets in both slum and rural areas. That rural residents represent 32% of stove end users – just slightly behind urban stove users at 33% – is a key highlight of partner efforts to deliver cleaner cooking technologies and techniques to access-challenged populations.

Across all of these types, partners reported that men and women were equitably served by distribution programs (19% of users, each), followed by another 36% of consumers that were already buying stoves and/or fuels. This is in line with the significant proportion of urban users that are most likely to buy, rather than “gather” due to issues of access to raw materials. Institutions and community groups made up 22% of end users, which is roughly proportionate to the volume of research compiled on these subgroups in 2012 (see “Research”).

**Financing**

Willingness and ability to pay varies by end users’ demographics. With the exception of humanitarian programs, where 80% of stoves were not purchased by the end users, 99% of stoves within the sector as a whole were purchased by end users. As seen in Figure 19, humanitarian programs focusing on refugee, internally-displaced persons (IDPs), and other disaster- and conflict-stricken areas serve a small proportion of stove users globally and are discussed at greater length in this report’s “Humanitarian Programs” section.

The increased material and design costs associated with producing better performing stoves will remain a challenge for the sector until economies of scale can be reached and willingness/ability to pay are increased.

Distributing locally manufactured, lower-quality stoves will continue to be more profitable in the absence of innovative financing models, including carbon finance, to encourage adoption of better performing technologies. The price that end users ultimate pay for stoves and/or fuels is sometimes partially offset or financed by the distributor, subsidized by the government or other organizations, or by in-kind contributions from end users themselves.

The most popular financing options to reduce the economic burden to end users ranged from carbon finance, which supported the distribution of 4.1 million stoves; to subsidies offered by the distributor or a related organization (1 million stoves); to buyers’ in-kind contributions of skills rather than cash (behind 0.7 million stoves distributed). End users also leveraged micro-finance or installment payments to purchase another 0.4 million stoves.

Despite a plummeting “carbon price” in 2012, which is discussed in this report’s Carbon Finance section, carbon finance was used to support the distribution of half of all stoves survey-wide and was the most popular finance option for distributors in Africa.

On average, end users saw a 34% reduction in cost for the 95 models that reported leveraging this and other types of financing – an average $8 discount. Evaluating the sector’s most popular technologies and financing arrangements, this trend is also seen where the end user cost of the average rocket stove is $28 without subsidy and between $6 and $10 with the support of own-organization or carbon finance, respectively.
Humanitarian cooking programs are delivering life-saving interventions to the most vulnerable populations around the world. Because most of the food provided in humanitarian settings must be cooked before it can be eaten, women must risk their physical safety, health, and sometimes their lives to collect firewood and cook meals for their families. These programs provide cookstoves and fuels in severely resource-constrained environments, making distribution very challenging. Safe interventions are especially important, since fires in these densely populated areas can be devastating. More efficient technologies can reduce the need to collect fuel, which can decrease vulnerability to gender-based violence. Reflecting a large unmet need, emergency aid programs account for only 1% of the 8.2 million stoves distributed worldwide, reaching only 0.7 million people out of the over 42 million refugees and internally displaced people (IDPs) in the world today.

In contrast to the broader sector’s reliance on a mix of funding from foundations, donations, sales revenue, and several other sources, humanitarian programs relied most heavily on donations, philanthropy, and grants. While the broader sector gave away only 1% of cookstoves for free, relief programs distributed 89% of their cookstoves for free, valued at $1.6 million. However, because implementers are purchasing the stoves at some point in the transaction, humanitarian interventions still contribute to the creation of a thriving global market.

Refugee and IDP camps were the settings for two-thirds of partners’ humanitarian work last year. The remainder focused on areas afflicted by natural disasters or conflicts. Countries where partners reported the largest number of humanitarian programs include Bangladesh, Haiti, and the Philippines.

Table 3: Comparison of Humanitarian and Sector-Wide Stove and Fuel Distribution Programs

<table>
<thead>
<tr>
<th>Program element</th>
<th>Sector-wide</th>
<th>Humanitarian programs only</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total stoves/fuels disseminated</td>
<td>8.2 m stoves / 7.5 m kg fuels</td>
<td>0.08 m stoves / 0.05 m kg fuels</td>
</tr>
<tr>
<td>Program country locations reported</td>
<td>59 countries</td>
<td>21 countries</td>
</tr>
<tr>
<td>% programs in Least Developed Countries (LDCs)</td>
<td>44% LDC-based</td>
<td>62% LDC-based</td>
</tr>
<tr>
<td>% programs disseminating stoves free of cost to end users</td>
<td>9% of programs</td>
<td>78% of programs</td>
</tr>
<tr>
<td>Most common stove type</td>
<td>36% side-feed ROCKET models</td>
<td>78% side-feed ROCKET models</td>
</tr>
</tbody>
</table>


Notes: Based on 27 humanitarian organization responses.
Here, too, rocket cookstoves topped other cookstove types as the device chosen by almost 80% of humanitarian programs. Portable cookstoves were favored over fixed stoves by a scale of 3:1. When selecting cookstoves for relief work, rapid deployment and use were key – determined by durability, cultural acceptance, and partners’ previous experience with the technology. Cost and availability of the fuel type were also critical considerations.
The carbon offset market sprang to life in the middle of the last decade with the global launch of the Clean Development Mechanism (CDM) international offset program – intended to achieve the United Nations’ climate change and sustainable development aims. Clean cookstove and fuel projects were well suited for the CDM, as they uniquely address not only carbon emissions but also public health, gender, and employment issues, and often in least developed countries (LDCs).

In 2012, 4.1 million of the total 8.2 million cookstoves reported as distributed in this report were disseminated with at least some support from carbon finance, up from 15% in 2011. A total of 70 survey respondents contracted 16.9 MtCO\textsubscript{2}e in offsets, for immediate or future delivery to voluntary or compliance buyers (Box 3).

Figure 20: Cookstove Project Offsets Contracted: Historical Volume, Average Price, and Standard (MtCO\textsubscript{2}e and $/tCO\textsubscript{2}e)

Notes: Based on 70 carbon offset retailer and carbon asset developer responses.

Box 3. Carbon Offset Markets Explained

Organizations buying carbon offsets that support clean cooking may do so because they want to – or because they have to.

Depending on the guidelines used to measure carbon emissions reductions from more efficient cooking, cookstove project developers can generate and sell offsets to compliance buyers driven by regulation; or to voluntary buyers driven by social responsibility, branding, or other motivations to offset their carbon footprint.

In a compliance carbon market, a central regulator caps the level of emissions allowed from regulated sectors (e.g., power generators, heavy industry, transport). Emissions allowances, each one representing one metric ton of carbon dioxide equivalent (CO\textsubscript{2}e), are distributed to participants, either for free or at auction.

Participants can sell unneeded allowances and those that emit more than their cap can purchase allowances or regulator-approved carbon offsets to balance excess emissions.

The largest source of international offsets for compliance carbon markets is the UN’s Clean Development Mechanism (CDM). The CDM has methodologies to produce certified emissions reductions (CERs) that are approved by regulators like the European Commission. CDM projects can additionally certify their sustainable development “co-benefits” to the Gold Standard, thus creating Gold Standard CERs.

In the voluntary carbon offset market, demand is not driven by regulation, but by businesses seeking to offset emissions from their activities (like transport), often in pursuit of corporate social responsibility (CSR) commitments. NGOs, individuals, and governments may also wish to offset their emissions.

Continued on next page...
Anecdotal evidence suggests that 2012’s quadrupling in cookstove offsets contracted stems from project developers’ growing awareness of how the carbon market can support such projects. Some cookstove projects that previously would have been exclusively funded by donor-aid programs are now looking to the carbon markets and using proceeds from offset sales to reinvest in additional projects or the host communities.

Favorable pricing may also have helped the uptake of cookstove projects with carbon financing: the survey found that offsets from cookstove projects averaged $9.9/tCO$_2$e in 2012. Respondents note that some European governments also remain willing to pay higher-than-average prices for cookstove CERs from the CDM primary market ($3/tCO$_2$e average in 2012). The 2012 average price nonetheless fell from $13.2/tCO$_2$e as reported in 2011.

Some project developers fear that prices will continue to fall due to the uncertainty surrounding the future of compliance markets, but also to ever-increasing volumes of offsets becoming available from cookstove projects. Competition from other project types which similarly address development and climate goals, like water filter distribution, could further depress prices. Even so, cookstove offset

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**Box 3. Carbon Offset Markets Explained (continued)**

Although CERs can be sold into the voluntary market, there are also several standards that guide the development of voluntary emissions reductions (VERs), like the Gold Standard and Verified Carbon Standard. Each standard offers their own rules for carbon accounting and registry systems to track offsets as they change ownership. Voluntary buyers typically look for interesting projects with a unique story behind them – these types of offsets are also known as “charismatic offsets”. Clean cooking offsets are often very desirable to these types of buyers.

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**Figure 21: Flow of Cookstove Offsets from Supply Region to Buyer Region, 2012 (Count and MtCO$_2$e)**


Notes: Based on 70 carbon offset retailer and carbon asset developer responses. Transactions described in this chart only apply to offsets for which survey respondents reported both project and buyer location and so do not total 16.9 MtCO$_2$e.
prices are expected to remain above the average VER price ($6.2/tCO\textsubscript{2}e in 2012).

**Standard-bearers**

Over half (56%) of cookstove offset projects were developed according to CDM guidelines, although some CDM project developers sold these traditionally compliance market-facing offsets to voluntary buyers since CDM credits can be sold in either market and voluntary buyers paid higher average prices.

A further 36% of offsets were certified to the Gold Standard, primarily VERs. These offsets typically attract higher prices as Gold Standard projects must prove additional contributions to sustainable development in order to claim offsets.

**Who, what, where, and why of transactions**

Survey respondents sold 16.9 MtCO\textsubscript{2}e of offsets from cookstove projects in 2012, up from 4.2 MtCO\textsubscript{2}e in 2011 – valued at $167.3 million. Of these, 15.5 million offsets were supplied by organizations working directly with projects (the “primary market”). Organizations that supply offsets – but do not work on the ground to develop them – took ownership of another 1.4 million offsets and sold them to end clients. This is known as the secondary market. Due to the need for up-front capital to get many cookstove projects off the ground, it is expected that contracts will continue to be negotiated directly between project or carbon asset owners and offsets end users.

The volume of partner offsets sold to voluntary versus compliance buyers was roughly split (Table 4). While government offset contracts tend to be higher-volume, some cookstove offset suppliers nonetheless looked to voluntary buyers that offered higher average prices and so made up the larger proportion of market value in 2012.

Geographically, the majority of offsets in both markets were from Africa-based projects, valued at $110.8 million. This geographic focus is tied to European demand for cookstove offsets, which totaled 10.6 MtCO\textsubscript{2}e last year – 8.4 MtCO\textsubscript{2}e of which were from projects in Africa.

From 2013, the European Union’s Emissions Trading System (EU ETS) requires that new CDM projects be based in LDCs – the largest number of which are in Africa and were associated with $98.2 million in cookstove offset transactions last year. While Asia is also home to several LDCs, offset suppliers say that Africa-based projects – carbon market-facing and generally – may be more prevalent due to more established stove distribution channels (see “Distribution” section); more partners leveraging donor-based revenue streams and other direct and indirect program services; and a large existing offset supply from cookstove carbon projects. Over half of

<table>
<thead>
<tr>
<th>Number of stoves delivered</th>
<th>2.7 million</th>
</tr>
</thead>
<tbody>
<tr>
<td>Volume of offsets contracted</td>
<td>16.9 MtCO\textsubscript{2}e</td>
</tr>
<tr>
<td>Average price, cookstove offsets</td>
<td>$9.9/tCO\textsubscript{2}e</td>
</tr>
<tr>
<td>Total market value</td>
<td>$167.3 million</td>
</tr>
<tr>
<td>Offsets sold to voluntary buyers</td>
<td>7.4 MtCO\textsubscript{2}e at $11/tCO\textsubscript{2}e</td>
</tr>
<tr>
<td>Offsets sold to compliance buyers</td>
<td>8 MtCO\textsubscript{2}e at $9.3/tCO\textsubscript{2}e</td>
</tr>
<tr>
<td>Average tCO\textsubscript{2}e reduced per device, annually</td>
<td>3 tCO\textsubscript{2}e</td>
</tr>
</tbody>
</table>

Notes: Based on 70 carbon offset retailer and carbon asset developer responses.
all Gold Standard-registered cookstove projects are from Africa-based activities.

Africa-based offset projects also deliver additional benefits to communities that are appealing to corporate voluntary buyers – “end users” that are primarily motivated to “demonstrate leadership within their industry or in policy” and are driven by more traditional CSR and public relations motives.

The story behind the story

Emissions reductions associated with cookstove offsets contracted in 2012 are equivalent to taking 3.2 million cars off US roadways for a year, or closing between four and five coal-fired power stations for one year. Non-carbon benefits are more difficult to quantify. For example, our survey shows that almost all cookstoves distributed as a result of carbon finance went to users below their respective national poverty line – two-thirds of which were in hard-to-reach rural communities, with some located in refugee camps.

But practitioners are only recently developing metrics to quantify improvements to public health, livelihoods, and other social benefits stemming from these projects. Once such benefits are quantified, market participants hope that donor and investor communities might also finance these “beyond carbon” benefits in their own right, adding to the revenue mix of projects that are otherwise exposed to a growing supply of offsets and significant price uncertainties.
Research in the Sector

Information is vital to furthering the adoption of clean cooking technologies and techniques. This includes investigating what consumers want, how they use clean cookstoves and fuels, and the wide range of benefits they derive from doing so. Documenting successes can make the case for program expansion, as well as new and continued sources of funding, and is an essential part of program evaluation.

In 2012, 87% of partners’ research activities were focused on household cooking devices, particularly related to users’ (and especially women’s) acceptance of cleaner technologies. This research primarily informed activities outside of researchers’ own organizations – only five partner organizations that engaged in sector research also distributed cookstoves and/or fuels.

Globally, adoption or acceptance of cookstoves/fuels accounts for 15% of partner studies. Evaluating technology performance was close behind, accounting for 12% of research activities. Other popular issues include capacity- and awareness-building, and market studies.

Geography and funding priorities helped shape partners’ research priorities. For example, while clean cookstove adoption research topped the research agendas in Africa and Latin America (16% and 19% respectively), it was the third-most researched issue in Asia, behind market studies and public awareness. Technology adoption and M&E of cookstove/fuel use were primary focuses for privately funded research, while foundation and donor-backed research largely investigated local capacity-building and broader market conditions.

Over half of all research activities (53%) were based in Africa, with a focus on both rural and peri-urban communities. Asia was home to another third of...
Partner studies, where rural populations were the subject of half of all research.

Rocket stoves were the most-researched model, reflecting their widespread use. This focus is sometimes detached from regional distribution trends – for example in Asia, where rocket stoves were 7% of models distributed, but the subject of 26% of all stove studies.

Notes: Based on 132 research organization responses to multiple survey sections.
Women are the most exposed to and harmed by household air pollution, and are disproportionately impacted by the use of dirty and inefficient cooking practices and reliance on biomass for fuel. Because they are the primary stove users, women’s preferences and needs must be met in order for clean cooking technologies to be effectively purchased, adopted, sustainably used, maintained, and replaced.

Women play a crucial role in the widespread adoption and use of clean cooking solutions due to their central responsibility for cooking and managing household energy. Furthermore, women can catalyze cookstove and fuel markets by engaging in income-generating opportunities along the value chain, especially in the marketing, distribution, sales, and after-sales servicing of these technologies.

Recognizing that women play a key role in addressing design and demand-side challenges, the Alliance explicitly focuses on women, as reflected in its mission statement, “to empower women and create local livelihoods.”

Indeed, many cookstove programs consider and engage women in their activities. Only a handful of partners within each role in the cookstove sector did not engage women in some fashion in their 2012 activities.

While gender considerations were not tracked among partners at every step along the value chain, the data does point to some encouraging examples. For example, two-thirds of distributors reported that women’s participation in the program or company is “highly important” to its success. In fact, 172 partners prioritize women’s empowerment in their missions. “Empowering women” also ranks highly within organizations’ core values and market approaches, with 68% of survey respondents saying the issue is “highly important” to their organization’s mission.

Many partners recognize that clean cooking solutions’ benefits to women extend well beyond positive health impacts. These solutions can economically empower women through income-generation opportunities and/or fuel savings, as well as save valuable time and reduce drudgery. While only 32% of survey respondents sex-disaggregate their employment data, those that do are creating many job opportunities for women. Of those who reported, over half of the 76,188 employment opportunities created by cookstove and fuel programs in 2012 – 54% or 41,022 positions – were filled by women. This proportion varies by women’s role in the value chain, however, with more men (67%) employed in distribution, for example.

This data shows a promising trend in the sector, but it also demonstrates a real need to sex-disaggregate data and to ensure that accurate information is available to the sector-at-large.

Table 5: Women’s Engagement in the Cookstove and Fuel Sector: By the Numbers

| 172 | Partners recognize women’s empowerment in program mission |
| 82 | Support women’s employment |
| 49% | Cite women as “very important” to activity success |
| 7 | Cite gender as primary research area |

Notes: Based on 246 responses to multiple survey sections.
Conclusions

Well-laid paths facilitate momentum. The intention of this and future reports in this series is to do just that – provide critical market insights that track existing approaches and that pave new routes for partner progress in the direction of 2020.

As the first of its kind, this report represents a new, to-be-routinely-updated source of knowledge for the Alliance and its partners, which will continue to evolve to reflect the needs of this fast-changing marketplace. In this report’s inaugural year, it is challenging to draw firm, sector-wide conclusions from responses reflecting a fraction of the Alliance’s over 800 partners. Results should be considered as conservative, as they are based solely on self-reporting by Alliance partners. As the Alliance continues to grow and demonstrate its relevance, it is hoped that respondents will be increasingly representative of the sector as a whole, such that results will better reflect progress across the cookstove sector as a whole.

Nevertheless, this report offers several findings worthy of reflection, celebration, and – perhaps most importantly – consideration as the Alliance turns its gaze to Phase II of its Business Plan.

For example, this report finds:

- Alliance partners distributed approximately 8.2 million stoves in 2012, more than twice the number reported in 2011 (3.6 million) and accounting for almost half of all stoves distributed (17.5 million) since PCIA started tracking progress in 2006.

- Over half of all stoves (3.3 million) were sold directly to end users by manufacturers or other intermediaries.

- Another 2.5 million stoves were sold to intermediaries themselves, such as retailers or distributing organizations, to disseminate to end users in 2012 or in the future.

- Carbon offset project developers reported distributing the remaining 2.5 million stoves, but did not specify whether these stoves went to distributors or directly to end users.

- Poor and low-income consumers in urban or peri-urban areas were the most commonly targeted end users, followed by users within other income brackets in urban and rural areas. Rural residents represent 32% of cookstove end users, just slightly behind urban/peri-urban cookstove users at 33%.

- Emergency aid programs account for only 1% of the 8.2 million cookstoves distributed, reaching around 0.7 million people.

- Around 84% of cookstove manufacturers reported testing their own stoves or enlisting third-party organizations to do so.

- While market studies topped the research agendas in Africa and Latin America (16% and 19% respectively), it was the third-most researched issue in Asia, behind capacity building and technology adoption.

- Only one-third of respondents provided sex-disaggregated employment data. Those that did reported that over half (54%) of positions were filled by women.

- Sector-wide, the most commonly cited sources of partner funding were government grants (supporting 36% of partners and combining domestic and international public giving); foundation grants (31%), individual donations (28%), and stove/fuel sales revenues (27%). Other major sources included private equity investments (another 30%) and multilateral grants (15%).

- 4.1 million cookstoves were distributed with at least some support from carbon finance, up from 15% in 2011. A total of 16.9 million carbon offsets were sold from cookstove projects in 2012, up from 4.2 MtCO₂e in 2011.

Results also demonstrate, in a broad-brush way, alignment of partners’ missions with the Alliance’s mission to save lives, improve livelihoods, empower women, and preserve the environment by creating a thriving global market for clean and efficient cookstoves and fuels.
The Alliance is already looking at lessons that can be drawn from the limited information presented in this report and is encouraged by the potential for continued growth across the value chain.

Over time, and particularly as the Alliance continues its efforts to scale the global market for clean cooking technologies and fuels, this collective information on partners’ progress can help inform the direction of Alliance efforts. For example, the data reveals strong engagement and momentum in the Alliance’s initial focus countries and also a hint of other promising markets. It also sheds light on areas with less representation within the Alliance community that require attention – in the clean fuels and humanitarian sectors, for example.

This report is a first step toward developing a broad baseline to enable tracking of trends and identifying key highlights and challenges in the Alliance community. Results also may be used to inform the direction and depth of in-country activities during Phase II (2015 – 2017) of the Alliance’s efforts (see also Box 1).

Report findings indicate strong and active engagement in all of the Alliance’s focus countries for Phase I – reflecting the momentum and wide range of activities being conducted by Alliance partners in these countries. Disproportionate growth among the Alliance’s partner base in these countries may be in part due to its efforts to convene the sector at the national level.

Results also suggest active engagement among partners in a broad range of other countries. Concerted efforts in these “rising” countries during the second phase of Alliance work may contribute to its efforts to drive innovations, operations, and investments to scale.

Results also identify countries with great need, but limited engagement with the sector. In the long term, actions to strengthen activities in these countries will be needed in order to achieve universal adoption of clean cooking technologies.

While the report suggests strong momentum among those partners who responded to the survey, there is still more work to be done, including developing a better understanding of the diverse needs of consumers and users; supporting enterprises in their distribution efforts; enhanced manufacturing through greater investment and brokering of partnerships; standardizing evaluation methods and data; and continued sharing of best practices and emerging research to further catalyze the sector while minimizing duplication of efforts.

The benefits of clean cookstoves and fuels will only be realized if they are sustainably adopted at scale. While this report is a key tool for benchmarking and tracking progress, it should be viewed as one component of the Alliance’s overall monitoring and evaluation strategy. Other components, including national results reporting, country-specific strategies in focus countries, qualitative and quantitative data on sustained adoption, and the development of tools for participatory approaches to monitoring progress, will be used to supplement this data on partner activities.

The Alliance is grateful to its partners that contributed valuable time to supporting data collection for this report, alongside their many other contributions to the sector.
**Key Alliance Resources and Online Tools:**

**Alliance Homepage**  
www.cleancookstoves.org

**Alliance Reports and Research Homepage**  
www.cleancookstoves.org/resources/reports-and-research/

**Alliance Partner Community Homepage**  
community.cleancookstoves.org

**REPORT:**  
*Igniting Change: A Strategy for Universal Adoption of Clean Cookstoves and Fuels*  
www.cleancookstoves.org/resources/fact-sheets/igniting-change.pdf

**PRESENTATION:**  
*Alliance Business Plan*  
www.cleancookstoves.org/resources_files/alliance-business-plan.pptx

**Regional Resources**

**Partner Country Toolkit (also available in Spanish)**  
www.cleancookstoves.org/resources_files/partner-country-toolkit.docx

**Country Action Plans / Market Assessments**  
www.cleancookstoves.org/resources/reports-and-research/

**Testing, Standards, and Data**

**Clean Cooking Catalog**  
www.catalog.cleancookstoves.org

**Data & Statistics Homepage**  
www.cleancookstoves.org/resources/data-and-statistics/

**REPORT:**  
*Stove Performance Inventory Report*  

**Gender**

**REPORT:**  
*Scaling Adoption of Clean Cooking Solutions through Women’s Empowerment: A Resource Guide*  
www.cleancookstoves.org/resources/reports-and-research/
The Global Alliance for Clean Cookstoves is a public-private partnership led by the United Nations Foundation that seeks to save lives, improve livelihoods, empower women, and protect the environment by creating a thriving global market for clean and efficient household cooking solutions. The Alliance’s “100 by ’20” goal calls for 100 million households to adopt clean and efficient cookstoves and fuels by 2020. The Alliance is working with hundreds of public, private, and non-profit partners to help overcome the market barriers that currently impede the production, deployment, and use of clean cookstoves and fuels in developing countries.