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Impact Assessment at Persistent

A Report on our Metrics, Challenges and Vision

By Line Cottier, May 2020

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Introduction[1]

What is impact? How is it measured and why? These are the questions that are increasingly raised in a space where more and more investors wish to understand the impact of their investment actions. As key to our mission at Persistent, we also see the tracking and assessment of our effects on the livelihoods of people and the environment. As a venture builder in underserved emerging markets, it is our core aim to strive for socio-economic, environmental and sustainable impact.

Due to the fact that the clean energy access sector has an exceptionally large impact narrative, we believe the sector also has a particular responsibility to provide quantitative evidence of its impact – all while taking into account cost-effectiveness. Impact assessment is in need of unified global standards, and transparency and accurate data collection is an essential part of reaching these standards. This report intends to provide insights into how we track our impact indicators, which metrics and methodologies we use, and what our limitations and visions are. We have also recently published a white paper on impact assessment in the impact investment sector that describes the challenges stakeholders in the impact investment sector face when measuring impact and proposes concrete solutions to improving impact assessment.[2] Through these two publications we hope to provide the big picture on impact assessment and how it could look in the future.

What does impact mean to us?

- We believe that climate is the challenge of our generation and the generations to come, and that sustainable development requires people to have access to basic services, essential products and economic opportunity.

- Persistent therefore develops, invests in, works for and advises commercial businesses in emerging markets that promote, leverage and proliferate renewable energy, as well as provide essential products and services to customers – thereby generating financial returns for their investors, enabling climate positive or neutral economic development, and creating economic opportunity for individuals in local communities.

[1] This paper is an outgrowth of Line Cottier's work for Persistent while an intern in Winter and Spring 2020. The author thanks Chris Aidun for his assistance with this article.

[2] Please find here our white paper "Lessons learned: Impact assessment in the impact investment sector".

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Our partner companies

We divide our partner companies into three categories based on their business model:

- Pay-as-you-go (PAYG), e.g. Oolu Solar, Solarworks!, PEG, upOwa, Zonful Energy
- Productive use (PU), e.g. C&I companies candi solar, Rensource, and Daystar that provide SHS on a utility like basis, and Asobo that provides electric engines to fishers on Lake Victoria
- Technology (TECH), e.g. Enable, Migo Money.

Not all partner companies are suited for the same impact indicators and we try to assess their impact case-by-case rather than imposing consistency at all costs. We generally prefer to collect raw data rather than end calculations. This allows us to have a better overview and make a more grounded assessment of our impact.

Our impact indicators

Persistent seeks positive impact in the areas of sustainable environment, gender equality, job creation and access to energy. We want our impact indicators to reflect these values, while simultaneously being aligned with the interests of our stakeholders. We also seek a balance between our own KPIs - customised to our needs - and standardised metrics. It is key to us to keep a pragmatic balance between thoroughness and cost-effectiveness. We therefore make an effort to keep the collection of our KPIs simple and consistent.

These are the impact indicators we focus on tracking:

1. Total number of installations
2. Number of households and number of businesses powered
3. Lives improved
4. Direct jobs created
5. Gender equality and diversity
    a. Women in jobs (in %)
    b. Women in management (in %)
    c. Women in executive management (in %)
6. Total tons of CO2e avoided
7. Cost savings
    a. For households
    b. For business customers

In addition, we track the following impact indicators for internal purposes, as it is important to us that we use our capital effectively not only in terms of financial returns, but also in terms of creating impact. These company objectives are adjusted for ownership and exclude distorting factors to capture the actual efficiency of our investments.

8. Indicators in relation to our investment cost
    a. Lives improved per $100 invested
    b. Local FTE jobs created per $10,000 invested
    c. tCo2e saved per $100 invested per year

We aspire to continuously review and adapt the way we measure impact in order to provide meaningful guidance and results for the work we do. In the last section of this report you can therefore also find our suggestions and aspirations for improved impact assessment.

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1. Total number of installations

This impact indicator is very straightforward, providing information on how many solar products and service installations are provided in total by each of our partner companies. Depending on their business model, installations vary greatly in size, from portable lanterns to solar home systems to micro-grids to larger-scale solar PV systems. This is why we have recently developed a way to collect more granular data on size and solar module capacity of installations sold by our PAYG partner companies. We base this product categorisation on the SEforALL factor that assesses which type of product applies to which Tier of energy access according to the Multi-Tracking Framework[3].

We track the total number of installations on a quarterly and annual basis and over the lifetime of each company – however, we do not collect this information from our TECH companies because it is not a relevant metric for them.

Meet Oumar Ndiaye and his agent Tamba from Oolu Solar. Oumar's family, who lives in the Thies region in Senegal, recently decided to get a solar-powered television on top of the solar home system that has enabled them to light their house over the previous two years.

[3] See Annex 1 on page 48 of the GOGLA Impact metrics 2020 for more detail.

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2. Number of households and number of businesses powered

Our companies sell to households and businesses with substantial product overlap.
Here we separately calculate the number of households and the number of businesses that gain access to clean energy. This impact indicator applies to household purchasers [PAYG and retail cash sales], on the one hand, and PU companies on the other.

$$No.\ of\ businesses\ powered\ =\ No.\ of\ installations$$
$$No.\ of\ households\ powered\ =\ No.\ of\ installations\ \times\ default\ rate\ \times discount\ for\ repeat\ sales$$

We take the same data as provided in section 1 of this paper for the total number of installations. For household sales, however, we also take into consideration the fraction of customers for whom the impact of a product is not fully realized, e.g. through product loss or breakdown, churn, repossession or default. We also apply a discount for repeat sales ranging from 3%-10%, depending on the solar module capacity of the installation as explained above[4].

Local shopkeeper in Saban Gari, Nigeria benefitting from clean, reliable energy

[4] All metrics relating to household sales are based on GOGLA's Impact metrics 2020.

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3. Lives improved

Our core mission is to have a positive effect on the lives of people. In this context, when we say we have "improved" a life, this means that we have enabled improved access to energy through the provision of a solar installation that is less expensive, more reliable, less dangerous, and offering better quality compared to baseline technologies such as generators, unreliable grids, kerosene lanterns, battery lights, candles, or even poor-quality solar products.

This is Tamari Zvomuya, one of Zonful Energy's first customers, who uses her solar home system for lighting and phone charging.

Lives improved in the case of household sales =
$No.\ of\ households\ powered \times av.\ household\ size$

The assumption here is that one product or service positively impacts the lives of an entire household. A solar home system for example won't just have a positive impact on the buyer, but also on the buyer's spouse or partner, who may be the one who now has enough light to prepare meals throughout the day and no longer has to inhale black carbon from kerosene lamps, as well as on the children who are now able to study in the evenings. Hence why we multiply the number of households powered with the average household size of our partner companies' target locations. Though this calculation is originally based on GOGLA[5] impact metrics, which uses 5.5 as the average household size throughout Africa, we decided to make it more precise by basing our average household size on the respective

[5] GOGLA is the global association for the off-grid solar energy industry.

target countries of our partner companies. If a partner company operates in more than one country, we take the sales numbers in each country and multiply it by the average household size in that country.[6]

Lives improved in the case of PU companies = $No.\ of\ businesses\ powered \times av.\ business\ size$

The same applies for PU companies who serve businesses, typically referred to as the C&I segment. Here we take the average size of their target businesses. 'Size' in this context means the average number of employees per business client. As our partner companies can only collect this information from Q2'2020 onwards, we take a conservative average of 10 employees per C&I customer for now.

Lives improved in Asobo's case =

$No.\ of\ businesses\ (fishing\ boats)\ powered \times av.\ business\ size \times av.\ household\ size$

Our partner company Asobo is an exception because of the nature of the productive use of its products. It currently provides electric boat engines on a rental or hire purchase model to fishers on Lake Victoria in Kenya. Asobo motors impact the lives of the fishermen, but also of their family members by virtue of the livelihood it supports. Assuming every boat hosts on average five fishermen and the average household size in Kenya is 3.6 according to UN population statistics, this results in a total of 18 livelihoods impacted per boat engine.

[6] We do not know the sales numbers in BBoxx secondary target locations, but as their primary market's average household size is the lowest, this enables us to stay conservative in our estimates.

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4. Direct jobs created

Our partner companies not only provide better access to energy and environmental, health and education benefits to people, but these companies also create local jobs. This includes providing knowledge and training, cultivating fair people practices, and promoting gender equality. Keeping track of the jobs created across our partner companies is one of the most direct ways of demonstrating our impact.

Merveille (in the middle) joined upOwa in 2018. She is today responsible for all commercial operations in the region where upOwa has the most sales & active clients.

5. Gender equality and diversity

a. Women in jobs (in %)

Gender equality is another important Persistent core value. Limiting the potential of women not only creates a huge loss in terms of social justice, it also constrains economic growth[7]. Multiple studies suggest that gender inequality is one of the greatest causes of poverty and that enabling equal opportunities for women and men alike will have a substantial positive impact on a country's economic situation[8]. We therefore strive for gender equality and diversity in all our partner companies and try to promote the hiring and empowerment of female talent whenever possible.

As for previous indicators, we collect the employee numbers and percentage of female employees of all our partner companies' on a quarterly basis. Only direct jobs are taken into consideration.

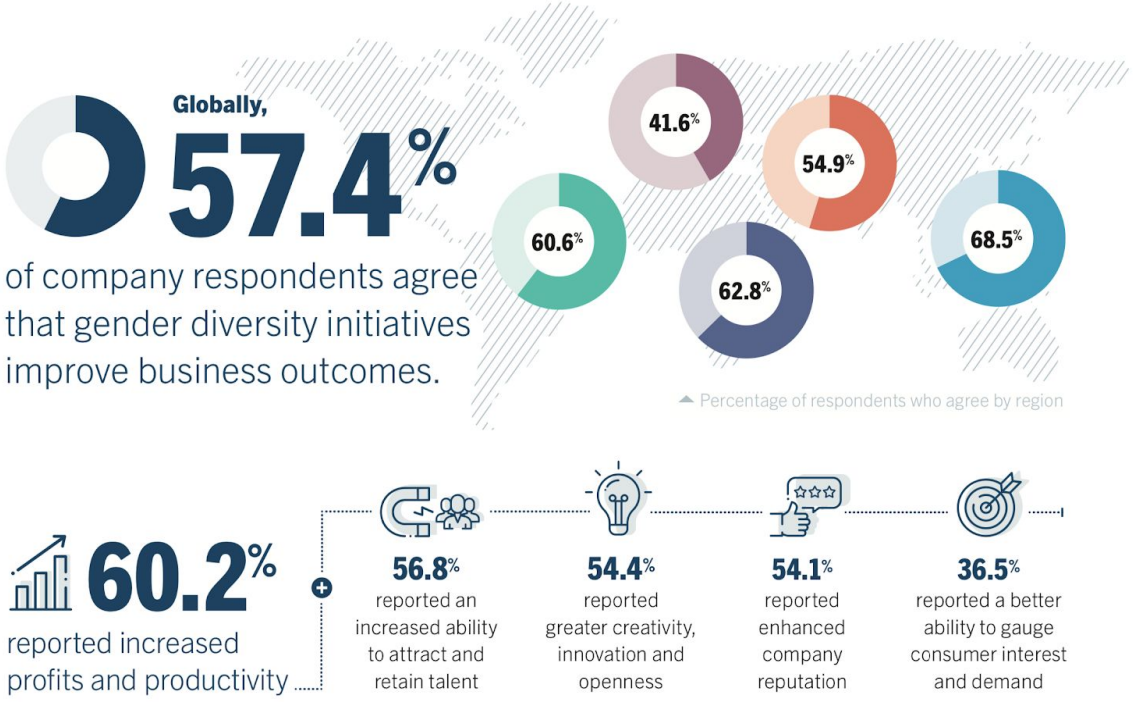
b. Women in management and executive management (in %)

Only one in five startups globally has a female founder, and only 2.8% of FORTUNE Global 500 CEOs are women.[9] Women today are still incredibly scarce at the top, despite all evidence pointing to a high correlation between gender diversity and improved business outcomes. In fact, a report by the International Labour Organisation states that almost three-quarters of those companies that track gender diversity in their management reported profit increases of between five and 20 percent. Considering the efforts companies make in other areas just to get an extra two or three per cent in profit, this means that gender diversity, particularly in senior management and leadership positions, should be a top priority for every company. We aim for at least 30% of women leadership in our partner companies because this is when the benefits from gender diversity usually begin to accrue according to the ILO report.[10]

We are also currently evaluating ways of how we can actively encourage our partner companies to improve their gender diversity. Measures could include training managers to change perceptions on gender roles (e.g. unconscious bias about typical jobs for men and women), applying a zero-tolerance policy against sexism and harassment, overcoming the gender pay gap, offering maternity and paternity leave, empowering female employees to shape company culture, and offering flexible working hours to improve the employees work

[7] See the World Economic Forum's Global Gender Gap Report 2020 for more information
[8] See also the United Nations' Fact and Figures on Economic Empowerment
[9] See Accenture's "Getting to Equal 2020 research report: The hidden value of culture makers" for more details
[10] See ILO's report "Women in Business and Management: The business case for change" published in May 2019

/ life balance. Another measure to consider would be tying financial compensation to gender diversity scores by designing specific incentive structures.



Report by the International Labour Organisation's Bureau for Employer's Activities "Women in business and Management: The business case for change. Chapter 1: The business and economic case for a gender-diverse workforce"

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6. Total tons of CO2e avoided

We believe that climate is the challenge of our generation and the generations to come, and that we can have a considerable positive effect on climate change by providing access to energy to hundreds of thousands of people in Africa – not only in terms of immediate reductions in CO2 equivalents (CO2e) avoided, but by creating a renewable energy based economy across off-grid Africa and South Asia.

We do not calculate CO2e avoided by our tech companies, as they do not have direct sources of emissions and no means of calculating indirect sources. For our PAYG companies we use the GOGLA metrics for our calculation:

Total tCO2e avoided overall

$$= Total\ no.\ of\ installations \times replacement\ ratio\ of\ kerosene\ lanterns \times av.\ annual\ CO2e\ emissions\ per\ kerosene\ lantern \times estimated\ product\ lifespan$$

Total tCO2e avoided this year to date

$$= No.\ of\ installations\ YTD \times replacement\ ratio\ of\ kerosene\ lanterns \times av.\ annual\ CO2e\ emissions\ per\ kerosene\ lantern$$

Variables used:

$$Replacement\ ratio = 0.2 - 1.3$$ [11]

$$Av.\ annual\ carbon\ dioxide\ and\ black\ carbon\ (CO2e)\ emissions\ per\ kerosene\ lantern = 0.431\ tCO2e$$

$$Estimated\ product\ lifespan = Period\ of\ warranty \times estimated\ product\ lifespan\ multiplier = 2 \times 1.5 = 3$$

As for our partner companies with more complicated business models: Considering tons of CO2e avoided is one of the most important prerequisites to ensure sales, PU companies like Rensource, candi.solar, Daystar, and Asobo already calculate this indicator for themselves. Candi.solar, for example, uses Version 18.0 of the Clean Development Mechanism's methodology on grid connected renewable electricity generation and the emission factor 0.91 tCO2/MWh to calculate their emissions saved. They are also in talks with South Pole Group to further capitalize on their renewable energy by monetizing additional environmental benefits through RECs or carbon credits. Rensource on the other hand calculates liters of fuel saved and uses a GHG Equivalency Calculator to derive CO2e emissions avoided. So does Asobo, which has calculated that on average a fishing boat uses 3,600 liters of petrol per year and that the emission of a petrol engine per year is 9.4 mt CO2. Multiplying this with the total no. of electric engines sold then gives us an accurate cumulative result for the tons of emissions saved by Asobo.

[11] This ratio depends on the target region (East Africa, West Africa, Southern Asia or Global Default) of the partner company, as well as on the solar module capacity of the installation based on the SEforALL factor.

Greenhouse gas (GHG) accounting is based on a range of assumptions that we believe are important to point out:

- In the case of calculating the emissions of PAYG companies using GOGLA metrics: First, we are using an average product lifespan based on the estimate that a product survives 1.5 times its warranty period.[12] Second, the replacement ratio of kerosene lanterns does not include the embodied energy from manufacturing and transporting these products. Third, emissions from different types of kerosene lamps (pressurized, hurricane and single wick) can differ significantly. Fourth, regional and sub-regional variations in kerosene usage are not captured. Last, one could argue that the replacement ratio of 1 kerosene lantern per 1 solar product is imprecise as some households might not in fact be replacing kerosene lanterns at all, but rather other products such as candles, diesel generators, other solar products, or unreliable on-grid electricity. However, GOGLA states that their data has been averaged out from research that also includes homes with no kerosene lamps and therefore provides an average kerosene replacement rate across all types of off-grid household.
- In the case of our PU partner companies, a limitation is that they are using different methodologies. This makes it harder to compare results between companies.

Notwithstanding the above mentioned limitations, we are convinced that our impact indicator is based on the most reliable and widely used standards and as such, provides enough precision for our purposes.

A typical fisher boat on Lake Victoria in Kenya (photo taken by Laurens Friso from Asobo)

[12] We believe this is a very conservative assumption and a subject worth exploring more by GOGLA.

7. Cost savings

Depending on the business model of the partner company, these can be cost savings for households or business customers.

Cost savings for business customers

For their business models to work, PU companies have one key requirement and that is that they must be able to provide their product or service to their customers at a lower cost than competing baseline fossil fuel technologies. This is the only way their target customers will switch their source of power, and hence the reason why it is essential for us to calculate total cost savings when assessing our impact.

If we take Asobo as an example, a fishing boat spends about $350-400 per month on petrol for their petrol engine plus ~$10 for maintenance and ~$80 on the loan that was taken out for the engine (interest and principal payments). Asobo would like fishermen to save at least 20% of this with their new electric Asobo engine. This means that they will rent their electric engines at about $350-400 per month, saving the fishes about $90 per boat.

Installation of solar panels by Rensource in Nigeria

We use the following calculation for this impact indicator for our PU companies:

$$\text{Total cost savings for business clients} = \frac{(Annual\ YTD)\ sales\ revenue \times average\ cost\ reduction\ in\ \%}{100\% - average\ cost\ reduction\ in\ \%}$$

This is the most efficient way of calculating this impact indicator for the moment. However, some of our partner companies are currently developing their own approaches to calculating a “cost savings” KPI, which will allow us to get more precise figures.

Cost savings for households

In the case of our PAYG companies, it only makes sense to calculate household cost savings resulting from the purchase of pico (low-capacity) solar products with an energy capacity between 0.5 to 10.9 Wp. The reasoning here is that the impact of a higher-capacity solar

product, e.g. a solar home system with a TV, might not result in household cost savings[13], but instead in a greater flow of information and connectivity to the world, which may be equally impactful but impossible to measure.

To calculate cost savings for households for pico installations based on GOGLA metrics, we need to know how many 0.5-2.9 Wp installations and how many 3.0-10.9 Wp installations our PAYG companies have sold overall (cumulative i.e. ever) and YTD, as well as the average unit costs per product category.

$$Total\ household\ cost\ savings = (((average\ annual\ expenditure\ on\ energy\ baseline\ per\ household - average\ annual\ expenditure\ on\ energy\ post\ purchase\ per\ household) \times estimated\ solar\ product\ lifespan) - average\ total\ cost\ of\ ownership\ of\ solar\ product\ in\ US\$) \times total\ no.\ of\ installations$$

Variables:

$$Av.\ annual\ expenditure\ on\ energy\ baseline\ per\ HH = \$95\ for\ 0.5\ to\ 2.999Wp\ and\ \$127\ for\ 3.0\ to\ 10.999Wp$$

$$Av.\ expenditure\ on\ energy\ post\ purchase\ per\ HH\ p.a. = \$22\ for\ 0.5\ to\ 2.999Wp\ and\ \$38\ for\ 3.0\ to\ 10.999Wp$$

$$Estimated\ product\ lifespan = Period\ of\ warrant \times estimated\ product\ lifespan\ multiplier = 2 \times 1.5 = 3$$

This metric is designed for pico solar products only, where the pre-post energy spending is most comparable. The assumption here is that the spending on non-solar energy is uniform across the product lifetime and that the costs of PAYG products are not increased or decreased due to early or late payment across the repayment period. What needs to be kept in mind is that the data used to build these variables comes from a limited number of countries, and that it is drawn from expenditure on lighting and phone charging only, and does not include expenditure on transportation costs for previous energy purchases or any other fees.

[13] This would depend on whether the household was using the solar home system to replace a diesel generator -powered TV and other appliances.

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8. Impact indicators in relation to our investment cost

Directly linking our impact to our own investment cost is useful for several reasons. Not only does it facilitate the setting of realistic impact objectives, but more importantly, it will allow comparison across different sectors, countries and partner companies and result in the most efficient use of our capital resources. It may also provide a good way to compare ourselves with others in the industry. This is why we track the following three indicators as part of our internal company objectives and key results (OKRs):

c. Lives improved per $100

$$Lives\ improved\ per\ \$100 = \frac{Livelihoods\ improved \times share\ of\ ownership}{investment\ cost} \times \$100$$

The condition for this impact indicator is an ownership share of more than 2.5%. Where we own less of a partner company, we do not believe we can have enough influence to increase the number of livelihoods improved. The same applies to the two indicators below.

d. Local FTE jobs per $10'000 invested

$$Local\ FTE\ jobs\ per\ \$10,000\ invested = \frac{Jobs\ created \times share\ of\ ownership}{investment\ cost} \times \$10,000$$

Full time jobs are calculated by adding up all part-time employees and rounding to full numbers. Other than that, the same comments apply as above.

e. Tons of CO2e saved per $100 invested per year

$$tCO2e\ saved\ per\ \$100\ invested\ p.a. = \frac{tCO2e\ saved\ p.a. \times share\ of\ ownership}{investment\ cost} \times \$100$$

As above.

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9. Our aspirations

We are always trying to improve and reexamine our impact indicators to make them more up to date and precise. A key factor in determining whether these changes are worthwhile is the cost-benefit analysis of any change. Every metric has a cost of tracking and collection that we must impose on our partner companies or fund for them. The suggestions for improvement below are all elements that we believe will be important to figure out in the future – be it by us or by bigger and more centralised organisations like GOGLA – but where we do not see the necessity and cost-effectiveness with regard to our partner companies' and our own capacities right now. Still, we believe it is useful to catalogue these and continually evaluate their cost-benefit potential.

- **Customer satisfaction:** We are aware that a larger output does not necessarily mean a better outcome, nor provide information on the quality of the product or service. In order to prioritise positive outcomes rather than simply high output, more focus should be put on measuring long-term customer satisfaction along with the number of products and services sold. For now, keeping account of default rates is enough to give us a rough picture. In the future, this may be done on some kind of annual basis or by sector trade associations or supporting agencies.

- **Accounting for regional variations:** For all our impact indicators, it would make a lot of sense to account for regional differences, e.g. to include rural/urban distinctions in average household size when calculating average household sizes for our "lives improved" indicator.

- **Product lifespan**: Rather than using an average product lifespan to calculate tons of CO2e avoided, it would be more precise to have each partner company tell us their actual average product lifespan.

- **Lives improved**: This indicator is based on the assumptions that 1) all people in a household or business have access to the product or service, and 2) that they previously had a "worse" source of energy. Yet this may not apply to every case. Therefore, future improvements might include finding a more case by case approach by collecting more granular data on intrahousehold / business usage across all house members / employees, location (rural / urban), as well as 'energy source history' of the respective household or business. Of course, granular data is the most expensive to secure.

- **Jobs created**: Future improvements of this indicator may consist of measuring not only direct, but also indirect jobs created or catalysed by our partner companies. These could include temporary contractors, or in the case of our partner company Rensource, people trained in local markets. However, like the suggestion above, the cost-benefit analysis is particularly high here.

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Conclusion

The importance of tracking and reporting impact metrics will only increase as the investment community comes to the realization that all investing has an impact on the world and, like financial performance measurements, that impact should be measured. In this white paper we present our own metrics. In our other publication about impact assessment we explore industry practices in the impact investment sector, the need for greater standardization to enable investors to compare and contrast investment performance, and some suggestions as to how to achieve those results.

We hope that by giving a clear indication of our work and the impact it has on our partner companies and their customers, this publication will be useful to interested parties and contribute to a collective effort in increasing collaboration among stakeholders. Our vision is a world where impact is incorporated as a standard measure and investment criteria, where metrics and methodologies are harmonized, and where impact is more financially viable.

We would like to take this opportunity to thank our partner companies for all the effort they put into building great businesses day by day. Let's continue to drive our actions to be the most impactful to all stakeholders involved!