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# IMPACT MEASUREMENT

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IN THE CLEAN ENERGY SECTOR

**GIIN NETWORK  
INSIGHTS**



# About the GIIN

The Global Impact Investing Network (GIIN) is a nonprofit organization dedicated to increasing the scale and effectiveness of impact investing. The GIIN builds critical infrastructure and supports activities, education, and research that help accelerate the development of a coherent impact investing industry.

## GIIN NETWORK INSIGHTS



*Network Insights* is part of a larger GIIN effort to capture and share key perspectives and insights from the GIIN member network —the world's largest community of impact investors, practitioners, and experts. The GIIN offers many opportunities for our members to connect and exchange views about important developments in impact investing and ways to overcome significant barriers to growing the market. We believe that impact investing's potential will only be achieved through collaboration and partnerships among the many stakeholders involved in the industry, and we play an active role in convening these leaders to share their views.

Leveraging the diverse experiences of GIIN members, the Network Insights series highlights current issues and key perspectives from the market. Each publication serves as a window into the current investor experience and provides leaders with practical information on which to inform their practice.

To view the GIIN's complete list of publications, which includes formal research reports and papers, please visit our website at [www.thegiin.org](http://www.thegiin.org).

*Views expressed by investors in this publication are theirs alone.*

## ACKNOWLEDGEMENTS

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[www.theimpactprogramme.org.uk](http://www.theimpactprogramme.org.uk).

## PARTICIPATING GIIN MEMBER ORGANIZATIONS

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## ADVISORY COMMITTEE TO THE BOP BASIC SERVICES TRACK

We would also like to recognize the Advisory Committee to the BoP Basic Services Track for the valuable guidance and input provided for this undertaking. This group comprises GIIN Investors' Council members who finance access to basic services in emerging markets. Current Advisory Committee members include: Acumen; Bill & Melinda Gates Foundation; CDC Group PLC; Inter-American Development Bank Group (IDB); Lok Advisory Services; Lombard Odier & Cie; Omidyar Network; and responsAbility Investments AG.

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## ABOUT THE GIIN MEMBERSHIP AND BOP BASIC SERVICES TRACK

The GIIN's Network Membership provides a platform for like-minded investors to meet and take part in activities that build the impact investing industry from a practitioner's perspective. With over 220 participating organizations, the GIIN Membership represents the largest global community of impact investors (asset owners and asset managers) and service providers engaged in impact investing.

Within the GIIN Membership, the BoP Basic Services Track supports the critical work of impact investors active or interested in financing access to basic services for underserved populations in emerging markets. Funded by the UK Government through the Department for International Development's Impact Programme, the BoP Basic Services Track engages GIIN members to exchange learnings, tackle shared challenges, and collaborate on emerging opportunities related to investing in BoP basic services.

## ABOUT IRIS

IRIS is the catalog of generally-accepted performance metrics that leading impact investors use to measure social, environmental, and financial results of their investments. Managed by the GIIN, IRIS is offered as a free public good to support transparency, credibility, and accountability in impact measurement practices across the impact investing industry. For more information, visit [iris.thegiin.org](http://iris.thegiin.org)

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# Introduction

Impact investors have been trying to determine how best to measure the social and environmental performance of clean energy investments for years, yet details of these efforts have rarely been documented. To this end, in late 2014, the Global Impact Investing Network (GIIN) launched a project under its BoP Basic Services Track to better understand how impact investors measure the social and environmental performance (henceforth referred to as ‘impact’ for shorthand) of investments in the clean energy sector — in particular, investments made into companies targeting bottom-of-the-pyramid (BoP) or underserved consumers in emerging markets.<sup>1</sup>

Drawing insights from the GIIN’s Network Membership and IRIS initiative, this report examines the impact measurement approaches of 13 GIIN members (including fund managers, foundations, development finance institutions (DFIs), and banks) who invest directly into clean energy companies (as opposed to investing through funds) — detailing the metrics, methodologies, and assumptions they use to measure impact as well as the challenges and limitations they face.<sup>2</sup> In doing so, **we aim to bring greater transparency to the diversity and limitations of current impact measurement approaches, facilitate shared learning, and provide a tangible resource for those who are new to the sector or seeking to improve practice.**

**This report presents our most relevant findings for impact investors, identifying 12 commonly-used metrics for clean energy investments and the approaches used to measure them.** Those interviewed believe this set of metrics to be fairly comprehensive, though not universally applied by impact investors in the clean energy sector. Metric selection often depends on the investee company and its business

model, customer, and type of product or service sold. Impact investors tend to use a sub-set of the metrics featured in this report based on relevance to specific transactions.

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*We encourage readers to leverage this report’s findings to drive improvements, efficiency, and greater collaboration in impact measurement.*

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**This report will be immediately useful for impact investors making direct investments into clean energy companies — as a sense check and to expose important challenges and limitations involved in measuring impact — but should also resonate with a broader set of stakeholders in the impact investing community.**

In particular, *investors who invest through funds* may use this report’s findings to inform reporting requirements and to deepen engagement with fund managers, while *entrepreneurs* may gain insights that help drive efficiency and alignment in measurement and reporting. Finally, while this report is focused on the clean energy sector, it will also be useful for investors and entrepreneurs operating in other sectors that provide basic products and services to BoP consumers, such as health, education, and financial inclusion.

The body of this report is organized in two parts: the first details key trends and insights that are shaping impact measurement practice broadly, as well as key takeaways for the clean energy sector in particular. The second part provides detailed technical information on commonly-used impact objectives, metrics, and measurement approaches for the clean energy sector, and outlines related assumptions, challenges, and limitations. An Appendix includes guidance on how the metrics featured in this report can be used in tandem with metrics in the GIIN’s IRIS catalog. We encourage readers to leverage this report’s findings to drive improvements, efficiency, and greater collaboration when measuring impact in the clean energy sector and beyond.

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1 For this report, any reference to ‘clean energy sector’ denotes this more specific definition.

2 Thirteen impact investors contributed insights to this report, out of 25 who were invited by the GIIN to participate. GIIN members were invited to participate based on level of direct investment activity in the clean energy sector in emerging markets. Given the small sample size, the metrics and approaches presented in this report should not be viewed as representative of all impact investors operating in this sector; rather, they offer a survey of practice and a sense of what is common in terms of metrics, assumptions, challenges, and limitations.

# Impact Investing in the Clean Energy Sector

For the purposes of this report, we focus on clean energy products or services that produce energy or electricity from renewable resources and emit less greenhouse gas (GHG) emissions than conventional fuel sources like kerosene or charcoal.

## Why Do Impact Investors Finance Access to Clean Energy in Emerging Markets?

Energy shortage is an acute problem among the BoP in emerging markets, the majority of whom rely on relatively inefficient, polluting, and health-threatening fuels such as kerosene, firewood, and coal for their lighting and cooking needs. Impact investors finance clean energy companies because they see significant opportunities to support sustainable energy solutions of the future while improving the livelihoods of BoP consumers. Social and environmental outcomes sought include reduced health problems (particularly among women and children), reduced air pollution, lower fuel costs, and other public benefits such as lower GHG emissions.

## Main Focus of Investment Activity

To date, impact investors targeting BoP or underserved populations have tended to make investments in three main areas of the clean energy sector in emerging markets:

1. **Solar products for households and small businesses:**
  - a. **Solar lanterns.** Portable LED lanterns that are powered by solar panels and can typically provide light for four to eight hours, replacing polluting and inefficient kerosene lanterns and supplying basic lighting to BoP households.
  - b. **Solar home systems.** Solar-based electricity-generating and storage systems designed to provide power to individual households. These systems are typically purchased on credit by individual households and are customized to meet specific electricity requirements.
2. **Energy-efficient cookstoves and fuels:** Fixed or portable cookstoves that burn solid-biomass cooking fuels more efficiently than do traditional stoves. They can replace traditional polluting stoves that cause indoor air pollution and severe respiratory problems affecting primarily women and children.
3. **Micro-grids and mini-grids:** Decentralized power grids or plants that supply clean power to a community. These systems supply largely rural BoP consumers with electricity services generated from renewable sources of energy (primarily small hydro and waste biomass) through existing grids or company-owned distribution systems.

Source: Power to the People: Investing in Clean Energy for the Base of the Pyramid in India (World Resources Institute, 2010).

# I. Insights into Current Trends in Impact Measurement Practice

## A. IMPACT MEASUREMENT PRACTICE IN THE IMPACT INVESTING INDUSTRY

The discussion below highlights some of the key trends and considerations shaping impact measurement practice in today's market. While many of the insights are drawn from interviews with clean energy investors (most of whom also invest in other sectors), they are consistent with the issues and challenges we see in the broader industry with respect to impact measurement.

### Shifting Perspectives on Impact Measurement

Impact measurement is central to impact investing, and is increasingly viewed as a driver of value creation for both investors and investee companies. The question among many impact investors is no longer *why* and *whether* to measure, but *what* and *how* to measure. But answering these questions is not as simple as it may seem.

*What* to measure depends on the investor's impact objectives as well as the business model and operating context of the investee company. Investors also need to consider what level of evidence is good enough — whether measuring at output level is sufficient, or whether the burden of proof requires a demonstration of outcomes. These different decision

points have led to a range of individual impact measurement frameworks, developed by investors who deploy capital in the same sector, and at times, into the same businesses.

**Understanding which metrics are commonly used and at what level (output versus outcome) can help investors and entrepreneurs avoid duplication of efforts and take us one step further towards coherent and comparable performance data.**

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*The question among many impact investors is no longer **why** and **whether** to measure, but **what** and **how** to measure.*

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Once investors decide what metrics to use, the question turns to *how* to measure them. There are a range of approaches to measure and report on any given metric — some more reliant on empirical data than others — and each with its own set of assumptions and limitations. **Sharing details of methodologies used and being clear about where extrapolation begins will bring more transparency to the practice of impact measurement and enable investors to learn from each other.**

### Impact Measurement Explained

- **Impact measurement:** The implementation of processes and activities in order to track progress toward desired social and/or environmental objectives and to manage investee performance. These activities may include determining what to measure, collecting and analyzing the related information, and using the results in decision-making and reporting.
- **Impact measurement framework:** A blueprint for how specific metrics are used within an organization's impact measurement program and align with the organization's impact objectives. It includes both the metrics and the logic for how they are applied across a portfolio.
- **Metric:** A defined unit of measurement; a system or standard for measurement.
- **Outputs versus outcomes**
  - **Outputs:** Tangible, immediate practices, products, and services that result from the activities that are undertaken.
  - **Outcomes:** Changes, or effects, on individuals or the environment that follow from the delivery of products and services.
- **Assumption:** Information which is taken to be true based on a reason or rationale.

Source: Measuring Impact: Guidelines for Good Impact Practice (Impact Measurement Working Group of the Social Impact Investment Taskforce established by the G8, 2014).<sup>3</sup>

### Key Considerations for Designing an Impact Measurement Approach

Three key considerations are important to bear in mind when designing an impact measurement approach — considerations which help to explain and validate the diversity of approaches used by impact measurement practitioners featured in this report and beyond.

#### 1. MEASURE WHAT MATTERS

There is currently no one-size-fits-all approach for measuring impact. Today, impact investors tend to develop individual, idiosyncratic systems and practices that reflect their impact objectives, those of limited partners (LPs) and investees, and

the operating environment in which deals take place<sup>4</sup>. In other words, *they measure what matters to them*.

For example, the 13 investors interviewed for this report have different impact objectives for financing access to clean energy — ranging from improving the quality of services for BoP consumers, to demonstrating the viability of a new technology, to driving sector development. From these different objectives emerge 13 distinct frameworks for measuring impact that share commonalities but also have features that make them unique. Most impact investors embrace this diversity of approaches, pointing to differentiation as a key value proposition for fund managers and a source of choice in the marketplace for their investors. While diversity is encouraged and expected, it is also important to consider the effects of fragmentation on investee companies and ensure that the impact measurement approach makes sense for the underlying businesses.

<sup>3</sup> Measuring Impact: Guidelines for Good Impact Practice was developed by the Impact Measurement Working Group (IMWG) of the Social Impact Investment Taskforce established by the G8 to elevate existing best practices. The IMWG was established in June 2013 at the G8 Social Impact Investment Forum in London to develop measurement guidelines for impact investors as well as a vision for impact measurement in the years ahead.

<sup>4</sup> As noted in "Measuring Impact: Guidelines for Good Impact Measurement Practice", (Impact Measurement Working Group of the Social Impact Investment Taskforce established by the G8, 2014).

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*Understanding how customers use and benefit from a product or service, and their attitudes towards it, not only gives a sense of impact, but also provides valuable insights on end-user demographics and product demand.*

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## 2. OUTPUTS VERSUS OUTCOMES

In addition to output measurement, investors are starting to measure outcomes in order to better understand the overall impact of their investment activity.<sup>5</sup> Outputs are tangible, immediate practices, products, and services that result from the investment activity, whereas outcomes are changes, or effects, on individuals or the environment that follow from the delivery of these practices, products, and services. Understanding outcomes relies in part on well-considered output measurement tracked over time — quantitatively using strong proxy metrics to measure the degree of change since the onset of the investment — ideally together with a qualitative observation of changes. The majority of impact investors are not yet actively measuring outcomes, but instead exploring whether and how to do so given limited resources.

Demand for greater rigor in data collection, and more evidence of investment outcomes, is driven by direct investors, fund investors, and even entrepreneurs. Fund investors, particularly development finance institutions (DFIs) and philanthropic organizations that make investments, want to understand what is being done with their capital and are placing more emphasis on impact measurement considerations being reflected in the portfolio and investment approach. Direct investors want better social and environmental performance data to understand their end beneficiaries and to assess which companies will have greater impact at scale. And finally, entrepreneurs want better customer insights to understand how end users benefit from their products and services to inform marketing and new product development.

While the value of measuring outcomes may be apparent, what is less clear is how to go about doing it. For one, measuring outcomes is not easy. For example, the correlation between

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5 For example, moving beyond tracking the number of beneficiaries (an output level metric) to measuring the positive health impacts of a clean cookstove on women in the household (an outcome level metric).

solar lanterns and improved health outcomes may be intuitive to the observer, but it is difficult to prove on a per transaction basis. Another challenge is the cost. Measuring outcomes can be expensive, particularly if rigorous impact evaluations are required. **Impact investors must balance the demand for more evidence with the practicality and resources required to actually obtain it. While some are starting to devote more resources towards measuring outcomes, it is still early days.**<sup>6</sup>

## 3. IMPORTANCE OF QUALITATIVE INFORMATION

While much of this report focuses on the measurement and reporting of quantitative data, it is important to bear in mind that impact investors also use qualitative data and anecdotes to report on their impact. Many do so in narrative format, using qualitative information that ranges from in-depth case studies to more nuanced stories and anecdotes. For example, the majority of investors interviewed acknowledge that qualitative evidence has largely been used to report on outcomes, in part because quantitative methodologies or models are still nascent in their development. However, recent years have seen the emergence of data analysis and impact reporting practices that incorporate more quantitative data, and we expect this trend to continue as quantitative approaches mature.

Qualitative data is not viewed as a substitute for hard numbers, but rather an explanation for and complement to the numerical reach or breadth data often provided by investee companies. It not only helps to prove or contextualize these figures but also allows for a more sophisticated understanding of the causal relationship between outputs and outcomes. This is useful information for investors — to drive learnings within and across the portfolio, and to attract additional capital. Stories and anecdotes help make the impact more tangible and are valuable tools to motivate people to invest in the sector.

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6 Some of these initiatives include Acumen's Lean Data Initiative, Innovations for Poverty Action's (IPA) Goldilocks Project, and the technology platform Premise.

## Opportunities for Greater Efficiency and Collaboration in Impact Measurement

As impact investors continue to fine-tune their impact measurement practices, there are many opportunities for improved collaboration and greater efficiency. We discuss three such opportunities below.

### 1. MAKING IMPACT DATA COLLECTION MORE PURPOSEFUL

Several investors are working with investees to pilot leaner, more purposeful approaches to impact measurement that make data collection and reporting more useful for the investee. For example, innovative surveying techniques that are integrated into existing business processes (like after-sales service) or technology platforms (like SMS) are leveraged to obtain better information about end users<sup>7</sup>. Understanding how customers use and benefit from a product or service, and their attitudes towards it, not only gives a sense of impact, but also provides valuable insights on end-user demographics and product demand — information that can be used by the investee to improve the product or the way it is delivered. Demonstrating the intrinsic business value of tracking impact data, including customer insights, will be an important next step for the sector; this will help to alleviate fear of burden and ‘reporting paralysis’ surrounding impact measurement and justify greater investment in these practices.

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*Many investors pursue their own research to generate evidence of impact, improve understanding of how outputs relate to outcomes, or develop and test new models.*

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<sup>7</sup> Developing these systems requires considerable investment and customization, and thus may not make sense for smaller businesses operating in nascent sectors. Investors can certainly play a role in covering initial sunk costs, and several are already working with portfolio companies to test such approaches.

### 2. REDUCING THE BURDEN OF IMPACT MEASUREMENT ON INVESTEE COMPANIES

Impact investors think carefully about the burden — real or perceived — that impact measurement and reporting can place on investee companies. While these companies are fully committed to social and environmental impact, many find the measurement and reporting process to be excessively resource-intensive and time-consuming — especially when dealing with multiple funders who have different requirements. This is particularly true for early-stage or smaller enterprises which are wholly focused on setting up and proving their business models.

To address this issue, many investors are taking steps to simplify the measurement and reporting process for investees — by reducing the number of metrics tracked to only those that make business sense or by adopting metrics already tracked by the investee company. Others provide funding or technical assistance to build investee capacity for impact measurement or to undertake targeted research. These efforts are a big step in the right direction, but their overall effectiveness in reducing the burden on investees will still depend on better coordination among co-investors, both pre- and post-investment.

### 3. INCREASING COLLABORATION AMONG IMPACT INVESTORS

There is huge potential for greater collaboration on impact measurement among impact investors in the clean energy sector and beyond. Very little formal collaboration takes place at the investor or fund manager level, despite obvious benefits of shared learnings and costs, and the potential to reduce reporting burden on investees<sup>8</sup>. One opportunity is to increase collaboration among co-investors during the due diligence phase of an investment, when impact reporting requirements are being determined. Better coordination of the metrics tracked, the reporting frequency, and the data collection

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<sup>8</sup> Recent and promising examples of investor collaboration around impact measurement and reporting include the harmonization effort undertaken by the development finance institution (DFI) community and the standardization effort undertaken by the Global Off-Grid Lighting Association (GOGLA) for the off-grid energy sector. The DFI harmonization effort aims to reduce the reporting burden imposed on shared clients by harmonizing several development impact indicators, methodologies, and definitions (e.g., job creation), while the GOGLA standardization effort aims to produce a harmonized industry standard for reporting on social impact for consistent use across the off-grid lighting sector.

template would help to reduce duplication and unnecessary work for the investee. Achieving greater alignment may not be practical on a per transaction basis, given that investors use different systems to collect and manage impact data and operate according to specific internal procedures and timelines.

Another opportunity for collaboration arises when conducting intensive impact evaluations or other targeted research — for example, when trying to prove the health or education benefits of a solar lantern. Many investors pursue their own research to generate evidence of impact, improve understanding of how outputs relate to outcomes, or develop and test new models — often in collaboration with investee companies or industry associations, but not other investors. While structuring research partnerships can have major cost and resource implications, partnering with other investors can have potential benefits, including cost sharing and larger data sets. Leveraging other industry bodies or nonprofits to coordinate research among multiple investors may be a good alternative and lead to greater investor collaboration for research and impact evaluation.

## B. IMPACT MEASUREMENT PRACTICE IN THE CLEAN ENERGY SECTOR

The discussion above outlines the prevailing issues and considerations shaping impact measurement practice in the broader impact investing industry. Below, we summarize key insights from our survey of impact measurement practice in the **clean energy sector in particular**, highlighting trends in metric use as well as related challenges and limitations. Further details on commonly-used metrics and measurement approaches are provided in the technical section that follows. The insights and observations presented here are based on interviews with 13 clean energy investors contributing to this report, and should be viewed as a frame of reference, or starting point, for measuring the impact of clean energy investments, rather than representative of practice across the sector as a whole.

### Metric Use in the Clean Energy Sector

- **Metric selection and use is nuanced and not universal; impact investors choose what metrics to collect based on their impact objectives and those of their investees.** As discussed earlier, “measure what

matters” is a principle that guides metric selection by impact investors broadly, and this report offers concrete examples of how clean energy investors apply it in practice. For example, there are 12 metrics identified by this report as commonly-used, but investors only use a sub-set of these — seven on average — across clean energy investments in their portfolios. This number may vary on a per transaction basis, depending on a variety of factors such as sub-sector, business model, target customer, and type of product or service.

- **Social impact objectives drive investment activity in the clean energy sector.** The majority of investors interviewed for this project invest in the clean energy sector to improve quality of life through access to energy for poor or underserved populations. Investors are also motivated by the desire to test the viability of new business models or innovative technologies. Surprisingly, only eight of the 13 investors interviewed cited catalyzing positive environmental outcomes as an explicit impact objective of their investment activity in the clean energy sector, despite the obvious environmental benefits of many of these business models. Many track environmental metrics if provided by the investee, but do not otherwise include an environmental emphasis in their investment thesis and theory of change.
- **Access to energy, job creation, and environmental benefit are the primary metrics being used for clean energy investments.** All investors interviewed track number of beneficiaries as a proxy for access to energy, and most also track number of people employed and reduction or avoidance of greenhouse gas (GHG) emissions. Again, it is interesting to note the contradiction between the number of investors tracking an environmental benefit metric (11 investors) and the number citing environmental impact objectives as a reason for investing in the clean energy sector (eight investors). Secondary metrics (tracked by fewer investors) include those related to investor leverage or demonstration effect, cost savings, and enhanced opportunity for productivity and income generation.

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*As impact measurement practices mature and evolve, the question will no longer be what and how to measure, but how to measure more efficiently and in a way that is financially sustainable.*

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## Measurement Challenges and Limitations in the Clean Energy Sector

This report uncovers challenges and limitations of measuring impact in the clean energy sector that are rarely discussed among impact investors. Here we summarize some of the key issues that emerged during the investor interviews, many of which are also relevant to investments in other sectors.

- **Many metrics used by clean energy investors are based on assumptions about the product or customer**, which challenge the overall reliability of data. For example, the metric ‘number of beneficiaries’ is based on assumptions about the product lifetime, number of products sold to each household, household size, and the frequency of the product’s use. Assumptions make it difficult to measure and verify certain outputs and outcomes, and also need to be re-vetted on a periodic basis to reflect changing market conditions.
- **It is difficult to contextualize the significance of outcomes and impacts if local circumstances are not taken into account.** Impact can only be truly assessed and understood if investors consider local context. For example, cost savings resulting from switching fuel sources

### AT A GLANCE

## Key Insights into Impact Measurement Practice in the Clean Energy Sector

### Impact Objectives and Metrics

- Metric selection and use is nuanced and not universal; impact investors choose what metrics to track based on their impact objectives and those of their investees.
- Social impact objectives, as opposed to environmental objectives, drive investment activity in the clean energy sector for the investors interviewed in this report.
- Access to energy, job creation, and environmental benefit are the primary metrics being used for clean energy investments. Many investors track environmental benefit as a metric, but do not cite catalyzing positive environmental outcomes as an explicit impact objective of investment activity.

### Measurement Challenges and Limitations

- Many metrics used by clean energy investors are based on assumptions about the product or customer, which challenge the overall reliability of data.
- It is difficult to contextualize the significance of outcomes and impacts if local circumstances are not taken into account.
- Metrics are often tracked and reported by investees; investors have no way to verify the accuracy and reliability of impact data.
- Current impact measurement practice in the clean energy sector is largely based on observable but unverifiable data.

can be estimated across all customers, but the actual impact will depend on local fuel prices in each market. Obtaining such information can be difficult, due to resource constraints and access to reliable data. As such, investors often make estimations or generalizations about impact without accounting for local context.

- **Metrics are often tracked and reported on by investees; investors have no way to verify the accuracy and reliability of impact data.** For example, many investors obtain data on the energy production capacity of mini-grids from the investee, and have no way of validating the actual production capacity of the system — which could vary greatly depending on local conditions. Self-reporting of employment figures by investees is also common, and can potentially lead to overestimation of actual numbers of people employed.
- **Current impact measurement practice in the clean energy sector is largely based on observable but unverifiable data.** Qualitative assessments and anecdotal or self-reported data are frequently used to estimate outputs and outcomes, which are often not supported by

quantitative data. Accurate monitoring and quantitative assessment tend to be prohibitive due to high costs for the investor and significant effort and resources required by the investee.

## Looking Ahead

As impact measurement practices mature and evolve, the question will no longer be what and how to measure, but how to measure more efficiently and effectively in a way that is financially sustainable. We think the opportunities and challenges identified in this report provide a good starting point for future dialogue and investor collaboration around impact measurement in the clean energy sector and beyond. We also recognize that more needs to be done to understand how metric use changes over time, to further socialize and address the challenges and limitations involved in measurement, and to improve the intrinsic business value of collecting impact data. We are excited to engage and support the impact investing community in this effort and look forward to working with the GIIN membership to improve collective impact measurement practice.

# II. Technical Notes: Metrics and Approaches for Measuring Impact in the Clean Energy Sector

## A. COMMONLY-USED IMPACT OBJECTIVES AND METRICS FOR CLEAN ENERGY INVESTMENTS

What are investors measuring in the clean energy sector and which metrics are commonly-used? This section provides important insights into these frequently asked questions. Table 1 below (and continued on page 11) shows a) the social and environmental performance metrics currently tracked by the 13 investors interviewed for this report, organized by impact area, b) the level at which they are commonly measured as determined by the investor (i.e., output or outcome), and c) the related impact objectives of the investment activity. The table gives readers a sense of which objectives and metrics are common, and the average number of metrics tracked by each

investor participating in this report. It is important to note that the full set of 12 metrics is not universally applied by impact investors who finance access to clean energy; rather, metrics are used selectively on a per transaction basis depending on their relevance to the investee company, sub-sector, business model, customer, or type of product or service sold.

*Metrics are used selectively on a per transaction basis depending on their relevance to the investee company, sub-sector, business model, customer, or type of product or service sold.*

**TABLE 1: IMPACT OBJECTIVES AND COMMONLY-USED METRICS**

	Acumen	Bamboo Finance	Calvert Foundation	Deutsche Bank	DOEN Foundation	FMO	Global Alliance for Clean Cookstoves	Gray Ghost Ventures	LGT VP	Lundin Foundation	OPIC	responsAbility	Shell Foundation
PRIMARY IMPACT OBJECTIVES													
Improve quality of life for poor or underserved populations through access to energy	●	●	●	●	●	●	●	●	●	●		●	●
Support social enterprises to test new business models or innovative technologies	●		●	●	●		●	●	●	●			●
Catalyze positive environmental outcomes			●	●	●	●	●		●		●		●
Catalyze positive socioeconomic outcomes in the local economy or in a specific sector			●			●	●	●	●		●	●	
Use technology to bridge information, access, or service gaps								●					

## METRICS LIST: WHAT IS BEING MEASURED?

### ACCESS TO ENERGY (pp. 14-15)

1. Number of beneficiaries (Output Metric)	IRIS	●	●	●	●	●	●	●	●	●	●	●	●	●
2. Clean energy capacity of products or services sold (Output Metric)	IRIS		●	●		●			●	●			●	●

### JOB CREATION (p. 16)

3. Number of people employed (Output Metric)	IRIS	●	●	●	●		●	●		●	●	●	●	●
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### ENVIRONMENTAL BENEFIT (pp. 17-18)

4. Reduction or avoidance of GHG emissions due to products or services sold (Outcome Metric)	IRIS		●	●	●	●	●	●	●			●	●	●
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### INVESTOR LEVERAGE OR DEMONSTRATION EFFECT (pp. 19-21)

5. Investments catalyzed by leveraging own capital (Outcome Metric)				●	●	●	●	●	●	●	●	●		●
6. Level of influence on a sector (Outcome Metric)				●					●	●			●	●
7. Introduction, upscale, and replication of new business models or technologies (Outcome Metric)				●		●		●	●		●	●		

### COST SAVINGS (RESULTING FROM SHIFTS IN SPENDING ON FUEL) (pp. 22-23)

8. Household cost savings resulting from shifts in spending on fuel (Outcome Metric)		●	●						●	●	●	●		●
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### ENHANCED OPPORTUNITIES FOR PRODUCTIVITY AND INCOME GENERATION (p. 24)

9. Increased income resulting from higher productivity or additional income-generating opportunities (realized by end users) (Outcome Metric)		●			●	●		●	●	●	●			
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### POVERTY LEVEL OF END USERS (p. 25)

10. Beneficiaries broken down by socioeconomic status (number and/or percent) (Output/Outcome Metric) <sup>9</sup>	IRIS	●			●					●	●		●	●
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### GENDER IMPACT OR BENEFITS TO WOMEN AND GIRLS (p. 26)

11. Investment supports or empowers women and/or girls (Outcome Metric)	IRIS			●	●			●					●	●
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### HEALTH BENEFITS (p. 27)

12. Reduction in deaths and disability-adjusted life years (DALYs) (Outcome Metric)					●				●	●				
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<sup>9</sup> Whether a metric is an output or an outcome level metric can be somewhat subjective. This particular metric was found to be measured at both output and outcome levels by different investors interviewed.

## B. MEASUREMENT APPROACHES FOR COMMONLY-USED IMPACT METRICS IN THE CLEAN ENERGY SECTOR

The following technical notes lay out different approaches to measuring the commonly-used metrics presented on the previous page, organized by impact area (e.g., access to energy or environmental benefit). These notes are primarily intended for impact measurement practitioners who are seeking a more granular understanding of how specific metrics are tracked or measured. They will also be useful for investors who are new to the sector and trying to determine where to start.

**The notes cite the most commonly-used methodology to measure or report on each metric, and provide other usage guidance on data sources, assumptions, and challenges or limitations, where available. The purpose of the technical notes is to provide a snapshot of measurement approaches, rather than to offer analysis**

**of the relative advantages or disadvantages of any one metric or methodology.<sup>10</sup>**

In aggregating the various measurement approaches, we observed some common trends in the way that data is collected and reported across all metrics presented in this report, which we have summarized here for simplicity's sake. First, the task of collecting and tracking the underlying social and environmental performance data is usually carried out by the investee and then reported to the investor (as opposed to the investor collecting the data directly from end beneficiaries). And second, most social and environmental performance data is reported by investees on a monthly or quarterly basis, consistent with the reporting requirements for financial and operating data.

<sup>10</sup> Information in the technical notes highlights a representative approach to measuring each metric, drawn from the interviews. As such, the investors who are cited as using the approach may make their own refinements and may measure with different levels of sophistication. All information presented in the technical notes is self-reported by investors interviewed for this report.

### AT A GLANCE

#### Important Notes about the Metrics Featured in this Report

- **Metrics were selected based on frequency of use.** Metrics were selected for inclusion in this report because they are commonly used by the investors interviewed (i.e., three or more instances observed across investors). The investors interviewed may track additional metrics not featured in this report.
- **Metrics are measured using both quantitative and qualitative approaches.** Investors use a variety of methods to measure and report on the metrics featured in this report, many of which are outlined in the following section. When investors are cited as using a given metric in this report, it means that they actively attempt to track and report on it using quantitative and/or qualitative methods.
- **Metrics are not always tracked systematically across all companies in an investor's portfolio.** Many investors use metrics passively, whereby a metric is tracked if the portfolio company provides the actual data or estimates, but is otherwise not required (and often not verified) by the investor.
- **Several of the metrics featured in this report align with IRIS metrics.** These are identified by the IRIS logo throughout this report, with further guidance on IRIS alignment provided in the Appendix. Other metrics featured in this report do not align with IRIS metrics, for two main reasons. First, IRIS metrics tend to measure outputs and not outcomes, whereas many of the metrics featured in this report are outcome-level metrics. Second, IRIS metrics are normally tracked, measured, and verified at the investee company level, instead of the investor level. As such, metrics that capture portfolio or other macro level impacts — such as an investor's influence on a sector — are not included in the current IRIS taxonomy.

**TABLE 2: USER GUIDE TO THE TECHNICAL NOTES**

The following tables present metrics notes, organized by impact area.

HOW TO READ THE DETAILED METRIC NOTES	
<b>NAME OF METRIC, LEVEL OF MEASUREMENT, AND IRIS ALIGNMENT</b>	Indicates the name of the metric, whether the metric is typically measured at output or outcome level, and whether it aligns with an IRIS metric (guidance on IRIS alignment is provided in the Appendix)
<b>DESCRIPTION</b>	Provides a brief description of the metric and its intended use
<b>COMMONLY-USED METHODOLOGY</b>	Provides a brief description and example of the most commonly-used methodology to calculate or report on the metric
<b>USAGE NOTES (WHERE AVAILABLE)</b>	Provides additional information for the user in key areas, such as:
<b>OTHER APPROACHES OBSERVED</b>	Other approaches to track, measure, or report on the metric that vary slightly from the commonly-used methodology
<b>DATA SOURCES</b>	Examples of data sources to supply the information needed for measurement
<b>ASSUMPTIONS</b>	Assumptions made during measurement and reporting that are specific to the metric
<b>CHALLENGES &amp; LIMITATIONS</b>	Brief commentary on challenges and limitations related to the tracking, measurement, or reporting of the metric, based on insights from the interviews
<b>CURRENT USERS</b>	Indicates which of the investors participating in this project currently use the metric — including those who actively measure it and those who are exploring approaches to measuring or tracking it



## 1. NUMBER OF BENEFICIARIES (OR REACH) (OUTPUT)

DESCRIPTION	Number of clients provided improved access, during the reporting period, to clean energy products or services. The figure often includes other end users or beneficiaries beyond the primary client, such as individuals who live in the same household as the client. Disaggregated by gender where possible.
COMMONLY-USED METHODOLOGY	Multiply the number of units sold by the average household size in the market to get the number of end beneficiaries. <i>Example: 100,000 solar lanterns sold x 5 people per household (in Kenya) = 500,000 end beneficiaries</i>
<b>USAGE NOTES</b>	
OTHER APPROACHES OBSERVED	For energy services (e.g., power generation), divide the expected energy production capacity for the project by the average per capita (or household) energy consumption in the country to get number of end beneficiaries. <i>Example: 500,000 kWh generated per year / 5,000 average kWh per person per year = 100 beneficiaries</i>
DATA SOURCES	<ul style="list-style-type: none"> <li>• Company operating metrics, or sales data, obtained directly from the company or from vendor receipts</li> <li>• National statistics on average household size and average household energy consumption</li> <li>• Other publicly available datasets from the World Bank, International Monetary Fund (IMF), Asian Development Bank (ADB), and others</li> </ul>
ASSUMPTIONS	<ul style="list-style-type: none"> <li>• One product purchased per household (and one product can benefit multiple people)</li> <li>• Average household size per market</li> <li>• Households that purchase products or services use them regularly, based on the average energy capacity per day</li> <li>• Once sold, products do not break down nor are repossessed</li> <li>• A product or service creates impact over its useful life (estimated to be three years for solar lanterns and clean cookstoves)</li> <li>• For organizations that sell through distributors, additional assumptions are made regarding the number of units sold to distributors being the number of units sold to end clients</li> </ul>
CHALLENGES & LIMITATIONS	<ul style="list-style-type: none"> <li>• Assumptions on household size and use of the product make it difficult to produce an actual figure that is 'bulletproof'. For example, there is a need to discount for products that are purchased and not used, either because they are defective or for other reasons.</li> <li>• Gender and age dynamics may cause certain members of the household to have access to clean energy products and services while others do not (e.g., a man might use a solar lantern but not allow the women or children to use it). In this case, simply multiplying by the average household size would not reflect accurate levels of access or use.</li> <li>• Reliability of data, especially around assumptions that may need re-vetting to reflect changing market conditions.</li> </ul>
CURRENT USERS	Acumen, Bamboo Finance, Calvert Foundation, Deutsche Bank, DOEN Foundation, FMO, Global Alliance for Clean Cookstoves, Gray Ghost Ventures, LGT VP, Lundin Foundation, OPIC, responsAbility, Shell Foundation



## 2. CLEAN ENERGY CAPACITY OF PRODUCTS OR SERVICES SOLD (OUTPUT)

DESCRIPTION	Amount of potential clean energy generated over the lifetime of the product or system for all products or services sold during the reporting period, measured in number of kW or kWh.
COMMONLY-USED METHODOLOGY	<p>Multiply the number of units sold by the average annual energy capacity of the product, and then by the average lifetime of the product to get total clean energy generation capacity of the product or service.</p> <p><i>Example: 100,000 units sold x 10 kWh per day x 365 days per year x 3 years average lifetime of product = 1095 GWh</i></p>
USAGE NOTES	
DATA SOURCES	<ul style="list-style-type: none"> <li>• Company operating metrics, or sales data, obtained directly from the company or from vendor receipts</li> <li>• Technical product data, including relevant Clean Development Mechanism (CDM) documentation from audited carbon programs (specifying annual energy capacity, average lifetime of the product, etc.)</li> </ul>
ASSUMPTIONS	<ul style="list-style-type: none"> <li>• A product or service creates impact over its useful life (currently estimated to be three years for solar lanterns and clean cookstoves).</li> <li>• Assumptions made by manufacturers as to the average energy generation capacity of the product. These assumptions are often based on tests conducted in laboratories based on ideal conditions (e.g., 12 or more hours of sunlight), which often do not reflect actual conditions in areas where the product is sold and used. Assumptions are also based on particular product-fuel combinations (e.g., use of clean cookstoves with pellets versus wood), which may not accurately reflect circumstances in all households.</li> <li>• Once sold, products do not break down nor are repossessed.</li> <li>• Households that purchase products or services use them regularly, based on the average energy capacity of the product per day.</li> <li>• For organizations that sell through distributors, additional assumptions are made regarding the number of units sold to distributors being the number of units sold to end clients.</li> </ul>
CHALLENGES & LIMITATIONS	<ul style="list-style-type: none"> <li>• Many investors obtain the energy production capacity data point from investees, and have no way of verifying the actual production capacity of products or systems sold.</li> <li>• Actual utilization rates could vary from the projected useful life from the manufacturers.</li> </ul>
CURRENT USERS	Bamboo Finance, Calvert Foundation, DOEN Foundation, Gray Ghost Ventures, LGT VP, responsAbility, Shell Foundation



## 3. NUMBER OF PEOPLE EMPLOYED (OUTPUT)

DESCRIPTION	Number of people employed by the organization as of the end of the reporting period. This includes paid full-time and/or part-time employees of the investee (enterprise level), and may be disaggregated by gender and/or by management level (e.g., number of management versus non-management employees).
COMMONLY-USED METHODOLOGY	<p>Add the number of people employed directly (full-time and part-time) by the investee as of the end of the reporting period to get the total number of people employed during the reporting period, disaggregated by gender where possible.</p> <p><i>For example: A stove manufacturer has 5 full-time employees + 3 part-time employees as of the end of the reporting period = 8 people employed directly during the reporting period.</i></p>
<b>USAGE NOTES</b>	
OTHER APPROACHES OBSERVED	<ul style="list-style-type: none"> <li>• In addition to measuring direct employment, some investors also measure the number of people employed indirectly by partners in the value chain (e.g., suppliers or distributors). This figure may also incorporate micro-entrepreneurs who sell the investee’s product or service.</li> </ul>
DATA SOURCES	<ul style="list-style-type: none"> <li>• Company operating metrics, including employee data and personnel costs in financial statements</li> <li>• Questionnaire completed by the investee</li> <li>• Site visit by investor</li> </ul>
ASSUMPTIONS	<ul style="list-style-type: none"> <li>• Regarding indirect employment, investees often only know the number of people employed directly, and tend to make assumptions about the number of people employed indirectly through partners or micro-entrepreneurs.</li> </ul>
CHALLENGES & LIMITATIONS	<ul style="list-style-type: none"> <li>• Self-reporting of employment figures by investees can sometimes result in over-estimation of actual numbers of people employed. Self-reported information is somewhat subjective and needs to be tracked over time in order to really understand the ‘delta effect’.</li> <li>• There is often little indication of the quality of the jobs, only the number created or sustained.</li> <li>• It is difficult to contextualize the significance of the number of jobs created for the local population and economy, unless management level positions are disaggregated in the total direct employment figure. For example, management positions tend to overinflate average wage statistics, particularly for lower-income populations.</li> <li>• It is important to understand the underlying numbers of full-time and part-time employees, and also the number of hours that constitute a part-time position (e.g., five hours per week). However, this information is often difficult to obtain.</li> </ul>
CURRENT USERS	Acumen, Bamboo Finance, Calvert Foundation, Deutsche Bank, FMO, Global Alliance for Clean Cookstoves, LGT VP, Lundin Foundation, OPIC, responsAbility, Shell Foundation



4. REDUCTION OR AVOIDANCE OF GREENHOUSE GAS (GHG) EMISSIONS DUE TO PRODUCTS OR SERVICES SOLD (OUTPUT)	
DESCRIPTION	Amount of reductions in greenhouse gas (GHG) emissions over the lifetime of products or services sold during the reporting period, reported in number of metric tons of CO <sub>2</sub> equivalent.
COMMONLY-USED METHODOLOGY	<p>Subtract the GHG emissions of the cleaner product from the GHG emissions of the product that has been replaced and then multiply by the number of units of product or service sold and the average product lifetime to get the total reductions over the lifetime of the product, for all products sold during the reporting period (usually one year). For further guidance, refer to the WRI Greenhouse Gas Protocol Standards.</p> <p><b>Standard equation per year:</b> (# units alternative product sold x average lifetime of alternative product) x [(emissions factor1 CO<sub>2</sub> per unit of measure fuel replaced x # unit of measure fuel replaced used annually) – (emissions factor2 CO<sub>2</sub> per unit of measure alternative fuel x # unit of measure alternative fuel used annually)] = emissions factor1 unit of measure GHG emissions reduced over lifetime of product sold per year</p> <p><b>SAMPLE VARIABLES</b></p> <p>Cleaner product/fuel = solar lantern            Replaced product/fuel = traditional lantern using kerosene            Average lifetime of solar lantern = 3 years            Emission factor1 for kerosene = 2.6 kg CO<sub>2</sub> per L kerosene            Unit of measure for kerosene = litre            Emissions factor2 for solar lantern = 0 kg CO<sub>2</sub> per solar unit            Unit of measure for solar lantern = solar unit</p> <p><i>Example: (100,000 solar lanterns sold x 3 years average lifetime of solar unit) x [(2.6 kg CO<sub>2</sub> per litres of kerosene used X 50 litres of kerosene used annually for kerosene lanterns) – (0 kg CO<sub>2</sub> emissions per solar unit)] = 19.5 million kg CO (or 19,500 metric tons) of GHG emissions reduced over the lifetime of the products sold during that year.</i></p> <p><i>Commonly-replaced products include kerosene, candles or D-cell batteries.</i></p>
<b>USAGE NOTES</b>	
OTHER APPROACHES OBSERVED	<ul style="list-style-type: none"> <li>Companies active in the carbon markets can use other proxies to estimate reduction or avoidance of GHG emissions, such as number of regulated carbon credits verified, number of voluntary credits verified, number of certified involuntary credits sold, amount of pre-carbon financing raised, and number of carbon programs registered.</li> </ul>
DATA SOURCES	<ul style="list-style-type: none"> <li>Efficiency tests or carbon audits for the product, service, or project and site visits to validate the data</li> <li>Technical data and CDM documentation from audited carbon programs</li> </ul>



Table continues on next page.

## 4. REDUCTION OR AVOIDANCE OF GREENHOUSE GAS (GHG) EMISSIONS DUE TO PRODUCTS OR SERVICES SOLD (OUTPUT)



<p><b>ASSUMPTIONS</b></p>	<ul style="list-style-type: none"> <li>• Cookstoves and lanterns that use traditional energy sources (e.g., kerosene and unsustainably harvested wood) are significant sources of harmful GHG emissions.</li> <li>• Clean energy products or services purchased displace the use of traditional fuels like kerosene.</li> <li>• Households that purchase products or services use them regularly.</li> <li>• A product or service creates impact over its useful life (currently estimated to be three years for solar lanterns and clean cookstoves).</li> <li>• Each type of product replaced (kerosene lamp, candle, etc.) produces a different amount of emissions and investees must make assumptions based on the type of product used previously.</li> </ul>
<p><b>CHALLENGES &amp; LIMITATIONS</b></p>	<ul style="list-style-type: none"> <li>• Product efficiency and resulting estimations of GHG emissions reduced as measured in the field tends to vary widely, and is influenced by numerous factors, such as improper use of the product, lack of maintenance, and variations in fuel (e.g., wet wood versus dry wood), among others. It also depends upon the accuracy of company-reported emission data and the method used for auditing carbon programs. As a result, it may be difficult to specify an efficiency for each product that is a realistic reflection of its actual performance.<sup>11</sup></li> </ul>
<p><b>CURRENT USERS</b></p>	<p>Bamboo Finance, Calvert Foundation, Deutsche Bank, DOEN Foundation, FMO, Global Alliance for Clean Cookstoves, Gray Ghost Ventures, LGT VP, OPIC, responsAbility, Shell Foundation</p>

<sup>11</sup> The GHG Protocol also provides an emissions factor database and set of calculation tools that practitioners may find useful as a standardized approach to GHG accounting.



## INVESTOR LEVERAGE OR DEMONSTRATION EFFECT

### 5. INVESTMENTS CATALYZED BY LEVERAGING OWN CAPITAL (OUTCOME)

DESCRIPTION	An indication of the amount of investment capital mobilized or secured by the investee by leveraging the investor's own capital and influence. This includes investments catalyzed using first-loss capital or other forms of credit enhancement, as well as through a pooled capital effect. Shows increased acceptance of the business model or technology and/or the investee's financial viability.
COMMONLY-USED METHODOLOGY	Quantify the annual change in financing mobilized by adding the total amount of funding secured (committed and/or disbursed) plus the total amount of revenue (re)invested in the company per year. <i>Example: An investor provides USD 2 million in investment to a portfolio company, which unlocks an additional USD 10 million in debt from other investors.</i>
USAGE NOTES	
OTHER APPROACHES OBSERVED	<ul style="list-style-type: none"><li>• Count the number of new investors or shareholders acquired by the investee within five years of the investment.</li><li>• Confirm whether the investment has been exited and/or handed over to another investor or strategic buyer.</li></ul>
DATA SOURCES	<ul style="list-style-type: none"><li>• Shareholder reports</li><li>• Company financial statements and other company-specific data</li><li>• Self-reporting by investees</li></ul>
ASSUMPTIONS	<ul style="list-style-type: none"><li>• Additional investment can be attributed to the original investment. Assumes a direct relationship between an investor's own capital and its impact on catalyzing or leveraging investment capital from other investors. Does not reflect the potential influence of other shareholders (e.g., co-investors) at the time of the transaction.</li><li>• Early-stage capital demonstrates viability and diminishes risks for subsequent capital.</li><li>• Positive business traction will signal to investment capital that the opportunity is viable and investable.</li></ul>
CHALLENGES & LIMITATIONS	<ul style="list-style-type: none"><li>• Attribution, which is implicit in the assumption that additional investment can be attributed to the original investment. In other words, it is difficult to demonstrate causation between one's own investment and follow-on capital.</li><li>• Product or business model validation may not imply financial viability or a sustainable path to profitability.</li><li>• Self-reported information is somewhat subjective and needs to be tracked over time in order to really understand the 'delta effect'.</li></ul>
CURRENT USERS	Calvert Foundation, Deutsche Bank, DOEN Foundation, FMO, Global Alliance for Clean Cookstoves, Gray Ghost Ventures, LGT VP, Lundin Foundation, OPIC, Shell Foundation



## INVESTOR LEVERAGE OR DEMONSTRATION EFFECT

### 6. LEVEL OF INVESTOR INFLUENCE ON A SECTOR (OUTCOME)

DESCRIPTION	An indication of knowledge transfer and/or uptake of new information or practices, based on the investor's influence as a first-mover in the sector.
COMMONLY-USED METHODOLOGY <i>* Qualitative approach</i>	<p>Observe whether there have been material changes resulting from an investor's influence at sector level. This could include changes in the regulatory environment or in relation to operating practices or industry standards. It could also include changes in the level of private sector investment or activity in a sector, or the extent to which businesses incorporate gender appropriate models into their operations.</p> <p><i>Example: An investor finances a new kind of renewable energy project in Pakistan, for which the investor negotiated different terms for a power purchase agreement (PPA) with the local government. If the government utility replicates these new terms for other projects, then the investor has had an influence on the regulatory environment for the sector as a whole.</i></p>
USAGE NOTES	
DATA SOURCES	<ul style="list-style-type: none"><li>• Site visit by investor</li><li>• Questionnaires completed by investee and key stakeholders</li><li>• Market and industry data</li><li>• Follow-on investment practice, i.e., an early-stage investor's ability to signal to other investors of the positive aspects of an investment or trend</li></ul>
ASSUMPTIONS	<ul style="list-style-type: none"><li>• Positive developments or changes observed in the sector are attributable to the original investment (or investor). Does not reflect the potential influence of other investors or variables at the time of the transaction.</li></ul>
CHALLENGES & LIMITATIONS	<ul style="list-style-type: none"><li>• It is difficult to disaggregate the investor's impact from other inputs into sector development. It is easier to aggregate at the sector level and could be done via a sector-building organization like the Global Alliance for Clean Cookstoves (e.g., for the clean cooking sector).</li></ul>
CURRENT USERS	Calvert Foundation, Global Alliance for Clean Cookstoves, Gray Ghost Ventures, OPIC, responsAbility, Shell Foundation



## INVESTOR LEVERAGE OR DEMONSTRATION EFFECT

### 7. INTRODUCTION, UPSCALE, AND REPLICATION OF NEW BUSINESS MODELS OR TECHNOLOGIES (OUTCOME)

DESCRIPTION	An indication of an investor’s influence or role in proving the viability of a new business model or technology and/or its potential to scale. Tracks the growth of a particular market or sub-sector through the introduction and/or expanded use of the business model or technology.
COMMONLY-USED METHODOLOGY <i>* Qualitative approach</i>	Quantitatively or qualitatively assess whether the business model or technology has been introduced and/or replicated (e.g., number of incidences of expansion to new markets) and size of new or existing businesses (e.g., number of products sold, number of clients, or sales figures) over a given period of time to indicate whether the investor has had a demonstration effect.  <i>Examples: A) a new solar lantern company has expanded sales from one country to 40 countries over the life of the investment. This is proof that the company has scaled; or B) there are 30 cases of replication of an energy-efficient cooking technology. This is evidence that the business model or technology has been replicated.</i>
<b>USAGE NOTES</b>	
DATA SOURCES	<ul style="list-style-type: none"> <li>• Company-specific sales and expansion performance data, obtained directly from the company or from vendor receipts</li> <li>• Market data</li> <li>• Site visit by investor</li> </ul>
ASSUMPTIONS	<ul style="list-style-type: none"> <li>• Business model success can be attributed to the original investment. Assumes a direct relationship between an investor’s own capital and its impact on scaling and replicating a given business model. Does not reflect potential influence of other variables or inputs at the time of the transaction (e.g., co-investors).</li> <li>• The customer feedback loop is positive and validates the assumptions in different markets.</li> </ul>
CHALLENGES & LIMITATIONS	<ul style="list-style-type: none"> <li>• Attribution, which is implicit in the assumption that business model scale and replication can be attributed to the original investment. In other words, it is difficult to ascertain which investor, if any, has influenced the scale and replication of a given business model.</li> <li>• Qualitative assessments may not be supported by quantitative data.</li> </ul>
CURRENT USERS	Calvert Foundation, DOEN Foundation, Global Alliance for Clean Cookstoves, Gray Ghost Ventures, Lundin Foundation, OPIC



## COST SAVINGS RESULTING FROM SHIFTS IN SPENDING ON FUEL

### 8. HOUSEHOLD COST SAVINGS RESULTING FROM SHIFTS IN SPENDING ON FUEL (OUTCOME)

DESCRIPTION	<p>An indication of cost efficiencies resulting from shifting spending on fuel (often resulting from switching away from traditional products in favor of more energy-efficient technologies that consume less fuel). Measured in terms of cost savings realized by reducing spending on kerosene or charcoal, which tends to be more costly than renewable fuel sources.</p>
COMMONLY-USED METHODOLOGY	<p><b>To calculate cost savings from shifts in spending on fuel:</b> For solar lanterns and solar home systems, which have no operating cost (i.e., free sunlight), the cost savings accruing to a household equals the annual expenditure on traditional sources of fuel. For cookstoves, which have an operating cost in terms of cleaner fuel, the cost savings equals the annual expenditure on previously-used traditional fuels (e.g., kerosene, wood, charcoal) minus the annual expenditure on cleaner fuels (e.g., liquid petroleum gas, ethanol, pellets, or electricity) and/or the annual expenditure on traditional fuels (e.g., wood or charcoal, which may still be used but which would burn more efficiently and thus require less fuel resulting in lower fuel expenditure).</p> <p><i>Example: Cost savings resulting from switching to a solar lantern = annual expenditure on kerosene – USD 0.00 operating cost for solar lantern (free sunlight).</i></p> <p><i>Example: Cost savings resulting from switching to a clean cookstove = annual expenditure on traditional fuels (e.g., kerosene, wood, charcoal) – annual expenditure on cleaner fuels (e.g., LPG, ethanol, etc.) and/or on lower volumes of traditional fuels (e.g., wood or charcoal).</i></p> <p><b>The above methodology does not account for the cost of the energy product or service itself, only the savings associated with reductions in fuel use.</b> As such, investors may also want to calculate cost savings, inclusive of the cost of the product. For example, if a household has ownership of the energy asset (e.g., cookstove or solar lantern), then cost savings is the difference between the cost savings from switching to clean energy (see calculation above) over the lifetime of the product and the cost of the product itself.</p> <p><i>Example: Cost savings over the lifetime of the product = (lifetime of the product x annual cost savings resulting from switching to cleaner energy) – cost of the product.</i></p> <p>On the other hand, if it is a utility-based model, then cost savings is the difference between the cost of energy from the utility and the market cost of fuel per unit of energy. Finally, value-added features of the product or service — like phone charging capacity of solar lanterns — can also yield cost savings and can be accounted for.</p>
USAGE NOTES	
OTHER APPROACHES OBSERVED	<ul style="list-style-type: none"> <li>• Using customer surveys, track household expenditure on new versus traditional products and services, and the increase in usage over time compared to six months prior. For more information, see here.</li> <li>• Expand the calculation to include cost savings resulting from time saved (e.g., gathering wood for fuel or purchasing kerosene) or reduction in medical expenditures as a result of improved health.</li> <li>• Calculate the percentage of household income spent on acquiring cooking fuels using a model based on fuel prices, fuels sold, and household income data.</li> </ul>
DATA SOURCES	<ul style="list-style-type: none"> <li>• Market research and/or survey of customers</li> <li>• Household income data</li> <li>• Company operating metrics, or sales data, obtained directly from the company or from vendor receipts</li> <li>• Site visit by investor</li> </ul>

*Table continues on next page.*

## 8. HOUSEHOLD COST SAVINGS RESULTING FROM SHIFTS IN SPENDING ON FUEL (OUTCOME)

<b>ASSUMPTIONS</b>	<ul style="list-style-type: none"><li>• Kerosene and other traditional fuels are more expensive than renewable sources of energy.</li><li>• Average daily household expenditure on kerosene or other traditional fuels.</li><li>• Clean energy products or services purchased displace or increase the efficiency of the use of traditional fuels like kerosene. This also assumes that households are purchasing kerosene to begin with, rather than using cheaper sources of energy like wood. Switching from wood to charcoal or LPG may actually lead to an increase in expenditure on fuel, rather than a decrease.</li><li>• Households that purchase products or services use them regularly.</li><li>• A product or service creates impact over its useful life (currently estimated to be three years for solar lanterns and clean cookstoves).</li></ul>
<b>CHALLENGES &amp; LIMITATIONS</b>	<ul style="list-style-type: none"><li>• Cost savings can be estimated quantitatively, though the impact can only be assessed if local context is taken into account — for example, local fuel prices.</li><li>• Switching away from traditional products and fuels can actually lead to cost increases (not cost savings) as mentioned above, and so assumptions need to be validated.</li><li>• This metric frequently does not incorporate the cost of the product itself (e.g., the solar or cookstove unit), which is important to factor into total cost savings achieved. The methodology above provides an example of how to address this limitation.</li></ul>
<b>CURRENT USERS</b>	Acumen, Bamboo Finance, Global Alliance for Clean Cookstoves, Gray Ghost Ventures, LGT VP, Lundin Foundation, Shell Foundation



## ENHANCED OPPORTUNITIES FOR PRODUCTIVITY AND INCOME GENERATION

### 9. INCREASED INCOME RESULTING FROM HIGHER PRODUCTIVITY OR ADDITIONAL INCOME-GENERATING OPPORTUNITIES (OUTCOME)

DESCRIPTION	An indication of the amount of additional income that has accrued to end users by virtue of extended hours of commercial operation and/or other informal income-generating activity, as a result of extra hours of light (access to solar lanterns) and/or extra time resulting from time saved during cooking or gathering fuel. Does not include increased income from money savings resulting from the use of more energy efficient products (see Metric 8).
COMMONLY-USED METHODOLOGY	<p>Calculate the differential in increased income generated by multiplying the average hourly income of the end user or commercial establishment by the number of extra hours of operation enabled per day by the number of work days per year to get the annual increase in income resulting from use of one unit of the product or service.</p> <p><i>Example: USD 1 average hourly income x 3 extra hours of operation per day x 312 work days per year = USD 936 dollars of increased income generated that year.</i></p>
USAGE NOTES	
DATA SOURCES	<ul style="list-style-type: none"> <li>• Customer surveys or market research</li> <li>• Company operating metrics, or sales data, obtained directly from the company or from vendor receipts</li> <li>• National census data</li> <li>• Other publicly available datasets from the World Bank, International Monetary Fund (IMF), Asian Development Bank (ADB), and others</li> </ul>
ASSUMPTIONS	<ul style="list-style-type: none"> <li>• Percentage of units sold for commercial purposes versus household use; for solar lanterns, one third of sales are currently estimated to be used for commercial purposes.</li> <li>• Beneficiaries will use their additional hours of light (or time saved cooking or gathering fuel) for income-generating activities.</li> <li>• Businesses and households that purchase products or services use them regularly.</li> <li>• A product or service creates impact over its useful life (currently estimated to be three years for solar lanterns and clean cookstoves).</li> <li>• One product purchased per business or household.</li> </ul>
CHALLENGES & LIMITATIONS	<ul style="list-style-type: none"> <li>• It is difficult to estimate the number of extra hours of operation per day as a result of more hours of light, which may lead to large overestimation of increased income.</li> <li>• Understanding whether end users are using the additional free time to engage in income-generating activities is important, but may be very difficult to estimate accurately through this calculation. Greater accuracy may be achieved by measuring increases in income directly through household surveys and then taking an average, as opposed to modeling.</li> <li>• Does not capture whether the additional lighted hours lead to more lucrative income-generating opportunities than the original business activity. Also, additional productive time could lead to more hours spent on education and professional development, new business ventures, entrepreneurial opportunities, and the like.</li> <li>• Opportunity cost estimates are often based on observable but unverifiable data. The metric is mostly based on anecdotal or qualitative data; to monitor this accurately (rather than base it on an assumed figure or system) would require considerable effort by the investee.</li> </ul>
CURRENT USERS	Acumen, Deutsche Bank, DOEN Foundation, Global Alliance for Clean Cookstoves, Gray Ghost Ventures, LGT VP, Lundin Foundation



## POVERTY LEVEL OF END USERS

### 10. BENEFICIARIES BROKEN DOWN BY SOCIOECONOMIC STATUS (NUMBER AND/OR PERCENT) (OUTPUT OR OUTCOME)



DESCRIPTION	An indication of whether or not products or services are reaching the target market, based on the socioeconomic status (e.g., BoP or poor) or income-level of clients and/or other end users.
COMMONLY-USED METHODOLOGY	<p>Estimate the socioeconomic demographics of customers by:</p> <ul style="list-style-type: none"> <li>• Surveying a sample of customers via mobile phone or household survey, using tools like the Progress out of Poverty Index.</li> <li>• Calculating or estimating the percentage of products or services sold or distributed in areas with high concentrations of BoP or low-income populations, for example, rural areas, using publically available socioeconomic or income data based on location or geography.</li> <li>• Using data obtained at the point of sale of the product or service.</li> </ul> <p><i>Example: Multiply the number of units sold (per geographic area) by socioeconomic data (for that geographic area) to get number of end clients that fall within that socioeconomic group.</i></p> <p><i>100,000 solar lanterns sold in Region A x 30% (percent of people living in poverty in Region A) = 30,000 clients who are poor.</i></p>
<b>USAGE NOTES</b>	
DATA SOURCES	<ul style="list-style-type: none"> <li>• Mobile (via SMS) or household surveys</li> <li>• Publically-available socioeconomic or income data based on location</li> <li>• Company operating metrics, or sales data, obtained directly from the company or from vendor receipts</li> </ul>
ASSUMPTIONS	<ul style="list-style-type: none"> <li>• One product purchased per household (and one product can benefit multiple people).</li> <li>• Households that purchase products or services use them regularly.</li> <li>• For organizations that sell through distributors, additional assumptions are made regarding the number of units sold to distributors being the number of units sold to end clients.</li> </ul>
CHALLENGES & LIMITATIONS	<ul style="list-style-type: none"> <li>• There is no common standard used by investors to define poverty levels or what constitutes a BoP or low-income customer. As such, it is important for investors to include specific definitions and assumptions used when tracking beneficiaries by socioeconomic status to allow for transparency and comparability.</li> <li>• Getting data on the income level of end beneficiaries is very inefficient at present. Customer segmentation requires investees to get into the field and develop different proxies for income level. Some companies like M-KOPA Solar have the ability to access a different level of customer data via mobile phone, and this is where most progress is seen.</li> <li>• The above is particularly true for organizations further upstream in the value chain (like manufacturers), which do not interact with end users.</li> </ul>
CURRENT USERS	Acumen, Deutsche Bank, Gray Ghost Ventures, LGT VP, OPIC, Shell Foundation



## GENDER IMPACT OR BENEFITS TO WOMEN AND GIRLS

### 11. INVESTMENT SUPPORTS OR EMPOWERS WOMEN AND/OR GIRLS (OUTCOME)



DESCRIPTION	An indication of the extent to which the investment supports women-led organizations and/or organizations that engage women throughout their value chains, and/or has a strong impact on female clients.
COMMONLY-USED METHODOLOGY	<p>Apply a gender lens to individual transactions to understand whether and the extent to which the investment:</p> <ol style="list-style-type: none"> <li>1. Supports women-led organizations: based on female representation on the board and/or management team, and/or number and value of partnerships with women-led suppliers and distributors.</li> <li>2. Supports female employment at different levels of the organization or in the organization's value chain (e.g., management, employees, or distributors).</li> <li>3. Has a strong impact on female clients: based on the percentage of female beneficiaries and/or the creation of health and other social benefits that disproportionately accrue to women.</li> </ol> <p><i>Example: Ten new job opportunities created for women along the entire value chain as a result of additional capital injected to support the organization's growth.</i></p>
<b>USAGE NOTES</b>	
DATA SOURCES	<ul style="list-style-type: none"> <li>• Company operating metrics, including personnel data. For an example, see here.</li> <li>• Site visit by investor.</li> </ul>
ASSUMPTIONS	<ul style="list-style-type: none"> <li>• For women-led organizations: Women-owned or women-led organizations will run their businesses in a gender-inclusive manner that will create impacts for both women engaged within their value chain and for female customers.</li> <li>• For female clients: The product or service improves women's and/or girls' agency in their household and/or community, given that they will have more time to devote to income-generating or self-improving activities.</li> </ul>
CHALLENGES & LIMITATIONS	<ul style="list-style-type: none"> <li>• Gender-related questions tend to have a lower response rate from investees than do other impact areas. Self-reported information is somewhat subjective and needs to be tracked over time in order to really understand the 'delta effect'. Moreover, many investees do not think it makes sense to specifically target women customers or women employees, and would not be able to identify if and when this occurs.</li> </ul>
CURRENT USERS	Calvert Foundation, Deutsche Bank, Global Alliance for Clean Cookstoves, OPIC, Shell Foundation



### 12. REDUCTION IN DEATHS AND DISABILITY-ADJUSTED LIFE YEARS (DALYS) (OUTCOME)

<b>DESCRIPTION</b>	Estimates the reduction in deaths and disability-adjusted life years due to chronic obstructive pulmonary disorder (COPD), acute lower respiratory infection (ALRI), and lung cancer (disaggregated by gender where possible), resulting from the use of clean cooking technologies.
<b>COMMONLY-USED METHODOLOGY</b>	<p><i>Estimates are based on the Comparative Risk Assessment methodology used to estimate the burden of disease from household air pollution.</i></p> <p>The starting point for estimating health effects arising from adoption of cleaner cooking solutions is exposure reduction data for PM<sub>2.5</sub>.<sup>12</sup> These figures are used to estimate changes in exposure, using assumptions about the kitchen size, length of time cooking, and ventilation. The outputs then serve as inputs into an exposure-response model to provide estimates of health outcomes. The best developed national exposure-response model currently available is the HAPIT (Household Air Pollution Interventions Tool).</p> <p><i>More information on the HAPIT is available here.</i></p>
<b>USAGE NOTES</b>	
<b>DATA SOURCES</b>	<ul style="list-style-type: none"> <li>• Field research: at the dissemination site to demonstrate pollution exposure before and after the investment or intervention in a representative sample of households, as well as intensity of product use.</li> <li>• Technical inputs: technology life span and performance.</li> <li>• Detailed information on country-specific health data from Institute of Health Metrics and Evaluation and other key model inputs documented at <a href="http://www.cleancookstoves.org/HAPIT">www.cleancookstoves.org/HAPIT</a>.</li> </ul>
<b>ASSUMPTIONS</b>	<ul style="list-style-type: none"> <li>• The level of displacement. In other words, the extent to which the new cooking method completely replaces the traditional method.</li> <li>• Annual average exposure rates.</li> <li>• Equal distribution of health indicators at the national level.</li> <li>• Constant emission rate of product in question.</li> <li>• Activity patterns of individuals in household, or the amount of time a person spends in the living space.</li> <li>• Instantaneous and uniform mixing of pollutants in the living space (though this is taken into account in the HAPIT).</li> </ul>
<b>CHALLENGES &amp; LIMITATIONS</b>	<ul style="list-style-type: none"> <li>• Limited national level data on exposure reductions associated with various cooking technologies available.</li> <li>• It is difficult to distinguish between causal and coincidental positive health impacts.</li> <li>• Influence of interventions on local ambient air pollution are not fully captured by the HAPIT.</li> </ul>
<b>CURRENT USERS</b>	Deutsche Bank, Global Alliance for Clean Cookstoves, Gray Ghost Ventures

<sup>12</sup> PM<sub>2.5</sub> / PM<sub>10</sub> Monitoring Data - PM is the abbreviation for Particulate Matter. PM<sub>2.5</sub> is the abbreviation for Particulate Matter with a diameter smaller than 2 1/2 microns, where a micron is one millionth of a meter.

## OTHER IMPACT AREAS OF NOTE

Two additional impact areas — education benefits and safety and security — were mentioned frequently during interviews with investors but are not currently being measured or reported on in a systematic way. Many of the investors interviewed expressed interest in better understanding causal relationships in these areas, and several are pursuing research to this end.

### Education Benefits

Some investors are interested in the relationship between solar lanterns or solar home systems and educational outcomes for children. The assumption is that increased hours of lighting will enable children to study more hours in the evening and thus improve learning outcomes. There is anecdotal evidence of educational benefits accruing from solar lanterns, but the evidence tends to be difficult for investors to use because there is limited data on the long-term relationship between fuel replacement, access to lighting, and educational outcomes. As such, many of the investors interviewed have stopped making claims about educational benefits, citing instead that they represent potential additional benefits of the investment.

### Safety and Security

A smaller set of investors interviewed are interested in the personal safety or security benefits created by solar-powered lighting. One potential benefit is that solar lanterns and/or solar-powered lighting improve personal safety and security at night time, in terms of the number of incidences of petty crime or snake bites. Another potential benefit of solar lanterns (as a replacement for kerosene lamps) is the reduced incidence of household fires that result from kerosene lamps tipping over. Research and evidence in both of these impact areas is limited; investors reporting on safety or security tend to use qualitative information in the form of anecdotes or stories.

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*While impact measurement objectives and needs will differ for every investor and entrepreneur, we believe that the information presented in this report should be useful for all. It is only a beginning and we are exploring additional opportunities to deepen our work on impact measurement in the clean energy sector and beyond.*

Please share suggestions and comments by emailing **[NetworkMembership@thejiin.org](mailto:NetworkMembership@thejiin.org)**.

# Appendix: Guidance on IRIS Metric Alignment

Several of the metrics featured in this report align with or reference IRIS metrics. The table below provides guidance on how to align the metrics featured in this report with parallel metrics from the IRIS catalog.

Other metrics featured in this report do not align with IRIS metrics, for two main reasons. First, IRIS metrics tend to

measure outputs and not outcomes, whereas many of the metrics featured here are outcome-level metrics. Second, IRIS metrics are normally tracked, measured, and verified at the investee company level, instead of the investor level. As such, metrics that capture portfolio or other more macro-level impacts — such as an investor’s influence on a sector — are not included in the IRIS taxonomy.

## IRIS ALIGNMENT WITH IRIS METRICS

METRICS PRESENTED IN THIS REPORT	RELATED IRIS METRICS
<b>ACCESS TO ENERGY</b>	
1. Number of beneficiaries	Client Individuals: Total (PI4060) Client Households: Total (PI7954) Units/Volume Sold: Total (PI1263) Client Household Size (PI4548)
2. Clean energy capacity of products or services sold	Units/Volume Sold: Total (PI1263) Energy Capacity of Product (PD2713) Product Lifetime (PD4587)
<b>JOB CREATION</b>	
3. Number of people employed	Permanent Employees: Total (OI8869) Full-time Employees: Total (OI3160) Part-time Employees: Total (OI8864) <i>Visit the IRIS website to view additional employee focused IRIS metrics</i>
<b>ENVIRONMENTAL BENEFIT</b>	
4. Reduction or avoidance of GHG emissions due to products or services sold	Units/Volume Sold: Total (PI1263) Product Lifetime (PD4587) Greenhouse Gas Emissions of Product (PD9427) Greenhouse Gas Emissions of Product Replaced (PD2243)
<b>INVESTOR LEVERAGE OR DEMONSTRATION EFFECT</b>	
5. Investments catalyzed by leveraging own capital	N/A
6. Level of influence on a sector	N/A
7. Introduction, upscale, and replication of new business models or technologies	N/A

*Table continues on next page.*

METRICS PRESENTED IN THIS REPORT	RELATED IRIS METRICS
 <b>COST SAVINGS (RESULTING FROM SHIFTS IN SPENDING ON FUEL)</b>	
8. Household cost savings resulting from shifts in spending on fuel	N/A
 <b>ENHANCED OPPORTUNITIES FOR PRODUCTIVITY AND INCOME GENERATION</b>	
9. Increased income resulting from higher productivity or additional income-generating opportunities (realized by end users)	N/A
 <b>POVERTY LEVEL OF END USERS</b>	
10. Beneficiaries broken down by socioeconomic status (number and/or percent) (Output/Outcome Metric)	Client Individuals: Poor (PI3193) Client Individuals: Very Poor (PI9835) Client Individuals: Low-income (PI7098)  <i>Visit the IRIS website to view additional poverty-level focused IRIS metrics.</i>
 <b>GENDER IMPACT OR BENEFITS TO WOMEN AND GIRLS</b>	
11. Investment supports or empowers women and/or girls	Permanent Employees: Female (OI2444) Full-time Employees: Female (OI6213) Full-time Employee: Female Managers (OI1571) Part-time Employees: Female (OI8838) Board of Directors: Female (OI8118) Distributor Individuals: Female (PI6659) Client Individuals: Female (PI8330)  <i>Visit the IRIS website to view additional gender focused IRIS metrics.</i>
 <b>HEALTH BENEFITS</b>	
12. Reduction in deaths and disability-adjusted life years (DALYs)	N/A

### DISCLAIMER

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