

# Development Impact Bonds

The Power of Participatory Development in Creating Sustainable Market Demand:  
A Case Study of Open Fires and Inefficient Cookstoves

Lena Backe and Matthew DeGagne

## Abstract

Millions of people in developing countries utilize open fires and inefficient cookstoves for meal preparation, resulting in the production of toxic smoke that kills over four million people per year. Access to clean cookstove technology for citizens at the bottom of the economic pyramid can be directly improved through a participatory model of Development Impact Bonds (DIBs). This proposed bond model enhances the current structure of DIBs financially, while also building in an innovative component that supports local training, education, and knowledge sharing.

The solution utilizes existing capital dedicated to the international development space by philanthropic institutions or NGOs to secure and leverage additional investment from the private sector. With mitigated risk, investors seeking long-term holdings will see high rates of return on their unsecured capital commitment, funded by the savings and economic gains realized by governments and NGOs from the impacts of investment. Coupon payments, subject to predetermined impact outcome being met, will occur at a short- and medium-term time junctures, while a final coupon payment and principal repayment will occur at bond maturation. Through the lens of clean cookstoves, 5, 10 and 15 year junctures are proposed for the realization of health, environmental and economic impacts.

Unlike previous versions of DIBs, our model provides not only enhanced financial access to clean cookstove technology, but also furnishes the resources to train local individuals on the maintenance, distribution and sales of the cookstoves. This structure enables adoption to occur in a culturally sensitive, sustainable way that empowers citizen involvement and adoption. In addition, the model funds the training of local NGO workers on impact measurement to demonstrate to investors the impact of their investment.



## Table of Contents

- 1.0 Innovations to Existing Development Impact Bond
  - 1.1 Public-Private Partnership: Financial Leveraging
  - 1.2 Incentivizing Long-Term Investment
  - 1.3 Integrative & Participatory
  - 1.4 Encouraging Knowledge Sharing & Impact Measurement
- 2.0 Clean Cookstoves: Problem and Context
- 3.0 Proposed Solution
  - 3.1 Finance-Based Innovations
  - 3.2 Implementation-Based Innovations
- 4.0 Scope: A Discussion of Target Countries
- 5.0 Auditing Process
- 6.0 Anticipated Impact
- 7.0 Proven Examples
- 8.0 Challenges
- 9.0 Relevance to the Sustainable Development Goals
  - 9.1 Energy Poverty: SDG Goal 7
  - 9.2 Health: SDG Goal 3
  - 9.3 Environment: SDG Goals 13 & 15
  - 9.4 Economic/Gender Empowerment: SDG Goals 5 & 8
- 10.0 Big Picture
- 11.0 Bibliography
- 12.0 Appendix
  - 12.1 Development Impact Bond Readings
  - 12.2 Clean Cookstove Readings

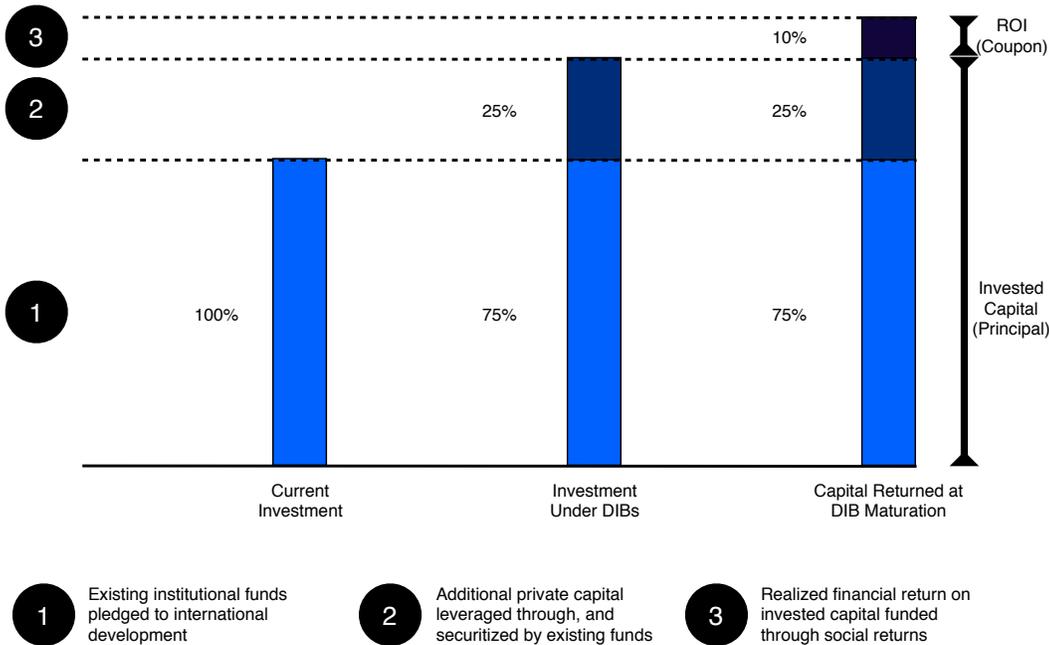
**1.0 Innovations to Existing Development Impact Bond**

Similar to Social Impact Bonds (SIBs), Development Impact Bonds (DIBs) use invested capital to fund improved social outcomes surrounding a particular development issue and utilize the long term savings experienced by the government (or NGO) to repay investors their principal and return. While our proposed investment tool is applicable for a range of development issues, this report examines its application to the provision of clean cookstoves. Beginning with an overview of the finance- and implementation-based innovations proposed, the paper discusses in detail our model’s application to the provision of clean cookstoves before concluding with the bond model’s potential for use in other development contexts.

**1.1 Public-Private Partnership: Financial Leveraging**

The key financial innovation of the proposed DIB is the utilization of existing public funds committed to international development to leverage additional capital from the private markets that would otherwise not be invested in the space. Highlighted in Figure 1 (below), funds committed from existing development, philanthropic, or governmental institutions will be utilized to secure 75% of the total bond issue. The remaining 25% of total investment capital will be the funds at risk from private investors and the amount on which they will base their returns. This leveraging method not only attracts new capital to the development space, but also provides high levels of return to private investors. In Figure 1, regardless of impact achieved, investors will see 75% of the capital returned at bond maturation.

**Development Impact Bonds: Leveraging New Capital**



*Figure 1: Development Impact Bonds: Capital Stack*

## 1.2 Incentivizing Long-Term Investment

Short-, medium-, and long-term time junctures (intervals dependent on specific investment) will be set for coupon payments and principal repayment to occur. Coupon payments will occur at all three junctures, and are contingent on the investment having achieved pre-determined, contractual social outcome metrics related to the desired impact of the investment (e.g. improved health or environmental outcomes). Principal repayment will occur at maturation at the third time interval. This tiered investment structure incentivizes the private market to invest in long-term payouts/results, rather than short-term deliverables, by offering higher and additional returns in the long-term.

## 1.3 Integrative & Participatory

Again variable to the investment, our DIB model stresses community participation, training and education for ensuring high success of desired social outcomes. For clean cookstove investment, education would be provided to local residents on how to properly use, maintain and repair clean cookstoves. Local understanding of how the technology works will enable further innovation and development of more locally-oriented initiatives. Additionally, the provision of training on stove sales and distribution will allow local residents to fully integrate into the adoption process as market agents and ensure that the model is locally adapted. This structure of involvement will promote greater program sustainability, as local residents can build on pre-existing distribution networks of other products in order to facilitate the spread of this new technology, a critical component given that a significant barrier has been lack of proper distribution channels.

## 1.4 Encouraging Knowledge Sharing & Impact Measurement

Our DIB will provide local residents, businesses and governments with the resources and knowledge necessary to collect and utilize data, enabling the investor money to be spent more efficiently. By working toward a structure of locally-run impact measurement, this model enables the development of local knowledge and information sharing across geographies that can promote a dialogue surrounding best practices. Without such training and resources, programs in the developing world cannot develop the metrics or measurement processes to determine if goals are being met and to what scale.

## 2.0 Clean Cookstoves: Problem and Context

Access to quality technologies and services in developing countries for people at the bottom of the economic pyramid is severely limited by lack of access to capital. Furthermore, historical instances of traditional aid show that the sustainability of investment and ownership from community members is often limited when simply given technology or financing to resolve development issues (World Bank Institute). While the issue of clean cookstoves has been on the development radar for some years now, a wide-scale, locally-integrative model of sustainable access and adoption has not yet been achieved.

In many developing countries, millions of people lack access to power and basic technology, forcing the use of open fires and inefficient cookstoves for meal preparation. The primary detriment of these cooking methods is the toxic smoke produced, attributable to over four million deaths annually; one death every 8 seconds (“Impact Areas: Health”). Beyond the negative health externalities, these cookstoves are a significant contributor to climate change, as the burning of solid fuels releases toxic pollutants, adding to the growing amount of black carbon in our atmosphere. Residential solid fuel burning currently makes up 25% of black carbon emissions internationally, with 84% of those emissions stemming from households in developing nations (“Impact Areas: Environment”).

Fortunately, clean technology solutions exist to resolve this issue in the form of fuel-efficient cookstoves. However, the impacted populations largely lack the financial resources and distributional access to this life-changing technology. Furthermore, many families have an insufficient understanding of the health risks of current practices, limiting the implicit desire to change habits and tools. Combined, these two factors limit adoption and scalability of transformative clean technology in the developing world. Studies and past interventions have shown that free distribution of this type of technology does not yield sustainable or successful adoption practices in local populations because there is little pride of ownership, understanding of purpose, or knowledge of how to repair the technology in the event of breakdowns (World Bank Institute). Alternatively, market-based solutions that facilitate consumer access to clean technology and that integrate the needs of individualized, local contexts prove to be a much more viable, scalable option in enabling the widespread adoption of technology (World Bank Institute). Our participatory model of Development Impact Bonds has great potential to accelerate the expansion of market-based development and create scalable change.

### **3.0 Proposed Solution**

#### **3.1 Finance-Based Innovations**

Our Development Impact Bond framework will utilize existing philanthropic, public or foundation capital to leverage new, private capital from sources currently not investing in the international development space. These new firms, funds or individuals entering the impact investing market will seek both financial and social returns, as well as a degree of mitigated risk in this new market. This arrangement will enable the use of existing capital committed to international development to secure a percentage of the privately invested principal. Drawing parallels to the SIB market in the United States, an existing donor / grantee will be sought to secure private investments. In this example, the Goldman Sachs’ Urban Investment Group funded SIBs to combat recidivism at the Rikers Island Correctional Facility in New York City. Bloomberg Philanthropies secured 75% of the total investment in the instance that the anticipated results of the funded programming were not achieved, and thus, no repayment was remade by the City of New York (Olsen).

Mirroring this case, our proposal envisions social impact related investment funds, such as those led by major banks (Cohen), as well as pension funds, life insurance companies, and university endowments as the targeted, new capital investors. These targeted institutions hold long term assets (duration matching), and are mandated or pressured to invest in a socially

responsible manner. The organizations or public institutions providing financial security on private investment will be those who currently invest capital in the international development sphere, such as the Bill and Melinda Gates Foundation and the Rockefeller Foundation. Risk can be further mitigated for private funds by the tranching of bonds and the eventual pooling of bonds for investment, with geographical and investment variance, once a market is established.

Our model also involves the creation of a three-tiered bond incentivizing both social and financial returns over the short-, medium- and long-terms. With each bond issuance focused on a unique development goal, flexibility of timeline on the basis of the impact outcomes can be integrated. In the example of clean cookstoves, proposed intervals are set at 5, 10, and 15 years, in order to balance both realized outcomes and desired tenure of investment by investors. The repayment structure will be such as that the principal and coupon will be repaid at the bond maturation in year 15, and returns (coupon payments) being paid at the earlier valuation periods. Unique impact criteria will be set and evaluated at each juncture, enabling long-term impact and mitigating the risk in achieving impact by a single date. At each time interval, contractual payments on the basis of achieving predetermined impact metrics will originate from the government (and potentially NGOs) experiencing long-term financial savings based on reduction of service needs (i.e. health care costs, environmental clean up, etc.), or increased economic output related to the investment. Concurrently, if impact metrics are achieved, the government or NGO will also place funds in the escrow account for principal repayment at maturation.

In our application of this method to clean cookstoves, savings from realized gains in improved health and environmental outcomes are long term in nature. While a variety of metrics can be used, the initial 5-year coupon payment structure will be evaluated on the basis of achieving a benchmark of total stoves distributed and regularly used in targeted communities. The subsequent 10-year evaluation and 15-year maturation will evaluate the benefits resulting from distribution through air quality improvement, reductions in chronic health conditions, and increases in economic productivity. See Section 6.0 Anticipated Impact for more details on metrics and outcomes.

During the negotiation and formation of the DIB terms, local governments and NGOs whose investments and expenses relate to the bond's impacts will engage contractually for principal and coupon payments, subject to impact performance. The basis of payments would be directly related to measurable achievements, rendering the engagement of the local population in data collection and result tracking essential to independent impact evaluation process. See Figure 2 for a hypothetical example.

**Figure 2: Hypothetical Example**

The Bill and Melinda Gates Foundation pledges \$750,000 to the proliferation of access to clean cook stoves in India. As opposed to a direct investment, they utilize this sum to secure 75% of a \$1,000,000 private investment, otherwise not directed to the international development space. This secured sum of the principal, which will be held in an escrow account and not be returned to investors until the bonds have matured, leaves an investment of \$250,000 to the private fund, on which an impact-based return can be earned. Under the tiered investment structure of the investment, the principal will be repaid at a maturation date of 10 years, while coupon payments, based on meeting pre-determined impact targets, will be evaluated and granted at years 5, 10 and 15. These funds for the remaining 25% of the principal balance and the expected returns will be derived from contracts established with various levels of the Indian Government, realizing both reduction of service costs and improved economic output as a result of impact achievement. With reduced levels of toxic smoke from cookstoves in the environment, lower rates of respiratory illness and premature death will be realized, thus reducing both healthcare costs and improving the economic output of the communities. Upon meeting specific criteria set for each time interval, a portion of funds from the government will be paid directly to investors in the form of returns, while a remaining percentage will be placed in escrow for the remaining 25% principal repayment at maturation.

**3.2 Implementation-Based Innovations**

Funds provided by private sector investors would directly subsidize existing clean cookstove technology that is currently out of financial reach for individuals at the bottom of the pyramid. The financing of the product would be channeled through existing NGOs, governmental organizations or social enterprises depending on the country of implementation and the pre-existing initiatives in place. For instance in India, Haiti, Sudan and Nepal, an organization called Prakti operates a business model that designs, manufactures and distributes clean cookstoves. The enterprise builds on community knowledge empowers the local economy by hiring local people to manufacture and/or distribute their product and propel greater dissemination (Appendix 12.2). Many similar organizations in partnership with the umbrella group, The Global Alliance for Clean Cook Stoves, already have similarly-structured initiatives in place, but are in need of funding, manpower, and knowledge sharing to properly implement, scale and achieve their desired impact. Depending on the financial mechanisms in place and the partners in specific locations (i.e. an NGO, government body or social enterprise), our model would either subsidize the initial cost of clean cook stoves to local consumers or support a discounted loan structure to promote bottom of the pyramid access to this technology through pre-existing organizations.

Our funding model would not only subsidize and/or support loans to give residents financial access to this technology, but would also fund education on maintenance, sales and distribution of the product that would be led by the local enterprises, NGO branches or government entities operating in specific locales. A set of local individuals who can maintain the technology in the event of break downs would allow its adoption to be more sustainable, mitigating the possibility of reversion to old cooking methods. In addition, organizations would provide trainings on the health benefits of clean cookstoves, as well as on sales and distribution of the product in order to allow local actors to become agents of adoption and promotion within

their own communities. This model would thereby cultivate a greater sense of investment and trust in this new technology by creating multiple areas of buy-in. Organizations that already work to employ and empower community members (especially women) would thus be able to expand the scope of their operations and hire a greater quantity of workers, thereby growing women’s roles as market agents as well as heightening the scale of clean cook stove adoption.

Finally, these local organizations and enterprises would provide training on impact measurement. In the developing world, the usage of big data and implementation of impact measurement is still vastly underutilized due to constraints on local knowledge, time, and funding. Our bond model would fund training on impact measurement via these regional organizations, which would educate their employees and community members on measurement practices and metrics. Empowering local organizations to quantify the impact of their efforts (a crucial component of a successful DIB) leads to increased efficacy of initiatives. In return for the funding that supports this training, the organizations would be required to submit bi-annual reports of key insights, innovations and learning in order to strengthen local knowledge and build a cross-cultural dialogue around best practices within the cookstove and impact financing sectors. In areas with less access to technology to generate reports and best practices, insights and learning could be shared through cell phone/mobile technology due to its increasing prevalence throughout the developing world (“Mobile Phone Access”). This mandatory component of shared knowledge will promote a more cohesive learning process across the world with the aim to generate a more rapid process of innovation.

Below, Figure 3 summarizes the aforementioned flow of finances and information from the DIB financiers, to community members benefiting from the funds. The Audit Board will be discussed in Section 5.0.

Development Impact Bonds: Capital and Information Flow

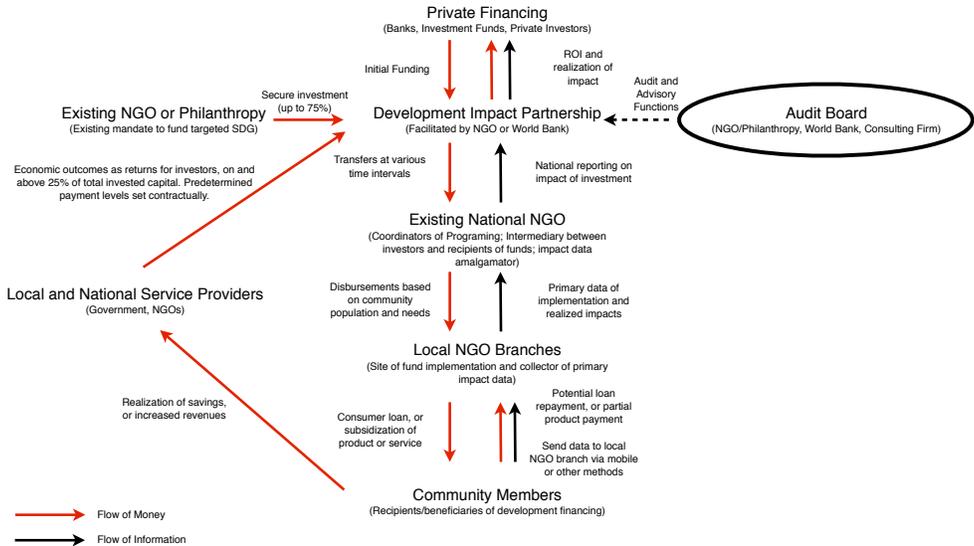


Figure 3: Development Impact Bonds: Capital and Information Flow

#### 4.0 Scope: A Discussion of Target Countries

This model's connection of positive externalities to realized savings requires certain threshold conditions with regard to state structure. Our model would work best for Middle Income Countries (MICs) in which the state has legitimate tax collection authority, real social services, and substantial spending. Our clean cookstove DIB model has the potential to generate significant savings for the state, but necessitates that a state be spending substantial money in the first place in order to incentivize the government to recoup that money or benefit from tax gains arising from increased productivity. For MICs, a DIB in clean cookstoves can generate real savings, most straightforwardly in the form of increased tax collection stemming from clean cookstoves' long-term ability to enhance economic productivity. The nature of the state structure in MICs makes them more pre-equipped to be able to realize the savings generated by clean cookstoves (including improved health, heightened economic productivity, and reduction in environmental degradation) than are Low Income Countries. Countries that fit these criteria include India, Brazil, Colombia, among a wide swath of other Middle Income Countries with sufficient government structures in place and broad sectors of the population in need of greater clean cookstove access. By implementing our solution in Middle Income Countries (especially those with a high Gini coefficient), the numerous impacts of clean cookstoves can still reach the very poor, but can do so within the context of a state able to secure the trust of investors and uphold a long-term, multi-party contract.

#### 5.0 Auditing Process

Essential to the operation of this bond structure is the accurate measurement of impact to determine fiscal savings for governments and NGOs, as well as ensure that coupon payments to investors occur at the evaluation junctures when criteria are met. While a variety of auditing bodies could play this role once the tool is developed, the most suitable player would be the organization holding the deal's funds in escrow. The proposed body occupying this function would be the philanthropic organization contributing the principal's security. With their incentives aligned to ensure responsible spending and the accurate measurement of results, both investors and government/NGO payees would be ensured honest reporting. Furthermore, given the large operations of these organizations (such as the Bill and Melinda Gates Foundation), they carry the human capital and knowledge of the international development space required to effectively gather and evaluate the necessary data for these DIBs. In the case of the initial DIB offering, the facilitator of the transaction would be the likely audit board and escrow holder. Under the assumption that the World Bank acts as the initial facilitator for bond trial, they would serve as the well-resourced, and neutral party gathering and evaluating data. Other alternatives would be private consulting firms, or other NGOs in the international development space.

#### 6.0 Anticipated Impact

In the short term, wider access to clean cookstoves would generate a reduction in air pollution and the quantity of black carbon emissions. As a result, the air quality in regions with growing adoption rates of clean cook stoves would dramatically improve, leading to significant, cost-saving long term results including a drop in respiratory disease rates, a reduction in the number of deaths of children under five, and therefore an overall drop in healthcare related costs.

A decline in these rates of disease would promote a rise in rates of economic productivity, in conjunction with greater economic empowerment of women as agential market participants. In addition, rates of deforestation, soil erosion, and biodiversity degradation would decline, as stove users would require less fuel for their cooking practices.

In looking at the big picture, our model not only improves both the quality of health and the environment for local communities, but also builds an understanding of impact measurement and sector best practices. As a result, a shared knowledge base is created that can be applied to other social services within the region, making them more effective and efficient in terms of impact. Finally, this model helps to establish a sustainable market for clean technology. Our framework's support of a local distribution mechanism and maintenance network enables the developing world to become more investment-friendly thanks to the pre-existing avenues of product distribution and demand established.

In order to have a meaningful impact in terms of health, productivity, and the environment, there must be localized concentrations of clean cookstove adoption, training, and maintenance. Isolated usage of clean cookstoves provides significant benefits for the user, but in order for this DIB model to be successful in realizing actual savings, concentrated areas of usage must be created in order to generate measurable improvements in areas such as health and air quality. A parallel model to microfinance's approach to get groups of people to take on debt all at once together could be created wherein local groups adopt clean cookstove technology and receive training/maintenance instruction in unison. This group adoption model could be driven by marketing the stove as status item, through promotion via cultural and political leaders, or by building up a social norm around clean cookstoves. A valuable cultural norm (and a priority area for domestic policy action according to the WDR 2012 report) that could be strengthened via this model and eventually applied to other initiatives would be an increase in women's agency in the household and society. While women in developing countries are often not in control of their household's financial decisions, they are the primary utilizer of cookstove technology, as well as the primary bearer of the stove's detrimental health consequences. Consequently, group adoption approaches could target women as the agential change makers within the community, thereby appealing directly to primary users, as well as generating greater economic agency.

Furthermore, a group approach to adoption provides the model a heightened degree of sustainability compared to one-at-a-time individual adoptions. This method helps to prevent backsliding that can result from isolated cases of adoption or from lack of technical knowledge to repair the technology because there will be a localized set of norms in addition to a market in place to help support maintenance. Lastly, a group adoption approach enables a more comprehensive educational approach that will help users understand the health risks of 'dirty' cookstoves, grasp the benefits of clean cookstoves in terms of health, time, and money, and therefore be willing to invest in the technology.

## 7.0 Proven Examples

- DIBs as a feasible investment mechanism: Rikers Island Social Impact Bonds: Goldman Sachs UIG and Bloomberg Philanthropies (Olsen)

- Measurable financial results of social impact investment in clean cookstoves: World Bank and CQuest Capital (Appendix 12.2)

## 8.0 Challenges

As with many social sector interventions, the metrics of ‘success’ for this initiative needed to measure program impact remain somewhat underdeveloped. Quantifying the impact of this specific bond intervention will require the systematization of measurements that can determine the impact that wider access to clean technology has created. To address this problem in measuring environmental impact, our model could build off of current parallel models utilizing carbon credits to offset the costs in ‘green’ technology. Longer-term quantification and models of impact with regards to disease rates and premature deaths could utilize averted Disability-Adjusted Life Years (DALY) to track improvements in health. In addition, we could model our impact measurements based on pre-existing work done by CQuest Capital in collaboration with the World Bank (Appendix 12.2) to better measure both health and environmental improvements.

Metrics also present an interesting hurdle in terms of the contract between funders and host governments that will be created. Our model is based on positive externalities that will need to be identified in advance of the contract’s drafting. The contract will be between investors and either the state government or an NGO, if one exists with a permanent presence in a set of locations and provides a version of government services that would see realized savings from clean cookstoves’ positive spillovers. A comprehensive understanding of the causal mechanism of our approach based on rigorous pre-existing data backing up contractual expectations will thus be necessary in order to have an efficacious contractual agreement. The positive externalities stipulated in the contract will need to be very specific, detailing what percent of the positive spillovers will be claimed by the host state government and what will be returned to investors. Despite the relatively nascent body of knowledge on the long-term impacts of clean cookstoves, feasibility studies conducted in India, Brazil, and Uganda serve as valuable reference documents that can substantially guide the creation of impact metrics and timelines for contractual agreements. (See Appendix 12.2)

An additional challenge presented is that clean cook stove models and technology will differ depending on the cultural context due to variation in availability of local fuels, cooking practices, and pre-existing local organizations. The stove models being distributed will thus vary by context, but our framework takes this component into account by building off of pre-established organizations and enterprises in different regions that have created culturally specific product models. This flexibility is a strength of our model because it enhances the work of current organizations, rather than creating an infrastructure from scratch, and enables a more sustainable, locally adapted process of implementation. In addition, our bond structure directly incorporates local actors into the repair, distribution, and innovation process, thereby ensuring that interventions are sensitive to the varying cultural needs and bases of knowledge present in different regions.

## **9.0 Relevance to the Sustainable Development Goals**

### **9.1 Energy Poverty: SDG Goal 7**

Over one billion individuals across the globe lack access to electricity, meaning that there is ample space for clean technology to be implemented and successfully scaled in the developing world. Our proposal directly works to provide sustainable, affordable energy for all by facilitating the usage of more energy-efficient technology and growing the proportion of the population with access to a clean, reliable energy source.

### **9.2 Health: SDG Goal 3**

The use of inefficient cookstoves and open flames for daily food preparation results in the emission of toxic chemicals whose levels far exceed the WHO's daily recommended limit of smoke exposure. These fumes have been directly linked to a large number of serious medical conditions including low birth weight, pneumonia in young children, COPD, emphysema, cardiovascular disease, cataracts, and other ailments (Benac). The WHO estimates that the number of deaths for diseases linked to cookstove smoke will exceed those from Malaria, HIV/AIDS, and Tuberculosis by 2030 ("Igniting Change"). Clean cookstoves would dramatically reduce exposure to particulate matter, driving down rates of respiratory disease and other serious conditions, as well as reducing premature mortality of children from non-communicable diseases.

### **9.3 Environment: SDG Goals 13 & 15**

Cookstoves' burning of biomass fuels generate pollutants including black carbon, methane, and carbon dioxide, which contribute to air pollution and accelerate climate change. It is estimated that residential sources (the majority of which are cookstoves) represent over a quarter of the global inventory of black carbon emissions ("Igniting Change"). Furthermore, due to the fact that around three billion individuals internationally utilize locally gathered fuel materials, the usage of these stoves places significant pressure on natural resources, leading to dangerous processes such as deforestation, soil erosion, and declining biodiversity (Benac). Wider access to clean cookstoves would therefore reduce rates of environmental degradation, diminish black carbon emission rates, and thus help to slow down the rate of climate change.

### **9.4 Economic/Gender Empowerment: SDG Goals 5 & 8**

Because our proposal involves the direct integration of local actors into the repair, maintenance, distribution, and impact measurement surrounding the adoption of clean cookstoves, it has the power to encourage gender equality and female economic empowerment. Efficient cookstoves would enable women and girls to reduce the amount of time spent collecting fuel, allowing them to pursue opportunities such as education or routes of economic empowerment. With more time to devote to economic engagement and fewer health risks hindering their productivity, women and girls could become marketplace agents that sell, market and distribute the technology within their communities.

## 10.0 The Big Picture

The scope and timing of our participatory DIB model provide it with a significant potential for impact given that it simultaneously addresses a wide array of the Sustainable Development Goals, fits with World Bank Report policy agendas, and builds upon the increasing momentum behind pay-for-success schemes. As actors in the development arena look ahead, it is clear that a multi-sector, mixed-methods, and participatory approach must be developed in order to best leverage the unique resources of both developed and developing countries to create scalable solutions. The Sustainable Development Goals provide a tangible motivation for greater collaboration between developed and developing countries with the recognition that meaningful progress requires an effort being made on both sides. Our model recognizes the ability of the SDGs to create and build transformative change across the developing world and aims to capitalize on this momentum by engaging a diverse set of actors and harnessing their unique bases of knowledge and skills.

The 2010 World Development Report estimates that in the years ahead, developing countries will bear about 75% of the damage costs stemming from climate change. Nonetheless, these nations are without the proper financial or technical resources to deal with the escalation of climate change (WDR 2010). Our model directly addresses the constraints facing developing nations and provides a mechanism to finance their access to and development of clean technology that not only reduces carbon emissions, but also helps reduce the rate of natural resource depletion. The impact of access to clean cookstoves however, reaches far beyond the significant environmental benefits listed above. With widespread adoption of clean cookstoves, women and children can see dramatic reductions in chronic health conditions and childhood mortality, as well as increases in economic productivity and economic empowerment. Thus, our model, in initially addressing the critical lack of access to clean technology in the developing world, results in a long-term web of significant, interconnected positive impacts.

Most importantly, our model's public-private structure, innovative payback mechanism, and use of pre-existing organizations lends itself to be applied to a variety of interventions beyond cookstoves. The framework of our DIB model has the flexibility to be translated into a wide spectrum of development programs that, like cookstoves, harness the resources and insights of developed and developing countries to help the Sustainable Development Goals reach their impressive potential in the years ahead.

## 11.0 Bibliography

- Benac, Nancy. "Dirty Cookstoves Pose Enormous Health Risk." *Canadian Medical Association Journal* (2010): 1718-719. *NCBI*. Web. 24 Jan. 2015.
- Cohen, Sir Ronald, and Matt Bannick. "Is Social Impact Investing The Next Venture Capital?" *Forbes*. *Forbes Magazine*, 20 Sept. 2014. Web. 24 Jan. 2015.
- Igniting Change: A Strategy for Universal Adoption of Clean Cookstoves and Fuels*. Issue brief. N.p.: Global Alliance for Clean Cookstoves, 2011. *Cleancookstoves.org*. Web. 24 Jan. 2015.
- "Impact Areas: Environment." *Global Alliance for Clean Cookstoves*. N.p., 24 Jan. 2015
- "Impact Areas: Health." *Global Alliance for Clean Cookstoves*. N.p., 24 Jan. 2015
- Olsen, John, and Andrea Phillips. "Rikers Island: The First Social Impact Bond." *Community Development Investment Review* 9.1 (2012): 97-101. Web. 15 Jan. 2015.
- The World Bank. *Mobile Phone Access Reaches Three Quarters of Planet's Population*. *Worldbank.org*. N.p., 17 July 2012. Web. 18 Mar. 2015.
- World Bank Institute. World Bank Institute Capacity Development and Results. *The Importance of Stakeholder Ownership for Capacity Development Results*. By Nicola Smithers. Washington, DC: May 2011. Print.
- "World Development Report 2010: Development and Climate Change" *The World Bank* 2010. Web. 15 Mar. 2015
- "World Development Report 2012: Gender Equality and Development" *The World Bank* 2012. Web. 15 Mar. 2015

## 12.0 Appendix

### 12.1 Development Impact Bond Readings

[\*Investing in Social Outcomes: Development Impact Bonds\*](#)  
[\*The Report of the Development Impact Bond Working Group\*](#)

### 12.2 Clean Cookstove Readings

[Global Alliance for Clean Cookstoves: India Cookstoves and Fuels Market Assessment](#)  
[Results-Based Financing for Clean Cookstoves in Uganda](#)  
[Global Alliance for Clean Cookstoves: Brazil Feasibility Study](#)  
[\*Creating a Salable Health Product from Clean Cookstoves\*](#)  
[Prakti Two Page Overview](#)