SOCIAL IMPACT

ADVANCING DEVELOPMENT EFFECTIVENESS

Evaluation Design Report

MCC Indonesia Green Prosperity Project

Grant Facility Community-Based Off Grid Renewable Energy Grant Portfolio

August 2017 -

This report was prepared independently by Social Impact, Inc. at the request of MCC.

EVALUATION DESIGN REPORT

MCC Indonesia Green Prosperity Project

Grant Facility Community-Based Off Grid Renewable Energy Grant Portfolio

v.2

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ACRONYMS

ADB	Asian Development Bank
AEI	Akuo Energy Indonesia
APDS	Asosiasi Periau Danau Sentarum
ARI	Acute respiratory infection
BA-SBT	Bentang Alam Sumba Bagian Tengah
BI	Bahasa Indonesian
BPS	Badan Pusat Statistik
BUMD	Badan Usaha Milik Daerah
BUMDes	Badan Usaha Milik Desa
CBA	Cost benefit analysis
CBOG	Community-Based Off Grid
CEM	Coarsened exact matching
CEO	Chief Executive Officer
CIA	Conditional Independence Assumption
CIFOR	Center for International Forestry Research
CoK	Center of Knowledge
CPI	Charta Putra Indonesia
CUKK	Koperasi Kredit Keling Kuman
DFS	Detailed Feasibility Study
DiD	Difference in differences
DRB	Disclosure Review Board
EDR	Evaluation Design Report

EPC	Engineering, Procurement and Construction
EQ	Evaluation Question
ERR	Economic Rate of Return
ESMP	Environmental and Social Management Plan
EVI	Electric Vine Industries
FEED	Front End Engineering Design
FGD	Focus Group Discussion
GEF	Global Environment Facility
GHG	Greenhouse gas
GIS	Geographic Information System
GOI	Government of Indonesia
GP	Green Prosperity
GSK	Green Sumba Consortium
GW	Gigawatt
ha	Hectare
IBEKA	Inisiatif Bisnis dan Ekonomi Kerakyatan
ICC	Intra-Cluster Correlation
IR	Indonesian Rupiah
IE	Impact Evaluation
IEA	International Energy Agency
IIEE	Indonesian Institute for Energy Economics
IRB	**I**nstitutional Review Board
ISEAS	Yusof Ishak Institute
KEN	Kebijakan Energi Nasional/ National Energy Policy
KII	Key Informant Interview
KKI Warsi	Komunitas Konservasi Indonesia WARSI
KSM	Kelompok Swakelola Masyarakat

kWp	Kilowatt peak value
LATIN	Yayasan Lembaga Alam Tropika Indonesia
LED	Light Emitting Diode
LLPSLH	Lingkungan Hidup
M&E	Monitoring and Evaluation
MCA-I	Millennium Challenge Account- Indonesia
MDES	Minimum detectable effect size
MHP	Micro Hydro Power
MKS	PT Mikro Kisi Sumba
MW	Megawatt
NRE	New and Renewable Energy
NRM	Natural Resource Management
O&M	Operations and Maintenance
OECD	Organization for Economic Cooperation and Development
PE	Performance Evaluation
PEKA	Yayasan Peduli Konservasi Alam
PLTMH	Micro Hydro Power Plants
PLN	Perusahaan Listrik Negara
PLTS	*penerangan lampu tenaga surya rumah tangga*
PLUP	Participatory Land Use Planning
PMAP 1	Participatory Mapping and Planning
PODES	Village Potential Statistics
PSGIP	Project Social and Gender Integration Plan
PSM	Propensity Score Matching
PV	Photovoltaic
RE	Renewable Energy
REDD	Reducing Emissions from Deforestation and Forest Degradation

RESCO	Renewable Energy Service Center
RT	Sub-village administrative unit, also known as kampungs
RUPTL	Rencana Usaha Penyediaan Tenaga Listrik
SI	Social Impact
SHS	Solar Home System
SPV	Special Purpose Vehicle
SWP	Solar Water Pump
TA	Technical Assistance
TAPP	Technical Assistance and Preparation Project
TV	Television
UN	United Nations
UNEP	United Nations Environment Program
VBS	Village Boundary Setting
WtP	Willingness to Pay
WWF	World Wildlife Fund
YLBHL	Yayasan Lembaga Bantuan Hukum Lingkungan Jambi

1 INTRODUCTION & BACKGROUND

1.1 Country context

Indonesia, which has the largest economy in Southeast Asia, has experienced steady growth averaging between 5-6 percent since the Asian financial crisis of 1997-1999.[1] Nonetheless, as an archipelago nation stretching over 5,000 kilometers across Oceania, Indonesia is vulnerable to the increased occurrence of extreme weather events, flooding due to sea-level rise, and water-borne illnesses that are likely to accompany the climate change that is already being observed across the country.[2] For this reason, it is a stated objective of the Government of Indonesia (GOI) to achieve a reduction of greenhouse gas (GHG) emissions "in a way that is consistent with pro-growth, pro-poor, and pro-job development objectives."[3] As one way of achieving these parallel objectives, Indonesia's National Energy Policy (Kebijakan Energi Nasional, or KEN) set a target of increasing the country's usage of new and renewable energy (NRE) from 4 percent of all energy usage in 2011 to 23 percent by 2025 and 31 percent by 2050.[4] Indeed, the Asian Development Bank (ADB) indicates that renewable sources of electricity offer many "positive cobenefits" in addition to reduced GHG emissions including rural revitalization, jobs and employment, economic development, and avoided environmental costs of fuel extraction and transport.[5]

Although Indonesia has rapidly electrified a large proportion of its population, 16 percent of households still lacked access to electricity as of 2014.[6] Compared to the 84 percent with access to electricity, these households are more frequently found in remote islands or rural villages where the feasibility and cost of electrification through traditional means is prohibitive. As a result, households in these villages typically resort to "costly and polluting"[7] diesel-fired power generation for intermittent electricity throughout the day.[8] For some of these communities, off-grid, renewable resources (such as solar, biomass, or micro-hydro systems) represent a more feasible path to electrification than traditional, fossil-fuel based power grids.

1.2 Objectives of this report

This report has four primary objectives. The first is to present the process for identification of the two focal projects within the portfolio of community-based off grid (CBOG) renewable energy (RE) grants of the Millennium Challenge Account-Indonesia (MCA-I) Green Prosperity (GP) Project's Grant Facility for pre/post evaluation. The second is to communicate the purpose and guiding research questions behind the evaluation of those two projects. The third is to define the quantitative and qualitative methods Social Impact (SI) has chosen to respond to these evaluation questions, along with the limitations of these methods. The final objective is to outline SI's administrative approach to executing the evaluation, including the evaluation team structure and schedule.

[1] https://www.adb.org/sites/default/files/publication/178039/ino-paper-09-2015.pdf pg. 6.
[2] https://www.adb.org/sites/default/files/publication/215986/adbi-wp622.pdf pg. 2
[3] https://www.illegal-logging.info/sites/files/chlogging/uploads/IndonesiasiaranpdfGreenPaperFinal.pdf pg. 20
[4] http://prokum.esdm.go.id/pp/2014/PPpercent20Nomorpercent2079percent202014.pdf pg. 8
[5] https://www.adb.org/sites/default/files/publication/217001/ewp-502.pdf pg. 7-8
[6] W3A Anekatek Solar, East Sumba DFS pg. 1-3.
[7] In addition to the increased household-level cost of this energy source relative to renewable sources, the Asian Development Bank estimates that about $0.50 of every $1.00 expended on conventional electricity leaves the local economy, whereas every dollar invested in renewable electricity can produce $1.40 in gross economic gain due to the local and labor-intensive nature of the capital required.
[8] W3A-80 DFS pg. 1-2.

Since these two projects are not fully representative of the entire CBOG RE grant portfolio, this report will also aim to suggest ways in which the scope of the evaluation could be broadened in future data collection periods to more representatively comment on the portfolios achievements and lessons learned for future programming as a secondary objective.

2 OVERVIEW OF COMPACT & INTERVENTIONS

2.1 Overview of the Project and Implementation Plan

To combat environmental degradation and alleviate rural poverty, The Millennium Challenge Corporation (MCC) entered a five-year, $600 million Compact with the Government of Indonesia (GOI) in April 2013, establishing MCA-I, which aims to reduce poverty through economic growth. The GP Project, the flagship project of the Indonesia MCC Compact with a budget of $332 million, is designed to support the GOI's commitment to a more sustainable, less carbon-intensive future by promoting environmentally sustainable, low carbon economic growth. The main objective of the project is to work with local communities to create economic opportunities that alleviate poverty and improve management of Indonesia's natural capital. The project will provide a combination of technical assistance and grants to help communities improve land management practices and design and implement economic activities that enhance livelihoods and protect critical ecosystem services that people rely on for income and wellbeing. It is anticipated that activities under the GP project will complement the GOI's efforts to reduce emissions from deforestation and environmental degradation. More broadly, the project is also expected to help foster greater, greener, and smarter outside investment in Indonesia by improving the basis by which land use decisions are made and by creating incentives for increased deployment of cleaner technologies.

The Green Prosperity project as a whole is comprised of four discrete activities, detailed below:

1. The **Participatory Land Use Planning (PLUP)** activity is meant 1) to ensure that projects funded by the GP Finance Facility are designed based on accurate and appropriate spatial and land use data, and adhere to and reinforce existing national laws, regulations and plans; and 2) to strengthen the capacity of local communities and district-level institutions to manage their own land and resources. This is accomplished through participatory village boundary setting (VBS), updating and integrating land and other natural resource use plans, and enhancing district and provincial spatial plans. The first PLUP contract, called Participatory Mapping and Planning 1 (PMAP 1), was awarded to Abt Associates to implement PLUP Tasks 1 through 4 in the four starter districts. Seven additional PMAPs with varying levels of implementation of the four PMAP 1 tasks were also originally planned, although one of these—PMAP 5—has since been cancelled. As of August 2017 PMAPs 1-4 are complete and PMAPs 6-8 are underway. Overall, PMAP contracts will include implementation in up to 45 districts throughout Indonesia.

2. The **GP Facility** provides grant financing to mobilize greater private sector investment and community participation in RE and sustainable land use practices. The GP Facility investments are intended to enhance sustainable economic growth and social conditions while also reducing Indonesia's carbon footprint. The GP Facility targets investments in commercial and community-based renewable energy projects less than 10 megawatts (MW) in size, sustainable natural resource management, and community-based projects to promote improved forest and land use practices. These investments will support a number of objectives that promote productive use of energy and protect renewable resources from which energy can be derived. Grants will be funded through three schemes, or "funding windows": Partnership Grants (Window 1), Community-based Natural Resource Management Grants (Window 2), and RE Grants (Window 3).

3. The **Technical Assistance and Oversight** activity is designed to provide assistance and oversight for eligible districts, project sponsors and community groups to identify and develop potential investments in sustainable low-carbon economic growth. This activity will also institute a comprehensive set of procedures to track and evaluate the progress of the projects it funds and the effectiveness of the GP Project activities implemented to facilitate the success of those projects. Technical Assistance will include performing or reviewing detailed feasibility studies, engineering designs, as well as requirements on environmental, social and economic benefit, monitoring and evaluation to meet GOI permitting and international performance standards.

4. The **Green Knowledge** activity supports and enhances the results of GP projects by facilitating the collection, application and dissemination of knowledge relevant to low carbon development within and beyond GP districts. The activity will provide capacity building for local and provincial stakeholders, develop and improve centers of excellence in science and technology related to low carbon, and broad networks for information exchange, knowledge generation, and sharing.

2.1.1 Original Project Description

At the outset of the GP Facility, grants were meant to be issued through three separate funding windows, each with different mechanisms for selecting grantees. At the time of this report, MCC prefers to consider aggregations of GP Facility grants by thematic area (e.g. CBOG RE, palm oil, cocoa, etc.) rather than by the funding window through which they were granted. We will introduce the CBOG RE portfolio in the context of how each grant was funded before proceeding to characterize each grant by the method through which it aims to promote the usage of CBOG RE in Indonesia. By introducing the grants in this way, we also hope to facilitate referencing them throughout the report.

Window 1 of the GP Facility aimed to co-fund grants leveraging private resources to accomplish an array of larger GP objectives including “improving land governance, resource management, and renewable development to improve people’s access to clean energy.”[9] Ultimately two grants co-financed through this window included renewable energy components, although only one (implemented by a Hivosled consortium) maintained this component.

Window 2 of the Facility sought to issue grants for small-scale, community-based natural resource management (CBNRM) projects that “promote community-based initiatives in forestry, agriculture and off-grid renewable energy, enhanced management of watersheds and forests to improve the sustainability of renewable energy and/or agriculture investments, and support rural livelihoods and economic development.”[10] Although it is uncommon that these grants focus entirely on CBOG RE components, many (18 of 49) include some kind of CBOG RE component in their programming.

Finally, Window 3 of the GP Facility funded grants focusing almost entirely on the promotion of RE. These grants were divided into two funding schemes: Community-based RE grants (Window 3A, or W3A) and

[9] http://www.mca-indonesia.go.id/en/project/green-prosperity/grant/green-prosperity-partnership-grant
[10] http://www.mca-indonesia.go.id/en/project/green-prosperity/grant/community-based-nrm-cbnrm-grants

Commercial-scale RE Grants (Window 3B).[11] The former funding scheme provides grants for "project preparation, construction, initial Operations & Maintenance (O&M), and training for suitable small RE projects that will benefit local communities. These grants will help communities receive reliable and adequate supplies of electricity and benefit from revenue streams derived from energy production."[12] The projects financed by these grants are defined by new or expanded electricity generation from a community-based facility utilizing off-grid micro-hydro, solar, biomass, and/or wind energy systems.

By July of 2015, 21Technical Assistance & Project Preparation (TAPP) Grant Agreements had been issued to organizations working with various communities across Indonesia to implement the Window 3A projects described above. Seven of these were granted TAPP extensions. The stated purpose of these grants was to strengthen "Implementer project preparation on par with MCA-Indonesia standards in order to support high quality, evidenced-based project preparation." Under each grant, implementers were to produce four key deliverables[13]:

1. A Detailed Feasibility Study (DFS) and Front-End Engineering Design (FEED);
2. Specific studies to bridge design gaps identified in any existing feasibility study;
3. Capacity-building, staff training, and supervision services necessary for successful project preparation for implementation; and
4. Incremental work related to complying with MCC Environmental Guidelines and MCC Gender Policy and landscape-lifescape analysis.

On the basis of the deliverables produced under these seven extended TAPP grant agreements, MCA-I funded the implementation of six additional implementation grant agreements.

Table 1, below, includes a high-level summary of all 26 grants that comprise the CBOG RE Portfolio as of July 31, 2017. Although grant numbers and project titles are included in this table, these numbers and titles are not referred to consistently across project documentation. Henceforth in this report, to avoid confusion, we will refer to grants using the following convention: "[W(indow)#] [Grantee] [Technology], [Location]." For example, the first grant in the solar category below would be referred to as "W2 Yayasan Javlec Solar, Berau" and the first grant in the biomass category below would be referred to as "W3A Charta Putra Biomass, Siberut Island."

It was not possible to review documentation for all the grants in the CBOG RE portfolio prior to writing this report; nor will it be possible to include all of them in the scope of a pre/post evaluation meant to characterize the portfolio's achievements and lessons learned. In the sections that follow, we give a more detailed overview of the targeted participants and implementation to date of ten grants whose project documentation SI was able to access as of July 31, 2017. This overview is meant to serve as a resource for our justification of which grants to select for pre/post evaluation as well as for suggestions of additional grants that could be included in a recommended *ex post* portion of the portfolio evaluation to broaden the representativeness of evaluation findings to a larger proportion of the overall portfolio.

[11] As none of the Window 3B grants include CBOG RE components, they are outside the scope of this evaluation and will not be included in this report.
[12] http://www.mca-indonesia.go.id/en/project/green-prosperity/green-prosperity-facility
[13] W3A-80 TAPP Agreement pg. 7

Table 1: CBOG RE Grants Signed (as of August 16, 2017)[14]

Window	Grant Year / Number	Grantee	Project Title	Project Location	Planned Capacity (KW)	Technical Assistance Grant Value	Project Grant Value	Total Project Value with Co-financing	Description of RE works
SOLAR									
2	2016 Grant 044	Yayasan Javlec Indonesia	Developing Eco-friendly Businesses	Berau, East Kalimantan	100	N/A	$1,187,822	N/A	Solar PV & small-scale ice cube processing unit for fisherman; Mangrove Information Center
2	2016 Grant 039	Yayasan Peduli Konservasi Alam (PEKA)	Utilization of Natural Resources and Sustainable Renewable Energy for Community Welfare Improvement	Berau, East Kalimantan	320	N/A	$870,469	N/A	Solar PV (Sumber Agung) and seaweed/ fish cake processing unit; Solar PV (Giring Giring) and cocofiber processing unit
2	2016 Grant 037	Yayasan Dian Tama	Natural Resources Management of Peat Swamp Forest	Kapuas Hulu, West Kalimantan	6	N/A	$1,848,953	N/A	Solar PV (APDS); Solar PV (APMB); Solar PV (APMP); Solar PV (APNL); Solar PV (APBS); Honey Production Houses (Central and each location); Ecotourism (Selimbau)
2	2016 Grant 047	PT Cahaya Inti Trimanunggal	New renewable energy development utilizing solar power	Malinau, North Kalimantan	101	N/A	$1,764,363	N/A	Solar PV (Metut); Solar PV (Long Berang)

[14] Note: multiple grants are undergoing amendments in 2017 that may change the scope of the renewable energy work

Window	Grant Year / Number	Grantee	Project Title	Project Location	Planned Capacity (KW)	Technical Assistance Grant Value	Project Grant Value	Total Project Value with Co-financing	Description of RE works
2	2016 Grant 035	Lembaga Kajian dan Pengembangan Sumber Daya Manusia – Pengurus Besar Nahdlatul Ulama (LAKPESDAM – PBNU)	Improvement of poor household income through green business practices	Solok Selatan & Tanjug Jabung Timur, West Sumatra	86	N/A	$1,241,250	N/A	Solar Home System (SHS) (Rawasari); SHS (Sungai Rambut); SHS (Bukik Bulek)
2	2016 Grant 071	Bumi Manira	Subur Makmur DAS Kadahang	Sumba Timur & Sumba Tengah	[pump]	N/A	$827,943	N/A	Solar water pump
2	2016 Grant 024	Burung/ Konsorsium Sumba Hijau	Enhancing Community Livelihood and Conserving Environment	Sumba	[pump]	N/A	$1,813,475	N/A	Irrigation; Small Retention Basin; Rainwater reservoir; Deep Wells
2	2016 Grant 032	Kemitraan	Building a productive and Sustainable Social Forestry Entrepreneurship	Sumba Timur	7.8	N/A	$1,370,264	N/A	Solar PV
2	2016 Grant 029	YKP Donders	Cacao commodity development and food crop plantation	Sumba Barat Daya	4	N/A	$1,203,938	N/A	Nursery house (capacity 10.000 seeds); Barsha pump 10 unit; Solar Water Pump (SWP)
3A	2017 W3A-59	Anekatek Consortium		Sumba	492	$498,350	$9,200,000	$10,091,279	Solar PV
3A	2017 W3A-68	Puriver Consortium		Wakatobi, South Sulawesi	800	$648,302	$7,857,472	$8,833,169	Solar PV

Window	Grant Year / Number	Grantee	Project Title	Project Location	Planned Capacity (KW)	Technical Assistance Grant Value	Project Grant Value	Total Project Value with Co-financing	Description of RE works
3A	2017 W3A-80	Sky Energy Consortium		Mamuju, West Sulawesi	598	$561,523	$5,786,266	$6,588,883	Solar PV
BIOMASS									
3A	2017 W3A - 56/7/8	PT Charta Putra Indonesia		Siberut Island, Mentawai Island, West Sumatera	700	$973,288	$11,946,181	$13,417,229	Bamboo &/or biomass power plant
2	2016 Grant 056	Yayasan Lembaga Bantuan Hukum Lingkungan Jambi (YLBHL)	Optimizing land use to support food and energy souvereignity	Jambi, Central Sumatra	[1 HH bio-digester]	N/A	$411,498	N/A	Biogas/ Biodigester (Muaro Pijoan); Communal Cow Cattle (Muaro Pijoan); Rehabilitation Irigation (S. Duren)
2	2016 Grant 054	Yayasan Lembaga Alam Tropika Indonesia (LATIN)	Supporting community based forest management	Solok Selatan, Sub District Sangir, West Sumatra	[7 HH bio-digesters]	N/A	$1,378,080	N/A	Biogas/Biodigester (Lubuk Gadang); Ecotourism (Solok Selatan)
Hydro									
1	2015 Grant/014	WWF Indonesia		Riau, and Jambi Sumatra Barat	150	N/A	$5,500,000	$10,000,000	Dusun Tuo 150 KW micro-hydropower plant (RE component of grant: $1,125,872)
2	2016 Grant 060	Lembaga Penelitian dan Pengembangan Sumberdaya dan	Development of Community-based Sustainable Agriculture Model	Sintang, West Kalimantan	154	N/A	$1,063,038	N/A	Micro hydro (Rantau Malam); Microhydro (Jelundung); Irigation & Small Bridge (Jelundung); Farmer Hut (Jelundung); Rubber

Window	Grant Year / Number	Grantee	Project Title	Project Location	Planned Capacity (KW)	Technical Assistance Grant Value	Project Grant Value	Total Project Value with Co-financing	Description of RE works
		Lingkungan Hidup (LPPSLH)							Production Unit (Rantau Malam); Tempoyak (Fermented Durian) Production House (Rantau Malam)
2	2016 Grant 048	Yayasan Pena Bulu	Utilization of Small Hydropower Renewable Energy for Households Electrification and Improvement of Community Cacao Business	Mahakam Ulu, East Kalimantan	64	N/A	$1,454,393	N/A	Microhydro (Tepuse); Microhydro (Suwan); Cocoa Production House (Long Apari); Cocoa Production House (Long Pahangai)
2	2016 Grant 061	Komunitas Konservasi Indonesia WARSI (KKI Warsi) - initiative Sumatera Barat	Improvement of community's Welfare through inclusive livelihood	Solok Selatan, Pesisir Selatan, West Sumatra	120	N/A	$866,097	N/A	Microhydro (Pulakek Koto Birah); Biodigester/ Biogas; Animal Watching Shelter (Solok Selatan); Composting Production Unit (Solok Selatan & Pesisir Selatan); Rice Milling (Solok Selatan & Pesisir Selatan)

Window	Grant Year / Number	Grantee	Project Title	Project Location	Planned Capacity (KW)	Technical Assistance Grant Value	Project Grant Value	Total Project Value with Co-financing	Description of RE works
2	2016 Grant 062	Komunitas Konservasi Indonesia WARSI (KKI Warsi) - initiative Jambi	Strengthening green development practices to improve the environment's carrying capacity	Kerinci, Merangin, Muaro Jambi, Tanjung Jabung Timur, Central Sumatra	200	N/A	$1,016,817	N/A	Microhydro (Beringin Tinggi); Microhydro (Rantau Kermas)
2	2016 Grant 063	Indonesian Institute for Energy Economics (IIEE)	Economic improvement through Renewable energy-based Center of Knowledge (CoK)	Solok Selatan, Sub District Towoti,West Sumatra	50	N/A	$1,378,980	N/A	Microhydro (Wonorejo)
2	2016 Grant 066	IBEKA	Pro Poor for community based RE development, watershed management, ecotourism, and sustainable agriculture	Sumba Timur	160	N/A	$1,923,000	N/A	Micro Hydro (Kutta); Micro Hydro (Kalilang); Micro Hydro (Kamanjara); Knowledge Center Facilities
3A	2017 W3A-04	Lombok Utara Hijau Consortium		Bayan and Santong, North Lombok, West Nusa Tenggara	1,320	$930,315	$7,375,360	$10,845,768	Mini hydro
Combination									

Window	Grant Year / Number	Grantee	Project Title	Project Location	Planned Capacity (KW)	Technical Assistance Grant Value	Project Grant Value	Total Project Value with Co-financing	Description of RE works
1	2015 Grant/018	HIVOS - PG		Lombok, Sumba	50	N/A	$4,700,000	$9,400,000	3,200 home bio-digesters; 55 school or kiosk solar charging stations (RE component of grant: $727,782)
2	2016 Grant 046	Koperasi Kredit (CU) Keling Kumang		Sub District: Benua Tengah District: Kapuas Hulu Province: West Kalimantan	150	N/A	$1,489,100	N/A	Microhydro (Lebuk Lantang); Microhydro (Lanjau); Microhydro (Sungai Buluh); SHS(Benua Tengah); Pipe Water Supply (Benua); Pipe Water Supply (Riam Batu); Homestay (Sunagi Utik); Ecotourism (Lebuk Lantang) & Solar home system
3A	2017 W3A-33	PT Akuo Energy Indonesia		Berau, East Kalimantan	1,243	$921,673	$9,796,525	$10,705,875	Solar PV/mini hydro

2.1.2 Project Participants and Geographic Coverage

2.1.2.1 W3A Akuo Energy Solar/Micro-Hydro, Berau

The Off-Grid Power Plants for three Villages in Berau Regency-East Kalimantan Project (W3A Akuo Energy Solar/Micro-Hydro, Berau) targets three villages in the Berau Regency of the East Kalimantan Province: Teluk Sumbang, Long Beliu, and Merabu. All the households in Teluk Sumbang and Merabu (comprising 167 and 73 households, respectively) will be connected to the new and/or upgraded power systems. In Long Beliu, 223 out of 251 total households will be connected to the new power system. In all cases, the grantee plans to attempt to connect all households where a connection would be practical and feasible based on distance from the grid and socioeconomic conditions. In the case of the non-connected households in Long Beliu, all these pertain to a sub-village administrative unit (or "RT") that is wealthier than other parts of the village, located directly along the main village road. The target households pertain to a different RT seven kilometers away from the road.

At the village level, site selection occurred on the basis of government priority lists of villages with low or no rates of electrification. The Mining and Energy Agency in Berau (Dinas Pertambangan dan Energi (Distamben)) collected applications from villages to receive grant assistance and presented a list of ten suitable villages to PT. Akuo Energy for potential inclusion in the project. PT Akuo Energy initially selected four of these villages in which they would conduct DFS, and ultimately dropped one (Balikukup) when the DFS found that the most suitable location for a solar PV micro-grid was prone to erosion and potentially unsustainable. Figure 1 displays the final three villages selected for grant assistance, along with the originally considered fourth village.

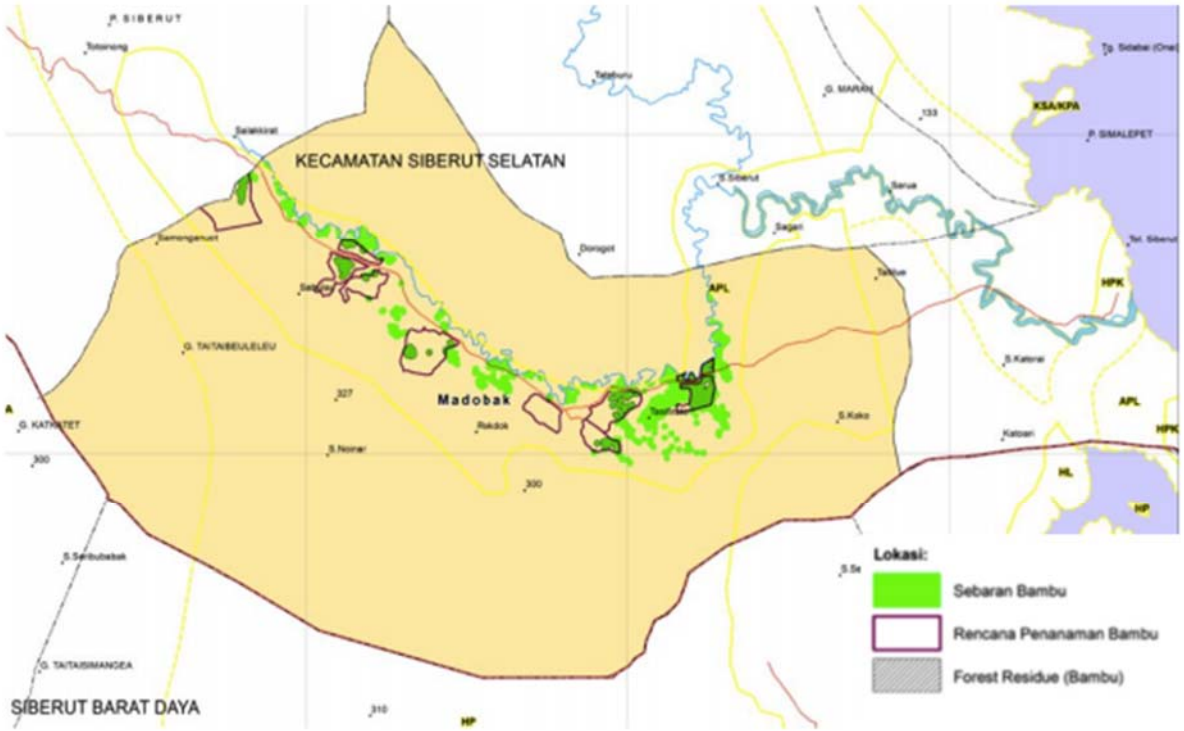
Figure 1: Map of Target Villages for W3A Akuo Energy Solar/Micro-Hydro, Berau

2.1.2.2 W3A Charta Putra Biomass, Siberut Island

The Siberut Aggregated Biomass Gasification Power Plant Project (W3A Charta Putra Biomass, Siberut Island) targets three villages on Siberut Island in the Mentawai Islands regency of West Sumatra, including Madobag and Matotonan in South Siberut and Saliguma in Central Siberut. The project is targeting all households in the South Siberut villages for connection to the new biomass off-grid system, and all but thirty to forty households in Saliguma. The non-targeted households in Saliguma are not being considered for collection because of their distance from the rest of the households of the village, although the project still hopes to improve their access to electrification via rechargeable batteries or some other means.

The project implementer, PT Charta Putra Indonesia (also known as Clean Power Indonesia, or CPI) selected the Mentawai Islands regency for the project because it has the lowest rate of electrification in Western Indonesia. Siberut Island is the largest of the Mentawai Island chain, and CPI claims that the three villages targeted by the project were selected because, together, they "represent the whole island." The selected villages include culturally and ecologically critical portions of the island (Madobag and Matotonan), as well as a new, coastal village which is the poorest in the regency (Saliguma). CPI would ideally like to replicate the Biomass-based micro-grids across the remaining seventeen villages of Siberut Island, although this activity would not be funded under the grant issued by MCA-I. The three villages targeted by the MCA-I grant can be found in Figure 2.

Figure 2: Map of Target Villages for W3A Charta Putra Biomass, Siberut Island

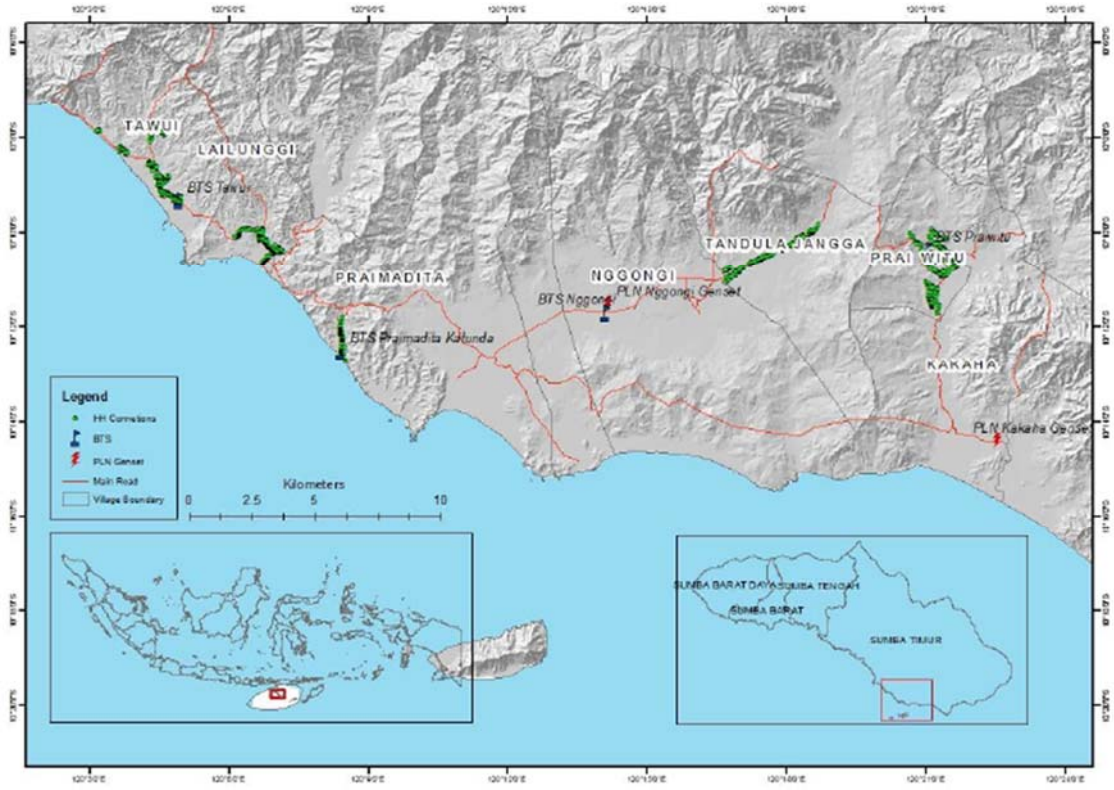


2.1.2.3 W3A Anekatek Solar, East Sumba

The Solar PV Distributed System in East Sumba Project (W3A Anekatek Solar, East Sumba) targets 909 households in the East Sumba Regency for electrification via connection to eleven, sub-village (or kampung) level solar PV micro-grid systems. These eleven systems are distributed across five villages: Tawui, Lailunggi, Praimadita, Tandula Jangga, and Praiwitu. The 909 households targeted include all the households in the eleven kampungs targeted across the five villages.

The East Sumba regency was targeted by this project based on previous studies executed under an ADB Technical Assistance grant (TA 8287) held by Castlerock Consulting, a service provider on cross-cutting deliverables on the W3A grant.[15] Within this regency, the implementer selected villages (desa) based on criteria that included mobile network access and proximity to a Perusahaan Listrik Negara (PLN)[16] station. Finally, targeted kampungs were selected within these villages based largely on population density, as measured by a GPS roof-tagging exercise. Aside from population density, it is the implementer's belief that there are no categorical differences between selected and non-selected kampungs. Figure 3, below, displays the kampung targeted by the project in the larger context of East Sumba.

Figure 3: Map of Target Sub-Villages for W3A Anekatek Solar, East Sumba



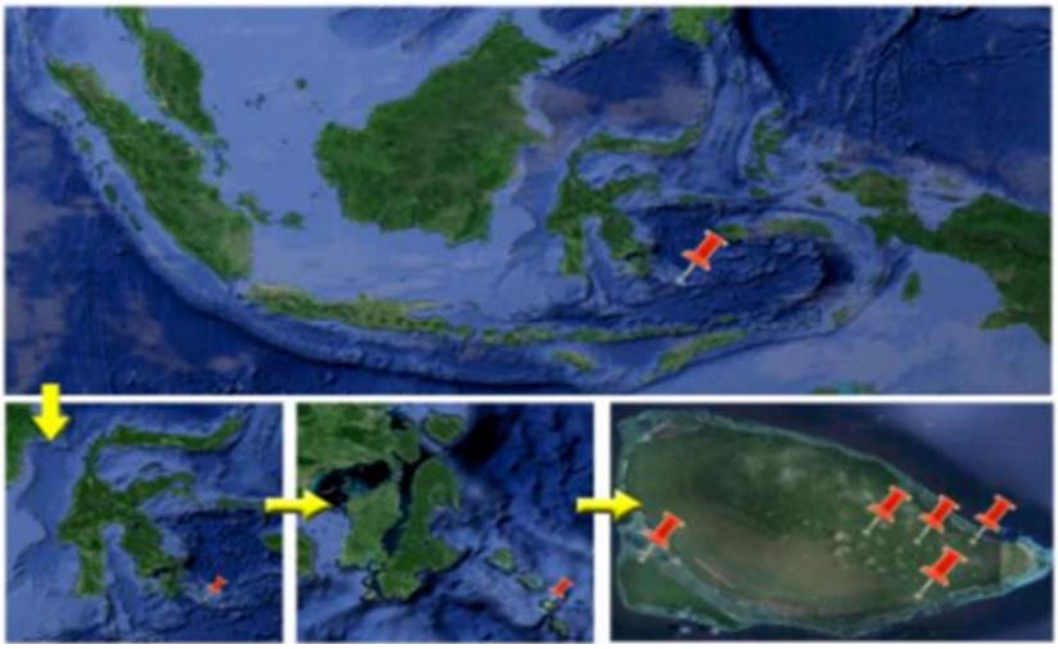
15 The purpose of this TA was to "support the GoI's Sumba Iconic Island Initiative," which aims to electrify 95% of households on the island of Sumba via 100% renewable means by 2025. The referenced Network Planner exercise was part of a "comprehensive least-cost electrification planning exercise" for Sumba, wherein the most cost-effective and technically appropriate means for achieving a 100% electrification ratio were laid out (ADB 2014).

16 Indonesian state-owned company tasked with supplying the electricity needs of the Indonesian people.

2.1.2.4 W3A Puriver Solar, Tomia Island

The Solar Photovoltaic Electricity for Tomia Island: A Green Prosperity Model Project (W3A Puriver Solar, Tomia Island) targets all 987 households in the Kahianga, Wawotimu, Kulati, Dete, and Lamanggau villages of Tomia Island, one of the Wakatobi Islands in Southeast Sulawesi. These five villages were selected because they are excluded from the PLN's Electrical Power Provision Business Plan for 2015 – 2024 and it would not be economically or environmentally feasible to integrate them into existing power grids on the mainland of Sulawesi or other surrounding islands.[17]

Figure 4: Map of Target Villages for W3A Puriver Solar, Tomia Island



2.1.2.5 W3A Sky Energy Solar, Karampuang Island

The Solar Photovoltaic Electricity for Karampuang Island Project (W3A Sky Energy Solar, Karampuang Island) targets all 784 households in Karampuang Village, which covers all of Karampuang Island in the Mamuju regency of West Sulawesi. Although the criteria by which this island was selected for this grant are uncertain, the project's DFS indicates that demand for electricity on the island far outstrips the baseline supply provided by ten community diesel generators and supplemental household generators. This project site is unique compared to its surroundings, as is depicted in Figure 5, since it is a lone island off the coast of West Sulawesi.

Figure 5: Map of Targeted Village for W3A Sky Energy Solar, Karampuang Island

[17] Detailed Feasibility Study, pg. 16

2.1.2.6 W2 Green Sumba Solar, Central Sumba

This Window 2 grant is implemented by the Green Sumba Consortium (GSK)[18] in 79 villages in 13 sub-districts in the Central Sumba Landscape (*Bentang Alam Sumba Bagian Tengah* (BA-SBT)). The area covers 260,000 hectares (ha) in three districts including Central Sumba, West Sumba, and East Sumba (70 percent, 18 percent, and 12 percent, respectively, from the area of BA-SBT), and an estimated 90,000 citizens. The project aims to strengthen natural resource management (NRM) to increase prosperity, leading to climate resilience as well as contributing to climate change mitigation and to the preservation of the natural ecosystem in BA-SBT.

[18] The grant agreement is between MCA-I and Perhimpunan Pelestarian Burung Liar Indonesia (Burung Indonesia), the lead institution in the Consortium. The Consortium, in addition to Burung Indonesia, includes Lembaga Peduli Sejahtera dan Lestari Sumba (Pelita Sumba), Yayasan Bahtera, Yayasan Wahana Komunikasi Wanita, Forum Perempuan Sumba (FOREMBA), and Forum Jaringan Manupeu Tanadaru (JAMATADA).

2.1.2.7 W2 IBEKA Micro-Hydro, East Sumba

This Window 2 grant is implemented by Inisiatif Bisnis dan Ekonomi Kerakyatan (IBEKA) Foundation (as the lead institution) together with consortium partners.[19] The project targets two sub-districts in East Sumba (Kahaungu Eti and Pandawai), and 756 households within seven villages. These households are expected to benefit from the development of four Micro Hydro Power (MHP) facilities that will have a total capacity 186 kW.

2.1.2.8 W2 Yayasan Dian Tama Pontianak Solar, Kapuas Hulu

This Window 2 grant is implemented by Yayasan Dian Tama Pontianak (Lead Consortium institution) together with consortium partners.[20] They implement the project in the district of Kapuas Hulu in West Kalimantan,[21] in the Kapuas watershed and Leboyan-labian sub-watershed. This 86,000-ha area includes peat swamp forest and dry lowland forest, which are particularly vulnerable to forest fires and other land use changes. The project plans to reach 18 villages in seven sub-districts in Kapuas Hulu (namely Selimbau, Jongkong, Batang Lupar, Suhaid, Badau, Bunut Hilir, and Embaloh Hilir), and 1,014 households.

2.1.2.9 W2 CUKK Micro-Hydro/Solar, West Kalimantan

This Window 2 grant is implemented by Koperasi Kredit Keling Kuman (as the Consortium leader (CUKK), together with consortium partners.[22] CUKK has 62 branch offices, four of which are located in the project area – namely Kapuas Hulu and Sintang District in West Kalimantan. The project will work in six villages in the former district (two sub-districts), and seven villages in the latter district (one sub-district). Beneficiaries include 789 households (or 3,190 individuals) in Kapuas Hulu and 444 households (or 1,776 individuals) in Sintang.

2.1.2.10 W1 Hivos Solar/Biogas, Sumba/Sulawesi

This grant operates in nine districts spread across three provinces: East Nusa Tenggara, West Nusa Tenggara, and South Sulawesi. The specific districts targeted include East Sumba, West Sumba, Central Sumba, Southwest Sumba, North Lombok, East Lombok, Central Lombok, North Luwu, and East Luwu. Although most of the grant's physical outputs (such as solar lanterns or solar PV units) target schools, kiosks, and agro-processing mills on the island of Sumba, the grant will also aim to install household biogas digesters across all three provinces. Besides physical RE outputs, the grant targets government, private sector, and civil society stakeholders with community engagement programming. In total, the grant estimates that it will have 61,500 direct beneficiaries. These direct beneficiaries are mostly comprised of rural households with school-aged children, with emphasis placed on households where program outputs might promote livelihood security, reduce economic constraints, or promote economic opportunities. [23]

[19] The Consortium, in addition to IBEKA, includes Koperasi Serba Usaha (KSU) Kamanggih, Koperasi Jasa Peduli Kasih Kamanggih, PT.RENERCONSYS, PT. Caruban Inti Technology, and CV Insan Bangun Utama.
[20] Consortium partners include Yayasan Dunia Lingkungan Hidup Indonesia / World Wildlife Fund for Nature Indonesia, Perkumpulan Kahan, Koperasi Asosiasi Periau Danau Sentarum (APDS), Lembaga Pengkajian dan Studi Arus Informasi Regional (LPS- AIR), Yayasan Riak Bumi, and Komunitas Pariwisata Kapuas Hulu (KOMPAKH).
[21] APL area.

[22] The consortium includes Koperasi Produsen K77 and Aliansi Masyarakat Adat Nusantara Kalimantan Barat (AMAN Kalbar).
[23] Grant agreement, Attachment B

2.1.3 Implementation to Date and Planned Outputs

Each of the Window 3A grants has six general categories of outputs in common (as enumerated in their grant agreements): (i) an Engineering, Procurement and Construction (EPC) contract with an MCA-I approved contractor; (ii) physical infrastructure including off-grid Power Plants, electricity distribution lines, house installation lines, protection devices, and meters; (iii) Mandatory operational permits and licenses for electricity generation and distribution; (iv) fully implemented and monitored environmental and social performance (ESMP) and project social and gender integration plans (PSGIP); (v) community members with adequate technical, managerial, and entrepreneurial capacity to sustainably operate a SPV responsible for overseeing the off-grid system and supporting productive activities for the electricity's use; and (vi) project management, monitoring, and reporting. As of the submission of this report, all five grants have initiated construction on key physical outputs as well as community capacity building.

Although the grants have similar outputs in the abstract, they differ in the nature and amount of physical infrastructure in each grant, the timeline for the infrastructure's activation, and the capacity building requirements for the establishment of an SPV in each community. These specific differences in planned outputs are presented in the following sub-sections, with the exception of W3A Puriver Solar, Tomia Island for which complete data was not available in time for preparation of this report.

2.1.3.1 W3A Akuo Energy Solar/Micro-Hydro, Berau

W3A Akuo Energy Indonesia (AEI) Solar/Micro-Hydro, Berau started construction of all facilities and necessary complementary outputs for all three villages in July of 2017. The facility in Merabu is scheduled for commissioning in December of 2017, while the remaining facilities will be commissioned in March of 2018. A summary of the main physical outputs from this project and their corresponding power capacities can be found in Table 2.

Table 2: W3A Akuo Energy Solar/Micro-Hydro, Berau Summary of Physical Outputs

Location	Technology	Number of facilities	Capacity (kWp)	Household connections
Teluk Sumbang	Solar PV, Micro-hydro	2	414 (solar), 30 (hydro)	138
Long Beliu	Solar PV	1	518	165
Merabu	Solar PV	1	311	97
TOTAL		**4**	**1,273 kWp**	**400**

While the facilities are under construction, AEI will work with the local communities to form SPVs that will be responsible for the facilities' long-term operation. According to the grant's SPV Business Plan (revised May 8, 2017), these village-level SPVs will be dually owned by the implementer and a village-owned enterprise (Badan Usaha Milik Desa, or BUMDes). During construction, AEI will have a majority share in the SPV, whereas after construction shares will be split 75% to 25% in favor of the BUMDes. Each SPV will be shaped according to the organigram in Figure 6.

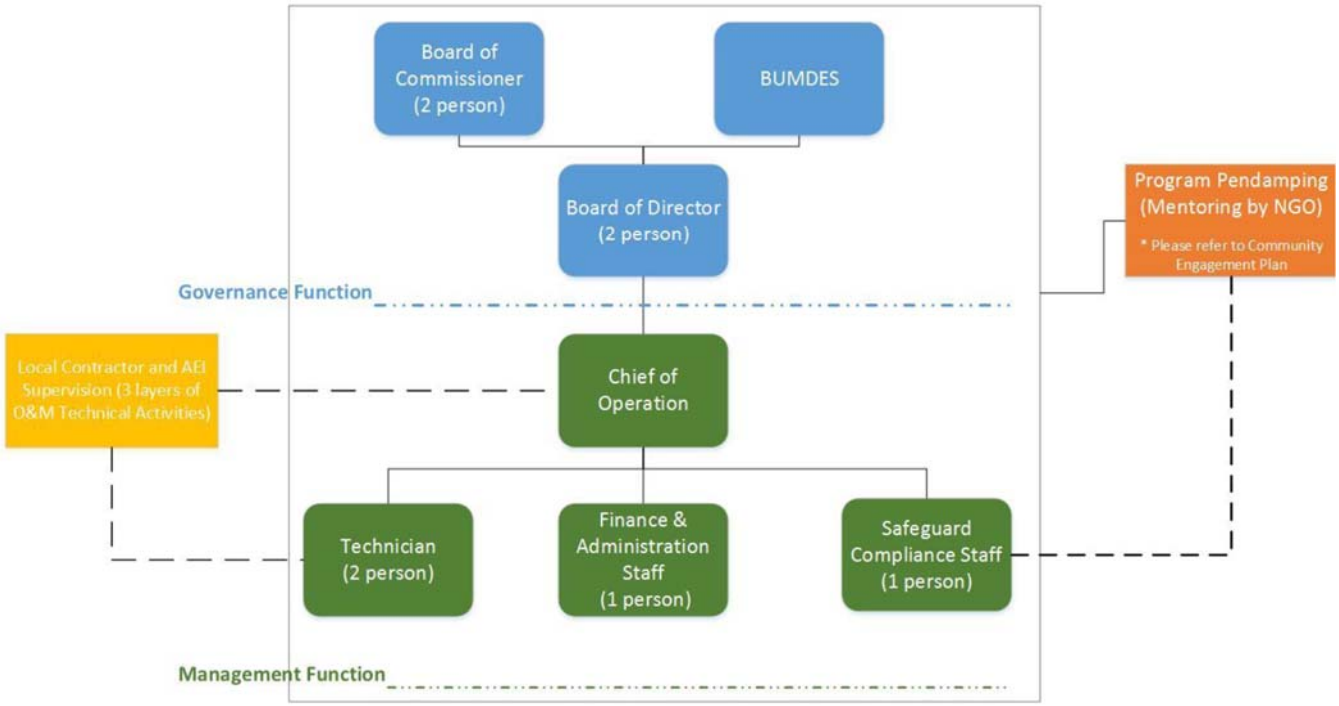


Figure 6: W3A Akuo Energy Solar/Micro-Hydro, Berau SPV Organigram

Operationally, the technician is responsible for day-to-day O&M of the plant. The finance and administration staff is responsible for book-keeping and documentation as well as managing the SPV's voucher-based sales system and financial reporting. The safeguard compliance staff is responsible for coordinating community development and compliance with environmental, social, and gender safeguard procedures. Routine preventative maintenance and intermediate troubleshooting will be contracted out to a local O&M company, while system control and advanced and inverter troubleshooting will be handled by AEI.

Although AEI will have a 25% share in the SPV, all SPV dividends will belong to the BUMDes. These dividends will be utilized according to the procedure outlined in Figure 7.Specifically, the 10% of gross profits reserved for community benefits each year will target electricity usage effectiveness awareness and economic activities by women's groups.

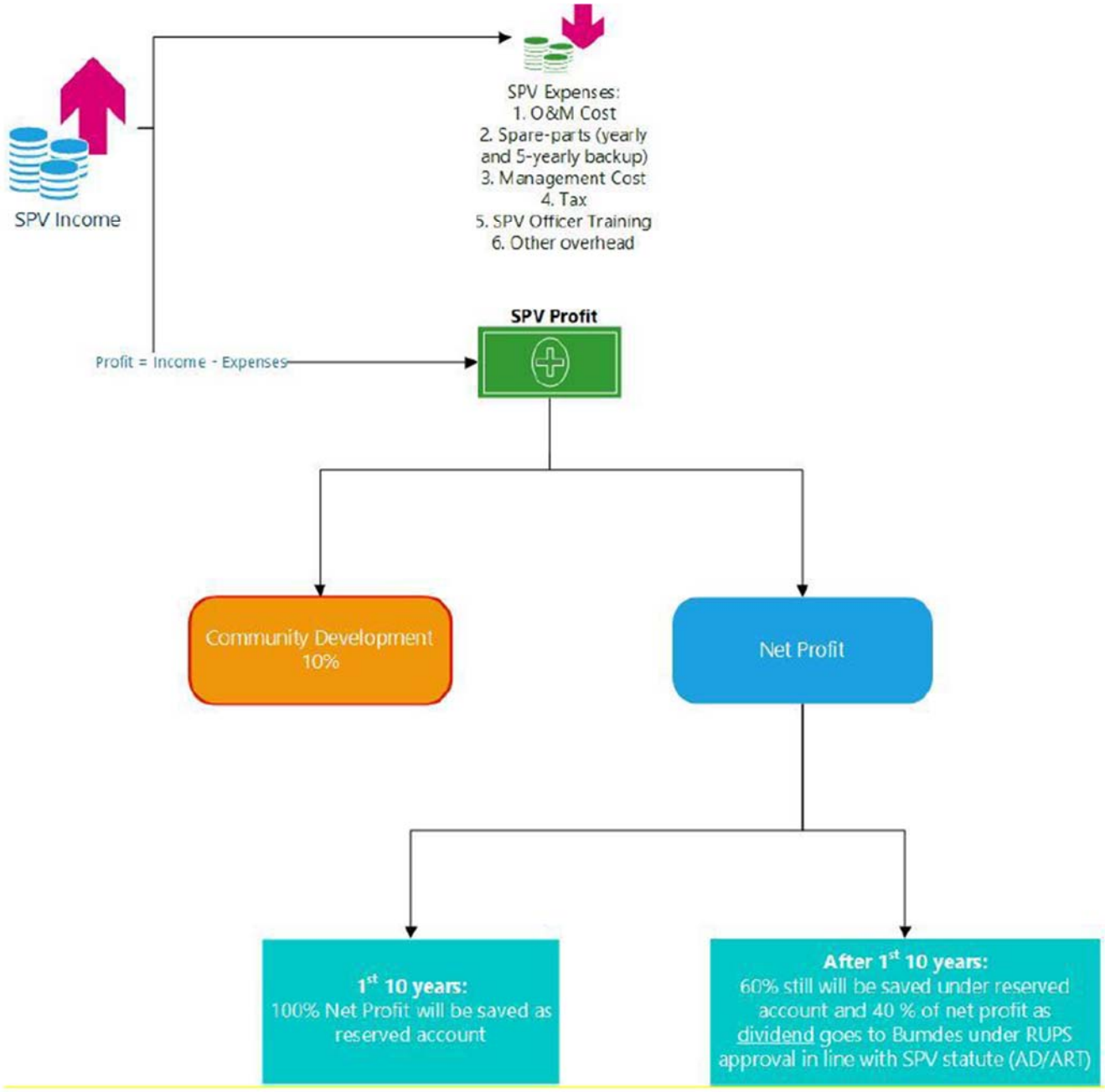


Figure 7: W3A Akuo Energy Solar/Micro-Hydro, Berau SPV Profit Utilization

2.1.3.2 W3A Charta Putra Biomass, Siberut Island

The Siberut Aggregated Biomass Gasification Power Plant Project is due to commission all seven of its biomass gasifier facilities in March of 2018. These facilities will be split among three villages with the capacity indicated in Table 3. As of July 2017, these facilities are under construction.

Table 3: W3A Charta Putra Biomass, Siberut Island Summary of Physical Outputs

Location	Technology	Number of facilities	Capacity (kW)	Household connections
Madobag	Biomass	3	300	537
Matotonan	Biomass	2	150	270
Saliguma	Biomass	2	200	397
TOTAL		**7**	**650 kW**	**1,204**

As this grant is the only one to implement biomass-based micro-grids, it has a unique economic model and community engagement mechanism relative to the other Window 3A grants. The project will construct an SPV[24] co-owned and operated by local villagers (as represented by three Village-Level Enterprises, or VLEs), regency government representatives (as represented by a Badan Usaha Milik Daerah, or BUMD), and the project implementer (CPI).

The VLEs will harvest and supply bamboo as feedstock for the grids, at first from indigenous sources before ultimately harvesting from a new bamboo plantation. These VLEs are the majority owners of the SPV and primary beneficiaries of the project. The BUMD is responsible for guaranteeing the financial viability of the power plants, monitoring electricity demand from local industries and businesses, and encouraging productive uses of the electricity through government programming or subsidy. CPI is responsible for the project implementation, including appropriate vocational training of local villagers as both bamboo farmers and power-plant managers and operators.

Representatives from each of these three groups will be involved in two separate teams: an SPV Project Management team that will dissolve after the project has been fully implemented, and an O&M Team that will persist through the lifetime of the power plants. Each team will manage a contractor related to its role in implementation. In the case of the O&M team, the O&M contractor will be appointed for five years with an option for an additional five-year extension. See Figure 8, below.

[24] The SPV approach described here is based on the DFS, which is the most updated SPV plan available to SI as of July 2017. SI acknowledges based on MCA-I comments that this approach has been updated since this time.

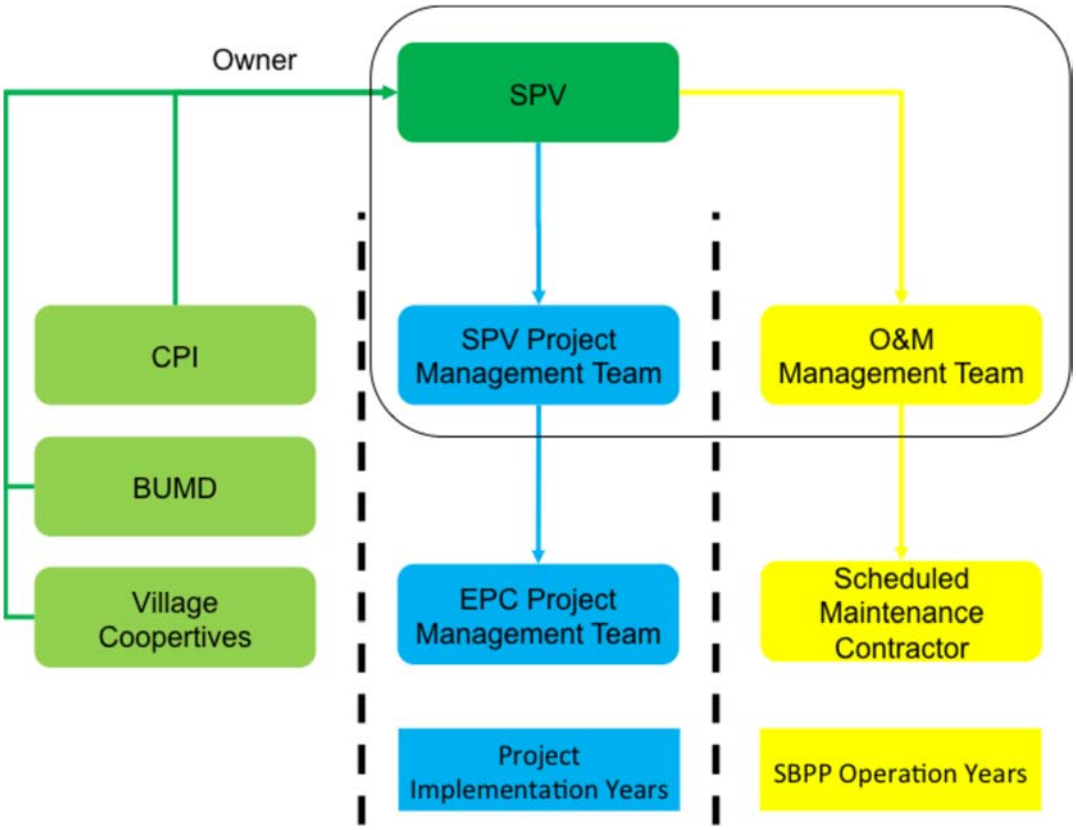


Figure 8: W3A-56-58 SPV Organization and Management[25]

2.1.3.3 W3A Anekatek Solar, East Sumba

Construction of Solar PV facilities and complementary structures for W3A Anekatek Solar, East Sumba is due to commence in August of 2017. At this time, the facilities in Tawui Riyang, Tawui Northeast, Tawui North, and Tawui West are due to be commissioned by November 10, 2017. The remaining facilities will be completed between November 28,

2017 and January 31, 2018. Table 4 summarizes the capacity and expected household connections of each of these facilities.

Table 4: W3A Anekatek Solar, East Sumba Summary of Physical Outputs

Location	Technology	Number of facilities	Capacity (kW)	Household connections
Tawui Riyang	Solar PV	1	9	18
Tawui West	Solar PV	1	12	28
Tawui Northeast	Solar PV	1	7.5	17
Tawui North	Solar PV	1	12	27

[25] As pictured on pg. 26 of W3A 56-58 DFS.

Location	Technology	Number of facilities	Capacity (kW)	Household connections
Tawui South	Solar PV	1	99	209
Lailunggi	Solar PV	1	103.5	216
Rehi Jara	Solar PV	1	16.5	32
Tanah Rong	Solar PV	1	24	44
Tandula Jangga	Solar PV	1	75	136
Praiwitu North	Solar PV	1	103.5	136
Praiwitu South	Solar PV	1	30	46
TOTAL		**11**	**492 kW**	**909**

Compared to the W3A grant in Berau, which will set up an SPV in each village in which it operates, W3A Anekatek Solar, East Sumba has established one SPV, "PT Mikro Kisi Sumba (MKS)," to cover all eleven treatment areas spread across five villages.[26] The implementer's sister company, Electric Vine Industries (EVI), will have 100% ownership of the SPV during the construction phase, after which ownership will be split 51% to 49% in favor of the communities. The communities will be represented by a secondary cooperative comprised of members of five primary cooperatives representing each village in which the project will operate.[27]

Operationally, the SPV will issue a contract to "PT LVI" for O&M of the facilities and management of administration and finance. Where other grant's SPVs typically aim to complete finance and administration in-house, PT MKS is paying for these to be completed externally since the contractor has key experience and software to implement a mobile phone-based, pre-paid "smart metering" system that aims to increase project sustainability by matching payment cycles with end-user's income cycles. Users of the micro-grids will lose access to power once they have used their pre-paid credit. Custodians employed by the SPV will be responsible solely for O&M tasks related to cleaning arrays and clearing vegetation and debris from the roots and distribution. Besides the custodians, the only other operational SPV staff will be community, social, and environmental officers responsible for overseeing the implementation of ESMP and PSGIP along with liaising between cooperative members and technical and managerial SPV staff—including registering customer complaints. See Figure 9 for an overview of the SPV's structure following the end of the construction phase.

[26] The information presented in this section is based off of the grant's SPV Business Plan, dated July 5, 2017 which is the most updated plan available to SI as of July 2017. SI acknowledges based on MCA-I comments that this approach may have been updated since this time.

[27] In all villages but Praiwitu, these cooperatives will be established from scratch. Since Praiwitu is the only village with an existing cooperative, this cooperative will be assessed for suitability as an SPV before a cooperative is established from scratch.

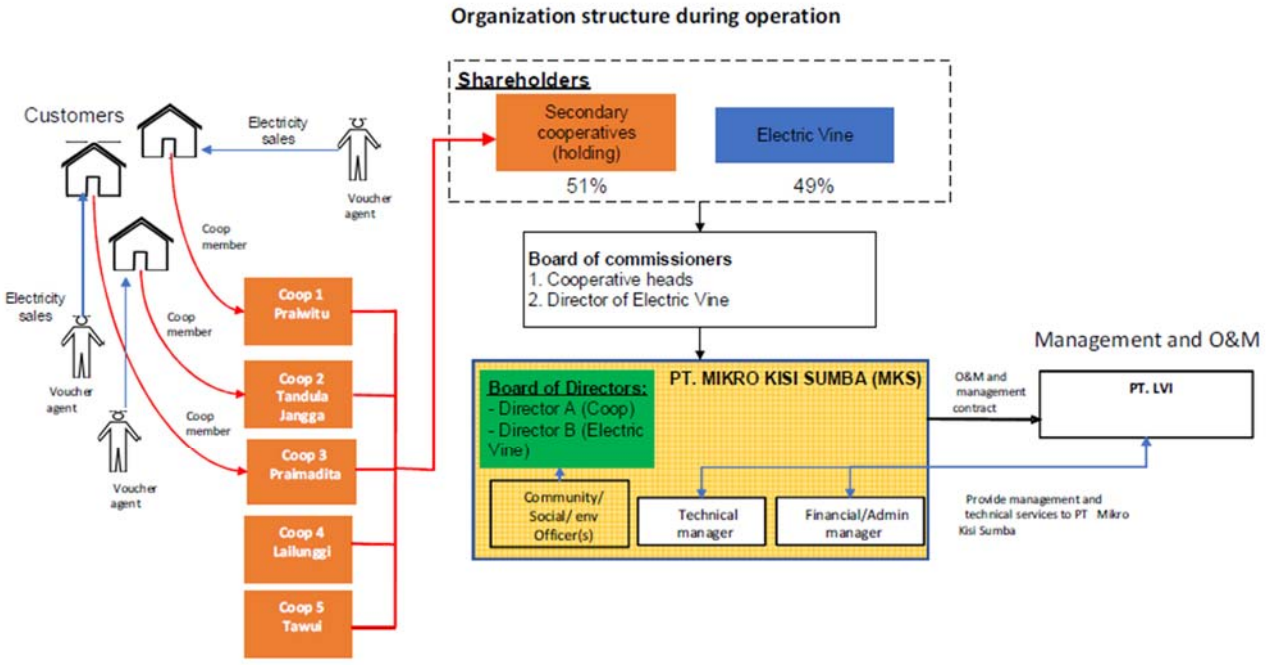


Figure 9: W3A Anekatek Solar, East Sumba SPV Organigram[28]

In order to increase sustainability of the micro-grids, members of the primary cooperatives (households in each village) will receive capacity building over the course of construction on various themes, including: community development, social inclusion, and gender awareness; SPV management and sustainability; operation and maintenance, and renewable energy. These trainings are meant to increase community members' awareness of and engagement with the benefits of the RE technology as well as their ability to successfully manage it after the project has ended.

Once the SPV is generating revenue and funds have been set aside for a maintenance reserve, dividends remaining after O&M and contractor costs will be allocated for activities. These may include capital for new businesses in the villages, incentives for members that do not have sufficient income to pay electricity tariffs, or capital for cooperative members.

2.1.3.4 W3A Sky Energy Solar, Karampuang Island

According to the schedule laid out in the grant agreement, procurement and construction of all Solar PV facilities on Karampuang Island was underway by February of 2017. The four plants will be commissioned between September and December of 2017. Their combined capacity, as laid out in Table 5, will be sufficient to connect all 784 households on the Island.

[28] W3A Anekatek Solar, East Sumba SPV Business Plan (dated July 5, 2017); Exhibit 2

Table 5: W3A Sky Energy Solar, Karampuang Island Summary of Physical Outputs

Location	Technology	Number of facilities	Capacity (kW)	Household connections
Karampuang Island	Solar PV	4	599	784
TOTAL		**4**	**599 kW**	**784**

The structure of the SPV[29] for W3A Sky Energy Solar, Karampuang Island is centered on a Village-Owned Enterprise (Badan Usaha Milik Desa, or BUMDes) headed by the village chief as CEO (Chief Executive Officer) and supported by a Secretary, O&M Coordinator, and Treasurer. In addition to these technical roles within the BUMDes, there will be two BUMDes representatives for each of the four sub-villages responsible for maintaining relationships between the villagers and the BUMDes. Besides these central roles within the BUMDes, the SPV will also include "Shareholders" responsible for stepping in to address major problems in the SPV and an O&M Contractor responsible for major O&M problems that cannot be resolved by BUMDes O&M staff. Chapter 11 of the W3A-80 DFS clearly maps out the roles and responsibilities of each of these parties across several business processes, including procurement, routine O&M, major O&M, and voucher sales.

According to the schedule found in the grant agreement, public consultation, technical training, and managerial training of the SPV is due to take place between March and September of 2017. MCA-I will complete handover to the SPV in January of 2018.

2.1.3.5 W2 Green Sumba Solar, Central Sumba

This project is expected to result in renewable energy (RE), forest management, and sustainable agriculture benefits. The project has three high-level outcomes as follows:

- Outcome A: Strengthened livelihoods of people in BA-SBT through natural resources management and capacity building of village level organizations
- Outcome B: Strengthened practice of land management to increase forest cover and strengthened practice of utilizing renewable energy
- Outcome C: The mainstreaming of the development of productive and sustainable BA-SBT management

Specifically related to RE, Outcome B includes an output titled 'Increased households which utilize renewable energy'. The consortium expects activities focused on promoting household solar power lighting (*penerangan lampu tenaga surya rumah tangga* (PLTS)) to help provide electricity to 13 villages covering around 283 households in the project implementation area.

The project importantly includes a community-based approach to the promotion of RE sources toward the goal of sustainability post-implementation. In order to improve the livelihoods of local communities, the project not only focuses on improving agriculture and animal husbandry, but also technical capacity, social investment, and social organization. At the village level, the project develops community groups that discuss access to

[29]The SPV approach described here is based on the DFS, which is the most updated SPV plan available to SI as of August 2017. SI acknowledges based on MCA-I comments that this approach has been updated since this time.

natural resources, park boundaries, and monitoring of resource use. These groups promote village-level agreements and regulations to better manage their lands. The project encourages participation in the government-established musrenbang and village development planning process, so that they play a key role in achieving a productive and sustainable landscape.

The grant began in July 206 and will conclude activities within 18 months of its start date in December 2017.). It is currently completing work in quarter 5 of the grant agreement and is on track with most planned activities.

2.1.3.6 W2 IBEKA Micro-Hydro, East Sumba

The W2 IBEKA Micro-Hydro project aims to achieve the following three outcomes:

- Outcome 1: Strengthened communities and cooperatives as Local Economic Development Centers
- Outcome 2: Operationalization of four micro hydro power plants (PLTMH) to supply seven villages
- Outcome 3: Increased agricultural productivity

Specifically related to Outcome 2, the project not only constructs four MHP facilities but also trains operators for each location. This outcome's success is closely linked to Outcome 1, which includes outputs related to the development of community cooperatives with the purpose of operating and maintaining the MHP facilities. In Outcome 1, the project involves the community through orientations and regular meetings, in addition to actual participation in the construction of the facilities. The project plans to involve the community in facility location selection, construction, and maintenance. The project also regularly meets with farmer and women's groups to collect feedback and data on needs and impacts of MHP development. In this way, the community takes on a leadership and maintenance role related to the RE source introduced through this Window 2 grant.

The grant will conclude activities within 17 months of its start date in December 2017. (start date of August 2016). In quarter 1 and 2, the project was facing significant challenges with receiving required licenses for MHP development (leading to construction delays). This reportedly affected community buy-in and participation, and has led to the need for re-socialization activities and adjusted community approaches.

2.1.3.7 W2 Yayasan Dian Tama Pontianak Solar, Kapuas Hulu

The goal of this project is to increase productivity and value added of community products through the use of renewable energy, management of peat forests to increase people's incomes, management of peat swamp forests, and reduction of dependence on fossil fuel in and around conservation areas in Kapuas Hulu. The project has two expected outcomes, as follows:

- Outcome 1: Increased productivity, product added value, product standardization and marketing networks in three ecotourism management groups and five solar energy sub-centers of honey (39 groups of fish and processed products farmers, 5 groups of fishermen women) without the use of fossil fuel.
- Increased management of peat land ecosystems, aquaculture ecosystems, ecotourism destinations and habitat of bees through sustainable use of land.

These outcomes are further specified by seven specific outputs, including forest fire mitigation/management, ecotourism development, a market study, RE (solar energy) sub-center development, and information sharing within the community about renewable energy.

The RE component of this grant involves the development of five solar energy processing houses for honey and fish. The production houses (and the processes) will reduce their use of fossil fuels and reduce public spending on fossil fuels for production purposes by using 250 W solar panels. The project plans to conduct capacity building activities regarding production house (and solar panel) maintenance and operation by December 2017.

The grant will conclude activities within 18 months of its start date, in November 2017 (start date of June 2016). The houses were expected to be completed in December 2016 (with solar panels completed by June 2017). Issues noted in the quarter 3 project report included availability of funding, which has slowed implementation.

2.1.3.8 W2 CUKK Micro-Hydro/Solar, West Kalimantan

The goal of this project is to reduce poverty and improve people's quality of life through fair and sustainable environmental management efforts for sustainable economic growth. The project will conduct empowerment, cultivation, productivity and RE activities/trainings. The project has four high-level outcomes, as follows:

- Outcome 1: Decreasing the dependency on fossil fuel by providing renewable energy.
- Outcome 2: Improving Saran and Embaloh Hulu territories governance participatorily (sic) and sustainably.
- Outcome 3: Changing community behaviors on maintaining natural resources and increasing productivity.
- Outcome 4: Optimizing catchment area functioning.

Particularly related to Outcome 1 and the RE component of this grant, various targeted villages at the time of project launch relied on diesel-fueled power plants. This resulted in high diesel prices and air pollution. The power was only provided for 3 hours at a time, and, resultingly, residents had to resort to kerosene fuel to light their homes. To address this, the project is procuring RE sources through development of Micro Hydro Power Plants (PLTMH)[30] and a Solar Power Plant (PLTS)[31]. The project will also develop a governance system to maintain these facilities, and encourage community participation in the development/construction/maintenance process.

The plants will range in capacity from 21 – 74 KW, reaching 151 KW to 273 households.

The grant will conclude activities within 19 months of its start date, in December 2017 (start date of June 2016). At inception, the project implementer already identified challenges will accessing parts to maintain PLTMH and PLTS in West Kalimantan. In their third quarterly report, the implementer reported completing participatory mapping workshops in seven villages. The project had also already received letters of recommendation regarding the development of the solar plant. The project planned to socialize and conduct focus group discussions regarding PLTS and PLTMH in March 2017.

[30] *To be developed in Lebuk Lantang (servicing 500 households, 2 churches, 1 homestay and 1 town hall), Lanjau (servicing 90 households, 1 village office, 1 village hall, 1 primary school and 1 church) and Sungai Buluh (in some grant documents, this is listed as Rawa Bangun – 60 households, 1 village office, 1 village hall, 1 primary school, and street lighting).*

[31] *To be developed in Benua Tengah (servicing 60 households, 10 street lights, 1 church and 1 health clinic).*

2.1.3.9 W1 Hivos Solar/Biogas, Sumba/Sulawesi

Hivos' grant aims to improve rural livelihoods through utilization of renewable energy across two dimensions: increased access to and application of RE technology and improved human capacity and social cohesion with respect to RE technology. It aims to accomplish the first dimension by installing 50 solar-powered agro-processing mills, 25 school-based solar PV systems, and 20 solar remote charging stations in Sumba, while installing 3,200 household biogas digesters across the East Nusa Tenggara, West Nusa Tenggara, and South Sulawesi provinces. The grant will also rent 6,000 solar lanterns in the same areas where school-level solar PV units are installed. In total, these technologies will have a combined capacity of 9,152 kW spread across an estimated 61,500 direct beneficiaries.[32]

To complement these physical installations and accompanying rental technologies (including solar lanterns accompanying the school-based solar PV systems and charging kiosks), the Hivos consortium will conduct capacity building on business-, technical-, and gender-related themes to prepare communities for the utilization of the new technology.

In order to sustain these outputs, the consortium will simultaneously create a market for the off-grid technologies using a renewable energy service center (RESCO) approach coupled with stakeholder engagement and community outreach to maintain a commitment to participatory and gender-sensitive development of RE systems in government, civil society, and the private sector. The Waingapu- and Waitabula-based RESCOs constitute a different approach to community engagement and ownership than the SPV approaches utilized by the Window 3A grants. Specifically, they will collect monthly fees from customers (mostly local cooperatives or user groups and kiosk owners) to fund maintenance fees, repayment of equipment funded by the grant, and an operating margin. The repaid equipment portion of these fees will fund replacement of RE system components when they fail, and the operating margin will cover operating expenses such as salaries and rent. In turn, the RESCOs will ensure delivery of the RE service and provide monthly maintenance and system repairs.

As of March2017, procurement of the non-biodigester physical installations was ongoing. In turn, 1,453 of the targeted 3,200 biogas digesters had already been constructed. Training of RESCO staff was also ongoing, specifically on themes related to system installation, reporting, site safety, and community engagement.[33] All program activities are scheduled to be completed by March of 2018.

2.2 Theory of Change[34]

All five of the Window 3A grants operate on a nearly identical theory of change, which can be summarized as: if communities with low access to electrification in remote areas of Indonesia are provided with renewable-energy based micro-grids and capacity building in the proper operation and management of these micro-grids, then (i) the communities will have an increased awareness of RE and sustainable natural resource management; (ii) households in these communities will have reliable and sustainable access to electricity; and (iii) community cooperatives will have the capacity to operate and manage the micro-grids. Supposing these

[32] Grant agreement, Attachment B
[33] Q5 Quarterly Report.
[34] As section 3.2 will explain, the evaluation at this time will focus on two Window 3A grants. As such, we provide an overview of the theory of change for Window 3A grants only in this section.

outcomes are realized and the communities derive sustainable benefits as SPVs continue to provide adequate O&M services, household income will be increased and GHG emissions decreased due to the improved access to and utilization of electricity generated from RE sources. In addition to the three outcomes mentioned above, all but W3A-56-58 additionally posit that increased economic opportunities will result from productive uses of the increased supply of electricity. By way of example, the log frame for W3A Anekatek Solar, East Sumba depicts the logical progression of this theory of change from the status quo through to final impacts in Figure 10.[35]

Although the DFS or M&E (Monitoring and Evaluation) Plans for the Window 3A grants typically include some characterization of the theory of change above, they rarely include the underlying assumptions or detailed intermediate steps required for the ultimate goals to be realized. We provide a bit more detail from the literature here to highlight key measurement areas for the evaluation.

In theory, electrification is expected to positively affect households and service provision. First, it improves incomes via a decrease in energy expenditures, an extension of working hours, the use of productive motive power, and eventually better income opportunities and new and more efficient businesses. Second, it yields better education via extended study hours, improved access to knowledge and information, and improved school services. Third, it leads to improved health from a decrease in polluting lighting sources (kerosene) and improved health services by electrified health facilities. Lastly, it yields positive effects via electrification on security, community participation and (gender) attitudes via improved connectivity and media access (see Lenz et al., 2017).

These theorized impacts are contingent upon a handful of key assumptions:

1. Households are open to using the new technology. While this is generally not a problematic assumption, it could be violated if there is mistrust between the community and the implementer or a lack of optimism in the community that the new technology will be sustainable.
2. Beneficiary communities will have adequate access to regional and national markets to allow village enterprises to count on more than local demand. Without this, there may be little incentive to expand or create new businesses. This assumption is likely to be tested more often in agricultural communities that cannot count on the same export base as enterprises in communities that rely on fishing or eco-tourism.
3. For education outcomes to materialize, schools must be up and running and students must have access to study materials in order to allow households to use electricity in a beneficial way with regards to education.
4. Finally, this theory of change assumes that all program components are fit for purpose. The physical infrastructure and training of community members must be suitable for achieving the purposes set out below. If it is not, the construction of solar arrays may not result in a sustainable source of usable electricity that meets the energy demands of uses that contribute to the above stated goals. For example, if energy supply in practice is only sufficient to power small household appliances or lights, then new economic opportunities may not be available. Similarly, without sufficient training and

[35] Our presentation of program logic in this section is representative of the benefit streams outlined in project M&E plans. There are frequently additional outcomes associated with increased electricity access, including improved gender equality through changes in time use due to time-saving appliances and improved security due to lighting. Our evaluation will aim to capture such outcomes of similar programming, even if they are not included in project M&E documents.

resources, communities might not have the capacity to conduct adequate O&M procedures to ensure the sustainability of physical outputs.

SI will work to monitor the veracity of these assumptions, where appropriate, using our existing instruments. As an example, we may monitor the assumption about access to markets by asking enterprises where their customers generally come from alongside questions about their revenue and future prospects. Additionally, we may ask community members about their interactions with grantees and their past direct or indirect experiences with similar programming to monitor their openness to the new technology.

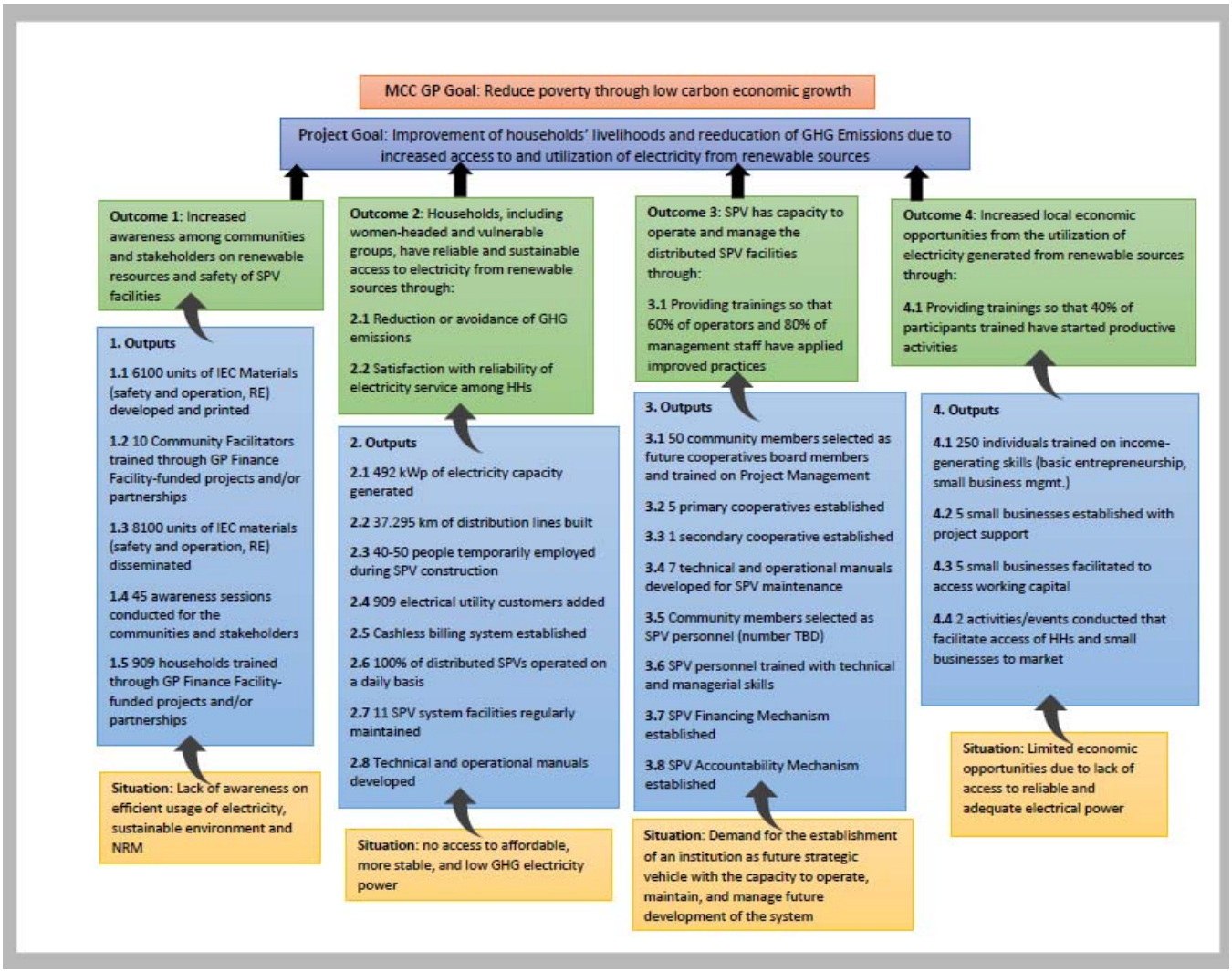


Figure 10: Log Frame for W3A Anekatek Solar, East Sumba

2.3 Cost Benefit Analysis & Beneficiary Analysis[36]

The largest and most consistent economic benefit considered by MCC cost benefit analyses (CBAs) for the Window 3A grants is derived from the increased access to electricity from the newly established power systems. This benefit mirrors outcome 2 in the grants' logical frameworks. The economic benefit of this outcome is quantified as the increased consumer surplus of the increased access to electricity (as measured through a Willingness to Pay (WtP) methodology). Another benefit stream that appears consistently in all the economic rate of return (ERR) calculations is a resource cost savings benefit, measured by the decrease in consumer expenditure on electricity from the new RE sources compared to status quo sources like kerosene or diesel generators. This substitution is not explicitly linked to any of the four grant outcomes, although it is an implicit mechanism for the increased household income and decreased GHG emissions cited as the overall objective and impact of the grants.

Inconsistently, individual CBAs consider additional benefits to the increased consumer surplus and resource cost savings. In the case of W3A Akuo Energy Solar/Micro-Hydro, Berau, these additional streams include increased income for honey and boat production and additional resource cost savings on ice for storage of caught fish. These benefits are linked to outcome 4 of the grant logic, which involves productive uses of the increased electricity supply. Although these benefits are between ten and fifty times the magnitude of the standard resource cost saving benefit from substitution of the source of electricity, they still pale in comparison to the increased consumer surplus benefit. After adding these to the WtP benefit, the overall 20-year ERR only increases from 24.5 percent to 25.0 percent.

In the case of W3A-80, additional benefit streams include cost savings of public facilities and increased income from quality improvements in various local micro-industries resulting from training funded by the grant. It is not clear that the first of these fits into the grant's logical framework, which is mostly concerned with household-level outcomes and impacts, although it stands to reason that public facilities would make the same substitution a household would make in the face of the increased, renewable supply. The second is linked with outcome 4, as was the case for W3A Akuo Energy Solar/Micro-Hydro, Berau. Similar to W3A Akuo Energy Solar/Micro-Hydro, Berau, these additional benefit streams are marginal compared to the more significant WtP benefit.

Table 6: ERR for each of the Window 3A Grants

Grant	20-year ERR (standard benefits)	20-year ERR (total)
W3A Akuo Energy Solar, Berau	24.50 percent	25.03 percent
W3A Charta Putra Biomass, Siberut Island	26.57 percent	26.57 percent
W3A Anekatek Solar, East Sumba	19.45 percent	19.45 percent
W3A Puriver Solar, Tomia Island	8.77 percent	Not available
W3A Sky Energy Solar, Karampuang Island	34.10 percent	34.90 percent

[36] This section only describes the ERRs to which SI had access as of July 31, 2017

2.4 Literature Review

2.4.1 Summary of Existing Evidence

Micro-grids play a crucial role in efforts to provide universal access to electricity by 2030 around the world, as proclaimed by the United Nations (UN) initiative Sustainable Energy for All (SE4All) and the Sustainable Development Goal 7. The International Energy Agency (IEA) estimates that 42 percent of the additional electricity generation capacity to reach universal access can most economically be achieved through micro-grids (IEA 2010[37]).

The academic literature is inconclusive about the impacts of rural electrification on rural development, and there are only few rigorous studies to provide compelling evidence. For example, in India, Bangladesh, and Vietnam respectively, Van de Walle et al. (2015)[38], Khandker, Barnes, and Samad (2012)[39], and Khandker, Barnes, and Samad (2013)[40] find evidence for positive effects on job market indicators, household income, and educational performance as a result of electrification. Parikh et al. (2015)[41] find positive effects in particular for women from infrastructure provision, including electricity, in Indian slums on literacy, income and health. Grimm, Sparrow and Tasciotti (2015)[42] and Peters and Vance (2011)[43] show that electrification contributes substantially to the fertility decline in Indonesia and Côte d'Ivoire respectively. In addition, some positive evidence on firm productivity comes from India, Kenya, Nicaragua, and South Africa (Rud, 2012[44]; Gibson and Olivia, 2010[45]; Kirubi et al., 2009[46]; Grogan and Sadanand, 2013[47]).

There is, however, a set of more sobering findings. While research indicates that lighting is a high priority for people and is in fact used also for purposes considered to be beneficial from a development perspective, impacts on productive activities, however, are often much less pronounced than expected (Bernard, 201[48]; Peters, Vance and Harsdorff, 2011[49]; Neelsen and Peters, 2011[50]; Grimm, Hartwig and Lay, 2013[51]; Banerjee

[37] Birol, F. (2010). World energy outlook 2010. International Energy Agency, 1(3).
[38] van de Walle, D., Ravallion, M., Mendiratta, V., & and Koolwal, G. (2015). Long-term impacts of household electrification in rural India. World Bank Economic Review, forthcoming.
[39] Khandker, S. R., Barnes, D.F. & Samad, H.A. (2012). The Welfare Impacts of Rural Electrification in Bangladesh. The Energy Journal, 33(1), 187.
[40] Khandker, S. R., Barnes, D.F. & Samad, H.A. (2012). The Welfare Impacts of Rural Electrification in Bangladesh. The Energy Journal, 33(1), 187.
[41] Parikh, P., Fu, K., Parikh, H., McRobie, A., & George, G. (2015). Infrastructure Provision, Gender, and Poverty in Indian Slums. World Development, 66, 468-486.
[42] Grimm, M., Sparrow, R., & Tasciotti, L. (2015). Does electrification spur the fertility transition? Evidence from Indonesia. Demography, forthcoming.
[43] Peters, J., & Vance, C. (2011). Rural Electrification and Fertility – Evidence from Côte d'Ivoire. Journal of Development Studies, 47 (5), 753-766.
[44] Rud, J.P. (2012). Electricity provision and industrial development: Evidence from India. Journal of Development Economics, 97(2), 352–67.
[45] Gibson, J., & Olivia, S. (2010). The effect of infrastructure access and quality on non-farm enterprises in rural Indonesia. World Development, 38(5), 717-726
[46] Kirubi, C., Jacobson, A., Kammen, D. M., & Mills, A. (2009). Community-based electric micro-grids can contribute to rural development: evidence from Kenya. World Development, 37(7), 1208-1221.
[47] Grogan, L. & Sadanand, A. (2013). Rural Electrification and Employment in Poor Countries: Evidence from Nicaragua. World Development, 43(0), 252–265.
[48] Bernard, T. (2012). Impact Analysis of Rural Electrification Projects in Sub-Saharan Africa. World Bank Research Observer, 27(1), 33–51.
[49] Peters, Jörg, Colin Vance, and Marek Harsdorff. 2011. "Grid Extension in Rural Benin: Micro-Manufacturers and the Electrification Trap." World Development, 39(5): 773–83.
[50] Neelsen, Sven and Jörg Peters. 2011. "Electricity usage in micro-enterprises — Evidence from Lake Victoria, Uganda." Energy for Sustainable Development, 15(1): 21–31.
[51] Grimm, M., Hartwig, R. & Lay, J. (2013). Electricity Access and the Performance of Micro and Small Enterprises: Evidence from West Africa. European Journal of Development Research, 25, 815-829.

et al., 2011[52]; Lenz et al., 2017[53]; Peters et al., 2013[54]; Peters and Sievert 2015[55]; Oakley et al., 2007[56]; Obeng and Every, 2010[57]). A recent large-scale evaluation of a rural electrification program in Tanzania[58], for example, finds reductions in some traditional energy source uses and positive effects on land prices and lighting usage as proxies for well-being. However, there are no impacts on non-agricultural employment or firm creation. The reason is often that in most rural areas electricity is not the only bottleneck that impedes business development. In the absence of roads and market access, electricity can only be used for productive purposes that serve the local demand, which is often small. Moreover, households and enterprises in rural areas typically have a very low ability to pay. As a result, typical household electricity demand is very low (see for example D'Agostino et al. 2016[59]; Grimm and Peters 2016[60]; Bensch et al. 2016[61]). Electricity in rural areas is often only used for lighting, charging mobile phones and operating radios and sometimes TV (television)-sets (see for example IEG 2008[62], Lenz et al., 2017[63]).

The impacts of electrification on GHG emissions and the environment depends on the source of electricity that is supplied and the initial energy sources that are being replaced. Currently, RE sources make up between 15 percent and 20 percent of the world's total energy demand. In the case of solar PV and micro-hydro plant installation, the energy provided is from non-depletable fuels solely and consumption does not emit GHG (Akella et al., 2009)[64]. The more these new systems replace initial reliance on oil, coal, and natural gas, the better the environmental impacts of the intervention. One example is dry-cell batteries and light emitting diode (LED) lamps, which have replaced kerosene in many parts of the developing world (see Bensch, Peters and Sievert 2017[65]). Electrification can hence help to reduce e-waste in rural areas. Furthermore, high emission reductions can in particular be expected when rural households replace diesel-driven machinery use or biomass-based cooking and heating by electric appliances. Biomass use for cooking and heating is a major cause of climate-relevant emissions (for example Shindell et al., 2012[66]; Ramanathan & Carmichael 2008[67];

[52] Banerjee, S. G., A. Singh, and Samad, H. (2011). Power and people : the benefits of renewable energy in Nepal. Washington D.C., World Bank.
[53] Lenz, L., A. Munyehirwe, J. Peters und M. Sievert. 2017. Does Large Scale Infrastructure Investment Alleviate Poverty? Impacts of Rwanda's Electricity Access Roll-Out Program. World Development 89 (17): 88-110.
[54] Peters, J., M. Sievert and C. Vance (2013), Firm Performance and Electricity Usage in Small Manufacturing and Service Firms in Ghana. In: Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH (ed.), Productive Use of Energy – PRODUSE - Measuring Impacts of Electrification on Small and Micro-Enterprises in Sub-Saharan Africa. Eschborn: Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH. 75-94
[55] Peters, J., & Sievert, M. (2015). The provision of electricity to rural communities through Micro-Hydro Power in rural Indonesia: Micro Hydro Power pilot programme within the national programme for community development (PNPM) supported by the Netherlands through energising development (No. 88). RWI Materialien
[56] Oakley, D., P. Harris, et al. (2007). Modern energy - Impact on micro-enterprise. A report produced by the Department for International Development. R8145. DFID. AEA Energy and Environment. March 2007.
[57] Obeng, G. Y. and H. D. Evers (2010). Impacts of public solar PV electrification on rural microenterprises: The case of Ghana. Energy for Sustainable Development 14(3): 223-231.
[58] Chaplin, D., Mamun, A., Protik, A., Schurrer, J., Vohra, D., Bos, K., ... & Cook, T. Grid Electricity Expansion in Tanzania by MCC: Findings from a Rigorous Impact Evaluation, Final Report (No. 144768f69008442e96369195ed29da85). Mathematica Policy Research.
[59] D'Agostino, A.L., Lund, P.D. and Urpelainen, J., 2016. The business of distributed solar power: a comparative case study of centralized charging stations and solar microgrids. Wiley Interdisciplinary Reviews: Energy and Environment.
[60] Grimm, M., & Peters, J. (2016). Solar off-grid markets in Africa. Recent dynamics and the role of branded products. Field Actions Science Reports. The journal of field actions, (Special Issue 15), 160-163.
[61] Bensch, G., Grimm, M., Huppertz, M., Langbein, J., & Peters, J. (2016). Are promotion programs needed to establish off-grid solar energy markets? Evidence from rural Burkina Faso (No. 653). Ruhr Economic Papers.
[62] Independent Evaluation Group (IEG). 2008. The Welfare Impacts of Rural Electrification – An IEG Impact Evaluation. Independent Evaluation Group, World Bank.
[63] Lenz, L., A. Munyehirwe, J. Peters und M. Sievert. 2017. Does Large Scale Infrastructure Investment Alleviate Poverty? Impacts of Rwanda's Electricity Access Roll-Out Program. World Development 89 (17): 88-110.
[64] Akella, A.K. 2009. Social, economical and environmental impacts of renewable energy systems. Renewable Energy 34: 390–396
[65] Bensch, G., J. Peters und M. Sievert (2017), The lighting transition in rural Africa — From kerosene to battery-powered LED and the emerging disposal problem. Energy for Sustainable Development 39 : 13-20.
[66] Shindell, D., Kuylenstierna, J. C., Vignati, E., van Dingenen, R., Amann, M., Klimont, Z., ... & Schwartz, J. (2012). Simultaneously mitigating near-term climate change and improving human health and food security. Science, 335(6065), 183-189.
[67] Ramanathan, V., & Carmichael, G. (2008). Global and regional climate changes due to black carbon. Nature geoscience, 1(4), 221.

Bailis et al. 201[68]). While typically electricity is rarely used for cooking in developing countries, in Asia the use of electric rice cookers is very common.

There are very few rigorous studies on the sustainability of micro-grid programs, partly because only few examples of sustainably working micro-grid programs exist that have matured beyond the installation of just a model micro-grid. There are a few potential reasons for low sustainability. First, institutional and political challenges often impede cost-covering electricity consumption tariffs that would make investments into micro-grids attractive. In most countries, rural electricity tariffs - even for the national grid - are not cost recovering (see Trimble et al. 2016[69]), but highly subsidized by governments or in the best-case cross-subsidized by urban consumers. Accordingly, typically regulatory bodies or the incumbent utility will not readily approve higher tariffs that are needed to make micro-grids cost covering (Peters and Sievert, 2015[70]). In addition, payment enforcement may be hampered by low ability to pay (D'Agostino et al. 2016[71]) and irregular, seasonal income flows that are typical among agriculture-reliant populations. Furthermore, there may be a low willingness-to-pay, as the costs of renewable energies (solar, hydro, wind) are not directly visible for the population given its local generation (as compared to, for example, the case of generators).

Mini-grids can be operated by public-private partnerships or by communities. For micro-grids operated by the community, the two key challenges are tariff setting and payment enforcement (Peters and Sievert 2015[72]). Incentives and obstacles to enforce payment rigorously are different for a community member than for outsiders working for a commercial operator. Most importantly, social entanglements may complicate rigorous enforcement. In theory, the same mechanism can also work the other way around, where social cohesion might lead people to feel more obliged to pay their contributions. Lastly, payment for operational staff may seem dispensable in rural subsistence communities where paid labor is rather an exception than the rule. This, again, may lead to too low tariffs and bad payment discipline.

2.4.2 Gaps in Literature

This evaluation can provide evidence on three gaps in the literature. In particular, two design features of the Window 3A projects are highly interesting from a global learning point of view.

First, as outlined above, despite high costs attached to electrification, there is generally no consensus on the impacts of electrification on rural development, and less so for the case of micro-grids. Given that micro-grids play an important role in the SE4ALL goal of universal electricity access, evidence is highly required.

Second, a comparison of different micro-grid management or financing systems does not exist in the literature. The only examination has been done in Indonesia for non-private micro-grids run by the community and fully subsidized by the government (see Peters and Sievert 2015[73]). Evidence on the impacts of the management

[68] Bailis R., Drigo R., Ghilardi A. and O. Masera (2015). The carbon footprint of traditional woodfuels. National Climate Change 5:266–72
[69] Trimble, Christopher Philip; Kojima, Masami; Perez Arroyo, Ines; Mohammadzadeh, Farah. 2016. "Financial viability of electricity sectors in Sub-Saharan Africa : quasi-fiscal deficits and hidden costs". World Bank Policy Research Working Paper.
[70] Peters, J., & Sievert, M. (2015). The provision of electricity to rural communities through Micro-Hydro Power in rural Indonesia: Micro Hydro Power pilot programme within the national programme for community development (PNPM) supported by the Netherlands through energising development (No. 88). RWI Materialien
[71] D'Agostino, A.L., Lund, P.D. and Urpelainen, J., 2016. The business of distributed solar power: a comparative case study of centralized charging stations and solar microgrids. Wiley Interdisciplinary Reviews: Energy and Environment.
[72] Peters, J., & Sievert, M. (2015). The provision of electricity to rural communities through Micro-Hydro Power in rural Indonesia: Micro Hydro Power pilot programme within the national programme for community development (PNPM) supported by the Netherlands through energising development (No. 88). RWI Materialien
[73] Peters, J., & Sievert, M. (2015). The provision of electricity to rural communities through Micro-Hydro Power in rural Indonesia: Micro Hydro Power pilot programme within the national programme for community development (PNPM) supported by the Netherlands through energising development (No. 88). RWI Materialien

system on the sustainability of micro-hydro plants is not available and, more concretely, there is no understanding of the dynamics that may hamper or foster payment enforcement among local customers and O&M practices among the local community operators.

Third, there is no study that assesses the impact of providing electricity access paired with productive use promotion. The exception is one study on microfinance and electricity (Khandker and Koolwal (2010[74]). Given high impact expectations from electrification and productive use aspirations, but often limited income effects in practice, learning on combined interventions is highly relevant. The trainings on productive use, as provided by the Window 3A projects, in conjunction with electricity provision therefore serve as a unique opportunity to fill this gap.

2.4.3 Policy Relevance of the Evaluation

The electrification rate in Indonesia has been increasing at a steady pace, expanding from approximately 43 percent in 1995 to 84 percent in 2015[75]. There are, however, great disparities in electricity access across regions, ranging between 36.4 percent in Papua and 100 percent in Jakarta. Generally, electrification is disproportionately provided in the centers of Java and Bali, while the eastern provinces are characterized by the lowest electrification rates. In 2012, the provinces East Kalimantan (W3A Akuo Energy Solar/Micro-Hydro, Berau) and East Nusa Tenggara (W3A Anekatek Solar, East Sumba) had electrification rates of 64 and 44 percent respectively, lagging behind the average electrification rate of 75 percent of that year.

The country has an installed electricity generating capacity of 51.92 GW (gigawatts), of which the vast majority is generated from fossil fuels (83.2 percent), with coal being the predominant type of fossil fuel. 11 percent of the capacity is generated by hydroelectric plants. The remaining 5.8 percent comes from other renewable sources.[76] The country produces high levels of GHG emissions. The use of fossil fuels, in particular in the power sector and transportation, is expected to more than double the country's energy-related CO_2 emissions in the coming 25 years, rising to more than 800 million tons by 2035.[77]

The GoI political agenda pursues as major objectives the increase in electricity access, an expansion of RE use and green growth. The country was one of the first to ratify the United Nations Framework Convention on Climate Change and to adopt the Kyoto Protocol[78]. The *National Energy policy* (KEN) aims at increasing the country's usage of new and RE from 4 percent of all energy usage in 2011 to 23 percent by 2025 and 31 percent by 2050[79]. Simultaneously, the *2015-2019 National Medium Development Plan* sets the goal of reaching an electrification rate of 96.6 percent by the end of 2019 with a particular focus on disadvantaged communities and remote, undeveloped regions.[80] In an attempt of bringing together these multiple goals, the GOI and the state electricity company Perusahaan Listrik Negara (PLN) have launched several rural

[74] Khandker, S.R., Koolwal, G.B. (2010) How Infrastructure and Financial Institutions Affect Rural Income and Poverty: Evidence from Bangladesh. Journal of Development Studies, Vol. 46 (6), p.1109–1137
[75] https://www.cia.gov/library/publications/the-world-factbook/geos/id.html
[76] https://www.adb.org/sites/default/files/publication/178039/ino-paper-09-2015.pdf pg.8
[77] https://www.adb.org/sites/default/files/publication/178039/ino-paper-09-2015.pdf pg.9
[78] http://prokum.esdm.go.id/pp/2014/PP%20Nomor%2079%202014.pdf pg. 8
[79] https://www.adb.org/sites/default/files/publication/178039/ino-paper-09-2015.pdf pg.31
[80] Current policies in the RE sector include the Ministerial Decree No.38/2016, which aims at expediting electricity access in remote Indonesia. However, the Ministerial Decree No. 12/2017 by the Ministry of Energy and Mineral Resources regulates tariffs of electricity generated from RE, and Decree No. 4 and 5/2017 by the Ministry of Industry set quality requirements for the content of solar PV modules. Both may hamper investments into RE (see https://d2oc0ihd6a5bt.cloudfront.net/wp-content/uploads/sites/837/2017/06/ACEF-2017-Session-18-Info-sheet-02-06-2017.pdf)

electrification plans. Among them stands out the longer-term solar development plan *Thousand Islands Program,* which aims at expanding the solar installed capacity to 620 MW (megawatts) by 2020[81].

However, the government faces several challenges in reaching the remaining 16 percent of its population that lacks electricity access. This population group is the most costly and timely and technically more difficult to serve, given the lower population density and ability to pay. Moreover, the mountainous topography of the archipelagic nation represents a challenge for the expansion of electricity access. Electricity supply in the provinces East Kalimantan (W3A Akuo Energy Solar/Micro-Hydro, Berau) and East Nusa Tenggara (W3A Anekatek Solar, East Sumba) is particularly costly[82].

Concerning off-grid electrification programs, the ADB[83] summarizes the experience made by PLN and several governmental agencies to be “mixed at best”. Private sector efforts are small in number and are described as ad hoc. In addition, they seem to be hindered by project-specific regulatory requirements. Off-grid efforts by line ministries and regional governments (Pemerintah Daerah) often only fund initial installation of plants, but do not ensure financial and technical sustainability, resulting in high failure rates. PLN would be better placed to assure sustainability, but has little experience with renewable technologies, is in a bad financial situation and has a high workload in conventional grid extension.

As a result, many initial attempts of the *Thousand Islands Programs* have been delayed due to financing or technical difficulties. The following problems have been encountered in the implementation of off-grid electrification projects:

- Failure to assess full present and future electricity needs of the target population
- Poor design, materials and workmanship, compromising technical performance and sustainability
- Lack of financing mechanisms to trigger payment discipline among customers to finance O&M
- Lacking human resources to operate and maintain the plants
- Pricing that is inconsistent with ability to pay of the target population
- Limited scale-up opportunities due centralized focus on PLN and too little mobilization of local governments, NGOs, the private sector, and community.

The Window 3A project approaches coincide largely with current and future (governmental) efforts of providing electricity to the remaining unconnected 16 percent of the Indonesian population, which are characterized by residence remoteness, low ability to pay, and limited productive activities. Thereby, the projects and the evidence that Window 3A project create on sustainability and worthwhileness are relevant and timely. In addition, the project design incorporates several features to tackle past challenges in sustainable off-grid electricity provision outlined above. First, the community-based operation approaches (EQ 4: Special Purpose Vehicles and the primary-secondary cooperative scheme) may serve as examples of how to trigger payment discipline, thereby financing O&M and assuring sustainability of the plants. Second, the implementation of income generating trainings (EQ 2) might represent a positive example of complementary activities to unlock growth potentials of electrification interventions. Based on these experiences, learnings from this evaluation may inform the design of a (still lacking) coordinated, sound policy instrument to foster sustainable off-grid provision in rural areas. Third, this evaluation will provide evidence on electricity consumption patterns in the

[81] https://www.adb.org/sites/default/files/publication/182314/achieving-electricity-access-ino.pdf pg.35
[82] https://www.adb.org/sites/default/files/publication/182314/achieving-electricity-access-ino.pdf pg.46
[83] https://www.adb.org/sites/default/files/publication/182314/achieving-electricity-access-ino.pdf pg.46

typical unconnected areas (EQ 1), which can improve assessment of present and future electricity needs of the unconnected 16 percent of the population. Lastly, an assessment of off-grid electrification impacts on households, GHG emissions (EQ 3) and the local economy can confirm or adjust theoretical impact expectations, and provide evidence on potential bottlenecks to unlock them in practice.

3 EVALUATION DESIGN

3.1 Evaluation Questions

Taken as a whole, this evaluation aims, to the extent possible, to validate the program logic underlying the portfolio of CBOG RE grants in the GP Grant Facility, doing so through a focused investigation of two specific grants: W3A Akuo Energy Solar/Micro-Hydro, Berau and W3A Anekatek Solar, East Sumba. It will simultaneously aim to measure impacts and compare and contrast how the grants operate, both in terms of how similar programs operate in different contexts within Indonesia and in terms of how programs with different approaches to electrification and community engagement operate.

At baseline, the evaluation will seek to characterize baseline conditions of outcomes of interest and important contextual factors for program success through quantitative and qualitative means that will ultimately allow for a rigorous validation of program logic and comparative study of approaches. Our baseline will contribute to this effort by validating the logic that is underlying two typical Window 3A grants' approaches to increasing household income and reducing GHG emissions via the increased utilization of electricity generated from renewable sources. The evaluation will be guided by four primary questions:

1.) How have energy consumption patterns changed among beneficiary households and businesses in response to the provision of a renewable source of electricity?
    a. What are the implications of these changes for household expenditures?
2.) Has the electricity provided through the RE infrastructure been used for economic purposes at the community or household level?
    a. Has the productive uses/profit-generating component of the grant been effective; and has it helped the SPV be sustained?
3.) To what extent do any changes in energy consumption patterns favor reduced GHG emissions?
    a. Are there any other ways in which the grants contribute to the objective of reducing or avoiding GHG emissions?
4.) Has the Special Purpose Vehicle been an effective intervention to improve community buy-in and sustainability of the infrastructure?

This evaluation will include multiple grants from the CBOG RE portfolio and, we will analyze and present results both within and across the grants included in the evaluation to identify patterns or differences. However, since the evaluation design and contextual factors will also vary across grants, we will note where attribution

of evaluation findings may be more heavily confounded (in a simple, treatment-only pre/post comparison vs. a quasi-experimental, counterfactual-based comparison, for example).

It is possible that additional lines of inquiry to these evaluation questions may be pursued in future data collection periods using *ex post* evaluation approaches of additional CBOG RE grants in the GP Facility. Because the salient lines of inquiry for other grants may not become apparent until the grants are under way, we will only suggest possibilities, as appropriate, in our Evaluation Design Overview. They will not be formally included in the Evaluation Purpose or Questions at this time.

3.2 Evaluation Design Overview

As outlined in section 2.1.1, it is not possible due to financial, logistical, and technical constraints to include all 26 CBOG RE grants in the scope of a pre/post evaluation meant to characterize the portfolio's achievements and lessons learned. In order to be clear about which grants the approach outlined in this EDR applies to, this evaluation design overview will be split into two sections: Portfolio Evaluation Design (3.2.1) and Optional Portfolio Evaluation Add-Ons (3.2.2). All remaining sections of the EDR (including annexes) apply to the former section, while the latter section is simply meant to serve as a point of departure for a discussion on how the scope of the evaluation could be broadened—both in terms of lines of inquiry and in terms of grants evaluated—if MCC desires to expand the representativeness of evaluation findings to the portfolio, as a whole.

Following these sections, we lay out the quantitative approach for an impact evaluation of W3A Anekatek Solar, East Sumba as well as for the mini survey for W3A Akuo Energy Solar/Micro-Hydro, Berau. We then discuss the approach to the qualitative components of the study.

3.2.1 Portfolio Evaluation Design

This portfolio evaluation will begin with two major components seeking to validate key quantitative and qualitative tenets of the Window 3A program logic. The first component is an impact evaluation of grant W3A Anekatek Solar, East Sumba, which will include a pre/post, large-scale quantitative exercise designed to respond to evaluation questions 1-3 and a qualitative exercise to provide depth on evaluation questions 1-3 and respond fully to evaluation question 4. The quantitative exercise will be a rigorous, quasi-experimental evaluation that collects primary data on outcomes of interest and important contextual factors in treatment as well as comparison areas of East Sumba. The impact evaluation will use a matching methodology and difference-in-differences analysis to construct a valid counterfactual. The qualitative exercise will cover both treatment and control areas, focusing mainly on actors involved in or affected by the SPV approach to community engagement and ownership. It will utilize key informant interviews and focus group discussions, analyzed through rigorous coding and triangulated by the quantitative data.

The second component is a pre/post performance evaluation of W3A Akuo Energy Solar/Micro-Hydro, Berau including a duplicate of the household survey utilized in East Sumba to provide non-experimental, quantitative information in response to evaluation questions 1-3 and qualitative data collection to provide depth on these and respond fully to evaluation question 4. The scope of this performance evaluation will focus on treatment areas alone. As with the qualitative component of the W3A Anekatek Solar, East Sumba component, the PE (performance evaluation) will utilize key informant interviews and focus group discussions, analyzed through rigorous coding and triangulated by the quantitative data.

We propose to conduct two follow up data collection periods for each of these components—one occurring one year after baseline data collection and another occurring three years after baseline data collection. The justification for the first follow up is that it will allow for measurement of outcomes expected to manifest in the short- and medium-term (such as increased energy consumption and decreased expenditure) without risking contamination of the control group by electrification efforts conducted by other actors in East Sumba. Meanwhile, the second follow up will capture longer-term outcomes and allow more time for challenges to arise to project sustainability that may not be captured after only one year. It will be important to track progress of other electrification efforts in the target areas prior to follow-up data collection. In the case of large scale electrification of comparison areas, the design may need to be reconsidered.

A third component will be added to the evaluation during the two follow-up data collection activities: an ex-post evaluation of the W1 Hivos Solar/Biogas, Sumba/Sulawesi grant. The evaluation of this grant, like the one in Berau, will include quantitative (household survey) and qualitative (KII and FGD) elements that are not qualified by a comparison group of non-treated households. Although it was not financially or logistically feasible to include this evaluation in the scope of baseline data collection, it has a unique implementation model in a shared geographic area with W3A Anekatek that will allow for interesting comparisons in terms of typical outcomes of RE programming and sustainability. Specifically, data from the first follow up will allow for a comparison of outcomes between programming using off-grid RE technology and programming using micro-grid RE technology in East Sumba. Data from both follow-ups will enrich the analysis of sustainability of CBOG RE grants by allowing for the comparison of a RESCO model to an SPV model in the same geographic area.

Table 7 demonstrates how the evaluation's two initial major components will collectively serve as the foundation for responding to these four evaluation questions. The third component is not included in the table because its instruments will not be developed until the first follow up data collection period.

Table 7: Evaluation Design Overview

EQ	Key Outcomes	Data source, location	Data type
1	Household and enterprise energy consumption (by source), energy expenditures	Household survey, Quant. Community KII/FGD, Qual. Enterprise Survey, Quant. Enterprise KII, Qual.	Quantitative, Qualitative
2	Productive uses of electricity, occupational and transformed agricultural income, employment	Household survey, Quant. SPV KII protocols, Qual. Community KII/FGD, Qual. Enterprise Survey, Quant. Enterprise KII, Qual.	Quantitative, Qualitative
3	Greenhouse gas emissions	Household survey, Quant. Gov. official KII, Qual. Grantee KII, Qual.	Quantitative, Qualitative
4	Capabilities of SPV members, sustainable operation of facilities	All qualitative instruments	Qualitative

In choosing which grants to include at minimum using a pre/post methodology in this portfolio evaluation, we placed the highest emphasis on which grant would lend itself the most to an impact evaluation design, since such a design is essential to providing valid quantitative responses to evaluation questions 1-3. On this question W3A Anekatek Solar, East Sumba was the only suitable candidate. All of the Window 3A grants, as described in the previous section, targeted whole villages in a way that made a household-level experiment impractical. As such, any grant that could be evaluated quantitatively needed to provide adequate treatment clusters with similar control clusters nearby. Since W3A Anekatek Solar, East Sumba is operating in eleven sub-village units with comparable analogs in geographic proximity, we selected it as the subject of our impact evaluation. The other Window 3A grants were either providing treatment to all villages on an island, for fewer communities, and/or for relatively unique communities with few options for similar comparisons nearby.

The utilization of an SPV approach for community engagement and sustainability of program outputs is a fundamental aspect of the design of the Window 3A grants. Any evaluation of the GP Facility's approach to community-scale RE programming must evaluate the extent to which the SPV approach contributes to the achievement (or lack thereof) of program outcomes. This approach differs in specific details and contextual factors from grant to grant, so we selected the remaining grant with the most compelling potential narratives in terms of community engagement for a performance evaluation to combine with the impact evaluation of W3A Anekatek Solar, East Sumba.

On this count, all of the other grants have merits. However, W3A Akuo Energy Solar/Micro-Hydro, Berau has a variety of factors that will make for interesting qualitative comparison. First, it has a diverse set of villages for implementation that have varying degrees of history with community cooperatives and distinct socio-economic backgrounds. Second, the grant includes a micro-hydro component—albeit quite small in the context if the capacity provided by the Solar PV facilities—that may provide for interesting comparisons with community management of Solar PV components alone. Finally, it is in a different geographic area from W3A Anekatek Solar, East Sumba, allowing for a comparative study of how similar program logic applies in different geographic contexts. By investigating process, outcomes, and sustainability across these two grants, we can qualitatively explore a variety of factors that mediate results and sustainability.

As stated above, W1 Hivos Solar/Biogas, Sumba/Sulawesi was selected as an ex-post add-on to the evaluation to broaden the types of CBOG RE programming informing the evaluation's answers to its core questions. Specifically, it will allow for the inclusion of off-grid RE technology and a RESCO business plan in a comparison of program outcomes and sustainability in common geographic settings.

3.2.2 Optional Portfolio Evaluation Add-Ons

It would be ideal to include more grants representing a broader portion of the CBOG RE portfolio in our scope of inquiry, but this is not financially or logistically feasible at baseline. Overall, we expect the trio of grants we have selected to produce learning relevant to the CBOG RE portfolio at a broader scale. Funds permitting, it may be possible to broaden the scope during future data collection periods to cover even more nuances of what grants within this portfolio were able to achieve and how.

From a technical perspective, it is reasonable to believe that the other 23 grants would provide valuable learning and increased accountability for MCC utilizing an *ex post* evaluation design. As none were suitable for an impact evaluation, it is not necessary to deploy a pre/post evaluation approach to maximize learning

and accountability from each grant since such an approach would not have been technically feasible to yield valid, quantitative impact estimates on outcome variables of interest.

Ex post investigations of grant implementation and changes in outcomes of interest compared to grantee baseline data would provide increased accountability compared to grantee data, alone; and comparative case studies between grants could yield relevant learning for similar programming in the future. These comparisons could contrast grants with similar approaches in different geographic areas (as we aim to do with our selected grants at baseline) or they could contrast grants with different approaches in the same area (as we aim to do with the inclusion of the W1 Hivos grant during the follow-up periods). Table 8 outlines some non-exhaustive examples of lines of inquiry which could be pursued based on SI's initial review of documentation. These lines of inquiry could be added to either follow-up data collection period, although the second follow up would likely be more appropriate for themes related to sustainability.

Table 8: Possible Add-On Lines of Inquiry

Additional line of inquiry	Grants that could be compared
How do outcomes of interest and sustainability of Window 3A-style programming compare between large islands and small islands?	W3A Anekatek Solar, East Sumba vs. W3A Sky Energy Solar, Karampuang Island
How do increases in access to RE affect the profitability and sustainability of ecotourism ventures?	W3A Akuo Energy Solar/Micro-Hydro, Berau vs. W3A Puriver Solar, Tomia Island
How does the scale/capacity of RE installations deployed (e.g. household-level solar lamps or biogas digesters vs. school- or community-level micro-grids) affect household- and community-level outcomes of interest and sustainability?	W1 HiVOS Solar/Biomass, Sumba/Sulawesi vs. W2 Green Sumba Solar, Central Sumba
Does pairing increased access to RE with improved NRM increase community engagement or improve the sustainability of programming?	Any Window 3 grant to any Window 2 grant
How does the type of RE technology deployed affect outcomes of interest and/or sustainability via community engagement?	W1 HiVOS Solar/Biomass, Sumba/Sulawesi vs. W2 IBEKA Micro-Hydro, East Sumba vs. W2 Green Sumba Solar, Central Sumba
How has local government policy enhanced or impeded the sustainability or replicability of RE programming in different areas of Indonesia?	W1 HiVOS Solar/Biomass, Sumba/Sulawesi vs. W2 Yayasan Dian Tama Pontianak Solar, Kapuas Hulu vs. W3A Charta Putra Biomass, Siberut Island
Which new enterprises have successfully demonstrated productive uses of RE due to GP CBOG RE programming? What did these enterprises have in common?	Multiple, depending on which target and produce successful enterprises

3.3 Quantitative Approach

3.3.1 Methodology

To answer evaluation questions 1-3 which seek to identify the impact of the RE installations, we compare the outcomes of individuals who have received increased access to electricity through RE sources against the

counterfactual: the outcomes for these same individuals, if they had not received increased access to RE sources. Since it is not possible to directly observe the counterfactual, we need a mechanism to estimate it with as little bias as possible. The ideal method is to randomly assign participation among a sample of potential participants, creating a treatment and control group. Through random assignment, the treatment and control groups, on average, are expected to be similar along the characteristics affecting the outcome of interest. Hence, in the absence of the project, both groups would have the same expected outcome and any differences between the two groups after project implementation can be attributed to the project.84

For the grants we are evaluating, including Grant W3A Anekatek Solar, East Sumba, participation is not randomly assigned. Rather, sites were purposefully selected for installation of RE, as described above. One means of randomization would have been to randomly assign connections (or randomly offer discounted connection fees to generate random variation in connection status) to the micro-grids within selected villages. However, for political, logistical, and ethical reasons, nearly all households in selected communities will receive free connections to the micro-grid, with only very remote households not being offered a connection. Thus, SI will utilize a quasi-experimental approach which incorporates elements of statistical matching techniques and difference in differences (DiD) to estimate counterfactual outcomes and program impact for the W3A Anekatek Solar, East Sumba grant.

We propose to collect panel data from a sample of treatment and comparison households, with the evaluation sample identified using the following approach:

1.) **Identification of comparison kampungs:** Given that nearly all households in the 11 treatment kampungs will be electrified and the few that do not are systematically different, we must identify comparison households from other kampungs in the same desas or in nearby desas. To do this, we developed a sample frame of nearby kampungs that (1) had, like the treatment kampungs, been classified as suitable for a micro-grid according to a recent network planning activity conducted by the ADB (described below) and (2) based on discussions with key stakeholders, were not slated to receive electrification in the following year through other planned initiatives, including through Window 2 grants. From this sample frame, we used data on population size and geographic distance to identify a sample of 17 comparison kampungs. Comparison kampungs (relative to treatment kampungs) were oversampled in order to increase power (given the fixed and limited number of treatment kampungs), to generate a buffer in case a small number of comparison kampungs are electrified during the evaluation period, and to provide a larger pool of potential comparison units from which to draw matches.

2.) **Baseline data collection:** Within each treatment and comparison kampung we sampled, on average, 30 households, as described below in Section 3.3.3.

3.) **Match similar treatment and comparison households**: To generate the final sample of households for the evaluation, we will use statistical matching techniques to identify similar treatment and comparison groups. We will conduct two types of matching at the household level, Coarsened Exact Matching (CEM) and Propensity Score Matching (PSM), and select the matching technique which

[84] Assuming a well-run experiment without spillovers, differential attrition, Hawthorne effects, etc.

maximizes the comparability of the groups, statistical power of the comparison, and external validity. Given the potential for electrification in comparison areas, which would exclude the electrified community from the evaluation comparison sample frame, we recommend that final matching is conducted prior to follow-up data collection. However, we will present the results of a tentative matching exercise at baseline to illustrate how the groups can be made more comparable.

Follow up data collection with the final matched sample will be conducted once twelve months after the micro-grids are commissioned and then again thirty-six months after commissioning. As described below, we will then analyze the results using a DiD regression approach.

The initial selection of similar kampungs and matching of treatment and comparison households helps to reduce selection bias by minimizing differences along observed household and community characteristics measured at baseline. However, all matching methods rest on the Conditional Independence Assumption (CIA). That is, we assume that conditional on the vector of baseline characteristics used in matching, the expected outcomes of the treatment and comparison groups are independent of the assignment, and selection bias is removed. However, the potential exists that unobserved variables will differ across the treatment and comparison group, thus violating the CIA. The DiD approach to analysis will serve to reduce the threats posed by unobservable differences between the households that do not vary over time.

Also, there is a tradeoff in CEM between the level of coarsening and power that is similar to the common support condition or assumption other matching approaches. With very fine coarsening of variables (separating them into higher numbers of strata), we increase the number of strata and reduce the likelihood of matches. This leads to pruning higher numbers of observations which reduces sample size and power and limits our ability to generalize to the full evaluation sample (or to those pruned observations). However, if we use only very loose coarsening of variables (separating them into fewer strata), we increase the likelihood of matches, preserving a larger proportion of the evaluation sample, but we risk retaining a greater degree of imbalance between treatment and comparison units. We propose a systematic approach to variable selection and degree of coarsening, as described below in the baseline analysis section, which optimizes the tradeoff between imbalance and power.

3.3.2 Timeframe of Exposure

Since the methodology employed to evaluate W3A Anekatek Solar, East Sumba in East Sumba will rely most critically on an appropriate timeframe of exposure to treatment, SI will select the timeframe of exposure on the basis of this grant.

Based on discussions of historical implementation of similar programming in East Sumba, SI expects that beneficiaries will switch from baseline consumption sources (e.g. kerosene, diesel generators) soon after the commissioning of the new solar micro-grid facilities. In the past, it has taken longer for communities to innovate productive uses of new RE technology, but stakeholder interviews suggest this should occur starting within three to six months of exposure to the program. Besides the exposure to treatment required for positive outcomes to manifest, it is additionally necessary to consider how long it would take for O&M or administrative challenges to occur that would put the sustainability of grant outputs at risk. The final consideration is the potential for contamination or electrification of comparison villages, which increases over time.

With these aspects in mind, SI suggests waiting a full year to collect follow up data for the evaluation. This will allow sufficient time for productive uses and/or operational challenges for the micro-grids to develop and be considered in the measurement of program outcomes. Additionally, this will allow for follow up data collection events to occur during the same season, cancelling out any unobserved bias from seasonal effects on energy consumption and income.

Given that sustainability and O&M concerns become more pronounced over time, we highly recommend a smaller, second follow-up three years after installation to further investigate evaluation question 4 and observe longer-term outcomes of interest in the other evaluation questions.

3.3.3 Study Sample

3.3.3.1 Sample unit

The quantitative portion of the evaluation will take a clustered approach, where individual sample units include households that are clustered into either “settlement aggregations” in East Sumba or villages/desa in Berau. For the most part, the settlement aggregations in East Sumba are sub-village units sometimes referred to as kampungs or RT. Occasionally, a settlement aggregation will encompass a whole village.

3.3.3.2 Sample size

The sample in East Sumba will include approximately 840 households (330 treatment and 510 comparison) clustered into 11 treatment settlement aggregations and up to 17 comparison settlement aggregations. The sample in Berau will include approximately 150 households clustered into 3 treatment villages.

3.3.3.2.1 Power Calculation and Assumptions

Given the clustered nature of the intervention and sample, we will collect data from all 11 treatment settlement aggregations and up to 17 comparison settlement aggregations in East Sumba. To determine the number of households to sample in each settlement aggregation, we must estimate the intra-cluster correlation (ICC) for key outcomes and then look at the relationship between minimum detectable effect size (MDES) and cluster size at the estimated values of ICC. To estimate ICC, we use data from Castlerock’s baseline survey in the W3A Anekatek Solar, East Sumba target villages and calculate values ranging from 0.00 to 010 (see Table 8).

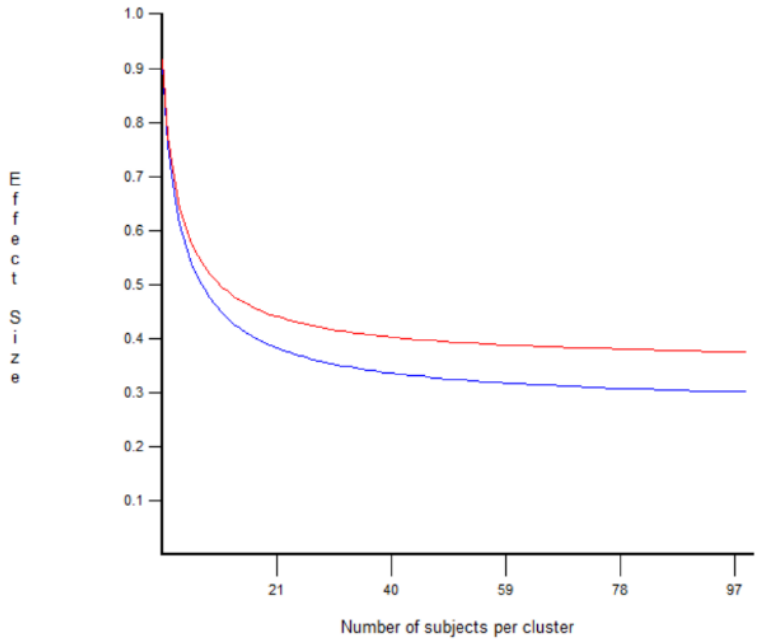


Figure 11: Relationship between cluster size and MDES

The graph in Figure 9 displays the relationship between cluster size and MDES using the highest estimated ICC values (0.06 and 0.10) as well as assuming 22 total cluster, power of 80 percent, Alpha (α)=0.05, and R-squared=0.2. Unsurprisingly, we find an inflection point around approximately 15 households with diminishing returns to power for additional households per cluster beyond that. Given this relationship and the fact that five of the eleven treatment kampungs have between 27 and 41 households, we recommend a sample size of approximately 25 households per cluster[85], which corresponds to an MDES of 0.37 and 0.43 for ICC values of 0.06 and 0.10, respectively. Based on the baseline data, this corresponds to an ability to confidently measure a change in monthly electricity expenditure of at least approximately 60,000 to 70,000 IDR (Indonesian Rupiah) or a change in electricity access of 1.52 to 1.77 hours per day.[86]

Table 9: Power Calculation Summary Statistics percent

Outcome	Mean	SD	ICC	MDES=0.35 (ICC=0.06)	MDES=0.41 (ICC=0.10)
Monthly electricity expenditure (IDR)	82,660.93	161,915.2	0.06	59,909	69.623
Monthly kerosene usage (liters)	1.73	32.93	0.00	12.18	14.16
Monthly kerosene usage for lighting only (liters)	0.43	2.06	0.02	0.76	0.88
Electricity access per day (hours)	3.23	4.12	0.10	1.52	1.77

To account for attrition and pruning during the CEM process, we propose to inflate this sample by 20 percent at baseline, yielding a total baseline sample size of approximately 840 households in Sumba.

[85] Only 2 treatment kampungs have fewer than 25 households.
[86] The grant's CBA indicates that expected benefits include a 19,583 IDR per month reduction in energy expenditures and an increase in energy consumption of 39.19 kwh/month. We would be adequately powered to detect such a change in consumption, although we may not be adequately powered to detect changes in expenditure unless they exceed those predicted in the CBA.

Since our evaluation design in Berau will not include a counterfactual approach (e.g. we will not be making comparisons between a treatment and control group), there is no need to do a power calculation. The sample size of 150 households has been selected because this number would be adequate to pull representative samples from each village.

3.3.3.3 Sample frame

Since treatment units have already been selected by the grantee in East Sumba, the sample frame for W3A Anekatek Solar, East Sumba will include all 909 total households among the 11 treatment kampungs. To construct this sample frame, we will request a list of these households from the implementer.

For the comparison group, the sample frame will include all settlement aggregations in East Sumba that satisfy the following conditions:

1.) The Network Planner Activity of ADB TA 8287 indicates that the settlement aggregation was best suited for electrification via micro-grid or off-grid technology;
2.) The settlement aggregation does not include households that are currently connected to the PLN grid; and
3.) The settlement aggregation is not targeted by PLN for electrification until after September of 2018.

After selecting settlement aggregations from this sample frame, the household sample frame will be constructed by requesting a list of all the households in each settlement aggregation.

The sample frame for household data collection in Berau will include all households that will be connected to the solar or micro-hydro micro grid. This includes 463 households among three villages. We will request a list of these households from the grantee.

In both kabupatens, the sample frame for enterprises will be constructed by asking local officials upon arrival about the location of enterprises in each kampung.

3.3.3.4 Sampling strategy

For the evaluation of W3A Anekatek Solar, East Sumba, we will use a **random sampling** strategy from the sample frame in treatment areas where settlement aggregations include over 25 households. Where settlement aggregations include fewer than 25 households, replacement households will be selected randomly from other treatment settlement aggregations.

Since the objective of selecting comparison settlement aggregations is to match the treatment aggregations as closely as possible (and not to represent the entire sample frame of potential comparisons), settlement aggregations will be selected using a **non-random method**. Specifically, we will calculate the distance between each of the settlement aggregations that meets the conditions from the list in the previous section and each of our eleven treatment settlement aggregations and select the seventeen which are closest to a treatment settlement aggregation, under the assumption that these would be the most similar on important characteristics in the absence of any other data.[87] For the selection of comparison households within

[87] The only data in our possession on these settlement aggregations prior to the baseline survey are GIS coordinates and population figures, so we will verify that the distribution of aggregations on each of these characteristics is similar to the treatment kampungs prior to sampling.

comparison aggregations, we will use the same **random sampling** technique as will be used for treatment households from lists of households obtained by local officials in selected settlement aggregations. The final list of settlement aggregations selected for sampling in East Sumba is presented in Table 10.

Table 10: Sampled settlement aggregations and households, Baseline

No.	Kampung, Kecamatan - Treatment	Kampung, Kecamatan - Control
1	Tawui Northeast, Pinu Pahar	Kalimbu Maramba, Mahu
2	Tawui Riyang, Pinu Pahar	Tara Amah, Mahu
3	Tawui West, Pinu Pahar	Mauhani, Paberiwai
4	Tawui North, Pinu Pahar	Pahulu Bandil, Matawai La Pawu
5	Rehi Jara, Karera	Lumbuwudi, Pinu Pahar
6	Praiwitu North, Ngadu Ngala	Pingi Ailun, Matawai La Pawu
7	Tanah Rong, Karera	Linggi Tana, Paberiwai
8	Praiwitu South, Ngadu Ngala	Prai Kalu, Paberiwai
9	Tandula Jangga, Karera	Laipabundu, Pinu Pahar
10	Lailunggi, Pinu Pahar	Undut Maringging, Pinu Pahar
11	Tawui South, Pinu Pahar	Rakamau, Pinu Pahar
12		Winumuru, Paberiwai
13		Matawailuri, Pinu Pahar
14		Pada Djara, Ngadu Ngala
15		Prai Maninggat, Paberiwai
16		Laironja, Matawai La Pawu
17		Dusun 2, Matawai La Pawu
	Total	**Total**

For W3A Akuo Energy Solar/Micro-Hydro, Berau, households will be sampled using a simple **stratified random sampling** technique. The strata will include the three treatment villages, from each of which fifty households will be randomly selected.

In both kabupatens, up to eight enterprises will be sampled for the enterprise survey per treatment unit. If fewer than eight enterprises exist, all of them will be surveyed. If more than eight exist, enterprises will be selected for the survey purposively to cover a broad cross-section of industries.

3.3.4 Primary Data Collection

3.3.4.1 Instruments

The quantitative approach described above will rely on both household surveys and semi-structured interviews with enterprises, community leaders, SPV members, and other key stakeholders. The household survey is described here while the principal semi-structured interviews for the quantitative component are introduced here and described in more detail below in the qualitative section. At this stage, the household surveys are the same for both grants (W3A Akuo Energy Solar/Micro-Hydro, Berau and W3A Anekatek Solar, East Sumba) though we may make contextual revisions as we gather additional grant information and conduct piloting.

The household survey covers all relevant dimensions of the household that might be affected by the new access to electricity or that might affect the adoption and usage of electricity. The socio-economic living conditions will be elicited ranging from background variables like age, household size, and educational status of adult members to variables that potentially change after electrification, for example employment status, educational investments of children and expenditures. A particular focus is on energy consumption and usage, i.e. different energy services, fuels, expenditures, and appliances. Moreover, the questionnaire probes into the activities related to energy usage, for example activities after nightfall, TV usage and appliances. Attention is dedicated to income generating activities. More specifically, the household questionnaire includes the following sections and can be found in Annex 3:

Instrument	Outcome Area	Specific Topics	Description/Use
Household Survey	Household Information	- Housing conditions and size - Household roster with education - Transportation assets	Covariates for energy spending and consumption as well as potential outcomes in household assets
	Migration	- Migration roster	Covariates for energy spending and potential outcomes in economic migration rates
	Energy Sources and Use	- Source of energy - Household energy use - Energy use and spending by source	Verification of increases in access to RE; key outcomes in energy usage and spending
	Agriculture and Livestock	- Agricultural income by product - Livestock assets and income	Outcomes related to increases in agricultural income
	Financial Situation and Expenditures	- Banking and savings status - Remittances - Household expenditures	Outcomes related to decreases in poverty measured through increased expenditures
	Activity Profile	- Time spent on productive, leisure, and household activities (and studying, for children)	Outcomes related to time use, including productive, leisure, studying, and household chores disaggregated by men, women, and children
	Health	- Experience of key health issues including ARI (acute respiratory infection)	Outcomes related to improved health status due to cleaner energy use

Instrument	Outcome Area	Specific Topics	Description/Use
	Security	- Mobility and safety at home in night	Outcomes related to increased safety due to access to lighting at night
	Green knowledge	- Attitudes related to environmental practices	Outcomes of community awareness activities
Enterprise	Electricity access	- Type of electricity available	Verify increased access to RE
	Services	- Key services offered - Customer base	Covariate and important outcomes related to increased services offered and expansion of customer base
	Energy Use	- Appliance use by energy source - Lighting by energy source	Outcome related to productive use of RE
	Employment	- Employment by type	Outcomes related to business expansion
	Production and Expansion	- Production, expansion, and bottlenecks	Qualitative discussion to explore role of energy access in business constraints, investments and expansion
Community Leader	Demographics	- Population size and number of households	Covariates of household outcomes
	Infrastructure and services	- Transportation - TV, radio, mobile networks - Social infrastructure	Covariates of household outcomes
	Energy sources	- Energy sources and prices in the community	Covariates of household outcomes and verification of treatment
	Income generating activities	- Enterprises operating in the community - Market access	Outcome related to increase productive use of energy

Semi-structured protocols will be held with the chief of the respective sub-villages or a sub-village member with good knowledge on the population and village dynamics. The protocol comprises modules on basic sub-village information, availability and quality of infrastructure and services, energy access and use patterns, and detailed sections on income generation in the sub-village. Lastly, it includes information on community engagement, development programs and subjective community well-being. Given the semi-structure, the protocol allows for flexibly gathering village-specific information in-depth and for learning about unexpected circumstances or developments.

Similarly, semi-structured interviews will be held with all microenterprises of the sub-village. In case of large enterprise numbers, a non-random sample will be chosen, which includes all different types of enterprises, for example welders, bakers, shop owners, or carpenters. The protocol includes modules on basic enterprise and customer information, energy use and production processes, and employment patterns. It is designed to capture growth potentials of the enterprise, which might be unlocked by electricity access. Particular attention is given to understanding growth hindering bottlenecks and potential net effects of electrification for the local economy.

The present version of the questionnaires are draft versions which we designed based on experiences gained in previous work on electrification in Indonesia and elsewhere. It will be revised based on further document review, discussions with key stakeholders and after pre-tests in the field.

3.3.4.2 Rounds and timing

The baseline will be implemented in October and November 2017, with an initial follow-up one year later in order to track adoption behavior and investigate initial changes on key outcomes. However, many impacts may evolve over time and technical-economic sustainability issues of the micro-grid materialize rather in the mid/long-term. Accordingly, we recommend a final follow-up survey around three years after the baseline.

We will revisit the sampled communities in the same season as in baseline to avoid seasonality distortions and will also have an eye on potential delays in the installation of the micro-grids, which – if substantial – would entail a rescheduling of the follow-up survey.

3.3.4.3 Respondents within the sample unit

A priori, the desired respondent is the person most responsible for decisions related to energy use and expenditures, likely the household head. If this person is unavailable, we would permit the survey to be conducted with another adult household member who is involved in and informed of decisions related to energy use. We envision maintaining the same respondent for the questions on activity profile, but will consider the benefits and feasibility of engaging an alternate respondent for that section during pre-testing.

3.3.4.4 Staff

Our Program Manager, Mike Duthie, will lead the quantitative data collection effort, including participating in instrument piloting and enumerator training. He will be supported by two Research Assistants, Miguel Albornoz (SI-HQ) and a local researcher that has yet to be determined. Dr. Jörg Peters and Ms. Luciane Lenz are expected to be in the field leading the qualitative component shortly before the initiation of the household surveys. Mr. Duthie and Dr. Peters will collaborate to ensure integration across the two efforts. One of SI's local research assistants will be trained to provide field monitoring of data collection in both locations under the direct guidance of Mr. Duthie and Mr. Albornoz.

SI will competitively procure a local data collection company to conduct the field work, and we have already sent out and received responses to a request for proposals to conduct the surveys. SI will provide expert guidance in a comprehensive training, at least five days in duration and including field practice, to all field staff employed by the data collection company.

3.3.4.5 Data processing

Since we intend to conduct electronic data collection, we expect to receive data regularly throughout field work[88], which we will import into Stata and using the SI-developed errout Stata command will check for a variety of common logic, range, missing value, skip, and outlier errors. This can be conducted in near real time and generates a log of errors for discussion and verification with the data collection partner, as well as for further training of staff on common errors. Once SI receives the final dataset, we will conduct data cleaning, again checking for missing data; logic, range, and skip errors; and outliers, using Stata do and log files. Identified issues will be discussed with the data collection partner for verification and any changes will be entered into do files with notes explaining the change. Relevant variables will be transformed for analysis. All

[88] Given that we do not expect data collection field work for the survey to last more than two or three weeks, it may not be logistically practical to get interim data sets, conduct quality checks and feedback information prior to completion of field work, but this will be discussed with the data collection firm as a priority.

data cleaning, management, and analysis will be conducted through Stata do files to ensure transparency and reproducibility of results.

3.3.4.6 Data quality

While the specific data quality assurance protocols will be agreed with the data collection partners, the following represents SI's standard approach and can be considered representative of the approach we will take. We expect to conduct electronic data collection which permits regular, timely verification of data quality, logic and range check in data entry, and additional quality assurance checks related to automatic time stamps and geocoding.

Data Quality Assurance processes will occur in the field, in real-time, during data collection and during data entry and in delivery of datasets. The data collection company will provide significant oversight of enumerators in the field. Specifically, they will provide on-site management of enumerators that is sufficient to observe the activities of the interviewers, identify problems in their administration of the questionnaires, and correct those problems. The data collection partner will ensure that all administered surveys are checked at the conclusion of each day by field supervisors to ensure that they are complete and devoid of inconsistencies. The partner will be responsible for implementing quality monitoring processes and will identify key personnel ultimately responsible for data quality. Specific activities include:

- A supervisor will accompany 5percent of survey interviews to ensure completeness and to monitor and record any discrepancies or abnormal responses.
- A supervisor will monitor the sampling process and location of completed surveys and should immediately notify SI upon discovery of any irregularity;
- Supervisors will review nightly their interviewers' instruments to ensure appropriate skips are accurately followed and answers are properly recorded;
- The partner will conduct spot-check interviews of 5percent of surveys, by re-visiting or re-calling respondents and verifying responses to a subset of 10-20 survey questions;
- Full re-interviews will be conducted by supervisors in the event that any interviewer is suspected of fraudulent behavior;
- Weekly summaries of data quality control activities shall be submitted to SI, in addition to a final tally of interview observations, re-visit spot checks, and complete re-interviews at the completion of data collection.
- SI staff or designates will also conduct independent quality assurance.

At the conclusion of data collection, the partner will deliver a data quality summary with the final dataset. This will include information about challenges in data collection, any modifications to the data collection protocols, data quality process, identification of any data quality issues, as well as metadata about the final dataset (sample replacement, response rate, attrition, average duration of survey, etc.) SI may provide further detailed outline as needed but data quality reports will include at least the following information:

- Data source
- Sample size
- Samper size of pilot(s)
- Dates of pilot(s)
- Dates of data collection

- Number of enumerators
- Number of supervisors
- Number & percent of randomly selected survey responses audited by field supervisor
- Number and percent of randomly selected survey responses audited by the firm
- Average number of surveys conducted per enumerator per day
- Summary of quality checks performed during fieldwork

3.3.4.7 Summary Table

See the summary table included above in Section 3.3.4.1.

3.3.5 Secondary Data

This evaluation will primarily use secondary data in support of our sampling strategy. Due to the sub-village nature of treatment in East Sumba, most secondary data is not representative at an adequate level to serve as a covariate in analysis. SI will utilize the following data in support of our sampling approach:

1.) GIS (Geographic Information System) shapefiles of settlement aggregations in East Sumba generated by ADB TA 8287
2.) Network Planner data generated from the Midline Report of ADB TA 8287
3.) List of desas where PLN is implementing micro-grids in 2017 and 2018
4.) Variables from blocks 4 (Population and Employment) and 12 (Economy) of the 2014 PODES (Village Potential Statistics) Survey

The first two of these datasets are critical to the development of our sampling frame. They identify treatment and potential comparison clusters and characterize key conditions of the clusters, namely their population and their suitability for electrification via micro-grid technology. The third dataset provides critical information for our sampling approach by identifying potential future contamination sites. The final dataset may be helpful in providing covariates for sampling or balancing at baseline.

All of this secondary data has been transferred to SI by its owner using appropriate and secure channels. Prior to using the data from ADB TA 8287, SI assessed its quality by reviewing the methodological section of TA deliverables and asking follow up questions of staff who collected the data based on any inconsistencies found. There was no need to independently verify the quality of PLN or PODES data, since these were generated by qualified actors (PLN and BPS (Badan Pusat Statistik in Indonesia)).

3.3.6 Analysis Plan

3.3.6.1 General Approach

To analyze the project's impact on key outcomes of interest, we must first verify that the project achieved its intended *outputs*. Prior to conducting econometric analyses, we will use a combination of project monitoring data, SPV records (as available), information gathered from key informant interviews, and household survey data to determine whether the micro-grids have been successfully installed and that households have been connected. This will help establish whether the project has indeed increased access the RE. At baseline, verification of outputs is not applicable.

Following this, we will analyze the impact of the project on our key indicators, including energy consumption, energy spending, and household economic and time use outcomes, using statistical and econometric models. Note that baseline statistical analysis focuses on associations of factors with outcomes rather than analyzing impacts.

This study is powered to report impacts for all treatment households. We may also explore outcomes for critical sub-groups, such as poorer households or female-headed households to test the heterogeneity of impact. In some cases, for example, with female-headed households, estimates of sub-group differential impact will be made with reduced precision and power due to the smaller sample size available for that sub-group.

3.3.6.2 Baseline

The focus of baseline analyses will be to both identify the matched sample of treatment and control households and to investigate the current status of, and factors associated with, energy consumption and expenditures in the target area.

Identification of matched treatment and control households

We will use the CEM approach described above with baseline data to match treatment and control households, thereby identifying the final sample for the evaluation. Specifically, we will:

1. **Identify secondary and baseline variables that correlate with treatment and key outcomes, with a specific focus on energy consumption and expenditures.** To look at variables associated with treatment, we will estimate a logistic regression, whereas we will use a linear regression model to look at factors associated with energy consumption and expenditures. Candidate variables will include
    - household variables such as sex, age, education, and employment of the household head; household and home size; and household asset index; and
    - community level variables such as an index for community resources, population size/density, and geographic location (for example, travel time to the district capital).

    Pending the results, we envision selecting each variable that is statistically significant in either model, though we may include more restrictive criteria if we find that many variables are significant in either model. Note that this analysis is also a critical input for the second key focus on the baseline analysis described below.
2. **Develop bin sizes for CEM**. As a starting point, we will think critically, and based on the literature, about appropriate bin sizes for each variable. However, given that there are not natural bin sizes for most of the variables we expect to include in the matching (with the exception of sex of household head, for example), we will develop a few sets of bin sizes that range from fine to loose coarsening.
3. **Conduct CEM based on each set of bin sizes**. Using the Stata CEM command, we will match units under each bin size scenario, pruning observations that fall into treatment-only or control-only strata.
4. **Determine the most appropriate bin size scenario.** Given the tradeoff between level of imbalance and power in matching approaches, we will investigate each bin size scenario according to the following criteria:
    - Imbalance: We will measure the average absolute standardized difference in means for variables included in the CEM and other variables associated with the outcomes of interest.
    - Power: We will recalculate the MDES and power based on the number of households pruned.

- External validity: To investigate the representativeness of the sample to the target population, we will conduct t-tests to look for differences in means between the pruned sample and full treatment sample and then calculate an average t-statistic for each bin size scenario.

We will document the results of each of these tests and based on these criteria, the evaluation team will decide which bin scenario offers the optimal tradeoff.

5. **Identify final sample**. Based on the selected bin size scenario, the final evaluation sample will be all non-pruned households. This represents the sample of households for which follow up data collection and analysis should be conducted. We will present in the baseline report the similarity of the matched treatment and comparison group, alongside balance in the unmatched groups for reference.

Investigate the current status of energy consumption and expenditures in the target area

The baseline analysis will also be useful in documenting the pre-intervention status in the target area. This will include:

1. Descriptive statistics of outcome variables and covariates, by socioeconomic status and in some cases by age or gender.
2. Econometric analysis of factors associated with key outcomes*:* Regression analysis will be used to explore the relationship between outcome variables and covariates, and test posited relationships from the project logic.

3.3.6.3 Follow-up

Follow up analysis will focus on estimating the one-year impacts of the grant using a DiD regression approach with controls. We will also provide a review of outputs to ensure that the project did indeed increase access to RE. Specifically, this will include:

1. Descriptive statistics of outcome variables and covariates, by socioeconomic status and in some cases by age or gender.
2. Analysis of determinants of outcomes: Regression analyses built on baseline models by examining changes in the marginal effects of household and individual demographic and economic variables on select outcomes of interest, such as energy consumption and energy expenditures. This builds on the baseline analysis, looking further at which variables (and how changes in those variables) are related to the outcomes of interest. While the relationships cannot be confidently considered causal, they may be instructive in identifying additional questions and research in household energy consumption and expenditure dynamics.
3. Analysis of output data*:* Through analysis of project monitoring data, household survey data on electricity availability, SPV documents, and key informant interviews, we hope to establish whether the grant was effective in increasing access to RE. If we find, for example, that the RE systems are non-operational or systems suffer from significant shortage in supply or that comparison areas have also gained access to RE, then we might expect null or limited results on key outcomes.

4. Statistical analysis of one-year impacts[89]: Using the matched sample, we will estimate program impacts using the following fixed effects panel regression framework:

$$Y_{ijt} = \alpha + \gamma T_{jt} + \delta d_{jt} + \kappa T_{jt} \cdot d_{jt} + \beta X_{ijt} + \delta_{ijt},$$

where Y_{ijt} is the outcome of interest for household or other unit *i* in kampung *j* at time *t*; *d* represents treatment assignment and is equal to 1 if kampung *j* is assigned to treatment, and 0 otherwise; T_{jt} represents time and is equal to 0 at baseline and 1 at follow-up; X_{ijt} is a vector of time-varying variables that affect the outcome for unit *i* in kampung *j* at time *t*, and δ_{ijt} is a time-varying error term. The coefficient κ will measure the "treatment effect," or the change in outcome *Y* for treatment households or enterprises relative to that for controls. This estimate is unbiased so long as the error term δ_{ijt} is not correlated with treatment.

3.4 Qualitative Approach

3.4.1 Methodology

To provide additional data to answer evaluation questions 1-3 (which seek to identify the impact of the RE installations) and to answer evaluation question 4 (which seeks to identify the level of effectiveness of SPVs at managing the Solar PV facilities), SI will collect baseline and endline qualitative data in treatment sites representing W3A Anekatek Solar, East Sumba and W3A Akuo Energy Solar/Micro-Hydro, Berau grants as well as conduct a mini-survey in W3A Akuo Energy Solar/Micro-Hydro, Berau areas (described in the quantitative section above). The pre-post PE approach will rely on primary qualitative data from key informants and focus group participants at the regency and village levels. Observation of SPVs and facilities may be included at endline, but is not applicable at the baseline.

Pending availability of funds, SI also suggests a follow-up PE (post-intervention, qualitative data collection only) of other grants referenced in this report (Window 2 and other Window 3A grants not selected for the baseline) in addition to another round of endline data collection 2-3 years after installation in Berau and East Sumba to further explore the factors that contribute to micro-grid success, particularly looking at evaluation question 4. A follow-up PE would allow more time for failure to potentially identify additional factors of success and failure of the uptake of micro-grids. It would also allow a more comprehensive review of sustainability and investigation of factors across the different solar grants that affect sustainability. Based on the time it takes to install grids, transfer management to the community, and allow for challenges/problems to arise that require SPV response, re-visiting sites two or three years after baseline data collection (as opposed to one-year post-baseline, as proposed below for the first round of endline data collection) could also prove informative.

As noted in the Literature Review section above, the Window 3A grants innovatively utilize a community engagement (SPV) approach or scheme to attempt to address challenges identified in the transition of communities to micro-grids. The SPV approach seeks to transfer ownership to the communities in a way that will promote sustainability and use of Solar PV facilities by strategically engaging communities from project

[89] Note that these impact estimates will serve as quantitative answers to evaluation questions 1 and 2 on their own, and will subsequently feed into a model developed by ICF International to produce estimated reductions in GHG emissions in response to evaluation question 3. These results will be presented alongside ICF's original estimations for context. In the event that primary data calls into question assumptions used as inputs in the ICF model, SI will note this and calculate the resulting change in GHG emissions if these assumptions were altered.

inception, establishing (or re-vitalizing existing) community engagement groups, and training SPV members in the areas of O&M, finance and administration, and sales.

In order to holistically answer evaluation question 4 related to the SPVs ability to generate community buy-in and sustainability of critical infrastructure, baseline qualitative data collection will be useful to document what the community is like pre-intervention. Areas or themes of interest would include the current status of existing community engagement mechanisms/groups; levels of engagement in existing groups by various community members (men, women, and youth); community past experiences with RE sources or donor/government energy projects/initiatives; key community needs/challenges in terms of economic growth (or access to income generating activities); and perceptions (optimism) of the Solar PV facility plan. Endline data collection, in addition to collecting data along similar lines of inquiry as the baseline, will include themes related to the SPV intervention in a given site. These could relate to relationship to the implementer/grantee/contractors; experience with intervention roll-out; preparedness; and productive uses. Qualitative data at this stage is expected to provide depth to quantitative findings related to key variables that were found to relate to outcomes of interest. Endline comparative studies may prove useful, but the approach is expected to be substantially informed by baseline data (both quantitative and qualitative).

Therefore, collecting pre-post qualitative data in both East Sumba in Berau will provide an opportunity to a) document baseline community engagement conditions and investigate the current status of energy consumption; and b) explore how each SPV approach/scheme ultimately impacted the achievement of outcomes of interest (measured via indicators collected in quantitative data in both locations) at endline. Additionally, a follow-up PE in unique comparative sites (from Window 2) could provide further depth surrounding the role community engagement plays in the success or failure of uptake of micro-grids. Specifically, qualitative data collected in East Sumba and Berau will: at baseline, provide baseline context for indicators of interest related to evaluation questions 1 – 4; and, at endline, provide depth on evaluation question 1-3 and answer evaluation question 4.

Data will be collected from both treatment and control sites in Sumba and in treatment sites only in Berau, with the exception of grantee and SPV interviews and beneficiary FGDs which are only relevant in treatment areas. SI will conduct semi-structured interviews with approximately 250 enterprises and 50 other stakeholders along with approximately 12 FGDs in six selected villages in East Sumba and Berau at baseline, further described below. This will allow for discussions with village/regency government officials, community members (both beneficiaries and SPV members), enterprises, contractors and grant implementers/managers.

3.4.2 Timeframe of Exposure

Similar to section 3.3.2 above, SI suggests waiting a full year to collect endline data for the evaluation. SI suggests collecting qualitative endline data shortly *after* collection of quantitative endline data (in November – December of 2018) so that the latter can inform the former in terms of additional lines of inquiry to include. This will allow sufficient time for productive uses and/or operational challenges for the micro-grids to develop and be considered in the measurement of program outcomes. This will also allow for endline data collection events to occur during approximately the same season, cancelling out any unobserved bias from seasonal effects on energy consumption and income. Lastly, this will allow time for the project to transition O&M and administrative responsibility for the Solar PV facilities to SPVs.

Additionally, we suggest a second follow-up PE (post-intervention data collection only) to be conducted after three years of community exposure to the intervention/program, under the theory that more challenges to sustainability and opportunities for investment in productive capital will have had the opportunity to manifest by this time.

3.4.3 Study Sample

3.4.3.1 Sample unit

SI's qualitative approach will include a variety of sample units with each type of stakeholder being interviewed using a distinct protocol (see Annex 3). For all KII protocols, the sample unit will be individuals selected to represent SPVs[90], government entities[91], grant implementers/managers[92], and private firms contracted to provide support to the facilities[93]. For the community beneficiary FGD guide, the sample unit will be households. For the enterprise beneficiary KII guide, the sample unit will be firms and/or informal community enterprises. These enterprises are those, in addition to the SPV, that may use energy for productive uses and may include individuals earning income above a subsistence level by selling a good or service (or producing a good or service for more than auto consumption).

3.4.3.2 Sample size

The SPV Leadership KII protocol will be issued to three to four individuals in each treatment unit sampled. Grantee or contractor KII protocols will be issued to one individual each per treatment unit sampled. At times, these individuals may repeat across treatment units (e.g. one O&M contractor is interviewed in reference to several desas), but this information is not known at the time of writing. One regency official will be interviewed per grant, and one to three grantee staff (including MCA-I Window 3 managers) will be interviewed per grant. Kampung official and enterprise semi-structured interviews will be conducted in all treatment and control areas.

There will be two FGDs of community beneficiaries per treatment unit (one for male beneficiaries and one for female beneficiaries), and we will aspire to include eight to ten beneficiaries in each focus group. We expect a total sample size of 50 - 78 key informants, approximately 250 enterprises and around 120 focus group participants.

3.4.3.3 Sample frame

In the case of W3A Akuo Energy Solar/Micro-Hydro, Berau, the three villages selected for qualitative study will include all three treatment units involved in the grant. In the case of W3A Anekatek Solar, East Sumba, time and feasibility constraints preclude the qualitative team from visiting any more than three villages. The sample frame for these villages will include all five of the treatment villages targeted by the grant.

The sample frame of stakeholders to serve as key informants in each village will be constructed by soliciting contact lists from each of the grantees. The sample frame of beneficiaries to serve as focus group participants will be constructed from beneficiary lists from each grantee. The sample frame of enterprises in each village

[90] In W3A Akuo Energy Solar/Micro-Hydro, Berau, this could include the director, secretary, treasurer, O&M division head, sales and collection division head, or the finance and administration division head. In W3A Anekatek Solar, East Sumba, this could include the head, Finance Manager, Secretary, or other members of the community appointed to the cooperative.
[91] Primarily including the Head of the Village (Kepala Desa) and the Head of the Sub-District (Camat).
[92] Primarily including grantee staff (both local and HQ based), MCA-I Window 3 grant managers, and MCC RE Advisors.
[93] Primarily including O&M and EFC contractor staff, as relevant for each treatment unit.

will be constructed by communicating with village officials in advance about how many and which types of enterprises were present in the village.

3.4.3.4 Sampling strategy

At the village level, the three villages selected for additional qualitative study in East Sumba will be selected **purposively** to draw the most interesting comparisons possible both within East Sumba and between East Sumba and Berau. These will also contain as many treatment kampungs as possible. Barring any constraints from selecting these, we currently propose to conduct qualitative data collection in Tawui, Lailunggi, and Praiwitu.

Most key informants will be selected using a **purposive** sampling technique. In some cases, there may only be one person or a few specific people that are performing the role whose perspective we require as a key informant. We will review program documents and work with the grantee before data collection to identify which role this is in village and regency government offices and in each contractor's office. In the event that an identified informant indicates a colleague who could provide additionally illuminating information, we will attempt to contact this colleague to serve as an additional informant (**snowball** sampling).

Community beneficiary FGD participants will be selected using a **convenience** method on the basis of which community members are available to participate in an FGD when the evaluation team passes through each village. Since we propose qualitative field work to occur before quantitative field work, it will not be necessary to avoid community members who may have been fatigued from participating in the quantitative survey. Given that there are reportedly few enterprises in each village, especially few that are not basic kiosks or shops, we will use a **purposive sampling** technique to ensure that the firms selected represent as diverse a cross section as possible of enterprises in each treatment unit.

3.4.4 Primary Data Collection

3.4.4.1 Instruments

All KIIs and FGDs will be conducted according to pre-developed and tested protocols (see Annex 3). SI has developed semi-structured protocols to direct each qualitative data collection activity. SI will utilize the same baseline qualitative questionnaires in both East Sumba and Berau sites. As previously noted, endline instruments are likely to differ from baseline instruments, depending on baseline findings. Baseline instruments will document baseline community engagement conditions and investigate the current status of energy consumption; and endline instruments will explore how each SPV approach/scheme ultimately impacted the achievement of outcomes of interest (measured via indicators collected in quantitative data in both locations). The team developed parallel protocols (see Annex 3) with the same or similar questions across KIIs, FGDs, and mini-surveys (where appropriate/relevant) to enable greater data triangulation (additional information on the analysis plan provided in section 3.4.5.2). To facilitate analysis, the enterprise and kampung official protocols will be principally quantitative but will include qualitative elements.

Table 9 below provides a summary of instruments, respondents, and estimated respondent numbers per treatment unit.

3.4.4.2 Rounds and timing

Qualitative baseline data collection will occur shortly before quantitative baseline data collection, in September – October of 2017. While Berau data collection could occur later as commissioning will not occur until December 2017, it will prove efficient to collect both East Sumba and Berau qualitative baseline data in the same timeframe.

Endline data collection, as noted in section 3.4.2 above, is proposed to occur after endline quantitative data collection in both East Sumba and Berau, scheduled for one year after baseline. Therefore, qualitative endline data collection is proposed for November – December of 2018.

3.4.4.3 Respondents within the sample unit

Respondents within the sample unit (of six villages in East Sumba and Berau) are described in Table 9. Respondents will represent sub-district and village levels, and range from implementing staff and grant advisors to community members and local enterprises. If respondents are missing or absent at the scheduled time, the team will follow the sampling procedures defined in section 3.4.3.4 and identify replacement respondents (both at baseline and endline).

3.4.4.4 Staff

For the qualitative component, SI proposes a staffing structure of two evaluators, Sr. Analyst Jörg Peters and Jr. Analyst Luciane Lenz, and two local research assistants (RAs), in addition to an interpreter at baseline. The two evaluators have expertise in RE and solar power micro-grid programming, while the local RAs will have expertise in Indonesia and the RE sector. Dr. Peters will serve as the Team Leader for the qualitative field work and with the support of Mr. Duthie will supervise the evaluation team's work from design and fieldwork to data analysis and reporting. Dr. Peters will not conduct KIIs and FGDs (with the exception of those in English), but rather will allow the RAs to collect primary qualitative data in Bahasa Indonesian. He will be assisted by an interpreter during fieldwork to facilitate note-taking and on-going analysis as well as by staff from the data collection partner who will conduct the enterprise interviews.

This team of four will allow for efficient coverage of the six sites over a period of 17 days (September 18 to October 5). While SI expects that some interviews may take place in English, the use of local team members that are culturally and linguistically fluent in Bahasa Indonesia will allow interviews to be conducted in the national language when necessary. See section 4.5 for more details on staffing.

3.4.4.5 Data processing

Interview and discussion notes from qualitative data collection activities will be created during field work with daily review by the team to ensure clarity. The team will also record all interviews and discussions to lend to eventual transcription and translation. Transcription and translation may be done through external consultants and/or members of the evaluation team. Complete transcripts will be a) anonymized for the protection of respondents and b) uploaded into qualitative data analysis software for analysis and report writing. Qualitative data will be handled solely by the evaluation team and SI HQ management team members that provide support during baseline and endline data collection activities.

3.4.4.6 Data quality

The data processing methods described in section 3.4.4.5 lend to high quality data at the baseline. The team leader will have the ultimate responsibility to check interview notes for completeness and accuracy during team de-briefs and review sessions during fieldwork. A local evaluator will be tasked to review transcripts and translations to ensure accuracy of wording and phraseology used. Additionally, if the team splits and the team leader is not present during multiple KIIs and FGDs, the team leader will randomly spot check interview notes and transcripts related to those KIIs/FGDs to ensure the facilitator/interviewer followed protocols and adhered to best practice for conducting qualitative data collection.

Qualitative Questionnaires Summary Table				
No.	Type	Name	Respondents	Estimated Number of Respondents
1	KII	SPV Leadership	Berau: Director, Secretary, Treasurer, O&M division head, Sales and collection division head, or Finance and administration division head East Sumba: Head, Finance Manager, Secretary, or other members of the community appointed to the cooperative	3-5 individuals per treatment unit
2	KII	Village Official	Head of Village (Kepala Desa)	1 individual per treatment/control unit
3	KII	Regency Official	Head of Sub-District (Camat)	1 individual per sub-district including a treatment unit
4	KII	Project Grantee/Manager	Grantee staff; MCA-I Window 3A Manager(s); MCC RE Advisors	1-3 individuals per grantee (including both local and HQ-based, if possible); 2-3 individuals from MCA-I and MCC
5	KII	EPC Contractor	Contractor staff	1 individual per treatment unit (may be duplicates across units)
6	KII	O&M Contractor	Contractor staff	1 individual per treatment unit (may be duplicates across units)
7	FGD	Community	Household members (not selected for quantitative survey)	2 groups (1 M, 1 F including 8-10 individuals each) per treatment unit
8	KII	Enterprise	Firms and/or informal community enterprises	Up to 8 per community

Table 11: Summary of instruments, respondents, and estimated respondent numbers per treatment unit (Qualitative Questionnaire)

3.4.5 Analysis Plan

3.4.5.1 Coding

Interview transcripts will be coded using electronic software (Dedoose or similar software) to construct response categories and identify patterns in data, as relevant. Coding qualitative data through use of electronic software will allow SI to analyze transcripts with speed and efficiency, easily cataloging and documenting emergent themes from among respondents. Prior to fieldwork, the team will develop a preliminary coding scheme based on finalized protocols. During fieldwork, the team leader will adjust the coding scheme as new themes or areas of interest arise as relate to each evaluation question. The coding scheme will be finalized post-fieldwork and will include codes across identified themes and evaluation questions.

3.4.5.2 Analysis method/framework

At baseline, the team will utilize interview notes and codes (resulting from aggregated and coded transcripts detailed in section 3.4.5.1) to detail key indicators related to evaluation questions 1 – 3 (including energy consumption, energy spending, and household economic and time use) and community engagement levels (through description of themes related to evaluation question 4). Triangulation will enable the team to cross-verify and cross-validate the findings that emerge to identify correlations between findings. In particular, the team developed parallel protocols (see Annex 3) with the same or similar questions across KIIs, FGDs, and mini-surveys (where appropriate/relevant). This will enable greater data triangulation because each method addresses sub-sets of the same evaluation questions, and findings will be validated or refuted by the other techniques. Methodological triangulation will also enable the team to strengthen the potential linkages and accuracy of its data if the results obtained through one method are less conclusive than another method.

The team plans to employ several data analysis methods to identify key findings from the collected data. The type of analyses will depend on the specific data being assessed, but will most likely include the following. The first two listed are likely to be employed at baseline, while all listed are likely to be employed at endline.

1. **Comparative Analysis** – The team will compare baseline context and endline results across grants, treatment sites (villages), and stakeholder groups to assess convergence or divergence in perspectives.
2. **Trend Analysis** – Trend analysis will enable the team to examine different indicators or interest over time (from baseline to endline) to identify patterns of convergence or divergence of outputs and outcomes related to the evaluation questions.
3. **Contribution Analysis** – Contribution Analysis is an approach for assessing and inferring causality in program evaluations. It provides evidence for drawing conclusions that the grant's activities have contributed to positive, documented results identified by the team. Such analysis will be most useful in confirming the relevance of the program's theory of change at endline.
4. **Gender Analysis** – The team will consider at baseline the current status of women and men in the treatment sites and at endline, consider whether activities and resulting outcomes specifically benefit (or do not benefit) women or men. All data collected through KIIs, FGDs, and mini-surveys will be disaggregated by gender and analyzed for effects on women and men beneficiaries of the project.

3.5 Challenges & Limitations

3.5.1 Limitations of Interpretations of the Results

While the approaches outlined above should generate reliable and representative information for the three grants studied, we are limited in our ability to generalize these results to other RE grants, particularly those using other RE technologies or SPV mechanisms. The inclusion of three grants allows us some degree of analytical purchase in investigating the generalizability of the results across contexts, but analysis of additional grants, including of other RE technologies, would support further analysis and confidence of the role of context and intervention type, thus supporting discussion of generalizability and interpretation of results.

3.5.2 Risks to the Study Design

This section describes a variety of potential risks with the evaluation approach as well as our proposed mitigation strategies. Specifically, we consider the most important risks as summarized in Table 10, and discuss them in greater detail below.

Violation of CIA assumption. A major risk is related to the assumption that conditional on control for baseline observable characteristics through the matching process, the expected outcomes of treatment and comparison groups are similar. Given that the selection of treatment kampungs was neither random nor did it follow a systematically documented approach, it would be impossible to exhaustively model the treatment process or control for all relevant factors. However, based on discussions with a variety of stakeholders, we believe that the potential comparison areas are quite similar to treatment areas along demographic, social, economic, and energy use characteristics. Moreover, we will collect extensive data at baseline on which to match, and the DiD approach eliminates this concern for any time-invariant unobserved characteristics.

Type of risk	Description	Mitigation strategy
Violation of CIA assumption	Imperfect control for factors that influence program outcomes	-Conduct balance tests at baseline -Test for systematic differences following baseline -Use CEM based on variables from an extensive baseline -Use DiD approach to control for time-invariant factors
Lack of statistical power	Power may be too low to identify expected effect sizes	-Use conservative assumptions in power calculations -Oversample, particularly in comparison areas, to limit effects pruning and minimize the effect of clustering

Type of risk	Description	Mitigation strategy
Confounding	Outcome variables may be affected by time-varying factors that are not related to treatment (e.g. electrification in comparison kampungs)	-Review and interviews with regional stakeholders to identify plans for electrification -Relatively short measurement time horizon makes installation of new systems during IE unlikely -Oversampling of comparison kampungs
Other important considerations (not discussed in detail in following text)	1) Attrition in sample 2) Spillovers/general equilibrium effects 3) Incomplete program implementation prior to compact close	1) Power calculations allow for 15percent loss to follow-up 2) Spillovers unlikely, but oversampling of kampungs to permit dropping as needed 3) Track monitoring data and maintain flexibility in data collection timing

Table 12: Categorization of threats to identification of impacts, and mitigation strategy

Lack of statistical power. Another distinct concern has to do with the potential lack of statistical power to reliably measure impacts of the MCC investments. This is of particular concern in this case due to the very low number of treatment kampungs, which makes power very sensitive to ICC. Moreover, any specific events that would require removal of a treatment kampung from analysis (for example, lack of completion of installation in a kampung) would have a large effect on power. A third concern relates to the pruning process during matching. If many households (or even perhaps whole kampungs) are pruned due to lack of a suitable match, power will further decrease. To mitigate this risk, we have been relatively conservative in estimating parameters for power calculations. We also propose oversampling at baseline to allow for pruning, as well as sampling additional comparison kampungs to gain power (due to the diminishing returns of increasing the sample of households in each treatment kampung).

Confounding. Another potential source of bias in our estimates of impact could emerge from confounding by time-varying factors affecting treated and untreated comparison units differentially. Perhaps the most important confounder would be electrification of comparison kampungs, either by PLN or another project. To mitigate this risk, we will do a systematic review of other stakeholders involved in electrification in E Sumba and through interviews identify (and exclude from our comparison kampung population) any areas planned for electrification. Through this review and because of the relatively short duration of the IE, in comparison to the time typically taken for permitting and installation of electrification, we do not expect this to be a significant threat in practice. Moreover, we intend to oversample comparison kampungs, which would permit dropping a very small number of comparison kampungs if they are electrified.

4 ADMINISTRATIVE

4.1 Summary of IRB Requirements and Clearances

In conjunction with MCC's commitment to respect and follow the Common Federal Policy for the Protection of Human Subjects where feasible, SI will pass the approved evaluation design through IRB review prior to data collection. SI has an in-house Institutional Review Board (IRB) that can review applications for human subjects research. SI's internal IRB has established protocols for gathering informed consent, protecting anonymity and identifying information, and ensuring ethical data collection—including from children and other vulnerable populations. It is registered with the U.S. Department of Health & Human Service's Office for Human Research Protections.

In addition, SI closely monitors and adheres to human subject research regulations in its countries of operation to ensure all evaluations are registered and fully compliant with local law. In this case, in accordance with Government Decree No: 41/2006,[94] SI will ensure that, if required, research activities under this evaluation and staff supporting these activities apply for and receive the appropriate permits from the GoI's Ministry of Research, Technology, and Higher Education (Ristekdikti).

4.2 Data Protection

SI's process for respecting privacy of respondents during data collection, transfer, storage, analysis, disposal and dissemination is governed by SI's data security guidelines, which are aligned with MCC's microdata guidelines.

4.3 Preparing Data for Public Use

SI will adhere to MCC's open data policy with regard to preparing data for publication. All primary quantitative data collected by the evaluation will be prepared and submitted to MCC according to the most updated version of the Disclosure Review Board (DRB) guidelines available at the time of data collection. On an instrument-by-instrument basis, SI and MCC will weigh the utility of publishing primary qualitative data (even in a restricted-access database) against (i) the risks of respondent re-identification and (ii) the risks of adverse effects on data quality from disclosure. In the event that the utility of this data outweighs the risk of re-identification, and that respondents can be adequately informed via a consent script as to the data's intended use without jeopardizing their willingness to be forthcoming with interviewers, SI will submit this primary qualitative data to MCC as part of the DRB process.

4.4 Dissemination Plan

Since reporting and dissemination must be completed prior to Compact closeout, SI will present the baseline evaluation findings in draft form after receiving feedback from MCC and local stakeholders on the baseline draft evaluation report. One presentation will be given in Washington to MCC, while another will be given to

[94] The text of which can be found as Annex 1 to this document:
http://www.international.itb.ac.id/web/wp-content/uploads/2010/05/Foreign_Research_Permit_Procedure_2015.pdf

local stakeholders in Jakarta including MCA-I, implementing grantees, and relevant GoI stakeholders. We recommend a similar set of presentations in both Jakarta and Washington for follow-up reports given the importance of this sector to the GoI and other stakeholders.

4.5 Evaluation Team Roles and Responsibilities

The evaluation team will be comprised of a field evaluation team and support staff at SI headquarters. In some cases, evaluation team members will have a role both as field evaluators and management support staff. The evaluation team includes all personnel described in Table 11.

Table 13: Evaluation Team

Personnel	Role	Technical/Support	Responsibility
Mike Duthie	Program Manager	Both	Principal Investigator, responsible for technical oversight and senior-level evaluation expertise. Will lead evaluation design, data collection, reporting, and dissemination. Also responsible for oversight of overall contract performance for SI-HQ.
Jörg Peters	Sr. Analyst, Renewable Energy	Technical	Expert in the evaluation of RE programming, responsible for advising evaluation team on sector-appropriate evaluation design and instruments. Will contribute to the oversight of field data collection as instructed by Principal Investigator, as well as data analysis and reporting.
Hussain Samad	Sr. Analyst, Renewable Energy (advisory)	Technical	Expert in Solar PV programming, specifically. Will serve in an advisory role to the team and review evaluation methodology and instruments prior to finalization.
Luciane Lenz	Jr. Analyst	Technical	Subject matter expert in solar photo-voltaic technology and programming, will advise on quantitative and qualitative instruments and plan for field data collection. Will contribute to the oversight of field data collection as instructed by Principal Investigator as well as data analysis and reporting.
Amanda Stek	Jr. Analyst	Both	Mid-level evaluator, responsible for liaising with local stakeholders and overseeing enumerator training.
TBD	Research Assistant(s) (local)	Technical	Local research assistant responsible for assisting in the arrangement and oversight of both quantitative and qualitative data collection. SI anticipates that we will require one quantitative research assistant and two qualitative research assistants.

Personnel	Role	Technical/Support	Responsibility
Miguel Albornoz	Research Assistant (HQ)	Both	Will serve as the evaluation manager for SI-HQ support staff, and thus manage finances, personnel, scheduling, and contractual compliance for the evaluation. Will also serve as a research assistant and contribute to evaluation design, data collection, analysis, and reporting as instructed by the Principal Investigator. Primarily responsible for managing the data collection subcontractor and overseeing data quality assurance.
Julia Higgins	Administrative Assistant	Support	Project assistant responsible for administration and project backstopping. Will contribute to data quality assurance as instructed by the Principal Investigator.

4.6 Evaluation Timeline and Reporting Schedule

Table 12 displays the schedule for the evaluation's baseline. This schedule would be repeated after one year for endline data collection.

Table 14: Evaluation Timeline and Reporting Schedule

Name of Round	Data Collection	Data Cleaning & Analysis	First Draft Report Expected	Final Draft Report Expected
Baseline	October/2017 – November/2017	November/2017 - December/2017	January/2018	February/2018
Follow-up 1	October/2018 – December/2018	December/2018 - January/2019	February/2018	March/2019
Follow-up 2	October/2020 – December/2020	December/2020 - January/2021	February/2020	March/2021

Task	Deadline
Draft Evaluation Design Report (EDR) Submission	July 21, 2017
Institutional Review Board and Ristekdikti Materials Submission	July 28, 2017
Feedback on EDR Received	Aug. 11, 2017
Data Collection Subcontractor Selected	Aug. 25, 2017
Final EDR Submission	Aug. 21, 2017
Baseline Qualitative Data Collection	Sep. 18 – Oct. 5, 2017

Task	Deadline
Baseline Quantitative Piloting/Enumerator Training	Oct. 16 – 20, 2017
Baseline Quantitative Data Collection	Oct. 23 – Nov. 30, 2017
Summary of Quality Control Checks Submission	Dec. 15, 2017
Draft Baseline Evaluation Report Submission	Jan. 12, 2018
Feedback on Baseline Evaluation Report Received	Jan. 31, 2018
Draft Baseline Findings Presentation Delivered - Washington	Week of Jan. 15, 2018
Draft Baseline Findings Presentation Delivered - Jakarta	Week of Jan. 22, 2018
Final Baseline Evaluation Report Submission	Feb. 23, 2018
DRB Submission	Mar. 2, 2018

5 REFERENCES

Aguirre, J. 2014. “Impact of Rural Electrification on Education: A Case Study from Peru.” Mimeo, Research Center, Universidad del Pacifico (Peru) and Department of Economics, Universidad de San Andrés (Argentina).

Akella, A.K. 2009. Social, economical and environmental impacts of renewable energy systems. Renewable Energy 34: 390–396

Apergis, N. 2010. Renewable energy consumption and economic growth: Evidence from a panel of OECD countries. Energy Policy 38(1): 656-660.

Arraiz, Irani, and Carla Calero. *From Candles to Light: The Impact of Rural Electrification*. Working paper no. IDB-WP-599. Inter-American Development Bank, May 2015. Web.

Asian Development Bank (2014). Mid-Term Report (Final): Least-Cost Electrification Plan for the Iconic Island; ADB TA8287

Asian Development Bank (2016). Achieving Universal Electricity Access in Indonesia ADB 2016; TA8287

Bailis R., Drigo R., Ghilardi A. and O. Masera (2015). The carbon footprint of traditional woodfuels. National Climate Change 5:266–72.

Banerjee, S. G., A. Singh, and Samad, H. (2011). Power and people : the benefits of renewable energy in Nepal. Washington D.C., World Bank.

Barron, M., and M. Torero. 2014. “Short Term Effects on Household Electrification: Experimental Evidence from Northern El Salvador.” Mimeo.

Bensch, G., Grimm, M., Huppertz, M., Langbein, J., & Peters, J. (2016). Are promotion programs needed to establish off-grid solar energy markets? Evidence from rural Burkina Faso (No. 653). Ruhr Economic Papers.

Bensch, G., J. Peters und M. Sievert (2017), The lighting transition in rural Africa — From kerosene to battery-powered LED and the emerging disposal problem. Energy for Sustainable Development 39 : 13-20.

Bernard, T. (2012). Impact Analysis of Rural Electrification Projects in Sub-Saharan Africa. World Bank Research Observer, 27(1), 33–51.

Birol, F. (2010). World energy outlook 2010. International Energy Agency, 1(3).
Chaplin, D., Mamun, A., Protik, A., Schurrer, J., Vohra, D., Bos, K., ... & Cook, T. Grid Electricity Expansion in Tanzania by MCC: Findings from a Rigorous Impact Evaluation, Final Report (No. 144768f69008442e96369195ed29da85). Mathematica Policy Research.

D'Agostino, A.L., Lund, P.D. and Urpelainen, J., 2016. The business of distributed solar power: a comparative case study of centralized charging stations and solar microgrids. Wiley Interdisciplinary Reviews: Energy and Environment.

Feron, S.; Heinrichs, H.; Cordero, R.R. Sustainability of rural electrification programs based on off-grid photovoltaic (PV) systems in Chile. Energy Sustain. Soc. 2016, 6, 32 https://energsustainsoc.springeropen.com/articles/10.1186/s13705-016-0098-4

Gibson, J., & Olivia, S. (2010). The effect of infrastructure access and quality on non-farm enterprises in rural Indonesia. World Development, 38(5), 717-726.
Glemarec, Y. Financing off-grid sustainable energy access for the poor. Energy Policy 2012, 47, 87–93.

Global Environment Facility (2009). “Investing in Renewable Energy: the GEF experience”. 2009. Global Environment Facility.

Gonzalez, M., and M. Rossi. 2006. “The Impact of Electricity Sector Privatization on Public Health.” IDB Working Paper No. 219, Inter-American Development Bank, Washington, DC.

Grimm, M., & Peters, J. (2016). Solar off-grid markets in Africa. Recent dynamics and the role of branded products. Field Actions Science Reports. The journal of field actions, (Special Issue 15), 160-163.

Grimm, M., Hartwig, R. & Lay, J. (2013). Electricity Access and the Performance of Micro and Small Enterprises: Evidence from West Africa. European Journal of Development Research, 25, 815-829.
Grimm, M., Sparrow, R., & Tasciotti, L. (2015). Does electrification spur the fertility transition? Evidence from Indonesia. Demography, forthcoming.

Grogan, L. & Sadanand, A. (2013). Rural Electrification and Employment in Poor Countries: Evidence from Nicaragua. World Development, 43(0), 252–265.
Hasan, A. 2013. Indonesian province explores ‘green growth’ amidst economic expansion. CIFOR. <blog.cifor.org>

http://en.rwi-essen.de/publikationen/rwi-materialien/353/

http://prokum.esdm.go.id/pp/2014/PP%20Nomor%2079%202014.pdf pg. 8
http://www.unredd.net/documents/un-redd-partner-countries-181/asia-the-pacific-333/a-p-partner-countries/indonesia-187/15077-final-evaluation-of-the-un-redd-programme-in-indonesia.html

http://www.unredd.net/documents/un-redd-partner-countries-181/asia-the-pacific-333/a-p-partner-countries/indonesia-187/15078-indonesia-redd-national-strategy.html

http://www.unredd.net/regions-and-countries/asia-pacific/indonesia.html

https://openknowledge.worldbank.org/handle/10986/16068

https://openknowledge.worldbank.org/handle/10986/20524

https://openknowledge.worldbank.org/handle/10986/22565

https://openknowledge.worldbank.org/handle/10986/23507

https://openknowledge.worldbank.org/handle/10986/24928

https://www.adb.org/documents/indonesia-energy-sector-assessment-strategy-and-road-map

https://www.adb.org/publications/adb-and-climate-investment-funds-country-fact-sheets

https://www.adb.org/publications/clean-energy-asia-case-studies-adb-investments-low-carbon-growth

https://www.adb.org/publications/climate-change-vulnerability-poverty-indonesia

https://www.adb.org/publications/cobenefits-and-trade-offs-green-and-clean-energy

https://www.adb.org/publications/cobenefits-and-trade-offs-green-and-clean-energy

https://www.adb.org/publications/diagnosing-indonesian-economy-toward-inclusive-and-green-growth

https://www.adb.org/publications/ground-case-studies-community-empowerment

https://www.adb.org/publications/investing-renewable-energy-generation-transmission-eastern-Indonesia

https://www.adb.org/publications/summary-indonesias-energy-sector-assessment

https://www.adb.org/publications/summary-indonesias-poverty-analysis

https://www.adb.org/sites/default/files/publication/178039/ino-paper-09-2015.pdf pg.8

https://www.adb.org/sites/default/files/publication/178039/ino-paper-09-2015.pdf pg.9

https://www.adb.org/sites/default/files/publication/178039/ino-paper-09-2015.pdf pg.31

https://www.adb.org/sites/default/files/publication/182314/achieving-electricity-access-ino.pdf pg.35

https://www.adb.org/sites/default/files/publication/182314/achieving-electricity-access-ino.pdf pg.46

https://www.adb.org/sites/default/files/publication/182314/achieving-electricity-access-ino.pdf pg.46

https://www.bps.go.id/website/pdf_publikasi/Neraca-Energi-Indonesia--2011-2015--.pdf

https://www.bps.go.id/website/pdf_publikasi/Neraca-Energi-Indonesia--2011-2015--.pdf

https://www.cia.gov/library/publications/the-world-factbook/geos/id.html

https://www.illegal-logging.info/sites/files/chlogging/uploads/IndonesiasiaranpdfGreenPaperFinal.pdf

https://www.researchgate.net/profile/Muhammad_Shahbaz29/publication/257548547_Economic_growth_energy_consumption_financial_development_international_trade_and_CO2_emissions_in_Indonesia/links/56dd1cb308ae

e1aa5f88cc5d/Economic-growth-energy-consumption-financial-development-international-trade-and-CO2-emissions-in-Indonesia.pdf

Independent Evaluation Group (IEG). 2008. The Welfare Impacts of Rural Electrification – An IEG Impact Evaluation. Independent Evaluation Group, World Bank.

Indonesia National Council on Climate Change. Fact Sheet Norway-Indonesia Partnership REDD+.http://www.norway.or.id/PageFiles/404362/FactSheetIndonesiaGHGEmissionMay252010.pdf

Khandker, S. R., Barnes, D. F., & Samad, H. A. (2013). Welfare Impacts of Rural Electrification: A Panel Data Analysis from Vietnam. Economic Development and Cultural Change, 61(3), 659–92.

Khandker, S. R., Barnes, D.F. & Samad, H.A. (2012). The Welfare Impacts of Rural Electrification in Bangladesh. The Energy Journal, 33(1), 187.

Khandker, S.R., Koolwal, G.B. (2010) How Infrastructure and Financial Institutions Affect Rural Income and Poverty: Evidence from Bangladesh. Journal of Development Studies, Vol. 46 (6), p.1109–1137

Khandker, Shahidur R., Douglas F. Barnes, and Hussain A. Samad. *Welfare Impacts of Rural Electrification: A Case Study from Bangladesh*. Working paper no. 4859. The World Bank, Mar. 2009. Web.

Kirubi, C., Jacobson, A., Kammen, D. M., & Mills, A. (2009). Community-based electric micro-grids can contribute to rural development: evidence from Kenya. World Development, 37(7), 1208-1221.

Lenz, L., A. Munyehirwe, J. Peters und M. Sievert. 2017. Does Large Scale Infrastructure Investment Alleviate Poverty? Impacts of Rwanda's Electricity Access Roll-Out Program. World Development 89 (17): 88-110.

Luttrell, Cecilia, Ida Aju Pradnja Resosudarmo, Efrian Muharrom, Maria Brockhaus, and Frances Seymour. “The Political Context of REDD+ in Indonesia: Constituencies for Change.” *Environmental Science & Policy* 35 (2014): 67–75.

McCarthy, John F, and Kathryn May Robinson. *Land and Development in Indonesia: Searching for the People’s Sovereignty*. Singapore: ISEAS – Yusof Ishak Institute, 2016.

National Council on Climate Change. 2010. Setting a course for Indonesia’s green growth.

Neelsen, Sven and Jörg Peters. 2011. “Electricity usage in micro-enterprises — Evidence from Lake Victoria, Uganda.” Energy for Sustainable Development, 15(1): 21–31.
Oakley, D., P. Harris, et al. (2007). Modern energy - Impact on micro-enterprise. A report produced by the Department for International Development. R8145. DFID. AEA Energy and Environment. March 2007.

Obeng, G. Y. and H. D. Evers (2010). Impacts of public solar PV electrification on rural microenterprises: The case of Ghana. Energy for Sustainable Development 14(3): 223-231.
Obeng, G.Y.; Evers, H.D. Impacts of public solar PV electrification on rural micro-enterprises: The case of Ghana. Energy Sustain. Dev. 2010, 14, 223–231

Pacheco, P. 2013. Biofuels and forests: Revisiting the debate. CIFOR. <blog.cifor.org>

Parikh, P., Fu, K., Parikh, H., McRobie, A., & George, G. (2015). Infrastructure Provision, Gender, and Poverty in Indian Slums. World Development, 66, 468-486.

Peters, J., & Sievert, M. (2015). The provision of electricity to rural communities through Micro-Hydro Power in rural Indonesia: Micro Hydro Power pilot programme within the national programme for community development (PNPM) supported by the Netherlands through energising development (No. 88). RWI Materialien

Peters, J., & Vance, C. (2011). Rural Electrification and Fertility – Evidence from Côte d'Ivoire. Journal of Development Studies, 47 (5), 753-766.

Peters, J., M. Sievert and C. Vance (2013), Firm Performance and Electricity Usage in Small Manufacturing and Service Firms in Ghana. In: Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH (ed.), Productive Use of Energy – PRODUSE - Measuring Impacts of Electrification on Small and Micro-Enterprises in Sub-Saharan Africa. Eschborn: Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH. 75-94

Peters, Jörg, Colin Vance, and Marek Harsdorff. 2011. "Grid Extension in Rural Benin: Micro-Manufacturers and the Electrification Trap." World Development, 39(5): 773–83.
Ramanathan, V., & Carmichael, G. (2008). Global and regional climate changes due to black carbon. Nature geoscience, 1(4), 221.

*Rencana Usaha Penyediaan Tenaga Listrik (*or RUPTL) 2015-2024

Rud, J.P. (2012). Electricity provision and industrial development: Evidence from India. Journal of Development Economics, 97(2), 352–67.

Shindell, D., Kuylenstierna, J. C., Vignati, E., van Dingenen, R., Amann, M., Klimont, Z., ... & Schwartz, J. (2012). Simultaneously mitigating near-term climate change and improving human health and food security. Science, 335(6065), 183-189.

Trimble, Christopher Philip; Kojima, Masami; Perez Arroyo, Ines; Mohammadzadeh, Farah. 2016. "Financial viability of electricity sectors in Sub-Saharan Africa : quasi-fiscal deficits and hidden costs". World Bank Policy Research Working Paper.

UNEP. 2012. Financing renewable energy in developing countries: Drivers and barriers for private finance in sub-Saharan Africa.

United Nations Environment Programme (UNEP). 2008. Green Jobs: Towards Decent Work in a Sustainable, Low-Carbon World.

UN-REDD. 2011c. UN-REDD Programme in Indonesia Semi-Annual Report.

van de Walle, D., Ravallion, M., Mendiratta, V., & and Koolwal, G. (2015). Long-term impacts of house

6 ANNEXES

6.1 Annex 1: Stakeholder Comments and Evaluator Responses

6.1.1 MCA-I Comments and Evaluator Responses

Reviewer Name/ Institution	Page Number (in draft EDR)	Comment	Evaluator Responses
Dwi Faiz/MCA-I	8	Correct abbreviation for PSGIP is Project Social and Gender Integration Plan (please do make necessary correction accordingly throughout the document	Corrected.
Dwi Faiz/MCA-I	24	positive impact of electrity should also include not only (gender) attitude but gender equality outcomes where women who are mostly overburden with household chores and mobility due to lack of electricity could save time, use it for capacity building and leisure, increase mobility and safety. See Deloitte (2014); ENERGIA (2007); Dinkelman (2011); Suggestion to revise or add the (gender) attitute to positive outcome for gender equality above, or to add not only education for children, but also opportunity for women to reduce household chores, improved mobility and safety as appropriate in the text explaining about positive impact of electricity. Evidence on rural electrification positive impact on women's employment could also be seen in the literature (example from South Africa, in addition to India) such as in: Dinkelman, Taryn (2011).	These outcomes are omitted from this section because they are not included in project M&E documents, but the evaluation does aim to capture and report on these outcomes, as appropriate (see instruments). We added a footnote to make this more clear.
Dwi Faiz/MCA-I	32	for primary question 2: additional lines of inquiry n may also be needed to differentiate between productive use of electricity at community/village of at household	Added the words "… at the community or household level" to the question for clarity
Dwi Faiz/MCA-I	32	For primary question 4: additional lines of inquiry should also cover: how does the SPV governance ensure transparent and participatory monitoring of community? Has the SPV governance/business models taken into account gender equality and social inclusion? How has the implementer prepared the transition/hand over of share to village enterprise? how has the SPV business model/business plan fit into existing condition of the village in terms of willingness/affordability to pay for electricity? (especially to ensure that less affluent household are able to pay for electricity)?	We will include these probing questions in our instruments, but feel it is superfluous to include them in the evaluation question itself.

Reviewer Name/ Institution	Page Number (in draft EDR)	Comment	Evaluator Responses
Dwi Faiz/MCA-I	37	Household information should also covers the following: number of family members, primary occupation/livelihoods and composition of gender, to differentiate electricity use for productive activities. In W3A-33, most villagers are farmers, where electricity consumption may reach its peak during the night for leisure and others, the most affluent households may be family of traders with more opportunity for off-farm economic activity that needs electricity. in W3A-59, agriculture post harvest processing is presumably contributes to productive use of electrity. Another point is any information about non-farm asset/livelihoods should also be included. In W3A-33 location, there are households opening stalls, or households with handicraft making as source of income in addition to agriculture activities. In household activities, household chores should also be identified clearly, to ensure that reproductive activities such as water-fetching, child rearing/nurturing be included. On key health issues, outcomes should include other than cleaner energy use, but longer availability of electricity for key health services, especially for child and maternal health. Longer availability of electricity can contributes to availability of cold chain for vaccine, better assistance and support for pregnancy with complication (maternal health), better access to clean water and good sanitation.	This information is included in the household survey.
Dwi Faiz/MCA-I	38	Security should also include mobility in the community, W3A-59 includes street lighting, security/safety in mobility outcome should also be diseggregated by sex.	The outcomes are captured in the household survey.
Dwi Faiz/MCA-I	38	Just a reminder to also put a gender balance in selecting member of sub-village for semi-structured protocols, there may be some social dynamics unable to be captured by one gender only.	For Beneficiary FGDs, there will be separate male and female groups to ensure inclusion of female perspective. For enterprise surveys, all enterprises (included female-operated) will be included. For HH survey, we will interview whoever is most responsible in household for decisions related to electricity usage. All other instruments will select people per their roles in their respective

Reviewer Name/ Institution	Page Number (in draft EDR)	Comment	Evaluator Responses
			organizations, whatever gender they may be.
Dwi Faiz/MCA-I	42	Limiting the respondents to household head may have risks of bias view on energy/electricity consumption, not to mention gender bias, as household head is presumable male. In most households observed in Berau, many questions raised during consultation come from women who are the household "manager" who oversee household spending, including on electricty. Having both men and women interviewed has merit in getting better information about electricity consumption, expenditure, clearer information on family members activities and time use. If this cannot be done, steps to avoid gender bias in responses should be taken such as triangulation with other methods. Pilot test should also sensitive to this issue.	The plan is not to interview household head, but to interview person in household responsible for decisions related to electricity, whether they are male or female. SI will take steps during piloting to ensure that we are not prevented from speaking with female household managers
Dwi Faiz/MCA-I	87	Questions for household health status should also incorporate maternal health, filter question on female household members pregnancy status and health will be needed	Due to concerns around the length of the survey, we have not included questions related to maternal health as it is not a primary intended outcome.
Dwi Faiz/MCA-I	87	In addition to health insurance, type of health service providers accessed should also be captured, such as puskesmas, pustu, house of bidan (midwives), traditional healers, halfway houses for labour, in case of maternal health complication (this will give information on potential electricity needed for basic service at village level)	Due to concerns around the length of the survey, we have not included questions on this in the household survey. However, we do include questions about health care options in the village survey.

Reviewer Name/ Institution	Page Number (in draft EDR)	Comment	Evaluator Responses
Dwi Faiz/MCA-I	93	Questions on perception on gender equality among community members is worth to ask, since as required in PSGIP development, gender equality has to be integrated in key critical stages of SPV development, such as engagament and participation in SPV establishment as well as information sharing on SPV.	Included in SPV Leadership instrument
Dwi Faiz/MCA-I	95	all demographic data should be disaggregated by sex , where appropriate	Population figures disaggregated by male/female in regency and village official protocols.
Dwi Faiz/MCA-I	100	for the open ended question on living condition, the protocol does not explanatory notes on what is considered as 'improved living condition' , while general poverty indicators such as housing condition is understood, the response could be varied. Hence it will be good if there is an explanatory notes to explain the living condition. It will be good if improvement of living condition could also identify availability of basic social services, such as availability of (functional) health and education services and basic human development improvement such as education attainment, health status (numbers/incidence of maternal mortality and children under two, malnutrition, etc).	Regarding educational attainment, the questionnaire includes questions on the highest level of education, the years spent on education, and the time spent studying inside and outside of school of children (disagregared by gender). We elicit information on availability of basic services via regency and community official instruments. We added maternal health questions only to the FGD guides and Village Official questionnaire, as we do not expect electricity access to affect maternal health variables with a detectable size, as the timeframe is only one-year, the channel of this impact is only indirect, and as sample sizes of pregnant women within this year will

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			be too small to detect effects.
Dwi Faiz/MCA-I	102	Question no. 22L: please refer to my comment in p. 93	A few questions on gender awareness were added to the questionnaire. They may be adopted to the training context after receiving training materials.
Dwi Faiz/MCA-I	103	There is no reference on basic social service facilities (Schools, Puskesmas, etc) at Regency	This is included in the regency and village official protocols
Dwi Faiz/MCA-I	105	At Regency-level, information on priority agriculture commodities (produk pertanian unggulan) and value-addition agro commodities could be available , it should also be on the list of question.	This has been added.
Dwi Faiz/MCA-I	106	Similar comment on living condition	This has been added.
Dwi Faiz/MCA-I	107	Similar comment on gender equality for question no. 16	This has been added.
Arief/MCA Indonesia/M&E	iii	ESMP: Environmental and Social Management Plan	Corrected.
Arief/MCA Indonesia/M&E	iv	M&E: Monitoring and Evaluation	Corrected.
Arief/MCA Indonesia/M&E	iv	NRE: New and Renewable Energy	Corrected.

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Arief/MCA Indonesia/M&E	iv	PE: Performance Evaluation	Corrected.
Arief/MCA Indonesia/M&E	v	PMAP 1: Participatory Mapping and Planning 1	Corrected.
Arief/MCA Indonesia/M&E	v	PMAP 2: Participatory Mapping and Planning 2	Corrected.
Arief/MCA Indonesia/M&E	7	Paragraph 2: PMaP 2 and 8 has been contracted and PMaP 5 are cancelled.	Corrected.
Arief/MCA Indonesia/M&E	8	Para 5: By July of 2015, 21 TAPP grant agreements had been issues	Clarified in the text.
Arief/MCA Indonesia/M&E	9	para 2: the secuence should be: there are 21 TAPP has been awarded for window 3A. Then 7 grantees out of 21 received the TAPP Extension. Then 5 grantees awarded the Grant Agreements to move to the construction stage.	Clarified in the text.
Arief/MCA Indonesia/M&E	9	The table: according to Grant Agreement, the Implementer for W3A-59 is PT Anekatek Consultant not Castlerock Consulting	Corrected.
Arief/MCA Indonesia/M&E	29-34	As the methodology will apply impact evaluation for W3A-59 I East Sumba, there is still unclear explanation on determining the control group. What kind of criteria used to determine that these control group does not receive any intervention except MCA-Indonesia project. it is better to have explanation regarding the situation in control group to make us understand the link between criteria and condition in control group.	Explanation of determining sample frame and sample for control group is in section 3.3.3
Arief/MCA Indonesia/M&E	29	Regarding the Evaluation Question No. 4 related to the SPV, it is also valuable to assess about the factors that makes the SPV sustainable. This is unclear whether this key success factor will be one of the results of this evaluation.	We will explore these factors. EQ4 directly asks about the SPV's effect on sustainability. Our qualitative approach says we will "explore how each SPV approach/scheme ultimately impacted the achievement of outcomes of interest."
Arief/MCA Indonesia/M&E	29-34	The evaluation will evaluate the project implementation based on project theory of change. This assumes that the project theory of change is correct. However, it is also possible that the deviation in the implementation because of the development of the theory of change is very weak such as not through assessment from previous experience.	We will assess the outcomes and assumptions of the theory of change as well as assess its relevance in our

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		therefore, it is valuable also to assess the process of the development of the theory of change.	literature review, but we belive that an analysis of the development of the theory of change is outside the scope of this evaluation.
Arief/MCA Indonesia/M&E	29-34	For SPV model, it is very difficult to see the genesis of the SPV structure. In Indonesia, there are many community project that tries to develop an organizations to maintain infrastructure sustainability such as Community water supply project for low income (Pamsimas), National Community Empowerment for rural area (PNPM Perdesaan) and for environmental protection (PNPM Green) not to mention other projects on maintaining community infrastructure such as Community electricity implemented by Ministry of Energy and Minaral resource and community empowermnet in fishery and coastal area implemented by Ministry of small island and Marine. I think the evaluator should also to assess whether the development of the SPV model has also taken into account the best practices from similar model developed before.	Incorporated in grantee protocol
Syarifah/ PMC		**Sample selection**: For Window 3A, W3A-59 East Sumba and W3A-33 Berau were nominated as the sample for the perfomance and impact evaluation. From methodological perspective and practicality, we understand why these two grants were selected. However, we are wondering if it is possible to consider additional sample(s) with different characteristic (at least for performance if not posible for impact evaluation). For example, unlike East Sumba and Berau, W3A-68 Wakatobi and W3A-80 Karampuang, as you are aware, are geographically isolated (small Island). Karampuang is also the most advance in term of the implementation progress which allow the evaluation to explore more. Further, from the design stage, we've learned that there are at least three types of grantees in W3A Pprojects: 1) Contractor: Grantee with the main interest in constructing the facilities and then leave e.g. W3A 56-58; 2) Grantee with the interest to contribute to local development as part of their Social Responsibility and to improve profile. Grantee might stay 2-3 year after the project and then leave e.g. W3A-33, W3A-59, W3A-68; and 3) Grantee with the interest to stay for a long tearm and expand business in the area. It will be interesting to how these different characteristic contribute to the project effeciveness and sustainability .	It is not financially feasible at the baseline stage to expand the scope of the evaluation past Berau and East Sumba. However, we have included a sub-section in the Evaluation design overview to provide initial ideas for optional lines of inquiry that could be pursued with an expanded endline scope, budget permitting. We plan to include H1 Hivos in future data collection periods.

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Syarifah/ PMC		The Project information/description presented in the EDR is based on the planning documents, which some might have changed as the implementation started. There is a need as such for the Evaluation team to update the information.	SI requested updated documents from MCC and from grantees before final submission of EDR. Information in EDR reflects the most updated documents shared with SI.
Syarifah /PMC		**Data colection Schedule** : given the differences in the project start and implementation progress, we have a concern on the project ability to complete the activities and demonstrate results by the time the evaluation is started i.e. October. W3A-59 for example, we are aware that they will only start the trainings on economic opportunity (realistically) in late September and October. How the evaluator will consider the project implementation progress in starting teh evaluation process.	The first data collection event in the evaluation is a baseline. Thus, it is not meant to capture any results. It is meant to serve as a point of comparison for a future point in time when we expect to be able to discern results, if they have indeed occurred.
Syarifah /PMC		**Length of questionnaires and time of HH survey**: The questionnaires for HH survey is comprehensive yet long (140s questions) and the interview will most likely take more than 3 hours/respondent. Given the context of the respondents who are mostly fishermen and or farmers, how would you make sure the availability and most importantly maintain the interest of respondents in answering the questions.	We took out the Willigness-to-Accept taks, as it may consume time. We furthermore took out: a) Questions 96 on livestock and animal products sold within last 12 months; b) Question 115 on exact cook stove use, as electric stoves are asked for beforehand; c) Questions 119, 120, 121: membership in associations, as community participation is an expected impact of electrification but it is not an explicit target of the program; d) Questions 125

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			and 126 on boiling and filtering water; e) Question 142 on purpose of mobile phone usage. However, a few questions were added as response to the comments. We expect the interview to take around 1,5 hours, given that most questions are simple yes/no questions. Also note, that some questions have to be skipped when not appropriate. We ask attitude and awareness questions towards the end, expecting to raise interest. However, we will pretest the questionnaire in the field and will revise, if it's implementation takes longer than 1,5 hours.
Linny Ayunahati/PMC		During the conference call meeting, it was told the Evaluation type for this Off-Grid RE will cover both Performance Evaluation and Impact Evaluation. As for the Impact Evaluation, the survey tools, analysis plan and questionnaires are very well prepared and thorough. Will SI develop more in-depth survey instrument/questionnaire and the analysis plan for the PE? such as questions related to how the project is being implemented, how is the program management, operational decision making, performance issues,how it is perceived and valued, accomplishments to date, constraints. The Grantee KII Protocol covers some questions related to the evaluation on the implementation, is it enough? Who are the other target respondents to triangulate the information?	The IE and PE will largely use the same instruments (although the household survey will be more brief for the PE). They mainly differ in that the PE does not utilize an evaluation design with a valid counterfactual. Thus, outcomes of interest will be characterized by a simple pre/post measurement technique and qualified

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			from stakeholder views on program effectiveness.
Linny Ayunahati/PMC		We understand the reason for the selection of 2 projects for this evaluation. However, it is suggested to include a sample of project at a more advance level of implementation (W3A-80) for the Performance Evaluation, with the objective to learn from the design phase to the implementation/completion phase of the construction on the performance, design, effectiveness and operational performance. What worked well, what could be done differently, what are lesson learned for the implementation of similar projects in future in Indonesia. Lessons and recommendations will be very useful for the Government of Indonesia and other stakeholders.	SI appreciates this recommendation. However, for the reasons outlined in the EDR, we and MCC agreed to target the grants in Berau and East Sumba for evaluation.
Jeff D. PMC	8	by July 2015 -more than 7 TAPP grants existed	Corrected.
Jeff D. PMC	9	W3A-33: check size of combined capacity -1671 may not be correct	Corrected based on grant agreement. Previous figures were from DFS. Note summary table was replaced, correction is in grant-specific section.
Jeff D. PMC	9	W3A-56-58: They are not using 10 different facilities - they are using 7 gasifiers machines spread over 3 locations. (Additional fact checking shall be conducted to ensure accuracy).	Corrected. Note summary table was replaced, correction is in grant-specific section.
Jeff D. PMC	9	W3A-59: They are helping to establish Cooperatives in each village, but there is only 1 "SPV"	Summary table was replaced, but correction made in grant-specific section
Jeff D. PMC	9	W3A-68: Combined capapcity of output much higher than report stated 300kW	Corrected based on grant agreement. Previous figures were from DFS. Note

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			summary table was replaced, correction is in grant-specific section.
Jeff D. PMC	16	W3A-33: They are not using the "KSM" approach. They are using the BUMDes structure within the village government	SPV approach corrected based on May 2017 SPV Business Plan
Jeff D. PMC	17	W3A-56-58: says 7 facilities here (page 9 uses 10). Is a facility considered the building/site used for generation -or- the number of electricity generating equipment used?	Summary table was replaced, but grant-specific section references gasifiers as facilities
Jeff D. PMC	17	W3A-56-58: This project is changing the "SPV" structure. No "LVEs" are currently envisioned and most recent 'SPV" business plan is different than what is presented here.	SI did not receive more updated business plan than DFS. We note in Evaluation Design that SPV approaches will be updated using primary data collection where possible, and recommend that these be updated ex post where possible.
Jeff D. PMC	18	W3A-59: construction start was postponed past May 2017	Updated based on most recent work plan
Jeff D. PMC	19	W3A-59: They are no longer pursuing the Cooperative approach -using BUMDes instead	Based on July 2017 SPV business plan, this grant is still using a cooperative approach. We will update in evaluation report based on primary data collection and any updated documentation.
Jeff D. PMC	20	W3A-80: They are no longer pursuing the BUMDes approach -using Cooperatives instead	SI did not receive more updated business plan than DFS. We note in Evaluation Design that SPV approaches

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			will be updated using primary data collection where possible, and recommend that these be updated ex post where possible.
Jeff D. PMC	31	W3A-33: please note that the "micro-hydro component is insignificant to the overall supply of electricity in the mini-grid.	Noted and included in the text.
Aretha Aprilia. PMC	9	On point 4, please check whether it should instead be stated as 'landscape-lifescape analysis'	Corrected.
Aretha Aprilia. PMC	9	W3A-33: "Connect 463 households across 3 villages to grids powered by 3 Solar Photovoltaic (PV) and 1 Micro-hydro facilities." It should be 'Pico-hydro' as the installed capacity is only 30 kW (when the actual capacity estimates based on PMC's engineering team is less than 10 kW).	In order to reflect project documentation and US industry standard classifications (https://www.irena.org/DocumentDownloads/Publications/RE_Technologies_Cost_Analysis-HYDROPOWER.pdf; pg. 11) we will continue to use micro-hydro. However, we have updated text to reflect relative capacity of micro-hydro to solar in Berau
Aretha Aprilia. PMC	12	"The East Sumba regency was targeted by this this project based on previous studies executed under an ADB Technical Assistance grant (TA 8287) held by the implementer, Castlerock Consulting" --> The implementer of project is PT Anekatek. Castlerock provided service on the crosscutting deliverables.	Corrected.
Aretha Aprilia. PMC	19	"Over the course of a month while the facilities are under construction, Electric Vine Industries (EVI) will conduct Focus Group Discussions (FGD)…" --> The Implementer of this project is PT Anekatek, not Electric Vine.	Corrected

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Aretha Aprilia. PMC	23	"In the case of W3A-33, these additional streams include increased income for honey and boat production and additional resource cost savings on ice for fishing." The statement on honey and boat production came from PT Akuo (the implementer), which needs further revalidated. Secondly, the term 'ice for fishing' should perhaps be replaced by 'ice for storage of caught fish' or something to that effect.	Without commenting on the validity of this statement, we simply note in this section that it is included in the ERR to which we have access. Sentence on "ice for fishing" corrected.
Aretha Aprilia. PMC	27	In regards to the policy relevance, there were no mentioning of the recent development of RE policies e.g. the Ministerial Decree No. 38/2016 was devised to help expedite electricity development in the remote villages across the nation. Conversely, the Energy and Mineral Resources Ministry Regulation No. 12/2017 and Industry Ministry Decrees No. 4 and 5/ 2017 on requirements for local content for solar PV modules in Indonesia may inflict negative trends in RE development throughout the country.	This is included in the literature review section now.
Aretha Aprilia. PMC	29	Project W3A-80 has more advanced progress compared these two projects, has overall better performance in both engineering and crosscutting deliverables, and therefore shall be considered to be investigated further in order to obtain the 'good practices' perspectives.	SI appreciates this recommendation. However, for the reasons outlined in the EDR, we and MCC agreed to target the grants in Berau and East Sumba for evaluation. We note that W3A-80 may be considered for ex post evaluation, where good practices could be noted.
Aretha Aprilia. PMC	N/A	There are 144 Questions in total, which would essentially take a lot of time and may cause inconvenience to the HH respondents. The authors shall select questions carefully and tally them with the main objectives / key questions.	We took out the Willigness-to-Accept taks, as it may consume time. We furthermore took out: a) Questions 96 on livestock and animal products sold within last 12 months; b) Question 115 on exact cook stove use, as electric stoves

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			are asked for beforehand; c) Questions 119, 120, 121: membership in associations, as community participation is an expected impact of electrification but it is not an explicit target of the program; d) Questions 125 and 126 on boiling and filtering water; e) Question 142 on purpose of mobile phone usage. However, a few questions were added as response to the comments. We expect the interview to take around 1,5 hours, given that most questions are simple yes/no questions. Also note, that some questions have to be skipped when not appropriate. We ask attitude and awareness questions towards the end, expecting to raise interest. However, we will pretest the questionnaire in the field and will revise, if it's implementation takes longer than 1,5 hours.
Aretha Aprilia. PMC	113	What is "EWSA electricity" as stated in Q11?	Thank you. This was a mistake. It has been replaced by PLTMH

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Aretha Aprilia. PMC	30	Regarding the Outcome 3 on GHG emissions: as we understand that MCAI has hired a consultancy firm to conduct GHG emission evaluations to estimate the avoided emissions, using IPCC methodologies. Does this relate to that assessment results?	Yes--SI will provide primary empirical inputs to this model and qualify any of the models assumptions if they are not supported by our data collection.
Econ Team	23	For your kind information, ERR for community-based RE projects have been through some re-scopings, such as increased/decreased in project cost, number of HH to be electrified. And as per today (August 8) ERR for: 1. W3A-33 Project is 24.5.%, 2. W3A-56-58 Project is 11.82%, 3. W3A-59 Project is 16.82%, 4. W3A-68 Project is 15.7%, 5. W3A-80 Project is 34.91% Yes indeed, there were additional benefits for W3A-#33 and W3A-#80. But MCC Economist suggested to generalized all ERR models, which is, at least for now, no need to put additional benefits for all W3A projects.	MCC has asked SI to use ERR estimates in the report to which we had access at the time of the draft EDR (July 2017). We will update these estimates in our evaluation report according to updated documentation.
Econ Team	23	Since one of the outcome for these projects is replacement for fossil fuel used, such as kerosene and solar for diesel genset, it would be good to get data and information about how many litters are kerosene/diesel that was replaced after connected to RE grid.	These variables are included in our household survey instrument.
Rini/M&E	questionnaire p 88 - 89	Refine the questionnaire to measure level of increased awareness contributed by the project - whether the beneficiaries: (i) understand what is RE; (ii) understand the importance of RE; (iii) understand the cost & benefit of using RE; (iv) somewhat reach the level of understanding on importance of RE that add/push them to exert effort to sustain the RE investment. Triangulate the questions by interviewing the grantee and reviewing the quality of training materials developed by the grantees.	We added these questions to the household questionnaire and similiar questions to the grantee protocol. Training materials will be reviewed and potential changes made to the instruments upon receipt of the materials.

6.1.2 MCC Evaluation Management Committee Comments and Evaluator Responses

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MCC Energy eval lead	1	Remember that there are two types of RE grants under GP: on-grid/commercial and off-grid/community. This evaluation only covers off-grid, so it should be titled accordingly. Something along the lines of "Grant Facility Community-based Off-grid Renewable Energy Grant Portfolio". This wil come up again in later comments, but this evaluation should refer mostly to the community-based off-grid renewable energy grant portfolio. It's fine to reference the windows when introducing the project, but after windows closed, MCA-I shifted to discussing grants in the context of portfolios. This is at least in part because grants with RE components ended up being awarded under all 3 windows and so the window distinction is no longer meaningful.	Thank you, we have made this change in referencing the grant portfolio.
MCC Energy eval lead	7	PLUP is not going to end up working in all 45 districts. Please change to "Overall, PMAP contracts will include implementation in UP TO 45 districts throughout Indonesia"	Done.
MCC Energy eval lead	7	To make the term "windows" slightly clearer, you could say "funding windows' in this sentence: Grants will be funded through three schemes, or “windows”: Partnership Grants (Window 1), Community-based Natural Resource Management Grants (Window 2), and Renewable Energy Grants (Window 3).	Done.
MCC Energy eval lead	8	For the sake of comprehensiveness of the GP evaluation work after the Compact closes, the focus of the evaluation should be described as "community-based off-grid" not Window 3A. The EDR was being developed as MCC was getting a better sense of what interventions were incorporated into the W2 portfolio, as we were not involved in the investment decisions on W2. Midway through the EDR development process we notified SI that there was actually a significant number of off-grid RE grants in W2 and asked those to be considered for this evaluation. We can understand if SI was not able to incorporate W2 into the evaluation design for technical or practical reasons, but the existence of those off-grid grants needs to be acknowledged in the EDR. Similarly, there was one W1 grant with an RE component (WWF), though it seems the RE component is not going to proceed. Section 2.1.1. will need to be edited to discuss off-grid RE under different scenarios: W1, 2, and 3A. The description of the TAPPs and 3A is fine, but the report has to acknowledge that there were also off-grid RE projects in W2 that were awarded and designed with a slightly different approach. You can make reference to the one W1 RE grant, though not much needs to be written about that.	We have reshaped the report as requested in this comment, presenting the context by which all CBOG RE grants were funded, not just those from Window 3A. We have included ways that the evaluation's scope could be expanded in future data collection periods to include some of the other grants.

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MCC Energy eval lead	8	It's important to specify that 3A is off-grid (in addition to be community-based) and that 3B is on-grid (in addition to being commercial-scale)	Added the following sentence: "Compared to the off-grid W3A grants, all W3B grants fund on-grid electrification. "
MCC Energy eval lead	8	The description of 3A TAPP grants needs to be updated. Please see the 2017 M&E Plan for more details (both the GP project description in the narrative and Annex V). 21 3A TAPP grants were signed.	Corrected based on MCA-I comment.
MCC Energy eval lead	9	A 6th 3A grant is likely to be signed in August. If it does go through, it should be referenced in the table with a footnote similar to the Puriver one.	Included in the new overall CBOG RE portfolio table. It does not have a section in the narrative because we were unable to review project documentation.
MCC Energy eval lead	10	2.1.2. would ideally cover the other off-grid RE grants as well, even if not in as much detail. A list of the relevant W2 grants and a sentence or two on each could be sufficient.	New Table 1 is a list of all relevant CBOG RE grants provided by Shreena/MCA-I. We included more detailed sections for the ten grants for which we were able to review project documentation. Note that we only had the grant agreement for the Puriver grant so we were unable to fill out implementation to date section.
MCC Energy eval lead	22	Please refer to the analysis as "cost benefit analysis" rather than "ERR analysis". The ERR is just one statistic to come out of a CBA.	Done.
MCC Energy eval lead	29	Given the planned comparison between the two RE grants (Anekatek vs. other), it might make sense to add an evaluation question or sub-question to one of the existing questions, along the lines of: How do energy consumption patterns differ across [type of technology / geography / window]? Or are findings consistent across different types of grants? The wording of this Q will depend on which second grant the group opts for.	We have added a note following the evaluation questions to indicate that findings will be analyzed and presented within and across grants to identify patterns or differences. However, we also note that the lack of a counterfactual in Berau can heavily confound results and is not an equal comparison to the counterfactual-based design in Sumba.
MCC Energy eval lead	31 / General	Let's agree on a name for grants other than the grant number and replace references to the grant numbers after the initial introduction. Apparently there are sometimes two different	See new naming convention preceding Table 1.

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		numbers in the accounting systems. I would suggest "Sumba Anekatek Solar" for 59, for example.	
MCC Energy eval lead	33	Exposure period - note that 1 year after the baseline might only give households an exposure to treatment of 6 months (let's say works aren't completed until March 2018). This doesn't seem long enough to expect HHs/businesses to have changed behaviors and bought new appliance, particularly for productive uses. I would conduct the follow-up in 2019. Is the stakeholder input on adoption of electricity in Sumba documented in a report?	Per Anekatek's updated work plan, commissioning in Sumba will take place between November of 2017 and February of 2018. This will make for exposure period of between 8-11 months. As discussed in presentations, there is also concern about contamination from PLN electrification after October of 2018. For this reason, and per MCC's approval issued via email on 8/10, we will maintain our proposed exposure period.
MCC Energy eval lead	34	We'll need to be clear whether the EDR is approved including the 3rd round of data collection 2-3 years post-installation or not. The wording should be adjusted accordingly.	Based on email from Vivian following DC presentation, SI's understanding is that we are to move forward with both follow ups in the EDR. We have included both follow ups in the budget.
MCC Energy eval lead	35	How do these MDEs compare to the assumptions in the CBA for Anekatek? Please document this so that we have a sense of how the power of the evaluation compares to the investment committee's expectation of impacts.	Added a footnote to describe this. In summary, we are likely adequately powered to detect changes in consumption, although we may be underpowered for changes in expenditure based on CBA's estimates.
MCC Energy eval lead	36	Please introduce the ADB TA referenced, at least in a footnote. What did the TA cover, where was it, etc. so that readers understand how it's relevant.	Added the following footnote to the TA's introduction in section 2.1.2.3: "The purpose of this TA was to “support the GoI’s Sumba Iconic Island Initiative,” which aims to electrify 95% of households on the island of Sumba via 100% renewable means by 2025. The referenced Network Planner exercise was part of a “comprehensive least-cost electrification planning exercise” for Sumba, wherein the most cost-effective and

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			technically appropriate means for achieving a 100% electrification ratio were laid out (ADB 2014). "
MCC Energy eval lead	44	When proposing optional work, the EDR needs to be clear about what's actually agreed to and what's optional for a future decision. Perhaps add a section to the end with Optional expansions to the evaluation.	New sub-section included in Evaluation Design Overview to separate proposed evaluation work from optional add-on work.
MCC GSI lead	v	Correct abbreviation for PSGIP is Project Social and Gender Integration Plan (please do make necessary correction accordingly throughout the document	Done.
MCC GSI lead	6	SI states the following "Indeed, the Asian Development Bank (ADB) indicates that there is substantial evidence that “energy efficiency is the best way to mitigate GHG emissions while also meeting the growing requirements for energy services that accompany expanding economic growth". RE under GP is not "energy efficiancy" project, rather reducing fossil fuel and GHG reduction. What is the rationale of refering to "energy efficiency" ?	We have replaced this quote justifying investment in RE for low-carbon growth with the following "Indeed, the Asian Development Bank (ADB) indicates that renewable sources of electricity offer many “positive cobenefits” in addition to reduced GHG emissions including rural revitalization, jobs and employment, economic development, and avoided environmental costs of fuel extraction and transport. "
MCC GSI lead	6	The objective of GP is to help Indonesia reduce GHG, as it is one of the worst polluters. Not because it is suffering from global warming events.	We present GP's objectives in a later section--this section is referencing GoI's own policy and justification for reducing GHG emissions, per the cited Green Paper, which is tied to their policy on climate change.
MCC GSI lead	20	The Theory of change states " community cooperatives will have the capacity to operate and manage the micro-grids such that household income will be increased and GHG emissions decreased…" . It is better to have a more practical narrative such as "micro-grids	We felt it important to include downstream impacts, as these are part of the testable theory of change, but we included an intermediate sentence using the suggested

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		will be sustainable as communities receive benefits and SPV will continue to provide O&M services.	language to improve the practicality of the narrative.
MCC GSI lead	21	One very important gender equality outcomes with electricity access is missing. Women are able to save time and efforts by using timesaving appliances and equipment that need electricity. This results women having more time for human development, social, networking and economic opportunities, able to take rest, and feel secure in lighted homestead. See Deloitte (2014); ENERGIA (2007); Dinkelman (2011); Evidence on positive impact on women's employment and income opportunities from electrification (example from South Africa, India): Dinkelman, Taryn (2011).	These outcomes are omitted from this section because they are not included in project M&E documents, but the evaluation does aim to capture and report on these "typical" outcomes, as appropriate (see instruments). We added a footnote to make this more clear.
MCC GSI lead	29	for primary question 2: need to differentiate between productive use of electricity at community/cooperative and at household levels.	Added the words "… at the community or household level" to the question for clarity
MCC GSI lead	29	For primary question 4: additional probing questions can include (a) does the SPV governance ensure transparent and participatory monitoring of community? (b) Has the SPV governance/business models taken into account of equal participation by women and marginalized/poor households in SPV formation and management? (c) How has the implementer prepared the smooth transition/hand over to community SPVs? (d) how has the SPV business model/business plan fit into existing condition of the village in terms of willingness/affordability to pay for electricity? (especially to ensure that less affluent household are able to pay for electricity)?	We will include these probing questions in our instruments, but feel it is superfluous to include them in the evaluation question itself. See updated SPV leadership and grantee protocols.
MCC GSI lead	37	Household information should also covers the following: number of family members, primary occupation/livelihoods and composition of gender, to differentiate electricity use for productive activities. In W3A-33, most villagers are farmers, where electricity consumption may reach its peak during the night for leisure and others, the most affluent households may be family of traders with more opportunity for off-farm economic activity that needs electricity. in W3A-59, agriculture post harvest processing is presumably contributes to productive use of electrity. Another point is any information about non-farm asset/livelihoods should also be included. In W3A-33 location, there are households opening stalls, or households with handicraft making as source of income in addition to agriculture activities. In household activities, household chores should also be identified clearly, to ensure that reproductive activities such as water-fetching, child rearing/nurturing be included. On key health issues, outcomes should include other than cleaner energy use,	This information is included in the household survey.

Reviewer Name/ Institution	Page Number (in draft EDR)	Comment	Evaluator Responses
		but longer availability of electricity for key health services, especially for child and maternal health. Longer availability of electricity can contributes to availability of cold chain for vaccine, better assistance and support for pregnancy with complication (maternal health), better access to clean water and good sanitation.	
MCC GSI lead	38	Security should also include mobility in the community/village, W3A-59 includes street lighting, security/safety in mobility outcome should also be diseggregated by sex.	The outcomes are captured in the household survey.
MCC GSI lead	38	Protocols need to include gender balance in selecting member of sub-village, women need to have their voices in all structures.	For Beneficiary FGDs, there will be separate male and female groups to ensure inclusion of female perspective. For enterprise surveys, all enterprises (included female-operated) will be included. For HH survey, we will interview whoever is most responsible in household for decisions related to electricity usage. All other instruments will select people per their roles in their respective organizations, whatever gender they may be.
MCC GSI lead	42	Limiting the respondents to household head may yield biased/onesided view on energy/electricity consumption, not to mention gender bias, as household head is considered male. In most households observed in Berau, many questions raised during consultation come from women who are the household "manager" who oversee household spending, including on electricty. Having both men and women interviewed has merit in getting better information about electricity consumption, expenditure, clearer information on family members activities and time use. If this cannot be done, steps to avoid gender	The plan is not to interview household head, but to interview person in household responsible for decisions related to electricity, whether they are male or female. SI will take steps during piloting to ensure that we are not prevented from speaking with female household managers

Reviewer Name/ Institution	Page Number (in draft EDR)	Comment	Evaluator Responses
		bias in responses should be taken such as triangulation with other methods. Pilot test should also sensitive to this issue.	
MCC GSI lead	87	Questions for household health status should also incorporate maternal health, filter question on female household members pregnancy status and health will be needed	Due to concerns around the length of the survey, we have not included questions related to maternal health as it is not a primary intended outcome.
MCC GSI lead	87	In addition to health insurance, type of health service providers accessed should also be captured, such as puskesmas, pustu, house of bidan (midwives), traditional healers, halfway houses for labour, in case of maternal health complication (this will give information on potential electricity needed for basic service at village level)	Due to concerns around the length of the survey, we have not included questions on this in the household survey. However, we do include questions about health care options in the village survey.
MCC GSI lead	93	Questions on perception on gender equality among community members need to be asked, as required in PSGIP development, gender equality has to be integrated in key critical stages of SPV development, such as engagament and participation in SPV establishment as well as information sharing on SPV.	SPV leadership protocol updated to include such a question
MCC GSI lead	95	all demographic data should be disaggregated by sex , where appropriate	Population figures disaggregated by male/female in regency and village official protocols.
MCC GSI lead	100	for the open ended question on living condition, the protocol does not include explanatory notes on what is considered as 'improved living condition' , while general poverty indicators such as housing condition is understood, the response could be varied. Hence it will be good if there is an explanatory notes to explain the living condition. It will be good if improvement of living condition could also identify availability of basic social services, such as availability of (functional) health and education services and basic human development improvement such as education attainment, health status (numbers/incidence of maternal mortality and children under two, malnutrition, etc).	Regarding educational attainment, the questionnaire includes questions on the highest level of education, the years spent on education, and the time spent studying inside and outside of school of children (disagregared by gender). We elicit information on availability of basic services via regency and community official instruments. We added maternal health questions only to the FGD guides and Village

Reviewer Name/ Institution	Page Number (in draft EDR)	Comment	Evaluator Responses
			Official questionnaire, as we do not expect electricity access to affect maternal health variables with a detectable size, as the timeframe is only one-year, the channel of this impact is only indirect, and as sample sizes of pregnant women within this year will be too small to detect effects.
MCC GSI lead	102	Question no. 22L: please refer to comment in p. 93	A few questions on gender awareness were added to the questionnaire. They may be adopted to the training context after receiving training materials.
MCC GSI lead	103	There is no reference on basic social service facilities (Schools, Puskesmas, etc) at Regency	This is included in the regency and village official protocols
MCC GSI lead	105	At Regency-level, information on priority agriculture commodities (produk pertanian unggulan) and value-addition agro commodities could be available , it should also be on the list of question.	This has been added.
MCC GSI lead	106	Similar comment on living condition	This has been added.
MCC GSI lead	107	Similar comment on gender equality for question no. 16	This has been added.

6.2 Annex 2: Evaluation Budget

Per MCC's instructions regarding sensitivities around future procurements, the evaluation budget corresponding to this Evaluation Design Report has been provided to MCC separately.

6.3 Annex 3: Instruments

This annex includes the English version of all instruments that we plan to use in the evaluation, as they were referenced in Sections 3.3.4 and 4.3.4. W3A Anekatek Solar, East Sumba/W3A Akuo Energy Solar/Micro-Hydro, Berau Household Survey.

6.3.1 Household Questionnaire

HOUSEHOLD QUESTIONNAIRE

Impact Evaluation Baseline Study 2017

Green Prosperity Renewable Energy Grant

1. Questionnaire N° _____

2. Site code _____

3. Geo coordinate _____

4. Date _____

5. Hamlet _____

6. Interviewer's name _____

7. Starting Time of Interview _____ : _____ h

8. The walls of the main building consist of…

1	☐	Bamboo
2	☐	Wood
3	☐	Coconut stem
4	☐	Unburnt bricks

9. The main roofing material is …

1	☐	Ijuk
2	☐	Palm leaves
3	☐	Wood
4	☐	Iron sheets

10. The main flooring material is…

1	☐	Earth
2	☐	Bamboo
3	☐	Wood
4	☐	Concrete
5	☐	Bricks

5 ☐ Burnt bricks	5 ☐ Concrete	6 ☐ Stones
☐ Other_____	6 ☐ Tiles	7 ☐ Ceramics
	☐ Other_____	☐ Other_____

11. Are the windows fitted with glass?

1 ☐ Yes
0 ☐ No

12. Is the building plastered?

1 ☐ Yes
0 ☐ No

[COMMENTS]

Basic Information

13.	**14.**	**15.**	**16.**		**17.**	**18.**	**IF CODE 2. or 3.**	
							19.	**20.**
Who are the permanent residents of this household? What relationship does each member have to the head of household? **[Only include household members who are at least 11 years of age]**	Sex	Age	Education **1.** Level of education	**2.** Number of years	First Occupa-tion	Second Occupa-tion	Where does he/ she exercise this occupation?	How much does he/ she earn per month?
	m / f	*years*	*code*	*Years* **[WITHOUT RE-PETITIONS**	*code*	*code*	*code*	*IDR*
a. ☐ _____							1.	1.

								2.	2.
b. ☐ _____								1.	1.
								2.	2.
c. ☐ _____									
d. ☐ _____									
e. ☐ _____									
f. ☐ _____									
g. ☐ _____									
h. ☐ _____									
i. ☐ _____									
j. ☐ _____									
k. ☐ _____									
l. ☐ _____									
m. ☐ _____									
n. ☐ _____									

21. Who is the head of household?

LETTER OF Q.13

22. Who is the interviewee?

LETTER OF Q.13

23. Is any female household member pregnant?

LETTER OF Q.13

24.

CODE of Q.13

1. Head of household
2. Spouse
3. Father/ mother
4. Brother/ sister
5. Son/ daughter
6. Grandchild
7. Other relative
8. Servant
9. Other non-relative

CODE of Q.17 and 18

1. Farmer (**independent**)
2. Farmer **(dependent)**
3. Civil servant **[SPECIFY]**
4. Other **dependent** occupation **[SPECIFY]**
5. Other **independent** occupation **[Specify]**
6. Studies
7. Domestic work, child rearing
8. Without occupation/work

How many children between 6 and 11 years live in the household?

25. How many children younger than 6 years live in the household?

26. **[TOTAL NUMBER OF PERSONS IN HOUSEHOLD.]**

CODE of Q.16.1

0. None
1. Primary school
2. Junior high school
3. Senior high school.
4. Vocational training
5. University
9. Retired

CODE of Q.21

1. Same village
2. Village in same Kecamatan
3. Village in same Kabupaten

[COMMENTS]

27. How many buildings does your house have?

28. How many rooms are there in your main house [excl. bathroom]?

29. How long have you been living on this plot of land?

30.

Do you own the following means of transportation?

[IF SEVERAL, GIVE NUMBER]

0	☐	No			
1	☐	Bicycle	____	4 ☐ Cart	____
2	☐	Motorcycle	____	5 ☐ Tractor	____
3	☐	Car	____	6 ☐ Other:	_____

2. Persons migrated

31.	Have any former household members migrated?	1 ☐ Yes	
		0 ☐ No	→ **q.37**

	32. What relationship does he/ she have to the head of household?	**33.** What is his/ her age?	**34.** What is his/ her education level?	**35.** Where did he/ she migrate to?	**36.** For what reason does he/ she live somewhere else?
	0. He/ she is the head of household 1. Father 2. Mother 3. Son 4. Daughter 5. Spouse 6. Other	*age*	0. None 1. Primary school 2. Junior high school 3. Senior high school 4. Vocational training 5. University	1. Jakarta 2. Village in same Kecamatan 3. Village in same Kabupaten 4. Makassar 5. Padang 6. Other, – specify	1. Seasonal work 2. Daily wage 3. Regular work 4. Scarcity of land 5. Lack of work 6. Studies 7. Marriage 8. Other, specify?
1.					
2.					
3.					
4.					

[COMMENTS]

3. Electric energy

37. Do you have the following electricity sources in your household? [**SEVERAL ANSWERS POSSIBLE**]

0	☐ None	→ **q.38**
1	☐ Car battery (without solar panel)	
2	☐ Individual genset	
3	☐ Connection to a MHP	
4	☐ Individual traditional waterwheel	
5	☐ Traditional waterwheel in the village	
6	☐ Genset in the village	
7	☐ Genset shared with neighbour	
8	☐ Solar panel (installed on roof)	
9	_____kW of solar panel	

[COMMENTS]

10	☐ Solar panel (not installed on roof)
11	_____kW of solar panel
12	☐ Solar PV Kit
13	☐ PLN → **q.41.3**

		a	b	c	d	e	f	g
		MHP	Car battery	Genset	Traditional water wheel	Solar panel	PLN	No
38.	Have you ever used an electricity source in this household? If so, which type?	1	2	3	4	5	6	0
39.	How many years has it been since your household was disconnected from the electricity source or since the source become non-functional?	_____ years	_____ years	_____ years	_____ years	_____ years	_____ years	-3
40.	Why are you no longer connected to the electricity source? 1. No longer interested 2. Not able to pay the bill 3. Other: ____							-3

→ **q.46**

	1.	**2.**	**3.**
41.	When did you receive the battery?	When did you receive the genset?	When did you receive this electricity source?
	_____	_____	_____

	YEAR	YEAR	MONTH -YEAR
42.	How many times per year do you charge the battery?	Which fuel do you use for the genset?	How much did you pay for the connection and the electric installation in your house?
	TIMES	1 ☐ petrol 2 ☐ diesel	IDR
43.	How much do you pay for charging the car battery?	How many litres of this fuel do you consume per month?	How did you pay for it?
	IDR	LITRES	1 ☐ Cash 2 ☐ Credit 3 ☐ sell sth, what? _____ 4 ☐ Donation
44.	How long does it take you to reach the place where you charge the battery?	How much do you pay per litre for the corresponding fuel?	How much did you pay for the current line last month?
	IDR	IDR	IDR
		How much did you pay for the reparation of this electricity source last year?	How much did you pay for the reparation of this electricity source last year?
		IDR	IDR
	→ **q.41.2 or 41.3, if other electricity source in household**	→ **q.41.3, if other electricity source in household**	

4. Energy for appliances and lighting

	46. Do you use any of these appliances or machines in your home? **[READ ALL]** If yes, how many?		47. Do you use the appliance(s)/ machine(s) to produce goods to sell at home? If yes, for how much time?	48. Does any household member use any of the appliances/ machines outside the household? If yes, where? 1 = At a friend's place 2 = At work 3 = At a neighbour's house 4 = other, specify
0.	None ☐ → q.49			
1.	Iron			
	a. Charcoal	____	☐No☐ Yes YEARS: ____	
	b. Electric	____	☐No☐ Yes YEARS: ____	
2.	Refrigerator			
	a. Fuel-run	____	☐No☐ Yes YEARS: ____	
	b. Electric	____	☐No☐ Yes YEARS: ____	
3.	Electric stove	____	☐No☐ Yes YEARS: ____	
4.	Electric kettle	____	----------	
5.	Rice cooker	____	☐No☐ Yes YEARS: ____	
6.	Magic Jar	____	☐No☐ Yes YEARS: ____	
7.	Ventilator	____	----------	
8.	Landline telephone	____	☐No☐ Yes YEARS: ____	☐No☐ Yes PLACE: ____
9.	Mobile phone	____	☐No☐ Yes YEARS: ____	☐No☐ Yes PLACE: ____

10.	Radio		----------	☐No☐ Yes PLACE: _____
	a. Battery only	____	----------	
	b. Bivalent	____	----------	
	c. Line power only	____	----------	
11.	CD / VCD	____	☐No☐ Yes YEARS: _____	
12.	TV	____		☐No☐ Yes PLACE: _____
	a. Black and white	____	☐No☐ Yes YEARS: _____	
	b. Color	____	☐No☐ Yes YEARS: _____	
13.	Satellite receiver	____	----------	
14.	Computer	____	☐No☐ Yes YEARS: _____	
15.	Printer	____	☐No☐ Yes YEARS: _____	
16.	Mill	____		
	a. Fuel-run	____	☐No☐ Yes YEARS: _____	
	b. Electric	____	☐No☐ Yes YEARS: _____	
17.	Sewing machine	____		
	a. Mechanical	____	☐No☐ Yes YEARS: _____	
	b. Electric	____	☐No☐ Yes YEARS: _____	
18.	Other :_____	____	☐No☐ Yes YEARS: _____	

	49.	**50.**	**51.**
	Do household members use electric appliance(s)/ machine(s) to produce	Who is the household member **[use code Q.13]**?	Which are the three most important electric appliance(s)/ machine(s) the household member uses?

	goods/ offer service **outside home**?		
1	1 ☐ Yes 0 ☐ No → **q.52**	_____	A _____ B _____ C _____
2	1 ☐ Yes 0 ☐ No → **q.52**	_____	A _____ B _____ C _____
3	1 ☐ Yes 0 ☐ No → **q.52**	_____	A _____ B _____ C _____
4	1 ☐ Yes 0 ☐ No → **q.52**	_____	A _____ B _____ C _____
5	1 ☐ Yes 0 ☐ No → **q.52**	_____	A _____ B _____ C _____

[COMMENTS]

52. Do you charge your mobile phone(s) at home?

yes
1 ☐ → **q.55**
0 ☐ No
-3 ☐ No mobile phone in the household → **q.57**

53. What is the distance to the place where you charge the battery?

1 ☐ Metres
2 ☐ Min. by foot
☐ _____

54. How much do you pay per charge?

_____ IDR

55. How often did you charge your mobile phone last week?

_____ TIMES

56. How many times did you personally use your mobile phone in the last week?

_____ TIMES
-3 ☐ You do not have a mobile phone

57. How many flash lights **[PORTABLE]** are there in the household?

_____

58. How many sockets are there in the household?

_____

59. How often do you use candles?

1 ☐ Minimum once per day
2 ☐ Minimum once per week
3 ☐ Only in the case of fuel shortage
4 ☐ Only in the case of blackout
5 ☐ Never
☐ Other: _____

		1.	3.	4.	5.
60.	Which lighting sources do you use in your household **[INCLUDING EXTERIOR LIGHTING]**?	Normal electric bulb ☐	Neon/ fluorescent tube ☐	Energy saver ☐	1. Hurricane lamp ☐ 2. Tin lamp ☐ 3. Gas lamp ☐ 4. Battery-driven LED ☐ 5. Rechargeable bulb ☐
61.	How many of these lamps do you use?	Outside _____ Inside _____	Outside _____ Inside _____	Outside _____ Inside _____	_____
62.	How many hours per day do you use the lamp(s)?	Outside ____ HOURS Inside ____ HOURS	Outside ____ HOURS Inside ____ HOURS	Outside ____ HOURS Inside ____ HOURS	_____
63.	How often are you satisfied with the lighting quality of the lamp? 1. Always 2. Often 3. Seldom 4. Never	_____	_____	_____	_____
64.	How many rooms do you illuminate with these lamps?	_____			_____

65.	What is this room used for? 1. Living room 2. Head of HH's room 3. room of other HH members 4. Kitchen 5. Toilet 6. Other [SPECIFY]				
66.	Within the last year, how many of these bulbs/lighting sources you had to replace because they were broken?				
67.	What do you do with the neon lights / energy savers when they are broken?				1. Throw away with garbage 2. Throw away in the toilet 3. Throw away into nature 4. Return it to the place where I bought it 5. Other (SPECIFY)

5. Energy sources

		1.	2.	3.	4.	5.	6.	
		Candles	Gas	Kerosene	Charcoal	Fire wood	Coconuts	Batteries
			kg	*litres*	*kg*	*bundles*	*number*	
68.	How many units of ____ do you consume per month?	_____ CANDLES	_____ KG	_____ for lighting	_____ for cooking	_____ collected	_____ for cooking	_____ for lighting
				_____ for cooking	_____ for ironing	_____ bought		_____ for radio
				_____	_____			_____

				for other purposes	other purposes			other purposes
69.	How much do you pay per unit?	_____ IDR per candle MIN	_____ IDR per kg MIN	_____ IDR per litre MIN	_____ IDR per kg MIN	_____ IDR per bundle MIN		_____ IDR per battery MIN
70.	**[If HH uses batteries]** What do you do with the batteries when they are empty?	1 ☐ Throw away →**Where ?** _____ 2 ☐ other : _____					Throw away-where: 1. Into garbage 2. Into toilet 3. Into nature	

71.

Do you sell charcoal or other forest products? If yes, how much do you earn per month in sales?

0 ☐ No ☐ Yes _____ IDR

72. Do you see negative impacts induced by electricity?

1 ☐ Yes

0 ☐ No → **q.74**

73. Which negative impacts have you observed?

_____

_____

74. [☐ HOUSEHOLD **HAS A MODERN ELECTRICITY SOURCE** → **Q.75**

☐ HOUSEHOLD **DOES NOT HAVE AMODERN ELECTRICITY SOURCE** → **Q.80]**

75. Which are the main advantages of your electricity source?

1. _____
2. _____
3. _____

☐ -6 None

76. Have any of this household's appliances been damaged due to voltage fluctuation? If yes, which appliance(s)?

1 ☐ No → **q.75**

0 ☐ Yes

77. Which appliance has been damaged?

_____

1 Light bulb/energy saver/neon
2 TV
2 Rice cooker
3 Water cooker
4 Radio
5 Other, SPECIFY

78. Do you wish to see any improvement in the electricity supply?

79. Please specify.

1 ☐ Yes

0 ☐ No → **q.77**

6. Agriculture

80. Do you cultivate farm land?

1 ☐ Yes

0 ☐ No → **q.95**

81. What is the property status of your farm land?

1 ☐ Your property

2 ☐ Rented

3 ☐ Bagi Hasil

[COMMENTS]

[EXPLAIN THE DIFFERENCE BETWEEN NON-TRANSFORMED AND TRANSFORMED PRODUCTS]

	82. Please indicate your five most important agricultural products:	**83.** Which products did you sell in a non-transformed way last year?	**84.** How much did you sell within the last 12 months in a non-transformed way?	**85.** For how many IDR do you sell each unit? **[UNIT OF Q.82]**
1	Apple ☐	☐No☐ Yes	_____ kg	

2	Shallot	☐	☐No☐ Yes	_____ kg	
3	Hot Pepper	☐	☐No☐ Yes	_____ kg	
4	Cocoa	☐	☐No☐ Yes	_____ kg	
5	Maize	☐	☐No☐ Yes	_____ kg	
6	Orange	☐	☐No☐ Yes	_____ kg	
7	Soy Bean	☐	☐No☐ Yes	_____ kg	
8	Beans	☐	☐No☐ Yes	_____ kg	
9	Peanut	☐	☐No☐ Yes	_____ kg	
10	Kangkung	☐	☐No☐ Yes	_____ kg	
11	Rubber	☐	☐No☐ Yes	_____ kg	
12	Potato	☐	☐No☐ Yes	_____ kg	
13	Cucumber	☐	☐No☐ Yes	_____ kg	
14	Coffee	☐	☐No☐ Yes	_____ kg	
15	Cabbage	☐	☐No☐ Yes	_____ kg	
16	Pumpkin	☐	☐No☐ Yes	_____ kg	
17	Mango	☐	☐No☐ Yes	_____ kg	
18	Mangosteen	☐	☐No☐ Yes	_____ kg	
19	Pineapple	☐	☐No☐ Yes	_____ kg	
20	Rice	☐	☐No☐ Yes	_____ kg	
21	Papaya	☐	☐No☐ Yes	_____ kg	
22	Banana	☐	☐No☐ Yes	_____ bunches	
23	Watermelon	☐	☐No☐ Yes	_____ kg	
24	Cassava	☐	☐No☐ Yes	_____ kg	
25	Sugar	☐	☐No☐ Yes	_____ kg	
26	Tea	☐	☐No☐ Yes	_____ kg	
27	Tobacco	☐	☐No☐ Yes	_____ kg	
28	Eggplant	☐	☐No☐ Yes	_____ kg	
29	Sweet Potato	☐	☐No☐ Yes	_____ kg	
30	_____			_____	_____
31	_____				

			_____	_____
32	_____		_____	_____

86. How much do you earn per year selling non-transformed agricultural products?

_____ IDR

[COMMENTS]

87. Do you transform agricultural products?

1 ☐ Yes

0 ☐ No → **q.95**

88. What is the basic product?	**89.** Who trans-forms the product?	**90.** By which means does he transform the product?	**91.** Into what?	**92.** What is the unit?	**93.** What are the approximate quantities that you sell per year?	**94.** For how much do you sell each unit?
[USE THE CODE OF Q.105]	1. Family Member (male) 2. Family Member (female) 3.Employee 4.Other, specify	1.Motorized appliance 2.Electric appliance 3. Tools 4. By hand 5. Other, specify	1. De-shelled rice 2. Hulled coffee 3. Flour 4. Beverage 5. Oil 6. Grilled product 7. Other- what?	Sack of *x* kg, Bottle of *x* ml, ...	**[IN UNITS OF Q.90]**	**[UNIT OF Q.901]** *IDR*

1.							
2.							
3.							
4.							

7. Livestock

95. Do you own domestic animals?

1 ☐ Yes

0 ☐ No → **q.98**

	96. Which animals do you currently own?		97. How many of these animals do you own?
1.	☐	Pig	
2.	☐	Sheep	
3.	☐	Goat	
4.	☐	Rabbit	
5.	☐	Buffalo	
6.	☐	Horse	
7.	☐	Cow	
8.	☐	Poultry	
9.	☐	Dog	
10.	☐	Other,specify _____	

8. Financial Situation

98. Do you have an account at a bank or savings association?

1 ☐ Yes, at a bank

2 ☐ Yes, at a savings association

0 ☐ No

99. Do you save money at home?

1 ☐ Yes

2 ☐ No

100. Did the household take up a loan during the last two years?

1 ☐ Yes

0 ☐ No → **q.102**

101. Where? **[SEVERAL ANSWERS POSSIBLE]**

1. Kepada keluarga atau orang lain
2. Di toko
   Ddi lembaga keuangan
   Bbank
3. Lainnya – sebutkan

_____

102. How many remittances do you receive per month?

_____
IDR

103. To cover family needs, your household income is…

1 ☐ Sufficient

2 ☐ Tight

3 ☐ Not sufficient

[COMMENTS]

9. Expenditures

104.	a.	b.	c.
Do you spend money on the following expenditures? If Yes, how much do you roughly spend? **[TRY TO GET THE INFORMATION ON MONTHLY LEVEL]** -9. Paid in kind	per week *IDR*	per month *IDR*	per year *IDR*

1.	1 ☐ Yes 0 ☐ No	Rent (house and fields) (in money)			
2.	1 ☐ yes 0 ☐ no	Food (for the whole family)			
3.	1 ☐ yes 0 ☐ no	Crop transformation			
4.	1 ☐ yes 0 ☐ no	Transport (public and private)			
5.	1 ☐ yes 0 ☐ no	Telecommunication			
6.	1 ☐ yes 0 ☐ no	Water			
7.	1 ☐ yes 0 ☐ no	Schooling expenses for children (material, school fees, transport, etc.)			
8.	1 ☐ yes 0 ☐ no	Agricultural expenses (seeds, fertilizer, dung, pesticides, and worker)			
9.	1 ☐ yes 0 ☐ no	Livestock breeding			
10.	1 ☐ yes 0 ☐ no	Family and religious ceremonies			
11.	1 ☐ yes 0 ☐ no	Remittances **to** family members who do not live at home			
12.	1 ☐ yes 0 ☐ no	Medical expenses [excl. health insureance]			
13.	1 ☐ yes 0 ☐ no	Cigarettes			
14.	1 ☐ yes 0 ☐ no	Clothes (for the whole family)			

	105.
	What other large investment **[>230.000 IDR]** did you make during the last 12 months?
1.	
2.	
3.	

	[SEVERAL ANSWERS POSSIBLE]	**106.** Who manages the household budget?
1.	Male	☐
2.	Female	☐

On working days, when does the ... in the household usually...		**107.** Father/ man	**108.** Mother/ woman
0.		☐ No father/ man in household → **q.107**	☐ No mother/ woman in household → **q.108**
1.	wake up?	_ _: _ _ h	_ _: _ _ h
2.	perform income generating activities **[INCLUDING FARMING]**?	From _ _: _ _ h till _ _: _ _ h From _ _: _ _ h till _ _: _ _ h From _ _: _ _ h till _ _: _ _ h	From _ _: _ _ h till _ _: _ _ h From _ _: _ _ h till _ _: _ _ h From _ _: _ _ h till _ _: _ _ h

3.	perform household duties?	From _ _: _ _ h till _ _: _ _ h From _ _: _ _ h till _ _: _ _ h From _ _: _ _ h till _ _: _ _ h	From _ _: _ _ h till _ _: _ _ h From _ _: _ _ h till _ _: _ _ h From _ _: _ _ h till _ _: _ _ h
4.	watch television?	From _ _: _ _ h till _ _: _ _ h From _ _: _ _ h till _ _: _ _ h	From _ _: _ _ h till _ _: _ _ h From _ _: _ _ h till _ _: _ _ h
5.	perform other leisure activities?	From _ _: _ _ h till _ _: _ _ h From _ _: _ _ h till _ _: _ _ h	From _ _: _ _ h till _ _: _ _ h From _ _: _ _ h till _ _: _ _ h
6.	go to bed?	_ _: _ _ h	_ _: _ _ h

	On working days, when do the ... in the household usually...	**109.** children of age 6-11	**110.** **male** children of age 12-17	**111.** **female** children of age 12-17
0.		☐ No children of age 6-11 in household → **q.109**	☐ No male children in household of age 12-17 → **q.110**	☐ No female children in the household of age 12-17 → **q.111**
1.	wake up?	_ _: _ _ h	_ _: _ _ h	_ _: _ _ h
2.	study at home after school?	From _ _: _ _ h till _ _: _ _ h From _ _: _ _ h till _ _: _ _ h	From _ _: _ _ h till _ _: _ _ h From _ _: _ _ h till _ _: _ _ h	From _ _: _ _ h till _ _: _ _ h From _ _: _ _ h till _ _: _ _ h
3.	study outside the house after school?	From _ _: _ _ h till _ _: _ _ h	From _ _: _ _ h till _ _: _ _ h	From _ _: _ _ h till _ _: _ _ h
4.	watch TV?	From _ _: _ _ h till _ _: _ _ h From _ _: _ _ h till _ _: _ _ h	From _ _: _ _ h till _ _: _ _ h From _ _: _ _ h till _ _: _ _ h	From _ _: _ _ h till _ _: _ _ h From _ _: _ _ h till _ _: _ _ h
5.	go to bed?	_ _: _ _ h	_ _: _ _ h	_ _: _ _ h

[COMMENTS]

112. [☐ HOUSEHOLD **WATCHES TV AT HOME** → **Q.113**

☐ HOUSEHOLD DOES NOT **WATCH TV AT HOME** → **Q.115]**

113. Who decides what kind of program you watch on TV?

1 ☐ Adult male

2 ☐ Adult female

3 ☐ Child < 18

		114. Which TV programs do the household members watch?	**115.** Which other activities **[THAN Q.135 – 136]** do the household members carry out after nightfall?
		[DO NOT READ] 1. Cartoons 2. Movies 3. News 4. Soap operas 5. Sports 6. Other, specify	1. Radio 2. Reading 3. Praying 4. Playing 5. Going out 6. Household duties 7.Other, specify
a.	Father/ man	1. _____ 2. _____	
b.	Mother/ woman	1. _____ 2. _____	

116.	Does any member of the household collect firewood?	1 ☐ Yes	
		0 ☐ No	→ q.117

		1.	2.	3.	4.
117.	Who normally collects wood?	Code Q. 13	Code Q. 13	Code Q. 13	Code Q. 13
118.	How much time does he/ she need to collect wood per week?	_____ HOURS	_____ HOURS	_____ HOURS	_____ HOURS

11. Health

119.		1.		2.	
Did any members of your household in the last six month suffer from ...?		Adults >=18 years		Children <18 years	
		m. Male	f. Female	m. Male	f. Female
a.	Headaches	☐	☐	☐	☐
b.	Respiratory disease	☐	☐	☐	☐
c.	Eye disease	☐	☐	☐	☐

120. Do you have a health insurance?

1 ☐ Yes

0 ☐ No

121. How much do you pay per _____?

IDR. _____

Year / Month /

12. Security

122. How many days per week do the members of your household go out after nightfall?

1.	Man	_____
2.	Woman	_____
3.	Boys 12-17	_____
4.	Girls 12-17	_____
5.	Children <12	_____

123. Are you concerned for their safety when they go out?

1. Yes 0. No

-3. Not applicable

1.	Are you outside after nightfall?	___
2.	Are your female children outside after nightfall?	___
3.	Are your male children outside after nightfall?	___

124. Do you think that darkness is dangerous?

1 ☐ Yes

0 ☐ No

13. Environmental awareness

125. _____

	Which environmental issue concerns you the most? Why?	
☐	-6 None	

	How much do you agree with the following statements:	Strongly disagree ☐	Somewhat disagree ☐	Somewhat agree ☐	Strongly Agree
126.	Good air quality is a depletable good				
127.	Solar power is a depletable good				
128.	Wood is a depletable good				
129.	I consciously try to conserve energy.				
130.	I am interested to know about environmental problems				
131.	I dispose of garbage in dustbins				

132.	Everyone has the responsibility to preserve the environment.				

		A	B	Please explain. [Write down keywords]
133.	Do you know what "Renewable Energy " is?	1 ☐ Yes 0 ☐ No → **Q.134**		
134.	Do you think your community should use Renewable Energy?	1 ☐ Yes 0 ☐ No → **Q.135**		
135.	Do you think Renewable Energy is better for the environment than alternative electricity sources?	1 ☐ Yes 0 ☐ No → **Q.136**		
136.	Do you know how to support longevity of a community mini-grid as community member?	1 ☐ Yes 0 ☐ No → **Q.137**		

14. Gender Equality Awareness

	Do you think that…		
137.	Women should take care of housework	0 ☐ No	1 ☐ Yes

		2 ☐ No opinion
138.	Women are good in making business	0 ☐ No 1 ☐ Yes 2 ☐ No opinion
139.	Women have the same capacities to gain money as men	0 ☐ No 1 ☐ Yes 2 ☐ No opinion
140.	Women should do what their husbands tell them to do	0 ☐ No 1 ☐ Yes 2 ☐ No opinion
141.	Men are better political leaders than women	0 ☐ No 1 ☐ Yes 2 ☐ No opinion

	Do you think it is justified that men use violence against women in the following situations	
142.	She burns food	0 ☐ No 1 ☐ Yes 2 ☐ No opinion
143.	She leaves the house without informing him	0 ☐ No 1 ☐ Yes 2 ☐ No opinion
144.	She neglects her children	0 ☐ No 1 ☐ Yes 2 ☐ No opinion
145.	She argues with him	0 ☐ No 1 ☐ Yes 2 ☐ No opinion
146.	She wants to earn money independently	0 ☐ No 1 ☐ Yes 2 ☐ No opinion

[COMMENTS]

15. Conclusion

				became much better	became better	stayed the same	became slightly worse	became much worse
147.	In comparison with the situation 1 year ago, the living conditions…	**1.**	In your family…	①	②	③	④	⑤
		2.	In your village…	①	②	③	④	⑤

148. How?

1. _____

2. _____

149. Which is your main source of information?

1 ☐ Radio
2 ☐ TV
3 ☐ Newspaper
3 ☐ Neighbour/ friends
4 ☐ Other _____

150. Household has mobile phone 1 ☐ Yes 0 ☐ No

[COMMENTS]

151. Please, could you give us your first and your family name?

_____

_____

152. Could you give us your telephone number?

_____

[FINAL COMMENTS / QUESTIONS BY INTERVIEWEE]

[FINAL COMMENTS BY ENUMERATOR]

153. Finishing time of interview _____ : _____ h

THANK YOU VERY MUCH FOR YOUR PARTICIPATION!

6.3.2 SPV Leadership KII Protocol

This KII should be issued *at minimum* with the following roles (or equivalents) of SPV leadership:

1. SPV Head
2. Secretary
3. Treasurer
4. Other division heads (e.g. O&M, sales and collection, finance and administration, environment/community officers)

Questions	EQ	KII	Theme
What do you understand the SPV's responsibilities to be as a whole with respect to [grant] and the Solar PV facility in your area? What are the specific responsibilities of your role on the SPV?	4	All	Preparedness
Have you had a leadership role in your community before? If so, explain what your role was.	4	All	Preparedness, existing organization
What is your role in your community? Do you expect conflicts with community members due to your role in the SPV?	4	ALL	Preparedness
Do you expect the SPV to be prepared better to provide sustainable energy systems in the longer term than a private enterprise? Why (not)?	4	ALL	Sustainability
Do you expect high or low payment moral among electrified households? What factors will be decisive for payment moral?	4	ALL	Sustainability, Optimism
How would you describe your existing relationship with [grantee] to this point?	4	All	Relationship with grantee/contractors
How would you describe your existing relationship with [O&M contractor] to this point?	4	O&M	Relationship with grantee/contractors
What challenges do you anticipate will occur in your role with the SPV given your knowledge of your community? [If SPV will include cooperation among treatment units] How do you think [treatment units] will cooperate with one another?	4	All	Preparedness, optimism, cooperation with other villages
How would you describe your existing relationship with the other members of SPV leadership? Have you collaborated with them before on community initiatives? If so, what was your relationship with them then?	4	All	Existing organization
What sorts of enterprises do you anticipate will take advantage of the new renewable energy resource? Do you anticipate that community members will start new business once the micro-grid is commissioned? If so, what kinds of businesses?	2	Head	Productive uses
Why did you decide to pursue participating in the management of the micro-grid?	4	All	Optimism
How would you generally describe members of your community with respect to: • Motivation and work ethic	2, 3, 4	Head, Community Officer	Existing organization, optimism, gender

Questions	EQ	KII	Theme
• Environmental consciousness • Community engagement • Gender equality			
How does your community generally address community-level problems or goals?	4	Head	Existing organization
What is your assessment of micro-grids as a resource for providing electricity to communities? Have you heard of them being used in other communities? If so, what have other communities experienced with this technology?	4	All	Optimism
[If SPV is set up already] How are responsibilities within the SPV distributed between females and males?	4	ALL	Preparedness
[IF SPV is set up already] How will responsibilities in day-to-day operation and maintenance be handed over to you? Does this process seem reasonable to you?	4	O&M	Preparedness
[If vocational training has already commenced] How confident are you that your training will prepare you for your role in the SPV? What part or parts of your training have seemed the most useful?	4	All	Preparedness, relationship with grantee/contractors
What might affect people in your community's willingness to pay for electricity?	2, 4	All	Optimism
Who stands to benefit the most in your community from increased access to electricity?	2, 4	All	Optimism, productive uses
Will women be affected proportionally by access to RE?	4	All	Optimism, Gender
How might your SPV choose to use surplus electricity or revenue, if a surplus exists?	2	Head, Treasurer	Productive uses
Do you expect any challenges in payments or sustainability of the system?	2,4	All	Sustainability
How does your SPV plan to ensure transparent and participatory monitoring of the community?	4	Head, Community Officer	Sustainability
How will your SPV ensure gender equality and social inclusion in benefits from the new RE systems?	4	Head, Community Officer	Gender
How confident are you that the SPV will be prepared, in terms of capacity, equipment, and legal status, to operate the infrastructure after construction has ended?	4	Head	Optimism

6.3.3 Village Official KII Protocol

*This protocol will be used with Village Heads (Kepala Desa) in treatment and comparison areas in East Sumba, and in treatment areas in Berau. This protocol, in comparison to others for the qualitative component of data collection, includes mostly closed questions with several open-ended questions.

Date: ☐☐ ☐☐ ☐☐

I. Basic Sub-village Data

Name of Data collector: _____

Name of sub-village: _____

Site code : _____

Name of interviewee : _____

Role of interviewee : _____

Phone number of interviewee: _____

→ *All questions shall refer to the sub-village listed above*

1. Demographic Data ***Sub-village***

1.1. Population, male	
1.2. Population, female	
1.3. Population, total	
1.4. Number of households, total	

II. Infrastructure and Services in the sub-village

2. Availability and conditions of basic infrastructure

a. Roads: *(road condition, construction work,* ***access during rainy season)***

a.1 Distance from main road	a.2 To which city does the main road connect? (the nearest town or rural center)	a.3 Access to main road (circled the appropriate one)	a.4 Can the road be travelled year-round by four-wheeled vehicles?
.....		1. Asphalt pavement 2. Stone pavement 3. Earth pavement	1. Yes 0. No

b. Transportation:

b.1 Transport possibilities in the village (circle the appropriate)	b.2 Price to reach the next urban center (for each option circled in b.1)	b.3 If public transport is available, how frequently does it arrive per week?
1. Bus/ public transport 2. Mototaxi 3. Taxi 4. Donkey cart 5. Other, define: _____	1. _____ 2. _____ 3. _____ 4. _____ 5. _____	

c. TV, radio and mobile phone network reception:

Type of network	Receivable?			If YES : quality of reception?			
	Yes	No	Don't know	Good	Medium	Bad	Don't know
1. Radio	1	0	- 1	1	2	3	-1
2. Mobile Phone Network	1	0	- 1	1	2	3	-1
3. TV	1	0	- 1	1	2	3	-1
4. Internet mobile phone	1	0	- 1	1	2	3	-1
5. Internet landline	1	0	-1	1	2	3	-1

[COMMENTS]

3. Availability and conditions of social infrastructure (SI)

Type of SI	Public or Private	Uses electricity source (M)?
code	1. Public 2. Private	1. PLTMH 2. Battery 3. Solar panel 4. Genset 5. PLN 6. Kincir

1. Primary school (SD)
2. Junior high school (SMP)
3. Senior high school (SMA)
4. Islamic boarding school (*Pesantren*)
5. Other school – specify
6. Community health center (*Puskesmas*)
7. Community health subcentre (Pustu)
8. Health service post (Posyandu)
9. Midwife house *(house of bidan)*
10. Traditional Healers
11. Other health structure, specify
12. Church
13. Mosque

[COMMENT]

14. Other religious building
15. Administrative office, specify

Question	EQ	Theme
3.1. What are the challenges health facilities frequented by this community face?	1, 2	Community details
3.2. Do you expect health service quality to be affected by access to RE? Why?	1, 2	Community details
3.3. How would you describe maternal health services in your community (consider public and private facilities, Midwifes and traditional healers)?	1, 2	Community details
3.4. How many cases of maternal deaths have you had in your community in the last 12 months?	1, 2	Community details
3.5. Do you think access to RE can improve health and wellbeing of pregnant women? How?	2	Productive Uses, Gender, Community details
3.6 What are the challenges schools frequented by this village face?	1, 2	Community details
3.7 Do you expect school service quality to be affected by access to RE? Why?	2	Productive Uses, Community details

4. Availability and conditions of social infrastructure

a **Main access to water (circle the appropriate response)**	
1. River or lake	3. Fountain (unprotected)
2. Fountain (protected)	4. Private connection
	5. Other, specify _____

III. Energy

Question	EQ	Theme
1. How do you dispose of used/empty batteries and broken energy savers? (If thrown away, where?)	1	Energy Consumption
2. Do you know what “Renewable Energy“ is? Pease explain.	1, 4	Sustainability, Preparedness

Question	EQ	Theme
a. Do you think your community should rely on RE? Explain	1, 4	Sustainability, Preparedness
b. Do you think Renewable Energy is better for the environment than alternative electricity sources? Explain.	1, 3	Environment
c. Do you know how to support longevity of a community mini-grid as community member?	1, 4	Sustainability, Preparedness

IV. Income generation

3. **Enterprises:**

Type of business unit	**Number**	**Electricity Sources of each** 0. None 1. PLTMH 2. Kincir 3. Battery, 4. Genset 5. Solar panel 6. Other, specify	**Gender of Owner of each** 0. Male, 1. Female
Kiosk /warung			
Store			
Carpenter			
Wall-maker/ builder			
Tailor			
Beauty salon			
Flour miller			
Rice huller			
Sawmill			
Auto workshop			
Welding workshop			

4. *Economic opportunities*

Question	EQ	Theme
a. Are there economic activities in this community, which may grow in case of electricity access?	2	Productive Uses
b. What are these activities (for example boat production, honey making, or fishing)?	2	Productive Uses
c. Why or why not may they grow?	2	Productive Uses
d. What are other factors hindering their growth of economic activities in your community? What type of training or support may help reduce them?	2	Productive Uses
e. Do you expect any new or existing businesses would use the RE resource? In what ways? Do you anticipate that community members will start new business once the micro-grid is commissioned? If so, what kinds of businesses?	2	Productive Uses
f. What are typical productive activities pursued by women? How could economic activities of females be encouraged?	2	Productive Uses, Gender

5. *Quality of land in sub-village* *(fertility, acidity, erosion)*

Fertility – majority of land	1. Very fertile 2. Fertile 3. Less fertile 4. Not fertile
Erosion	1. Often eroded 2. Seldom eroded 3. Never eroded

6. ***Sub-village market (held at least once per week)***

Is there a market in the sub-village?

1. Yes, there is ☐

0. No, there is not ☐ Where is the nearest market (distance)? _____km

V. Socio-economic issues

7. *Involvement in sub-village activities:*

**Include definition of organization. Should include SPV if already formed at time of interview (in treatment sites).*

Organization	**Type of organization:** 1. Religious **2.** Non- religious	**Main activity**	**Activity Frequency per month**	**How many participants** 1).0-10 2).10-

Organization	Type of organization: 1. Religious 2. Non- religious	Main activity	Activity Frequency per month	How many participants 1).0-10 2).10-

8. **How would you generally describe members of your community with respect to:**
    a. Motivation and work ethic
    b. Environmental consciousness
    c. Community engagement
    d. Gender Equality

Question	EQ	Theme
9. How does your community generally address community-level problems or goals?	4	Community details, Preparedness
10. Are there development projects in the sub-village? What do they do?	4	Community details, Optimism
11. Have the general living conditions (particularly poverty level) in the sub-village changed within the last 2 years? *(Explain)* 1. Improved significantly ☐ 2. Improved slightly ☐ 3. Stayed constant ☐ 4. Deteriorated slightly ☐ 5. Deteriorated significantly ☐	4	Sustainability
12. Why	4	Sustainability
13. What factors are hindering an improvement in living conditions in this sub-village? *(Explain)*	4	Sustainability
14. Security		
a. Do people in this community feel safe?	4	Community details
b. Have there been crimes of any sort in your community in the last year? Please explain.	4	Community details

VI. SPV (for treatment site Kepala Desa only)

Question	EQ	Theme
a. What do you understand the SPV's responsibilities to be as a whole with respect to [grant] and the Solar PV facility in your area?	4	Preparedness

Question	EQ	Theme
b. If you are involved in the SPV, what are the specific responsibilities of your role? If you are not involved in the SPV, how would you describe your existing relationship with the members of SPV leadership?	4	
c. What challenges do you anticipate will occur with the SPV given your knowledge of your community?	4	Preparedness, Sustainability
d. How would you describe your village's relationship with [grantee] to this point?	4	Project details, grantee relationship
e. How would you describe your village's relationship with [O&M contractor] to this point?	4	Project details, grantee relationship
f. What is your assessment of micro-grids as a resource for providing electricity to communities? Have you heard of them being used in other communities? If so, what have other communities experienced with this technology?	4	Preparedness, Sustainability
Conclusion		
g. Final comments/ questions by the interviewee h. Final comments by enumerator	NA	NA

6.3.4 Regency (sub-district) Official KII Protocol

Date: ☐☐ ☐☐ ☐☐

I. Basic **Regency** Data

Name of Data collector: _____

Name of Regency: _____

Site code : _____

Name of interviewee : _____

Role of interviewee : _____

Phone number of interviewee: _____

→ *All questions shall refer to the regency listed above*

Demographic Data	***Regency***
1. Population, total	
2. Number of households, total	

II. Infrastructure and Services in the Regency

3. Availability and conditions of basic infrastructure

Question	EQ	Theme
a. What percentage of villages in your regency are connected to roads?	1, 2	Community details
b. What are the main town centers (cities) in this regency? Please list.	1, 2	Community details
c. Please describe the majority of roads in your regency [asphalt pavement, stone pavement, earth pavement…] Can these roads be used year-round?	1, 2	Community details
d. Please describe the transportation options in your regency [bus/public transport, mototaxi, taxi, donkey cart, other…]	1, 2	Community details

Question	EQ	Theme
e. How frequently is this transportation available for regency residents?	1, 2	Community details
f. What percentage of regency residents receive radio, mobile phone network, TV, internet mobile phone and internet landline reception?	1, 2	Community details
g. Please describe access to public, private, and informal health services in your regency.	1, 2	Community details
h. How would you describe maternal health services in your community (consider public and private facilities, Midwifes and traditional healers)?	1, 2	Community details
i. What are the challenges health facilities face?	1, 2	Community details
j. Do you expect health service quality to be affected by access to RE? Why?	1, 2	Community details
k. Please describe access to public and private schools in your regency.	1, 2	Community details
l. What are the challenges schools frequented by this village face?	1, 2	Community details
m. Do you expect school service quality to be affected by access to RE? Why?	1, 2	Community details

III Energy

4. Main energy sources and prices (other than electricity):

Please describe in general the energy sources in your regency overall.

Energy source	Used by people?
Candles	1. Yes ☐ 0. No ☐ 2. Only in exceptional cases ☐
Gas (LPG)	1. Yes ☐ 0. No ☐ 2.Only in exceptional cases ☐
Diesel	1. Yes ☐ 0. No ☐ 2. Only in exceptional cases ☐
Petrol	1. Yes ☐ 0. No ☐ 2. Only in exceptional cases ☐
Kerosene	1. Yes ☐ 0. No ☐ 2. Only in exceptional cases ☐
Charcoal	1. Yes ☐ 0. No ☐ 2.Only in exceptional cases ☐

Energy source	Used by people?
Firewood	1. Yes ☐ 0. No ☐ 2. Only in exceptional cases ☐
Batteries (large)	1. Yes ☐ 0. No ☐ 2.Only in exceptional cases ☐
Batteries (small)	1. Yes ☐ 0. No ☐ 2. Only in exceptional cases ☐

5. ***Electricity sources used by households in this regency*** *(car batteries, gensets, solar panels, PLTMH, traditional waterwheel (kincir) – individually vs. commonly used*

Electricity source	Approximate % of households owning this source	Individual or shared use?
Car battery		
Genset		
Solar Panel		
PLN*)		
Biodigesters		
Kincir		
PLTMH		

Question	EQ	Theme
6. Do you know what “Renewable Energy“ is? Please explain	1, 4	Sustainability, Preparedness
7. Do you think your regency should rely on RE? Explain	1, 4	Sustainability, Preparedness
8. Do you think Renewable Energy is better for the environment than alternative electricity sources? Explain.	1, 4	Sustainability, Preparedness
9. What is required to ensure longevity of mini-grids in your regency in your opinion?	1, 4	Sustainability, Preparedness
Income Generation		
10. Enterprises		
a. What types of enterprises are most common in this regency (also inquire boat production, honey making, and fishing)? Please list.	2	Productive Uses
b. If you are aware, what electricity sources do they use?	2	Productive Uses

11. Economic Opportunities		
a. What are factors hindering growth of economic activities in your regency?	2	Productive Uses
b. What type of training or support may help reduce them?	2	Productive Uses
c. What are typical productive activities pursued by women?	2	Productive Uses, Gender
d. How could economic activities of women be encouraged?	2	Productive Uses, Gender
e. Are there economic activities in this community, which may grow in case of electricity access? Why or why not may they grow?	2	Productive Uses
f. Do you expect any new or existing businesses would use the RE resource? In what ways? Do you anticipate that community members will start new business once the micro-grid is commissioned? If so, what kinds of businesses?	2	Productive Uses
12. Agriculture		
a. Describe the quality of land in the regency (fertility, acidity, erosion) Fertility – majority of land: 1. Very fertile 2. Fertile 3. Less fertile 4. Not fertile Erosion: 1. Often eroded 2. Seldom eroded 3. Never eroded	1	Community details
b. What are the main agricultural commodities (Product pertanian unggulan) in the regency?	1	Community details
c. What type of value-addition and aggro processing is performed in the regency?	1	Community details
d. Are there any particularities in agriculture in your regency?	1	Community details
13. Security		
a. What type of security problems do the communities in your Regency face?	1	Community details
b. Are security problems increasing or decreasing?	1	Community details
c. What is needed to improve security in your Regency?	1	Community details
d. Do you expect access to RE to improve security?	1	Community details
14. How would you generally describe members of your community with respect to: a. Motivation and work ethic b. Environmental consciousness c. Community engagement d. Gender equality	3, 4	Community organization, Preparedness, Environment
15. How does your community generally address community-level problems or goals?	4	Preparedness, Sustainability
16. Are there development projects in the regency? What do they do?	4	Preparedness, Optimism

17. Have the general living conditions (particularly poverty level) in the regency changed within the last 2 years? *(Explain)* 1. Improved significantly ☐ 2. Improved slightly ☐ 3. Stayed constant ☐ 4. Deteriorated slightly ☐ 5. Deteriorated significantly ☐	4	Sustainability
18. Why?	4	Sustainability
19. What factors are hindering an improvement in living conditions in this regency? *(Explain)*	4	Sustainability
20. Are there other particularities to note in the regency?	NA	NA
SPV (for treatment site Camat only)		
1. What do you understand the SPV's responsibilities to be as a whole with respect to [grant] and the Solar PV facility in your area?	4	Preparedness
2. If you are involved in the SPV, what are the specific responsibilities of your role? If you are not involved in the SPV, how would you describe your existing relationship with the members of SPV leadership?	4	Preparedness
3. What challenges do you anticipate will occur with the SPV given your knowledge of your sub-district?	4	Preparedness, Sustainability
4. What is your assessment of micro-grids as a resource for providing electricity to communities? Have you heard of them being used in other communities? If so, what have other communities experienced with this technology?	4	Preparedness
5. Final comments/ Questions by the interviewee	NA	NA
6. Final comments by enumerator	NA	NA

6.3.5 Grantee KII Protocol

**Note: Some questions in this protocol may be skipped based on the informant's role in the implementing organization, or the implementing organization's role in an implementing consortium. For example, engineering firms will not be asked about community engagement plans for SPVs, unless they are somehow involved.

Question	EQ	Theme
1. Please describe your role on this grant.	4	NA
2. Please describe the grant's work in [village name; regency name]. a. When did you begin work, and with what activities? b. What stage of implementation are you currently in? c. What is the ultimate goal of your work, and when will it be completed?	4	Project Details, Preparedness
3. Please describe your progress with licensing and permitting for the development of the Solar PV Facility. Is this going according to schedule? If no, how will this impact your work? How has this impacted your engagement work with the community?	4	Project Details, Preparedness
4. Please describe your project's stakeholder engagement plan in this village/regency.	4	Project Details, Preparedness
5. Have you implemented any of this plan yet (for example, have you met with the Village Head, village leaders, held FGDs, etc)? If yes, what has been the community's response/level of engagement?	4	Project Details, Preparedness
6. Have you facilitated the formation of the SPV yet in this village/regency? If yes, what steps have been completed (have members been selected)? If no, when will you do so?	4	Project Details, Preparedness
7. Please describe the business plan you are pursuing in creating the SPV(s) for this project. Who will comprise the SPV? How will you attempt to gain community buy in and build the community's capacity to participate? What will the governance process be in terms of managing cash	4	Project Details, Preparedness

Question	EQ	Theme
flow and assets? Will dividends be reinvested in the community and, if so, how?		
8. Have you finalized the selling price for electricity in each village/kampung? Please describe how you arrived at this figure and, if it has changed, why.	1	Energy Consumption
9. How did you decide on the current business and community engagement plans with respect to the SPV(s)? If these were based on similar models employed by your organization or others in other projects, please describe how you learned about them.	4	Project Details, Preparedness
10. How do you plan to transition ownership to the SPV after construction has been completed?	4	Preparedness, Sustainability
11. What do you believe the likelihood to be that PLN will expand into the villages/kampungs targeted by this grant in the near term? Describe how the SPV may mitigate this, if it came to fruition.	1 and 4	Preparedness
12. Do you plan to tap into additional resources besides those provided by MCA-I to ensure the sustainability of the project? If so, what do you plan to do?	4	Preparedness, Sustainability
13. At this stage of implementation, what are the main challenges you see to the Solar PV Facility development? (ask about SPV leadership and role, if not mentioned) What challenges do you expect in terms of sustainability?	4 (though potentially all EQs)	Preparedness, Sustainability
14. In each of the targeted areas, what do you expect will be the main outcomes from your project? Do you expect new or expanded businesses? If so, what kinds? How long do you expect it would take before these businesses are developed or expanded?	1-4	Preparedness, Sustainability

6.3.6 Community Beneficiary FGD Guide

Question	EQ	Theme
Energy		
1. What type(s) of electricity source(s) do you use in your homes? [options to probe for are in HH survey Q.37. Note how many respondents have a modern electricity source.]	1	Energy Consumption
2. How long have you used these sources?	1	Energy Consumption
3. How much does this source(s) cost you/your family (per month, per year)?	1	Energy Consumption
4. Please explain if there are sources you have been disconnected from or have become non-functional. When did this occur, and why?	1	Energy Consumption
5. Please discuss challenges you face with accessing electricity in this village. Does this differ by HH/area in the village?	1	Energy Consumption
6. What is your HH main use for electricity (appliances, lighting, productive uses)?	1, 2	Energy Consumption, Productive Uses
7. Are you satisfied with the source(s) of electricity your family uses currently? What are the main advantages/disadvantages of this source(s)? Please discuss.	1	Energy Consumption
8. Please discuss what you think of micro-grids as a resource for providing electricity to communities - Have you heard of them being used in other communities? If so, what have other communities experienced with this technology?	1	Energy Consumption
9. Would you prefer other types of electricity? What and why?	1	Energy Consumption
10. Do you think electricity access can bring growth in economic activities? How?	2	Productive Uses
11. What else is needed in your community to raise economic wellbeing?	1	Energy Consumption

Question	EQ	Theme
12. Do you think households should pay for energy from a RE mini-grid? What would be the best billing system? Why?	1	Energy Consumption
Equality, Gender, Security		
1. Who would benefit most from energy access in these communities?	1	Energy Consumption, Gender
2. Do you think female community members will be affected equally by electricity access as male members? How will electricity access change the life of women, and their rights and roles within the community?	1	Energy Consumption, Gender
3. Do you think electricity access can affect security in your community? Please discuss.	1	Energy Consumption
4. What do you think about mini-grids that are managed by a team of community members? How will such a management system affect payment morale within the community? How will it affect dynamics between community members?	4	Preparedness, Community Organization
Environment		
1. Which environmental issue concerns this community the most? Why?	3	GHG Emissions
Community (engagement and work ethic)		
1. Please discuss the main source of income for HH in this community. In your opinion, do individuals have a strong work ethic in this village (do they work hard)?	1, 2, 4	Preparedness
2. Please discuss whether your community/village has other groups/organizations like the SPV. How have these worked, and were they successful at managing a community good? How many of you have participated in a community group/organization/initiative?	4	Preparedness, Optimism
3. How does your community generally address community-level problems or goals?	4	Preparedness
4. Please discuss your village's previous experiences with donor projects, if any. Did you consider these projects a success? Why or why not?	4	Preparedness, Optimism

Question	EQ	Theme
Project Details		
1. [Project name/grantee name] is working in this village to develop a Solar PV Facility. Please discuss the work they have done thus far.	NA	Project Details
2. Please discuss how you have interacted with [project name/grantee name] in the last 3 months. Have you attended any meetings/FGDs/events/activities or received information about the project goal? If yes, please discuss the purpose of these events and how you were invited.	NA	Project Details
3. If you are you aware of the SPV in this village, please discuss their role/function as related to the Solar PV Facility.	4	Preparedness
Conclusion		
1. In comparison with the situation 2 years ago, have the living conditions in this village improved? If yes, how? If not, why not?	1, 4	Sustainability

6.3.7 Enterprise KII Guide

ENTERPRISE QUESTIONNAIRE Impact Evaluation Baseline Study 2017 Green Prosperity Renewable Energy Grant	1 Date: _____
	SUB-VILLAGE NAME
	SUB-VILLAGE SITE
	INTERVIEWEE/ENTERPRISE NAME
	MALE/FEMALE
	OWNER OR MANAGER/STAFF EMPLOYEE
	INTERVIEWER NAME

STARTING TIME:	

A. Basic Information and Customers

Q1. Line of business	
Q2. Enterprise age	

Q3. Type of electricity available
Q4. Since when is it available?
Q5. In case of solar panel, what's the size of the panel (kW)?

1	*None*	
2	*Connection to a MHP*	☐ *Since when (Month, Year)* _____
3	*Car battery (without solar panel)*	☐ *Since when (Month, Year)* _____
4	*Solar panel (installed on roof)*	☐ *Since when (Month, Year)* _____ *kW* ☐ *of solar panel*_____
5	*Solar panel (not installed on roof)*	☐ *Since when (Month, Year)* _____
6	*Individual genset*	☐ *Since when (Month, Year)* _____ *kW* ☐ *of solar panel*_____
7	*Genset in the village*	☐ *Since when (Month, Year)* _____
8	*Genset shared with neighbors*	☐ *Since when (Month, Year)* _____
9	*PLN*	☐ *Since when (Month, Year)* _____

10	*Individual traditional waterwheel*	☐ *Since when (Month, Year)* _____	
11	*Traditional waterwheel in village*	☐ *Since when (Month, Year)* _____	

Q6. Kind of products and services offered by the enterprise (USE CODES) **Q7. Price per piece or unit (define)**		*price*	*organize hierarchically*
1			
2			
3			
4			
5			
6			

CODE of Q.13

1. Sale of small products (for example cigarettes, batteries, petrol)
2. Food or Drinks
3. Cupboard
4. Tables
5. Chairs
6. Bedsteads
7. Window and door frames
8. Doors
9. New clothing
10. Cloth repair and alteration
11. Rice hulling
12. Coffee milling
13. Coffee procession
14. Coconut milling
15. Baking
16. Metal products
17. Welding products
18. Woven products
19. Hair cutting
20. Wedding styling
21. Make-up

Q8. Structure of customers	*This sub-village* ___*percent; This village* ___*percent; Other villages* ____*percent; Traders* ____*percent* | *Others* _____*percent Next city* _____*percent* **[Specify]** _____ *Number of Customers (supplied) per day:* _____

B. ENERGY AND PRODUCTION

Q9. *Which of the following appliances does this enterprise use?*		Appliance	**Q10.** *What powers the appliance?* a) Electricity b) Diesel/Petrol c) Mechanic d) Other, define.
	1	Lighting	
	2	Sewing machine	
	3	Refrigerator	
	4	Rice cooker	
	5	Carpentry equipment	
	6	Brush	
	7	Coconut grinder	
	8	Chili grinding machine	
	9	Blender	
	10	Mill	
	11	Other:	
	12	Other:	
	13	Other:	
	14	Other:	

Q11. *Which of the following energy sources does this enterprise use for its production process (including lighting)? Multiple entries are possible.*			**Q12.** *For which of the following purposes do you use…[use Codes from Q1. or define]?*		**Q13.** *In a regular month, how much does this enterprise spend on …?*		
		ENERGY SOURCE	Lighting	Operating equipment SPECIFY	Reg		
	1	PLTMH					
	2	Diesel/petrol for generator			Litre		
	3	Kerosene			Litre		
	4	Candles					
	5	Gas (LPG / LNG)					
	6	Charcoal / briquettes					
	7	Firewood					

	8	Car or other rechargeable battery					
	9	Solar Panel					
	10	Other:					

C. LIGHTING

Q14. Operation time of enterprise on regular day?

Q15. *How many of the following lighting devices does this enterprise use?*		**Q16.** *What is the number of hours you use lighting per day?*
ENERGY SAVER		
INCANDESCENT BULB (ORDINARY BULB)		
FLUORESCENT TUBE (NEON)		
TIN LAMP (KEROSENE)		
HURRICANE LANTERN		
CANDLE		
BATTERY-RUN LANTERN		
GAS LAMP (PRESSURIZED)		
Other (specify):		

D. EMPLOYMENT

Q17. *How many employees does this enterprise have in total (including owner)*	
Q18. *How many of the employees work the more than 7 hours per day on 5 days?*	
Q19. *How many of the employees receive payment?*	
Q20. *How many of the employees are family members?*	

Q21. Discuss how micro-grid access could change use of labor

E. PRODUCTION AND BUSINESS EXPANSION

Q22. Would you purchase machinery/appliances in case of electrification?

Q23. In case, new machinery/appliances were/would be purchased, why didn't you/don't you buy a generator to run machinery appliances?

Q24. Why don't you produce more of products you produce? (Bottlenecks…)

Q25. In case of bottlenecks, what is needed to overcome them?
Q26. Do you think that access to a micro-grid would help to overcome these obstacles?
Q27. Do you think micro-grid connection could change your production and prices? If yes, how?
Q28. In your opinion, if you were able to produce/offer more of your product – through, for instance, longer hours, better equipment, more workers - would there be sufficient demand for the additional products?
Q29. Are you currently in a high/low demand period compared to the rest of the year?

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