



# Sustainable Development Verified Impact Standard



Tuik Ruch Lew Improved Cookstove Project for Lake Atitlan

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Project Title	Tuik Ruch Lew Improved Cookstove Project For Lake Atitlan
Version	1.4
Date of Issue	01-January-2021
Project Location	Sololá, Guatemala
Project Proponent(s)	Tuik Ruch Lew/Helping the Earth (TRL), Cameron Krummel, <a href="mailto:programdevelopment@trleearth.org">programdevelopment@trleearth.org</a> , +502 4120 9086.
Assessor Contact	AENOR
Project Lifetime	01 September 2018 – 31 August 2039; 21-year lifetime
History of SD VISTA Status	2018 Pilot Project Selection
Other Certification Programs	None currently in use. Undergoing VCS Validation.
Expected Future Assessment Schedule	Initial validation and verification to be completed early 2020.

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# 1 SUMMARY OF SDG CONTRIBUTIONS

Table 1: Summary of Project SDG Contributions

Row number	Estimated Project Contribution by the End of Project Lifetime	SDG Target	SDG Indicator	Net Impact on SDG Indicator	Section Reference	Claim, Asset or Label
1)	With the installation of 3,000 new ONIL stoves and completion of 2,100 energy efficiency improvements to existing ONIL cookstoves the project will: - Provide 3,000 additional families with access to improved cookstove technology - Reduce the amount of non-renewable woody biomass consumed per family - Maintain all stoves for optimal performance	7.1	7.1.2 Proportion of population with primary reliance on clean fuels and technology	Increase	3.2 #1	Claim
		7.b	Expand infrastructure and upgrade technology for supplying modern and sustainable energy service	Increase	4.2 #2	Claim
		1.4	1.4.1 Proportion of population living in households with access to basic services	Increase	3.2 #1	Claim
2)	With the installation of 2000 LED light bulbs to replace incandescent light bulbs, the project will improve energy efficiency in beneficiary homes	7.3	Number of light fixtures that undergo improvements in energy efficiency	Increase	3.2 #7	Claim

3)	Implement activities to promote income increases through money and time saved using ICS Technology. The project will: Increase monthly income of families who purchase wood fuel by an average of Q168.88/mo (about Q2027/yr or \$261/yr) Save an average of 2 days/ week in time for families who collect firewood Provide families with greater access to basic services in the form of clean cooking technology	1.1	1.1.1 Proportion of population below the international poverty line, by sex, age, employment status and geographical location (urban/rural)	Decrease	3.2 #3	Claim
		1.2	1.2.1 Proportion of population living below the national poverty line, by sex and age	Decrease		Claim
			1.2.2 Proportion of men, women and children of all ages living in poverty	Decrease		Claim
4)	Implement activities to decrease deaths associated with Household Air Pollution (HAP) and burns from open cooking fires. The project will: - Reduce HAP by 99% in 3,000 homes through use of ONIL Stove, leading to: - Reduced instance of acute respiratory infection - Improved respiratory function - Reduced risk of child/infant death by eliminating open fire	3.2	3.2.1 Under-five mortality rate	Implement activities to decrease	3.2 #2	Claim
			3.2.2 Neonatal mortality rate	Implement activities to decrease		
		3.4	3.4.1 Mortality rate attributed to cardiovascular disease, cancer, diabetes or chronic respiratory disease	Implement activities to decrease		Claim
		3.9	3.9.1 Mortality rate attributed to household and ambient air pollution	Implement activities to decrease		Claim

5)	By enabling access to British Berkefeld Water Filters, the project will lower exposure to unsafe water for 300 families	3.9	3.9.2 Mortality rate attributed to unsafe water, unsafe sanitation and lack of hygiene (exposure to unsafe Water, Sanitation and Hygiene for All (WASH) services)	Implement activities to decrease	3.2 #6	Claim
		6.1	6.1.1 Proportion of population using safely managed drinking water services	Increase		Claim
6)	By providing ONIL stoves that save money, time, and health costs, the project will decrease the amount of time that women spend on unpaid domestic and care work	5.4	5.4.1 Proportion of time spent on unpaid domestic and care work, by sex, age and location	Implement activities to decrease	3.2 #5	Claim
7)	Implement activities to increase access to financial institutions. The project will: Enable access to community-savings, micro-finance, or similar opportunities, enrolling 10% of families over the lifetime of the project in said programs	8.1	8.10.2 Proportion of adults (15 years and older) with an account at a bank or other financial institution or with a mobile-money-service provider	Increase	3.2 #8	Claim

8)	By replacing inefficient open cooking fires with 3,000 ONIL stoves and performing 2,100 energy efficiency improvements in existing biomass cookstoves, the project will generate approximately 38,056.82 tCO2e of emission reductions	13	Tonnes of greenhouse gas emissions avoided or removed	Decrease	VCS validation report	SD VISTA-LABELLED VCU
9)	By replacing inefficient open cooking fires with 3,000 ONIL stoves and performing energy efficiency improvements in existing biomass cookstoves, the project will provide for approximately 39,997.53 tonnes of savings in woody biomass, equivalent to 756,000 trees or 219.76 ha of forest area over the 21 year lifetime	15.1	15.1.1 Forest area as a proportion of total land area	Implement activities to increase	4.2 #1	Claim
		15.2	15.2.1 Progress towards sustainable forest management	Implement activities to increase		Claim
		15.4	15.4.2 Mountain Green Cover Index	Implement activities to increase		Claim
		15.5	15.5.1: Red List Index	Implement activities to increase		Claim

## 2 PROJECT DESIGN

### 2.1 Project Objectives, Context and Long-term Viability

#### 2.1.1 Summary of Project Sustainable Development Objective(s)

- Install an estimated 3,000 ONIL high-efficiency, clean burning ONIL cookstoves, providing families with greater access to basic services in the form of clean cooking technology, thus benefiting approximately 14,760 individuals (SDI 7.1.2, 7.b, 1.4.1), and provide an estimated 2,100 energy efficiency improvements to existing ONIL cookstoves to benefit approximately 10,332 individuals (7.b).
  - Increase Tz'utujil Maya families' disposable income by reducing the amount of wood fuel purchased monthly. (SDI 1.1.1, 1.2.1, 1.2.2)
  - Increase Tz'utujil Maya families' disposable income by reducing the amount of time spent monthly collecting firewood, thus increasing time for income producing activities. (SDI 1.1.1, 1.2.1, 1.2.2)
  - Reduce total wood fuel usage in the project area to generate approximately 38,056.82 tCO<sub>2</sub>e of emission reductions. (SDG 13)
  - Reduce demand for wood fuel and the resulting deforestation within the project area, thus contributing to: a net positive increase in (1) forest area as a proportion of total land area (SDI 15.1.1), (2) the mountain green cover index (SDI 15.4.2), and (3) progress towards sustainable forest management. (SDI 15.2.1) This progress will help conserve ecosystem biodiversity by providing for estimated 10.47 hectares per year of habitat for 67 species on the IUCN Red List of Threatened Species. (SDI 15.5.1)
- Reduce Household Air Pollution (HAP) by 99% in an estimated 3,000 households. (SDI 3.9.1)
  - Reduce instance of non-communicable respiratory disease, such as Chronic Obstructive Pulmonary Disease (COPD) among adult family members, particularly women and the elderly. (SDI 3.4.1)
  - Reduce risk of mortality among infants and children under five years of age due to (1) acute respiratory illnesses, such as pneumonia, the leading cause of

mortality of children under five in Guatemala,<sup>1</sup> and (2) burns resulting from children falling into open cooking fires. (SDI 3.2.1, 3.2.2)

- Decrease the proportion of time Tz'utujil women spend on unpaid domestic and care work. (SDI 5.4.1)
- Increase the number of individuals with an account at a bank or other financial institution and increase financial literacy by enrolling beneficiaries and prospective beneficiaries in community savings programs. (SDI 8.10.2)
- Improve energy efficiency in an estimated 2,000 beneficiary homes by providing LED light bulbs to replace incandescent light bulbs (SDG 7.3).
- An estimated 300 British Berkefeld Water Filters will be distributed, providing 300 families with access to clean drinking water and lowering exposure to unsafe water and corresponding risk of illness and/or death. (SDI 3.9.2, 6.1.1)

### 2.1.2 Description of the Project Activity

The TRL Improved Cookstove (ICS) Project promotes 4 project activities: (1) introduction of high-efficiency, biomass-fired project devices to replace open cooking fires; (2) provision of energy efficiency improvements in existing biomass-fired cookstoves; (3) distribution of British Berkefeld water filters; and (4) replacement of incandescent light bulbs with LEDs. With over 30 years of experience, the Tuik Ruch Lew (TRL) team has enabled greater access to the projects chosen ICS technology, ONIL stoves, in the Lake Atitlán basin, mainly serving Tz'utujil Maya communities. In September of 2018, the commencement of project activities one and two, marked the start of the SD VISTa pilot project: TRL's Improved Cookstove Project for Lake Atitlán. At later dates, TRL began two other project activities, detailed below.

TRL uses an innovative digital platform to execute the project, including its educational program, and to monitor and evaluate the project's success. Using Samsung tablets, TRL's Outreach Team administers various surveys and questionnaires built in Kobo Toolbox to track project objectives and beneficiary information (see section 3.3). The four project activities are as follows:

#### Introduction of high-efficiency, biomass-fired devices to replace open cooking fires

ONIL stoves cost Q1,200/ea, including procurement and installation. TRL subsidies make them available to our beneficiaries for Q350. The project includes an innovative educational

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<sup>1</sup> Health in the Americas, 2012 Edition: Country Volume N ' Pan American Health Organization, 2012. P. 362.

[https://www.paho.org/salud-en-las-americas-2012/index.php?option=com\\_docman&view=download&category\\_slug=hia-2012-country-chapters-22&alias=132-guatemala-132&Itemid=231&lang=en](https://www.paho.org/salud-en-las-americas-2012/index.php?option=com_docman&view=download&category_slug=hia-2012-country-chapters-22&alias=132-guatemala-132&Itemid=231&lang=en)

component to empower our mostly female clientele to preserve indigenous cultural cooking traditions while adopting this new technology. The price of Q350 per stove was maintained due to its accessibility and, combined with our educational program, its ability to accelerate the uptake of the technology, promote responsible ownership, and ensure long-term stove maintenance. Nevertheless, when the beneficiaries do not have the noteworthy economic resources available, TRL seeks to achieve a further reduction in Q350. However, this is only possible if TRL has sufficient financial resources. Our Technology Adaptation Specialist's (TAS) experience as a chef and community nutritionist, and her many years' experience cooking on the stove, makes her the perfect person to impart new cooking techniques for traditional foods. Because she can communicate with beneficiaries in their native language, she can easily communicate the significance of the stove's positive environmental impacts and obtain a commitment from the beneficiary to its correct usage.

TRL aims to install approximately 120-150 ONIL stoves per year over the project period of 21 years. All stoves will be maintained for optimal performance.

TRL's digital monitoring platform tracks ONIL stove condition and net social and environmental impacts. Intake questionnaires gather general demographic information and baseline data for each family participating. Maintenance questionnaires and surveys are then administered over a multi-visit follow-up schedule, detailed in section 3.3. Within this schedule, our Outreach Team provides a unique educational component: ample environmental education alongside technological adaptation support.

Two surveys have been designed in-house: Adoption Metrics and Female Empowerment. Additionally, TRL uses the Poverty Probability Index (PPI) to track project participant poverty levels over time. The PPI is a ten-question survey designed and statistically validated for international organizations to use in tracking and combating poverty.<sup>2</sup> PPI questionnaires are country specific and compare responses to a scorecard, which then compares beneficiary responses against national and international poverty lines.<sup>3</sup> TRL also asks beneficiaries select questions from The St. George's Respiratory Questionnaire and Clean Cooking Alliance indicators to monitor and evaluate health outcomes. The St. George's Respiratory Questionnaire, designed by St. George's University in London, England, is also statistically backed and has been approved for randomized controlled therapy trials as well as population surveys.<sup>4</sup> Each survey has a "prior" and "post" version to establish a baseline scenario and identify changes that take place during the project lifetime. The "prior" and "post" versions are conducted for each additional instance of project activity one, one year apart. Each additional instance for project activity one (e.g., ONIL stove installed) mandates a minimum of five visits in the home of the beneficiary in the first year of installation.

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<sup>2</sup> <https://www.povertyindex.org/about-ppi>

<sup>3</sup> See appendix 1

<sup>4</sup> <http://www.healthstatus.sgul.ac.uk/sgrq>

**The ONIL stove was selected based on the following criteria:**

**Durability** – stoves previously installed are still functioning correctly after more than 15 years of use. The stoves can be maintained easily and TRL’s stove servicing program is included in the cost of the stove. Our beneficiaries purchase replacement parts at cost and perform other maintenance upon request.

**Heat Transfer** – heat is evenly distributed across the full breadth of the metal plate.

Insulation – stoves cannot radiate too much heat as day-time temperatures are high year long, but must be able to heat the home at night. The stoves have insulated cement walls that make them warm to the touch while in use, reducing risk of burns.

**Mobility** – stoves can be easily relocated if the family moves or builds a new kitchen.

**Efficiency** – the stove is 70% more efficient in the use of wood fuel<sup>5</sup> than an open fire (1) reducing time and/or money spent by families in firewood collection/purchase and (2) lowering wood fuel demand and consequently slowing local deforestation rates.

**Health Benefits** – the stove provides for a 99% reduction in HAP, compared to open cooking fires.

**Value** – other, similar stove designs are more expensive than the ONIL stove we promote, despite the fact that the construction of TRL’s ONIL stove is customized to our specific requirements based on our beneficiaries’ needs (i.e., more durable construction, metal *plancha* ideal for culturally specific culinary needs, use of a chimney, interior design radiates heat well after fire is out). The design is standard, however cookstoves are manufactured in-country, and thus customized by the manufacturer to suit the needs of families in rural Guatemala.

**Uptake** – The ONIL stove design is suited to local indigenous cooking practices and is thus culturally, widely accepted in the service area.

In addition to the installation of stoves and trainings, TRL has joined a number of promotional initiatives to improve family economies and alert the community to the dangers of open fire cooking and the benefits of ICS and other environmental technologies. Our goal is to expand access to the ONIL cookstove and spread knowledge of TRL’s work as an environmental, not-for-profit organization.

**Provision of energy efficiency improvements in existing biomass-fired cookstoves**

TRL provides energy efficiency improvements to any existing biomass-fired cookstove in the project area that is performing poorly due to damage and/or degradation (see VCS Project Description, section 1.11). The energy efficiency improvements TRL will have performed over the 21-year project lifetime. Existing biomass-fired cookstoves that undergo energy efficiency improvements receive a modified visit schedule:

**First Visit: Provision of energy efficiency improvement**

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<sup>5</sup> <https://www.helpsintl.org/communitydevelopment>

After a damaged, underperforming existing device is identified, TRL performs the energy efficiency improvement on the same day, once provided with beneficiary permissions and project consents. A TRL technician removes all components from the interior of the old ONIL stove, saving only the metal inlet and exhaust if they are in good condition. Next, they assemble and install a new ONIL stove combustion chamber while the TAS explains the importance of preserving the stove's internal mechanisms to provide for future efficient and proper function. The technician scrapes the cook surface clean from the lime build-up over time that inhibits effective heat transfer.<sup>6</sup> Once installed, the TAS reviews best-use techniques to ensure environmental and health benefits for as long as possible. The TAS completes the corresponding questionnaire.

**Additional Visits** (1,3, 5, and 7 years after provision of energy efficiency improvement):

The Outreach Team returns after one year, and then, to a random sampling of ONIL stoves on a biennial basis. The team addresses any issues with the improved ONIL stove, performs maintenance, and answers beneficiary questions. At this time, the TAS verifies contact information and reminds families of stove parts prices.

TRL also provides visits upon request, outside of the schedule described, for both project activities one and two.

### Distribution of British Berkefeld water filters

Over time, the TRL ICS Project has expanded to include additional activities designed to address the project area's environmental and sustainable development challenges. TRL offers British Berkefeld water filters to beneficiaries. The water filters provide access to safe, clean drinking water -- a resource largely inaccessible in beneficiary homes. We charge beneficiaries Q300 per filter. British Berkefeld water filters provide beneficiaries water that is less wasteful than drinking from plastic bags, safer than drinking tap or lake water, which is contaminated by fecal matter, and more cost-effective than buying larger water jugs. Our follow-up program is designed to monitor and evaluate whether families use their filter, prefer them over other options, and are using best maintenance practices. We also make sure that families return to us once a year to replace their filter candle for Q125 to ensure that the water filter is working at capacity. Both the filter and candle are sold to beneficiaries at-cost. Project activity results are entered in Samsung tablets and organized and analyzed on our cloud-based servers.

### Replacement of incandescent light bulbs with LEDs

TRL also distributes LED light bulbs to beneficiaries. In most cases, this involved replacing incandescent light bulbs with LEDs. However, if a client has a dead lightbulb of any kind (including CFL or LED), we will also offer them a LED. For each LED light bulb that replaces an

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<sup>6</sup> As the metal *plancha* (griddle) degrades over time, beneficiaries typically add a calcium-based substance to the cooking surface to prevent tortillas from sticking. This substance ultimately builds up, reducing heat transfer.

incandescent bulb, the project avoids an estimated 0.03468 tonnes of CO<sub>2</sub> from being released into the atmosphere each year.<sup>7</sup> Families save roughly Q200 per light bulb per year (depending on the fluctuating price of electricity), improving family economies. We offer LED light bulbs at-cost for Q15.<sup>8</sup> We educate beneficiaries on the environmental and financial benefits of using LED light bulbs and other ways that household electricity consumption can be minimized. Our follow-up program records kilowatt hours (kWh) used per month and changes in energy bill costs. Project activity results are entered in Samsung tablets and organized and analyzed on our cloud-based servers.

In Santiago Atitlán, open fire cooking, lack of access to safe, potable drinking water, and limited knowledge of energy efficient technologies like LEDs present complex health, socio-economic, and environmental challenges to local communities. The traditional method of cooking over an open fire brings great risk of burns, acute respiratory infections, eye irritation, and chronic obstructive pulmonary disease (COPD) resulting from decades of exposure to wood smoke. Particularly for women and children, multiple studies show high correlations between smoke exposure from a variety of home cooking sources and increased death rates. Worldwide, acute respiratory infection is a leading cause of death in children under five contributing to an estimated 11–22% of deaths among children under five.<sup>9</sup> EPA researchers estimate the lifetime cancer risk from wood smoke to be 12 times greater than from a similar amount of cigarette smoke.<sup>10</sup> "Solid fuels emit particulates and harmful gases when burned, causing elevated levels of indoor exposure that can reach 10-20 times above safe limits. Women, children, and the elderly are particularly exposed. The result is acute respiratory infections, chronic obstructive pulmonary disease (such as bronchitis), eye problems, and cancer of the lungs. Burns from open fires pose another significant health hazard."<sup>11</sup> In Guatemala, acute respiratory infections are

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<sup>7</sup> "Electricity-specific emission factors for grid electricity" p. 20 table: Emissions per kWh of electricity consumed (value for Guatemala)

<https://ecometrica.com/assets/Electricity-specific-emission-factors-for-grid-electricity.pdf>

<sup>8</sup>[https://www.ecoluxlite.com/home/index.php?option=com\\_virtuemart&view=productdetails&virtuemart\\_product\\_id=996&virtuemart\\_category\\_id=35&Itemid=386](https://www.ecoluxlite.com/home/index.php?option=com_virtuemart&view=productdetails&virtuemart_product_id=996&virtuemart_category_id=35&Itemid=386)

<sup>9</sup> Tomczyk, S., McCracken, J.P., Contreras, C.L. et al. Factors associated with fatal cases of acute respiratory infection (ARI) among hospitalized patients in Guatemala. BMC Public Health 19, 499 (2019) doi:10.1186/s12889-019-6824-z. Accessed 8 Nov. 2019.

<https://bmcpublihealth.biomedcentral.com/articles/10.1186/s12889-019-6824-z>

<sup>10</sup> What You Should Know About Residential Wood Smoke Pollution,

[https://www.marincounty.org/-/media/files/departments/cd/buildingsafety/woodsmokedocformarin\\_planning.pdf](https://www.marincounty.org/-/media/files/departments/cd/buildingsafety/woodsmokedocformarin_planning.pdf). Accessed 8 Nov. 2019.

<sup>11</sup> Household Fuel Use and Fuel Switching in Guatemala June 2003 ....

<http://documents.worldbank.org/curated/en/255351468771351289/text/272740ESMAP0Te1361030HouseholdOfuel.txt>. Accessed 28 Mar. 2019.

prevalent among 20.1 percent of children under five.<sup>12</sup> In 2015 the mortality rate for children under the age of five in Guatemala related to respiratory infections like influenza or pneumonia was 36.4 (deaths per thousand live births).<sup>13</sup>

The TRL ICS Project was formed after becoming aware of these risks. The goal has always been to identify ways to combat the ill-effects of open fire use while confronting local ecological threats and improving family economies. TRL enables access to technology and education that empowers our beneficiaries to overcome these challenging circumstances. Other family members and neighboring families also share in the benefits.

TRL staff have maintained a strong commitment to the community and its indigenous culture. Because TRL must work within the framework of an impoverished, often semi-illiterate community, we have never been able to implement a payment schedule, a sliding payment scale, or signed documentation. We instead have opted for a one-time base charge for all community members. Consent to the project is obtained through a verbal agreement with the beneficiary at the time of the site visit. This structure is built on years of trust earned among local residents and enables TRL to expand its programs to confront additional environmental challenges within the project area.

### 2.1.3 Implementation Schedule

The following implementation schedule reflects past and future development activities and accomplishments, based on the current, TRL ICS Project plans.

Date	Milestone(s) in the Project’s Development and Implementation
21 September 2015	TRL files to become a registered Guatemalan nonprofit dedicated to the implementation of sustainable solutions to the environmental, health, and development challenges that threaten indigenous livelihoods in the Lake Atitlán drainage basin.
June 2016	TRL applies and is approved for collaboration with Princeton in Latin America, set to receive Fellows on a yearly basis.
October 2017	TRL sends final grant report to Journey Latin America detailing project activities concluding five-year grant cycle.
January 2018	A \$14,000 unrestricted donation is made to support operating costs of TRL.
February 2018	TRL is accepted into Verra’s Sustainable Development Verified Impact Standard (SD VISTA) pilot project.
July 2018	TRL accepts the first Princeton in Latin America (PiLA) fellow for 2018-2019 cycle.

<sup>12</sup> “Desigualdades en salud en Guatemala” P. 21

[https://www.paho.org/gut/index.php?option=com\\_docman&view=download&category\\_slug=publicaciones&alias=793-desigualdades-en-salud-en-guatemala&Itemid=518](https://www.paho.org/gut/index.php?option=com_docman&view=download&category_slug=publicaciones&alias=793-desigualdades-en-salud-en-guatemala&Itemid=518)

<sup>13</sup> Pan American Health Organization. PLISA: Health Information Platform for the Americas. Mortality data: leading causes of death, Guatemala, 2015 [Internet]. Washington, D.C.: PAHO; 2016. Available from: <https://hiss.paho.org/pahosys/lcd.php> Accessed on 12 May 2020.

1 September 2018	Project Start Date: Project Activities commence with a new series of ONIL stove installations and energy efficiency improvements in existing biomass-fired cookstoves under the new, TRL Improved Cookstove Project for Lake Atitlan.
November 2018	Implementation of digital survey system begins with mobile platform Kobo Toolbox.
19 February 2019	A \$30,000 unrestricted donation is made to TRL to benefit the stove project.
March 2019	A \$10,000 unrestricted donation is made to support operating costs of TRL.
March 2019	Seattle International Foundation (SEAIF) and TRL begin coordinated partnership enabling TRL to use SEAIF as a fiscal agent, thus expanding institutional funding access.
17 May 2019	TRL begins the distribution of British Berkefeld water filters as an additional project activity.
September 2019	TRL has installed 153 ONIL stoves
October 2019	TRL receives an in-kind donation of 100 LED light bulbs and completes its first installation in a beneficiary's home, commencing the start of a 4th project activity.
December 2020	TRL has installed an additional 60 ONIL stoves, distributed additional 5 water filters, and enrolled another 2 families to the microsavings program
December 2021	TRL will have installed an additional 150 ONIL stoves, distributed additional 15 water filters, and enrolled another 20 families to the microsavings program
December 2022	TRL will have installed an additional 150 ONIL stoves, distributed additional 15 water filters, and enrolled another 20 families to the microsavings program
December 2022	Next monitoring period report
December 2023	TRL will have installed an additional 150 ONIL stoves, distributed additional 15 water filters, and enrolled another 20 families to the microsavings program
December 2024	TRL will have installed an additional 150 ONIL stoves, distributed additional 15 water filters, and enrolled another 20 families to the microsavings program
August 2024	Next monitoring period report
August 31 2039	This 21-year project cycle concludes positively, affecting the health and economic status of residents of Sololá department.

#### 2.1.4 Project Proponent

Organization Name	Tuik Ruch Lew/Helping the Earth (TRL)
Role in the Project	Primary Project Proponent
Contact Person	Cameron Krummel
Title	Administrative Director

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### 2.1.5 Other Entities Involved in the Project

No other entity is involved with the TRL ICS Project.

### 2.1.6 Project Type

The project is a non-AFOLU, Grouped Project. The general sector is energy efficiency.

SD Vista Sectoral Scopes	U.N. Sustainable Development Goals
1. Agriculture, forestry and other land use	Life on land 15.1.1 15.2.1 15.4.2 15.5.1
2. Climate Change Adaptation	Climate action
4. Energy	Affordable and clean energy 7.1.2 7.b 7.3
7. Health	Good health and well-being 3.2.1 3.2.2. 3.4.1 3.9.1 3.9.2
10. Livelihoods	End poverty in all its forms everywhere 1.1.1 1.2.1 1.2.2 1.4.1 Decent work and economic growth 8.10.2
12. Water Access and Sanitation	Clean water and sanitation 6.1.1
14. Women's empowerment	Gender equality 5.4.1

### 2.1.7 Project Location

The project takes place within the Sololá Department (14.70°N, 91.25°W), which includes the Lake Atitlán Basin, a nature preserve. 14°38'17.63"N, 91°13'44.44"W are the coordinates of Santiago Atitlán, headquarters of the project. See KML file. The photo situates Lake Atitlán in

the Sololá Department and outlines the project area. The project office is located in the town of

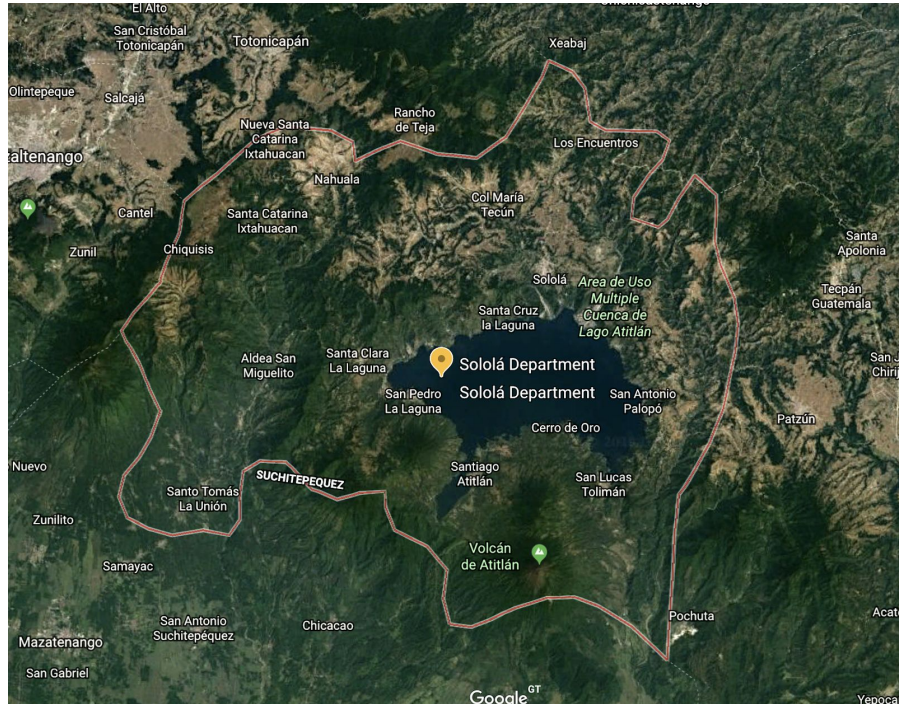


Figure 1: Map of Project Area

Santiago Atitlán at the south end of the lake.

### 2.1.8 Baseline Scenario

Lake Atitlán is one of the most beautiful lakes in the world. It is situated to the west of Guatemala City, at an altitude of 1,562 meters. A volcanic caldera surrounded by volcanoes San Pedro, Atitlán, and Tolimán, the lake was rich in fish, crabs, and migrant waterfowl, with verdant lake shores for planting corn, beans, and squash. This is the food cultivated by the indigenous Maya – the Tz’utujil, Kaqchikel, and K’iche people, who have made this area their home for thousands of years.

On the back side of Volcano Atitlán, the sacred Resplendent Quetzal bird has returned to a protected area. Sustainable tourism was recently assisted through funding by the Audubon Society for the construction of splendid bird watcher trails. Bird watching has become a new source of income for the Maya Audubon-trained guides. But the territory surrounding this area is also prime forest for wood cutters – especially threatened by the wood cutters’ chainsaws are the old snags of ancient oak trees, which the quetzals need to build their nests.

The mountains surrounding the southern end of Lake Atitlán are covered with forests, which also provide the Tz’utujil Maya with wood fuel for cooking. Most residents still prepare meals

using a traditional three-stone hearth and consume 5.6 tonnes of wood per year.<sup>14</sup> With increasing population, these mountains around Lake Atitlán are in extreme danger of severe deforestation – cutting trees for wood fuel drives the 3.1% decrease in tree cover in the Sololá Department since 2000.<sup>15</sup> As settlements grow, slopes are denuded, and the danger from landslides on the slopes of the volcanoes increases, with van-sized boulders crashing down the steep inclines towards the houses below.

Despite centuries of Spanish occupation and subsequent political domination by a wealthy, ruling oligarchy, these indigenous cultures have survived, and their unique dialects remain in wide-use today. In Guatemala, there is a stark difference between Maya and Ladino, the former being indigenous in culture and lifestyle; the latter identifying more with pan-Latino culture, such as adoption of the Spanish language. After 1996, the end of the 30-year civil conflict in Guatemala, the numbers of Ladinos greatly declined in most of the lakeside towns, as the indigenous people regained political power over their own communities. TRL primarily works in these Tz’utujil communities, located at the southern end of the lake; however, we offer services to the 421,583 inhabitants of Sololá Department.<sup>16</sup>

Fire is elemental in the Maya cosmovision and still held to be an important aspect of daily life. The Maya view the lower portion of the constellation, Orion’s belt and feet (the stars Saiph and Rigel), as the hearthstones of creation, similar to the triangular three-stone hearth that was, and often still is, at the center of all traditional Maya homes. The Orion nebula, lying at the center of the triangle, is interpreted by the Maya as the cosmic fire of creation surrounded by smoke. This constellation is clearly visible in the winter skies above Lake Atitlán, and on a clear night, one can see the smoky nebula. To this day, smoke rising from a home indicates that there is a woman at the hearth and tortillas in a basket – people are loath to separate themselves from this ancient cosmic connection. This reverence for fire and the three-stone hearth, along with key economic factors, have preserved the use of open cooking fires within the home for both cooking and heating. To remove the smoke, in former times, lofty grass-thatched roofs – sealed from the inside with the creosote from the smoke – worked in unison with traditional cooking methods. However, newer construction techniques have led to concrete block homes, most with tin roofs, and lacking smoke outlets. Smoke inside the home exposes women and children to harmful HAP levels.

Economically, these communities are diverse, ranging from families that live in extreme poverty to families that form part of the educated and emerging middle class. TRL does not discriminate economically as to whom we serve, because our priorities are protecting the environment by reducing the number of trees cut for wood fuel and improving respiratory health by eliminating

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<sup>14</sup> Per TRL survey data.

<sup>15</sup> Global Forest Watch. “Tree Cover Loss in Sololá, Guatemala”. Accessed on 14/04/2020 from [www.globalforestwatch.org](http://www.globalforestwatch.org).

<sup>16</sup> Devised from the data of the Population and Housing Census 2018, Guatemala. “Table A1 – Total population by sex, five-year age groups and area” Cell C16 <https://www.censopoblacion.gt/explorador>

smoke from open cooking fires. However, we focus most of our efforts on those living close to, or in, poverty as the economic and health benefits will often be most strongly felt by these families.

Poverty is one compelling reason that people still use a three-stone open fire, thus inspiring environmental programs that always benefit family economies. The ONIL stove burns more efficiently and removes smoke from the home via a chimney, saving families time gathering or money spent on wood, while protecting family health.

In the homes of our most economically disadvantaged beneficiaries, incandescent light bulbs are the primary source of energy consumption. After one month of LED use, beneficiaries who have replaced incandescent light bulbs will see financial savings on their energy bill greater than the cost of the new light bulb. Given that the majority of energy generated in Guatemala is non-renewable, minimizing household energy consumption is critical to limiting carbon emissions.

A family using a British Berkefeld water filter will have unlimited access to clean water for Q25 a month while local purified water vendors sell agua pura by the gallon for Q16. Purified water is also sold in small bags contributing to extensive plastic pollution in and around Lake Atitlán. In the project area, local community members face recurring expenses for basic resources that, coupled with relatively low incomes, seriously inhibit long-term savings. Furthermore, this scenario is characterized by ecological problems that threaten both the local environment and atmospheric greenhouse gas levels.

### 2.1.9 Causal Chain(s)

See appendix 2 for causal chain.

### 2.1.10 Threats to the Project

#### Human-Induced threats

**Threat:** Cultural worldview limits reception of ONIL stove as a larger fire is seen as superior (PA1).

**Solution:** Continue to employ Tz'utujil educators to explain the depth of the project in participants' native language and from their cultural perspective.

**Threat:** Stove owners alter the stove itself so that it no longer functions as designed, or owners refuse to maintain their stoves to function properly (PA 1 and PA 2).

**Solution:** (1) Improve our screening process as to who receives an ONIL stove, i.e., people who are committed to using the ONIL stove to accomplish the SDGs. (2) Educate stove recipients about best use practices and environmental and economic benefits and share tips to help families adapt more quickly to the change in technology. (3) Foster of responsibility for stoves through the subsidised Q350 charge for a new ONIL stove or Q60 charge for a new combustion chamber. Thus beneficiaries are only paying a part of the entire stove installation and monitoring

costs of Q1200. Research showed that once people partly pay the Q350 for the ONIL stove, they gain the feeling of ownership and therefore will care better for their belongings. (4) Maintain an intensive schedule of information dissemination about the importance of the ONIL stoves and how they must be used appropriately to achieve the benefits, both for people and the planet, using social media outlets. Continue to provide maintenance when needed so to avoid frustrations with stove performance.

Threat: U.S. trade-war reduces availability of supplies, increasing price for the foreseeable future. This includes supplies for stoves, replacement parts, water filters or LEDs (PA 1, PA 2, PA 3, PA 4).

Solution: These impacts have already been seen (e.g., local fabricators cannot get quality metal to make replacement parts). Price changes have not, and will not, be passed on to TRL beneficiaries because TRL's financial structure enables the organization to offset these costs using a mix of funds generated from private donations, other forms of institutional funding and upon completion of VCS, carbon markets.

### Natural threats

Threat: Climate change and deforestation make firewood an untenable source of fuel (PA 1 and PA 2).

Solution: Although scarcity would seem to support the use of the ONIL stove, at some point the economy of obtaining firewood could make other fuels a more sustainable option. TRL's environmental education program is designed to encourage sustainable management of natural resources. The organization will continue to encourage discussion and action around the design of sustainable forest management programs in the region. Our goal is to support local efforts to organize community forestry models. We will continue to participate in local meetings and contribute to the development of a collective conscience among project participants and the rest of the community to sustainably manage local forests.

Threat: Climate change negatively affects agricultural yields, reducing reliable income streams in the local community and thus availability of funds to purchase ONIL stoves, replacement parts, water filters and/or LEDs (PA 1, PA 2, PA 3, PA 4).

Solution: Encourage project participants to enroll in the TRL savings program. With access to savings, project participants will be less vulnerable to the economic consequences of a failed crop or other agricultural challenges brought about by climate change. Additionally, TRL will support local coordinated efforts to develop strategies for climate resilience. Our environmental education platform seeks to strengthen environmental values among project participants, empowering them to be leaders of such efforts in the area.

### 2.1.11 Benefit Permanence

The TRL ICS Project focuses on a program of education and supports a system of maintenance that helps extend the lifespan of the environmental technologies deployed. Through the first

five home visits made to families that receive an ONIL stove, beneficiaries learn how to extend the life of the ICS technology, which parts will need scheduled maintenance, how to clean stoves to ensure proper airflow, and what cooking techniques can be used to protect and preserve stove components. Since TRL's founding, the organization has outsourced manufacture of custom stove parts to increase quality and reduce beneficiary costs. TRL's dedication to free maintenance while selling replacement parts at-cost has increased demand for maintenance from not only TRL beneficiaries, but beneficiaries of other ONIL stove projects in the region. As a result, our project is helping ensure that stoves installed over 15 years ago continue to function efficiently ensuring benefit permanence.

To ensure the project's long-term viability and the permanence of ICS and other program benefits, TRL has embraced the following long-term aims:

- 1) Open a factory from which stoves and replacement parts are sold and maintenance visits scheduled. On site fabrication of the stove parts will ensure affordable prices for the ONIL stoves as transportation costs among others are minimized. Moreover, local stove production will benefit the local economy as we will offer job opportunities to people in Santiago and purchase materials locally. This service will be provided beyond the project lifetime of 21 years.
- 2) Continue to enroll women in the TRL savings group, working to improve financial literacy. Beneficiaries will be encouraged to save money to be able to buy their replacement parts and new stoves. High poverty rates have kept many families from considering savings plans. TRL offers its own community savings service. This program enables families to contribute small amounts of money, without the minimum balance required by larger financial institutions. The goal of this program is to instill financial planning capacities in beneficiaries, enabling them to transition to larger savings institutions and begin saving and purchasing independently.

Preliminary testing of this concept has proven the idea to be eagerly accepted. To date, about 15% of families have enrolled. The idea was conceived when TRL noticed that very poor beneficiaries never had enough money on hand to purchase their replacement parts. Our TAS learned that the concept of saving money was not viewed as possible by the owners because the amount needed seemed overwhelming. By explaining the idea of saving small amounts periodically, the goal of purchasing repair parts suddenly seemed possible, provided that the money was not saved within the house. This service will be provided beyond the project lifetime of 21 years.

- 3) Enable access to other environmental technologies that provide for financial savings among beneficiaries.

By providing water filters and LED light bulbs to beneficiaries, TRL can educate the community on other opportunities to lower household expenses. This will enable lower and middle-class residents to save, facilitating the opportunity to purchase a stove

outright and ultimately reducing TRL's reliance on grants and private donations. This service will be provided beyond the project lifetime of 21 years.

- 4) Target grants and other institutional funding sources to address costs associated with the most vulnerable beneficiaries.

While micro-financing will enable some beneficiaries to purchase stoves outright, due to high rates of poverty and extreme poverty, TRL plans to continue sourcing institutional funds. These funds will go directly to enhancing project inclusivity among the project area's most vulnerable stakeholders. Finding subsidies for future ONIL stoves will be an ongoing activity beyond the project's 21-year life.

- 5) Offer a holistic and long-term social, environmental, and economic educational program that accompanies all project activities.

TRL's education program will ensure long-term sustainability due to awareness rising about the benefits for the people and their environment by maintaining the project activities.

## 2.2 Stakeholder Engagement

### 2.2.1 Stakeholder Identification

To identify stakeholders who will be informed and consulted, TRL considers individuals, groups, or communities that either: (1) are affected or likely to be affected by project activities or (2) may have an interest in the project. Marginalized and/or vulnerable individuals and groups are directly identified within the first category. Broader stakeholders within the second category do not experience direct project impacts, but may still be consulted on an informal basis to identify risks and opportunities associated with project activities.

TRL's stakeholder identification process is modelled after Section 3 of the "Template for ESS10" which provides guidance on the application of the World Bank's Environmental and Social Standards (ESSs).<sup>17</sup> Adjustments are made to suit the scope and context of the project and TRL's role in the project area.

We consider the following stakeholders within each category (see also table 2): government authorities, environmental public-sector agencies, local NGOs and businesses, academics, religious groups, the media and individuals and families within nearby communities. Particular

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<sup>17</sup> Template for ESS10: Stakeholder Engagement and Information Disclosure Stakeholder Engagement Plan and Stakeholder Engagement Framework  
<http://pubdocs.worldbank.org/en/909361530209278896/ESF-Template-ESS10-SEP-June-2018.pdf>.  
Accessed 16 September 2019.

focus is directed to individuals and groups who may be directly or potentially adversely affected by project activities.

Stakeholder identification is ongoing and did not end at project conception. TRL's local staff possess extensive knowledge of the project area and affected populations. Weekly team meetings include discussions of how to modify the programs to best serve various stakeholder groups within the local community and mitigate any foreseen adverse impacts.

## 2.2.2 Stakeholder Description

### Affected Parties

(1) Current Beneficiaries: ONIL stove, British Berkefeld Water Filter and LED users

**Beneficiaries** are identified as any individual in the Sololá Department willing to adopt a new environmental technology. **Beneficiary families** are those living in or sharing the same family compound as project beneficiaries. We give priority to installing stoves for people whose extended family has already demonstrated successful adaptation to new technology. Conversely, based upon experience, TRL has a strict policy against providing ONIL stoves to family members of those who have *intentionally* altered or destroyed a previously installed stove.

TRL's beneficiary base is reflective of local demographics. Culturally, the area is still very traditionally Tz'utujil, though the younger generations and more educated elders (usually men) speak Spanish. Due to lack of educational opportunity, changes do not happen easily. TRL also serves the small, local Ladino population (people who have chosen to reject their indigenous culture, or have some or entirely European ancestry). Unsubsidized improved cookstove technology is largely inaccessible to the general population. For this reason, interventions that also bring increased economic productivity to families are both well accepted and critical to helping alleviate poverty in all of its forms.

The TRL ICS project does not infringe on any rights of the beneficiary. Beneficiaries' interest is in improving their health and promoting economic stability. They are relevant as primary participants in the project activities.

(2) Potential Beneficiaries

TRL does not actively seek out new beneficiaries, but instead relies on some promotional events and, most importantly, word-of-mouth recommendation by current ONIL stove owners. TRL further screens applicants by sending the TAS to assess a family's needs and whether or not the family shows signs of being a successful ONIL stove adopter. It is worth noting that TRL will exclude beneficiaries who have previously damaged a ONIL stove intentionally.

**Current and potential beneficiaries** share many similar characteristics, the primary difference being lack of awareness of our programs or financial ability to provide the Q350 copayment. TRL aims to expand its beneficiary base by publicizing its subsidized ONIL stove price. The

organization also solicits private donations to enable access to the community's poorest families and offers other environmental technologies with lower up-front costs than the ONIL stove, such as LEDs and water filters, to promote savings among prospective beneficiaries. Special attention is paid to elderly, female, disabled, and otherwise vulnerable and or/marginalized individuals of this stakeholder group to ensure our project activities are not just accessible to, but also inflicting no adverse impacts on those individuals.

### (3) Local Vendors

Various local businesses supply wood, purified water, and light fixtures in the project area. TRLs services influence the consumption of these products and could thus negatively affect vendor livelihoods.

## Other Interested Parties<sup>18</sup>

### (1) Project Donors

TRL has worked with numerous individuals or groups of foreigners who have come to help the poorest people in Santiago Atitlán, (e.g., those who cannot afford even our subsidized price, Q350 for the ONIL stove).

### (2) Religious groups

The majority of local community members, including TRL beneficiaries, observe Catholic or Evangelical Christianity. Occasionally, local religious institutions will refer beneficiaries to TRL.

### (3) Government authorities

The COCODE (local indigenous authorities), and the Mayor of Santiago Atitlán are the governing bodies of the population serviced by TRL.

### (4) Environmental public-sector agencies

The INAB (National Forest Institute), CONAP (The National Council for Protected Areas) and (Ministry of Agriculture) are engaged in work relevant to TRL's mission.

### (5) Academic institutions

The *Universidad del Valle*, located in Sololá Department, manages an active Centro de Estudios Ambientales y Biodiversidad (CEAB) (Center for Environmental and Biodiversity Studies). TRL attends events and symposiums on ecological threats to the project area hosted by CEAB.

### (6) Local NGOs

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<sup>18</sup> Although other interested parties have been consulted to inform project design, only impacts experienced by affected parties are included below in Section 3.

Various other NGOs in Santiago Atitlan, including Pueblo a Pueblo,<sup>19</sup> Adisa,<sup>20</sup> Mayanza,<sup>21</sup> and Hospitalito Atitlán,<sup>22</sup> One Two Tree, Africa 70, and ADECCAP provide services to TRL’s beneficiary base. These organizations also provide philanthropic services targeted towards vulnerable members of the Sololá Department and have recommended potential beneficiaries to us in the past.

(7) Media

The local radio station, *Radio Voz de Atitlán* is the primary media outlet accessed by the local community and TRL’s beneficiary base.

### 2.2.3 Stakeholder Consultation

Stakeholder engagement is an ongoing and steadily improving process. Even if the four project activities do not require the approval of governing bodies, TRL is constantly engaging with their local community. TRL team’s integration into the community has enabled them to gain valuable feedback through community meetings and conferences, as well as in an unofficial capacity, through casual conversations with stakeholders.

TRL’s consultation activities are as follows:

**Table 2: Overview of Stakeholder Consultation Activities**

Stakeholder Group	Stakeholder	Consultation Activities
<b>Affected Parties</b>	Current Beneficiaries	- Household Visits / Surveys - Public Events / Expositions - Open Office
	Potential Beneficiaries	- Household Visits / Surveys - Public Events / Expositions - Open Office
	Local Vendors	- Public Events / Expositions
<b>Other Interested Parties</b>	Project Donors	- Public Events / Expositions - Annual Report - Regular Newsletter - TRL's Social Media Communication
	Religious Groups	- Public Events / Expositions - Annual Reports published on the TRL's website - TRL's Social Media Communication

<sup>19</sup> <https://www.puebloapueblo.org/>

<sup>20</sup> <https://www.adisagt.org/>

<sup>21</sup> <https://www.mayanza.org/>

<sup>22</sup> <https://hospitalitoAtitlan.org/>

	Governmental authorities	- Public Events / Expositions - Annual Reports published on the TRL's website - TRL's Social Media Communication
	Environmental public-sector Agencies	- Public Events / Expositions - Annual Reports published on the TRL's website - TRL's Social Media Communication
	Academic Institutions	- Public Events / Expositions - Annual Reports published on the TRL's website - TRL's Social Media Communication - Research Collaboration
	Local NGOs	- Public Events / Expositions - Annual Reports published on the TRL's website - TRL's Social Media Communication
	Media	- Public Events / Expositions - Annual Reports published on the TRL's website - TRL's Social Media Communication

### Household Visits / Surveys

TRL has engaged with the beneficiaries and their families by household visits, where the TAS is explaining the benefits of the four different project activities. During a regular year TRL is conducting about 250 household visits of which about 50% of the beneficiaries visited requested a ONIL stove.

The procedure of the household visits are as follows:

1. TAS is planning an appointment (day/time) with the current beneficiary at their house
2. TAS is preparing informational and educational material for the beneficiary
3. TAS is explaining the benefits of the four project activities, putting emphasize on the social, environmental and economic impact of each project activity
4. TAS is registering the beneficiary if they are interested in one of the project activities. Registration of the beneficiary takes place through the digital capture of the data through the application Ix-ko-pajay (KOBO Toolbox). During this visit TAS is surveying about the general situation of the beneficiary (general personal data, general information about the water, sanitation and cooking situation)

**OUTCOMES:** Over the last years, TRL has realized that these Household Visits are not only important for gaining the beneficiaries trust, but also helped TRL to better understand the community need. For example, TRL noticed that for some beneficiaries in remote areas the cost of Q350 is unaffordable. Based on these results, TRL considered offering stoves at a lower price for residents of this neighborhood. TRL aims to provide similar discounted services in the future, as funding permits. When TRL has access to additional funds that allow for a larger subsidy, or alternative payment options, enabling members of these areas with greater accessibility to stoves is now prioritized. It is worth mentioning at this point that the price of Q350 is already

subsidised. The entire stove installation and monitoring costs are Q1,200 which is unaffordable for most of the beneficiaries.

### Public Events / Expositions

To engage with a wider range of stakeholders, especially with those identified as Other Interested Parties, TRL regularly attends public events and expositions to present the four different project activities. These platforms give TRL the opportunity not only to engage with stakeholders but also to regularly evaluate the project activities based on the community and stakeholder needs. Moreover, TRL also provides **group educational seminars** to introduce beneficiaries from lesser frequently served areas to the environmental technologies offered by TRL.

The procedure of the public events / expositions of the project activities are as follows:

1. TRL's team is developing the goals and objectives for the event in a co-creating process
2. TAS is planning the event, such as the budget, team participation
3. TAS is preparing the informational / educational material (e.g. handouts, banner) and the exhibits for the event (ONIL stove, Berkshire Water Filter, LED light bulbs).
4. TAS is preparing the Q&A with stakeholders together with the TRL team.
5. TRL's participation in the event with the focus on identifying and establishing partnerships, finding donors, and informing various stakeholders about the benefits of the four project activities.
6. Debriefing in the TRL team where all insights will be discussed. Please note that for future events TRL will publish the outcomes and findings of the public events and expositions on through their social media platforms (Instagram, Facebook, YouTube Channel, Website).

**EXAMPLE:** In July of 2018, TRL attended the Second Annual International Symposium on Continental Waters of the Americas held in Panajachel, Sololá at which certain stakeholders were consulted. Hosted by the Centro de Estudios Atitlán - Universidad del Valle de Guatemala<sup>23</sup> - the symposium brought together key stakeholders with vested interest in confronting the ecological threats facing the Lake Atitlán basin. Various groups were in attendance, including

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<sup>23</sup> A local university with a center for environmental studies.

CONAP,<sup>24</sup> Amigos del Lago de Atitlán,<sup>25</sup> Legambiente,<sup>26</sup> Africa 70,<sup>27</sup> and ADECCAP,<sup>28</sup> among others. TRL presented the ONIL stove technology and the project design to symposium attendees as part of an exhibition (see figure 2).

**Figure 2: TRL consults with a stakeholder at the Second Annual International Symposium on Continental Waters of the Americas.**



**OUTCOMES:** TRL was able to gather useful feedback from several stakeholder groups, including representatives of social and environmental public-sector agencies as well as civil society organizations, and use it to modify the project design. Please find here some examples of feedback:

- Positive remarks about stove technology specifically enable the reduction of firewood through the use of an ONIL stove and the accessibility of the technology.

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<sup>24</sup> The Consejo Nacional de Áreas Protegidas is the national agency dedicated to the conservation and the sustainable use of the biological diversity and protected areas of Guatemala.

<sup>25</sup> A local environmental NGO that works to educate, investigate, and ensure the conservation of the lake in cooperation with neighbors, scientists, local and national authorities, organizations, and universities.

<sup>26</sup> <https://www.legambiente.it>

<sup>27</sup> <http://www.africa70.org>

<sup>28</sup> The Asociación de Desarrollo Comunitario del Cantón Panabaj is an organization dedicated to the community development of Panabaj, a neighborhood of Santiago frequently serviced by TRL.

- Discussion and solution finding on the price of transporting an ONIL stove from the manufacturer to remote areas as another financial barrier preventing families from being able to afford a cooker. This stimulated TRL's internal discussion on developing a stove factory in Santiago Atitlan.
- Emphasize the importance of providing ample education, access to repair parts and maintenance services, given the less successful experiences of cookstove projects they had witnessed elsewhere in the country.
- TRL's Administrator spoke with Africa 70's Mario Zutteroli about the project. He provided positive comments about the project and its environmental impacts, but noted its reach was limited given the size of the organization. One recommendation was partnering with other organizations to apply for funding at the national level and to expand the reach of the project so that smaller villages would be able to access identical services.



Figure 3: TRL holds a training for ODIM on December 12, 2019

Past public events and expositions motivated the following actions by TRL:

1. place additional emphasis on seeking funding to provide for larger subsidies for the project area's most vulnerable families;
2. hire additional field team personnel to increase TRL's capacity to provide maintenance and educational visits;
3. planning the stove fabrication in Santiago Atitlan;
4. hold training for other community projects that wish to replicate TRL's model in areas the project cannot reach, e.g. TRL has held two training sessions with the Organization for the Development of the Indigenous Maya (ODIM), pictured below (figure 3).

### Open Office

TRL has an Open Office policy to expand its informal consultation activities to reach more stakeholders. From Monday to Friday (9am to 4:30pm), interested stakeholders can come to TRL's open office and engage with the TRL's team, asking questions about the four different

project activities and get information about the benefits of these respectively. TRL's office is located centrally in Santiago Atitlan, no more than 2 walking minutes from the market. The front of the office building shows the logo and the two of TRL's



project activities (figure 4). This attracts people and stimulates discussions.

#### Figure 4: TRL's Open Office

TRL has noticed that various relevant socio-economic and cultural barriers in the project area impede the participation of marginalized members of the local community (e.g. registration fees for public events, transportation fees, lack of free time). The open office TRL attracts stakeholders of all kinds and fosters direct community communication, but especially people passing by and being interested in the project activities of TRL.

A typical stakeholder engagement with an affected party looks like the following:

1. Potential beneficiaries come to the TRL's office asking for information about the project activities.
2. TAS is explaining the benefits of the project activity while showing the different environmental technologies offered by TRL's project activity.
3. TAS is explaining the process to participate in the different programs, including the financial contribution of the beneficiaries, the subsidies from donors, and the procedures of house visits and environmental technology distribution.
4. Q&A between the potential beneficiary and TAS

#### Interaction through publications

TRL engages with several stakeholders (see table 2) through annual reports published on the organisation's website ([www.trlearth.org](http://www.trlearth.org)), regular newsletter, and TRLs social media communication.

**Annual reports** have been established in 2018 and are published on the [TRL's website](#)<sup>29</sup>. The annual report includes information about the operations throughout the year, stories from Santiago, as well as challenges that TRL has faced and overcome.

**Newsletters** are being sent to project donors and friends of the organisation about 6 times a year. Newsletters include updates on current projects, community stories to share, fundraising appeals and much more. To date, TRL's database on MailChimp includes 165 recipients.

**Social media communications** are crucial to stay engaged with a variety of stakeholders. TRL's social media communication include the following platforms:

- [TRL's website](#)
- [Instagram](#) (english and spanish bilingual platform to engage with current beneficiaries, potential beneficiaries, project donors, and local NGOs)
- [Facebook](#) (english and spanish bilingual platform to engage with current beneficiaries, potential beneficiaries, project donors, and local NGOs)

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<sup>29</sup> <https://www.trlearth.org/2019-annual-report>

- [YouTube Channel](#) (spanish and tz'utujil bilingual platform to engage with current beneficiaries, potential beneficiaries, project donors, academic institutions, local NGOs, and local media)
- [LinkedIn](#) (english platform to engage with project donors and to attract potential donors)

#### 2.2.4 Continued Consultation and Adaptive Management

Consultation will continue throughout the project lifetime, and will continue to influence project design. Adaptations will be made if deemed necessary.

Since the beginning of the stove project of TRL, the local community has been consulted to determine their cooking needs. Based on the feedback, TRL has adapted as follows:

- Beneficiaries demand a rapidly heating and evenly distributed hot cooking surface; insulated sides that protect children from burn; a compact, durable, module unit that can be easily taken apart and reinstalled in a new location; and a stove that does not throw off excess heat during the day, but retains and radiates heat at night. Thus the ONIL stove was chosen to reflect the specific, expressed needs of this culture and context as determined through listening to feedback and client experiences with other supposedly energy-efficient models.
- In the past beneficiaries reported a rusting effect on the metal cooking surface of the ONIL stove. TRL's lead TAS realized that the practice of roasting tomatoes directly on the stove top generates a chemical reaction that degrades the quality of the metal plate. Thus, the TAS has, over time, added new components to the educational program.
- TRL has also found that misuse and destruction of the ONIL stove runs in families. For example, when one family member intentionally destroys the combustion chamber to be able to fit in large pieces of wood (thus destroying its efficiency as well as the clean combustion), other family members in the compound tend to do the same. As a policy, TRL will not work with members of a family who have a history of destroying their stove or neglecting maintenance. This policy, however, can be overturned at the TAS's discretion. Knowing this consequence in advance discourages stove abuse.

TRL will continue to implement these informal ongoing consultation procedures, alongside formalized consultation via our digital survey platform, described in section 2.2.8.

#### 2.2.5 Anti-Discrimination

TRL is dedicated to supporting diversity and has a strict policy prohibiting any form of discrimination or harassment. Both are grounds for dismissal from employment. We pride ourselves on a staff and Board that include male, female, indigenous, foreign, and LGBTQ members.

The Guatemalan Work Code states: (Article 14 bis.) “Discrimination is prohibited on the grounds of race, religion, political creeds and economic situations, education, culture, entertainment or commerce that works for the use or benefit of workers, in companies or work property sites. In particular, in the status of workers in general.” TRL abides by all Guatemalan labor laws.

The project welcomes any individual who requests our services and commits to the stated terms and conditions of project participation. TRL’s focus is on the realization of the benefits to be attained and not who is receiving them.

## 2.2.6 Worker Training

### New Hire and Onboarding Procedure

#### **Policy brief & purpose**

Our New Hire policy refers to TRL’s efforts to help new employees and/or volunteers settle in their new position. We provide new hires with the necessary information and training to perform their job to the standards set by TRL. TRL employees facilitate new hires’ and/or volunteers’ adaptation to TRL and Santiago, Atitlan.

#### **Scope**

This policy applies to all employees/volunteers, including to those who recently received and accepted an offer of employment from us or an offer to volunteer.

#### **Policy elements**

Our onboarding efforts aim to:

1. Integrate new employees/volunteers into the culture of both TRL and Santiago Atitlan
2. Provide useful information about their position and TRL’s expectations
3. Inform our new hires/volunteers about employee orientation, organizational culture, mission, and procedures
4. Train new employees/volunteers in field work conduct

#### **Actions**

We have implemented steps to fine-tune and document in detail our onboarding goals. Some steps refer to the period before the new hire’s first day and some refer to their first months on the job.

#### ***Before a new hire starts work***

1. The Administrative Director should:
  - a. Announce our new member’s start date to TRL staff and in correspondence with the President of the Board.
  - b. Prepare our new member’s workspace with all equipment and material necessary.
2. The Program Developer should:
  - a. Enter our new member’s information in our company database and set up their individual emails, accounts, and phones.

- b. Create an orientation program specific to this member, including activities, timelines, participants, and documentation.

**After a new member starts work**

1. The Program Developer should:
  - a. Coordinate appropriate training presentations and programs
  - b. Review TRL's mission statement, values, and goals.
  - c. Introduce the new member to the code of conduct including conduct in the field.
  - d. Review our Public Relations policies including photos taken while in the field and other considerations.
    - i. For example, no photos taken on the job may be used for personal use without Program Developer approval.
  - e. Introduce new members to the project sites and safety considerations while in the field and to the various projects undertaken at TRL.
  - f. \*New hires ONLY\* Inform the new-hire of the probationary period (3 months)
2. The Lead TAS should:
  - a. Coordinate supervisory field work
3. The Administrative Director should:
  - a. Arrange a morning meeting to welcome the new member on their first day
  - b. Show new members to their workstation and help them familiarize themselves with their surroundings.
  - c. Present important documents to review (Operations Manual, previous reports etc.). This paperwork must be kept at a bare minimum so as not to overwhelm a new member.
  - d. Give short presentations so the new member can become familiar with our mission, procedures, values, and policies.
  - e. Explain the first week, mandatory field work, etc.
  - f. The first few days our new member spends in our organization are important to help them settle in. TRL will:
    - i. Assist in building a communication network (who to contact for what, who to report to etc.)
    - ii. Ease new members into their new position by assigning simple but meaningful work from the start. New members should not have to deal with urgent work or duties not involved in their job description during their first days.
    - iii. Arrange for our new member to shadow colleagues during their work so they can get hands-on experience on how things are done.
    - iv. Assign a mentor.

We want individuals who are joining our team to feel respected and valued early on. The appropriate supervisor can implement onboarding activities that aren't included in this policy. We encourage collective activities because they help new members feel part of the TRL team. New members may need more than a few days to fully grasp their responsibilities and learn to be productive in their new workplace. Onboarding may continue until the individual feels sure they can function independently.

Key stakeholders (i.e., Team members) involved in carrying out project activities include the positions of **Technology Adaptation Specialist (TAS)** and **Technician**.

The **position of TAS** is trained through shadowing the current Lead TAS on field visits. This position requires an employee who (1) uses and cherishes her ONIL stove, (2) has an assertive personality, (3) respects cultural norms in traveling about the community and entering the homes of potential and current beneficiaries, (4) is literate and speaks Tz'utujil and Spanish, (5) is open to new ideas and information, (6) is an honest, responsible, and independent worker, and (7) understands the mechanical functioning of the ONIL stove. The person must be able to present to an audience. In a culture where corruption is pervasive and accepted, personal recommendations are of the highest importance. The TAS position offers individuals the opportunity to improve their computational skills and expand their depth of environmental knowledge.

The position of **Technician** is also learned by accompanying a current Technician. This position requires many of the same characteristics as the TAS, in addition to which the installer must (1) have a personality that inspires confidence and trust and is courteous, (2) be able to carry loads of nearly 100 pounds and do simple construction tasks, and (3) be able to understand the mechanical functioning of the ONIL stove and its assembly. Finding a person who can be trusted to work competently and reliably on their own is often difficult. To be confident that this employee will uphold certain standards in interacting with vulnerable populations, it is critical that TRL is well acquainted with and has full trust in this worker.

TRL takes pride in its multilingual, multicultural office environment. To exercise sensitivity and foster an inclusive work environment, team meetings and office-wide communications are conducted in Spanish. Onboarding and training are conducted in the native language of the new team member, whether it be Tz'utujil, Spanish, or English, to facilitate a smooth transition into the new work environment.

### 2.2.7 Equal Work Opportunities

TRL is dedicated to being an equal opportunity employer as defined by the ILO: This fundamental convention defines discrimination as any distinction, exclusion, or preference made on the basis of race, colour, sex, religion, political opinion, national extraction, or social origin, which has the effect of nullifying or impairing equality of opportunity or treatment in employment or occupation. The ILO requires ratifying states to declare and pursue a national policy designed to promote, by methods appropriate to national conditions and practice,

equality of opportunity and treatment in respect of employment and occupation, with a view to eliminating any discrimination in these fields. This includes discrimination in relation to access to vocational training, access to employment and to particular occupations, and terms and conditions of employment. The proceeding Guatemalan national policy says: the Guatemalan Labour Code (Código de Trabajo, Decree 1441) (Labour Code) [prohibits] discrimination based on sex, race, religion, political beliefs, economic situation, schooling, or any other cause, which may have a detrimental effect on access to employment.<sup>30</sup>

In the Tz'utujil culture, jobs are often passed through family members who have proven to be trustworthy and efficient workers. Since this project involves working with vulnerable populations, employability is highly dependent on the reliability and professionalism of employees. Employees must have a deep understanding of cultural nuances relevant to the community served and an ability to work independently. TRL requires a thorough understanding of the applicant's ability to fulfill the requirements of the position, both in their relationship to the community and their level of education.

When recruiting, TRL aims to prioritize hiring local community members. We remain dedicated to offering new opportunities to our project beneficiaries as TRL expands operations and job openings arise.

### 2.2.8 Workers' Rights

Each of our workers has a contract that states his/her rights and obligations. In Guatemala, the labor laws favor the employee and reputable organizations work hard to comply with these laws, which are enforced by the Ministry of Labor (MINTRAB).

### 2.2.9 Occupational Safety Assessment

Members of TRL's Outreach Team must be Tz'utujil-speaking people and residents of the community. As a result, they are familiar with the community in which they are about to work. They are also the best equipped to determine the risks to their safety due to the following occupational safety hazards unique to this community.

Robbery is the most common crime in our town. In the local community, there exists what is known as *envidia*, or envy. TRL outreach employees must always be very careful not to display any material evidence of success and maintain a humble profile. Our Outreach Team, the Installer and TAS, always travel in groups of two and work only during daylight to prevent theft. These team members were involved in the distribution of ONIL stoves for many years before the official formation of TRL, and they have not experienced an incident in the 15 years they have been doing this work in the community.

Extortion is a very common crime in Guatemala. As such, organizations tend to keep their financial information out of public view. TRL distributes ONIL stoves only in-line with demand

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<sup>30</sup> <https://www.mintrabajo.gob.gt/index.php/documentacion/leyes-ordinarias> See appendix 3.

and does not buy large quantities of stoves for storage. Part of the qualifications of our TAS and Installer are that they understand these intricacies and work to avoid publicizing the financial situation of TRL.

Kidnapping for monetary reward is common in Guatemala. Thus, if the financial details of a project are publicized, the employees become targets for kidnapping. TRL does not actively publicize the total amount of our funding within our community to avoid drawing attention to the organization as a target.

As most workers at TRL have lived in the community for a number of years, they already possess the skills to avoid the dangers outlined above. TRL's current PiLA fellow was selected partially based on her extensive experience living and working in Latin America in low-income settings. Part of a Fellow's integration into the community involves time spent both in the office and in the field. In field training, Fellows learn the safety measures necessary to have a positive experience during their time with TRL. TRL employees work together to assess and avoid danger situations. Examples include working in teams when in the community, not carrying large sums of cash or valuables, and not publishing detailed financial information on the internet. In addition to the risk of crime, the work of the Installer can be physically challenging. Tuk Tuks (small, three-wheeled vehicles) are used to transport the stoves to the beneficiary's dwelling. At times, the road may end quite a distance from the home, and the large parts must be carried to the building. TRL works to make sure families have at least one family member available who is strong enough to assist with the lifting required.

#### 2.2.10 Feedback and Grievance Redress Procedure

Beneficiaries and stakeholders have TRL's contact information and the understanding that they should contact the organization with any problems, questions, or grievances. If there is an issue that cannot be resolved through direct communication with TRL, the municipality has an official mediator office, where complaints or disputes can be brought for resolution. At The Centro de Mediación, the first step is to present the case to the official mediator, who calls the other side to be present at a meeting between the two parties. The Centro de Mediación will contact the second party up to three times before informing the first party that they must take the matter to the Juzgado de Paz (Justice of the Peace) or other appropriate court, if they want to pursue the matter.

#### 2.2.11 Feedback and Grievance Redress Procedure Accessibility

TRL maintains a contact form on our website that is accessible in both Spanish and English. Completing this form generates an email to our program developer who responds personally. In the event of a grievance, the TAS logs it in her documents to be addressed either at the following staff meeting or immediately, depending on the urgency. Due to the high illiteracy rate and Tz'utujil being a non-written language, community grievances would most likely be made in person. Among the younger generation, Facebook plays a growing role in communications, and

community members can always contact us via Facebook, or rate the organization on line, making their comment public for other community members to see and read.

The majority of grievances TRL has encountered up to this point have been complaints about manufacturer changes to the ONIL stove. TRL staff have resolved these complaints as best as possible and reported them to the manufacturer, HELPS International.

When funds permit, we have an announcement on the local Tz'utujil radio station or TV where we publicize any new details of our project. This also gives stakeholders an opportunity to reach us through the contact information provided on the broadcast.

### 2.2.12 Stakeholder Access to Project Documentation

In addition to an enhanced focus on verbal communication among staff and local community members, TRL will include direct links to monitoring reports on our website. TRL posts annual reports online as well as project descriptions on our website and publishes links to these materials on Facebook.

### 2.2.13 Information to Stakeholders on Assessment Process

We inform our beneficiaries and their families that they are participating in a project that distributes the ONIL stove at a reduced price to improve their respiratory health, the family economy, and the environment. We also inform them of our need to track their successes and monitor key data, such as money spent on wood fuel among other economic indicators. As this community is still very suspicious of foreign intentions, auditors will have to be accompanied by TRL staff for site visits to which families will be notified several days in advance either via telephone, or in-person.

As the SD VISTA program progresses, the main forms of information dissemination to the local community will be radio broadcasts and Facebook, as well as our website. We have already announced our participation in SD VISTA's project via our newsletter, social media publications, blog publications, and on our website.

## 2.3 Project Management

### 2.3.1 Avoidance of Corruption

As a small nonprofit, TRL staff maintain the highest standards of transparency. The organization uses an external accountant who manages our accounts and organizes all receipts and other financial documents. In addition, TRL employs an auditor to guide the association in its transactions – our first external audit will be completed in 2020. To maintain transparency, TRL publishes annual reports on our website. The organization complies with all Guatemalan laws against favoritism, cronyism, or nepotism.

The project proponents and all connected with TRL are actively involved out of dedication to the protection of our environment as well as a desire to share the benefits created by the project with the Tz'utujil Maya people of Lake Atitlán.

### 2.3.2 Statutory and Customary Rights

TRL operates entirely out of a private office space with installation activities taking place in beneficiary homes. TRL staff enter private property only with the explicit permission of the owner. Stove installations take place around the lake. Our key area of installations thus far is in Santiago Atitlan, which is just visible at the southern end of the lake.

### 2.3.3 Recognition of Property Rights

We will install a stove only at the property owner's invitation. Most often the home is built on property acquired through inheritance. The project does not infringe or interact with property rights. After delivery and payment, the ONIL stove is the sole property of the owner – TRL relinquishes all claims.<sup>31</sup>

Due to past experience with illegitimate projects that solicited identifying information from community members for the sake of theft, there is a high level of distrust between community members and new NGOs. The members of our community will not sign documents and are extremely suspicious of any unknown person asking them for information.

All beneficiaries verbally consent to take part in the project during the first site visit. The act of purchasing the ONIL stove and verbally agreeing to several consents constitutes a formal agreement between TRL and the new owner.

### 2.3.4 Free, Prior and Informed Consent

FPIC does not apply to the project activities since they do not infringe on or otherwise concern land rights.

### 2.3.5 Restitution and/or Compensation for Affected Resources

Our project does not affect any party's access to resources or their lands.

### 2.3.6 Property Rights Removal/Relocation of Property Rights Holders

ONIL stove installations do not impede on the land or property rights of a beneficiary. After installation, TRL forfeits any future claim to the stove as property, and beneficiaries can withdraw from the project at any point without penalty. Part of participation in the project includes terminating the use of open cooking fires. To ensure the project does not infringe on cooking activities important to Tz'utujil Maya culture, the TAS guides new families through the adjustment period from three-stone fires to a clean cookstove based on her own experience. Beneficiaries learn how traditional meals can be prepared using the new ICS technology. Our lead TAS's expertise as a community nutritionist is applied daily to her work with beneficiaries to aid in this transition.

### 2.3.7 Identification of Illegal Activities

Extortion is a very common crime in Guatemala. As such, organizations tend to keep their financial information out of public view. TRL distributes ONIL stoves only on demand. It does not buy large quantities of stoves for storage. Part of the qualifications of our TAS and installer are

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<sup>31</sup> With the exception of an agreement that allows TRL to claim Sustainable Development Benefits and/or Verified Carbon Units.

that they understand these intricacies and work to avoid publicizing the financial situation of TRL.

Robbery is the most common crime in our town. Our outreach workers, the installer and TAS, always travel in groups of two and work only during daylight to prevent theft.

TRL purchases made with an association check must have two signatures of the administrator and treasurer. Funds can be accessed only if these two members agree..

### 2.3.8 Ongoing Conflicts or Disputes

This issue is not applicable to our project as the installation of ICS technology does not affect property rights or property disputes.

### 2.3.9 National and Local Laws and Regulations

In 2016 Tuik Ruch Lew became a registered Guatemalan nonprofit, adhering to the registration process and all subsequent local and national laws governing nonprofit activities in the country. TRL abides by all Guatemalan Labor Laws as written in the Guatemalan Employment Code, and Laws for Protected Areas. See appendices 3 and 5.

### 2.3.10 Project Ownership

*Escritura Pública Número 802* (see appendix 4) establishes the Project Proponent as a registered not-for-profit association in Guatemala. Although TRL beneficiaries possess ownership of the equipment, before installation, beneficiaries enter into a verbal contractual agreement with TRL. Beneficiaries agree to allow TRL, as a not-for profit association, do the following:

- (1) Claim the GHG emission reductions and/or removals generated by the equipment used in the TRL ICS Project.
- (2) Conduct follow-up visits for monitoring purposes.

All communication is conducted in Tz'utujil, the native language of the beneficiary. The verbal agreement is designed by our local Outreach Team to explain the environmental benefits of the ONIL stove and communicate to our beneficiaries how claiming benefits will enable the project to remain financially viable. This verbal agreement vests project ownership in the Project Proponent. See VCS Project Description for further information on project ownership.

### 2.3.11 Grouped Projects

The project ensures that inclusion of all new project activity instances will abide by the following eligibility criteria.<sup>32</sup>

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<sup>32</sup> Developed per requirements detailed in the SD VISTa Standard, v1.0

<b>Project Activity One:</b> Introduction of high-efficiency biomass fired project devices to replace open cooking fires		
Criterion		Achieved by:
(1)	Adopt and implement the project activities in the same manner as specified in the project description.	Forecasted instances (e.g., ONIL stove installs) will be implemented in the manner described in Section 2.1.2. At this time and for forecasted instances, no other project device type will be used, other than ONIL stove technology.
(2)	Meet the applicability conditions as defined in CDM AMS-II.G. Small-scale Methodology: Energy efficiency measures in thermal applications of non-renewable biomass (Version 11.1, Section 2.2).	New instances will meet all applicability conditions listed in VCS Project Description, Section 3.2.
(4)	Are subject to the same processes for stakeholder engagement described in the project description.	New instances will be installed only when the same stakeholder engagement processes detailed in Section 2.2 have been executed. Every beneficiary will participate in the same consultation process described.
(5)	Are subject to the same processes for respect for rights to lands, territories and resources – including free, prior and informed consent.	All new instances will be installed only when TRL has performed the processes required per the SD VISTa Standard, v1.0 section, Section 2.4.
(6)	Have similar monitoring elements to those set out in the project description.	All new instances will undergo equivalent monitoring procedures as described in Section 2.1.2.

<b>Project Activity Two:</b> Energy efficiency improvements in existing biomass-fired cookstoves <sup>33</sup>		
Criterion		Achieved by:
(1)	Adopt and implement the project activities in the same manner as specified in the project description.	Forecasted instances (e.g. energy efficiency improvements in existing ONIL stoves) will be implemented in the manner described in Section 2.1.2. At this time and for forecasted instances, no other project device type will be

<sup>33</sup> Project Activity Two will generate only SD VISTa-labeled VCUs and does not seek to claim additional sustainable development benefits

		used, other than ONIL stove technology.
(2)	Meet the applicability conditions as defined in CDM AMS-II.G. Small-scale Methodology: Energy efficiency measures in thermal applications of non-renewable biomass (Version 11.1, Section 2.2).	New instances will meet all applicability conditions listed in VCS Project Description, Section 3.2.
(3)	Are subject to the same scenarios at project start with respect to stakeholders' well-being as determined for initial project instance(s).	The project shall add new instances only within the Sololá Department thus subject to the baseline scenario described in Section 2.1.8 and causal chain outlined in section 2.1.9. Thus all new instances will affect stakeholder's well-being in a manner equivalent to those approved at the time of validation, per the SD VISTa Standard, v1.0 Section 3.1.
(4)	Are subject to the same processes for stakeholder engagement described in the project description.	New instances will be installed only when the same stakeholder engagement processes detailed in Section 2.2 have been executed. Every beneficiary will participate in the same consultation process described.
(5)	Are subject to the same processes for respect for rights to lands, territories and resources – including free, prior and informed consent.	All new instances will be installed only when TRL has performed the processes required per the SD VISTa Standard, v1.0 section, Section 2.4.
(6)	Have similar monitoring elements to those set out in the project description.	All new instances will undergo equivalent monitoring procedures as described in Section 2.1.2.

<b>Project Activity Three: Distribution of British Berkefeld Water Filters</b>		
Criterion		Achieved by:
(1)	Adopt and implement the project activities in the same manner as specified in the project description.	Forecasted instances (additional water filters) will be distributed in the same manner specified in Section 2.12
(2)	Are subject to the same scenarios at project start with respect to stakeholders' well-being as determined for initial project instance(s).	The project will add new instances only within the Sololá Department thus subject to the baseline scenario described in Section 2.1.8 and causal

		chain outlined in section 2.1.9. Thus, all new instances will affect stakeholder's well-being in a manner equivalent to those approved at the time of validation, per the SD VISTa Standard, v1.0 Section 3.1.
(3)	Are subject to the same processes for stakeholder engagement described in the project description	New instances will be added only when the same stakeholder engagement processes detailed in Section 2.2 have been executed. Every beneficiary will participate in the same consultation process described.
(4)	Are subject to the same processes for respect for rights to lands, territories and resources – including free, prior and informed consent.	All new instances will be distributed only when TRL has performed the processes required per the SD VISTa Standard, v1.0 section, Section 2.4.
(5)	Have similar monitoring elements to those set out in the project description.	All new instances will undergo equivalent monitoring procedures as described in Section 2.1.2.

<b>Project Activity Four:</b> Replacement of Incandescent Light Bulbs with LEDs		
Criterion		Achieved by:
(1)	Adopt and implement the project activities in the same manner as specified in the project description.	Forecasted instances (additional LEDs/CFLs) will be distributed only in the same manner specified in Section 2.12.
(2)	Are subject to the same scenarios at project start with respect to stakeholders' well-being as determined for initial project instance(s).	The project will add new instances only within the Sololá Department thus subject to the baseline scenario described in Section 2.1.8 and causal chain outlined in section 2.1.9. Thus, all new instances will affect stakeholder's well-being in a manner equivalent to those approved at the time of validation, per the SD VISTa Standard, v1.0 Section 3.1.
(3)	Are subject to the same processes for stakeholder engagement described in the project description.	New instances will be added only when the same stakeholder engagement processes detailed in Section 2.2 have been executed. Every beneficiary will

		participate in the same consultation process described.
(4)	Are subject to the same processes for respect for rights to lands, territories and resources – including free, prior and informed consent.	All new instances will be distributed only when TRL has performed the processes required per the SD VISTA Standard, v1.0 section, Section 2.4.
(5)	Have similar monitoring elements to those set out in the project description.	All new instances will undergo equivalent monitoring procedures as described in Section 2.1.2.

# 3 BENEFITS FOR PEOPLE AND PROSPERITY

## 3.1 Condition of Stakeholders at Project Start

Lake Atitlán, located in the Sololá Department is the center of an environmentally and economically challenged area, forecast to become more severe, as Guatemala is among the top ten countries predicted to be most affected by climate change.<sup>34</sup> Extreme surface water and air pollution, widespread deforestation, drought, poverty, malnutrition, and limited access to education and healthcare characterize the region. All identified stakeholders experienced some or all of these conditions at the project start date.

Current and Prospective Beneficiaries

### **Conditions at Project Start:**

In Guatemala over 50% of the population lives under the national poverty line, and 25% of the population lives in extreme poverty. Indigenous groups in Guatemala, which make up more than 40% of the population disproportionately experience the negative impacts of poverty and inequality. 79% of indigenous Guatemalans live below the national poverty and 40% live in extreme poverty.<sup>35</sup> This economic inequality is prevalent among the population TRL serves. In the Sololá Department, an above-country average of 77.5% of the population lives in poverty, and the municipality of Santiago Atitlan, (where TRL is headquartered) possesses the highest extreme rural poverty rate of the department.<sup>36</sup> In Santiago Atitlán, it is common for agricultural laborers to earn only Q30 a day (\$4USD). Reports from Avivara and the World Bank predict rising poverty rates. According to World Bank data, due to the slow reduction in the poverty rate, the total number of Guatemalans living in poverty is projected to increase by more than 175,000 between 2019 and 2021.

Within the project area, the Tz'utujil-speaking Maya population is especially hard hit. According to recent studies,<sup>37</sup> poverty disproportionately affects rural indigenous areas. For example, in 2017 and 2018, severe drought affected the area, limiting the corn production to the lakeshores devastating the majority of the plants located higher up on the mountainous slopes. Not only

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<sup>34</sup> "Climate Risk Profile" <https://www.climatelinks.org/resources/climate-change-risk-profile-guatemala>. Accessed 6 November, 2019.

<sup>35</sup> CIA World Factbook. [https://www.cia.gov/library/publications/the-world-factbook/geos/print\\_gt.html](https://www.cia.gov/library/publications/the-world-factbook/geos/print_gt.html). Accessed 6 November, 2019.

<sup>36</sup> "Solola 2012" <https://www.ine.gob.gt/sistema/uploads/2013/12/09/LrQm6TxhEtYd25S0Ma1QG9aSu94hxdIQ.pdf>. Accessed 6 November, 2019.

<sup>37</sup> "Fiscal Policy, Inequality, and the Ethnic Divide in Guatemala." <https://www.cgdev.org/sites/default/files/CGD-Working-Paper-397-Cabrera-Lustig-Moran-Fiscal-Policy-Inequality-Ethnic-Divide-Guatemala.pdf>. Accessed 28 Mar. 2019.

was this source of staple food destroyed, but the local coffee crops were also ruined by the drought, thus eliminating the main cash crop available to the Tz'utujil people. Because they cannot afford other means to cook their food and warm their homes, the traditional, Maya three-stone open fire hearth is still in use in most homes. Today, 96% of the population of the Sololá Department is indigenous Maya and 84% uses wood as the primary energy source for cooking<sup>38</sup> – these residents represent our target demographic – current and prospective beneficiaries. Approximately 50% of the population is illiterate.

There is economic diversity in these communities. Some families live in extreme poverty while other families form part of the educated and emerging middle class. TRL does not discriminate economically as to whom we serve, because we aim to protect the environment by reducing the number of trees cut for wood fuel and to improve respiratory health by eliminating smoke from open fires. However, we focus most of our efforts on those living close to, or in, poverty as the economic and health benefits will often be most strongly felt by these families. The Ladino population is usually better off economically, as is the emerging professional class of educated Tz'utujil. Since the end of the conflict years (1996), these educated Tz'utujil have filled jobs in the government, healthcare systems, schools, and NGOs in the area. Before the civil war, positions of local power were held by Ladinos; whereas now the mayors are all indigenous. Due to past oppression, the mistrust between Ladinos and Tz'utujiles remains high.

The community is very cohesive in its identity as Tz'utujil Maya, and the historical distrust between Tz'utujil and the Kakchiquel and Quiche tribes at the other end of the lake still affect interactions. (These other tribes accompanied the Spanish in the conquest of the Tz'utujil Maya, the last tribe to be conquered at the lake). There are also minor cultural differences between the Tz'utujil Maya of Santiago Atitlán and San Pedro, with San Pedro population being slightly more educated and progressive.

At the beginning of the ICS stove project, indigenous families cooked on the traditional three-stone hearth – a simple open fire on the floor. Indigenous reverence for fire and the three-stone hearth, as well as economic factors, have led to continued use of open fires within the home for both cooking and heating. Traditional home structures, with thatched roofs (coated with soot from the inside, which acted as a sealant) filtered out the smoke and worked in unison with traditional cooking methods. New construction technologies have led to concrete homes with tin roofs, lacking sufficient air circulation.

In traditional Tz'utujil culture, the women are responsible for the preparation of food. Because women spend so much time in the kitchen with their children, they are the most at risk for the negative health effects of HAP created by burning wood fuel in the home. Smoke trapped in the home (see figure 5 below) can cause acute lower respiratory infections and long-term complications such as chronic pulmonary obstructive disease and cataracts and contributes to the risk of pneumonia in infants. Over time, HAP can also cause stroke and ischemic heart

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<sup>38</sup> “2018 Census” <https://www.censopoblacion.gt/mapas>. Accessed 6 November, 2019.

disease according to the WHO. The fire on the floor is a burn risk for small children who can fall into it. Women are exposed to the flames while cooking and often one can see discoloration of the skin on the arms and legs of women who cook on an open fire.



**Figure : Open cooking fires generate ambient air pollution levels that are highly hazardous to human health.**

Not only are these open fires dangerous, they are wasteful. The ONIL stove design for efficient combustion and distribution of heat, burns 70% less wood. Families who purchase their wood for an open fire and switch to an ONIL stove will save approximately Q170 (\$23), on wood each month. Families who search for and collect wood will save two days/week on average, time that can be redirected towards other income producing activities.

Inefficient combustion of open fires and poorly designed wood-burning stoves requiring large amounts of wood fuel, combined with growing populations

throughout Guatemala (the country is experiencing the largest population growth in Central America) has worsened localized deforestation and caused a local firewood deficit 53,000 cubic meters.<sup>39</sup> Denuded slopes cause an increased danger of deadly mudslides during the rainy season and a loss of biodiversity, including the devastation of the forest home of the endangered Resplendent Quetzal – the national bird of Guatemala and the sacred deity, Kukulcan, of the Maya culture. To divert money away from acquiring wood fuel and back into the family economy, TRL installs ONIL stoves that save families on average about Q170/monthly or two days/week in time spent gathering wood.

In traditional Tz'utujil merchant culture, men cultivate crops and women sell or trade them in a local market – formerly men were not even allowed in the market – putting the management of money into the hands of women. Lack of education, especially financial literacy, often contributes to poor financial management, exacerbating the struggles of poverty these families experience. In families where the man earns an income from other than agriculture, the money management has been turned around; in these homes, men control the money, and women must ask permission to use it to cover household expenses.

<sup>39</sup> "Estrategia producto y uso leña copy - CNCG."

<http://www.usaid-cncg.org/wp-content/uploads/2015/07/Estrategia-producto-y-uso-le%C3%B1a-v6.pdf>. Accessed 28 Mar. 2019.

Women and children in beneficiary households were cooking over traditional open fires at the commencement of project activities. Toxic smoke penetrated deep into the lungs of the female beneficiaries and their children, causing a range of deadly chronic and acute health effects. Diseases such as childhood pneumonia, lung cancer, chronic obstructive pulmonary disease and heart disease, as well as low birth-weights in children are prevalent amongst families who cook over open fires. In children under five years, respiratory problems were the leading cause of death. Frequent exposure to cookstove smoke also caused cataracts. Children were also frequently badly burned by falling into open cooking fires, resulting in disfiguring scarring. Daily exposure to health hazards from traditional cooking practices are conditions that continue to threaten the health of prospective beneficiaries. In 2012, the number three cause of hospitalization in the department of Sololá was pneumonia, accounting for 39% of all deaths.<sup>40</sup> In the past, aid projects introduced different cook stoves into Tz'utujil homes. However, the stoves often failed to prevent the HAP, because of faulty construction or because the owners rejected the stoves – due to inefficient cooking ability, large size, heavy consumption of wood fuel, or lack of understanding of the use of the stoves. The women simply returned to cooking over an open fire on the floor.

### **Interactions**

As the primary focus of the project, beneficiaries have the most interactions. They work directly with TRL to receive and maintain their stoves, and they participate in five home visits and surveys during the first year and follow-up surveys at some subsequent visits. Some beneficiaries already do their banking at community savings groups, are part of their vibrant local community where church gatherings, parades, and other events bring the community together on a regular basis. Our employees are also members of this community and apart from specific visits, our beneficiaries regularly see and speak with our staff on the street, in the market, and at other community events. Finally, our beneficiaries often become lifelong members of the project; one recently joined our board of directors. Current beneficiaries frequently interact with prospective beneficiaries, sharing project information.

### **Significant Changes in the Past**

In the past, Tz'utujil families lived in family compounds in high-peaked, thatched-roof homes, surrounding a shared patio space. Open fires were needed to maintain the roofs of their homes by creosoting it from the inside out. Since the roof was high and porous, the smoke rose over their heads into the peak of the roof and filtered to the outside. But after the 1976 earthquake and the resulting high death rates in communities where roofs were made of clay tiles, zinc roofing became the material of choice and was introduced into all of the highland towns. Although Santiago Atitlán had no devastation nor deaths due to the 1976 earthquake (principally because of their thatched roofs, which are similar to an inverted basket), the readily

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<sup>40</sup> "Sololá 2012 - INE." 9 Dec. 2013, <https://www.ine.gob.gt/sistema/uploads/2013/12/09/LrQm6TxhEtYd25S0Ma1QG9aSu94hxdIQ.pdf>. Accessed 28 Mar. 2019.

available and relatively inexpensive zinc roofing became popular here as well. People replaced lofty thatched roofs with lower tin ones, but the cooking fires stayed in the main houses, and the interior smoke became unbearable. Some people moved their kitchens into corn-stalk walled, tin-roofed spaces, removing them from the main sleeping quarters. But the family still gathered near the fire in these kitchens, and all of the problems created by smoke were exacerbated. Women and small children who spent most of their time in the kitchens disproportionately bear these adverse impacts.

In 1964, Santiago Atitlán was plagued by a devastating measles epidemic that killed over 600 children. Families were large: 10 to 18 children were not uncommon. When the epidemic passed through the community, a family might lose 9 of their 10 children, so it behooved them to have as many children as possible. When vaccines were introduced, the measles epidemics stopped, but the level of reproduction did not change. Thus, with the absence of widespread access to and cultural acceptance of family planning methods and services, the population rapidly increased. Today, with the level of education rising among the Tz'utujil population, the use of family planning has increased, in spite of religious opposition. Yet the growing population coupled with a lack of economic opportunity drives many young people to emigrate.

The town of Santiago Atitlán has always been a merchant town, as it lies on an ancient trade route between the highland and coastal markets. In the old days, *Atiteco* merchants walked down from the highland markets with boxes of produce on their backs, carried via a tramp line. Then they paddled across the lake to the Santiago Atitlán market, where they exchanged these goods for tropical products from the coast, brought to Santiago Atitlán by other local merchants who then traded the highland products in the coastal towns. This merchant heritage remains today, and it is the most common occupation of the people from Santiago Atitlán.

Some of the smaller and poorer communities we serve house displaced individuals from the 60-year civil war, who, due to their direct involvement in the armed conflict, have not been able to successfully re-adjust to civilian life. These individuals are typically from coastal farms and although ethnically indigenous, most identify as Ladino. These communities suffer from high crime rates and drug and alcohol abuse and tend to host social outcasts not accepted in other Tz'utujil towns. The result has been chronic male incarceration, which has strong economic implications for spouses and other family members who rely on the potential earnings of the incarcerated male family members.

As the outlying *aldeas* have grown, municipal services have been added, such as electricity and water. Churches of various denominations have established branches there, as well as housing projects.

### **Local Vendors**

#### **Conditions at Project Start**

Formerly, men harvested the firewood in the communal forests or on land they owned, stacking it to dry in neat rows on the land before they brought it down to their home. They then carried loads, often of 150 pounds, on their backs down the mountain sides, following steep, narrow

footpaths to their homes. With the arrival of pick-up trucks in Santiago Atitlán in the late 1980s, the men began carrying their wood to the nearest road, where they stacked it to be loaded onto a truck, which then delivered it to their houses. Recently, local wood vendors have driven up the price of firewood in response to growing scarcity.

**Interactions**

Local vendors interact with current and potential beneficiaries daily. Their work is dependent on business from local community members.

**3.2 Expected Impacts on Stakeholders**

Impact #1	Access to ONIL ICS
Type of Impact	Positive, actual, direct
Affected Stakeholder Group(s)	Beneficiaries, beneficiaries’ families
Resulting Change in Well-being	Less reliance on wood fuel to meet equivalent thermal energy needs for cooking purposes, freeing up time/money for other economic activities (see impact #3), health benefits from reduced smoke in home (see impact #2), traditional tortilla making is preserved. Increased access to sustainable energy technology and clean cooking technology.

Access to the ONIL energy-efficient stove merges cultural preference for fire use when cooking with innovative technology, providing the traditional fire in the hearth for the ritual of making tortillas and other foods, all while greatly reducing the consumption of wood fuel and saving money otherwise spent or time gathering it. The ONIL stove encourages the use of readily available twigs, corn stalks, and cobs and maintains the hearth as the center of the Mayan home.

Impact #2	Reduced exposure to smoke, HAP and other dangers associated with open-fire cooking
Type of Impact	positive, predicted, direct
Affected Stakeholder Group(s)	beneficiaries, beneficiaries’ families,
Resulting Change in Well-being	Each stove provides for the following improved health outcomes: lower risk of developing COPD, less instances of acute lower respiratory illness, improved overall respiratory health. Lower risk of deaths of children under five from falling into open cooking fires. Lower risk of neonatal deaths resulting from dangerous levels of exposure to HAP for pregnant women.

A woman cooking with a baby nestled on her back wrapped in her *tzut*, is a common scene in any Tz'utujil household. Cooking on an ONIL stove eliminates the smoke in the kitchen, so that both mother and baby and any other small siblings can help her or play in the area while their mother cooks, without the danger of falling into an open fire. The mother no longer burns her arms over the flames licking out from beneath the *comal* (flat, clay pan) she once used to cook tortillas over the open fire.

Impact #3	Reduced fuel wood expenditure
Type of Impact	Positive, predicted, direct
Affected Stakeholder Group(s)	Beneficiaries, beneficiaries' families
Resulting Change in Well-being	Money saved for families that regularly purchase their wood fuel, time saved for other economic activities for families that collect their wood.
Impact #4	Fewer wood vendors
Type of Impact	negative, predicted, indirect
Affected Stakeholder Group(s)	Local vendors
Resulting Change in Well-being	There remains the possibility that if enough community members begin to use ONIL ICS, the reduction in wood consumed would reduce the need for wood causing some vendors to leave the profession. As TRL will provide more job opportunities the more stoves are installed, this negative impact will be mitigated by the provision of new job opportunities as stove builders and stove installers within the organization of TRL.
Impact #5	Less time spent on unpaid domestic and care work.
Type of Impact	Positive, predicted, direct
Affected Stakeholder Group(s)	Beneficiaries
Resulting Change in Well-being	Females who spend less time on unpaid domestic and care work can redirect that time to income generating activities, contributing to enhanced conditions for gender equality.

Tz'utujil women are customarily very productive members of their families. In addition to preparing the food and caring for children, they maintain the tradition of backstrap loom weaving, embroidering the ancient bird and flower designs on their *huipils* (blouses), and, more recently, making beaded jewelry for resale. In households where beading is done, the mother and her able children work together, after school if they attend, to fulfil orders from bead sellers. Having an ONIL stove makes a great contribution as it reduces the time used to gather wood fuel and/or to care for a child with a respiratory illness or burn. Now those hours can be spent in a productive manner that brings extra income into the household – to be spent on an improved diet or education for her children.

Impact #6	Increased access to safe drinking water
Type of Impact	Positive, predicted, direct
Affected Stakeholder Group(s)	Beneficiaries, beneficiaries' families,
Resulting Change in Well-being	Each water filter provides a family with clean, safe drinking water for 1 year, renewable with the annual purchase of a replacement ceramic candle. A higher proportion of the population will be using safely managed drinking water services. Improved health outcomes include: lower risk of contracting water-borne illnesses and deaths attributed to unsafe water.
Impact #7	Reduced electricity expenditure
Type of Impact	Positive, predicted, direct
Affected Stakeholder Group(s)	Beneficiaries, beneficiaries' families
Resulting Change in Well-being	Money saved on energy bills, made possible by transitioning from incandescent light bulbs to LEDs.
Impact #8	Increased access to local microcredit or community savings opportunities.
Type of Impact	Positive, predicted, direct
Affected Stakeholder Group(s)	Beneficiaries
Resulting Change in Well-being	Financial savings encouraged and made possible by TRL's community savings group. Low-income beneficiaries can access TRL's savings program. They can then allocate savings

towards additional environmental technologies or other empowering goods and services (e.g. education).

### 3.3 Stakeholder Monitoring Plan

The TRL ICS project uses a results-based framework that allows TRL to track short-term and long-term success and make necessary changes to improve the project results. The project tracks client information and VCS required data and parameters  $N_{y,i,j}$  and either  $B_{y=1,new,i,j,survey}$  or  $SC_{new,i,j}$ , for Project Activities One and Two, through the combination of the digital survey platform, KoBo Toolbox, and a cloud-based server. Using in-house designed surveys that account for cultural nuances relevant to our beneficiary base, the Outreach Team gathers data in beneficiary homes (offline) using a tablet over the course of a multi-year visit follow-up schedule. Maintenance and educational services are also included on these visits, conducted entirely in the native language of the beneficiary. Once connected to wifi at the end of each day, an Outreach Team member will sync the tablet, uploading survey results to the cloud. TRL conducts data validation after every round of data collection to ensure accuracy. When non-conformances arise, the Outreach and Program Development team discuss the reasons for such and plan to ensure monitoring activities abide by the validated monitoring plan. The quality of data collected that coincides with non-conformances is internally evaluated, and excluded if incomplete or inaccurate. The principle of conservativeness is applied in these evaluations.<sup>41</sup>

#### 3.3.1 (PA 1) Introduction of high-efficiency biomass-fired project devices to replace open cooking fires

##### **Pre-evaluation/Site Visit**

TRL's Outreach Team visits the home of the prospective beneficiary and evaluates the installation site. The TAS explains the nature of the stove project and discusses project commitment in Tz'utujil. Should the TAS determine that the prospective beneficiary is a probable adopter and if they consent to project requirements regarding participation in the program, installation is scheduled within a week. The TAS completes the corresponding questionnaire and conducts one of the following surveys using the Samsung tablet.<sup>42</sup>

##### **Survey: Adoption Metrics, PPI, Health**

##### **Installation (1-7 days after site visit)**

A TRL Technician assembles and installs the ONIL stove while the TAS explains the function of its internal mechanisms. Thus, beneficiaries can better understand how preserving the parts and aerodynamics of the model is essential for efficient and proper function. Once installed, the TAS

<sup>41</sup> Per the VCS standard section 2.2.1

<sup>42</sup> Surveys are administered to a representative sample of project beneficiaries.

teaches beneficiaries how to use the new appliance. Our approach uses participatory learning methods to help beneficiaries in their transition. Most commonly, this includes a hands-on tortilla making demonstration. Beneficiaries learn how to properly load wood fuel into the cookstove's combustion chamber. The TAS will respond to any doubts or questions and leave a contact number where she can be reached should future concerns arise. Before completing the visit, the TAS ensures that the beneficiary is confident and capable to prepare meals on their new improved cookstove. The TAS completes the corresponding questionnaire.

### **Third Visit (1 week after installation)**

The TAS conducts follow-up visits with families one week after installation. This is the most critical visit because it is during this time that frustration with the new technology may arise. The TAS demonstrates additional best use practices to help facilitate the adaptation, provides support to the women who cook, and troubleshoots emerging problems. The team offers solutions and collects feedback from our beneficiaries. Our Programs Team aggregates, analyzes, and applies this feedback to adjust our project to best suit the community at large. The TAS completes the corresponding questionnaire and conducts TRLs Female Empowerment survey, if applicable.<sup>43</sup>

### [Surveys: Female Empowerment](#)

#### **Fourth Visit (Three months after installation):**

The Outreach Team returns to check in on ONIL stove functionality and technology adaptation. The TAS works with families to ensure cooking is problem free and reviews basic maintenance techniques. Data are collected on stove condition. If maintenance is required, our technician will perform maintenance free of charge and provide replacement parts at-cost. The TAS completes the corresponding questionnaire. Families are encouraged to give feedback to help us fine-tune the project, collected in the comments section of the questionnaire. The TAS completes the corresponding questionnaire and conducts TRLs Female Empowerment survey, if applicable.<sup>44</sup>

#### **Fifth Visit (One year after installation):**

The Outreach Team returns for their final planned visit in the first year of installation. Stove maintenance is performed if necessary and questions and concerns that have arisen since the fourth visit are addressed by the TAS. Proper care is taken to ensure that beneficiaries know how to contact TRL should they need future assistance or maintenance, a lifetime commitment of the TRL ICS Project. The TAS reminds families of stove parts prices. The TAS completes the corresponding questionnaire, including verification of contact information.

### [Surveys: Adoption Metrics, PPI, Health](#)

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<sup>43</sup> Surveys are administered to a representative sample of project beneficiaries.

<sup>44</sup> Surveys are administered to a representative sample of project beneficiaries.

### **Additional Visits (3, 5, and 7 years post installation):**

The Outreach Team returns to a random sampling of ONIL stoves on a biennial basis. Visit structure is parallel to the fifth visit. Stove condition is monitored and recorded in the corresponding questionnaire. TRL also conducts maintenance visits as requested by the beneficiary.

Surveys: Female Empowerment (3 years after installation), PPI (5, 7 years after installation)

### 3.3.2 (PA 3) Distribution of British Berkefeld water filters

#### **Distribution**

Using the Samsung tablet, and a digital survey platform, the TAS collects beneficiary information, including the number and location of filters in circulation. Results are uploaded to a cloud-based server. TRL also solicits feedback through stakeholder interviews, asking beneficiaries why they prefer British Berkefeld filters over other options.

#### **Follow up (1 year after distribution)**

To ensure that the water filter is working at capacity, beneficiaries are prompted once a year to replace their filter candle for Q125. TRL staff return to a random sampling of households to monitor filter condition and ensure beneficiaries are using best maintenance practices. Additional visits are administered upon request.

### 3.3.3 (PA 4) Replacement of incandescent light bulbs with LEDs

The following objectives must be measured, monitored, and evaluated:

- Prevent an estimated .03468 tonnes of CO<sub>2</sub> from being released into the atmosphere each year.
- Save roughly Q200Q per light bulb per year, increasing family economies.\*
- Educate beneficiaries on the environmental and financial benefits of replacing incandescent light bulbs with LEDs.
- Affect behavioral change by educating beneficiaries on the environmental and financial benefits of household energy savings, as they pertain to other appliances.

\*We review the three energy bills at installation and compare them to the bills prior to installation to calculate energy and financial savings.<sup>45</sup>

Monitoring & Evaluation (M&E) Procedures (for objectives 1 & 2)

- Return 3 months later. Record kWh and subtract from the baseline month.
- Return 3 months later. Record energy costs and subtract from the baseline month.

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<sup>45</sup> If the beneficiary does not have bills on hand, we ask them to self-report their energy costs. In these cases, KWH are not monitored.

#### Stakeholder Interview Questions (for objectives 3 & 4)

- If your neighbor were to ask you why they should get an LED bulb, what would you say?
- When I mention energy savings, what do you think about? Free listing (providing a list of words, sentences, ideas, or whatever comes to mind) is acceptable.

### 3.4 Net Positive Stakeholder Well-being Impacts

All of the impacts identified except for number four, “Fewer wood vendors” generate a positive impact. Furthermore, wood vendors represent a fraction of the population. Thus, the negative impact on their livelihoods is outweighed by the positive impacts of the following combined, long-term sustainable development benefits for the project’s stakeholders:

- A higher proportion of the population will live in a household with access to basic services and will primarily rely on clean fuels and technology to prepare meals. Open cooking fires will be eliminated in the homes serviced.
- Beneficiaries below the international and national poverty lines will have a greater capacity to save money that would otherwise be spent on energy bills/wood fuel, and/or time that would otherwise be spent collecting wood. This is especially relevant for the rural areas TRL serves.
- Fewer individuals will be at risk of death attributed to household and ambient air pollution as they will no longer be at risk of cardiovascular diseases, cancers, or chronic respiratory diseases that are caused by exposure to HAP.
- Fewer pregnancies will be at risk of ending prematurely due to complications arising from exposure to HAP.
- Fewer children under-five will be at risk of falling into open cooking fires.
- Female beneficiaries will spend a lower proportion of time on unpaid domestic and care work.
- A higher proportion of the population will be using safely managed drinking water and fewer individuals are at risk of death resulting from water-borne illnesses caused by consuming unsafe water.
- A higher proportion of the population will have access to an informal financial institution in the form of TRL’s Savings Program.

The reduction in wood consumption brought about by the use of the ONIL stove may affect the livelihood of some wood vendors. Nevertheless, wood cutters are already complaining about the lack of larger trees to harvest. They are now having to search farther away from the towns to find less-suitable trees, and each year the trees they harvest are smaller. The price of wood fuel goes up because of the extra transportation expenses. As the cost of a bulk quantity becomes prohibitive, it is now retailed in smaller bundles at Q10 each, raising the price of an entire tarea (commonly purchased bulk quantity) to Q600. The wood cutters see the future of their work. Consequently, some enroll in efforts to conserve the forests they used to harvest to equip these

forests for eco-tourism (e.g., building trails), a growing business. In fact, the Asociación de Desarrollo Comunitario del Cantón Panabaj, a fellow non-profit based in Santiago Atitlán, offers sustainable livelihood programs for wood vendors. In the long-run, slowing deforestation will be in the wood vendors', the local community's, and the climate's best interest. Nevertheless, in the meantime, it is essential to offer these individuals alternative, sustainable economic activities to generate income.

# 4 BENEFITS FOR THE PLANET

## 4.1 Condition of Natural Capital and Ecosystem Services at Project Start

Lake Atitlán is surrounded by secondary and primary forest, home to flora and fauna that people travel the world over to experience. Unfortunately, financial desperation and a lack of educational opportunity drive deforestation and mono-cropping on the slopes of the volcanoes destroying key habitat and negatively affecting the biodiversity of this mountain ecosystem. Deforestation has devastating effects around Lake Atitlán, causing erosion that results in deadly mudslides. Forests in the region, including protected areas, are being logged at an increasingly high rate. According to remote-sensing data from Global Forest Watch, “from 2001 to 2018, Sololá lost 2.48kha of tree cover, equivalent to a 3.1% decrease in tree cover since 2000, and 909kt of CO<sub>2</sub> emissions.”<sup>46</sup> The forest area in the Sololá Department is experiencing a negative annual net change rate. High demand for wood fuel for cooking is a key driver of the deforestation that contributes to this decrease in forest area and aboveground live woody biomass density.

These forests provide several ecosystem services including habitat for biodiversity, soil and water conservation, and carbon sequestration. In 2015, the land use of the Sololá Department was mostly forest (74.4%), covering an area of 91.1kha.<sup>47</sup> Lake Atitlan is situated in a volcanic caldera at an elevation of 1562 meters. The highest point in the area is the peak of Volcano Atitlan, which reaches 3535 meters above sea level. This mountain ecosystem is home to forests that span different altitudes, thus enabling vast biodiversity. Intact forests are integral to the overall integrity of a complex ecological system. This system directly facilitates such high levels of biodiversity and species richness in the Lake Atitlán basin which provide benefits that are essential for sustainable development.

Ecotourism, for example, is a growing industry thanks to the 236 bird species home to the region. 28% of these birds are on the IUCN Red List of Threatened Species, including the Resplendent Quetzal, a national symbol. The project area is home to 798 plant species (61 of which are endemic), 116 reptile and amphibian species (12 of which are endemic), and 141 mammal species (7 of which are endemic).<sup>48</sup> With increasing logging occurring in prime habitat, without proper intervention, this biodiversity and species richness will only continue to decline.

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<sup>46</sup> Forest Monitoring Designed for Action. Accessed on 06/11/2019 from [www.globalforestwatch.org](http://www.globalforestwatch.org).

<sup>47</sup> Global Forest Watch. “Land cover in Sololá, Guatemala”. Accessed on 02/03/2020 from [www.globalforestwatch.org](http://www.globalforestwatch.org).

<sup>48</sup> Global Nature Fund. “Lake Atitlán – Guatemala”. Accessed on 02/03/2020 <https://www.globalnature.org/en/atitlan>

## 4.2 Expected Impacts on Natural Capital and Ecosystem Services

With the installation of at least 3,000 ONIL stoves, TRL can avoid the cutting of 756,000 trees.<sup>49</sup> "In 2000, Santiago Atitlán had an aboveground live woody biomass density of 182t/ha, and a total biomass of 2.27Mt."<sup>50</sup> Combined, Project Activity One and Project Activity Two will provide for at least 13,332.51 tons of savings in woody biomass over the first 7-year project period (39,997.53 tons of savings in woody biomass during the project lifetime). This translates to 219.67 ha of forest areas conserved over the project lifetime of 21 years.

Impact #1	Avoided deforestation of forested area due to wood fuel savings made possible by ONIL ICS
Type of Impact	Positive, predicted, indirect
Affected Natural Capital and/or Ecosystem Service(s)	Biodiversity and Species Richness, Soil and Water Conservation
Resulting Change in Condition	<p>Slow the negative annual net change rate of forest area in the project area, increasing forest area as a proportion of total land area. Generate progress towards sustainable forest management and the conservation of a mountain ecosystem, enabling the following ecological benefits:</p> <ul style="list-style-type: none"> <li>- 219.76 ha of forests conserved that provide for biodiversity and species richness, and soil and water conservation. These forests provide natural habitat for over 65 species on the IUCN Red List of Threatened Species.</li> </ul>
Impact #2	Reduced demand for non-renewable woody biomass made possible by ONIL ICS
Type of Impact	Positive, actual, direct
Affected Natural Capital and/or Ecosystem Service(s)	Biodiversity and Species Richness, Soil and Water Conservation
Resulting Change in Condition	By slowing the consumption of wood fuel for cooking purposes, households require less non-renewable woody biomass. The resulting drop in demand slows deforestation, thus increasing the renewable energy share in the total final energy consumption of the project area.

## 4.3 Natural Capital and Ecosystem Services Monitoring Plan

<sup>49</sup> According to HELPs International, each stove saves one commercial tree per month. <https://www.helpsintl.org/onil>

<sup>50</sup> Woods Hole Research Center. Unpublished data. Accessed through Global Forest Watch Climate on 04/03/2020. [climate.globalforestwatch.org](http://climate.globalforestwatch.org)

In addition to monitoring the number of project devices operating in each year, for both Project Activity One and Project Activity Two, TRL will monitor the following to evaluate the net ecological impact of the project:

(PA1)

**Prior to installation:** Survey the amount of woody biomass used for fuel wood to meet thermal energy needs for meal preparation using an open cooking fire

**1-year follow-up:** Survey the amount of woody biomass used for fuel wood to meet thermal energy needs for meal preparation using an ONIL stove

(PA2)

**Prior to energy efficiency improvement:** Survey the amount of woody biomass used for fuel wood to meet thermal energy needs for meal preparation using a damaged existing biomass-fired device

**1-year follow-up:** Survey the amount of woody biomass used for fuel wood to meet thermal energy needs for meal preparation using an Improved ONIL stove

Survey data is then used with Global Forest Watch data to calculate the ha of forest area that would otherwise have been logged for wood fuel. This value can be used for evaluations against the following metadata:

- Indicator 15.2.1: (1) Forest area annual net change rate (2) Above-ground biomass stock in forest.
- Indicator 15.4.2: Trends in the Mountain Green Cover Index.
- Indicator 15.5.1: Trends in Red List Index, specifically for the 65 species currently on the IUCN Red List that rely on forests in the project area for habitat.

The TAS will be responsible for collecting survey data and the Program Development team will be responsible for revising the data, completing and reporting all relevant calculations.

Relevant VCS Parameters (Includes PA 1 and PA 2: Provision of energy efficiency improvements in existing biomass-fired cookstoves)

Project Activity One: Data / Parameter: $B_{y=1,new,i,j,survey}$			
Method	Stored	Time-Frame	Responsible Party
On the one-year visit, beneficiaries are surveyed on monthly wood use. Amounts are synced daily, uploaded and converted to appropriate units. The average value of batch data is used.	Cloud-based Server	365 days following installation	TAS, M&E Director

All clients are surveyed 365 days following installation. Included in Adoption Metrics Survey.

Project Activity One: Data / Parameter: $N_{y,i,j}$			
Method	Stored	Time-Frame	Responsible Party

At the end of each visit, a survey question prompts the TAS to update the stove status (figure 9).	Cloud-based Server	365 days after installation and ongoing biennial monitoring for a representative sample	TAS, M&E Director
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Questions are asked in all forms. Each visit includes an update in stove status.

The screenshot shows a survey form titled "Estado de la estufa" with a "Question limit" indicator. On the left, there are seven radio button options: "Bien", "Destruida", "Necesita Mantenimiento", "Saber?", "Vendida/Regalada", "Perdida", and "Uso Pendiente". On the right, there are seven corresponding "Value:" fields with the following text: "bien", "destruida", "necesita\_mante", "saber", "vendida\_regala", "perdida", and "uso\_pendiente". At the bottom left, there is a link that says "Click to add another response...".

**Figure :** The TAS choses between the options listed in the stove status questionnaire.

Project Activity Two: Data / Parameter: $N_{y,i,j}$			
Method	Stored	Time-Frame	Responsible Party
At the end of each visit, a survey question prompts the TAS to update the stove status.	Cloud-based Server	365 days after installation and ongoing biennial monitoring for a representative sample	TAS, M&E Director

We survey a representative sample of each batch, biennially, per CDM guidelines (95% confidence,  $\pm 10\%$  target precision level).<sup>51</sup> This representative sample is visited one, three, five and seven years after installation.

#### 4.4 Net Positive Natural Capital and Ecosystem Services Impacts

<sup>51</sup> Per AMS-II.G Section 6.2, “When biennial inspection is chosen a 95 percent confidence interval and a 10 percent margin of error shall be achieved for the sampling parameter.”

The 74.61 ha of forests conserved will provide for a net positive ecological impact on the natural capital in the project area. This area will thus continue to provide the following ecosystem services: habitat for biodiversity, soil and water conservation and carbon sequestration. Without the project activities, this area of forest would be logged for wood fuel, and thus unable to provide for the ecosystem services detailed in section 4.1.

By replacing open cooking fires with ICS technology and performing energy efficiency improvements in existing biomass-fired cookstoves, the project reduces energy demand in the form of wood fuel use, thus generating net GHG reductions.

No negative ecological impacts have been identified for the project, therefore net impacts of the project activities are positive.

# 5 OPTIONAL: CLIMATE MODULE

## 5.1 Baseline Scenario for GHG Sinks and Sources

“Not applicable. Project is applying the “deemed estimates” approach.”

### 5.1.1 Defensible Methodological Approach

“Not applicable. Project is applying the “deemed estimates” approach.”

### 5.1.2 Baseline Emissions

“Not applicable. Project is applying the “deemed estimates” approach.”

## 5.2 Monitoring

### 5.2.1 Monitoring Plan

VCS Parameters (Includes PA 1 and PA 2: Provision of energy efficiency improvements in existing biomass-fired cookstoves)

Project Activity One: Data / Parameter: $B_{y=1,new,i,j,survey}$			
Method	Stored	Time-Frame	Responsible Party
On the one-year visit, beneficiaries are surveyed on monthly wood use. Amounts are synced daily, uploaded and converted to appropriate units. The average value of batch data is used.	Cloud-based Server	365 days following installation	TAS, M&E Director

All clients are surveyed 365 days following installation. Included in the Adoption Metrics Survey.

Project Activity One: Data / Parameter: $N_{y,i,j}$			
Method	Stored	Time-Frame	Responsible Party

At the end of each visit, a survey question prompts the TAS to update the stove status (figure 7).	Cloud-based Server	365 days after installation and ongoing biennial monitoring for a representative sample	TAS, M&E Director
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Questions are asked in all forms. Each visit includes an update in stove status.

The screenshot shows a survey question titled "Estado de la estufa" with a "Question hint" icon. Below the title are seven radio button options, each with a corresponding "Value" field:

- Bien (Value: bien)
- Destruida (Value: destruida)
- Necesita Mantenimiento (Value: necesita\_mante)
- Saber? (Value: saber)
- Vendida/Regalada (Value: vendida\_regala)
- Perdida (Value: perdida)
- Uso Pendiente (Value: uso\_pendiente)

At the bottom, there is a link: "+ Click to add another response..." with a value of "AUTOMATIC".

Figure : The TAS chooses between the options listed in the stove status questionnaire.

Project Activity Two: Data / Parameter: $N_{y,i,j}$			
Method	Stored	Time-Frame	Responsible Party
At the end of each visit, a survey question prompts the TAS to update the stove status.	Cloud-based Server	365 days after installation and ongoing biennial monitoring for a representative sample	TAS, M&E Director

We survey a representative sample of each batch, biennially, per CDM guidelines (95% confidence,  $\pm 10\%$  target precision level).<sup>52</sup> This representative sample is visited one, three, five and seven years after installation.

Project Activity Two: Data / Parameter: $SC_{new,i,j}$
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<sup>52</sup> Per AMS-II.G Section 6.2, “When biennial inspection is chosen a 95 percent confidence interval and a 10 percent margin of error shall be achieved for the sampling parameter.”

Method	Stored	Time-Frame	Responsible Party
The Controlled Cooking Test (CCT), administered per international guidelines. <sup>53</sup>	Cloud-based Spreadsheet	Ongoing annual monitoring for a representative sample	TAS, M&E Director, Technician

We randomly sample three or more families each year from the first batch, with three tests per stove, for a total of at least nine tests, or until sufficient to reach 90% confidence,  $\pm 10\%$  target precision level, per CDM guidelines.

See VCS Project Description, Section 5 for greater detail.

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<sup>53</sup> Procedures specified by the Clean Cooking Alliance.

## 5.2.2 Dissemination of Monitoring Plan and Results

In addition to an enhanced focus on verbal communication among staff and local community members on the content and findings of project documentation, TRL will include direct links to monitoring reports on our website. TRL posts annual reports online as well as project descriptions online and publishes links to these materials on Facebook.

## 5.3 Net Emission Reductions and Removals

### 5.3.1 Project Emissions

See VCS Project Description, Section 4.

### 5.3.2 Leakage

The project uses a net gross adjustment factor of 95% to account for leakage.<sup>54</sup>

### 5.3.3 Net GHG Emission Reductions and Removals

The TRL ICS Project replaces traditional open cooking fires with energy efficient ONIL stoves and performs energy efficiency improvements in existing ONIL stoves. By driving down energy demand in the form of wood fuel use, the TRL ICS Project generates net GHG emission reductions and/or removals, as measured in tCO<sub>2</sub>e. The project uses the CDM AMS-II.G. Small-scale Methodology: Energy efficiency measures in thermal applications of non-renewable biomass, Version 11.1, Sectoral scope(s): 03, which includes the introduction of high-efficiency biomass-fired project devices to replace the existing devices and/or energy efficiency improvements in existing biomass fired cookstoves or ovens or dryers to quantify Net GHG Emission Reductions and Removals. Project activities one and two will generate approximately 38,056.82 tCO<sub>2</sub>e of emission reductions. See VCS Project Description Section 4 for calculations.

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<sup>54</sup> Per section 5.4 paragraph 34 of CDM AMS-II.G. Small-scale Methodology: Energy efficiency measures in thermal applications of non-renewable biomass, Version 11.1.

## 6 APPENDIX

- (1) Guatemala PPI 2014
- (2) Causal Chains
- (3) Código de Trabajo de Guatemala Decreto 1441-1961
- (4) TRL Official Government Certification of Non-profit Status
- (5) Leyes Áreas Protegidas