



Standardised Impact Metrics for the Off-Grid Solar Energy Sector



Executive Summary
April 2020



About

GOGLA is the voice of the off-grid solar energy industry. Established in 2012, GOGLA now represents over 180 members as a neutral, independent, not-for-profit industry association. Its mission is to help its members build sustainable markets, delivering quality, affordable products and services to as many households, businesses and communities as possible across the developing world. The products and solutions that GOGLA members sell transform lives. They improve health and education, create jobs and income opportunities and help consumers save money.

To find out more, go to www.gogla.org

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Why Impact Metrics Matter

A consistent approach to impact calculations allows companies, investors, policymakers, multi-lateral institutions, non-government organizations and other sector stakeholders to estimate the impacts created by off-grid solar in a consistent, clear, and coherent manner. For this reason, the GOGLA Impact Working Group was established in 2013, with the goal of creating a standardised framework for impact measurement that can be used by the off-grid industry. These metrics were designed to enhance knowledge and help stakeholders to streamline reporting in order to attract investment and regulatory support. The first standardized impact metrics were launched in 2015.

This document presents version 4.0 of those metrics, which have been updated and expanded using the best available data from across the off-grid solar industry and research community. The updated metrics enable users to estimate the impact of different categories of off-grid technology (from solar lanterns to large solar home systems) while accounting for regional differences, where necessary.

Individual organizations can use these metrics to estimate the impact of their products, services or market supporting activities. GOGLA also uses the metrics to calculate the impact of those GOGLA Members, IFC Lighting Global Associates and companies engaging with the Low Energy Inclusive Appliances (LEIA) Programme, that are participating twice yearly in the Off-Grid Solar Global Sales and Impact Reports. This generates aggregated, global impact figures to be shared with key decision-makers.

Version 4.0 of the Standardised Impact Metrics for the Off-Grid Solar Sector has been

aligned with the IRIS Metrics. IRIS is an initiative of the Global Impact Investing Network (GIIN), a non-profit organization dedicated to increasing the scale and effectiveness of impact investing.

Please see: www.iris.thegiin.org/metrics



Background

In 2013, the GOGLA Impact Working Group was established to construct calculations for modelling a set of priority impact metrics. The Impact Working Group brought together off-grid practitioners, researchers and data experts to co-create these metrics. This resulted in version 1.0 of the Standardised Impact Metrics, launched in June 2015 and piloted by the GOGLA membership. Following the pilot, the Impact Working Group published version 2.0 of the metrics in January 2016.

In the previous iteration (version 3.0, released in 2018), the Impact Working Group, along with support from the GOGLA Secretariat and Schatz Energy Research Center further refined the standardised impact metrics, enhancing them so they better accounted for variations in impact created by different sizes of off-grid systems and expanding them to account for economic activity.

This latest development in the framework accounts for regional variation where research shows that large differences are present. For example, new data finds that, on average, more kerosene is replaced by off-grid solar in East Africa than in other regions. These regional insights allow for greater accuracy of impact estimates.

Version 4.0 also sets out 'Reporting Guidelines' for two further impact areas:

- the location of customers and
- the number of jobs enabled due to the sale of off-grid solar products

The guidelines have been included to encourage companies, investors and sector stakeholders to adopt a common approach to reporting on topics for which it's not yet feasible to create metrics.

These Reporting Guidelines have also been created in conjunction with off-grid solar experts and practitioners in the Impact Working Group and can be found on page 44.

This Paper was developed to:

- update and replace version 3.0
- provide specific regional variables relevant for the impact of solar lanterns, multi-light kits, small solar home systems and large solar home systems
- enable and encourage more off-grid organizations and stakeholder to use these standardised metrics to calculate estimated impact

Impact Metrics: An iterative approach

As the ongoing review and expansion of the impact metrics indicates, GOGLA's approach to measuring the impact of off-grid solar products will continue to be iterative to take into account new data and evidence. GOGLA aims to review and revise these metrics every 18–24 months to ensure that they are in line with the latest research. Please note that a conservative approach has been taken to all metrics. In instances where metric variables have been created using smaller sample sizes, an even more conservative approach has been applied.

In addition, while these metrics lay the foundations for calculating **estimated** impact, many critical social development benefits from off-grid solar remain difficult to track. Therefore, these metrics should be seen a starting point, not an end, to the exploration of socioeconomic impacts by the off-grid sector and new metrics may be added as new data becomes available. GOGLA welcomes input from its Members and other stakeholders in the sector on future enhancements to these metrics.

What has changed from version 3.0

Several variables are now split by region

The availability of regional data sets from research carried out in the last two years allowed for regional splits for six variables. These were: economic activity, enterprise, time spent working, income generation (x2) and replacement of kerosene lamps. This enables greater accuracy of impact measurement. Please note that in some instances, such as 'Average additional income generated' in South Asia, variables cannot be split both regionally and by system size due to data availability – a conservative approach has therefore been taken and a standard variable used. It should be noted that regional variables are based on aggregated and averaged results across urban / rural location.

A 'People Per Household Ratio (PR)' variable has been introduced

Several thousand interviews in East and West Africa and South Asia show that, in many cases,

Background

more than one person per household spends additional time working since purchasing an off-grid solar system. To more accurately calculate the number of people who spend more time working and account for this phenomenon, the formula for this metric now includes the PR variable. As the 'number of people who spend more time working' is a part of the 'number of people undertaking economic activity' metric, this has also been updated to include the new PR variable. Please see more details on the PR ratio on page 30.

Certain variables have been updated

New data has led to changes to a number of variables. Among these are the percentage of households in which someone spends more time working, and the replacement ratio of kerosene lanterns per solar product.

For the greatest accuracy, the Global Impact Estimates shared bi-annually by GOGLA will be calculated using the version 4.0 of the metrics as of July 2019, with version 3.0 applied for sales before this date. Therefore, impact estimates are calculated using the impact metrics available at that point in time. This approach aims to best represent the situation at the time that products were sold*, allow for change given new and better data and to provide a continuous approach to impact estimation. Using the relevant version of these metrics for each time period allows for this nuance to be included when estimating impact. GOGLA recommends that this approach is also followed by others using the metrics. However, where using two versions of the metrics for different time periods will prove too complex, using only the latest version 4.0 is advised.

* For example, in recent years, households in some countries have significantly reduced their use of kerosene for lighting. At the same time, the capacity of off-grid solar products has increased, allowing families to use them for a greater number of hours. This has led to differences in the variables for baseline and post-purchase hours of light used between version 3 and version 4 of the metrics.



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How to use the Metrics

The off-grid solar industry and stakeholders can:

1. Adopt the GOGLA metrics framework

Organizations including manufacturers, distributors, investors, multilateral programs, and industry groups are strongly encouraged to adopt this set of core metrics as a key input to estimating and reporting impact. When organizations report impact on one or more of the dimensions included in this framework, the GOGLA methodology should be applied.

2. Go beyond the framework

There are a range of development outcomes that may be specific to a region, product, or company. Users are encouraged to go beyond the framework to collect targeted data and / or to validate these impact estimates. Research by individual organizations also helps to increase the knowledge base and provide contextually specific data-points. The GOGLA framework is meant as a foundation, not a ceiling, on social impact reporting.

3. Broadcast results

Organizations and coalitions that adopt the GOGLA framework are encouraged to speak with a unified language about the estimated impact being created by the off-grid solar industry.

4. Use our new online impact calculator tool

The online impact calculator tool is designed to help you estimate your company or investment's impact. The calculator has been built using the metrics formulas. Simply add relevant sales and product information to instantly generate impact estimates.

Go to the Impact Calculator:
www.gogla.org/impact/calculator

Limitations

When using the metrics, please be aware that:

Specific metrics or variables apply to specific technology types, sizes or geographies. For example, certain variables might be specific to Pay-As-You-Go (PAYGo) companies only, while different variables may apply to solar lanterns versus large solar home systems. In this latest version of the impact metrics, a regional split

is also available for a select number of metrics. Please ensure you review the metrics carefully and only use those metrics or variables that relate to the relevant product(s), service(s) and / or geographies.

The metrics apply to solar products sold in off-grid, weak grid or underserved communities only.

Therefore, only off-grid solar products sold in the developing world should be included when using the metrics to measure impact.

These metrics apply to high-quality solar products.

The metrics have been created using data and evidence from high-quality solar products. As such, these metrics should only be used to calculate the impact of GOGLA Members or organizations selling Lighting Global / IEC quality-verified solar products, or products that deliver comparable performance.

Results calculated using these metrics should be described as estimates.

It is important to note that, while these metrics have been created using the best available data, when describing results created by using the metrics these should always be referred to as estimates as the data represents research done with specific companies or organizations and most is self-reported. As such, it may not be representative of all GOGLA Member or company impact. Please see details on individual variables for any specific limitations, and details on each metric for more information on how these should be used / described.

Metrics should not be used when it is clear specific products and services do not have the estimated impact.

While applicable in most cases, there may be instances where a specific product type, location or use-case may not lead to a commonly observed impact. For example, in a region with a high density of torch use, little kerosene reduction will be seen, while systems sold specifically to light an educational facility are less likely to lead to new business creation. A common-sense approach should be taken to use and application of the impact metrics.

Metrics at a Glance

The overview of formulas and variables in the tables on the following pages summarize the harmonized framework detailed in the rest of this document. **Red** coefficients are to be inputted by users of the metrics (e.g. GOGLA Member companies) whilst **Blue** coefficients have default values that have been supplied by GOGLA where companies do not have their own data – outlined in detail later in this document.

The primary basis used for counting and scaling estimates of social impact is the number of products sold or deployed to end-users (product specifications are also used for certain metrics). In some cases, it makes sense to count all products ever sold [S], while in others the estimated number of currently operating systems [S_l] (i.e., within the lifetime of the product) is a more appropriate basis.

For sales and deployment estimates for cash sales business models, sales numbers should be discounted by a channel loss discount factor [D_l] that is the fraction of products that are damaged or lost and never reach end users. This discount factor has been added as typically the sales data available for cash sales business models are at the wholesale level. However, if retail sales totals are accounted for, these could be used directly, without the sales channel loss factors.

For PAYGo sales where retail account totals are available, the number of total retail sales should be discounted by a channel loss discount factor [D^r] that estimates the fraction of customers for whom the impact of a product is not fully realized. This could be due to a variety of potential reasons e.g. product loss or breakdown, churn, repossession or default. As PAYGo discount factors will vary widely between different companies, programs and regions, organizations are asked to input their own, appropriate and conservative PAYGo discount factor based on their specific experience. (Please note that GOGLA applies a conservative PAYGo discount factor to all publicly shared industry-level data, as well as impact estimates shared directly with GOGLA Member companies.)

The formulas within the tables on the following pages have been split by cash sales and PAYGo to reflect these different discount factors.

As with the PAYGo discount factor, if more specific company or organizational-level impact data has been gathered through robust research, other relevant variables can be updated with this data to best represent organizational impact. However, we strongly recommend that the harmonized metric formulas are used in all cases to enable consistency of reporting. Any organization using their own impact data to replace a variable is advised to take a conservative approach and to transparently communicate if they deviate from the GOGLA default variables.

Please note that variables used in the Impact metrics are primarily based on research that uses self-reported customer data.

Metrics at a Glance

Impact Metrics – Overview of Formulas

Metric	Business Model	Formula	
Energy Access			
1ai	Number of people with improved energy access, cumulatively	Cash	$S * (1 - D_i) * (1 - D_r) * H$
		PAYGo	$S_L * (1 - D_i) * (1 - D_r) * H$
1aii	Number of people with improved energy access, currently	Cash	$S_L * (1 - D_i) * (1 - D_r) * H$
		PAYGo	$S_L * (1 - D_i) * (1 - D_r) * H$
1bi	Number of people with access to Tier 1 energy services	Cash	$S_L * (1 - D_i) * (1 - D_r) * H * D_{T1}$
		PAYGo	$S_L * (1 - D_i) * (1 - D_r) * H * D_{T1}$
1bii	Number of people with access to Tier 2 energy services	Cash	$S_L * (1 - D_i) * (1 - D_r) * H * D_{T2}$
		PAYGo	$S_L * (1 - D_i) * (1 - D_r) * H * D_{T2}$
Economic Activity			
2a	People undertaking more economic activity	Cash	$S_L * (1 - D_i) * EA * PR$
		PAYGo	$S_L * (1 - D_i) * EA * PR$
2b	People using products to support enterprise	Cash	$S_L * (1 - D_i) * E$
		PAYGo	$S_L * (1 - D_i) * E$
2c	People that spend more time working	Cash	$S_L * (1 - D_i) * T * PR$
		PAYGo	$S_L * (1 - D_i) * T * PR$
Income Generation			
3a	Households generating additional income	Cash	$S_L * (1 - D_i) * IG$
		PAYGo	$S_L * (1 - D_i) * IG$
3b	Additional income generated, cumulatively	Cash	$S * (1 - D_i) * (IG * AI * P_i)$
		PAYGo	$S * (1 - D_i) * (IG * AI * P_i)$
Kerosene Replacement & CO₂e Reduction			
4	Kerosene lanterns replaced	Cash	$S_L * (1 - D_i) * R$
		PAYGo	$S_L * (1 - D_i) * R$
5	CO ₂ e emissions avoided	Cash	$S * (1 - D_i) * R * G * P_L$
		PAYGo	$S * (1 - D_i) * R * G * P_L$
Light Availability and Quality			
6ai	Additional light hours used, by household	Cash	$(L_f - L_b) * L_D * P_L$
		PAYGo	As Cash
6aii	Additional light hours used, cumulatively	Cash	$S * (1 - D_i) * ((L_f - L_b) * LD * P_L)$
		PAYGo	$S * (1 - D_i) * ((L_f - L_b) * LD * P_L)$
6b	Change in quality of light, by household	Cash	$B_f - B_b$
		PAYGo	As Cash
Energy Spending			
7ai	Savings on energy expenditure for pico-solar, by household	Cash	$((E_b - E_f) * P_i) - C$
		PAYGo	$((E_b - E_f) * P_i) - TCO$
7aii	Savings on energy expenditure for pico-solar, by household	Cash	$S * (1 - D_i) * (((E_f - E_b) * P_i) - C)$
		PAYGo	$S * (1 - D_i) * (((E_f - E_b) * P_i) - TCO)$
Financial Inclusion			
8	Number of people currently benefitting from clean energy financing (PAYGo only)	PAYGo	$S_L * (1 - D_i)$

Details on definitions, assumptions and limitations for individual metrics can be found from page 14 onwards

Metrics at a Glance

Impact Metrics – Overview of Variables

Variable (input by users)	0.5 – 2.999 Wp	3 – 10.999 Wp	11 – 49.999 Wp	50+ Wp
S	number of units sold (cumulative i.e. ever)			
S_L	number of units sold within estimated lifespan of product (1.5 x warranty period)			
P_L	estimated solar product lifespan (1.5 x warranty)			
B_F	average post-purchase lumens (brightness) of household lighting			
C	average retail price of solar product (cost to customer), in US\$ (Cash only)			
D_F	discount for loss factor: products not used for full lifetime (PAYGo only)			
TCO	average total cost of ownership of solar product (cost to customer), in US\$ (PAYGo only)			

Variable (default values)		0.5 – 2.999 Wp	3 – 10.999 Wp	11 – 49.999 Wp	50+ Wp	
D_L	discount for loss: products not working or not in use, excluding loss in supply chain (Cash only)			3%		
D_R	discount for repeat sales: to avoid double counting of customers, but does not try to estimate proportion of customers who owned solar more generally before	10%	3%	3%	3%	
H	Household size			5.5		
D_{T1}	Tier 1 Factor			Annex 1		
D_{T2}	Tier 2 Factor			Annex 1		
EA	percentage of customers undertaking more economic activity	East Africa	14%	29%	23%	23%
		West Africa	14%	18%	17%	11%
		South Asia	14%	10%	8%	11%
		Global Default	14%	10%	8%	11%
E	percentage of customers using products to support enterprise (including those that have opened a new business)	East Africa	10%	16%	14%	10%
		West Africa	10%	7%	12%	9%
		South Asia	10%	5%	10%	12%
		Global Default	10%	5%	10%	9%
T	Percentage of customers that spend more time working	East Africa	5%	16%	13%	11%
		West Africa	5%	7%	7%	5%
		South Asia	5%	6%	6%	8%
		Global Default	5%	6%	6%	5%
PR	Ratio for the number of people per household	East Africa	1	1.8	1.8	1.8
		West Africa	1	2.5	2.5	2.5
		South Asia	1	1.3	1.3	1.3
		Global Default	1	1.3	1.3	1.3

Metrics at a Glance

Variable (default values)			0.5 – 2.999 Wp	3 – 10. 999 Wp	11 – 49.999 Wp	50+ Wp
IG	percentage of households creating additional income	East Africa	10%	23%	19%	19%
		West Africa	10%	12%	12%	9%
		South Asia	10%	9%	7%	10%
		Global Default	10%	9%	7%	9%
AI	average additional income generated, per household (annual)	East Africa	\$170	\$306	\$429	\$475
		West Africa	\$170	\$263	\$392	\$149
		South Asia	\$170	\$548	\$548	\$548
		Global Default	\$170	\$263	\$392	\$149
R	replacement ratio of kerosene lanterns per solar product	East Africa	1	1.2	1.3	1.1
		West Africa	1	0.2	0.2	0.4
		South Asia	1	0.9	0.2	0.3
		Global Default	1	0.4	0.4	0.4
G	average annual carbon dioxide and black carbon (CO ₂ e) emissions per kerosene lantern, in metric tons			0.431		
L_b	average baseline hours of light used, per day / night (24 hours) per household		5.8	3.9	4.1	3.8
L_f	average post-purchase hours of light used, per day / night (24 hours), per household		8.1	5.3	5.4	5.7
L_d	Average number of days per year that off-grid solar product is used for lighting			350		
B_b	average baseline lumens (brightness) of household lighting use		35	45	45	45
E_b	average annual expenditure on energy baseline (lighting and phone charging), per household		\$95	\$127	[no data]	[no data]
E_f	average annual expenditure on energy post-purchase (lighting and phone charging), per household		\$22	\$38	[no data]	[no data]

Details on definitions, assumptions and limitations for individual variables can be found from page 27 onwards

Standardised Guidelines

In addition to the standardised metrics above, companies are often requested to report on sector specific parameters such as the location of product sales, and the number of jobs directly created e.g. company staff and agents.

These guidelines were developed to encourage companies, investors and stakeholders within the sector to take a common approach to reporting on areas for which is not yet feasible to create metrics.

Location

When classifying whether sales are made in rural or urban regions, this paper recommends the first approach should be to distinguish urban and rural in the same manner as the National Statistical Office of the country where the sales are reported.

Should this information not be available, the following simplified guidance, based on population size, is proposed.

- **Urban:** towns with a population >5000
- **Rural:** outside of towns, with a population <5000

This guideline is based on the general guidelines established by the International Labour Organisation and the World Bank.

Company Level Jobs

Off-grid solar companies are often asked to report the number of company-level jobs that they have directly created, and are commonly asked to distinguish between formal and informal jobs. The definitions below propose a standardised definition of the different job categories and suggest an approach to count these jobs based on their full-time equivalency (FTE).

- **Direct Jobs - Formal:** Formal jobs are defined as those created directly by a company through contractual engagement.

Direct, formal jobs are often in manufacturing and assembly, importation, marketing, distribution, retail, customer relations, financing, market research and monitoring & evaluation. These job types typically include higher and middle management.

Reporting formal jobs as FTE: To report the FTE created by formal jobs, data should be drawn from HR systems or knowledge of contracted hours.

- **Direct Jobs – Informal:** Informal jobs are those where the employee has no fixed contract. In the off-grid sector these are commonly commission-based sales agents or technicians who service products on an ad hoc basis.

- **Reporting informal jobs as FTE:** If an agent or other employee is not on a fulltime contract, companies should report the FTE equivalent of the average hours worked, divided by the work week in that particular country.

Should this information not be available through either specific data or management insight, **GOGLA suggests that an average of 0.45 FTE of the agents' time is used to estimate the work performed for the company.** This number is based on the average number of hours worked by commission-based sales agents reported in the GOGLA 2019 publication "Off-Grid Solar. A Growth Engine for Jobs".

Contributors

These metrics were developed by the GOGLA Impact Working Group, a body of industry practitioners, and academic observers. The revision program was led by the Working Group Chairs and GOGLA's Research Advisor as well as the Impact and Outreach Manager, with the support of researchers from the Schatz Energy Research Center. GOGLA would like to express its thanks to the Working Group Chairs, peer-reviewers and contributing members and observers noted below.

Working Group Co-Chair: Nabeela Khan, CDC Group, October 2017 – present

Nabeela leads on impact for Energy Access and Efficiency within CDC Group, the UK government's development finance institute. It is a major investor in energy infrastructure, including distributed energy, on the continent. She joined CDC to design and execute the Impact Accelerator, a direct investment fund focusing on businesses with challenging risk-return profiles to prepare them towards commercial investors. Over the last three years, Nabeela has helped steer the GOGLA Impact Working Group, bringing with her years of experience in impact investment, measurement and reporting.

Working Group Co-Chair: Yomi Jegede, Greenlight Planet, December 2019 – present

Yomi Jegede is Operations Manager for Greenlight Planet in Nigeria. He joined as co-chair of the Working Group at the end of 2019. He brings with him over four years' operational experience, and knows first-hand of the challenges consumers and agents face, and how their solar products create impact.

Working Group Co-Chair: Roeland Menger, ZOLA Electric, May 2018 – October 2019

As part of his role as Senior Financial Analyst Corporate Finance at ZOLA Electric, Roeland led the organization's impact reporting. He has been an active member of the Working Group, as well as supporting the 'Powering Opportunity' socioeconomic impact research. Roeland has played a key role in bringing the impact calculator tool into existence, both supporting with the thought process and the creation of the initial tool.

Research Advisory: Dr. Peter Alstone & Dr. Nicholas Lam, Schatz Energy Research Center Peter Alstone, based out of the Schatz Energy Research Center at Humboldt State University, has authored leading research on the off-grid solar market and the impact and efficiency of off-grid products, amongst numerous other topics. Nicholas Lam is an expert in health and environmental impacts of household energy use. His work was among the first to uncover the impacts of fuel based lighting on climate and the risk of exposure to health damaging air pollutants. Their expertise and inputs to key metrics and variables provided valuable insights that have shaped and contributed to this revision.

These updates and whitepaper were coordinated by GOGLA, with management and input by:

- Susie Wheeldon, Research Advisor
- Eveline Jansen, Outreach & Impact Manager
- Sjef Ketelaars, Project Manager Research
- Silvia Francioso, Data Analyst

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The Voice of the **Off-Grid Solar Energy** Industry